



Northamptonshire Archaeology

Archaeological evaluation at South Quay Hayle Harbour, Cornwall June-July 2011



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OASIS REPORT FORM

PROJECT DETAILS		
Project name	Archaeological evaluation at South Quay, Hayle Harbour, Cornwall June-July 2011	
Short description	In June-July 2011 Northamptonshire Archaeology undertook a trial trench evaluation on behalf of Prospect Archaeology and their client ING Red UK at South Quay, Hayle, Cornwall. The quay, which is designated along with the rest of the harbour as a World Heritage Site as part of the Cornwall and West Devon Mining Landscape, is the subject of proposals for commercial and residential development. Trenches successfully located buried quay walls of Carnsew dock, the join between the stone and timber quay/slipway and parts of two buried slipways.	
Project type	Evaluation (HH11)	
Site status	Harbour quay	
Previous work	Northamptonshire Archaeology evaluation 2010	
Current Land use	Harbour/waste ground	
Future work	Unknown	
Monument type/ period	Industrial	
Significant finds	Quay walls and building footings	
PROJECT LOCATION		
County	Cornwall	
Site address	South Quay, Hayle Harbour, Hayle	
Study area	c 3.5ha	
OS Easting & Northing	NGR 15570 07400	
Height OD	0-5mOD	
PROJECT CREATORS		
Organisation	Northamptonshire Archaeology (NA)	
Project brief originator	Cornwall Council's Historic Environment Planning Advice Officer	
Project Design originator	Northamptonshire Archaeology (NA)	
Director/Supervisor	Tim Upson-Smith	
Project Manager	Ian Meadows/Adam Yates	
Sponsor or funding body	ING Red UK (Hayle Harbour) Ltd	
PROJECT DATE		
Start date/end date	June 2011-July 2011	
ARCHIVES		
	Location	Content (eg pottery, animal bone etc)
Paper	Northamptonshire Archaeology	Site records, photographic, drawings
Digital	Northamptonshire Archaeology	Mapinfo GIS data, photographs
BIBLIOGRAPHY		
	Unpublished client report (NA report)	
Title	Archaeological evaluation at South Quay, Hayle Harbour, Cornwall June-July 2011	
Serial title & volume	Northamptonshire Archaeology Report 11/164	
Author(s)	Tim Upson-Smith	
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**ARCHAEOLOGICAL EVALUATION AT
SOUTH QUAY, HAYLE HARBOUR, CORNWALL
PHASE 2: JUNE-JULY 2011**

ABSTRACT

In June-July 2011 Northamptonshire Archaeology undertook a trial trench evaluation on behalf of Prospect Archaeology and their client ING Red UK at South Quay, Hayle, Cornwall. The quay, which is designated along with the rest of the harbour as a World Heritage Site as part of the Cornwall and West Devon Mining Landscape, is the subject of proposals for commercial and residential development. Trenches successfully located buried quay walls of Carnsew dock, the join between the stone and timber quay/slipway and parts of two buried slipways.

1 INTRODUCTION

Northamptonshire Archaeology (NA) was commissioned by Prospect Archaeology on behalf of their client, ING Red UK (Hayle Harbour) Ltd, to undertake a further trial trench evaluation at South Quay, Hayle Harbour, Cornwall (NGR SW 5570 7400, Fig 1). The work was undertaken at the recommendation of the Cornwall County Council's (CCC) Historic Environment Planning Advice Officer (HEPAO) in response to an application for outline planning permission for commercial and residential development of the site (Application no 09-1334-ORM) and in accordance with a brief prepared by CCC (2010) and the method statement prepared by Northamptonshire Archaeology (2011).

The fieldwork was undertaken between 20th June and 7th July 2011. Fourteen trenches of varying length were excavated to locate an in-filled quayside and slip way (Fig 2). The site code HH 11 was allocated to the project and the site archive will be held at Northamptonshire Archaeology before being submitted to Cornwall Record Office.

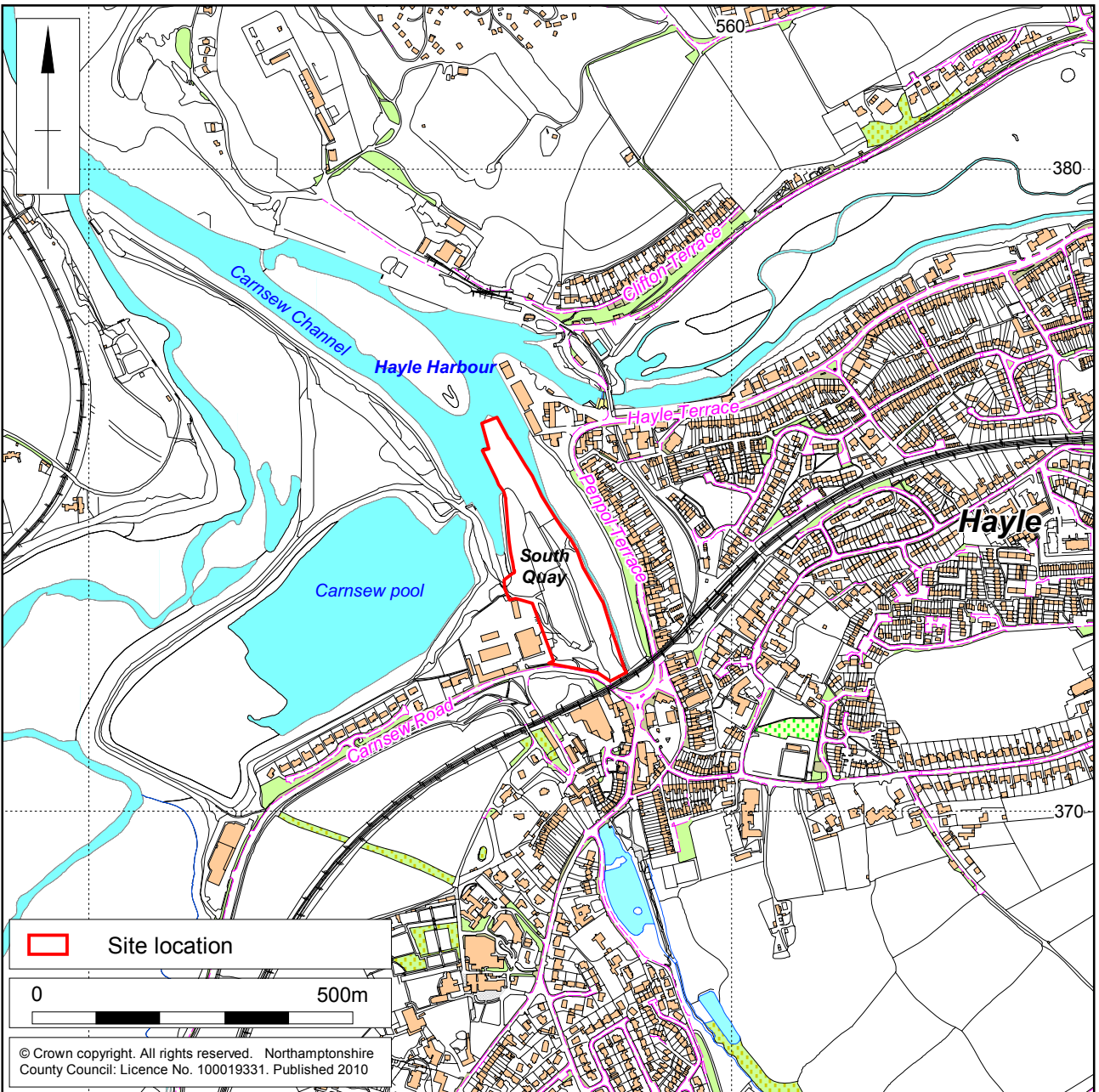
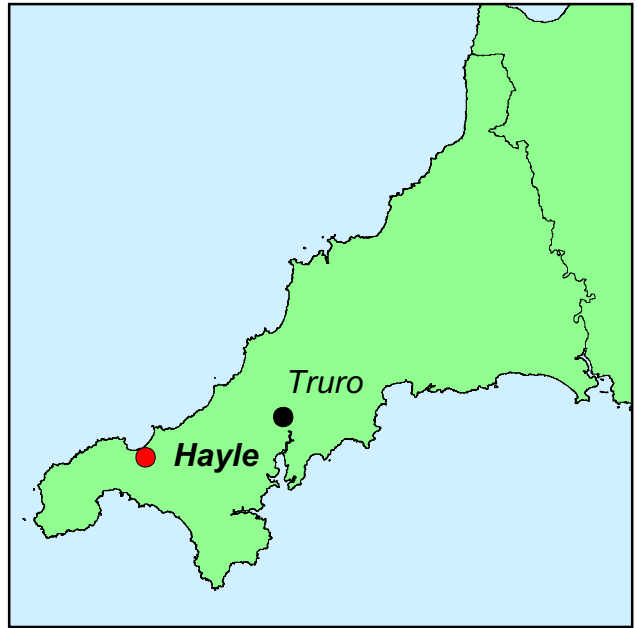
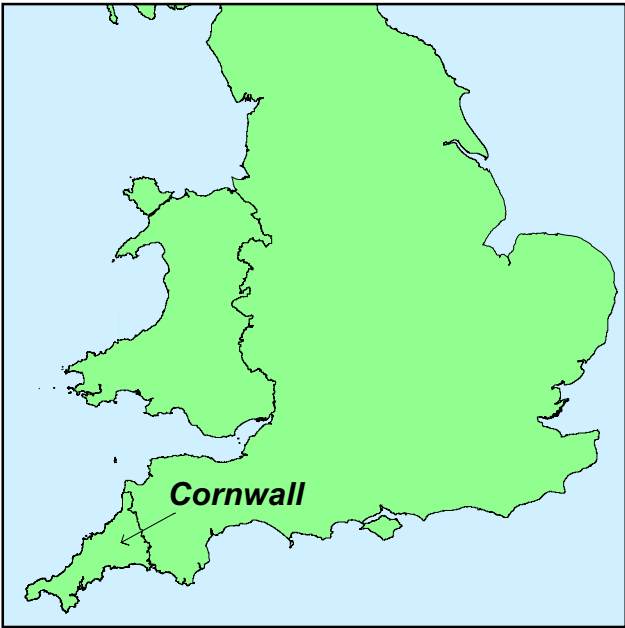
This forms the second phase of investigation on the site following on from the previous phase of trial trenching in 2010 (Mason 2010).

2 BACKGROUND

2.1 Topography and geology

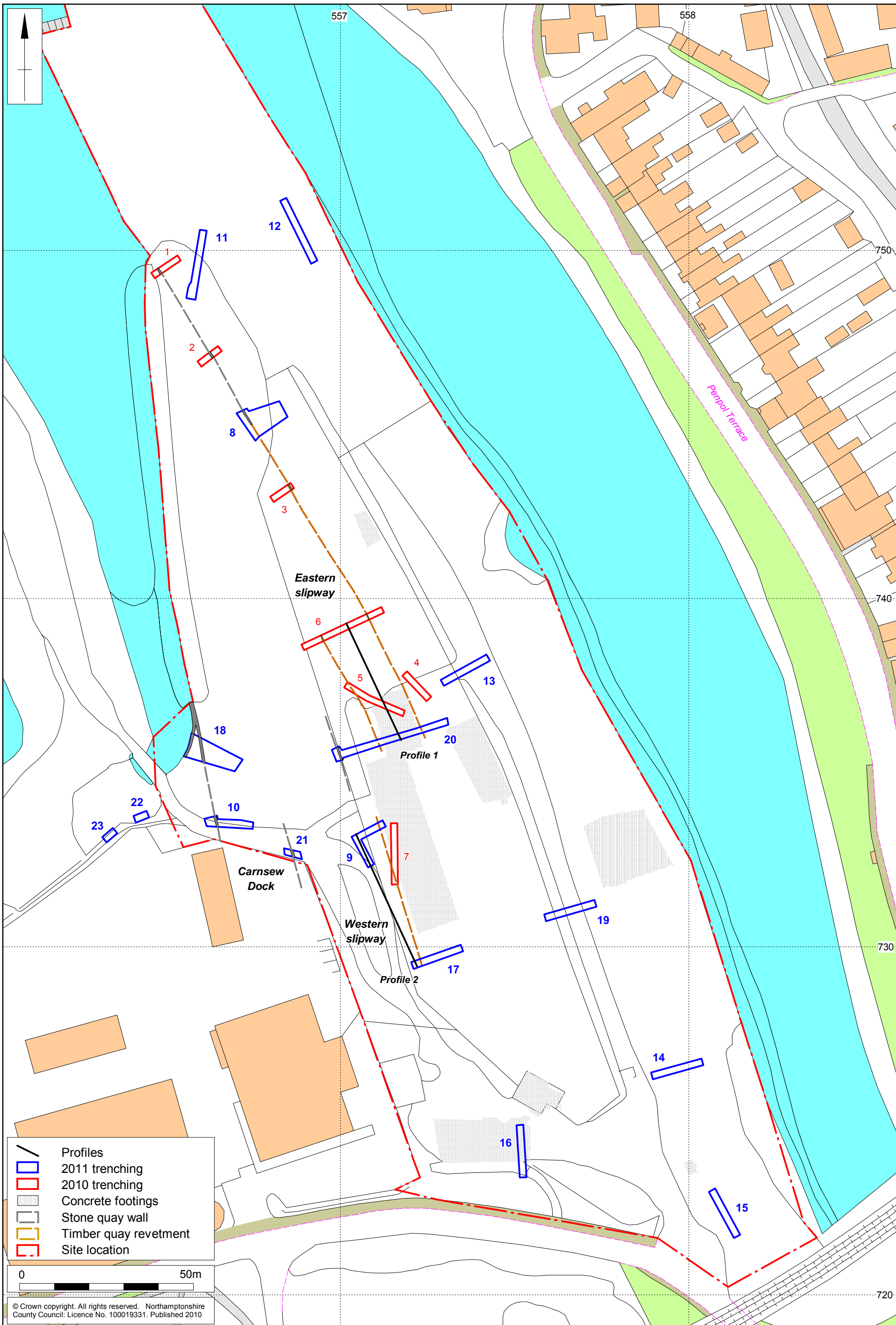
Hayle is located in north-west Cornwall on the eastern side of the Hayle Estuary which opens onto St Ives Bay, c4km south-east of St Ives itself. The harbour lies on the western side of the town with South Quay (NGR SW 5570 7400) projecting northwards into the centre of the estuary. The quay is bounded to the south by the mainland, to the west by the Carnsew Channel and to the east by the Penpol River; the latter providing moorings for Hayle's small fleet of private fishing boats and leisure craft.

The site (c3.4ha) is currently a makeshift car park for harbour users, although much of the area is covered in mounds of fly-tipped building debris and very overgrown with scrub (Fig 3).



Scale 1:10,000

Site location Fig 1



General site plan showing the phases of archaeological works and major features Fig 2

Scale 1:1000 (A3)

The evaluation trenches were located to give coverage across the development area with the exception of the northernmost part and were positioned to clarify aspects unresolved in the first phase in 2010 (Mason 2010). The ground surface hereabouts lies at c4-5m OD.

The geology is recorded as Middle Devonian (undifferentiated) mudstone, siltstone and sandstone overlain by clay, silt and sand alluvium (www.bgs.ac.uk/GeolIndex).



A view of the material in-filling South Quay and Carnsew Channel, looking south Fig 3

2.2 Historical background

The historical background is taken from Mason 2010 with some amendments where new evidence has come to light. The later history of Hayle, and more specifically for the purposes of this report, South Quay, is closely linked to Hayle Foundry and the rise to prominence of its founders, the Harvey family. The history of the site and its immediate environs has been well documented in works such as Edmund Vale's *The Harveys of Hayle* (2009, first published in 1966) and, more latterly in the *Hayle Historical Assessment* (Cahill *et al*, 2000). The following background information summarises the key events as set out in these publications.

Quays were first established at Hayle Harbour in 1735 by John Ellis and later George Blewitts partnership. The Harvey family's association with the town dates to 1779 when John Harvey, a blacksmith by trade, established a small iron foundry, the first in Cornwall, to supply machinery to the mining industry. Seafaring was the principal mode of transport for movement of fuel, raw materials and goods and one of Harvey's first actions was to deepen the channel of the Penpol River following the grant of a lease in 1780. By 1805 a fleet of three ships served *Harvey and Co*; there was, however, no foundry quay - the only way of accessing the river was via areas of levelled ground known as 'plots' or 'plats' (Vale 2009, 105).

The foundry's rapid expansion saw the manufacture and export of complete steam engines by the end of the 18th century. The company enjoyed a long association with the renowned engineer Richard Trevithick, supplying engines and parts for a number of his inventions, including his 'fire-carriage' the first ever powered road vehicle (1801). Subsequent diversification into merchant trading led to a bitter rivalry with the older-established Cornwall Copper Company; violent clashes over land ownership and rights characterised their relationship for much of the 19th century.

Following the death of John Harvey in 1803 his son Henry took over the management of the family business. It was during his tenure that the expansion of the Harbour complex, including the construction of South Quay, was triggered in 1817 when the Cornish Copper Company's lease of Carnsew Quay expired. Its owners, whose sympathies lay with Harvey and Co, duly granted it to them. Henry Harvey set about deepening the Carnsew Channel and building South Quay over a reef of Killas rock that outcropped to the west of Penpol River. The quay, which stretched northward into the estuary for a full quarter of mile, was finished late in 1818 and included in its design an archway which allowed a pre-existing fording point over the estuarine sands to pass underneath it. In addition, the quay walls incorporated a series of unusual arcs to allow ships to berth tightly to the dockside, although it has been suggested that this design was actually dictated by the shape of the reef upon which it was built (Vale 2009, 134).

By 1832 Harvey and Co had branched into shipbuilding; two years later a 72-ton schooner, *The John Harvey*, and a 52-ton smack, *The Nautilus*, were seaworthy. The problem of silting in the Carnsew Channel was overcome in the years 1833-4 when a large reservoir was dug to the west of Carnsew Quay and its waters used to flush the channel via a series of sluice gates.

Further prestige was conferred when Harvey and Co were commissioned by the Dutch government to supply the world's largest steam engine; construction took place between 1843-9. The 1840s also saw Harvey's shipyard building iron-hulled ships for the first time. In 1867 they acquired the waterside premises of their old rival, the Cornish Copper Company thus uniting much of the harbour under a single ownership.

By the end of the 19th century, however, lack of investment coupled with the absence of strong leadership saw the business go into decline. In 1903 the foundry was broken up and sold, but Harvey and Co continued to trade as merchants, importing coal, timber and building materials. Ship breaking also took place on the slips and quayside in the years following the First World War.

In 1966 the company, who still owned much of the harbour, were operating as a general building merchants; three years later they were bought out by United Builders Merchants Ltd. Sluicing of the harbour ceased in 1972 leading to the effective end of commercial traffic in 1977. In 1983 the harbour was put up for sale, South Quay being one of ten lots made available for purchase.

2.3 Designations and Historic Environment Records

In 2006 Hayle Harbour was designated as a World Heritage Site as part of the Cornwall and West Devon Mining Landscape (UNESCO Ref 1215). South Quay falls within the Hayle Conservation Area and its stone fabric is Grade II listed.

A search of Cornwall and Scilly Historic Environment Record produced a total of 73 sites and monuments within a 250m radius of the site, including fourteen listed buildings. Of these sites, sixteen fell inside the boundary of the proposed development area (Fig 4; Table 1). All but one relate to the 18th, 19th and earlier 20th century development of South Quay - the exception being a house, 'Blue Hayes' that was built in the 1960s and only recently demolished (MCO34989)

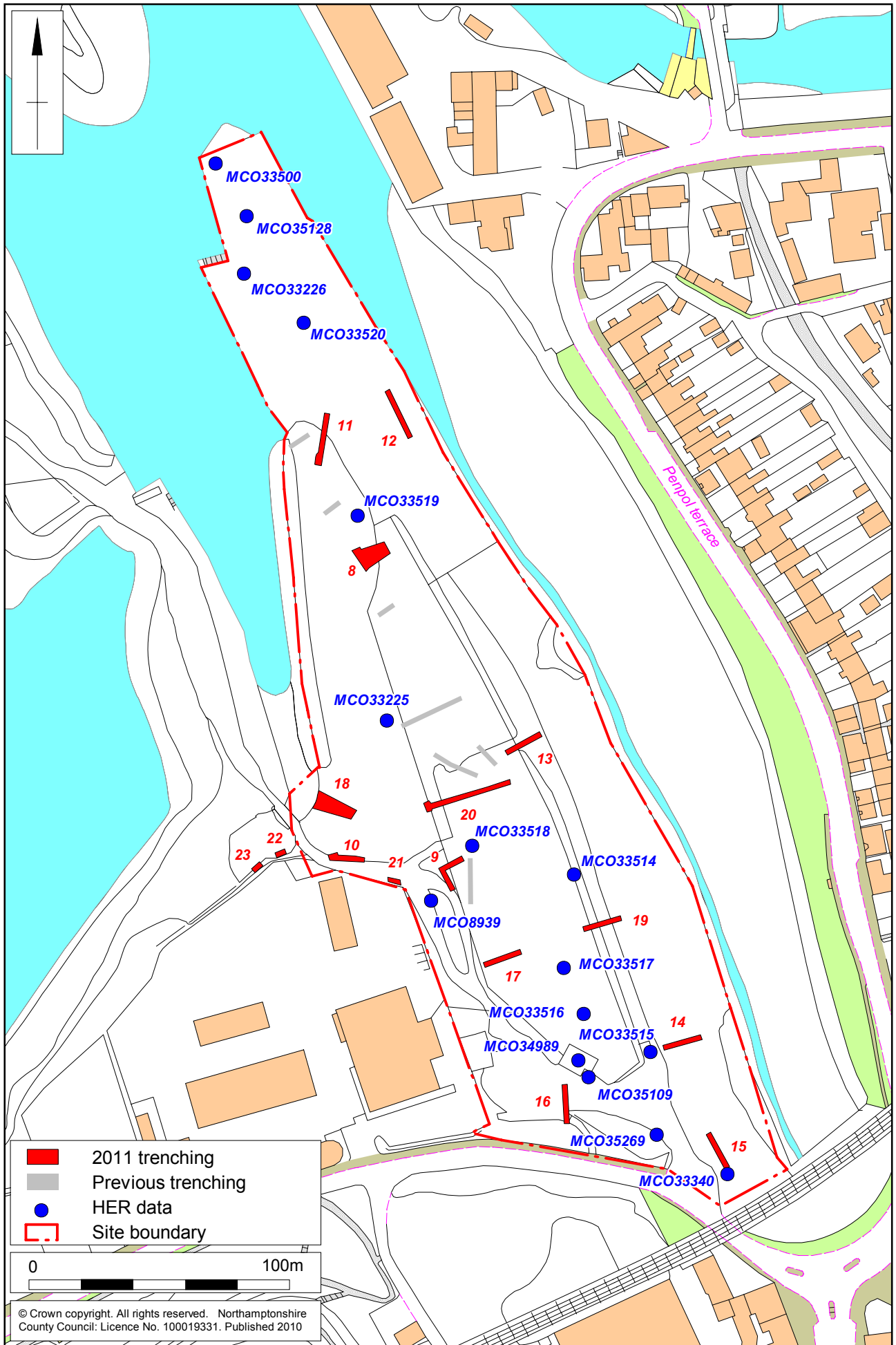
In close vicinity to the site are a large number of entries relating to Harvey's Foundry and also records pertaining to the site of a small earthwork, sometimes referred to as

Carnsew Hill-fort, which is located some 50m south-west of the southern boundary of the proposed development area. An inscribed grave stone of probable 5th-century date found in association is designated as a scheduled monument (MCO7140).

Table 1: Historic Environment Records within the proposed development area.

HER No	Grid ref (SW)	Description
MCO8939	5570 3732	Site of Harvey's shipyard, opened 1805
MCO33225	5568 3739	Buried quay, the site of Harvey's shipyard slips and docks
MCO33226	5563 3756	Extant quay walls, listed building 10/104
MCO33340	5582 3721	Location of iron and hemp loft mapped on 1864 plan of Hayle Foundry
MCO33500	5562 3760	Extant granite mooring posts, c 1818
MCO33514	5576 3733	Location of cart house mapped on 1864 plan of Hayle Foundry
MCO33515	5579 3726	Location of saw pit mapped on 1864 plan of Hayle Foundry
MCO33516	5576 3728	Location of timber shed mapped on 1864 plan of Hayle Foundry
MCO33517	5575 3730	Location of boiler shop mapped on 1864 plan of Hayle Foundry
MCO33518	5572 3734	Site of Harvey's shipwright's yard as mapped on 1864 plan of Hayle Foundry
MCO33519	5567 3747	Location of steamer's office mapped on 1864 plan of Hayle Foundry
MCO33520	5565 3755	Location of ore store mapped in 1842 and 1864
MCO34989	55757 37258	'Blue Hayes' house, 1960s
MCO35109	5576 3725	Drawing office, early/mid 19th century
MCO35128	5563 3758	Site of a former road tunnel under South Quay
MCO35269	5579 3723	Small area of mid 19th-century kerbing/cobbling

The Historic Environment Record also contains 23 event records within the search area. These include the World Heritage bid, historic surveys and management recommendations, small fieldwork projects focusing on elements of the Foundry and a building recording action undertaken on 'Blue Hayes' prior to its demolition (ECO1552). The latter is the only piece of archaeological work to have been undertaken within the proposed development area.



Scale 1:2000 (A4)

Historic Environment Record information Fig 4

2.4 Cartographic evidence

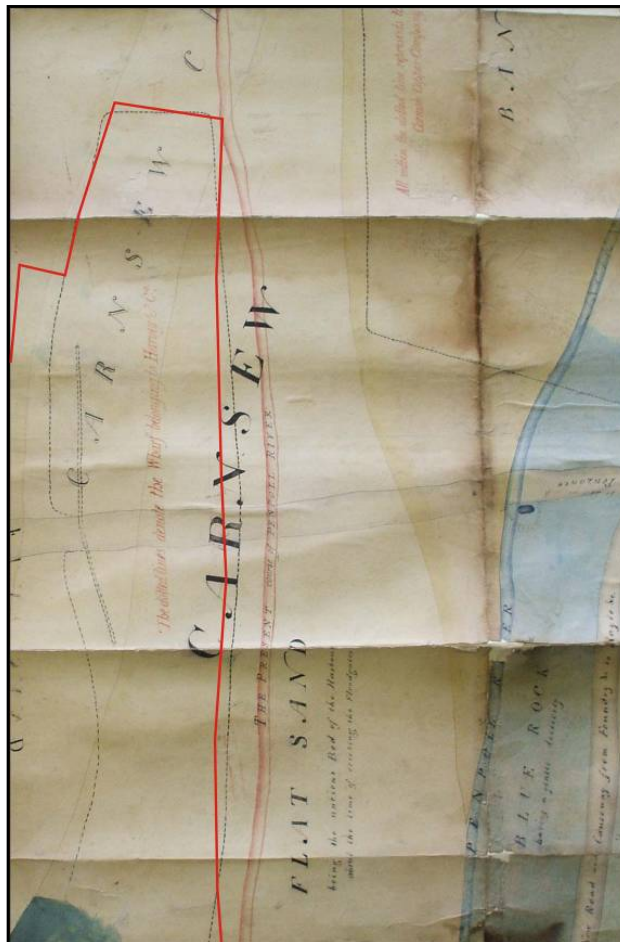
Historic maps have been selected from the extensive Harvey Archive held at Cornwall Record Office and combined with relevant Ordnance Survey maps, to demonstrate the development of South Quay. The proposed development area is outlined in red.

Plan of Hayle Harbour and Wharves at Hayle, c1809-1819 (Fig 5; CRO H166/30)

A dotted line on this early plan of the harbour denotes the northern part of South Quay at the time of its construction and annotates it as, '... the Wharf belonging to Harvey & Co'. The line of the path between Penzance and St Ives, fordable at low tide and passing via a tunnel under the quay, is indicated on an east to west axis. The Cornwall Copper Company's new Copper House Quay is outlined to the north-west of Harvey's wharf.

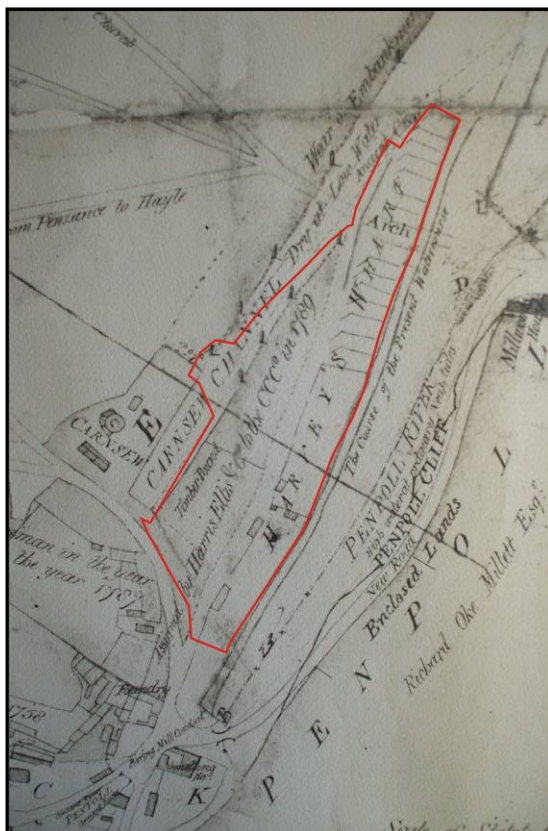
A plan of Carnsew, 1828 (Fig 6; CRO DDH166/20)

This map shows the quayside a decade after it was built, but includes a dotted line demarking the part that formerly belonged to the Cornwall Copper Company as part of their Carnsew holding prior to its transfer to Harvey and Co in 1817. A few small buildings are depicted in the south-eastern part of the quay and a 'timber pound' is annotated in the south-west. Further north, the location of the tunnel beneath the wharf is annotated 'arch'; either side are a series of lines spaced at regular intervals, presumably depicting light structures or 'pens' built on the quayside.

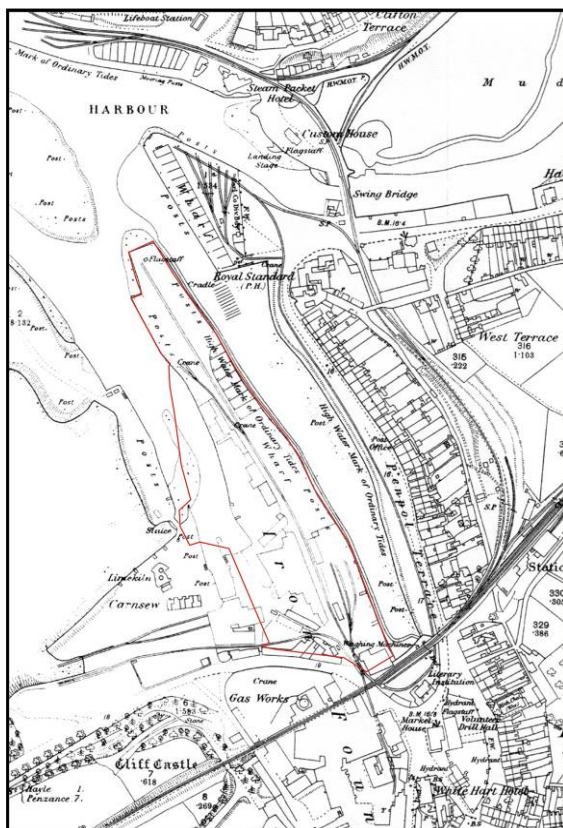


Plan of Hayle Harbour and wharves at Hayle, c1809-1819

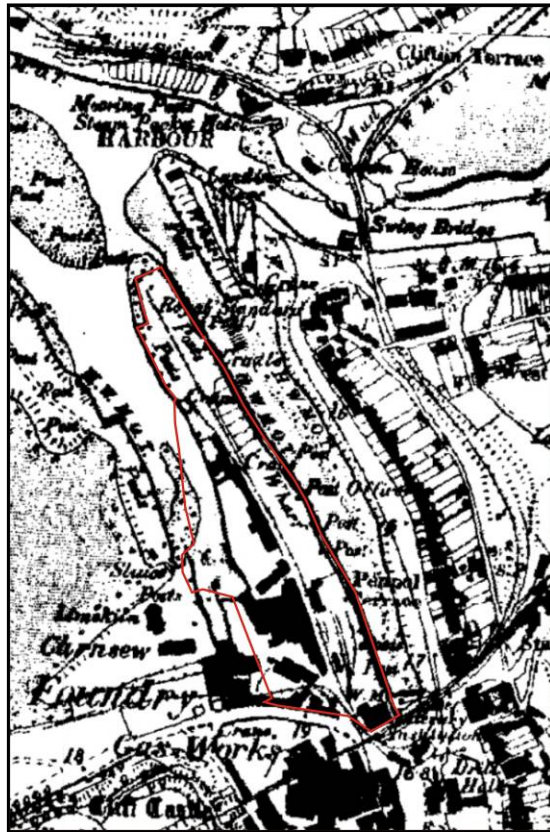
Fig 5



A plan of Carnsew, 1828 Fig 6



1st Edition Ordnance Survey map, 1879 Fig 7



Ordnance Survey map, 1888-1891 Fig 8

1st Edition Ordnance Survey map, 1879 (Fig 7)

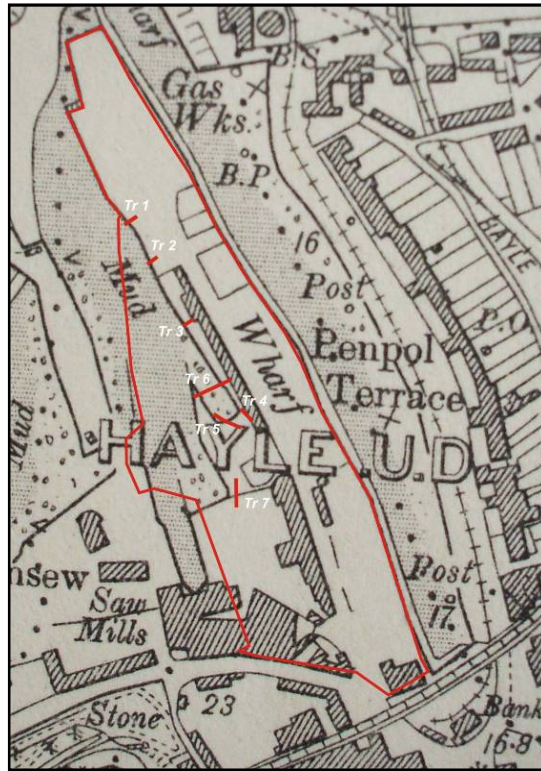
The earliest Ordnance Survey map shows much of the southern and western part of the quay built up with buildings together with tramlines running along its length and two cranes. At least one, perhaps two slipways give access to the southern end of the Carnsew Channel.

Ordnance Survey map, 1888-1891 (Fig 8)

The layout of the quay remains the same as that depicted on the earlier edition.

Ordnance Survey map, 1908 (Fig 9)

The most important development shown on this map (surveyed 1907) is the existence of a new slipway adjoining the south-eastern corner of the Carnsew Channel. A number of the quayside buildings appear to have been demolished, leaving a linear block aligned along the western side of the quay. The tramlines and cranes are no longer depicted.



Ordnance Survey map, 1908

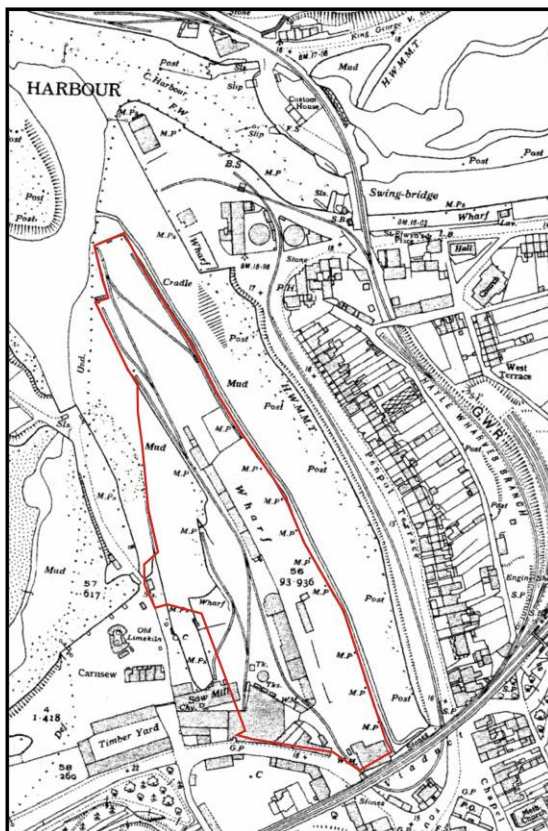
Fig 9

Ordnance Survey map, 1936 (Fig 10)

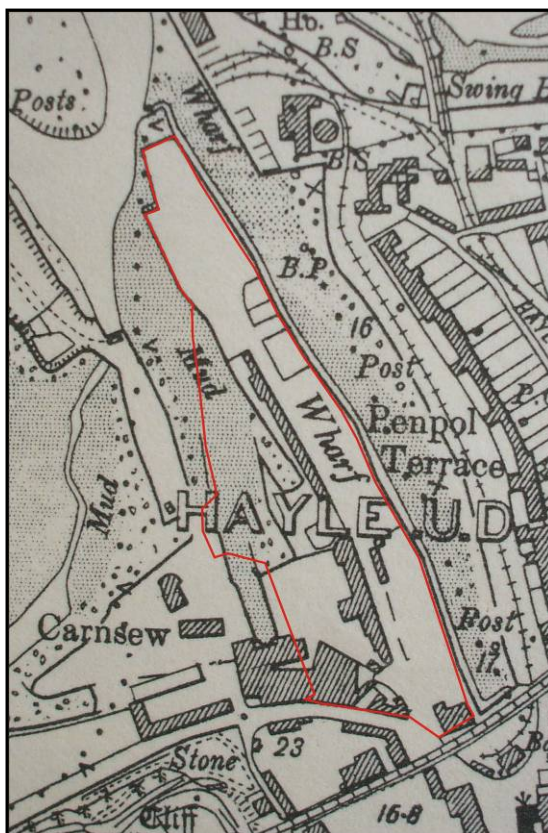
This map appears to indicate that the 'new' slipway depicted on the 1908 edition has been in-filled. The angle of its western wall is just visible where a mooring post is indicated. A series of tramlines are once again depicted, one branch appearing to divide either side of the former slipway.

Ordnance Survey map, 1938 (Fig 11)

This map is a revision of the 1907 survey and clearly shows the outline of the 'new' slipway suggesting that if it was indeed in-filled at the time of the 1936 survey, it had been re-exposed by this date. Otherwise, the morphology of the site is little changed.



Ordnance Survey map, 1936 Fig 10



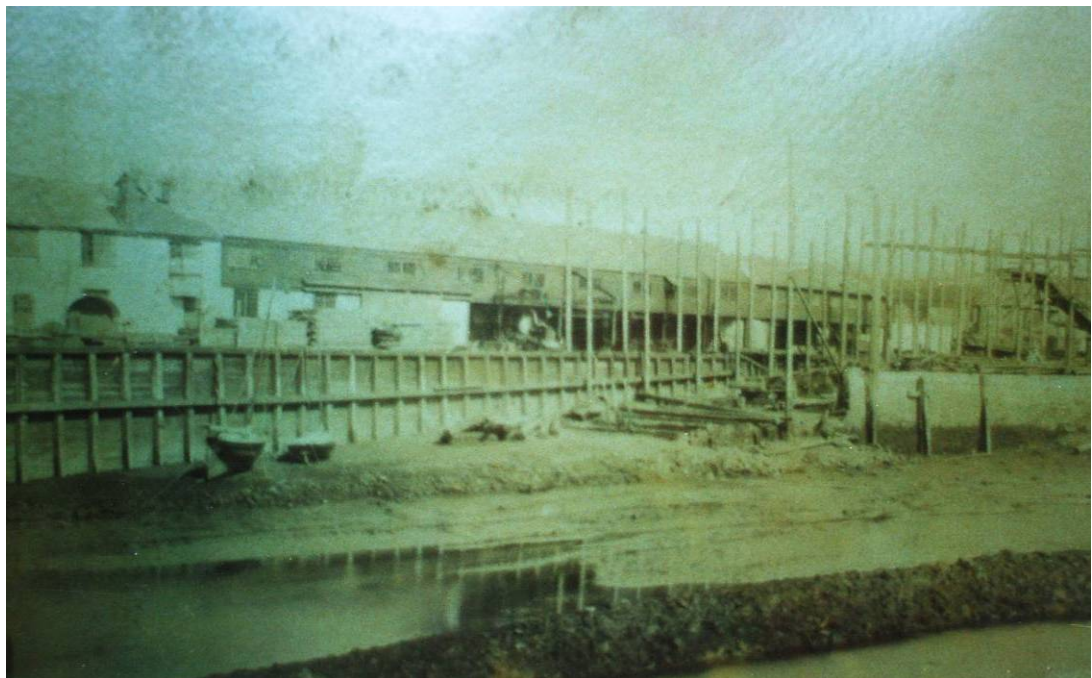
Ordnance Survey map, 1938 Fig 11

2.5 Photographic evidence

The 20th-century development of the site is well documented by a series of photographs, including aerial photographs, which serve to augment and sometimes clarify the cartographic evidence. The following sequence of images, spanning the period c1910-1968, is considered the most instructive of those available.

South Quay and slipway, c1900-1910 (Fig 12)

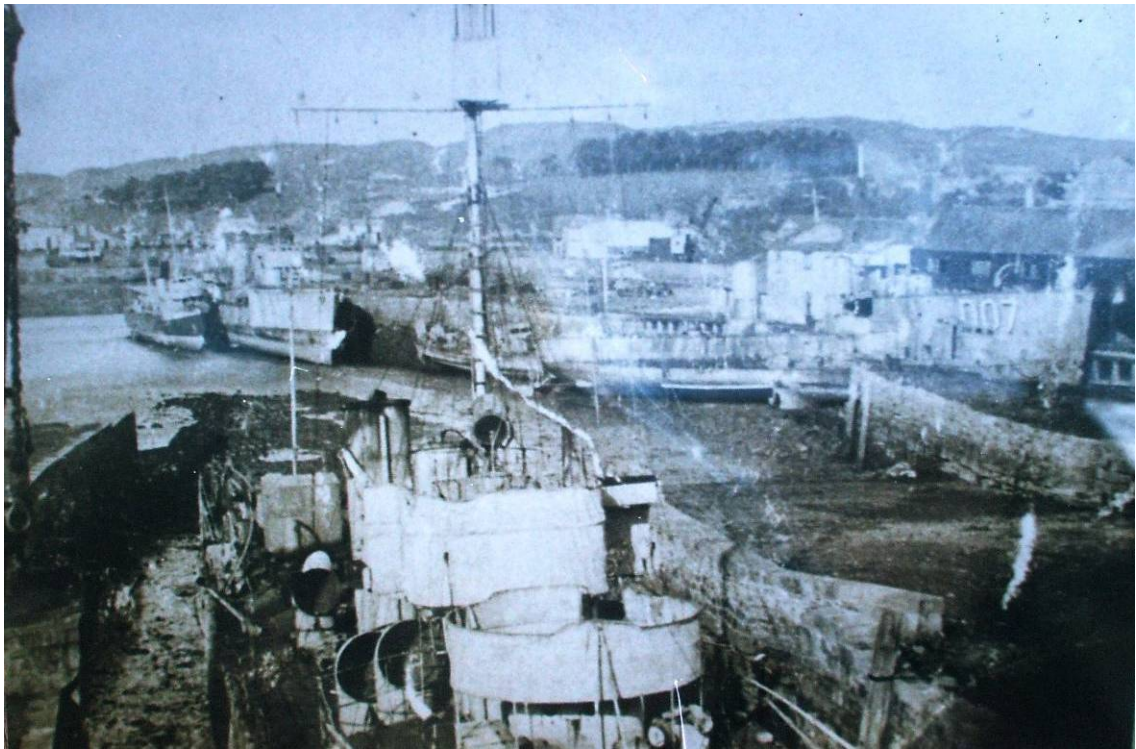
This undated photograph (provided by and reproduced with the permission of John Browne, former Harbour Master) was probably taken during the first decade of the 20th century from a vantage point on Carnsew Quay at low tide. It shows a timber revetment along the south-western side of South Quay and the east slipway (first depicted on the 1908 Ordnance Survey map; Fig 9). Timber beams lie across the base of the slipway and tall upright scaffolding posts are present suggesting shipbuilding. A linear block of buildings line the edge of the quay and slipway. The stone-built edge of a second slipway (the western), appears on the right hand side of the photograph.



South Quay and west slipway, c 1900-1910, showing timber revetment
(photograph reproduced courtesy of John Browne) Fig 12

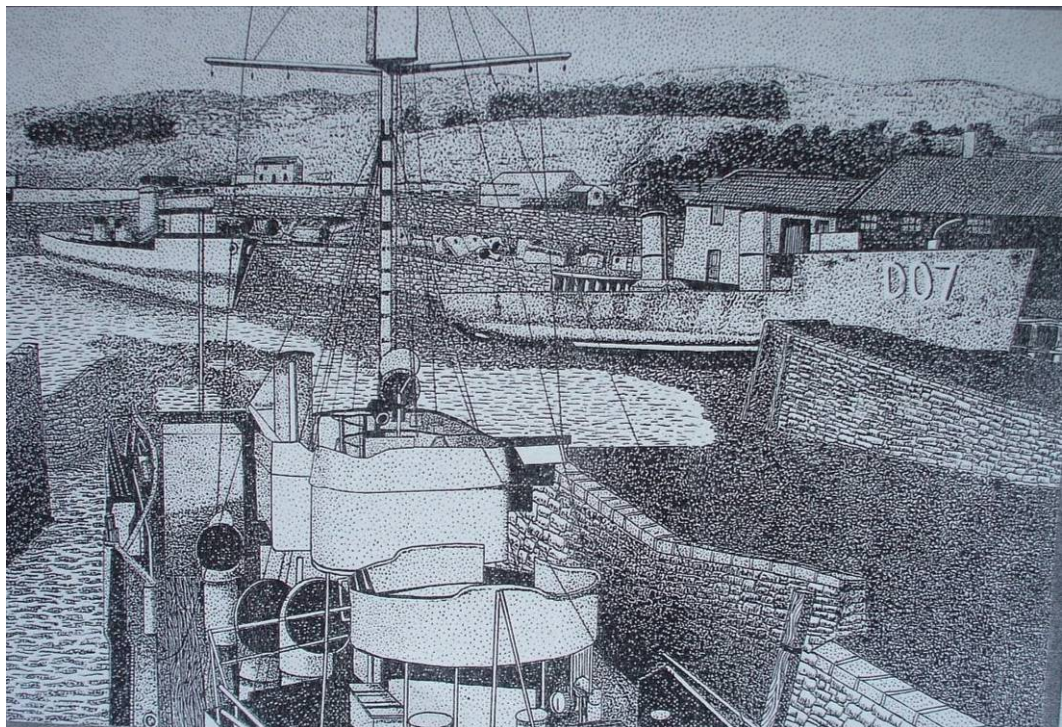
South Quay and Carnsew Channel, c1920 (Figs 13 and 14)

Taken from the head of the Carnsew Channel, this photograph (also courtesy of John Browne) shows a number of ships berthed along the quayside together with a large naval vessel with the number D07 pulled up on the eastern slipway. A cursory search of available naval records suggest that this was the River, or E-class Destroyer HMS Arun which was launched at Birkenhead in 1903 and sold for breaking up in 1920 (www.battleships-cruisers.co.uk/river_class.htm). The interface between stone and timber quayside construction can be seen close to the stern of the ship – it is more clearly visible on a drawing made from the photograph (Fig 14).



South Quay and Carnsew Channel, c1920
(photograph reproduced courtesy of John Browne)

Fig 13



South Quay and Carnsew Channel, c1920
(drawing reproduced courtesy of John Browne)

Fig 14

A smaller ship lies in Carnsew dock, in the foreground of the photograph, and to the right of this an open slip, the western slipway, is flanked by stone walls. In the photograph Figure 13 there is, visible on the west wall of Carnsew Dock (on the left hand side of the photograph), a step which was exposed during the excavation of Trench 18, (see Figs 43 and 44).

Hayle Harbour, c1921 (Fig 15)

This oblique aerial shot is taken from the north and shows a large four funnelled vessel probably HMS Bristol, or HMS Newcastle, (both Town Class Cruisers sold to Wards of Hayle for scrapping in 1921), moored at South Quay. Seven other destroyers, in various stages of being broken, are moored around the quay and pulled up on the slipways at the head of the Carnsew Channel. The linear block of buildings lines the south-western part of the quayside and goods, or perhaps piles of fuel, occupy the northern end of the wharf.



Hayle Harbour, 1921 Fig 15

Hayle Harbour, 1942 (Fig 16)

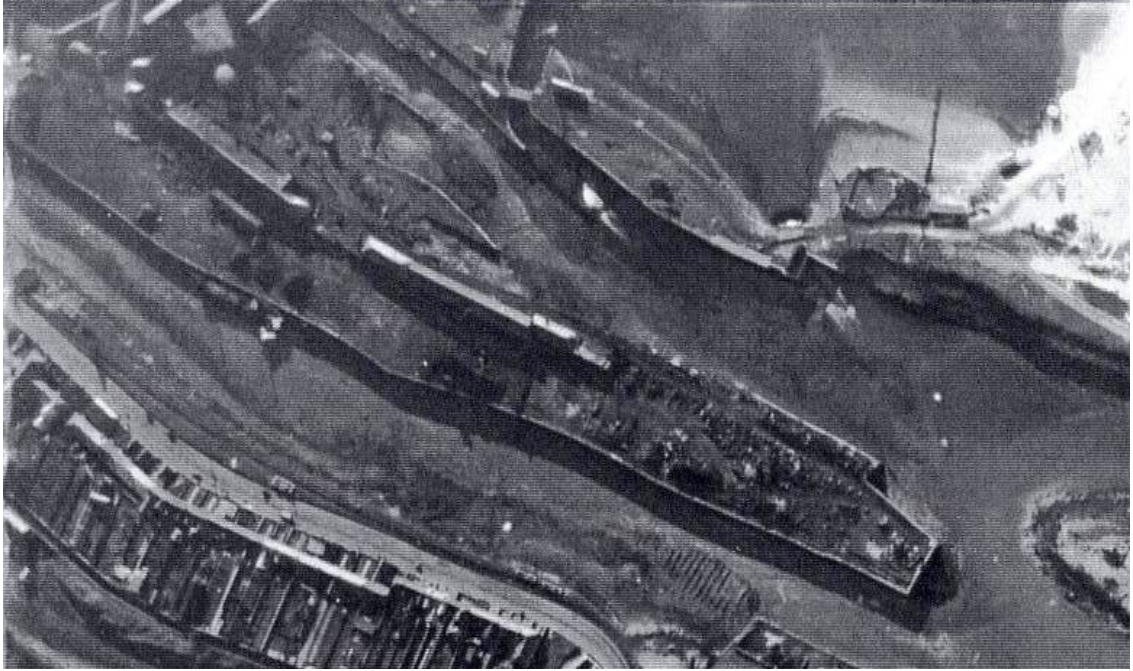
Both the eastern and western slipways and Carnsew Dock are visible on this wartime aerial photograph which was taken at low tide. The harbour is conspicuously free of shipping.

Hayle Harbour, 1946 (Fig 17)

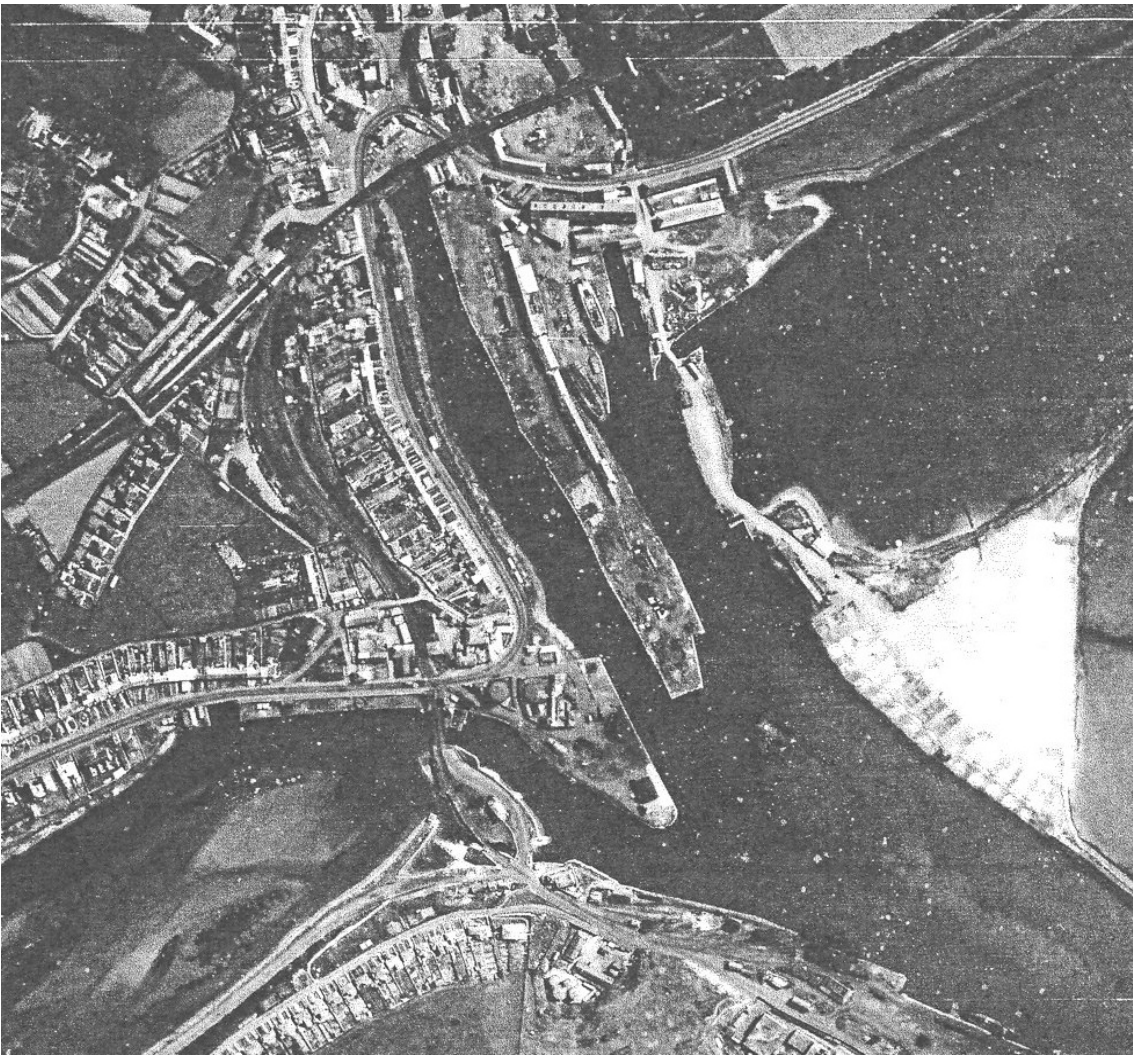
The morphology of South Quay and the neighbouring slipways remain the same on this early post-war aerial photograph. Ships are pulled up on both the eastern and western slipways.

Hayle Harbour, 1960 (Fig 18)

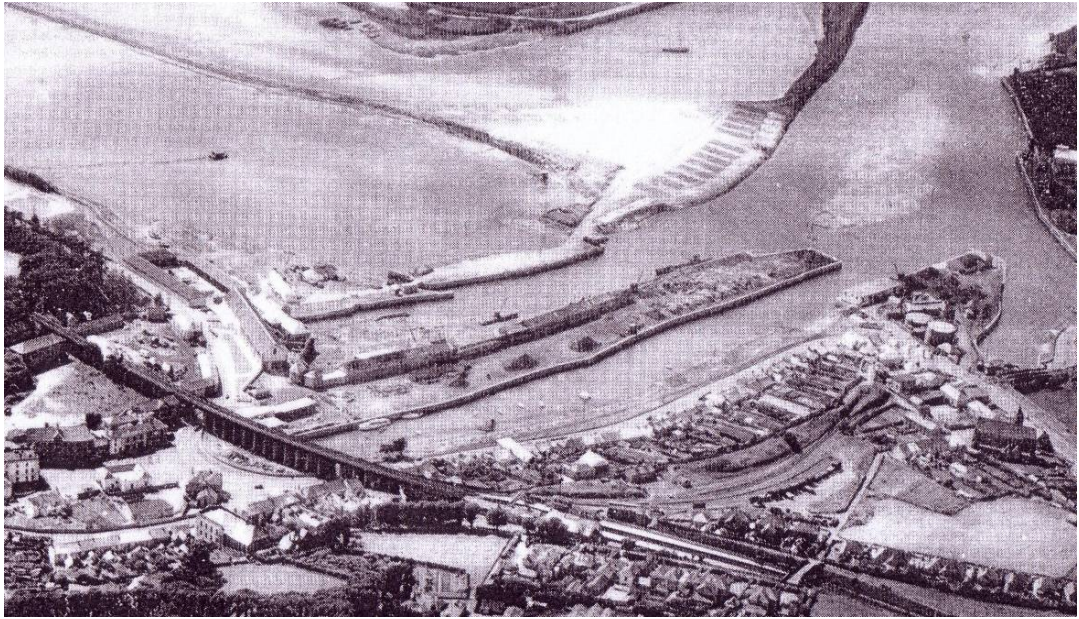
The South Quay and Carnsew slipways are visible on this aerial photograph taken obliquely from the south-east.



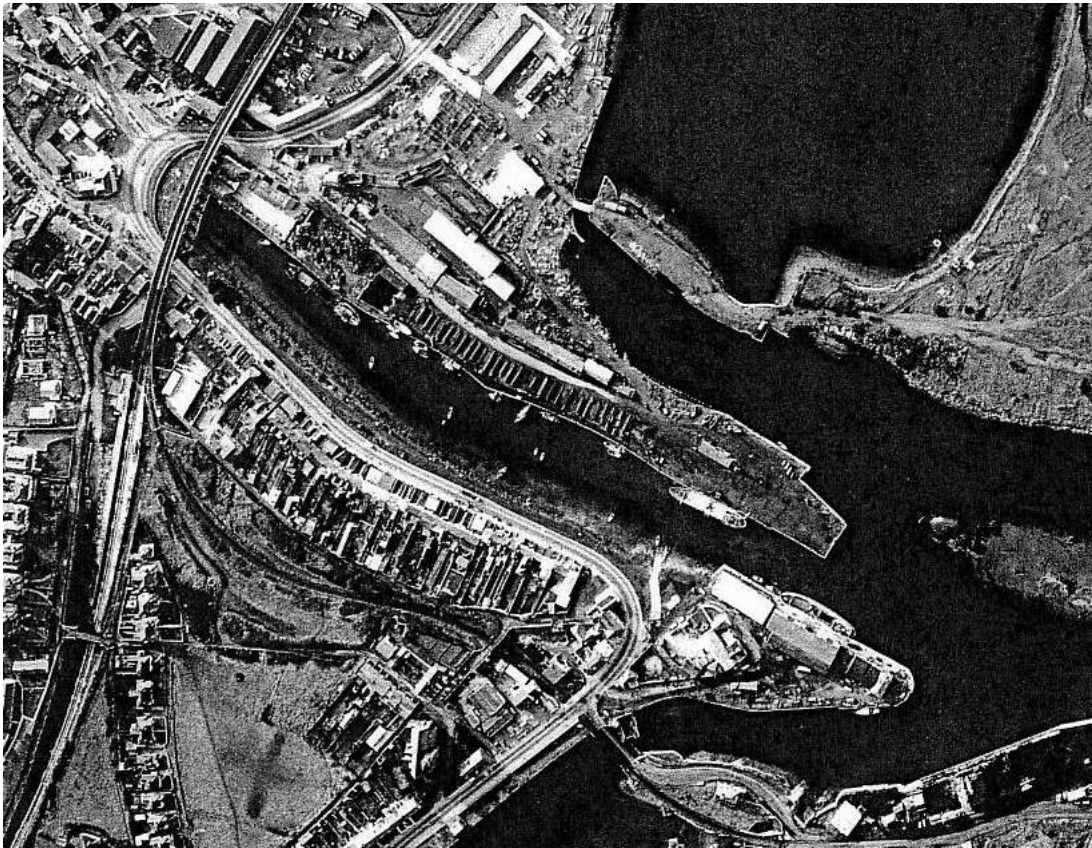
Hayle Harbour, 1942 Fig 16



Hayle Harbour, 1946 Fig 17



Hayle Harbour, 1960 Fig 18



Hayle Harbour, 1968 Fig 19

Hayle Harbour, 1968 (Fig 19)

This is the first image to show the in-filled slipways. The head of the Carnsew Channel, including the eastern slipway and Carnsew Dock, has been reclaimed to a point adjacent to the sluice gate in the south-western corner of Carnsew Pool. From here, the edge of the channel has been re-defined on a north-west alignment, meeting the western side of South Quay approximately half way along its length and burying the associated western slipway in the process. The linear block of buildings still survives but a new building has been constructed to the west.

3 AIMS AND OBJECTIVES

The approved method statement (NA 2011) defined the aims and objectives of the evaluation as follows:

The site specific aims were to:

- Ascertain the extent and survival of the western quay walls;
- Discover where the western quay stone wall(s) end and the timber wall begins and the type and survival of this junction;
- Discover the construction methodology (stone and/or timber) of the slip way walls;
- Determine the nature and material of the base of the slip ways and angle of their raking;
- Determine the nature, extent and depths of the deposited material affecting the slipways;
- Determine the condition and stability of the buried quay walls, slipways and associated structures;
- Determine whether the buried quay walls, slipways and associated structures are capable of being exposed in the long term and the level of remedial work required to enable this.

The general aims were to:

- To gain an understanding of the buried archaeological potential of the development site;
- To gain an understanding of the nature, extent and depths of the deposited material on the development site;
- To provide an impact assessment of the proposed development on the buried archaeology;
- To provide a mitigation strategy for the buried archaeology.

4 METHODOLOGY

All works were conducted in accordance with the procedural documents *The Management of Archaeological Projects* issued by English Heritage (1991) and the IfA's *Standard and Guidance for Archaeological Field Evaluation* (1999) and in accordance with the Cornwall Council Brief for Archaeological Assessment and Evaluation (2011) and the method statement prepared by Northamptonshire Archaeology (2011).

Evaluation comprised the excavation of 14 trenches at locations shown on Figure 2, distributed across the area targeting key parts of quay and slipway and quay walls. Trenches were set out in the specified positions by survey grade GPS (Leica System 1200) operating to an accuracy of +/- 0.05m. Trench dimensions and targets were as follows:

Table 2: The excavated trenches

Trench	Dimensions	Target and date where known
8	20m x 13.6m	Stone/timber wall interface and quayside structures
9	20m x 1.8m	Eastern slipway
10	10m x 1.8m	Western slipway
11	20m x 1.8m	Tracks and crane position (1879)
12	20m x 1.8m	Quayside structures (1828+)
13	15m x 1.8m	Structures (1828+) and tracks (1879)
14	15m x 1.8m	Structures (1828+) and tracks (1879)
15	15m x 1.8m	Structures (1828+)
16	15m x 1.8m	Structures (1828+) and tracks (1879)
17	15m x 1.8m	Structures (1828+)
18	10m x 1.8m	Western slipway
19	15m x 1.8m	Tracks and buildings (1879)
20	20m x 1.8m	Wall to Eastern slipway
21	5m x 2m	East wall Carnsew dock/west wall of Western slipway
22	4m x 2m	Exposed part of the recess for the sluice gates
23	4m x 2m	Examined a loading ramp in the upper surface of the quay wall of Carnsew Pool

Trenches were mechanically excavated, under continuous archaeological direction, to expose the archaeological remains.

Where safe operating procedures existed, each trench was cleaned sufficiently to enhance the definition of features. The stratigraphy of a trench was recorded by means of photographs, measured drawings and written descriptions.

Following the completion of the work on each trench they were backfilled with the up-cast material.

All archaeological deposits and artefacts encountered during the course of evaluation were fully recorded. Recording followed standard Northamptonshire Archaeology procedures. All archaeological features were given a separate context number. Deposits were described on pro-forma context sheets including details of the context, its relationships, interpretation and a checklist of associated finds.

The heights of each end of the trenches were related to Ordnance Datum.

A photographic record was maintained using 35mm colour slide and black and white film supplemented by digital photography. Overall views of the site were taken prior to excavation and after backfilling. Overall views of each trench were taken together with detailed views of individual features and feature groups as appropriate.

The works were monitored by Phil Markham and Nick Carhill of Cornwall Council, Simon Ramsden of English Heritage and by Nansi Rosenberg of Prospect Archaeology on behalf of the client.

5 THE EXCAVATED EVIDENCE

5.1 Trench 8

Trench 8 (12m x 10m; Figs 2, 20-24) was located to expose the junction of the stone quay wall and the timber revetment for the eastern slipway. The top of the wall [801] was revealed c0.4m below the existing ground level at c3.90mOD. It was constructed from large, rectangular, roughly-coursed granite blocks (802) partially overlain by a single course of 0.55m-wide concrete blocks (801) – in the same manner as seen in 2010 evaluation in Trench 1 (Mason 2010, Fig 21). The timber revetment (803/4) abutted the stone quay wall which appeared to have been partially rebuilt to give a vertical join (Figs 20, 21 and 22). No physical evidence was observed within the confines of the trench of the partial rebuild other than it is likely that as the timber revetment for the eastern slipway cut through the earlier stone quayside wall (Figs 20, 21 and 22).

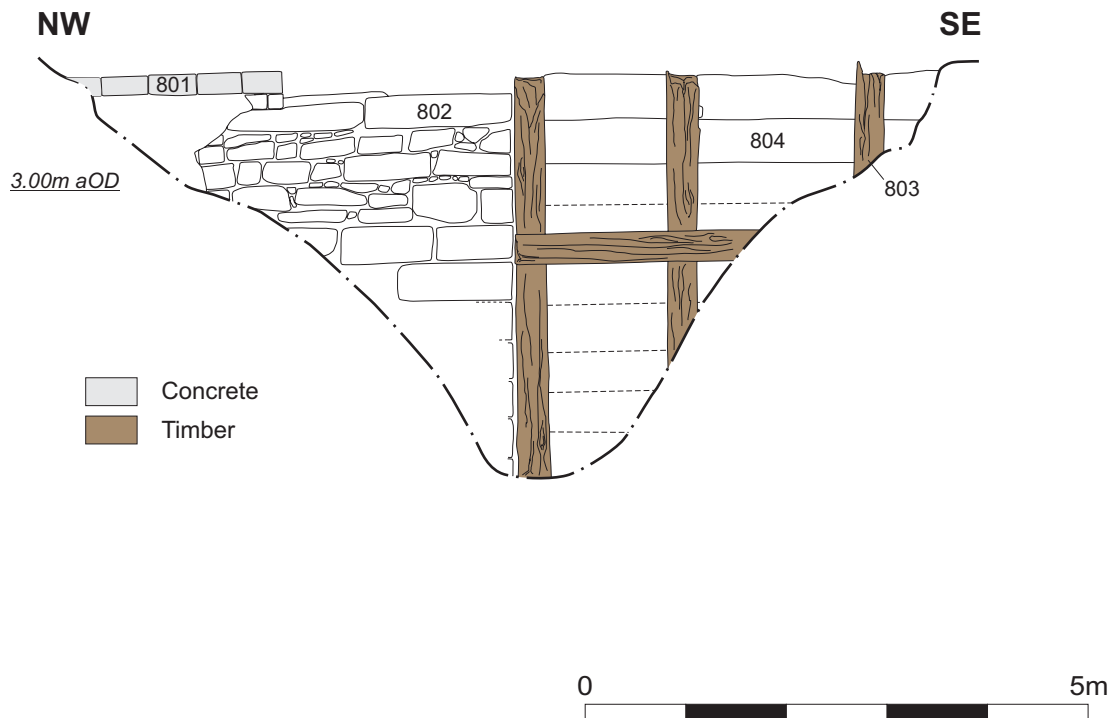
The timber revetment comprised vertical square cut posts c0.3m square (803), behind which were horizontal timber planks c0.07m wide by 0.28m deep (804), (measurements in some cases are approximate due to the degraded nature of the timber). At 1.6m down from the top of the timber revetment there was a horizontal timber rail attached to the front of the vertical posts with similar dimensions to the posts (Fig 20), this was observed during the excavation of a machine cut sondage to attempt to expose the base of the slipway; silts were exposed in the bottom of the excavation at a depth of c0.11m aOD.

The slipway had been filled with mixed layers of soil, foundry sand and general demolition waste (808). These layers were overlain by a 0.3m thick levelling layer of crushed demolition waste (809), which would indicate that when the slipway was infilled the original intention was to use the reclaimed land. Latterly the levelled area has been used for the dumping of soil and general building waste, which in places is over 1m thick.

Trench 8



Section 16





Trench 8, the join between the stone quay and timber slipway revetment (Scale 2m)
Fig 21

Exposed on the landward side of the wall (802) was the timber base of a quayside structure likely to be a crane (806/7) (Figs 20, 21 and 22). The structure comprised a pair of squared timbers c0.3m x 0.3m parallel with the quay edge (806) bolted, (Fig 23), to unevenly spaced squared timbers set at right angles to the edge of the quay/slipway (807). The northern extent of the structure lay outside the limit of excavation, the southern end of the timberwork was revealed giving a length of more than 7.5m for the structure.



Trench 8, timber structure for a possible crane on the quayside adjacent to the join
between the stone quay and timber slip walls (Scale 2m) Fig 22



Detail of bolt head joining the timber crane base (Scale 100mm) Fig 23

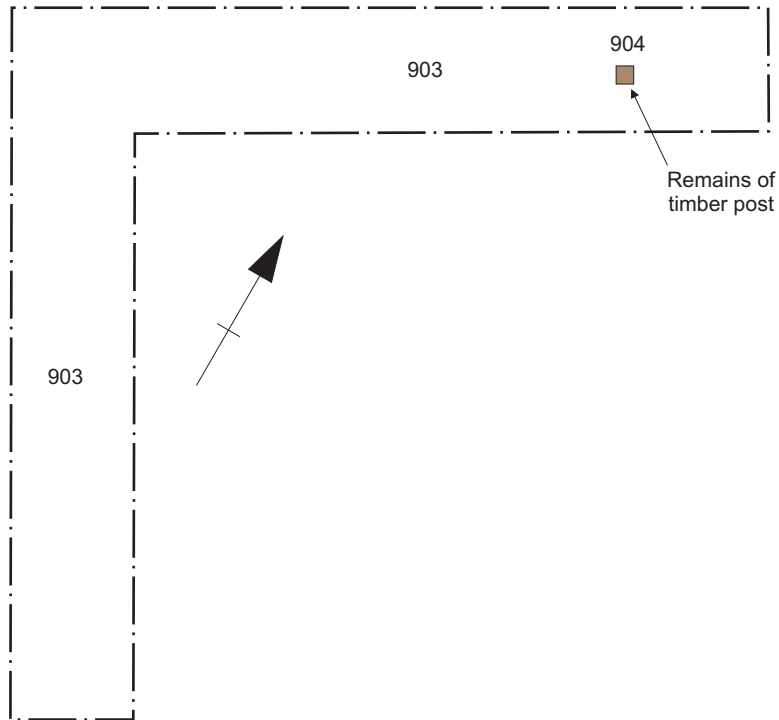
The crane base timber work was set into and covered by a firm layer of sandy ash (811), possibly foundry sand. This layer appeared to form the quay side surface in this area. No other footings for the crane base were observed. It is possible that the base may be for the crane which is visible on the aerial photograph (Fig 15) on the quayside by the large four funnelled vessel.

A single degraded timber post (812) with similar dimensions to the slipway revetment posts was observed on eastern limit of the trench. The purpose of this post was not clear.

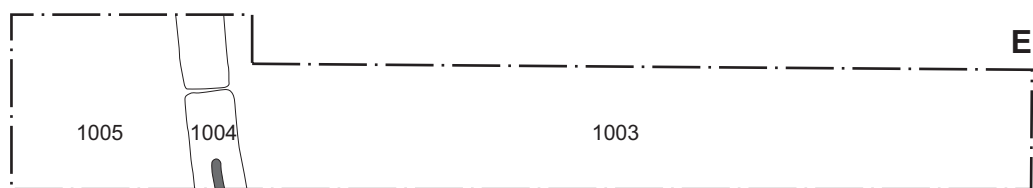
5.2 Trench 9

Trench 9 was L-shaped (10m x 1.8m by 10m x 1.8m; Figs 2, 24, and 25) and was excavated to locate the Western slipway. Here the compacted ferrous slag base of the slipway (903) was located at the northern end of the north-south arm of the trench at 2.48m aOD and at the southern end of the north-south arm at 2.87m aOD.

Trench 9



Trench 10 W





Trench 9, looking east (Scale 2m Fig 25

The remnants of a degraded timber upright, (904), (possibly the eastern edge of the slipway), was exposed at the eastern end of the east–west arm of the trench; this had been truncated by a modern sewer pipe. It was not possible to measure the dimensions of the post due to the depth and unstable nature of the trench edges.

The slipway had mostly been filled with substantial, faced granite blocks (1.25m long by 0.6m wide by 0.3m), some of which were lintils, within a mid brown loam matrix (902), which was overlain by a compacted clay layer and modern made ground and tarmac (901).

5.3 Trench 10

Trench 10 (14m x 1.8m; Figs 2 and 24) lay east-west and was excavated to locate the west wall of Carnsew Dock. The top of the wall (1004) was located c0.50m below the existing ground level (4.15m aOD). The wall construction consisted of irregular rubble blocks capped with a substantial granite coping stone 1.25m long by 0.6m wide by 0.3m deep, which was joined to the neighbouring blocks with iron cramps (Fig 27). It was abutted on its eastern side by the in-fill of the dock, which here comprised concrete, bricks, granite blocks and miscellaneous detritus (1002).



West wall of Carnsew Dock exposed in Trench 10 (Scale 1m) Fig 26

The quayside surface on to the west of the wall comprised a compact layer of foundry sand and slag (1005).

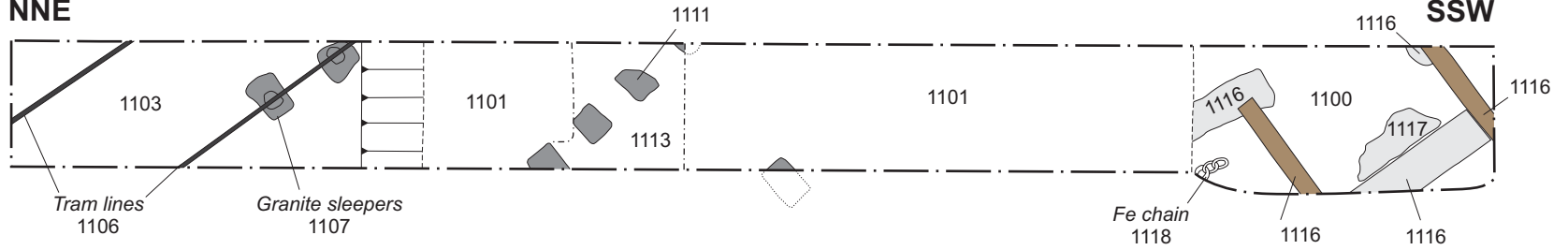
5.4 Trench 11

Trench 11 (20m x 1.8m; Figs 2, and 27 to 30) lay north-south and was excavated to locate tracks for dockside horse trams and a crane base, shown on the 1879 first edition OS map. The tracks were a pair of rectangular section iron rails (1106), exposed at the northern end of the trench, c0.3m below present ground surface. Each track measured 3 inches (76mm) deep by 1.25 inches (32mm) wide, they were mounted on granite sleeper blocks (1107) and were 4 feet 6 inches (1.37m) apart (Figs 27-29). These rails had been covered over by a compacted layer of slag (1103), which formed a later quayside surface.

In the middle part of the trench there was a further set of rails evidenced by the survival of the northern sleeper blocks only (1111), (Figs 27 and 29). These blocks were set into a mixed deposit of yellowish brown stony clay (1113).




At the southern end of the trench was a concrete (1117) and timber (1116) base, similar to those observed in Trench 1 during the 2010 evaluation (Mason 2010, Fig 23). These were interpreted as part of the quay structure perhaps tying the wall to the quay surface using the concrete blocks as anchor points; it is also possible is that the structure forms the base for a quayside crane.

Trench 11
NNE



Trench 12
NNW



-  Granite sleepers
-  Wooden sleepers
-  Concrete



Iron rails at the northern end of Trench 11, looking south
(Scale 1m) Fig 28



Granite sleeper blocks in the middle part of Trench 11, looking south
(Scale 1m) Fig 29



Trench 11 looking north, with the crane base and mooring chain in the foreground (Scale 1m) Fig 30

Adjacent to this structure several links of an iron mooring chain (1118) were exposed in the section (Fig 30). Similar mooring chains can still be observed spaced at regular intervals around the quayside edge, where many are still in used as mooring points.

Natural sand (1101) was exposed in two sections of the trench at c1m below present ground surface.

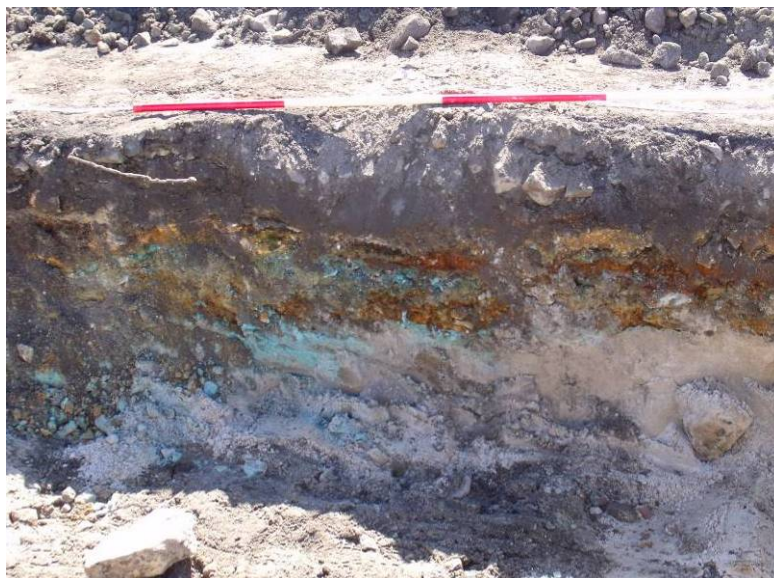
5.5 Trench 12

Trench 12 (20m x 1.8m; Figs 2, 27, 31 and 32) lay north-south and was excavated to locate post-1828 quayside structures. A compacted slag/metalled quay surface (1203) was located 0.4m below the present ground surface (Fig 32) along the length of the trench, no other archaeological features were observed in this trench.

Natural sand (1206) was exposed in machine excavated sondages at both ends of the trench at 0.8m below present ground surface this was overlain by a 0.2m thick layer of sand and rubble containing a metallic ore (1205) (Fig 32).



Trench 12, looking south (Scale 1m) Fig 31

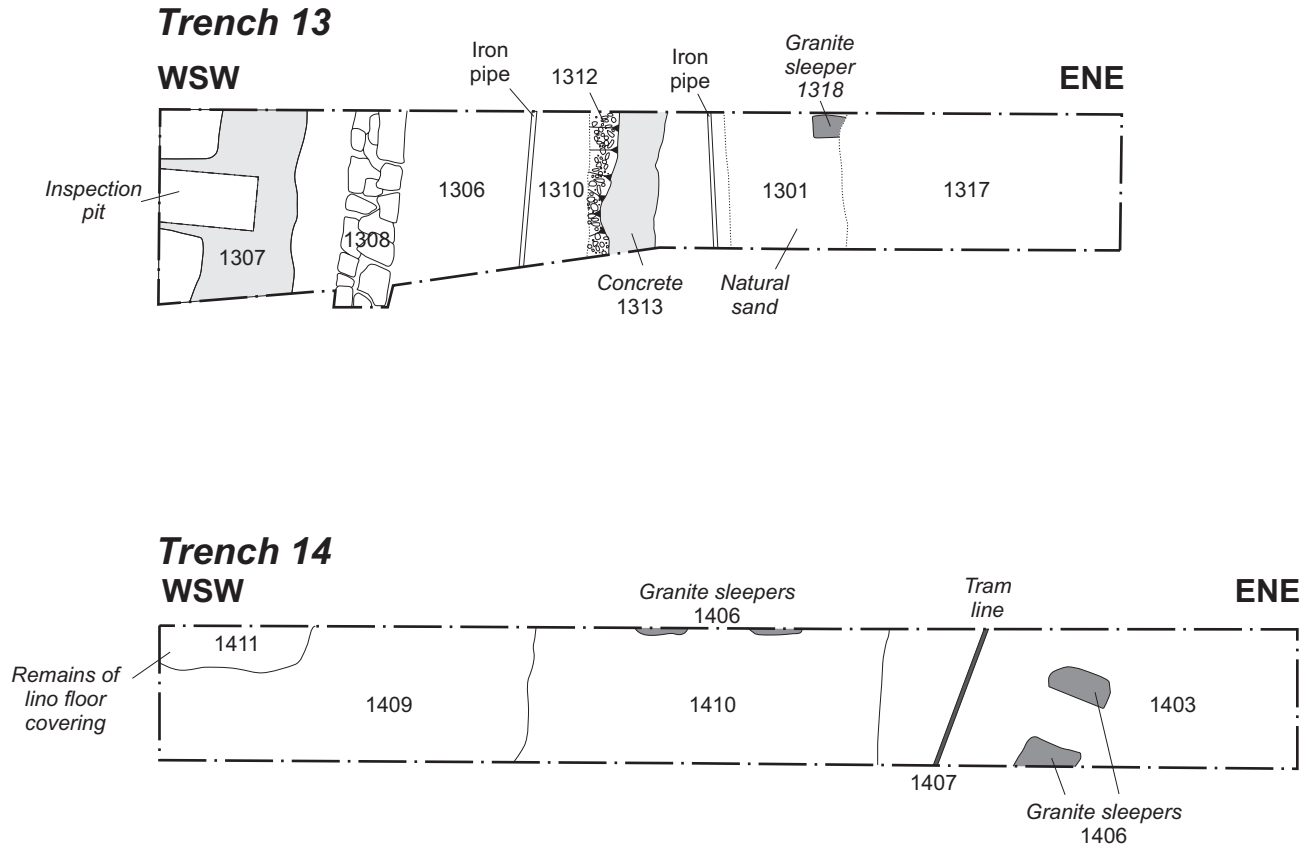


Trench 12, showing natural sand overlain by contaminated overburden (Scale 1.5m) Fig 32

5.6 Trench 13

Trench 13 (15m x 1.8m; Fig 2 and 33) lay east-west and was excavated to locate quayside buildings and track, shown on the 1879 Ordnance Survey map.

The coursed rubble west wall (1308) of a quayside building was observed in the western end of the trench (Fig 33). Only one granite sleeper block (1318) survived within the trench as evidence of the tracks which ran through this part of the site.



- Granite sleepers
- Concrete





Trench 13, looking east, showing the west wall of a quayside building (above the 1m scale) Fig 34

The trench was mainly characterised by later concrete surfaces, the one at the western end (1307) had an inspection pit cut into it (Figs 33 and 34). Two cast iron service pipes were also present in the trench. The archaeology was overlain by hardcore and a layer of tarmac (1300).

5.7 Trench 14

Trench 14 (15m x 1.8m; Figs 2 and 33) lay east-west and was positioned to intercept two tracks and the western side of a quayside building shown on the 1879 Ordnance Survey map.

The archaeology was exposed 0.3m below the present ground surface c4.2m aOD. At the western end of the trench was the compacted/poured ferrous slag floor (1409) of the building shown on the 1879 OS map (Fig 7), still with patches of hessian backed lino (1411) surviving on it (Fig 33). There was no indication of the wall of the building, which would perhaps suggest it was of light construction.

Evidence for the two tracks was observed, in the case of the western track this was the survival of two granite sleeper blocks (1406) seen in section (Fig 36). The blocks measured 0.56m by 0.34m by 0.26m deep and were set into a layer of compacted slag and clinker (1403), which overlay the natural sand (1410). For the eastern track, the western rail (1407) survived *in situ*, its dimensions being the same as those exposed in Trench 11. The other rail had been removed but two sleeper blocks (with the same dimensions as (1406)) survived giving a gauge of 4 feet 6 inches (Fig 37). This track was set into the same layer of compacted slag and clinker (1403) as the other pair of sleeper blocks.

The archaeology was overlain by a further layer of slag chippings (1402), which in turn was overlain by a layer of degraded tarmac chippings (1401).



Trench 14, looking east, showing the compacted slag floor
(Scales 1m) Fig 35



Trench 14, granite sleeper blocks in section, looking north
(Scale 1m) Fig 36



Trench 14 in *situ* rail and sleeper block at the eastern end of the trench
(Scale 1m) Fig 37

5.8 Trench 15

Trench 15 (15m x 1.8m; Figs 2 and 38) lay north-south and was excavated to identify the level of survival of the weighing house shown on the 1879 OS map (Fig 7).

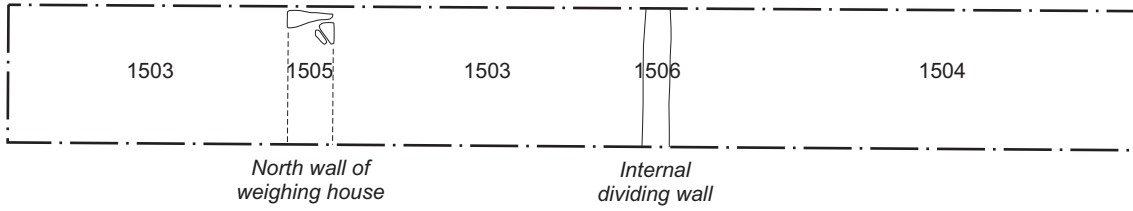
The compacted ferrous slag floor (1504) of the weighing house was exposed 0.55m below the present ground surface at c4.2m aOD. The northern east-west aligned wall of the weighing house (1505) was exposed in the trench only the lower course of the wall partially survived within the trench, as there was no indication of a foundation trench it would suggest that this building was also of a light construction (Fig 39). An internal dividing wall (1506), represented by a pinkish clay footing 0.35m wide, on the same alignment was observed 4m to the south of the north.

The quayside surface (1503) comprised the same compacted slag surface as the floor of the weighing house, with no visible difference between the two surfaces.

The archaeology was overlain by a firm dark grey-brown ash and clay layer (1502) 0.3m thick, which in turn was overlain by the modern quay surface compact grey stony hardcore layer (1501).

Trench 15
NNW

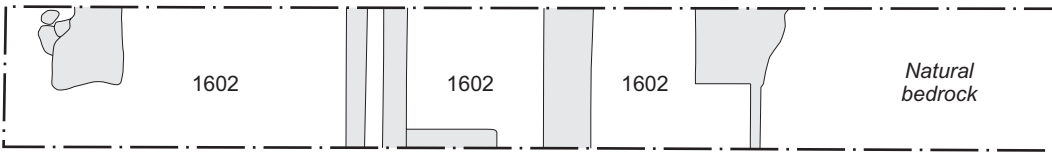
SSE



Trench 16

N

S



Concrete (1604)





Trench 15 looking south, showing the quayside surface, foreground and interior of the weighing house background (Scales 1m) Fig 39

5.9 Trench 16

Trench 16 (15m x 1.8m; Figs 2 and 38) lay north-south and was excavated to intercept rails shown on the 1879 OS map (Fig 7). A compacted slag surface (1602) was exposed in part of the trench; cut by modern concrete footings (1604) (Fig 40). Natural bedrock was observed in the southern part of the trench c0.8m below present ground surface.

It was not possible to date the compacted slag surface and no evidence for the rails shown on the map was observed in this trench. The surface (1602) and concrete footings (1604) were overlain by a modern concrete hard standing (1601).



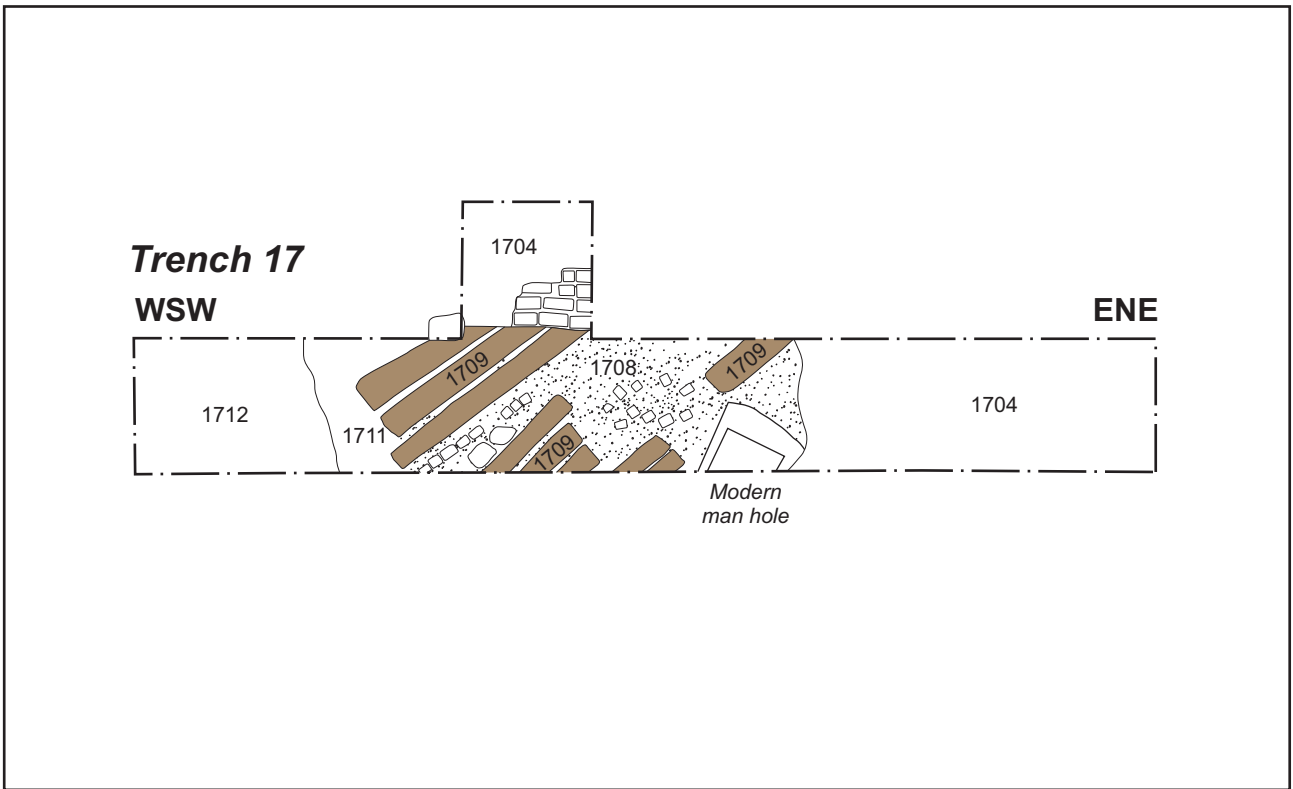
Trench 16, looking south (Scales 1m)

Fig 40

5.10 Trench 17

Trench 17 (15m x 1.8m; Figs 2, 41 and 42) lay east-west and was positioned to examine post-1828 structures. The quayside surface was exposed 0.25m below the present ground surface at c4.45m aOD. The surface comprised laid timber sleepers (1709), which measured 0.36m wide by 0.20m deep and 3m in length and were a soft wood, most likely to be pine. The timbers were set into and overlain by a layer of black foundry sand (1708), which in turn was overlain by a recycled laid brick surface (1707). The bricks comprised a mix of un-frogged standards some of which were over-fired with only a few complete examples, measuring 230mm by 110mm by 70mm. There was no discernable pattern to the laying of the bricks, which appeared to be demolition waste from elsewhere reused to give a hard surface over the timber sleepers. The bricks were bedded over the timbers with foundry sand. The eastern end of the Trench had a compacted slag surface (1704), overlain by tarmac.

At the western end of the trench the base of the Western slipway was exposed (Fig 42), this would appear to be an unmapped extension to the slipway observed in Trench 9. The base of the slipway was at 3.93m aOD and comprised a compacted slag surface of possibly two layers (1712). The time interval between the layers could not be determined and it is unclear whether they represent phases of repair or alteration to the slipway.



Scale 1:100 (A4)

Trench 17, plan Fig 41



Trench 17 looking east, with the slipway base in the foreground, and the timber quayside in the mid ground Fig 42

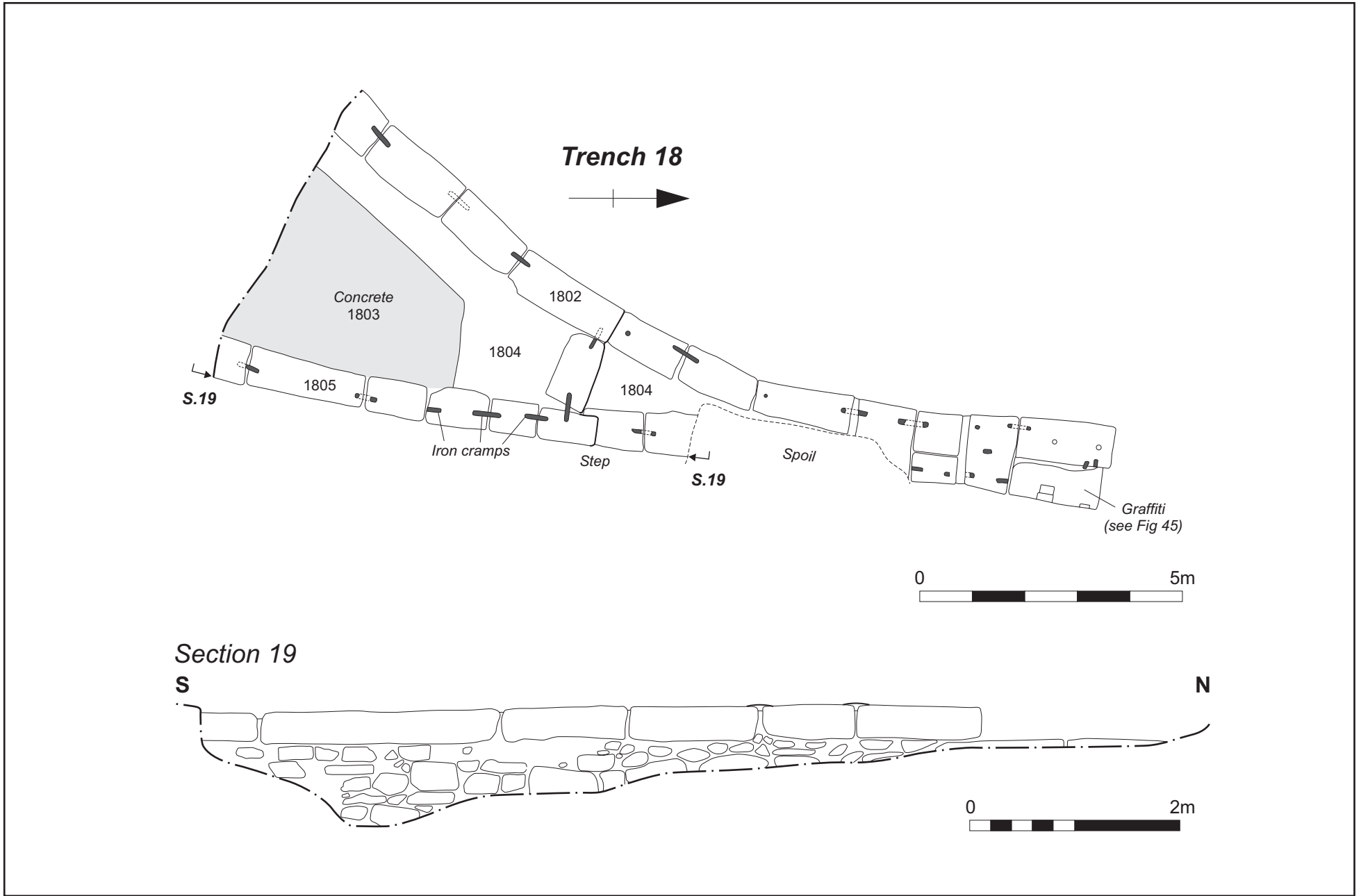
5.11 Trench 18

Trench 18 was relocated and enlarged when the modern dumped overburden had been removed and the archaeology was found to be just under the surface. The decision was taken to expose as much of the west wall of Carnsew Dock and the sluice wall as possible (10m x 1.8m; Figs 2 and 43).

The top of the west wall of Carnsew Dock (1805) was exposed at 4.08m aOD (Fig 43) and the Sluice wall (1802) at 4.23m aOD, both walls were capped with large granite blocks joined with iron cramps most of which survived. The construction however of the Carnsew Dock wall comprised irregular blocks of un-coursed stone (Fig 44), as observed in Trench 10 (Fig 27), contrasting with that of the sluice which comprised large dressed coursed granite blocks. The step exposed on the wall is visible on the far left of the photograph of Carnsew Channel dated c1920 (Fig 13).

At the point where the west wall of Carnsew Dock met the east wall of the sluice there had been some repair in brick, which had been partially covered in cement render. Whilst the cement was wet at least two people had graffitied their name into the cement (Fig 45). One appeared to be *L Barrett* or *Bennett* with the date *1916* (?) underneath, this name was outlined with a stylised whale. The other name was not legible.

Excavation was undertaken to 0.08m aOD into Carnsew Dock to try and expose the base of the dock but this was not reached, due to the depth exceeding the full reach of excavator; only mixed modern deposits (1805) were encountered.





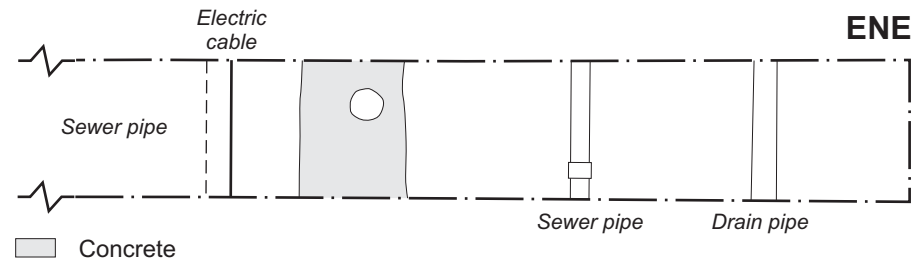
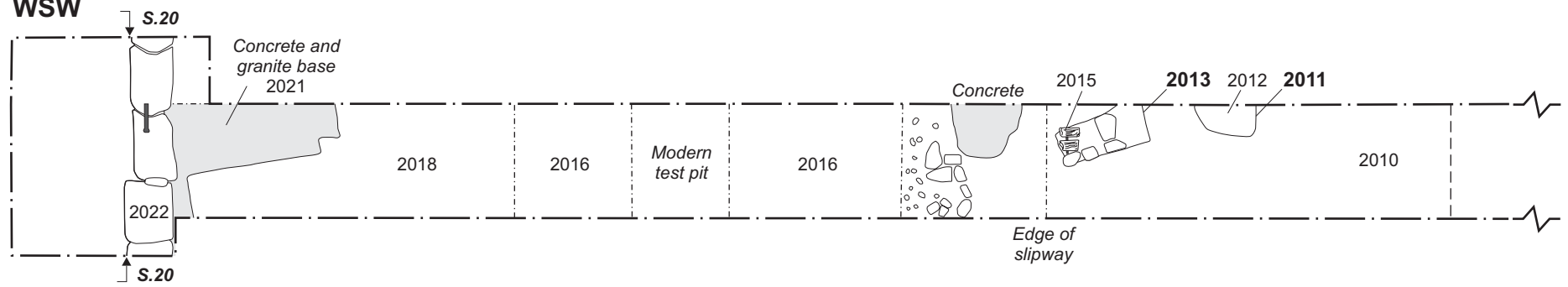
Trench 18, west wall of Carnsew Dock, looking north-east, the step visible on the right of the wall is that also seen in Figure 13 (Scale 2m) Fig 44



Graffiti on the northern end of wall between Carnsew Dock and the sluice to the west (north to the left, Scale 1m) Fig 45

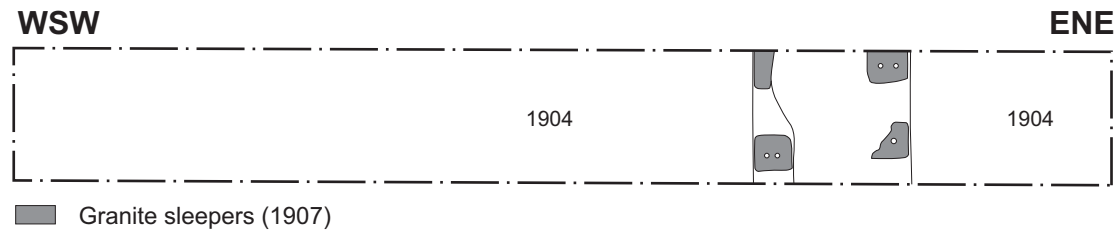
Trench 20

WSW

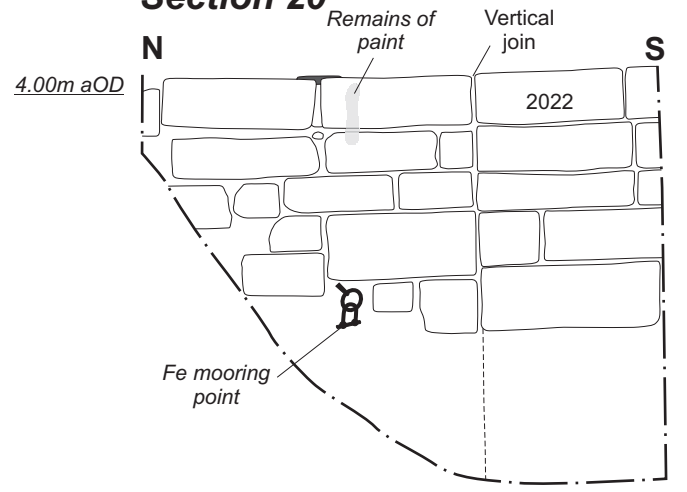


Trench 19

WSW



Section 20



5.12 Trench 19

Trench 14 (15m x 1.8m; Figs 2, 46 and 47) lay east-west and was excavated to intercept rails and quayside buildings.

The only archaeological deposits exposed were four granite sleeper blocks (1907) for a track at the eastern end of the trench at 4.47m aOD. Three of the blocks had pairs of holes in the top to take the fittings for the rail chairs. The gauge for the track was as elsewhere 4 feet 6 inches although it could not be measured as accurately due to the absence of surviving rail. No further archaeology was observed in this trench.

Natural sand (1904) was exposed at 4.23m aOD, the archaeology was overlain by two layers of hardcore (1903) and (1902) which in turn was overlain by a layer of tarmac (1901).



Trench 19 looking west, a dislodged sleeper block is visible in the middle of the trench (Scales 1m) Fig 47

5.13 Trench 20

Trench 20 (20m x 1.8m, extended to 34m long; Figs 2 and 46) lay east-west and was positioned to expose the west quayside wall and the eastern slipway.

The quayside wall (2022) was exposed c1.0m below the present ground surface at 4.08m aOD. The wall was constructed from large coursed granite blocks. There was a vertical joint in the wall in the exposed section which went the full depth of the machine excavated sondage to 1.38m aOD, which would suggest that the quay wall had been modified in this section (Figs 46 and 48). Set into the wall was an iron mooring point which had traces of an orange painted line above, suggesting that this was the line between two berths.

The cap stones of the section of wall exposed in this trench were cut to join each other in a chevron fashion reinforced with iron cramps (Fig 46 and 48). This was the only part of the quay where this style of joint was observed. Elsewhere the joining method was just the iron cramps, many of which around the quay have rusted through.

On the landward side of the wall there was a granite and concrete base (2021) for a quayside structure of unknown function. The quayside surface adjacent to this feature comprised compact dark orange brown sandy clay with granite chips (2018). Elsewhere in the trench the quay surface was comprised of a dark black brown compacted slag (2016).



Trench 20, showing vertical joint between the two stones at the top of the picture and the chevron style of joint Fig 48

The compacted slag base of the slipway (2010) (Fig 49) was exposed in the middle part of the trench at 3.85m aOD, the western side of the slip was evidenced by a truncated timber upright (2015), set in a post pit [2013]. The eastern side was inferred by the lack of the surface as seen in section; no firm evidence was visible because the eastern end had been heavily disturbed by modern services.

Cutting the base of the slipway, was a post hole [2011], possibly for a timber upright to support ships whilst being built as seen in historic photographs of the slipway (see Fig 12).



Trench 20 looking west showing the slipway base
(Scales 1m) Fig 49

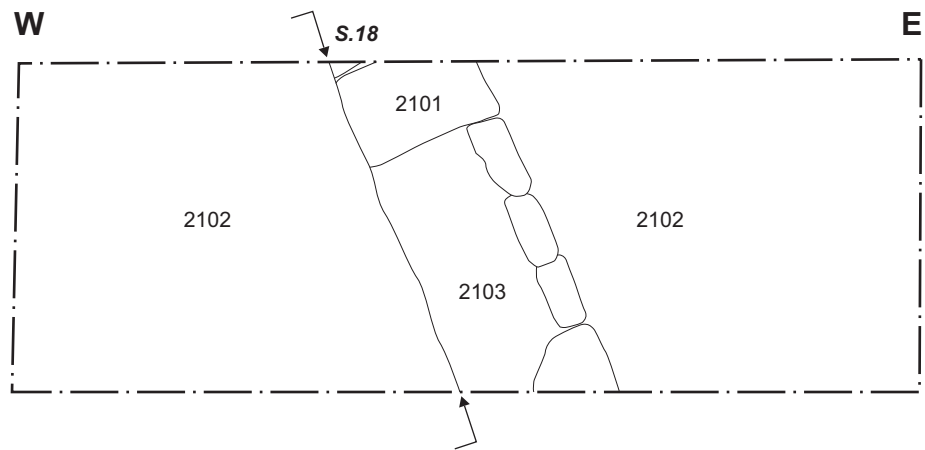
5.14 Trench 21

Trench 21 (5m x 2m; Figs 2 and 50) was an additional trench aligned north-west to south-east to locate the eastern side wall of Carnsew Dock which also forms the western revetment of the Western slipway (visible to the right of the ship in the foreground of Fig 13).

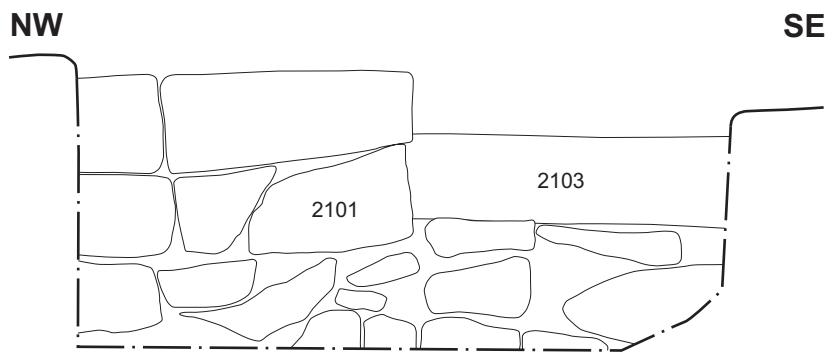
The top of the wall (2101) was exposed 0.3m below present ground surface at 4.22m aOD. All except two of the granite capping stones, had been removed from the exposed section of the wall (Figs 50 and 51); this was possibly done when the adjacent track was laid. The construction of the wall followed that of the other side of the dock as exposed in Trenches 10 and 18, with loosely coursed rubble capped with regular granite blocks.

The slipway and dock either side of the wall had been filled with clay and rubble (2102). The wall was overlain by a layer of hardcore (2103) for the adjacent track way.

Trench 21



Section 18





Trench 21 East side of the eastern wall of Carnsew Dock (Scale 1m) Fig 51

5.15 Trench 22

Trench 22 (4m x 2m; Figs 2, 4 and 52) was excavated to expose part of the recess for the sluice gates. The quay wall was composed of roughly coursed granite blocks, which were exposed to a depth of the third course. The granite capping stones were also present. Parts of the quay face preserved a course rendered face. Set into the wall an iron turnbuckle bolt was found which would have served to hold the sluice gate tight to the quay.

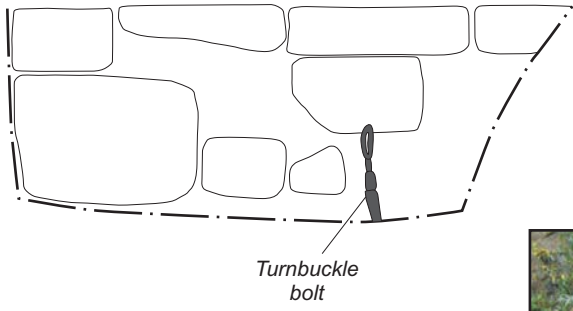
5.16 Trench 23

Trench 23 (4m x 2m; Figs 2, 4 and 52) was excavated to examine a loading ramp that could be observed in the upper surface of the quay wall of Carnsew Pool as a pair of granite walls, 1.9m apart, and extending perpendicular to the face of the quay. The face of the quay was locally exposed revealing that the loading ramp had been blocked with concrete blocks prior to being infilled. At a depth of 1.7m from the quay surface the bottom of the loading ramp had not been observed.

Trench 22

NE

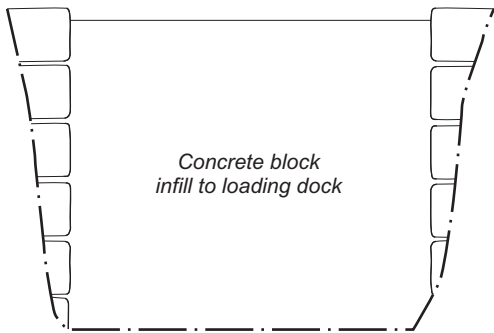
SW



Trench 23

NE

SW



6 CONCLUSIONS

A combination of desk-based assessment (Mason 2010) and trial trench evaluation (2010 and 2011) has been used to establish, with some degree of accuracy, the character and extent of the quaysides and slipways lying within the proposed development area. Particularly informative results were achieved in fulfilment of the principal aim of the fieldwork: to locate and characterise the walls buried beneath the modern in-fill along the western edge of South Quay.

Cartographic and documentary evidence indicates that South Quay was constructed in the period 1817-1818 by Harvey and Co and that two slipways and Carnsew Dock were eventually located at the head of the Carnsew Channel. The most easterly of these, the Eastern slipway alongside South Quay, was constructed at a relatively late date, first appearing on Ordnance Survey maps of 1907/8. Some debate exists as to whether this slipway was temporarily in-filled as it is not depicted on the Ordnance Survey map of 1936 (Fig 10) but is clearly shown on that of 1938 (Fig 11) as well as appearing on photographs of the 1940s and 1960s (Figs 16-18). Whilst the evidence for this temporary in-filling remains equivocal, the slipway had definitely been permanently buried by 1968 (Fig 19).

The evaluation was successful in locating the position of the junction between the stone quay and the timber lined eastern slip and demonstrated that the timber survives, although in poor condition. It also demonstrated, in conjunction with the 2010 evaluation, that the other quay walls on the western side also survive and gave an indication of their construction methods.

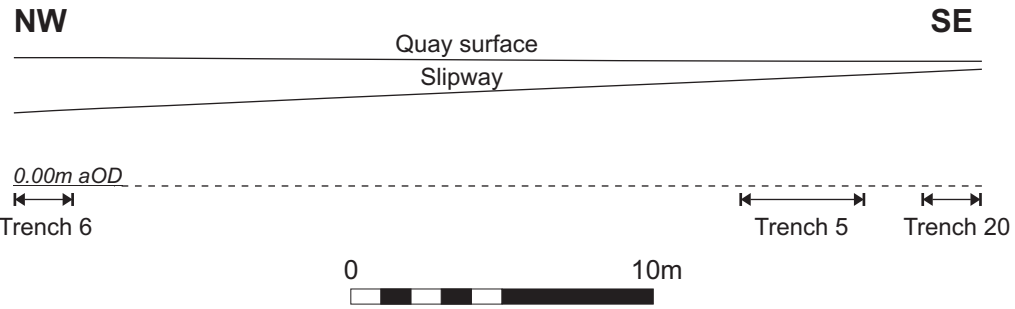
The evaluation combining information from the 2010 works managed to get profiles of the eastern and western slipways (Fig 52, profiles 1 and 2), it was however unable to achieve a profile of Carnsew Dock due to the depths being beyond the maximum reach of the excavator. The profiles show a shallow slope of between 2° and 4° from horizontal for the slipways.

The evaluation demonstrated that evidence for some of the quayside structures survive, and that even if the rails do not survive the sleeper blocks do survive in places.

The evaluation has also shown that there were areas of ground disturbance by recent service trenches in the areas of modern concrete hard standing which relate to the buildings of the latter use of the quay in the 1970s as a scrap merchants yard.

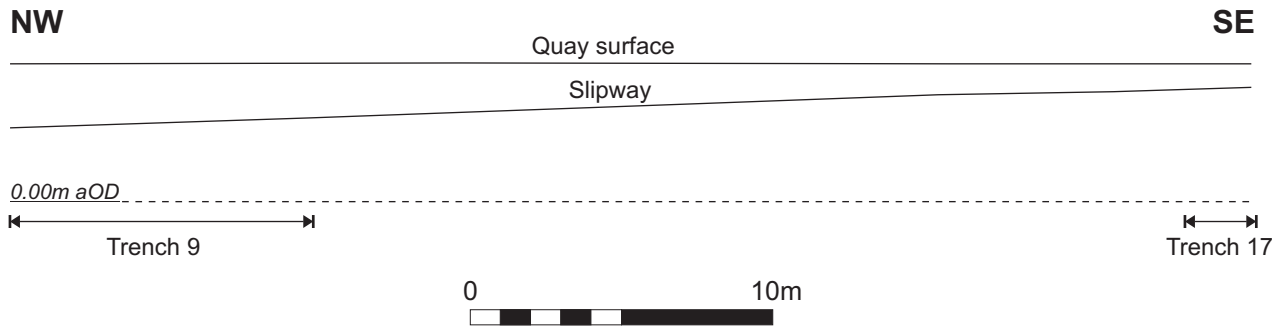
Profile 1

Profile of eastern slipway between Trenches 6 and 20



Profile 2

Profile of middle slipway between Trenches 9 and 17



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