

FORESHOCK – AFTERSHOCK: THE ARCHAEOLOGY OF CHEWS LANE, WELLINGTON

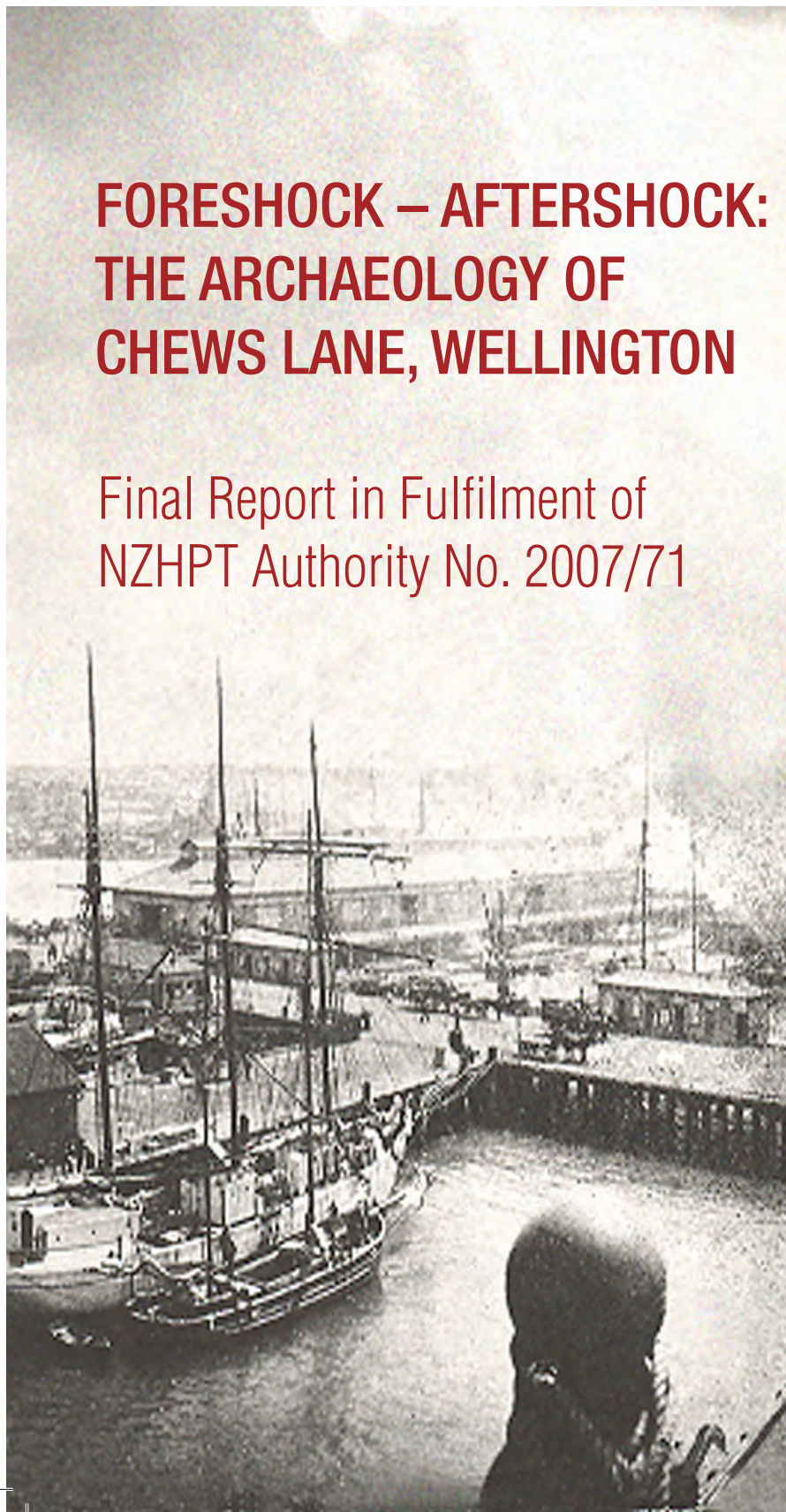
Final Report in Fulfilment of
NZHPT Authority No. 2007/71

Prepared for
Willis Street Holdings Ltd

by

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INTRODUCTION

Project Background

An area around Chews Lane in Wellington is being redeveloped by Willis Street Holdings Ltd. The development area incorporates Nos. 29-55 Willis Street and 42-60 Victoria Street, and occupies an area of 4,139m² (Figure 1, Figure 2). Prior to redevelopment there were 10 buildings within the precinct, several of which were assessed as having heritage significance (Bowman n.d.). Four of these have been retained and the remainder have been demolished to make way for new commercial development.

An archaeological assessment of the development area had not been commissioned prior to the start of site works, but was undertaken in conjunction with archaeological monitoring of piling and trenching at 50 Victoria Street, north of Chews Lane, in 2006 (Clough & Christoffel 2006; monitoring was carried out by the first author). Historical research carried out as part of the assessment indicated that there was potential for the survival of archaeological remains relating to 19th century occupation of the site, and subsequently a brick foundation of unknown age was exposed on the Victoria Street end of the development site. An Authority to modify an archaeological site was therefore applied for by Willis Street Holdings Ltd and was granted by the NZ Historic Places Trust in September 2006 (no. 2007/71).

The Authority conditions required that any earthworks affecting any archaeological site should be monitored by an archaeologist, and that any subsurface stratigraphy, features and remains should be recorded, analysed and reported on. The following account is the final report on the archaeological investigation of the Chews Lane redevelopment area.

Archaeological Investigation

Archaeological monitoring was carried out as required between September 2006 and May 2007. The investigation focused on the area north of Chews Lane incorporating Nos. 37 to 43 Willis Street and 50 Victoria Street. South of the lane the 20th century construction of building basements had removed any earlier archaeological remains, while to the north of 37 Willis and 50 Victoria Street the buildings were retained. Apart from some building foundations (Appendix 9), useful archaeological remains were limited to deep pile holes and foundation trenches. However, the development area lies on land reclaimed in the 19th century both before and following an earthquake in 1855, and these excavations provided the opportunity to record a sequence of natural and cultural deposits dating from before the 1855 earthquake to the late 19th century, and to recover a range of cultural items.

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INTRODUCTION, CONTINUED

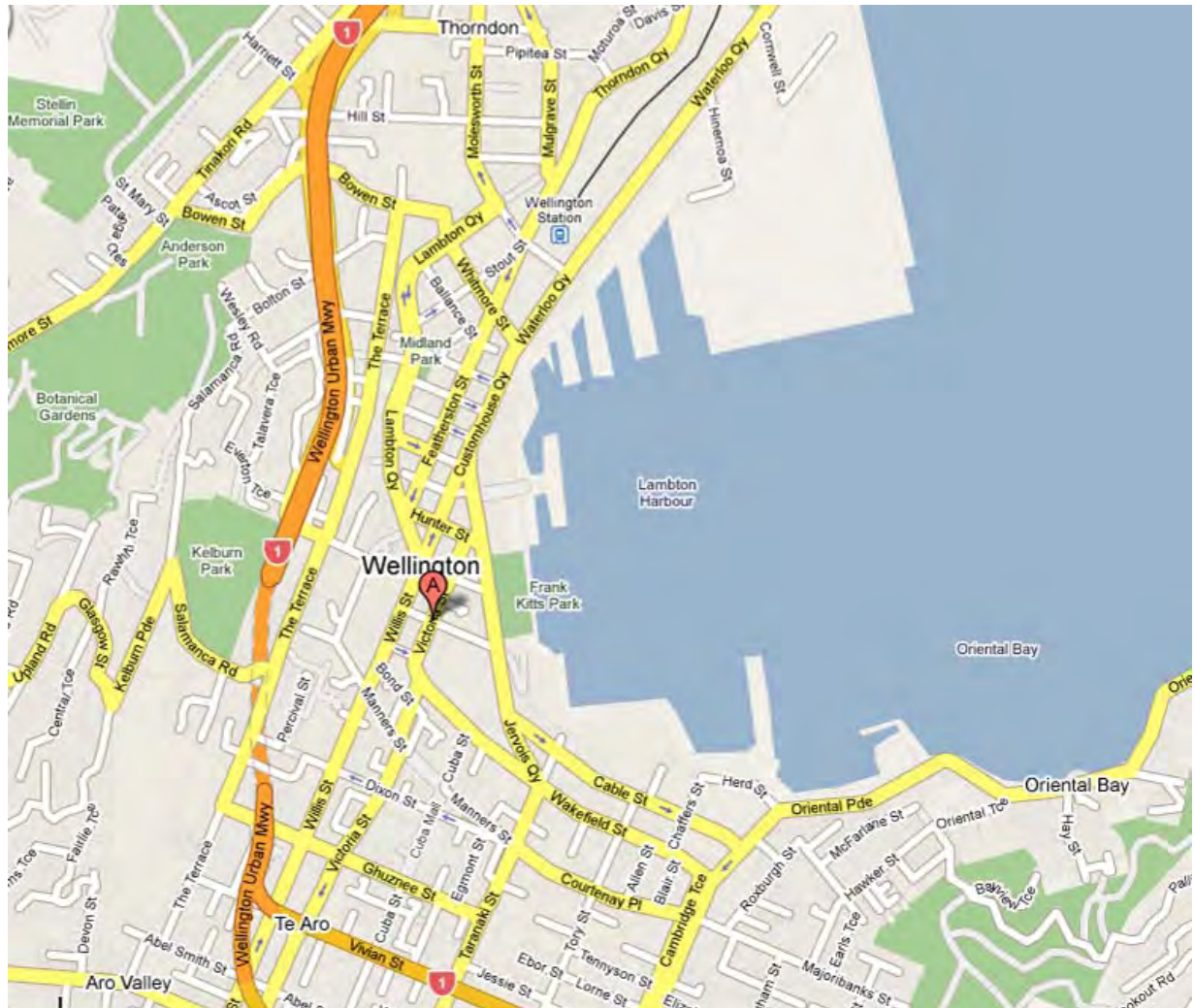


Figure 1. Map showing general location of Chews Lane (Google Maps 2008)

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INTRODUCTION, CONTINUED

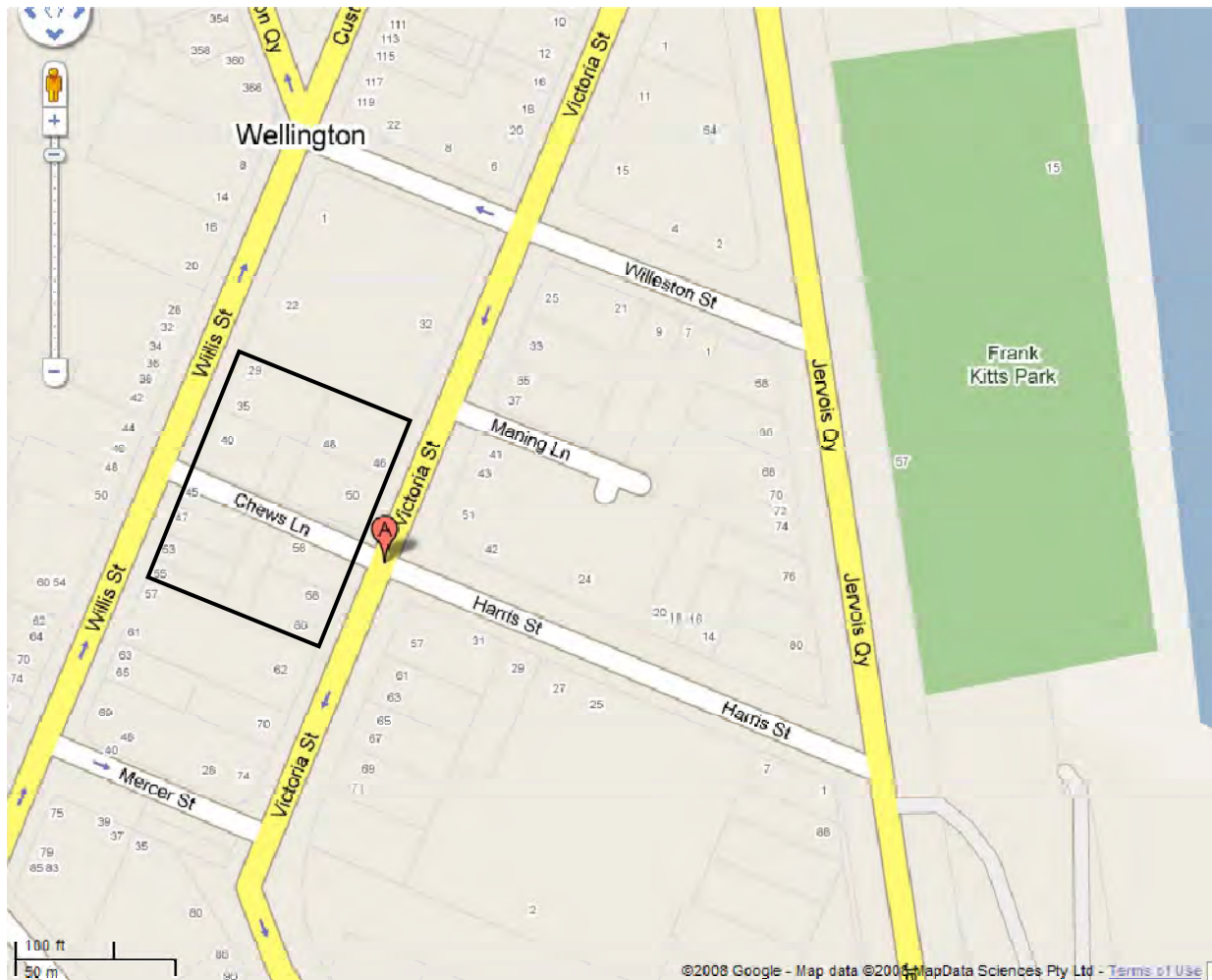


Figure 2. Chews Lane development area (source: Google Maps 2008). The archaeological monitoring and investigations were focussed on the area to the north of Chews Lane within the properties shown as Nos. 40 Willis Street and 50 Victoria Street

HISTORICAL CONTEXT

The 1855 Earthquake

In 1855, a magnitude 8+ earthquake shook Wellington (Grapes and Downes, 1997), which was then a small town on the southwest shore of Wellington Harbour (Figure 3). It was the second very large earthquake to strike Wellington since the town was founded in 1840, the first being the 1848 Marlborough Earthquake. Both earthquakes severely shook the region, causing severe damage.

The 1855 earthquake was triggered by a rupture of the Wairarapa Fault, located to the east of the harbour. It uplifted the land around the harbour about 2m on the east side and 1m on the west. It severely damaged brick buildings in Wellington; it demolished more than half the chimneys and damaged nearly all the remainder; it ruined many wooden buildings; and it badly frightened the town's inhabitants, killing one of them. In short, the town was a wreck. In the long term, however, the earthquake was to prove a benefit. Before the earthquake, the sea lapped the foot of the hills around much of the harbour. One result of the uplift was easier access along a newly formed strip of dry land around the shoreline; a second was that it eased the burden of reclamation of the harbour in order to provide flat land for the development of the town and port facilities.

Foreshore Reclamations

Before the earthquake, Wellington's foreshore ran south along Lambton Quay, and then along Willis Street (Figure 4, Figure 5, Figure 7). The first reclamation, "Sir George Grey's reclamation" (Baillie, 1924), was in 1852, along Willis Street south of what today is Chews Lane (Figure 6, Figure 8). Between 1857 and 1863, the land north of Chews Lane was reclaimed and became known as "Carter's reclamation" (Figure 6, Figure 8) (Baillie, 1924). In 1886, the harbour seaward of these two reclamations was filled in to the east of Victoria Street (Figure 6, Figure 9) (Wellington Harbour Board, 1936). The reclamations subsequently became part of the thriving commercial and business district of Wellington.

Sir George Grey's 1852 reclamation filled in a small area (3187m²) from what is now Mercer Street to Chews Lane and enabled buildings to be erected on the seaward side of Willis Street. The contractor in 1852, Mr C.R. Carter, built a wooden retaining wall to hold in the reclamation material. Carter was again contractor for the much larger reclamation (named after him) of over 84,000m² that followed the 1855 earthquake. This extended from Chews Lane almost to the present-day Hunter Street, and allowed more buildings to be erected on the seaward side of Willis Street from the late 1860s (Figure 10, Figure 12). (*Evening Post*, 27.8.1927: 17 and McGill, 1984: 66).

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HISTORICAL CONTEXT, CONTINUED

Foreshore Reclamations, continued

The material for Carter's reclamation was held in by a brick retaining wall, part of which was prefabricated, then lowered into the water. The earlier wooden and later brick retaining walls therefore met at what became the Victoria Street end of Chews Lane. The meeting point of these two walls was uncovered in 1927 during excavation work for the foundations of a new building for the Colonial Carrying Company (*Evening Post*, 27.8.1927: 17 and 9.9.1927: 10).

The unidentified remains of an old ship's hull were also uncovered in 1927. These were thought to have been buried in the third reclamation in the area, carried out by the Wellington City Council in 1886 (Figure 6, Figure 9) (*Evening Post*, 9.9.1927:10). Part of this reclamation created Victoria Street at the far end of Chews Lane, running between what are today Mercer and Willeston Streets. The total reclamation was over 166,000m² (*Evening Post*, 27.8.1927: 17; McGill, 1984: 66).

Figure 3.
Wellington and its geographic setting. The Wairarapa Fault is located off the picture to the right



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HISTORICAL CONTEXT, CONTINUED

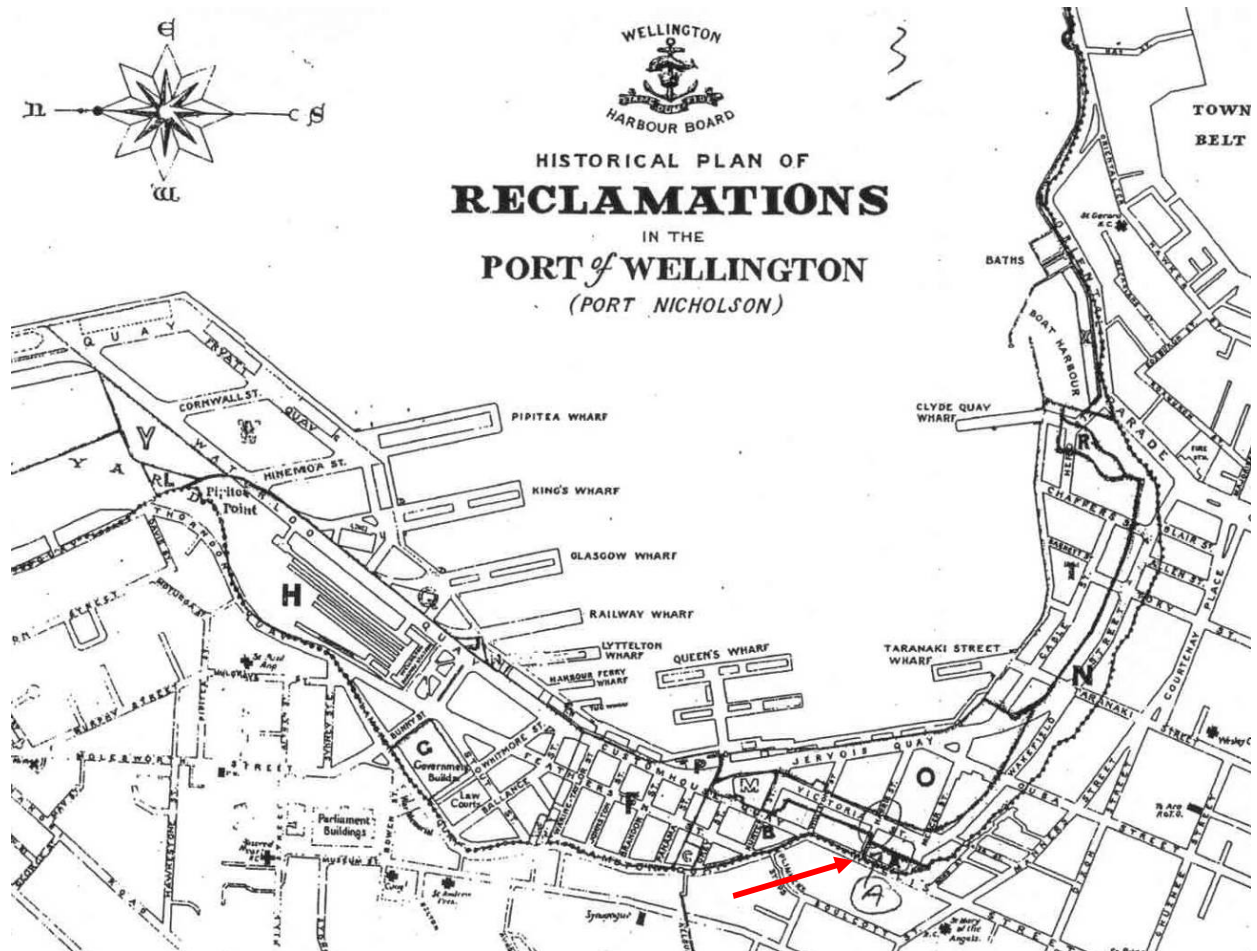


Figure 4. Original coastline (dotted line), location of Chews Lane arrowed (Wellington Harbour Board, 1936)

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HISTORICAL CONTEXT, CONTINUED



Figure 5. The shoreline along Lambton Quay and Willis Street before the 1855 earthquake (SO10569)

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HISTORICAL CONTEXT, CONTINUED

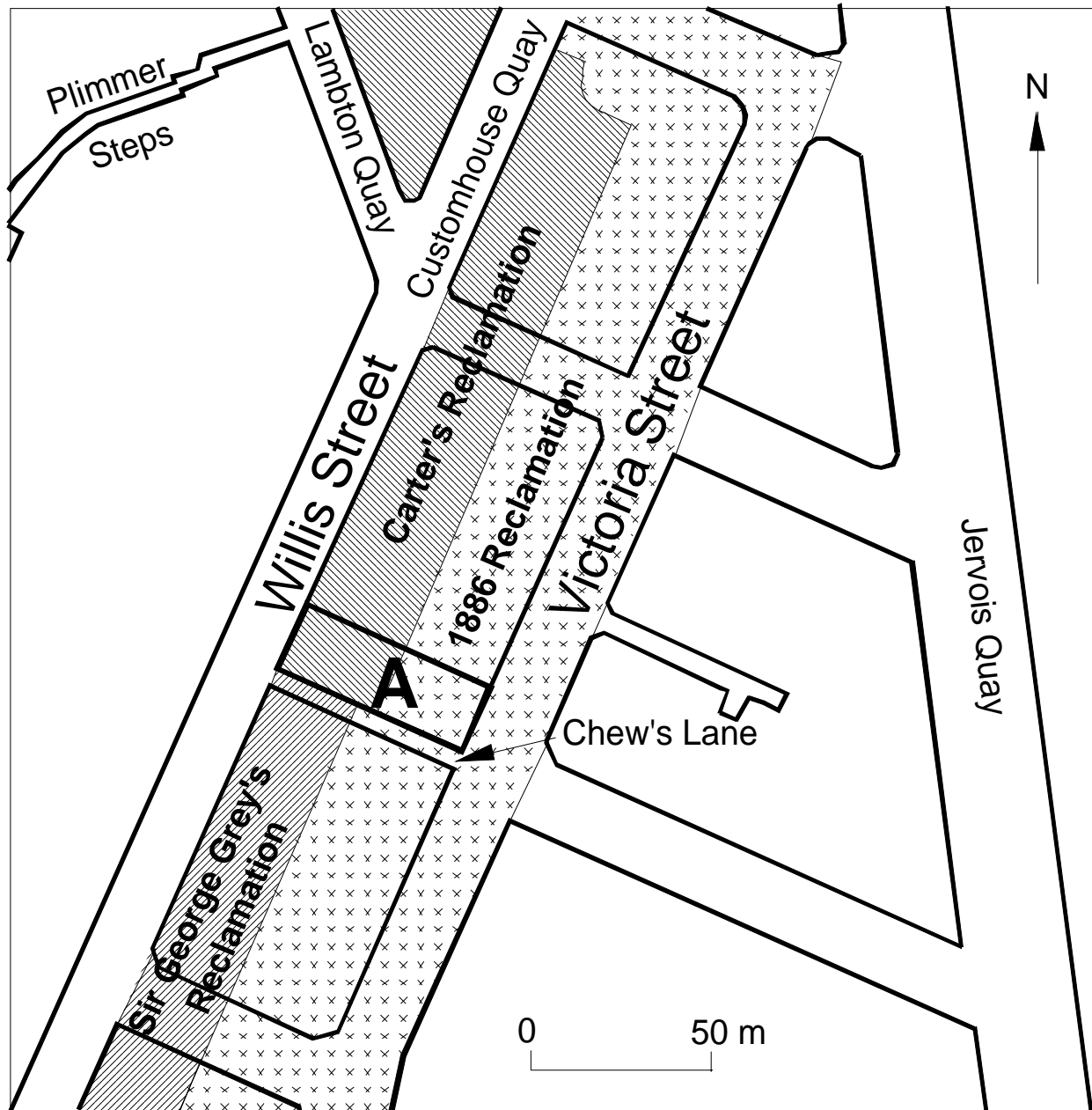


Figure 6. Reclamations in the vicinity of Chews Lane

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Figure 7. Sketch of Wellington coastline in the 1840s, prior to reclamation (Judy Siers collection)

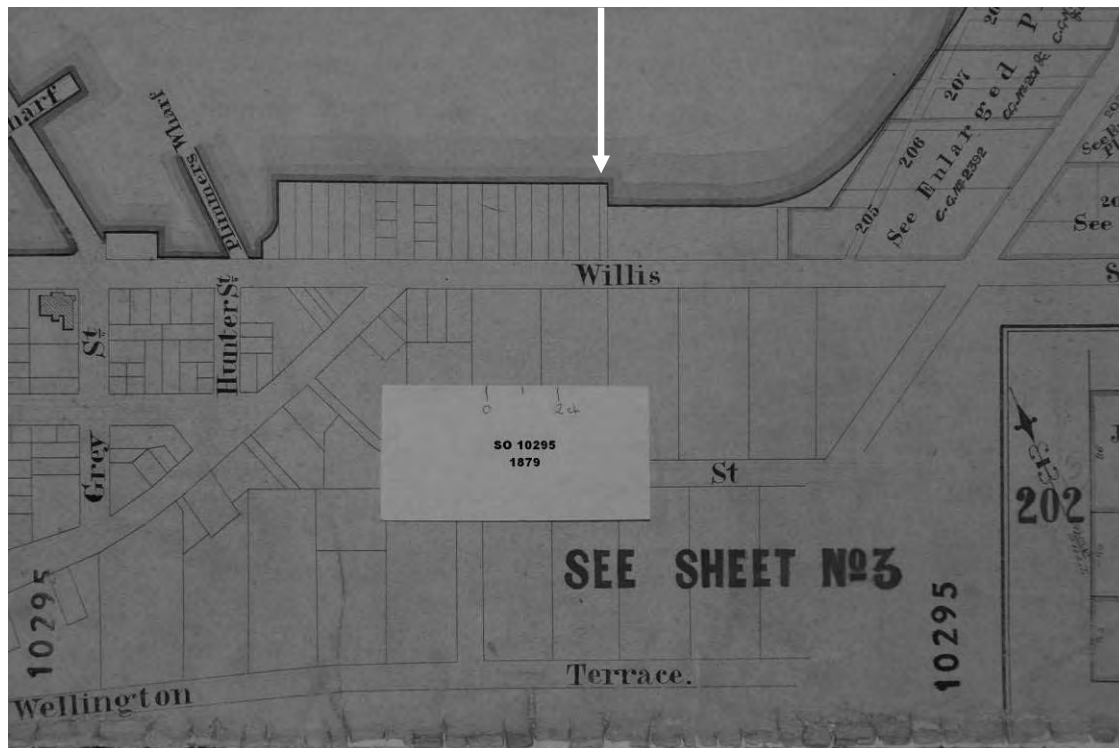
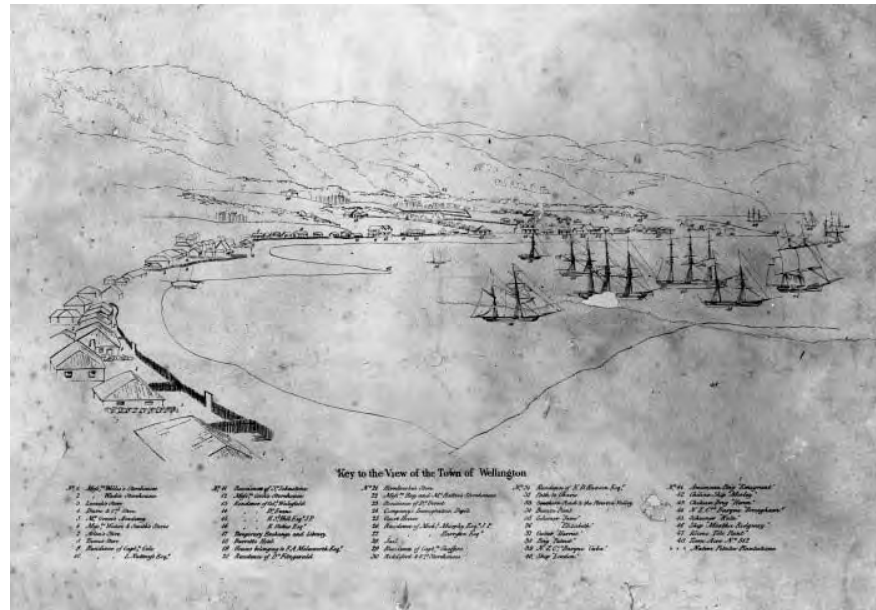
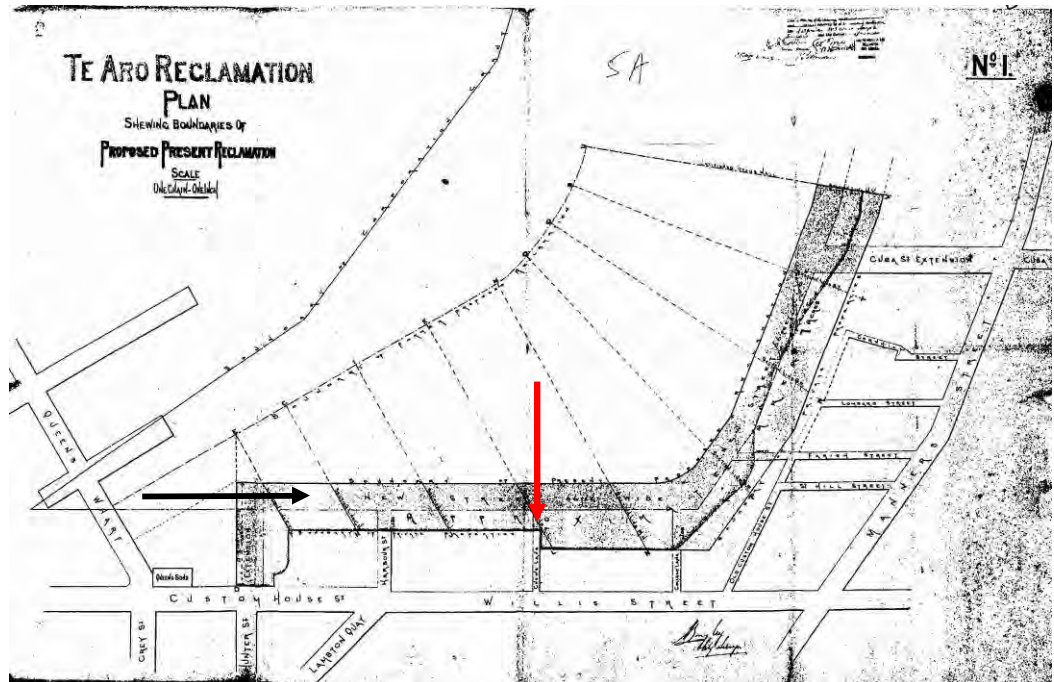


Figure 8. An 1879 map showing the extent of the reclamation in Willis Street completed in the 1860s. The position of Chews Lane can clearly be seen (arrowed) dividing the first reclamation of 1852 (right) from the 1857-63 reclamation (left) (SO 10295)

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HISTORICAL CONTEXT, CONTINUED

Figure 9. 1886 plan of third area of reclamation. Chews Lane (red) and Victoria St arrowed (Judy Siers collection)



19th Century Occupation

Before redevelopment, the earliest of the 10 buildings in the Chews Lane precinct dated back to the 1890s (and in one case the mid 1880s), although with later modifications. The buildings at 37-43 Willis St were built before 1891, 29-33 Willis St in 1898, 55 Willis St possibly in 1896, and 58-60 Victoria St probably sometime in the 1890s, while the rest were of 20th century date (Bowman n.d.). However most of the properties had been in private ownership since 1852-3 (45-53 and 55 Willis St, in the Sir George Grey reclamation) or 1862-4 (the remaining Willis St properties created by the Carter reclamation). The properties along Victoria St would have been developed after 1886, when that area was reclaimed. There would therefore have been a variety of activities and businesses prior to the construction of the 10 buildings within the precinct, particularly along the Willis St side. Initially, most if not all of the buildings would have been constructed of timber (Figure 10, Figure 11).

One of the longest-lasting businesses in the area was the Empire Hotel, to the north of Chews Lane near the Lambton Quay intersection. This opened in 1865, replacing the former Swinburne's Packet Hotel and was rebuilt after being gutted by fire in 1876. It remained as a hotel until 1955 when it was converted to offices. The building was demolished in 1973 (Lawlor 1974: 38-9). The early timber hotel is shown in Figure 10 and Figure 11.

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HISTORICAL CONTEXT, CONTINUED

Figure 10. Area of Willis St in 1860s after 1857-63 reclamation. Empire Hotel on left (Alexander Turnbull Library 8506½)



Figure 11. Buildings along Willis St 1860s. Empire Hotel on left, with balcony, Commercial Hotel opposite (Alexander Turnbull Library F31084½)



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HISTORICAL CONTEXT, CONTINUED

Figure 12. View of Willis St in the 1880s (pre 1886 reclamation) (Burton B2289)



19th Century Occupation, continued

Businesses on the land on the eastern side of Willis St created by the reclamations of 1852 and 1857-67 did not tend to last long. For example in 1881 there were four ironmongers in the stretch between the Empire Hotel and College Lane (now Mercer Street). All had gone by 1886 (*Wises NZPO Directory*, 1880-1 and 1886-7). Another ironmonger established about 1890 on the original 1852 reclamation – John Duthie & Co. – lasted into the 20th century. This made it one of the more permanent businesses in the area. The turnover of businesses during the 1890s is shown in Table 1 (based on *Stone's Wellington, Hawkes Bay and Taranaki Directory*, most editions 1891-2 to 1900, and *Wises NZPO Directory*, various editions 1878 – 1900). Despite this high turnover of tenants, some businesses showed a degree of longevity.

To the north of Chews Lane, Mrs Knigges' restaurant opened in 1890 and lasted into the 20th century. It opened after a restaurant owned by Mr Charles Knigges closed on the opposite side of Willis St. Maurice Fruhauf's pawnbrokers also lasted through the 1890s. Other businesses to the north of Chews Lane lasting from 1895 to at least 1900 included a tailor at number 36, McLean's ironmongers at number 28 and Henry Shortlander's fur importing business at number 24 (note, however, that the street numbers in Willis Street changed in the early 1900s).

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HISTORICAL CONTEXT, CONTINUED

19th Century Occupation, continued

The effect of new technology became apparent when Judah Meyer's china importing business was replaced by a short-lived cycle depot in 1898. The Hollis Cycle Agency opened two doors away the same year and later moved to the other side of Chews Lane. Immediately to the south of Chews Lane, Robert Laery and Co. auctioneers lasted throughout the 1890s. Stephen Green's bookbinder at 44a survived from 1895 into the 20th century.

A small number of larger businesses were established after Victoria Street was created by the 1886 reclamation. The fact that there were never more than five businesses in the stretch of Victoria Street located between Chews Lane and Mercer St indicates that these were comparatively large enterprises. Those that survived into the 20th century included Thomas Ballinger & Co., a workshop and later plumbers, immediately to the south of Chews Lane. Two importing businesses just north of Chews Lane – Hayman & Co. and Bing, Harris & Co. – also lasted throughout the period. In 1898 a Dunedin-based transport business, the New Zealand Express Company, established an office immediately south of Chews Lane.

Table 1 lists the occupants recorded in street directories during the 1890s. The street numbers of businesses in the table below are based on those in the street directories. The change in street numbers in the early 1900s meant that properties on the eastern side of Willis Street changed from even to odd numbers. The properties on either side of Chews Lane therefore came to be numbered 43 and 45 rather than 42 and 44.

Overall, during the late 19th and early 20th century, the Willis Street side of the development area came to be characterised by a variety of retail and commercial activities ranging from tobacconists, tailors, hairdressers, booksellers and grocers, etc, with three hotels at various times. The Victoria Street side of the development area was dominated by warehouses, importers and wholesalers.

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HISTORICAL CONTEXT, CONTINUED

Table 1. Businesses between the Empire Hotel and Duthie & Co., 1891-1900 (original numbers, later changed to odd numbers)

St No.	1891-2	1895-6	1898-9	1900
Willis St				
20	Abel, Julius, Tobacconist	Abel, Julius, Tobacconist	Geor, Massed, fancy goods	Medical Battery Co.
22	Fruhauf, Maurice, pawnbrokers	Fruhauf, Maurice, pawnbrokers	Fruhauf, Maurice, pawnbrokers	Fruhauf, Maurice, pawnbrokers
24	Fiyger, George, Tailor	Shortlander, Henry, importer of furs	Shortlander, Henry, importer of furs	Shortlander, Henry, importer of furs
26	Coltman, Thomas, watchmaker	Beale, William, Sewing Machine importer	Lethaby, John, umbrella maker	Lethaby, John, umbrella maker
28	Phillips, John fruiterer and poulterer	McLean, John, ironmonger	McLean, John, ironmonger	McLean & Archibald, ironmongers
30	Wilson, James, Restaurateur	O'Donoghue, Florence, rest	O'Donoghue, Florence, rest	Snowden, Arthur, draper
34	Knigge, Mrs A., Restaurateur	Knigge, Mrs A., Restaurateur	Knigge, Mrs A., Restaurateur	Knigge, Mrs A., Restaurateur
36	Neil, James, Herbalist	Eames, Joseph, Tailor	Eames, Joseph, Tailor	British Tailoring Co.
38			Hollis Cycle Agency	Summers, Andrew, Pastrycook
40	McEwan, Brown and Kitto, hat makers	Davis and Clater, men's mercers and outfitters	Summers, Andrew, Pastrycook	Summers, Andrew, Pastrycook
42	Myers, Judah & Co., china, glass and earthenware importers	Myers, Judah & Co., china, glass and earthenware importers	Massey, Harris, Cycle depot	Turnbull & Jones, Electrical engineers
Chews Lane				
44	Laery, Robert & Co., auctioneers, general merchants	Laery, Robert & Co., auctioneers, general merchants	Laery, Robert and Co., auctioneers, general merchants	Laery, Robert & Co., auctioneers, general merchants
44a		Green, Stephen, Bookbinder	Green, Stephen, Bookbinder	Green, Stephen, Bookbinder
46	Catholic Times Newspaper	Pasley, George, sheep ear mark maker	Treadwell, Arthur, Printer	Ashdown, Frederick, tailor
46a			Colgate, Mrs Agnew, Poultry dealer	Colgate, Mrs Agnew, Poultry dealer
48		Hewson & Co, commercial and labour agents	Yerex and Jones, American speciality imports	Hollis Cycle Agency

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HISTORICAL CONTEXT, CONTINUED

Willis St Buildings in the Vicinity of Chews Lane

Tables 2 and 3 outline the buildings in Willis Street immediately to the north and south of Chews lane as recorded in 1886. The information is based on a publication by the Wellington Fire Underwriters' Association entitled *Special Block Tariff for the City of Wellington* (revised and corrected up to 23 August 1886). The publication contains maps showing the size, shape, position and construction materials of buildings in parts of central Wellington. Although it indicates that the maps are drawn to scale, no actual scale is provided. In addition there is no indication as to whether the buildings are single or multi-storied. Photographs from the time indicate that buildings in the area were of a similar height and were generally two storied. The lack of precise size information available means only schematic information is given on building dimensions in the tables. The Underwriters' information is supplemented with information from the *Wises NZPO Directory* of 1887-8. As neither source contains street or block numbers, street numbers have been estimated from later information in the 1891-2 *Stones Wellington Directory*.

The general picture is one of larger and more industrial-type buildings immediately to the south of Chews Lane, on the site of the 1852 reclamation. Immediately to the north of Chews Lane were smaller shops and offices. The buildings in each table are listed from north to south. The only businesses still listed in 1891-2 were the Empire Hotel, James Wilson's restaurant, McKewan, Brown and Kitto hatmakers, Judah Meyer's china and glass dealership, and John Duthie & Co. ironmongers.

Buildings within the Area Investigated

Prior to redevelopment the area north of Chews Lane that was the focus of the archaeological investigations was occupied by a group of four heritage buildings at 37-43 Willis Street dating back to before 1891, a 1972 Post Office building at 50-54 Victoria Street, and between them the Chews Lane Substation built in 1925 (Bowman n.d.).

Figure 13 shows a plan of the buildings at 37-43 Willis Street in 1891. Most of the buildings are of brick construction, with the exception of some wooden buildings on the Victoria St side of the block, to the rear of the brick buildings. Shops are identified on the Willis St frontage, consistent with the street directory information.

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HISTORICAL CONTEXT, CONTINUED

Buildings within the Area Investigated, *continued*

The two storey buildings were described by Bowman (n.d.), as a “rare pre-1891 group of inner city commercial buildings united with a joint facade in a representative Edwardian, Italianate style”. Bowman suggests that the buildings may have been constructed before 1891 as they appear on maps of that year. In fact, the brick building appears to have been in place in 1886 (Table 2, and Figure 15), and retained some of the same occupants from 1887 to 1891 (compare Tables 1 and 2, McEwan, Brown & Kitto, hatmakers, and J. Meyer & Co., china, glass and earthenware importers).

The buildings at 37-43 Willis Street were acquired by the Wellington City Council in 1906, and changes to the façade were designed in 1910 which allowed for the removal of the front façade and cutting 10 feet off the existing building, so that Willis Street could be widened (Bowman n.d.). Figure 14 shows the redesigned building, which was now to accommodate offices rather than shops.

The land on which the 37-43 Willis Street shops were built was acquired by J. Farmer in 1863 (Bowman n.d.), and then in 1864 by James Kelham (an accountant, who had been the first Chairman of the Wellington Chamber of Commerce 1856-58). In 1868 part of the land was acquired by William Turnbull (a former militia officer). In 1876 the land was acquired by John Chew, timber merchant and engineer, after whom Chews Lane was named, and in 1883 it passed to the Colonial Bank of New Zealand. In 1884 it was acquired by Jacob Joseph, a merchant, and in 1903 it passed to Alfred Brandon Joseph, before being acquired by the Council in 1906. The buildings were presumably constructed during the merchant Jacob Joseph’s period of ownership rather than before, indicating a date of construction around the mid 1880s. Bowman suggests that prior to the construction of the buildings John Chew may have had his timber yard in this area during the 1860s and 1870s.

The substation was built on land that was originally part of 43 Willis Street, the land being taken by the Council in 1924 (Bowman n.d.).

The land later occupied by the Post Office at 50-54 Victoria Street was also owned by Jacob Joseph from 1887 to 1903 (Bowman n.d.), and he was responsible for the construction of the building on the corner of Chews Lane and Victoria Street shown in Figure 13. Another building was constructed in 1895 on 50-52 Victoria Street. Both were owned by Jacob Joseph, Abbot Oram & Co. Earlier landowners owners had been F.A. Krull (1864-1865), J. Compton (1865-1883) and L.E. Compton (1883-1887); Krull later became a Wellington City Councillor (1871-74) (Bowman n.d.). It is unclear what use was made of the western part of the property prior to the 1886 reclamation, but Figure 15 indicates that buildings were present at that date.

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HISTORICAL CONTEXT, CONTINUED

Table 2. Willis St Buildings north of Chews Lane, 1886 (north to south)

Approx St Number (1)	Name Listed	Use	Size (2)	Building Materials(3)	Tenants
18	Empire Hotel	Hotel	Medium, 100%	Wood, some iron, some roof slates	Empire Hotel
20	Northern L. L. (lend lease?) & Building Company building	Offices	Wide, 30%	Wood	See note (4) below
22	Unnamed	Shop/small business	Narrow, 30%	Wood frontage, iron walls	Empty
24	Unnamed	Shop/small business	Narrow, 30%	Wood	Bootmaker (M O'Brien & Co.), Tailors (George Dempsey & Co.)
26	Unnamed	Shop/small business	Narrow, 30%	Wood, iron south wall	Grocer (George Young), Restaurant (John McGimmity)
28	Unnamed	Shop/small business	Narrow, 30%	Wood, iron north wall	Tobacconist (Frederick Harvey)
30-42	Unnamed	Shop/small business	Wide, 40%	Brick	See note (5)

Notes

1. Street numbers are estimated from Stones Wellington Directory 1891-2. Note that numbers were changed from even to odd in the early 1900s.
2. The size indicates the extent of the frontage, from narrow to very wide, and the proportion of the distance the building covers between Willis and what was later Victoria Street.
3. Options are wood, corrugated iron and brick. All roofs are corrugated iron unless otherwise stated.
4. Tenants of number 20 were: General Merchants (Henry Brooks and Co), Commercial Agents (Dwan Brothers), Architect (Edward Coupin), Solicitor (Edward Shaw), Commercial Agent, (Henry Augarde).
5. Tenants of number 30-42 were (north to south): Restaurant (James Wilson), Bookseller (Andrew Wylie), Hatters (McEwen, Brown and Kitto), China and Glass Dealer (J. Meyers), Ladies outfitters (Hansen and Co)

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HISTORICAL CONTEXT, CONTINUED

Table 3. Willis St Buildings South of Chews Lane, 1886 (north to south)

Approx St Number (1)	Name Listed	Use	Size (2)	Building Materials(3)	Tenants
44-46	Pearce	Offices and Warehouse	Medium, 80%	Wood frontage, iron on north (Chews Lane) side, brick rear and south side	Edward Pearce, general merchant and mortgage agent
48	Pearce	Offices	Medium, 30%	Brick frontage and north, rest wood, slate roof	Edward Pearce, general merchant and mortgage agent
50-52	Duthie	Shop, Warehouse, Factory	Very wide, 100%	Brick, some wood at rear	John Duthie & Co, ironmongers and iron merchants

Notes

1. Street numbers estimated from Stones Wellington Directory 1891-2. Note that numbers were changed from even to odd in the early 1900s.
2. The size indicates the extent of the frontage, from narrow to very wide, and the proportion of the distance the building covers between Willis and what was later Victoria Street.
3. Options are wood, corrugated iron and brick. All roofs are corrugated iron unless otherwise stated.

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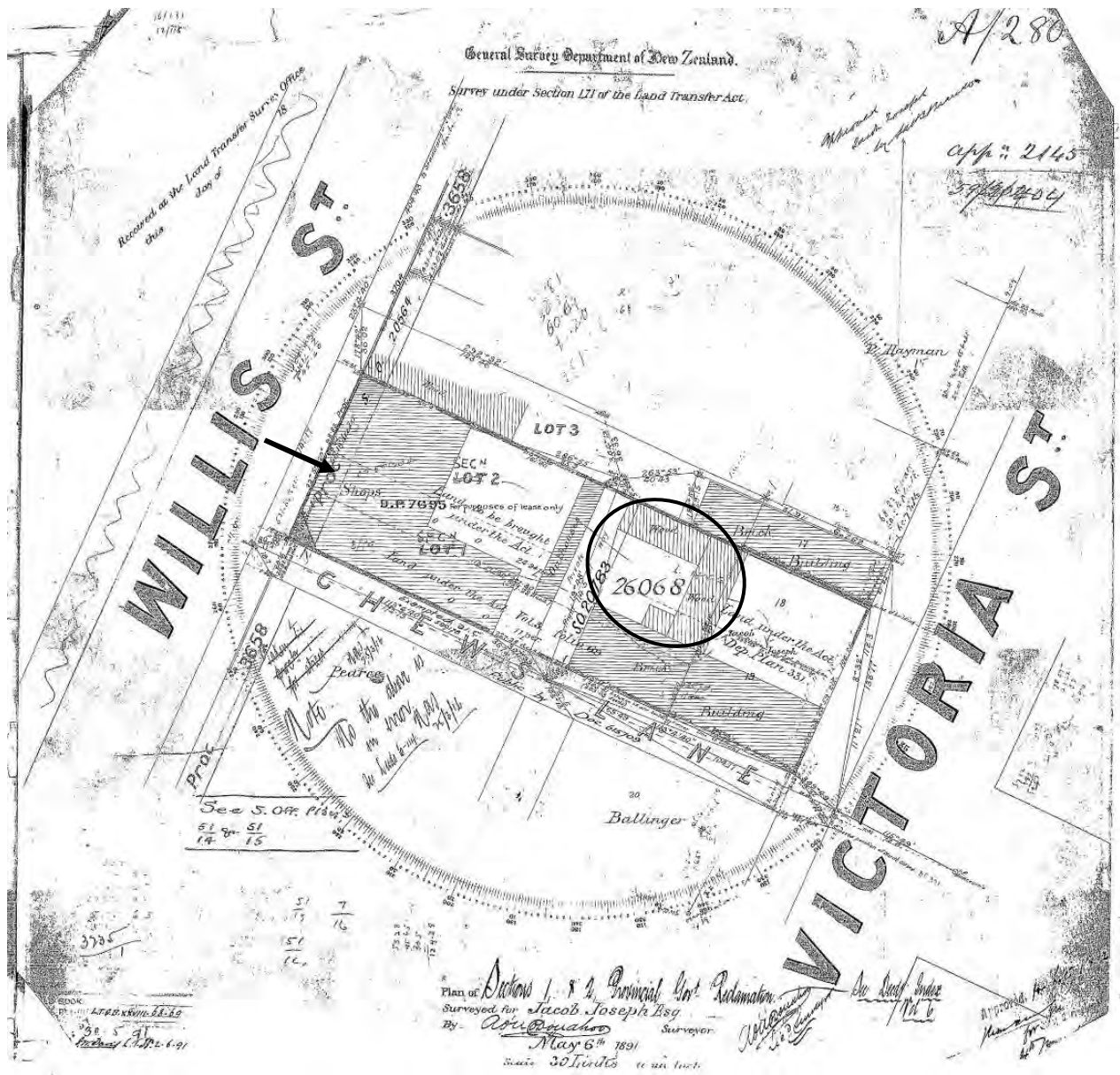


Figure 13. 1891 plan showing brick buildings on northern side of Chews Lane, within the area investigated (A280). The plan identifies shops (arrowed) on the Willis Street frontage. To the rear of the eastern brick buildings are wooden structures (circled)

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HISTORICAL CONTEXT, CONTINUED

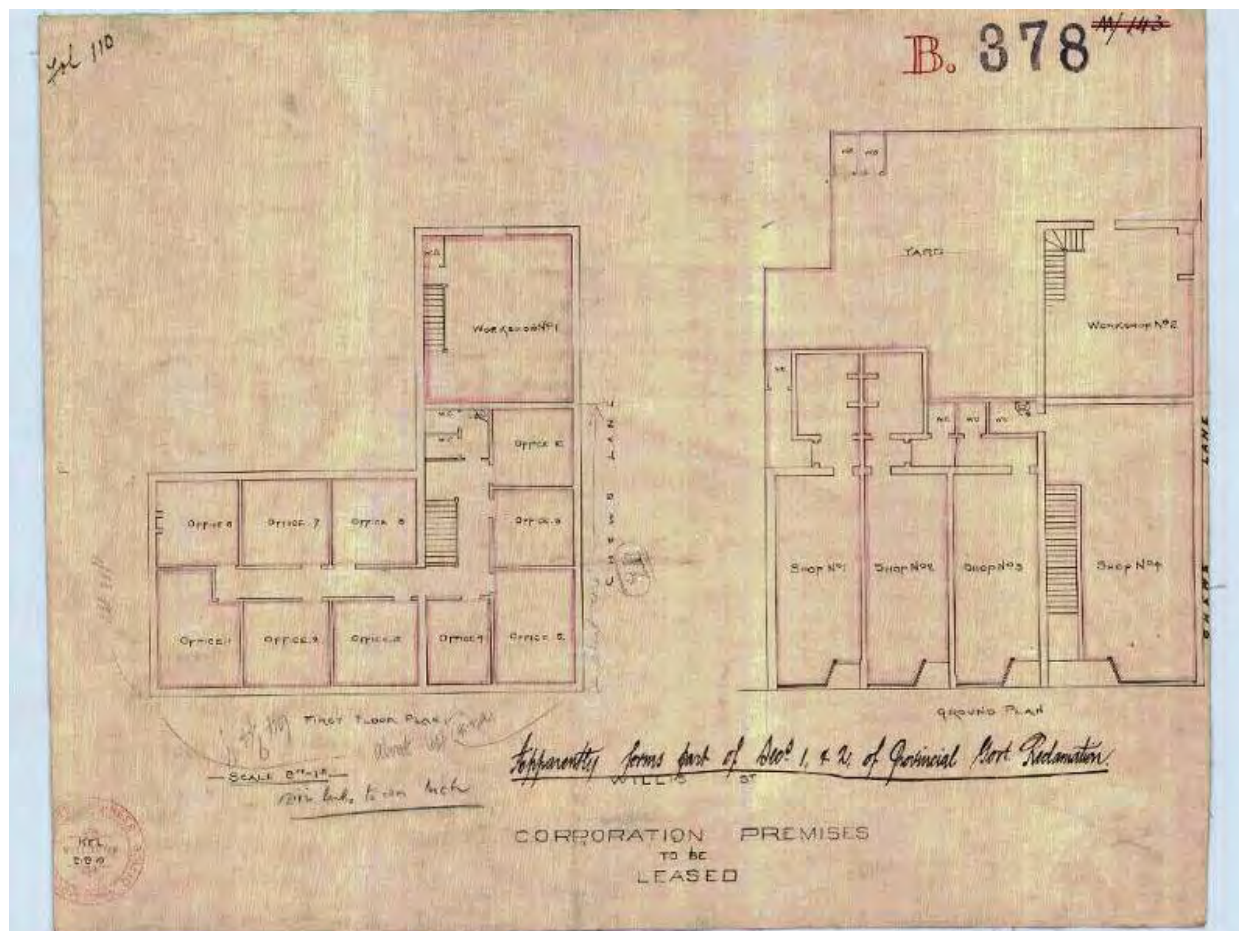


Figure 14. Details of buildings on Willis Street on northern side of Chews Lane, 1910

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HISTORICAL CONTEXT, CONTINUED

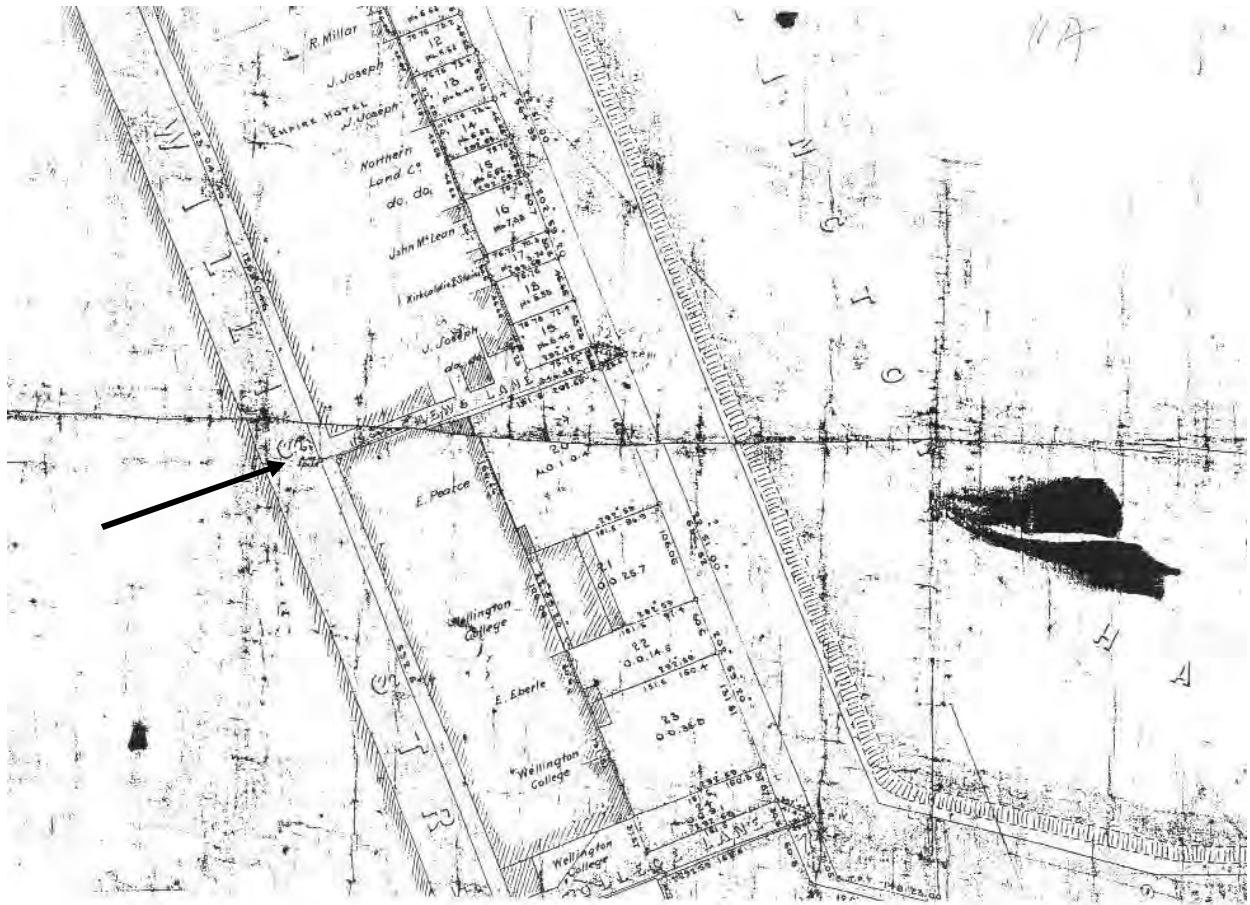


Figure 15. Detail from “Plan shewing sections on the Te Aro Reclamation (Contract No. 1) Wellington 1886”. Buildings are indicated north of Chews Lane (arrowed) extending up to the reclamation area

THE INVESTIGATION

Introduction

Redevelopment of the Willis Street-Victoria Street area since 2006 has been directed at the buildings on either side of Chews Lane – some of the old buildings were demolished, and new multi-story buildings with retail outlets and apartments were erected. To support the new buildings, large foundations were needed that required the excavation of trenches up to 2 m deep, and the drilling of pile holes even deeper (Figure 16). These depths are considerably more than for the foundation trenches dug for earlier buildings. All pile holes, and in some places the trenches, were dug through the reclaimed land and into the underlying foreshore and sea bed, exposing a sequence of natural and cultural deposits spanning from before the 1855 earthquake until after 1886. These deposits, especially those immediately following the earthquake until about 1863, contained an array of cultural items.

These items give an unusual insight into one of the probable effects of the 1855 earthquake on local Wellington households and businesses. The earthquake damaged many of the wooden buildings; it demolished several, and twisted others to the extent that they were too damaged to be lived in. “Fittings” are reported to have been destroyed (Grapes 2000), with some houses needing to be emptied of debris, and this would have included chattels. The effect on chattels, in particular china, is an aspect of the 1855 earthquake that archaeology has not addressed before, and the Chews Lane results provide a glimpse of what these effects possibly were. The results of the investigation also reflect the poor state of public services in the town at the time.

Scope of Investigation and Methodology

The archaeological investigation was directed at monitoring the clearance of the remains of old buildings from the construction site to the north of Chews Lane, and the subsequent excavation of the foundation trenches and pile holes. South of Chews Lane the rubble was fresh and angular, and it appears that the basement of the demolished building here had been excavated at some time in the recent past, and later refilled with clean spoil. Clearance of building remains to the north of Chews Lane exposed the foundations of buildings erected either sometime after 1863, or sometime after 1886, including into the 20th century (see Appendix 9), and these effectively covered the whole site, although not necessarily at the same time. Trench excavations and pile drilling, on the other hand, were restricted to those places where the foundations for the new buildings were required. At the time monitoring began, trenches and pile holes had largely been excavated to the east of a former electricity substation (Figure 17). (This was later to have implications for interpreting a piece of china (CP180, Appendix 1) embedded in former seabed near two concrete blocks on the north boundary of the construction site.)

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THE INVESTIGATION, CONTINUED

Figure 16. Plan of foundation trenches and piles

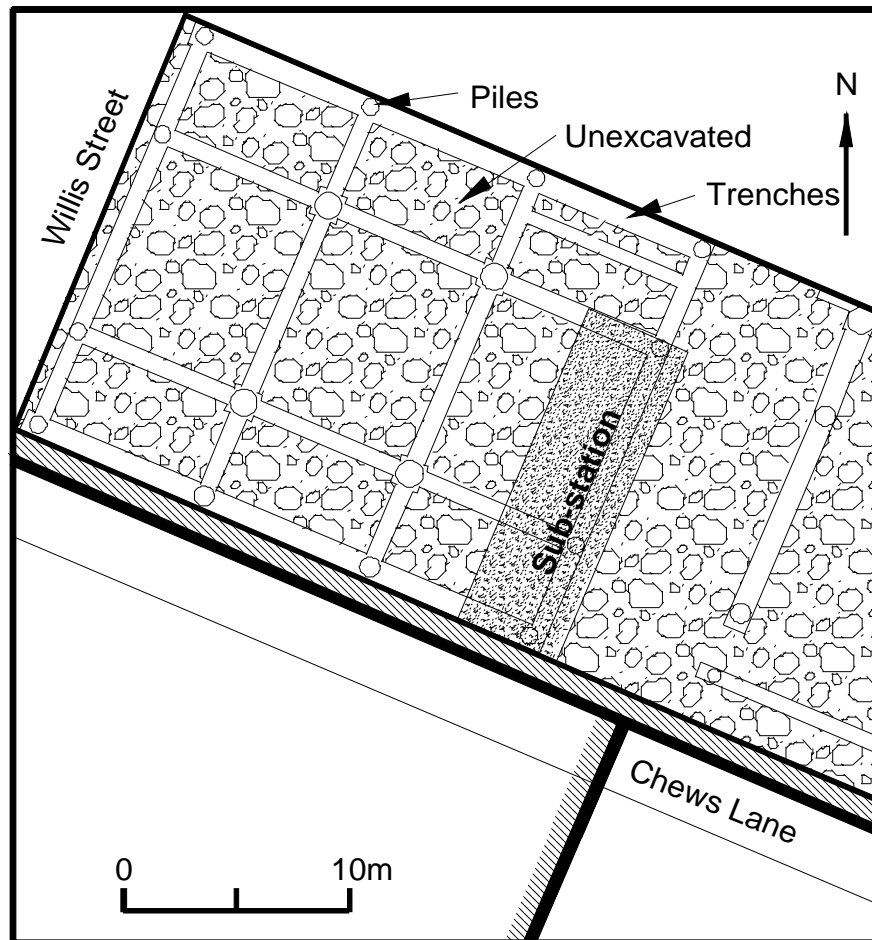
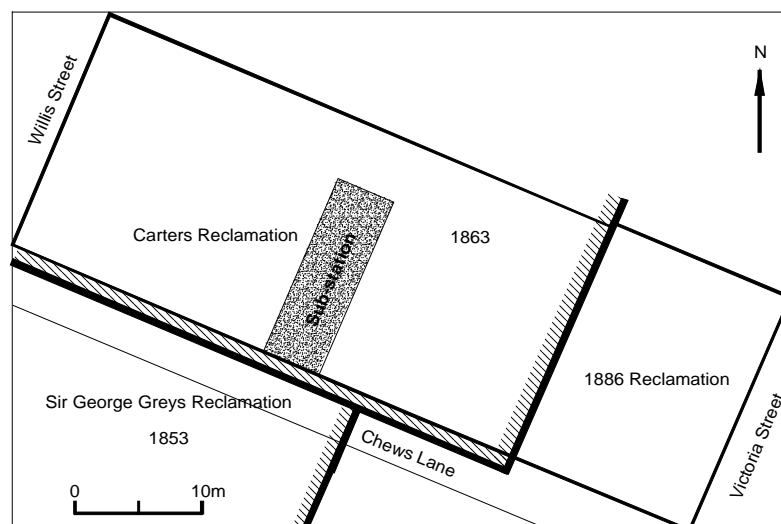


Figure 17. Electricity substation (shown dark hatched) in relation to the reclamations. The boundaries of Sir George Grey's reclamation, and of Carter's reclamation, are shown line-hatched



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THE INVESTIGATION, CONTINUED

Scope and Methodology, *continued*

This report discusses the results of the monitoring of the trench and pile excavations to the west of the substation. With the exception of the immediate corner between Chews Lane and Willis Street, the excavations were within the area covered by Carter's Reclamation (Figure 17). Many cultural items were found during the excavation of the trenches, in particular, several hundred pieces of broken china. It was neither possible nor practicable to collect all of the china or other remains; the procedure adopted was to collect whatever was seen during the removal of spoil by the trench digger and, where appropriate, to take samples of the excavated dirt to sieve. It was not always clear what layer items recovered during the trench digging were from, and this is reflected in the stratigraphic ages assigned to them. Sampling, however, was usually of specific layers excavated as carefully as possible using the trench digger. Items recovered from the sides of the excavation trenches usually have a known stratigraphic age.

It was inevitable that, with tracked machinery such as pile drilling equipment and diggers trundling around the site, the ground surface would be disturbed. The depth of disturbance from this cause alone is estimated to have been at least 30 cm. This, and rainfall washing the ground surface, meant that items were frequently recovered from the ground surface. The stratigraphic age of such items, however, is usually unknown and they are recorded simply as "surface". The items include sewers and fittings (sanitary and stormwater), water and gas pipes, broken stoneware bottles, and sanitary ware.

Sieving was carried out by dumping a bucket load of spoil from the trench digger into specially made sieves. The sieves comprised a piece of flat steel with round holes 7mm in diameter and a density of 41 per 100cm², either fixed to a bottomless wooden box about 30cm high (Figure 18), or placed on the steel frame of a table. Fines were then washed out with a hose and items remaining were picked out by hand. This resulted in the recovery of items as small as sewing pins.

Stratigraphic Recording

Height in relation to sea level was recorded in order to interpret site stratigraphy and determine where the shoreline was at different times in the past. The level datum for the building construction was present mean sea level, and this is the datum used to record archaeological remains. Around the periphery of the site, where there were permanent structures of known height to measure from, layer heights are probably reasonably accurate (estimated to be within about $\pm 0.10\text{m}$). In the centre of the site where the ground height varied, layer heights are less accurate.

Continued on next page

THE INVESTIGATION, CONTINUED

Figure 18. Sieves used for Chews Lane material



Stratigraphic Recording, continued

In addition, there are corrections to make when estimating past sea levels and where the shoreline was. Sea level has gradually risen since the 1840s, as a result of a warming climate following the end of the Little Ice Age. For New Zealand, the sea level rise since 1900 has been about 15 cm, based on tide gauge records at the four main New Zealand ports (Hannah, 1988). Unfortunately there are no usable records before 1900, and sea level for the first 60 years after the founding of Wellington is assumed here to have been constant.

There is also the uplift of the harbour during the 1855 earthquake to consider. Contemporary estimates of the uplift height are discussed by Grapes and Downes (1997), and it appears that the eastern side of the harbour was uplifted about 2m, and the western side probably around 0.9m to 1.2m. The value of 1m is adopted here for the uplift of the western shoreline of Lambton Harbour.

Continued on next page

THE INVESTIGATION, CONTINUED

Stratigraphic Recording, *continued*

The tidal range for spring tides in Wellington is 1.32m (<http://www.linz.govt.nz/>). Tide levels adopted here for high water springs and low water springs, are +0.7m and -0.7m respectively. Although a record was made of the stratigraphy in many of the trenches, much of the stratigraphy was repetitive, and the detail consisted almost entirely of layers and lenses of reclamation fill, or disturbance of the upper layers of the reclamation from the excavation of foundations of later buildings. Across the middle of the construction site a substation had been built; this, and other recent excavations, effectively precluded a detailed stratigraphic link between the western and eastern parts of the site. With one exception – concrete blocks (interpreted as possibly the remains of a jetty) – there were no identifiable cultural remains older than the 1857-1863 reclamation found on the eastern part of the site, and the stratigraphic age of the concrete blocks depends on other criteria. Furthermore, apart from the inferred jetty, the eastern part of the site underneath the 1857-1863 reclamation is below present sea level, and it would have been even further below sea level before the 1855 earthquake. The stratigraphy is therefore represented by generalised sections across the western half of the site. Trench stratigraphy and the heights of features in relation to sea level allowed the topographic context of the site to be reconstructed before and after the 1855 earthquake, and this is shown by two plans (Figure 19 and Figure 22, below).

BEFORE AND AFTER THE EARTHQUAKE

Site Stratigraphy

Identified stratigraphic events of known age on the site are the 1855 earthquake uplift and the reclamations. These provide convenient time-stratigraphic marker horizons for ordering the cultural materials recovered, and for interpreting the site. The time-stratigraphic divisions, in order of decreasing age, are: Pre-1855, 1855 to 1857, 1857 to 1863, Post-1863. The divisions and their respective deposits are set out in Table 4.

Table 4. Time-stratigraphic divisions and their respective deposits

Date	Events	Stratigraphic layers (Oldest at bottom, youngest at top)
Post-1863	Construction of buildings on Carter's reclamation, ending with the redevelopment of Chews Lane in 2008.	Re-deposited reclamation material resulting from, for example: the digging of holes; the excavation of sewer trenches (stormwater and sanitary), building foundations, sumps, and other structures; disturbance from earthmoving machinery moving around the site.
1857 to 1863	Infilling of the foreshore as part of Carter's reclamation.	Various layers and lenses of predominantly clay, and angular, weathered greywacke gravel and stones covering nearly the entire western end of the site from the Willis Street boundary to the substation (Figure 17).
1855 to 1857	Interval between the 1855 earthquake and the start of Carter's reclamation; formation of a beach above high water mark between Chews Lane and Willis Street.	Beach deposits (above high water level) overlying the intertidal gravel beach and the western edge of the rock platform (Figure 19 – Figure 21).
Pre-1855	Formation of a gravel beach; infilling of the foreshore south of Chews Lane in 1852 (Sir George Grey's reclamation); uplift of the intertidal zone and Sir George Grey's reclamation during the 1855 earthquake.	Sir George Grey's reclamation (1852), intertidal gravel beach ridge, sandy sea-bed and rock platform (Figure 19 – Figure 21).

Continued on next page

BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

Sea Level Changes

Using stratigraphy and reconstructed sea levels, the inferred high water mark before the 1855 earthquake, and before any reclamation took place, was west of the site boundary along Willis Street (Figure 19 – Figure 21). This position is comparable with the shoreline in 1843 shown on survey plan SO10433, which runs along the eastern side of Willis Street. Low water mark, inferred from the reconstructed sea levels, was about 25m east of the street boundary (Figure 19).

The western end of the construction site thus fell largely within the intertidal zone (Figure 19), which was: a sandy sea bed over most of the area; a rock platform in the northeast corner; and a gravel beach in the corner between Willis Street and Chews Lane. The gravel beach, which consisted of marine gravel and sand, was below high water level, and is probably the seaward edge of a gravel beach that ran along Willis Street; it contained a small quantity of charcoal at one point, possibly introduced after the uplift, but no other cultural remains were seen.

Following the 1855 earthquake, the edge of the sea moved eastwards; high water mark was located more than 13m from Willis Street at its closest point (Figure 22), and low water mark was more than 30m from Willis Street. The western end of the site was therefore largely above normal tide level, and the eastern end was exposed at low tide (Figure 22). After the uplift, high water mark lapped the toe of the gravel beach along the Chews Lane boundary.

The Gravel Beach and Foreshore after the Earthquake

Gravelly sand overlay the gravel beach. In contrast to the gravel beach, the gravelly sand contained round marine gravel and pebbles, angular weathered and un-weathered greywacke gravel, marine shells, and cultural remains. It was mounded up to about a metre above high water level along its seaward edge, and then decreased in height and thickness inland, thinning to about 30cm. Such mounding is unlikely to have survived if the gravelly sand was in the intertidal zone. The gravelly sand is therefore considered to have been above high water mark, and part of the foreshore that formed after the 1855 earthquake uplift.

Sandwiched between the gravel beach and sandy gravel was a tongue of reclamation fill extending out from the Chews Lane boundary (Figure 19, Figure 20). Its stratigraphic position indicates that the fill either predates the 1855 earthquake, or arrived in position soon after – perhaps by slumping onto the gravel beach as a result of the earthquake.

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BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

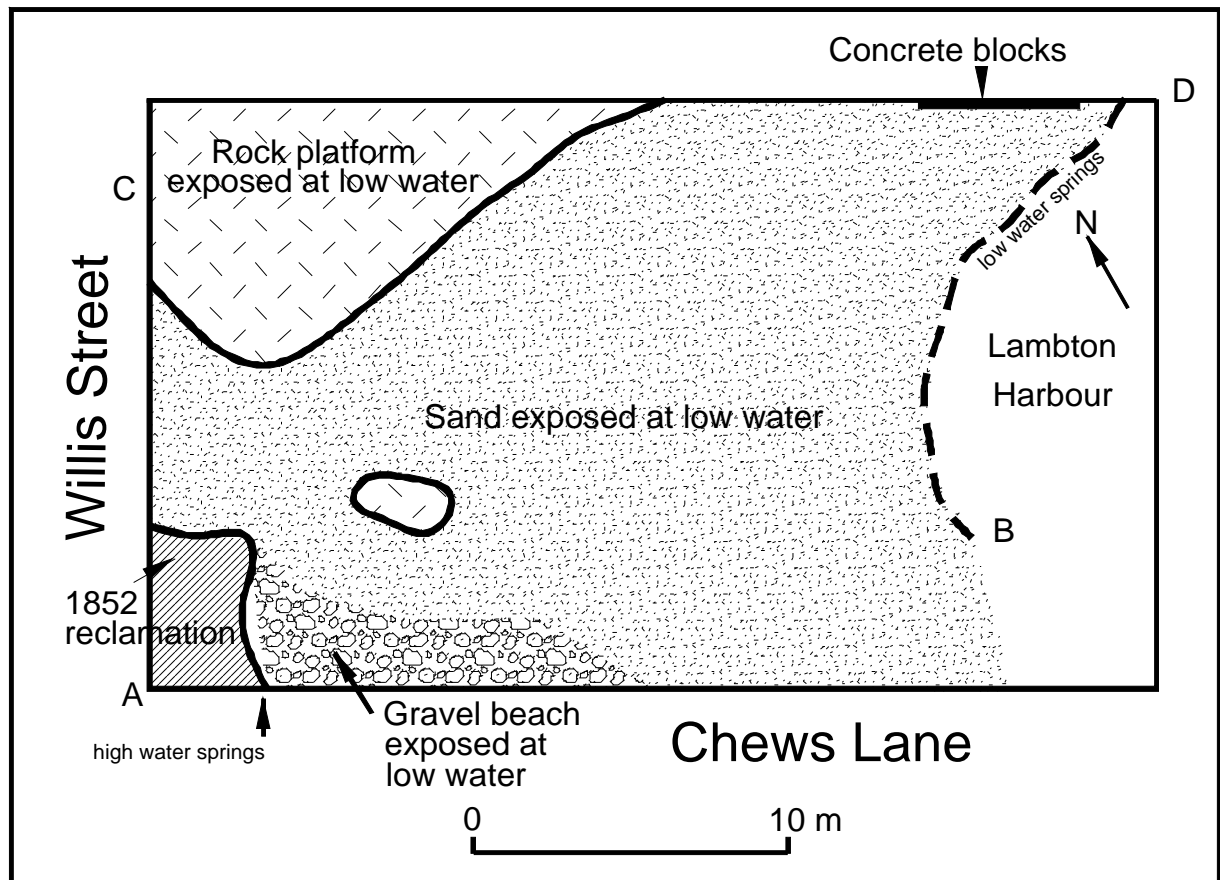


Figure 19. The western end of the construction site before the 1855 earthquake uplift, inferred from the stratigraphy exposed in the foundation trenches and pile holes

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BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

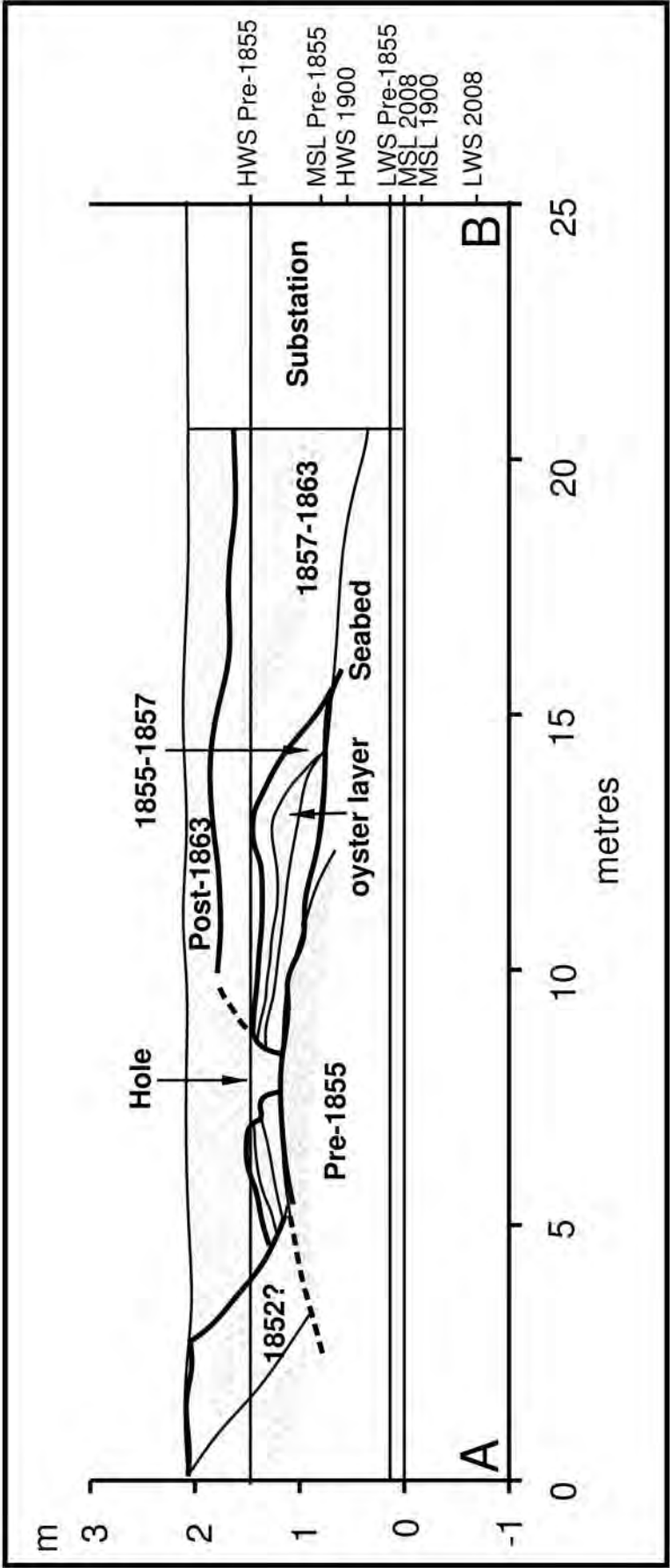


Figure 20. Generalised stratigraphy along line A-B, Figure 19. Stratigraphy indicated by light lines, boundaries of stratigraphic divisions indicated by heavy lines

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BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

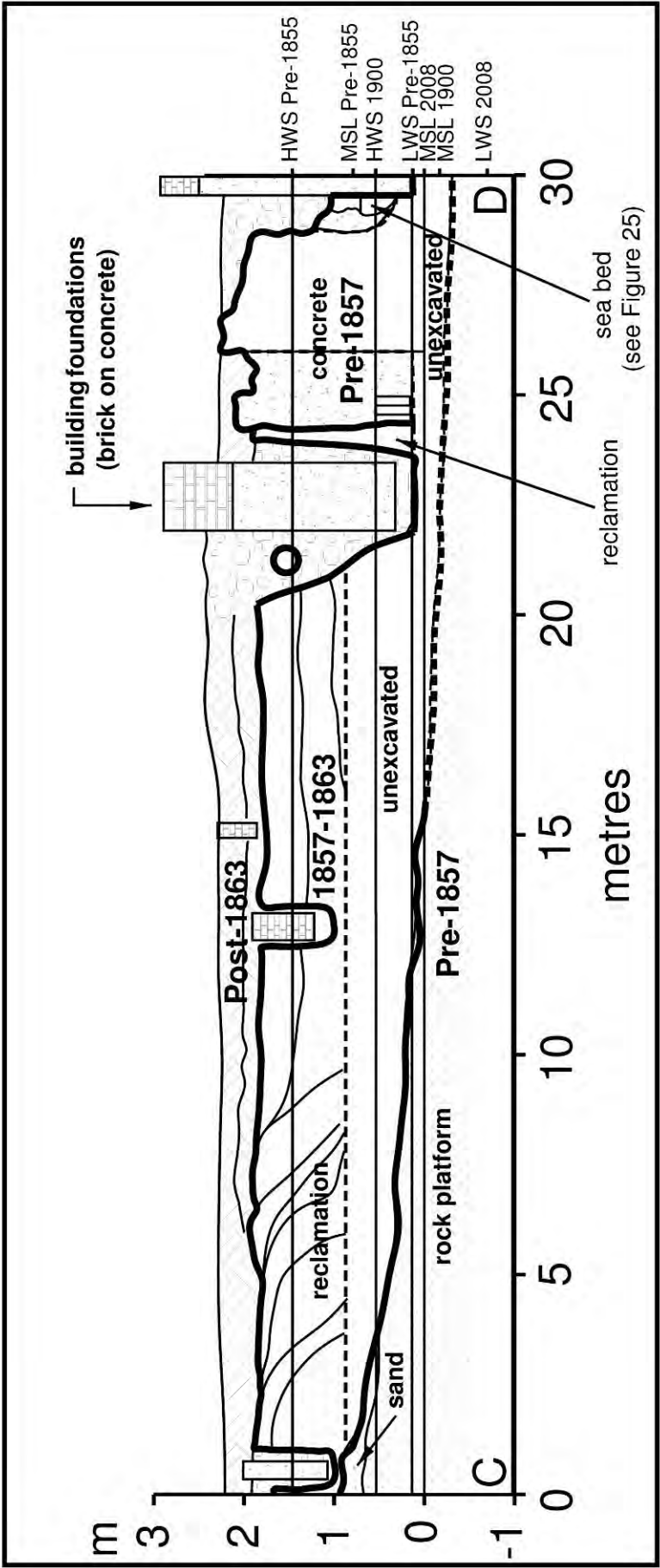
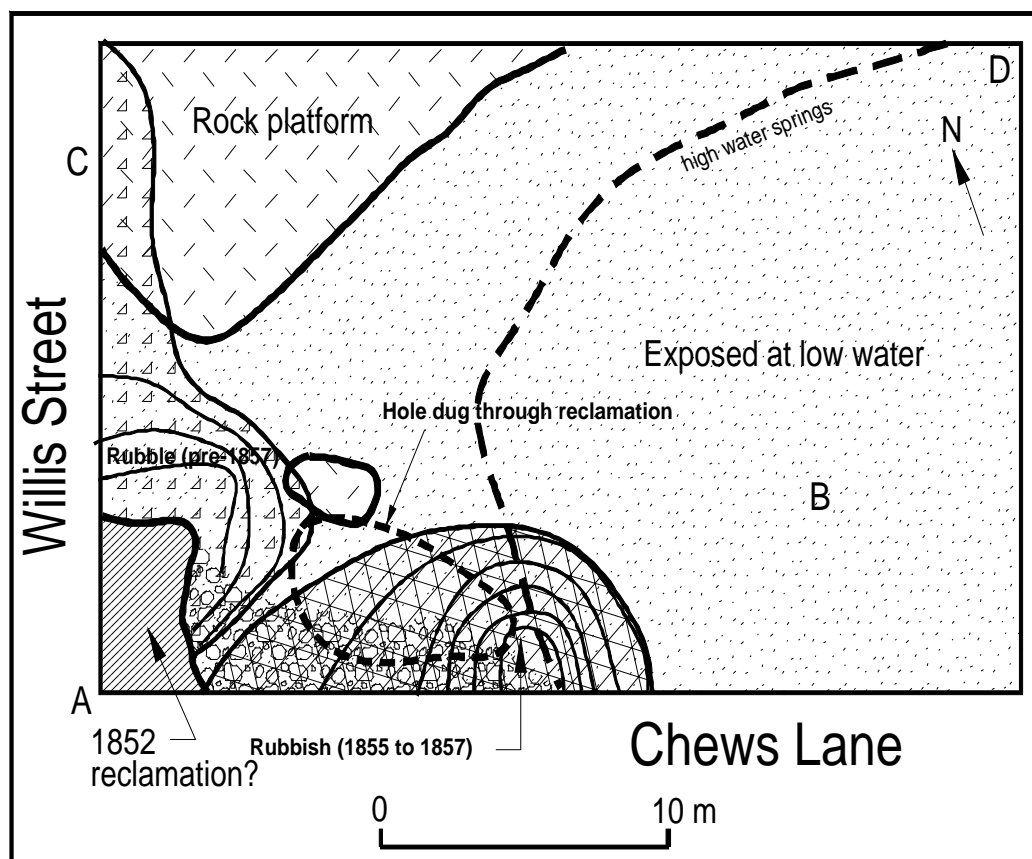


Figure 21. Generalised stratigraphy along line C-D, Figure 19. Stratigraphy indicated by light lines, boundaries of stratigraphic divisions indicated by heavy lines

Continued on next page

BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

Figure 22. The western end of the construction site after the 1855 earthquake uplift, inferred from the stratigraphy exposed in the foundation trenches and pile holes



The Gravel Beach and Foreshore after the Earthquake, continued

The marine shells were generally sparse, and except for imported oysters, amounted to considerably less than 10% of the deposit. Among the shells were: *Austrovenus stutchburyi* (including shells in position of articulation), *Dosinia anus*, fragments of mussel shell, *Melagraphia aethiops*, *Turbo smaragdus* (juvenile), limpets (*Cellana* sp.), *Cominella* sp., and many smaller gastropods, some worn with small holes in them and clearly old when they were deposited.

Unlike the gravel beach, the gravelly sand was full of cultural remains including: oyster shells (*Ostrea chilensis*), broken china (some water-worn), animal bones (including butchered animals), a small quantity of bird bone (probably chicken), broken bottle glass, window glass, black stone (probably coal), slate, and pieces of bricks (some water-worn). For a full list of items, see Table 5 and Appendices 2 and 8. From its content of water-worn brick and china, the sandy gravel would appear to have incorporated cultural material from the sea as well as the land.

Continued on next page

BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

The Gravel Beach and Foreshore after the Earthquake, *continued*

The gravelly sand was not a homogenous deposit, but consisted of three sub-layers with indistinct boundaries between them: a lower gravelly sand; a middle gravelly sand rich in oyster shells; and an upper gravelly sand. At its thickest part, the oyster layer was quite loose, and the shells included both valves. The oyster valves ranged from about 3cm to 10cm long, with a mean size of 6.6cm (Figure 23). Sometime after Carter's reclamation had been deposited, a hole was dug through the reclamation and gravelly sand, down into the top of the gravel beach. The hole was about 1m wide at the base and up to 6m wide at the top (Figure 21, Figure 22).

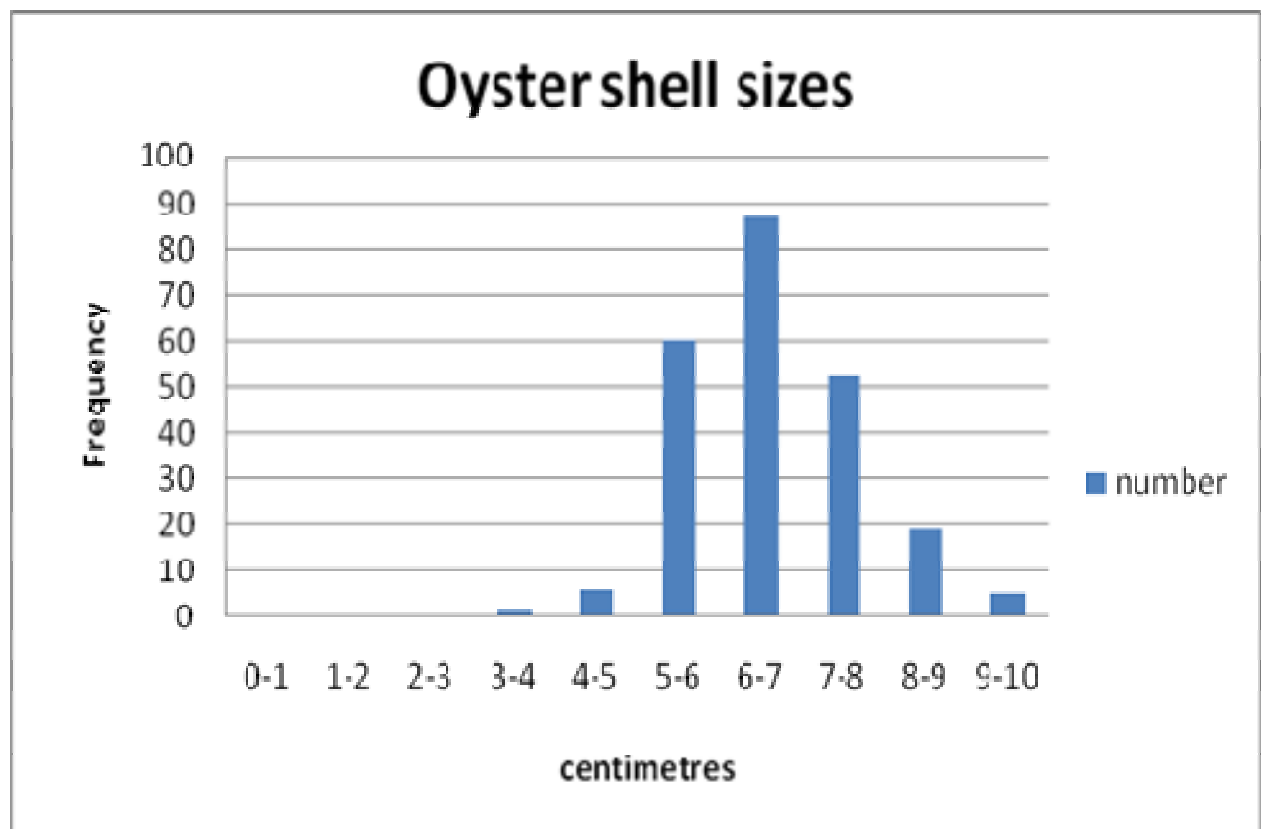


Figure 23. Histogram of the length of oyster shells (*Ostrea chilensis*) found on the post-1855 uplift beach

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BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

Sir George Grey's Reclamation 1852 and the Gravel Beach

The 1852 reclamation was largely to the southwest of Chews Lane, but in the corner between Willis Street and Chews Lane were layers of clay and angular gravel that are identified as part of a reclamation that predated the 1855 earthquake (Figure 19, Figure 20, Figure 22). The layers of clay and angular gravel overlay part of the gravel beach, and the outer part of the deposit was overlain by the gravelly sand forming part of the beach after the 1855 uplift. No artefacts, nor other items of cultural origin, were found in the reclamation fill.

The orientation of the gravel beach below the reclamation deposit appears to be almost at right angles to the Willis Street boundary (Figure 19), suggesting that the gravel beach had formed up against the 1852 reclamation. The outer edge of the 1852 reclamation was a wooden sea wall (Baillie, 1924), of which no sign was seen in front of the layers of clay and angular gravel. The clay and angular gravel are, therefore, possibly the remains of a small piece of infilling in the corner of Chews Lane and Willis Street, sometime after 1852 but before the gravelly sand beach formed following the 1855 uplift. Alternatively, Sir George Grey's reclamation may not have been fully protected by a sea wall, and some of the reclamation slumped onto the beach during the earthquake.

There is a possibility that the gravel beach pre-dates Sir George Grey's reclamation, and had formed up against a part of the pre-1855 foreshore that was higher than the surrounding sea bed, possibly a rock platform that protruded out from Willis Street, and was later covered by the reclamation. The rock platform need not have extended above high water level.

Carter's Reclamation 1857 to 1863

The reclamation between 1857 and 1863 abutted the 1852 reclamation, and originally covered the remainder of the construction site between Willis Street and the substation, and beyond. It was composed of rubble consisting of varying mixtures of clay, and angular gravel and stones of weathered greywacke, and occasionally patches of marine gravel. It contained cultural remains – pieces of broken china, bottle glass, broken bricks, rare charcoal fragments, small pipi shells, bone and so forth – and had been greatly disturbed on its upper surface by trenches for building foundations and sewer pipes etc, relating to the later development of the reclamation.

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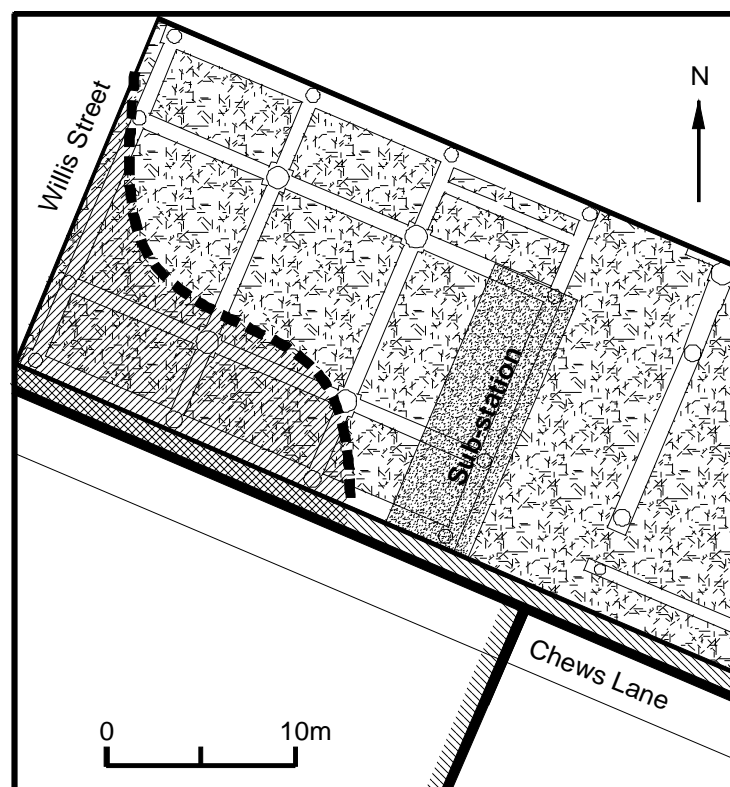
BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

Glass and China

Broken glass and china were found throughout the reclamation fill and on the beach. It was, however, considerably more common in the Chews Lane-Willis Street corner than elsewhere on the site (Figure 24). The questions to answer are: why such a large amount of broken glass and china? And why was it concentrated close to the corner?

The glass was from a variety of bottles (Table 5). The china exhibited a range vessel types including bowls, jugs, and plates, and a range of patterns and makers (Appendix 1); all were fragmented, with some broken by earthmoving machinery, but mostly the breaks were old. Neither the china nor the glass appeared to have been thrown directly into the reclamation from Willis Street or Sir George Grey's reclamation; they were not in discrete deposits – instead they appeared to be distributed through the reclamation rubble. From its concentration near to the edge of the reclamation boundaries at Willis Street and Chews Lane (Figure 24), the inference is drawn that the glass and china in the reclamation were deposited during the early stages of reclamation.

Figure 24. Finds of broken glass and china were most common between the dashed line and Willis Street and Chews Lane, and more scattered and increasingly less common with distance eastwards



Continued on next page

Table 5. List of items found in the gravelly sand beach and Carter's reclamation (1857-63)

Bottles	Pig Snout
	Round
	Square
	Necks
	Wire fastening
Clay Tobacco Pipes	Stems
	Bowls
Stoneware	Bottles
	Jars
	Wire fastening
Metal	Copper
	Iron
	Spikes
	Nails
	Barrel Bands?
	Coin
	Table fork
	Pin, and thimble (disintegrated)
	Brass swivel rings
Other	Leather shoe sole
	Bone buttons
	Broken bricks
	Porcelain ornament base
	Leather with metal and mother-of-pearl
Bones	Beef (sawn)
	Pig
	Sheep
	Chicken (?)
	Fish
Shells	Oysters
	Cockles
	Whelks
	Mussels
	Pipi
	Paua
China	Plates and platters
	Bowls
	Cups
	Vases
	Tea pot

Continued on next page

BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

Glass and China, *continued*

Spoil for the various Wellington reclamations came from the cliffs along Lambton Quay – from Boulcott Street to Woodward Street (Baillie, 1924). The rubble for Carter’s reclamation thus probably came from behind the buildings along the opposite side of Willis Street, buildings that only two years earlier had suffered a very severe earthquake, one large enough to topple brick chimneys, throw people to the ground, and cause widespread devastation. In an earthquake of this size, a dresser would be thrown across a kitchen, or a dining room, or a shop, spilling and breaking its contents of glassware and china. Glassware and china would be thrown from shelves and cupboards. After the earthquake there would be tens of thousands of pieces of broken glass and china to be disposed of.

The first task, when the earthquake was over, would be to clean up the mess – probably throwing the broken glass and china outside and down the back of the yard; or on to the beach just across the road. Down the back of the yard would, in many cases, be the foot of the cliffs, or for buildings at the top of the cliff, over the cliff. It would be this material that Carter would have first collected as fill for his reclamation.

The implication of this scenario for studying the glassware, china, and other remains from Chews Lane is that the material from the gravelly sand beach that formed after the earthquake through to the top of the 1857-1863 reclamation, is considered as a single assemblage with a younger age limit of 1863 (Appendices 1 and 2), and distinct from the material from above the reclamation.

The total assemblage comprises 187 different patterns from 34 makers. Many of the pieces were small and did not incorporate all elements of the parent pattern. It is therefore possible that the number of patterns will reduce as more becomes known about the range of elements in complete patterns from this period.

The most common pattern represented among the china generally was willow, comprising a blue transfer pattern on a white background; a pattern that has remained popular for domestic chinaware until the present day. It is specifically mentioned in early ship’s cargo sales advertised in newspapers (e.g. *NZ Spectator* 1850, *NZ Spectator* 1853). Judging from comments of Charlotte Godley in the early 1850s (Godley 1951), willow pattern plates and dishes were for everyday use, distinct from the dinner service used for guests. Interestingly, Asiatic Pheasant, thought to have been relatively common in early times (Macready and Goodwyn 1990), was uncommon on the site. Blue was extremely common, being the colour of about 60% of the patterns, with grey, green, brown, mauve, puce, and black also represented.

Continued on next page

BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

Glass and China, *continued*

Of the assemblage identified as pre-1863, and therefore possibly pre-dating the 1855 earthquake, there are 36 different patterns and seven makers, each being roughly 20% of the total identified from the site as a whole. Slightly more than 70% of the patterns are rendered in blue, with grey, green and black also present. These figures, however, should only be taken as approximate, as it is probable that some of the patterns and makers identified in the assemblage as a whole also pre-dated the 1855 earthquake.

If the earthquake scenario is correct, then the age of the currently unidentified china and glassware on the site, when sufficient is known about it to identify its age independently, should be mostly older than 1855. Furthermore, reclamation rubble of a similar age from elsewhere along Lambton Quay should show a similar wide range of patterns and makers as found at Chews Lane. Rubble of Sir George Grey's reclamation, which was before the earthquake, should not; neither should rubble of the 1886 reclamation, which was considerably later and from a different source. The range of patterns and makers should also be wider than that found in individual domestic rubbish pits. Shipping records might conceivably show an increase in the quantity of china imported into Wellington in the months following the earthquake, and it is possible that the archaeological record will show an abrupt change in popular patterns or manufacturers soon after the earthquake, as residents acquired whatever was fashionable and available at the time to replace that which had been destroyed. It is also conceivable that local potteries might have been set up for a time.

The Oysters and Other Rubbish on the Beach

Oysters (*Ostrea chilensis*) were not apparently found in Wellington Harbour, at least not in commercial quantities; the nearest supply was Queen Charlotte Sound (*NZ Spectator* 1864). Oysters, however, were a popular part of the British diet in the mid-19th century (Veart, 2008: 85), and no less so in New Zealand. To meet the demand for the shellfish, oysters were shipped across Cook Strait in barrels from Queen Charlotte Sound (e.g. *NZ Spectator* 1848, 1865). By 1870 their popularity was such that the number of oyster parlours was increasing in Wellington (Yska, 2006: 46).

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BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

The Oysters and Other Rubbish on the Beach, *continued*

Layers of oysters have been found in reclamation deposits at other places around Wellington Harbour – I have seen them, for instance, in the reclamation from the early 1900s along Cable Street – so their occurrence at Chews Lane is not unusual. It is, however, a matter of conjecture whether the oyster layer on the beach was from a barrel-load that had gone off, or whether the oysters were part of the rubbish dumped, for example, by a shop, or by an oyster parlour owner. Some of the smaller specimens were still in position of articulation; they would have had organic matter still attached when they were dumped on the beach, and no doubt would have smelt!

The oysters were not the only organic matter dumped on the beach; there were butchered beef bones showing saw marks, mutton bones, pig skulls (some with tusks), fish bones, and at least one chicken bone. This was possibly all commercial refuse, but probably a mixture of both commercial and domestic. The refuse would almost certainly have been accompanied by vegetable matter, since rotted away. Judging from comments about the lack of sanitary sewers in the mid to late 19th century (Higginson, 1889; Yska, 2006; Waitangi Tribunal 2003: p.475), and the state of the streams and drains that flowed through the town (Yska, 2006) the refuse would almost certainly have been accompanied by raw sewerage washed ashore – and by rats.

In addition to rotting organic matter there were pieces of leather from boots and/or shoes, and a range of inorganic matter – broken bottles, broken clay smoking pipes, broken china, rusty iron of indeterminate use, and women's sewing items (pins and a thimble) (Table 5).

Clay pipes were all in pieces, which included both stems and bowls. White clay was most common, with a few fragments of terracotta, including decorated terracotta. Most fragments were plain; but some showed moulded decoration and others, letters from presumably the makers' name and place of manufacture (Appendices 5 and 6). Judging from the letters on the pipe remains, there were pipes from: McDougall, Glasgow; Balme, Mile End (London); and Dixon, Sydney. Styles included "Burns Cutty Pipe", and decoration motifs included a sailing ship, anchor, Scotch thistle, vines, and ram's horns.

Continued on next page

BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

The Oysters and Other Rubbish on the Beach, *continued*

Some of the broken glass was from gin bottles and reflects, along with the clay pipes, the popular male pastimes of the era – boozing and smoking. But probably not on the beach, which would not only have been smelly and unhealthy, but by reason of the broken glass and china buried in the gravelly sand, also a physical danger. Sketches in the Alexander Turnbull Library show parts of the Lambton Quay beach cluttered with goods in the mid 19th century (Holmes, 1854; Rowe, 1864), however, the remains found at Chews Lane are discarded rubbish, not unloaded cargo.

The state of the beach was probably no worse than the state of streams and drains at the time; but how widespread such beaches were in Wellington, and what pathogens they likely contained, will depend on future research to find out.

Concrete Blocks

Just across the northern boundary of the construction site, to the east of the substation (Figure 16), were two concrete blocks, one on top of the other. The blocks were well inland of the boundary between Carter’s reclamation and the 1886 reclamation. They were separated from the rear of a building that fronted onto Victoria Street by less than 10 cm. The lower block was firmly embedded in former sea bed consisting of grey-black mud with round marine gravel (Figure 25). The mud is at and above the height of high water mark today, and at about the height of mean sea level before the 1855 earthquake. There was no sign of any reclamation rubble mixed with the former sea bed, and from the way the mud and gravel were sitting, hard up against the concrete block with no sign of any hole being dug, it is suggested that the block was embedded in the mud and gravel at the time the mud and gravel were sea bed. If so, then this would make the block part of one of the earliest surviving concrete structures in Wellington.

Immediately south of the blocks and embedded in the sea bed beneath what is apparently clay reclamation fill from Carter’s reclamation, was a piece of china plate with a blue bramble pattern around its rim (Figure 26; CP180, Appendix 1). The rear of the plate had the mark “K & Co,” with the pattern name “Thorn” above it. The mark has not been positively identified, but appears it could be younger than 1886. This poses a dilemma as to how and when it became embedded in the old sea bed. The most likely possibility is that it was thrown into an old rubbish pit that was removed when the foundation trench was dug, leaving just the edge of the pit and the undercut portion in which the china was preserved.

Continued on next page

BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

Concrete Blocks, *continued*

The concrete aggregate was round and sub-round marine gravel. The upper block, which was 44 cm high, had been cast in a mould with corrugated iron on at least one side, the corrugations having a wavelength of about 85mm. The seawards face was wood that was still in place. Cement was being imported in to Wellington in the late 1840s (*NZ Spectator* 1848), and Carter was using cement and bricks for his seawall that protected the 1857 reclamation (Baillie, 1924). Corrugated iron was being used for house construction in Wellington in 1854 (*NZ Spectator* 1854). The use of concrete components for a structure, and casting them in a corrugated iron mould in the late 1850s, is therefore feasible.

There was too little of the concrete exposed to determine what function the blocks served. They were, however, immediately offshore of the rock platform. Jetties and wharves were very common along the Lambton Quay (Willis Street) waterfront in the early days, and it is possible that the blocks are the remains of such a structure. Corroboration of this supposition, however, will have to wait until the building north of Victoria Street is demolished at some stage in the future and the blocks can be more closely examined.

Figure 25.
Concrete blocks showing the marine deposits of muddy sand and round gravel sandwiched between the blocks and the foundation wall of an existing building. The bottom of the trench is recently-poured concrete



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BEFORE AND AFTER THE EARTHQUAKE, CONTINUED

Figure 26. China plate (CP180, Appendix 1), embedded in the sea bed below Carter's reclamation. The rusty coloured material in the reclamation above the china is iron sheet



DISCUSSION AND CONCLUSIONS

Investigation Results

The northern corner of Willis Street and Chews Lane was the only area of the Chews Lane development precinct that proved productive archaeologically. This area may have been used by John Chew as a timber yard in the 1860s and 1870s, but from the mid 1880s was occupied by a group of brick buildings housing a variety of small businesses which included hatmakers (McEwan, Brown & Kitto) and importers of china, glass and earthenware (J. Meyers & Co.). These buildings survived until the current redevelopment, although altered and converted to office space in the early 20th century when Willis Street was widened.

Beneath the foundations of the 1880s brick buildings, the excavations uncovered part of the harbour foreshore that existed before and after the 1855 earthquake, and had been buried by Carter's reclamation of 1857 to 1863. The beach that formed after the 1855 earthquake, and the reclamation deposits, contained quantities of china, glassware, and other discarded items of a domestic and possibly commercial nature. It is proposed that these remains are a result of the destruction of household furniture and fittings from nearby buildings as an outcome of the earthquake. Possible consequences that might be addressed by further archaeological and historical research are suggested.

The state of the beach as effectively a rubbish dump reflects the generally unhealthy state of drains and streams at the time: that is, badly polluted. How widespread such beaches were in Wellington is not known.

On the northern boundary of the construction site, a concrete block with another sitting above it was embedded in the pre-1855 seabed. The block appeared to have been emplaced before Carter's reclamation was completed in 1863. Further archaeological work is needed to corroborate the age of the blocks, but if confirmed, the blocks will be one of the earliest surviving concrete structures in Wellington.

The collection of artefacts from Carter's reclamation is significant for its early (pre-1863) date and the information it can provide about the china and other goods used by early settlers in the area around Willis Street. It can also provide valuable comparative information for the analysis of other artefact collections in the future. Potentially, however, its most valuable contribution may relate to how people respond to the effects of large earthquakes.

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DISCUSSION AND CONCLUSIONS, CONTINUED

Further Research

Archaeoseismology is a rapidly developing field of scientific archaeological enquiry (cf. Stiros and Jones 1996; Force 2008). New Zealand, with its history of seismic activity, is potentially in a position to contribute to understanding the effects of seismic events on societies in the past. In this respect, there are two outstanding examples of large New Zealand earthquakes that have had devastating effects followed by significant changes in non-portable artifact styles. The first followed the 1848 Marlborough earthquake, when many of the brick buildings in Wellington were badly damaged and rebuilding was almost entirely in wood (Grapes 2000). The second followed the 1931 Napier earthquake and subsequent fire, which caused severe damage to a coastal city. The city was rebuilt in the new art deco style, and there were changes in town planning to take account of the increasing use of the motor car; street corners, for example, were splayed to provide better visibility for motorists (Art Deco Trust 2008). Following on from these events, building regulations in New Zealand were strengthened to ensure that damage from future earthquakes was minimised. Earthquakes have clearly influenced the history of New Zealand, and the measures taken to minimise future damage are a fascinating parallel to the increasingly sophisticated attempts at earthquake protection noted during antiquity (Dr E. Force, written communication).

Less well known is the relationship between large earthquakes and changes in portable artefact styles. Changes in the styles of pottery in use in ancient Mycenae have been noted following at least three large earthquakes (Kilian 1996, in Dr E. Force, written communication). The assemblage from the reclamation at Chews Lane is an example of the styles and makers of portable artefacts that were in use before the 1855 earthquake. Changes in the styles of portable artefacts that parallel the changes in styles of non-portable artefacts mentioned above might reasonably be expected in the period following the earthquake. To find out what, if any, these changes might be, and the circumstances surrounding them, first requires comparison of the Chews Lane assemblage with similar artefacts from Wellington sites occupied after the earthquake.

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Continued on next page

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APPENDIX 1: CERAMICS CATALOGUE

Patterns and makers' marks on the china recovered from Chews Lane.

CP numbers are the numbers of the type patterns found on the site. The patterns are illustrated by the best examples regardless of stratigraphic status, and include examples found in layers post-dating 1863. Willow pattern is not illustrated, but was represented by many examples.

CM numbers are the makers' and other marks found on the site. They include all makers and marks able to be identified, regardless of stratigraphic status, and they include makers and marks found in layers post dating 1863. Where patterns occur on the opposite side of the piece, the pattern CP number is given, or if Willow (or other) pattern, Willow (or other) pattern name is stated.

Description refers to the vessel, both pattern and mark.

For illustrations of patterns and marks, see Appendix 4, Photographs.

Pattern Number CP	Occurrences of pattern	Material	Vessel form	Colour	Decoration type	Pattern name	Back stamp	Motif	Number of examples	Comments
1	Post-1863	white e/w	drainer	blue	U.G.T.P.	Florentine	FLOR... OPAQ...	floral		Scroll and floral border. Mark CM1. Probably Florentine Opaque China by George Gordon, early 19 th century (Coysh & Henrywood 1982: 139; Godden 1991: 282).
2	Post-1863									
3	Post-1863	white e/w	bowl	flow blue	U.G.T.P.			chinoiserie	2 pieces	Pattern inside and outside, geometric style.
4	Post-1863	white e/w		blue	U.G.T.P.			classic		Scrolls, spiral rim edge.
5	Post-1863	white e/w	footed base	gray	U.G.T.P.	Rhine		scenic		Trees, towered buildings, water.
6	Post-1863	white e/w		blue	U.G.T.P.	Antique		classic		Fleur de lys on pale blue ground, darker blue geometric edge.
7	Post-1863	white e/w	plate	blue	U.G.T.P.			classic		"C" scroll, woman playing harp, with swan, definitive edge.
8	Post-1863	white e/w	possibly bowl	dark blue	U.G.T.P.			floral		Scatter of flowers on white.
9	Post-1863	white e/w		blue	U.G.T.P.					Border, white garland and dark blue geometric garland on blue. Found on Kawau Island 1840s-50s context (PLOWMAN pers. comm.).
10	Post-1863	white e/w		blue	U.G.T.P.			scenic		Rim, outer curve tree, inner chinoiserie border like Whampoa.
11	Post-1863	white e/w		gray	U.G.T.P.					Geometric well border, outline leaf, berries on face. Like HM 247 (PLOWMAN 2000).
12	Post-1863	white e/w		gray	U.G.T.P.					Border, curved stringing, same border as on C8.
13	Post-1863	white e/w	possibly bowl	gray	U.G.T.P.	Rhine		scenic		Inside curve has Rhine style border stringing.
14	Post-1863	white e/w		blue	U.G.T.P.					Letter forms on "C" scrolls.
15	Post-1863	white e/w		mauve	U.G.T.P.			floral		One side geometric light and dark stripe, other side outline single flowers.
16	Post-1863	white e/w		blue	U.G.T.P.					Part of CP46.
17	Post-1863	white e/w		brown	U.G.T.P.	Medici		classic		Border, leafy rococo on striated background.
18	Post-1863	white e/w	plate	puce	U.G.T.P.			scenic		Border, tree stipple & line, also striation and white scrolls. CP60 similar.
19	Post-1863	white e/w	platter	blue-gray	U.G.T.P.					Border, geometric pale flowers, and different design garland intertwine on white ground.
20	Post-1863	white e/w	cup, with handle	blue	U.G.T.P.			floral		Flower spray in "C" scroll cartouche, cellular ground, outer curve includes birds.
21	Post-1863	white e/w		bluey-green	U.G.T.P.	?Rhine		scenic	broken in 3	Men in boat throwing out net.
22	Post-1863	white e/w		blue	U.G.T.P.			scenic		Rococo pillar, hills, woman's face with hat? plumed hat.
23	Post-1863	white e/w	footed base	brown	U.G.T.P.			chinoiserie		Dancing child, women with chair.
24	Post-1863	white e/w	plate	blue	U.G.T.P.	Whampoa		chinoiserie		Well, double foot rim, daisy flowers & dots on tree branches.
25	Post-1863	white e/w	platter	blue	U.G.T.P.			scenic		Tower, roof, wall.
26	1863 reclamation or Post-1863	white e/w	platter	blue	U.G.T.P.			scenic		Dome edge, wall, palm-like trees.
27	1863 reclamation or Post-1863	white e/w	platter	blue	U.G.T.P.			scenic		Trees, spire, cross.
28	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.					Border edge, same pattern as CP7, "C" scrolls have letter shapes, part of head.
29	1863 reclamation	white e/w	plate	blue	U.G.T.P.			floral		Border rim, rose, flower & leaf spray; enclosed by garland of grape

	or Post-1863 1863 reclamation or Post-1863												leaves.
30		porcelain							moulded				Moulded strap pattern, shiny inside, orange skin outside.
31		white e/w						U.G.T.P.					Border, scrolls, tendrils, flowers, geometric rim edge.
32	Post-1863	white e/w	platter					U.G.T.P.					Border, moulded roccoco scrolls, flowers and leaf sprays.
33	Post-1863	white e/w						U.G.T.P.					Curved, "marble" sort of pattern, outside, and inside near rim.
34	1863 reclamation or Post-1863	white e/w						U.G.T.P.					Border rim.
35	1855 to 1863	white e/w						U.G.T.P.					Rim and well border, basket weave pattern, curve stringing, pooled blue glaze. Found on Kawau Island 1840s-50s context (Plowman 2000); same as DOC ref. coll. EA 227.
36		white e/w						U.G.T.P.			4		Border, plumey roccoco scrolls over flatter outline scrolls. Another piece found in gravelly sand (1855-1857)
37		white e/w						U.G.T.P.					Border, roccoco scrolls, vignette of urn on striated ground.
38	Post-1863	white e/w						U.G.T.P.			broken in 2		Border, inner flowers and "C" scrolls; outer has grape or hop vine.
39	Post-1863	white e/w	plate					U.G.T.P.					Border, open double line cellular pattern along edge and into well, leaf.
40	Post-1863	white e/w						U.G.T.P.					Part of pagoda with bells, doorway with curtain.
41	1863 reclamation or Post-1863	white e/w						U.G.T.P.					Border, net ground, petal outline, tendril stems, stringing. Same as HM 208 (Plowman 2000).
42	1863 reclamation or Post-1863	white e/w						U.G.T.P.					Border rim, white flower & leaf on stipple ground, geometric rim edge.
43	1863 reclamation or Post-1863	white e/w						U.G.T.P.					Pagoda, flowers, double foot rim.
44	1863 reclamation or Post-1863	white e/w						U.G.T.P.					Inside curve has buildings, bush; outer with water, boat edge. Stringing.
45	1855 to 1863	white e/w	cup or bowl					U.G.T.P.					Inside Rhine style border, outer curve has boats, bridge.
46	1855 to 1863	white e/w						U.G.T.P.					Corinthian capital, flower spray, same border as CP16.
47	1863 reclamation or Post-1863	white e/w						U.G.T.P.					Border, geranium pattern (Spode).
48	Post-1853	white e/w						U.G.T.P.					Border, four petal small flowers, on billowy shapes. Same as DOC ref. coll. EA 337.
49	1863 reclamation or Post-1863	white e/w						U.G.T.P.					Border, small fragment.
50	1863 reclamation or Post-1863	white e/w						U.G.T.P.			broken in 2		Buildings and towers against a hill with a waterfall.
51	Post-1853	white e/w						U.G.T.P.					Border, flowers & leaves.
52	Post-1853	white e/w						U.G.T.P.					Border, small vertical lines in cellular pattern with centre dot.
53	Post-1853	white e/w						U.G.T.P.					Very open pattern of lily type flower and 4 buds.
54	Post-1855	white e/w						U.G.T.P.					Mark CM11. Tree, well border is chains; edge of mark border
55	Post-1853	white e/w						U.G.T.P.					Flowers & trace scroll done with outline & stipple.
56	Post-1853	white e/w						U.G.T.P.					Rim, wavy checked pattern.
57	1855 to 1863	white e/w						U.G.T.P.					Inner curve, "fibre" style, tiny blue stars round rim edge.
58	1855 to 1863	white e/w						U.G.T.P.					Border, 5-line squarish design with "snowflake" style centres.
59	1857-1863	white e/w	possibly					U.G.T.P.		Vinustus/			Flowers in a basket. Mark CM15. Davenport pottery 1793-1887 (Godden

60	Post-1855	white e/w	bowl	light puce	U.G.T.P.		DAVENPORT		1991: 189).
61	Post-1855	white e/w		blue	U.G.T.P.	Whampoa			Border, flowers on stipple ground, striated between white lines.
62	Post-1855	white e/w		puce	U.G.T.P.			chinoiserie	Border pattern, rim edge.
63	Post-1855	white e/w		brown	overglaze				Border, bit of sea, scroll, stringing. Foot rim has pooled bluish glaze.
64	Post-1855	white e/w		brown	U.G.T.P.				1 broken in 2, plus 1 other
65	Post-1855	white e/w	possibly cup	dark gray	U.G.T.P.			floral	Brown, cream and blue feather swirls.
66	1857-1863	white e/w		gray	U.G.T.P.	Rhine			Moss rose, leaves, thorns, line and stipple.
67	Post-1863	white e/w		blue	U.G.T.P.				Leaves and acorns, same pattern as CP103. Same as HM24 by W.T. Copeland, registered 1848 (Pflowman 2000).
68	Post-1863	white e/w		green	U.G.T.P.			scenic	People in boat.
69	Post-1863	white e/w		green	U.G.T.P.			sheet	Clouds, towers, hills; inside border has grapevine, striated zigzag ground.
70	Post-1863	white e/w		blue	U.G.T.P.			sheet	Scrolls & "C" scrolls.
71	Post-1863	white e/w		green	U.G.T.P.	Vermicelli			Squiggles, leaves & petals, over-painted in green, white & blue.
72	Post-1863	white e/w		blue	U.G.T.P.			sheet	Border, scrolls, leaves and buds, dark ground near rim edge.
73	Post-1863	white e/w		blue	U.G.T.P.	Whampoa		chinoiserie	Squiggle and two dots.
74	1857-1863	white e/w		blue	U.G.T.P.	Whampoa		chinoiserie	Large, white, snowflake form, edge of roccoco scrolls.
75	Post-1863	white e/w		blue	U.G.T.P.			sheet	Man sailing boat, single foot rim, pooled glaze.
76	Post-1863	white e/w		flow blue	U.G.T.P.		Copeland	floral	Pagoda with bells.
77	Post-1863	white e/w		blue	U.G.T.P.				Marble style pattern, rounded foot rim, pooled bluish glaze.
78	Post-1863	white e/w		blue	U.G.T.P.			floral	Large scattered, blue flowers. CM23, Copeland in green.
79	Post-1863	white e/w	bowl	flow blue	U.G.T.P.				Border, white leafy scrolls on lacy ground.
80	Post-1863	white e/w		blue	U.G.T.P.			spongware	Daffodil on light blue ground.
81	Post-1863	white e/w	possibly jug	blue	U.G.T.P.			2	Border, inner flowers & scrolls; outer has urn with roses.
82	Post-1863	white e/w	bowl edge	blue	U.G.T.P.				Border, very scribbly giving sponged effect.
83	Post-1863	white e/w		mauve	U.G.T.P.				White on blue marble effect.
84	Post-1863	white e/w	possibly cup	gray	U.G.T.P.	Fibre			Diaper pattern border, rim edge cable & ribbon, inside stringing of leaves.
85	Post-1863	white e/w		blue	U.G.T.P.				Flower outlines.
86	Post-1863	white e/w		blue	U.G.T.P.	Swiss Scenery	Swiss Scenery/ OPAQUE CHINA	scenic	On border inside, deeper outside.
87	1855-1863 (Probably)	white e/w		blue	U.G.T.P.			scenic	Border, small flowers, "c" scrolls, net pattern.
88	Post-1863	white e/w		blue	U.G.T.P.			scenic	Scene of chalet, bridge; back ground church, foreground has flowers, CM24.
89	Post-1863	white e/w		blue	U.G.T.P.			scenic	Houses on hill in background, foreground has traces of tree branches.
90	Post-1863	white e/w	possibly cup	brown	U.G.T.P.			scenic	Border, large flower on blue ground, white scroll.
91	Post-1863	white e/w		blue	U.G.T.P.			scenic	Border is like CP46, appears to be skirt of woman seated by water.
92	1855-1863	white e/w		green	U.G.T.P.			sheet	Rushes, flowers.
93	Post-1863	white e/w		red	U.G.T.P.			sheet?	Inside, stringing & vase on stipple ground; outside, barrel, animal body & tail.
94	Post-1863	white e/w	possibly	blue	U.G.T.P.				Windows of church, trees, bushes; edge of stringing. Includes CM26.

95	Post-1863	white e/w	bowl	brown	U.G.T.P.					Border, "c" scrolls, stylised flowers; medallion with leaves on stipple ground.
96	Post-1863	white e/w		mauve	U.G.T.P.		sheet			Buds and flower edge.
97	Post-1863	white e/w	probably chamber pot	mauve	U.G.T.P.					Geometric border rim, holly leaves and berries.
98	Post-1863	white e/w		brown	U.G.T.P.	Mansion	scenic			Urn to left on bank. mansion with columns on right. CM27. Mansion pattern by James & Thomas Edwards (Coyshe & Henrywood 1989: 130), dated 1839-41 (Godden 1991: 231).
99	1855-1863	white e/w		blue	U.G.T.P.		scenic			Indefinite bushes, worn edges. In sandy gravel.
100	1855-1863	white e/w		blue	U.G.T.P.	Kulat				Well & rim border of flowers, scrolls, medallion.
101	1855-1863	white e/w		blue	U.G.T.P.					Flowers & leaves, both sides, straight feathered lines ground. See CPI 154.
102	1855-1863	white e/w		green	U.G.T.P.					Border rim, stipple & fine line pattern of stars & stringing, worn edges.
103	1855-1863	white e/w		dark blue gray	U.G.T.P.					Border rim, acorns & leaves; same as CP65, worn edges. Same as HM24 by W.T. Copeland, registered 1848 (Plowman 2000).
104	1855-1863	white e/w		dark gray	U.G.T.P.					Line pattern including leaves, hexagons, Greek key style scrolls, very worn edges.
105	1855-1863	white e/w		blue	U.G.T.P.		classic			Border rim, scrolls & darker leaves on light blue & white.
106	1855-1863	white e/w		black	U.G.T.P.					Border, black outline, leaves, scrolls on cell like ground.
107	1855-1863	white e/w	possibly cup	blue	U.G.T.P.					Border, rim geometric, stylised flowers & ferny leaves, then fringe stringing.
108	1855-1863	white e/w		blue	U.G.T.P.		classic			Border rim, stylised pineapple, angle scroll.
109	1855-1863	white e/w	jug base	green	U.G.T.P.	Fibre				Tendrill pattern outside & inside base; complete foot rim, bluish glaze.
110	1855-1863	white e/w		dark gray	U.G.T.P.					Outline feathery scroll, worn edges. Bag 2.
111	1855-1863	white e/w		green	U.G.T.P.					Outline acanthus scrolls on stipple ground. Bag 2.
112	1855-1863	white e/w	possibly vase	flow blue	U.G.T.P.					Rococo scrolls border, leaves.
113	1855-1863	white e/w		flow blue	U.G.T.P.					Outline flowers are over-painted dull red; dark leaves with gold? Veining.
114	1855-1863	white e/w		blue	U.G.T.P.					Moss rose bud, leaves; border & well of plate.
115	1857-1863	white e/w		blue	U.G.T.P.	Whampoa	chinoiserie			Border rim, net & blue & white scrolls.
116	1855-1863?	white e/w		flow blue	U.G.T.P.					Oriental scrolls, fence; flowers, leaves.
117	Post-1863	white e/w		light green	U.G.T.P.		sheet	broken in 5		Thistle leaves & fluffy heads.
118	Post-1863	porcelain		gilt		Tea leaf		2		Gilt tealeaf pattern, 1 piece flat, 1 with foot-rim, cup?
119	1855-1863	white e/w		blue	U.G.T.P.					Border rim, white scrolls on blue ground, worn edges. Same as CPI 30.
120	1855-1863	white e/w		blue	U.G.T.P.					Found on Kawau Island in 1840s-50s context (plowman, pers. comm.).
121	Post-1863	white e/w		blue	U.G.T.P.	Wild Rose				Border rim, geometric keyhole curves & points in light & dark blue.
122	Post-1863	white e/w	possibly bowl	blue	U.G.T.P.		scenic			Border rim, white flowers, leaves on dark blue.
123	Post-1863	white e/w		brown	U.G.T.P.		basket			Clouds, palm leaves, CM30.
124	Post-1863	porcelain		lavendar			imitation Jasper	3		Inside, basket pattern & stringing; outside scenic, tree, building towers. Same as DOC ref. coll. EA 227.
125	1863 reclamation or Post-1863	white e/w	bowl	blue	U.G.T.P.	Filigree	floral			Lavender sprig; moulded panel, rim, foot-rim.
										Border rim of white pattern on dark blue, in well are dark blue flowers on white.

126	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.			scenic		Shadowy mountains, diamond and star stringing.
127	1855-1863	white e/w		blue	U.G.T.P.		Whampoa	chinoiserie		Small pagoda; double foot rim, pooled bluish glaze.
128	Post-1863	white e/w		blue	U.G.T.P.					Border rim, lace style pattern. Same as HM 224 (PLOWMAN 2000).
129	Post-1863	white e/w		puce	U.G.T.P.					Leaves, flowers, berries.
130	1855-1863	white e/w		blue	U.G.T.P.					Scrolls, blue line on white; dark blue on light. Worn edges. Same as CP119.
131	Post-1863	white e/w		flow blue	U.G.T.P.				broken in 2	Border & rim, geometric acanthus scrolls and stylised flowers.
132	Post-1863	white e/w		blue	U.G.T.P.					Border rim, stylised flowers, light blue background, dark lines on white.
133	Post-1863	white e/w		blue	U.G.T.P.			chinoiserie	broken in 2	Pagoda, chinoiserie rocks, bluish glaze.
134	Post-1863	white e/w	possibly bowl	blue	U.G.T.P.			scenic		Flowers, leaf, in scene.
135	Post-1863	white e/w		black	U.G.T.P.					Border rim has chain pattern, large acanthus leaf.
136	Post-1863	viraceous		greyish white						Impressed basket pattern, outer curve.
137	Post-1863	white e/w		bright blue	U.G.T.P.					Border rim, band with white dots; fine feathered spiral with small flower.
138	Post-1863	white e/w		blue	U.G.T.P.			scenic		Tree foliage, elaborate geometric spiral & diamond stringing. Bluish glaze.
139	Post-1863	white e/w		green	U.G.T.P.					Well, double foot rim, geometric point & dot stringing, pointy flowers.
140	1857-1863	white e/w		blue	U.G.T.P.			scenic		Mountains, cottages, woman head with hat.
141	1857-1863	white e/w		blue	U.G.T.P.			scenic		Bit of tower and castellated wall.
142	1857-1863	white e/w		blue	U.G.T.P.			scenic		Cottage and foliage, persons arm, puff sleeve, by water.
143	1857-1863	white e/w		blue	U.G.T.P.			scenic		Blue on blue, hill, far foliage, nearby leaves.
144	1857-1863	white e/w		blue	U.G.T.P.		Wild Rose			Border, "c" scrolls, white flowers on dark blue medallion.
145	1857-1863	white e/w		blue	U.G.T.P.					Border, pale blue & white flowers & leaves on dark blue. Zigzag rim.
146	Post-1863	stoneware		gray						Moulded leaves, dimpled surface.
147	Post-1863	stoneware		fawn						Moulded vine leaves.
148	Post-1863	white e/w	urn/jug?	blue	U.G.T.P.			scenic	broken in 3	Plus 1 with handle? Scrolls round temple style building; scene of trees, mountains.
149	Post-1863	white e/w		blue	U.G.T.P.			scenic		Buildings, mountains; inner curve has tendrils & berries.
150	Post-1863	white e/w		blue	U.G.T.P.					Border, flowers & scrolls; zigzag border rim, bluish pooled glaze.
151	Post-1863	white e/w		brown	U.G.T.P.					Stippled, flowers, leaves, lines; bluish pooled glaze.
152	Post-1863	white e/w		blue	U.G.T.P.		Forest	scenic		Exotic, tree with bell flowers; worn edges.
153	Post-1863	white e/w		green	U.G.T.P.		Gem			Well border, geometric, lines and circles.
154	Post-1863	white e/w		blue	U.G.T.P.					Border, flowers & leaves on feather line ground, similar to CP101. Worn edges.
155	Post-1863	white e/w		blue	U.G.T.P.			scenic		Top of vase or amphora surrounded by foliage including a palm.
156	Post-1863	?	figurine							Torso of female, gilt trimmed bodice. "tea cosy" type.
157	Post-1863	white e/w		gray	U.G.T.P.		Rhine	scenic	3	Towers, 2; water 1; same thickness.
158	Post-1863	white e/w		gray & green	U.G.T.P.			sheet		Squiggles with over-glaze green splodges; same as CM22. Same as HM 232 (PLOWMAN 2000).
159	Post-1863	white e/w	bowl	brown	U.G.T.P.			scenic		Walking feet, building. Raised foot rim.
160	Post-1863	white e/w	jar base	brown	U.G.T.P.					One side has acanthus spiral and ferny leaves.
161	Post-1863	white e/w		blue	U.G.T.P.			scenic		Light blue top of 4 roofed pagoda with bells.
162	Post-1863	white e/w		green	U.G.T.P.					Border, rim edge, outline of white & dark green leaves on green stipple ground.

163	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.	Napoleons Battles?		scenic	broken in 7	Plus 2; flowers & Greek figures; "c" scrolls of ancient looking letters. Similar to CP28.
164	1863 reclamation or Post-1863	white e/w		green	U.G.T.P.				3	Water, bushes, 1 rim edge; all same thickness & colour.
165	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.					Border, diamond & dot edge, dark flowers? On pale cellular ground.
166	1863 reclamation or Post-1863	vitreous	teapot spout	blue gray						Curved & moulded, outside "orange peel", inside is shiny glaze.
167	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.					Rim border, striated with faint diamond outlines, indistinct stylised flowers. Same as HM 224 (Pflowman 2000).
168	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.					Rim border, small white flowers & leaves on blue ground.
169	1863 reclamation or Post-1863	white e/w		pale mauve	U.G.T.P.					Rim border, small flowers, some stippling, tendril vine; outline of flowers, leaves.
170	Post-1863	white e/w		blue	U.G.T.P.	Albion				Rim border, very blurry scene of 2 figures & trees in cartouche, like "Albion".
171	1863 reclamation or Post-1863	white e/w		mauve	U.G.T.P.					Border, stylised flowers and geometric lines, patterns both sides.
172	1863 reclamation or Post-1863	white e/w		dark blue	U.G.T.P.					Stylised outline acanthus leaf and scrolls; rim has leaves on vertical parallel lines.
173	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.				3	2 rim borders, blue flowers & leaves on white ground, scale pattern near rim.
174	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.			scenic		2 towers & wall; inside are dark blue vine scrolls on striated ground.
175	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.					Outline white flowers & leaves on blue ground with wavy vertical lines.
176	1863 reclamation or Post-1863	white e/w		green	U.G.T.P.			scenic		Water, bank, bushes; outer is geometric waves, ribbon; vine, tendrils, circle & dot flowers.
177	Post-1863	white e/w		blue	U.G.T.P.					Border; blurry vine & tree, feathered scroll on faint diamond ground.
178	1855-1863	white e/w		blue	U.G.T.P.				broken in 3	Borders, circle & dot rim stringing; trellis with twigs & circles. Same as DOC ref. coll. EA232.
179	Post-1855	white e/w		blue	U.G.T.P.					Border & well; garland leaves & flowers; vine & dots on band of stipple blue.
180	Pre-1855?	white e/w	plate	blue	U.G.T.P.	Thorn	THORN/ K & Co.	floral		CM34. Scattered twigs with flowers and thorns, moulded rim with band of flower and leaf panels, fan and sprays stringing.
181	Post-1857	white e/w		Flow-blue	U.G.T.P.		"...USAN"	chinoiserie		CM4. Pagoda and leaves.
182	Post-1863	white e/w		brown	U.G.T.P.	Tiger Lily	.IGER LILY"/..M&Co	floral	broken in 3	CM6. Tiger lily flowers. Attributed to Brown-Westhead, Moore & Co., 1862 to 1904 (Godden 1991: 111).
183	Post-1855	white e/w		blue	U.G.T.P.			scenic		CM7. Bushes on a bank. Edge of oval mark.
184	Post-1857	white e/w		dark mauve	U.G.T.P.		"..combe Pottery" LIVERPOOL	scenic		CM9. Dome impediment of building, mark is in a belt ring with flowers. Attributed to Seacombe Pottery, 1852 to 1871 (Neale 2005: 123).
185	Post-1855	white e/w		blue	U.G.T.P.	Medici	Register mark shows September 1847	scenic		CM10. Urn and trees. Possibly Mellor Venables and Company, 1834 to 1851 (Brooks 2005: 70).
186	Post-1857	white e/w		green	U.G.T.P.		...VENPORT			CM20. Scattered clover or tea leaf, fleur de lys stringing. Impressed

187	1857-1863	white e/w		gray	U.G.T.P.			SEWELL			anchor. Davenport, 1793-1887 (Godden 1991: 189)/ CM22. St Anthony's Pottery 1804-78 [Godden 1992: 591]; amoeba-like forms, overglaze green centre. Same as HM 232 (Plowman 2000).
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Ceramic Mark number CM	Occurrences of mark	Material	Vessel form	Colour	Decoration type	Pattern name	Back stamp	Motif	Number of examples	Description
1	1863 reclamation or Post-1863	white e/w	drainer	blue	U.G.T.P.	Florentine	"FLOR..." "OPAQ..."	floral		CP1. scrolls around "Flor..." bird with twig in beak; "Opac..." below. Probably 'Florentine Opaque China' by George Gordon (Coysh & Henrywood 1982: 139), dated to the early 19 th century (Godden 1991: 282)
2	Post-1852	white e/w		dark blue	U.G.T.P.	willow	"..E" "WARE"	chinoiserie		Crown, tendrill and ribbon banner, "Ware" in banner.
3	Post-1857	white e/w		blue	U.G.T.P.	willow		chinoiserie		Edge of mark border. Mark same as that used by D. Methven & Sons, 1 st half of 19 th century to 1930 (Godden 1991: 433).
4	Post-1857	white e/w		flowblue	U.G.T.P.		"--USAN"	chinoiserie		CP181. Pagoda and leaves. Copeland Late Spode mark dateable to c.1847-67 (Godden 1991: 171).
5	1857-1863 reclamation, but possibly later	white e/w		blue	U.G.T.P.	willow	"Copelan..late Spode"	chinoiserie		Willow pattern. Willow branches.
6	Post-1863	white e/w		brown	U.G.T.P.	Tiger Lily	"!GER LILY"/"..M&Co"	floral	broken in 3	CP182. Name in ring around a shield. Brown-Westhead, Moore & Co., 1862-1904 (Godden 1991: 111)..
7	Post-1855	white e/w		blue	U.G.T.P.	Whampoa"	"W" over 3	scenic		CP183. Edge of mark border; scene of bushes on bank.
8	Post-1855	white e/w		blue	U.G.T.P.		"..combe Pottery/ LIVERPOOL"	chinoiserie		Pagoda with bells; impressed mark.
9	Post-1857	white e/w		dark mauve	U.G.T.P.			scenic		CP184. "LIVERPOOL"; probably Seacombe Pottery, 1852-1871 (Neale 2005: 123). Scene is dome of tower.
10	Post-1855	white e/w		blue	U.G.T.P.	Medici	reg mark Sept 1847	scenic		CP185. Scene with urn, possibly Mellor, Venables & Co, 1834-51 (Brooks 2005: 70).
11	Post-1855	white e/w		blue	U.G.T.P.			scenic		CP54. Tree, well border is chains; edge of mark border.
12	Post-1855	white e/w		blue	U.G.T.P.		"...nd/spode"			Leaves, Oak?
13	Post-1857	white e/w		blue	U.G.T.P.	willow	"IRONSTO../ CHIN."	willow		Willow pattern. "IRONSTONE/ CHIN." in draped swag with blue urn.
14	Post-1857	white e/w		white	U.G.T.P.		"Copeland/ Late Spode"; impressed			Green mark, "Copeland late Spode"; "13" in blue. Copeland Late Spode mark dateable to c.1847-67 (Godden 1991: 171).
15	1855-1863	white e/w	possibly bowl	blue	U.G.T.P.	Vinustus	"Vinustus/ DAVENPORT"			CP59. Basket of flowers; name in garland of scrolls, flowers, grapes; pooled bluish glaze. Davenport 1793-1887 (Godden 1991: 189).
16	1855-1863	white e/w		blue	U.G.T.P.	willow	"..D/ ..IRE"	chinoiserie	1 of broken piece	Willow pattern. "...D/...IRE" and scroll end.
17	Post-1855	white e/w		blue	U.G.T.P.	willow	"...ANTE../ ..ORDSH.../B&H"	chinoiserie	2nd of broken piece	"ANTE" above; "ORDSHIRE" in scroll. Godden 1991 lists 4 possible potteries: Beech & Hancock 1857-76; Bednall & Heath 1879-1900; Blackhurst & Hulm 1890-1932; Bodley & Harrold, 1863-5.
18	1857-1863	white e/w		blue	U.G.T.P.	willow		chinoiserie		Impressed edge of letter, "w"?; double foot rim with pooled

19	1857-1863	white e/w		plain		Foliage	"IAGE"			glaze. Plain. Black on white wreath circle with letters. Mark used by Pinder Bourne & Co., 1862-1882 (Godden 1991: 495).
20	Post-1857	white e/w		green	U.G.T.P.		"...VENPORT"			CP186. Impressed; and anchor; indeterminate motif, and stringing. Davenport 1793-1887 (Godden 1991: 189).
21	Post-1863	white e/w		blue	U.G.T.P.	willow	"Semi China/Warranted/ B&H	chinoiserie		Willow pattern. "Semi China/Warranted/B&H" ; in spiral edged oval. Godden 1991 lists 4 possible potteries: Beech & Hancock 1857-76; Bednall & Heath 1879-1900; Blackhurst & Hulm 1890-1932; Bodley & Harrold, 1863-5.
22	1857-1863	white e/w		gray	U.G.T.P.		Sewell			CP187; amoeba-like forms, overglaze green centre. St Anthony's Pottery, 1804-78 (Godden 1992: 591).
23	1857-1863	white e/w		blue	U.G.T.P.		"Copeland"	floral		CP176. Large flowers; Copeland in green, "B 773" in blue; impressed crown.
24	Post-1857	white e/w		blue	U.G.T.P.	Swiss Scenery	"Swifts Scenery/ OPAQUE CHINA"	scenic		CP86; "Swifts Scenery/OPAQUE CHINA" in scroll cartouche. Scene of chalet.
25	Post-1857	white e/w		plain			E&C Challenor			Coat of arms, below is "STONE CHINA", "E&C CHALLENGOR", "FENTON". 1862-91 (Godden 1991: 137).
26	Post-1857	white e/w		blue	U.G.T.P.			scenic	broken in 5	CP91. 3 small flowers & leaves above 3 posts & rail. Cathedral, bushes; stringing.
27	1857-1863	white e/w		brown	U.G.T.P.	Mansion	"MANSION"	scenic	broken in 4	CP98. Mark in geometric design oval; scene of um, columned building. Mansion pattern by James & Thomas Edwards (Coysh & Henrywood 1989: 130), dated 1839-41 (Godden 1991: 231).
28	1855-1857	white e/w		blue	U.G.T.P.	willow	"Co..." "I..."	chinoiserie		Probably Copeland, late Spode (c.1847-67, Godden 1991: 171).
29	1855-1857	white e/w		blue	U.G.T.P.	willow	"COPELAN../ BLANC"	chinoiserie		Impressed crown, Copeland in a ring, inside is "BLANC..." all very worn.
30	Post-1857	white e/w	owl?	blue	U.G.T.P.		vase	scenic		CP122. Mark looks like the top of a vase; scene palm tree and rocks.
31	1863 reclamation or Post-1863	white e/w		mauve	U.G.T.P.					Thin light and darker mauve bands interlace, edge of mark.
32	1863 reclamation or Post-1863	white e/w		blue	U.G.T.P.			scenic		Mark is edge of twisted ribbon; scene of trees.
33	Post-1863	white e/w		blue	U.G.T.P.	willow	"...land/...Spode"	chinoiserie		Blue UG mark; scene of willow branches.
34	Pre-1855?	white e/w	plate	blue	U.G.T.P.	Thorn	"THORN/K. & Co."	floral		CP180. Scroll with pattern name inside scroll, and company name beneath; Scattered twigs with flowers and thorns, moulded rim with band of flower and leaf panels, fan and sprays stringing. Godden 1991 lists 3 potteries under K. & Co – Keeling & Co, 1886-1936; William Kirkby & Co, 1879-85; and Kirkland & Co, 1897-8. Not an obviously early style of plate, so possibly intrusive. "Thorn" is not a pattern listed in Coysh & Henrywood 1982 or 1989.

APPENDIX 2: PRE-1863 ARTEFACTS AND FAUNAL MATERIAL

Summary of ceramic patterns and items collected from, or noted at, Chews Lane from the Time Stratigraphic Divisions set out in Table 4 from layers dating before 1863. The column headed 'CP' lists the reference numbers of the CP type specimens present; 'Like CP' lists the pattern numbers represented by ceramic pieces that are not the type specimen pieces. Unless otherwise noted, all ceramics and other items were fragmented or broken, and the numbers in the columns other than the columns headed 'CP' or 'Like CP' refer to how many pieces were collected. Except for the oysters listed under the heading 'Shells', all shells were naturally-occurring beach shells, and unlikely to be food refuse; they included cockles and pipi in position of articulation.

Ceramic Patterns							
Layer date	CP	Like CP	CM	Willow	Flow blue	Plain	Other
							Worn Ceramics
							Comments
1852-55						2*	*One china piece has double foot rim with bluish glaze.
1855-63	36 ¹ , 45-46, 57-58, 59 ² , 99-113, 114, 116, 119-120, 127, 130, 178	12, 19, 28, 35, 39, 42, 58, 61, 63, 65, 77 ⁴ , 80, 107 ⁴ , 123	4, 15 ² , 28	59	18 ⁵	20	61 ⁶
							¹ Broken off CP36. ² Items CP59 and CM15 are the same piece, Davenport "Venustus". ³ Two of the pieces are white with a blue rim; two pieces are terracotta, and cream inside; one piece is blue and white. ⁴ Pieces that have broken off from CP77 & 107. ⁵ Includes one cup handle. ⁶ One piece of worn ceramic is vitreous, khaki coloured, shiny glaze, letters " ...EAL..." but indistinct.
1855-63?	87	92		4	1	2	>3
1857-63	65-66, 74, 92, 115, 140-145	7, 55, 57, 61, 63, 74, 100, 107, 137	16, 18-19, 22	25	2	18 ⁷	3
							⁷ Five plain pieces of china have pooled bluish glaze; one piece has a trace of band inside top edge; one piece is moulded. ⁸ Includes: basket style pattern; one vitreous piece with gilt rim; three blue and white, one "Scenic"; one white jar shoulder with blue and green bands.

Bottles					
Layer date	Pig snout	Round	Square	Neck	Other
1855-63	7	14	15	9 ¹	42 ²
1855-63?			1		8
1857-63		2 ³	1 ⁴	3 ⁵	3 ⁶

¹ One neck of aqua glass; one with metal wire in place.
² Two bottles of clear glass, seven of aqua glass, one of thin glass; one aqua-green jar mouth; nine flat bottles, one cobalt bottle.
³ Both round bottle bases have deep "push-ups".
⁴ The square base is aqua glass.
⁵ One neck is clear worn glass; one neck still has attached metal wire; one includes an aqua glass stopper.
⁶ One piece is the worn heavy faceted base of tumbler or vase or similar; one is clear glass; one is the bottle with remains of a label, see Appendix 7 (Photo DSCN1791).

Clay Tobacco Pipes			Stoneware		Other artifacts/faunal material				
Layer date	Stems	Bowls		Slate	Metal	Other	Bone	Shells present	Other
1855-63?	1		1				Yes	Cockle, turret, oyster, marine snail, mussel shell	
1855-63	14 (Including one terracotta, and one with the letters "DIXSON" "SYDNEY")	13 (Including one red coloured, one with moulded grapes and vines on both sides, and one with worn edges)	27 (Including four worn pieces, one with the letters "...COTCH MARMA..." and nine pieces, plus wire, from one bottle)	27 (of 2 shades) plus one broken pencil	25+ pieces, including five spikes (two copper, one with a square head), one copper nail, one metal loop, two possible barrel bands, nails, and assorted rusty unidentifiable pieces.	One porcelain ornament base. Two brass swivel rings. The sole of a woman's shoe, One straight pin (like a sewing pin). Buttons, three with four holes each (one with "improved four holes" written on it), and one of bone in 1850s style. One coin 1839-49. One three prong fork. One worn white ceramic ornament base with traces of gilt, red, and green.	Fish, sheep, pig, beef (including large and small sawn bones), four bird vertebrae (possibly chicken).	Oyster, cockle, mussel, turret, marine snail, pipi, paua, whelk.	Pumice; round pebbles; obsidian lump, dark green/black (12x8x5cm)

							Two broken bricks. One piece of terracotta, cream on one side, with worn edges.				
1857-63	13, including one stem with the letters "...UGALL", and one with "...BARTH LOND..." , and one	3, including one with two moulded curved horns at base, and indistinct number "387"; and one with a vine pattern.	25, including one jar with letters "...INGTON", and one jar in 23 pieces with the letters "...ON"				Piece of metal and leather with 2 circles of mother of pearl.	Oysters			
post-1863	1 with chipped out mouthpiece (reworked stem)										

APPENDIX 3: GLOSSARY (SHELLFISH)

Common name	Latin or proper name
Cockle	<i>Austrovenus stutchburyi</i>
Pipi	<i>Paphies australis</i>
Whelk	<i>Cominella spp.</i>
Marine snail	<i>Melagraphia aethiops</i>
Oyster	<i>Ostrea chilensis</i>
Ringed Venus	<i>Dosinia anus</i>
Cat's eye	<i>Lunella smaragda</i>
Turret	<i>Maoricolpus roseus</i>
Paua	<i>Haliotis iris</i>
Limpet	<i>Cellana spp.</i>

APPENDIX 4: PHOTOGRAPHS (CERAMICS)

Ceramic patterns (CM) and ceramic marks (CP). Scales in cm.



CP1 Florentine (mark CM1)



CP3



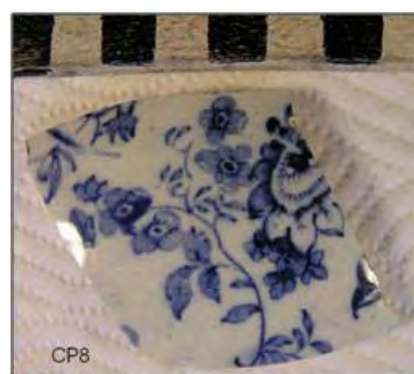
CP6 Antique



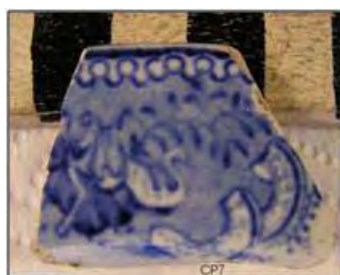
CP4



CP5 Rhine



CP8



CP7i



CP7ii



CP7iii



CP9



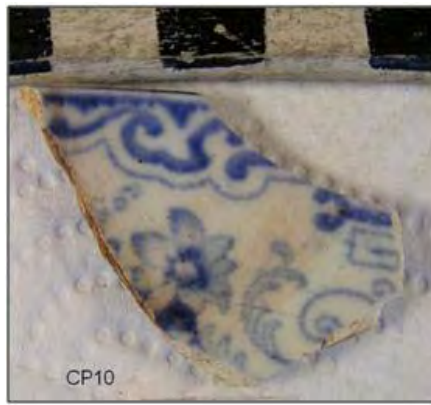
CP11



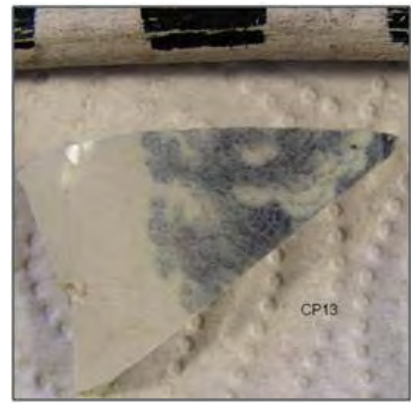
CP12



CP10A Whampoa



CP10B Whampoa



CP13A Rhine



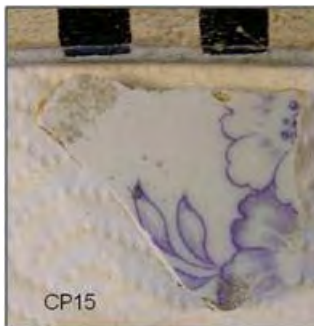
CP13B Rhine



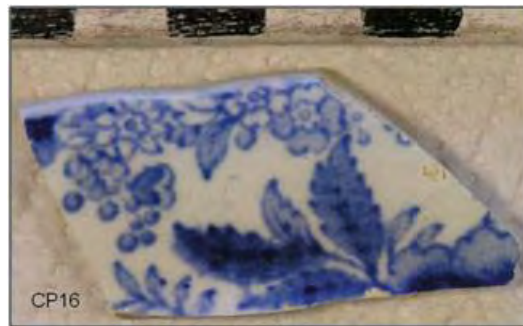
CP14



CP15A



CP15B



CP16



CP17 Medici



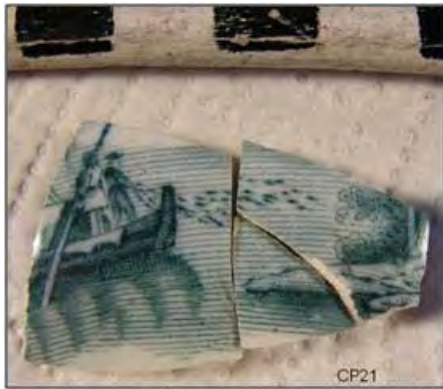
CP18



CP19



CP20



CP21 ?Rhine



CP22



CP23



CP24 Whampoa



CP25



CP26



CP27



CP28



CP29



CP32



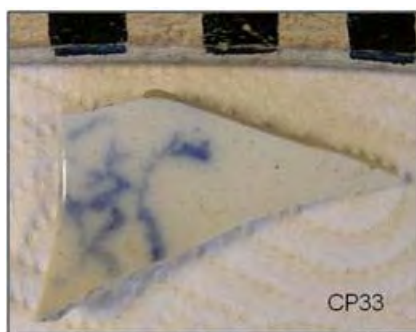
CP30



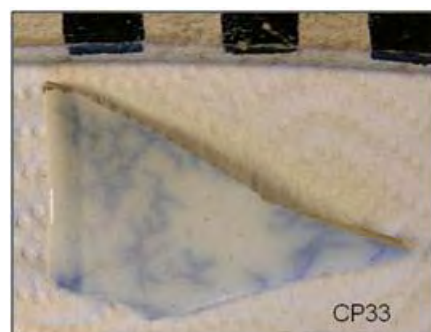
CP31



CP32 ?Asiatic Pheasant



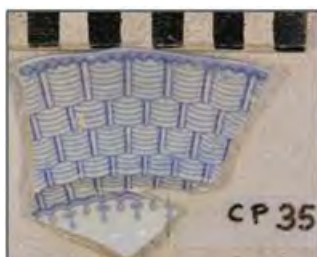
CP33A Marbled



CP33b Marbled



CP24 Asiatic Pheasant



CP35



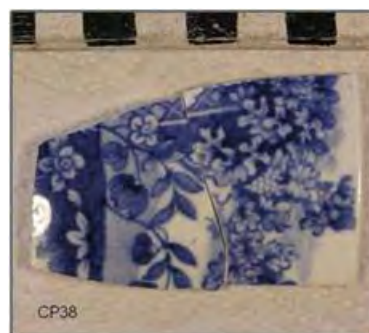
CP36



CP37



CP38a



CP38b



CP39



CP40 Whampoa



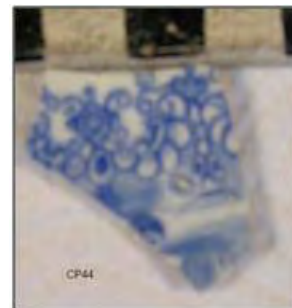
CP41



CP42 ?Botanical Beauties



CP44a



CP44b



CP45a Rhine



CP45b Rhine



CP46 Morea



CP47 Geranium



CP48



CP49 Asiatic Pheasant



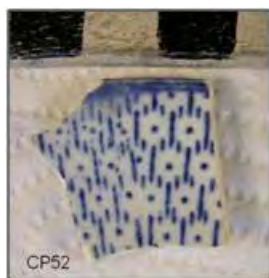
CP50



CP51 Guy's Cliffe



CP52a



CP52b



CP53



CP54 (mark CM11)



CP57



CP55ii



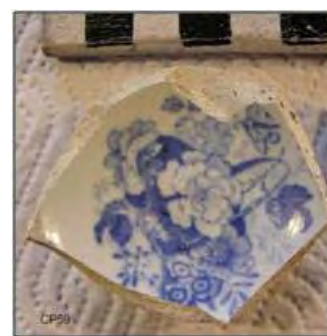
CP56



CP57 Fibre



CP58



CP59 Vinustus (mark CM15)



CP60



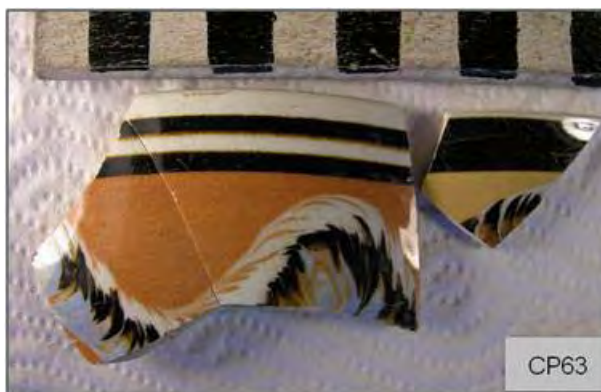
CP61 Whampoa



CP62



CP62



CP63



CP64a



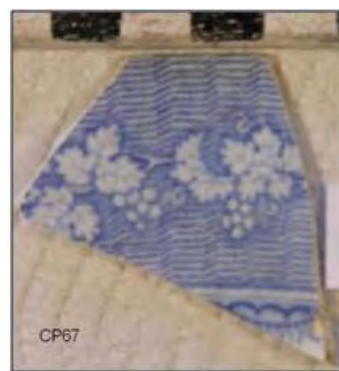
CP64b



CP65



CP66 Rhine



CP67



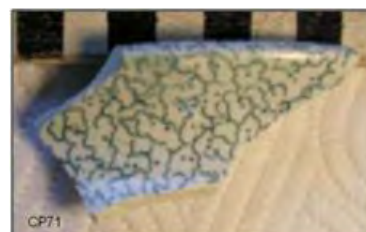
CP68



CP69



CP70



CP71 Vermicelli



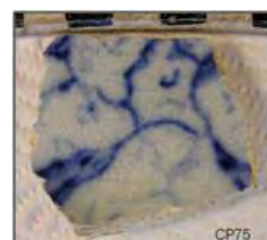
CP72



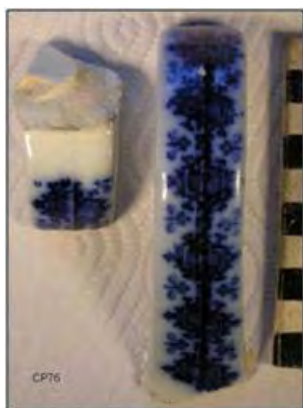
CP73 Whampoa



CP74 Whampoa



CP75



CP76 (mark CM23)



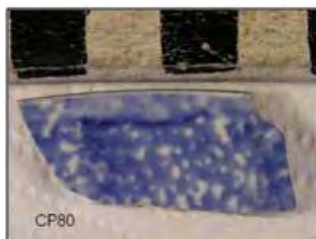
CP77



CP78



CP79



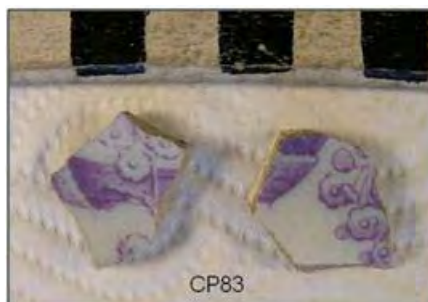
CP80



CP81



CP82



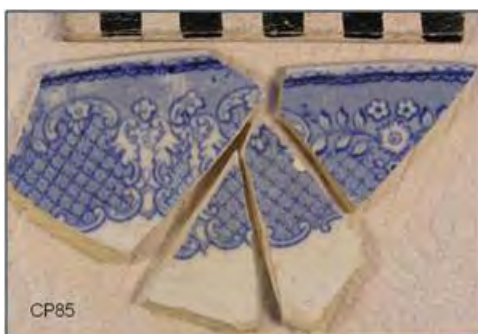
CP83



CP84a Fibre



CP84b Fibre



CP85



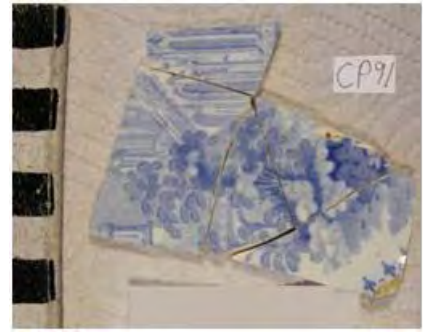
CP86 Swiss Scenery (mark CM24)



CP88



CP89



CP91ii



CP90a



CP90b



CP91i (see CM26)



CP92



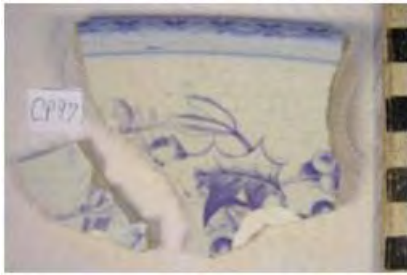
CP93



CP94



CP96



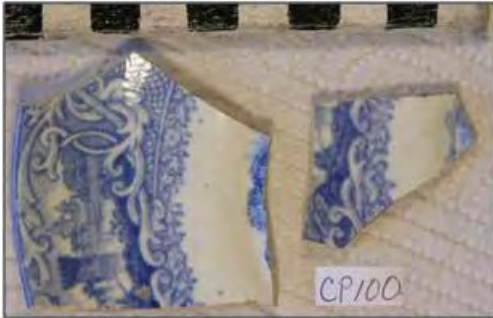
CP97



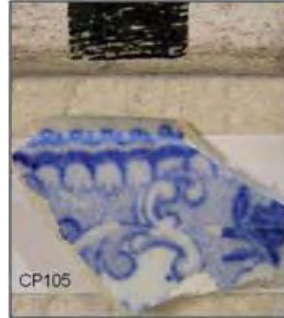
**CP98 Mansion (mark
CM27)**



CP99



CP100 Kulat



CP105



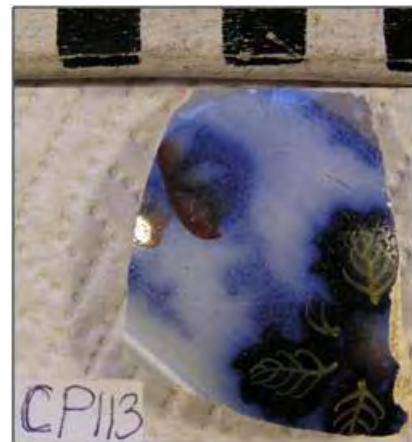
CP108



CP107A



CP107B



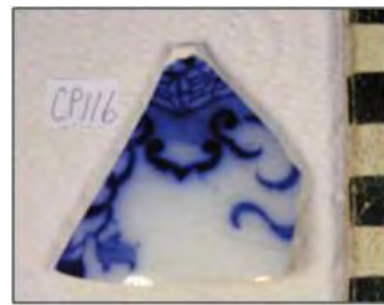
CP113



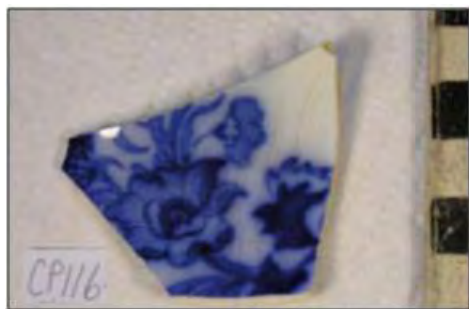
CP114



CP115 Whampoa



CP116a



CP116b



CP117



CP118 Tealeaf



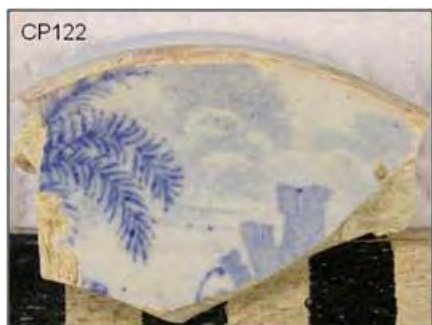
CP119



CP120



CP121 Wild Rose



CP122



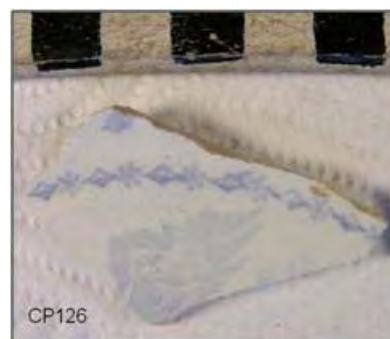
CP123 (mark CM30)



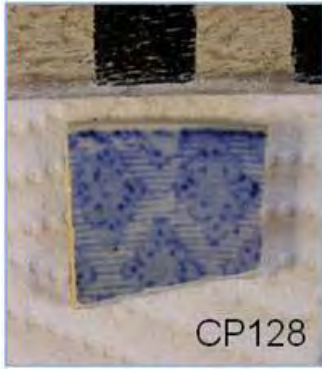
CP124



CP125 Filigree



CP126



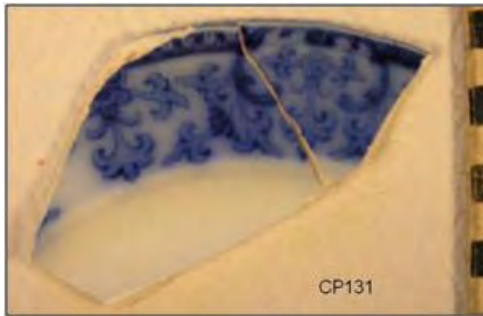
CP128



CP129



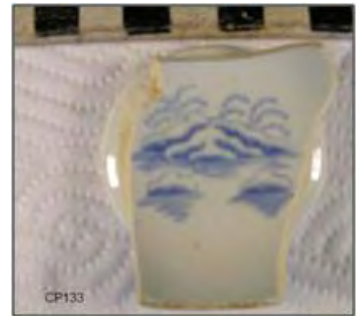
CP130



CP131



CP132



CP133



CP134



CP135



CP136



CP137



CP138



CP139



CP140a



CP140b



CP144



CP145 Wild Rose



CP146



CP147



CP148



CP149a



CP149b



CP150



CP151



CP152 Forest



CP153 Gem



CP154



CP155



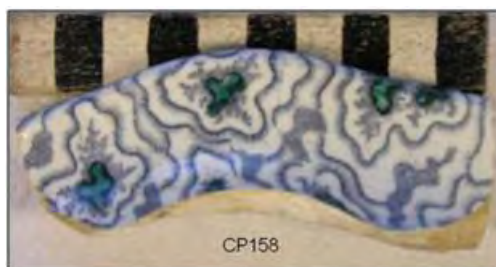
CP156a



CP156b



CP157 Rhine



CP158



CP159



CP160



CP161



CP162

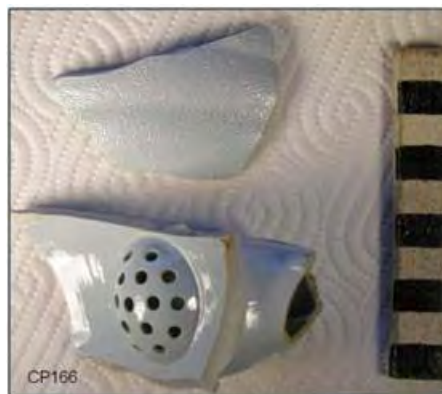


CP163 ?Napolean's Battles



CP164

CP164



CP166

CP166a



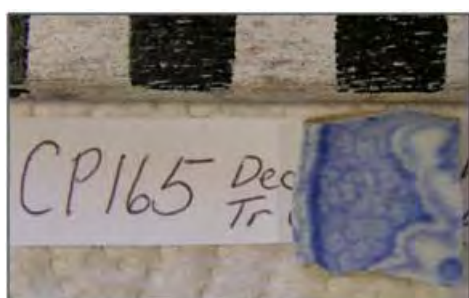
CP164

CP164b



CP166

CP166b



CP165



CP167



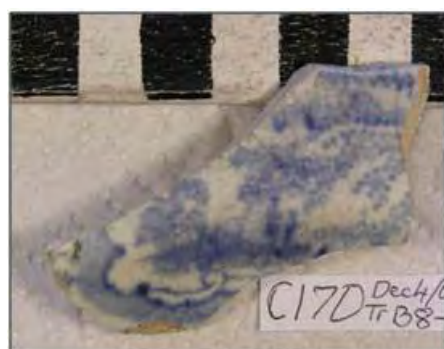
CP168



CP169a



CP169b



CP170 Albion



CP171a



CP171b



CP172



CP173



CP174a



CP174b



CP175



CP176a



CP176b



CP177



CP178



CP179



CP180 Thorn (mark CM34)



CP181 (mark CM4)



CP182 (mark CM6)



CP183 (mark CM7)



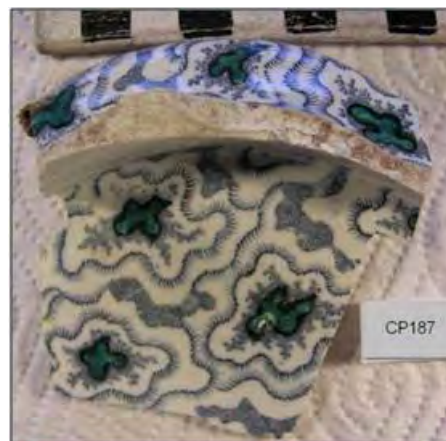
CP184 (mark CM9)



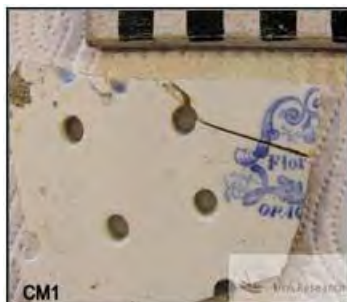
CP185 (mark CM10)



CP186 (mark CM20)



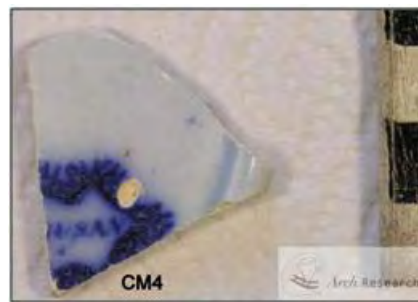
CP187 (mark CM22)



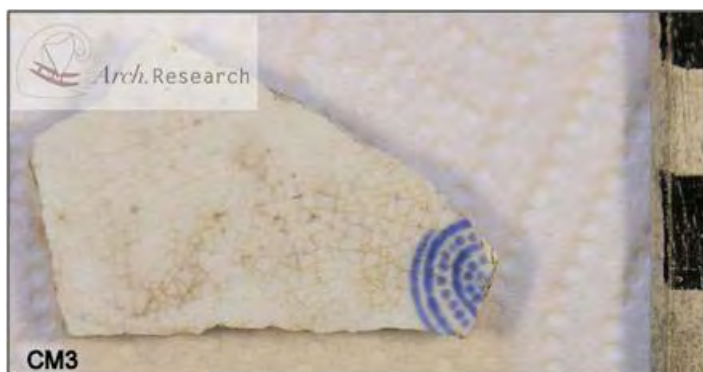
CM1 (see CP1)



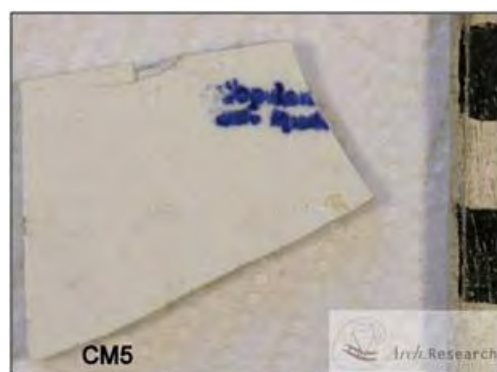
CM2



CM4



CM3 (see CP181)



CM5



CM6 (see CP182)



CM7 (see CP183)



CM8



CM9 (see CP184)



CM10 (see CP185)



CM11 (see CP54)



CM12



CM13



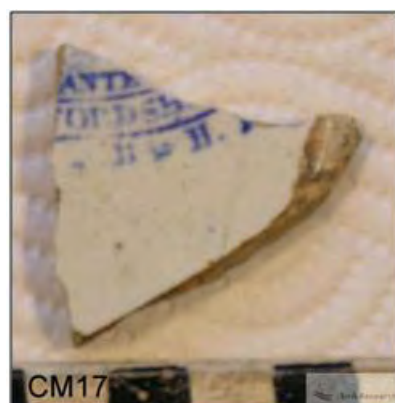
CM14



CM15 (see CP59)



CM16



CM17



CM18



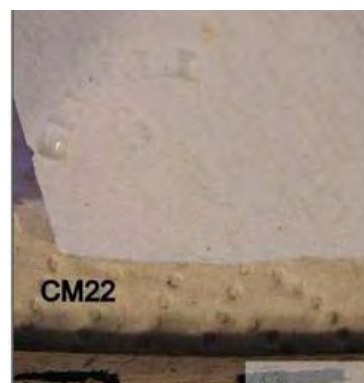
CM19



CM20 (see CP186)



CM21



CM22 (see CP187)



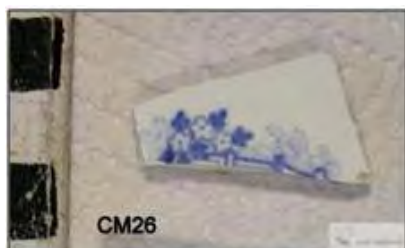
CM23



CM24 (see CP86)



CM25



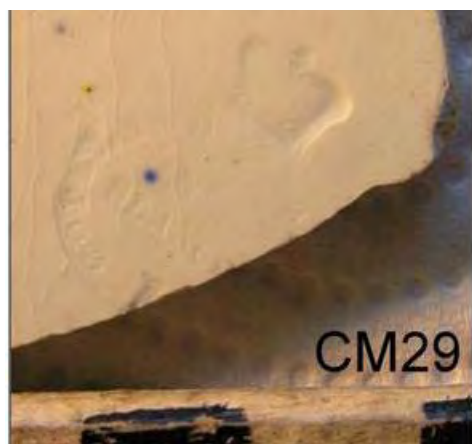
CM26 (see CP91)



CM27 (see CP98)



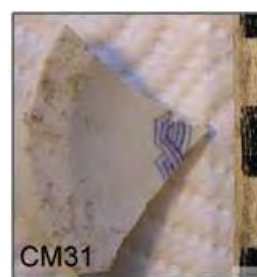
CM28



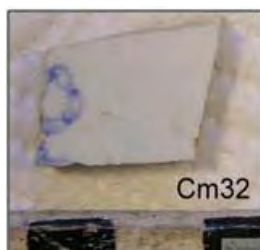
CM29



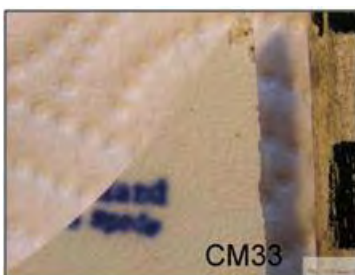
CM30 (see CP122)



CM31



CM32



CM33



CM34 (see CP180)

APPENDIX 5: OTHER ITEMS

Note: this list is an indication only of the other remains recovered from the pre-1863 layers. These items are illustrated in Appendix 6

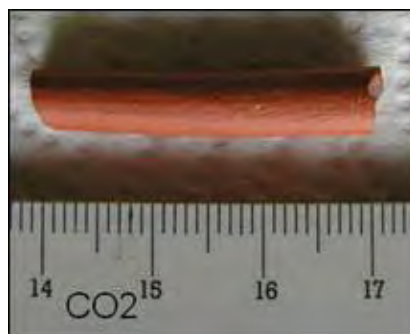
CO number	Site date	Item
1	55-63	1 thimble (sewing), in pieces
2	55-63	1 piece of terracotta pipe stem
3	55-63	Straight pin (like sewing pin).
4	55-63	One 3-prong fork
5	55-63	1 clay pipe bowl and 4 stem pieces
6	55-63	5 pieces metal, 1 piece wire
7	55-63	4 pieces clay pipe stem, 3 water-worn and one with incised decoration and letters "...OW" on one side, and "C" on other. 5 bowl fragments, 1 with letter "N", and 1 with sailing ship.
8	55-63	3 "Pig Snout" bottle necks of green glass, part of bottom side of round green bottle.
9	55-63	1 piece of clay pipe stem with letters "DIXSON" "SYDNEY"
10	57-63	4 pieces of clay pipe stem, 1 piece with letters "...UGALL" on one side and GLAS on other, and 1 piece with letters "...BARTH LOND..." on one side and "...RNS Cutty P..." on other.
11	unknown	Clay pipe bowl fragments, 2 with a sailing ship on one side and an anchor on the other, 4 with letters "BALME MILE END" in a shield, 1 with initials "TW" in an ellipse, 2 with scotch thistle. 2 stem fragments.
13	57-63	Neck of a clear glass bottle, round base of a clear glass bottle
15	post-1863	1 piece of a clay tobacco pipe stem with chipped out mouthpiece
16	55-63	2 fragments of clay pipe bowl, and pieces of 2 stems
17	55-63	2 pieces of stoneware
18	55-63	2 fragments of clay pipe bowl, and 1 red coloured fragment of clay pipe bowl, and 2 pieces of stem
23	55-63	1 clay pipe bowl with worn edges.
24	57-63	1 clay pipe bowl with 2 moulded curved horns at base, and indistinct number "387", 2 pieces of stem, one with brown varnish at narrow end.
25	57-63	1 clay pipe bowl with vine pattern.
27	55-63	Button, 4 hole bone, 1850 style
28	55-63	Buttons, 2 with 4 holes each. One has "improved four holes" written on it.
29	55-63	Coin 1839-49.
34	55-63	1 broken slate pencil, 1 copper nail, 1 metal ring.
35	55-63	Porcelain ornament base.
36	55-63	2 pieces stoneware, 1 with letters "...OTHERSPO...COTCH MARMA..".
38	57-63	1 piece stoneware jar with letters "...LLINGTON".
39	57-63	1 piece of stoneware jar (one of 23 pieces), with letters "...ON" on it.
40	57-63	Piece of metal and leather with 2 circles of mother of pearl.
41	55-63	Sole of woman's shoe.
42	55-63	2 fragments of clay pipe bowls, 4 pieces of stem.
43	55-63	1 clay pipe bowl with a short piece of stem.
44	57-63	2 fragments of clay pipe bowl and 1 piece of stem.
45	57-63	1 worn and heavily faceted base of a tumbler or vase or similar item.
46	55-63	Glassware (broken) from post-1855 beach.
47	57-63	Bottle bases, round, green glass.
48	55-63	Bottle bases, 2 square, 1 round green glass.
49	55-63	Bottle bases, square and round, green glass; bottle necks, Pig Snout in green, rimmed in clear glass.
50	55-63	1 base of ceramic goblet or vase, circular with slightly concave under-surface, and upper surface curving to a stem. Blue and white pattern of flow blue leaves on upper surface.

APPENDIX 6: PHOTOGRAPHS (OTHER ITEMS)

Items listed in Appendix 5. Scale in cm



CO1



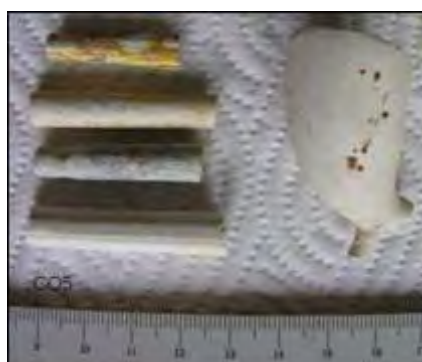
CO2



CO3



CO4



CO5



CO6



CO7



CO7 pipe decoration



CO8



CO9 text on pipe stem



CO10



CO10a letters on pipe stems



CO10b letters on reverse side of pipe stems
in CO10a



CO11 examples of motifs



CO13



CO15



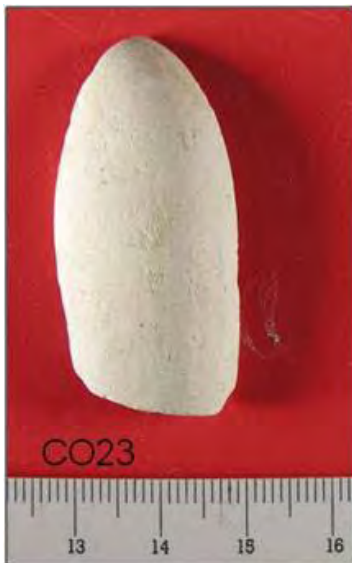
CO16



CO17



CO18



CO23



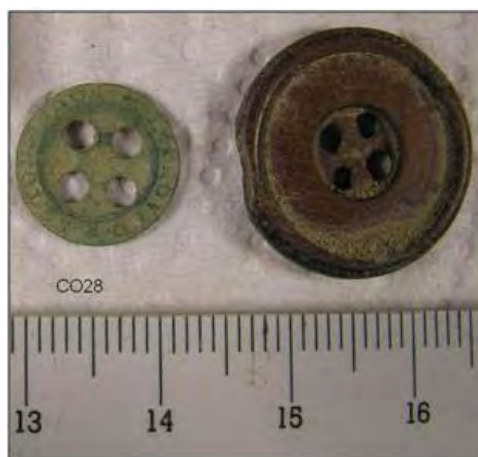
CO24



CO25



CO27



CO28



CO29



CO34



CO35



CO36



CO36



CO38



CO39



CO40



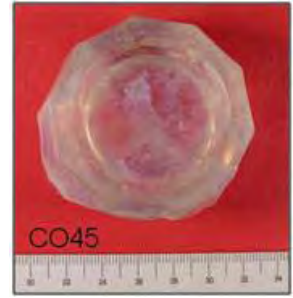
CO42



CO43



CO44



CO45



CO46



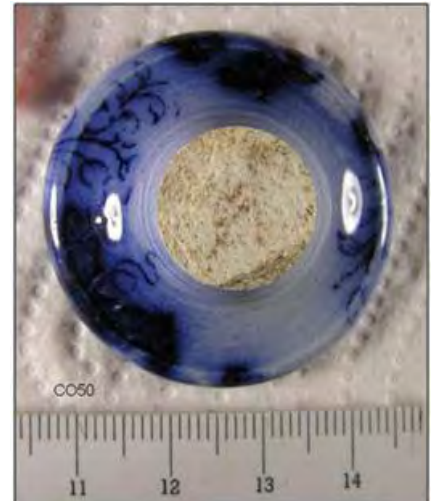
CO47



CO48



CO49



CO50

APPENDIX 7: BOTTLE WITH LABEL

Photograph (DSCN1791) of bottle with label found in the 1857-1863 reclamation material, in the trench between piles C5 and D5 (Appendix 2). The remains of the label are the light blue patch in the bottom left quadrant of the bottle image



Detail of the label shown in the previous photograph. Note the letters SM in yellow at the top of the label



APPENDIX 8: SHELLS FROM GRAVEL BEACH

Gastropods:

Buccinulum linea

Cantharidus purpureus

Cellana sp. (Limpet)

Cominella adspersa

Cookia sulcata (Cook's Turban shell)

Diloma aethiops

Haliotis iris (Paua)

Lunella smaragda (Catseye, adult and juvenile)

Maoricolpus roseus

Siphonaria australis

Bivalves:

Austrovenus stutchburyi (Cockle)

Macomona liliana

Myadora striata

Ostrea chilensis (Oyster)

Paphies australis (Pipi)

Perna canaliculus (Mussel)

Ruditapes largillierti

Tawera spissa

Echinoderm:

Evechinus chloroticus (Sea egg)

APPENDIX 9: FOUNDATIONS OF WELLINGTON COMMERCE

Building Foundations

Footprints of buildings on the north side of Chews Lane between 1889 and 1910 are shown on Thomas Ward's map (Sheet 29) of Wellington City and on cadastral maps held by LINZ (A203, A280, B378) (see Figures A9.1, A9.2, A9.3 and A9.4). There was little change in the footprints during this time, and the maps provide a good indication of the foundation layout, and also of the materials used to construct the buildings at the end of the 19th century. The archaeological remains conformed well to the footprints and construction details (Figures A9.5 and A9.6). There was very little archaeological indication of structures on the site before the buildings were erected.

The foundations contained both concrete and bricks (Table A9.1). The standard of the concrete was below that of modern concrete used for building construction, which contains steel reinforcing and angular aggregate. The concrete in the archaeological foundations contained no reinforcing, varying amounts of round and sub-round gravel and pebbles, and only a small quantity of angular aggregate, if indeed any; it also contained pieces of wood and sometimes the occasional shell. The round gravel and pebbles indicated that aggregate sources included beach deposits.

Foundations from Victoria Street buildings coincided with the external walls of the building fronting Victoria Street and Chews Lane (Table A9.1; Figure A9.5). The structure to the north of this building was wood, and no trace was seen of its foundations; they were probably destroyed by the later one storey and four storey buildings shown on DP26068 (Figure A9.5). There were two types of foundation: brick arch footings and piles overlain by concrete and brick (Figures A9.7 and A9.8); and a massive concrete footing overlain by brick (Figure A9.12). The foundations formed by the brick arches were about 1m wide, and the arches rested on brick piles of unknown depth about 2.2m apart. The bricks overlying the concrete footing were identified as probably younger than 1900AD (John Morrison, pers. comm.).

Foundations of the later four storey building fronting Victoria Street (DP26068, Figure A9.5) are included in Table A9.1 for comparison with the earlier foundations. The concrete contained more angular aggregate than the footings for the building fronting Chews Lane and Victoria Street, and the footings were supported by concrete piles at least 70cm deep (Figure A9.14).

Continued on next page

**Building
Foundations,
*continued***

Foundations from Willis Street buildings coincided with external and internal walls. There were also foundations between the building walls (Figure A9.6). All foundations consisted of a concrete footing overlain by bricks. The foundations beneath external walls were generally more massive than those within the building footprints, and had several lines of bricks laid longitudinally along the concrete footing (Figures A9.15 and A9.16). The foundations beneath internal walls differed slightly from those between the internal walls, which appear to have supported floor joists. Beneath the internal walls, a layer comprising two lines of bricks laid longitudinally, alternated with a layer of bricks laid transverse to the concrete footing (Figures A9.17 and A9.18); the foundations below floor joists were layers of bricks a single line wide, laid longitudinally along the concrete footing (Figure A9.19).

References

Bowman, I. nd. Report on Heritage Values: 29-33 Willis St; 35 Willis St; 37-43 Willis St; 42-48 Victoria St; 45-53 Willis St; 50-54 Victoria St; 55 Willis St; 56 Victoria St; 58-60 Victoria St. Unpublished Report.
LINZ Survey and Cadastral Plans: A203, A280, B378, DP26068, SO20564.

Table A9.1. Comparison of foundation characteristics

Buildings with Victoria Street frontage			
	1889-1891	Post-1900 (?)	Post-1904
Parent Structure	Three storey brick building constructed between 1886 and 1889 (A203, A280, Ward 1891).	Three storey brick building (possibly the replacement of, or refurbishment of, pre-1891 building). Age inferred from the style of bricks.	Four storey brick building (DP26068).
Wall	External wall of building (A and A', Figure A9.5).	External wall of building (B, Figure A9.5).	External wall of building (C and C', Figure A9.5).
Construction	Brick arches with 30cm thick concrete course above, and brick above the concrete. Width of the foundation about 1 m. Arches rested on brick piles of unknown depth, about 2.2m apart. Arch height was 0.5m (A and A', Figure A9.5; Figures A9.7 and A9.8).	Massive concrete footing >1 m deep and c 1m wide with brick courses above (B, Figure A9.5; Figure A9.12). Concrete poured in a wooden formwork of planks 26.5cm and 16cm wide.	Concrete footing 30cm to 40cm thick over concrete piles 30cm diameter and 70cm long (Figure A9.14). Concrete poured over a sub-grade of boulders and gravel. Brick courses above concrete.
Concrete Aggregate	Coarse round gravel and pebbles (no visible shells or wood).	Fine, medium and coarse round beach gravel, some angular gravel (no visible shells or wood) (Figure A9. 13).	Angular stones up to 20cm long and boulders, round pebbles and shells present (Figure A9.11).
Reinforcing	No	No	No

Table A9.1 continued

Buildings with Willis Street frontage				
	1889-1910			Between 1910-1964
Parent Structure	Two storey brick building constructed before 1889 (A203, A280, Ward 1891, B738).			
Wall	External and internal walls of building			Ground Floor External walls of building.
	External	Internal	Floor Support	External
Construction	Concrete footing, rectangular in cross-section, with brick courses several bricks wide, laid longitudinally along the line of the foundation (A and A', Figure A9.6; Figures A9.15 and A9.16). Cross-section dimensions of the concrete foundations variable, but generally between about 15cm to 54cm thick, and 5cm to 80cm wide, with maximum recorded width of 105cm. Remains of wooden formwork seen on the concrete footing of the foundation alongside Chews Lane but otherwise not always apparent; for some footings concrete possibly poured into a dug trench without formwork.	Concrete footing, dish-shaped in cross-section (Figure A9.17), with brick courses laid longitudinally and laterally along the line of the concrete footing (Figure A9.18), to give brick work two bricks wide laid longitudinally, and one brick wide laid laterally (B and F, Figure A9.6). Cross-section dimensions of the concrete footing are variable, and generally between 15cm and 27cm thick, and about 45cm wide. Construction apparently carried out by pouring the concrete into a shallow dish-shaped trench without any formwork.	Concrete footing, dish-shaped in cross-section similar to that shown in Figure A9.17, with single line of bricks laid longitudinally along the line of the footing (C, Figure A9.6; Figure A9.19). Timber floor joist laid on top of the bricks (Figure A9.20). Cross-section dimensions of the concrete footing are variable, and generally between 9cm and 25cm thick, and between 30cm and 36cm wide. Construction apparently carried out by pouring the concrete into a shallow dish-shaped trench without any formwork.	Concrete footing, rectangular in cross-section, with brick courses above (E, Figure 9.6). Cross-section dimensions of the order of 75cm wide and 95cm thick.
Concrete Aggregate	Fine, medium, and coarse round and sub-round gravel, brick fragments, angular gravel and small stones, occasional wood fragments.			Not recorded.
Reinforcing	No	No	None seen	

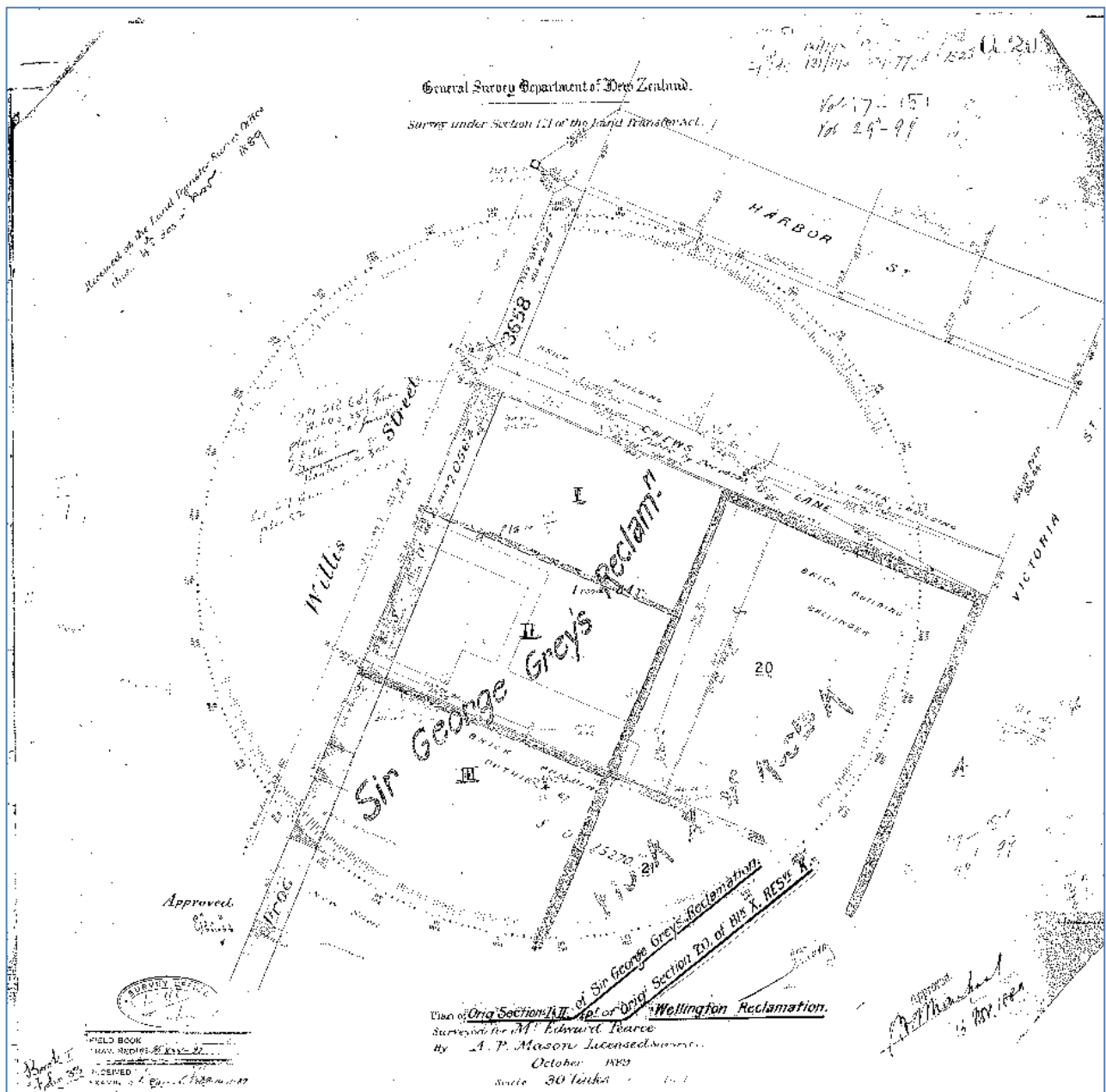


Figure A9.1. Cadastral plan A203, showing the south edge of the 1889 building footprints on the north side of Chews Lane, and the construction material of the buildings

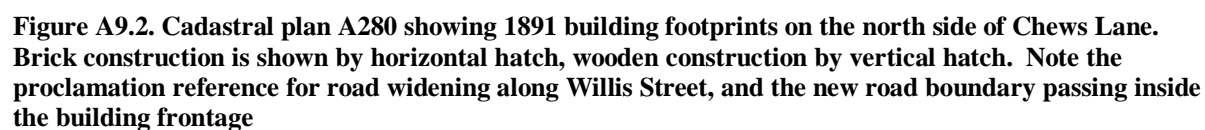


Figure A9.3. Thomas Ward Plan (part of Sheet 29) showing 1891 building footprints on the north side of Chews Lane and some construction details. Numbers in triangles indicate the number of floors in the buildings greater than one. The four buildings fronting Willis Street have 2 floors; the rear of the building fronting Victoria Street and Chews Lane has three floors, the front buildings one floor. Double lines depicting buildings indicate brick walls; single lines, wooden walls; hatched lines, iron walls

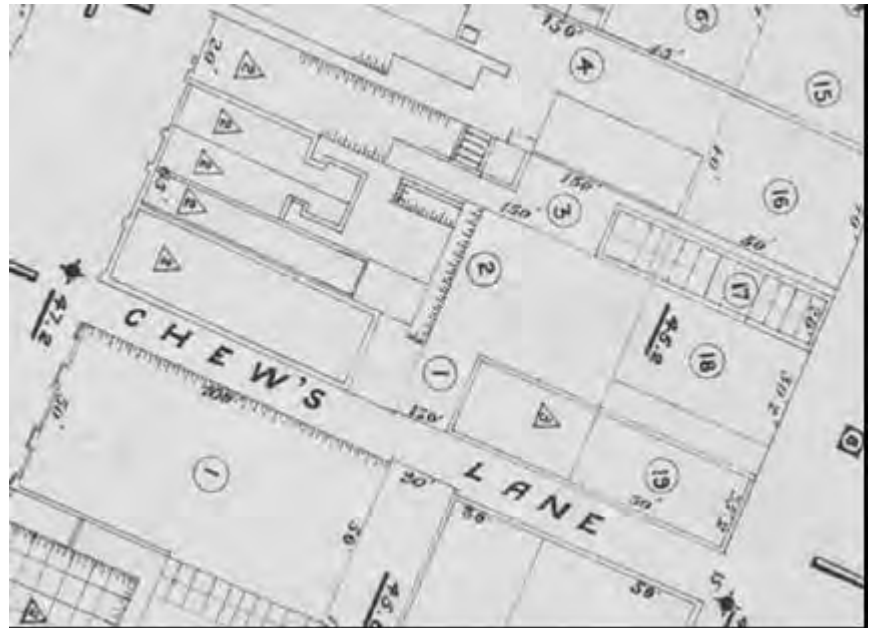


Figure A9.4. Part of cadastral plan B378 showing footprint of buildings on the north side of Chews Lane fronting Willis Street

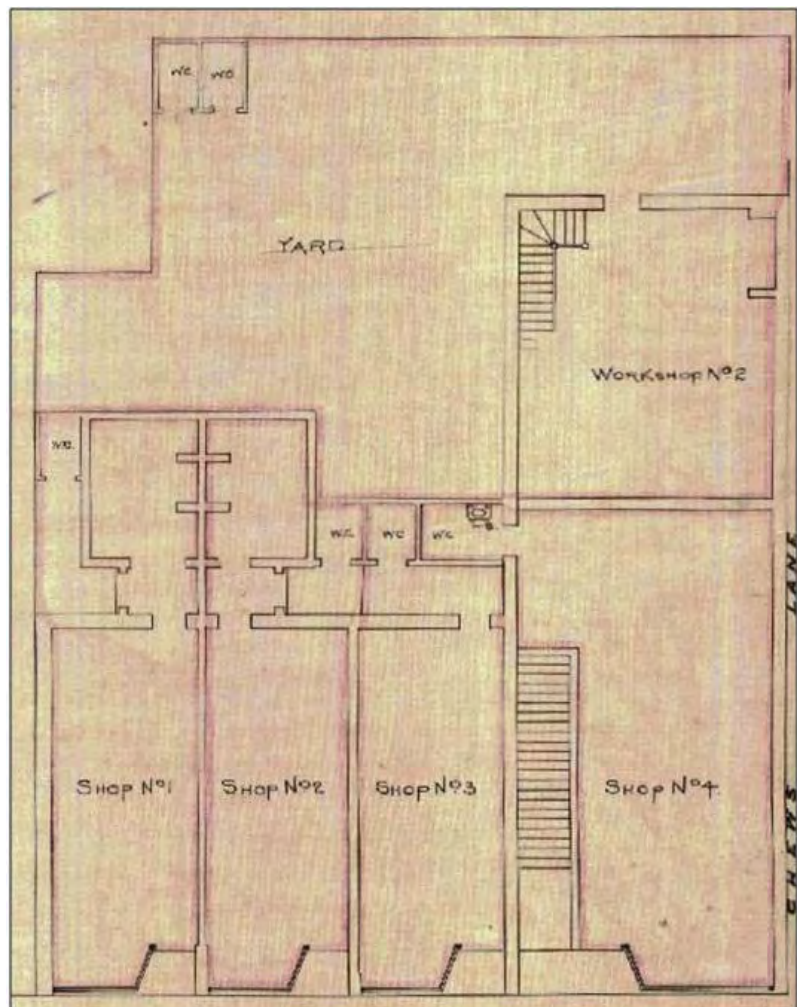


Figure A9.5. Plan showing the archaeological foundations and building footprints fronting Victoria Street. A and A' = brick arch foundations. B = foundation with massive concrete footing and brick courses above (building is probably younger than 1900). C and C' = foundations with concrete footings and concrete piles beneath them, with brick courses above (building is probably mid-20th century)

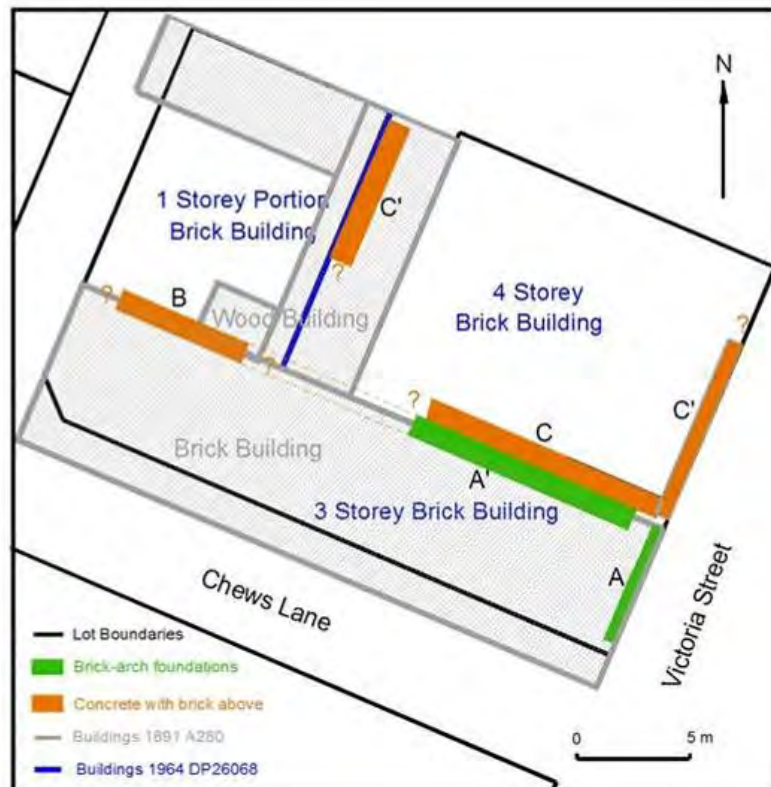


Figure A9.6. Plan showing the archaeological foundations and building footprints fronting Willis Street. A = foundations below external walls, B = foundation below internal wall separating two shops in the same building. C = foundations not beneath walls, probably used to support floor joists. D = foundation below external wall present in the section along the Willis Street road frontage, showing signs of later strengthening. E = a foundation for the external wall of a building erected after 1910. F = external wall of 1910 building annex



Figure A9.7.
Brick arch
foundation along
the south end of
the Victoria
Street road
frontage (A,
Figure A9.5)
(image compiled
from two
overlapping
photographs).
Note the infill of
brick between
the complete
arch and the next
arch at the right
hand side of the
photograph.
Scale = 50cm



Figure A9.8.
Underside of
brick arch
foundation, along
the north side of
the three story
building fronting
Victoria Street
(A', Figure A9.5)



Figure A9.9.
Brick arch (at right) after removal of the left hand section of curve, and the arch support pile (bottom left)



Figure A9.10.
Brick arch foundation (Figure A9.8) with the younger, abutting concrete footing and bricks of the foundation of the building to the north. Concrete aggregate included angular stones more than 10cm long, and round beach gravel and pebbles (See Figure A9.11)



Figure A9.11.
Round gravel
and pebbles with
sea shell from
poorly cemented
aggregate
forming part of
the concrete
foundation
footing (C,
Figure A9.5)



Figure A9.12.
Foundation with
a massive
concrete footing
and bricks above
(B, Figure A9.5).
Note the
rounding of the
brick upper
surface, probably
a result of
demolition of the
wall in
preparation for a
new building



Figure A9.13.
Concrete
aggregate used in
the massive
concrete footing
(Figure A9.12).
Note the round
and sub-round
gravel and
pebbles

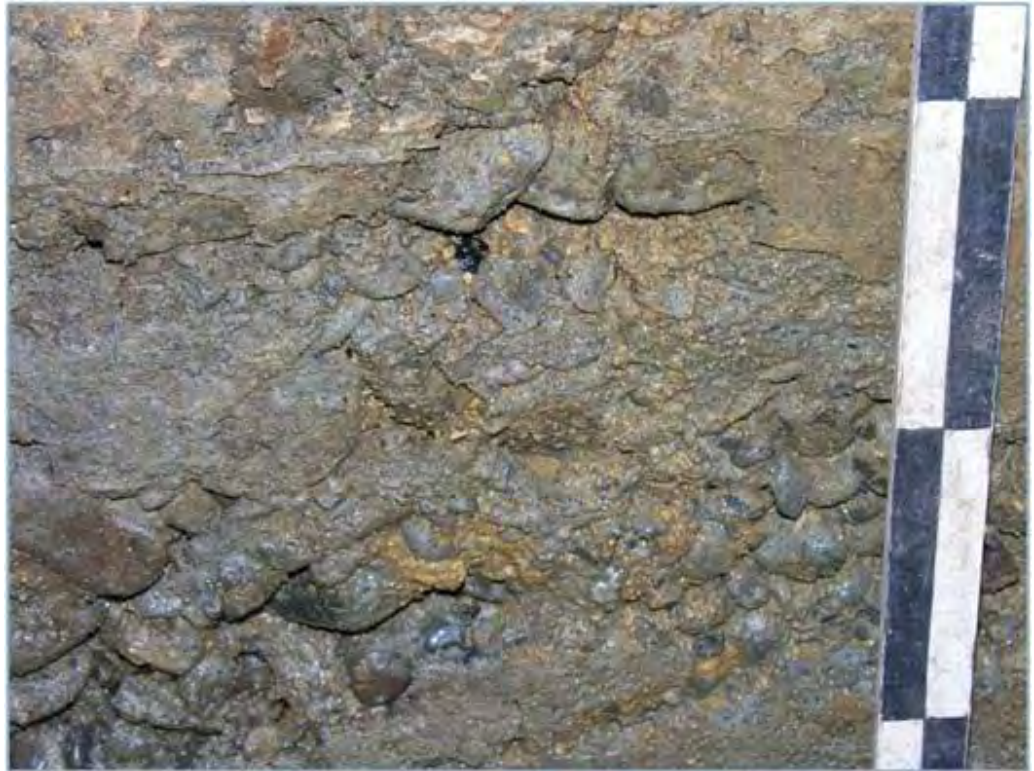


Figure A9.14.
Concrete footing
with piles
beneath along the
front of the four
story building
fronting Victoria
Street (C', Figure
A9.5)



Figure A9.15.
Concrete footing
with bricks above
forming the
foundation for
the external wall
of the building on
the corner of
Chews Lane and
Willis Street (A',
Figure A9.6)



Figure A9.16.
Concrete footing
of the foundation
shown in Figure
A9.15 showing a
flat surface that
is probably the
result of wooden
formwork.
Whether the
formwork was
part of the
original
foundation
construction or
dates from when
the foundation
was strengthened
is not known



Figure A9.17.
Concrete footing
of brick wall the
width of one
brick laid
laterally across
the footing, or
two bricks laid
longitudinally
along the footing
(B, Figure A9.6)



Figure A9.18.
Laterally laid
bricks of building
wall similar to
that shown in
Figure A9.17



Figure A9.19.
Single brick
alignment on a
concrete footing
(C, Figure A9.6),
probably used to
support floor
joists (see Figure
A9.20)



Figure A9.20.
Wooden floor
joist on top of a
single brick
alignment
(Figure A9.19).
The concrete at
the top of the
joist is from a
later floor. Scale
= 10cm



Figure A9.21. Concrete footing and brick work of external wall of building at D, Figure A9.6, on the Willis Street road frontage. The original footing is the lighter-coloured concrete immediately below the bricks. The slightly darker concrete below the light coloured concrete, and to the left and right of the bricks, is later and probably to strengthen the foundation below the building frontage when Willis Street was widened

