

LYTTELTON GRAVING DOCK PUMPHOUSE (M36/327), CYRUS WILLIAMS QUAY, LYTTELTON: REPORT ON ARCHAEOLOGICAL MONITORING

HNZ AUTHORITY 2016/248EQ

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INTRODUCTION

Subsequent to the earthquake on 22 February 2011 the pumphouse (M36/327) at Lyttelton Graving Dock, Cyrus Williams Quay, Lyttelton, was demolished (Figure 1 and Figure 2). On 10 September 2015 Heritage New Zealand Pouhere Taonga issued an emergency authority (2016/248eq) under Clause 11(1) of the Canterbury Earthquake (Historic Places Act) Order 2011 to Lyttelton Port Company. This authority was issued to allow Brownlees Contracting Ltd to carry out earthworks for the new pumphouse build. An authority was required as the works would cover and affect part of the original pumphouse foundations (which still remain extant) as well as affecting any potential sub-surface deposits. As per condition 2 and 3 of the HNPT archaeological authority the foundations were recorded before works commenced and all earthworks were monitored.

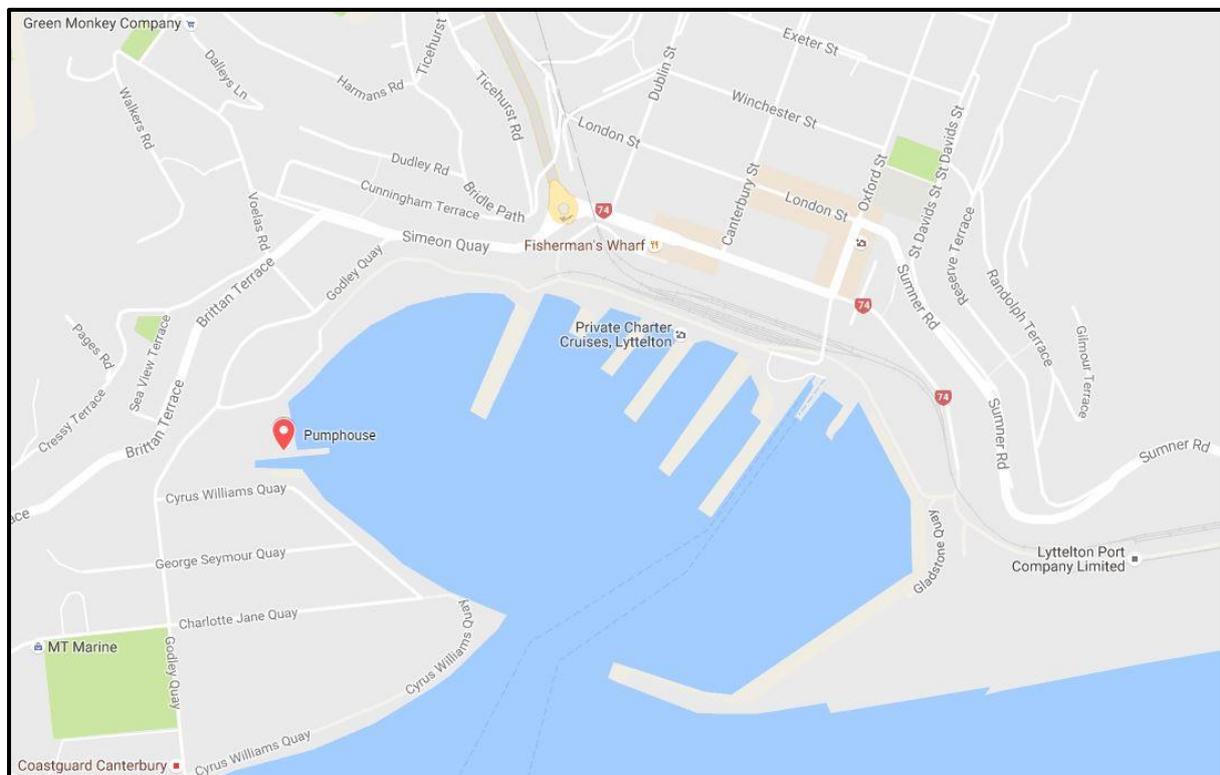


Figure 1. Lyttelton, showing the location of Lyttelton graving dock pumphouse (marked by the red pin). Image: Google Earth.

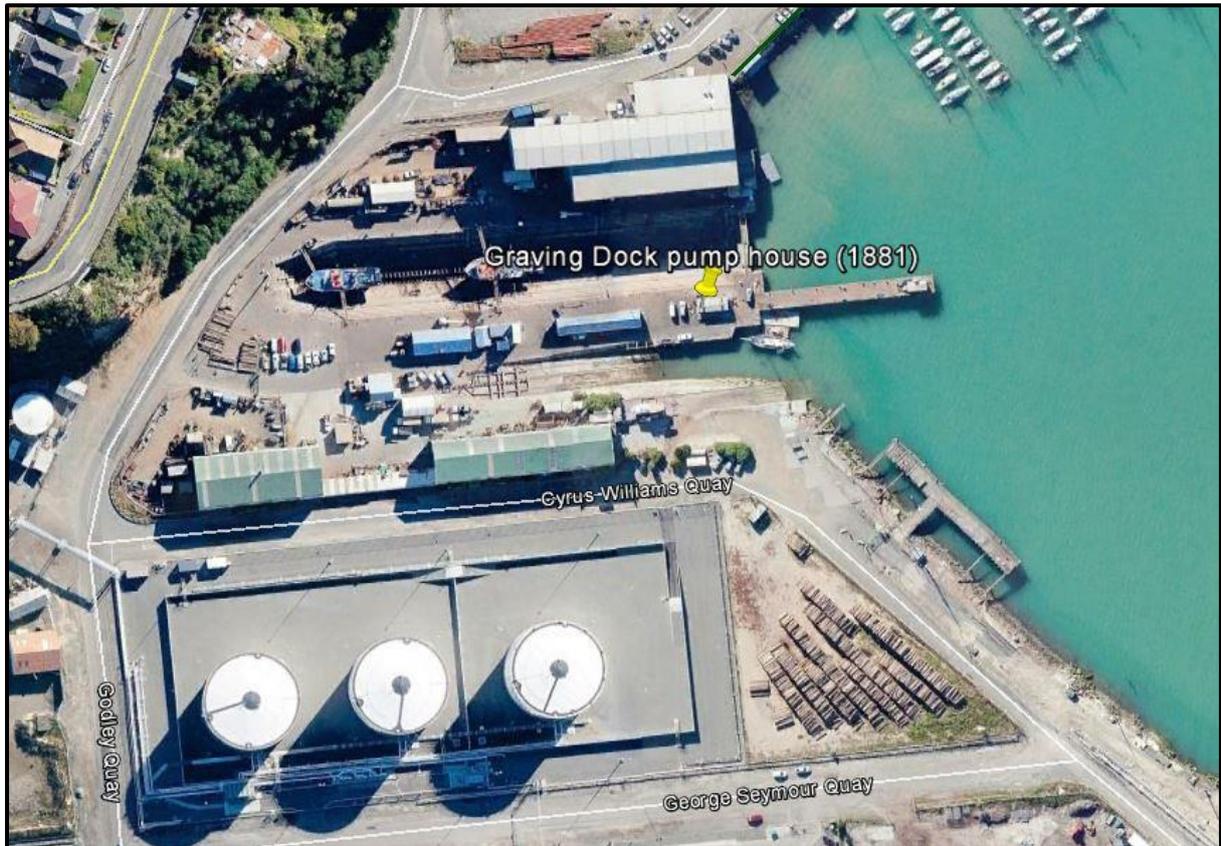


Figure 2. Location of the Lyttelton graving dock pump house (marked by the yellow pin). Image: Google Earth.

HISTORICAL BACKGROUND

The premise for a graving dock at Lyttelton originated with the Provincial Council in 1875 in response to the increasing number of shipping accidents involving vessels using the port. This included the construction of a pumphouse.

Construction eventually went ahead under the jurisdiction of the newly-constituted Lyttelton Harbour Board (1877), when in October 1879 the successful tenderers, Ware & Jones, were awarded the contract and work began (Figure 3 and Figure 4). In July of the following year the Board decided to increase the length of the proposed dock by 15 metres, and in February 1882 the structure was completed. With the iron caisson finally installed, the graving dock was officially opened by the acting Governor, Sir James Prendergast, on January 3 1883 when the *Hurunui* entered into the dock (Heritage New Zealand 2015; Figure 5).



Figure 3. The graving dock during construction, 1880. Notice the area where the pumphouse was to be built – it appears to be a road way at this time. Photograph courtesy of Hal Upton.

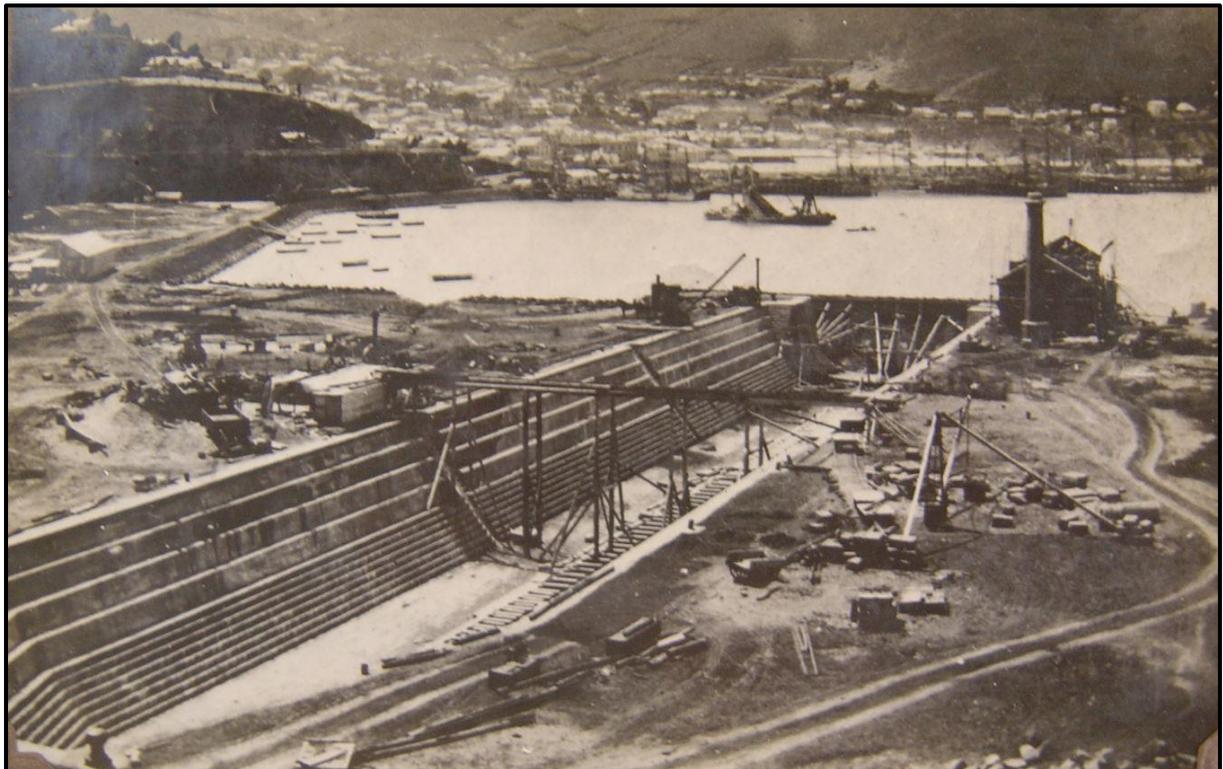


Figure 4. The graving dock in 1881 nearing completion. The pumphouse can be seen in the middle distance, to the right. Photograph courtesy of Hal Upton.



Figure 5. The graving dock and pumphouse when the Hurunui entered into the dock, 1883. Photograph courtesy of Hal Upton.

The Lyttelton graving dock pumphouse was built in c.1881-82 (Rice 2004: 49). The pumphouse was a brick structure with a pitched iron roof (Figure 6). The original pumps were imported from the English firm of Easton and Anderson and they make it possible to empty the dock in about 4½ hours (Heritage New Zealand 2015). The pumping equipment including the impeller, propeller and brass water gates, which have been well maintained and are serviced every two years, still remain (Hal Upton, pers. comm.). Now, however, they are powered by modern electric motors rather than coal and steam. Besides ship construction, modification and repair, the dry dock has also been used throughout the years as a recreational swimming pool by local schools and groups (Figure 7).



Figure 6. At left, the pumphouse prior to demolition, with the graving dock to the right. Photograph courtesy of Hal Upton.

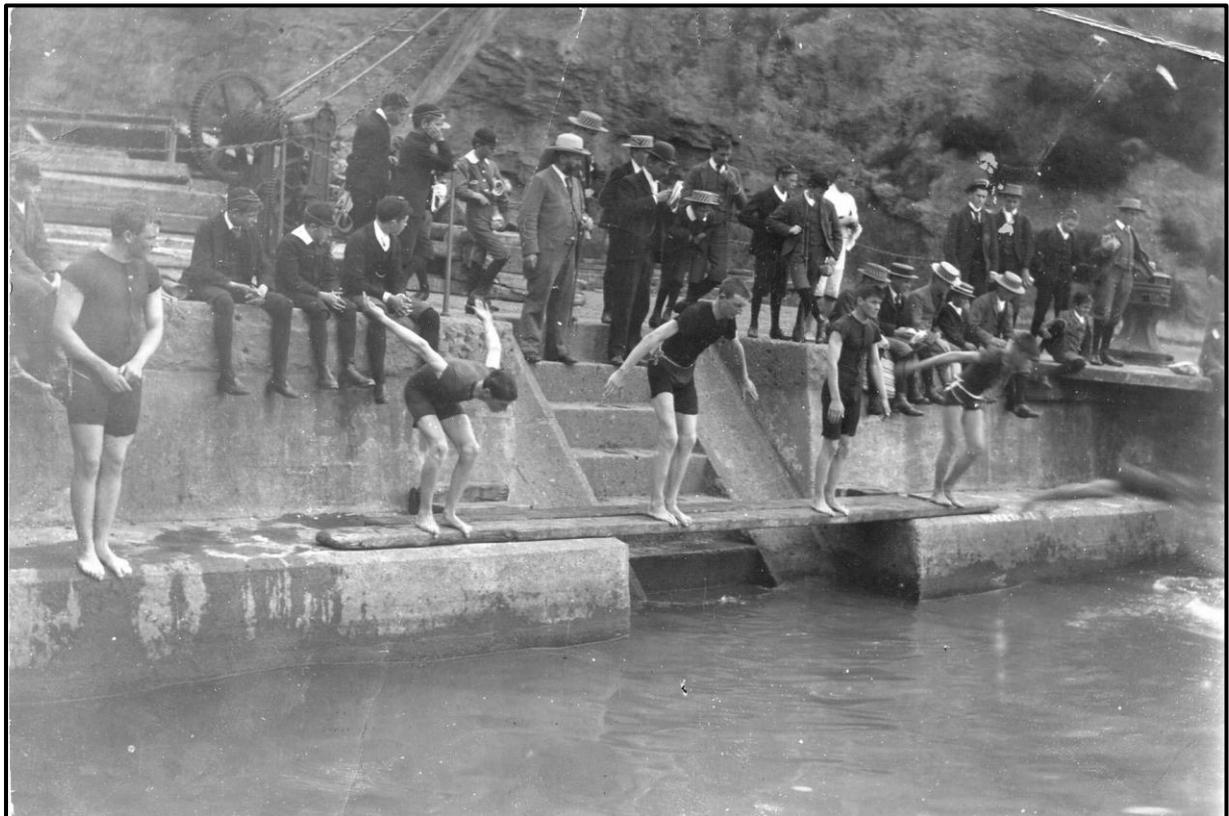


Figure 7. Swimming sports being held within the graving dock, c. 1892. Photograph courtesy of Hal Upton.

The graving dock pumphouse is registered as a Category I Historic Place by Heritage New Zealand (along with the graving dock; Reg. No. 4389). The large brick chimney of the pumphouse was demolished in 1931, and following the Canterbury earthquakes, the building was demolished,

leaving the pumping equipment intact. A corrugated iron shed was subsequently built over the original pumphouse footprint to temporarily protect the pumping machinery until these works commenced.

ARCHAEOLOGICAL MONITORING OF EARTHWORKS

Between 12 May and 2 August 2016 the earthworks at Lyttelton graving dock, Cyrus Williams Quay, Lyttelton, were carried out by Brownlees Contracting Ltd using a mechanical excavator, with Luke Tremlett (Underground Overground Archaeology) monitoring the work. This work involved excavating a trench immediately outside the extant pumphouse footings in order to build a new pumphouse to protect the pumping gear. Also, two small excavations were carried out to the west of the new pumphouse footings as part of these works. A scale drawing of the site was prepared showing the location of all earthworks (Figure 8 and Figure 9).

The earthworks involved trenching 300 mm wide around the extant foundations of the former pumphouse to 400 mm depth. The stratigraphy of each of the outer trench baulks was drawn (Figure 11). These drawings show each profile as seen from within the pumphouse.

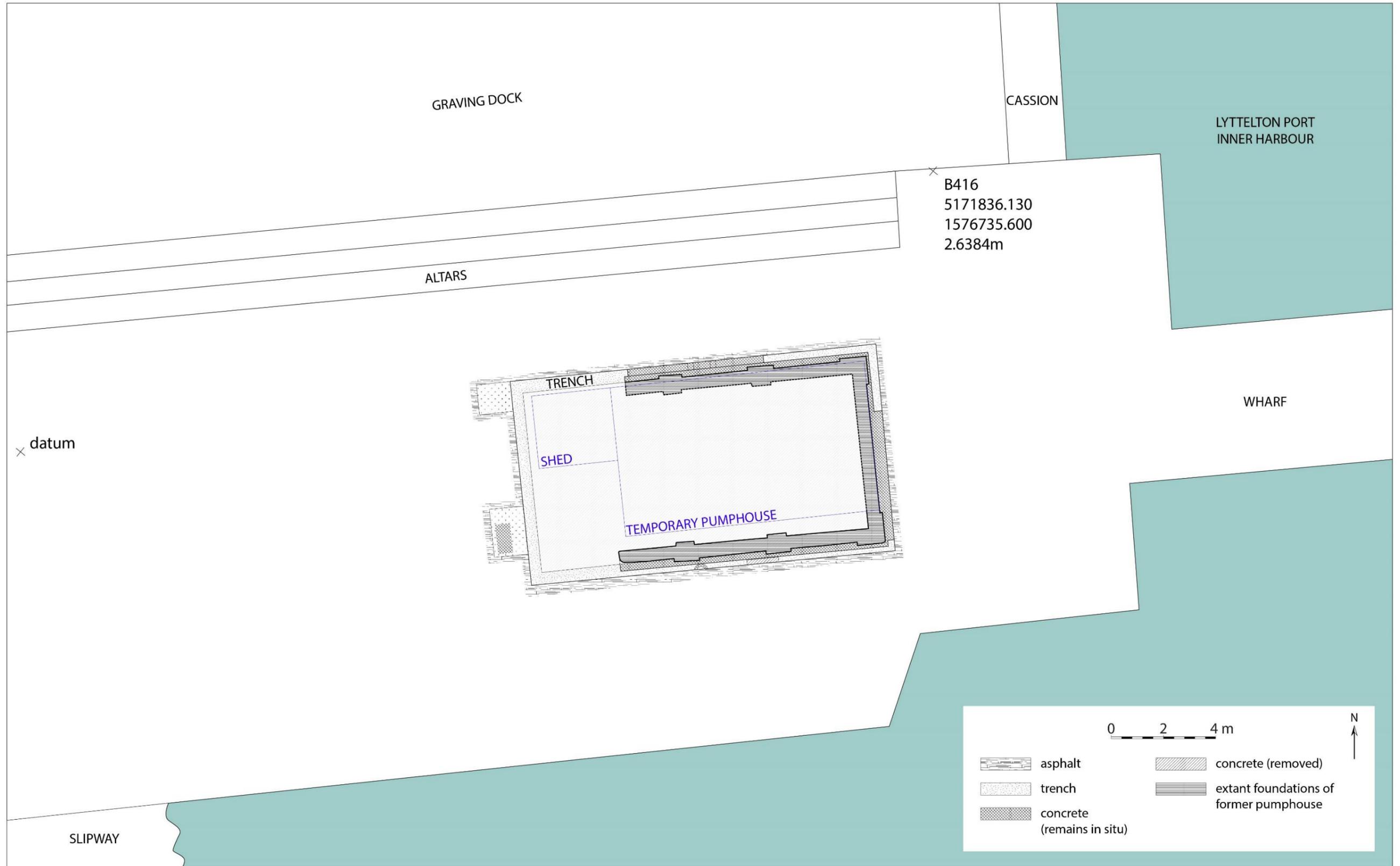


Figure 8. Site plan showing the location of the works.

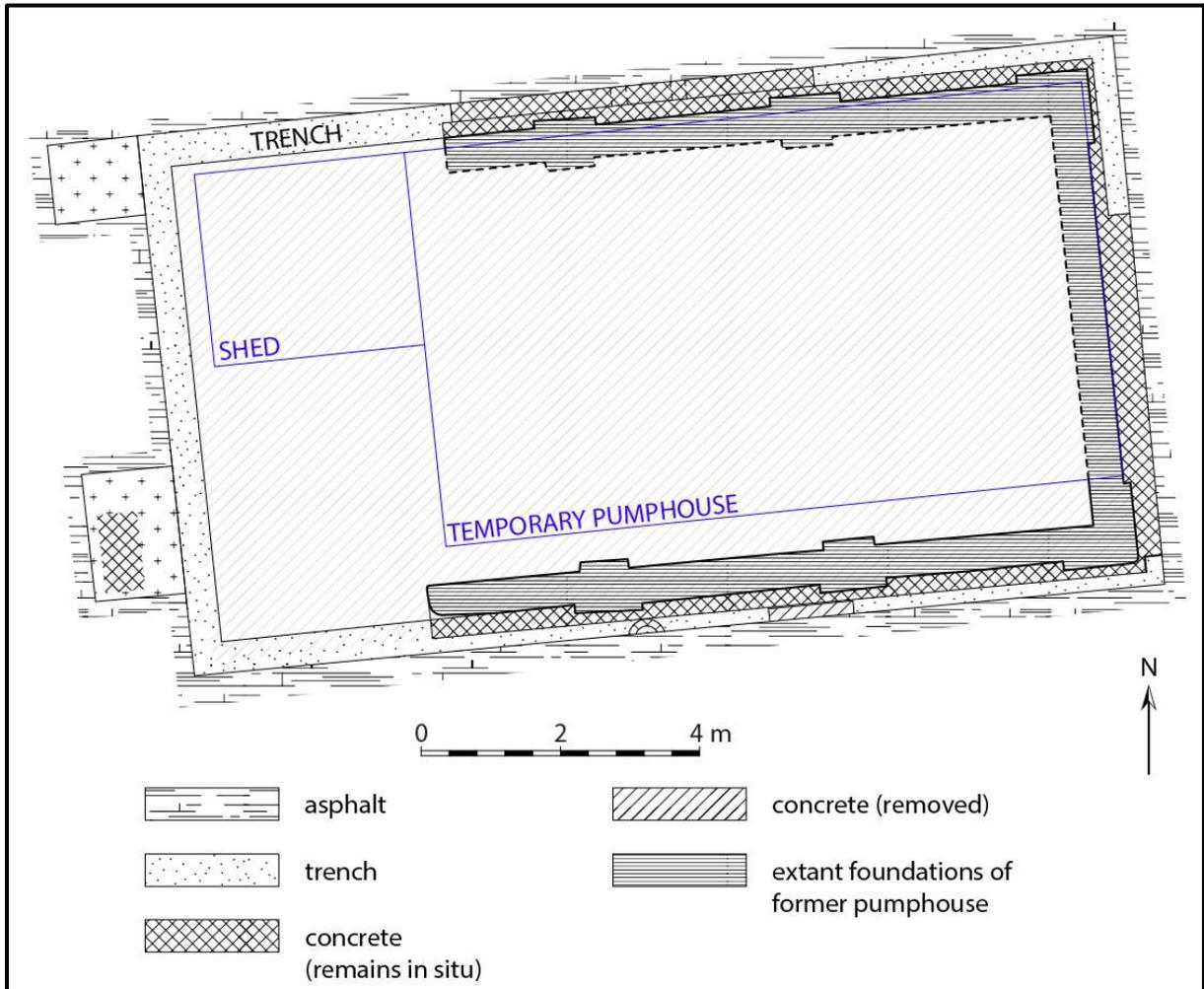


Figure 9. Detail showing the pumphouse foundations and associated earthworks.

Pumphouse foundations

The original foundations of the former pumphouse were constructed in concrete. Extending from this foundation were the brick walls of the pumphouse. Here, three brick courses were left in situ revealing an English bond pattern which measured approximately 300 mm from the concrete foundation (Figure 10). The top-most brick course sat above the asphalt. The bricks did not have any visible makers marks but appeared to be handmade slop/pallet moulded bricks constant with the time period. During the earthworks it was discovered that the concrete foundations of the former pumphouse extended 130-140 mm from the north, east and south elevations of the building – the foundations where buttresses were located did not extend any further (Figure 10). The west end of the pumphouse once adjoined the boiler room, the foundations of which had been removed prior to these earthworks.



Figure 10. The footings of the former pumphouse exposed under the asphalt in the south trench. Both images look east.

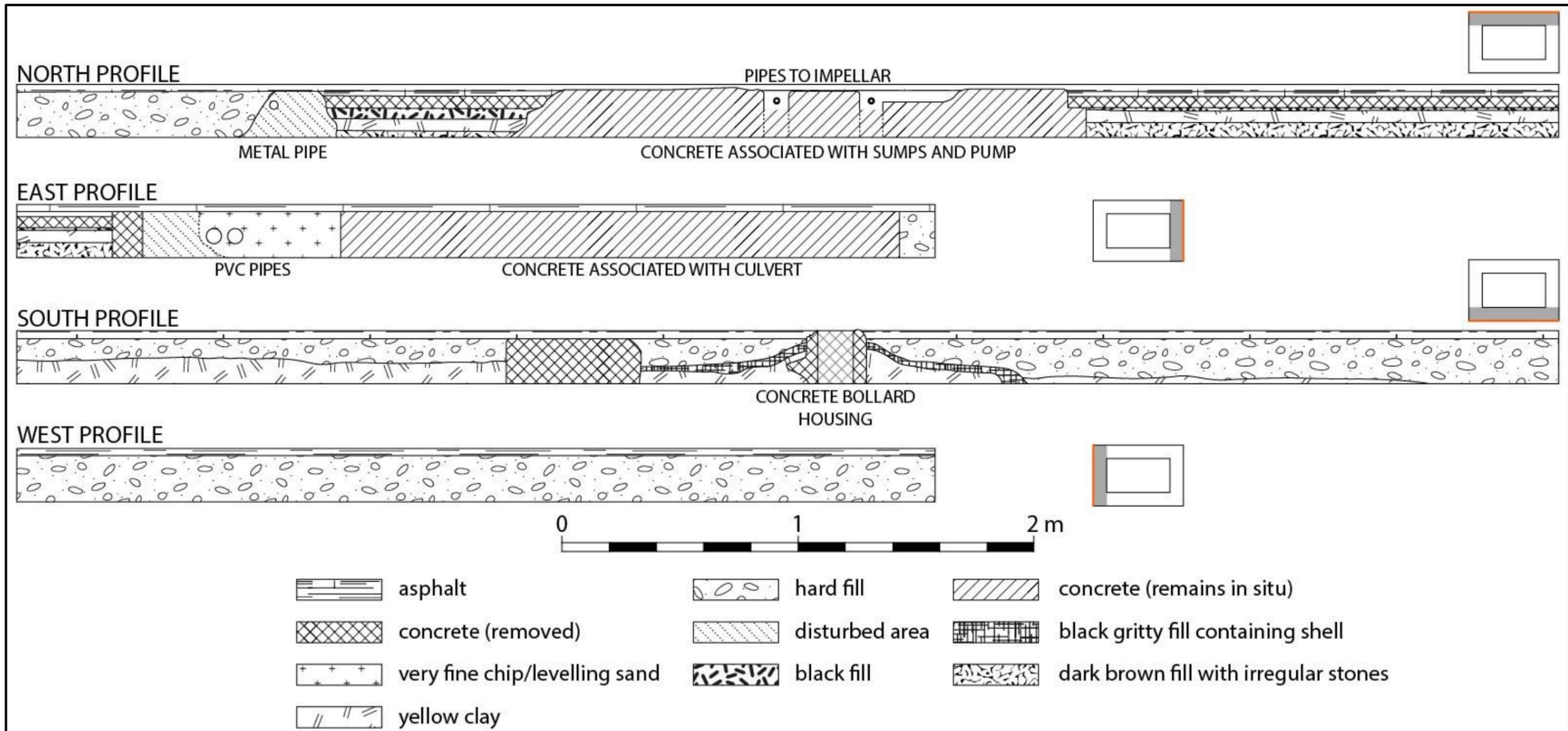


Figure 11. The stratigraphy observed in each trench during the works.

North trench profile

Found in the north baulk was a large concrete support located between the pumphouse and the sumps to the north (Figure 12). Here, two black 20th century pipes run from these sumps to the impeller, delivering freshwater as lubricant when the pump is operational (Figure 12). It is not clear whether this concrete was 19th or 20th century. This was left in situ.



Figure 12. The concrete found in the trench to the north of the pumphouse. The two black pipes leading from the concrete deliver fresh water from the sumps to lubricate the impeller when the pump is operational. Left: facing south. Right: facing west.

The west portion of the north baulk had been disturbed, presumably by the removal of the foundations to the west and consisted of asphalt on top of hard fill (Figure 12 and Figure 13). The stratigraphy comprised the following strata:

1. The first stratum was a layer asphalt 85 mm thick.
2. The second stratum was a layer of asphalt 50-55 mm thick.
3. The third stratum was a layer of concrete 110 mm thick.
4. The fourth stratum was a layer of black fill or chip which was 100 mm thick east of the concrete supports mentioned above and 10-20 mm thick west of this.
5. The fifth stratum was a yellow clay approximately 100 mm thick.
6. The sixth stratum was a layer of dark brown fill with irregular shaped stones. This was found to be between 50 and 125 mm thick. The base of this was not reached.

None of the layers appeared to be natural.



Figure 13. The stratigraphy of the north profile, looking east.

East trench profile

Here, a large section of concrete was found and this appeared to be attached to the pumphouse foundations. Therefore, it is most likely that this section of concrete dated to c. 1881-82. This most likely supported the large culvert where water is pumped from the dock to the sea (Figure 14 and Figure 15). This was left in situ.



Figure 14. The large section of concrete found during trenching that is most likely associated with supporting the graving dock culvert. Left: facing north. Right: facing south - notice the very fine chip or levelling sand in the foreground.



Figure 15. The existing sea wall located to the east of the pumphouse. Notice the culvert to the right – the concrete seen in the trench is likely to have supported this culvert. Both images look west.

The stratigraphy observed in the north end of the east profile matched that seen in the north profile. However, a very fine chip or levelling sand was observed around PVC services and hard fill was seen to the south (Figure 14).

South trench profile

Two features were found in the south trench – a large section of concrete and what appeared to be a bollard and concrete casing. The fine-grained nature of the concrete suggested that both dated to the 20th century, and these features were removed. The concrete sat clear of the extant pumphouse footings and was not a working part of pumphouse operation (Figure 16). The bollard and concrete casing appeared to pre-date the asphalt and hard fill surrounding it (Figure 17). A black fill layer (containing at least one oyster shell fragment) sloped down from near the top of the concrete housing to the base of the trench and so appeared to have been deposited after the concrete bollard

housing was constructed (Figure 18). Perhaps this black fill layer represents an earlier working surface prior to the deposition of the hard fill and asphalt.

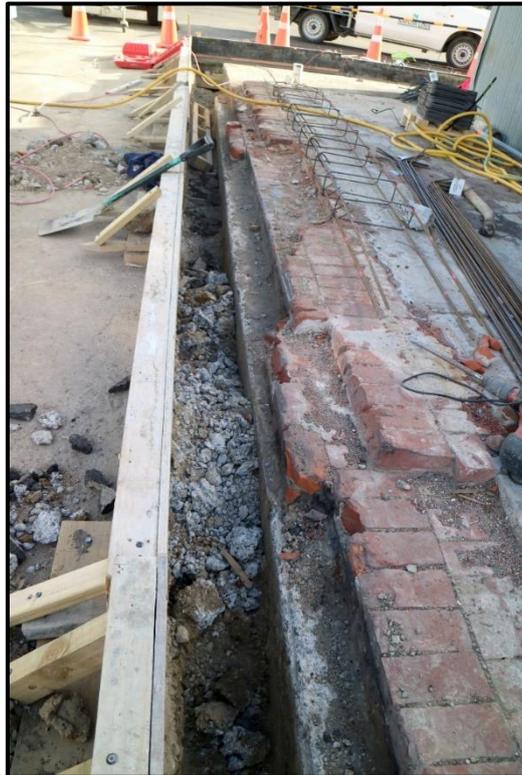


Figure 16. The section of concrete that was removed from the trench to the south of the pumphouse. Here it has been broken before it will be removed.



Figure 17. The bollard found within the south trench.



Figure 18. The concrete bollard housing which has a layer of black soil associated with it.

West trench profile

The trench here consisted almost entirely of asphalt on top of hard fill. This is most likely because part of the pumphouse extended from this elevation of the building, the foundations of which were most likely removed and replaced with hard fill.



Figure 19. The stratigraphy of the west trench profile.

Excavation west of the building footprint

During the construction of the new pumphouse two areas were excavated immediately west of the new pumphouse foundations. The northern-most area was excavated to a depth of approximately 200 mm and only hard fill was observed (Figure 20).



Figure 20. The northern-most area excavated to the west of the new pumphouse building footprint. Looking east.

The southern-most area was excavated to a depth of approximately 400 mm. Here, a section of concrete was found to the southwest (Figure 21). This is shown on the site plan. It remains unclear what this concrete was once associated with, although it could be from the part of the pumphouse that sat in this location, and was removed in 2011. The concrete was encountered at approximately 300 mm depth and the base of this was not reached. Hard fill was all that was observed at this depth and the concrete remains in situ.



Figure 21. The southern-most area excavated to the west of the new pumphouse building footprint. Looking east.

DISCUSSION AND CONCLUSION

The earthworks for the new pumphouse at the Lyttelton graving dock, Cyrus Williams Quay, Lyttelton, were monitored by an archaeologist due to the potential for the works to affect subsurface archaeological remains associated with the occupation of the section prior to 1900. No artefacts were found during the works, although a number of archaeological features were found. This, combined with the stratigraphy recorded, suggests that the land around the building has been progressively built up and modified for at least the last 130 years. Although excavation occurred to only 400 mm depth, several layers were found to suggest that they were once working surfaces of the area. These include three layers of asphalt and concrete and three layers of fill and clay. It is possible that archaeological material remains in situ elsewhere at the site and deeper in the area affected by these works. As a result of these works, more has been learnt about the graving dock pumphouse and the site record form has been updated.

REFERENCES

Heritage New Zealand, 2015. Lyttelton Graving Dock and Pump House. [online] Available at: <http://www.heritage.org.nz/the-list/details/4389> [Accessed September 2015].

Rice, G., 2004. *Lyttelton: Port and town. An illustrated history*. Canterbury University Press, Christchurch.