



Central Docks Canal Link, Merseyside

Archaeological Excavation and Watching Brief Report



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SUMMARY

Between March 2006 and June 2008, Oxford Archaeology North carried out archaeological excavations within the Central Docks area of Liverpool (centred at SJ 334 914). The work was undertaken for Pierse UK, and British Waterways, in advance of the cutting of a new Canal Link, creating 1.4 miles of new navigable waterway along the banks of the River Mersey. The development footprint forms a significant part of the Central Docks, stretching between the north/south dock divide at Pier Head and the Stanley Dock lock flight. The site lies within the Maritime Mercantile City of Liverpool World Heritage Site and is also classed as a conservation zone. It includes the sites of eighteenth-century sea walls, Princes Dock, Princes Half-Tide Dock, West Waterloo Dock, Victoria Dock, and Trafalgar Dock.

The excavation revealed details of both the known major monuments, and additional structures which do not feature on maps and had not been documented previously. The excavations revealed a fragment of sea wall and also phases of surfacing and warehousing which appear to have been in use for a relatively short period before modification. The dock walls, for the most part, survive in almost perfect condition, and to their full height, indicated by the presence of granite coping stones with the Hartley locking stone pattern. The full depth of the walls was not revealed, as their foundations lie below the formation level for the Canal. Evidence for warehouses and sheds was limited, as they lay outside the limit of excavation. Tip lines from land reclamation were visible at both Plot 7 and between dock walls at Victoria and Trafalgar Docks. By the nineteenth century, however, when this area of the docks was under construction, land reclamation was being achieved more rapidly, on an industrial scale, partly because of the strategic control of the new Dock and Harbour Board. The majority of the infill was a mix of quarry waste and material purpose-dredged from the river bed. Limited amounts of ceramic and clay pipe fragments did find their way into this material, although the quantities are minor compared with the assemblages from the Mann Island and the Pier Head sections of the Canal Link. This may be explained by the now considerable distance of the reclamation sites from the potteries and domestic centres of the City, the rapid extension of the docks northwards meaning that the system was outstripping urban expansion, and that it was not a practical dumping ground for refuse.

Taken together with the results from Mann Canal and Pier Head, where further extensive archaeological work was also undertaken as part of the Canal Link project, these excavation results add significantly to what was known and understood about the construction and technical development of some of Liverpool's most notable maritime engineering structures.

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Many thanks are offered to all the British Waterways staff involved in the project, for all their help and support, including Tim Brownrigg, Ian Thomas and particularly Richard Longton, for his support after Pierse UK went into liquidation. Thanks are also given to the ARUP team of Richard Summers, Lyndsey Hammond and Miles Wilkinson.

The evaluation and excavation work was undertaken by Caroline Raynor, with the assistance of Ric Buckle, Tim Christian, Pascal Eloy, Dave Lamb, Des O'Leary, and Kieran Power. We would also like to thank David Higgins for his specialist report on the clay pipes. This report was compiled by Nick Johnson and edited by Rachel Newman, and the drawings were produced by Anne Stewardson and Caroline Raynor.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT

1.1.1 Oxford Archaeology North (OA North) was appointed to undertake the archaeological works for the entire length of the proposed Liverpool Canal Link project, which has been designed by British Waterways. This involved the undertaking of watching briefs and large-scale excavations on the archaeologically sensitive sections of the route. The purpose of the archaeological work was to mitigate any adverse effect the construction of the Canal Link might have on the cultural heritage of Liverpool. Piers UK held the contract for the route of the Liverpool Canal Link through the Central Docks, including Princes Dock and Trafalgar Dock, and this company commissioned OA North for this section of the project. This section had previously been evaluated, when a series of trenches indicated the excellent survival of buried archaeological features relatively close to the surface (OA North 2006a). This report presents the results of the archaeological evaluation, excavation, and watching brief, undertaken over the period 2006–8, following the analysis of the material excavated.

1.2 SITE LOCATION, TOPOGRAPHY AND GEOLOGY

1.2.1 The site lies on reclaimed land, west of the former Mersey shoreline, which is marked today by the course of Bath Street and Waterloo Road (Fig 1). At its northern end it passes through Collingwood Dock before terminating in Stanley Dock (SJ 337 921), the only dock on the estate to have been cut from dry land. The Dock Perimeter Wall lies east of the Canal, at a varying distance over its length, while the floating roadway (SJ 338 904) marks the southern limit. For management and construction purposes, the whole length of the Canal was divided into a number of sections, numbered from south to north, as far as Princes Dock (SJ 337 907), as LCL1–8, while the northern part, the Central Docks section, was numbered from north to south, as LCD1–7 (Fig 1).

1.2.2 The boundary of the Maritime Mercantile City of Liverpool World Heritage Site (Fig 1) encompasses Princes Half-Tide Basin, north of Princes Dock, and Salisbury, Collingwood and Stanley Docks, all of which lie on the route of the Central Docks Canal Link. The route also passes through several backfilled basins, *ie* Victoria, Trafalgar and Clarence Half-Tide Docks (Fig 2). The area was reclaimed from the river during the further development of the port in the nineteenth century, and now forms a uniform plateau, at 7–8m OD.

1.2.3 The drift geology of this part of Liverpool includes alluvium and intermixed silts and sands along the estuarine margins of the Mersey (Philpott 1999), although the inferred shoreline, in the vicinity of Regent Road, before the development of the docks, lies *c* 350m from the sea wall west of Stanley Dock. The vast area between the sea wall and the old shoreline, where not occupied by expanses of open water, is made-ground. The finished depth of the docks themselves nevertheless entailed excavation of the foreshore, with inherent difficulties (Jarvis 1996, 66–7). The made-ground has three principal phases: the first, to

allow the construction of the docks themselves, over the period from the end of the eighteenth century through to the middle of the nineteenth; an intermediate phase, when Clarence Dock was closed and filled to provide a site for a new power station in 1928 (Stammers 1999, 54; Sharples 2004, 124); and modern backfilling, following the closure of many of the docks in the 1980s.

1.3 PREVIOUS WORK

- 1.3.1 An impact assessment was prepared by Wardell Armstrong on behalf of British Waterways, in which the archaeological value of the dockland remains was recognised (Wardell Armstrong 2003). In 2005, Wardell Armstrong prepared a brief for a mitigating archaeological investigation, which emphasised that ‘the canal project presents a unique opportunity to gain considerable and valuable information which will greatly improve our understanding of the dock development’ (Wardell Armstrong 2005, 4). This formed the basis of a project design for evaluation and watching brief submitted by OA North (OA North 2006a).
- 1.3.2 OA North undertook a limited watching brief adjacent to Princes Dock in 2006 (OA North 2006b), and Merseyside Archaeological Services undertook a similar watching and recording brief at the north end of Princes Dock during construction work in 2006 (MAS 2006). The evaluation report (OA North 2006b) made specific proposals for future archaeological works, encompassing a range of strategies appropriate to the significance of the archaeological remains likely to be encountered in different areas of the development footprint. OA North was subsequently commissioned to undertake further work at Princes Dock and in the Central Docks on the basis of these proposals, which is reported on here.

2 METHODOLOGY

2.1 PROJECT DESIGN

- 2.1.1 Following a request from British Waterways, a Project Design was developed (OA North 2006a), outlining methodologies designed to mitigate the impact on archaeological remains arising from the construction of the Canal. Building on the results of the impact assessment and the evaluation (OA North 2006b), the significance of the archaeological features known and thought to be preserved was assessed, and appropriate levels of investigation and recording specified.
- 2.1.2 The overall aim of the mitigating works was to provide an appropriate, specialist response to known or newly discovered archaeological remains during the course of construction, including the recording of archaeological and structural features, with particular attention paid to those features considered particularly significant, including the dock and sea walls. This would serve the aim of enhancing knowledge about the development of the Liverpool docks (Wardell Armstrong 2005).
- 2.1.3 A series of research questions was formulated:
- what techniques were employed in the construction of the various docks, and were particular techniques characteristic of a specific engineer?
 - what is the evidence for earlier dock structures?
 - what is the evidence for buildings associated with the docks, and ancillary fittings and furniture?

2.2 EXCAVATION AND WATCHING BRIEF

- 2.2.1 The results from the evaluation (OA North 2006b) had implied that there was good survival of archaeological remains, undisturbed by more recent development, at the southern end of Princes Dock, and between Victoria and Trafalgar Docks. Further work was recommended in these locations.
- 2.2.2 The sheets for field recording utilised a format acceptable to the *Institute for Archaeologists* (IfA 1995), a unique alpha-numeric project code being applied to all records. All archaeological features were accurately located on a site plan and recorded by photographs, scale drawings and written descriptions, in accordance with the Brief (Wardell Armstrong 2005, 5 *et seq.*). The open-area excavations were accurately surveyed, tied into the Ordnance Survey (OS) datum, and located on an up-to-date 1:1250 OS map base (Figs 3 and 4). Artefacts were retained for processing and analysis. An extensive digital and analogue photographic archive was built up, recording the progress of the excavations and details of significant features. The resulting artefactual, paper and digital archive has been prepared for deposition in accordance with the aims and objectives set out

in the revised project design (OA North 2011a, 10).

2.3 UPDATED RESEARCH AIMS

2.3.1 The revised project design (OA North 2011a) updated and added to the original research aims and objectives. These were formulated in accordance with guidance from English Heritage (English Heritage 1991, 2–3), and were as follows:

2.3.2 *Updated research aim 1:* how did the environment of the river Mersey foreshore and its human use develop over time?

- Objective 1: to examine the early environment of the river Mersey, including evidence for early sea level and vegetational changes;
- Objective 2: to examine the nature of post-medieval exploitation of the river Mersey, including evidence for the changing shore-line and land surfaces.

2.3.3 *Updated research aim 2:* how did the layout and character of the site develop through the post-medieval period?

- Objective 1: to characterise the nature of the main phases of activity via their stratigraphy and to detail the archaeological formation of the sites;
- Objective 2: to determine the phasing of the structures to set their development within an historical context.

2.3.4 *Updated research aim 3:* what is the evidence for the development of trade and industry in post-medieval Liverpool, and its associated infrastructure?

- Objective 1: to examine the contribution of the docks to the development of Liverpool's production, industry, trade and transport;
- Objective 2: to explore the evidence from the site for the rise of consumerism;
- Objective 3: to integrate evidence for the wider development of transport and industrial infrastructure in Liverpool with the evidence for goods, trades and services provided by the artefacts and structures located by the excavation.

2.3.5 *Updated research aim 4:* what evidence is there for developments in engineering and methodology in Liverpool's 'dock system'?

- Objective 1: to detail the construction methods and materials, including adaptations and rebuilds, for all the maritime features within the site;
- Objective 2: to investigate the 'dock system', its development and use, examining the evidence for the Liverpool docks and those in other global port cities.

2.4 THE ARTEFACTS

2.4.1 The revised project design (OA North 2011a) confirmed the likely value of post-excavation analysis on specific categories of finds, such as the pottery. Each category was analysed by a specialist, with the aim of extracting the information anticipated in the revised project

design, and in accordance with the methodologies outlined in that document.

2.5 ARCHIVE

2.5.1 A full archive, produced to professional standards, has been prepared, in accordance with current English Heritage guidelines (English Heritage 1991) and both the *Environmental standards for the permanent storage of material from archaeological sites* (UKIC 1984, Conservation Guidelines 3) and *Guidelines for the Preparation of Excavation Archives for Long Term Storage* (Walker 1990), now that the project is complete. The project archive collates and indexes all the data and material gathered during the course of the project. The deposition of a properly ordered and indexed project archive in an appropriate repository is considered an essential and integral element of all archaeological projects by the IfA in that organisation's code of conduct. The archive will be deposited with National Museums Liverpool, which meets the criteria of the Museums, Libraries and Archives Council for the long-term storage of archaeological material (Museums and Galleries Commission 1992).

2.5.2 **Structural and Stratigraphic Data:** the context record generated by the excavation, which forms part of the site archive, describes 144 contexts in total. The archive of primary field drawings and photographs comprises the following:

Digital survey files	37
Multiple context drawings	14
Laser scans	4
Monochrome contact prints	612
Slides	612
Digital images	500

2.5.3 The digital data has been temporarily stored on the server at OA North, which is backed up on a daily basis. CDs are being used for long-term storage of the digital data, the content including the reports, plans, scanned images and digital photographs. Each CD is fully indexed and is accompanied by the relevant metadata for provenance.

2.5.4 **Finds:** all dry and stable finds have been packed according to the Museum's specifications, in either acid-free cardboard boxes, or in airtight plastic boxes for unstable material. Each box has a list of its contents and in general contains only one type of material, such as pottery or glass.

2.5.5 The assemblage is currently well-packaged, and box lists derived from the site database have been compiled. The paper records are in acid-free storage, fully indexed, and with the contents labelled.

2.6 RECIPIENT MUSEUM

2.6.1 National Museums Liverpool is a group of eight museums in Liverpool, including the

Merseyside Maritime Museum and the Museum of Liverpool Life. The main museum has been nominated as having the capacity to co-ordinate the deposition of the finds and the paper and electronic archive. Paper and digital copies of issued reports will be deposited with the Liverpool Record Office.

Site Code: evaluation LC 06, excavation LC(P) 07.

National Museums Liverpool, William Brown Street, Liverpool, L3 8EN. Contact: Liz Stewart. Tel 0151 207 0001 (switchboard).

Liverpool Record Office, Central Library, William Brown Street, Liverpool, L3 8EW. Tel 0151 233 5817.

2.7 DISCARD POLICY

- 2.7.1 A Discard Policy has been prepared, in consultation with the recipient museum, National Museums Liverpool. Material of no discernible long-term archaeological potential has been discarded, with the Museum's agreement.

2.8 DISSEMINATION

- 2.8.1 In accordance with the *Project Brief* (Wardell Armstrong 2005), and following consultation with the client and the Merseyside Archaeologist, a suitable text is being prepared to publish the results from the excavation in an appropriate journal.
- 2.8.2 A synthesis (in the form of the index to the archive and a copy of this report) will be deposited with the Merseyside Historic Environment Record. A copy of the index to the archive will also be available for deposition in the National Monument Record in Swindon.

3 BACKGROUND

3.1 HISTORICAL BACKGROUND

- 3.1.1 The development of the docks at Liverpool exploited certain natural geographical advantages of the Mersey, but also had to overcome the disadvantages presented by that same watercourse. Over the course of 100 years, since work began on the Old Dock in 1709, the technique of building sea walls far down the foreshore of the Mersey, reclaiming land behind them, and building docks within that land, had been steadily developed (Ritchie-Noakes 1984). Nevertheless, the Dock Committee's ambitions to build larger and better facilities were apparent when, in 1800, having obtained an enabling act of Parliament the previous year, they approached one of the leading engineers of the day, William Jessop, to advise them (Jarvis 1991a, 8). His advice led to the construction of what became Princes Dock, then the largest dock in Liverpool, and the lessons learnt during its construction enabled Jesse Hartley, Dock Engineer from 1824 to 1860, to develop dock construction and, in particular, masonry walling, to an apotheosis (Jarvis 1991b).
- 3.1.2 The site of the Liverpool Canal Link, Central Docks Section, lies to the north of Pier Head and extends from the edge of the former George's Dock Basin to Bramley Moor Dock, where it joins the Stanley Dock lock flight, and from there the Leeds–Liverpool Canal (Fig 1). The whole of the northern section of the Canal Link is bounded on the west by the River Mersey and on the east by the Dock Boundary Wall, adjacent to Waterloo Road (also known as the Dock Road). The site lies partly within the Maritime Mercantile City of Liverpool World Heritage Site, specifically the Stanley Dock Conservation Area, and is also part of a designated conservation zone. The Central Docks were created on reclaimed land, during the period from the end of the eighteenth century through to the first half of the nineteenth century.
- 3.1.3 **George's Dock Basin:** this dry (tidal) basin, at the south end of this section of the scheme, was constructed to provide access from the river to George's Dock and was completed in 1771 (Ritchie-Noakes 1984, 27). George's Dock was reported to be in poor condition in 1822, necessitating rebuilding work, and it is possible that this extended to the basin also (*ibid*). It was closed and filled in 1871, to permit the construction of the 'Floating Roadway' which gave improved access to the landing stage.
- 3.1.4 **Princes Dock:** the construction of Princes Dock (Fig 2), opened in 1821, took 11 years, and had been ten years in the planning before then (Jarvis 1991b, 230; McCarron and Jarvis 1992, 71). There was sufficient pressure on dock space to justify its construction, with Liverpool benefiting from a geographical position far enough removed from the disturbance to trade caused by the French Revolutionary Wars (Jarvis 1991a, 8). The procrastination, however, was a consequence of other wartime economic difficulties and some local considerations.
- 3.1.5 The proposed site for the new dock was partly occupied by a fort, about which little is known, except that there was some reluctance to dispense with it while the French wars

continued (Jarvis 1991a). Wartime shortages had substantially driven up the costs of both labour and timber. In addition, the Dock Committee lacked funds, having only recently completed King's Dock further south, which opened in 1788 (Ritchie-Noakes 1984, 37). The Committee's decision to consult with leading engineers of the day was partly driven by problems occurring at King's Dock, including collapsing dock walls and silting, but also by uncertainty about the design and construction of the proposed new dock.

- 3.1.6 William Jessop and John Rennie were both invited to comment (Hadfield and Skempton 1979, 249; Ritchie-Noakes 1984, 37; Jarvis 1991a, 10; Jarvis 1996, 14). In his report of 1800, Jessop commented on the silting of those older dock entrances with tidal basins, and proposed the installation of proper locks as a solution, together with improvements to the construction of the retaining walls. He also rejected the idea that the area of the planned new dock could be advantageously increased by building below the low water mark, pointing out the considerable increase in cost this procedure would cause. It had been recognised that there were structural flaws in setting sandstone walls directly on the reclaimed ground, as the sheer weight of the walls made them likely to subside. There was also doubt about the choice of stone, as the sandstone from the town quarries was friable and prone to fracture and erosion (Ritchie-Noakes 1984, 37).
- 3.1.7 Rennie reported in 1809 and, although the Committee may have hoped otherwise, he confirmed the necessity to build as Jessop had specified (Jarvis 1991a, 11). The removal of this last reason for procrastination did not result in an immediate start, however. Further delays resulted from the numerous social and economic problems brought about by the Napoleonic Wars (1803–15). The war had limited the supply both of horses, for moving spoil and stone, and fodder for those that were available (Jarvis 1991b, 33). There were also disputes over the acquisition of land at the site for the new dock (Jarvis 1991a, 11).
- 3.1.8 Work finally commenced in 1810 (*op cit*, 12), with the intention of making a much smaller dock than originally planned, since the full complement of land remained unavailable. At the same time, the sea wall that now forms the boundary of the current Marine Parade was under construction. Stone for the works was shipped across the river from quarries at Runcorn. The Committee sought a government loan in 1812 to complete the dock, and at the same time applied for powers to acquire the remainder of the land, including that occupied by the fort (*op cit*, 15). Ironically, the main opponents to the construction of the dock in the form proposed were the shareholders of the Leeds and Liverpool Canal Co, who stood to benefit considerably from the increased trade the dock would generate, but who not unreasonably objected to the idea that the dock was to be constructed within a walled, secure compound, because the canal company had only just extended their basins southwards with the aim of constructing a set of locks to link with the new dock (Jarvis 1991b, 62).
- 3.1.9 A further problem with the construction of the dock lay at the door of the Committee's incumbent surveyor and superintendent, John Foster, appointed in 1799 (Jarvis 1996, 13). The history of the stranglehold exerted by him and his family on public works in Liverpool in the first quarter of the nineteenth century has been documented (Jarvis 1991b; Jarvis 1996), but two particularly telling details stand out in relation to the work on Princes Dock. In 1822, the Audit Commissioners appointed by the Committee were able to show that the

amount paid for stone vastly exceeded the quantity delivered: in the words of one historian, it 'would have more than sufficed to sink each and every one of the vessels said to have delivered it' (Jarvis 1991a, 20). The appointment of Jesse Hartley as Assistant Surveyor, on 24th March 1824, a man entirely capable of untangling Foster's methods and documentation from within, perhaps not surprisingly resulted in the resignation of Foster three days later (Jarvis 1991a, 20; Jarvis 1996, 15). In the longer term, quantities of the stone supplied during Foster's tenure were found to be soft, and had to be replaced (Jarvis 1991a, 38).

- 3.1.10 In 1819, the first buildings around the dock and its half-tide basin were under construction. These included transit sheds, open to the dockside and designed to be dismantled easily and resituated, should the need arise (McCarron and Jarvis 1992, 71). The Dock Wall was also constructed forming the 'cyclopean' barrier which now runs the length of Waterloo Road (Liverpool City Council 2005), to provide security for goods entering the northern dock system. The dock was officially opened on 19th July 1821, the day of the coronation of King George IV, a full 21 years after it was commissioned. Its construction had cost ten times as much per acre as King's Dock, its immediate predecessor (Jarvis 1991b, 32).
- 3.1.11 Princes Dock was regularly, if belatedly, modified during the course of its existence. Sections of the walls of the dock were relaid *c* 1866 (Jarvis 1991b, 41), the half-tide basin at its northern end being completely remodelled in 1868, and the open-sided transit sheds, lining both long sides, and completed *c* 1827, were augmented by closed sheds along the west side in 1843. The open sheds on the west side were replaced in 1878, and substantially modified in 1929 to form closed sheds (Jarvis 1991a, 46). In 1872–4, a radical solution to the need to improve the access to the landing stage west of Princes Dock resulted in the infilling of George's Dock Basin, and the construction of what came to be known as the 'Floating Roadway', a long, hinged ramp, able to take up the rise and fall of the tide (*op cit*, 43). The passage which once linked the south end of Princes Dock to the basin was then converted to a graving dock (*op cit*, 45).
- 3.1.12 In 1895, the Mersey Docks and Harbour Board opened its Riverside station immediately west of Princes Dock, beside the Princes Landing Stage, operated by the London and North Western Railway, and providing easy access both to the Irish Packet and transatlantic liners. The station, and improved facilities at the landing stage, were principally a response to Cunard's threat to leave Liverpool (Jarvis 1991a, 54–7; Reed 1992, 4).
- 3.1.13 By the turn of the century, it was obvious that the dock walling itself was a problem. Designed to accommodate sailing vessels, and ensure long-term stability, its curved, toed-out cross-section was unsuited to steamships with vertical, deep sides and bilge keels, which collided against the lower levels of the wall before they were even alongside. Concrete staging was built out over the water to solve this, so that the open area of the dock was significantly reduced. The west side was so treated in 1904–5, and the east in 1928 (Jarvis 1991a, 49–51, 63).
- 3.1.14 In the early twentieth century, Princes Dock was mainly used by the Belfast Steamship Company (*op cit*, 53) and, in the late 1930s, the pressure from coastal traders led to the conversion of the graving dock at the south end of Princes to a branch dock, and the construction of a new transit shed on its west quay (*op cit*, 64–5). In the longer term, the

shift to container shipping led to the redevelopment of the Garston Docks further south, and brought about another change of use. A ‘roll-on/roll-off’ terminal was installed, and opened in 1967, in the south-west corner of Princes dock, for the Irish Packet, but the continuing reduction in passenger numbers, and the construction of a new terminal at Victoria Dock (*Section 3.1.20*), combined to make it redundant by 1981 (McCarron and Jarvis 1992, 72). The dock then fell into decline until the 1990s, when a new phase of regeneration used it as the focal point of a waterfront business district.

- 3.1.15 **Princes Basin:** Princes Dock was accessible from the south, via George’s Dock Basin and a linking channel, and from the north, via Princes Basin. This was originally a ‘dry’ basin, directly open to the river, and empty at low tide. As such it was only suitable for manoeuvring into the dock towards the top of the tide, and was otherwise used by small vessels which could load or unload conveniently in the time allowed by the water level. This was a poor use of the space, and it was converted into a half-tide dock in 1868, with three entrances, two suitable for the large vessels, for use on the top half of the tide, and a small lock entrance, which could be used by flats and barges at almost any state of the tide. In 1875, Hartley added a transit shed with rail access on the east quay, which was so effective that it was extended by 50% in 1877 (Jarvis 1991a, 36–8).
- 3.1.16 **Later Docks:** the series of docks constructed during the 1830s, following the completion of Princes, and immediately north of it, were ambitious undertakings, adapted to meet changes in trade and the merchant fleet (Jarvis 1991b). The first to be constructed was Clarence Dock, which, because it was designed to accommodate steamships, was deliberately sited by the Dock Committee a distance from docks to the south, as a solution to the risk of fire (Jarvis 1991a, 29–30). The intervening gap was soon filled, however, by the complex of Waterloo, Victoria and Trafalgar Docks. These uniform structures were the last three docks built to provide berthing and quaysides for sailing ships. While sailing vessels continued in widespread use until the turn of the century (Greenhill 1980), and experienced a brief resurgence during the First World War (*op cit*, 49–52), the purpose of every dock constructed in Liverpool from c 1840 was the accommodation of increasingly large steamships (McCarron and Jarvis 1992, 94).
- 3.1.17 **Clarence Dock and Clarence Half-Tide Dock:** Clarence Dock (Fig 2) was designed by Jesse Hartley, opened around 1830, and named after William, Duke of Clarence, who in that year became King William IV. There Jesse Hartley, the Dock Engineer, used granite as the wall facing for the first time (Sharples 2004, 96). The dock was irregular in shape, as was its corresponding half-tide basin, and flanked on all sides by transit sheds. The march of dock development south of it soon brought it into contact with the dock system, and once steamers became commonplace, it mainly served the smaller coastal traffic (McCarron and Jarvis 1992, 27). The dock was filled in to permit the construction of a power station in 1929, and the Half Tide Dock was remodelled (McCarron and Jarvis 1992, 27; Stammers 1999, 33).
- 3.1.18 **Clarence Graving Docks:** directly to the north of the Clarence Half-Tide Dock (Fig 2) lay a smaller sub-basin, which provided access to the Clarence Graving Docks. These are the oldest docks on the Mersey still in service. Constructed in 1830, they were modernised in 1928–33 and, for Liverpool, are unusual in being dug partly from rock (Liverpool City

Council 2005, 68).

- 3.1.19 *Waterloo Dock*: situated immediately north of Princes Dock Half-Tide Basin, and separated from Clarence Dock by Victoria and Trafalgar Docks, Waterloo Dock (Fig 2) was opened in 1834, and comprehensively remodelled in the late 1860s (Jarvis 1991b). Compared with Princes Dock, its construction, under Jesse Hartley, had been managed with significantly greater efficiency. Waterloo Dock began as a regularly shaped rectangular basin, orientated with its long axis perpendicular to the river. The dock covered 6¼ acres, with gates 45 feet wide, and was designed to accommodate the largest sailing ships then in service (Jarvis 1991b, 145). The traffic from cotton imports and emigrants had markedly increased, and Princes Dock was especially overcrowded in the spring, when large numbers of vessels assembled in advance of their first annual voyage (*ibid*). Waterloo Dock was designed to absorb some of this pressure, but subsequently gradually specialised in the import of corn, especially following the repeal of the Corn Laws in 1846 (McCarron and Jarvis 1992, 103). It was constructed of pink sandstone, shipped from across the Mersey, from Runcorn (Jarvis 1991b, 144), with coping stones in grey granite, maintained in alignment by the Hartley locking stone. Waterloo Dock was the focus of the construction of a number of significant new buildings, an indication of its status in international trade. A northern customs house, much smaller than the main offices at Canning Place, was established on the south side of the dock, along with a new fish market. In addition, the second observatory to be constructed in Liverpool was built in 1844 on the south side of the dock. This superseded the smaller observatory on St James Mount and played a central role in helping to fix the longitude of Liverpool (Jarvis 1991b, 146). The observatory was relocated in the 1860s, when the dock was altered to attract and accommodate the grain trade (*ibid*). It was then split in two, along its north/south axis, making Waterloo Dock East (sometimes referred to as Waterloo Grain Dock) and Waterloo Dock West. New six-storey warehouses were constructed on the north, east and west sides of the Waterloo Dock East. In 1925, the warehouses were completely re-equipped for handling oil seeds (McCarron and Jarvis 1992, 103). The final alteration to these docks was the installation of an entrance lock in 1949 (*ibid*). The north warehouse was damaged during the Blitz, and demolished in 1951, while the west warehouse was demolished following redundancy in 1969, although the east warehouse is still extant, having been converted into apartments in 1989–98 (Sharples 2004, 123; Liverpool City Council 2005, 129).
- 3.1.20 *Victoria Dock*: this dock (Fig 2) opened in 1836, two years after Waterloo Dock, forming the second in the triumvirate of uniform, multi-functional docks. Covering almost six acres, with a gated entrance again 45 feet wide, Victoria Dock provided another link in the system. Its river entrance was soon regarded as superfluous, however, and was closed in 1846, after which access could then only be gained through the dock network either from the north or south, making the Victoria, Trafalgar and Waterloo system ‘the first real examples of spine and branch docks’ (McCarron and Jarvis 1992, 94). The dock was flanked on the south and north by a transit shed which extended the full length of the quayside, and a shed was added to the east quay in the late nineteenth century. It was remodelled in 1929, when the the north and south quaysides were left open, and the railway access was altered. A new shed was added to the north quay in the mid-twentieth century, and the dock was backfilled for the construction of the British and Irish Steam Packet office and berth in 1972. The dock was closed in 1988 (*ibid*).

- 3.1.21 **Trafalgar Dock:** Trafalgar Dock, the last of this group of three to be constructed, covered 6½ acres, and could be accessed either from the Victoria entrance to the south (Fig 2) or the Clarence Half-Tide Basin to the north. The dock was named after the battle of 1805, and was opened at the same time as Victoria (*Section 3.1.20*). Like that dock, it was not designed for a specific trade, and the quayside was initially occupied by two sets of transit sheds, the larger to the south, and a smaller shed at the east end of the north quay. This small shed was extended in the late nineteenth century, when sheds were also constructed on the east and west quays (OS 1893). At the turn of the century, the pier dividing Trafalgar from Victoria Dock was shortened, and the gate between them was removed, as was the swing bridge crossing from it to the west quay. The west quay shed was also then extended south and west (OS 1908). As with Victoria Dock, the redevelopment of the Trafalgar, which followed upon the selling of Clarence to provide a site for a power station in 1928, resulted in the clearance of sheds from the north and south quaysides, and the addition of rail access (OS 1955). In common with all the Central Docks, Trafalgar soon became too small for transatlantic ships engaged in bulk trades, and switched to high-value ocean trades in small vessels, and coastal trades (Jarvis 1991b, 42). In 1971, it was mostly filled in, and re-orientated north/south, when it became the site for a new coastal container terminal, and a roll-on / roll-off ramp was provided (McCarron and Jarvis 1992, 90).
- 3.1.22 **Salisbury Dock:** Salisbury Dock (Fig 1) was opened in 1848, as part of a larger scheme. The programme of works was approved by Parliament in the Dock Act of 1844 (Jarvis 1991b, 77). Although called a ‘dock’, Salisbury’s principal purpose was to provide a half-tide basin for the other docks around it, extending the period on the tide when vessels could access the dock system. Salisbury Dock lies within the confines of the World Heritage Site and the Stanley Dock Conservation Area (Fig 1).
- 3.1.23 **Collingwood Dock:** Collingwood (Fig 1) was constructed at the same time as its neighbours, Salisbury and Stanley. Extending to a little over five acres, it was intended from the outset to serve small vessels, and with the rapid increase in the sizes of vessels, soon became suitable only for coastal traffic (McCarron and Jarvis 1992, 32). Such traffic was a long way down the pecking order (Jarvis 1991b, 122), and so it is not surprising that the dock was never modernised and retains walls exactly as originally built (McCarron and Jarvis 1992, 32).
- 3.1.24 **Stanley Dock:** construction for the Liverpool Canal Link terminates at Stanley Dock where, via the Stanley Dock lock flight, it links into the Leeds and Liverpool Canal (Fig 1). Stanley was constructed in 1844–8, and uniquely, lies inland of the former high tide mark, the relationship with the canal being an essential consideration in its design and planning (Jarvis 1991b, 77; McCarron and Jarvis 1992, 85). Stanley Dock was arranged to permit the direct transfer of bulk goods between sea-going vessels and canal boats, saving on cartage fees, and allowing substantially improved turn-around times for steamship owners keen to maximise the revenue-earning capacity of their comparatively expensive vessels (Jarvis 1991b, 76–7). In similar vein, Jesse Hartley ensured direct connections from Stanley Dock to the Lancashire and Yorkshire Railway, and also the dock railway (*op cit*, 77 and 98).

3.2 ARCHAEOLOGICAL BACKGROUND

- 3.2.1 There have been no previous large-scale excavations within the area of the Central Docks. OA North undertook a limited watching brief adjacent to Princes Dock in 2006 (OA North 2006a), and Merseyside Archaeological Services undertook a similar watching brief at the north end of Princes Dock during construction work in 2006 (MAS 2006). OA North monitored excavations for the cutting of the new canal, but were not present for the works associated with the link where it altered the faces of existing linked sections of the docks, for example at the north end of Princes Dock and the south end of the Waterloo Dock complex.

4 EXCAVATION RESULTS

4.1 INTRODUCTION

- 4.1.1 Generally speaking, in the nineteenth century, land reclamation and development of the dock system in Liverpool mostly progressed northwards along the banks of the Mersey; these developments may be tracked on historical maps and, from the end of the eighteenth century, in the minutes of the Dock Committee (Jarvis 1991b, 22). As the methods and materials employed to reclaim land and construct the dock and sea walls were regarded as unexceptional at the time, there is little direct documentary evidence for these activities; the archaeological excavations have been able to shed new, and useful, light on both.
- 4.1.2 The evidence from the below-ground archaeological investigation takes a number of forms. There is the structural evidence provided by the remains of sea and dock walls, and ancillary structures contemporary with the working life of the docks. The material used to fill in behind the dock and sea walls derived from a number of sources over the history of the development of the river frontage, a history which culminates in the backfilling of the dock basins themselves. Finally, there are the artefacts, some incorporated in the reclamation material, others belonging to the period when the docks were active.
- 4.1.3 Research aims 2.1 and 2.2 (*Section 2.3.3*) required a programme of analysis to characterise and phase the activities identified on the site, including the episodes of construction and development. The individual phases are described, covering both the archaeological excavations (LCD7 and LCD2) and the watching brief, with supporting evidence from a synthesis of the artefactual and documentary analysis. A further research aim (4.1) was to acquire information about the methods and raw materials used in the construction of the major structures (*Section 2.3.5*), and this is also provided below, and the features are shown, and numbered, on Figures 3 and 4.

4.2 PHASE 1 (MERSEY FORESHORE: MEDIEVAL–LATE EIGHTEENTH CENTURY)

- 4.2.1 Before the start of significant reclamation of land from this section of the Mersey foreshore, north of George's Dock, the area occupied by the Canal Link was foreshore, exposed twice daily at low tide. The excavation, which was focused on the ground occupied by the Canal and, therefore, was generally limited to the footprint and formation level of that structure, did not certainly encounter the level of the foreshore anywhere. In his report to the Dock Committee, William Jessop advised against any construction below the low tide mark (Jarvis 1991a, 10), so it may reasonably be assumed that the sea wall complementing Princes Dock, positioned to maximise the area of open water in that dock, lay on this limit, *c* 200m from the edge of the land, indicating that the Mersey foreshore was extensive and gently sloping.

4.3 PHASE 2 (RECLAMATION AND GEORGE'S DOCK BASIN: LATE EIGHTEENTH CENTURY)

- 4.3.1 The earliest structure encountered by the excavation was the north wall of George's Dock Basin (Fig 3), constructed in the late eighteenth-century to ease access for vessels into George's Dock itself (*Section 3.1.3*). Historical mapping shows that the basin was not gated, and so functioned in a manner similar to Dry Dock, further south (OA North 2011b; Ritchie-Noakes 1984, 21). The wall was mainly constructed from pink sandstone, but included some blocks of yellow sandstone, and there was some evidence of repair. Red sandstone fragments, of unknown origin, formed the fill behind it.
- 4.3.2 A sandstone- and brick-built recess (Plate 1) was revealed within the wall of George's Dock Basin at the south end of LCD7. No further evidence of its purpose was available, but it may have served to protect a ladder for access to the lower levels of the basin at low tide. The foot of the rear face of the wall was stepped out, indicative of improved engineering (Plate 2). It was not entirely certain that this was an original build, although this is implied by the execution of the lower levels in sandstone similar to the rest of the wall. The brickwork, however, suggests that it was at least extensively repaired.
- 4.3.3 Following the opening of George's Dock in 1771 (*Section 3.1.3*), there was further land reclamation north of it, shown on Horwood's map of 1803 and, while it does not coincide with the westward extent of the new land shown on that map, the north/south sea wall, **7583**, 0.6m wide, marks a stage in the process (Fig 3; Plate 3). The style of its construction, in yellow sandstone, was identical to sea walls revealed during excavations further south along the Canal (OA North 2011c; 2011d), and at Mann Island (OA North 2011b). A single course of the wall was revealed at the base of the formation for the Canal, showing that it had been reduced in height during later reclamation. This is the earliest example, from the dockside excavations conducted by OA North in Liverpool, of the dismantling of a sea wall during land reclamation, and suggests that there had been a change in the value of finished sandstone.

4.4 PHASE 3 (PRINCES DOCK: EARLY NINETEENTH CENTURY)

- 4.4.1 At the north end of LCD7, a short length of the south quay (**7553**) of Princes Dock was revealed, constructed in pink and yellow sandstone, with a waterside face of pink sandstone ashlar (Fig 3; Plate 4). Earlier construction in Liverpool, of both sea and dock walls, used only yellow sandstone, but following the completion of King's Dock, in 1785, there was a change to pink sandstone, from Runcorn, for the waterside face of such structures, prompted by the inferior durability of the yellow sandstone (Ritchie-Noakes 1984, 37). The Canal cut through the south quay where a 'roll-on/roll-off' facility had been installed in 1967 (*Section 3.1.14*), and later removed and the wall reinstated. Some of the original wall of the dock remained *in situ*, however.

4.5 PHASE 4 (VICTORIA AND TRAFALGAR DOCKS: MID-NINETEENTH CENTURY)

- 4.5.1 The walls of Victoria and Trafalgar Docks were constructed from pink sandstone, bonded with Portland-type cement, and capped with granite, these coping stones being maintained

in alignment by Hartley's trademark diamond-shaped locking stones. The docks were opened in 1836 (*Sections 3.1.20 and 3.1.21*). The excavation at LCD2 was focused on their shared quayside (Fig 4), the north quay of Victoria Dock being readily identifiable before work began, but the south quay of Trafalgar Dock was revealed 0.3m below the present ground surface, in excellent condition (Plate 5). The rear, south, face of the wall had two buttresses, or counterforts, a feature of Hartley's engineering, designed to counteract the tendency of such walls to rotate and founder (Ritchie-Noakes 1984, 105–6), and two drainage apertures were connected to a network of brick culverts.

- 4.5.2 The wall of Victoria Dock was almost identical to that of Trafalgar, in pink sandstone, with apertures for drainage, and granite coping stones. There was a large counterfort, 1.1m square, constructed from pink sandstone, against the rear of the wall. The fill, behind both dock walls, consisted of sandstone waste, coarse and fine sands, with some pea gravel, and shale and shell fragments. The upper levels of the fill behind the wall of Victoria Dock consisted of clay and demolition rubble.
- 4.5.3 The historical documentation reveals that there was a gap of several years between the opening of Princes Dock and the erection of transit sheds and office buildings around it (Jarvis 1991a, 33). The area designated LCD7 remained mostly open until *c* 1955, with only a few buildings, relatively small in dockside terms, and a north/south wall separating the graving dock from other activity. The position of this wall may be marked by the western edge of the lowest and earliest of three areas of hard surface, formed from beach cobbles, revealed along the eastern part of the cut for the Canal, *c* 1m below the modern ground surface (Fig 3; Plate 6). A cobbled surface closely resembling this is visible in a photograph, dated *c* 1860, of the north quay of George's Dock Basin (Stammers 1999, 100).
- 4.5.4 Another feature revealed during the excavation was the base (7542) of the 'Machine House' (Fig 3), marked on the 1850 Ordnance Survey Town Plan. The excavated remains consisted of an irregularly shaped brick and concrete platform, with a complex arrangement of recesses in the centre, some containing timber.

4.6 PHASE 5 (DEVELOPMENT OF ANCILLARY DOCKSIDE FACILITIES: MID-NINETEENTH–EARLY TWENTIETH CENTURY)

- 4.6.1 The excavation showed that red sandstone fragments were used to fill in George's Dock Basin from its closure in 1871 (*Section 3.1.3*), when the site was used to provide easier access to the landing stage, via the 'Floating Roadway', which opened in 1874. The origin of this material is not known.
- 4.6.2 Along the west side of the excavation for the Canal, south of Princes Dock, in LCD7, the brick foundations of a shed were revealed, 38m in length, with beam slots and timber sills (Fig 3). The area west of the graving dock and east of the Irish Sea packet offices was, for many years, occupied by a timber yard, with overhead travelling crane. The foundations seem likely to belong to the large, rectangular, single-storey shed, aligned north/south, which appears on Ordnance Survey maps and in a number of photographs (OS 1908; Welbourn 2008, 126).

- 4.6.3 Brick culverts were identified at both excavation sites. A single east/west-orientated culvert was present towards the northern end of the excavation in LCD7, possibly associated with the roof drainage from the sheds of the timber yard (Fig 3), while in LCD2, a complex, interconnecting network of culverts was revealed (Plate 7; Fig 4). These will have been associated with the transit sheds, with which both Victoria and Trafalgar Docks were provided from the beginning. The excavation also revealed a short length of standard-gauge railway line, inset into the hard surfacing of square and rectangular stone setts, and a cast-iron water main. The alignment of the railway does not coincide with that shown on the Ordnance Survey map of 1955, following the removal of the transit sheds. To install the water main it had been necessary to cut into one of the counterforts and the edge of the quay of Trafalgar Dock.
- 4.6.4 On the evidence of photographs of other parts of the dock estate (Stammers 1999), it seems likely that the hard surfacing south of Princes Dock was altered during this phase, and the beach cobbles replaced by square and rectangular stone setts. A layer of these was revealed c 0.5m below the modern ground surface (Plate 6).
- 4.6.5 A concrete base, likely to have accommodated a crane or other machinery, was revealed in the centre of the excavations at LCD7 (Fig 3). No artefacts were discovered in association with it, and its only stratigraphic relationship was with the stone setts, into which it had been inserted. It does not appear on the available historical mapping. It may be nearly contemporary with the stone setts, or it may have been associated with the construction of the new transit shed on this site in the late 1930s (*Section 3.1.14*).
- 4.7 PHASE 6 (ROLL-ON ROLL-OFF FACILITIES: MID-TWENTIETH CENTURY)**
- 4.7.1 The excavation in LCD7 revealed some remnants of the roll-on/roll-off facility installed in the south-west corner of Princes Dock, and opened in 1967 (*Section 3.1.14*). The dock wall, 7553, cut through to accommodate the ramp, had been restored using concrete and coloured cement render, and backfilled behind with rubble (Plate 8; Fig 3). In addition, there was a substantial, rectangular, concrete structure 0.4m below the surface, measuring 5.5 x 6m, and 1.2m deep. This appears to have been a component of the new dock facility, and is likely to have housed machinery. The ramp was no longer used from 1981 (Jarvis 1991a, 68), and was demolished shortly after.
- 4.8 PHASE 7 (REDUNDANCY, DEMOLITION AND REPLACEMENT: LATE TWENTIETH CENTURY)**
- 4.8.1 The transit sheds which occupied the quaysides of both Trafalgar and Victoria Docks are no longer represented on Ordnance Survey maps from 1955. A single two-storey office block, with a 1970s appearance, was the sole building extant on the site at the start of the excavation at LCD2, and will have served the coastal container service which operated from West Waterloo, Victoria and Trafalgar Docks at that time (Plate 9; Jarvis 1991a, 68; McCarron and Jarvis 1992, 94–5).
- 4.8.2 East of the excavation of the south quay of Trafalgar Dock, most of the area of the backfilled dock was capped with concrete, although a hard surface of stone setts still remained at the excavation site itself. The backfill appeared to be material dredged from

the Mersey, and consisted of fine and coarse yellow sand, with pea gravel, shale and shell fragments. Elements of the methodology recorded for the backfilling of Herculaneum Dock may well have been applied there, with an initial phase during which accumulated silt was removed, probably to ensure later stability, followed by filling with dredged sand (Ritchie-Noakes 1984, 66). The most recent development at the site leaving archaeological remains appeared to be the installation of fibre-optic cables, which were extant within backfilled trenches cut into the stone setts.

4.9 NOT CLOSELY PHASED

- 4.9.1 A circular structure, 10m in diameter, and built using yellow sandstone ashlar, was revealed in the final stages of the excavation at Victoria and Trafalgar Docks, at the base of the formation level (Fig 4; Plate 10). The finish of the blocks was closely comparable to those employed in the eighteenth-century sea walls exposed during excavations at Pier Head and Mann Island (OA North 2011d; 2011b). No artefacts were recovered in association with the structure.
- 4.9.2 Development of dock facilities north of Princes Dock did not begin until the late 1820s, however, and this particular location was still part of the river until the 1830s (*Section 3.1.1*). Nothing which might explain this feature is apparent on any historical mapping, and its chronology and purpose remain unknown.

5 THE FINDS

5.1 THE MATERIAL

5.1.1 The quantities of artefacts recovered, by type, are presented in Table 1.

Type	Total
Post-medieval pottery	147
Clay tobacco pipe	31
Coin	1
Glass	11
Shell	12
Animal bone	8

Table 1: Artefact totals by type

5.2 THE POTTERY

5.2.1 In all, 147 fragments of pottery, weighing 6.792kg, were recovered from nine contexts, as well as being unstratified (Table 2). It was all in good condition, being, for the most part, in medium to large fragments, on occasion with substantial parts of vessels represented. The range of fabrics was relatively restricted, but comprised mainly eighteenth-century types, with a strong emphasis on the later part of the century, although some later material was present. The balance of the different types of pottery fabrics suggests that deposition did not begin until the end of the eighteenth century. This inference is perhaps supported by the lack of other fabrics typical of the mid–late part of the century.

Fabric	No fragments	%age total assemblage	Weight (g)	%age total assemblage
Black-glazed redwares	34	23.13	3762	55.39
Brown stonewares	8	5.44	186	2.74
Creamware	53	36.05	460	6.77
Industrial slipwares	3	2.04	42	0.62
Pearlwares	3	2.04	103	1.52
Porcelain	1	0.68	46	0.68
Self-glazed redwares	4	2.72	408	6.01
Sugar wares	25	17.01	1568	23.09
Tin-glazed wares	4	2.72	10	0.15
White earthenwares	7	4.76	36	0.53

Fabric	No fragments	%age total assemblage	Weight (g)	%age total assemblage
White salt-glazed stonewares	3	2.04	15	0.22
Other minor fabrics	2	1.36	156	2.30
<i>Totals</i>	<i>147</i>		<i>6792</i>	

Table 2: The fabrics present within the assemblage

- 5.2.2 **Table wares:** the few fragments of tin-glazed wares (Table 2) are probably amongst the earliest pottery from the site, and none of the other marginally earlier fabrics that might have been expected, like slip-trailed wares, were present, suggesting that deposition did not begin until the end of the eighteenth century. Only a single very small fragment of white plain salt-glazed stoneware was recovered from demolition fill **7568**, and two of scratch blue from material associated with wall **7580**. The latter was a style of decoration introduced in the 1720s, which was at the height of its popularity in the period 1745–55 (Savage 1952, 199). A single, small fragment of undecorated, possibly Chinese, porcelain was unstratified (**7587**); teawares were imported in huge quantities during the eighteenth century by the East India Company, with imports coming to an abrupt end in 1791 (Hildyard 2005, 123).
- 5.2.3 Creamwares formed the largest element of the assemblage (Table 2), but were not particularly varied in form. The greatest concentration was unstratified, with 20 fragments representing 37.7% of the creamware by fragment count, and 40% by weight. Most were plates and shallow bowls with rim patterns including Royal pattern and shell-edge in blue, which have their origins in the later eighteenth century (Noel Hume 1969, fig 35). None of the creamwares was transfer-printed, but a closed vessel from the material associated with wall **7580** is painted with swags of green ivy leaves, and the edge of a plain plate rim is painted with brown lines. Fragments of handles and bases imply the presence of chamber pots as well as tablewares.
- 5.2.4 Pearlwares, produced from 1779 (Draper 1984, 51), comprised a surprisingly small proportion of the assemblage, and are, for the most part, transfer-printed, with mainly Chinese-influenced designs. Later white earthenwares, dominating the market by c 1820 (Noel Hume 1969, 130), are also present, but again in small amounts. Industrial slipwares were also present in very small quantities, and included the base of a tankard in banded ware from material around wall **7580**, dating to the late eighteenth or early nineteenth century.
- 5.2.5 **Kitchen wares:** most of the kitchen wares in the assemblage are black-glazed redwares, probably made locally, or in Prescott, which was an important supplier of such basic vessels to Liverpool (Davey 1991). There were no particular concentrations. Only two, utilitarian, vessel-types were recorded: tall, more or less cylindrical storage vessels; and large bowls or pancheons. Although there were numerous slight variations in rim form which might reflect different sources, all can be paralleled at Prescott (McNeil 1989) and in the assemblage from South Castle Street, Liverpool (Davey and McNeil 1985), and both fabric and form suggest that it is highly likely that most were supplied from Prescott. A single unstratified mottled redware dish was recovered (**7587**), and is probably in a similar fabric

to the black-glazed vessels. Its deliberately heavily ridged profile probably has a specific purpose, but this has not been determined.

- 5.2.6 Brown stonewares formed only a small element of the assemblage (Table 2) and included part of the upright rim of a thin-walled possible jug, which was unstratified. The unusual highly blistered appearance of the latter raises the possibility that it is a waster, or at best a second, from a local pottery. A single grey stoneware transfer-printed marmalade jar came from the bedding layer **7558** (*Section 4.6.4*), and is likely to date to after 1862, the date at which, as stated on the label, Keillers' marmalade won an International Exhibition.
- 5.2.7 *Sugar wares*: sugar wares (sugar-loaf moulds) comprised a significant element of the assemblage. There were no particular concentrations, but the characteristic base of a sugar-loaf mould, with an aperture of only a few centimetres, came from material associated with the wall **7583** (*Section 4.3.3*). No attempt was made to reconstruct the vessels, but there were a large number of rim fragments from sugar-loaf moulds, and variation in the rim profile made it clear that there were several different moulds present. Several fragments seem to have rows of small holes running across them, which does not seem to be a normal feature, and might point to a more specialist use, or a specific manufacturer.
- 5.2.8 Excavation has established that sugar wares were produced in Prescot during the early eighteenth century (McNeil 1989), and the fabrics analysed are effectively identical to those. It is quite likely that sugar wares were also made in Liverpool, although Davey has suggested (1991) that, as several potters had interests in both production centres, a split was made between finewares and coarsewares. The finewares, such as porcelain and creamwares, relied on imported clays brought to Liverpool by sea, and so were most economically made in Liverpool, while the coarsewares, which used coal-measures clays and coal for fuel, could be made in Prescot, where these were locally abundant.
- 5.2.9 *Tin glazed tiles*: nine small fragments of tile were collected, from contexts associated with the late eighteenth-century sea wall (**7583**; *Section 4.3.3*), and also unstratified. Liverpool was a well-known eighteenth-century production centre (Ray 1973), with tiles known from as early as 1716 (Honey 1969, 49), although, from 1756, when a Liverpool entrepreneur developed the transfer-printing technique and effectively moved tile production to an industrial scale (*ibid*), it appears, to a degree, to have specialised in cheaply made tiles printed with designs in black. A fragment from material associated with wall **7580** is polychrome (yellow and green) rather than blue and white, and the black outlines of the design could well have been transfer-printed, dating it to after the introduction of this technique in 1756 (Savage 1952, 152). A small fragment from wall **7583** seems to have been decorated using a technique known as 'bianco-sopra-bianco', which was popular in the mid-late eighteenth century (Honey 1969, 45).
- 5.2.10 *Discussion*: compared to other excavations along the line of the Liverpool Canal Link (OA North 2011c; 2011d), the Central Docks section has produced only a small ceramic assemblage. The range of fabrics was fairly restricted, representing a typical late eighteenth- to early nineteenth-century assemblage and reflecting the wares made locally in Liverpool or brought in from associated production centres such as Prescot, which appear to have had close economic links to the city. There does seem to have been some relatively late activity, however, with a later nineteenth-century marmalade jar from a

bedding layer (7558) for hard surfacing at Princes Dock (*Section 4.6.4*).

5.3 THE CLAY TOBACCO PIPE

5.3.1 In total, 31 fragments of clay pipe were recovered by the excavations. One stem fragment from this assemblage possesses a partial stamp likely to be that of Thomas Hayes, a Liverpool pipemaker working 1780–1800, and known from the excavations at Mann Island and Pier Head (OA North 2011b; 2011d). The remainder of the assemblage was not exceptional, and confirms the late eighteenth- and early nineteenth-century contexts from which it was recovered. It consisted mostly of stems, with eight bowl fragments and one mouthpiece.

5.4 THE COIN

5.4.1 A single coin was the only metal item recovered from this site, although its precise stratigraphic context is unclear. It is worn and sufficiently corroded as to be only partly legible, but is clearly a halfpenny, probably of George III, and most likely to have been struck 1806 or 1807 (Brooke 1966, 221).

5.5 THE GLASS

5.5.1 Only 11 fragments of vessel glass and two of window glass were recovered from the site. All were in relatively good condition, although some showed signs of iridescent weathering and some slight surface flaking. Most of the fragments were large, and the bases, the most robust part of the vessel, tended to be complete. All of the vessel glass derived from dark olive green bottles, with the exception of a single fragment from a similar bottle, but in amber/brown glass.

5.5.2 A simple count of largely complete bases indicates the presence of at least three tall cylindrical bottles with bases 80–90mm in diameter, and a domed kick. Although dark green bottles had been made in England from the mid-seventeenth century (Noel Hume 1961), the taller cylindrical forms did not come into use until the mid-late eighteenth century, and the form seen in this group evolved from *c* 1760 (Morgan 1976). The unstratified amber/brown vessel, is probably of later nineteenth- or early twentieth-century date.

5.5.3 The two small mid-pane fragments of colourless window glass were probably cast plate glass. Such glass was produced in England from 1773, when the British Plate Glass Company was opened in St Helen's (Barker and Harris 1994, 112), and probably would soon have been available in Liverpool.

5.6 ANIMAL BONE

- 5.6.1 The assessment (OA North 2011a) of the animal bone suggested that there was only limited potential for additional understanding of the site to be gained from the small assemblage of eight fragments, and this was borne out in practice.

5.7 DISCUSSION

- 5.7.1 The finds assemblage from the excavations conducted in the Central Docks section of the Canal is small and, as such, can contribute only to a limited extent to the interpretation of the archaeological remains. The date of the material is consistent with what is understood from the historical documentation about the development of these two parts of the dock estate in the first half of the nineteenth century (*Section 3.1*), while also indicating that there was some undocumented land reclamation, north of George's Dock Basin, at the very end of the eighteenth century.
- 5.7.2 In contrast to the excavations further south along the Canal Link (OA North 2011c; 2011d), artefacts were not recovered from land reclamation, with the exception of the material in close association with the late eighteenth-century sea wall, **7583**. It seems likely that this is a consequence of a change in the methods used in reclamation, and the sources of the backfill (*Section 6.2*).

6 DISCUSSION

6.1 INTRODUCTION

6.1.1 Generally speaking, the value of the archaeological results obtained from a late industrial site such as this is twofold: some of the information is wholly different from anything available historically and, therefore, provides new insights into the past; while other elements are complementary and may serve either to confirm or gloss existing historical data. The Central Docks Canal Link cut through reclaimed land, and dock walls, the construction of which had developed to a high degree by the early nineteenth century. The programme of archaeological work has recovered evidence for the methods by which reclamation was achieved, and for developments in dock design and construction techniques.

6.2 RECLAMATION

6.2.1 While land reclamation continued to be the principal means of providing new docks along the east bank of the Mersey, it is apparent that, from the very end of the eighteenth century onwards, new techniques and materials were adopted. In contrast with the archaeological excavations further south, at Pier Head and Mann Island (OA North 2011d; 2011b; 2011c), the Central Docks work encountered no dumps of industrial waste, including failed clay pipe kiln firings, and pottery wasters. Instead, the material used to backfill behind the dock and sea walls in any one location was generally homogeneous, provided in large quantities, and from the same source. In the vicinity of Princes Dock, the backfill appeared to have derived from quarrying or the excavation of a dock basin, while further north, at Trafalgar and Victoria Docks, such material was still used, alongside sands and gravels probably dredged from the river itself.

6.2.2 In part, this may be explained by the relative distance of the new docks from the centre of the town, but what is more significant is that the scale of new construction, and the speed at which it was carried out, meant that sources capable of rapidly providing large quantities of backfill material were now required. Dock and sea walls were now constructed with Portland-type cement, which set in considerably less time than the lime mortar previously used, and the excavation of the dock basins themselves was now carried out with mechanical assistance. These changes, in themselves, meant that there was no longer the opportunity to fill behind walls slowly, over a period of years, using whatever came to hand.

6.3 DOCK WALLS

6.3.1 During the archaeological excavations and watching briefs carried out by OA North on the Central Docks Canal Link, four different dock walls were encountered. At the southern end of the scheme, the north wall of George's Dock Basin, dating to the late eighteenth century, was revealed, and, *c* 97m further north, the south quay of Princes Dock, built in the early

nineteenth century (*Sections 4.3.1 and 4.4.1*). The north and south quays of Victoria and Trafalgar Docks, respectively, opened 15 years after Princes Dock (*Section 4.5.1*), were exposed c 1020m further north still.

- 6.3.2 All were constructed mostly from pink or red sandstone, with an ashlar finish on the waterside face. Documentary records suggest that this was mostly imported from Runcorn, although some may have derived from the excavation of the dock basins themselves. Beyond this shared characteristic, they were mostly different. The walls of George's Dock Basin and Princes Dock both used some yellow sandstone, although not in the waterside face. The yellow sandstone, thought to be from Brownlow Hill, appears to have lost favour as a construction material for dock walls after King's Dock was completed in 1785, because it was not particularly durable (Ritchie-Noakes 1984, 37). The section of George's Dock Basin revealed by the excavation had been repaired, and its relatively poor execution in pink sandstone is notable, given that the short section of the south wall of the same basin wall, exposed at Pier Head (OA North 2011d) used yellow sandstone, as might be expected from the date of its construction, and was work of a better quality. It is possible, therefore, that there was a major failure of the north wall of the Basin.
- 6.3.3 Jarvis notes that, in 1860, the coping of the east quay of Princes Dock had to be replaced because it was too soft, and suggests that this was a consequence of the poor practices which developed during John Foster's tenancy of the post of Dock Surveyor (Jarvis 1991a, 39). The coping was replaced in granite, the same material employed from the outset in the same situation at Trafalgar and Victoria Docks, under the direction of Jesse Hartley. The walls of these two docks were the last where Hartley used red sandstone; his subsequent work used imported granite (*Section 3.1.17*). In this respect, Trafalgar and Victoria Docks represent an intermediate stage in the development of Hartley's preferred method of constructing dock walling. The walls possessed counterforts, to resist their tendency to tip over, were mortared using Portland-type cement, and had granite coping stones, but did not use granite throughout, nor had been thoroughly grouted; such developments were implemented in the next phase of construction (Ritchie-Noakes 1984).

6.4 SEA WALL

- 6.4.1 The single length of sea wall revealed by the excavation was constructed from yellow sandstone in the same style as other sea walls encountered elsewhere during the construction of the Canal Link, at Pier Head and Mann Island (OA North 2011d; 2011b; 2011c). No artefacts were recovered to assist in its dating, nor does it appear on the available historical mapping, but the construction was distinctive and the chronological sequences elsewhere are well understood, so that it is very likely that the wall was erected in the late eighteenth century, possibly in conjunction with George's Dock Basin, which was opened in 1771 (*Section 3.1.3*). In common with archaeological discoveries at Mann Island (OA North 2011b), it is clear that, at this time, certain developments along the waterfront in Liverpool were so rapid, and so quickly superseded, that surveying and mapping was not able to keep pace.

6.5 RESEARCH AIMS

- 6.5.1 Four research aims were outlined in the updated project design (OA North 2011a; *Section 2.3*), each of which, and their accompanying objectives, has been addressed. The first research aim was directed at the changing environment of the Mersey, with the intention of detecting changes in vegetation and shoreline during the course of land reclamation and dock development. Achievement of this aim is principally dependent on the availability of palaeoenvironmental samples of the requisite quality from appropriate locations. The stratigraphic analysis has shown that there were no deposits revealed by the excavation which had the capacity to sustain this type of investigation.
- 6.5.2 The second aim was to chart the post-medieval development of the layout and character of the site. The phased account of the results from the excavation (*Section 4*), together with research on historical sources (*Section 3.1*), has been able to demonstrate the progress of reclamation of land from the river from the very end of the eighteenth, through to the first half of the nineteenth, century, and the establishment and development of facilities for shipping. The historical narrative of the sequence of construction of the docks is, generally speaking, not controversial, and the archaeological results have served to reinforce, by close observation, analysis and interpretation, the detail of certain aspects of the historical record, while adding to it in respect of more recent developments.
- 6.5.3 Another aim was focused on the evidence for the development of trade and industry in post-medieval Liverpool, and its associated infrastructure. During the period in which the Central Docks were constructed and used, the vessels employed in both the transatlantic and coastal trades changed from sail to steam, and from all-wooden construction, to all-steel, via iron. This change in construction material also enabled a substantial increase in the size of vessels. In the nineteenth century, dock construction and facilities had to respond to these developments, and, later, in the second half of the twentieth century, had to accommodate alterations in the expectations of passengers, and, with the advent of containerisation, the means by which goods were handled.
- 6.5.4 The results from the archaeological excavations and watching briefs have shown the effect of some of these major changes on details of the infrastructure. The Dock Committee's concerns for the stability and longevity of the dock walls, in which they had invested substantially, emerges in changes in the choice of raw material, with yellow sandstone no longer used, the introduction of granite, and the use of Portland-type cement mortar. It may also be seen in the introduction, under the leadership of Jesse Hartley, of counterforts as a regular element of construction (*Section 4.5.1*). Unlike Princes Dock, both Victoria and Trafalgar Docks were provided with transit sheds for the temporary storage of cargoes from the day of their opening, and these were soon augmented by rail access (*Section 4.6.3*), which had been notably absent at all the docks further south, with the exception of those developed by the railway companies themselves, such as Garston (Ritchie-Noakes 1984, 7).
- 6.5.5 The increasingly influential effect of motor transport was responsible for a further set of developments from the late 1960s onwards. By this time, car ownership was becoming more common, and passengers using the Irish Sea ferries wished to travel with their vehicles (Jarvis 1991a, 68). The answer was to install a roll-on/roll-off facility in the south-

west corner of Princes Dock, which opened in 1967 (*Sections 3.1.14* and *4.7.1*). A similar ramp was constructed at the other terminal servicing the Irish Sea routes, at Trafalgar and Victoria Docks, both of which were substantially modified to accommodate the new trade in containerised traffic, itself partly a phenomenon of motor transport.

- 6.5.6 Relatively small number of artefacts were recovered by the Central Docks excavations. This was mostly as a result of changes in the methods and materials used in land reclamation, but meant that there was no substantive evidence for the rise of consumerism.
- 6.5.7 The final research aim addressed the development of engineering techniques and operational methodologies in the Liverpool dock system. The most obvious change is that pink sandstone became the material of choice for the wall facing, in preference to the yellow sandstone. The yellow sandstone did not fall out of use completely, as it was incorporated within the north wall of George's Dock Basin, and the south wall of Princes Dock, but generally only as backing material, not facing the waterside. This preference is thought to have been dictated by the superior durability of the pink sandstone (Ritchie-Noakes 1984, 37). Further developments include the introduction of granite and Portland-type cement in wall construction (*Section 6.3.3*), and the use of sand and gravel dredged from the river for land reclamation (*Section 6.2.1*).
- 6.5.8 The results of the excavations provide a degree of insight into the operation of the docks. The changes in hard surfacing at Princes Dock were probably influenced both by practicality and the availability of materials, so that, although beach cobbles served initially (*Section 4.5.3*), and were readily obtained locally, the increasing availability of stone setts led to their replacement, and provided a smoother, more durable surface, while still providing sufficient traction for horseshoes (*Section 4.6.4*; Jarvis 1991a, 62).
- 6.5.9 Under the leadership of Jesse Hartley, rail access was introduced (*Section 4.6.3*), and was developed further in other areas of the dock estate, including Princes Dock, with the construction of Riverside Station (*Section 3.1.12*). Before the rise of motor transport after the First World War, rail was the principal means by which goods and passengers were moved around the country, and, although there were constant disputes with the railway companies, the links which Hartley facilitated between the docks and the railways, including the Lancashire and Yorkshire Railway, through its warehouses at Exchange and Great Howard Street, and the London and North Western Railway at Waterloo, enabled the exchange of huge tonnages of goods (Hyde 1971, 93).
- 6.5.10 With the increasing prevalence of motor transport came great change in the movement of goods and passengers, and the excavations encountered the physical evidence of this at both Princes and Trafalgar Docks, in the shape of roll-on/roll-off ramps for the direct access of motor vehicles to and from shipping (*Sections 4.7* and *6.5.5*).

6.6 CONCLUSIONS

- 6.6.1 As noted by Jarvis (1991b, 22), from 1793 the minutes of the Dock Committee are a detailed source, contrasting with what is available for the earlier period, which requires careful and sceptical handling by the historian. Nevertheless, this does not necessarily

result in a full picture, since it is in the nature of committees to make policy and address problems; they are less interested in taking note of what is regarded as normal (*ibid*). The results from the archaeological investigations can illuminate the ‘un-minuted’ and the ‘normal’, so that the introduction, by Jesse Hartley, of granite coping stones in the construction of Victoria and Trafalgar Docks (*Section 4.5.1*), and in replacement work at Princes Dock (*Section 6.3.3*), can be seen as a stage in a steady process of change, driven by accumulating experience, which was to culminate in the use of granite for all wall construction in later docks (*Section 6.3.3*). The materials used in land reclamation during the nineteenth century, identified during the archaeological watching briefs, were different from those used in the eighteenth century, and allow more informed interpretation of the different processes and pressures bearing upon construction at this time, and the new methodologies adopted to meet these demands (*Section 6.2*). Similarly, the shift, from beach cobbles (*Section 4.5.3*) to stone setts (*Section 4.6.4*), to asphalt, for the hard surfacing around the docks over the course of 100 years is significant in terms of the availability and manufacturing of materials, and changes in transport, although it was not a matter likely to exercise either the Dock Committee or the Mersey Docks and Harbour Board.

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APPENDIX 1: POTTERY FABRICS

A1.1 In order to provide a basic record of the pottery assemblage, the material was divided into broad fabric groups and, within those, it was quantified by fragment count and weight. In addition, the entire group was recorded by digital photography.

A1.2 BLACK-GLAZED REDWARES

A1.2.1 Made from the local red-firing coal-measure clays, these wares are difficult to assign to a particular source. There is, however, much similarity between the fabrics seen in this group and those of the Prescott kilns (Philpott 1989, especially Fabric 6), known to have been major suppliers of blackwares to Liverpool in the eighteenth century (Davey 1991, 135). This fabric group shows a very restricted range of forms, being dominated by only two vessel-types: large storage vessels with horizontal lug handles similar to those seen at Prescott (Philpott 1989, figs 10.7.5, 10.8.10, 10.8.16) and from excavations in South Castle Street, Liverpool (Davey and McNeil 1985); and large pancheons and/or bowls, again comparable to those from Prescott (Philpott 1989, fig 10.11.29) and the South Castle Street excavations.

A1.3 BROWN STONEWARES

A1.3.1 Brown stonewares were made in England from the seventeenth century, mainly by John Dwight at Fulham (Cotter 2000, 246). Nottingham salt-glazed stonewares, identified by the characteristic presence of a thin white or grey line between fabric and glaze (Jennings 1981, 219–21), were produced from the late seventeenth century into the nineteenth, and a parallel industry in Derbyshire remained in production into the late twentieth century. Other brown stonewares were widely produced, and include a wide range of utilitarian vases (Oswald *et al* 1982).

A1.4 CHINESE AND ENGLISH PORCELAINS

A1.4.1 Chinese hard-paste porcelain began to enter the European market in the later sixteenth century, and was known in England from 1596 (Allan 1984, 105–9). It became increasingly common during the seventeenth century, and, imported in huge quantities by the East India Company as an adjunct to the tea trade, it dominated the fine pottery market during most of the eighteenth century. The development of English-made substitutes, however, brought an end to the trade, and the East India Company ceased importing it in 1791 (Hildyard 2005, 123).

A1.4.2 Despite many attempts, porcelain was not produced in England until the 1740s (Godden 1974, 13). By the mid-eighteenth century, Liverpool was a major producer, with several factories documented (*op cit*, 262–4). No attempt was made to identify the products of the various Liverpool producers.

A1.5 CREAMWARE

A1.5.1 This was also known as Queensware. A fine cream-coloured earthenware with a transparent colourless lead glaze, this was introduced *c* 1740. Within 20 years, it had almost entirely replaced tin-glazed wares and white salt-glazed stonewares as the good-

quality tableware in general use (Cotter 2000, 253). Although originally a Staffordshire product, it was widely imitated, and Liverpool was both a noted production centre (Draper 1984, 47) and also decorated Staffordshire products.

A1.6 INDUSTRIAL SLIPWARES

A1.6.1 Industrial Slipwares comprise a number of widely made slip-decorated white earthenwares, amongst them banded and marbled wares, Terra Tersia, and Mocha ware. They were made from the late eighteenth century, being particularly popular *c* 1790–1810 (Hildyard 2005, 173). Although they remained in production well into the nineteenth century, quality declined considerably in the later products.

A1.7 PEARLWARE

A1.7.1 This fabric is essentially a variation on creamware, the blue-tinged glaze being an attempt to create a whiter-seeming fabric. It was produced from 1779 (Draper 1984, 51) into the nineteenth century. Widely produced, it was often under-glaze transfer-printed, and, again, much of the Staffordshire production was sent to Liverpool for decoration (Hildyard 2005, 100).

A1.8 SELF-GLAZED REDWARES

A1.8.1 These are in essence identical to black-glazed redwares, but with a colourless glaze which does not obscure the original colour of the fabric. The composition of the fabric seems identical to that of the black-glazed redwares, and it seems likely that they derive from the same sources.

A1.9 SUGAR WARES

A1.9.1 These are represented by two quite different types, the use of which is discussed in detail by Brooks (1983). Sugar-loaf moulds are unglazed redwares, with a characteristically smoothed interior and a distinctive aperture at their base (*ibid*). Again, the fabric is very similar to those seen at Prescott, where sugar-loaf moulds are known to have been produced, and it is quite likely that they were also made in Liverpool. Syrup-collecting jars are wide-shouldered vessels with a distinctive narrow rim. The rim and upper part of the interior are black-glazed, but apart from occasional splashes, the exterior is unglazed.

A1.10 TIN-GLAZED (DELFT) WARES

A1.10.1 The production of tin-glazed wares in England is thought to have begun in London in 1567, at the hands of Dutch émigrés (Honey 1969, 33). The industry expanded during the seventeenth century, with Bristol becoming a major producer not later than 1669 (*op cit*), and, by the early eighteenth century (*c* 1710), Liverpool had also become a large-scale producer, with much of its output destined for the American market (Mankowitz and Haggart 1968, 68). Production in Liverpool had come to an end by the 1780s (Hildyard 2005, 100).

A1.11 WHITE EARTHENWARE

A1.11.1 True white earthenwares were perfected in *c* 1810, from which time they rapidly replaced both Creamwares and Pearlwares. Again, although Staffordshire was the major producer,

Liverpool was a leading manufacturer and continued to decorate the products of other producers. Much of the Liverpool output was destined for export to the USA (Coysh and Henrywood 1982).

A1.12 WHITE SALT-GLAZED STONEWARE

A1.12.1 White salt-glazed stoneware was made in London in the late seventeenth century (Draper 1984, 36), but it was not until the 1720s that Staffordshire began production on a commercial scale (Jennings 1981, 222), achieving a hey-day of popularity *c* 1745–65 (Hildyard 2005, 49). Production was not entirely confined to Staffordshire, and white salt-glazed stonewares were produced in Liverpool and Prescot in South Lancashire (Oswald *et al* 1982).

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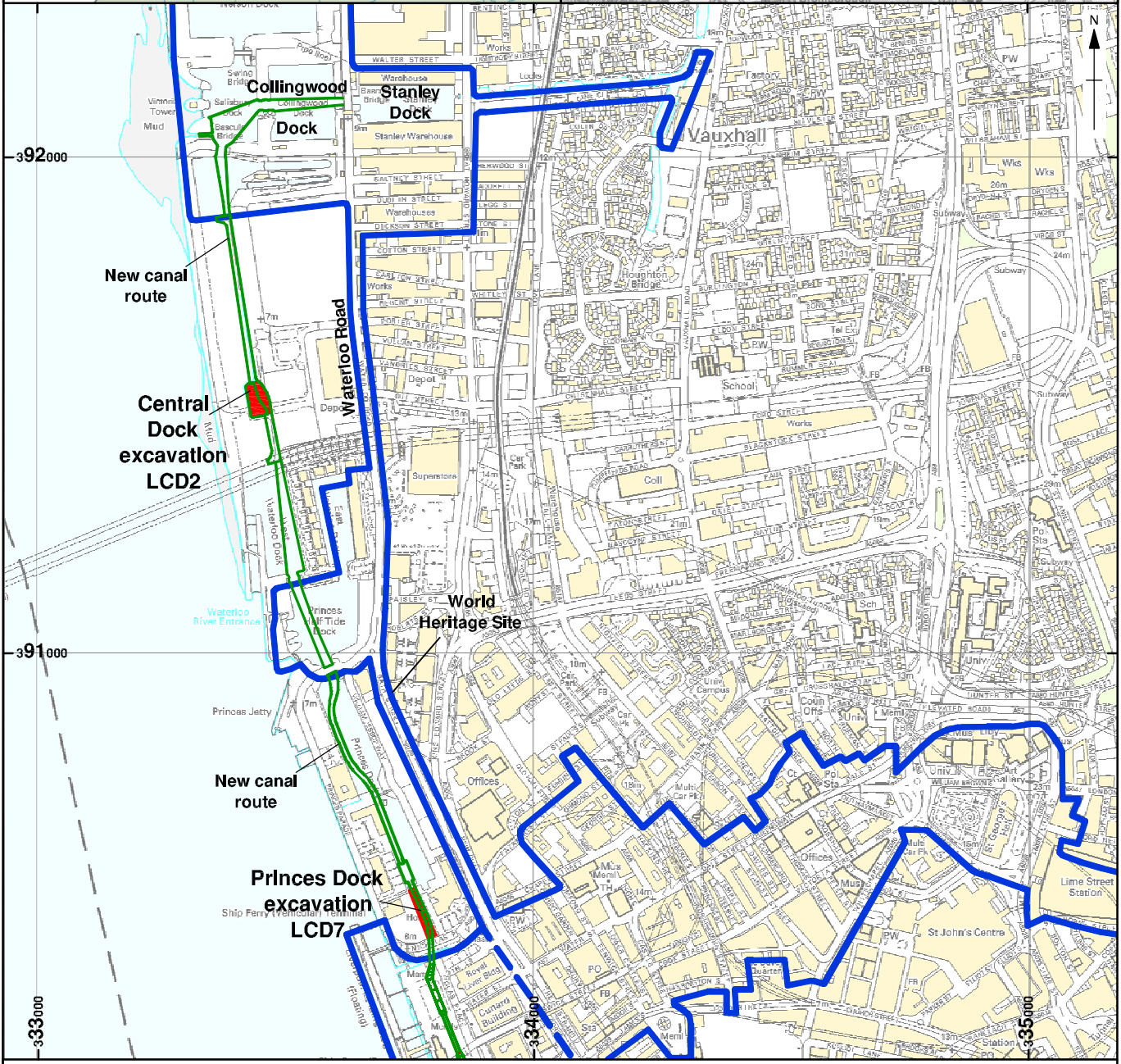
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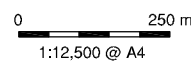
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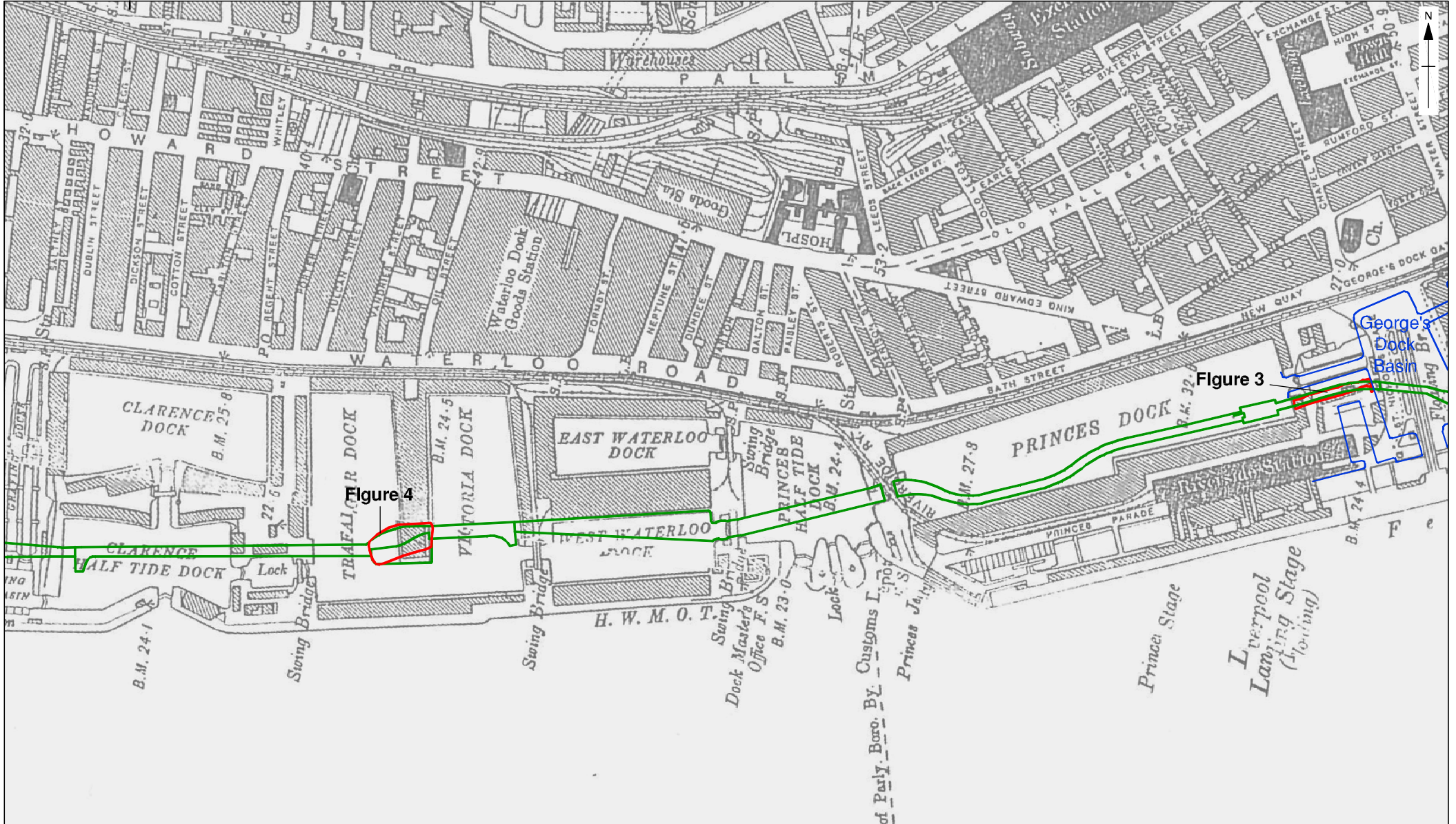




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Figure 1: The Liverpool Canal link, northernmost part



-  New canal route
-  George's Dock Basin (OS 1848)
-  Excavation area

0 100 m
1:6000 @ A4



Figure 2: Extract from the Ordnance Survey Map, 6" to 1 mile, 1928

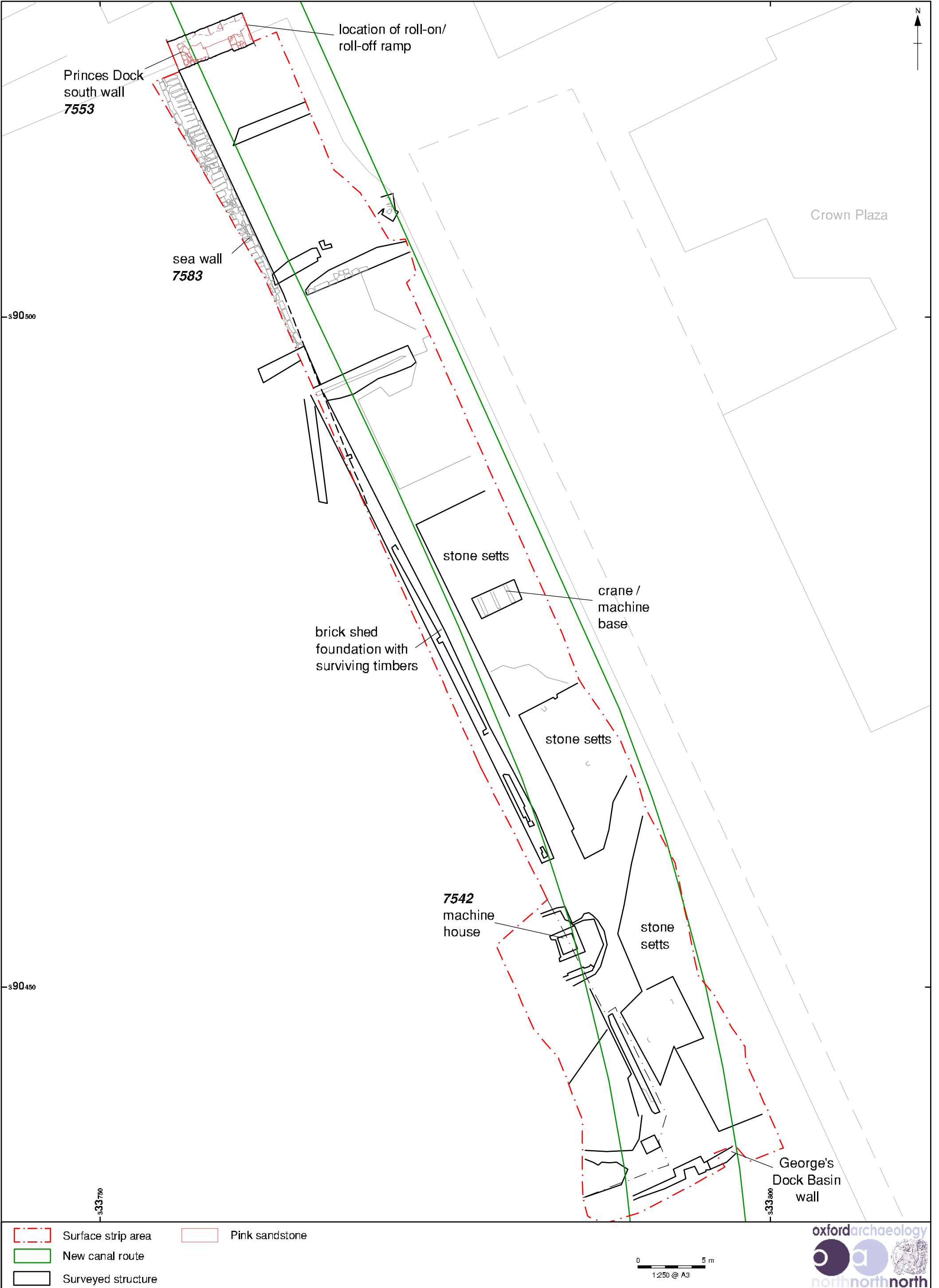


Figure 3: Princes Dock excavation area, LCD7

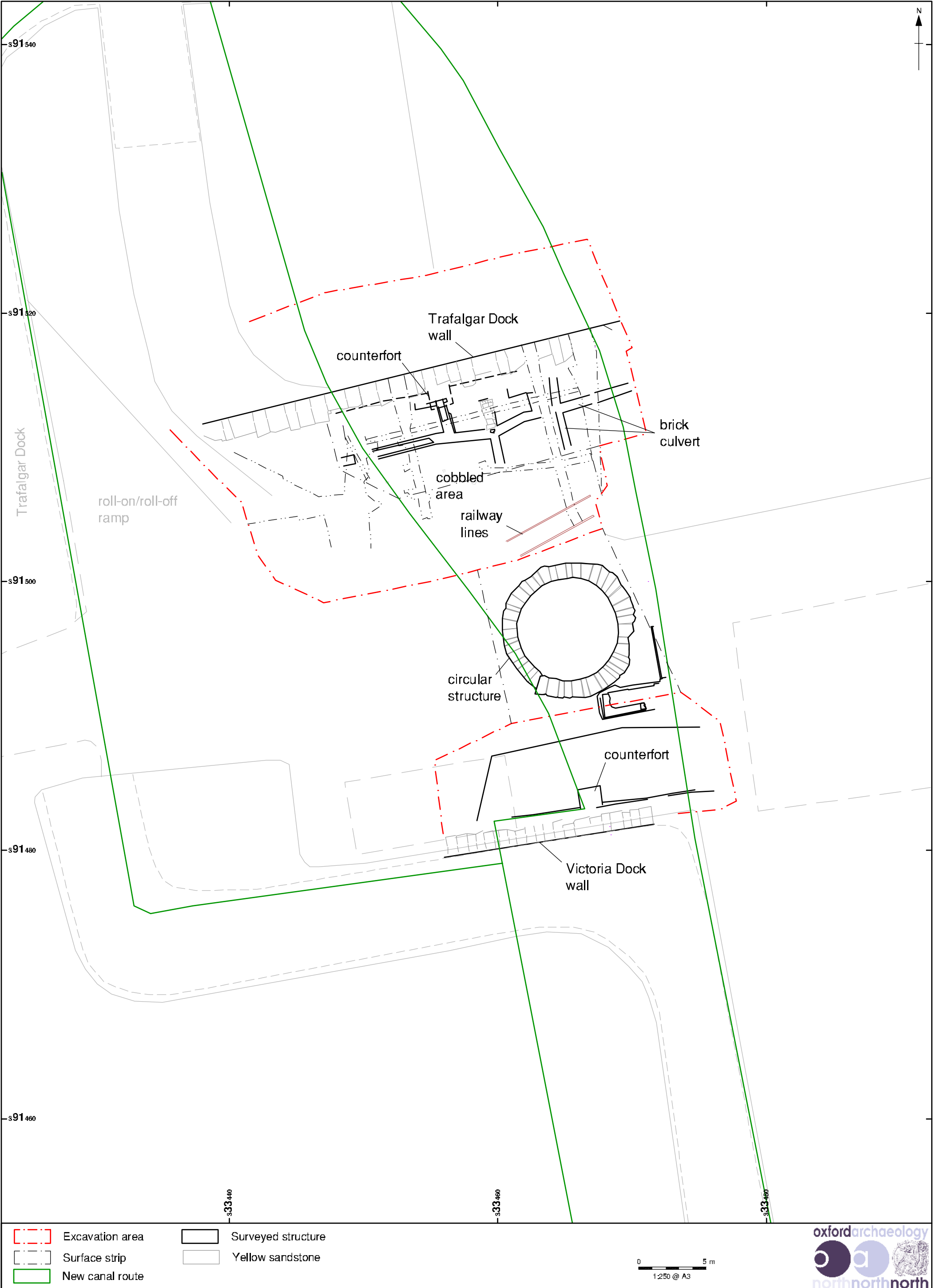


Figure 4: Victoria and Trafalgar Docks excavation area, LCD2



Plate 1: George's Dock Basin: recess in northern wall, from the south



Plate 2: George's Dock Basin: the rear face of the north wall



Plate 3: Remains of the sea wall between George's Dock Basin and Princes Dock



Plate 4: Princes Dock: south wall



Plate 5: Trafalgar Dock: south wall



Plate 6: Princes Dock: the earlier layer of hard surfacing, overlain (background) by a later layer of stone setts



Plate 7: Brick-built culverts on the quayside between Trafalgar and Victoria Docks



Plate 8: Princes Dock: the south wall during demolition, showing the materials used when the wall was reinstated in the 1980s



Plate 9: Office block at Trafalgar Dock



Plate 10: Yellow sandstone circular structure at Trafalgar Dock



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