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TAIPA BRIDGE UPGRADE WORKS AND INVESTIGATION OF SITE 004/1022 – NORTHLAND BRIDGES PROJECT

Final Archaeological Report

WSP

WAKA KOTAHI NZ TRANSPORT AGENCY

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Report prepared for WSP and NZ Transport Agency
Under HNZPT Authority No. 2018/098

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June 2022

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EXECUTIVE SUMMARY

WSP was commissioned by Waka Kotahi NZ Transport Agency (NZTA) to undertake the archaeological assessment component of their Taipa Bridge Upgrade Works at the resource consent stage. Clough & Associates Ltd was subsequently commissioned by WSP to undertake the fieldwork required under archaeological Authority 2018/098, granted by Heritage New Zealand Pouhere Taonga (HNZPT) on 12 September 2017, and prepare the interim and final reports on the archaeological investigations.

Archaeological monitoring and investigation were undertaken over a period of 21 months from April 2018 to December 2019. Analysis of archaeological material and post-excavation works were carried out in 2020 to 2022. This final report fulfils condition 8 of Authority 2018/098.

While the construction of the Taipa bridge was substantial, the physical earthworks which had the potential to impact on archaeology were relatively small, mainly consisting of trenches for the installation of new services.

The archaeological investigations revealed the primary area of in situ archaeology to be along the Taipa River coastal edge, with the most notable finds around the western approach and abutment, where various structures and deposits relating to pre-Contact Māori temporary occupations focused on kaimoana cooking and processing were discovered. These were part of midden site O04/1022 that had previously been discovered. The investigations were limited to the area of the project's relatively thin service trenches, with over half of site O04/1022 likely to remain in place.

Although the oldest phases of Māori settlement in the Taipa area are not represented at this site, the sequence of occupation from the mid-1500s AD onwards is represented by the features and deposits discovered at O04/1022, comprising hangi, scoops, post/stake holes, pits and midden. Earlier occupation evidence may well be present in other sites at Taipa, but the area studied was only a small part of the overall archaeological landscape.

The findings are compatible with other, albeit limited, archaeological research in the area. The data and analysis from the Taipa Bridge Upgrade Project fit into a much larger archaeological context and relate to four key themes: pre-Contact kaimoana exploitation in Northland's north-eastern region; pre-Contact activity in coastal bay systems; pre-Contact settlement patterns; and how the riverbank within Taipa's tidal lagoon system was used. Site O04/1022 lies at the junction between the entrance to the sea, the coastline network and the inland agricultural systems associated with the Oruru Valley. The data in this report shed light on these themes and provide useful information to be incorporated with local history and whakapapa.

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1.1 Project Background

As part of the Northland Bridges Upgrade Project, Waka Kotahi NZ Transport Agency (NZTA) was tasked with the construction of a new two-lane bridge at Taipa to replace the old existing one-lane bridge. The initial stages of assessment for the project were undertaken by WSP (Jamieson 2017a). The report identified the potential for archaeological remains within the footprint of the proposed works, resulting in an application for an Authority under the Heritage New Zealand Pouhere Taonga (HNZPT) Act 2014.

The Authority (2018/098) was granted on 12 September 2017. Following a change of personnel, Clough & Associates was commissioned by WSP to undertake the fieldwork component as well as prepare the interim and final archaeological reports outlining the archaeological works undertaken during the bridge upgrade. An interim report on the investigations was prepared in 2020 (Jamieson 2020). This final report fulfils condition 8 of the Authority.

The works area was located on the eastern and western bridge approaches along State Highway 10, Oruru Road, Taipa Point Drive, Taipa Heights Drive and Mamarua Road reserves (Figure 1–Figure 4).

Figure 1. General location map showing Taipa, marked with a red arrow (source: Quickmap 2016)

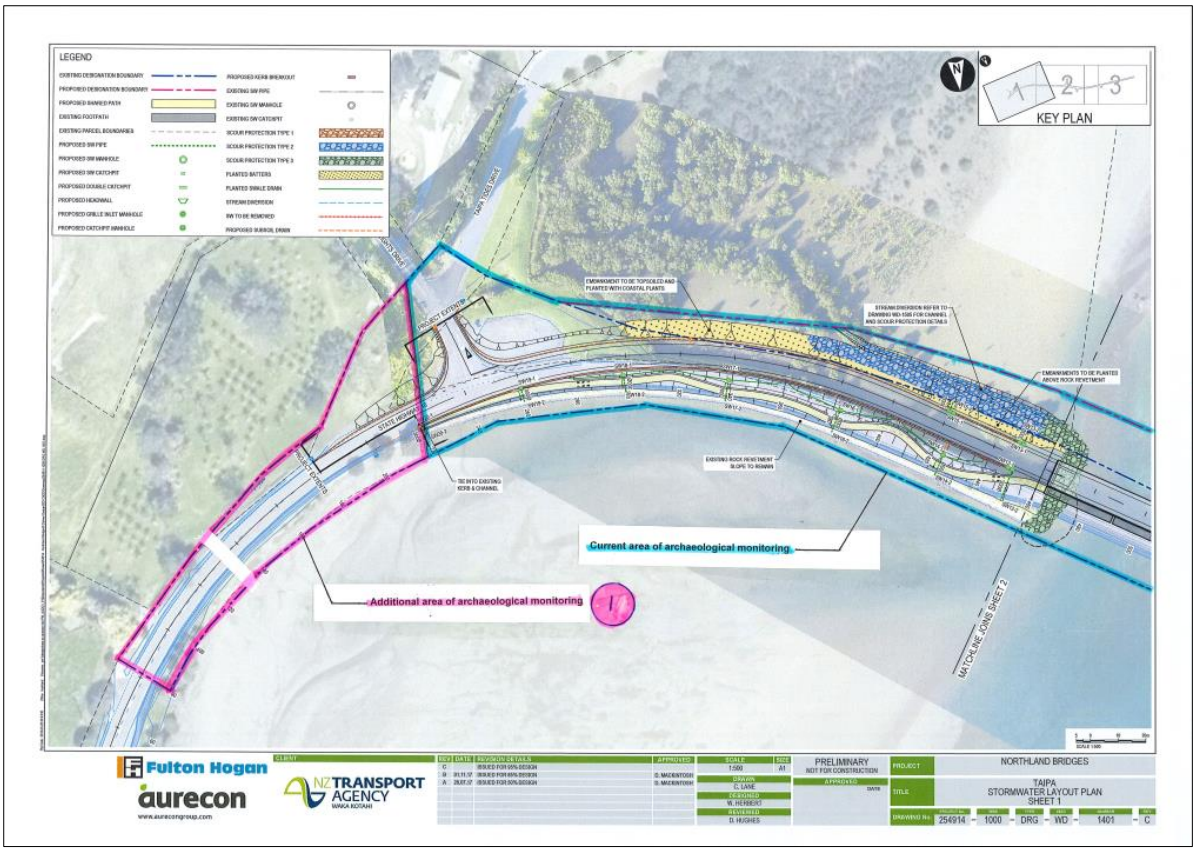


Figure 2. Location plan showing footprint of Taipa Bridge Upgrade Works – Sheet 1 (source: Fulton Hogan)

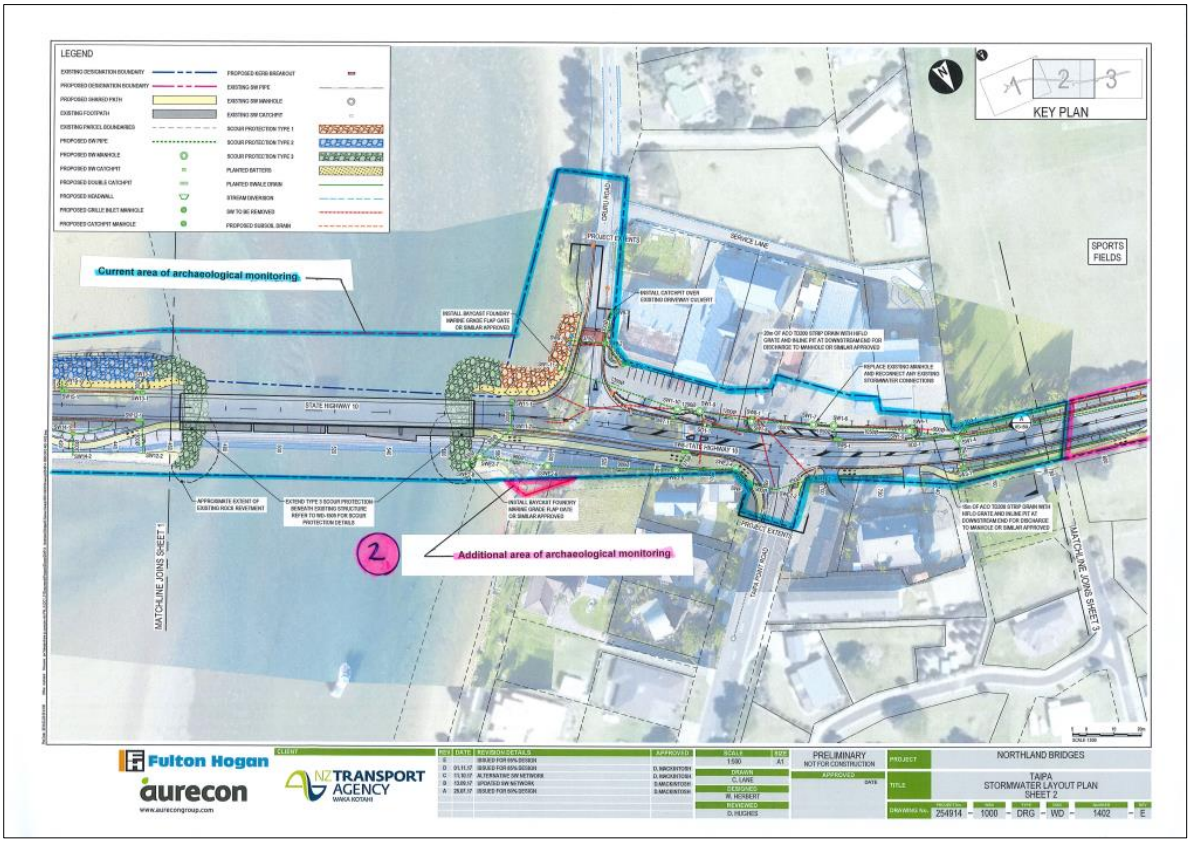


Figure 3. Location plan showing footprint of Taipa Bridge Upgrade Works – Sheet 2 (source: Fulton Hogan)

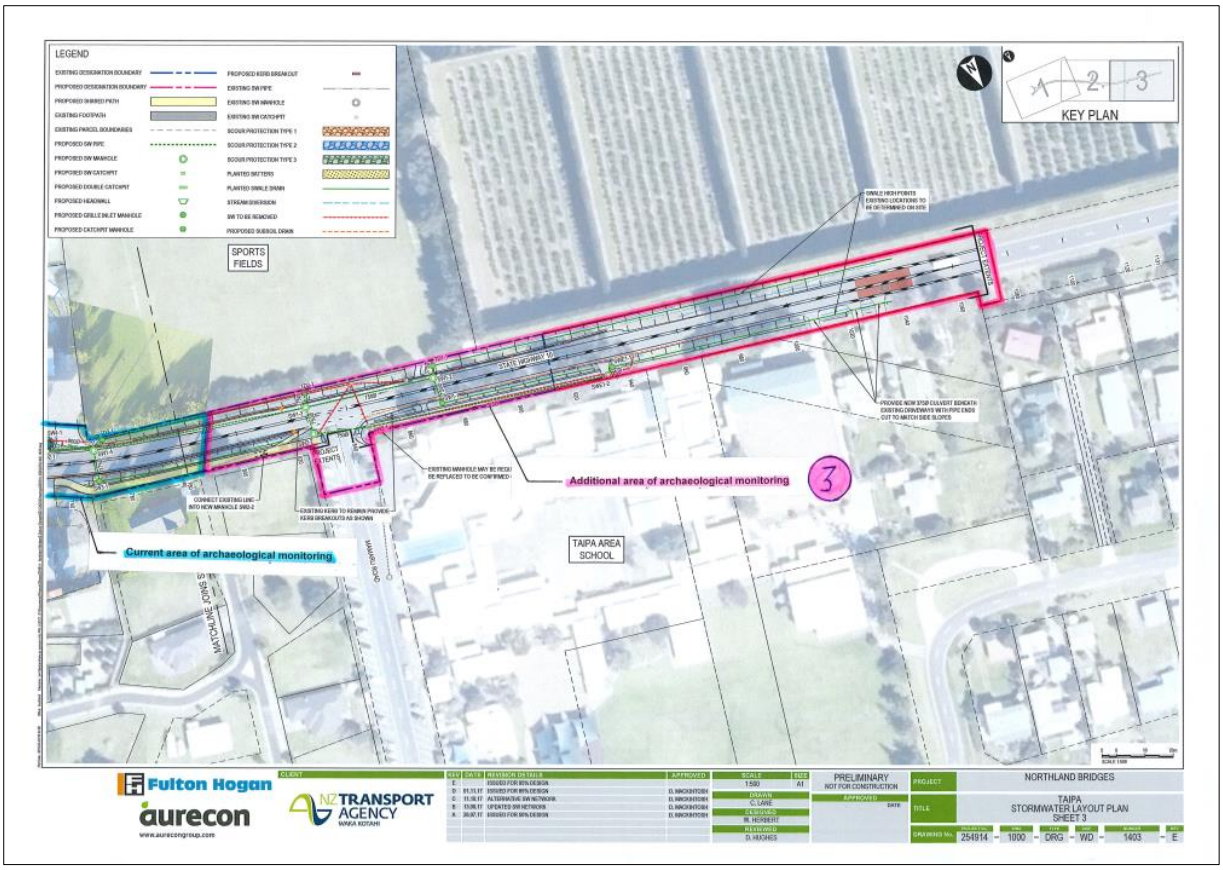


Figure 4. Location plan showing footprint of Taipa Bridge Upgrade Works – Sheet 3 (source: Fulton Hogan)

1.2 Excavation Methodology

Archaeological monitoring was undertaken over a period of 21 months from April 2018 to December 2019 to accommodate the scheduled programme of works required for the project.

Works commenced with the ground reduction and preparation of the western abutment, as well as the construction of the new bridge reclamation platforms, then construction of a temporary bridge to enable the new bridge to be constructed. After this, new stormwater and sewerage lines were cut and installed primarily on the western side of the bridge within Taipa township. The Taipa War Memorial was deconstructed, and the area surrounding this was reduced. Installation of new services such as Telecom/Chorus, water and drainage were continued as well as the ground reduction works within the road corridor at Taipa Heights Drive and the eastern approach of the state highway. During this time the new two-lane bridge was constructed along the southern side of the old one-lane bridge. Deconstruction work for the one-lane bridge was undertaken between May and November 2019. The final works consisted of road resurfacing, kerb and channelling, lighting and landscaping. Earthworks requiring archaeological involvement were completed in December 2019.

An archaeological investigation of the western abutment area within the confines of recorded archaeological site O04/1022 (condition 2) were undertaken sporadically over a period of months due to the sequencing of earthworks required. The final design for the stormwater lines and sewerage was being completed as works were being carried out. The first lot of earthworks in this area consisted of ground reduction works to a depth of 300-500mm. The ground reduction works

were not sufficiently deep to impact upon in situ features; only the cut for the new sewerage and stormwater lines and coastal bench exposed the archaeology, which was investigated and recorded.

During works for the installation of the new sewerage line along Oruru Road and the western bridge abutment it was identified that the actual project corridor had changed from the extent outlined in the authority application. In consultation with HNZPT the footprint was extended further along the state highway within the roading corridor. This was to facilitate the insertion of stormwater and Chorus lines.

A number of delays occurred throughout the project due to consenting and scheduling issues. This in turn extended the duration of the project.

1.3 Project Personnel

All archaeological monitoring, recording and investigation required as a condition of archaeological authority 2018/098 was undertaken by the section 45 archaeologist Brooke Jamieson. Brooke was primarily assisted by Ben Jones, Doug Gaylard, Bernie Larson and Helen Heath. Simon Bickler assisted with the final report and specialist reports were prepared by Patricia Pillay (analysis of Fish and other bone), Rod Wallace (Charcoal identification), Leela Moses (Midden and Lithic analyses).

1.4 Acknowledgements

The overall project was managed by WSP, with Fulton Hogan undertaking the construction and earthworks in conjunction with Jecentho Construction. The archaeologists would like to thank them and acknowledge the respect, patience and assistance provided to us during earthworks and the completion of the archaeological component. Without this support we would not have been able to do our job.

Tikanga and cultural support were provided by Ngāti Kahu, whose assistance and advice were gratefully welcomed and received by all of the archaeologists involved. The traditional knowledge of Taipa provided by the cultural advisers enabled the archaeology to be understood in a meaningful and important way. The sharing of this information and the partnership formed made this project special to all.

HNZPT Regional Archaeologist James Robinson provided never-ending support, advice and also information that was not available at the time the assessment was prepared. Thank you for this support.

2 HISTORICAL BACKGROUND

The following information has been summarised from the archaeological assessment report (Jamieson 2017a) submitted for the archaeological Authority application with additional information from a Waitangi Tribunal Report (1988a) providing a brief summary of the Māori history of the area. No attempt is made here to synthesise the rich and detailed record of Māori oral traditions and whakapapa concerning the area, or the various perspectives of the tangata whenua representative organizations involved.

2.1 Māori Accounts

Local traditions record that the great explorer Kupe first landed at Taipa. He named the Taipa River Ikatiritiri ('to apportion fish') because of the abundant fish and set up a settlement at Otengi headland for his daughter to stay at while he explored the country. After Kupe returned to Hawaiiki, he provided the information on how to find Aotearoa and descendants were able to make the return journey. Ngāti Kahu traditions include descriptions of voyages by Tumoana following Kupe's path in his waka Tinana. Tumoana's daughter, Kahutianui, became the eponymous ancestor of the iwi and was joined by Parata, who had returned from Hawaiiki to help establish the new settlement (Evans 2009).

Taipa was known for its an abundance of fish and shellfish of great variety – toheroa, tipa (scallops), kōkota (pipi), huai (cockles), karahū (periwinkles), kūtai (mussels), tio (oysters), kina, pūpū and koramarama (rock periwinkles), paua, pātiotio (limpets), ngakihikihi (small mussels) and kōtoremoana (shell-less paua). One account of the origin of the name describes a dispute between two chiefs that had arisen over these shellfish beds. Their compromise was to erect a boundary between their pā, with each iwi to keep to its allotted area. The place was therefore called Taiapā, or dividing fence or boundary, which was eventually shortened to Taipā (NZHistory https://nzhistory.govt.nz/ keyword/taipa). Fresh water was available in the Taipa sands.

Pā sites of various ages are spread across the landscape. Mamangi on the Otengi headland was named after the daughter of Parata and Kahutianui. This site remained one of the main centres with direct lines of sight to the other headlands and to promontories inland. As their descendants settled around the coast and further inland, signal fires were used to maintain contact.

In later years, the growing population were joined by other groups and expanded through intermarriage, with groups adopting numerous names reflecting their whakapapa. The settlements across the landscape included the pā and kāinga as well as extensive garden areas. Taipa, and the Oruru Valley behind it, was densely occupied. Dr Susan Bulmer, cited in the Waitangi Tribunal report (1988), suggests that the Oruru Valley may have supported one of the densest concentrations of population in the country with perhaps over 8,000 people living there. It has been suggested that this density was so great that news and messages could be shouted between the settlements from Taipa to Kauhanga. That population had been depleted by the early 19th century as a result of epidemics in 1794 (Waitangi Tribunal 1988b:13-15).

2.2 Pākehā Accounts

As with a number of areas within Northland, the earliest Pākehā accounts of the Taipa region come from the explorer Captain James Cook and French explorer J.F.M de Surville, who were in the area in 1770. Despite visiting the area within a few days of one another, each had different experiences (Waitangi Tribunal 1988).

Pākehā continued to visit the area, with whalers and traders arriving in the early 1790s. Ngāti Kahu, a mana whenua group, took advantage of this through the provisioning of visitor boats which brought trade and the introduction of new kinds of clothes, articles and food (Waitangi Tribunal 1988). It was from Taipa that Tuki Tuhia was kidnapped and taken to Norfolk Island, because of his presumed knowledge of flax planting and preparation. Fortunately, he was returned home by Governor King in 1793 with a range of exotic gifts (Waitangi Tribunal 1988). However, the contact with Pākehā also brought diseases which caused the local population to decrease dramatically.

Two Māori chiefs, Nopera Panakareao of Te Rarawa (based mainly in Kaitaia) and Pororua of Ngāpuhi (based mainly in Whangaroa), came to occupy parts of the Ngāti Kahu land and were involved in a number of pre-Treaty land sales within the area of Doubtless Bay, including Taipa (Waitangi Tribunal 1988: 28). When the Pākehā settlers arrived, Panakareao and Pororua developed rival land sale policies to attract settlers and sought to prove their right over Ngāti Kahu by granting Pākehā access to lands in Taipa and the wider area (Waitangi Tribunal 1988: 29). As a result, a number of Pākehā settled in the area prior to the signing of the Treaty of Waitangi in 1840. Like Māori, Pākehā settlers were attracted to the region's resources and capabilities for coastal transport. The signing of the Treaty changed the method in which Māori-held land could be sold, and from 1840 it could only be sold to the Crown.

Shortly after the signing of the Treaty of Waitangi, Captain Hobson travelled to Taipa and met with Pākehā settlers and Māori. Hobson meet with Te Rarawa and was impressed with the tribe's commitment to the new relationship with the Crown. He learnt of the rivalry over the Oruru (including Taipa, shown in Figure 5) and Mangonui lands, between Te Rarawa (Panakareao) and Ngāpuhi (Pororua) and that the Pākehā settlers feared for their own safety. It appears that Hobson agreed to purchase the whole of the disputed land (Waitangi Tribunal 1988: 29). This enraged Ngāpuhi, Pororua and Pākehā settlers, who opposed this sale. The area of purchased land included Taipa and the works corridor.

Leigh Johnson (2013) stated that the contesting of the sale between Pororua and Panakareao led to a battle for the land on Taipa Flat in 1843. The land sale was investigated by the Crown via various commissions and the land was ultimately acquired by the Crown in the 1850s. Johnson also notes that Taipa may have derived its name from Pororua, as he was also known as Pororua Te Taepa.

The first Pākehā who attempted to settle at Taipa was Stephen Wrathall in 1831. Wrathall was one of the crew from the schooner *Darling*. Wrathall is reported not to have stayed for very long, having been moved off by Ngāpuhi contenders (Waitangi Tribunal 1988). W.J. Clarke was the first Pākehā settler to hold on to his site, building a two-storey house on the Taipa riverside in 1842. After the Otengi purchase, in 1858, he was to obtain a title for the land and become the first European owner of the Taipa flats (Waitangi Tribunal 1988: 36). One of the first lands purchased by the Crown was the Otengi Block (2,722 acres), which lay to the west of Oruru and included the Taipa area and the works corridor. At the time of the Otengi sale, the Taipa lands were in possession of the settler W.J. Clarke.

Clarke sold his property to R.J. Adamson in 1867. In addition to farming, R.J. Adamson established a trading complex which included gum buying at Taipa, with branches at Waimahia, Kaimaumau and Oruru. Many Māori families were involved in gum extraction, working on communal lines, and a close association with Māori began that lasted over 100 years. It is said that Mr Adamson would take a large canoe laden with six tons of merchandise up the Taipa-Oruru river to Kauhanga pa in the Peria valley, where a large Māori population still remained (Waitangi Tribunal 1988: 36).

Adamson's son Alfred built the current Adamson house, which lies to the northwest of the works corridor, in about 1900. The first school at Taipa was a cottage in the house grounds, and the home has hosted nearly all visiting priests who came to minister to the Ngāti Kahu tribe (Waitangi Tribunal 1988: 36).

According to *The NZ Herald* (22 October 1937), the construction of the state highway by the Public Works Department began in the late 1930s. The works on the Awanui-Mangonui road (present-day SH10) had already started by 1937, with the original Taipa Bridge due for rebuilding in 1938, due to its desperate state of disrepair.[1] This account suggests that this was the original bridge, located further south of the recently replaced one-lane bridge along the Taipa River.

From the mid-20th century Taipa was subdivided from predominantly large farms to smaller residential plots, including a school and other community conveniences. These were centred on either side of the main state highway and the Taipa Beach frontage.

Figure 5. Taipa Beach c.1844 looking towards Cable Bay. (Hutton, Thomas Biddulph, 1824-1886. (10) Taipa. The battlefield of the Oruru fight. Hutton, Thomas Biddulph (Rev), 1824-1886: [Three sketchbooks of New Zealand scenes and people. 1844-1847]. Ref: E-111-1-017. Alexander Turnbull Library, Wellington, New Zealand. /records/37131238 Taipa - the battle field in the war to which John Heke was going - for a description of the march of his army see Spikeman's narrative (No. 9))

[1] http://paperspast.natlib.govt.nz/cgi-bin/paperspast?a=d&cl=search&d=NZH19371011.2.138&srpos=5&e=-------10--1----2taipa+bridge--

2.3 Historic Land Titles and Deeds

The following section briefly examines the historic land titles for land parcels that fall within the works corridor.

2.3.1 State Highway 10 and the Recently Replaced Bridge

The area that is now SH10 has been under Crown ownership since the Crown purchases. It was originally part of the Taipa Riverbed and Part Sec 42 Block IV Mangonui SD (Figure 6). Roll Plan 2 shows the area of the Taipa River prior to the bridge being constructed. Later, in SO 64252 and SO 49386, reclaimed land is noted in this area (state highway) above the Mean High Water Mark. This reclaimed land was formed by the National Roads Board (now Waka Kotahi NZ Transport Agency). No other notable features are identified on Roll Plan 2.

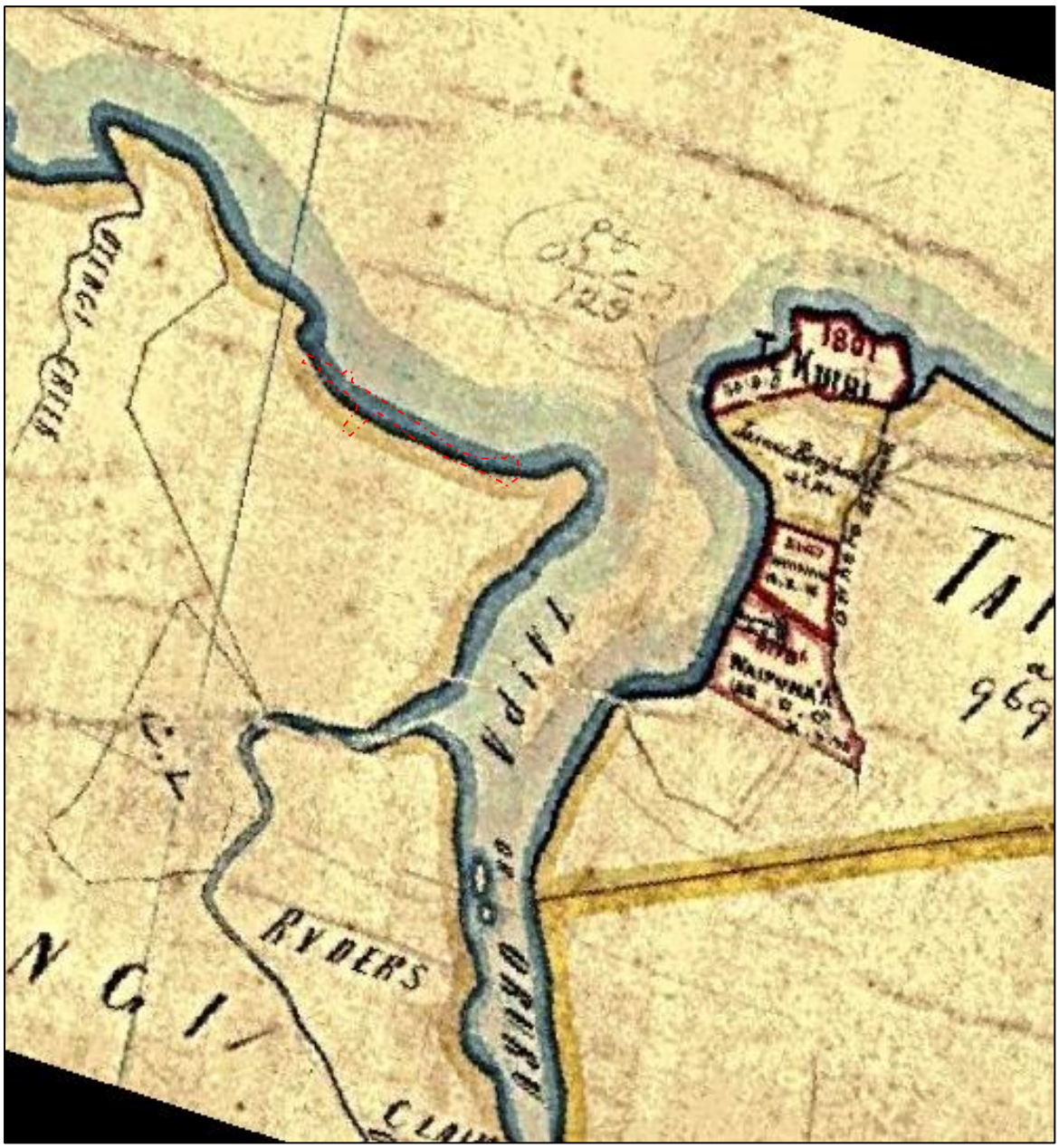


Figure 6. Detail from Roll Plan 2 showing the works corridor (source: Quickmap 2016). Note Roll 2 is slightly warped due to inaccuracies in the original survey

2.3.2 Oruru Road (Peria – Taipa)

Oruru Road is a public road by Crown Grant, as shown in DP 41175 and SO 11581. Block IV Mangonui SD was subdivided in the 1950s as per SO 11581. The road is in the area previously occupied by the Adamson family, but no evidence of this is noted on DP 41175 and SO 11581.

2.3.3 Taipa Point Road

Taipa Point Road was made a public road in 1957 by Crown Grant, as shown in DP 45000 (Figure 7). Block IV Mangonui SD was subdivided with the public road Crown Grant along the coastal edge. This eventually became the coastal esplanade.

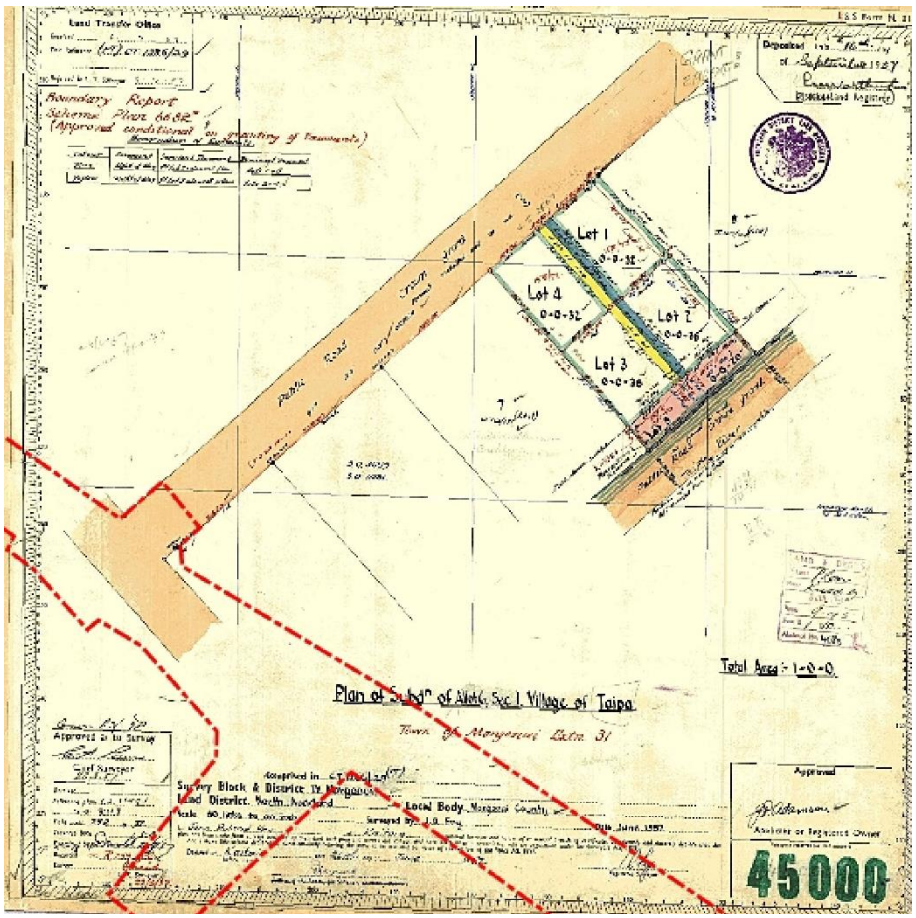


Figure 7. Detail of DP 45000 (source: LINZ)

2.3.4 NA101A/487 Local Purpose Reserve (Esplanade)

This parcel of land was initially part of Allotments 7, 8, 9 of Section 1 Taipa Village, Block IV Mangonui SD, as recorded in Deeds Index 1H 275 and 1H 156. In 1940, Allotments 2, 3, 4, 7, 8 and 9 of Section 1 were transferred into NA 762/186 pursuant to the Land Transfer Act 1921, at the time owned by William Wilkinson of Auckland (a retired farmer). The properties were subsequently transferred to various people, and when they were transferred to David William Robinson, he further subdivided the properties into 13 lots. Lot 12 was vested in the Far North District Council as Local Purpose (Esplanade Reserve) pursuant to S239 (2) RMA 1991.

2.3.5 BLK IV Mangonui SD/NA43B/838

This parcel of land has always been owned by the Crown; 12 acres were reclaimed and vested under Section 5 Northland Harbour Board Vesting and Empowering Act 1968 for the construction of Taipa Bridge.

It has not been possible to locate the gazette notice for when the one-lane Taipa Bridge was constructed, but it is believed to have occurred between 1938 and 1955. This date is based on the 1937 *New Zealand Herald* article referred to above in (section 2.2), and the historic Whites Aviation photograph dated to 1955 in section 2.5 of this report.

2.4 Historic Maps

The earliest historic plan of the works area is from 1858 (SO 812), by William Bertram White. It shows the area of the works corridor being part of a larger area 'Reserved for Township'. There is an area just north of the recently replaced one-lane bridge which is shown as a small enclosure, although there is no description of what that enclosure could be. It is possible that this could be an area of native reserve (Figure 8).

Plan SO 11581 shows the land on the western side of the works corridor in 1899 (Figure 9). This plan shows the Adamson family farm located along the Taipa River. This complex is thought to have been established from 1867. None of the marked dwellings or structures are located within the works corridor.

The 1932 SO 27403 plan shows the eastern portion of the works corridor (Figure 10). No structures, buildings or noted information exist within the works corridor or the immediate vicinity, suggesting the land had remained undeveloped. It is possible that the area was cleared of vegetation and was farmed during this time.

By 1953 Oruru Road is located along the western side of Taipa River (Figure 11). It is likely that a track or access way had existed along this side of the river for a number of years and this was the formalisation of this access. Adamson farm buildings noted in SO 11581 have not been noted in this plan nor have any other heritage or archaeological features.

The current layout of Taipa township was formalised in the 1950s as evidenced in the Taipa Village plan of 1959 (SO 1099) (Figure 12). This plan shows the proposed layout of the town with the subdivided properties and roads. This plan was not fully adopted and built, as evidenced by the modern (current) layout.

The recently replaced one-lane Taipa Bridge was constructed between 1938 and 1955, replacing an earlier bridge which lay further to the south. An NZTA plan shows the proposed new bridge location as well as the alignment of SH10 (Figure 13). This plan notes that the soils on the eastern side of the Taipa River are steeply sloping and unstable. A 'heavy slip' is noted between the proposed 1960 replacement bridge and the then existing bridge. This suggests that access to the bridge along the existing roadway had been compromised in the past. This plan does not contain any noted heritage or archaeological information within the works corridor.

By June 1968 the route of the current Taipa Bridge had been selected, and 12 acres of the land southwest of the bridge had been vested in the Northland Harbour Board for the purpose of its construction. This land was to be reclaimed below the Mean High Water Mark for the bridge. Plan SO 49386, of which Figure 14 is a detail, had been prepared for this work for Parliamentary Purposes. It also shows that a small area of land had been reclaimed on the western approach for the construction of the bridge.

The current alignment and location of the Taipa Bridge can be seen in SO 64252, which includes the road designation for the bridge (Figure 15). No heritage or archaeological features are noted within the area of the works corridor.

The area of land located on the northern side of the western approach appears to have always been in public ownership. It was originally a small section of paper road leading around the western side of Taipa River to the Taipa beach, as seen on SO 1099 (Figure 12). This section of the paper road was closed in 1964 and gazetted as a Public Pleasure Ground (SO 43951). At some point in time – possibly in the 1950s or 1960s – a low seawall consisting of concrete and timber was constructed north of the bridge running northwards towards Taipa Beach and the old Taipa Boat Ramp, which has since been demolished.

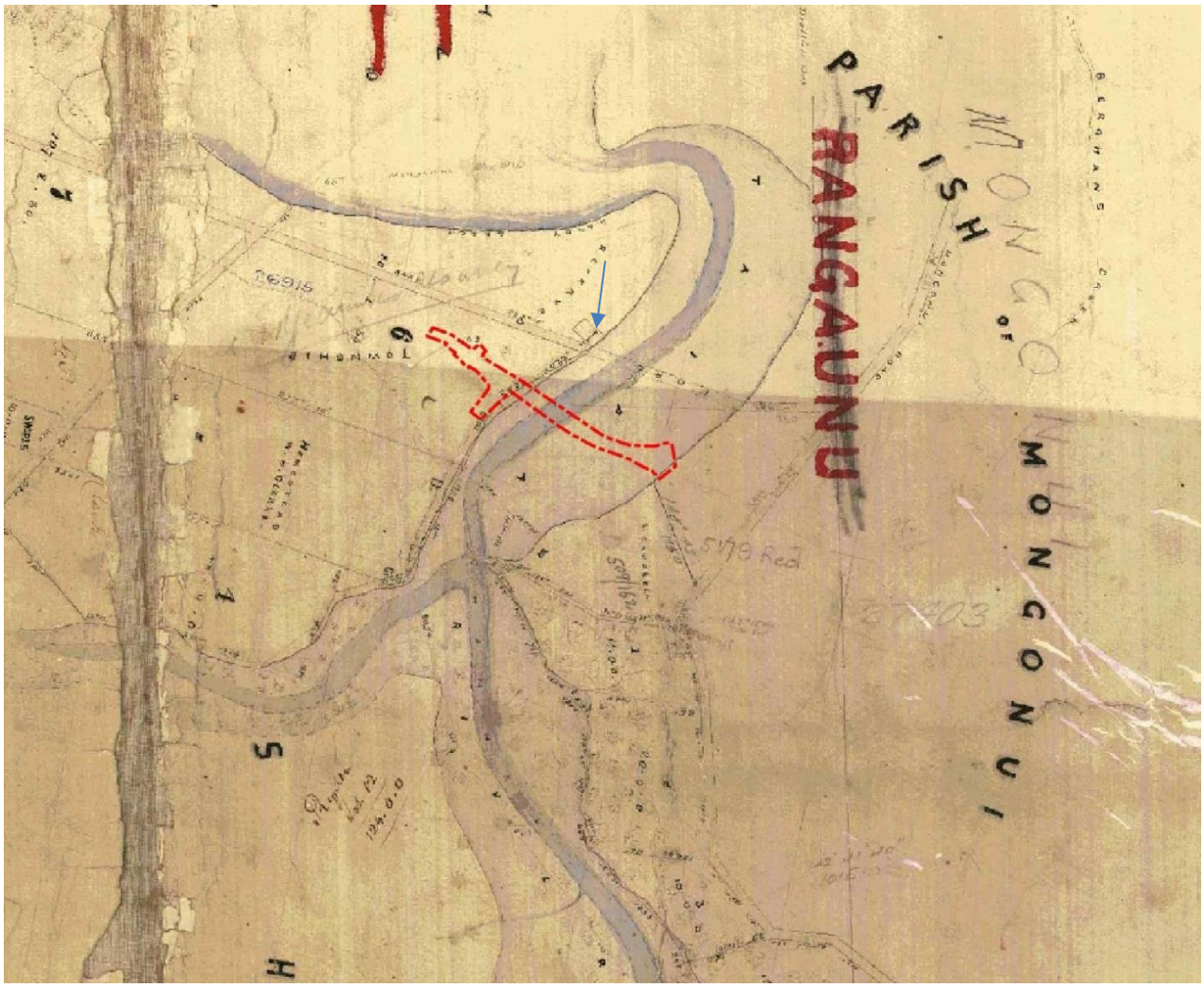


Figure 8. SO 812, showing area of works corridor (source: Quickmap 2016). Area of enclosure indicated with blue arrow

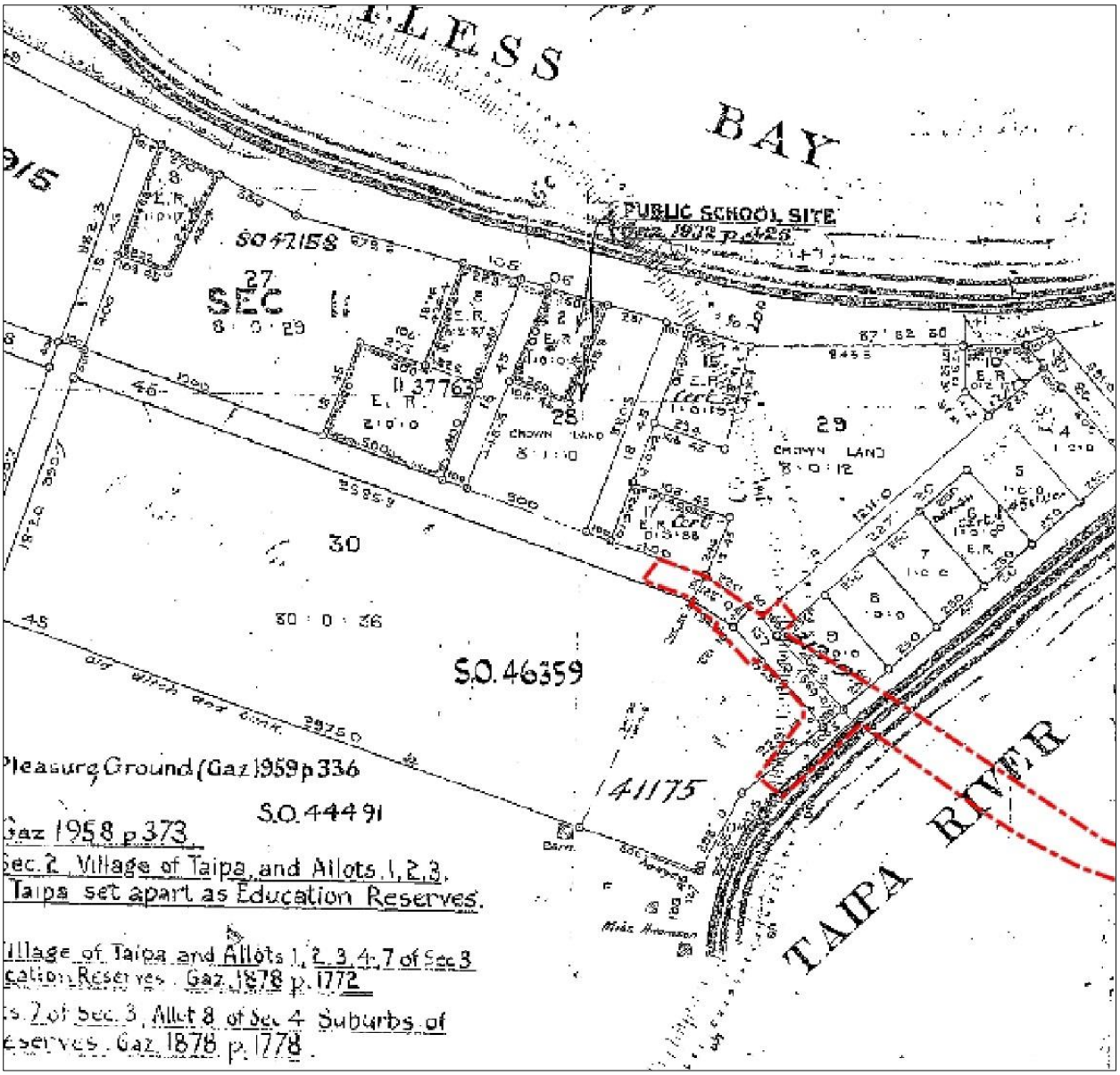


Figure 9. Detail from SO 11581, dated 1899 (source: Quickmap 2016)

Figure 10. Detail from SO 27403, dated 1932 (source: Quickmap 2016)

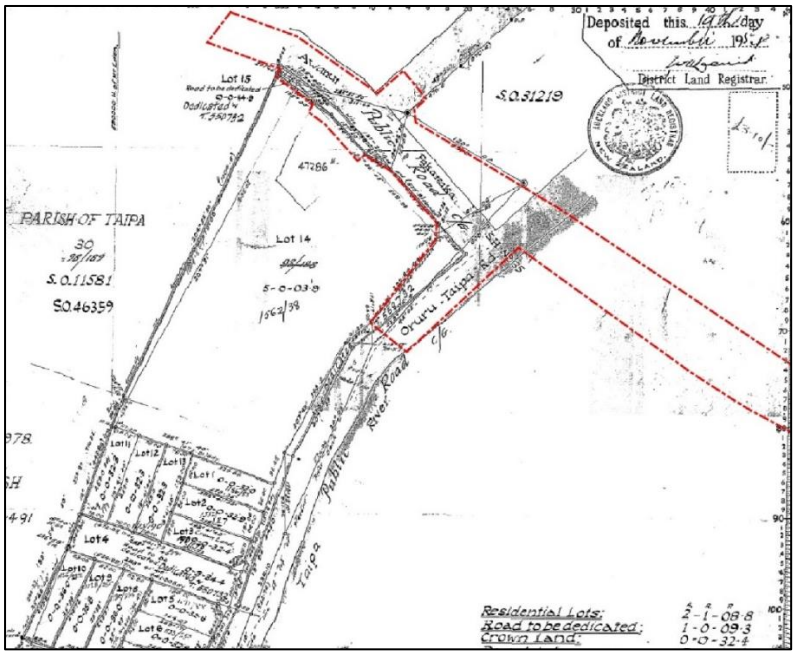


Figure 11. Detail from DP 41175, dated 1953 (source: Quickmap 2016)

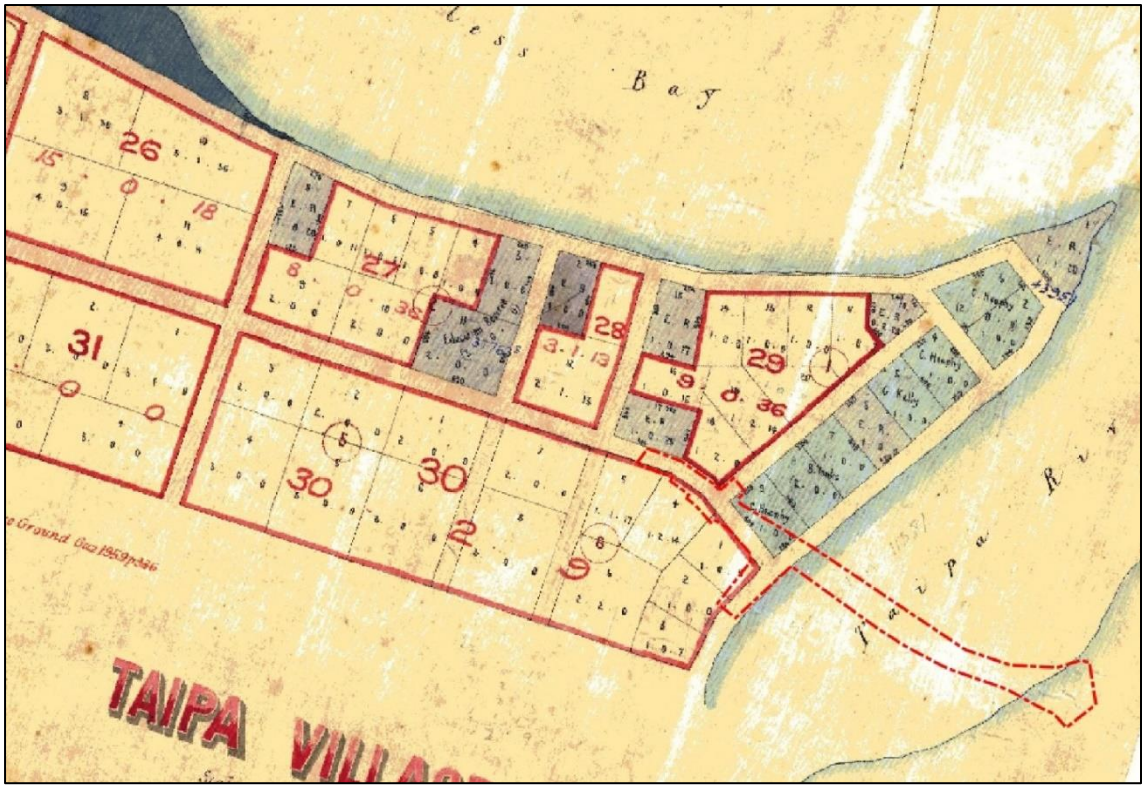


Figure 12. Detail of SO 1099, dated 1959 (source: Quickmap 2016)

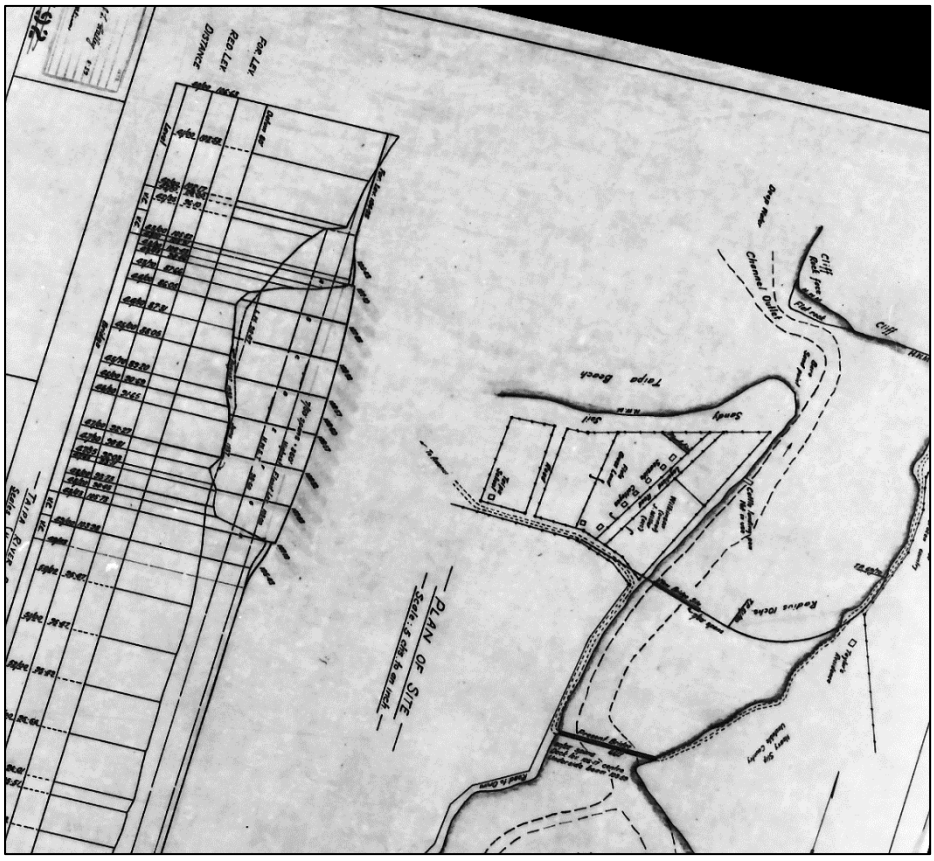


Figure 13. Detail from 1960s Bridge Plans, no date (source: Awanui – Mangonui Road, Taipa Bridge No. 272, supplied by client)

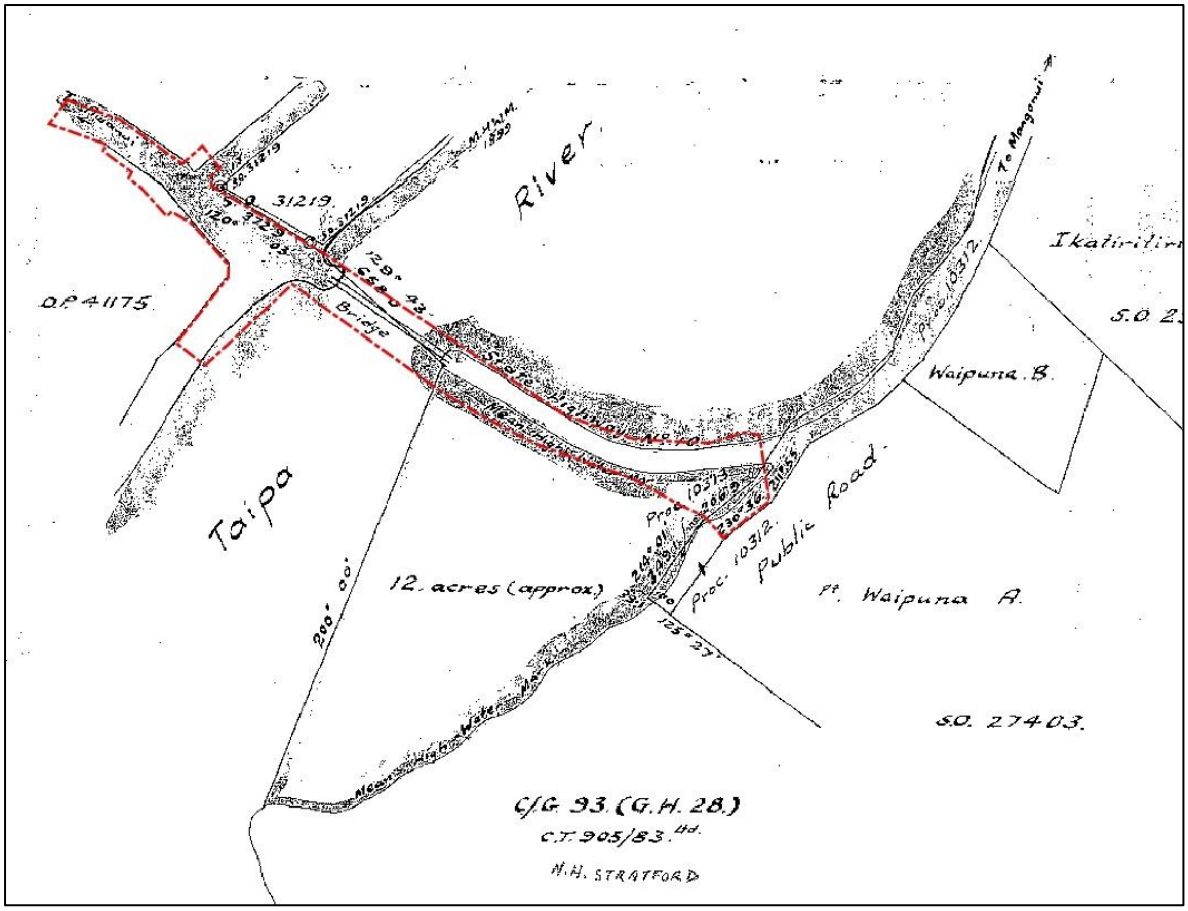


Figure 14. Detail from SO 49386, dated 1968 (source: Quickmap 2016)

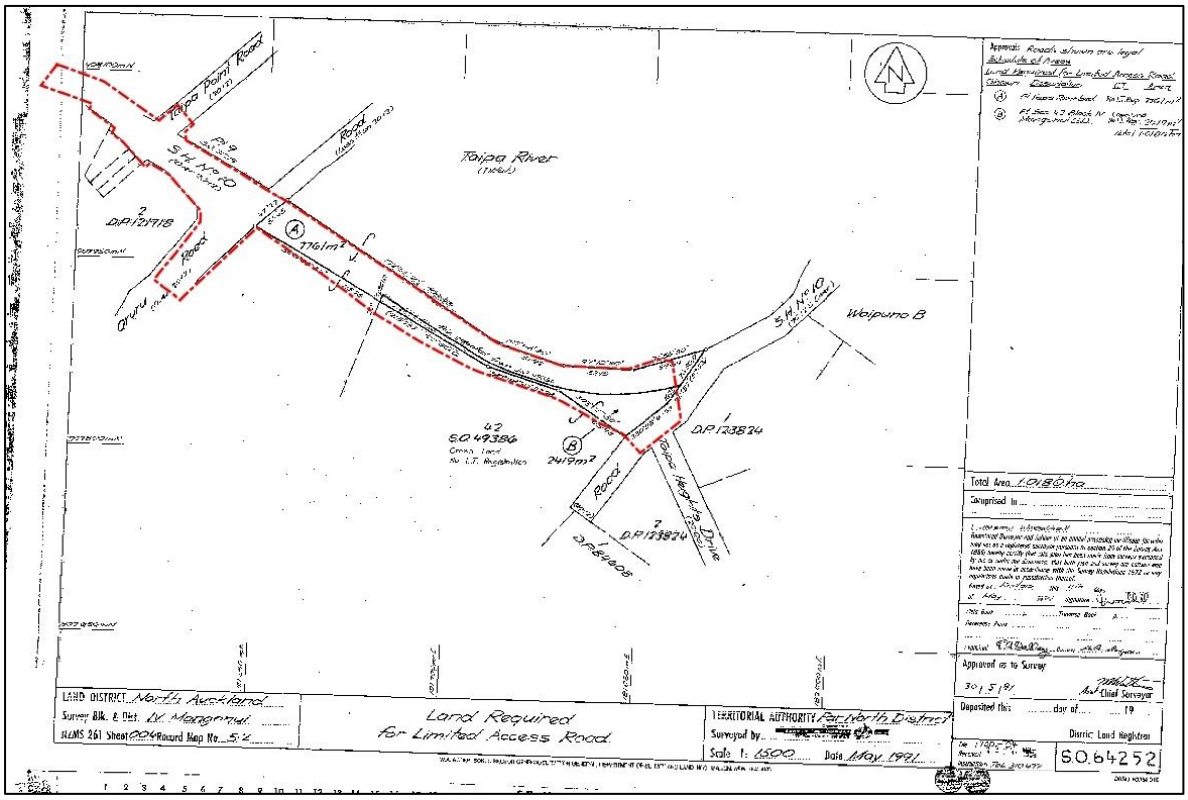


Figure 15. Detail from SO 64252, dated 1991 (source: Quickmap 2016)

2.5 Historic Photographs

A number of digitally available historic photographs are held in the Alexander Turnbull Library Online Collection for the Taipa Bridge and surrounding area.[2]

The earliest photograph of any of the former Taipa Bridges is from c.1903-1910 (Figure 16) and shows a bridge located to the south of the location of the current Taipa Bridge. This photograph is looking from the east to the western side of the Taipa River. The buildings in the photograph are likely to belong to the Adamson family.

The earliest photograph showing the current Taipa Bridge in its present location is from 1955 (looking south up the Taipa River) (Figure 17). This shows the undeveloped land on both the eastern and western approaches to the bridge. The earlier bridge has been removed and would be in the area located with a red arrow. The reclamation area (of the Northland Harbour Board) has yet to become colonised by mangroves. The area of Oruru Road appears to be partly formed, as does SH10 – albeit as an unsealed road. Taipa Point Road does not appear to exist and the western side of the river appears to be beach. The eastern side of the bridge approach appears to be an existing road; however, it is not clear if is sealed.

The photograph in Figure 18 is looking west to east over the recently replaced Taipa Bridge and current works corridor. This photograph shows that some development has taken place in the general layout of SH10, Taipa Point Road and Oruru Road. The eastern approach to the bridge is now formalised as SH10. A tree is located on the western approach at the corner of SH10 and Oruru Road, indicating the reserve area.

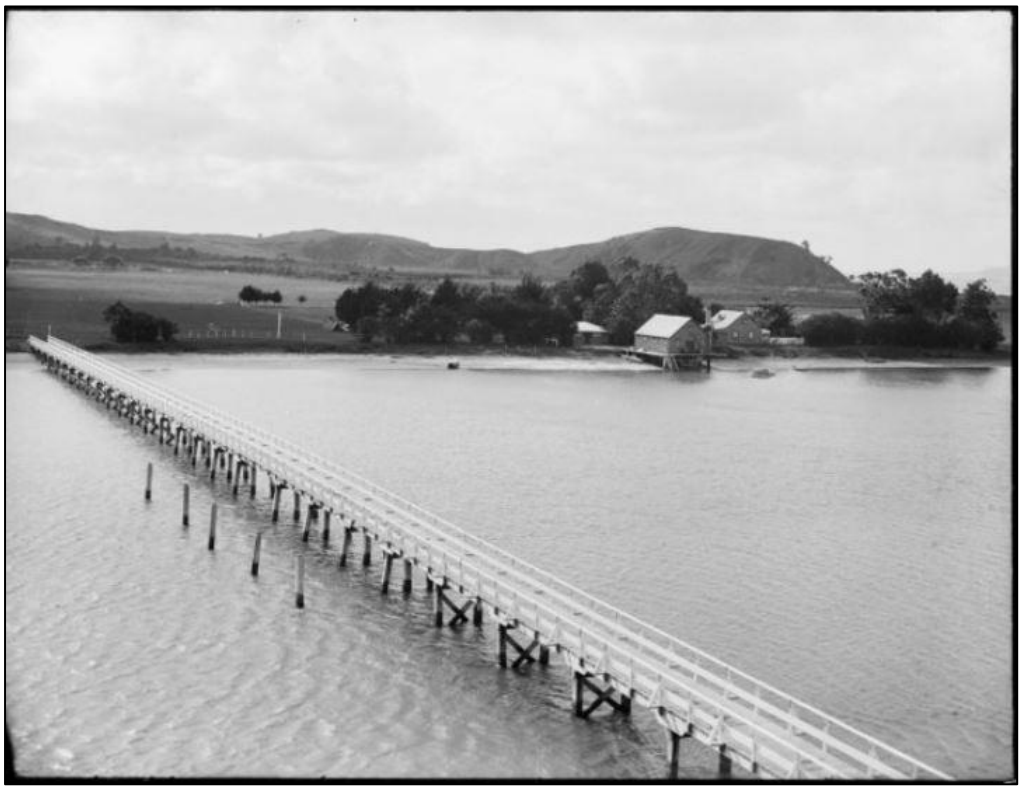


Figure 16. First Taipa Bridge c.1910, looking west (source: Alexander Turnbull Library Online, Reference 1/1-004911-G Northwood Brother: Photographs of Northland)

[2] https://natlib.govt.nz/collections/a-z/alexander-turnbull-library-collections

Figure 17. Taipa Bridge, 10 October 1955, looking south (source: Alexander Turnbull Library Online, WA-39784-F, Whites Aviation Ltd: Photographs). Red arrow showing location of the earlier bridge

Figure 18.Taipa Bridge, 25 January 1973, looking east (source: Alexander Turnbull Library online, WA-71206-G, Whites Aviation Ltd: Photographs)

3 EXCAVATION RESULTS

3.1 Introduction

A small number of archaeological sites had been recorded within the wider Taipa area; these had predominately been focused along the coastal river edge of the Taipa River which exits into the Bay (Figure 19). Within the immediate area and/or footprint of the works corridor were four recorded sites: O04/406 (midden and ovens), O04/407 (midden and ovens), O04/427 (burial) and O04/1022 (midden and ovens). The first three sites were covered over during the construction of the Taipa River seawall (Johnson 2013). Site O04/1022 was identified in 2009 as a result of site damage and fell directly in the area of the new western bridge abutment and realignment of Oruru Road (Harris 2010). The other sites were outside of the works footprint but had the potential to extend in the western area of works. Site O04/990, which was recorded as midden, pits and terraces, lay to the southeast of the works corridor within 556 SH10, on the eastern approach to the bridge. Whilst this site was noted to be near the works footprint it was not expected to be directly affected by the proposed works during the assessment stage (Jamieson 2017a).

Overall, the footprint of the works had been modified through the construction of the current SH10, side streets (Taipa Heights Drive, Taipa Point Drive, Mamarua Road and Oruru Road), Taipa township and associated services and infrastructure. The footprint of the new works did not require complete excavation of this area; rather earthworks were targeted to specific areas for specific requirements. The majority of the works consisted of open trench cutting for the laying of new services, with only the coastal western abutment edge and eastern SH10 road having ground reduction works undertaken.

Despite this, in situ archaeological deposits were encountered, specifically along the western abutment and approach area, approximately 40m from the current coastal edge. The deposits had survived in pockets between modern deeply cut services trenches for stormwater and sewerage, the construction and lying of Oruru Road and SH10, as well as the reclamation infill used to create the abutment for the old one-way bridge. This had for most part sealed the archaeological material of O04/1022 and resulted in the features being sealed and preserved by c.50-80cm of modern roading material.

The results of the current investigation of O04/1022 add to information obtained from the archaeological material exposed during the previous stormwater drainage insertion and investigated by CFG Heritage Ltd under archaeological authority 2010/203 (Harris 2010). Based upon the earthworks undertaken for this project it appears that the site covers a wider area and most likely extends into O04/406, 407 and possibly O04/427, or forms part of a long and extensive coastal midden. The information from this excavation has been added to the O04/1022 site record, as this site number will encapsulate the other sites.

Two other small areas of shell midden were exposed on the western side of the works corridor. The first was a small pocket of shell within the old Chorus jack pit within the Taipa shops car park and a partial lens along the northern side of the new stormwater trench by Taipa Area School. This material had been modified by the insertion of modern services and was not in situ but did identify that archaeological material was likely to exist nearby. The eastern abutment and SH10 approach contained redeposited midden associated with O04/990 which had been used as roading infill along SH10. Whilst the midden was no longer in situ it had survived relatively unmodified.

The post-1900 war memorial, formally known as the Taipa War Memorial, was archaeologically recorded during deconstruction and its footprint monitored during works, at the request of the client and tangata whenua.

Figure 19. Location map of recorded NZAA archaeological site records and the proposed work corridor

3.1.1 Excavation Areas and Sequence

Due to the complexity of bridge construction and associated infrastructure the earthworks required for the project were completed in stages, with each stage being dependent upon the previous one before the next one could begin. This meant that certain areas were repeatedly re-worked depending of the order of scheduled works. This was most apparent within the area of the western approach and new abutment, which required ground reduction works and benching works, then the construction of the new abutment, which needed to be partially completed before the new sewerage line could be cut and inserted. After this the stormwater drainage, Chorus and water lines could be inserted, then the area infilled and sealed. Overall, this exercise took 21 months to achieve.

The archaeology uncovered in the project corridor has been divided into four areas which encompass all of the different earthwork activities undertaken (trenching, ground reduction, potholing, test pitting, etc) for ease of understanding (Figure 20–Figure 23). These areas are as follows:

- **Taipa Monument:** this includes the area of the former Taipa War Memorial Monument, Taipa Township shops and car park and the section of SH10 between Taipa Point Drive and Mamarua Street (Figure 22).
- **Eastern Approach and Abutment:** this area is located on the eastern side of Taipa Bridge and includes SH10 and its junction with Taipa Heights Drive, and the eastern side bridge abutment (Figure 21).
- **Western Approach and Abutment:** this area is located on the western side of Taipa Bridge and includes SH10 and northern road berm, the junction of Taipa Point Drive and SH10, and Oruru Road (Figure 20 and Figure 22).
- **Taipa Area School:** this area is located along SH10 from Mamarua Road to the end of the works corridor (Figure 23). It includes the stormwater drainage trenches that were excavated on both the northern and southern side of the highway.

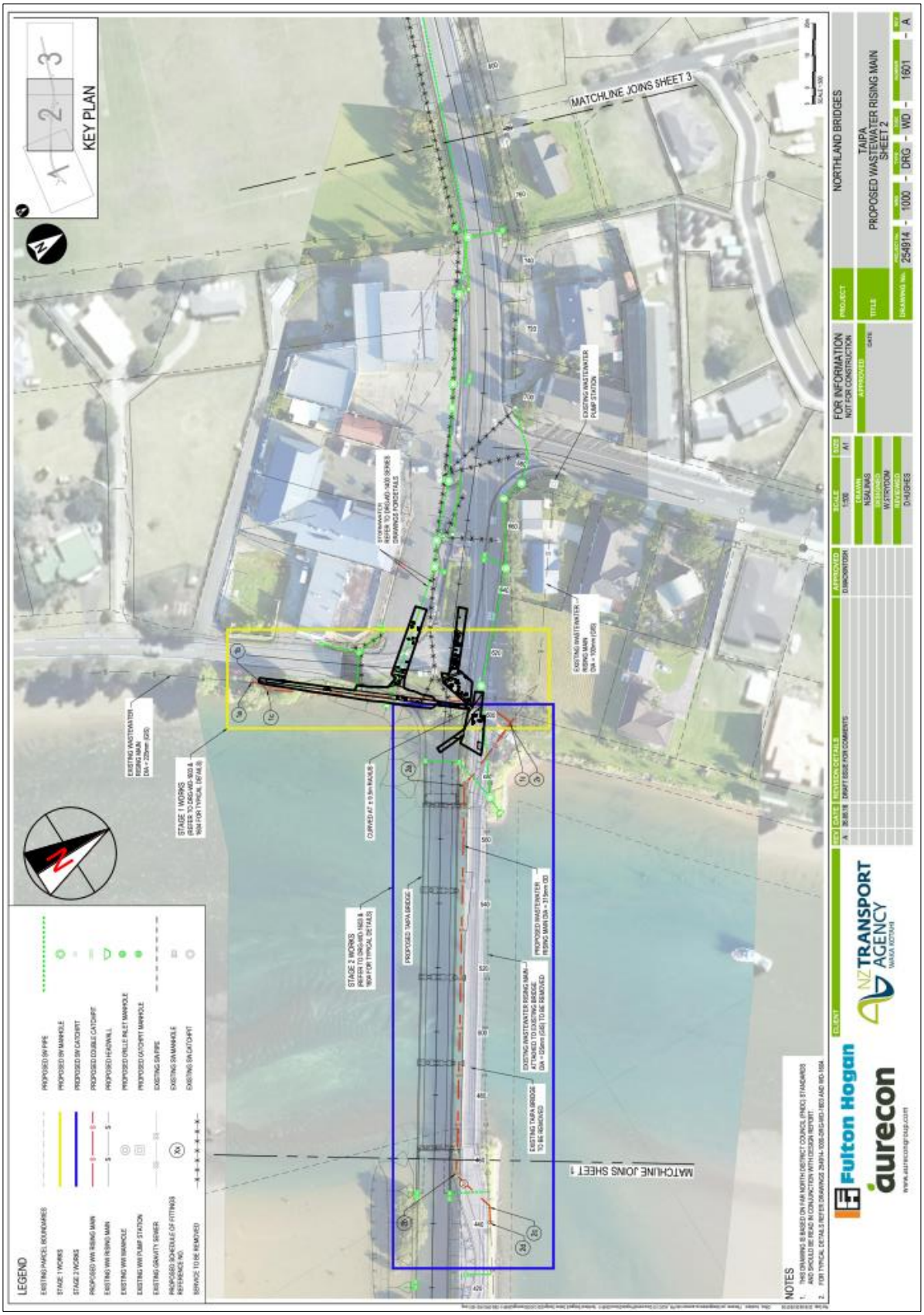


Figure 20. Plan showing Western Abutment and Approach with locations of archaeological features overlaid

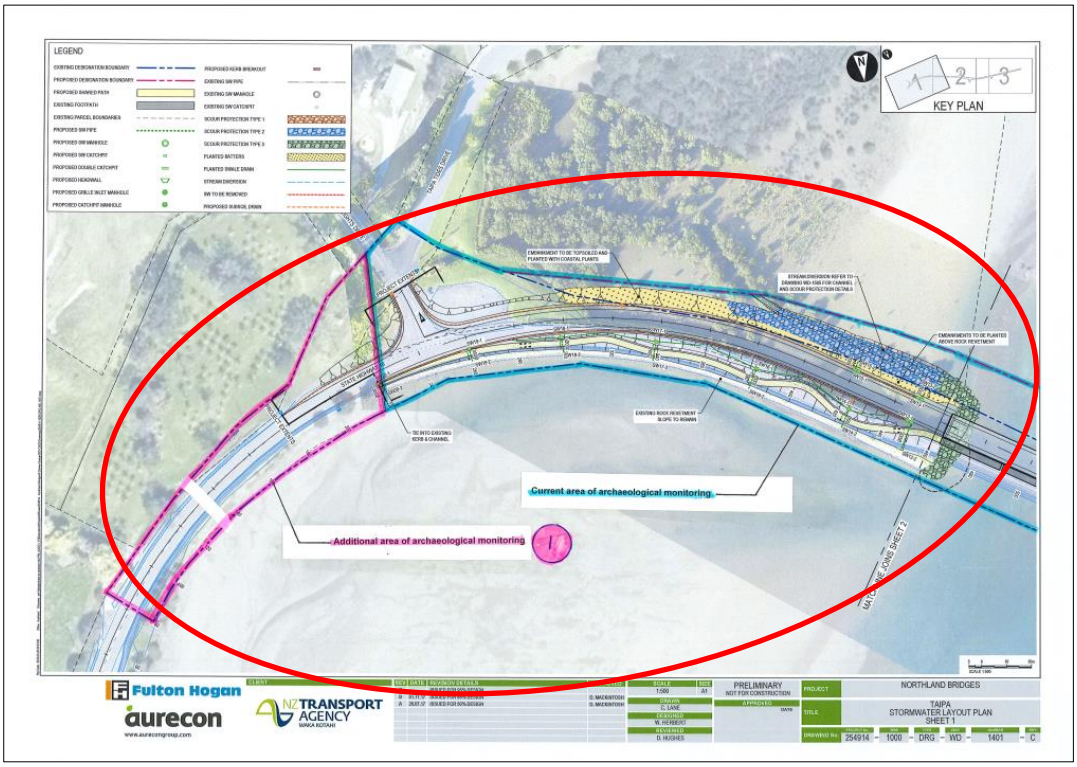


Figure 21. Plan showing general area of the Eastern Abutment area circled in red

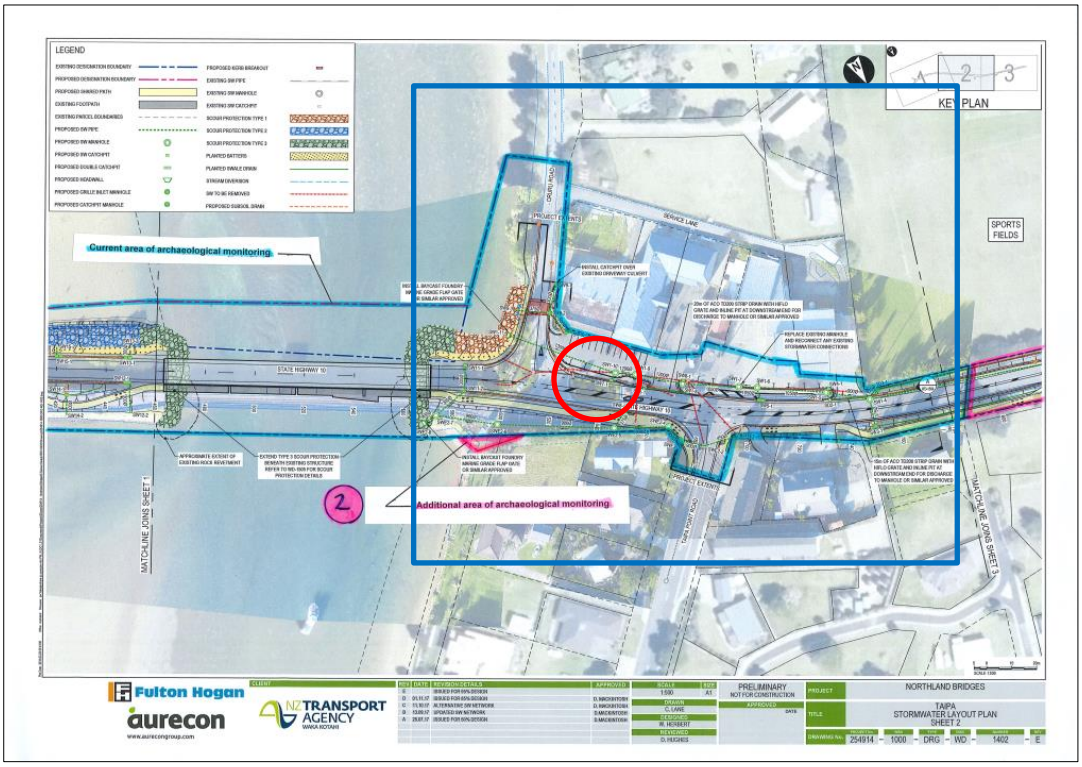


Figure 22. Plan showing general area of Western Abutment and Approach outlined in blue and Taipa Monument area circled in red

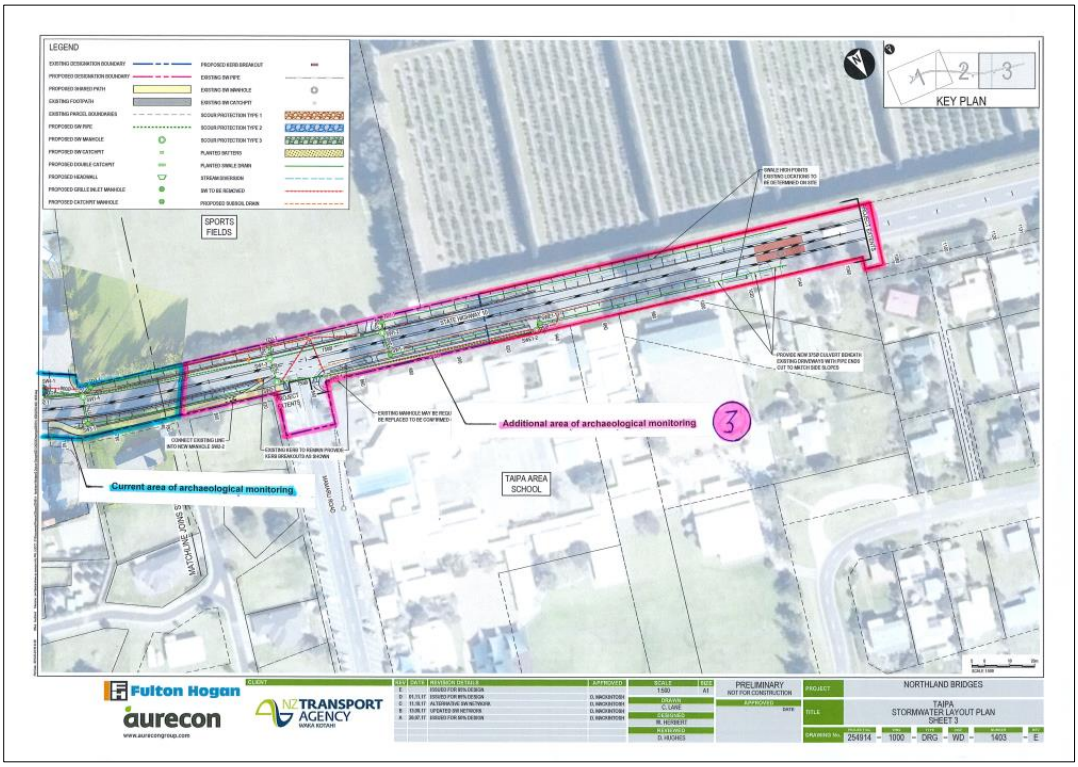


Figure 23. Plan showing Taipa School area outlined in pink

3.1.2 Excavation

The methods for undertaking the archaeological component of the works were as detailed in the archaeological management plan (Jamieson 2017b).

All features or suspected features were archaeologically investigated as per current best practice, sampled and their locations recorded in plan/section or with a robotic total station and overlaid on the As Built plans. The plans and elevations have been produced in AutoCAD.

In summary, an archaeological investigation was to be undertaken of the new western abutment area concentrated within the grass reserve area adjacent to Oruru Road prior to the main earthworks occurring (Jamieson 2017b: 3). This will be discussed under section 3.2.3 (Western Approach and Abutment). Direct archaeological monitoring was undertaken in three additional areas which were identified as having archaeological potential or risk associated with them (Eastern Approach and Abutment, Taipa Monument and Taipa Area School). These four areas are shown on Figure 20–Figure 23, which show the general location of areas of investigated archaeological features in relation to the project corridor. The features are described below with specific area plans and a list of contexts is provided in Appendix 2.

3.2 Excavation Results

3.2.1 Taipa Monument Area

This includes the area of the former Taipa War Memorial Monument, Taipa Township shops and car park and the section of SH10 between Taipa Point Drive and Mamarua Street (Figure 22). Works consisted of the deconstruction of the monument, ground reduction works beneath the monument and associated ornamental garden/traffic island, as well as trenching for the new stormwater

drainage and Chorus/Telecom cabling. This work was undertaken over several months from June 2018 to May 2019.

Deconstruction of the Taipa Monument

The Taipa Monument was deconstructed in June 2018 under archaeological supervision with cultural supervision from Ngāti Kahu kaitiaki in conjunction with Fulton Hogan. The memorial was constructed post-1900 and does not meet the definition or requirements of an archaeological site under the HNZPT Act 2014, nor did the resource consent (File: 39162 (01-14)) issued by Northland Regional Council have any specific conditions relating to the monument's deconstruction. However, it was decided by WSP-Opus, Waka Kotahi NZ Transport Agency and Fulton Hogan in consultation with Ngāti Kahu that the project archaeologist would record the monument during the deconstruction as per standard best heritage practice. The recording consisted of on-site photographs, written descriptive notes and sketch drawings which detailed the size, material and construction methods employed in the construction of the monument.

The Taipa Monument is thought to have been constructed after the late 1940s. A postcard of unknown date (provided by Fulton Hogan) and assumed to date to not long after construction shows the monument to consist of a concrete stepped plinth base, with central carved pouwhenua surrounded by 12 small pouwhenua acting as a fence or guard rail (Figure 24). Based on this postcard the central pouwhenua appears to be extensively carved on all sides with a squared shaft and figure on top. The carved word PARATA can be seen at the base of the figure. The base of the squared shaft extends into the concrete plinth base which held the brass memorial plaques carrying the fallen soldiers' names.

It is understood that the pouwhenua rotted away over time, eventually toppling in the late 1950s, possibly in 1959, the year that the Taipa Area School was established (pers. comm. Julie Ricketts, Ngāti Kahu). It was not known what happened to the pouwhenua once it collapsed or where it and the 12 smaller pouwhenua were taken. However, in recent years two of the 12 smaller pouwhenua were returned to Taipa Marae.

Figure 24. Taipa Māori Memorial postcard (n.d.) (source: provided by Fulton Hogan, 2018)

On 29 June 1982 a new sculpture was erected on the existing monument plinth base. This sculpture was designed and erected by P.R. Wilkinson and is reported to be based on the emblem of Taipa Area School. The sculpture consists of a waka riding an ocean wave into Taipa up the Taipa River towards a Kupe landing site. The sculpture faced inland towards the south from the seaward side to the north. The sculpture was painted in the Taipa Area School colours.

The sculpture had been repurposed from an existing concrete drainage pipe, with the stylized wave and waka having been cast from concrete and mounted in and upon it. At the time of deconstruction, the internal wave had been painted green with the pipe and waka painted red (Figure 25–Figure 27). The internal part of the pipe and wave had not been painted and the fabric was observable as rough pour concrete. The east-facing elevation of the sculpture had been moulded with detail outlining the sails and waka top.

At the time of deconstruction, the monument was located within a road island on SH10 with the surrounding ground surface consisting of shell gravel and ornamental plantings. A live Chorus cable had been directly drilled beneath the monument running in a west/east direction.

Figure 25. Taipa Monument prior to deconstruction looking eastwards. Scale intervals 0.5m

Figure 26. Inscription inside the Taipa Monument recording the erection of the waka sculpture

Figure 27. East-facing elevation of the sculpture top of the Taipa Monument. Note the decorative inscribed moulding on the sails. Scale intervals 0.5m

The monument was square in plan with a footprint of 4.56m x 4.56m. From this three smaller stepped-in plinth bases were added. The basal plinth platform consisted a of a river cobble and concrete stucco base capped with a concrete platform measuring 0.37m in height above the current ground surface. A 2.7m squared concrete platform was centred above this. This platform measured 0.1m deep and had been painted green. Above this was another 2.1m squared concrete platform which was painted red measuring 0.23m in depth. Both of these platforms, prior to painting, had been rendered with a smooth concrete. The edges of the platforms had been chamfered to create a simple decorative finish.

Above the three basal platforms was the display plinth which contained the brass plaques. This plinth measured 1.05m in height with a footprint measuring 1.2m squared. Like the two plinths below, this plinth had been rendered in smooth concrete; the only difference being that lines had been inscribed into the concrete, replicating ashlar stonework. The plinth again had a chamfered edge with areas for four brass plaques on each elevation. These areas had been recessed with chamfered edges for display purposes. These recessed areas measured 0.68m squared. Only three of the four recessed plaque areas actually held plaques. The south-facing recessed panel had not been used (Figure 28). It should be noted that at the time the deconstruction occurred the plaques had already been removed so it was not possible to transcribe the names from the plaques.

Figure 28. Looking northwards towards the monument. The recessed plaque panel on the southern elevation was never utilised. The eastern elevation shows evidence of the removal of the plaque. Scale intervals 0.5m

Figure 29 to Figure 38 show the deconstruction of the monument. Deconstruction was undertaken by a mini digger fitted with a small rock hammer in order to break up the monument into smaller pieces ready for transportation to the Marae. The sculpture atop the monument was removed by gently rock hammering the supporting concrete from between it and the upper plaque plinth in order to lift the piece off in its entirety for relocation and erection at Taipa Area School. The sculpture had been joined to the existing monument via a metal pipe which had been inserted into the upper

plaque plinth and to the base of the sculpture (Figure 30). This pipe was hollow and measured 12cm in diameter.

Figure 29. Slings holding the sculpture during removal from plaque plinth base

Figure 30. Sculpture after removal of concrete with exposed metal pipe arrowed in red

The basal portion of the monument was found to have been formed in three main sections which had been stacked upon each other. These three sections had then been sealed in a thick continuous layer of smooth concrete which encased the monument and provided the surface recesses for the brass memorial plaques.

The upper portion of the monument, which is termed as the upper plaque plinth, measured 0.84m in length by 0.5m in width; it had been constructed from rough cast concrete with evidence of shuttering scars along the edges. When removed the bottom was found to have been capped by 3cm thick rough-cut timber planks. The most important discovery was the remains of the timber pou base which had been encased within the concrete (Figure 32). This was removed by Ngāti Kahu as per tikanga requirements.

Figure 31. Looking eastwards over upper plaque plinth once the concrete sealing had been removed. Scale intervals 0.5m and 0.1m

Figure 32. Exposed centre of the upper plaque plinth with the exposed rotten timber of the pou. Scale intervals 0.1m

The basal remains of the monument consisted of a solid poured concrete slab foundation; no metal reinforcing was used during the construction, but four recycled metal bolts were located in the

corners of the basal plinth to ‘anchor’ the above plinths. These solid concrete plinth slabs measured 15cm thick. The internal space was filled with natural beach sand (Figure 34).

The monument was set on a concrete ring foundation which comprised rough cast concrete with river pebble aggregate. Its internal elevation had been shuttered and the external face set with large, rounded river cobbles (Figure 35–Figure 37). It had been cast directly into the underlying sand. Overall, the depth of the foundation ring beam measured 40-45cm wide by 80cm thick.

Figure 33. Remains of plinths during deconstruction works

Figure 34. Looking eastward after basal plinth had been removed showing internal natural sand infill and concrete ring foundation

Figure 35. Exposed internal elevation face inside the concrete ring foundation of the monument. Scale intervals 0.5m and 0.1m

Figure 36. Removed section of concrete ring foundation showing timber shuttering pours. Scale intervals 0.5m and 0.1m

Figure 37. Removed section of ring foundation showing underside base and pour methods. Scale intervals 0.5 and 0.1m

Located within the sand infill, context (259), beneath the monument was a small oval-shaped pit [258] (257) (Figure 38). This pit was located in what would have been the centre of the monument. The pit was filled with slightly browner sand than that of the surrounding area. It is possible that something may have been placed in the feature during monument construction. It was not a base of the former pou as this was confined to the upper portion of the monument. No artefacts were found within the feature.

Figure 38. South-facing section through Monument showing concrete ring foundation and pit [258]. Scale intervals 0.5m and 0.2m

Other Archaeological Features

Two areas of midden were found within the Taipa Monument Area, consisting of disturbed thin midden scatters in the area west of the monument which had been disturbed by modern service trenches (Figure 39). These scatters were in poor condition and contained patches of modern roading gravels.

A second small pocket of midden, (303), was found in the edge of the modern Chorus pit cut in front of the Bait and Auto Shop at the Oruru Road and SH0 junction. Based on this evidence it is likely that archaeological features extended over this area and have been significantly modified by modern development.

Figure 39. Looking eastward over the monument area showing service trenches, disturbed midden and darkened sand

3.2.2 Eastern Approach and Abutment

This area is located on the eastern side of Taipa Bridge and includes SH10 and its junction with Taipa Heights Drive, and the eastern bridge abutment (Figure 21). Earthworks undertaken in this area included the cutting of new Chorus fibre trenches and jack pits along the southern side of SH10 as well as the ground reduction of a section of SH10.

To achieve the correct road gradient and alignment the old roading surface of SH10 was reduced by mechanical digger to a depth of approximately 1.5m from west to east over a distance of approximately 180m. This work was undertaken between February and March 2019 under archaeological supervision due to the proximity of the works to recorded archaeological site O04/990 located on the property at Taipa Heights Drive.

The earthworks revealed that the area of SH10 and the eastern approach to the bridge had been extensively modified by their creation as well as by the installation of modern services and routine roading maintenance. Whilst not in situ, archaeological deposits were encountered during the works. Redeposited midden (293) deposits were found within the reclamation material used to create the eastern bridge approach and within the shoulder berm.

Redeposited midden (293) consisted of firm black sand with frequent whole and crushed pipi and possible tuatua shell. Within the matrix were occasional small, rounded pebbles/hangi stone and charcoal fragments. This midden was very thin and undulating and was sandwiched between reclamation infill deposits (294) and (295). The midden appeared to have been deposited into hollows and ruts within the clay reclamation, suggestive of it being used as infill within the immediate vicinity of the Taipa Heights Drive and SH10 junction. The rutting as seen in the following figures ran parallel with the road and was evenly spaced, suggestive of it being used to infill wheel ruts: Figure 40–Figure 44).

Figure 40. Redeposited midden (293) within reclamation deposits (294) and (295) on the eastern bridge approach, SH10. Scale intervals 0.5m

Figure 41. An example of the redeposited midden (293) within reclamation deposits (294) and (295) on the eastern bridge approach, SH10 (south-facing section). Scale intervals 0.5m

Figure 42. Redeposited midden (293) within reclamation deposits (294) and (295) on the eastern bridge approach, SH10

Figure 43. Photograph showing reclamation infill deposits on the eastern approach to the Taipa Bridge looking south-eastwards towards archaeological site O04/990

Figure 44. Chorus trench running roughly east/west along the southern side of SH10, eastern approach. Note the mixed deposits indicative of reclamation and roading formation. Scale intervals 0.5m

3.2.3 Western Approach and Abutment

This area is located on the western side of Taipa Bridge and extends for a distance of approximately 40m from the existing coastal river edge westwards, by 70m from north to south, and includes SH10 and its northern road berm, the junction of Taipa Point Drive and SH10, and Oruru Road (Figure 20, Figure 22). In all, 515m^2 was monitored and excavated in this section. The main concentration of in situ archaeological material was found within and immediately surrounding the identified area of O04/1022, on the western abutment and bridge approach area (Figure 20, Figure 45–Figure 53). The earthworks which affected site O04/1022 consisted of the coastal benching and ground reduction works for the new bridge abutment and realignment of Oruru Road; and the insertion of a new high-pressure sewerage line running parallel and beneath the new Oruru Road alignment and two new sets of stormwater lines located on the northern and southern sides of SH10. Earthworks to achieve these works were undertaken sporadically over a period from April 2018 to May 2019 under archaeological supervision.

The different earthwork requirements meant that a cross section of ground was archaeologically investigated within Taipa Township, specifically the coastal edge, which was the area where all of the previously recorded archaeological sites had been identified. The archaeology that was investigated under the conditions of the authority form part of wider site O04/1022, which consists of a long/large midden deposit with associated fire scoops, hangi and post/stake hole features. At the time of investigation all of the archaeological features appeared to be pre-Contact Māori.

It must be noted that due to the instability of the sand in relation to the depth of the trenches (1.5m plus) needed to insert the sewerage and stormwater pipes, only 3-5m long by 2-3m wide sections were opened at a time. This was because a section of pipe had to be laid and backfilled before connecting the section length. A full trench length could not be opened and archaeologically investigated prior to the final excavation and laying of the pipe due to this work being located at the western side of the SH10 and bridge approach – timings and resources did not allow for this. Therefore, the works were carried out in a piecemeal manner.

General Stratigraphy

The general stratigraphy of this area consists of natural beach sand which had formed in gentle undulating dunes running parallel from the coastal river's edge (north-south) upon which the archaeology was situated. This archaeology in turn had been truncated and sealed by modern roading (Oruru Road and SH10), bridge abutment reclamation and services. Intact archaeological deposits were encountered approximately 50-80cm below the current road surface (see Figure 54 for detailed Harris matrix of archaeological deposits and features within the service trenches, Appendix 2 for context list, and Appendix 8 for section drawings).

General Archaeology Description

In total a tentative 106 archaeological features were uncovered consisting of hangi (n=12), post holes (n=21), stake holes (n=6), pits (n=3), fire scoops (n=4) and general scoops (n=60) in relation to several substantial layers of midden, which predominantly sealed the features. The features were concentrated along the surviving sand dune which had been encapsulated by the 20th century roading, bridge and services.

The features were concentrated at the northern extent and covered an area approximately 30m west-east by 12m north/=-south. The features were densely spaced and a number of them intercut, suggesting intensification of activity and use in the area. The features began to lessen in intensity away from this concentration (see Figure 45–Figure 53).

During on-site works a total of 24 lithic samples were collected, but none had any clear evidence of cultural modification (see section 4.3). Some very small fragments of kōkōwai (red ochre) were

collected, but due to their small and fragmentary nature analysis was not effective. No obsidian was recovered.

The placement of the features suggests that this was a processing area for food – especially shellfish. The quantities of dense shell midden (context 056), charcoal-stained soil, scoops and hangi suggest food preparation and cooking rather than domestic habitation of whare or living areas. The limited range of lithic material and the fact that the predominant material found was hangi stone or fire cracked rock also support this assumption.

Two possible activity areas were tentatively identified in Trenches 7 (Figure 47) and 8 (Figure 46). Trench 7 contained a cluster of hangi and scoop features, including several in a semicircular arrangement. Trench 8 contained numerous features including hangi and scoops, some of which were intercutting, associated with post holes and a storage pit. However, it is difficult to fully determine the relationship between the features investigated due to the constricting nature of the trench excavations. The authority conditions and project requirements did not allow for target excavation outside the relatively narrow trenches.

A context list is provided in Appendix 2.

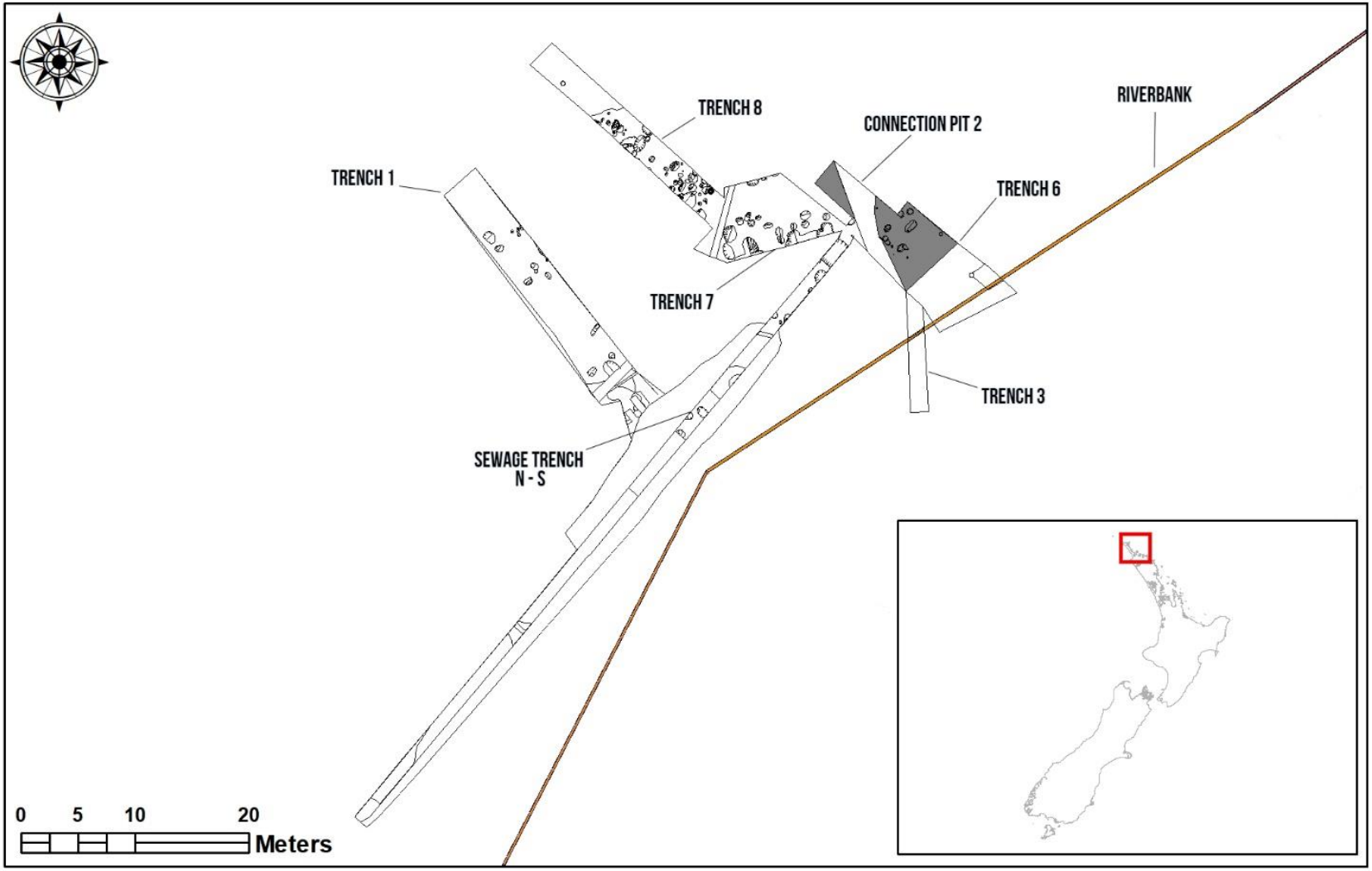


Figure 45. Overall post-excavation plan of Western Approach and Abutment area showing numbered trenches and construction areas

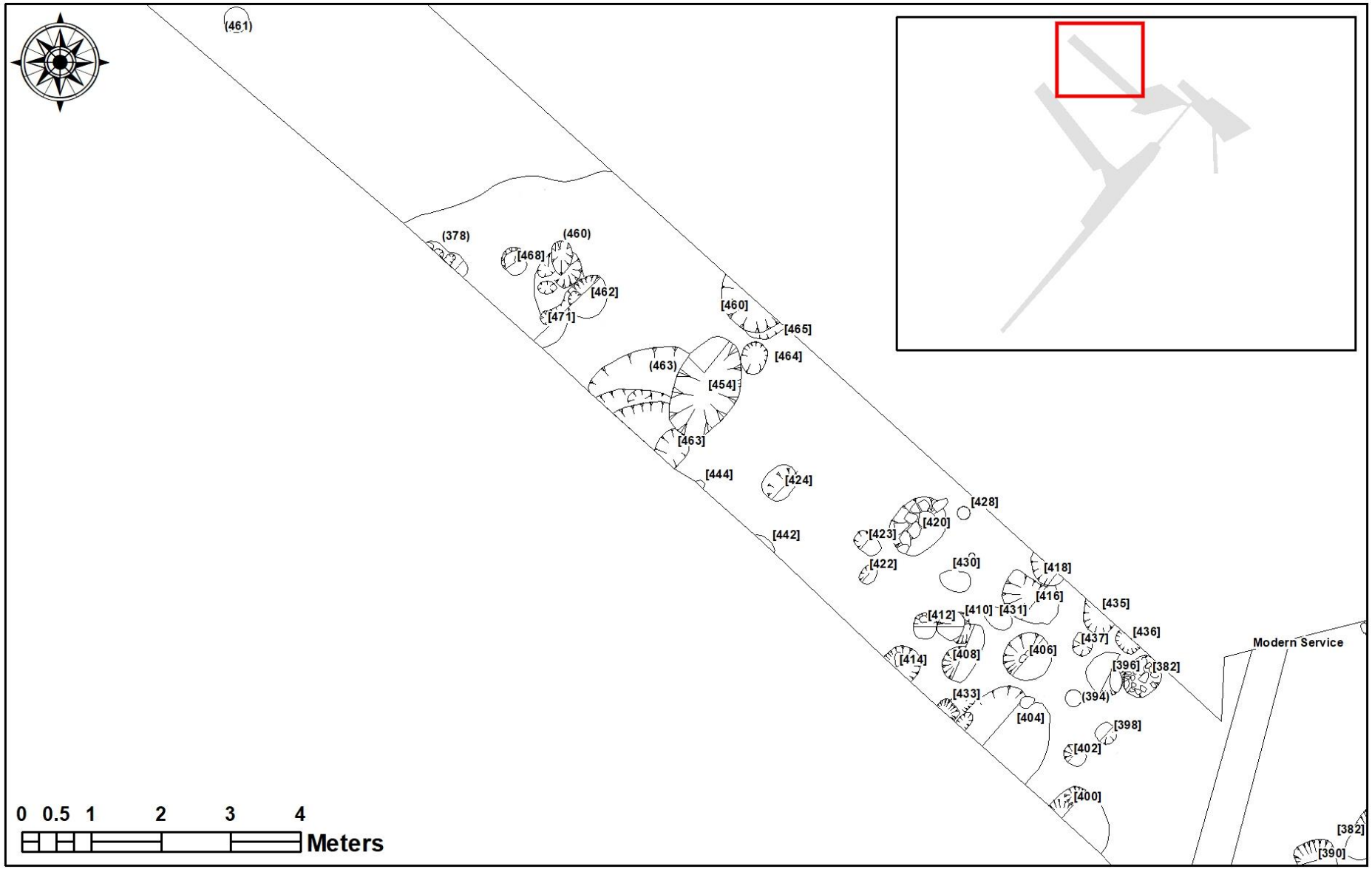


Figure 46. Post-excavation plan of Trench 8 – see red rectangle for specific location

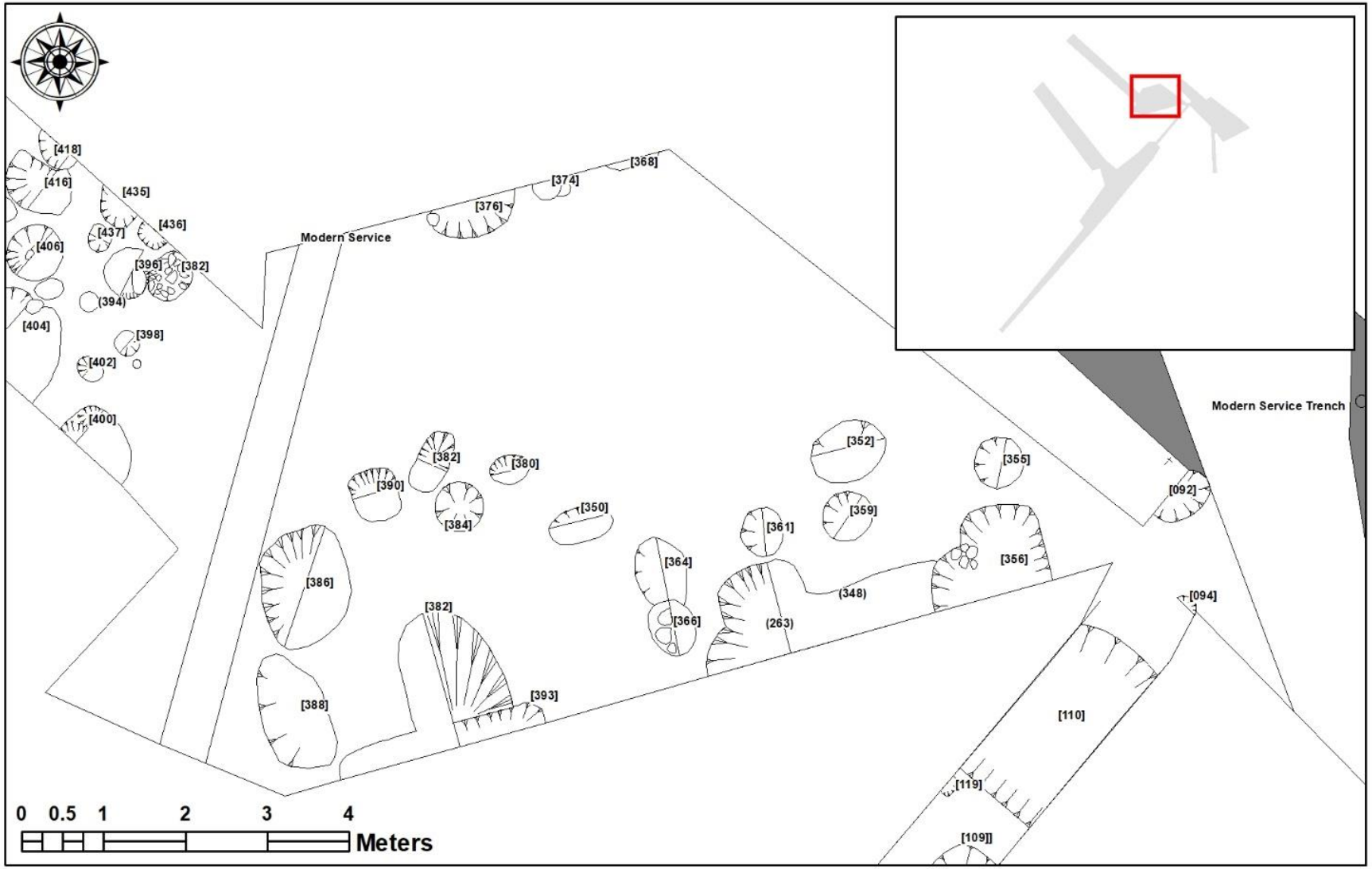


Figure 47. Post-excavation plan of Trench 7 – see red rectangle for specific location

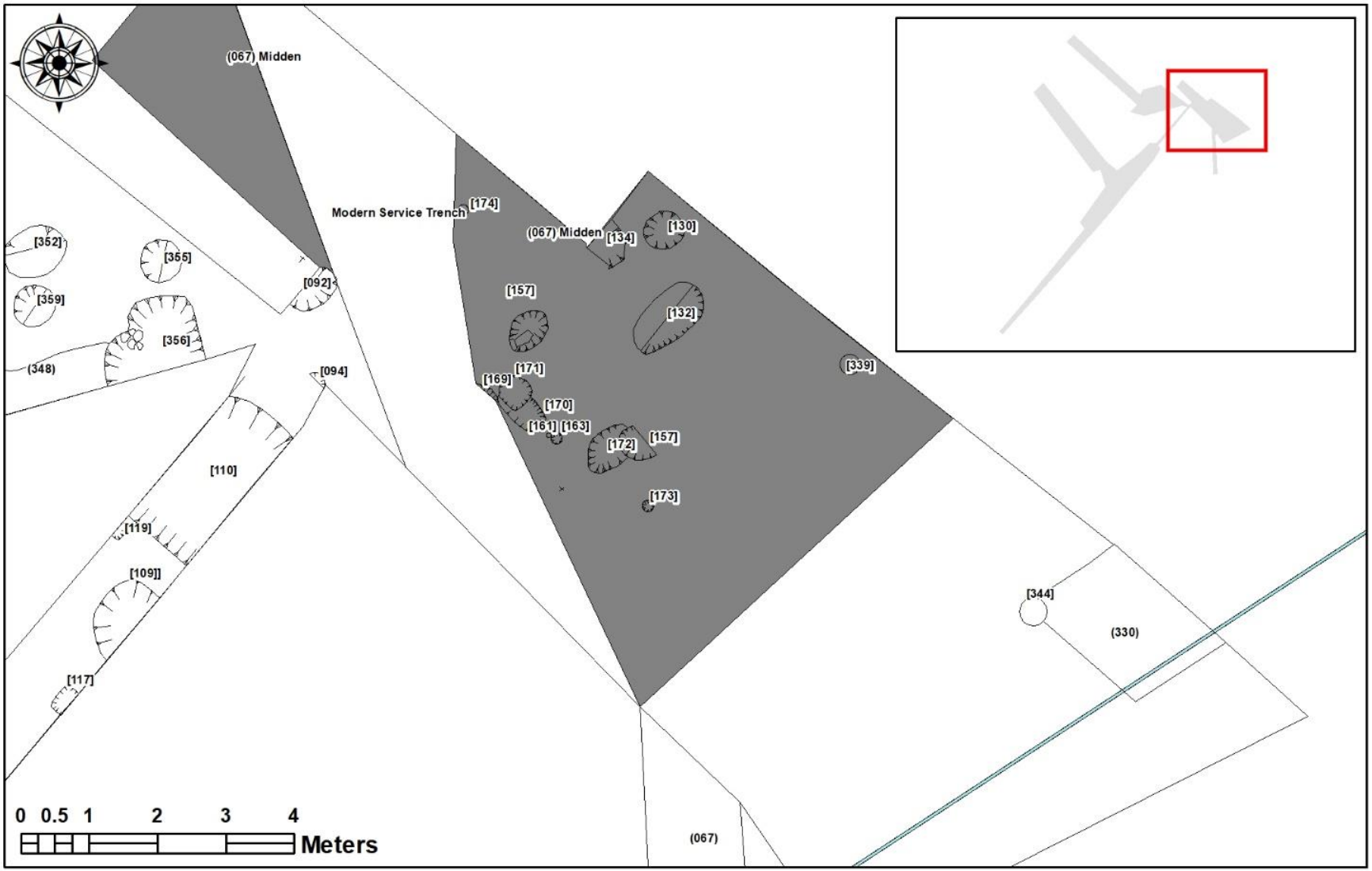


Figure 48. Post-excavation plan of Trench 6 – see red rectangle for specific location

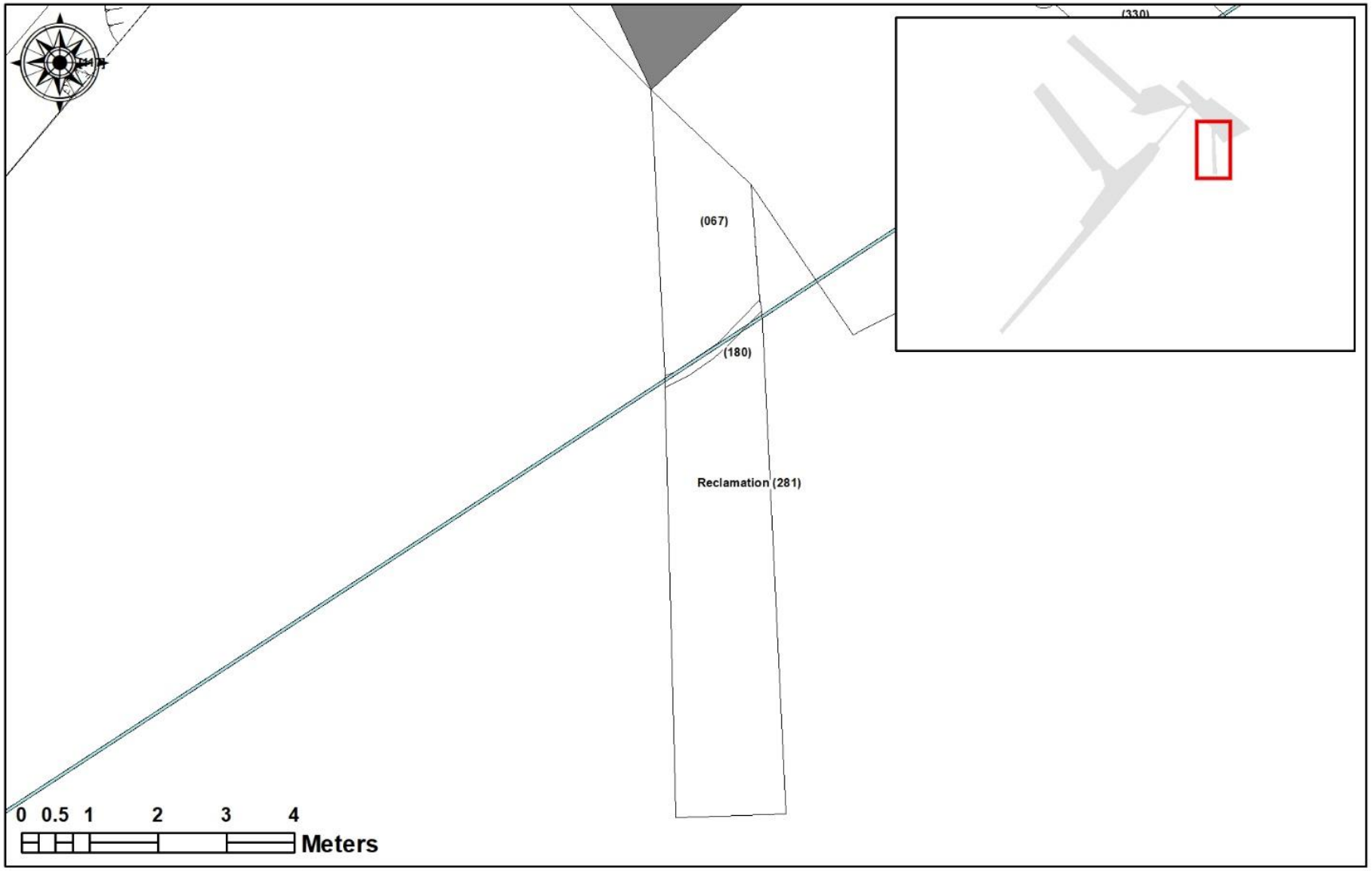


Figure 49. Post-excavation plan of Trench 3 – see red rectangle for specific location

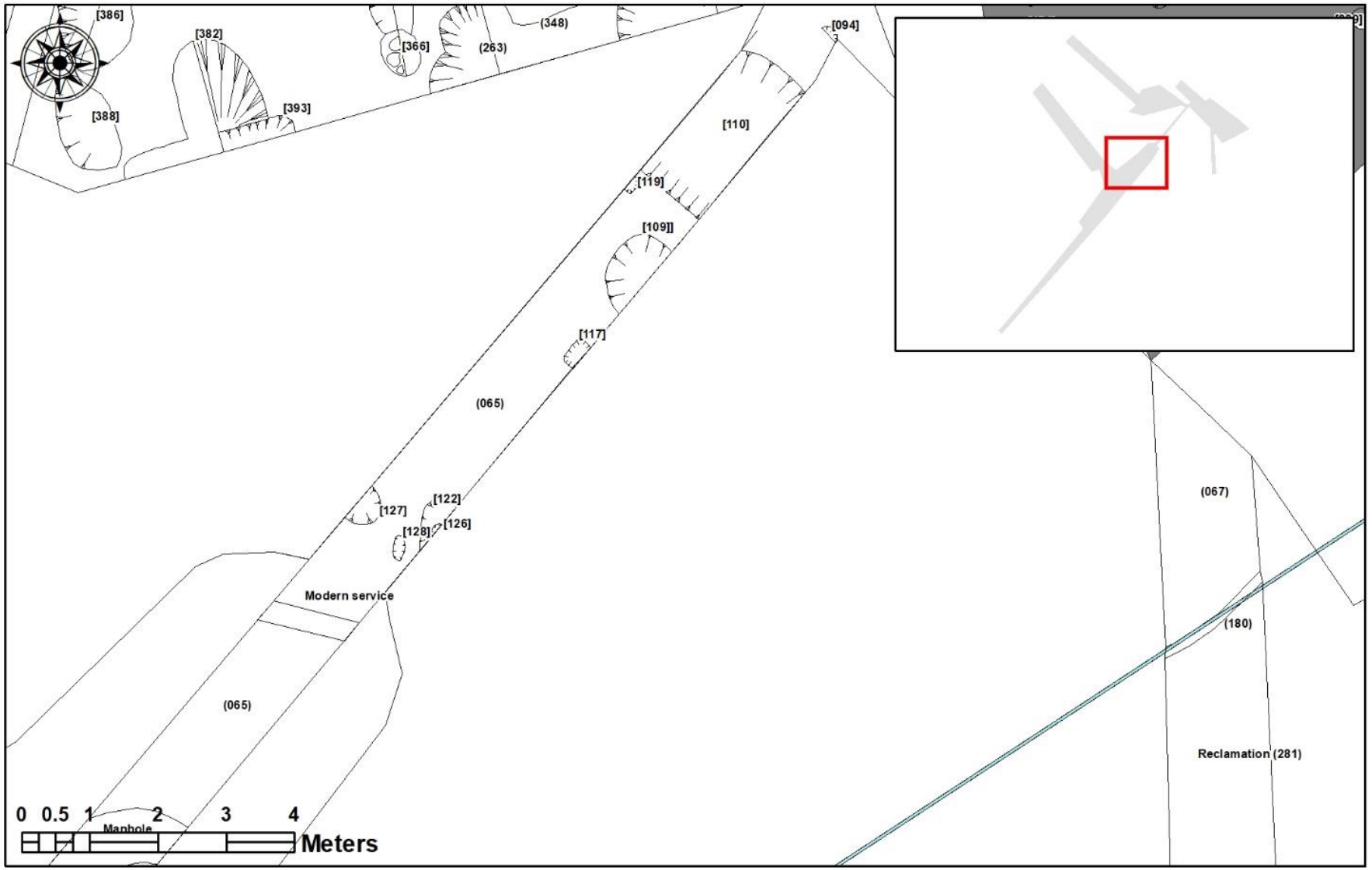


Figure 50. Post-excavation plan of northern section of Sewage Trench N–S – see red rectangle for specific location

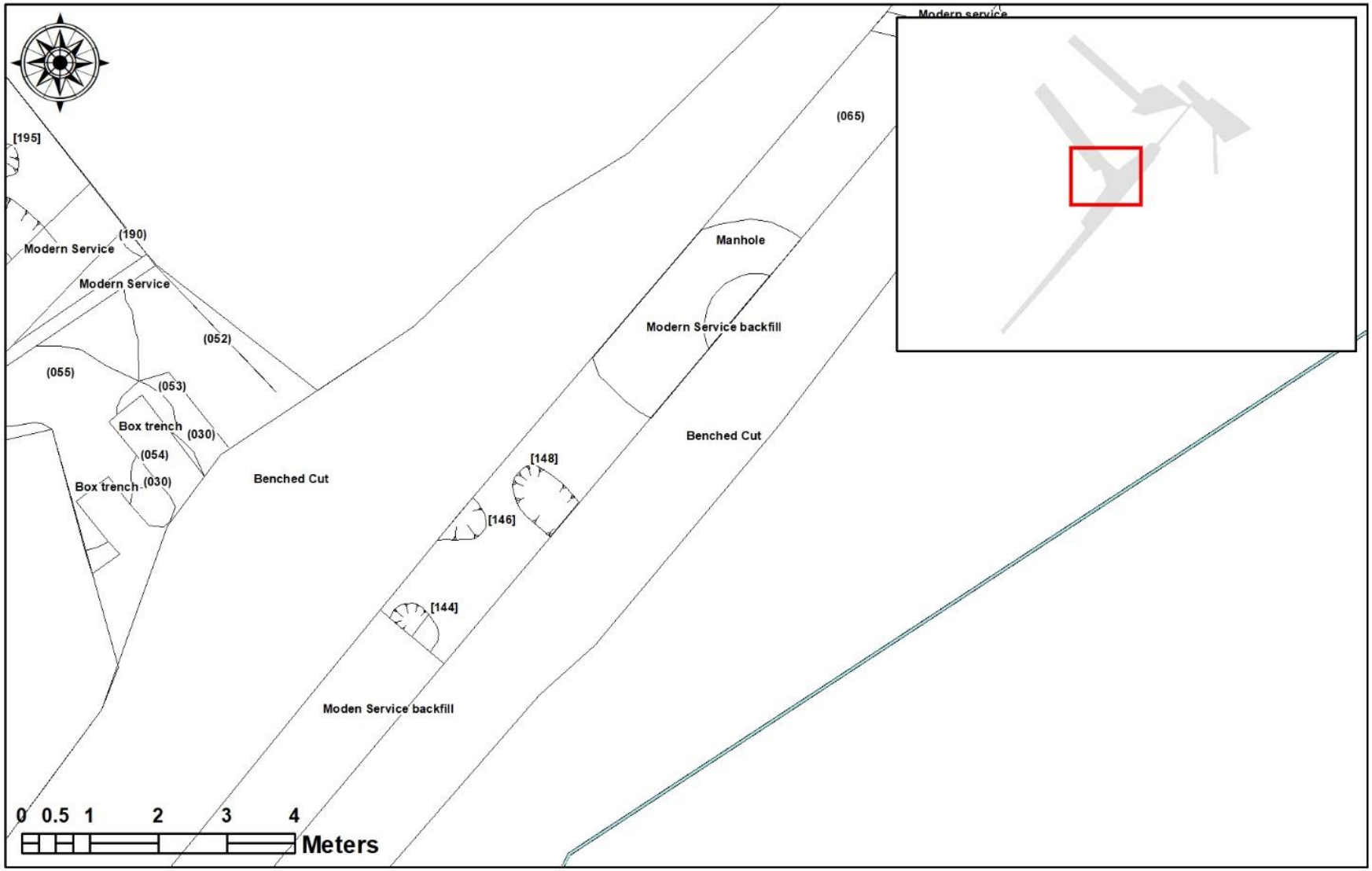


Figure 51. Post-excavation plan of central section of Sewage Trench N–S – see red rectangle for specific location

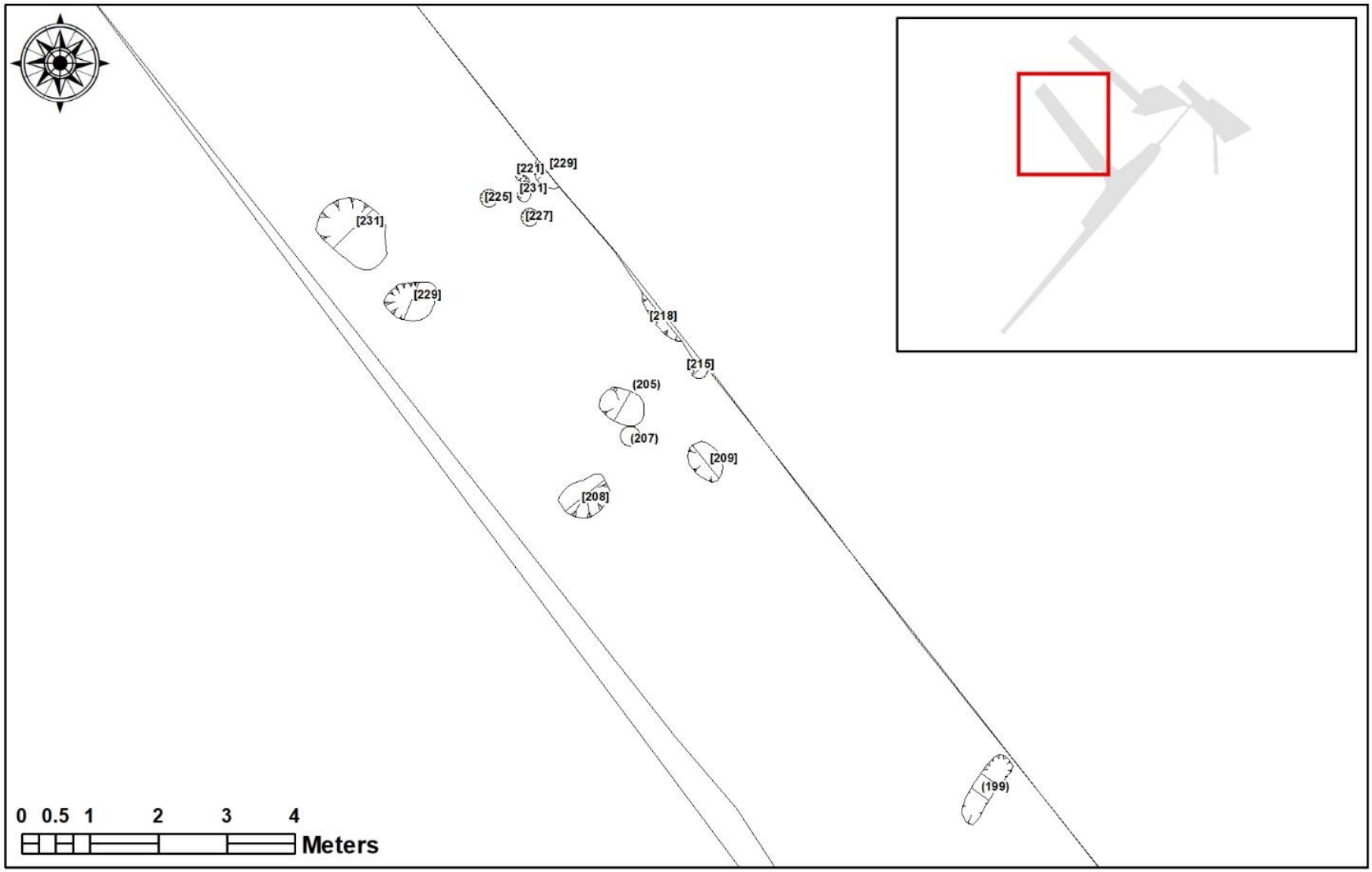


Figure 52. Post-excavation plan of Trench 1 – see red rectangle for specific location

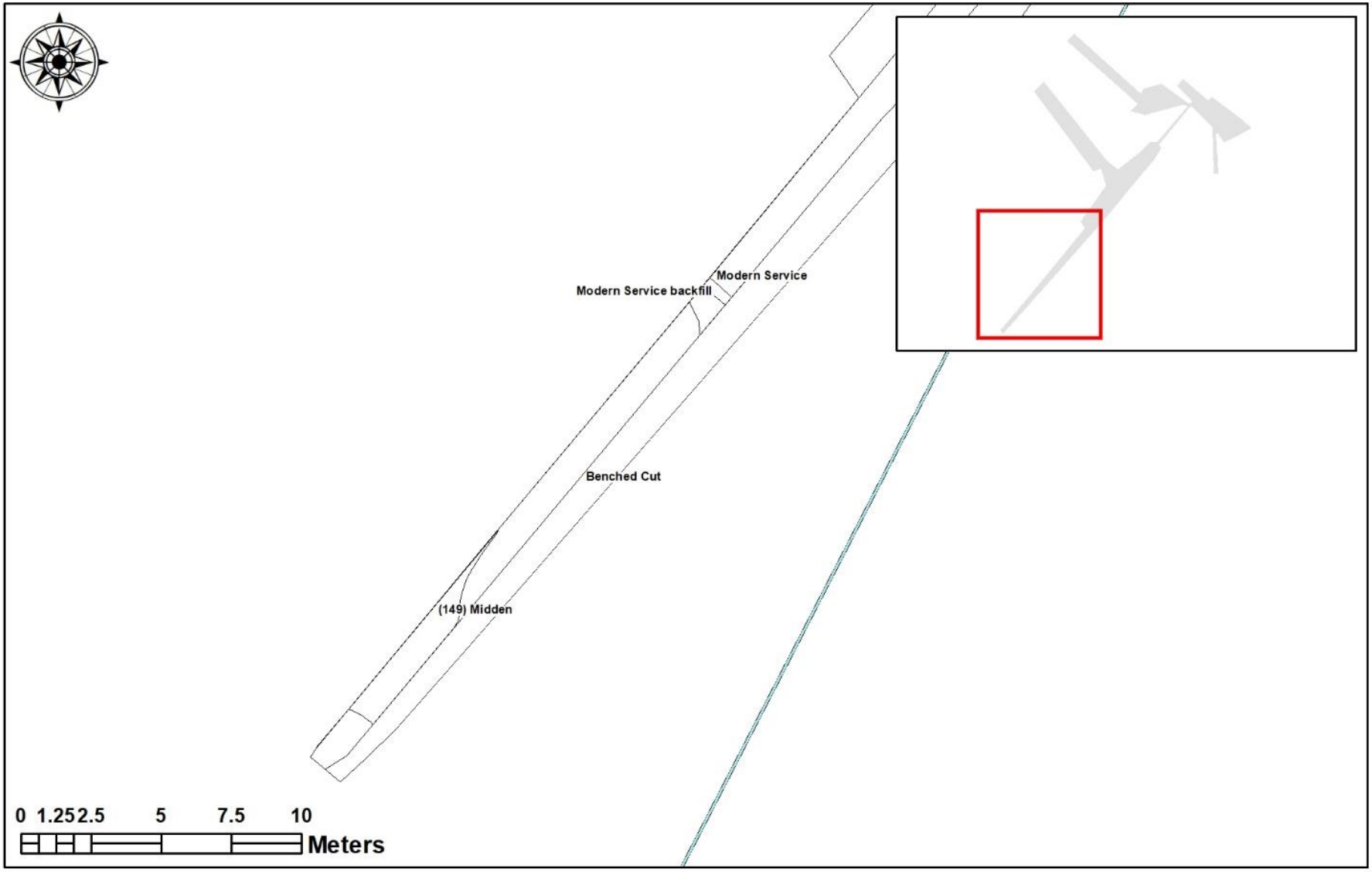


Figure 53. Post-excavation plan of southern section of Sewage Trench N–S – see red rectangle for specific location

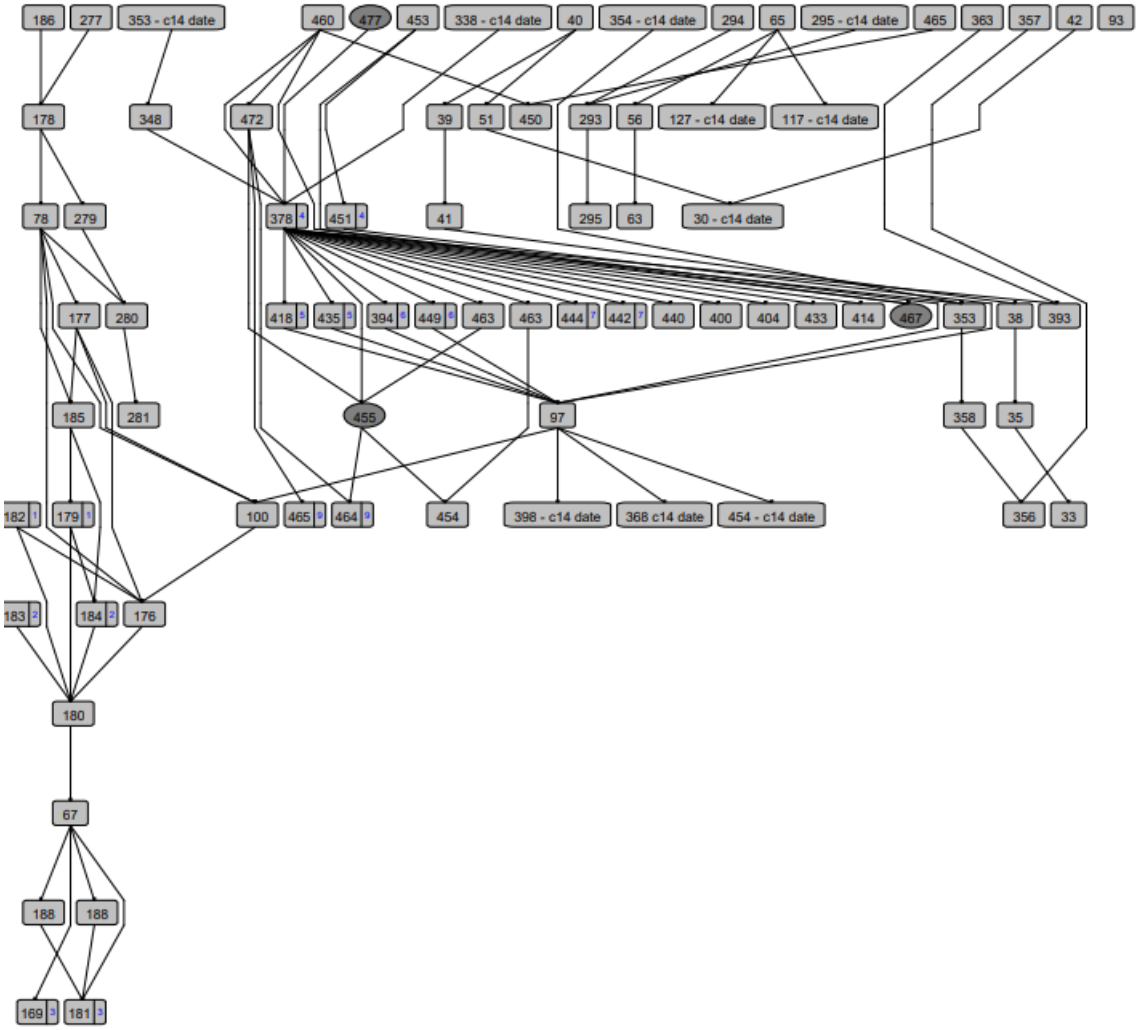


Figure 54. Harris matrix of stormwater sections based on stratigraphic relationship visible in trench walls in Trenches 7 and 8 and sewer connection 2; sand layers (e.g. 065) were used to establish relationships across trenches

Figure 55. Looking southwest at a section through the archaeological deposits to the immediate west of sewerage connection junction (blue pipes on left hand side of photo), in stormwater Trench 8. Scale intervals 0.5m

Figure 56. Looking westwards over hangi feature [420] and a number of smaller scoops and shallow pits in stormwater Trench 8. Scale intervals 0.1m and 0.5m

Figure 57. North-facing section of stratigraphy within stormwater Trench 8. This shows the typical stratigraphic sequence of roading materials of SH10 overlying a layer of midden and features. Scale intervals 0.5m

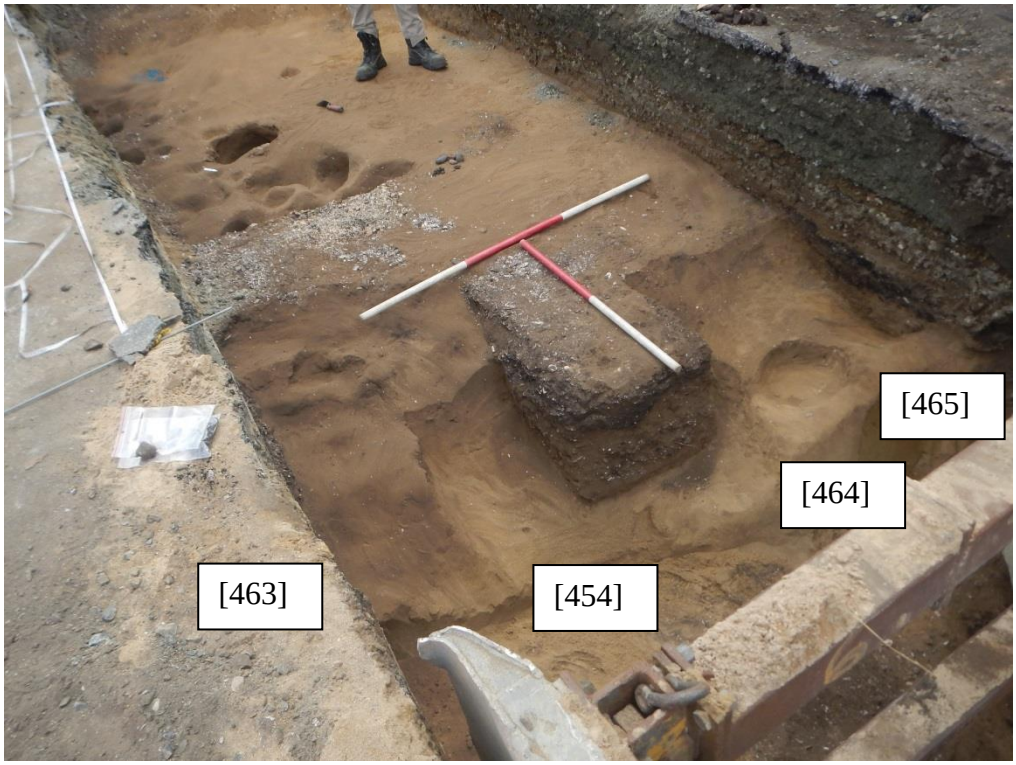


Figure 58. Post-excavation shot looking northeast over pit [454] and hangi [463] as well as scoop [465] and post hole/scoop [464] in stormwater Trench 8. Scale intervals 0.5m

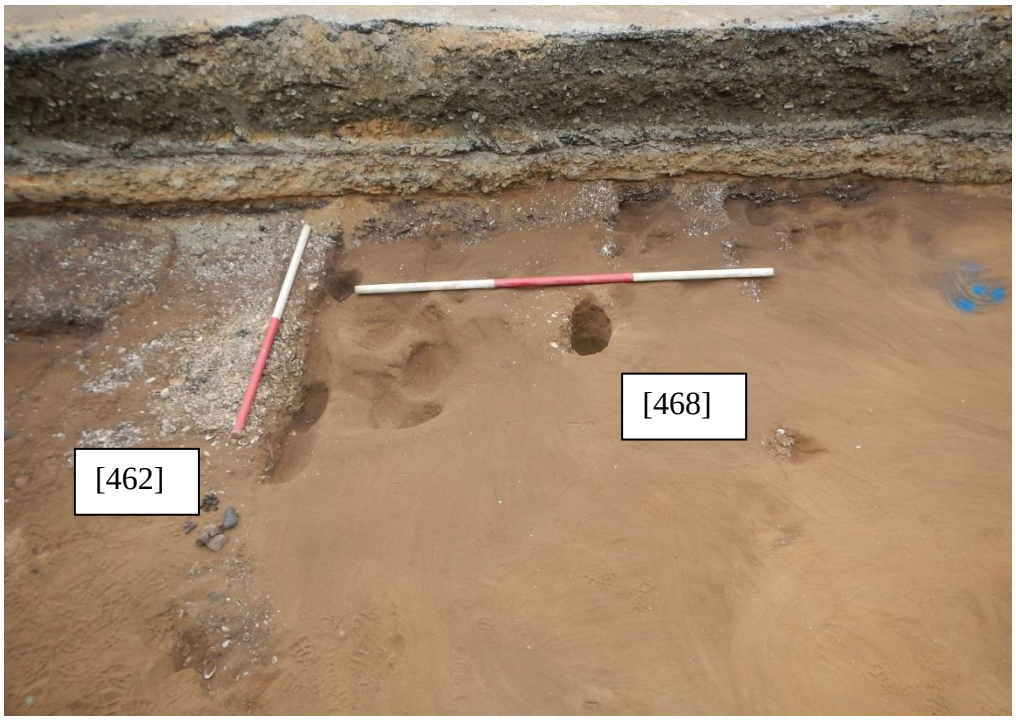


Figure 59. Post-excavation photo of post holes [462] and [468] and associated features as well as the overlying stratigraphy of SH10 in stormwater Trench 8, facing south. Scale intervals 0.5m

Figure 60. Looking northwards during excavation of the new sewerage line (running north-south) through SH10 which then extended along Oruru Road. This is the upper surface of exposed midden (056) Scale intervals 0.1and 0.5m

Figure 61. Looking southwards along the east-facing section of the sewerage trench running beneath SH10. Due to safety requirements (depth and narrowness of the trench) no archaeological access was permitted and recording was undertaken via photography and monitoring (see previous photo). This is midden (056). Scale intervals 0.5m

Figure 62. Insertion of sewerage pipe across SH10 showing east-facing section of stratigraphy and midden (056)

Figure 63. Looking northwards along sewerage trench. This is the location where the intensity of the archaeological features and midden begins to lessen. These are scoop features [146] and [148] beneath midden (056). Scale intervals 0.1m

3.2.4 Stormwater Adjacent to Taipa Area School

This area is located along SH10 from Mamarua Road to the end of the works corridor. It includes the stormwater drainage trenches that were excavated on both the northern and southern side of the highway as well as two trenches which cut across the highway north-south. This work was undertaken over several months from February to May 2019.

Overall, the stratigraphy exposed in the stormwater trenches was consistent, consisting of two modern roading events for SH10 overlying natural sand subsoil. It appears that for the most part the area of SH10 and its shoulder berms had been levelled for the construction of the main highway with modern services (stormwater, power, Chorus and water) being placed in those berms. Figure 64–Figure 69 show examples of this stratigraphy.

With the exception of two small lenses of midden, (297) and (307), located on the northern side of the northern stormwater trench adjacent to the school, no other archaeology was encountered.

Midden (297) consisted of occasional to moderate amounts of crushed pipi shell within a charcoal-stained sand. Occasional pieces of small fire cracked rock were present. The density of the midden varied, measuring 60cm wide (north-south) by 5m long (east-west) by 5cm thick. The midden was only exposed in a short section along the northern side of the trench and had been truncated by modern services (power). This suggests that further midden deposits exist in the sounding area – most likely to the north within the grounds of Taipa Area School. Midden (307) was similar to (297) albeit on a much smaller scale: 260cm in length by 2-3cm thick. Its likely that these middens formed part of a continous deposit.

Figure 64. Looking westward over section of stormwater trench (Trench 5) near Taipa school running north-south over SH10

Figure 65. Looking southwards over stormwater trench (Trench 5) near Taipa school on the northern side of SH10 within road berm. Scale intervals 0.2m

Figure 66. Looking northwards over stormwater trench (Trench 4) at Mamarua Road showing modern services running beneath road. The pipe is 750mm in diameter

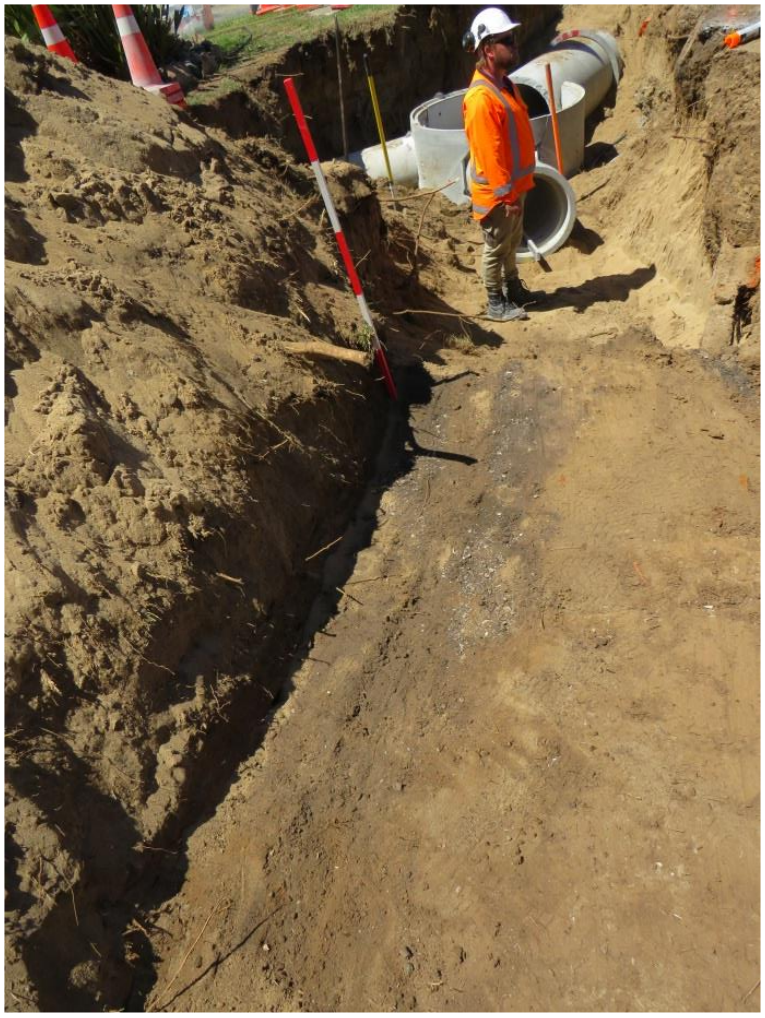


Figure 67. Looking eastwards over midden deposit (297) in stormwater trench (Trench 4) on the northern side of SH10. Scale intervals 0.5m

Figure 68. East-facing section of midden deposit (297) in the stormwater trench (Trench 4) on the northern side of SH10. Scale intervals 0.5m

Figure 69. South-facing section of midden deposit (297) in the stormwater trench (Trench 4) on the northern side of SH10. Scale intervals 0.5m

4 ANALYSIS

4.1 Midden Analysis

This midden analysis documents the methodology implemented in the sorting, identification and quantification of shellfish obtained from the excavations and the results of the analysis of each sample, with a discussion of those results. The following sections aim to investigate the temporal and spatial distribution of taxa, inform on possible subsistence economy strategies from species present in archaeological contexts, and aid in palaeoecological reconstruction.

Methods and Results

Bulk midden samples were collected during works. A total of nine bulk samples from midden deposits and features were processed and analysed.

Samples were dry sieved through 6mm, 4mm and 2mm sieves, with material smaller than 2mm set aside as soil. Components were then recombined and wet sieved through 6mm, 4mm and 2mm sieves, with charcoal and fish bone floated from a 2mm sieve. Sieved material was then air dried and hand sorted into the following components:

- Soil: fine particles removed during sieving; all fine grain particles smaller than 2mm.
- Unidentifiable shell: any shell material which did not include diagnostic features such as hinge or aperture. Often fragmented material.
- Identifiable shell: intact shell and shell including diagnostic features, such as ≥50% of the hinge or whole aperture.
- Charcoal: pieces of charcoal.
- Bone and scales: whole and fragmentary pieces of bone, including mammal and fish bone, and fish scales.

Each component was weighed (see Appendix 5). Soil tended to make up the largest proportion by weight of each sample, with pipi being the most common identified species of shell.

Moderate amounts of charcoal were recovered from all samples, except Sample 129, in which charcoal was second only to soil by volume. Charcoal was sent to Rod Wallace for analysis (see below, section 4.4). Moderate quantities of bone were also found in most samples, mostly fish bone but some mammal (kiore) also (see section 4.2).

Identifiable shell was sorted for further analysis by taxon. Preferred habitat was also noted (Table 1). All taxa identified in this analysis are listed in Table 1–Table 10. The analysis of each taxon examined six aspects: the Minimum Number of Individuals (MNI), MNI percentage, the Number of Identified Specimens (NISP), NISP percentage, weight (in grams) and weight percentage. NISP is calculated by counting the total number of identifiable shells for each species. The minimum requirement to be counted was an umbo for bivalves and whole or nearly whole terminal spires or a complete anterior canal for gastropods. MNI is calculated for bivalves by separating the left and right hinges and using the larger number. For bivalve taxa without clear siding, the total was divided in two. For gastropods the MNI is the largest number counted of the two methods for identifying individuals and NISP is the sum of the two. For those samples where both operculums and gastropods are present the category with the highest number of specimens is counted for MNI. Total weight for each species was calculated to the nearest gram. The taxon analysis for each sample is

presented in Table 2–Table 10. Sample 39 has been excluded from the following analysis as it only contained 22 identifiable shells in total.

Table 1. List of identified taxa by common and scientific names and preferred habitat

Common Name	Scientific Name	Preferred Habitat
Tuangi cockle	*(Austrovenus stutchburyi)*	(Muddy environment)
Gastropod sp.	(various unidentified gastropod species)	Other/Unknown
Pipi	*(Paphies australis)*	(Muddy and/or sandy environment)
Tuatua	*(Paphies subtriangulata)*	(Muddy and/or sandy environment)
Mussel	*(Mytilidae)*	(Rocky environment)
Dosinia	*(Dosinia anus/Dosinia subrosea)*	(Sandy environment)
Limpet	*(Gastropoda/Patellidae)*	(Rocky environment)

Table 2. NISP, MNI and weight by gram, with percentage, for Sample 39 from context 124 (fill of fire scoop 127)

Taxon	NISP	NISP %	MNI #	MNI %	Wt. G.	Wt. G. %
Cockle	5	22.7	3	25.0	2	12.5
Pipi	17	77	9	75.0	14	87.5
Tuatua	0	0.0	0	0.0	0	0.0
Total	22	100.0	12	100	16	100.0

Table 3. NISP, MNI and weight by gram, with percentage, for Sample 49 from context 149 (midden)

Taxon	NISP	NISP %	MNI #	MNI %	Wt. G.	Wt. G. %
Cockle	638	23.2	342	24.3	95	6.8
Pipi	2086	75.8	1043	74.2	1268	90.6
Tuatua	5	0.2	3	0.2	14	1.0
Dosinia	10	0.4	6	0.4	19	1.4
Gastropods Sp.	12	0.4	12	0.9	3	0.2
Total	2751	100	1406	100	1399	100

Table 4. NISP, MNI and weight by gram, with percentage, for Sample 88 from context 293 (redeposited shell midden)

Taxon	NISP	NISP %	MNI #	MNI %	Wt. G.	Wt. G. %
Cockle	241	10.3	123	10.3	77	8.9
Pipi	2049	87.5	1024	85.5	768	88.7
Tuatua	17	0.7	15	1.3	13	1.5
Limpet	7	0.3	7	0.6	0	0.0
Gastropods Sp.	29	1.2	29	2.4	8	0.9
Total	2343	100	1198	100	866	100

Table 5. NISP, MNI and weight by gram, with percentage, for Sample 108 from context 353 (midden)

Taxon	NISP	NISP %	MNI #	MNI %	Wt. G.	Wt. G. %
Cockle	465	7.4	278	8.6	120	5.2
Pipi	5676	90.1	2838	87.5	2164	93.0
Tuatua	4	0.1	3	0.1	6	0.3
Dosinia	60	1.0	31	1.0	27	1.2
Limpet	54	0.9	54	1.7	0	0.0
Gastropods Sp.	38	0.6	38	1.2	9	0.4
Total	6297	100	3242	100	2326	100

Table 6. NISP, MNI and weight by gram, with percentage, for Sample 117 from context 457 (fill of hangi 456)

Taxon	NISP	NISP %	MNI #	MNI %	Wt. G.	Wt. G. %
Cockle	355	9.4	204	10.6	186	8.5
Pipi	3405	90.0	1702	88.5	1981	90.4
Tuatua	2	0.1	2	0.1	0	0.0
Dosinia	13	0.3	7	0.4	18	0.8
Gastropods Sp.	8	0.2	8	0.4	7	0.3
Total	3783	100	1923	100	2192	100

Table 7. NISP, MNI and weight by gram, with percentage, for Sample 125 from context 397 (fill of post hole 398)

Taxon	NISP	NISP %	MNI #	MNI %	Wt. G.	Wt. G. %
Cockle	297	13.5	160	14.1	78	7.3
Pipi	1828	83.2	914	80.6	946	88.7
Tuatua	2	0.1	2	0.2	6	0.6
Dosinia	26	1.2	17	1.5	16	1.5
Toheroa	5	0.2	3	0.3	10	0.9
Limpet	8	0.4	8	0.7	0	0.0
Gastropods Sp.	30	1.4	30	2.6	10	0.9
Total	2196	100	1134	100	1066	100

Table 8. NISP, MNI and weight by gram, with percentage, for Sample 129 from context 399 (fill of hangi 400)

Taxon	NISP	NISP %	MNI #	MNI %	Wt. G.	Wt. G. %
Cockle	19	7.1	12	8.6	5	3.1
Pipi	245	91.4	123	88.5	154	96.9
Dosinia	2	0.7	2	1.4	0	0.0
Gastropods Sp.	2	0.7	2	1.4	0	0.0
Total	268	100	139	100	159	100

Table 9. NISP, MNI and weight by gram, with percentage, for Sample 133 from context 455 (fill of pit 454)

Taxon	NISP	NISP %	MNI #	MNI %	Wt. G.	Wt. G. %
Cockle	242	22.2	123	22.0	104	14.3
Pipi	797	73.1	398	71.3	557	76.7
Tuatua	5	0.5	4	0.7	19	2.6
Mussel	5	0.5	3	0.5	3	0.4
Dosinia	27	2.5	16	2.9	21	2.9
Limpet	7	0.6	7	1.3	0	0.0
Gastropods Sp.	7	0.6	7	1.3	22	3.0
Total	1090	100	558	100	726	100

Table 10. NISP, MNI and weight by gram, with percentage for Sample 134, from context 461 (fill of post hole 462)

Taxon	NISP	NISP %	MNI #	MNI %	Wt. G.	Wt. G. %
Cockle	1156	31.1	713	35.4	480	20.4
Pipi	2414	64.9	1207	59.9	1595	67.9
Tuatua	112	3.0	61	3.0	155	6.6
Limpet	9	0.2	9	0.4	0	0.0
Gastropods Sp.	26	0.7	26	1.3	120	5.1
Total	3717	100	2016	100	2350	100

Discussion

All Taipa Bridge midden samples were heavily dominated by Pipi with the highest MNI and NISP for all nine samples (Figure 70). Cockle was the next highest type followed by related Dosinia and Gastropods, with smaller amounts of Tuatua present in most samples. The site location, at the mouth of an estuary adjacent to a sandy beach, provides easy access to shellfish species which favour a muddy or sandy environment. This is clearly reflected in the nine samples, except for Sample 133 containing rocky shore mussel shell (MNI of 5), and limpets in Samples 88, 108 and 125. The poor preservation of mussels in midden suggests that their presence in pit fill represented by Sample 133 is likely why the shell survived.

The data suggest that the shellfish harvested were from muddy and sandy environments, where pipi beds will often be closer to where the estuary meets the sea. This includes the pipi and cockle, which were easily accessible in the river itself, with tuatua and mussel available from the nearby beach (Harris 2010: 6). Taipa River, with an enclosed barrier spit, narrow river mouth and tidal ebb estuary, may possibly indicate that the high predominance of pipi seen across the samples was a result of local harvesting by pre-Contact Māori as opposed to further afield shellfish harvesting. Relevant environmental variables which influence pipi growth are shell/sandbanks, gross topography, streams, and sediment. Both pipi and cockle species are found in a range of sheltered and semi-enclosed marine habitats such as embayments, estuaries, and harbours, where they frequently form high-density patches and extensive beds within intertidal sediments (Figure 71).

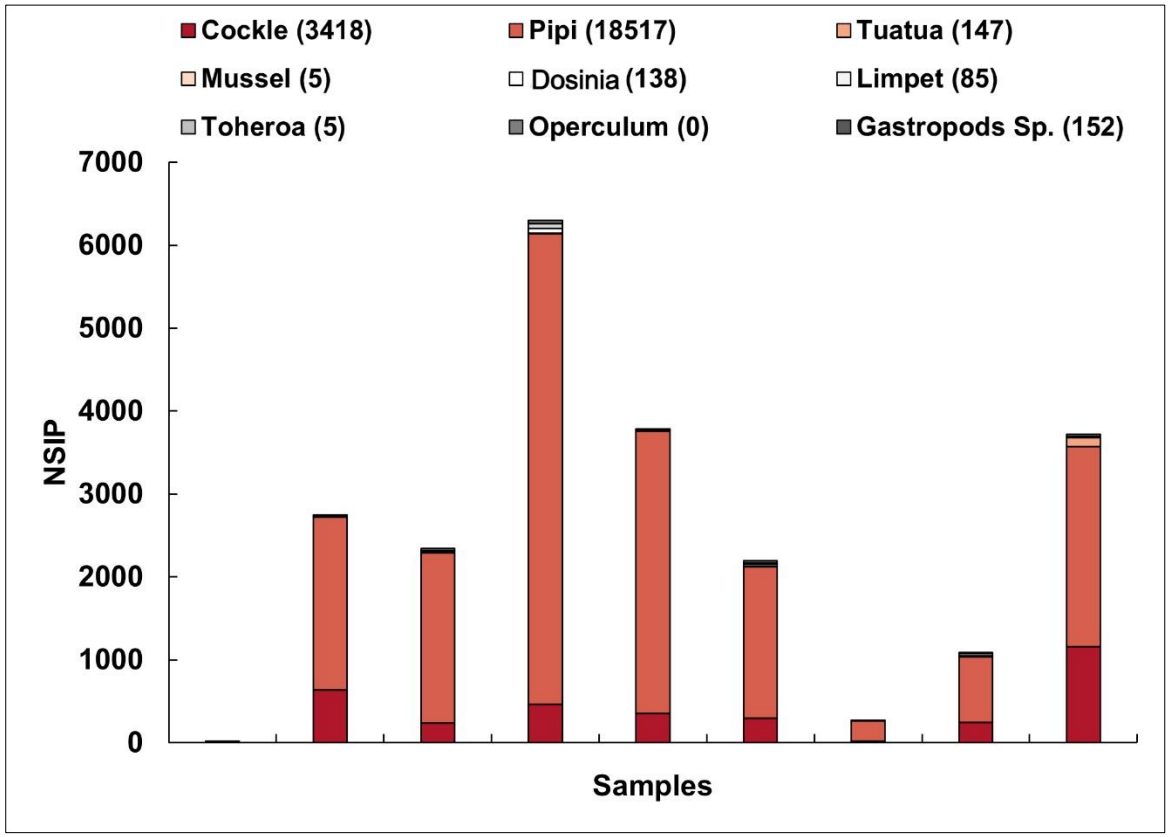
Local harvesting is reflected in pipi shell sizes. Pipi are considered mature at 40mm, and can reach up to 60mm in length, indicating that the pipi represented in these middens were largely mature, though some juveniles were also harvested (Fisheries NZ 2022). Human impacts on natural resources can be detected by changing shell dimensions over time. When people settle an area for a long period of time, larger individual shells will be selectively harvested, leading to an overall reduction in shell size within a species over time. Alternatively, mobile groups passing through a region may select only the largest or most high value shellfish, moving on before they impact local resources, in which case shell size will be consistent over time.

A hundred largely intact pipi shells were selected from each sample and the length measured. The results are represented in Figure 72. Overall, the mean shell size is consistent across most of the samples, ranging between 28 and 32mm. However, Sample 129 shows a lower-than-average mean value of 25mm and Sample 49 a higher-than-average mean of 35mm. For reference, modern-day median pipi size across all Northland east coast beaches was 29mm in 2010, with harvestable size defined as pipi larger than 50mm (Pawley and Smith 2012; see Figure 73). Pipi across all samples are smaller than modern-day harvestable size, suggesting harvesting pressure. The data from the

midden analysis may reflect that the area was used several times by a mobile Māori population who did not stay long enough to deplete resources, but who were accessing lower than average sized pipi under harvesting stress. However, seasonality and changes in sea temperature over that time period may all contribute to shell size and make definitive statements difficult (Smith 2013).

Overall, the midden analysed from Taipa Bridge is largely consistent across all samples, including the sample from redeposited midden (293) on the eastern side of the bridge. Pipi is the dominant species present by a significant margin, followed by cockle. The site location at an estuary with nearby sandy beach is an ideal location for these species so it is likely the population was harvesting, processing and consuming shellfish locally. The only rocky shore species present were mussel from pit fill (Sample 133) and limpets from three other samples, but these types of shellfish will often grow on small clusters of rocks on sandy beaches so this is not necessarily evidence of shellfish gathering elsewhere.

The consistency of the material suggests that there was little change over time on the local shellfish resources as evidenced in the midden. Radiocarbon dating (see section 4.5) suggests the site was used over three main time periods, although primarily in the mid-1500s AD and late 1700s AD, and the midden analysis therefore suggests there was little change in accessible shellfish across that time.



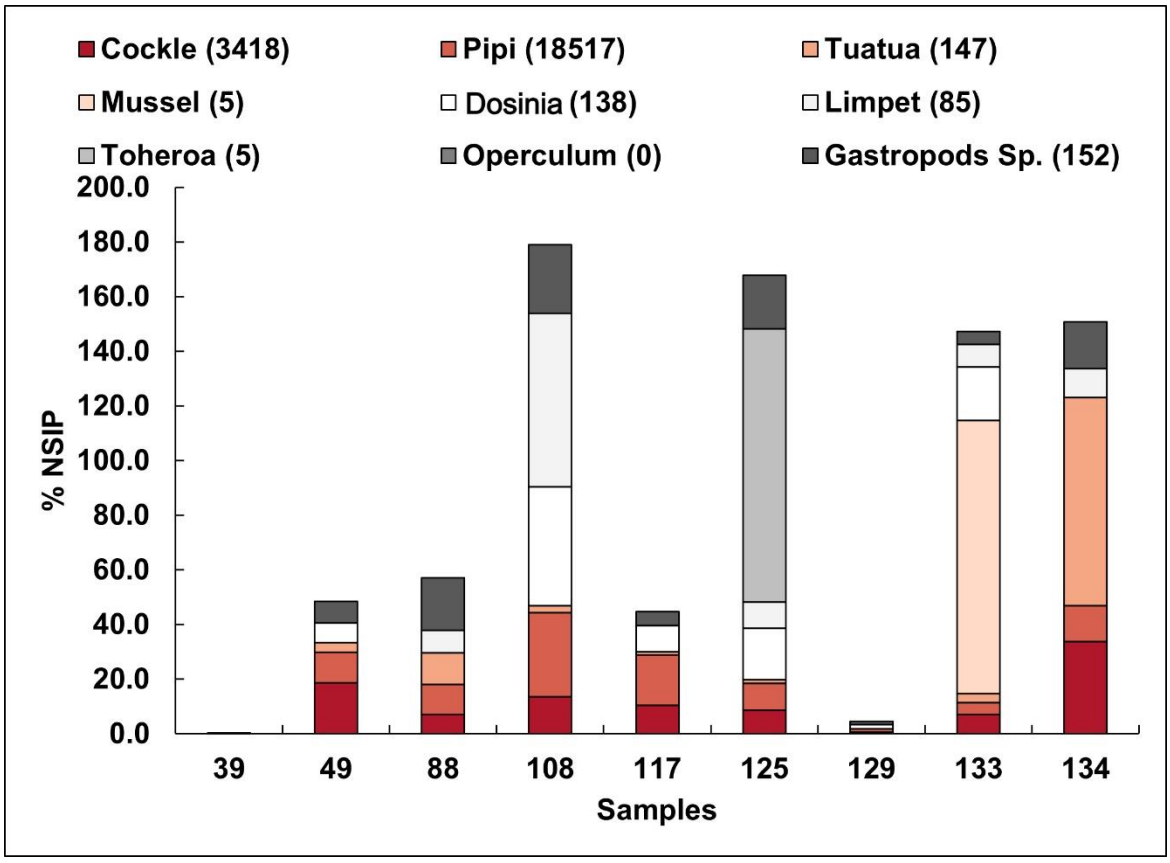


Figure 70. NISP (above) and %NISP (below) across samples

Figure 71. Coastal hydrosystems (Hume et al. 2016) with associated estuaries and midden sites within 1000m of the shoreline

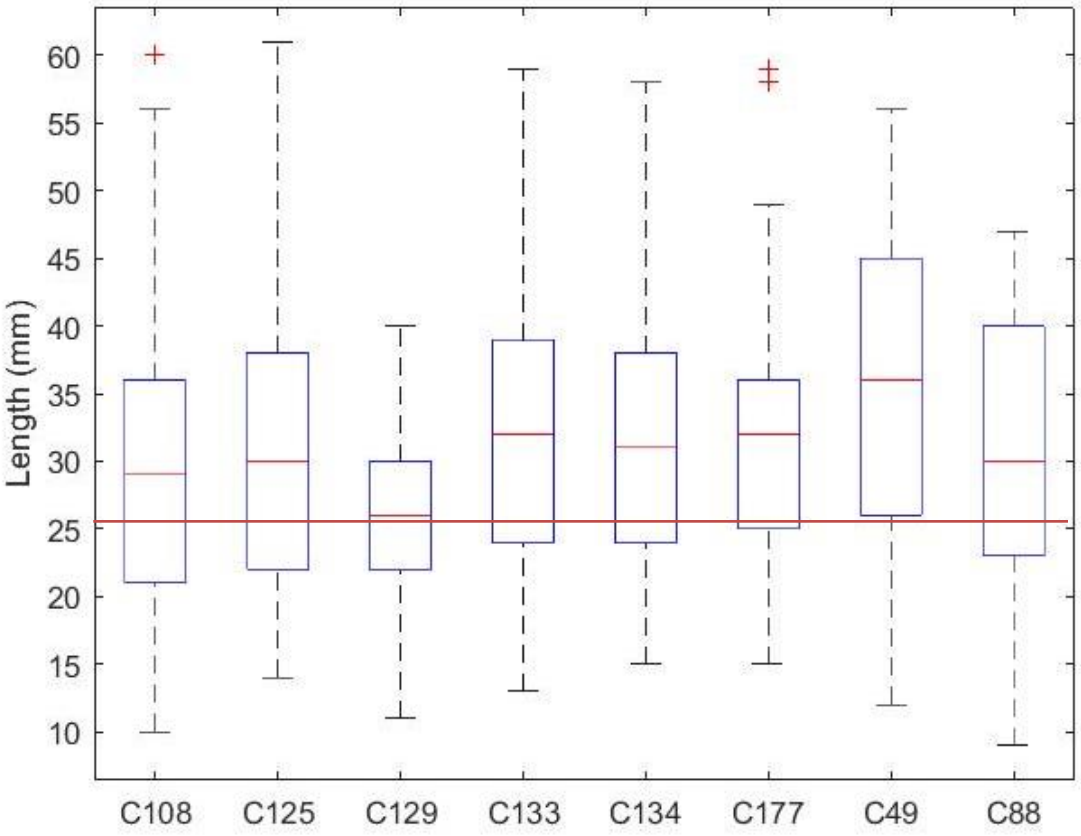


Figure 72. Box and whisker plot for pipi across all samples (excluding Sample 39)

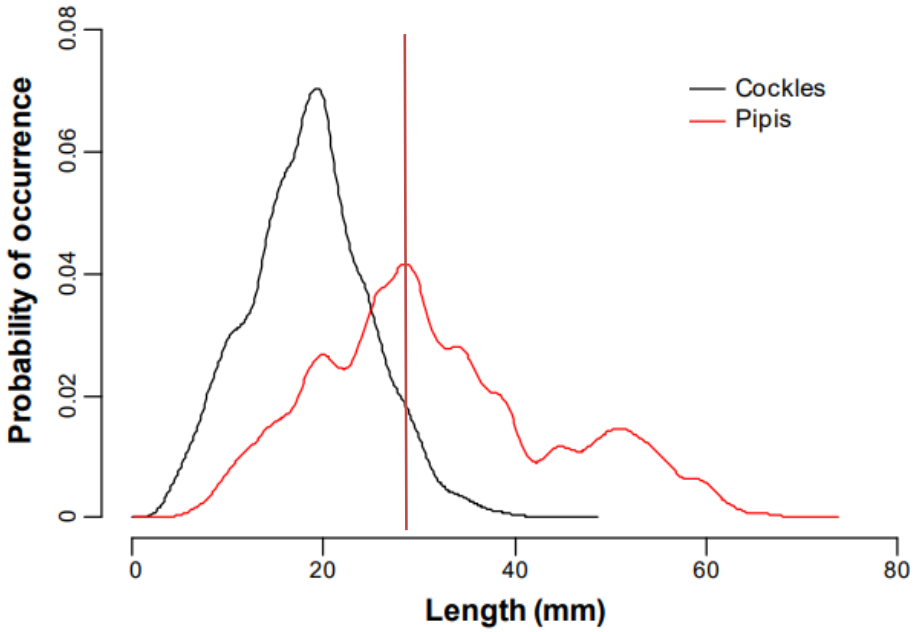


Figure 73. Figure taken from (Pawley and Smith 2012) showing length frequency distributions for cockles (black) and pipis (red) from Northland east coast beaches in 2010; the brown line shows the median for the shellfish analysed in the report

4.2 Analysis of Fish and Other Bone

This faunal analysis documents the methodology implemented in the sorting, identification and quantification of fish and other bone obtained from the excavations, the results of the analysis of each sample, and a discussion of those results. The following sections aim to investigate the temporal and spatial distribution of taxa, inform on possible subsistence economy strategies from species present in archaeological contexts, and aid in palaeoecological reconstruction.

Methods

Vertebrate material was sorted to element and side where possible and identified to lowest taxonomic unit. Fish bone was identified using the author's personal reference material, as well as the University of Auckland Reference collection and relevant literature (Campbell 2016; Campbell et al. 2019). Fish bones were identified on a wider range of elements beyond the methodology outlined by Leach (1986), which focuses on the five paired mouth parts (dentary, premaxilla, maxilla, articular, and quadrates). Other diagnostic head bones, special bones, and vertebrae were identified based on recommendations by Campbell (2016) and Nims and colleagues (2020).

Following identification, the material was quantified using zooarchaeological standard protocols (Grayson 1984; Reitz and Wing 2008) and re-bagged according to provenance, species, element and side (if applicable). Quantified data was entered into an Excel spreadsheet along with MNE (Minimum Number of Elements) values, and weight. MNE values were then used to calculate MNI (Minimum Number of Individuals). Scientific and common names for all identified taxa are provided in Table 11.

Table 11. Table of scientific and common names of taxa identified

Class	Species	Common Name
Fish	Carangidae	Jacks, Trevallies
	Chrysophrys auratus	Tāmure/Snapper
	Chelidonichthys kumu	Red gurnard
	Pseudolabrus sp.	Wrasse sp.
	Pseudocaranx dentex	Trevally
	Meuschenia scaber	Smooth leatherjacket
	Mugil cephalus	Grey mullet
	Nemadactylus macropterus	Tarakihi
	Notolabrus celidotus	Spotty
	Scorpis lineolata	Silver sweep
	Sardinops sagax	Mohimohi/Pilchard
	Thrysites atun	Barracouta
	Trachurus declivis	Jack mackerel
	Upeneichthys lineatus	Goatfish (bluestriped)
Echinoidea	-	Sand dollar/ Cake urchin

Crustacean	*c.f. Ovalipes catharus*	Paapaka /paddle crab
Mammal	*Rattus exulans*	Kiore/ Polynesian rat

Results

The distribution of taxa from the fish bone assemblages analysed in the Taipa Bridge samples are typical of North Island (Te Ika-a-Māui) archaeological assemblages (Table 12–Table 22) and what would be expected of Northland sites. Four bony fish taxa – *Chrysophrys auratus* (snapper), *Meuschenia scaber* (smooth leatherjacket), *Thrysites atun* (barracouta) and Carangidae (jacks, trevallies) – were identified from the redeposited shell midden at SH10, context 293 (Table 12), each with an MNI of 1. One crab claw was also identified from this midden. Three taxa – *Mugil cephalus* (grey mullet), Carangidae, and *Chelidonichthys kumu* (red gurnard) – were identified from the Stormwater Trench 7, midden context 353 (Table 13), each with an MNI of 1. Two bony fish were identified from Stormwater Trench 8, post hole fill context 397 (Table 14). These were *Chelidonichthys kumu* and Carangidae, both with an MNI of 1. Scutes were included in the Carangidae identification and are typically not identified further than the family level. At least 1 individual was identified to the Carangidae family from Stormwater Trench 8 pit fill context 455 (Table 15). Rat bone was also present in this assemblage. Based on the size of the teeth and mandible recovered, although poorly preserved, and considering the overall context and associated chronological information for the site, the identification was attributed to *Rattus exulans*. Stormwater Trench 8 midden 353 contained the highest number of identified taxa, all of which had an MNI of 1 respectively (Table 16). In addition, at least 1 individual was identified in Sample 117 (hangi fill context 457) and Sample 129 (hangi fill context 399), both from 2mm sieve screen sizes (Table 17 and Table 21). Several other species were recovered from Sample 117 with a 2mm sieve screen size with an MNI of 1 respectively for each taxon: *Upeneicthys lineatus* (goatfish), *Notolabrus celidotus* (spotty), *Chrysophrys auratus, Nemodactylus acropterus* (tarakihi) and one individual identified to the Carangidae family from scutes recovered. A *Pseudocaranx dentex* (trevally) was identified in two contexts (Table 19 and Table 20) with an MNI of 1 respectively. An MNI of two *Sardinops sagax* (pilchard) were recovered from the Taipa material – one specimen from Stormwater Trench 8 pit fill context 455 and the second in context 117 (Table 17). At least one cake urchin individual was present from the fragments recovered, although species identification was not possible. One crab claw was also present and one rat mandible, which based on size, diagnostic morphological traits, and associated archaeological context was identified as *Rattus exulans*.

Discussion

The preservation of fish bone is dependent on local taphonomic processes and excavation of the associated archaeological deposits, as well as recovery methods. The low MNI of fish taxa recovered may have been a result of various taphonomic processes, such as acidic soils and modern activity. However, the number of recovered taxa and broad diversity, particularly from Stormwater Trench 8 and Sample 117 using the 2mm sieve size, suggest fish were deliberately brought into the area. Fish with smaller bones are also subject to higher rates of fragmentation and taphonomic processes which draws caution to the fact that smaller-boned fish species may have a more significant role than the quantified results suggest (Campbell et al. 2019).

While MNI counts are low, the diverse fish taxa represented in the Taipa assemblages are typical of northern North Island coastal waters. Fish from the Carangidae family were the most commonly identified specimens and are frequently represented in Māori archaeological fish assemblages (Vogel 2018; Campbell et al. 2019). Mackerel (hāture, *Trachurus* sp.), which are part of the Carangidae family, are known to dominate open water coasts (Leach 2006; Campbell et al. 2009). Wrasses were a common source of subsistence for Māori, particularly the *Pseudolabrus* sp. identified from Stormwater Trench 8 (Paulin 2007; Smith 2013; Campbell et al. 2019). *Scorpis lineolata*, or the silver sweep, is found in northern North Island waters and resides in rocky reefs and brackish waters. They are not common in archaeological assemblages; however, other species from the *Scorpis* genus have been documented (Campbell et al. 2019). The use of 2mm screen size enabled increased recovery of smaller species such as *Sardinops sagax* that are common in northern Aotearoa waters. Campbell (et al. 2019:85-87) observes that the presence of pilchard in Māori archaeological sites indicates they were likely captured through nets rather than baited due to their small jaws and they may be more important to Māori than previously thought (see Paul et al. 2001:17). Their Māori name, mohimohi, indicates they were identified by Māori as an individual species (Paul et al. 2001:17). *Upeneicthys lineatus* are bottom-dwelling fish that are frequent in the northern waters of Aotearoa, as are both *Notolabrus celidotus* and *Nemadactylus acropterus,* which also appear frequently in northern archaeological assemblages (Anderson 1997).

Although crab is present in two contexts, it is unclear whether this is a result of natural processes or deliberate catch due to the low number of crab claws retained, although crabs are found in archaeological assemblages across Aotearoa (Lawlor 1981; Vogel 2020). Based on the surrounding environment and ecological context, the crab remains are likely from *Ovalipes catharus*, which are found widely around the sandy beaches of Aoteaora in harbours and estuaries and at intertidal zones (Wilkens and Ahyong 2015). The cake urchins/sand dollar segments recovered are likely from *Fellaster zealandiae,* which is endemic to Aotearoa and also referred to as ‘snapper biscuit’, due to being predated by snapper and other large fish (Miller and Batt 1973). It is plausible the small number of segments were recovered as a by-product from processed fish remains.

The mandibular bones and teeth recovered from *Rattus exulans* were highly fragmented, indicating that the low MNI counts could be limited by taphonomic processes impacting the assemblage. Rat bones can enter archaeological assemblages through natural post-depositional processes, and it is unclear if their presence indicates deliberate targeting.

Table 12. Faunal identification of SH10, redeposited midden context 293

Class	Species	NISP	MNE	MNI	Weight(g)
Fish	***Chrysophrys auratus***			**1**	
	Quadrate	1	1		0.16
	Meuschenia scaber			**1**	
	Vertebra, caudal	1	1		<0.1
	Thyrsites atun			**1**	
	Maxilla	1	1		0.64
	Carangidae			**1**	
	Vertebra, caudal	1	1		<0.1
	Vertebra, abdominal	1	1		<0.1
	Unidentified				
	Vertebra	6			<0.1
	Fragments	22			1.56
Crustacean	**Crab Sp.**				
	Claw	1	1	1	0.56
	Total	**34**	**6**	**5**	**2.92**

Table 13. Faunal identification of Stormwater Trench 7, midden context (353)

Class	Species	NISP	MNE	MNI	Weight(g)
Fish	***Mugil cephalus***			**1**	
	Vertebra, caudal	1	1		0.1
	Carangidae			**1**	
	Vertebra, abdominal	1	1		0.1
	Chelidonichthys kumu			**1**	
	Lachrymal	1	1		0.1
	Unidentified				
	Vertebra	4			0.11
	Fragments	66			1.07
	Scales	130			<0.1
	Fragments	3			<0.1
	Total	**206**	**3**	**3**	**1.48**

Table 14. Faunal identifications for Stormwater Trench 8, context 397 (fill of post hole 398), Sample 125

Class	Species	NISP	MNE	MNI	Weight (g)
Fish	***Carangidae***			1	0.82
	Quadrate	1	1		0.15
	Vetrebra, caudal	2	2		0.24
	Scutes	24	24		0.1
	Unidentified Fragments	20			0.38
	Total	**47**	**27**	**1**	**1.2**

Table 15. Faunal identifications for Stormwater Trench 8, context 455 (fill of pit 454)

Class	Species	NISP	MNE	MNI	Weight(g)
Fish	***Chelidonichthys kumu***			**1**	
	Vertebra, atlas	1	1		<0.1
	Lachrymal	2	1		<0.1
	Sardinops sagax	1	1	1	<0.1
	Vertebra, caudal				
	Carangidae			**1**	
	Hyomandibula	1	1		0.8
	Vertebra, caudal	1	1		<0.1
	Scutes	24	24		<0.1
	Unidentified				
	Quadrate	1	1		<0.1
	Vertebra	10			<0.1
	Misc. spines	33			0.1
Shell	Fragments	7			<0.1
Mammal	***Rattus* sp.**			**1**	
	Teeth	2	2		<0.1
	Mandible	1	1		<0.1
Total		**84**	**33**	**4**	**0.9**

Table 16. Faunal identification of Stormwater Trench 8 context 461 (fill of post hole 462)

Class	Species	NISP	MNE	MNI	Weight(g)
Fish	***Pseudolabrus* sp.**			**1**	
	Vertebra, caudal	1	1		<0.1
	Chelidonichthys kumu			**1**	
	Vertebra, caudal	1	1		<0.1
	Lachrymal	1	1		0.1
	Nemadactylus macropterus				
	Vertebra, caudal	1	1		<0.1
	Trachurus declivis				
	Supraoccipital	1	1		0.16
	Scorpis lineolata			**1**	
	Vertebra, caudal	1	1		<0.1
	Carangidae				
	Scutes	4	4	1	<0.1
	Unidentified				
	Scales	9			0.27
	Vertebra	6			<0.1
	Misc. Spines	161			<0.1
	Fragments	105			1.92
	Tooth	1	1		<0.1
Echinoidea	**Cake Urchin/Sand dollar**			**1**	
	Valve	5			0.1
Crustacean	**Crab sp.**			**1**	
	Claw	1	1		<0.1
Mammal	***Rattus* sp.**			**1**	
	Mandible	1	1		0.1
	Total	**299**	**13**	**7**	**2.65**

Table 17. Faunal identification of Stormwater Trench 8, context 457 (fill of hangi 546), 2mm sieve

Class	Species	NISP	MNE	MNI	Weight (g)
Fish	***Sardinnops sagax***				
	Vertebra, caudal	1	1	1	<0.1g
	Upeneichthys lineatus				
	Vertebra, caudal	1	1	1	<0.1g
	Notolabrus celidotus				
	Vertebra, caudal	1	1	1	<0.1g
	Chrysophyrs auratus				
	Ultimate vertebra	1	1	1	<0.1g
	Nemadactylus acropterus				
	Abdominal vertebra	1	1	1	<0.1g
	Carangidae				
	Scutes	68	68	1	0.35
	Unidentified				
	Vertebra	10			<0.1g
	Misc fragments	90			0.1
Shell	Fragments	7			<0.1g
Total		**180**	**73**	**6**	**0.45**

Table 18. Faunal identification of Sewerage Trench N-S (17-22m) midden context 149, 2mm sieve

Class	Species	NISP	MNE	MNI	Weight (g)
Fish	**Unidentified Fish Bone**				
	Misc fragments	19			0.12

Table 19. Faunal identification of Sample 117, 4mm sieve

Class	Species	NISP	MNE	MNI	Weight (g)
Fish	***Pseudocaranx dentex***	1	1	1	<0.1
	Caudal vertebra				
	Unidentified Fish Bone	2	2		<0.1
	Scales				
Unidentified	Misc Bone	3	3		0.1
	Total	**6**	**6**	**1**	**0.1**

Table 20. Faunal identification of Sample 49, 4mm

Class	Species	NISP	MNE	MNI	Weight(g)
Fish	***Cf. Pseudocaranx dentex***			**1**	
	Caudal vertebra	1	1		<0.1
	Unidentified Fish Bome				
	Scales	2	2		<0.1
	Misc	7	7		0.15
	Total	**10**	**10**	**1**	**0.15**

Table 21. Faunal identification of Stormwater Trench 8 context 399 (fill of hangi 400), Sample 129, 2mm sieve

Class	Species	NISP	MNE	MNI	Weight (g)
Fish	***Carangidae***	1	1	1	<0.1
	Unidentified Fish Bone	20	20		0.15
	misc				
	Total	**21**	**21**	**1**	**0.15**

Table 22. Faunal identification of Sample 129, 4mm sieve

Class	Species	NISP	MNE	MNI	Weight (g)
Unidentified	**Unidentified bone** Misc	16	16		0.17

4.3 Lithic Analysis

Introduction

No culturally modified lithics were identified during lithic analysis for Taipa Bridge, and only a sub-sample of lithic material collected during works was examined, with a general description of bulk material.

Methods

Dimensions for the selected sub-sample are recorded, including maximal length and width in millimetres, and weight in grams (Table 23).

Results

Lithic material sampled separately is largely indistinguishable from rock found in bulk samples and is made up of fire cracked rock (FCR), pebbles and other natural rocks. Objects 1 to 4 described below are a representative sub-sample.

Table 23. Measurements of objects

Context	Object	Material	Type	Max L (mm)	Max. W. (mm)	Max. T. (mm)	Weight (gm)
461	1	Argillite	Unmodified	70	41	21	132
460	2	Volcanic	Unmodified	59	36	14	32
75	3	Greywacke	Unmodified	53	38	5	17
79	4	Greywacke	Unmodified	32	22	4	7

Object 1 (Sample 135; Figure 74) is a polished nodule of fine-grained light and dark grey matrix with cream inclusions, found within the fill of a truncated post hole (context 461). There was no evidence of cultural modification, such as striations or evidence of intentional polishing.

Object 2 (Figure 75) is large grained volcanic material with a triangular cross section, found within a hangi, context 460. Red colouring and broken edges appear to be the result of heat damage.

Object 3 (Sample 24; Figure 76) is a thin section of fine-grained dark grey material with laminated fracture planes found in midden context 75. It is likely greywacke shaped by natural weathering. There was no evidence of cultural modification.

Object 4 (Sample 23; Figure 77), is a fragment of medium grained, rough textured grey material with laminated fracture planes, from scoop context 79. It is likely greywacke shaped by natural weathering, with no evidence of human modification.

Figure 74. Object 1: Sample 135, context 461

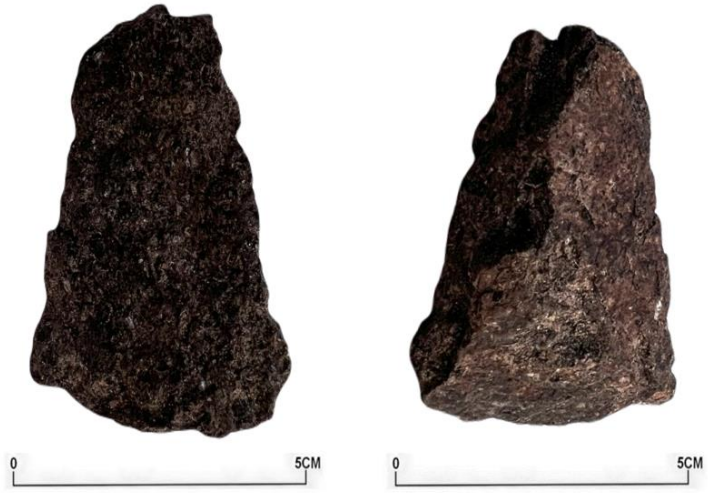


Figure 75. Object 2: no sample number, context 460

Figure 76. Object 3: Sample 24, found in midden deposit context 75

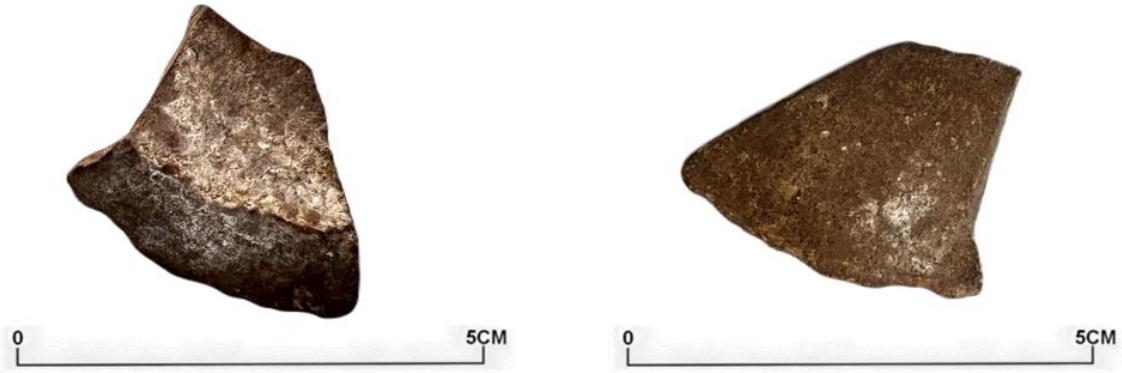


Figure 77. Object 4: Sample 23, found in scoop context 79

4.4 Charcoal Identification

This charcoal identification report documents the methodology implemented in the sorting, identification and quantification of charcoal obtained from the excavations, the results of the analysis of each sample (see Appendix 6), and a discussion of those results.

Charcoal analysis (anthracology) involves the identification and examination of carbonised wood remains relying on the observation of the three-dimensional anatomical structure of wood. Carbonised wood is often the by-product preserved in archaeological deposits. These deposits reflect not only the vegetation accessible to (and used by) communities in any given settlement but also the ways in which such resources were perceived, adapted to local conditions and finally incorporated into daily life (and by extension, subsistence economies).

The charcoal assemblage from the archaeological features/deposits exposed at Taipa Bridge suggests that mangrove was present in the tidal reaches of the Taipa River (Table 24). Interestingly, forest conifers are completely absent, suggesting the area was cleared of primary forest when the deposits were formed. Only two tree taxa are present, pohutukawa and puriri. These taxa persist on coastal landscapes to the present day and formed a part of the coastal niche exploited by Māori settlement. Smaller tree species are dominant, with the samples dominated by manuka and kanuka which, together with smaller shrubs, contribute 90% of the land taxa identified.

Clearly forest clearance occurred here long before these deposits were formed. Vegetation present during occupation consisted of Ti tree / Manuka scrub. This plant association occurs when firing intervals between burn-off are reasonably long as opposed to short interval firing, when bracken and small shrubs dominate. This plant also has a wide range of uses for Māori.[3]

Table 24. Summary of Taipa charcoal identification results

Taxa	Type	# pieces	%	# Occurrences	%
Bracken	Fern	1	0.5%	1	2%
Tutu	Small Shrubs	6	33%	4	39%
Hebe		2		2	
Coprosma		31		7	
Fivefinger		2		1	
Lancewood		9		1	
Pittosporum		4		3	
Mingimingi		19		4	
Mapou		5		2	
Manuka	Scrub sp.	67	53%	10	35%
Kanuka		59		12	
Pohutukawa	Broadleaf trees	6	4%	3	10%
Puriri		3		3	
Mangrove		22	9%	9	15%
Totals		236		62	
# pieces = pieces of each taxon identified					
# Occurrences = # samples out of 17 each taxon appears in					

[3] https://rauropiwhakaoranga.landcareresearch.co.nz/names/34969a5f-698d-437d-8a84-c71dd2135

4.5 Radiocarbon Dating

Ten charcoal samples identified as short-lived species were radiocarbon dated from the site (Table 25, see Appendix 7). The calibrated dates suggest that the site was used over at least two general periods and probably with a third later intrusion (Figure 78). The earlier occupation dates to the mid-1500s AD/CE and includes the dates from contexts 30 (midden), 124 (fill of fire scoop 127) and 369 (fill of scoop 368). Most of the other dates calibrated to around the mid-1700s AD with a later early 1800s occupation suggested by the date from context 397 (fill of post hole 398). Using stratigraphic information, Bayesian modelling of the dates can be used to refine the chronology to some extent; at its simplest, calibrating the dates with two main phases and a late intrusion dating to around 1850. This is largely the same as the unmodelled dates with the early and middle occupations grouping in the late 1500s and mid to late 1700s respectively (Figure 79). A date collected by Harris (2010) from the pipi shell from the same site (Wk27484) was calibrated and also fits the early phase of the site dated by the charcoal presented here (Figure 80). The dates from O04/1022 now represent the best samples from an archaeological site in the Taipa region, although the earliest phase of settlement is not represented at this site. Comparing the dates from the Far North region currently available, excavations at O04/1022 represent much of the occupied sequence from the mid-1500s AD onwards but not the earlier occupation identified in the region (Figure 81). Given the site's location in the inner harbour, this is perhaps not surprising, with earlier occupation more likely nearer the coast.

Table 25. Radiocarbon dates from Taipa site O04/1022 excavations calibrated using ShCal20 (see Appendix 7)

Sample	Material	CRA	Error	Area	Feature	Calibrated -1σ	Calibrated 1σ	Calibrated -2σ	Calibrated 2σ
Wk54397	Charcoal	195	26	Trench 7	353	1671	1876	1666	1950
Wk54398	Charcoal	150	26	Trench 8	398[397]	1671	1876	1666	1950
Wk54399	Charcoal	257	25	Trench 6	338[339]	1697	1950	1688	1950
Wk54400	Charcoal	252	25	Trench 7	354[355]	1651	1798	1644	1803
Wk54401	Charcoal	246	13	West Abutment	30	1661	1797	1653	1800
Wk54402	Charcoal	375	24	Sewerage trench N-S	124[127]	1497	1627	1464	1631
Wk54403	Charcoal	370	25	Trench 7	369[368]	1501	1628	1464	1635
Wk54404	Charcoal	338	25	Sewerage trench N-S	117	1510	1640	1502	1650
Wk54405	Charcoal	206	16	Trench 8	455[454]	1673	1806	1666	1810
Wk54406	Charcoal	223	16	East abutment	293	1670	1783	1665	1805

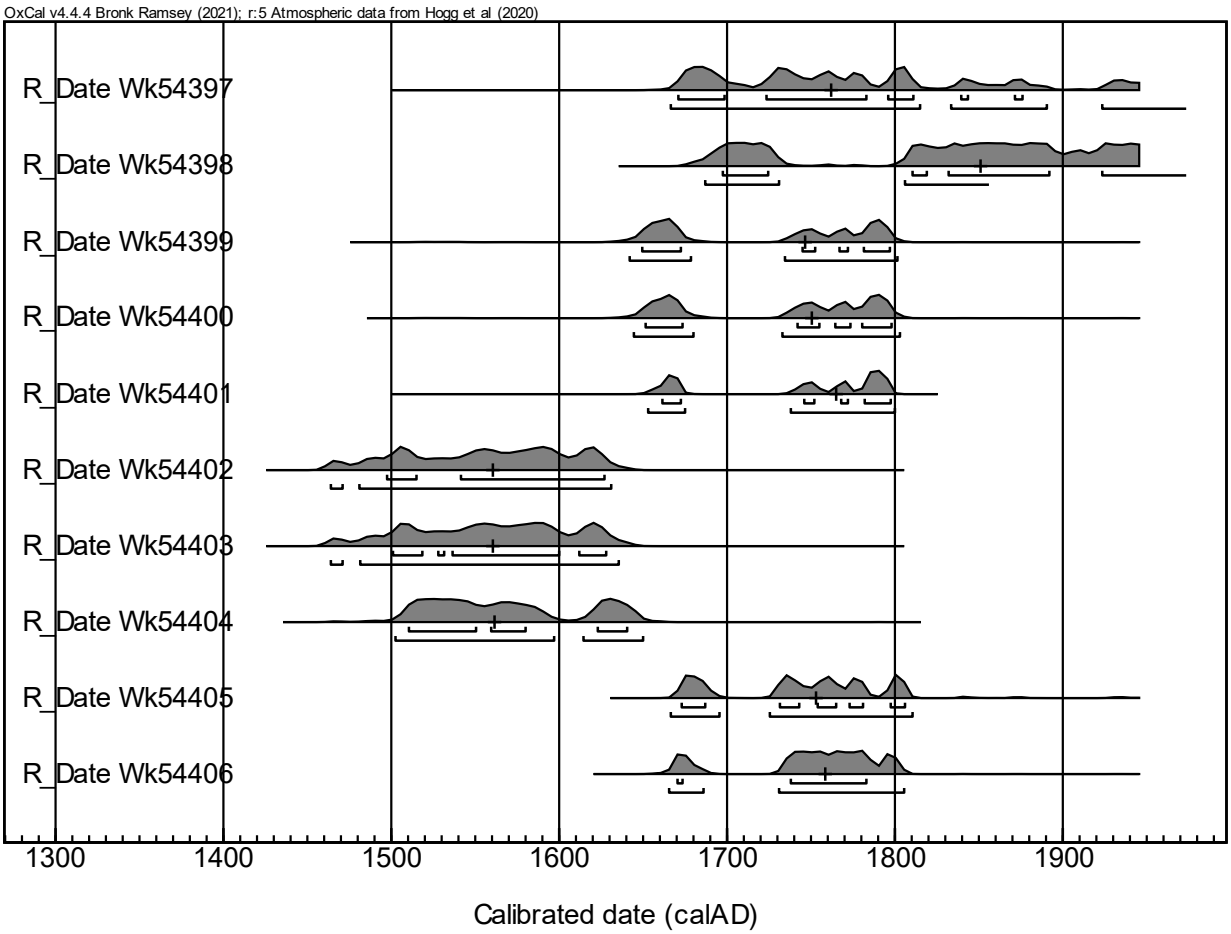


Figure 78. Calibration of radiocarbon dates from O04/1022 (OxCal 4.4)

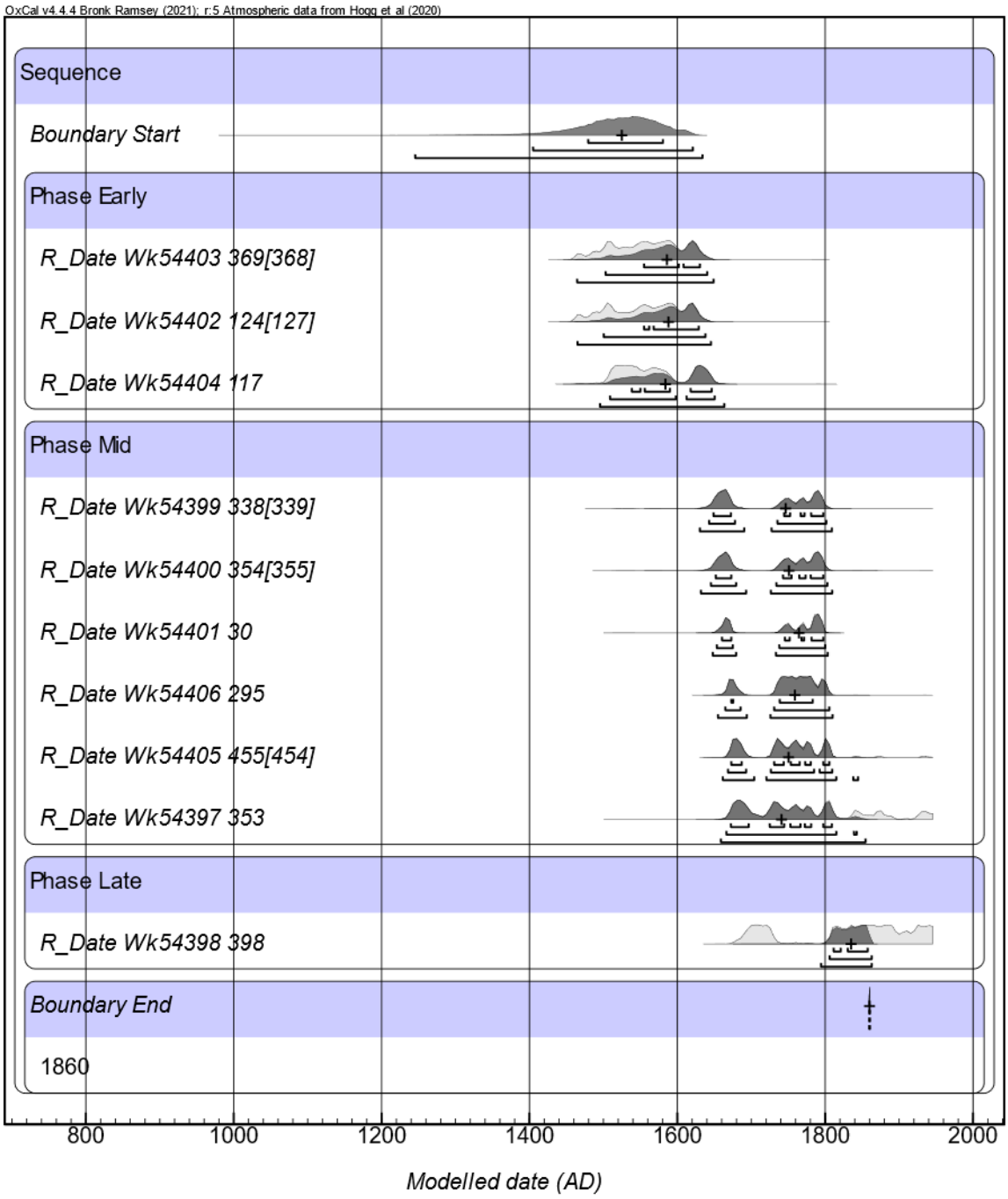


Figure 79. Bayesian modelling of radiocarbon dates in three phase model

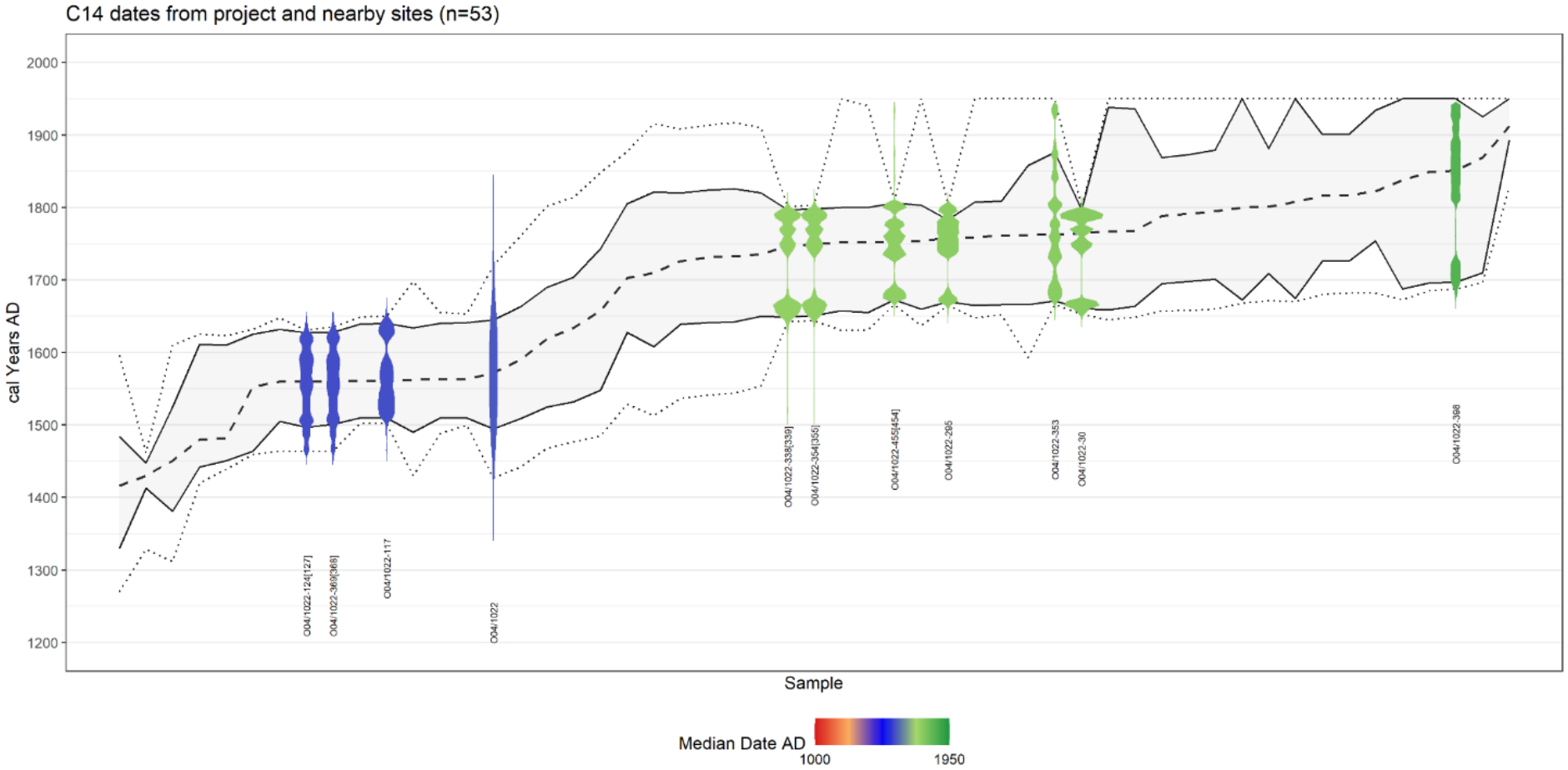


Figure 80. Comparison of dates from Taipa Bridge project and other nearby dates from Far North Island projects (solid lines - 1σ, dotted lines - 2σ, dashed line - median)

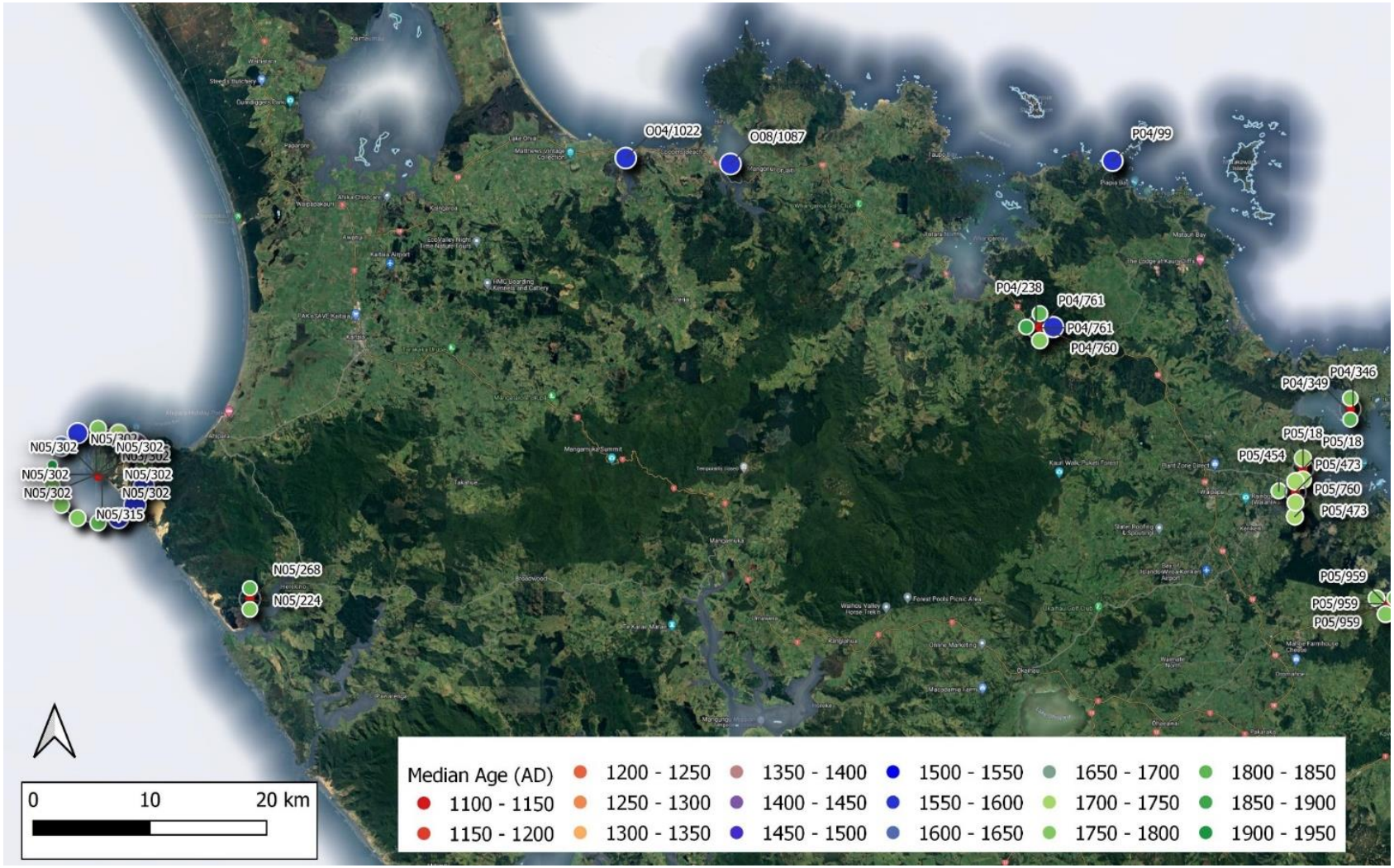


Figure 81. Radiocarbon dates from Taipa area

5 DISCUSSION

5.1 Summary

This report details the results of works related to the Taipa Bridge Upgrade Project at the Taipa Monument, the eastern and western approaches to the bridge and stormwater works in the Taipa school area. The Taipa War Memorial Monument investigation area encompassed the Taipa Township shops and car park and the section of SH10 between Taipa Point Drive and Mamarua Street (Figure 22). Works consisted of the deconstruction of the monument, ground reduction works beneath the mid-20th century monument and associated ornamental garden/traffic island, as well as trenching for the new stormwater drainage and Chorus/Telecom cabling. This work was undertaken over several months from June 2018 to May 2019. The deconstruction and archaeological recording of the monument are described above; however, no significant archaeological material was uncovered.

On the eastern side of Taipa River, earthworks undertaken included the cutting of new Chorus fibre trenches and jack pits along the southern side of SH10 as well as the ground reduction of a section of SH10 (Figure 21). The earthworks revealed that the area of SH10 and the eastern approach to the bridge had been extensively modified by their creation as well as by the installation of modern services and routine roading maintenance. Whilst not in situ, archaeological deposits were encountered during the works. Redeposited midden (293) deposits relating to site O04/990 were found within the reclamation material used to create the eastern bridge approach and within the shoulder berm. The species composition of this midden was similar to those on the western side relating to site O04/1022.

The Taipa school investigation area was located along SH10 from Mamarua Road to the end of the works corridor (Figure 23). It included the stormwater drainage trenches that were excavated on both the northern and southern side of the highway as well as two trenches which cut across the highway north/south. This work was undertaken over several months from February to May 2019. Overall, the stratigraphy exposed in the stormwater trenches was consistent, consisting of two modern roading events for SH10 overlying natural sand subsoil. It appears that for the most part the area of SH10 and its shoulder berms had been levelled for the construction of the main highway with modern services (stormwater, power, Chorus and water) being placed in those berms. With the exception of two small lenses of midden, (297) and (307), located on the northern side of the northern stormwater trench adjacent to the school, no other archaeology was encountered.

The main investigation area was located on the western side of Taipa Bridge and extended for a distance of approximately 40m from the existing coastal river edge westwards, by 70m from north to south, and included SH10 and its northern road berm, the junction of Taipa Point Drive and SH10, and Oruru Road (Figure 20, Figure 22). An area of approximately 515m^2 was monitored and excavated in this section. The main concentration of in situ archaeological material was found within and immediately surrounding the previously identified area of O04/1022, on the western abutment and bridge approach area. This is where the most significant archaeological remains were uncovered, which are discussed below in greater detail

5.2 Investigations at the Western Approach and Abutment

Harris (2010) submitted one sample for radiocarbon dating for site O04/1022 from his 2009 investigations, which fell within the footprint of the western abutment works area. The date obtained

from the sample gave a range of cal AD 1440–1660, at a confidence level of 95%. Pipi and cockle were argued to be the main source of shellfish and Harris (2010) suggested that the evidence indicated a temporary occupation sometime in the period between the mid-15th and mid-17th centuries. Harris (2010) also noted that little archaeological excavation has been carried out in Taipa Bay and therefore the baseline picture of pre-European Māori occupation of the area is unclear. Previous investigations have been limited to midden sites O04/438 on the eastern side of Taipa River (Johnson 1988) and O04/813 and O04/814 on the west (Bruce 2004); no C14 dates or detailed midden analysis have resulted from these investigations. The work presented here begins to fill this gap due to the discovery of substantial cooking and kaimoana processing features related to pre-Contact Māori activity along Taipa's riverbank.

Bayesian modelling of the radiocarbon dates obtained from the site as a result of the current investigations was used to refine the chronology using stratigraphic drawings drafted during excavation. Calibrating the dates resulted in two primary stages and a late intrusion about 1850 (Figure 79). The early and middle occupations are grouped in the late 1500s and mid to late 1700s respectively, as in the unmodeled dates (Figure 78). Although the earliest phase of Māori occupation in the region is not represented at this site, the dates from O04/1022 now represent the best examples from an archaeological site in the Taipa region. The excavations at O04/1022 represent much of the sequence of occupation from the mid-1500s AD onwards, but not the earlier habitation known to have occurred in the Far North region based on dates from other sites (Figure 80). This is perhaps to be expected given the site's placement in the inner harbour, as early habitation was more likely closer to the coast.

It is difficult to fully determine the relationship between the features investigated due to the constricting nature of the trench excavation. However, it seems likely the features in Trenches 1, 7 and 8 represent temporary occupations due to the diffuse and separate spatial configurations of earth oven placement. Figure 58, for example, shows the northern end of Trench 8 with earth oven features with several associated recuts, not far from a dense concentration of earth oven features in the same trench in Figure 56. Trench 7 to the southeast contained scoop cuts that varied in size and two clear hangi pits / earth ovens [366] and [356]. Trench 1 shows a less concentrated arrangement of features further back from the riverbank.

Middens are the most common type of archaeological sites recorded within Taipa Bay. These sites dominate the riverbank and areas immediately back from the shoreline, as seen in Figure 82. Burials seem to cluster along or near the river, with a recorded ridge pa overlooking the river mouth and bay. The association of burials with a freshwater source leading to the sea is a pattern noted in burial practices in Northland.

It seems likely that the distribution of sites reflects Harris' (2010) suggestion of temporary occupation along the riverbank with the main occupation occurring on the headlands or ridges, as indicated by the distribution of earthwork sites (pa, pit and terrace sites) (Figure 82). The presence of burials does indicate a permanence of settlement, or an area returned to. The midden, charcoal, and fish bone results suggest the riverbank was heavily used for food preparation and cooking on a temporary basis, including when the area was returned to for burial or horticulture. Broadly, exploitation of the riverbank relates to access to kaimoana and correlates to past activity in the broader coastal hydrosystems within which Māori operated.

Figure 82. Archaeological site distribution within the Taipa Bay and River landscape

Figure 71, showing coastal hydrosystems and midden distribution in the wider area, highlights three important considerations of temporary occupations related to kaimoana exploitation. Firstly, estuary is a broad term with more specific terminology related to hydrosystems with common elements (Hume et al. 2016), meaning that tidal river mouth, lagoon, shallow drowned valley and deep drowned valley all have an associated estuarine component. Both pipi and cockle species are found in a range of sheltered and semi-enclosed marine habitats such as embayments, estuaries, and harbours, where they frequently form high-density patches and extensive beds within intertidal sediments. Secondly, the distribution of midden reflects a clustering around estuarine hydrosystems seen in Figure 71, and to a lesser extent along the shorelines of the bays away from estuaries. Thirdly, Taipa forms part of this network of hydrosystems capable of sustaining pipi and cockle beds. Correspondingly, it is argued that temporary occupation relates to the exploitation of these systems as part of the larger kaimoana pre-Contact subsistence network. This report provides additional data and insights from Taipa Bay that will assist in answering questions relating to this network.

Taipa Bay forms a part of Doubtless Bay, which is a large bay bounded by Knuckle Point on the Karikari Peninsula and Berghan Point, the southern headland to the bay. The bay consists of exposed rocky cliff headlands and intertidal reefs, with intervening sand, shell and local gravel beaches broken by occasional rocky outcrops. Major beaches include Coopers Beach, Cable Bay, Taipa, Tokerau Beach and Whatuwhiwhi. There is a small estuarine harbour (Mangonui Harbour) in the south-eastern corner of the bay, 94% of which is made up of mudflats. Smaller estuaries are the Awapoko and Taipa estuaries.

Taipa Beach is a barrier spit which is attached to Otanguru Point at the western end. Located at the southern end of Doubtless Bay, approximately 22km northeast of Kaitaia, the northeast-facing shoreline forms a pocket beach embayment which is approximately 1.3km long. The Taipa River entrance is situated at the eastern end of the beach. The sandy beach of Taipa is composed of fine to medium sand with a berm width less than 5m above the high tide line (Hume et al. 2016). On the western side a small stream enters Taipa beach, which does not appear to have any effect on the shoreline. The dune vegetation is dense with spinifex and with a developing foredune along the open coast shoreline. The dune heights range from approximately RL 2m to 5m with a developed backshore, with the most seaward dwelling located 100m from the dune toe.

Taipa Bay is a permanently open estuarine tidal lagoon (Hume et al. 2016). These types of estuaries are usually shallow (mean depth 1-3m), with circular to elongate basins with simple (not dendritic) shorelines and an extensive intertidal area. They are often accompanied by a narrow entrance to the sea and constricted by a spit or sand barrier. Ebb and flood tidal delta sand bodies form in the sea and bay sides of the entrance where a strong reversing tidal current flows through the entrance. The tidal prism makes up a large proportion of the total basin volume. The river input is small when compared to tidal inflow, meaning hydrodynamic processes are dominated by the tides. Good flushing occurs despite the narrow entrance, because much of the water leaves the estuary on the outgoing tide. River inputs dominate the hydrodynamics for short periods (days) during floods, when seawater can be completely expelled. Incoming tide flood waters get backed up by the tide, causing low-lying land around the margins to be flooded. Whereas wind-generated mixing and resuspension of bottom sediments occur at high tide; this is more pronounced in larger and circular open water bodies with larger fetch. The combination of wave resuspension of the substrate and flushing results in generally homogeneous and sandy substrates. These classes are also well mixed because strong flushing, wind-mixing, and the shallow depths prohibit density stratification. Salinity is close to that of the sea. Water clarity is good because of the flushing and the sandy substrate. The spit or barrier can be overtopped by waves and breached in extreme events, leading

to multiple entrances. This often leads to a loss of archaeology on spits due to the breach of these landforms; hence very few sites are recorded in the dunes at Taipa Bay (Figure 82).

The identification of submitted charcoal samples suggests occasional pre-Contact forest clearance related to temporary occupation of the riverbanks by Māori. The charcoal data suggest forest clearance occurred here long before the temporary occupations at O04/1022 as vegetation present during occupation consisted of Ti tree / Manuka scrub. This plant association occurs when firing intervals between deliberate burn-off to clear the area occur and are reasonably long, as opposed to short-interval firing when bracken and small shrubs dominate. The firing intervals probably correspond to exploitation of pipi and cockle beds in the Taipa tidal lagoon.

The estuarine tidal lagoon of Taipa Bay currently hosts pipi and cockle beds. As shown by midden analysis, pipi is the dominant species present by a significant margin, followed by cockle. The site location at an estuary with a nearby sandy beach is an ideal location for these species so it is likely the population at Taipa was targeted by Māori for harvesting, processing and consuming shellfish. The report has shown that pipi across all samples are smaller (~30mm) than modern day harvestable size (50mm), suggesting harvesting pressure. The smaller size indicates that the area was used a number of times by a mobile Māori population who either did not stay long enough to deplete the resource, accessing lower than average sized pipi under harvesting stress, or the pipi was harvested until the size was too small to be worthwhile and the beds were left untouched to recover and accessed by Māori at a later. The charcoal selected for C14 dating from midden material from contexts 30, 353, 398 and 455 suggest a time period between 1798 and 1806 AD. The median size of pipi is ~30 to 36mm at this time, reflecting this smaller size, and suggests intense harvesting well into the 18th to 19th century.

The faunal data include several fish taxa and broad diversity, particularly from Trench 8, suggesting fish were deliberately brought into the area as a result of offshore fishing. Despite the low MNI counts, the diverse fish taxa represented in the Taipa assemblage are typical of northern North Island coastal waters. Fish from the Carangidae family (jacks/trevallies) were the most commonly identified specimens and are frequently represented in Māori archaeological fish assemblages (Paulin et al. 2001; Vogel 2018; Campbell et al. 2019). Mackerel (hāture, *Trachurus* sp.), which are part of the Carangidae family, are known to dominate open water coasts (Leach 2006; Campbell et al. 2009). Mandibular bones and teeth from *Rattus exulans* were also recovered. Rat bones can enter an archaeological assemblage through natural post-depositional processes, and it is unclear if their presence indicates deliberate targeting. Rats are also scavengers and their presence could indicate the exploitation of food waste left by temporary occupations.

Numerous cooking-related features were found during excavation (Table 26). Following Law's terminology (2008), features termed as Hangi were functionally characterised as earth ovens. Earth ovens have a scoop with ovenstones in place, with or without a fire-affected base. Scoops have an earth oven or hearth-like scoop, without other evidence. The presence of scoops suggest fire primarily for heating, or other forms of food preparation may have been built in scoops or scoops may have developed through repeated ash removal. Some scoops may be hearths with no cooking function and could relate to small groups making a fire for warmth as they were passing through.

Earth ovens relate to food processing or communal food preparation. Earth ovens often require a pit and more labour to construct them. The use of a pit provides shelter from the wind with the base of a pit being below the more organic rich surface soil, allowing more heat to be held. It also allows for the best use of the fuel by avoiding wastage in an excessive draught. Due to the relatively small trench corridors only small portions of the pre-Contact cooking areas were uncovered.

Figure 58 shows what is interpreted as a whareumu (cooking house) with sectioned earth ovens and scoops (Trench 8, see Figure 46). Post holes cluster around a central earth oven area visible as oval-

shaped scoops with steep sides and rounded bases, filled with black charcoal-stained sand with moderate amounts of small angular fire cracked rock. To the north intercutting scoops cluster as various intercutting hollows. These were likely used for heating the rocks in a fire beside the pit and after they were heated, pushing them into the earth oven and arranging them.

Heat shattered stones are a common find in New Zealand archaeological sites (Law 2008). Māori had a preference for water rounded stones from rivers or beaches and are recorded as using fire heated stones to boil water in wooden containers for cooking and other purposes. This has Polynesian parallels so is presumably ancient in New Zealand. These stones suffer the same stresses as ovenstones and would shatter the same way. Māori are also recorded as broiling some foods on fire heated rocks. These too could suffer shattering. Heat shattered stone, then, is not necessarily an indicator of earth ovens. Nor is a clump of ovenstones in a site necessarily an oven.

As one practice is to heat stones outside an oven pit, it is conceivable that stones awaiting use might be in a clump outside an oven and, if not used, remain in this form in a site. A good example of in situ rounded rocks was found in context [420], a relatively large earth oven (Figure 56). Soft black charcoal-stained sand with 10 angular fire cracked rocks 0.1m x 0.1m in size were located on the western half of the feature. Red scorching marks on the sand surrounding the feature were noted as well, indicating the high heat of the earth oven when it was fired in the past. The post holes around and near context [420] possibly further indicate the presence of a whareumu. However, this can only be speculated as the investigation was restricted to the corridor of the stormwater trench.

The statistics for measurements of features uncovered during the excavation (Figure 83, Table 26) provide three insights. Firstly, earth ovens are consistently shallower in depth (12cm) but larger in area. For example, earth ovens have a mean area of 4514 cm^2 compared to 2,790 cm^2 area for scoop features, with a generally deeper depth of 15cm. Secondly, post holes are generally shallow and would not support substantial structures, with a mean depth of 23cm, and although truncated are still relatively small in diameter. Thirdly, pits are relatively shallow at 27cm with a mean area of 7,469cm^2, suggesting these were likely to have been bin pits housing implements related to cooking and food preparation. The pits may also have functioned to store kete / baskets of food, either brought with them, or the results of shellfish processing.

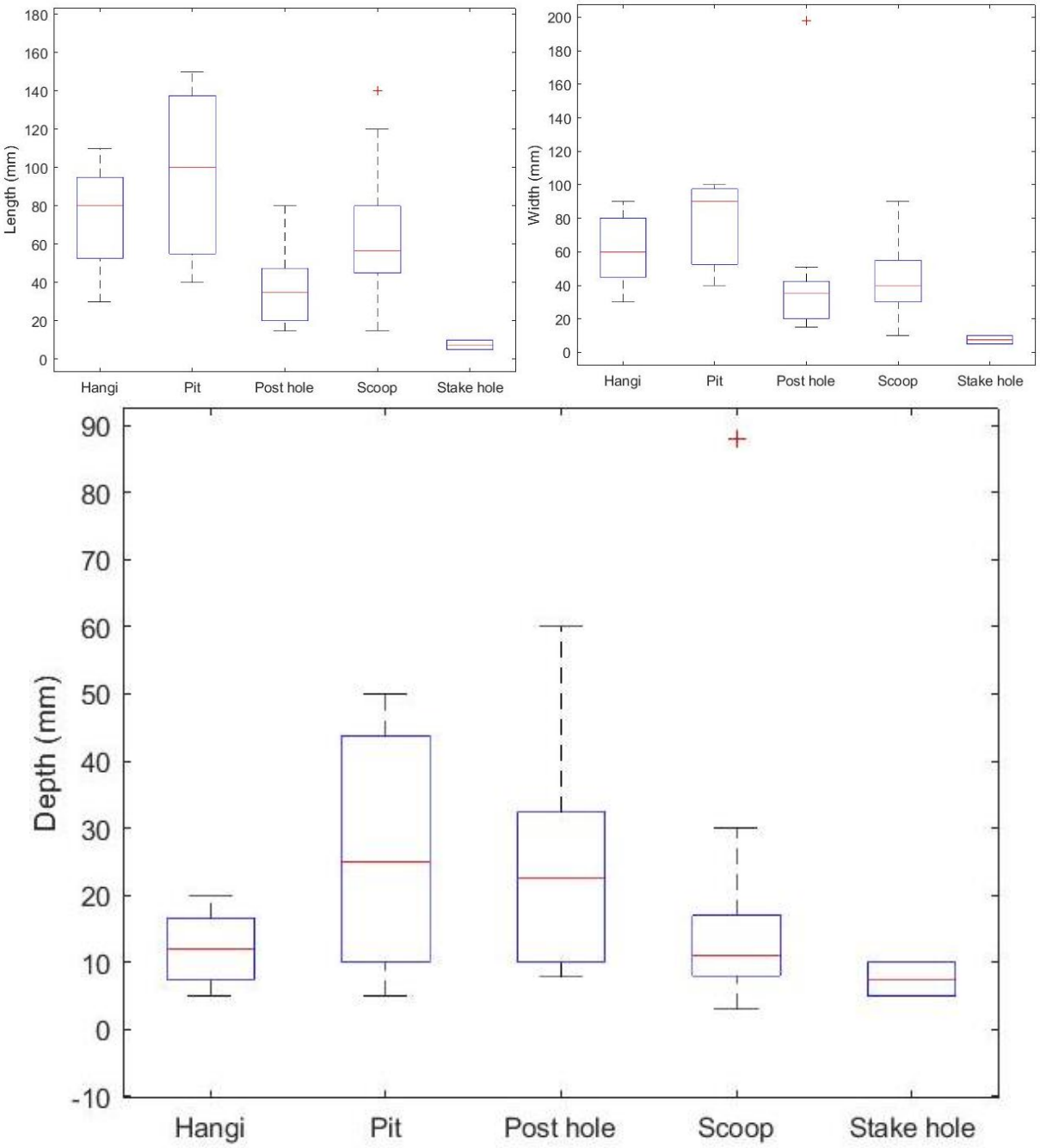


Figure 83. Box and whisker plots for features found

Table 26. Statistics for measured features found during monitoring and excavation. Features with ephemeral edges and partly in section not included

	Count of Cut/Fill/Deposit	Mean of Length (cm)	Mean of Depth (cm)	Mean of Width (cm)
Earth ovens (Hangi)	12	74	12	61
Pit	3	97	27	77
Post hole	16	36	23	42
Scoop	46	62	15	45
Stake hole	2	8	8	8
Total	79	58	16	47

Euclidean distance was calculated based on the centroid of the archaeological features' distance to the riverbank (Figure 84). Data used for this was based on mean high-water mark accessed from LINZ. Three insights were gained from the distance calculation. Firstly, the majority of the midden (78%) found was 10-15 from the riverbank. The relationship between kaimoana processing and proximity to the river is strongly suggested by this result. Secondly, earth ovens and scoops are set back further from the riverbank with 80% of these 20-25m away. A distance of 20-25m away from the riverbank may suggest that shellfish processing is occurring closer to the river with cooking further away, beginning at the 20m mark. Thirdly, very few archaeological features occur within 5m of the shoreline. Only 5 to 20% of features are within 0 to 5m (Figure 85), suggesting two possible scenarios – either intentional choice in allocating spaces for kaimoana processing, or the riverbank position has changed due to reclamation or historic change in the Taipa Tiver system.

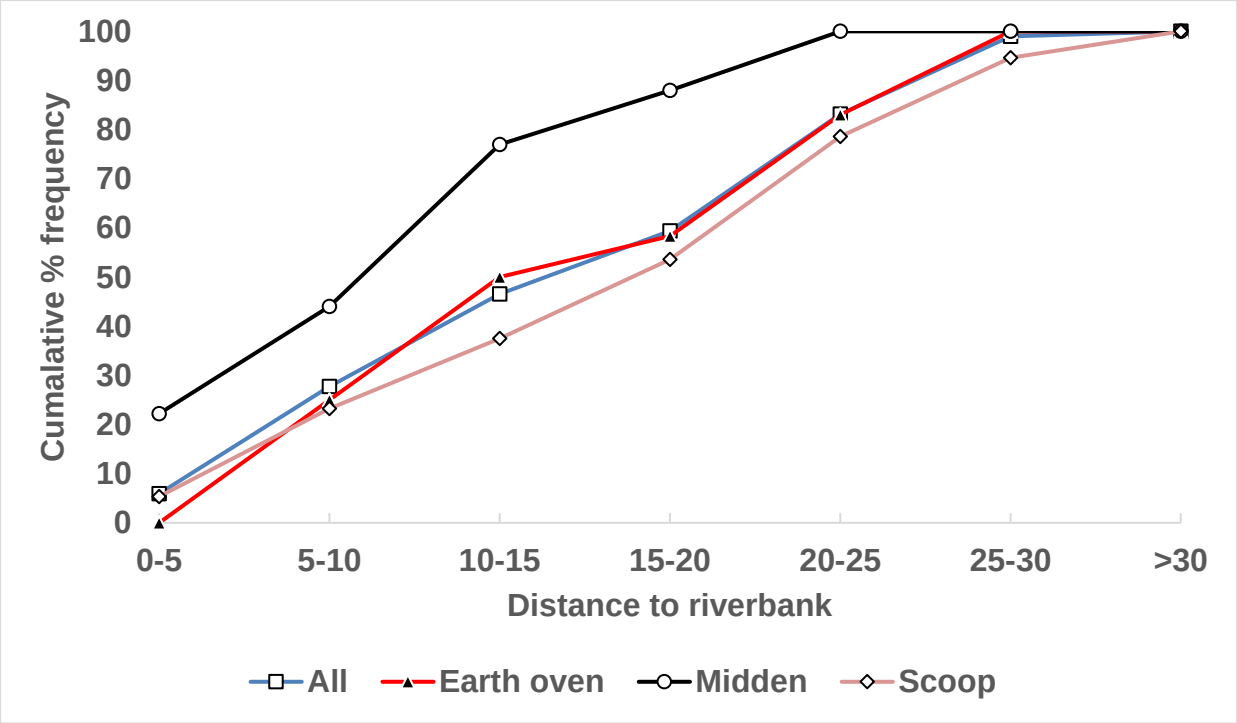


Figure 84. Cumulative % frequency of archaeological feature type distance to riverbank

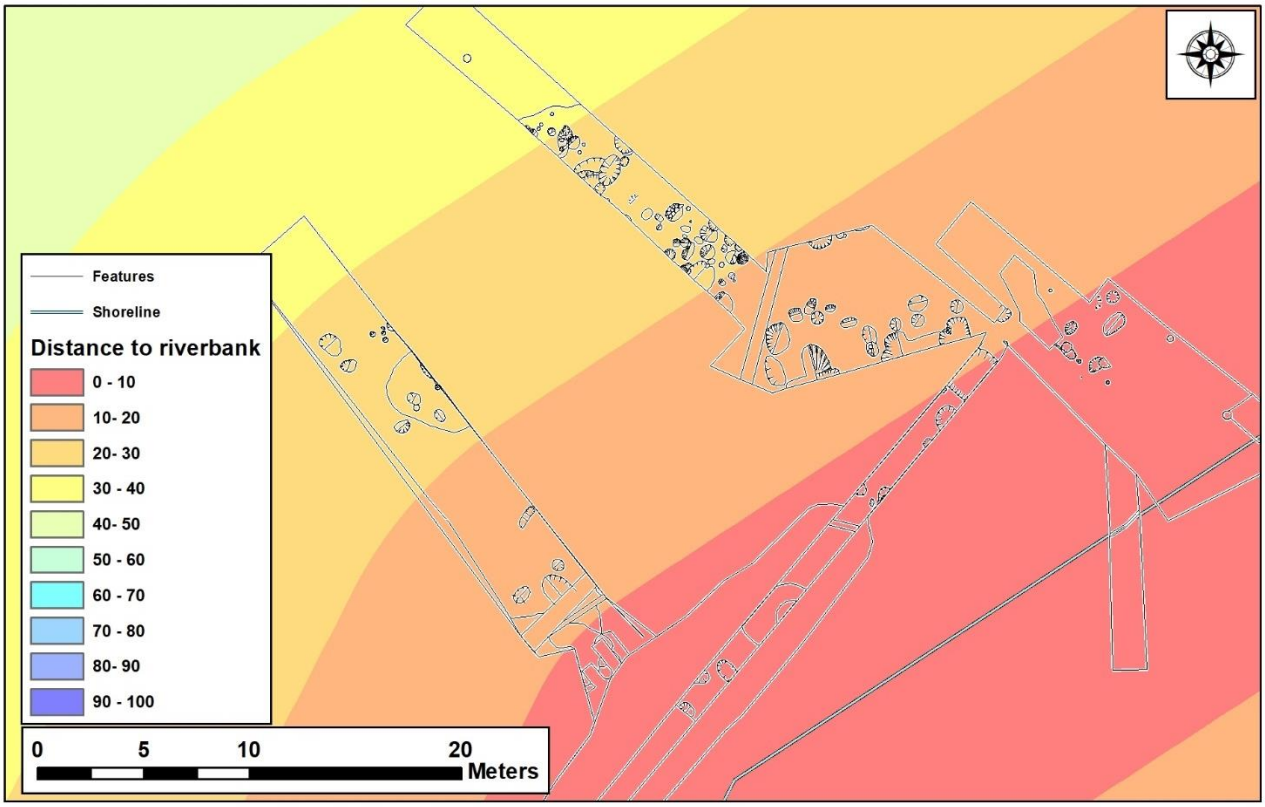


Figure 85. Distance to riverbank colour graded with archaeological features and shoreline (riverbank) overlaid

6 CONCLUSION

The archaeological investigations carried out during the Taipa Bridge Upgrade Project exposed extensive evidence of temporary encampments related to kaimoana food processing. The most significant discoveries were at the western approach and abutment, where numerous features and deposits relating to temporary occupations by pre-Contact Māori focussed on kaimoana cooking and processing. These were part of the previously recorded midden site O04/1022. The investigations were confined to the footprint of the relatively narrow service trenches required for the project, with over 50% of site O04/1022 estimated to remain in situ.

Although the oldest phases of Māori settlement in the Taipa area are not represented at this site, the sequence of occupation from the mid-1500s AD onwards is represented by the features and deposits discovered at O04/1022. This is not to argue that earlier occupation evidence is not present at Taipa, as the area studied was only a small part of the overall archaeological landscape.

The findings are compatible with other, albeit limited, archaeological research in the area. The data and analysis from the Taipa Bridge Upgrade Project fit into a much larger archaeological context, with four key themes: pre-Contact kaimoana exploitation in Northland's north-eastern region (cf. Smith 2013); pre-Contact activity in coastal bay systems; pre-Contact settlement patterns; and how the riverbank within Taipa's tidal lagoon system was used. Site O04/1022 lies at the junction between the entrance to the sea, the coastline network and the extensive inland agricultural and settlement systems located in the Oruru Valley to the south (Johnson 1986; Barber 1989). O4/1022 was probably occupied repeatedly during movements between the coast and the inland sites from the 1500s AD onwards. The data in this report shed light on these themes and provide useful information to be incorporated with local history and whakapapa.

REFERENCES

ArchSite, n.d. Arch Site. [Online] Available at: https://archsite.eaglegis.co.nz/

Anderson, A. 1997. Uniformity and regional variation in marine fish catches from prehistoric New Zealand. *Asian Perspectives*, 1-26.

Barber, I. 1989. Of boundaries, drains and crops: a classification system for traditional Maori horticultural ditches. *New Zealand Journal of Archaeology* 11:23-50.

Bruce, I. 2004. Archaeological Monitoring of Lot 2, DP 172800 and the Modification of Archaeological Sites O04/813 & O04/814, Taipa, Doubtless Bay. Unpublished report to Montpellier Group Ltd, Auckland.

Campbell, M., W. Gumbley and B. Hudson. 2009. The Tara Road Sites, Papamoa. Unpublished CFG Heritage Ltd report to The New Zealand Historic Places Trust, The LS Johnson Trust, Tauranga City Council, The Ministry of Education, MTEC Ltd, Tauranga and Harrison Grierson Ltd, Tauranga.

Campbell, M. 2016. Body part representation and the extended analysis of New Zealand fish bone. *Archaeology in Oceania*, 51:18–30. https://doi.org/10.1002/arco.5079

Campbell, M., B. Hudson, J. Craig, L. Furey, K. Greig, A. McAlister, B. Marshall, F. Petchey, T. Russell, D. Trilford and R. Wallace. 2019. The Long Bay Restaurant Site, R10/1374: Volume 1, The Archaeology (HNZPTA Authorities 2015/19 and 2016/81).

Evans, J. 2009. *Nga Waka o Nehera: the First Voyaging Canoes*. Oratia Media Ltd.

Grayson, D. 1984. *Quantitative Zooarchaeology: Topics in the Analysis of Archaeological Faunas.* Orlando: Academic Press.

Harris, J. 2010. Site O04/1022 Section 18 Investigation, Taipa Far North. Report to the New Zealand Historic Places Trust and Far North District Council. Unpublished CFG Heritage Ltd report.

Hume, T., P. Gerbeaux, D. Hart, H. Kettles, and D. Neale. A classification of New Zealand's coastal hydrosystems, 120. Hamilton: Ministry of the Environment http:/Avww. mfe. govtnz/publications/marine/classification-of-new-zealands-coastal-hydrosystems (2016). Fisheries NZ. 2022. Fisheries Infosite. [Online] Available at: https://fs.fish.govt.nz.

Jamieson, B. 2017a. Archaeological Assessment of Effects: Taipa One Lane Bridge Works. Unpublished Opus International Consultants Ltd report.

Jamieson, B. 2017b. Archaeological Management Plan: Taipa Bridge, Taipa. Opus International Consultants Ltd.

Jamieson, B. 2020. Interim Archaeological Report for Taipa Bridge Upgrade Works – Northland Bridges Project. Unpublished Clough & Associates report prepared under HNZPT Authority No. 2018/098 for WSP Opus and NZ Transport Agency.

Johnson, L. 1986. Aspects of the Prehistory of the Far North Valley Systems. Unpublished M.A. Thesis, Anthropology Department, University of Auckland.

Johnson, L. 1988. Excavation of Site N7/300 - Taipa, Mangonui. Unpublished preliminary report to the New Zealand Historic Places Trust.

Johnson, L. 2013. Archaeological Monitoring of the Taipa River Seawall, Taipa, Doubtless Bay, Far North (NZHPT Authority 2008/337). Prepared for Far North District Council. Unpublished Northern Archaeological Research report.

Leach, B.F. 1986. A method for analysis of Pacific Island fish bone assemblages and an associated data base management system. *Journal of Archaeological Science* 13(2): 147-159.

Law, G. 2008. Hangi, hangi pits, hangi scoops, umu, scoops, fire scoops, hearths, scoop hearths – sorting out what we are talking about. *Archaeology in New Zealand*, 51(2): 95-105.

Lawlor, I. 1981. Puhinui (N42/17) Excavation Report 1981. Department of Anthropology, University of Auckland.

Leach, B.F. 2006. *Fishing in Pre-European New Zealand*. New Zealand Journal of Archaeology Special Publication. New Zealand Archaeological Association, Wellington.

Miller, M. and G. Batt. 1973. *Reef and Beach Life of New Zealand*. Auckland: William Collins (New Zealand) Ltd.

Nims, R., D. Filimoehala, M.S. Allen and V.L. Butler. 2020. When less is more: element selection as sampling strategy in zooarchaeology. *Journal of Archaeological Science* 121. https://doi.org/10.1016/j.jas.2020.105205.

Paul, L. 2000. *New Zealand Fishes. Identification, Natural History and Fisheries*. Revised Edition. Auckland: Reed Books.

Paul, L.J., P.R. Taylor and D.M. Parkinson. 2001. Pilchard (*Sardinops neopilchardus*) biology and fisheries in New Zealand, and a review of pilchard (Sardinops, Sardina) biology, fisheries, and research in the main world fisheries. New Zealand Fisheries Assessment Report, 37: 1-44.

Paulin, C.D. 2007. Perspectives of Māori fishing history and techniques. Ngā āhua me ngā pūrākau me ngā hangarau āika o te Māori. *Tuhinga: Records of the Museum of New Zealand Te Papa Tongarewa*, 18: 11-47.

Paulin, C., A. Stewart, C. Roberts and P. McMillan. 2001. *New Zealand Fish. A Complete Guide*. Wellington: Te Papa Press.

Pawley, M.D.M. and A.N.H. Smith. 2012. The distribution and abundance of pipis and cockles in the Northland, Auckland and Bay of Plenty regions. *New Zealand Fisheries Assessment Report* 45: 69.

Reitz, E. and E. Wing. 2008. *Zooarchaeology.* Second Edition. Cambridge: Cambridge University Press.

Smith, I.W.G. 2013. Pre-European Maori exploitation of marine resources in two New Zealand case study areas: species range and temporal change. *Journal of the Royal Society of New Zealand*, 43(1):1-37. doi:10.1080/03036758.2011.574709.

Vogel, Y. 2018. Mackays to Peka Peka: Archaeological Monitoring Phase Faunal Analysis. Unpublished report for Mary O'Keeffe.

Vogel, Y. 2020. Faunal Remains from the Tirimoana Place Subdivision, Whanganui. Unpublished report prepared for Nick Mainwaring, WSP Ltd.

Wilkens, S., and S. Ahyong. 2015. Coastal crabs: a guide to the crabs of New Zealand. *NIWA: Taihoro Nukurangi*. Version 1:3–5, 43.

Waitangi Tribunal. 1988a. Report of the Waitangi Tribunal on the Mangonui Sewerage Claim (Wai-17). Wellington: Waitangi Tribunal, Department of Justice.

Waitangi Tribunal. 1988b. The Waipoua-Niaunganui Claim: A Preliminary Research Report on Waipoua Aspects of the Claim for the Waitangi Tribunal. Wai 38.

APPENDICES

APPENDIX 1 – ARCHAEOLOGICAL AUTHORITY

HERITAGE NEW ZEALAND
POUHERE TAONGA

S:\Archaeology\Archaeological Authorities

12 September 2017

File ref: 2018/098
11013-014

Mr Jim Sephton
NZ Transport Agency
Walton Plaza
1st Floor
4 Albert Street
Whangarei 1143

Tena koe Mr Sephton

APPLICATION FOR ARCHAEOLOGICAL AUTHORITY UNDER HERITAGE NEW ZEALAND POUHERE TAONGA ACT 2014: Authority no. 2018/098: Sites O04/406, 407, 427 & 1022; Taipa Bridge, State Highway 10, Oruru Road, Taipa Pt Road & Taipa Heights Road, Taipa, Northland

Thank you for your application for an archaeological authority which has been granted and is attached.

In considering this application, Heritage New Zealand Pouhere Taonga notes that you wish to earthworks and infrastructure development and replacement associated with replacing a one lane bridge with a two lane bridge at Taipa, Northland. Works to be undertaken will include construction of a dual lane bridge, road widening, reconnection or replacement of foot paths, drainage and services and use of existing laydown areas. This activity will affect recorded archaeological midden sites O04/406, 407 & 1022 and may affect the burial site O04/427. Although these sites have been damaged in the past, they still archaeological values. This cluster of sites is an excellent example of seasonal shellfish collecting on the edge of a major horticultural settlement focused on kumara gardens, storage and defensive structures along the Oruru Valley. The sites are of significance to Ngati Kahu represented by Matakairiri Taipa Marae, and we appreciate the consultation you have undertaken.

Please inform Matakairiri Taipa Marae, the approved archaeologist and the Heritage New Zealand Pouhere Taonga Regional Office of start and finish dates for the work.

An appeal period from receipt of decision by all parties applies. Therefore this authority may not be exercised during the appeal period of 15 working days, or until any appeal that has been lodged is resolved.

If you have any queries please direct your response in the first instance to:

Dr James Robinson
Regional Archaeologist
Heritage New Zealand Pouhere Taonga, Kerikeri Office
PO Box 836, Kerikeri 0245

P (64 4) 472 4341 P National Office, Antrim House, 63 Boulcott Street P PO Box 2629, Wellington 6140 P heritage.org.nz

LETTER1

Phone (09) 407 0473 Email ArchaeologistNA@heritage.org.nz

Yours sincerely

Frank van der Heijden
Senior Archaeologist

cc: Jim Sephton – New Zealand Transport Agency
via email at Jim.Sephton@nzta.govt.nz

cc: Brooke Jamieson – Opus International Consultants
via email at Brooke.Jamieson@opus.co.nz

cc: Trudy Allen – Matakairiri Taipa Marae
via email at indiajade@xtra.co.nz

cc: Planning Manager
Far North District Council
via email at askus@fndc.govt.nz

Pursuant to Section 51 Heritage New Zealand Pouhere Taonga Act 2014 Heritage New Zealand Pouhere Taonga must notify TLAs of any decision made on an application to modify or destroy an archaeological site. We recommend that this advice is placed on the appropriate property file for future reference.

cc: Ministry for Culture and Heritage
via email at protected-objects@mch.govt.nz

Pursuant to Section 51 Heritage New Zealand Pouhere Taonga Act 2014

cc: NZAA Central Filekeeper
c/o DOC, WELLINGTON
Attn: Nicola Molloy
via email at nmolloy@doc.govt.nz

cc: Heritage New Zealand Pouhere Taonga Regional Archaeologist, Dr James Robinson

cc: Heritage New Zealand Pouhere Taonga Area Manager Northland, Bill Edwards

cc: Heritage New Zealand Pouhere Taonga Maori Heritage Advisor, Atareiria HeiHei

cc: Heritage New Zealand Pouhere Taonga Northern General Manager, Sherry Reynolds

HERITAGE NEW ZEALAND
POUHERE TAONGA

AUTHORITY

Heritage New Zealand Pouhere Taonga Act 2014

AUTHORITY NO: 2018/098 **FILE REF: 11013-014**

DETERMINATION DATE: 13 September 2017 **EXPIRY DATE: 13 September 2022**

AUTHORITY HOLDER: New Zealand Transport Agency

POSTAL ADDRESS: Walton Plaza, 1st Floor, 4 Albert Street, Whangarei 1143, Attn. Jim Sephton via email at Jim.Sephton@nzta.govt.nz

ARCHAEOLOGICAL SITES: O04/406, 407, 427 & 1022

LOCATION: Taipa Bridge, State Highway 10, Oruru Road, Taipa Point & Taipa Heights Road, Taipa, Northland

APPROVED ARCHAEOLOGIST: Brooke Jamieson

LANDOWNER CONSENT: Landowner is applicant

This authority may not be exercised during the appeal period of 15 working days, or until any appeal that has been lodged is resolved.

DETERMINATION

Heritage New Zealand Pouhere Taonga grants an authority pursuant to section 48 of the Heritage New Zealand Pouhere Taonga Act 2014 in respect of the archaeological sites described above, within the area specified as State Highway 10 (NZTA), Road reserve (Oruru, Taipa Point & Taipa Heights Road) to New Zealand Transport Agency for the proposal to carry out earthworks associated with the construction of a dual lane bridge, road widening, reconnection or replacement of foot paths, drainage and services and use of existing laydown areas at Taipa Bridge, State Highway 10, Oruru Road, Taipa Point & Taipa Heights Road, Taipa, Northland, subject to the following conditions:

CONDITIONS OF AUTHORITY

1. The authority holder must ensure that all contractors working on the project are briefed by the approved archaeologist on the possibility of encountering archaeological evidence, how to identify possible archaeological sites during works, the archaeological work required by the conditions of this authority, and contractors' responsibilities with regard to notification of

the discovery of archaeological evidence to ensure that the authority conditions are complied with.

2. The authority must be exercised in accordance with the archaeological management plan (B. Jamieson, July 2017, 'Archaeological Management Plan Taipa Bridge, Taipa'), submitted with the application and any changes to the plan require the prior written agreement of Heritage New Zealand Pouhere Taonga.

3. All earthworks that may affect any archaeological sites must be monitored by an archaeologist approved by Heritage New Zealand Pouhere Taonga.

4. Any archaeological evidence encountered during the exercise of this authority must be investigated, recorded and analysed in accordance with current archaeological practice.

5. If insitu material suitable for carbon dating is encountered during the exercise of this authority, a minimum of three dates must be obtained.

6. As no protocols between the authority holder and Matakairiri Taipa Marae were provided with the authority application, the following shall apply:
   a) Access for Matakairiri Taipa Marae shall be enabled in order to undertake tikanga Maori protocols consistent with any requirements of site safety.
   b) Matakairiri Taipa Marae shall be informed 48 hours before the start and finish of the archaeological work.
   c) If any koiwi tangata (human remains) are encountered, all work should cease within 5 metres of the discovery. The Heritage New Zealand Pouhere Taonga Regional Archaeologist, New Zealand Police and Tangata Whenua must be advised immediately in accordance with Guidelines for Koiwi Tangata/Human Remains (Archaeological Guideline Series No.8) and no further work in the area may take place until future actions have been agreed by all parties. This condition is not a statement of mana whenua status.
   d) Matakairiri Taipa Marae shall be informed if any possible taonga or Maori artefacts are identified to enable appropriate tikanga protocols to be undertaken, so long as all statutory requirements under the Heritage New Zealand Pouhere Taonga Act 2014 and the Protected Objects Act 1975 are met.
   e) Matakairiri Taipa Marae shall be provided with a copy of any reports completed as a result of the archaeological work associated with this authority and be given an opportunity to discuss it with the archaeologist if required.

7. That within 20 working days of the completion of the on-site archaeological work associated with this authority;

   a) An interim report outlining the archaeological work undertaken must be submitted to the Heritage New Zealand Pouhere Taonga Regional Archaeologist.
   b) Site record forms must be updated or submitted to the NZAA Site Recording Scheme.

8. That within 12 months of the completion of the on-site archaeological work, the authority holder shall ensure that a final report, completed to the satisfaction of Heritage New Zealand Pouhere Taonga, is submitted to the Heritage New Zealand Pouhere Taonga Regional Archaeologist.

   a) One hard copy and one digital copy of the final report are to be sent to the Heritage New Zealand Pouhere Taonga Regional Archaeologist.

b) Digital copies of the final report must also be sent to: NZAA Central Filekeeper; Butler Point Whaling Museum and Matakairiri Taipa Marae.

Signed for and on behalf of Heritage New Zealand.

B L Rouse

Barbara Rouse
Acting National Heritage Policy Manager
Heritage New Zealand Pouhere Taonga
PO Box 2629
WELLINGTON 6140

Date 12/9/2017

ADVICE NOTES

Contact details for Heritage New Zealand Regional Archaeologist

Dr James Robinson
Regional Archaeologist
Heritage New Zealand Pouhere Taonga, Kerikeri Office
PO Box 836, Kerikeri 0245

Phone (09) 407 0473 Email ArchaeologistNA@heritage.org.nz

Current Archaeological Practice
Current archaeological practice may include, but is not limited to, the production of maps/ plans/ measured drawings of site location and extent; excavation, section and artefact drawings; sampling, identification and analysis of faunal and floral remains and modified soils; radiocarbon dating of samples; the management of taonga tuturu and archaeological material; the completion of a final report and the updating of existing (or creation of new) site record forms to submit to the NZAA Site Recording Scheme. The final report shall include, but need not be limited to, site plans, section drawings, photographs, inventory of material recovered, including a catalogue of artefacts, location of where the material is currently held, and analysis of recovered material.

Please note that where one is required, an interim report should contain a written summary outlining the archaeological work undertaken, the preliminary results, and the approximate percentage of archaeological material remaining *in-situ* and a plan showing areas subject to earthworks, areas monitored and the location and extent of any archaeological sites affected or avoided.

Rights of Appeal
An appeal to the Environment Court may be made by any directly affected person against any decision or condition. The notice of appeal should state the reasons for the appeal and the relief sought and any matters referred to in section 58 of the Heritage New Zealand Pouhere Taonga Act 2014. The notice of appeal must be lodged with the Environment Court and served on Heritage New Zealand Pouhere Taonga within 15 working days of receiving the determination, and served on the applicant or owner within five working days of lodging the appeal.

Review of Conditions
The holder of an authority may apply to Heritage New Zealand Pouhere Taonga for the change or cancellation of any condition of the authority. Heritage New Zealand Pouhere Taonga may also initiate a review of all or any conditions of an authority.

Non-compliance with conditions
Note that failure to comply with any of the conditions of this authority is a criminal offence and is liable to a penalty of up to $120,000 (Heritage New Zealand Pouhere Taonga Act 2014, section 88).

Costs
The authority holder shall meet all costs incurred during the exercise of this authority. This includes all on-site work, post fieldwork analysis, radiocarbon dates, specialist analysis and preparation of interim and final reports.

Assessment and Interim Report Templates [remove if no interim report referred to]
Assessment and interim report templates are available on the Heritage New Zealand Pouhere Taonga website: archaeology.nz

The Protected Objects Act 1975

The Ministry for Culture and Heritage ("the Ministry") administers the Protected Objects Act 1975 which regulates the sale, trade and ownership of taonga tūturu.

If a taonga tūturu is found during the course of an archaeological authority, the Ministry or the nearest public museum must be notified of the find within 28 days of the completion of the field work.

Breaches of this requirement are an offence and may result in a fine of up to $10,000 for each taonga tūturu for an individual, and of up to $20,000 for a body corporate.

For further information please visit the Ministry's website at http://www.mch.govt.nz/nz-identity-heritage/protected-objects.

Land Owner Requirements
If you are the owner of the land to which this authority relates, you are required to advise any successor in title that this authority applies in relation to the land. This will ensure that any new owner is made aware of their responsibility in regard to the Heritage New Zealand Pouhere Taonga Act 2014.

HERITAGE NEW ZEALAND
POUHERE TAONGA

APPROVED ARCHAEOLOGIST

Heritage New Zealand Pouhere Taonga Act 2014

AUTHORITY NO: 2018/098 **FILE REF: 11013-014**

APPROVAL DATE: 12 September 2017

This approval may not be exercised during the appeal period of 15 working days, or until any appeal that has been lodged is resolved.

APPROVAL

Pursuant to section 45 of the Act, **Brooke Jamieson**, is approved by Heritage New Zealand Pouhere Taonga to carry out any archaeological work required as a condition of authority 2018/098, and to compile and submit a report on the work done. Brooke Jamieson will hold responsibility for the current archaeological practice in respect of the archaeological authority for which this approval is given.

Signed for and on behalf of Heritage New Zealand.

B L Rouse

Barbara Rouse
Acting National Heritage Policy Manager
Heritage New Zealand Pouhere Taonga
PO Box 2629
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Date 12/9/2017

APPENDIX 2 – CONTEXT LIST

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
1	20th estuary ground surface (modern)	Deposit					Firm dark brown silty sand. Contains whole and broken pipi, tuatua, as well as occasional pieces of broken concrete, roading gravels, glass and plastic. Post 19th century beach surface. This was the old ground surface beneath trees seen in mid-20th century.	West abutment		9	
2	Roading surface (modern)	Deposit					Soft to firm mid brown silty sand. Contains occasional to moderate amounts of roading gravels, rootlets, glass, plastic. Old road surface.	West abutment		9	
3	Imported sand fill (modern)	Deposit					Soft yellow sand. No inclusions, except pockets of redeposited (001) and (002). Modern imported sand fill used to back fill around modern manholes and services.	West abutment		9	2
4	Tree root ball (modern)	Deposit					Pine Tree root ball removal.	West abutment		9	
5	Made ground (modern)	Deposit					Soft brown silty sand. Occasional to moderate roading gravel, lenses of yellow sand (003), roots. Fill over modern stormwater pipes.	West abutment		9, 10	
6	Made ground (modern)	Deposit					Soft yellow to brown /tan silty sand. Pockets of topsoil and beach shell. Fill around the top of the manholes.			9, 10	
7	Trench for modern service	Cut	8m+	50cm		N/S	Linear trench for modern service. Filled with soft yellow sand.	West abutment		10	
8	Reclamation for causeway (modern)	Deposit				W/E	Soft dark brown loamy sandy silt. Contains pieces of modern broken concrete fragments, broken pipes, roots, plastic, and pockets of yellow stiff clay. Mixed fill used for the creation of the causeway reclamation and for battering the coastal edge. It contains pipes for the current stormwater drainage cut through it.	West abutment		10	
9	Turf/topsoil (modern)	Deposit			5-10cm		Modern turn and topsoil layer consisting of dark brown loamy silty sand.	West abutment		10	N/A

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
10	Clay capping layer	Deposit					Firm mottled orange /brown/yellow silty clay. Contains occasional to moderate amounts of plastic, modern roading gravels, rootlets. This clay capping layer has been laid to cover and infill ground surface around the modern manholes.	West abutment		9	1
11	Midden found by CFG	Deposit	4m	2m	70cm	N/S	Soft dark brown/black loamy sand. Contains 75% crushed and whole pipi shell, roots. Midden deposit has been exposed in bench cut.	West abutment		17	10
12	Redeposited midden	Deposit					Containing mixed amounts of whole and crushed pipi and cockle fragments mixed around tree roots. Disturbed or redeposited midden.	West abutment		1	1
13	Redeposited midden	Deposit					Soft loose dark brown silty sand. Containing mixed amounts of whole and crushed pipi and cockle fragments mixed around tree roots. Disturbed or redeposited midden. Mixed in with (001) as a result of pohutukawa tree roots.	West abutment		1	1
14	Fire scoop	Cut	60cm	55cm	30cm	N/S	Oval shaped scoop. Steeply sloping sides with a flat base. Filled by (15) and (16). Sealed by (11). Feature exposed in cut benching but collapsed before investigation.	West abutment	14, 15, 16	15, 16,	17
15	Fire scoop fill	Fill	60cm	55cm	30cm	N/S	Soft mid brown sand. Contains heat altered hangi stones (16), fill of [14].	West abutment	14, 15, 16	11	15
16	Fire scoop fill	Fill	60cm	55cm	30cm	N/S	Heat altered hangi stones (16), fill of [14].	West abutment	14, 15, 16	11	14
17	Natural Sand	Deposit					Soft to medium compacted yellow sand. No inclusions. Beach sand.	West abutment	17=91	18, 19	LOE
18	Stained sand	Deposit				N/S	Friable/loose light brown/tan silty sand. Occasional roots. Variable staining beneath midden (19). Edges are diffused and undulating.	West abutment		19	17
19	Midden	Deposit	3.5m	50cm	15-20cm	W/E	Firm dark brown / black silty sand. Compact crushed and whole pipi, tuatua, cockle shell. Very occasional rounded pebbles. This midden follows the old coastal edge W/E into the estuary intertidal zone. Despite being crushed by the reclamation fill (8), No cut features were identified as the midden was exposed in bench cut.	West abutment		21, 22	18

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
20	Reclamation for modern road (modern)	Deposit	7.5m	3m	80cm+	W/E	Firm red, orange, brown and grey banded silty clay. Moderate amount of rough cut quarry stones. Reclamation in fill for current roading surface for SHW and bridge.	West abutment		2	21
21	Made ground (modern)	Deposit	3m	1.2m	30-40cm	W/E	Firm mid brown loamy silty sand. Occasional to moderate quarry rocks. Made ground consisting of multiple tipping events to create a made ground layer above midden (19) and forms part of the road construction for SHW and reclamation build-up of the bridge cause way.	West abutment		20	19
22	Made ground (modern)	Deposit	3.2m	1.5m	20cm	W/E	Moderate compacted dark brown grey sand. Frequent redeposited shell fragments (beach shell) and gravel stones. Disturbance material cause by creation of SHW and reclamation build-up of the bridge causes way.	West abutment		20	19
23	Fish Bone	Deposit	40cm	40cm	30cm	All	Soft yellow/tan sand. Pocket of fish bone within (28)	West abutment		28	28
24	Midden	Deposit	3m	20cm+	35cm	N/S	Firm black sandy silt. Dense shell midden consisting of cockle, pipi and tuatua. Midden was inset	West abutment		25	26
25	Redeposited sand?	Deposit	80cm		10cm	N/S	Soft brown sand. No inclusions. Possibly redeposited sand.	West abutment		5	11, 24
26	Sand staining	Deposit	60cm		10cm	N/S	Soft black sand. Staining from midden (24)	West abutment		24	27
27	Sand and cultural lens	Deposit	6m		30-40cm	N/S	Soft dark brown sand. Occasional shell lenses and stone fragments. Material is likely from midden (24) and associated cultural activity which has pushed material from midden down into soft sand.	West abutment		11, 24, 26	17
28	Redeposited sand	Deposit	1.2m		70cm	N/S	Soft yellow / tan mottled mixed sand. Looks to be redeposited natural sand and explains pocket of fish bone (23) within it. No clear edges.	West abutment		27	29, 17
29	Redeposited midden	Deposit				N/S	Firm black sandy silt. Slumped shell midden from Midden (24) but contains modern metal, glass and rock. This material has slumped off the coastal edge into the tidal estuary.	West abutment		24	1
30	Midden	Deposit	4m		40cm	N/S	Firm black sand. Containing whole and crushed shell consisting of cockle, pipi and tuatua, mud snail and	West abutment		51	42

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
							occasional fire cracked rock and charcoal. Midden inset.				
31	Overburden (modern)	Deposit	1.8m		90cm	N/S	Medium compacted dark brown silty sand. Containing modern road gravels, rock, roots. Interface between ground surface and modern infill stoning.	West abutment		34	32
32	Beach surface (modern)	Deposit	4.8m		50cm	N/S	Soft dark brown sand. Very occasional shell fragments. Remains of 20th century beach surface.	West abutment		31	17
33	65 gravel (modern)	Deposit					Project gravel infilling material for new abutment. Put in by Pip.	West abutment		35	35
34	Redeposited sand	Deposit	1m		5cm	N/S	Soft yellow brown sand. Redeposited sand.	West abutment		33	31
35	Old topsoil (post 1900)	Deposit	1.2m		40cm	N/S	Firm dark brown silty sand. Occasional hard core gravel from roading surface. 20th century topsoil. Now buried by works.	West abutment		33	38
36	Disturbance 2000AD (modern)	Deposit	5.5m		80cm	N/S	Soft mixed brown loamy sand. Frequent roots from pohutakawa tree. Disturbed area caused by tree roots and wash out c. 2000. This was undertaken as repair works to sewerage and H20 pipes by Pip in 2000.	West abutment	36, 37, 38, 39, 41, 43, 44	37	32
37	Disturbance 2000AD (modern)	Deposit	7m		40-80cm	N/S	Firm yellow/cream clay. Clay is from repair works to sewerage and H02 pipes in c.2000 by Pip.	West abutment	36, 37, 38, 39, 41, 43, 44	38	36
38	Disturbance 2000AD (modern)	Deposit	8m+		30-60cm	N/S	Firm brown/orange loamy clay. Redeposited topsoil from c. 200 repair works to sewerage and H20 pipes	West abutment	36, 37, 38, 39, 41, 43, 44	35	37
39	Disturbance 2000AD (modern)	Deposit	2.5m		40-50cm	N/S	Firm dark brown sandy silt. Occasional gravel and stone. Deposit is from repair works to sewerage and H02 pipes in c.2000 by Pip. And disturbance from old pohutakawa tree.	West abutment	36, 37, 38, 39, 41, 43, 44	38	40
40	Redeposited midden	Deposit	1.5m		10cm	N/S	Firm dark brown loamy sand. Moderate amounts of crushed shell / midden like material within root disturbance from the pohutakawa tree.	West abutment		39	41

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
41	Disturbance 2000AD (modern)	Deposit	1.8m		1m	N/S	Firm tan/yellow gritty silty clay. Disturbance from pohutakawa tree and from repair works to sewerage and H02 pipes in c.2000 by Pip	West abutment	36, 37, 38, 39, 41, 43, 44	40	38
42	Stained sand	Deposit	14m		1m+	N/S	Medium compacted dark brown silty sand. Lenses of shell midden (crushed shell and stained soil) beneath middens (30) and (48). This deposit is staining from those midden deposits. It has been partly disturbed by the pohutakawa tree root system.	West abutment, Stormwater trench 1		48	45
43	Disturbance 2000AD (modern)	Deposit	1m		70cm	N/S	Firm dark brown sand. Crushed cockle shell and rootlets. Redeposited midden material from repair works to sewerage and H02 pipes in c.2000 by Pip.	West abutment	36, 37, 38, 39, 41, 43, 44	40	42
44	Disturbance 2000AD (modern)	Deposit	2.5m		10cm	N/S	Band and lenses (horizontal) consisting of small stones and gravel. From repair works to sewerage and H02 pipes in c.2000 by Pip. Within fill (39)	West abutment	36, 37, 38, 39, 41, 43, 44	39	39
45	Beach surface (modern)	Deposit	4.8m		50cm	N/S	Soft dark brown sand. Very occasional shell fragments. Remains of 20th century beach surface.	West abutment		42, 43	17
46	Root disturbance (modern)	Deposit	3.6m		60cm+	N/S	Medium compacted brown loamy sand. Pohutakawa roots. Disturbance caused by pohutakawa roots. Modern.	West abutment		33	39
47	Redeposited sand	Deposit	2.5m		10cm	N/S	Soft tan brown sand. Redeposited sand, resulting from pohutakawa tree.	West abutment		46	48
48	Midden lens	Deposit	2.4m		10cm	N/S	Firm black silty sand. Containing crushed and whole cockle and pipi shell. Lenses of midden which has been modified and damaged by pohutakawa tree.	West abutment		47	42
49	Capping layer	Deposit	7.4m		40cm	N/S	Firm mid brown mottled silty clay. Occasional crushed shell fragments, gravel and gritty sand. Modern clay capping layer over 3 x concrete stormwater pipes (3). This is a variation on capping layer (5)	West abutment, Stormwater trench 1		33	30
50	Void										
51	Disturbance 2000AD (modern)	Deposit	2.2m		50cm	N/S	Firm dark brown gritty silty clay. Mixed with pockets of topsoil and occasional gravels. Possible continuation of (38) and is truncated and disturbed by pohutakawa tree.	West abutment, Stormwater trench 1		40	30

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
52	Midden	Deposit	1.4m	60cm	2cm	W/E	Loose black sand. Containing thin sparse whole and broken pipi and cockle shell. Possible lithic material.	Wing Wall West abutment, Stormwater trench 1		49	42
53	Sand	Deposit	2.2m	50cm	10cm	W/E	Soft black sand. Staining from middens (52), (53) and (55)	Wing Wall West abutment		49	42
54	Disturbance (modern)	Deposit	60cn	60cm	4cm	All	Soft tan yellow sand. Caused by modern tree root disturbance (pohutakawa tree).	Wing Wall West abutment		51	30
55	Midden	Deposit	1.6m	1.4m	20cm	W/E	Soft black sand. Containing whole and crushed shell, charcoal, and possible fragment and degraded fish bone. Possible kokowai fragment and hangi stones	Wing Wall West abutment, Stormwater trench 1		51	42
56	Midden	Deposit			30-60cm		Loose black sand. Containing thick dense shell midden consisting of whole and crushed pipi shell in a range of sizes, charcoal fragments and small fire cracked rock.	Pothole # 6 N side of bridge		63	65
57	H20 Pipe (modern)	Cut	6m+	50cm	30cm	W/E	Cut for modern white plastic H20 pipe. Running along northern side of SHW in berm. Steep sided and rounded rounded base. Filled with (58)	Pothole # 6 N side of bridge	57, 58	58	62
58	H20 Pipe (modern)	Fill	6m+	50cm	30cm	W/E	Firm dark brown sand contains H/C gravel, redeposited midden (56), yellow clay and sand. Fill of [57]	Pothole # 6 N side of bridge	57, 58	61	57
59	H20 Pipe (modern)	Cut	6m+	50cm	30cm	W/E	Cut for modern black plastic H20 pipe. Running along northern side of SHW in berm. Steep sided and rounded base. Filled with (60)	Pothole # 6 N side of bridge	59, 60	60	62
60	H20 Pipe (modern)	Fill	6m+	50cm	30cm	W/E	Firm dark brown sand contains H/C gravel, redeposited midden (56), yellow clay and sand. Fill of [59]	Pothole # 6 N side of bridge	59, 60	61	59
61	Topsoil and plantings (modern)	Deposit			20cm		Thin grass turf overlying dark brown loamy silty sand with plant roots and roading gravels. Contains disturbance from plantings and modern plastic rubbish as well as the remains of the old foot path kerb and base course	Pothole # 6 N side of bridge		n/a	58, 60, 62
62	Disturbed ground (modern)	Deposit					Firm loamy brown and tan sand silty sand. Frequent h/c gravel, roading tarmac, plastic rubbish, pockets of redeposited shell midden (), plastic, tree roots. Disturbed layer for insertion of services and plantings	Pothole # 6 N side of bridge		57, 59, 61	64

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
63	Sewerage pipe (modern)	Cut		70cm	80cm+	W/E	Cut for modern sewerage trench. Steep sides and rounded base. Filled with (64). Contains a grey white coloured plastic pipe	Pothole # 6 N side of bridge		64	56
64	Sewerage pipe (modern)	Fill		70cm	80cm+	W/E	Firm mid brown tan gritty sand. Contains moderate amounts of roading gravel and associated lenses of gravel, redeposited midden (56) and has been disturbed by modern roots.	Pothole # 6 N side of bridge		62	63
65	Sand	Deposit			20cm+		Soft sterile brown sand, Beneath midden (56), possible staining or variation of natural sand,	Pothole # 6 N side of bridge		56	LOE
66	Back fill (modern)	Fill	2m	2m	60cm+	Circular	Moderately firm brown loamy sand. Fill of [69]	Pothole #13 N side of the bridge	69, 66, 68	73	69
67	Midden	Deposit		2m			Dark black silty sand. Frequent concentrated crushed and whole shell. Predominately pipi with small amounts of cockle and mud snail. Occasional water rolled small pebbles. Midden deposit - very thick and intact. Possible grind stone.	Pothole #13 N side of the bridge, Sewerage connection pit 2		69	65
68	Back fill (modern)	Fill	2m	2m	60cm+	Circular	Moderately firm brown loamy sand. Fill of [69]	Pothole #13 N side of the bridge	69, 66, 68	73	69
69	Man hole (modern)	Cut	2m	2m	60cm+	Circular	Large sub circular cut for modern man hole. Steep sided, base unknown. Filled by (66)/ (68). Manhole is modern and constructed in concrete. It services the sewerage line on N side of bridge.	Pothole #13 N side of the bridge	69, 66, 68	66, 68	67
70	Back fill (modern)	Deposit	2m	1m	5cm	N/S	Firm dark brown sand. Redeposited midden (67) lenses, with h/c gravel inclusions. Modern back fill layer from insertion of [69] manhole.	Pothole #13 N side of the bridge		71	66, 68
71	Back fill (modern)	Deposit	3.6m	2m	5cm	N/S	Firm orange brown silty sand. Inclusions consist of modern h/c gravels, roots and plastic. Back fill layer from services or roading.	Pothole #13 N side of the bridge		70	73
72	Made ground (modern)	Deposit	12.5m	5m	30-40cm	W/E	Firm brown loamy sand. Includes lenses of h/c gravels, stones, plastic, roots, clay. Modern back fill in area or made ground.	Pothole #13 N side of the bridge		Concrete footpath/trees	70
73	Midden (redeposited)	Deposit	2m	1m	5cm	N/S	Firm black silty sand. Frequent crushed and whole pipi shell. Looks to be deposited midden (67).	Pothole #13 N side of the bridge		71	66, 68

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
74	Midden	Deposit	13m	1m	40cm	W/E	Loose black silty sand. Frequent whole and crushed pipi 85% shell with occasional cockle 5 % shell. Midden deposit - possibly O04/407. Heavily disturbed by tree line currently growing through it. Not sampled	Pothole #13 & 14 N side of the bridge		Trees/ duff	65
75	Midden	Deposit	2.4m	2m	20cm		Firm black silty sand. Moderate crushed and whole pipi shell.	Pothole #13 N side of the bridge and foot path extension	75=84	76, 78	67, 76
76	Sand (modern?)	Deposit		2.5m	5-10cm	W/E	Firm brown sand. Band of back filled sand overlying midden (67). Most likely modern	Pothole #13 N side of the bridge		71, 75, 100, 78	67, 77, 84
77	Midden	Deposit		1m	5cm	W/E	Firm dark brown black silty sand. Moderate crushed whole and broken pipi shells 90% with 5% cockle.	Pothole #13 N side of the bridge		76	67
78	Sand	Deposit		4m	25cm	W/E	Firm yellow brown sand - horizontal bands of brown and yellow sand. Possible modern sand back fills from services overlying midden (67).	Pothole #13 N side of the bridge		70	67
79	Scoop?	Cut	1.4m	50cm	20cm	W/E	Oval (?) shaped scoop? With gently sloping sides and rounded base. Filled by (67). Could possibly be a variation in natural sand and not a deliberate cut?	Pothole #13 N side of the bridge		67	65
80	Midden	Deposit		1.2m	5-15cm	W/E	Loose black silty sand. Frequent whole and crushed pipi 85% shell with occasional cockle 5 % shell. Midden deposit - possibly O04/407. Heavily disturbed by tree line currently growing through it. Not sampled	Pothole #14 N side of the bridge	See note book	Trees/ duff	65
81	Lens	Deposit		60cm	5cm	W/E	Firm brown loamy sand. Contains occasion pieces of fire cracked rock and crushed pipi shell and charcoal. Lens within (67).	Pothole #13 N side of the bridge		67	67
82	Midden	Deposit		1.2m	30cm	W/E	Soft mixed brown sand. Moderate crushed pipi shell, no charcoal. Fill looks to be shell mixed into (65) brown sand.	Pothole #13 N side of the bridge		67	65
83	Midden	Deposit		50cm	25cm	W/E	Soft mixed brown sand. Moderate crushed pipi shell, no charcoal. Fill looks to be shell mixed into (65) brown sand.	Pothole #13 N side of the bridge		67	65
84	Midden	Deposit	2.4m	2m	20cm		Firm black silty sand. Moderate crushed and whole pipi shell.	Pothole #13 N side of the bridge and foot path extension	75=84	76, 78	67, 76

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
85	Void							Pothole # 15 Abutment S side of the bridge			
86	Modern overburden	Deposit	3.6m	2m+	40-60cm		Modern roading gravels, made ground and topsoil. This is the modern ground fill beneath tuff in west abutment area.	Pothole # 15 Abutment S side of the bridge	Note book	N/A	87
87	Sand	Deposit	3.6m	2m+	30cm		Firm mottled or mixed brown and yellow sand. Contains roading gravel. This is a modern fill associated with the abutment/signage and services.	Pothole # 15 Abutment S side of the bridge	Note book	86	88
88	Sand	Deposit	3.2m	2m+	10cm		Firm dark brown black silty sand. Looks like a modern back fill layer above midden (89).	Pothole # 15 Abutment S side of the bridge	Note book	87	89
89	Midden	Deposit	3.6m	2m	40-50m	N/S	Form dark brown silty sand. Moderate amounts of crushed and whole pipi shell 90% with small amounts of cockle and fire cracked rock.	Pothole # 15 Abutment S side of the bridge	Note book	88	90
90	Sand	Deposit	3.6m	2m+	30cm		Soft sterile brown sand, Beneath midden (589), possible staining or variation of natural sand.	Pothole # 15 Abutment S side of the bridge	Note book	89	91/17
91	Natural Sand	Deposit	50cm	40cm	15cm		Soft to medium compacted yellow sand. No inclusions. Beach sand.	Pothole # 15 Abutment S side of the bridge	Note book	90	N/A
92	Scoop	Cut	50cm	40cm	15cm		Oval shaped scoop. Steeply sloping sides with a flat base. Filled by (93). Possible small fire scoope contained a lot of small stones/heat retainers.	Pothole #13 N side of the bridge and foot path extension	92, 93	93	102
93	Scoop Fill	Fill	50cm	40cm	15cm		Firm dark brown black silty sand. Fill of [92]. Moderate crushed whole and broken pipi shell, occasional to moderate charcoal flecking and some burnt stone/ heat retainers.	Pothole #13 N side of the bridge and foot path extension	92, 93	75	92
94	Post hole	Cut	20cm	20cm	10cm		Round post hole. Steeply sloping sides with a rounded base. Filled by midden (65).	Pothole #13 N side of the bridge and foot path extension		67	65
95	Midden	Deposit	1.6m		30cm	N/S	Firm dark brown black sandy silt. Moderate amounts of crushed and whole pipi shell 90% with occasional pebbles.	Pothole #13 N side of the bridge and foot path extension		101	102
96	Gravel modern	Deposit	1m	20cm	5cm	N/S	Dark brown silty gritty sand. Some occasional crushed shell and gravels. Modern.	Pothole #13 N side of the bridge and foot path extension		100, 97	95

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
97	Sand	Deposit		2m	10cm		Brown sand. Modern sand deposit.	Pothole #13 N side of the bridge and foot path extension		100	96/101
98	Midden (redeposited)	Deposit	2.8m	1m	5cm		Firm black silty sand. Moderate amounts of crushed and whole pipi shell, with 5% cockle and fire cracked rock. Redeposited band of midden from (67). Associated with roading and services.	Pothole #13 N side of the bridge and foot path extension		99, 70	97
99	H/C gravel band (modern	Deposit	1m	40cm	20cm		Grey 65 H/C gravels. Modern roading material.	Pothole #13 N side of the bridge and foot path extension		70	98/100
100	Midden (redeposited)	Deposit	2.8m	1m	5cm		Firm black silty sand. Moderate amounts of crushed and whole pipi shell, with 5% cockle and fire cracked rock. Redeposited band of midden from (67). Associated with roading and services.	Pothole #13 N side of the bridge and foot path extension		78	76
101	Gravel modern	Deposit	1m	20cm	5cm	N/S	Dark brown silty gritty sand. Some occasional crushed shell and gravels. Modern.	Pothole #13 N side of the bridge and foot path extension		100, 97	95
102	Midden	Deposit	12.m	1m	50cm	N/S	Brown silty sand. Frequent whole and crushed pipi shell 90%, degraded pockets of fish bone, occasional large cockle and tuatua shell, charcoal chunks. Midden variation.	Pothole #13 N side of the bridge and foot path extension		75, 95	67
103	Void										
104	Modern Tarmac road SHW 10	Deposit		1m	5cm	N/S	Current SHW 10 tarmac surface	Sewerage trench N to S		N/A	105
105	Roading metaling (modern)	Deposit		1m	50-60cm	N/S	Grey 65 gravels - modern roading stabilising fill. Modern SHW 10.	Sewerage trench N to S		104	160
106	Tarmac Road Surface (modern)	Deposit		1m	8-10cm	N/S	Earlier tarmac road for SHW 10. Buried beneath modern road.	Sewerage trench N to S		105	107
107	Roading metaling (modern)	Deposit		1m	10-30cm	N/S	Brown and grey layers of fine gravels. This is modern stabilising fill associated with buried road tarmac (106). Modern.	Sewerage trench N to S		106	108

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
108	Sand (modern)	Deposit		1m	20-40cm	N/S	Yellow and brown sand. Redeposited natural beach sand which has been used to build up road surface (106) as a leaving layer. Occasional lenses of midden and stone.	Sewerage trench N to S		107	111
109	Scoop	Cut		50cm	40cm	N/S	Oval (?) shaped scoop located on the eastern side of sewerage trench. Recorded in section. Steep sloping sides with a slightly rounded base. Not sampled due to H/S of sewerage trench.	Sewerage trench N to S	112	112	65
110	Scoop	Cut	1m+	90cm	20cm	N/S	Oval (?) shaped scoop. Recorded in section. Steep sloping sides with a slightly rounded base. Not sampled due to H/S of sewerage trench. Filled by (114).	Sewerage trench N to S	110, 114	114	65
111	Midden	Deposit	1m+	4m	10-15cm	N/S	Black silty sand, with moderate crushed shell midden consisting of whole and broken pipi, charcoal chunks, and occasional fire cracked rocks. Not sampled due to H/S of sewerage trench. Recorded in section.	Sewerage trench N to S		108	115, 112
112	Midden	Deposit	1m+	6.5m	30cm	N/S	Black brown silty sand. Concentrated shell midden consisting of mostly whole pipi shell of various sizes, lenses of beach crushed shell/sand, occasional to moderate amounts of fist sized fire cracked rock and charcoal chunks. Similar to (67). Not sampled due to H/S of sewerage trench. Recorded in section.	Sewerage trench N to S	109	115	114, 118
113	Void							Sewerage trench N to S			
114	Midden	Fill	1m+	90cm	20cm	N/S	Brown silty sand. Moderate amounts of whole and broken pipi shell, occasional fire cracked rock, charcoal chunks. Not sampled due to H/S of sewerage trench. Recorded in section.	Sewerage trench N to S		112	110
115	Sand/midden	Deposit	1m+		10cm	N/S	Black silty sand. Possibly charcoal staining from associated cultural activity and modern (112). Not sampled due to H/S of sewerage trench.	Sewerage trench N to S		111	112
116	Backfill	Fill		40cm	30cm	N/S	Loose soft brown sand with occasional fist sized fire cracked rocks, occasional to moderate amounts of whole and broken pipi shells. Possibly occasional charcoal fragments. Not sampled due to H/S of sewerage trench. Recorded in section.	Sewerage trench N to S	116, 117	112	117

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
117	Pit	Cut		40cm	30cm	N/S	Square shaped pit, vertical sides and flat base. Filled by (116). Recorded in section. Not sampled due to H/S of sewerage trench.	Sewerage trench N to S	116, 117	116	65
118	Sand/midden	Deposit				N/S	Black silty sand. Moderate whole and broken crushed pipi shell. Evenly mixed through matrix. Recorded in section. Not sampled due to H/S of sewerage trench.	Sewerage trench N to S			
119	Post hole	Cut		20cm	20cm	N/S	Round post hole. Filled by (120)/ Vertical sides and flat base. Located on west side of sewerage trench. Only recorded in plan and photo.	Sewerage trench N to S	119, 120	112	120
120	Post hole fill	Fill		20cm	20cm	N/S	Brown silty sand. Moderate whole and broken crushed pipi shell. Evenly mixed through matrix. Recorded in section. Not sampled due to H/S of sewerage trench. Fill of [119].	Sewerage trench N to S	119, 120	119	65
121	Scoop fill	Fill	50cm	30cm+	10cm	N/S	Firm black silty sand. Moderate whole and broken pipi shell, occasional small cockle shell and small round pebbles. Moderate charcoal staining and flecks. Fill of [122]. Partially excavated in extent of sewerage trench.	Sewerage trench N to S 7-12m	121, 122	126	122
122	Scoop	Cut	50cm	30cm+	10cm	N/S	Oval (?) shaped scoop. Filled by (121). Steep sides and rounded base. Partially excavated in extent of sewerage trench.	Sewerage trench N to S 7-12m	121, 122	121	65
123	Post hole fill	Fill	25cm	15cm	8cm	NW/SE	Black silty sand with frequent crushed, broken and whole pipi shell. Fill of [128]	Sewerage trench N to S 7-12m	123,128	118	128
124	Fire scoop fill	Fill	60cm	40cm	18cm	N/S	Black silty charcoal stained sand with charcoal and burnt fire cracked rock, very occasional shell fragments. Fill of [127].	Sewerage trench N to S 7-12m	124, 127	118	127
125	Post hole fill	Fill	30cm	20cm	38cm	N/S	Soft dark brown silty sand with occasional pipi shell and fire cracked rock. Occasion charcoal flecking. Fill of [126]. Partially excavated in extent of sewerage trench.	Sewerage trench N to S 7-12m	125, 126	115	126
126	Post hole	Cut	30cm	20cm	38cm	N/S	Post hole filled by (125). Steep sided with a flat base. This post hole truncates [122]. Partially excavated in extent of sewerage trench.	Sewerage trench N to S 7-12m	125, 126	125	121
127	Fire scoop	Cut	60cm	40cm	18cm	N/S	Oval (?) shaped shallow fire scoop with fire cracked rock and staining (124). Steep sides with a flat base. Partially excavated in extent of sewerage trench.	Sewerage trench N to S 7-12m	124, 127	124	65

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
128	Post hole	Cut	25cm	15cm	8cm	NW/SE	Oval shaped shallow post hole. Filled with (123). Steep sides and rounded base. Fully excavated but not sampled due to smallness of feature.	Sewerage trench N to S 7-12m	123,128	123	65
129	Wooden post	Post	30cm	30cm+	60cm	N/A	Very degraded and rotten piece of sub rounded timber post. Cut [130]. Timber measures 30cm in diameter by 60cm in surviving length.	Pot hole # 13 lead in trench extension	129, 130, 139, 140	140	130
130	Post hole	Cut	50cm	40cm	60cm	NE/SE	Sub round cut for timber post (129). Steep sided with rounded base. [modern?]	Pot hole # 13 lead in trench extension	129, 130, 139, 140	129	65
131	Scoop and rake out	Fill	70cm	60cm	15cm	N/S	Firm black silty sand with moderate broken and whole pipi shell and fist sized fire cracked rock and charcoal staining. This is the rake out from the northern portion of [132].	Pot hole # 13 lead in trench extension	131, 132, 135	136	135
132	Scoop and rake out	Cut	1.4m	70cm	20cm	N/S	Possible scoop with rake out. Steeply sloping sides, with a stepped base from north to south. Filled by (131) and (135).	Pot hole # 13 lead in trench extension	131, 132, 135	135	65
133	Scoop fill (?)	Fill		60cm	10cm	N/S	Soft brown silty sand with occasional to moderate whole and broken pipi shell, occasional small pebbles. Fill of [134].	Pot hole # 13 lead in trench extension	133, 134	136	134
134	Scoop (?)	Cut		60cm	10cm	N/S	Oval shaped scoop. Steep sides with a flat base. Filled by (133). Not fully excavated.	Pot hole # 13 lead in trench extension	133, 134	133	65
135	Scoop and rake out	Fill	70cm	70cm	20cm	N/S	Soft brown sand with occasional broken and whole pipi shell. This is the scoop portion to the south of [132].	Pot hole # 13 lead in trench extension	131, 132, 135	131	132
136	Midden	Deposit		3m+	80cm	W/E	Firm black silty sand with frequent dense pipi shell, occasional fire cracked rock and is disturbed by roots	Pot hole # 13 lead in trench extension		74	133, 131,
137	TV cable fill	Fill		1.5m+	40cm	W/E	Firm dark brown loamy sand with gravels, redeposited midden and TV Cable. Fill of [138]. Not fully excavated.	Pot hole # 13 lead in trench extension	129, 130, 139, 140	Duff	138
138	TV Cable Trench	Cut		1.5m+	40cm	W/E	TV cable trench. Filled by (137), Steep sides and flat base. Not fully excavated.	Pot hole # 13 lead in trench extension	129, 130, 139, 140	137	74
139	Post hole fill	Fill		60cm	40cm	W/E	Lens of yellow sand in a rectangular shape with redeposited shell midden (136)? in it. Within (140). Not fully excavated.	Pot hole # 13 lead in trench extension	129, 130, 139, 140	140	140
140	Post hole fill	Fill		1.6m	90cm	W/E	Mid brown loamy sand with moderate amounts of crushed and broken pipi shell, fire cracked rock and	Pot hole # 13 lead in trench extension	129, 130, 139, 140	74	129

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
							tree roots. Looks to be very disturbed. Contains a modern cut (138). Not fully excavated.				
141	Midden	Deposit	3m	1m+	35cm	N/S	Black silty sand. Moderate whole and broken crushed pipi shell. Evenly mixed through matrix. Charcoal staining. Recorded in section.	Sewerage trench N to S 17-22m		88	142
142	Sand (cultural)	Deposit	1.5m	1m+	40cm	N/S	Dark brown black sand. Charcoal stained most likely cultural layer associated with midden (141). Recorded in section.	Sewerage trench N to S 17-22m		141	145
143	Scoop fill	Fill	80cm	50cm	10cm	W/E	Dark brown black charcoal stained sand with frequent burnt fire cracked rocks s some root disturbance. Fill of [144].	Sewerage trench N to S 17-22m	143, 144	142	144
144	Scoop	Cut	80cm	50cm	10cm	W/E	Oval shaped scoop filled by (143). Found within cultural layer (142). Truncated by cut for 3 large concrete pipes. Steeply sloping sides with a rounded base.	Sewerage trench N to S 17-22m	143, 144	143	142
145	Scoop fill	Fill	80cm	40cm	30cm	N/S	Black stained sand with occasional broken pipi shell and fire cracked rock, fist sized. Fill of [146].	Sewerage trench N to S 17-22m	145, 146	141	146
146	Scoop	Cut	80cm	40cm	30cm	N/S	Oval shaped scoop filled by (145). Steeply sloping sides and rounded base.	Sewerage trench N to S 17-22m	145, 146	145	65
147	Scoop fill	Fill	80cm	65cm	10cm	N/S	Dark brown black silty sand with charcoal staining. Moderate crushed pipi shell and small rounded pebbles. Fill of [148].	Sewerage trench N to S 17-22m	147, 148	141	148
148	Scoop	Cut	80cm	65cm	10cm	N/S	Oval shaped scoop. Steeply sloping sides and flat base. Filled by (147).	Sewerage trench N to S 17-22m	147, 148	147	151
149	Midden	Deposit	10m	1m+	10cm	N/S	Black silty sand with moderate amounts of crushed and whole pipi shell, occasional fire cracked rock. Observed in pothole #17.	Sewerage trench N to S 55-65m		31	32
150	Redeposited midden	Deposit	6m	1m+	5-10cm	N/S	Brown loamy silty clay with crushed shell. Redeposited midden.	Sewerage trench N to S 38-43m		33	41
151	Sand	Deposit	5m	1m	20cm	N/S	Brown sand, similar to (65) but darker.	Sewerage trench N to S 55-65m		148, 146	65
152	Scoop fill	Fill				N/S	Loose brown sand with moderate broken and whole pipi shell, occasional water tolled pebbles and charcoal	Sewerage connection pit 1	152,153		152

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
							flecking. Pipi shell is not as dense as midden (149). Fill of [153]				
153	Scoop	Cut				N/S	Scoop filled by (152), oval in plan with vertical side and flat base.	Sewerage connection pit 1	152,153	152	65
154		Deposit					Compacted brown grey silty clay with road and occasional to moderate gravels	Sewerage connection pit 1			
155	Burnt wood	Fill	30cm	15cm	10cm	N/S	Burnt carbonized wood, basal remains in [157].	Sewerage connection pit 2	155, 156, 157	156	157
156	Scoop	Fill	60cm	50cm	15cm	N/S	Loose brown sand (30%) with moderate broken and whole pipi shell (70%), occasional water rolled pebbles and charcoal flecking. Fill of [157].	Sewerage connection pit 2	155, 156, 157	67	155
157	Scoop	Cut	60cm	50cm	15cm	N/S	Oval shaped scoop with burnt wood (155) in base. Steep sloping sides and a flat base. Filled by (155) and (156).	Sewerage connection pit 2	155, 156, 157	155	65
158	Midden lens	Deposit	70cm	50cm	30-40cm	N/S	Black silty sand, moderate charcoal flecks and broken pipi shell. Occasional fire cracked rock and rounded beach pebbles. A large gastropod shell also present and sampled This is a lens deposit within midden (67) or dump deposit as shell is over all smaller in appearance then (67).	Sewerage connection pit 2		189	67
159	Midden lens	Deposit		30cm+	10cm	N/S	Dark brown black charcoal stained sand with occasional charcoal flecking, fire cracked rock, broken and whole pipi shell and occasional small cockle shells. Shell 70% sand 30%. Within deposit (82).	Sewerage connection pit 2		82	82
160	Stake hole fill	Fill	10cm	10cm	10cm	N/A	Loose brown sand with moderate broken and whole pipi shell. Fill of [161].	Sewerage connection pit 2	160, 161	67	161
161	Stake hole	Cut	10cm	10cm	10cm	N/A	Small round stake hole filled by (160). Steeply sloping sides with rounded base. Inclination of axis N/S.	Sewerage connection pit 2	160, 161	160	65
162	Post hole fill	Fill	18cm	198cm	25cm	N/A	Loose dark brown sand with frequent broken and crushed pipi shells and occasional charcoal staining. Fill of [163]	Sewerage connection pit 2	162, 163	62	163
163	Post hole	Cut	18cm	198cm	25cm	N/A	Small round post hole with vertical sides and a rounded base. Filled by (162).	Sewerage connection pit 2	162, 163	162	65

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
164	Scoop fill	Fill	80cm	50cm	20cm	N/S	Black charcoal stained sand with several fist sized fire cracked rock, moderate to sparse whole and broken pipi shell and occasional charcoal flecking. Fill of [172]	Sewerage connection pit 2	164, 172	62	172
165	Scoop fill	Fill		30cm	10cm	W/E	Firm black sand with frequent whole and broken % shell to pipi shell, crushed shell. 75% shell 25% sand. Fill of [169].	Sewerage connection pit 2	165, 169	67	169
166	Scoop & pit fill	Fill	80cm	40cm	Oct-20	W/E	Firm black sand with frequent whole and pipi shell, crushed. 75% shell 25% sand. Fill of [170] and [171]	Sewerage connection pit 2	166, 170, 171	67	170, 171
167	Midden						Dark black silty sand. Frequent concentrated crushed and whole shell. Predominately pipi with small amounts of cockle and mud snail. Occasional water rolled small pebbles. Midden deposit - very thick and intact. Possible grind stone.	Pothole #13 N side of the bridge, Sewerage connection pit 2			65
168	Midden						Dark black silty sand. Frequent concentrated crushed and whole shell. Predominately pipi with small amounts of cockle and mud snail. Occasional water rolled small pebbles. Midden deposit - very thick and intact. Possible grind stone.	Pothole #13 N side of the bridge, Sewerage connection pit 2		69	65
169	Scoop	Cut		30cm	10cm	W/E	Oval shaped scoop with steep sides and a rounded base. Filled by (165).	Sewerage connection pit 2	165, 169	165	65
170	Pit	Fill	40cm	40cm	20cm	N/A	Round pit filled by (166) and part of [171] to west. Steeply sloping sides and rounded base.	Sewerage connection pit 2	166, 170, 171	166	65
171	Scoop	Fill	40cm	40cm	10cm	W/E	Shallow oval pit located on the eastern side of [170], filled by (166). Steeply sloping sides and a flat base. Possible scoop out.	Sewerage connection pit 2	166, 170, 171	166	65
172	Scoop	Cut	80cm	50cm	20cm	N/S	Sub oval shaped scoop. Steeply sloping sides with an uneven base. Filled by (164)	Sewerage connection pit 2	164, 172	164	65
173	Post hole	Cut	20cm	20cm	10cm	N/A	Small round post hole with vertical sides and rounded base. Filled by (181).	Sewerage connection pit 2	181, 173	181	65
174	Post hole	Cut	15cm	51cm	10cm	N/A	Small round post hole with vertical sides and rounded base. Filled by (67).	Sewerage connection pit 2	67, 174	67	65
175	Modern gravel	Deposit		80cm	10cm	W/E	Firm brown silty gravelly sand with fine hard core gravels. Modern deposit	Sewerage connection pit 2		185	179

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
176	Modern sand	Deposit		3m	10cm	W/E	Yellow and brown sand. Modern used to build up roading surface.	Sewerage connection pit 2		100	182
177	Modern made ground	Deposit		3.5m	10cm	W/E	Firm dark brown loamy sand with a slight gritty feel in places.	Sewerage connection pit 2		78	176
178	Roading gravel	Deposit		7m	40cm	W/E	Modern grey gravel for SHW 10 roading substrate. Modern	Sewerage connection pit 2		N/A	78
179	Sand modern	Deposit		60cm	10cm	W/E	Yellow sand band. Modern	Sewerage connection pit 2		175	180
180	Modern made ground	Deposit		3.6cm	10cm	W/E	Firm black silty loamy sand.	Sewerage connection pit 2		179	183
181	Midden?	Deposit		1m	30cm	W/E	Loose brown sand with moderate whole and crushed pipi shell occasional charcoal flecks. Similar to (82)??	Sewerage connection pit 2		67	65
182	Modern made ground	Deposit		1.4m	10cm	W/E	Grey hard core gravel and mottled stiff yellow/grey clay. Modern.	Sewerage connection pit 2		182	180
183	Modern made ground	Deposit		1.2m	5cm	W/E	Stiff plastic yellow grey clay	Sewerage connection pit 2		180	180
184	Concrete Modern	Deposit		1.m	5cm	W/E	Layer of hard rough cast concrete. Possibly part of old sewerage trench connection. Only visible in section DWG 49	Sewerage connection pit 2		185	180
185	Made ground (modern)	Deposit		1.2m	30cm	W/E	Dark brown silty sand with lenses of redeposited shell midden (67?) running horizontally though it.	Sewerage connection pit 2		78	175
186	Modern intrusion	Fill		40cm	1.2m	W/E	Grey brown silty sand with moderate amounts of modern hard core gravel. Fill of [187].	Sewerage connection pit 2	186, 187	Road	187
187	Modern intrusion	Cut		40cm	1.2m	W/E	Oval shaped cut. Possibly from post or signage. Cuts through SHW 10 substrate fill (178). Almost vertical sides and rounded base. Filled by (186).	Sewerage connection pit 2	186, 187	186	178
188	Sand staining	Deposit		30cm	5cm	W/E	Firm dark brown silty sand beneath (67). It's staining from the midden.	Sewerage connection pit 2		67	65
189	Gravel modern	Deposit	1.5m	1m	10-15cm	N/S	Lens of grey sand with modern fine hard core gravels.	Sewerage connection pit 2		78	158
190	Fire scoop fill	Fill		60cm	20cm	W/E	Firm black silty sand with dense charcoal staining, Moderate amounts of whole and broken pipi/tuatua	Stormwater trench 1 (0-16m E to W)	190, 191	51	191

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
							shell, occasional small fire cracked rock charcoal fragments. Fill of [191]				
191	Fire Scoop	Cut		60cm	20cm	W/E	Oval (?) shaped scoop, partially excavated in trench section. Filled by (190). Steep sided with a rounded base.	Stormwater trench 1 (0-16m E to W)	190, 191	191	198
192	Scoop fill	Fill	50cm	40cm	12cm	W/E	Firm black sand with charcoal staining, with occasional broken pipi shell and fire cracked rock. Fill of [195]	Stormwater trench 1 (0-16m E to W)	192, 195	51	195
193	Fire scoop fill	Fill	85cm	80cm	18cm	W/E	Firm black sand with charcoal staining, with frequent whole and broken pipi and tuatua shell. Moderate charcoal flecking. Occasional fire cracked rock. Fill of [196]	Stormwater trench 1 (0-16m E to W)	193, 196	55	196
194	Scoop fill	Fill	1m	60cm	3cm	N/S	Firm black sand with charcoal staining, with frequent and dense whole and broken pipi shell and fire cracked rock. Fill of [197].	Stormwater trench 1 (0-16m E to W)	194, 197	51	197
195	Scoop	Cut	50cm	40cm	12cm	W/E	Oval shaped scoop with steep sides and flat base. Filled with (192) and located on the edge of middens (52) and (55).	Stormwater trench 1 (0-16m E to W)	192, 195	192	198
196	Fire Scoop	Cut	85cm	80cm	18cm	W/E	Large oval shaped scoop with steep sides and flat base. Filled by (193). Fire scoop located on the edge of middens (52) and (55).	Stormwater trench 1 (0-16m E to W)	193, 196	193	198
197	Scoop	Cut	1m	60cm	3cm	N/S	Oval shaped feature, but in reality this looks to be midden filling a hallow in sand. No clear edges and flat base. Most likely the last remnant of midden (55). Filled by (194)	Stormwater trench 1 (0-16m E to W)	194, 197	194	198
198	Cultural layer	Deposit		3m	10cm	W/E	Firm black stained sand associated with middens (52) and (55), features [191], [195], [196], [197]. Most likely remains of cultural activity area associated with midden and staining from them. Contains occasional shell fragments and fire cracked stone.	Stormwater trench 1 (0-16m E to W)	190, 195, 196, 197, 55, 52	190, 195, 196, 197	42
199	Midden lens	Deposit	1.1m	30cm	10cm	NW/SE	Soft black charcoal stained sand with frequent whole and broken tuatua and pipi shell, occasional small fire cracked rock. Amorphous linear shaped feature resulting from pohutakawa root disturbance beneath middens. Could have been a scoop but too damage to tell. Base and sides are uneven and undulating.	Stormwater trench 1 (0-16m E to W)	52, 55, 198	198	42

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
200	Oruru Rd tarmac	Deposit		3m	5cm	N/S	Modern tarmac road surface of Oruru Rd	Stormwater trench 1 (0-16m E to W)			201
201	Oruru Rd gravel bedding	Deposit		3m	15cm	N/S	Modern grey gravel hard core for used as road bedding fill.	Stormwater trench 1 (0-16m E to W)		200	202
202	Oruru Rd infill	Deposit		3m	25cm	N/S	Compact brown/orange quarry clay and gravel used as an infill or levelling layer for current Oruru Rd	Stormwater trench 1 (0-16m E to W)		201	203
203	Oruru Rd infill	Deposit		3m	15-20cm	N/S	Firm brown/tan coloured clean sand. Bedding layer for Oruru Rd or old ground surface prior to roading being put down.	Stormwater trench 1 (0-16m E to W)		202	51
204	Scoop fill	Fill	60cm	55cm	5cm	N/S	Soft black sand with very sparse broken and crushed pipi shell. Very occasional charcoal flecking and some staining. Fill of [208].	Stormwater trench 1 (0-16m E to W)	204, 208	210	209
205	Midden	Deposit	50cm	50cm	3cm	N/A	Soft black sand with moderate amounts of broken and fragmented pipi shell. Occasional small fragments of fire cracked rock. Material from midden (210) caught in natural hollow.	Stormwater trench 1 (0-16m E to W)		210	198
206	Scoop fill	Fill	50cm	40cm	5cm	W/E	Soft black sand with moderate amounts of broken and fragmented pipi shell. Occasional small fragments of fire cracked rock. Fill of [209]	Stormwater trench 1 (0-16m E to W)	206, 209	210	209
207	VOID							Stormwater trench 1 (0-16m E to W)			
208	Scoop	Cut	60cm	55cm	5cm	N/S	Oval shaped scoop. Shallow sloping sides with flat base. Filled by (204).	Stormwater trench 1 (0-16m E to W)	204, 208	204	198
209	Scoop	Cut	50cm	40cm	5cm	W/E	Oval shaped scoop with steep sides and a rounded base. Filled by (206).	Stormwater trench 1 (0-16m E to W)	206, 209	206	198
210	Midden	Deposit			10cm	W/E	Firm black sand with moderate to frequent concentrations of pipi shell with very occasional gastropod whelks? Occasional charcoal flecking and chunks. Associated with (198) which appears to be staining from this midden area.	Stormwater trench 1 (12-16m E to W)		213	198
211	Oruru Rd infill	Deposit		3.6m+	18cm	N/S	Firm light brown/grey brown silty quarry gravels. In fill roading material. Very similar to (203).	Stormwater trench 1 (12-16m E to W)		202	214

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
212	Oruru Rd infill	Deposit		3.6m+	15-20cm	N/S	Firm brown/tan coloured clean sand. Bedding layer for Oruru Rd or old ground surface prior to roading being put down.	Stormwater trench 1 (12-16m E to W)		214	213
213	Oruru Rd infill	Deposit		3.6m+	20cm	N/S	Firm bands of tan/brown/grey brown silty sand. Some clay components and lenses. Modern roading infill.	Stormwater trench 1 (12-16m E to W)		212	210
214	Earlier Oruru Rd	Deposit		3.6m+	8cm	N/S	Hard concrete road surface with gravel inclusions, older Oruru Rd.	Stormwater trench 1 (12-16m E to W)		211	212
215	Post hole	Cut	20cm	20cm	20cm		Round post hole with vertical sides and rounded base. Filled by (216). Caught on northern side of Stormwater trench 1	Stormwater trench 1 (12-16m E to W)	216, 216	210	215
216	Post hole fill	Fill	20cm	20cm	20cm		Soft loose brown sand with moderate amounts of whole and broken pipi shell and occasional gastropod and charcoal flecking. Fill of [215].	Stormwater trench 1 (12-16m E to W)	216, 216	210	215
217	Scoop fill	Fill		60cm	10cm	W/E	Soft black charcoal stained sand with moderate amounts of crushed and very fragmented shell. Fill of [218].	Stormwater trench 1 (12-16m E to W)	217, 218	210	218
218	Scoop	Cut		60cm	10cm	W/E	Oval shaped scoop, gently sloping sides and flat base. Filled by (217). Only partially excavated as was located in northern side of trench wall.	Stormwater trench 1 (12-16m E to W)	217, 218	210	218
219	Scoop	Cut	45cm	28cm	15cm	W/E	Oval shaped scoop with gently sloping sides, flat base. Filled by (219). Partially excavated in north side of trench.	Stormwater trench 1 (16-19m E to W)	219, 220	220	42
220	Scoop fill	Fill	45cm	28cm	15cm	W/E	Medium compacted dark brown sand with moderate charcoal, pipi shell and FCR. Fill of [219]	Stormwater trench 1 (16-19m E to W)	219, 220	212, 215	220
221	Scoop	Cut	15cm	10cm	3cm	W/E	Small oval shaped scoop or gouge. Gently sloping side with rounded base. Filled by (222).	Stormwater trench 1 (16-19m E to W)	221, 222	222	42
222	Scoop fill	Fill	15cm	10cm	3cm	W/E	Medium compacted brown sand, with moderate pipi shell. Fill of [221].	Stormwater trench 1 (16-19m E to W)		212, 213	221
223	Scoop	Cut	20cm	15cm	5cm	N/S	Oval scoop or truncated base of a post hole. Steep sides with rounded base. Filled by [224].	Stormwater trench 1 (16-19m E to W)	223, 224	224	42
224	Scoop fill	Fill	20cm	15cm	5cm	N/S	Medium compacted brown sand, with moderate pipi shell and charcoal. Fill of [223].	Stormwater trench 1 (16-19m E to W)	223, 224	212, 213	223

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
225	Scoop	Cut	25cm	20cm	6cm	N/S	Oval scoop or truncated base of a post hole. Steep sides with rounded base. Filled by [226].	Stormwater trench 1 (16-19m E to W)	225, 226	226	42
226	Scoop fill	Fill	25cm	20cm	6cm	N/S	Medium compacted brown sand, with moderate pipi shell and charcoal. Fill of [225].	Stormwater trench 1 (16-19m E to W)	225, 226	212, 213	225
227	Scoop	Cut	19cm	15cm	17cm	N/S	Oval scoop or truncated base of a post hole. Steep sides with rounded base. Filled by [228].	Stormwater trench 1 (16-19m E to W)	227, 228	228	42
228	Scoop fill	Fill	19cm	15cm	17cm	N/S	Medium compacted brown sand, with moderate pipi shell and charcoal. Fill of [227].	Stormwater trench 1 (16-19m E to W)	227, 228	212, 213	227
229	Scoop	Cut	80cm	70cm	24cm	N/S	Oval shaped scoop with steep sides and a rounded base. Filled by (230).	Stormwater trench 1 (16-19m E to W)	229, 230	230	42
230	Scoop fill	Fill	80cm	70cm	24cm	N/S	Medium compacted brown sand, with moderate pipi shell and charcoal. Fill of [229].	Stormwater trench 1 (16-19m E to W)	229, 230	212, 213	229
231	Scoop	Cut	1.2m	72cm	25cm	W/E	Oval shaped pit/scoop steep sides and rounded base. Filled by (232).	Stormwater trench 1 (19m to 24m E to W)	231, 232	232	42
232	Scoop fill	Fill	1.2m	72cm	25cm	W/E	Compact dark brown, moderate whole and broken pip, occasional charcoal and Fire cracked rock. Fill of [231].	Stormwater trench 1 (19m to 24m E to W)	231, 232	212	231
234	Scoop	Cut	43cm	40cm	4cm	N/S	Oval shaped scoop withfa steep sides and a flat base. Filled with (235).	Stormwater trench 1 (0-3m E to W) Helen's zero	234, 235	235	238
235	Scoop fill	Fill	43cm	40cm	4cm	N/S	Moderate compacted black sand with frequent charcoal flecks and staining, moderate broken and fragmented pipi shell and fire cracked rock. Fill of [234].	Stormwater trench 1 (0-3m E to W) Helen's zero	234, 235	236	234
236	Cultural layer	Deposit	5m+	?	20cm	N/S	Dark brown/black sand. Cultural layer with occasional lenses of fragmented shell and occasional charcoal flecks.	Stormwater trench 1 (0-5m E to W) Helen's zero		203	237
237	Midden lens	Deposit	2m	?	8cm	N/S	Compact black sand with frequent whole and crushed pipi shell, occasional fire cracked rock.	Stormwater trench 1 (0-5m E to W) Helen's zero		236	238
238	Sand staining?	Deposit	5m+	?	40m	N/S	Dark brown sand, staining from (236) and (237). Diffused edge at base gradually entering into yellow sand.	Stormwater trench 1 (0-5m E to W) Helen's zero		236, 237	42
239	Scoop	Cut	?	36cm	70cm	W/E	Scoop steep sides with rounded base, filled by (240). Partly excavated in northern side of trench.	Stormwater trench 1 (0-5m E to W) Helen's zero	239, 240	240	42

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
240	Scoop fill	Fill	?	36cm	70cm	W/E	Dark brown/black sand with moderate amounts of crushed and fragmented pipi shell, occasional charcoal flecking and fire cracked rock. Fill of [239]. Partly excavated in northern side of trench.	Stormwater trench 1 (0-5m E to W) Helen's zero	239, 240	237	239
241	Surface	Deposit	3.5m	2m	3cm	W/E	Think lenses of water rolled pebbles from Tokoroa beach. Located on northern side of the trench, possibly an earlier surface associated with the monument, or part of roading infill.	Stormwater trench 1 (carpark)		203	236
242	Cultural layer	Deposit				W/E	Medium compacted dark brown sand with no inclusion, possibly a variation of (236).	Stormwater trench 1 (carpark)		242	42
243	Midden lens	Deposit		3.5m	10cm	W/E	Medium compacted black sand with moderate amounts of whole and broken pipi shell, occasional charcoal flecks. Located on northern side of the trench adjacent to monument area. Midden lenses in sparse and discontinuous and slopes up from E to W.	Stormwater trench 1 (carpark)		203	242
244	Sand Staining	Deposit		3.5m	10cm	W/E	Medium compacted dark brown silty sand. This deposit is staining from the midden deposit (243). It has been partly disturbed by the pohutakawa tree root system.	Stormwater trench 1 (carpark)		243	242
245	Midden lens	Deposit	2m+	1m+	52cm	N/S	Firm black sand with pipi, FCR, charcoal. Denser in shell where samples were taken (see DWG#59 10.12.18) than other places. Tree root intrusion throughout midden.	Cable Trench 1		212, 203, 202	Yellow natural sand
246	Modern roading gravel	Deposit	7m+	5m+	30cm	W/E	Modern 65 hard core roading gravel used as bedding beneath tarmac car park surface in front of Necta Café.	Stormwater trench (1) (Necta)		Tarmac	247
247	20th century ground sand surface	Deposit	7m+	5m+	30cm	W/E	Firm dark brown sand with an undulating basal edge. This deposit is directly above natural yellow subsoil sand. It is interpreted as old ground surface.	Stormwater trench (1) (Necta)		246	Yellow natural sand
248	Feature?	Fill	1m	60cm	N/A	W/E	Firm black charcoal stained sand with very sparse broken and whole pipi shell and cockle. No clear edges. Feature not excavated but preserved in situ as at formation depth. Located at the base of (249).	Monument ground reduction		249	250
249	Surface	Deposit	16m	1.5m	20cm+	W/E	Firm dark brown sand. Old cultural surface or ground surface. Not fully excavated as not excavated but preserved in situ as at formation depth.	Monument ground reduction		254	N/A

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
250	Staining	Deposit	11m	1.5m	20cm+	W/E	Firm mid brown chocolate coloured sand.	Monument ground reduction		249	Yellow natural sand
251	Modern service trench fill	Fill	17m	2.5-2.8m	20cm+	W/E	Firm mottled and mixed yellow and brown sand, occasional plastic wrappers and metal wires. Fill of old service trench [260].	Monument ground reduction	251, 260	254	260
252	Surface	Deposit	18.5m	1.5m	20cm+	W/E	Mid dark brown loamy sand with roots and lenses of black charcoal (?) staining. Similar to (249), except more loamy. Not fully excavated as not excavated but preserved in situ as at formation depth.	Monument ground reduction		250	N/A
253	Modern made ground	Deposit	16.5m	5m	20cm	W/E	Stiff orange brown clayey silt. This is made ground below the planting surface (261).	Monument ground reduction		261	247
254	Modern levelling level	Deposit	16.5m	5m	10cm	W/E	Firm brown yellow sand band. This is a redeposited layer of natural sand used as bedding or levelling layer in the monument formal planting area.	Monument ground reduction		253	249
255	Feature?	Fill	1.5m	1.2m	N/A	W/E	Firm black charcoal stained sand with very sparse broken and hole pipi shell and cockle. No clear edges within (252). Feature not excavated but preserved in situ as at formation depth. Feature had also been heavily disturbed by modern garden/car park kerbing.	Monument ground reduction		253	252
256	Midden features?	Fill	1.5m	1.5m	20cm+	W/E	Firm black sand with frequent hole and broken patches of pipi shell. The feature with amorphous and had been disturbed by modern kerbing. Possibly a large scoop. Not excavated but preserved in situ as it was within the formation depth.	Monument ground reduction		253	252
257	Pit fil	Fill	1m	1m	50cm	N/A	Firm mid to light brown sand with very occasional charcoal flecks. Fill of pit [258].	Monument ground reduction	257, 258	Monument	258
258	Pit	Fill	1m	1m	50cm	N/A	Round shaped pit with steeply sloping sides and a slightly rounded base. Located within the fill of the monument. No associated artefacts, not sampled as post 1900. Unknown function. Filled by (257).	Monument ground reduction	257, 258	257	259
259	Monumental basal fill				70cm		Redeposited natural beach sands in yellow and browns. Very occasional whole pipi or large cockle shell. Used to fill internal basal pith of monument. Not fully excavated beyond the formation depth	Monument ground reduction		258	

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
260	Modern service trench	Cut	17m	2.5-2.8m	20cm+	W/E	Linear trench cut aligned E/W and cuts through (249) and (250). No fully excavated as at formation depth.	Monument ground reduction	251, 260	251	249, 250
261	Modern planting surface	Deposit	20.5m	5m	10-20cm	W/E	Firm dark brown black loam with bark fragments - former planting surface for formal garden	Monument ground reduction			253
262	Void										
263	Void										
264	Void										
265	Void										
266	65 gravel modern	Deposit			30cm	W/E	Modern 65 hard core roading gravel beneath tarmac (272)	Stormwater Tr 1 Zstation/Playing field		272	273
267	Roading gravel	Deposit			10cm	W/E	Brown gritty gravel, fine within a brown sand matric. Roading bedding layer	Stormwater Tr 1 Zstation/Playing field		273	268
268	Infill roading material	Deposit			15cm	W/E	Bands of yellow and brown rotten quarry stone, clay and gravel. Very compact.	Stormwater Tr 1 Zstation/Playing field		267	271
269	Sand infill	Deposit				W/E	Firm tan brown sand. Infill layer beneath (268), possibly old ground surface of bedding layer for road.	Stormwater Tr 1 Zstation/Playing field		271	270
270	Old ground surface	Deposit			30-50cm	W/E	Firm dark brown loamy sand. No inclusions, very occasional shell. Roots on southern side associated with playing field trees; thickest on south side. Old ground surface.	Stormwater Tr 1 Zstation/Playing field		269	Natural sand
271	Older road surface?	Deposit	3	3	10cm	W/E	Yellow/brown rotten quarry stone and gravel. Very compact, possibly an early 20th century road surface?	Stormwater Tr 1 Zstation/Playing field		268	269
272	Tarmac SHW10	Deposit			5cm	W/E	Current surface of SHW 10.	Stormwater Tr 1 Zstation/Playing field		N/A	266
273	Tarmac SHW10	Deposit			5cm	W/E	Earlier roading surface of SHW 10.	Stormwater Tr 1 Zstation/Playing field		266	267
274	Tarmac SHW10	Deposit			5cm	W/E	Earliest roading surface of SHW 10.	Stormwater Tr 1 Zstation/Playing field		267	268
275	Roading gravel	Deposit			25cm	W/E	Firm mixed brown gravel and sand. Bedding material beneath kerbing and (266) along south side of road.	Stormwater Tr 1 Zstation/Playing field			

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
276	Void										
277	Tarmac surface	Deposit			5cm	W/E	Current tarmac surface of SHW10 on western bridge approach.	Connection pit trench 3 Bridge Abutment		N/A	178/278
278	VOID							Connection pit trench 3 Bridge Abutment			
279	Tarmac surface	Deposit			5cm	W/E	Buried tarmac surface of SHW10 on western bridge approach.	Connection pit trench 3 Bridge Abutment		178. 278	280
280	Roading gravel	Deposit		14m	20cm	W/E	Firm orange brown sandy gravel grit. Bedding layer for tarmac (279).	Connection pit trench 3 Bridge Abutment		279	281
281	Reclamation for causeway (modern)	Deposit				W/E	Stiff plastic bands of yellow, orange, cream and grey clay. Some rotten quarry rock and gravel, Infilling material for western bridge abutment which overlies the pre-1940 coastal edge.	Connection pit trench 3 Bridge Abutment		280	78, 179
282	Redeposited midden in reclamation	Deposit	2m	4.5m	20cm	W/E	Redeposited midden within reclamation on eastern side of the bridge abutment in compound reduction.	Compound ground/SHW10 road reduction			
283	Reclamation for causeway (modern)	Deposit					Stiff plastic bands of yellow, orange, cream and grey clay. Some rotten quarry rock and gravel. Infilling material for western bridge abutment which overlies the pre-1940 coastal edge.	Compound ground/SHW10 road reduction			
284	Redeposited shell midden	Deposit	4.5m	1m	10-15cm	W/E	Redeposited shell midden. Highly crushed shell (pipi) within a firm black/brown sand. Very occasional small water rolled pebbles and charcoal. Comes from site O04/990	Compound ground/SHW10 road reduction		285	287
285	Sand infill	Deposit	4.5m	1m	20cm	W/E	Firm dark brown silty sand. Modern roading layer.	Chorus Trench 2 extension East abutment		286	284
286	65 Modern roading gravel & tarmac	Deposit	22m	1m+	30-50cm	W/E	Modern 65 gravel roading gravel fill.	Chorus Trench 2 extension East abutment			285
287	Clay band infill	Deposit	22m	1m+	30-60cm	W/E	Bands of yellow, orange and brown clay. Appears to be made ground associated with construction of SHW 10 and roading berm shoulder. Looks like dumped infill material.	Chorus Trench 2 extension East abutment		284, 286, 291	LOE

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
288	Redeposited shell midden	Deposit	5m	50cm+	15-20cm	W/E	Redeposited shell midden. Highly crushed shell (pipi) within a firm black/brown sand. Very occasional small water rolled pebbles and charcoal and road gravel. Comes from site O04/990. Cut through and disturbed by telecom thrusted cable (289).	Chorus Trench 2 extension East abutment		286	287
289	Thrusted telecom fibre cable	Cable	22m+	10cm	10cm	W/E	Modern black plastic fibre cable which was broken during works. This had been thrusted through deposited and mixed fills within the road berm of SHW10 - south side.	Chorus Trench 2 extension East abutment		288	288
290	Clay band infill	Deposit	4.5m	1m+	30cm	W/E	Firm brown clayey loamy silt. Appears to be made ground associated with construction of SHW 10 and roading berm shoulder. Looks like dumped infill material.	Chorus Trench 2 extension East abutment		288	287
291	Redeposited shell midden	Deposit	5m	50cm+	15-20cm	W/E	Redeposited shell midden. Very highly crushed shell (pipi) within a firm black/brown sandy clay. Comes from site O04/990 and is highly disturbed.	Chorus Trench 2 extension East abutment		287	287
292	Void							Chorus Trench 2 extension East abutment			
293	Redeposited shell midden	Deposit		3-5m	2-5cm	W/E	Firm black sand with frequent hole and crushed pipi and possible tuatua shell. Occasional small rounded pebble/hangi stone and charcoal fragments. This midden is very thin and undulating and is sandwiched between (294) and (295). The material is not uniformed and appears to be redeposited from site O04/990? It is very odd.	SHW10 road reduction, East abutment north side		294	295
294	Reclamation for Eastern causeway abutment (modern)	Deposit		5m+	30-50cm		Firm orange/red clay. Upper fill for reclamation beneath SHW10, east bridge approach. Modern.	SHW10 road reduction, East abutment north side		286	293
295	Reclamation for Eastern causeway abutment (modern)	Deposit		5m+	30cm+		Firm mottled and mixed brown cream clay, with lenses of rotten rock and purple and brown clays.	SHW10 road reduction, East abutment north side		293	LOE

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
296	Reclamation for Eastern causeway abutment (modern)	Deposit		5m+	50cm+		Firm yellow and white friable clay.	SHW10 road reduction, East abutment north side		294	LOE
297	Midden	Deposit	5m+	?	2-5cm	W/E	Midden with crushed pipi, charcoal and occasional fcr. Within stained black sand. SWT#4 midden varies in concentration and density along southern facing section.	Stormwater Trench 4	308	298	299
298	Staining	Deposit	5m+	?	20cm	W/E	Dark brown staining under midden, similar to (236).	Stormwater Trench 4		natural	297
299	Gravel	Deposit	5m+	?	20-25cm	W/E	Gravel mix with topsoil, usually cut the top of midden (297) in south facing section. Possibly left over from roading or foot path as this section of the trench cuts the grass and not the SH.	Stormwater Trench 4		297	
300	Cable		20m+	3cm	60cm	W/E	Black telecom (?) cable that has been cut into the cultural, seen in the southern facing profile of SWT#4.	Stormwater Trench 4		301 or natural or 310	309
301	Backfill	Deposit	3-4m	30cm	40cm	W/E	Orange back fill for cable (300). Has mottled yellow natural. Moderately compact, only seen in a 3-4m strip.	Stormwater Trench 4		309	298
302	Redeposited midden	Deposit	30cm	30cm	40cm	W/E	Redeposit of midden in the backfill (310) of the cable (300).	Stormwater Trench 4		309	topsoil
303	Midden	Deposit	50cm+	16cm	4cm	W/E	Midden with whole pipi shells.	Chorus Trench 3		304	304
304	Staining	Deposit	5m+	1m+	12cm	N/S	Dark brown sand layer, possibly (250).	Chorus Trench 3		314, natural, 303	303, 305
305	Road gravel	Deposit	5m+	1m+	30cm	N/S	Road gravel above 304, same as all the other gravel layers in the car park	Chorus Trench 3		304	
306	Charcoal	Deposit	20cm	3cm	3cm	N/S	Charcoal at base of layer 314, possibly tree or charcoal scatter, no fire features associated found in trench.	Chorus Trench 3			314
307	Midden	Deposit	60cm	?	5cm	W/E	Very compacted and fragmented grey/white/light blue (burnt?) shell within (297).	Stormwater Trench 4	297	301, 298	310 and topsoil

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
308	Black staining	Deposit	10m+	?	2-5cm	W/E	Black staining within midden (297). Also is found present without midden, possibly charcoal staining.	Stormwater Trench 4	297	298	topsoil or 299
309	Timber		20m+	12cm	4cm	W/E	Timber used to "cap" cable 300.	Stormwater Trench 4		300	301, 310
310	Backfill	Deposit	20m+	30cm	40cm	W/E	Backfill for cable, mix of natural, 304 and topsoil. Midden mixed in on occasion. Moderately compacted sand. Not orange (301).	Stormwater Trench 4		309	309 and topsoil
311	Topsoil	Deposit	20m+	5m	20cm	W/E	Topsoil brown with lots of roots from the trees that lined the side of the road, topsoil over the cable backfill.	Stormwater Trench 4		310	
312	Backfill	Deposit	10m+	20cm	32cm+	W/E	Backfill for earth cable seen in north facing section of trench. Backfill consists of all roading layers (315-317). Earth cable and backfill a product of trenching and feeding cable into the ground through giant hydraulic needle (Heemi's explanation).	Stormwater Trench 4		natural	311
313	VOID										
314	Cultural layer or tree?	Deposit	5m+	?	16cm	N/S	Sandy, grey layer with mottled charcoal, mostly at base. Possibly tree. Sits under brown layer (304)	Chorus Trench 3		Natural	304
315	Modern roading	Deposit	20m+	?	4cm	W/E	Black sand with occasion crushed shell. Mostly a compact layer of gravel. Possibly a mix of roading a redeposited midden. Shell disappears as layer runs west but remains black.	Stormwater Trench 4		270	316
316	Modern roading	Deposit	20m+	?	8cm	W/E	Roots, sand and gravel, older roading, not as compacted as roading surfaces above.	Stormwater Trench 4		315	267
317	Modern roading	Deposit	20m+	?	4cm	W/E	Thin layer of sand and gravel. Modern roading layer, possibly less compacted base of (266).	Stormwater Trench 4		267	266
318	Redeposited midden	Deposit	30cm	25c,	not excavated	W/E	Redeposited midden consisting of very crushed shell within firm black sandy silt. Occasional 65 roading gravel is mixed through it. Associated with site O04/990.	Copper trench 1		319	295
319	Modern roading	Deposit			15cm+	W/E	Firm mid brown dry sandy silt. Frequent 65 roading gravel. occasional plastic and old fibre wires. Very sparse small lenses of crushed shell. Its significantly	Copper trench 2		318,	Loe

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
							modified soil associated with road shoulder and services.				
320	Void										
321	Void										
322	Void										
323	Void										
324	Void										
325	Void										
326	Void										
327	Void										
328	Void										
329	Void										
330	Midden	Deposit	4.6m	1.5m	60cm	W/E	Firm black sand with charcoal staining. Dense to moderate whole and broken pipi and tuatua , with occasional to small cockle shell.	Stormwater Trench 6, Northern Side		234	231
331	Stake hole fill	Fill	0.16m	0.16m	8cm		Firm black charcoal stained sand	Stormwater Trench 6, Northern Side	331, 332	330	332
332	Stake hole	Cut	0.16m	0.16m	8cm		Round in plan with steeply sloping sides to a rounded base. Filled by (331).	Stormwater Trench 6, Northern Side	331, 332	331	97
333	Midden	Deposit	0.8m	0.4m	8cm	W/E	Loose black sand with charcoal staining. Densely packed broken, whole and crushed pipi and tua tua shell. Only half sectioned as within section face of DWG 86.	Stormwater Trench 6, Northern Side		334	97
334	Midden	Deposit	2.2m	2m	20cm	W/E	Bands of mixed shell midden and charcoal stained sand caused by root disturbance.	Stormwater Trench 6, Northern Side		335	334
335	Midden	Deposit	2m	1.8m	26cm	W/E	Frim black sand with whole and crushed pipi and cockle shell with occasional charcoal chunks, beach rolled pebbles and occasional fire cracked rock.	Stormwater Trench 6, Northern Side		342	334

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
336	Midden	Deposit	2m+	1m	40cm	W/E	Firm black charcoal stained sand with thick dense midden consisting of whole, broken and crushed pipi and tuatua shell.	Stormwater Trench 6, Northern Side		337	97
337	Topsoil	Deposit	4m	3m	10=70cm	W/E	Brown loamy sand mixed with redeposited midden and roots. Modern topsoil layer.	Stormwater Trench 6, Northern Side		N/A	336, 341
338	Post hole fill	Fill	0.4m	0.4m	10cm		Loose brown sand with occasional charcoal chunks, and broken and crushed pipi and tuatua shell. Fill of [339].	Stormwater Trench 6, Northern Side	338, 339	336	339
339	Post hole	cut	0.4m	0.4m	10cm		Round post hole with steeply sloping sides on west, gentle sloping sides on east, with a rounded base. Filled by (338).	Stormwater Trench 6, Northern Side	338, 339	338	97
340	Midden	Deposit				W/E	Firm black sand with thick dense midden consisting of pipi and tuatua.	Stormwater Trench 6			
341	Midden (redeposited)	Deposit	4m	1m	10cm	W/E	Redeposited shell midden.	Stormwater Trench 6, Northern Side		337	342
342	Sand (redeposited)	Deposit	4m	1m	65cm	W/E	Redeposited yellow each sand.	Stormwater Trench 6, Northern Side		341	343
343	Sand (redeposited)	Deposit	2m	1m	10cm	W/E	Redeposited black sand with modern gravel stone mixed through it.	Stormwater Trench 6, Northern Side		342	330
344	Post hole	Cut	0.20m	0.2m	15cm		Roundpost hole with steeply sloping sides and a rounded base. Filled by (345) and left in situ in benched fill area.	Stormwater Trench 6, Northern Side	344, 345	345	97
345	Post hole fill	Fill	0.20m	0.2m	15cm		Firm brown sand with very occasional charcoal flecks. Fill of [344].	Stormwater Trench 6, Northern Side	344, 345	330	344
346	VOID										
347	VOID										
348	Midden	Deposit			40cm	W/E	Firm black sand with thick dense midden consisting predominately of pipi and tuatua. The shell was broken and crushed with some whole and complete shells. Sizes of shell ranged from small to larger. Some shells were not open. Occasional rock oyster and mud snail. Occasional broken angular fire cracked rocks and	Stormwater Trench 7		Modern fills	353, 378

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
							occasional small rounded beach pebbles. Some of the hangi stones were large 20cm x 20cm.				
349	Scoop fill	Fill	0.6m	0.4m	10cm	W/E	Firm black charcoal stained sand with occasional shell and large hangi stones. Fill of [450].	Stormwater Trench 7	349, 350	348	350
350	Scoop	Cut	0.6m	0.4m	10cm	W/E	Oval shaped scoop, gently sloping sides and flat base. Filled by (349). Only partially excavated.	Stormwater Trench 7	349, 350	349	97
351	Scoop fill	Fill	0.8m	0.8m	20cm	W/E	Firm black charcoal stained sand with occasional to moderate broken and crushed pipi shell. Occasional charcoal flecks and broken pebbles and root disturbance. Fill of [352].	Stormwater Trench 7	351, 352	353	352
352	Scoop	Cut	0.8m	0.8m	20cm	W/E	Oval shaped scoop filled with (351). Very greatly sloping sides and flat base.	Stormwater Trench 7	351, 352	351	97
353	Midden	Deposit	3m	2m	35cm	N/S	Densely packed pipi and tuatua shell, dumped shell with no sand matrix. This shell was rapidly dumped and had occasional pieces of charcoal and water rolled pebbles.	Stormwater Trench 7		348	351, 97, 358
354	Scoop fill	Fill	0.5m	0.5m	12cm		Firm brown sand with moderate amounts of whole and broken pipi and cockle shell. Moderate amount of small rounded pebbles used as heat retainer stones. Occasional charcoal fragments and degraded sparse fish bone. Fill of [354].	Stormwater Trench 7	354, 355	353	355
355	Scoop	Cut	0.5m	0.5m	12cm		Round shaped scoop, excavated in half section only. Gently sloping sides and rounded base. Filled by (354).	Stormwater Trench 7	354, 355	354	97
356	Hangi pit / Earth oven/ Earth oveb	Cut	1m	0.8m	20cm	NE/SW	L shaped Hangi pit / Earth ovenfilled by (357) and (358). Gently sloping sides with a slightly rounded base. Only partially excavated and left in situ.	Stormwater Trench 7	356, 357, 358	357	97
357	Hangi fill	Fill	1m	0.8m	3cm	NE/SW	Layer of charcoal at base of [356].	Stormwater Trench 7	356, 357, 358	358	356
358	Hangi fill	Fill	1m	0.8m	18cm	NE/SW	Loose brown sand with dense pipi and tuatua shell, occasional charcoal flecking and occasional fire cracked stones. Fill of [356].	Stormwater Trench 7	356, 357, 358	353	357
359	Scoop	Cut	0.55m	0.5m	16cm	N/S	Oval shaped scoop filled by (360). Steeply sloping sides and rounded base.	Stormwater Trench 7	359, 360	360	97

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
360	Scoop fill	Fill	0.55m	0.5m	16cm	N/S	Firm brown sand with occasional small pipi and tuatua shells, occasional charcoal and moderate small rounded pebbles. Fill of [359].	Stormwater Trench 7	359, 360	353	359
361	Scoop	Cut	0.55m	0.5m	10cm	N/S	Oval shaped scoop filled by (362). Steeply sloping sides and rounded base.	Stormwater Trench 7	361, 362	378	362
362	Scoop fill	Fill	0.55m	0.5m	10cm	N/S	Firm brown sand with moderate amounts of pipi and tuatua shells, occasional charcoal and moderate small rounded pebbles. Fill of [361].	Stormwater Trench 7	361, 362	361	97
363	Scoop	Cut	0.9m	0.7m	25cm	W/E	Oval shaped scoop filled by (362). Steeply sloping sides and rounded base. Only partially excavated and left inset in section.	Stormwater Trench 7	362, 363	378	97
364	Scoop	Cut	1m	0.85m	6cm	NE/SW	Oval shaped scoop rake out filled with (365). Gently sloping sides with a rounded base. Rake out from [366]	Stormwater Trench 7	364, 365	365	97
365	Scoop fill	Fill	1m	0.85m	6cm	NE/SW	Black sand with frequent broken and crushed shell of pipi and tuatua shell. Occasional charcoal flecks. Rake out from [364].	Stormwater Trench 7	364, 365	378	364
366	Hangi	Cut	0.9m	0.8m	12cm	NE/SW	Oval shaped hangi pit. Filled by (367). Steeply sloping sides and rounded base. Rake out is [364].	Stormwater Trench 7	367, 366	367	97
367	Hangi fill	Fill	0.9m	0.8m	12cm	NE/SW	Black sand with frequent broken and crushed shell of pipi and tuatua shell. Occasional charcoal flecks. Filled at base with 10 angular fire cracked hangi stones. Fill of [366].	Stormwater Trench 7	367, 366	378	366
368	Scoop	Cut		0.8m	30cm	NE/SW	Oval scoop filled by (369, 370, 371). Steeply sloping sides and flat base. Partially excavated and left in situ in section.	Stormwater Trench 7	368, 369, 370, 371	369	97
369	Scoop fill	Fill		0.8m	3cm	NE/SW	Layer of charcoal from burning at base of [368]	Stormwater Trench 7	368, 369, 370, 371	370	368
370	Scoop fill	Fill		0.8m	25cm	NE/SW	Loose brown sand with moderate whole and broken pipi shell. Fill of [368].	Stormwater Trench 7	368, 369, 370, 371	348	369
371	Scoop fill	Fill		0.5m	2cm	NE/SW	Firm black sand with dense lightly crushed shell fragments. Fill of [368].	Stormwater Trench 7	368, 369, 370, 371	370	370

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
372	Stake hole	Cut	0.05m	0.05m	5cm		Round stake hole filled by (373). Steep sides and pointed base. Partially excavated and left inset in section	Stormwater Trench 7	372, 373	373	97
373	Stake hole fill	Fill	0.05m	0.05m	5cm		Frim black sand. Fill of [372].	Stormwater Trench 7	372, 373	348	372
374	Scoop	cut		0.4m	8cm	NE/SW	Oval shaped scoop filled by (375), vertical sides and flat base. Partially excavated and left inset in section.	Stormwater Trench 7	374, 375	375	97
375	Scoop fill	fill		0.4m	8cm	NE/SW	Firm black brown sand with moderate crushed and broken pipi shells, occasional stones and roots. Fill of [374].	Stormwater Trench 7	374, 375	348	374
376	Scoop	cut		0.8m	20cm	NE/SW	Large oval scoop filled by (377) with steeply sloping sides and flat base.	Stormwater Trench 7	376, 377	377	97
377	Scoop fill	fill		0.8m	20cm	NE/SW	Firm black brown sand with moderate crushed and broken pipi shells, occasional stones and roots. Fill of [376].	Stormwater Trench 7	376, 377	348	376
378	Midden	Deposit		2.3m+	20cm	W/E	Firm black sand, with whole and broken pipi and tuatua shell with charcoal flecking and staining.	Stormwater Trench 7		348	353
379	Scoop fill	Fill	0.4m	0.3m	10cm	W/E	Loose black sand with moderate amounts of crushed pipi shell, occasional chunks of charcoal and small rounded pebbles. Fill of [380].	Stormwater Trench 7	379, 380	378	380
380	Scoop	Cut	0.4m	0.3m	10cm	W/E	Oval shaped scoop filled by (379), gently sloping sides and rounded base.	Stormwater Trench 7	379, 380	379	97
381	Scoop fill	Fill	0.55m	0.38m	10cm	N/S	Loose black sand with moderate amounts of crushed pipi shell, occasional chunks of charcoal and small rounded pebbles. Fill of [382].	Stormwater Trench 7	381, 382	378	382
382	Scoop	Cut	0.55m	0.38m	10cm	N/S	Sub rectangular shaped scoop filled by (381). Vertical sides and flat base.	Stormwater Trench 7	381, 382	381	97
383	Scoop fill	Fill	0.6m	0.4m	8cm	NE/SW	Loose black sand with moderate amounts of crushed pipi shell, layer of patchy charcoal at base and small rounded pebbles. Fill of [384].	Stormwater Trench 7	383, 384	378	384
384	Scoop	Cut	0.6m	0.4m	8cm	NE/SW	Oval shaped scoop filled by (353), steeply sloping sides and flat base.	Stormwater Trench 7	383, 384	383	97

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
385	Scoop fill	Fill	0.9m	0.8m	15cm	N/S	Loose black sand with dense amounts of whole and broken pipi shell. Moderate amounts of fire cracked rock and occasional charcoal chunks. Fill of [386].	Stormwater Trench 7	385, 386	378	386
386	Scoop	Cut	0.9m	0.8m	15cm	N/S	Large oval shaped scoop with steep sides and flat base. Filled by (385).	Stormwater Trench 7	385, 386	385	97
387	Hangi fill	Fill	0.9m	0.8m	15cm	NW/SE	Loose black sand with moderate amounts of whole and broken pipi and tuatua shell. Occasional amounts of fire cracked rock located along the base of the feature. Fill of [388].	Stormwater Trench 7	387, 388	378	388
388	Hangi	Cut	0.9m	0.8m	15cm	NW/SE	Oval hangi put filled by (387), Gently sloping sides and flat base.	Stormwater Trench 7	387, 388	387	97
389	Scoop fill	Fill	0.45m	0.4m	15cm	NW/SE	Loose black sand with dense amounts of whole and broken pipi shell. Moderate amounts of fire cracked rock and occasional charcoal chunks. All size of shell. Fill of [390].	Stormwater Trench 7	389, 390	378	390
390	Scoop	Cut	0.45m	0.4m	15cm	NW/SE	Sub square shaped scoop filled by (389). Steep sides and flat base.	Stormwater Trench 7	389, 390	389	97
391	Hangi fill	Fill	1.1m	0.9m	15cm	NW/SE	Loose black sand with dense to moderate amounts of whole and broken pipi and tuatua shell. Moderate amounts of fire cracked rock and occasional charcoal chunks. All size of shell. Partly excavated and left in situ in the section. Fill of [392].	Stormwater Trench 7	391, 392	393	392
392	Hangi	Cut	1.1m	0.9m	15cm	NW/SE	Oval shaped Hangi pit / Earth ovenfilled with (391), gently sloping sides with a flat base.	Stormwater Trench 7	391, 392	391	97
393	Scoop	Cut		0.58m	35cm		Scoop filled by (378), steeply sloping side with a flat base. This feature cuts into feature (391) [392]. Only partially excavated and left in situ of the section.	Stormwater Trench 7		378	97
394	Hangi	Deposit	0.6m	0.5m	5-8cm	N/S	Black charcoal stained sand with small pebble sized stones. Remains of a shallow scoop or very small hangi base. Slightly dished base but appears it was just set within natural sand beneath midden.	Stormwater Trench 8		378	97
395	Post hole fill	Fill	0.55m	0.35m	30cm	N/S	Loose brown/black sand with dense small to medium sized pipi, small rounded pebbles, burnt and a single large packing stone. Fill of [396].	Stormwater Trench 8	395, 396	378	396

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
396	Post hole	Cut	0.55m	0.35m	30cm	N/S	Ovalpost hole filled by (395), vertical almost concaved sized and rounded base. Stone located in NE area of post hole.	Stormwater Trench 8	395, 396	395	97
397	Post hole fill?	Fill	0.3m	0.3m	8cm		Loose brown sand with moderate whole and broken cockle and pipi shell. Highly degraded and non-diagnostic fish bone (not sampled). Occasional charcoal flecking. Fill of [398].	Stormwater Trench 8	397, 398	378	398
398	Post hole?	Cut	0.3m	0.3m	8cm		Round shallow post hole, filled by (397). Rounded sides and rounded base.	Stormwater Trench 8	397, 398	397	97
399	Hangi fill	Fill	0.6m	0.5m+	18cm	W/E	Firm black sand with whole and crushed dense small pipi shell. Occasional fragmented small fire cracked rock. Fill of [400].	Stormwater Trench 8	399, 400	378	400
400	Hangi	Cut	0.6m	0.5m+	18cm	W/E	Oval hangi pit, filled by (399), slightly rounded sides and rounded base. Partially excavated and preserved in section.	Stormwater Trench 8	399, 400	399	97
401	Post hole fill?	Fill	0.3m	0.25m	10cm	W/E	Loose grey black sand with occasional fire cracked rock, small crushed, broke and whole small pipi shell. Fill of [402].	Stormwater Trench 8	401, 402	378	402
402	Post hole?	Cut	0.3m	0.25m	10cm	W/E	Small oval post hole filled with (401), sloping side and rounded base.	Stormwater Trench 8	401, 402	401	97
403	Scoop fill	Fill	1m+	0.7m	8cm	N/S	Soft black sand with moderate amounts of broken and crushed pipi shells, occasional cockle, small broken fire cracked rock, occasional to moderate charcoal flecks and chunks. Fill of [404].	Stormwater Trench 8	403, 404	378	404
404	Scoop	Cut	1m+	0.7m	8cm	N/S	Large flat scoop, filled by (403) with shallow sloping sides and flat undulating base. Partially excavated and preserved in section.	Stormwater Trench 8	403, 404	403	97
405	Hangi fill	Fill	0.7m	0.7m	10cm		Soft black sand with moderate amounts of small fire cracked rock, charcoal staining, flecking and frequent small to large whole and broken pipi shell. Fill of [406].	Stormwater Trench 8	405, 406	378	406
406	Hangi	Cut	0.7m	0.7m	10cm		Round hangi filled by (405) with sloping sides and a rounded base.	Stormwater Trench 8	405, 406	405	97
407	Scoop fill	Fill	0.9m	0.6m	15cm	N/S	Soft black sand with moderate amounts of broken and crushed pipi shells, occasional cockle, small broken fire	Stormwater Trench 8	407, 408	378	408

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
							cracked rock, occasional to moderate charcoal flecks and chunks. Fill of [408].				
408	Scoop cut	Cut	0.9m	0.6m	15cm	N/S	Small scoop with rake out on NW side, filled by (407) with a small dished rake out to NW and, steep sided scoop with rounded base.	Stormwater Trench 8	407, 408	407	97
409	Scoop fills?	Fill	0.5m	0.5m	15cm	N/S	Soft black brown sand with dense amounts of whole and broken and fragmented pipi shell with occasional small fire cracked rock fragments. Fill of [410].	Stormwater Trench 8	409, 410	378	410
410	Scoop?	Cut	0.5m	0.5m	15cm	N/S	Round scoop or post hole, filled by (409). The northern side is undercut by 5cm, and it has a 45 degree sloping side to the south with a slightly rounded base.	Stormwater Trench 8	409, 410	409	97
411	Post hole fill	Fill	0.35m	0.35m	15cm		Soft black brown sand with dense amounts of whole and broken and fragmented pipi shell with occasional small fire cracked rock fragments. Fill of [412].	Stormwater Trench 8	411, 412	378	412
412	Post hole	Cut	0.35m	0.35m	15cm		Round post hole, filled by (411) with steeply almost vertical sides and flat base.	Stormwater Trench 8	411, 412	411	97
413	Post hole fill?	Fill	0.5m	0.4m	10cm	N/S	Soft black charcoal stained with a single large fire crack rock, occasional fragmented and crushed pipi shell. Single large stone, possible packing stone? Fill of [414].	Stormwater Trench 8	413, 314	378	414
414	Post hole?	Cut	0.5m	0.4m	10cm	N/S	Possible truncated post hole, filled with (413), with steep shallow sides and flat base. Partially excavated and preserved in section.	Stormwater Trench 8	413, 314	413	97
415	Scoop fill	Fill	0.9m	0.6m	25cm	W/E	Soft black charcoal stained with a single large fire crack rock, occasional fragmented and crushed pipi shell. Fill of [416].	Stormwater Trench 8	415, 416	378	416
416	Scoop	Cut	0.9m	0.6m	25cm	W/E	Oval shaped scoop filled by (415), with steeply sloping sides and rounded base. This may have been a cleaned out hangi pit?	Stormwater Trench 8	415, 416	415	97
417	Scoop fill	Fill	0.6m	0.2m+	15cm	W/E	Soft black charcoal stained sand with occasional crushed shell, fill of [418].	Stormwater Trench 8	417, 418	378	418
418	Scoop	Cut	0.6m	0.2m+	15cm	W/E	Oval shallow scoop filled by (417), with gently sloping sides and rounded base. Partially excavated and preserved in section.	Stormwater Trench 8	417, 418	417	97

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
419	Hangi fill	Fill	0.9m	0.6m	10cm	N/S	Soft black charcoal stained sand with 10 0.1m x 0.1m angular fire cracked rocks located on the western half of the feature. Red scorching marks on the sand surrounding the feature. Stones were inset. Fill of [420].	Stormwater Trench 8	419, 420	378	420
420	Hangi cut	Cut	0.9m	0.6m	10cm	N/S	Oval Hangi pit / Earth ovenfilled by (419). Gently sloping sides with flat base. Most dense hangi feature found to date.	Stormwater Trench 8	419, 420	419	97
421	Scoop fill	Fill	0.3m	0.2m	5cm	N/S	Loose black/brown sand with moderate amounts of crushed pipi shell and occasional charcoal flecks. Fill of [422].	Stormwater Trench 8	421, 422	378	422
422	Scoop	Cut	0.3m	0.2m	5cm	N/S	Oval scoop, with sloping sides and rounded base, filled by (421).	Stormwater Trench 8	421, 422	421	97
423	Scoop	Cut	0.4m	0.3m	8cm	W/E	Oval scoop, with sloping sides and rounded base, filled by (425).	Stormwater Trench 8	423, 425	425	97
424	Scoop	Cut	0.5m	0.4m	10cm	N/S	Oval scoop, with sloping sides and rounded base, filled by (426).	Stormwater Trench 8	424, 426	426	97
425	Scoop fill	Fill	0.4m	0.3m	8cm	W/E	Loose black/brown sand with moderate amounts of crushed pipi shell and occasional charcoal flecks. Fill of [423].	Stormwater Trench 8	423, 425	378	423
426	Scoop fill	Fill	0.5m	0.4m	10cm	N/S	Loose black/brown sand with moderate amounts of crushed pipi shell and occasional charcoal flecks. Fill of [424].	Stormwater Trench 8	424, 426	378	424
427	Post hole fill	Fill	0.18m	0.18m			Loose black/brown sand with moderate amounts of crushed pipi shell and occasional charcoal flecks.	Stormwater Trench 8	427, 428	378	428
428	Post hole	Cut	0.18m	0.18m			Round post hole, not excavated.	Stormwater Trench 8	427, 428	427	97
429	Scoop fill	Fill	0.45m	0.35m		W/E	Loose black/brown sand with moderate amounts of crushed pipi shell and occasional charcoal flecks.	Stormwater Trench 8	428, 430	378	430
430	Scoop	Cut	0.45m	0.35m		W/E	Oval scoop, not excavated.	Stormwater Trench 8	428	429	97
431	Scoop	Cut	0.45m	0.28m		W/E	Loose black/brown sand with moderate amounts of crushed pipi shell and occasional charcoal flecks. Filled by 432	Stormwater Trench 8	431, 432	378	432

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
432	Scoop Fill	Fill	0.45m	0.28m		W/E	Oval scoop, not excavated, fill of 431.	Stormwater Trench 8	431, 432	431	97
433	Post hole	Cut	0.4m	0.2m+	35cm	W/E	Oval post hole filled by (439 and 440), with steep almost vertical sides and flat base. Partially excavated and preserved in section.	Stormwater Trench 8	433, 439	439	97
434	Void							Stormwater Trench 8			
435	Scoop	Cut	0.7m	0.2m+	10cm	W/E	Oval scoop filled by (446), with gentle sloping sides and slightly rounded base. Partially excavated and preserved in section.	Stormwater Trench 8	435, 446	446	97
436	Scoop	Cut	0.58m	0.2m+	18cm	W/E	Oval scoop filled with (445), with gently sloping sides and slightly rounded base. Partially excavated and preserved in section.		436, 445	445	97
437	Scoop	Cut	0.3m	0.3m	8cm		Round scoop with steep sides and rounded base, filled with (438).	Stormwater Trench 8	437, 438	438	97
438	Scoop fill	Fill	0.3m	0.3m	8cm		Loose brown sand with moderate whole small pipi shell and occasional small angular fire cracked rock, fill of [437].	Stormwater Trench 8	437, 438	378	437
439	Post hole fill	Fill	0.4m	0.2m+	35cm	W/E	Loose brown black sand with thick dense pipi and tuatua shell, occasional charcoal flecking and small chunks. Fill of [433].	Stormwater Trench 8	433, 439	378	433
440	Post hole fill?	Fill	0.5m	0.4m	10cm	N/S	Soft black charcoal stained with a single large fire cracked rock, occasional fragmented and crushed pipi shell. Single large stone, possible packing stone? Fill of 433	Stormwater Trench 8	433		
441	Scoop fill	Fill	0.28m		5cm	W/E	Firm black sand, with whole and broken pipi and tuatua shell with charcoal flecking and staining. Fill of [442].	Stormwater Trench 8	441, 442	378	442
442	Scoop	Cut	0.28m		5cm	W/E	Shallow oval? scoop caught in DWG 95, filled by (441), very gentle sides and rounded base.	Stormwater Trench 8	441, 442	441	97
443	Stake hole fill	Fill	0.08m		5cm		Firm black sand, with whole and broken pipi and tuatua shell with charcoal flecking and staining. Fill of [444].	Stormwater Trench 8	443, 444	378	444
444	Stake hole	Cut	0.08m		5cm		Round stake hole filled by (443), steep sides and pointed base. Caught in DWG 95.	Stormwater Trench 8	443, 444	443	97

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
445	Scoop fill	Fill	0.58m	0.2m+	18cm	W/E	Loose brown black sand with occasional charcoal flecks, and occasional hole and broken pipi shell, fill of [436].	Stormwater Trench 8	445, 436	378	436
446	Scoop fill	Fill	0.7m	0.2m+	10cm	W/E	Loose brown black sand with occasional charcoal flecks, and occasional hole and broken pipi shell, fill of [435].	Stormwater Trench 8	435, 446	378	435
447	Midden	Deposit	3.4m	1m+	10cm	W/E	Firm black sand with powdery crushed shell, charcoal stained sand. Upper portion of midden (378).	Stormwater Trench 8		tan sand	378
448	Stake hole fill	Fill	0.08m		5cm		Black sand with moderate crushed pipi? Shell, fill of [449]	Stormwater Trench 8	448, 449	378	449
449	Stake hole	Cut	0.08m		5cm		Round stake hole filled by (448), steep sides and rounded base. Caught in DWG 94.	Stormwater Trench 8	448, 449	448	97
450	Midden	Deposit	5m	1m+	20-5cm	W/E	Firm black sand with crushed and powdery shell fragments, occasional to moderate amounts of crushed and whole pipi shell, dense charcoal staining.	Stormwater Trench 8		tan sand	378
451	Stake hole	Cut	0.8m		8cm		Round stake hole filled by (450), steep sides and rounded base. Caught in DWG 94.	Stormwater Trench 8		450	97
452	Scoop fill	Fill	0.6m		24cm	W/E	Firm black sand, charcoal staining occasional shell fragments and fresh rootless. Fill of [453].	Stormwater Trench 8	452, 453	450	453
453	Scoop	Cut	0.6m		24cm	W/E	Oval scoop filled by (452), gently sloping sides and rounded base. Caught in DWG 94.	Stormwater Trench 8	452, 453	452	97
454	Pit	Cut	1.5m	0.9m	25cm	N/S	Large oval pit filled with (455). Steep sides and flat base.	Stormwater Trench 8	454, 455	455	97
455	Pit fill	Fill	1.5m	0.9m	25cm	N/S	Loose brown sand with moderate amounts of whole and broken pipi shell mixed evenly through matrix. Occasional chunks of charcoal. Fill of [454].	Stormwater Trench 8	454, 455	456	454
456	Hangi?	Cut	0.4m	0.4m	5cm		Truncated basal remains of a hangi - very shallow with only the base remaining? Filled by (457).	Stormwater Trench 8	456, 457	457	455
457	Hangi fill	Fill	0.4m	0.4m	5cm		Black charcoal stained sand with moderate amounts of small angular fire cracked rock. Fill of [456] and [466].	Stormwater Trench 8	456, 466, 460,	463	456, 466
458	Hangi fill	Fill	0.45m	0.4m	12cm	N/S	Black charcoal stained sand with moderate amounts of small angular fire cracked rock. Fill of [463].	Stormwater Trench 8	458, 463		

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
459	Hangi fill	Fill	1m	0.6m+	18cm	W/E	Black charcoal stained sand with occasional crushed shell fragments. Fill of [460].	Stormwater Trench 8	456, 467, 460	467	460
460	Hangi cut	Cut	1m	0.6m+	20cm	W/E	Oval shaped Hangi pit / Earth ovenor scoop combination, filled by (459) and (467), steeply sloping sides and rounded base. It is cut over (472) from [465]. The relationship was hard to tell apart.	Stormwater Trench 8	456, 467, 460	459	472
461	Posthole fill	Fill	0.5m	0.5m	28cm		Dense white pipi shell with little to no sand matrix - dump of solid shell into [462].	Stormwater Trench 8	461, 462	378	462
462	Post hole	Cut	0.5m	0.5m	28cm		Several basal remains of a small round post holes which has been cut into the base or a scoop or it's a post that has been wiggled out and created drag shape. Scoop = 50cm round by 28cm deep with gentle sides and rounded base. Post hole is 8cm in diameter by 10cm deep. Filled by (461).	Stormwater Trench 8	461, 462	461	97
463	Hangi	Cut	0.45m	0.4m	12cm	N/S	Oval shaped Hangi pit / Earth ovenor scoop. Filled by (458). Steep sides and rounded base.	Stormwater Trench 8	458, 463		
464	Scoop?	Cut	0.45m	0.4m	10cm	N/S	Oval shaped scoop or post hole filled by (455), same as [454] pit.	Stormwater Trench 8	455, 464	455	97
465	Scoop	Cut	0.4m	0.4m+	10cm	W/E	Oval shaped Hangi pit / Earth ovenor scoop combination, filled by (472), gently sloping sides and rounded base. It is cut by [460]. The relationship was hard to tell apart. Only partially excavated and left inset in section.	Stormwater Trench 8	472, 465		
466	Hangi?	Cut	0.3m	0.3m	5cm		Truncated basal remains of a hangi - very shallow with only the base remaining? Filled by (457).	Stormwater Trench 8	457, 466	457	455
467	Hangi fill	Fill	0.6m	0.2m+	10cm	W/E	Black charcoal stained sand with small angular fire cracked rock densely packed into the centre of the [460], this could be the remains of a hangi base on top of a fire scoop.	Stormwater Trench 8	456, 467, 460	tan sand	459
468	Post hole	Cut	0.35m	0.35m	0.35cm		Round post hole filled with (469), concave sides and rounded base. Large packing stone on northern side of post hole.	Stormwater Trench 8	468, 469	469	97

No	Type	Cut/Fill/ Deposit	Length (cm)	Width (cm)	Depth (cm)	Orientation	Description	Location	Associated with	Above	Below
469	Post hole fill	Fill	0.35m	0.35m	0.35cm		Loose brown sand with small pipi shell (whole and broken) a single large packing stone approx. 15cm square in northern side. Fill of [468].	Stormwater Trench 8	468, 469	378	468
470	Post hole fill	Fill	0.45m	0.45m	26cm		Brown sand with occasional to moderate amounts of hole and crushed pipi and cockle shell.	Stormwater Trench 8	470, 471, 473		
471	Post hole	Cut	0.45m	0.45m	26cm		Basal remains of a small round post hole which has been cut into the base or a scoop or it's a post that has been wiggled out and created drag shape. "Scoop = 45cm round by 26cm deep with gentle sides and rounded base. Post hole is 14cm in diameter by 10cm deep. Filled by (470 and 473)	Stormwater Trench 8	470, 471, 473		
472	Scoop fill	Fill	0.4m	0.4m+	10cm	W/E	Loose brown sand with occasional to moderate amounts of well mixed in pipi shell. Fill of [465].	Stormwater Trench 8	472, 465	460	465
473	Post hole fill	Fill	0.45m	0.45m	26cm		Brown sand, very occasional shell fragments, fill of [471].	Stormwater Trench 8	470, 471, 473		

APPENDIX 3 – SITE RECORD FORM O04/1022

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

ARCHSITE archaeological site recording scheme

Site Record Form

NZAA SITE NUMBER: O04/1022

SITE TYPE: Midden/Oven

SITE NAME(s):

DATE RECORDED: 10/07/2009

SITE COORDINATES (NZTM) Easting: 1642593 **Northing:** 6127245 **Source:** Handheld GPS

IMPERIAL SITE NUMBER: **METRIC SITE NUMBER:**

Finding aids to the location of the site

Immediately south of west end of Taipa River Bridge (SH10); above river bank.

Brief description

Midden

Recorded features

Midden, Ovenstones

Other sites associated with this site

Printed by: rodclough 10/06/2022

1 of 3

NEW ZEALAND ARCHAEOLOGICAL ASSOCIATION

SITE RECORD HISTORY	NZAA SITE NUMBER: O04/1022

Site description

Updated 14/03/2020 (other), submitted by brookejamieson
Grid reference (E1642593 / N6127245)

Excavation under archaeological authority 2018/096 for the Taipa Bridge Upgrade project. Excavation for new bridge replacement and services. Excavation found a thick midden deposits with associated post holes, scoops, hangi and shallow pits associated with food production and cooking. This site is is rally a continuation of the previously recorded midden that run along the western side of the Taipa river

Updated: 14/08/2009, Visited: 09/07/2009 - NZTM E1642593 / N6127245 (Handheld GPS). Thin layer of midden (150-200 mm thick) containing mostly pipi, some tuatua and cockle; exposed for 8 m back from river bank. Inspected by: Campbell, M.

Updated: 15/01/2014, Visited: 09/07/2009 - See attached CFG Heritage Report:

Harris, J. 2010. Site O04/1022 Section 18 Investigation, Taipa, Far North. Unpublished CFG Heritage Report to the New Zealand Historic Places Trust and Far North District Council.

Updated by: Campbell, M.

Condition of the site

Updated 14/03/2020 (other), submitted by brookejamieson

The features within the foot print of the bridge abutment and service trenches have now been destroyed by earthworks. In situ archaeology exits outside of these areas in good preservation.

Updated: 14/08/2009, Visited: 09/07/2009 - Exposed by damage during earthworks.

Statement of condition

Updated: 14/08/2009, Visited: 09/07/2009 - Good – Majority of visible features are intact, but some minor loss of definition and/or damage

Current land use:

Updated: 04/09/2020 - Coastal margins, Road reserve, Services
Updated: 14/08/2009, Visited: 09/07/2009 - Services
Updated: 14/08/2009, Visited: 09/07/2009 - Services, Services

Threats:

Updated: 14/08/2009, Visited: 09/07/2009 - Erosion, Services/ utilities
Updated: 14/08/2009, Visited: 09/07/2009 - Erosion, Erosion, Services/ utilities, Services/ utilities

Printed by: rodclough 10/06/2022

2 of 3

APPENDIX 4 – FAUNAL DATA

Context No.	Sample No.	Cat No.	Bag Number	Species	Left	Right	NA/ NS	NISP	MNE	MNI	Weight(g)
397	**125**			**Carangidae**						**1**	
		1	1	Quadrate	1			1	1		0.1
		1	2	Vetrebra, caudal			2	2	2		0.24
		1	3	Scutes			24	24	24		0.1
				Unidentified Fish Bone							
				Fragments				20			0.38
455	**133**			***Chelidonichthys kumu***						**1**	
		2	1	Vertebra, atlas				1	1		<0.1
		2	2	Lachrymal				2	1		<0.1
				Carangidae						**1**	
		2	3	Hyomandibula	1			1	1		0.8
		2	4	Vertebra, caudal			1	1	1		<0.1
		2	5	Scutes			5	**5**	5		<0.1
		2	6	Scutes			19	19	19		<0.1
				Unidentified Fish Bone							
		2	7	Quadrate		1		1	1		<0.1
		2	8	Vertebra			1	1	1		<0.1
		2	9	Vertebra			9	9	9		<0.1
		2	10	Misc. spines			33	33			0.1
		2	11	Shell fragments			7	7			<0.1
				***Rattus* sp.**						**1**	
		2	12	Teeth				2	2		<0.1
		2	13	Mandible		1		1	1		<0.1
											0.9
461	**134**			***Pseudolabrus* sp.**						**1**	
		3	1	Vertebra, caudal			1	1	1		<0.1
				Chelidonichthys kumu						**1**	
		3	2	Vertebra, caudal			1	1	1		<0.1
		3	3	Lachrymal			1	1	1		0.1

				Nemadactylus macropterus							
		3	4	Vertebra, caudal			1	1	1		<0.1
				Trachurus declivis							
		3	5	Supraoccipital			1	1	1		0.16
				Scorpis lineolata						**1**	
		3	6	Vertebra, caudal			1	1	1		<0.1
				Carangidae							
		3	7	Scutes			4	4	4	1	<0.1
				Unidentified Fish bone							
		3	8	Scales			9	9			0.27
		3	9	Vertebra			6	6			<0.1
		3	10	Misc. Spines			16	161			<0.1
		3	11	Fragments				105			1.92
		3	12	Tooth			1	1	1		<0.1
				Clypeasteroida						**1**	
		3	13	Valve			5	5			0.1
				***Rattus* sp.**						**1**	
		3	14	Mandible			1	1	1		0.1
				Crab sp.						**1**	
		3	15	Claw			1	1	1		<0.1
				Non- Bone							
		3	16	Fragments				11			1.6
293	**88**			***Chrysophrys auratus***						**1**	
		4	1	Quadrate		1		1	1		0.16
				Meuschenia scaber						**1**	
		4	2	Vertebra, caudal			1	1	1		<0.1
				Thyrsites atun						**1**	
		4	3	Maxilla	1		1	1	1		0.64
				Carangidae						**1**	
		4	4	Vertebra, caudal			1	1	1		<0.1

			5	Vertebra, abdominal			1	1	1		<0.1
				Unidentified Fish Bone							
		4	6	Vertebra			6	6			<0.1
		4	7	Fragments			22	22			1.56
				Crab sp.							
		4	8	Claw			1	1	1	1	0.56
				Non-Bone							
		4	9	Fragments			8	8			0.1
353	**108**			***Mugil cephalus***						**1**	
		5	1	Vertebra, caudal			1	1	1		0.1
				Carangidae						**1**	
		5	2	Vertebra, abdominal			1	1	1		0.1
				Chelidonichthys kumu						**1**	
		5	3	Lachrymal			1	1	1		0.1
				Unidentified Fish Bone							
		5	4	Vertebra			4	4			0.11
		5	5	Fragments			66	66			1.07
		5	6	Scales			130	130			<0.1
			7	Fragments			3	3			<0.1
				Non-Bone							
		5	8	Fragments			5	5			<0.1

APPENDIX 5 – MIDDEN DATA

Sample 39 components by weight in grams. Context 124, fill of fire scoop 127

Sample 39	Weight (gm)	% of Total
Soil	1270	97.10%
Unidentified Shell	15	1.10%
Identified Shell	23	1.50%
Charcoal	7	0.50%
Artefacts	0	0.00%
Bone & Scale	0	0.00%

Sample 49 components by weight. Context 149, midden

Sample 49	Weight (gm)	% of Total
Soil	3865	48.50%
Unidentified Shell	2688	34%
Identified Shell	1412	18%
Charcoal	3	0%
Artefacts	0	0%
Bone & Scales	2	

Sample 88 components by weight. Context 293, redeposited shell midden

Sample 88	Weight (gm)	% of Total
Soil	1061	29.50%
Unidentified Shell	1654	46%
Identified Shell	866	24%
Charcoal	12	0.30%
Artefacts	0	0%
Bone & Scale	5	0.10%

Sample 108 components by weight. Context 353, midden

Sample 108	Weight (gm)	% of Total
Soil	2705	34.90%
Unidentified Shell	2705	34.90%
Identified Shell	2326	30.10%
Charcoal	5	0.10%
Artefacts	0	0%
Bone & Scale	1	0%

Sample 117 components by weight. Context 457, fill of hangi 456 and 466

Sample 117	Weight	% of Total
Soil	1679	32.6
Unidentified Shell	1262	24.5
Identified Shell	2192	42.5
Artefacts	0	0.0
Charcoal	11	0.2
Bone & Scale	0	0.0

Sample 125 components by weight. Context 397, fill of post hole 398

Sample 125	Weight (gm)	% of Total
Soil	2429	46.40%
Unidentified Shell	1714	32.70%
Identified Shell	1056	20.20%
Charcoal	39	0.70%
Artefacts	0	0%
Bone & Scale	2	0%
Total	5240	

Sample 129 components by weight. Context 399, fill of hangi 400

Sample 129	Weight	% of Total
Soil	6050	93.6
Unidentified Shell	110	1.7
Identified Shell	0	2.5
Artefacts	0	0.0
Charcoal	143	2.2
Bone	0	0.0

Sample 133 components by weight. Context 455, fill of pit 454

Sample 133	Weight (gm)	% of Total
Soil	6023	81.70%
Unidentified Shell	1714	8.30%
Identified Shell	608	9.70%
Charcoal	21	0.30%
Artefacts	0	0%
Bone & Scale	2	0%
Total	8368	

Sample 134 components by weight. Context 461, fill of post hole 462

Sample 134	Weight (gm)	% of Total
Soil	2433	30.70%
Unidentified Shell	3134	39.50%
Identified Shell	2350	29.50%
Charcoal	13	0.20%
Artefacts	0	0%
Bone & Scale	5	0.10%
Total	7935	100.00%

APPENDIX 6 – CHARCOAL IDENTIFICATION

By Rod Wallace

Sample 139 - Context 461 – Posthole - stormwater trench 7, cut 462, fill 461

Manuka	5	C14 dating sample
Pittosporum	1	
Kanuka	1	
Puriri	1	
Mangrove	2	

Sample 109 - Context 353 – Midden - stormwater trench 7, cut 462, fill 461

Pohutukawa	2	
Mangrove	2	

Sample 115 - Context 369 – Scoop fill

Lancewood	9	C14 dating sample
Kanuka	4	
Mangrove	1	

Sample 102 - Context 338 – Posthole fill

Coprosma	3	
Manuka	8	C14 dating sample
Kanuka	4	
Pohutukawa	2	
Mangrove	1	

Sample 112 - Context 354 – Scoop

Manuka	15	C14 dating sample

Sample 12 - Context 55 – Midden

Pittosporum	1	
Manuka	2	C14 dating sample
Mangrove	9	

Sample 15 - Context 30 – Fire scoop

Hebe	1	C14 dating sample
Mingimingi	7	

Sample 117 - Context 356 – Hangi Pit

Manuka	6	C14 dating sample
Kanuka	8	
Mapou	3	
Mangrove	1	

Sample 125 - Context 398 – Posthole

Tutu	1	
Coprosma	3	C14 dating sample
Manuka	8	
Kanuka	1	

Pohutukawa	2	
Mangrove	2	

Sample 39 - Context 124 – Fire scoop

Tutu	2	
Coprosma	3	
Fivefinger	2	C14 dating sample
Kanuka	4	

Sample 133 - Context 455 – Pit fill

Tutu	1	
Coprosma	2	
Manuka	8	C14 dating sample
Kanuka	4	

Sample 88 - Context 295 – Redeposited shell midden

Hebe	1	C14 dating sample
Coprosma	8	
Kanuka	3	
Mapou	2	

Sample 108 - Context 353 – Midden

Bracken root	1	
Coprosma	3	
Manuka	4	C14 dating sample
Kanuka	1	
Puriri	1	

Sample 134 - Context 461 – Posthole

Mingimingi	1	
Coprosma	3	
Manuka	9	C14 dating sample
Kanuka	3	
Puriri	1	

Sample 38 - Context 458 – Scoop

Tutu	1	C14 dating sample
Mingimingi	1	
Kanuka	20	

Sample 129 - Context ? – ? (not in spreadsheet)

Mingimingi	15	
Kanuka	6	
Mangrove	2	

Sample 49 - extra sample

Tutu	1	
Coprosma	3	
Pittosporum	2	
Manuka	2	C14 dating sample

Mangrove 2

Sample	Context	Type	Bracken root	Fivefinger	Tutu	Mapou	Mingimingi	Hebe	Pittosporum	Coprosma	Manuka	Pittosporum	Kanuka	Puriri	Mangrove	Pohutukawa	Lancewood
139	461	Posthole									5	1	1	1	2		
108	353	Midden													2	2	
115	369	Scoop											4		1		9
102	338	Posthole								3	8		4		1	2	
112	354	Scoop									15						
12	55	Midden							1		2				9		
15	30	Scoop					7	1									
117	356	Hangi				3					6		8		3		
125	398	Posthole			1					3	8		1		2	2	
39	124	Scoop		2	2					3			4				
133	455	Pit			1					2	8		4				
88	295	Midden				2		1		8			8				
108	353	Midden	1							3	4		1	1			
134	461	Posthole					1			3	9		3				

APPENDIX 7 – C14 DATES

Appendix

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54397

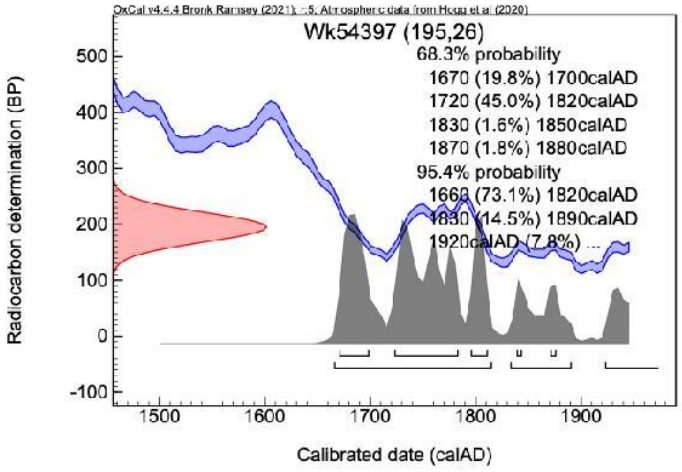
Submitter	Ben Jones
Submitter's Code	O04/1022-353
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Manuka
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-24.0 ±	3.2 ‰
$F^{14}C$%	97.6 ±	0.3 %
Result	**195 ± 26 BP**	

(AMS measurement)

Comments

Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



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

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54398

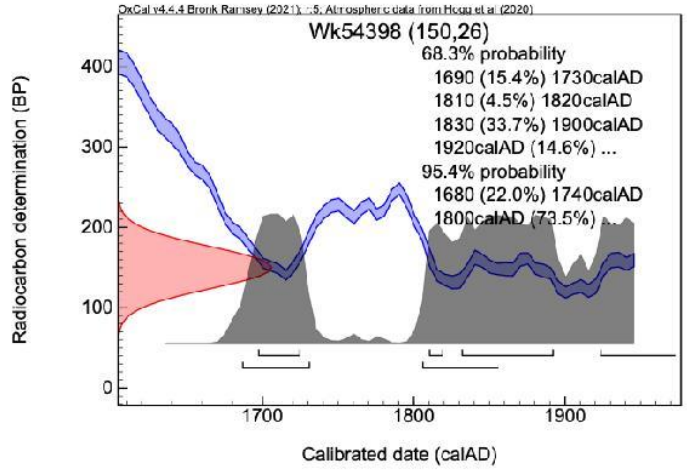
Submitter	Ben Jones
Submitter's Code	O04/1022-398
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Manuka
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-18.5 ±	3.2 ‰
$F^{14}C$%	98.1 ±	0.3 %
Result	**150 ± 26 BP**	

(AMS measurement)

Comments

Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



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

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54399

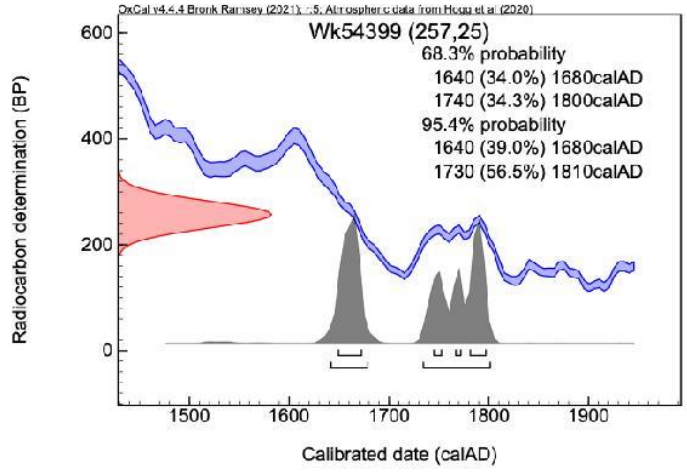
Submitter	Ben Jones
Submitter's Code	O04/1022-338 [339]
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Manuka
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-31.4 ±	3.0 ‰
$F^{14}C$%	96.9 ±	0.3 %
Result	**257 ± 25 BP**	

(AMS measurement)

Comments

Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



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

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54400

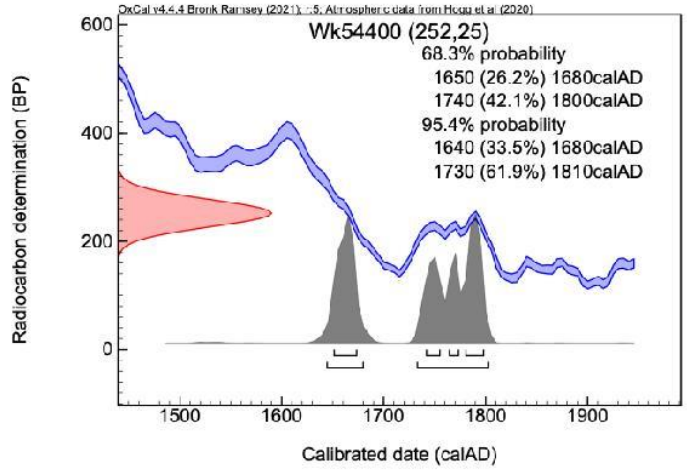
Submitter	Ben Jones
Submitter's Code	O04/1022-354[355]
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Manuka
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-30.9 ±	3.0 ‰
$F^{14}C$%	96.9 ±	0.3 %
Result	**252 ± 25 BP**	

(AMS measurement)

Comments

Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



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

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54401

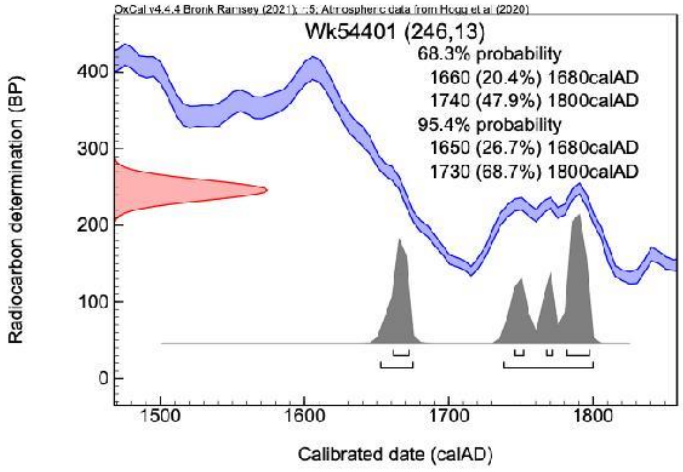
Submitter	Ben Jones
Submitter's Code	O04/1022-30
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Hebe
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-30.1 ±	1.5 ‰
$F^{14}C$%	97.0 ±	0.2 %
Result	**246 ± 13 BP**	

(AMS measurement)

Comments

Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



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

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54402

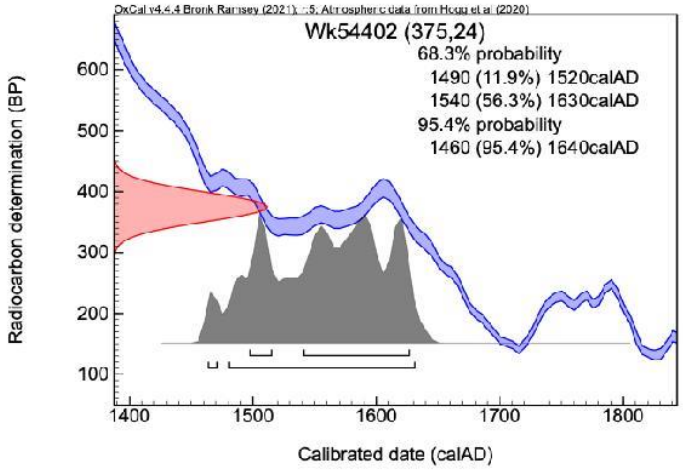
Submitter	Ben Jones
Submitter's Code	O04/1022-124[127]
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Fivefinger
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-45.6 ±	2.8 ‰
$F^{14}C$%	95.4 ±	0.3 %
Result	**375 ± 24 BP**	

(AMS measurement)

Comments

Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



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

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54403

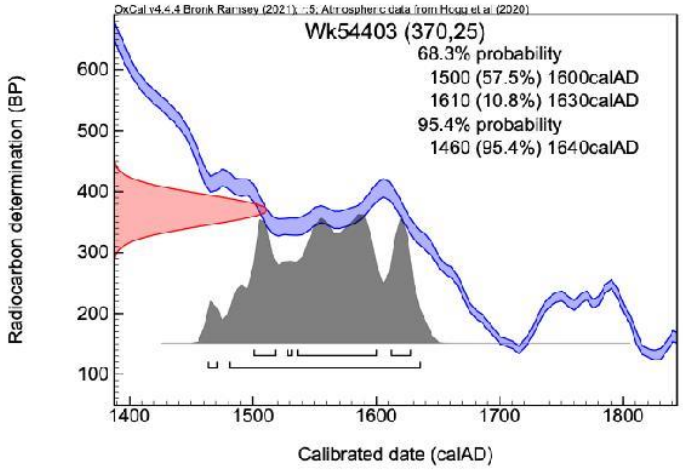
Submitter	Ben Jones
Submitter's Code	O04/1022-369[368]
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Ps. Crassifolius twig
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-45.0 ± 2.9 ‰
$F^{14}C$%	95.5 ± 0.3 %
Result	**370 ± 25 BP**

(AMS measurement)

Comments

Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



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

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54404

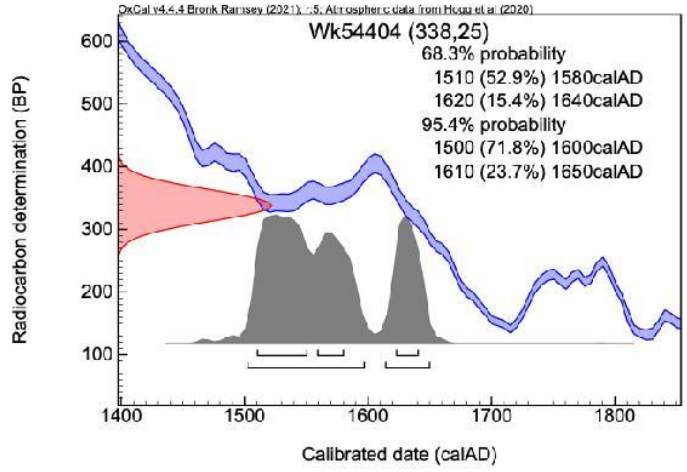
Submitter	Ben Jones
Submitter's Code	O04/1022-117
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Manuka
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-41.2 ± 3.0 ‰
$F^{14}C$%	95.9 ± 0.3 %
Result	**338 ± 25 BP**

(AMS measurement)

Comments

Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



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

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54405

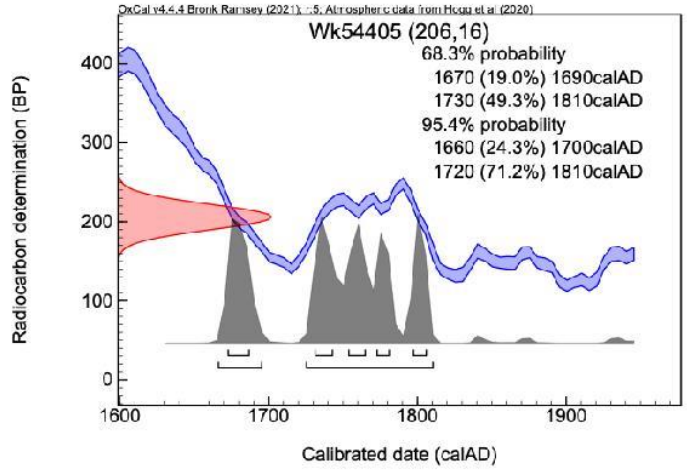
Submitter	Ben Jones
Submitter's Code	O04/1022-455[454]
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Manuka
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-25.4 ±	2.0 ‰
$F^{14}C$%	97.5 ±	0.2 %
Result	**206 ± 16 BP**	

(AMS measurement)

Comments

Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



- Explanation of the calibrated Oxcal plots can be found at the Oxford Radiocarbon Accelerator Unit's calibration web pages (http://c14.arch.ox.ac.uk/embed.php?File=explanation.php)
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- Quoted errors are 1 standard deviation due to counting statistics multiplied by an experimentally determined Laboratory Error Multiplier.
- The isotopic fractionation, $\delta^{13}C$, is expressed as ‰ wrt PDB and is measured on sample CO_2.
- $F^{14}C$% is also known as *Percent Modern Carbon (pMC)*.

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Thursday, 2 June 2022

Radiocarbon Dating Laboratory

Report on Radiocarbon Age Determination for Wk- 54406

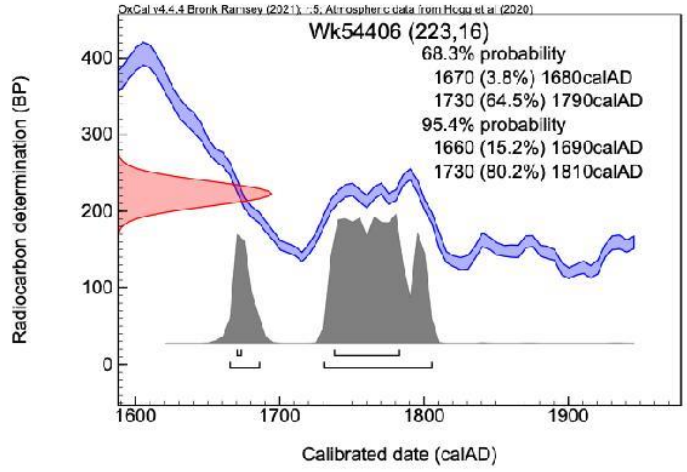
Submitter	Ben Jones
Submitter's Code	O04/1022-295
Site & Location	Taipa Bridge, New Zealand
Sample Material	Charcoal - Hebe
Physical Pretreatment	Sample cleaned.
Chemical Pretreatment	Sample washed in hot HCl, rinsed and treated with multiple hot NaOH washes. The NaOH insoluble fraction was treated with hot HCl, filtered, rinsed and dried.

$D^{14}C$	-27.4 ±	2.0 ‰
$F^{14}C\%$	97.3 ±	0.2 %
Result	**223 ± 16 BP**	

(AMS measurement)

Comments

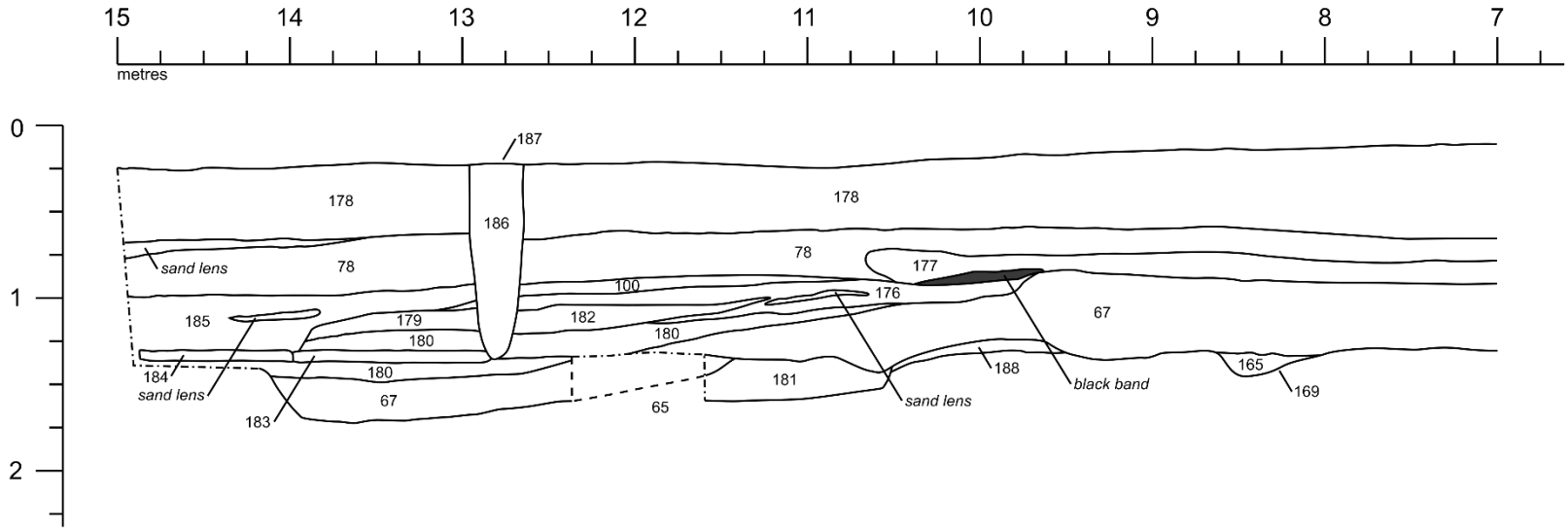
Please note: The Carbon-13 stable isotope value ($\delta^{13}C$) was measured on prepared graphite using the AMS spectrometer. The radiocarbon date has therefore been corrected for isotopic fractionation. However the AMS-measured $\delta^{13}C$ value can differ from the $\delta^{13}C$ of the original material and it is therefore not shown.



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

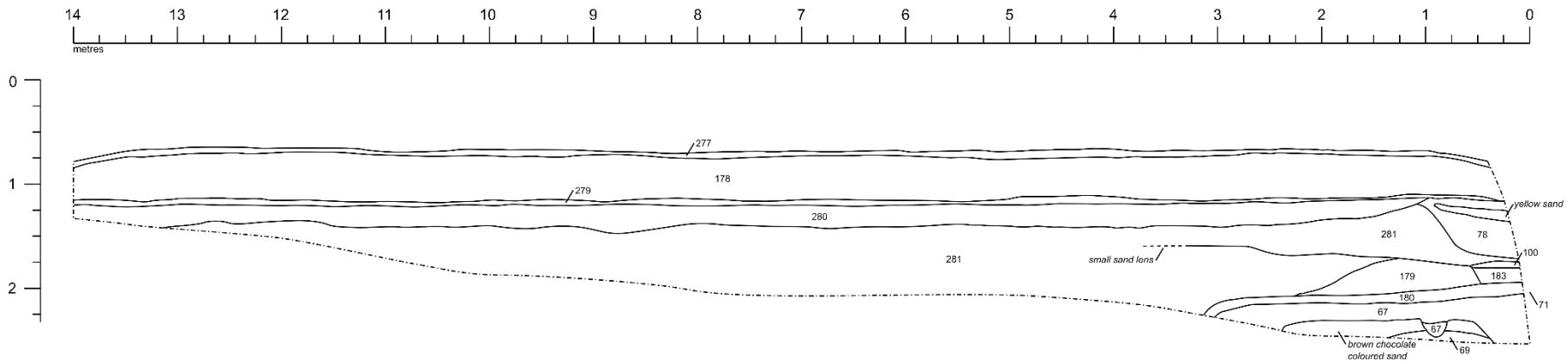
APPENDIX 8 – SECTIONS

Dwg. 49 Taipa - STM 1 & Main Ex
West Facing Section of Sewerage connection
30/10/2018



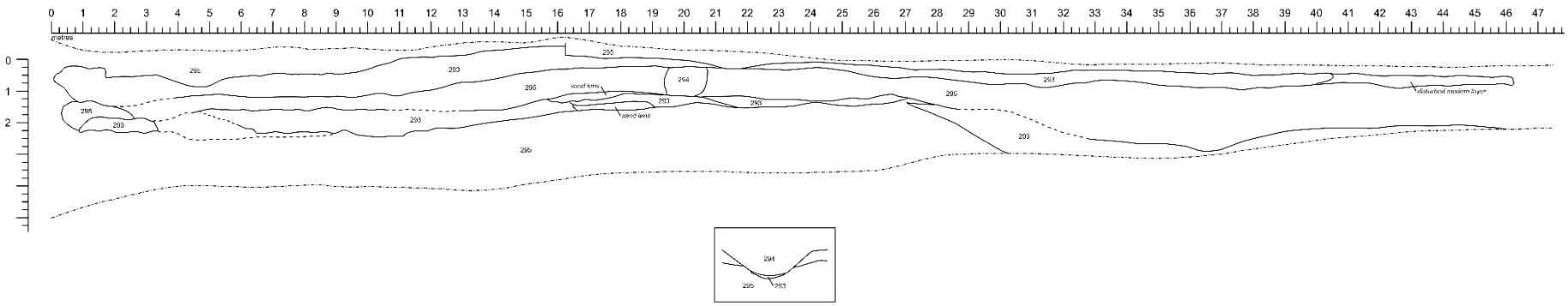
Dwg. 71 Taipa - STM 1 & Main Ex

Northeast Facing Section of Connection Pit (trench #3)
30/10/2018



Dwg. 73 Taipa - STM 1 & Main Ex

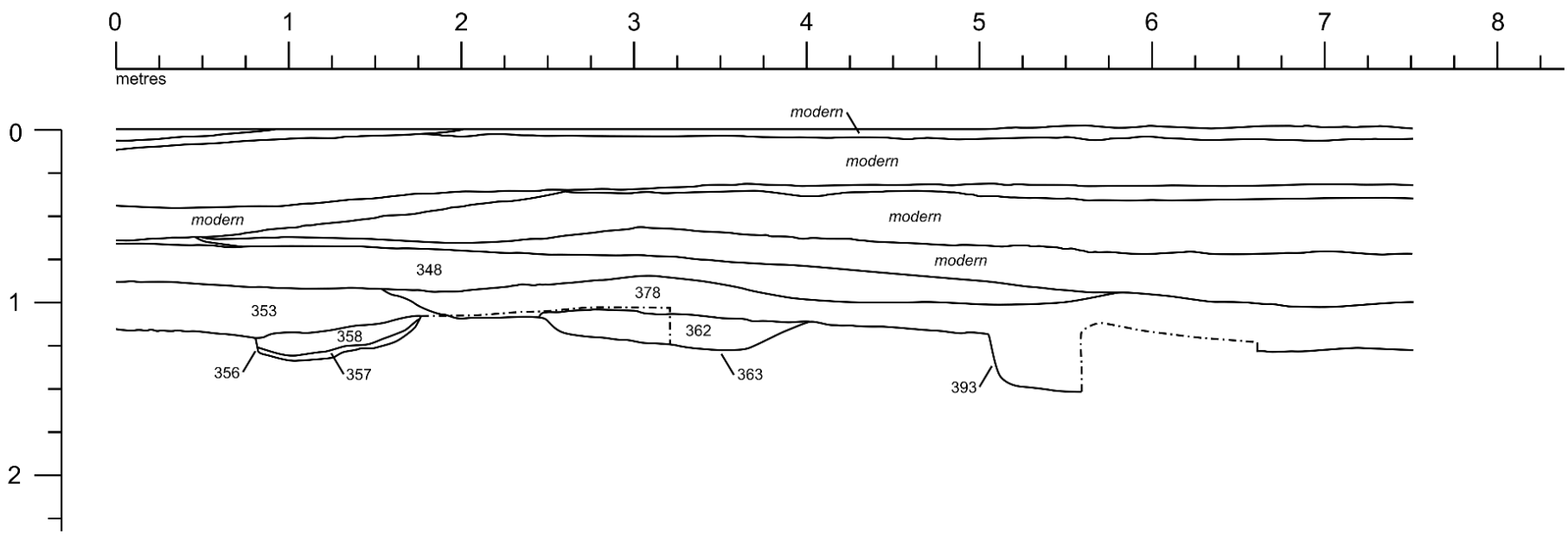
30/10/2018



Dwg. 93 Taipa - STM 1 & Main Ex

Northwest Facing Section of STW Trench #7

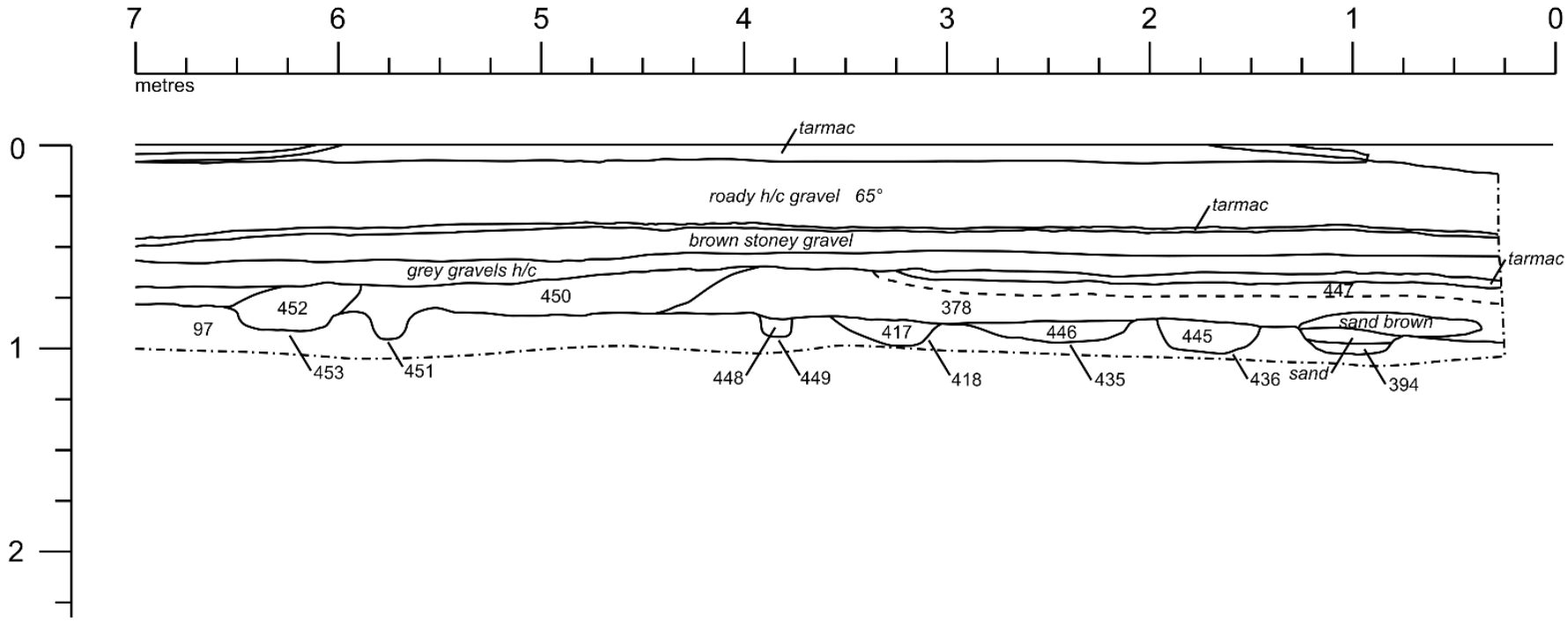
30/10/2018



Dwg. 94 Taipa - STM 1 & Main Ex

South Facing Section of STW Trench #8

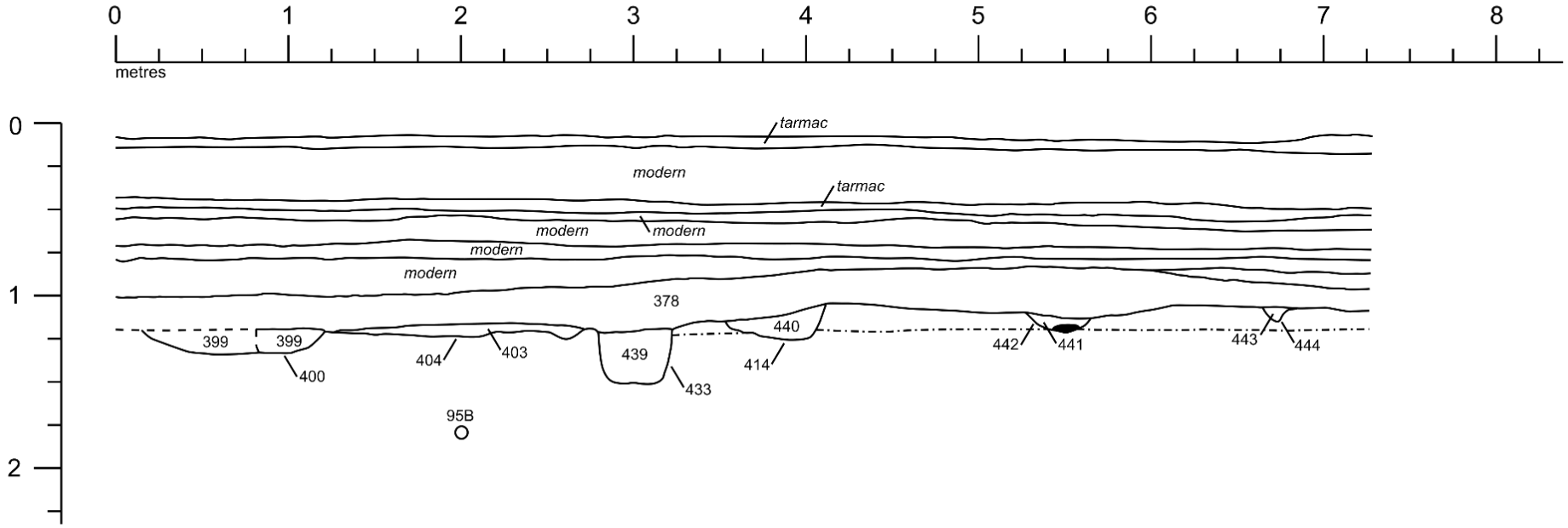
30/10/2018



Dwg. 95 Taipa - STM 1 & Main Ex

North Facing Section of STW Trench #8

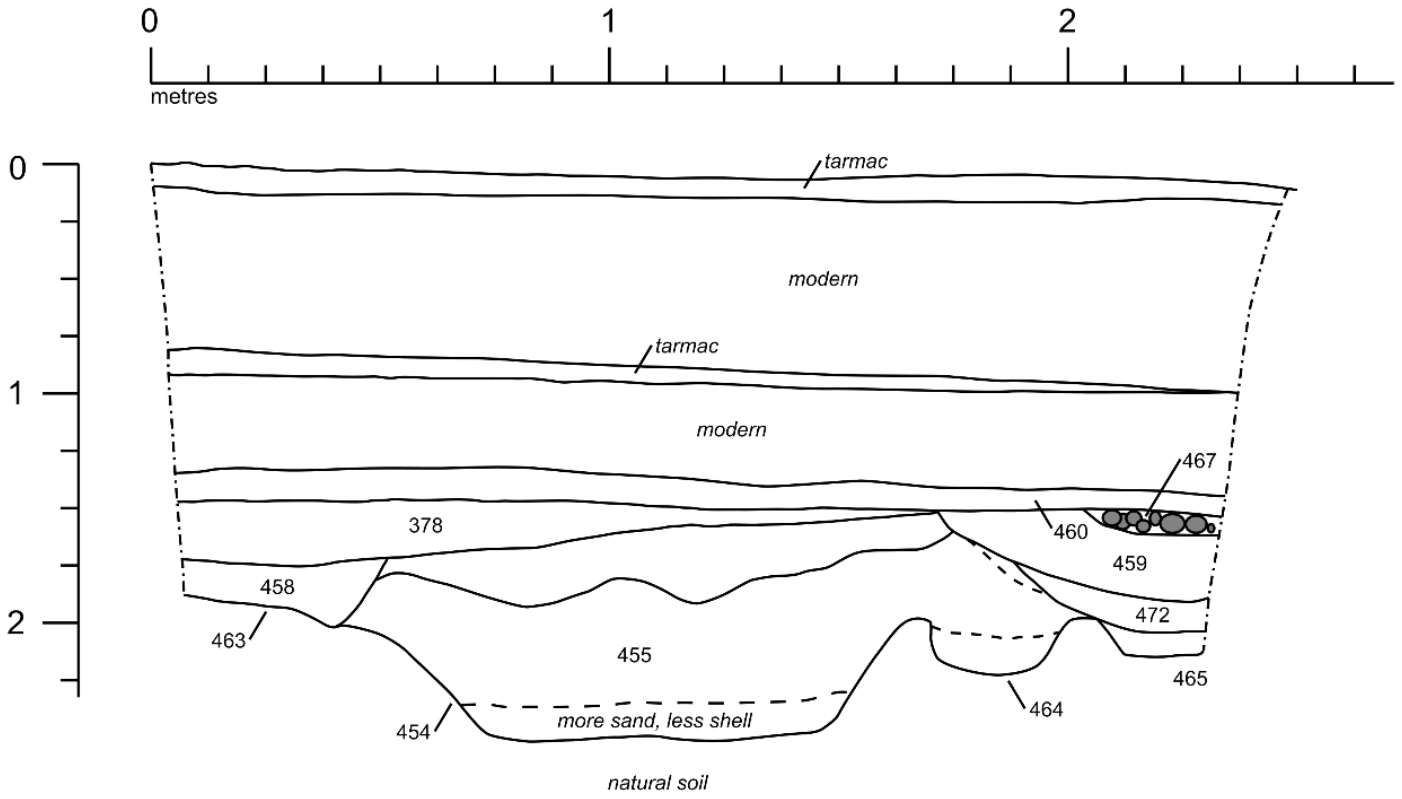
30/10/2018



Dwg. 97 Taipa - STM 1 & Main Ex

West Facing Section of STW Trench #8

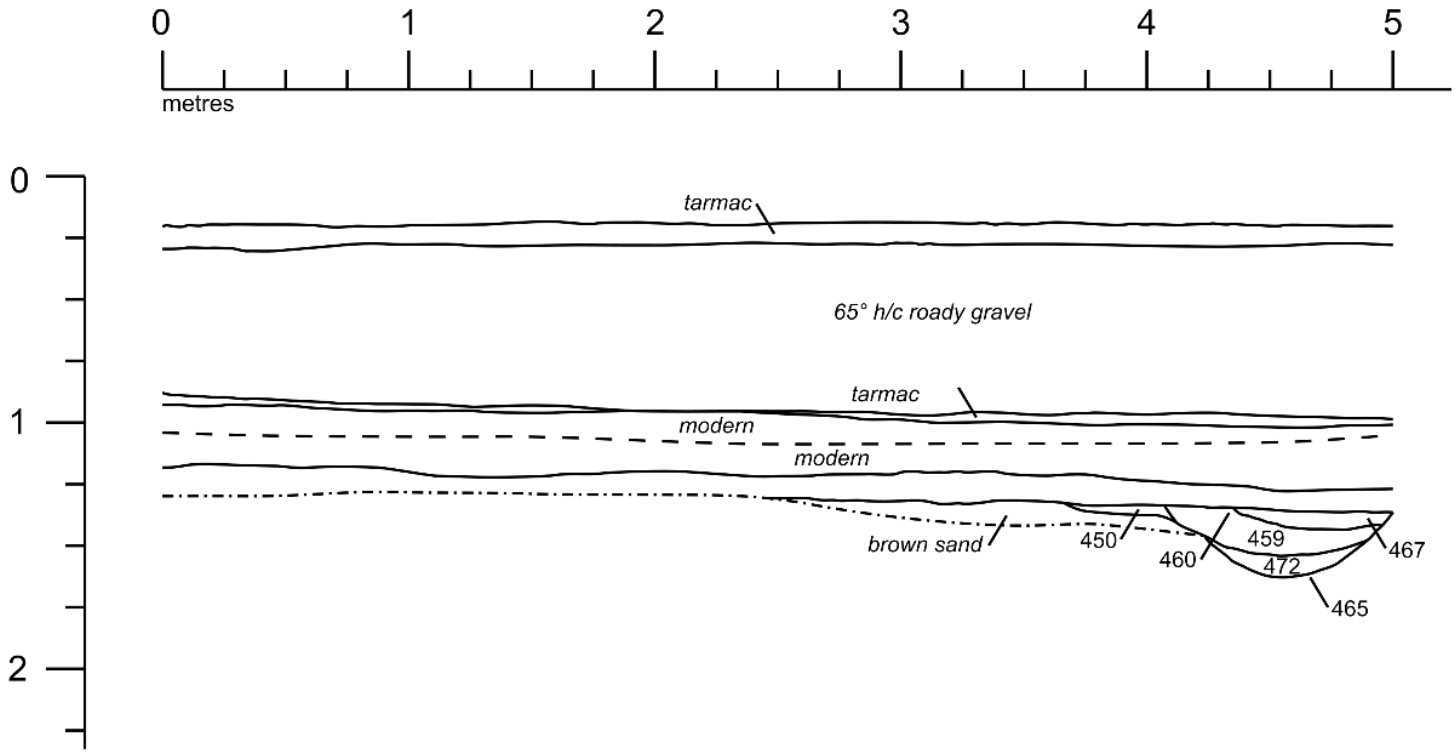
30/10/2018



Dwg. 98 Taipa - STM 1 & Main Ex

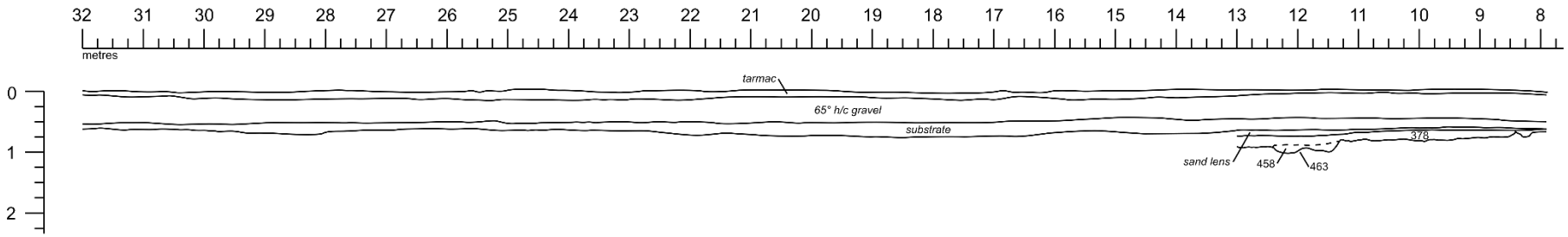
South Facing Section of STW Trench #8

30/10/2018



Dwg. 99 Taipa - STM 1 & Main Ex

South Facing Section of STW Trench #8
30/10/2018



Dwg. 100 Taipa - STM 1 & Main Ex

South Facing Section of STW
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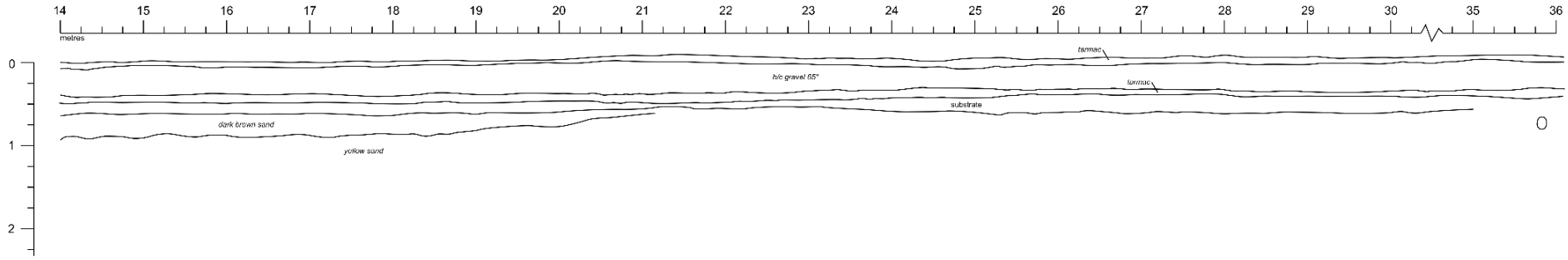
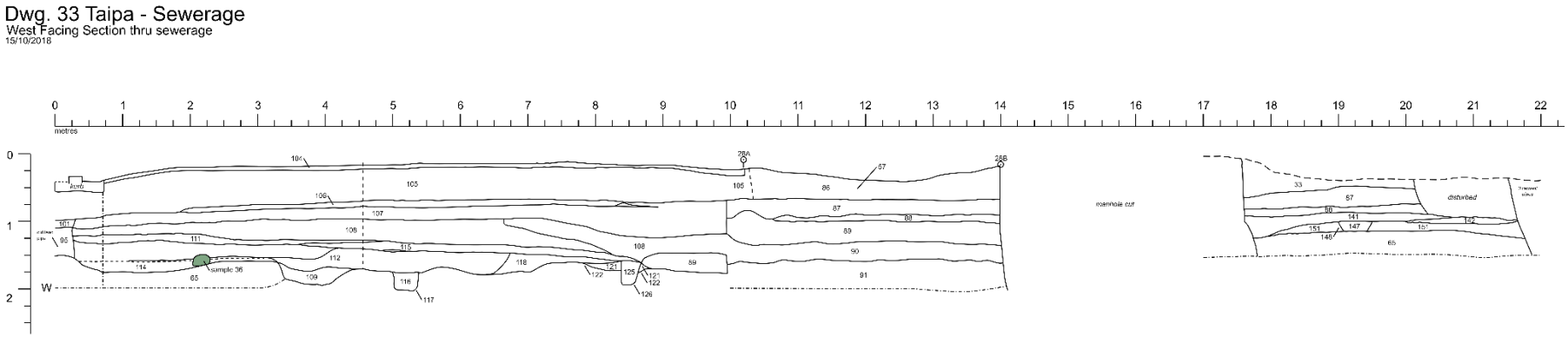


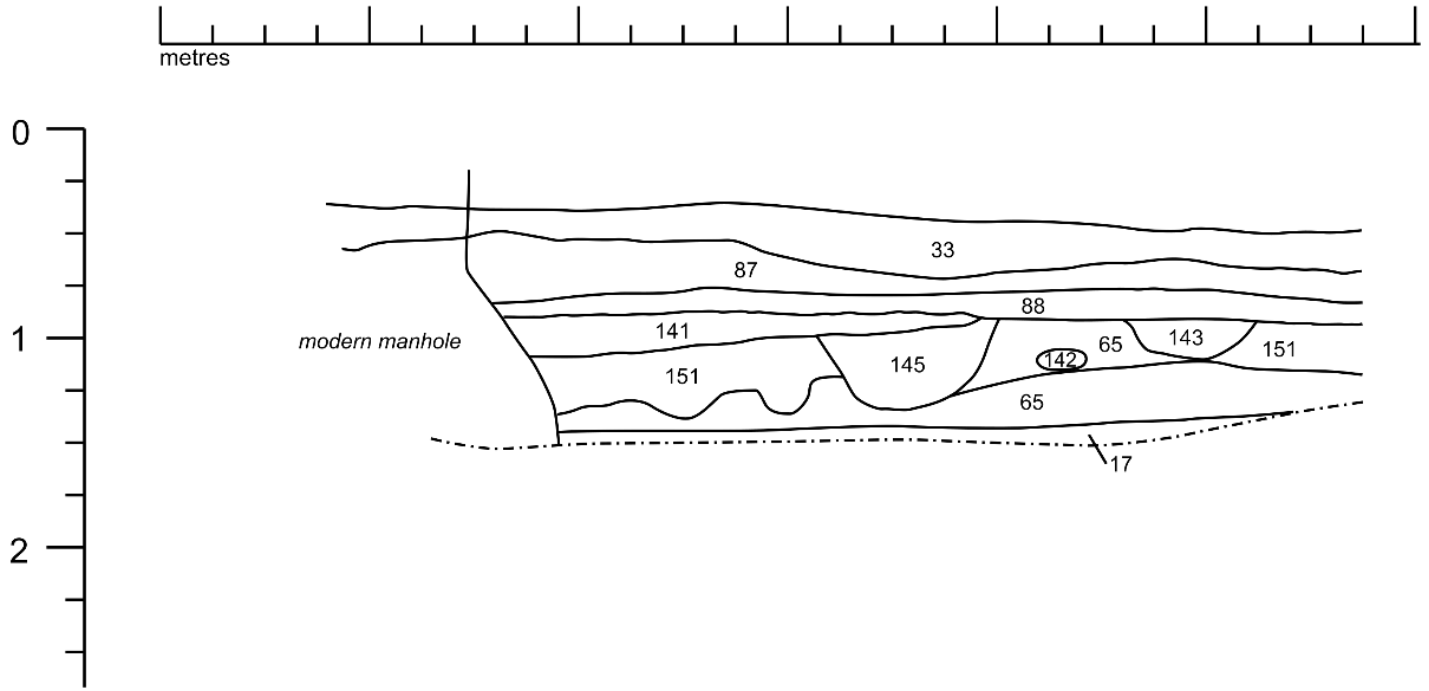
Sewage sections



Dwg. 41 Taipa - Sewerage

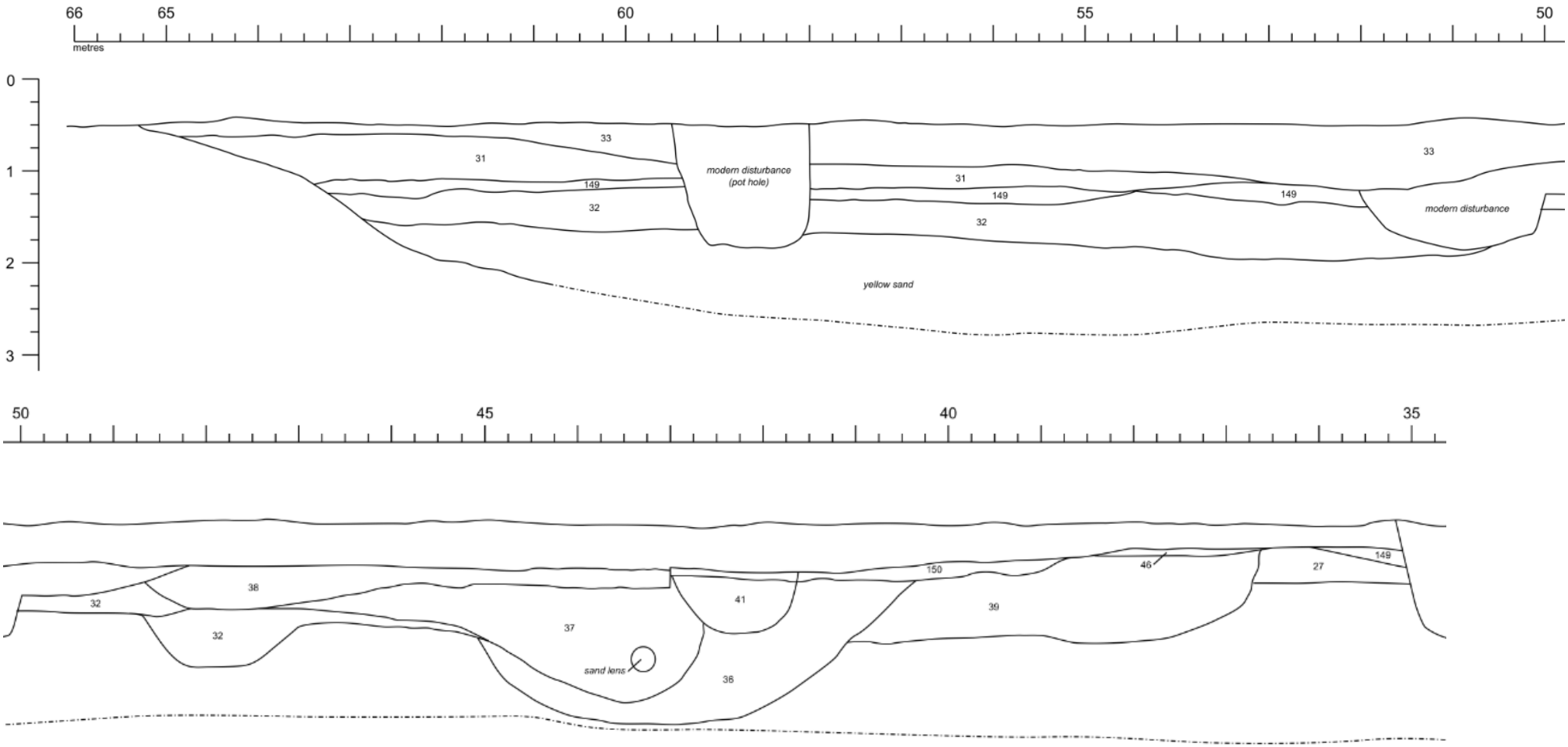
East Facing Section thru sewerage

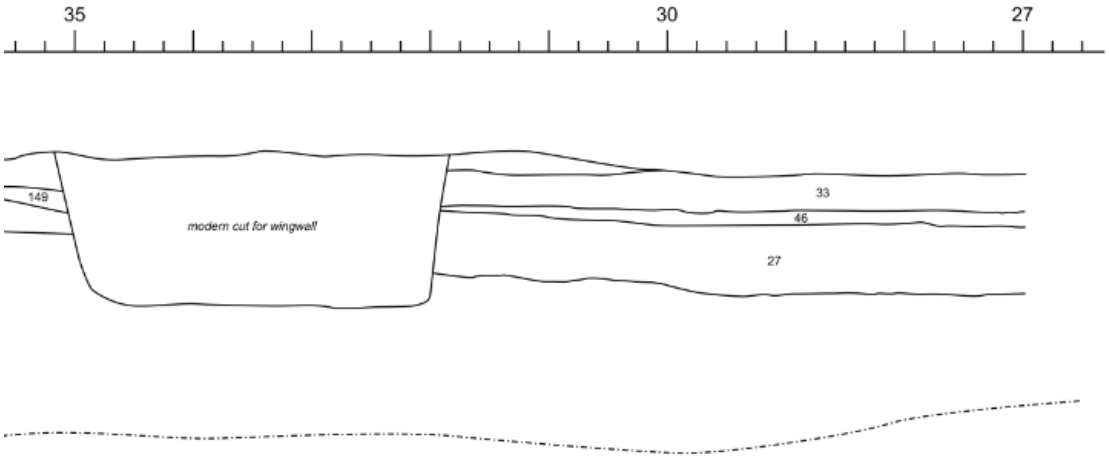
15/10/2018



(Drawing 42 presented in 3 parts for legibility)

Dwg. 42 Taipa - Sewerage
East Facing Section of sewerage trench
18/10/2018




35
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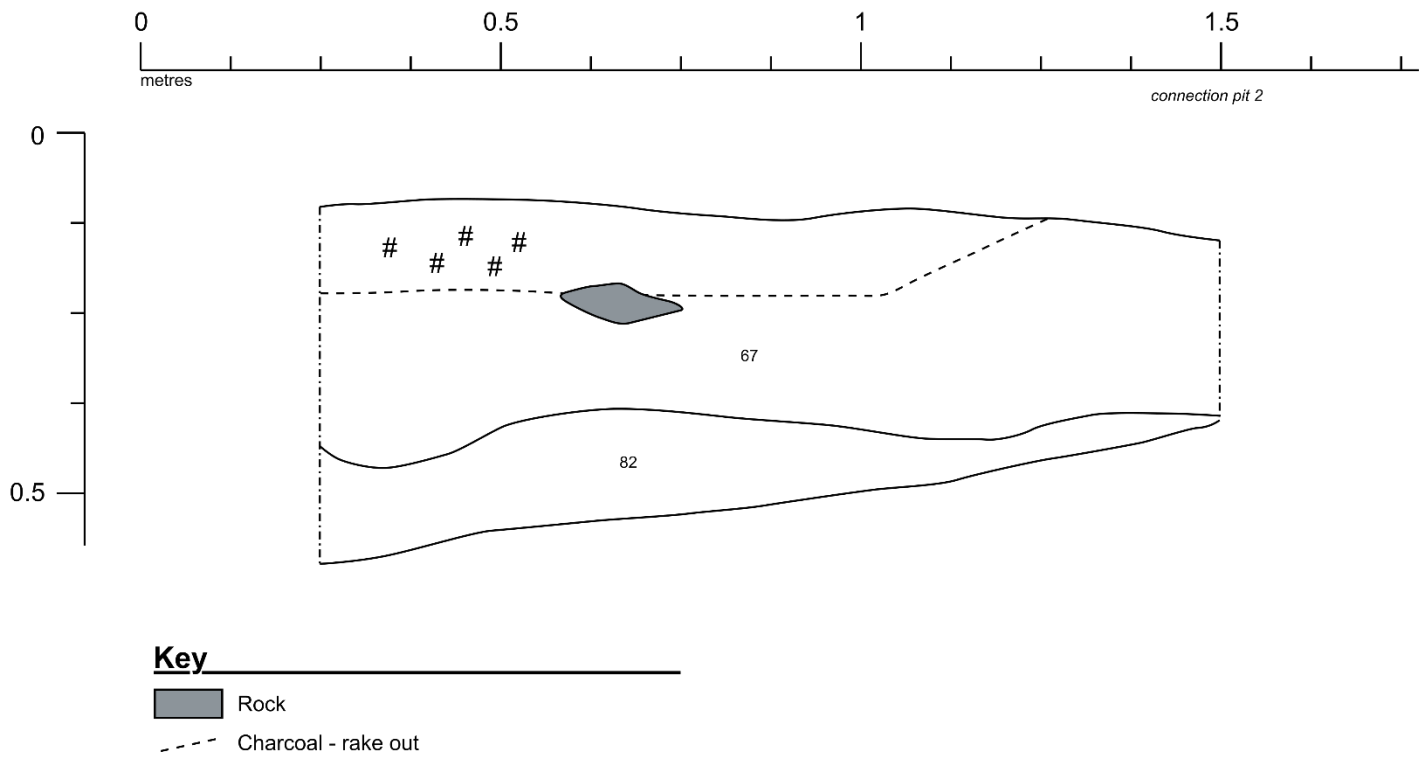
149
modern cut for wingwall
33
46
27

Dwg. 47 Taipa - Sewerage

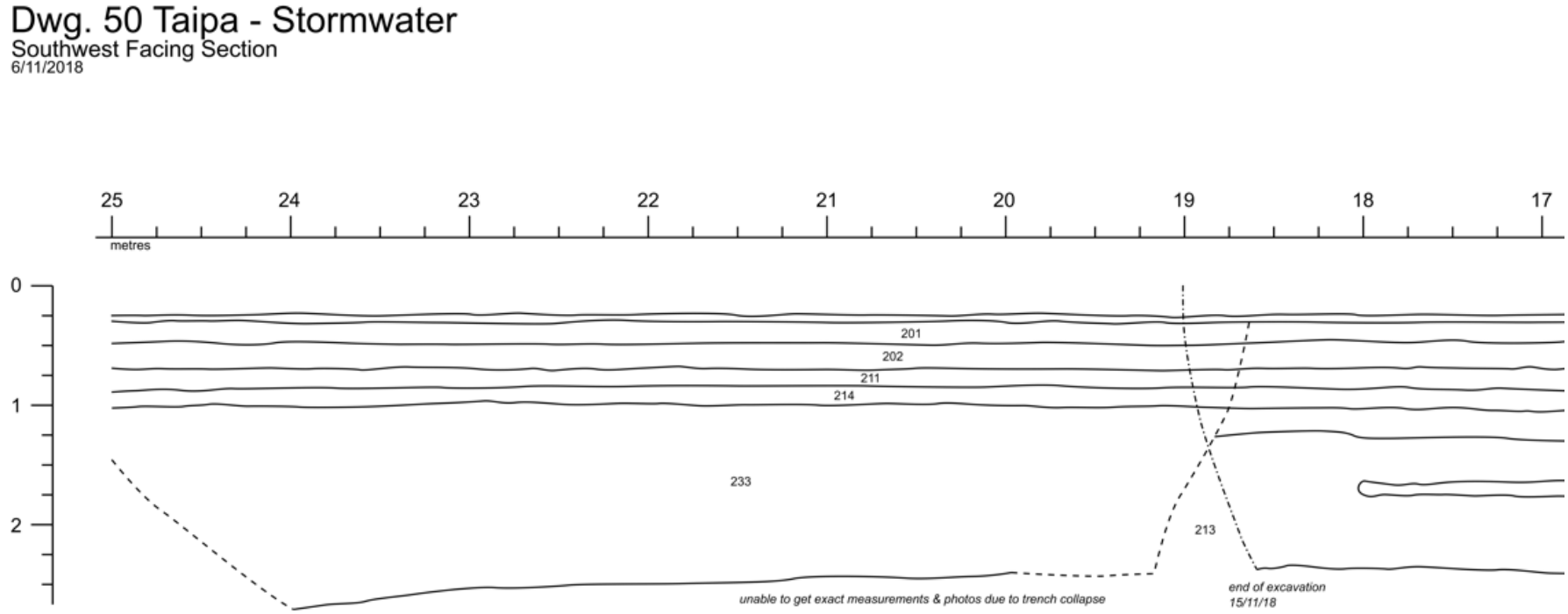
West Facing Section of Box #2

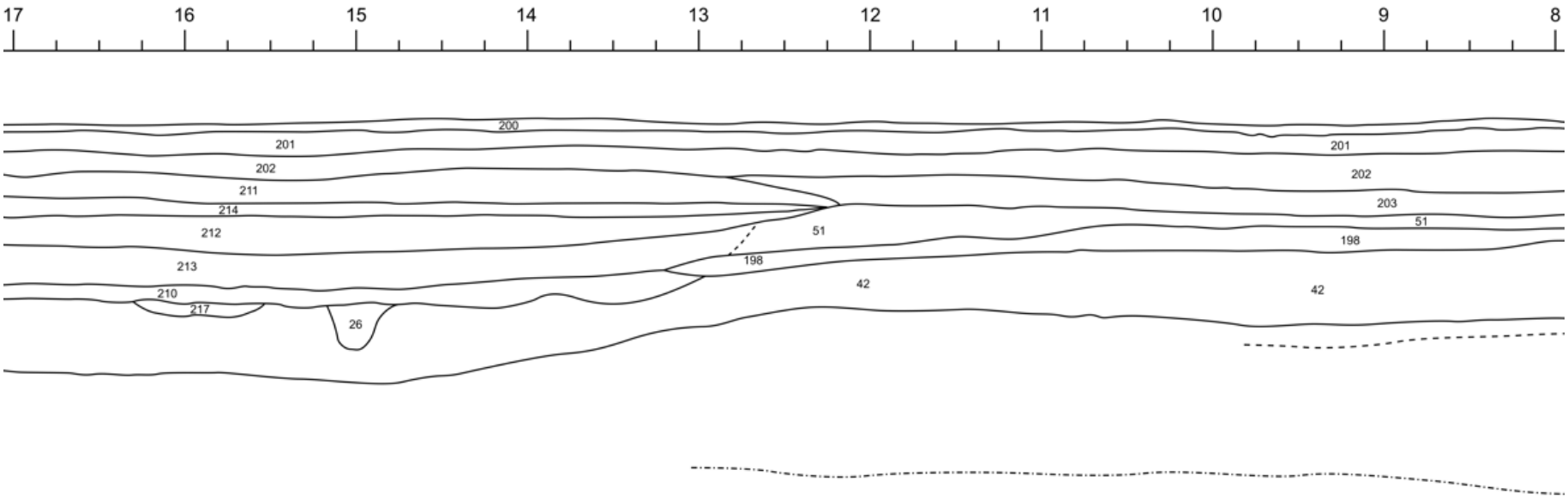
30/10/2018



Small stormwater sections

(Drawing 50 presented in 3 parts)

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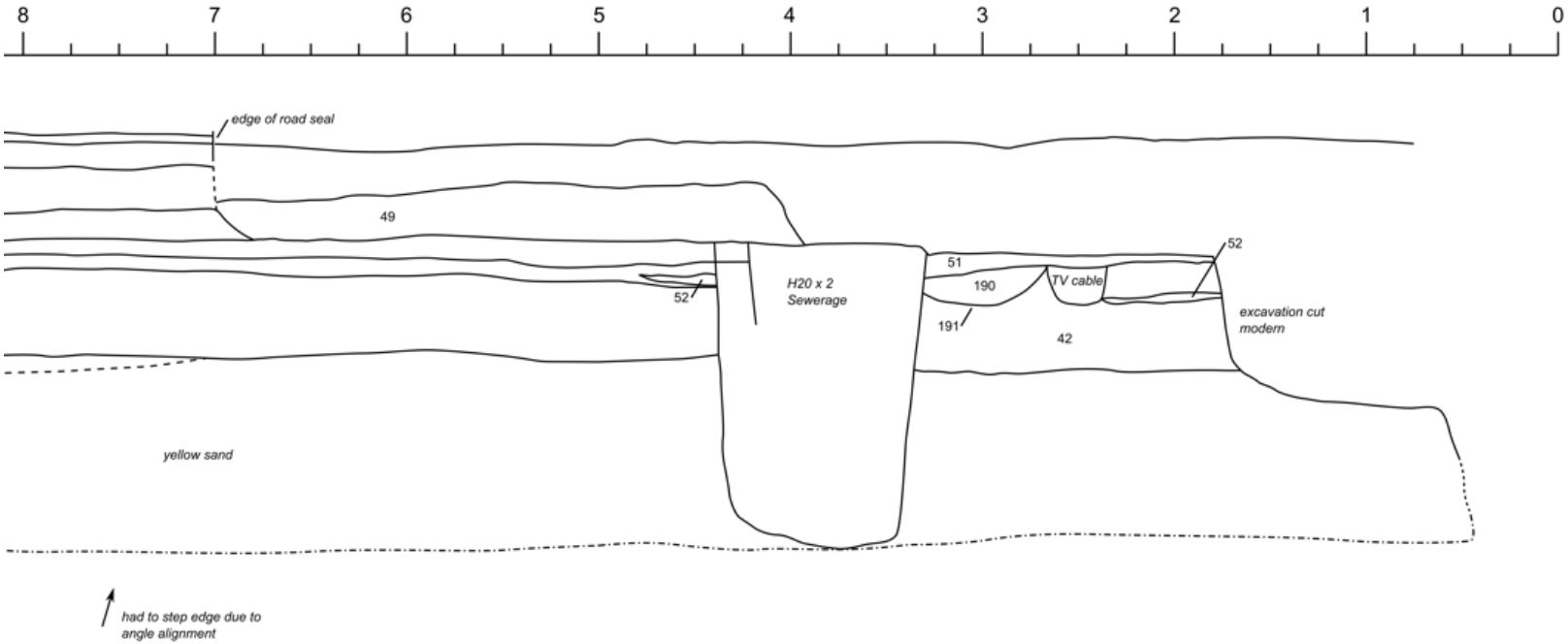
8
7
6
5
4
3
2
1
0
edge of road seal
49
52
H20 x 2
Sewerage
51
190
191
TV cable
52
excavation cut
modern
42
yellow sand
had to step edge due to
angle alignment

Dwg. 52 Taipa - Stormwater
Southwest Facing Section of Stormwater #1
19/11/2018