II: The Development of the Waterfront on the River Dee: Excavations at New Crane Street, Chester

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Archaeological investigations carried out between New Crane Street and the River Dee discovered five phases of activity associated with the development of the riverside area and the river embankment known locally as the 'Cop'. The river shifted rapidly during the late-seventeenth and early-eighteenth century from its former position adjacent to the 'Water Tower' to its present location some 200m to the west. This resulted in a rapid accumulation of sedimentary river deposits during this period. The river was canalised in the 1730s and revetments constructed which were faced in red sandstone. During the late-eighteenth century a second revetment formed an inlet that coincided with an extension of the port. By the mid-nineteenth century the southern half of the site was enclosed by a wharf wall and a series of sandstone structures that formed part of a smithy. By the 1870s the northern half of the site was replaced by three brick-built structures enclosed by the wharf wall and a slip-way to the north. Two of these were recorded prior to demolition as part of the current investigations.

Introduction

The site

The site is located to the west of the city centre (centred on SJ 3685 6645), about 200m west of the city walls, between New Crane Street and the east bank of the River Dee (Ill. II.1). It is bounded to the north by the Dee Lock and to the south by Crane House. The site occupied an area of *c.*2700m^2 with a ground level of around 9m above Ordnance Datum. The underlying geology consists of Triassic marls and sandstone of North-west England and the North Midlands and the North-east Wales Silurian and Ordovician rocks. The drift geology of the site was formed by sedimentary river deposits of the Dee river plain.

The project

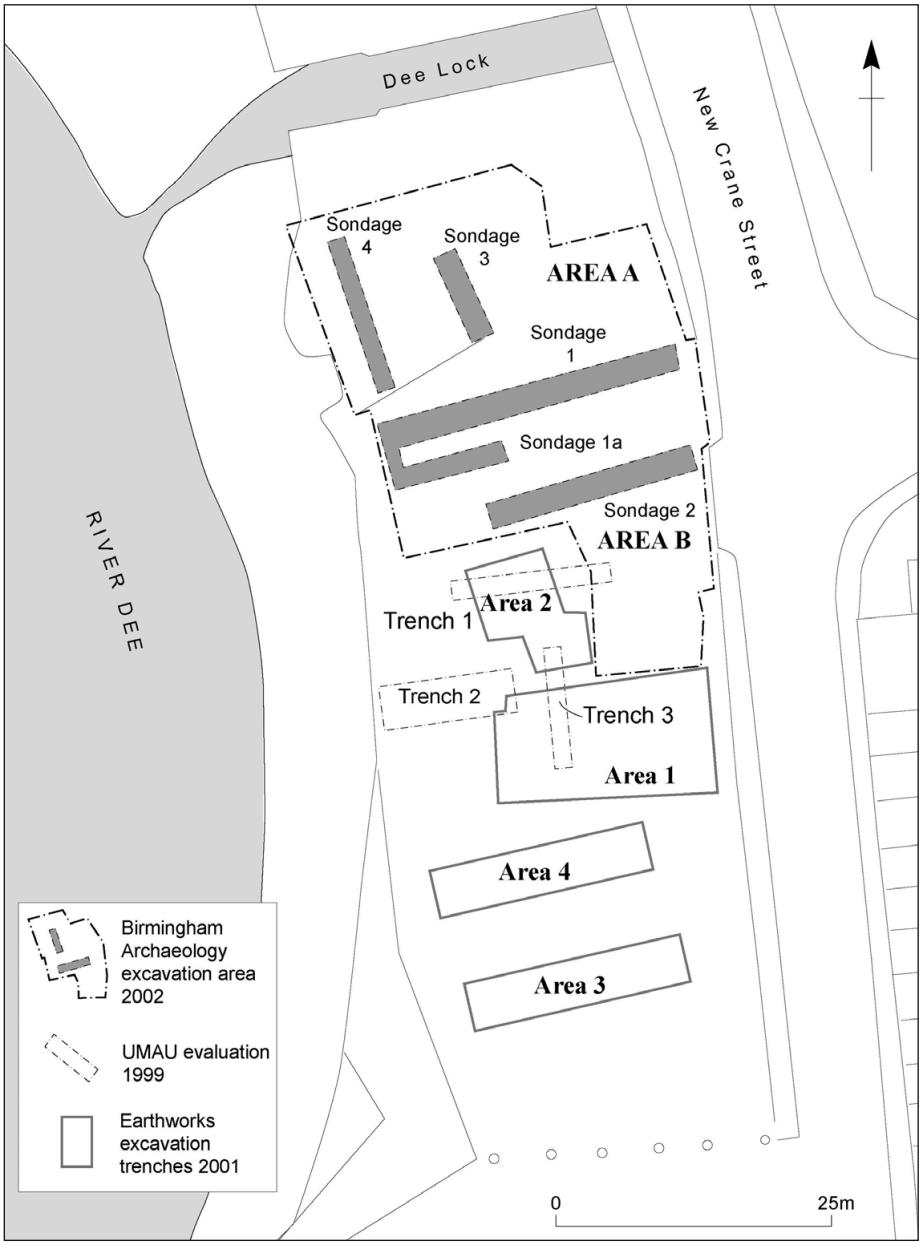
A series of archaeological investigations were carried out at New Crane Street, Chester in advance of the construction of residential homes by Watkin Jones. The site was the former location of the 'Cop', an embankment constructed in the eighteenth century as part of the

Ill. II.1: Site location

canalisation of the Dee. The archaeological investigations aimed to understand the nature of the 'Cop' and subsequent development of the site through to the present day. The archaeological investigations were undertaken by Birmingham University Field Archaeology Unit and Earthworks Archaeological Services. Earlier evaluation and monitoring work were undertaken by The University of Manchester Archaeological Unit and Gifford Consulting Engineers.

Archaeological work

A series of archaeological and geo-archaeological excavations, evaluations and assessments have been undertaken at different times and the results are combined in this report. In 1993 a structural investigation of the port walls between the Dee Lock and Crane Wharf was undertaken by Gifford Consulting Engineers (Harvey 1993). The work involved the excavation of six trial pits and six bore holes, but no finds or features were identified. During November 1999 an archaeological evaluation was undertaken by the University of Manchester Archaeological Unit (UMAU 2000). This comprised the excavation of three trial trenches (Trenches 1–3, Ill. II.2) located in an area identified as having been the location of the wharf in the nineteenth century.



III. II.2: Location of excavations

Ill. II.3: Overall site excavations December 2000 (Photograph: Earthworks Archaeological Services)

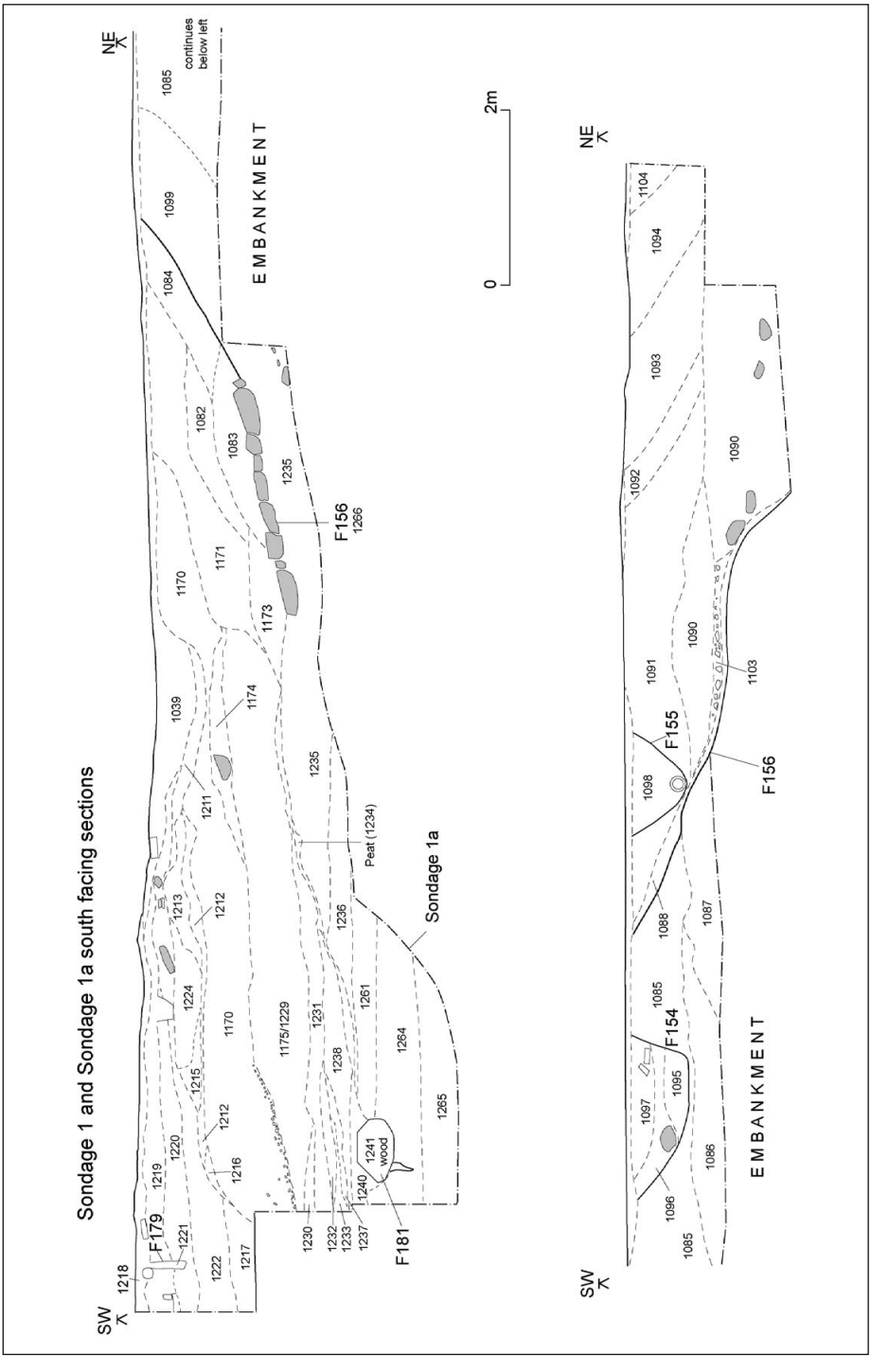
An archaeological desk based assessment was undertaken by Matrix Archaeology (Fletcher 2000) as part of a feasibility study for the river wall restoration at the Old Port. This work included the excavation of trial pits along the river bank and the examination of three service trenches for evidence of archaeological features during July 2000. Earthworks Archaeological Services undertook a rapid appraisal of the upstanding buildings (Scruby 2001) that was supplemented by Matrix Archaeology's historic buildings assessment (Fletcher 2001) of the standing structures in the northern half of the site in January 2001.

During November and December 2000, Earthworks Archaeological Services undertook Phase 1 of the excavation work in the south of the site (Areas 1–4, Ills II.2 and II.3). A geo-archaeological assessment by Terra-Nova of alluvial and archaeological deposits was undertaken during the excavation. Phase 2 of the excavations was undertaken by Birmingham University Field Archaeology Unit in April 2002 in two areas to the north of the site (A and B, Ill. II.2) and also involved geo-archaeological interpretation of deposits undertaken by Matthew Canti of English Heritage. The results discussed in this report are an amalgamation of the results from the Phase 1 and 2 excavations with additional information supplemented from the earlier archaeological fieldwork.

The excavations

Introduction

The background of commercial archaeological activity has resulted in multiple contractors working on the same project and adopting varying recording techniques. Of the principal contractors, Earthworks Archaeological Services adopted a continuous three-digit numeric



III. II.4: Sondage 1 and Sondage 1a south facing sections

system (e.g. 100, 101, etc.), their excavation areas have been accordingly numbered Areas 1 to 4. The University of Manchester Archaeological Unit likewise adopted a three-digit numeric system. Where they have been referred to in the text they have the prefix UMAU (e.g. UMAU231, UMAU232, etc.). The evaluation trenches were numbered Trench 1 to 3. Birmingham University Field Archaeology Unit adopted an alpha-numeric system, with continuous four-digit numbering of stratigraphic contexts (e.g. 1000, 1001, etc.) and significant features prefixed by F followed by a continuous three-digit numbering system (e.g. F100, F101, etc.). The areas were accordingly described Areas A and B with four significant machine excavated sondages to investigate the lower stratigraphy, given numbers S1 to S4.

Phase 1: Layers pre-dating the Cop, (pre-dating the eighteenth century)

The earliest deposits were sedimentary river sands located throughout the excavations. These were located in Sondage 1a (Ill. II.4) close to the river frontage at a depth of *c.*3.4m. Layers of sterile silt-sand alluvium (1261, 1264 and 1265) were overlain by layers of sterile light mid-brown-yellow sand and clay-sand (1236 and 1235), which sloped from east to west below the Phase 2 revetment. To the north of Sondage 1a a layer of grey-blue silt-clay (1267) was observed in the base of Sondage 3, which was sealed by a yellow grey silt-sand (1187/1223).

Elsewhere, trenching was shallower. Within Sondage 2 natural alluvium sand banding of pale grey and cream-yellow silt-sands (1182 to 1186) was encountered at a depth of *c.*2.0m. At the same depth in Area 1 close to the river frontage, the earliest deposits were a layer of yellow-brown alluvial sand-silt (155) and sterile mid-brown silt-sand-clay (154). Similar deposits were located in Area 2, a sterile mid-brown silt-sand-clay (313), and in Area 4, a sterile yellow-brown alluvial sandy-silt (309).

Phase 2: The revetment (early-eighteenth century)

The principal feature in Phase 2 was the remains of the former flood embankment known as 'The Cop'. This was a double-sided embankment constructed from re-deposited sands that was revetted by purple-red sandstone on the river frontage. It was aligned north-south and was encountered in several locations during the excavations.

The embankment in Sondage 1 (F156, Ill. II.4) survived as a series of sterile light-brown silt-sands with some creamy mottling (1085 to 1087 and 1099) with evidence for grass or turf root disturbance within (1085) and (1099). In Sondage 2, similar layers of pale cream sand (1036 and 1122) formed the embankment. In Areas 1 and 2 away from the riverfront, clean natural sand-silts were encountered at a much higher level. A clean pale yellow-brown sandy-silt (132) and a soft mid-yellow silt-sand (234) in Area 1 that were equivalent to layer (313) in Area 2 and layer (309) in Area 4 represented the original embankment.

The eastern side of the embankment was represented by a thin band of brown silt-sand (1088) and a thin layer of crushed red sandstone (1103) in Sondage 1. In Sondage 2 this was a shallow stepped band of brown sand-silt (1120, Ill. II.5) overlain by later yellow-brown silt-sand layer (1119). The final line of the embankment was represented by a steeply sloping layer of crushed red sandstone (1118).

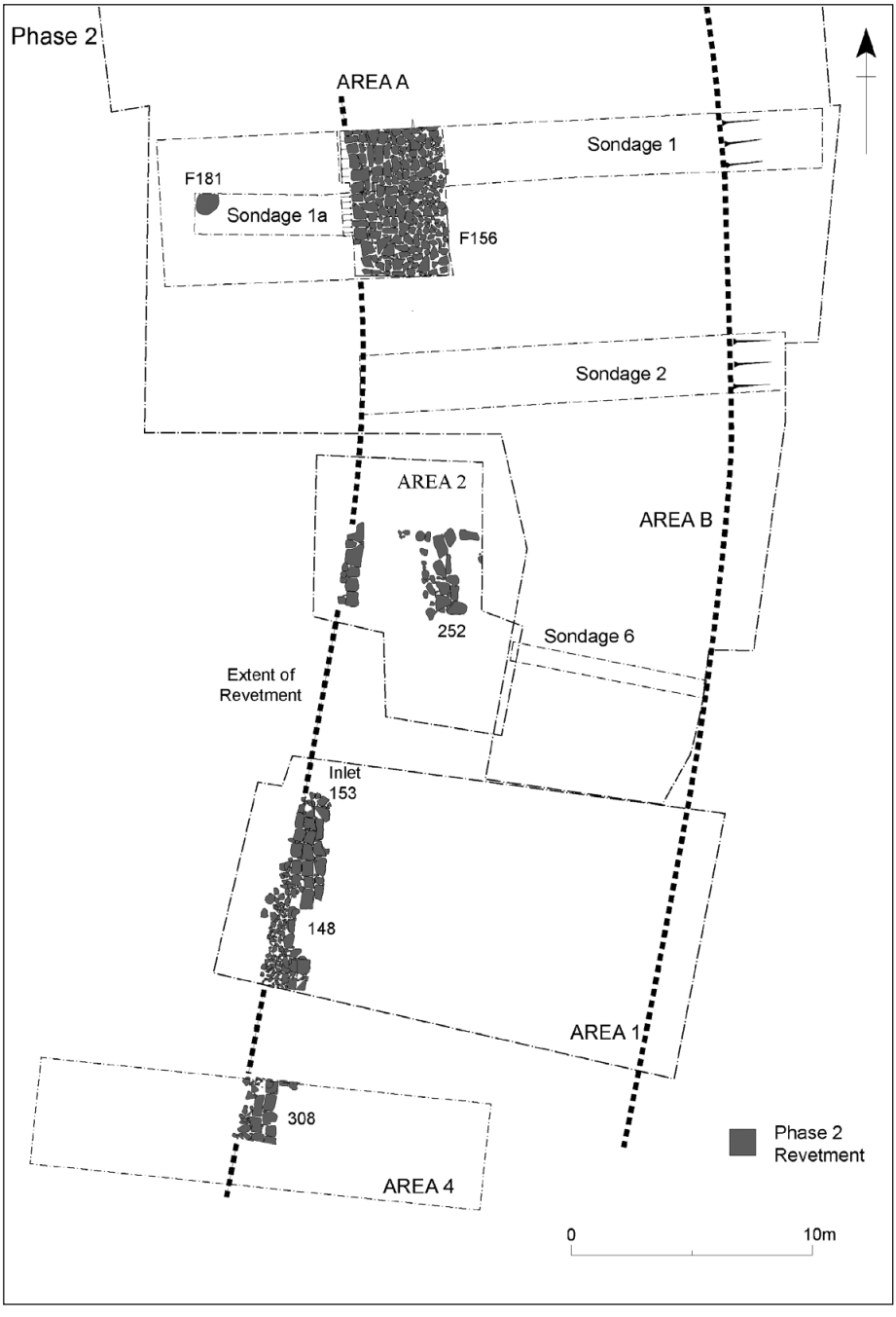
Ill. II.5: Phase 2 revetment in north facing section, Sondage 2 (Photograph: Birmingham University Field Archaeology Unit)

The western side of the embankment was covered by a purple-red sandstone revetment throughout (Ill. II.6). In Sondage 1 the revetment survived as a single course of worked red sandstone blocks (1266) varying in size from *c.*0.1m to *c.*0.6m (Ill. II.7). Between the sandstone blocks was a very light yellow sand (1102) that contained fragments of eighteenth century blackware pottery and slip-coated buff-ware. The revetment sloped down from *c.*1.0m below ground level on the east side to a depth of *c.*1.5m below ground surface on the west. The slope of the revetment appeared to coincide with a dark brown silt-clay-peat layer of decomposed wood or organic material (1234).

The revetment continued south and was located as a heavily disturbed area of irregular sandstone blocks and rubble-stone in Area 2 (252). The western edge of the revetment survived as a kerb of close-fitting roughly hewn rectangular blocks. A roughly circular post hole (250), *c.*0.5m in diameter, cut the underlying sterile silts (251) and represented the remains of a mooring post set in the revetment (Ill. II.6, II.9).

In Area 1 (Ill. II.6) the revetment (148) consisted of sandstone blocks that varied between 0.36–0.8m in size that overlay layer (154). The apron was curved round to the east at the northern end of the area of excavation, indicating the position of a channel or inlet. The inlet consisted of a vertically sided cut feature (153), which was subsequently filled with an olive green silty-sand containing water worn sandstone fragments and fresh water mussel and oyster shells (152) that represented material dredged from the main river channel.

The revetment at its southernmost extent was encountered as (308) in Area 4 towards the western end of the trench running north–south, broadly in line with the revetment in Area 1. The structure was heavily disturbed towards the eastern end, but was similar in construction to the rest of the revetment. In Area 1 and Area 4 the toe of the revetment included a substantial amount of water worn, rounded, sandstone rubble, indicating the normal tidal limit, with the sandstone blocks heavily water worn.



III. II.6: Phase 2 revetment

Ill. II.7: Phase 2 revetment Sondage 1/1a (Photograph: Birmingham University Field Archaeology Unit)

Phase 3: Natural deposition post-dating the revetment (mid-to-late eighteenth century)
Following the construction of the embankment was a period of alluvial deposition on the waterfront side and wind-blown deposition and land reclamation on the landward side. Within the peat (1234) in Sondage 1a was a small sub-circular pit (F181, Ills II.4 and II.6) containing a large piece of timber with a metal stud and shaft (1241). The sides of the timber were flat and it had been secured into the river silts by three wooden stakes. The peat (1234) was overlain by a layer of rubble (1239), which contained brick, slate, mortar and pottery dated to the late-seventeenth to mid-eighteenth centuries.

In Sondage 1a, the lower embankment was overlain by a silt-sand (1238), an organic dark orange, sand-silt and peat (1237), and layers of mid yellow-brown alluvial sand (1230 to 1233). A series of deposits covered the revetment (1173 and 1082–1084). (1082) contained early-to-mid-eighteenth century pottery, whilst (1083) contained creamware dated to the mid-to-late eighteenth century.

In Area 2 (Ill. II.8) the revetment was sealed by a series of deposits (232), (298) and (201) interpreted as channel edge deposits, the upper surfaces of which had been churned up during the construction of the later revetment. Layer (232) contained imported Chinese porcelain from the mid-to-late-eighteenth century. (201) had fragments of a press moulded slipware dish from the eighteenth century. Context (201) appeared to represent a phase of relative stability, with a low-energy depositional environment caused by slack water, resulting in the accumulation of silts, leaf litter and deadwood gradually accumulating over the river-bank (see below).

In Area 1 a series of contemporary alluvial deposits (291/112 & 292) sealed the revetment, whilst in Area 4 these overlying layers were seen as a compact yellow-brown silt (310), similar to that encountered in Area 2 (232). Upon analysis, a monolith sample of context (310) suggested that the sediments were *in-situ* alluvial deposits that had accumulated over time against the revetment.

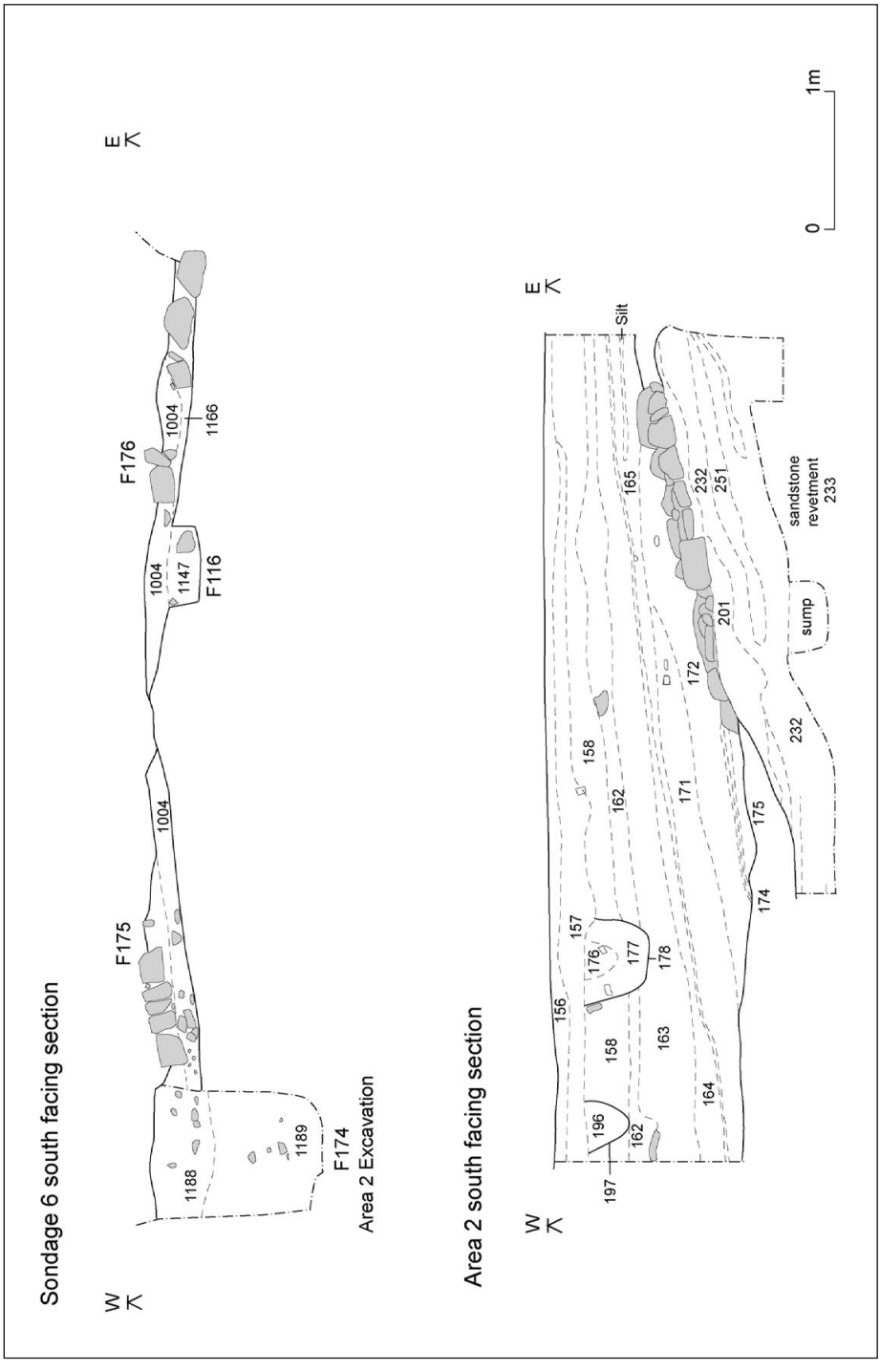
The area to the east in Sondage 1, between the embankment and New Crane Street was made up of layers of sterile pale cream and grey-brown sands (1091 to 1094) all sloping west to east. These layers were replicated in Sondage 2 (1116 and 1117). The uppermost levels of the embankment appeared to have been truncated.

Phase 4: The later revetment (late-eighteenth to early-nineteenth century)
After the period of alluvial silting in Phase 3, a second later phase of revetment dating to the late-eighteenth to early-nineteenth century was constructed above the first. This appeared to coincide with the inlet located on the early-nineteenth century cartographic evidence and coincided with the expansion of the waterfront north of the New Crane Wharf. Survival of the Phase 4 revetment was limited to an area in the centre of the site where later development had not caused truncation.

The second revetment in Area 2 (200, Ills II.8–11) was *c.*2.8m wide and consisted of irregular reddish-purple sandstone varying between 0.1–0.4m in size. It ran north-south and sloped east-west. To the south of the area, the edge of the revetment curved round to the east, mirroring the alignment of the earlier revetment (252). The revetment continued upward and survived to its greatest height as the revetment in Area B (F176, Ills II.8 and II.10). This was built directly over a layer of sterile yellow-white sand (1166, Sondage 6, Ill. II.8) and constructed using irregular purple-red sandstone in common with the revetment below.

In Sondage 2 (Ill. II.10) the revetment had been heavily truncated by a later cellar (F170). The stone in the construction of the revetment was smaller than in Phase 2, and the embankment (F168) closely corresponded to that observed in Area 2 (200). Its lower construction to the west (F169) consisted of dirty mid-yellow-brown clay with fragmented red sandstone rubble (1111), which contained late-eighteenth century pottery sherds.

Cut into the revetment (200) was a circular post hole (248), *c.*0.25m in diameter, which contained the remains of a rectangular wooden post. The edge of the revetment was overlain by an organic-rich silty-clay (185), which contained leaves, grass and degraded fragments



III. II. 8: Sondage 6 south facing section and Area 2 south facing section

Ill. II.9: Phase 2 and 4 revetments in Area 2 (Photograph: Earthworks Archaeological Services)

of leather and was clearly deposited by slow-flowing water. The revetment was overlain by a series of *in-situ* river deposits (171, 172, 174, 175, 186, 187 and 310). Deposit (174) contained late-seventeenth to mid-eighteenth century slipwares and deposit (187) that had agate ware dating to 1750–70.

Within Area B the revetment (F176, Ill. II.12) was built directly over a layer of sterile yellow-white sand (1166, Sondage 6). This survived to its highest point and was constructed using irregular purple-red sandstone blocks which ranged in size from 0.1m to 0.6m. A series of disturbances cut into the revetment: a sub-rectangular pit (F157) that contained fragments of late-seventeenth century pottery; a sub-circular pit (F117/1026) that produced a sherd of eighteenth century blackware; one post-hole (F160/1108) that contained fragments of pottery dated to the late-seventeenth to early/mid-eighteenth centuries; and another (F158) that did not produce any finds.

In Area 1 a sequence of re-cutting ditches (257), (259) and (261) cut into layer (234). They were orientated east–west and appeared to correspond to truncated drainage ditch (77) that overlay the sandstone revetment (148) located to the west. The ditch was filled with a dark grey silty-sand (76), which produced late-eighteenth to early-nineteenth century pottery. Ditch (259) was filled with a dark yellow-brown sand (260) that contained late-eighteenth century pottery. Ditch (261), filled with a light brown sandy-silt (262), also produced late-eighteenth to nineteenth-century pottery. These ditches were later infilled during a period of subsequent levelling.

III. II.10: Phase 4 revetment

Ill. II.11: Phase 4 revetment in Area 2 (Photograph: Earthworks Archaeological Services)

Phase 5: early-nineteenth century (Ill. II.13)

Phase 5 saw the redevelopment of the southern half of the site. This involved its enclosure by a wharf wall and the subsequent construction of several structures interpreted as the earliest remains of a mid-nineteenth century smithy. Redevelopment north of this wharf wall was limited to the repair of the revetment on the waterfront of the Cop.

Structure 1 consisted of a short east-west orientated sandstone wall (79) that overlay layer (112). It consisted of two courses of irregular blocks and rubble. A second wall (82) ran parallel to this, 2.6m to the north. It consisted of four courses of roughly hewn, rectangular sandstone blocks, *c.*0.40m in size. It appeared to correlate with the east-west sandstone wall (UMAU223) located in Trench 2 and as a further underlying sandstone wall (UMAU326) in Trench 3 of the University of Manchester Archaeological Unit evaluation (UMAU 2000).

The interior of the structure was sealed by a mid-brown silt (75/83) that represented a deliberate dump of material, which contained coal fragments and nineteenth century pottery. Cut into this layer were an irregular oval pit (93) *c.*0.6m deep, which produced a small quantity of metal working slag and late-eighteenth to early nineteenth century pottery, and a large sub-circular cess-pit (108). Both layer (83) and fill (92) of pit (93) contained the pottery fragments of sugar cones. Overlying these features were two layers (74) and (95) that formed a working surface.

Ditches (257), (259) and (261) were sealed by a dark brown sand-silt (263) that acted as a levelling deposit. Cut into layer (263) were the remains of two sandstone structures. The first (Structure 2) consisted of an east-west orientated wall (122) constructed from semi-

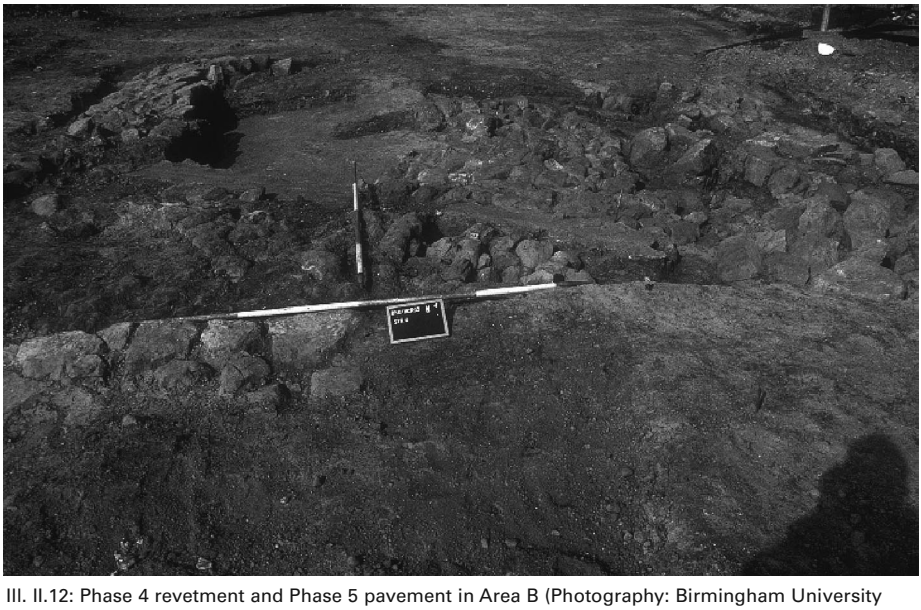
dressed sandstone rubble and bonded with a soft buff-pink lime mortar, which survived to a maximum height of only two courses.

To the north of (122) was a second heavily disturbed sandstone structure (Structure 3). Rectangular in plan, the surviving elements of the building consisted of walls (8), (101) and (63). Wall (8), orientated east-west and constructed of sandstone, also formed the northern boundary wall and correlated with wall (F114) located at the southern boundary of Area B. It was *c.*0.6m in width, aligned east-west and survived to three courses in height. A second disturbed section of wall (101) ran north-south with a small patch of stone-slabbed flooring (115) in the internal angle of the two walls. All that remained of the south-east corner of the structure was a truncated stretch of north-south orientated wall (63) in a shallow cut (170), which turned through 90° to run east-west.

The internal area between the structures may have been used as a yard with several discrete features. Pit (217) produced late-eighteenth to nineteenth century pottery and a small post hole (205) produced a coarseware bottle. The remainder of the features were a series of small pits (146), (207), (209) and (211) that did not produce any finds.

In Area B the Phase 4 revetment (F176) was sealed by a layer of compact grey-black clinker-silt-clay (1004) that contained fragments of mid-nineteenth century sherds. This was replicated in Sondage 2. Layers of mixed silt-sand and silt-sand rubble layers (1133, 1145, 1146, and 1263) were overlain by a continuous black silt-clinker-ash layer (1132).

A second sandstone pavement (F175, Ills II.12 and II.13) or repair in Area B was built directly over the clinker-silt-clay (1004). This was built from a single course of rectangular,



Ill. II.12: Phase 4 revetment and Phase 5 pavement in Area B (Photography: Birmingham University Field Archaeology Unit)

Ill. II.13: Phase 5 Structures 1–3

yellow-grey sandstone blocks (1190), measuring 0.2m to 0.6m. The stones were closely set on a north-south alignment.

In Area 2 the ground was built up over river deposit (187) by a pale yellow-brown silt (188) containing large ill-sorted lumps of angular sandstone rubble up to 0.27m in size and sherds of residual mid-to-late-eighteenth century pottery. This was sealed across the entire area of excavation by (189), a 0.26m thick levelling deposit of pale yellow-brown silt, containing sandstone fragments, water worn pebbles and mussel shells, which produced residual pottery of late-eighteenth to nineteenth century date. Above (189) was a dome-shaped dump of black cinder-sand (190) that corresponded to (1004) and represented burnt material discarded from the nearby smithy.

Phase 6: mid-nineteenth century onwards

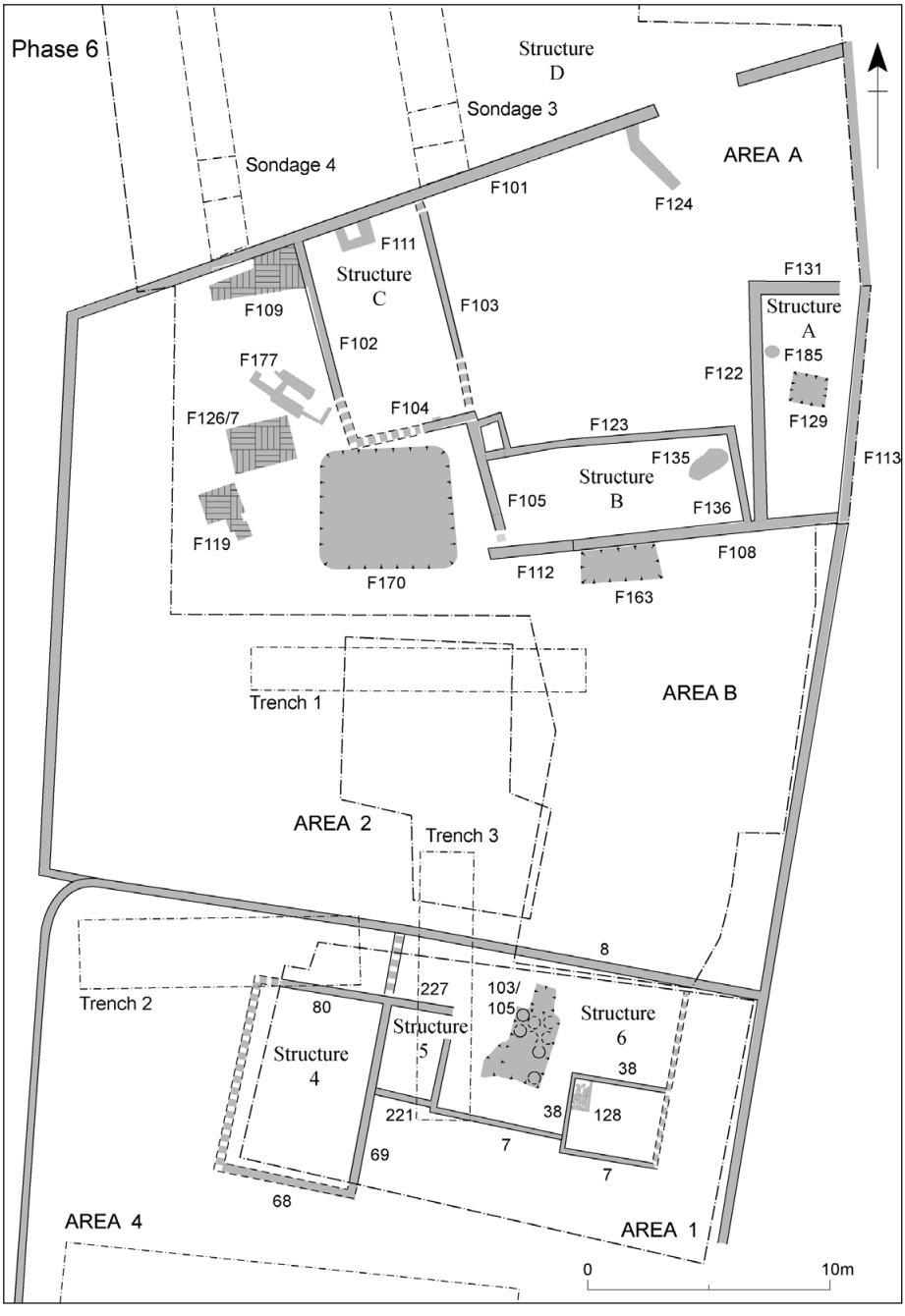
The nineteenth century phase of development involved the large scale remodelling of the site (Ill. II.14). This involved the enclosure of the northern half of the site by a wharf wall and the raising of ground levels. Subsequently three Structures (A–C) were constructed. To the north a slip-way (Structure D) was constructed. The southern half of the site was also extensively remodelled with the construction of three Structures (4–6) that replaced the original smithy.

Infilling above the revetment in Sondage 1 was seen as compact layers of grey sand-clay (1083, 1173 and 1175/1229) containing fragments of early-nineteenth century pottery. These were sealed by a layer of crushed purple-red sandstone (1174) and a layer of light brown sand-silt (1170/1228). In Sondage 2 the sequences were replications of the layers observed in Sondage 1. Layers (1119) and (1118) were overlain by a sterile cream-brown silt-sand (1104). These appeared to be the result of deliberate and rapid in-filling associated with the construction of the wharf wall and reclamation of land. A layer of mixed yellow-brown gravel (1039) sealed grey and brown silt-sands (1006, 1040, 1054 to 1056 and 1074) and lay directly below Structure C. Layer (1040) produced one sherd of eighteenth century blackware.

Within Area A, Structures A and B (Ill. II.14) were the surviving remains of the two brick buildings located at the eastern side of the site adjacent to New Crane Street. These buildings had been recently demolished and were examined in detail in an Historic Buildings Assessment (Fletcher 2001). Structure C was a further demolished building that formed the western side of the complex along with a series of other features adjacent to the wharf front.

Structure A consisted of a series of red brick walls. Wall (F113) ran north-south along the former New Crane Street frontage. Bonded to this was an east-west aligned wall (F108) that also formed the southern wall of Structure B and the northern wall of a former cellar (F163). The north and west walls of both Structures A and B were very shallow and had been removed prior to the commencement of excavation. However, the foundation trenches survived as shallow gullies (F122 and F131) and a short rectangular pit (F137).

Structure B was defined by a rough-surfaced wall (F112), a short brick wall (F123), red brick wall (F105) and a short shallow gully (F136). A lower set of nineteenth century vulcanite dentures was recovered from a cleaning layer (1002) above Structure B (Ill. II.15).



III. II.14: Phase 6 structures A–D and 4–6

Ill. II.15: Lower set of vulcanised dentures (Photograph: Birmingham University Field Archaeological Unit)

Internal to the northern end of Structure A was a small sub-circular pit (F185) filled with sandstone blocks (1101). This was sealed by a mixed brown/white sand with clinker/ash (1047), which produced nineteenth century blackwares and coarse wares. To the south of this was a shallow rectangular pit (F129), which although only 0.05m in depth, appeared to be wood lined. Within Structure B was a small sub-circular pit approximately *c.*1.8m diameter and filled with black coke-ash (F135). This was sealed by a mixed, dirty, brown-black silt layer, containing coke, purple-red sandstone, and rust-orange ironstone (1058).

Structure C was defined by four walls (F101 to F104) with the northern wall (F101), part of the slip-way (Structure D), faced with grey sandstone. This was *c.*0.7m wide and traversed the site roughly east-west. Two further brick walls (F102 and F103) were aligned perpendicular to (F101). The southern wall (F104) abutted, but was later than (F105) (Structure B), and had a sandstone block at its western end suggesting Structure C was open to the south. Within the interior of Structure C, abutting (F101), was a rectangular brick hearth (F111) measuring approximately 1.0m by 1.5m. To the south was a line of upright slates set in brown sand-silt (F128).

To the west of Structure C were several features which appeared to be contemporary with the nineteenth century buildings. A brick structure (F177) probably acted as a support for a machine or boiler. It was sealed by (1039) and was possibly slightly earlier than Structure

C. To the west of Structure C were the remains of three floor surfaces: one constructed from brick and sandstone (F119), a second from concrete (F127) with associated footings for a wall (F126) and a third of rectangular slate slabs and concrete (F109), which abutted (F101) and (F102). To the west of Structure B was a large disturbance from a former cellar (F170), which had truncated the former Cop revetment within this area. A second cellar was located to the south of Structure B (F163).

Within Area B several late-nineteenth century features included a trench containing a lead water pipe (F116/1149) that contained nineteenth century slipware, a sub-rectangular pit (F118) that contained nineteenth century coarse wares, a post-hole containing a decorated clay tobacco pipe bowl (Ill II.16) and nineteenth century stoneware (F159/1107) and a drain (F115).

In Area 1 sandstone Structures 1, 2 and 3 were demolished (large dumps of sandstone rubble (131) and (184) were located around the eastern wall of the structure) or incorporated into the later buildings, Structures 4–6, which in form correspond with the smithy as depicted on the Ordnance Survey first edition map (1872).

Ill. II.16: Clay tobacco pipe bowls (Photograph: Birmingham University field Archaeology Unit)

Structure 4 was defined by two substantial brick-built walls, (68) and (69), which formed the south and east sides of a rectangular room (Structure 4, Ill. II.14). The construction cut (97) for these walls cut the deposit (74). The northern side of the structure was built over an earlier sandstone wall (82), Structure 1, which had been levelled off with two courses of thin sandstone blocks (81) before being carried up in brick (80). A floor surface was formed by a compact black sand-silt with patches of water worn cobbles (73).

Structure 5 was a rectangular structure located to the east of Structure 4 (Ill. II.14). It consisted of the wall (69) from which ran two parallel east-west brick walls (227) and (221) with the eastern wall formed by north-south wall (UMAU323) located in evaluation Trench 3 (UMAU 2000). Wall (227) overlay an earlier sandstone wall (82) built up with levelling courses of sandstone blocks (230) and corresponded to wall (UMAU325) located in the earlier evaluation trench. The earlier evaluation trench truncated wall (221); however, its eastern part was identified as wall (UMAU327). The internal area of the structure was built-up by a series of levelling layers (229, 154, 225, 224 and 228). Internal to the structure was the fragmentary remains of a slate-slab floor (220). Overlying floor (220) was a 75mm thick layer of loose fine dark grey-black ash (218) that was in turn covered by a second slate slab floor (222).

Structure 6 was formed by the northern wall of the earlier sandstone Structure (8), while a double-skin brick wall (7) was constructed on top of the sandstone wall (122) to form the southern wall of the building. A rectangular room (38) with concrete floor was located at the eastern end of the site that truncated the end of the earlier sandstone wall (122). A rectangular brick structure (98) was constructed against the inside of wall (7) at its western end. The internal area of the structure had two layers, (99) and (100), which produced nineteenth century pottery. This was overlain by a brick and sandstone slab floor (128) that also covered the redundant brick structure.

Within the internal area of Structure 6 was an area of late disturbance, primarily late-nineteenth and early twentieth century in date, consisting of a series of irregularly sized intercutting pits and scoops. The central area of the building was cut by two large irregularly shaped pits (105) and (103). The large pit (103) had a stepped profile along its southern side and was filled with a dark brown sand-silt (144) and a compact mid-dark brown, silt-sand-clay mix (104) that produced residual early-to-mid-eighteenth century ceramics. Pit (105) truncated the earlier pit and was 2.7m in diameter and 0.7m deep with vertical sides to the north and east but a stepped profile to the west. The base of the pit was filled by a compact dark grey-black gritty deposit (116) that contained the impression of the base of a number of barrels or drums (eight in total) and produced residual nineteenth century pottery. The remainder of the pit was filled by a series of deposits (106), (127), (126) and (124) that contained charcoal, slag and brick fragments and produced residual eighteenth and nineteenth century pottery.

The northern part of the site was dominated by the remains of a mid-to-late-nineteenth century slip-way, Structure D. The southern edge of Structure D was defined by wall (F101), which survived to a depth of 1.5m at its western extent rising gradually to the surface at the eastern extent. A contemporary rough built sandstone block wall (F124) abutted (F101)

and continued south-east for *c.*2.2m. The slip-way wall (F101) was cut into sand layer (1153).

The slip-way was in-filled with (1153) sealed by a layer of light brown sand (1158), further layers of brown-black sand-silt (1152) to (1156) and a thin band of crushed red sandstone (1151). Two pits were recorded in section: a small pit (F167) and a later pit (F166) that was filled with slate fragments. A similar sequence of narrow layers was observed in Sondage 4 (1195 to 1200 and 1203 to 1206) and were truncated by a large modern pit (F178), *c.*3m in diameter. The western extent of the slip-way was defined by a curving brick wall (F100), which was a partially rebuilt continuation of (F101).

A series of demolition layers covered the site. Over Structures A and B this was a rubble and black silt layer (1002), formed during the demolition of the buildings prior to excavation. Above Structure C was a light grey angular sand-gravel used as car park aggregate (1000). Late-twentieth century pottery and glass were recovered from a cleaning layer (1007) above Structures A, B and C.

In Area 2 the demolition and levelling layers (163), (162), (158), (192) and (157) covered the entire area. Above (157) was a clean buff sand (2) overlain by car park aggregate (1).

In Area 1 on the west side of wall (69), overlying layer (73) was a 0.65m thick dump of soft light-brown silt (72). It contained nineteenth century pottery and it appeared to be river silts used to in-fill the redundant structure. The demolition of outlying structures around the central smithy resulted in a series of levelling deposits built up to the south of wall (7/221), including a deposit of crushed slate (231) and a layer of compact coal dust (264). In turn these were sealed by further levelling deposits including (266), (265), (267), (268), (269), (242), (243), (270), (271) and (272). In the central area of the smithy late demolition and levelling deposits included (62), (61), (52), (51), (42) and (43), which were in turn overlain by a final levelling deposit of buff sand (2) and sealed by car park aggregate (1).

North of the slip-way, layer (1153) sloped up and was visible across the remainder of the excavation area. During the removal of the overburden (1176) from this area a bell mechanism and several complete glass bottles were recovered. A small area defined by the former boundary fence was covered by car park gravel (1000).

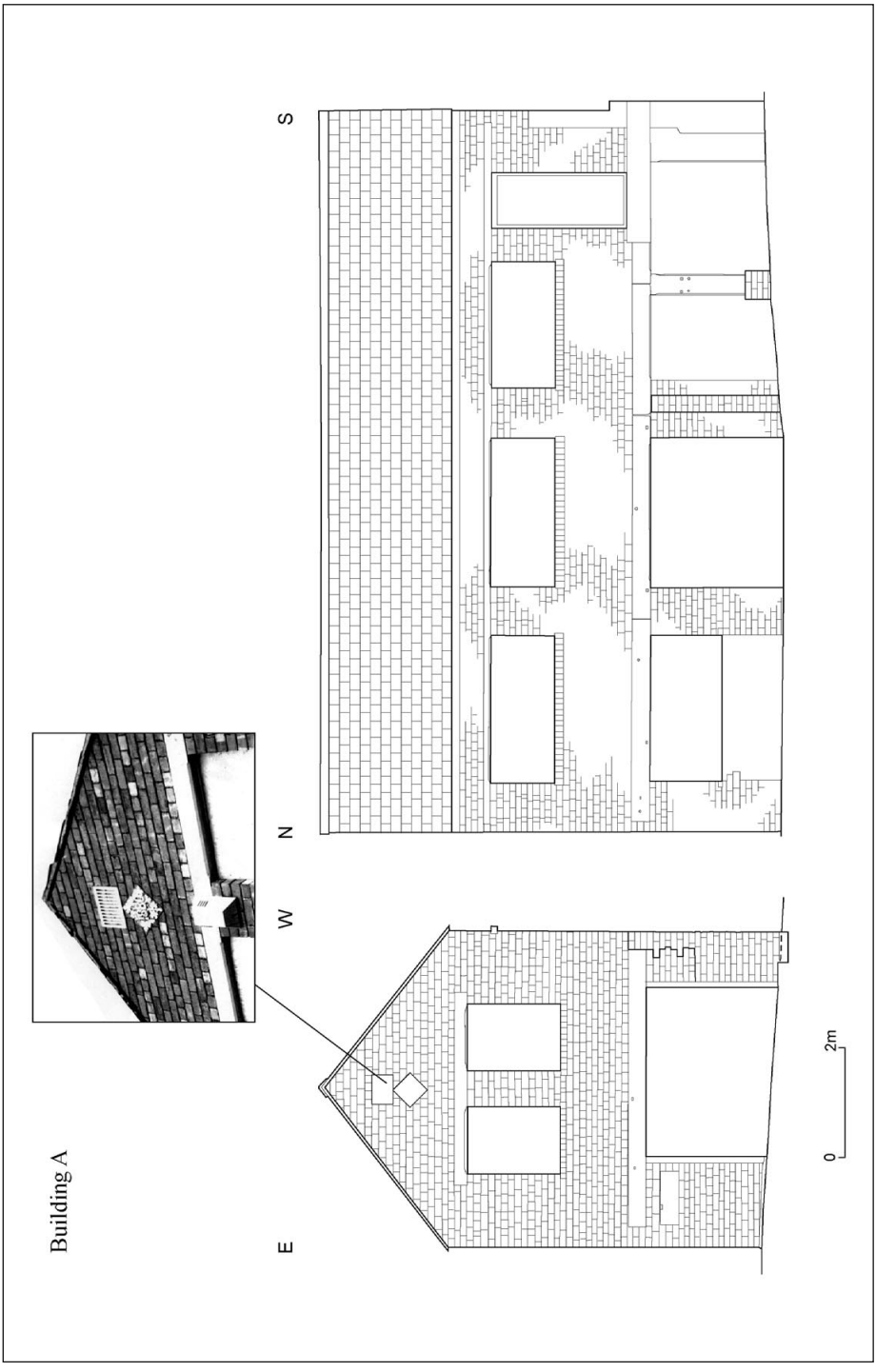
The standing structures

Background to research

Of the buildings that were located within the land plots covered under the study area only two survived as standing structures until the present investigation in 2001. These directly correlated with the brick remains of Structures A and B (Phase 6, *see above*) and were investigated in 2000 prior to their demolition. The work was undertaken by Earthworks Archaeological Services (Scruby 2001) and Matrix Archaeology (Fletcher 2001).

Built structure descriptions

Building A (Structure A, Ill II.17) comprised a two-storey machine-cut red-brick built structure in the English Garden Wall bond, orientated north-south. The lower courses of



III. II.17: Building A elevations (Inset photograph: Earthworks Archaeological Services)

the southern façade bore earlier construction material in the form of sandstone blocks with lime mortar. This was carried up in hand-made red-brick that continued onto the eastern façade at a height of *c.*1.0m from the ground. The south and east walls were rendered. The roof was pitched of blue-grey Welsh slate with moulded blue ridge tiles.

The principal façade faced west onto the yard and consisted of three bays symmetrically placed around a central wide doorway. The windows were heavily remodelled with cement lintels. The northern gable façade had been converted to a gateway entrance with two vertical windows on the first floor above. Set in the apex of the northern gable was a cast-iron diamond-shaped plaque with decorative floral design that bore the date '1880' (Ill. II.17). The southern gable had two first-floor vertical windows mirroring those on the north. The eastern street façade was plain.

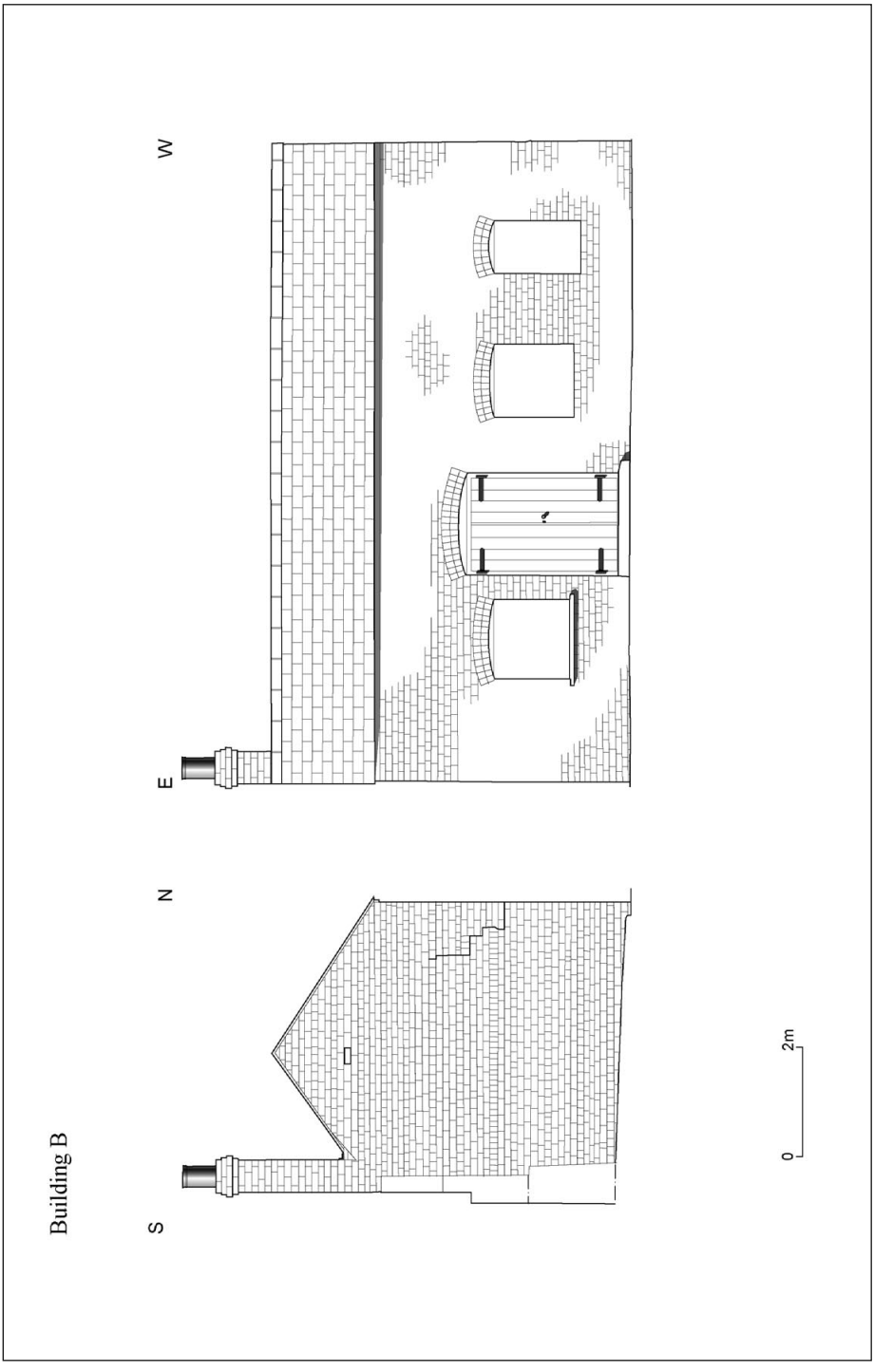
The internal ground floor was of irregular plan reflecting the irregular form of the building plot. Originally it was open to the north and east with wood-lintels supported on brick piers, now partially blocked with later brickwork. Internally the brickwork was supported on re-used cast-iron I-beams. The first floor internally was open, but had subsequently been sub-divided to provide office space. Access was via an external wooden staircase that rose to a doorway at the southern end of the western façade.

Building B (Structure B, Ill. II.18) was located perpendicular and to the west of Building A. It consisted of a single-storey structure of machine-cut red-brick in the English Garden Wall bond with a pitched-roof of blue Welsh slate. The original fenestration arrangement was retained throughout the building with segmental-arches to the heads of the openings. The four bays on the northern façade had two twelve-pane casement windows arranged symmetrically either side of a central double doorway, with a further narrow window to the west. The western façade had a high twelve-pane casement window set within the gable. The southern and western façades were obscured by render and scarring from the remains of a demolished building, respectively. Like Building A, the southern façade was a composite of three phases of construction, an initial sandstone block wall carried up in hand-made red-brick in the English Garden Wall bond and completed in the final phase of machine-cut-red brick construction in the English Garden Wall bond.

The internal layout was open with further storage space provided by the insertion of a partial first floor laid across the ceiling joists. The roof structure had been replaced by twentieth century collared trusses at a later date. A single one-pot chimney-stack had been inserted at the eave line in the south-east corner of the building. The only other internal features consisted of two rectangular recesses within the sandstone phase of the southern wall. It was unclear if they related to the structure presently standing.

The northern boundary wall of the yard survived as a sandstone block wall to a height of *c.*0.6m that was continued up in hand-made red brick in the English Garden Wall bond.

The buildings, when recorded, were isolated examples of the wharf buildings that lined the eastern bank of the River Dee and developed from the eighteenth century onwards. They represented the only surviving nineteenth century buildings lining the now extant wharf



III. II.18: Building B elevations

north of the T.S. Deva warehouse and Crane House. The buildings were of a lower status and represented the gradual expansion of activity north along the strip of land between the Dee and New Crane Street.

The artefacts

The artefacts from the site consisted predominantly of ceramics, but also large quantities of degraded metalwork, vessel glass and animal bone. Shell, clay tobacco pipes and a single set of vulcanized rubber and porcelain dentures were also found on the site. The artefacts recovered all post-dated the seventeenth century except for a single sherd of residual Romano-British pottery. The artefact assemblage was recovered primarily from the upper contexts of the site and associated with the later Phase 5 and 6, nineteenth century industrial activity. This supports the historical evidence, which suggests that the area served as flood protection and was not occupied by industry until the later period. Only the most diagnostic pieces have been published within this report. The vast majority of unstratified finds have not been examined, but are kept in the site archive located at the Grosvenor Museum, Chester.

The post-medieval ceramics

by Leigh Dodd

Introduction (Tables II.1, II.2 and II.3)

The post-medieval pottery assemblage discussed here comprises those sherds recovered during two seasons of archaeological excavations undertaken at New Crane Street, Chester. The excavations were conducted by Earthworks Archaeological Services during 2000, and Birmingham University Field Archaeological Unit (BUFAU) during 2002.

The number of stratified post-medieval pottery sherds recovered from the New Crane Street excavations totalled 470 weighing 22,845g. Also amongst the assemblage was a single sherd of residual Romano-British pottery, a sherd of orange ware weighing 12g and probably produced at the Holt workshops on the west bank of the Dee, seven miles south of Chester. The small quantity of unstratified material recovered has not been included here; details of this material can be found within the site archive. Most of the pottery recovered was of a very fragmentary nature, many vessels represented by a single sherd or two.

All of the pottery has been quantified by sherd count and weight. The small size of the assemblage and the general spread of small quantities of ceramics across a wide range of contexts, with few from discreet features such as refuse pits, negates any more detailed statistical analysis. A broad fabric series has been drawn up utilising common ware types; due to the generally late nature of the assemblage any further fabric analysis would prove fruitless. Vessel forms have been allocated to those sherds that are suitably diagnostic.

Significant examples of the vessel forms present within the assemblage have been illustrated, with an accompanying catalogue (Table II.4, Ill. II.19). The illustrations provide a representative example of the vessel forms and wares recovered from the excavations; however, they do not represent the entire range of material present within any single context or the assemblage overall.

Fabric series, fabric abbreviations, and forms present

A total of thirty-one fabric types have been identified from coarse wares to porcelain. Fabric distinctions have been made based, as expected, on the fabric itself, but also on distinctly differing decorative techniques, such as the colour of transfer printed designs. The coarse wares have been further sub-divided into six distinctly differing fabrics and suffixed with a letter from A to F; details of these fabrics can be found in the site archive. The fabrics, and their associated abbreviations as used in Table II.1, are outlined below together with discussions of the vessel forms present within the assemblage, and their general dating.

Coarse Ware: **CW** (**A-F**). Generally heavily potted vessels in fabrics ranging in colour from buff-pink through to orange-red. Most vessels, with the exception of CW-E, exhibit brown-black glazes often over an iron-rich slip coating. The vessel types represented are predominantly both small and large cylindrical storage jars and large dishes. A small, squat, cylindrical jar from (124) in CW-A fabric was clearly a warped, but useable, second that had been used as a paint pot. Traces of lead-based red and white paint residues remained in this vessel. The CW-E sherds are not glazed and are from the rims and upper body of at least a dozen sugar cones, notably from (83), and almost certainly representing a single episode of disposal. Rim diameters of these vessels range from 210–400mm with the interiors smoothly finished. No sherds from the base or lower body of these sugar cones were recovered during the excavations. The coarse ware vessels from New Crane Street date from the eighteenth century through to the early twentieth century and are probably the products of a variety of local workshops, including those established at Buckley, North Wales. Coarse wares predominate throughout the New Crane Street assemblage.

Midlands Purple Ware: **MP**. A high temperature fired earthenware exhibiting a hard body, purple-brown in colour. A single sherd from a jar in this ware was recovered from (1082) and dates to the early-to-mid-eighteenth century.

Brown Stoneware: **BSTW**. Pinkish-grey bodied vessels often large, narrow necked, bottles or flagons with a single handle. The exterior surfaces of these vessels have been coated in a brown ferruginous salt-glaze. The vessels from the New Crane Street assemblage generally date from the eighteenth to nineteenth centuries and probably originate from a variety of both local and non-local workshops. One example from (124) has been stamped with the maker's name, near the base prior to firing: J. BOURNE & SON, PATENTEES, DENBY POTTERY, NEAR DERBY. The Denby factory, specialising in stoneware, was established in 1809, with Joseph Bourne taking over the works in 1812 (Godden, 1972, 172).

Light-Bodied Stoneware: **LBSTW**. Hard, light-grey, stoneware. The New Crane Street vessels are large, narrow necked bottles or flagons equipped with a single handle. The upper one third of these vessels is often coated in a yellow-brown wash with the vessel completely clear glazed externally. Two bottles from (124) were Bristol maker marked; one was stamped POWELL BRISTOL in a small oval stamp on the shoulder, whilst the second was stamped C&J.R. PRICE MANUFACTURERES BRISTOL, again on the shoulder. The second vessel was also stamped prior to firing with the prospective customer's details, in this case BOWERS BROs CHESTER. Powell's pottery was established about 1816; however, the clear and yellowish tinged leadless glazes — as used on the New Crane Street vessels

— was developed in 1835 (Lewis 1999, 65–6). A number of LBSTW bottles were also present in (1007), one of which was stamped PRIC(E) on the shoulder, whilst others, the sherds from perhaps six or more individual vessels, were under-glaze ink-stamped MOULDING & SONS, HERBAL BREWERS, CRANE ST, CHESTER. One of these vessels was also dated 1924 and another 1927. The vessels from (1007) had provision for screw stoppers.

White Salt-Glazed Stoneware: **WSTW**. Fine white-bodied stoneware coated in a salt-glaze. A small amount of WSTW was recovered from the excavations. Of the forms identified were a small, moulded, round-bodied teacup of mid-eighteenth century date (232) and a chamber pot or similar vessel of later eighteenth-century date from (1111). Both contexts date to the second half of the eighteenth century and are associated with the construction of the sandstone revetments.

Slipware: **SW-A**. Buff or pink-buff coloured press-moulded earthenware vessels coated internally with cream and brown coloured slip, which has been combed together or 'feathered'. The cream slip usually shows yellow beneath the clear lead glaze. Sherds from two press-moulded dishes were recovered, both broadly dating to the eighteenth century, one sherd from (75), which was residual, and one sherd from (201).

Slipware: **SW-B**. Wheel-thrown pink-red earthenware vessels decorated internally with trailed cream slip patterns over a brown slip background under a lead glaze. A sherd from a dish in this ware was recovered from (104) and can be considered residual, whilst a single sherd, probably also from a dish, was recovered from (174). This particular sherd was seemingly fashioned into a crude circular gaming piece. Both sherds could date to either the later seventeenth or early-to-mid-eighteenth centuries.

Slip-coated buff ware: **SCBW**. Generally a relatively fine buff-bodied ware coated in a red slip, which gives the glaze and vessel a dark brown or black appearance. A variety of vessel types were produced in this ware, which was popular during the period c1720–60, including dishes and tankards, which were often lathe finished. A single base sherd from a cylindrical tankard was recovered from (1102), a deposit immediately overlying the sandstone revetment (F156).

Industrial Slipware: **ISW**. Industrial, or factory-made, slipware is a white-bodied pearl-glazed ware with its origins in the late-eighteenth century. Vessels manufactured in this ware were often very utilitarian and included forms such as bowls, jugs and mugs along with other kitchenware. Early examples tend to use a variety of coloured slips and designs in their decoration, by the mid to late nineteenth century these colours become much more limited in range. The New Crane Street sherds are from mid to late nineteenth century vessels including bowls, a jug and a mug, and are decorated with simple blue and brown bands directly on the white body of the vessel, with a single sherd decorated with white dots on a brown background.

Industrial Slipware-CC: **ISW-CC**. This is a buff-bodied or cane-coloured variation of the white-bodied ISW. Sherds from bowls were recovered from contexts (1004) and (1149); sherds from the latter decorated with simple blue banding.

Blackware: **BLW**. Relatively fine red-bodied earthenware with a black glaze developed during the seventeenth century from the earlier Cistercian Ware tradition and refined further in the eighteenth century. Vessels present in this assemblage include cups or jars from (1026) and (1040) dating to the eighteenth century, and a cup and jar, or chamber pot, from (1102) also dating broadly to the eighteenth century. This particular vessel sherd exhibited a glaze dribble over the sherd break implying that this vessel was either a waster or saleable/useable second.

Mottled ware: **MOTTW**. An earthenware, usually buff-bodied, coated in a streaky brown glaze, dating from the late-seventeenth century and continuing into the mid-eighteenth century. Two vessels are represented in this assemblage: a cup from (104) and a chamber pot from (1239), which bears abrasion marks caused through vigorous cleaning of the interior. This particular vessel is of red earthenware and may be of local, Buckley, origin. Both vessels probably date to the first half of the eighteenth century; although, that from (104) is in a demonstrably later nineteenth-century context.

Refined Redware: **RRW**. Fine, red-bodied earthenware with a clear brown glaze, popular during the period *c.*1720–40. Used predominantly in tea and other moulded fine wares. Sherds in this ware were recovered from (43) and are residual in a later context, and from (260), a possible late-eighteenth century ditch fill deposit.

Agate Ware: **AGATE**. Manufactured by mixing red and cream clays together and then turning on a lathe to expose the contrasting clays. Clear glazed. Used in the manufacture of tea and other moulded fine wares throughout the period *c.*1750–70. A single sherd was recovered from (187).

Creamware: **CRW**. A white-bodied earthenware coated in a clear, yellow-tinged, glaze developed during the mid-eighteenth century and common until late in that century. Creamware vessel types present in the New Crane Street assemblage include dishes, bowls, plates, a cup and a sauceboat.

Utilitarian Whiteware: **UWW**. Refinements in both the body and, perhaps more so, the glaze of creamware resulted in more pure white bodies and glazes. The category of UWW is applied here to those white wares which cannot be positively identified as either a creamware or pearl-glazed earthenware. Common from the late-eighteenth century and into the nineteenth century and later used in a wide variety of vessel forms.

Blue Transfer-Printed Ware: **BLTP**. White-bodied wares decorated with under-glaze blue printed designs, a common design being the Willow pattern, popular from the 1840s. Common forms include plates, bowls, cups and saucers.

Brown Transfer-Printed Ware: **BRTP**. White-bodied wares decorated with under-glaze brown/black printed designs. Common forms include plates, bowls, cups and saucers.

Lustre Ware: **LUSTW**. White ware decorated with metallic lustre, often silver, gold or purple-pink coloured. A cheap decorated ware, vessels include plates, cups and saucers and other tea wares, popular throughout the nineteenth century.

Pearl-Glazed Earthenware: **PGE**: Refinements in both the body and, perhaps more so, the glaze of creamware resulted in more pure white bodies and glazes of pearlware. The whiter glaze was achieved by the addition of cobalt; this often gives the glaze a slightly blue appearance.

Painted Pearl-Glazed Earthenware: **P-PGE**: As PGE, but decorated externally with over-glaze painted decoration.

Porcelain: **PORC**: A single sherd from a Chinese export porcelain plate was recovered from (232) and is probably of mid-to-late-eighteenth century date.

Tile: **TILE**: White-bodied wall tiles of twentieth-century date.

Sink: **SINK**: Vitreous sanitary ware of twentieth-century date.

Romano-British: **RB**: Residual Romano-British pottery. A single sherd of Holt orange ware was recovered from (51).

Discussion

The post-medieval pottery recovered from the New Crane Street excavations generally dated from the early/mid-eighteenth century through to the twentieth century, with much of the material dating to the nineteenth century. Many of the earlier datable sherds are residual and recovered from later, usually nineteenth century, contexts; this suggests various periods of dumping of waste materials. Few sherds were recovered from pit fill or similar sealed contexts. The small size and fragmentary nature of many of the pottery sherds further suggests that much of the ceramic material present within the excavated contexts is the result of secondary deposition.

Ceramics directly associated with the Phase 2 revetment were limited to those located within context (1102), which included manganese mottled ware and blackware from an eighteenth century chamber pot and were probably resultant from rubbish debris. The extension to the revetment of rough smaller blocks of sandstone located in Sondage 2 (1111/F169) revealed further quantities of glazed stoneware, creamwares and coarsewares of slightly later date (Phase 3). In Sondage 1, the layers (1082, 1083) that sealed the revetment (F156) were make-up layers with creamwares and utilitarian whitewares. Within Area B the layer that sealed the revetment (1004) consisted of utilitarian domestic wares. Both were suggestive of an episode of levelling as opposed to domestic occupation particularly as they dated to the mid-nineteenth century and Phase 5 of the site.

A large quantity of the remainder of the excavated ceramics came from features located within Area B and associated with activity during Phase 6 of the occupation when the area may have been re-used as a pavement combined with surviving elements of the revetment.

The ceramics consisted of coarsewares and stonewares with some industrial slipwares, but were unlikely to be more than residual debris and infilling from nineteenth-century occupation and levelling layers.

A single internal layer inside Structure A (1047), part of an internal feature (F184), produced painted pearl-glazed earthenware and blackwares and may have been associated with domestic occupation of the building.

The majority of the vessel forms present within the assemblage are utilitarian in nature, being bottles or flagons in stoneware fabrics and storage jars in coarse earthenware. Vessels of an industrial nature are represented by several rim and upper body sherds from sugar cones. Sugar cones are coarse earthenware vessels in which the sugar syrup is poured and subsequently solidifies into a loaf. Similar sugar cones have been recovered from the ports of London, Bristol and Exeter (Brooks, 1983, 1–14) and Liverpool. Examples are also known from sites in Chester (Edwards 2008; Rutter 1990, 194).

Vessels for the table and the individual are present in several utilitarian fabrics, such as slipwares and whitewares, and include bowls, dishes, and tankards or mugs aimed at the lower end of the market. Many of the eighteenth and nineteenth century wares present within the assemblage are typical of those being produced in the Staffordshire Potteries at that time; however, other production centres throughout the Midlands, Merseyside, Lancashire, and North Wales (Buckley) are almost certainly included here.

Domestic trade links with the port and city of Chester are hinted at by the presence of nineteenth and early twentieth century stonewares, manufactured in both Derby and Bristol and marked-up for traders based in Chester. Some of the more locally produced earthenwares, although clearly not all, may be products of the Buckley kilns in Flintshire. The presence of the stoneware imports on the New Crane Street site may be the result of shipments, possibly damaged during the offloading procedure, into the port of Chester, in particular those from (124) which post-date 1835, and those from (1007), which post-date 1927. However, it is equally feasible that much of the ceramic material had been imported into the site, from the city, as refuse material perhaps for levelling or backfilling purposes. There is the possibility that some of the pottery present on the site is derived from the process of dredging the riverbed and dumping the material on the wharf (*pers comm*, A Scruby). This may be particularly so with the later dumped deposits; although, there is little evidence of any pottery sherds being notably water-worn, despite their small size. The sugar cones, mostly from pit fill contexts (76) and (92) and deposit (83), are unlikely to have been imported with the sugar loaves and these sherds may have been utilised as ballast material.

The vast majority of material came from unstratified layers recovered during cleaning over Structures A, B and C within Area A (1007) and was predominantly of stonewares (58 fragments).

Ware	*CW-A*		*CW-B*		*CW-C*		*CW-D*		*CW-E*		*CW-F*	
	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
Totals	30	1940	11	392	12	646	27	969	96	6082	4	149

Table II.1: Post-medieval coarse-ware pottery

Ware	*SW-A*		*SW-B*		*SCBW*		*ISW*		*ISW-CC*	
	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
Totals	18	355	4	18	1	44	13	74	9	170

Table II.2: Post-medieval slipware pottery

Ware	*MP*		*BSTW*		*LBSTW*		*WSTW*		*BLW*		*MOTTW*		*RRW*		*AGATE*	
	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
Totals	1	19	39	4112	93	6570	4	37	9	224	5	262	2	17	1	7

Ware	*CRW*		*UWW*		*BLTP*		*BRTP*		*LUSTW*		*PGE*		*P-PGE*		*PORC*	
	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt	No.	Wt
Totals	29	159	15	120	14	178	4	19	1	4	19	237	1	1	1	1

Table II.3: Post-medieval other pottery

Eighteenth century vessels

1 Coarseware jar (CW-B). *c.*eighteenth century. Residual. Context (43)

2 White salt-glazed stoneware tea-bowl (WSTW). *c.*mid-eighteenth century. Context (232)

3 Slip-coated buff ware tankard (SCBW). *c.*mid-eighteenth century. Context (1102)

4 White salt-glazed stoneware chamber pot (WSTW). *c.*mid-eighteenth century. Context (1111)

5 Mottled ware chamber pot (MOTTW). *c.*early–mid-eighteenth century. Context (1239)

Nineteenth century vessels

6 Coarseware jar (CW-A). Warped. Context (124)

7 Coarseware sugar cone (CW-E). Smoothed interior. *c.*late-eighteenth–nineteenth century. Context (83)

8 Coarseware bottle (CW-D). Context (204)

9 Light-bodied stoneware bottle (LBSTW). Stamped: POWELL BRISTOL prior to firing. Yellow-tinged glaze to upper. *c.*mid–late-nineteenth century. Context (124)

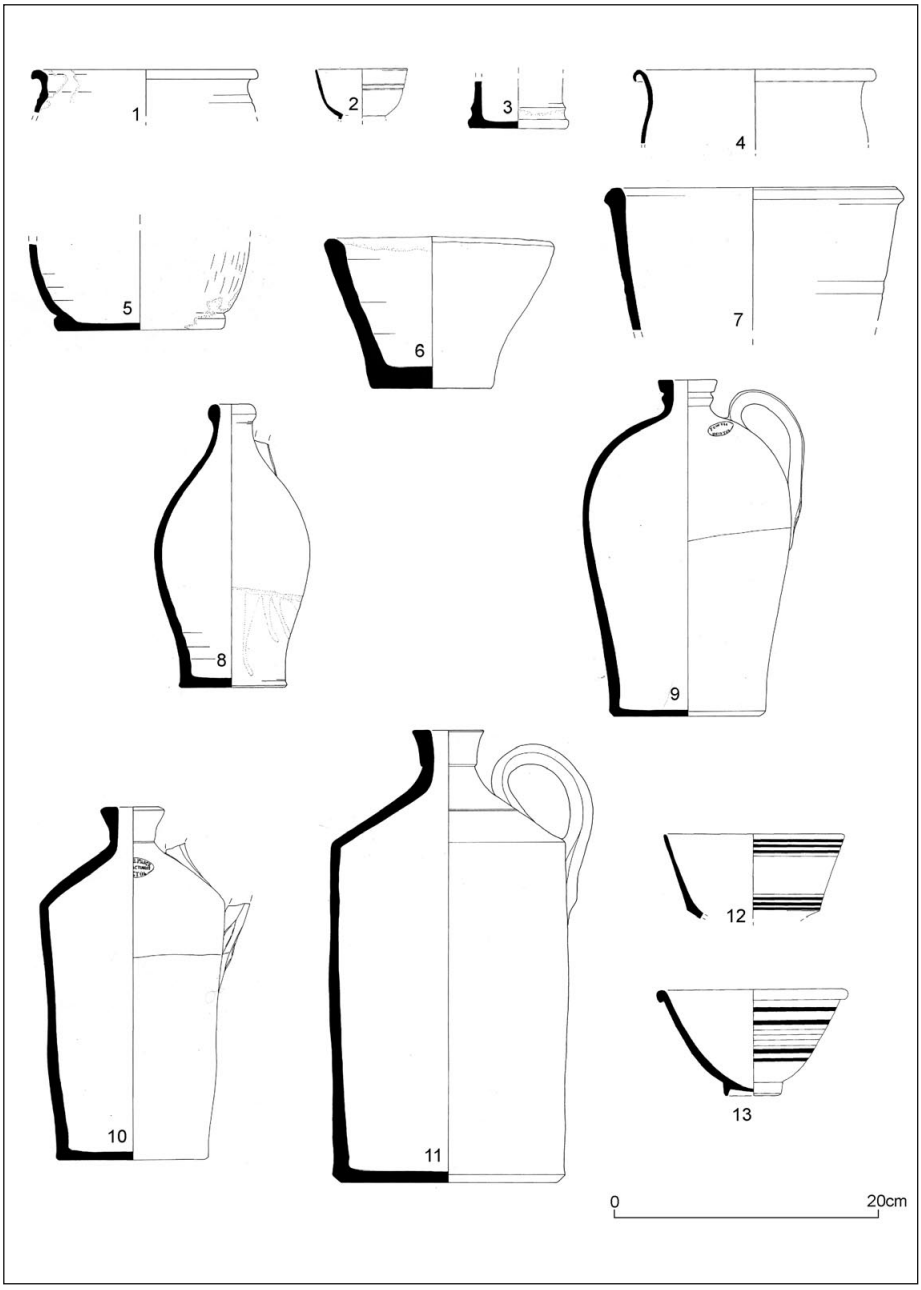
10 Light-bodied stoneware bottle (LBSTW). Stamped: C&J.R. PRICE MANUFACTURERES BRISTOL prior to firing. Yellow-tinged glaze to upper. *c.*mid–late-nineteenth century. Context (124)

11 Brown stoneware bottle (BSTW). Stamped near the base, on the front of the vessel opposite the handle, prior to firing with: J. BOURNE & SON, PATENTEES, DENBY POTTERY, NEAR DERBY. Patchy, brown, salt-glaze *c.*mid-neneteenth century. Context (124)

12 Industrial slipware banded bowl (ISW). Decorated over the white body with a broad blue central band bordered by two sets of three thin black-brown bands above and below

13 Industrial slipware banded bowl (ISW-CC). Decorated over the buff body with two sets of two thin black-brown bands above and below a set of two white bands *c.*mid-nineteenth century. Context (1004)

Table II.4: Catalogue of Illustrated Post-medieval Pottery (Ill. II.19)



Ill. II.19: Selected post-medieval ceramics recovered during excavation

Other artefacts

by Annette Hancocks

A range of artefacts were recovered from the site. A selective discard policy was adopted for unstratified artefacts, whilst those from stratigraphically secure contexts were kept and examined. The majority of the clay tobacco pipes recovered from the excavations were fragmentary and therefore undiagnostic. Diagnostic vessel glass was recovered from later contexts of the site and was associated with the water and brewing industries, but could add little to the presently understood chronology. Only the most diagnostic pieces are discussed below.

Clay tobacco pipes

A total of seventeen fragments of clay tobacco pipes were recovered. None of the clay pipe was particularly diagnostic in date. The majority were undecorated stem fragments and partial bowl fragments. Two intact bowls survived. One from (1137) had an elegant fluted style commonly found in Chester throughout the eighteenth and early nineteenth centuries but was undecorated (Rutter & Davey 1980, 221–3). The other, from (1107), a bowl with stem missing, had a limited amount of leaf style decoration on the inner mould joint and the pattern bore similarities to nineteenth century pipes produced locally in Chester (*ibid*, 208–9) (Ill. II.16). Associated post-medieval pottery dated to the second half of the nineteenth century.

Metal objects

The metal objects recovered from the site were all of post-medieval date and largely badly corroded. The majority comprised iron nails or small pieces of ferrous material. A more or less complete clock mechanism was recovered from context (1176). X-rays of the clock mechanism are available in the site archive. A single copper alloy coin from context (1225) was too badly corroded to date. A further unstratified copper alloy coin was likewise badly corroded but was tentatively recognised as a George II penny.

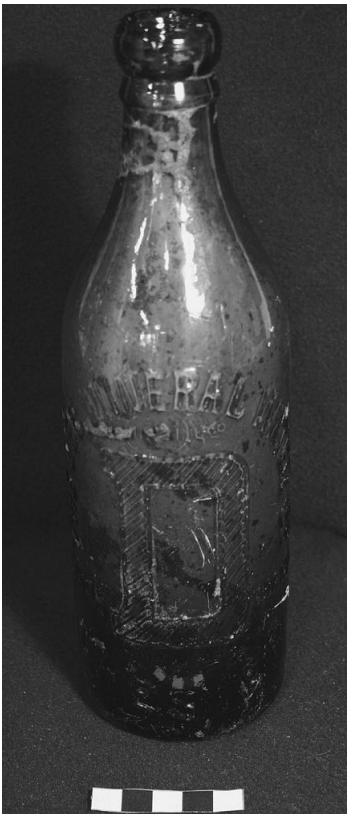
Dentures

A lower set of dentures was recovered from (1002) (Ill. II.15). These were of mid-to-late-nineteenth century date and made with porcelain teeth set within vulcanite gums. The use of vulcanite in dentures dates to the second half of the nineteenth century. It enabled the cheap manufacture of false teeth and the subsequent increase in their use (Woodforde 1968, 87–92).

Vessel glass

The majority of the glass recovered comprised post-medieval vessel glass of nineteenth/twentieth-century date. Diagnostic pieces observed include a green glass beer bottle stamped 'CHESTER' recovered as unstratified. In addition, a complete green glass beer bottle stamped 'J.T.MILNE & SON, TARVIN BRIDGE, CHESTER' was recovered from a cleaning layer above Structure C (1007). A complete base from a large green bottle was retrieved from a levelling layer (1119). Several complete bottles were recovered from the overburden above the slip-way (Structure D, 1176). The range and variety of bottles recovered included a vessel marked 'M. A. BALL, 15, YORKE STREET, WREXHAM', a clear beer bottle labelled 'TRENFALL'S BREWERY C^{O} L^{D}.' and a complete green screw top bottle embossed 'THE DEE MINERAL WATER CO, TRADE MARK 'D', CHESTER' (Ill. II.20). The bottle

post dates 1872 when the internal screw was introduced that secured a threaded seal into an adapted lip interior (Hedges 1996, 9). However, first references to the Dee Mineral Water Company do not occur until the early twentieth century (Kelly 1902).



Shell

Oyster shells were recovered from a post-hole (F159, 1107), the backfill of the UMAU evaluation trench (1188) and a layer (1191) above the revetment in Area B. A small quantity of unidentifiable shells was also recovered.

Animal bone

by Emma Hancox

A small amount of animal bone (633g) was recovered from twelve contexts (1004, 1007, 1026, 1027, 1047, 1082, 1101, 1111, 1112, 1114, 1188 and 1191). The bone was mostly in fair-to-poor condition and fragmented. Dog (*Canis familiaris*), cattle (*Bos* f. domestic) and sheep/goat (*Ovis/Capra* f. domestic) were the only species identified. There were fifty-four countable elements, fifty of which came from the fill of a pit in Area B (F118, 1027) and probably relate to one dog. No bones or teeth were measurable and no wear stages could be assessed. Three contexts contained bone with cut or chop marks (cleaning layer 1007, stone revetment, F169/1111 and cellar fill 1112), and gnawing was noted on one bone from a makeup layer (1082) above the stone revetment.

Environmental data

Geo-archaeological data was collected within the site during both periods of excavation in 2000 and 2002.

Geo-archaeological work

by David Jordan and Dr Clare Wilson

The history of channel migration and silting and the relationships between these and phases of navigation work on the River Dee are interesting questions that have not yet been addressed in this area. To address these questions requires exposures of *in-situ* alluvial sands at strategic points along the riverbank and its former quay walls.

Unfortunately at this site, only a small number of the deposits on the very edge of the former river channel appear to be *in-situ*. These show a gradual accumulation of sediment

Ill. II.20 Glass bottle from the Dee Mineral Company (Photograph: Birmingham University Field Archaeology Unit)

against the front of the sandstone apron. That these deposits have survived, and not been scoured away, implies a relatively low energy, depositional regime at least for a time before the revetment was built. The revetments were gradually abandoned and buried by dumps of alluvial sand as the river wall was extended further out into the former channel.

The remaining deposits appeared to be dumps used to make up the ground surface behind the river wall. Presumably, this was done to overcome silting and navigation problems and to make more land for quayside installations. These deposits, therefore, can tell us very little about the erosion and deposition regime of the river. However, they may contain information about the conditions in which they were re-deposited.

The randomly stratified deposits were found to slake (break down) very easily when placed in water. For the depositional structure to have survived, conditions would have been dry when they were re-deposited. By contrast, the 'clean' unstratified deposits present in the base of some of the trenches could have formed as alluvial sands and clays, cut from deposits with a well-defined structure, slaked and become homogenised as they were tipped into standing water. Hence, the depositional structure had been lost. However, the unstratified nature of many of the sands high up within the sections suggested that a number of different depositional and post-depositional processes are responsible for the appearance of the deposits.

As the river migrated westwards away from the city walls, it would have eroded and heavily truncated any pre-seventeenth century deposits at this site. It is likely that a great depth of early deposits have been eroded away by the river. Presumably, as the channel migrated, it eroded its west bank leaving an eastern bank where water movement was much less rapid and thus where finer deposits would have gradually accumulated. The eastern bank was then built up and developed as the river walls and flood defences were constructed and the quayside developed. The question of what caused the river to migrate in this way cannot be answered from these sediments; it is possible that an early phase of river engineering and the construction of the 'Cop' were in part responsible. Whatever the reason, the low energy, depositional environment that seems to have existed along the eastern bank of the river suggests that silting of the quays and inlets would have been a permanent problem. This may be one reason why the inlet exposed in Area 1 (152, Ill. II.3) had been abandoned and backfilled.

It is likely that the sands used to make up the ground level would have been sourced locally. The particle size and mineralogy of these deposits was similar to those of the *in-situ* deposits. They probably derive, therefore, from nearby alluvial deposits dug out during riverside work and developments around the site.

Geological work

by Matt Canti

The deposits consisted of a sloping stone revetment on the east side with horizontal bands of silt and clay (1173) covering its lower half. (1173) was a loamy sand to silt loam with up to 10% stones composed of angular coal fragments and rounded rock fragments. Layers in the zone were generally smooth and uniform, varying from pale brown loamy sand through

to dark rusty brown silt loam. These were capped by a dark band of organic material and coal fragments (1234) roughly parallel to the sloping revetment but levelling off to the east. Towards the river side, this band thickened to become a substantial peat layer (1240) (*see* Ill. II.4). Towards the river, the dark band thickened into a 30mm peat layer but became fainter and eventually disappeared in the grey/blue sediments at the westernmost end of the trench. Towards the east, it gradually petered out and became a thin line of organic remains and coal. Above the dark band, there was around 1–2m of complex sand, silt and coal seemingly disorganised except in its upper part (within 0.5 m of the land surface) where it was arranged in foresets, a vertical feature of sedimentary accumulation from modern flood deposition.

Interpretation

Clearly, gentle sedimentary conditions predominated close to the revetment wall for a period of years after its construction, leading to the deposition of the horizontal silt and clay layers (1175). This was probably accompanied by further westward migration of the main channel, until vegetation was able to colonise the now stable bank and the peat developed. Thereafter the area was built up with dredging producing the chaotic layers above the organic band, and modern floods still affecting the land surface on an occasional basis.

Discussion

by C Hewitson

The site has a short-lived history and only existed in any form from around the late-seventeenth to early-eighteenth century. However, within this period six distinct periods of development can be seen that ultimately give an important insight to the topographical and urban development of this area of Chester.

The initial development of the site focuses on its creation. The topography of the land during the Roman period is unclear. The remains of wooden piles, four human skulls and a pig of lead cast in AD 74 found during the construction of the former gas holders in 1885/6 at a depth of 7m below the ground level (NGR 339770 366070) have been commonly interpreted as wharf remains on the western bank of the former river course (Morris 1892, 68–9). Further remains of oak piles and substantial sandstone blocks just west of Watergate (NGR 340100 366180 and 340150 366130) suggest the location of a wharf on the eastern bank of the river (Watkin 1887).

Ward (1996, 4–11) suggested a broad channel existed in the first century AD and the present course of the river was formed by the migration of this channel in the later-Roman and early-medieval period as it eroded the western bank. The nature of the present channel suggests it was cut by slow migration that eroded the higher topography of the western bank. This would suggest the erosion of any *in-situ* archaeological remains even at the depth of 20 feet (*c.*6.5m) below the present ground level as suggested by Morris (1892, 68–9). Calculations of the depth of the river channel based on Kinderley's measurements for the canalisation of the Dee suggest that the base of the river channel has a depth of around 23 feet (*c.*7.5m) at maximum (Webster 1930, 66; see below).

In modern times it is known that the River Dee in its higher course was relatively stable (Gurnell 1997, 13–14). However, the regime of the modern period has been altered by water management schemes and the former fluvial system was certainly more active (Cohen 1986, 25–51). This would suggest conditions that would enable river avulsions (rapid channel migration) that occur typically as the river migrates over low lying ground (Slingerland & Smith 1998, 435–8). These require high sediment load, which the river is known to have had as far back as the early Holocene period as the catchment area has a high concentration of easily mobilised Quaternary glacial and outwash sands (Dr David Keen *pers comm*). Therefore, it is possible the river regime produced an avulsion that resulted in bifurcated channels in the Roman period with a western and an eastern channel and a central island in-between (Fletcher 2000, 24). This is supported by both historic and cartographic evidence. The name Roodee is derived from the '*Rood*,' a cross and '*Eyam*,' an island, literally meaning the 'island of the cross' and the land at the eastern side of the Roodee was marsh in the medieval period (Alldridge 1981, 29). An island in the centre of a bifurcated river channel is present on Captain Grenville Collins' map of 1689 (Collins 1689) beyond the turn north of New Crane Street in the former river channel forty years prior to the canalisation of the Dee. It would not be unrealistic to suggest similar processes occurred less than a mile further up the river during the Roman period when river-flow was less manipulated. Certainly the suggestion is that historically, prior to canalisation, the River Dee had a changeable course particularly in its lower tidal reaches.

In the medieval period the Water Tower is depicted as being located in the course of the river with the river passing the western gate of the city (Braun and Hogenberg 1581). It had moved only slightly to the edge of the Water Tower by *c.*1610 (Speed). In the later half of the seventeenth century it appeared to follow the course of the present channel on the western side of the estuary before crossing back to the other side just beyond Shotwick about five miles downstream (Collins 1689). However, the river course of the Dee clearly moved significantly, around 200m to the west, in a short space of time prior to the canalisation of the Dee in the 1730s. Nathaniel Buck's Prospect of 1728 shows the river removed from the Water Tower at a distance of possibly 100–150m (Buck 1728). Badeslade and Boydell's map (1740) clearly shows the extant river channel running along the eastern side of the estuary. The map was produced as part of a land rights assertion over the newly reclaimed salt marshes by the Manor of Hawarden in Flintshire. It clearly suggests that the course of the channel was disputed in the early-eighteenth century.

Much of the focus of the geo-archaeological work has centred on how and why the river moved to the west of the Water Tower. The findings of Terra-Nova suggested the deposits located beneath the revetment resulted from *in-situ* deposition. Those above the revetment were unsorted and suggested they had been dumped as the result of a build-up of land with dredged material. The most likely explanation is a rapid movement of the channel by alluvial erosion caused by the construction of a revetment around the site of the Roodee some time prior to 1710 (Fletcher 1816, 193). This altered the course of the river upstream and resulted in the steady erosion of the far bank and deposition of material at the near bank by slow-moving water. The large episodic flood that occurred in 1720 may ultimately have caused a rapid avulsion of the channel. This was to the west in the location of the site but altered the course of the river to flow on the eastern side of the estuary.

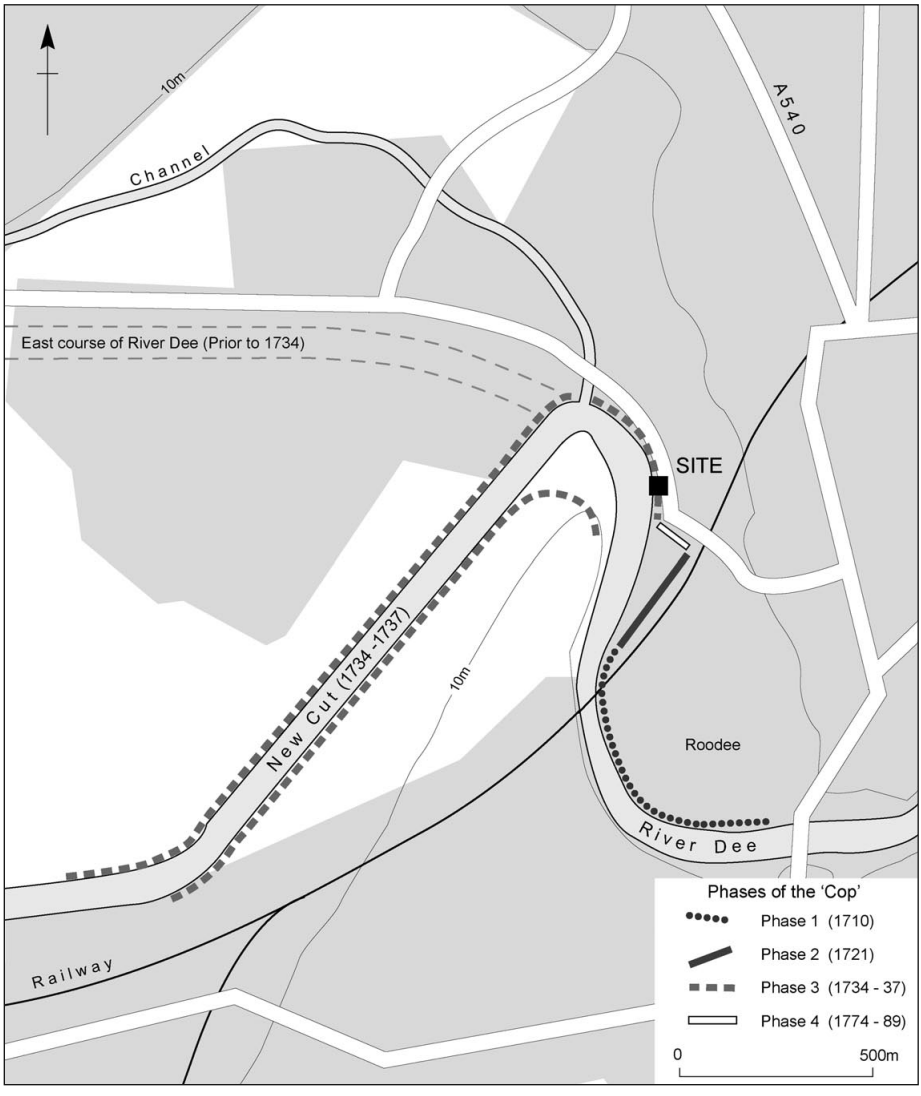
The 'Cop' in recent times has been applied universally as a name to the entire length of the flood revetment. However, four distinct phases of construction can be attributed by the historical sources (Ill. II.21). The initial phase dated to before 1710 when the Roodee was 'inclosed with a cop' (Fletcher 1816, 193). This would appear to relate to the semi-circular revetment around the Roodee. The second was the reconstruction of this phase of the 'Cop' in 1721 after the flood commemorated on the stone now located in the Grosvenor Museum, Chester and inscribed as follows:

> This Copp being washed
> Downe by a great Tide
> Which happened up on the
> 18th day of December, 1720
> Was made up & faced with
> Stone in length 336 yards
> And upwards and in height
> 4 yards Anno Domini 1721

The suggestion implied by the inscription was that the flood was caused by a tide or tidal surge and not an inundation from the higher reaches of the Dee. Examination of de Lavaux's plans of the 'New Cut' (1745) (Ill. I.2 in this volume) reveals a length of the 'Cop' indicated as a stone revetment directly south of Crane Wharf that when transcribed onto modern maps can be measured between 300–320m in length, well within the limits of the 336 yards (307m) described in the inscription above. This area of the 'Cop' would be at its weakest to a tidal surge flowing up the river as it turned the bend. Defoe writing in 1725 describes the location of 'a fine new wharf' that was destroyed in his account of the flood (1928, 142). It may be that the location of Crane Wharf was a subsequent replacement of this earlier wharf.

The third phase of the construction of the 'Cop' was as part of the diverted 'New Cut' constructed by Nathaniel Kinderley between 1734 and 1737. As already discussed there is a strong suggestion that the main channel of the river was located on the eastern side of the estuary between Chester and Shotwick when the cut was constructed (Badeslade and Boydell 1740). The cut was therefore constructed on the opposite side of the estuary and may have taken advantage of the former channel depicted by Collins (1689). This was done by the excavation of a channel 80 feet wide by 8 feet deep. The resultant material was used to construct double-sided embankments on the western side of the river. These were constructed to a height of 7 feet above the high water spring tide mark, with a gradient of 1:4 on the river-side bank and 1:2.5 on the far bank. A 6 feet-wide towpath was present along the centre and the river-side bank was a stone revetment (Webster 1930, 66).

Where the point of diversion occurred the new cut ran perpendicular to the old course of the channel to meet the cut on the eastern side of the estuary. The use of a dam and sluice-gate where the river channel diverted (Webster 1930, 66) would have enabled the river to slowly cut a new course whilst allowing a safety valve if river flow or tidal surges in the upper part became too great. With the new cut turning such a sharp angle it would have been necessary to reinforce the boundaries of the old course both in order to prevent tidal surges flooding the New Crane Street area and to divert the course into the new cut. The



Ill. II.21 Four phases of the development of the 'Cop'

orientation of the embankments defined on de Lavaux's plan (1745) north of Crane Street are noticeably different to those surrounding the Roodee and suggest they are part of the diversion into the new cut associated with the 1734–7 canalisation. The revetment at the site was clearly in a structurally sensitive point. A fourth phase of the cop is visible on Hunter and Weston's map (1789) probably associated with the expansion of the port and concerns about flooding around the area of the Workhouse (Ill. II.21, see papers by Reid and Poole in this volume for details).

The excavation work supports the idea that the whole embankment was constructed as a stone-clad revetment and has revealed more details about its structure. The stone revetment

did not extend to the top over the entire length of the embankment. However, the dimensions of the embankment and revetment encountered conform closely to those described historically. It is difficult to gauge the height of the embankment above the water due to the reduced water-flow of the river in recent years (Cohen 1986, 38–51) and the time of year of excavations was not concurrent with the spring tides. The deposits located within Sondages 1 (Ill. II.4) and 2 suggest the embankment had been truncated at its upper height. However, historical evidence points to the presence of a towpath, 6 feet wide, along the top, and truncation may be less pronounced than suggested by the excavation. Reclamation programmes within sandy estuaries such as the Dee suggest that when embankments are built parallel to the prevailing gales, wind-blown sand deposits build-up behind the embankment strengthening them naturally (Webster 1930, 68). This would explain the presence of sandy deposits to the rear of the embankment.

The second, Phase 4, revetment is more difficult to explain. It suggests a re-build or repair of the revetment that was particular to one location. It is likely the Phase 4 revetment related to a re-build associated with the development of the port during the late-eighteenth century. The construction of inlets is clearly visible on Stockdale's map (1796) (Ill. I.5 in this volume) and it is probable the later revetment related to these. The presence of material (185) deposited by slow moving currents overlying the revetment suggests this was an area of slack-water ideal for mooring boats. This is supported by the presence of a large post-hole (248) through the revetment in Area 2 and two further post-holes (F117 and F160) in Area B that suggested the area was used for the mooring of boats. The paved area on the top of the revetment (Area B, F176) would suggest that the original height of the Phase 3 revetment was comparable with present day ground levels. This probably acted as a metalled surface to enable the loading and unloading of moored boats. Cartographic evidence suggested that the inlet revetment appeared to extend further into the river channel (Stockdale 1796) and the remains of the Phase 3 revetment located during the excavations may represent minimal survival in the least exposed location. Also, the central area of the site was not subject to extensive truncation by later buildings.

The later, Phase 5, development of the site related to the construction and subsequent use of the wharf area and associated buildings. The cartographic evidence suggested that the newly formed wharf area within the site was first developed after 1833 (Wood) (Ill. I.7 in this volume). The sub-division of plot boundaries was visible prior to 1845 in the present form. The quayside wall curved round at the southern side of the site with the northern element of the quayside wall set further in and suggested the southern half of the site was initially developed prior to the northern.

In the southern half of the site a series of sandstone structures were constructed adjacent to the east-west boundary wall in the centre of the site. The boundary was formed by a sandstone wall (8/F114) that dog-legged from Structure 1 before continuing its path east-west. The structures (Structures 1, 2 and 3) comprised a probable two or three room building with Structures 2 and 3 built prior to *c.*1845. Two roughly rectangular structures extended south from the wall in twin cells (Structures 2 and 3). Structure 1 represented the limited remains of a sandstone-built structure, the former western extension to the initial building. It was probably constructed in the 1840s to 1860s.

The internal area of Structure 2 was stone flagged. Internal activity within the area in the form of waste pits contained metal-working slag associated with late-eighteenth to early-nineteenth century pottery thus suggesting even in its earliest form these buildings were associated with a smithy. The earliest reference in the trade directories suggested George Malt was a smithy on Crane Street (Post Office 1857, 70). Typical industries associated with the river-trade included nail production and general ironmongery. The use of iron-frames in Mersey Flats was a mid-to-late-nineteenth century development and by the late-nineteenth century steel hulled boats began to be built (Stammers 1993, 32). Large dumps of sandstone rubble (131) and (184) suggest that this building was demolished with the foundations incorporated into the smithy as depicted on the Ordnance Survey first edition map (1875).

The northern half of the site involved the infilling of the area behind the new quayside wall to create a wharf. The northern boundary of the wharf was defined by a sandstone wall (F101). This was identified during the recording of the standing structures as the northern yard wall as its earliest phase built in sandstone. Evidence of the earlier sub-division in the north of the site was visible as the first phase of sandstone wall construction in Buildings A and B.

Phase 6 within the site was undertaken from the mid-to-late-nineteenth century and involved the adoption of brick as a building material. Brick-built Structure C was probably constructed after the earliest phases of the smithy, but existed contemporarily prior to *c.*1858 (River Dee Company Plan).

The rebuilt smithy was constructed in red-brick (Structures 4, 5 and 6) and overlay the earlier sandstone structures. The boundary wall between the north and south of the site was moved further to the north and reconstructed in red-brick (wall 8). Internally within Structure 6 was a large pit with the impressions of eight barrel bases suggesting an internal storage area. These were possibly for coal or lime storage as tolls are known to have been collected for these goods (Willan 1937, 65); however, it is more likely they represented a modern disturbance associated with the demolition of the smithy.

The northern half of the site was redeveloped prior to 1872 (Ordnance Survey 1875, surveyed 1872). The quayside wall was extended to the west so it became flush with the southern element of the wall. Two further Structures (A and B) constructed in red-brick related to this phase of development and with Structure C formed a complex of buildings associated with the wharf industry. Structures A and B were identified during the recording of the standing structures as Buildings A and B respectively. There is evidence for three phases of construction within the building. The first appeared to relate to the sandstone boundary wall that was incorporated into the build. The second involved the use of hand-made brick within Buildings A and B but may be associated with the rebuilding of the boundary walls. The third phase involved the majority of the build in machine-cut red brick. There is some suggestion that Building A may have been entirely re-modelled in machine-cut brick around 1880 as attested by the date-plaque on Building A. However, this may merely relate to further alteration to the building particularly in view of the fact that Building A has a heavily altered fenestration pattern on the first floor.

To the west of this complex was a brick structure of unknown purpose (F177), but in form and size may have been the base for an engine or boiler. A crane was depicted on the Ordnance Survey first edition and it would appear the area between Structures 4–6 and Structures A–C was a separate wharf associated with Structure C, a small warehouse.

North of the wharf complex was a mid-to-late-nineteenth century slip-way (Structure D). The southern wall was defined by the boundary wall (F101). The first edition Ordnance Survey map depicts access to the slip-way from the yard associated with Structures A and B. This may suggest the slip-way was designed for the repair and maintenance of boats. The typical beam of a Mersey Flat that sailed on the Dee was around 4.5m (Stammers 1993, 20). This would tie easily with the width of the slip-way that measured *c.*14m at its mouth narrowing to *c.*8m.

Although the structures at the north of the site may have had an early association with the river this appeared to be short lived. There are no references in the trade directories for boat repair or boat builders on Crane Street or Crane Bank (the former names of New Crane Street) and the early-twentieth century use of the boatyard was associated with first a furniture remover and then an organ manufacturer (Kelly 1902–1923). The decline of the navigation in the nineteenth century and the consequent rise of other transport routes is well attested (Cohen 1986, Hawkes 1987). This meant the focus of the site shifted away from the river and it consequently ceased to be used as a wharf prior to the end of the nineteenth century.

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