

Archaeological Report on a Strip, Map and Record on
Land at

DUNWOODY WAY CREWE

For Nexus Heritage

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Archaeological Report on a Strip, Map and Record on Land at

DUNWOODY WAY CREWE

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Abstract

A programme of Archaeological investigation was undertaken on land at Bombardier, Dunwoody Way, Crewe, during groundworks associated with a new housing development. The fieldwork was carried out between the 12th and 19th February 2014 by Dan Garner and George Lacey of L – P : Archaeology on behalf of Nexus Heritage who were acting as archaeological consultants to Countryside Properties (UK Ltd).

Historic research places the site within the medieval township of Monks Coppenhall which was part of the early Domesday Manor of Coppenhall.

Two areas were excavated as part of the archaeological investigation. The first area measured 9m by 0.6m and uncovered part of the western arc to the brick kiln shown on earlier editions of the 6” OS map for Crewe. The second area measured 13m by 10.5m and uncovered the remains of a contemporary rectangular building to the south of the brick kiln which was thought to be an engine house.

No intact hearths or brick production waste were encountered during the investigation and therefore no scientific analysis was deployed as part of the work.

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1. Introduction and Scope of Study

- 1.1. This document considers archaeological works carried out at Bombardier Transportation, Dunwoody Way, Crewe. The site is centred at National Grid Reference 369274,356150 and lies to the northwest of Crewe town centre at an elevation of approximately 53mOD (FIGURE 1).
- 1.2. The archaeological works were carried out with approval from Cheshire Shared Services Archaeological Planning Advisory Service (CAPAS) which is hosted by Cheshire West and Chester Council.
- 1.3. This document records the results of the Archaeological works carried out between the 12th and 19th February 2014.
- 1.4. Archaeological works on the site comprised a strip, map and record exercise on two areas: the western arc of a former brick kiln; and the footprint of an associated 'engine house'.
- 1.5. The principle aim of the works was to determine the presence or absence of archaeological deposits.

2. Geology & Topography

2.1.GEOLOGY

2.1.1. The underlying geology was boulder clay overlying sandstone bedrock (WWW.BGS.AC.UK/GEOINDEX).

2.2.TOPOGRAPHY

2.2.1. The site lies to the northwest of Crewe town centre at an elevation of approximately 53 mOD (FIGURE 2).

2.2.2. To the north and east of the site is Dunwoody Way; to the west is West Street and to the south is the Chester to Crewe main line railway.

2.2.3. The site comprised formal office buildings and associated car parking areas related to Bombardier Transportation (FIGURE 9).

3. Archaeological & Historic Background

TIMESCALES USED IN THIS REPORT:

PERIOD	FROM	TO
PREHISTORIC		
PALAEOLITHIC	450,000	12,000 BC
MESOLITHIC	12,000	4,000 BC
NEOLITHIC	4,000	1,800 BC
BRONZE AGE	1,800	600 BC
IRON AGE	600	43 AD
HISTORIC		
ROMAN	43	410 AD
EARLY MEDIEVAL	410	1066 AD
MEDIEVAL	1066	1485 AD
POST MEDIEVAL	1485	PRESENT

3.1. It is not the aim of this section to present a complete history of Crewe from earliest times, nor is it the intention of this report to examine every artefact found in the local area. Rather, the aim is to review readily available sources, both published and unpublished, to determine a basic historic development of the site and any closely associated features of the brick making industry.

3.2. Examination of data from cartographic records and various published and unpublished sources suggests that the site lies within the township of Monks Coppenhall within the parish of Coppenhall.

3.3. PREHISTORIC

3.3.1. There are no known Prehistoric sites in Crewe, although there is evidence for Neolithic and Bronze Age activity in the wider area. Approximately 3km north of the site Neolithic polished stone axes have been recovered, with other finds from this period recorded between 3km and 4km to the north east and south of the site (CCC 2003). A Bronze Age axe is recorded as being discovered approximately 2km to the south of the site (CCC 2003).

3.4.ROMAN

- 3.4.1. There are no records of Roman activity within this area of Crewe. The closest Roman evidence comes from between 2.5km and 3.5km to the west, where Roman coins have been found dating to the 3rd Century, and a Roman road is known to run between saltworking settlements (CCC 2003).

3.5.EARLY MEDIEVAL

- 3.5.1. Coppenhall is listed in Domesday book as *Copehale* in 1086; the name combines the Saxon personal name '*Coppa*' with Old English '*halh*' meaning 'Coppa's nook of land' (POULTON-SMITH, 2012, PP38).

- 3.5.2. Coppenhall is listed in Domesday book (MORRIS, 1978, 265D, 266A) as:

Copehale. Haldane and Wulfheah held it as 2 manors; they were free. 1 hide paying tax. Land for 4 ploughs. In lordship 1; 2 ploughmen; 1 rider; 1 villager and 1 small holder with 1 plough. Meadow, 3 acres; woodland 1 league long and 1 wide; 2 enclosures. Value before 1066, 24s; in 1086 12s.

- 3.5.3. Although the Domesday book records both settlements of Coppenhall and Crewe it is not clear as to where the centres of these Early Medieval settlements were (CCC 2003). Coppenhall, or *Copehaleas* as it appears, fell within the lands of William Millbank and is thought to have covered both Monks Coppenhall and Church Coppenhall (ORMEROD 1882).

3.6.MEDIEVAL

- 3.6.1. The site lies within the medieval township of Monks Coppenhall which together with the township of Church Coppenhall formed the ancient parish of Coppenhall that was centred on the parish church of St Michaels. Settlement within the medieval township of Monks Coppenhall appears to have been focused to the east of the site around a staggered cross roads now marked by Victoria Street and High Town on the modern Crewe street map (at grid reference SJ 701 559). The settlement is defined by a roughly rectangular block of small irregular sized enclosures which are listed as crofts, homesteads, and houses on the tithe map of 1839. The population could easily access the parish church in the adjacent township of Church Coppenhall via Ford Lane.

- 3.6.2. To the south of the site (at grid reference SJ 692 548) in the adjacent township

of Wistaston a probable medieval moated site is noted on the first edition 6" Ordnance Survey (OS) map (1874-6); this was not shown on the earlier tithe map of 1840 but the accompanying apportionment gives the field name as 'Moat'. Later editions of the OS map show the moat to the south of Moathouse Farm on the southeastern side of Valley road; and it appears to have an arm extending to the north of the main circuit. The moat had been covered by suburban housing by the 1970's and is located somewhere beneath the houses on Langley Drive according to the modern street map.

3.7. POST MEDIEVAL

- 3.7.1. As late as the early 19th century it is clear that the area was still mainly agricultural with dispersed farms around what has been termed 'the great Crewe mansion and estate' (SYLVESTER 1980). The population of Coppenhall was relatively low, at around 140, in 1831 (CCC 2003). However, with the introduction of the railway in 1837 Crewe, and its surrounding areas, expanded rapidly. The population by 1839 had risen to over 4,000 (CCC 2003).
- 3.7.2. Because of this rapid expansion new housing was required for the railway workers and associated businesses that grew on the back of the railway boom. There was a desperate need for this housing, and with rich, heavy, clay deposits in the area brickworks sprung up. By 1883 there were eight brick makers within Coppenhall (CHALONER 1950).
- 3.7.3. The development of the area is well-documented through the sequence of maps dating from 1839 into the 20th century.
- 3.7.4. The 1839 Tithe map (FIGURE 2) identifies the site within the Township of Monks Coppenhall and shows that both the A532 road (also known as West Street) and the Chester and Crewe railway line were already established. The 1839 map also shows a road or trackway on the western side of the site which appears to have provided access for a farmstead to the south named as 'Coppenhall Heyes'; both the road and farmstead are still shown on the 1938 OS map.
- 3.7.5. Most of the site is occupied by two large rectangular fields in 1839 which are not shown on the 1874 OS map (FIGURE 2). These two fields are listed as being

owned and occupied by Martha Walker in 1839; the western field being known as 'Whitby's Field' was down to pasture whilst the eastern field was known as 'Barn field' and was used for arable. Each of the fields appear to have two ponds present (four in total) on the 1839 Tithe map and two of these ponds are still present to the east on the 1874 OS map; these ponds are likely to be extraction pits associated with the quarrying of either marl or clay prior to 1839 (FIGURE 4).

- 3.7.6. Between 1839 and 1874 a circular brick kiln was constructed on the site and the kiln along with an adjacent rectangular building (a possible engine house?) appear to have been connected by an 'L' shaped structure on the 1st edition 6" OS map (1874-6). The brick kiln was associated with the Crewe Railway Works which had been established by the Grand Junction Railway in 1840 for the construction of railway locomotives. The railway company also built 200 cottages establishing a new community in what had been the rural township of Monks Coppenhall. Among the first workers to arrive were those from the old works at Edge Hill producing an increase in the town's population by some 800 men, women and children. It is likely that the brick kiln was established to facilitate the construction of these new cottages along with additional railway related structures.
- 3.7.7. The first edition 6" OS map (1874-6) shows a massive amount of change to the ordering of the landscape compared to the tithe map of 1839. To the north of the Chester and Crewe railway line a complex of large rectangular buildings are shown; adjacent to which is the label 'London & North Western Railway Company's Steel Works'. These buildings are all served by a network of railway sidings and one of the rectangular buildings in the southwest corner of the complex is labelled as 'Brick kilns' (distinctly separate from the circular brick kiln shown to the north).
- 3.7.8. To the north and east of the new steel works there are a number of new roads flanked by lines of terraced houses. The new streets are furnished with names like Peel Street and Grosvenor Street which may allude to some of the benefactors associated with the development. Several parcels of land are marked out as 'Allotment Gardens' and there is a 'Smithy' shown at the corner of

Goddard Street and West Street. This probably represents the new workers houses provided by the railway company c.1840.

3.7.9. The road labelled as 'Goddard Street' which runs on a roughly north-south alignment from the steel works to a junction with West Street (the modern A532) is interesting because a branch railway is shown running along the western side of the road opposite a line of terraced houses labelled as 'White Terrace'. This branch line continues north until it terminates at a large water filled pit where a number of sidings are shown branching off to the pit edge. To the northeast of the pit is a rectangular building labelled 'Fustian Cutting Mill' but it is unlikely that the pit was associated with this industry. A second large water filled pit is shown to the northwest of the first pit and is located in a field labelled as 'Brick Fd.'. These features do not appear on the 1839 tithe map and are highlighted here as they may represent clay extraction pits associated with brick manufacture at the railway steel works site.

3.7.10. The second edition 6" OS map (1897) shows a number of changes which may be pertinent to the brick kiln and the wider brick manufacturing industry (FIGURE 3). First it should be noted that the brick kiln itself is not labelled as such even though it appears unchanged from the earlier edition map of 1874-6; the associated rectangular building is still present but it is no longer connected. A new railway siding is shown running up to and around the circular kiln structure with a branch terminating in an open area to the east of the kiln which is labelled as 'Brick Field'.

3.7.11. To the south of the 'Brick Field' the large complex of buildings identified as a steel works in 1874-6 has expanded to both sides of the Chester and Crewe railway; the whole complex is now labelled as 'Crewe Works L. & N.W.R.'. The rectangular building adjacent to the track labelled as 'Brick kilns' in 1874-6 appears to have been replaced by what is probably a large locomotive shed.

3.7.12. No trace remains of the branch railway line shown running north along the western side of Goddard Street in 1874-6; the north-western corner of the street is now shown as being occupied by a 'Coffee Tavern'. Further to the north the large water filled pit is still shown but it appears to be no longer in use,

whilst the 'Fustian Cutting Mill' appears to have expanded and is now named as the 'Alexandra Mill'. The second large water filled pit shown to the northwest of the first in 1874-6 has completely disappeared by 1897; a little further to the northwest of this former pit a field is labelled as 'Brick Field' but contains no pits, just a large rectangular building connected to Underwood Lane by a service track.

3.7.13. To the east of the site, between the Grand Junction Line and Crewe & Manchester Line there is a 'Brick Works' shown on the 1897 map; this was labelled as 'Brick Field' in 1874-6. To the north of the brick works there are three separate 'Brick Field' sites shown; the one to the north-east being adjacent to 'Shaw Hall'.

3.7.14. The third edition 6" OS map (1908) shows a number of changes which may be pertinent to the brick kiln and the wider brick manufacturing industry (FIGURE 3). First it should be noted that the brick kiln itself is still not labelled as such and an outer ring appears to have been added to the circumference since the earlier edition map of 1897; the associated rectangular building is still present and appears to be re-connected to the kiln as well as having two parallel lines extending from its eastern side. The railway siding is shown running up to the circular kiln structure with a branch terminating in an open area to the east of the kiln which is now labelled as 'Football ground'.

3.7.15. No trace remains of the large pit shown to the southwest of the 'Alexandra Mill' in 1897 and the 'Brick Field' shown to the west of Underwood Lane has also disappeared.

3.7.16. To the east of the site, between the Grand Junction Line and Crewe & Manchester Line the 'Brick Works' shown on the 1897 map is now unlabelled and only shown as a large disused pit. To the north and northwest of the former brick works two of the 'Brick Field' sites are shown in a similar state. The 'Brick Field' to the north-east is now labelled as 'Hall O' Shaw Brick works' and appears to have developed in to a larger concern with several clay pits in use.

3.7.17. The fourth edition 6" OS map (1938) shows little change to either the site of the brick kiln at the Crewe Works or the 'Hall O' Shaw Brick works' site (FIGURE 4).

4. Methodology

- 4.1. This section will address the methodology employed during the archaeological monitoring on the site.
- 4.2. Groundworks were carried out by mechanical stripping of modern overburden using a toothless ditching bucket.
- 4.3. A suitably qualified and experienced archaeologist monitored all groundworks.
- 4.4. All features were recorded stratigraphically and levels were recorded in metres beneath ground level (mBGL).
- 4.5. Examination and cleaning of all archaeological deposits was carried out by hand using appropriate hand tools. All archaeological deposits were examined and recorded both in plan and section.
- 4.6. A full photographic record was taken using 35mm black and white, 35mm colour slide and digital media. A photographic index was completed on site.
- 4.7. All features were drawn to scale, using appropriate scale for each feature. Plans were drawn at 1:50 or 1:20 and section at 1:10.
- 4.8. A Harris Matrix was compiled for the site.

5. Results

- 5.1. This section will examine the results of the archaeological works carried out at Bombardier Transportation, Dunwoody Way, Crewe between the 12th and 19th February 2014. (FIGURE 1).
- 5.2. In this report context numbers are indicated by brackets, with round brackets indicating fills and deposits (1) and square brackets indicating cut features [2]. Structures are indicated by underlined numbers, 3.
- 5.3. Levels are indicated in metres Below Ground Level (BGL) unless accompanied by an mOD symbol.
- 5.4. Two discrete areas were investigated as part of the works which were labelled trenches 1 and 2 (FIGURE 5); trench 1 was located to investigate the western edge of the circular brick kiln structure whilst trench 2 was located to expose the subsidiary rectangular building to the south of the brick kiln (PLATE 1).



Plate 1 - View of trench 1 Looking north-east.

- 5.5. Trench 1 was aligned approximately northeast to southwest and measured 9m long and 0.6m wide (FIGURE 6). The location of trench 1 was moved slightly to the east of the location agreed in the Nexus WSI owing to the demolition contractor having

completed groundworks in the original location prior to L – P : Archaeology arriving on site.

- 5.6. The upper most context in trench 1 was a layer of modern hardcore (1) which was up to 0.26m thick and covered the whole trench. Beneath this was a layer of dark grey/brown sandy silt (2) 0.16m thick, which was rich in fragments of clinker and brick. Underlying context (2) was a layer of loose brick rubble (3) up to 0.12m thick.
- 5.7. Beneath brick rubble (3) was the base to a composite brick structure consisting of a curving brick wall (4) and an internal brick surface (5); both of which were thought to represent part of the circular brick kiln shown on the first edition 6" OS map (1874-6). Brick wall (4) consisted of a curving brick structure 0.23m wide and surviving to a height of at least two courses; the section of exposed wall provided an arc of 5.4m from which a projected diameter of 12.714m could be calculated for the complete wall. Brick surface (5) appeared to form part of a contemporary internal floor surface.
- 5.8. To the south of brick wall (4) there was a deposit of burnt red clay (6) containing fragments of brick. Deposit (6) was not excavated but it was apparently bisected by a linear feature 0.16m wide and filled with a mid grey clay (7).
- 5.9. To the north of brick wall (4) there was a small brick base (8) measuring 0.2m by 0.26m which had the appearance of a small buttress on the external face of wall (4). Beyond brick buttress (8) the area was heavily disturbed by later activity.



Plate 2 - Brick kiln wall (4) and floor (5) looking east.



Plate 3 - View of brick kiln wall (4) and floor (5), looking south.

- 5.10. Trench 2 was aligned approximately northeast to southwest and measured 10.5m north-south and 13m east-west (PLATE 2). The trench was located beneath a recently demolished building which had been founded on a reinforced concrete slab and an associated concrete ring beam. All of the concrete was broken up using a large concrete breaker and removed by machine with a toothed bucket. Subsequently, underlying modern hardcore and make-up deposits were removed by machine using a toothless bucket.
- 5.11. It was quickly apparent that the northern end of the trench had been heavily disturbed by a substantial concrete ring beam associated with the recently demolished building. Furthermore, the northern limit of Trench 2 was constrained by the presence of live services including high voltage cables that were to remain in situ as part of the present development.
- 5.12. Within the confines of Trench 2 it was possible to identify the southern half of the rectangular building shown on the 1st edition OS map. The surviving wall footings included a substantial eastern wall foundation (10) (aligned roughly north-south) which was exposed for a distance of 10m, being 0.72m wide and at least 1m in height. The eastern wall was constructed from bricks laid in courses of headers 3 bricks deep which were bonded in a hard pale grey mortar.
- 5.13. At the southern end of wall (10) was a second wall foundation (14); which was aligned roughly east-west and was 8.1m long, 0.48m wide and at least 1m in height. The southern wall was constructed from bricks laid in courses of headers 2 bricks deep which were bonded in a hard pale grey mortar. Wall foundations (10) and (14) formed the south-east corner to the rectangular building shown on the 1st edition OS map. The southern side of wall (14) was likely to be external and this was supported by the presence of a brick built chamber (15) measuring 0.4m by 0.4m; which abutted the eastern end of wall (14) and had served as a drain. To the north of wall (14) was a surviving patch of an internal brick floor surface (16) in to which had been set a large sandstone block measuring 0.76m by 0.46m.
- 5.14. At the western end of wall (14) was wall foundation (27); which was aligned roughly north-south and was 6.4m long and 0.56m wide. The western wall was constructed from bricks laid in courses of headers 2 bricks deep which were bonded

in a hard pale grey mortar. Wall foundations (14) and (27) formed the south-west corner to the rectangular building shown on the 1st edition OS map. The western side of wall (27) was likely to be external and this was supported by the presence of a brick built chamber (28) measuring 0.76m by 0.5m; which abutted the western side of wall (27) and was connected to a ceramic drain running from brick chamber (26) on the interior of the building.

5.15. At the northern end of wall (27) was a wall foundation (11); which was aligned roughly east-west and was 8.1m long and 0.72m wide; this served as a cross-wall to wall foundation (10). Wall (11) was constructed from bricks laid in courses of headers 3 bricks deep which were bonded in a hard pale grey mortar. Wall foundations (10) and (27) continued north beyond the limit of wall (11) and it appears to have formed an internal division within the rectangular building shown on the 1st edition OS map. The area to the north of wall (11) was heavily truncated by a substantial reinforced concrete ground beam; therefore, no internal surfaces or features had survived in this area. To the south of wall (11) was a small surviving patch of an internal brick floor surface (12) that was likely to be contemporary with surface (16) described above.

5.16. The internal area formed by walls (10), (11), (14) and (27) was dominated by a narrow rectangular brick structure (21) which was 1.2m wide and 5.7m in length. Structure (21) consisted of two east-west aligned parallel brick walls 0.36m wide and at least 0.36m high which formed the sides to a sunken chamber that was 5.15m long and 0.5m wide. Each of the supporting walls had a series of five iron fixing rods (10 in total) set in to the top at regular intervals (these were given a group context number (29)); the spacings between the iron rods measured (from east to west) 1.1m, 1.1m, 1.34m and 1.2m. Structure (21) had cross walls at either end and an off-centre cross wall (23) 2.9m from the eastern end; which measured 0.5m long and 0.23m wide. The base of the sunken chamber between the eastern end of Structure (21) and cross wall (23) was a well-laid brick surface (24), above which had been placed a series of wooden planks (22); above the wooden planks at the western end was an iron grid cover but on investigation this appeared not to be *in situ*. To the west of cross-wall (23), brick structure (21) had been disturbed by the cutting of a later service trench (20). Beyond trench (20), there appeared to have

been another cross-wall (25) inserted towards the western end of the structure on a slight angle. The presence of the iron fixing rods would suggest that structure (21) had functioned as a mounting block for an engine. It is possible that the six eastern rods were associated with one piece of apparatus whilst the four western rods were for a different piece of equipment; hence the presence of cross-wall (23) and the larger gap in spacings of 1.34m between the eastern six and the western four rods.

5.17. At the western end of Structure (21) a later square brick structure (26) had been added. Structure (26) was constructed from perforated bricks which formed three sides to a square structure measuring 1.1m east-west and 1.1m north-south. The centre of structure (26) had been filled with compacted red clay which contained large fragments of ceramic sewer pipe. It was thought that this represented a manhole/inspection hatch associated with the sewer system represented to the west of wall (27) by brick structure (28).

5.18. Two later service trenches were found to be cutting across the footprint of the brick building. The first was represented by a linear cut (20) that was aligned roughly north-south and had been backfilled with a loose, black, clinker-rich sand (19). Service trench (20) could be seen to have cut through brick walls (14) and (11) as well as internal brick structure (21); thus, suggesting that it post-dated the building. The second service was represented by a linear cut (18) that was aligned roughly east-west and had been backfilled with clean yellow sand (17) within which was a ceramic duct containing electrical armoured cable. Service trench (18) could be seen to have cut across the backfill (19) of service trench (20) and was thought to be associated with the recently demolished building represented by the reinforced concrete ring beam.

5.19. To the east of brick wall (10) an area was investigated which was thought to be on the exterior of the rectangular building shown on the first edition OS map of 1874-6; the map had suggested the possible presence of a lean-to structure in this location. The area was covered with a 0.5m thick deposit of light yellow/brown clay (30) beneath which was a thin lens of dark grey silt-clay containing fragments of brick (31). Layer (31) overlay the natural clay subsoil and no suggestion of an external lean-to structure could be identified.



Plate 4 - General view of Trench 2, looking west.



Plate 5 - Internal brick structure (21), looking east.



Plate 6 - View of brick structure (21), looking east.

6. Finds

6.1. Ceramic Building Material

6.1.1. A single stamped fire-brick was recovered during the mechanical site stripping; this could not be attributed a secure context and was designated as unstratified. The fire-brick was incomplete and only part of the makers stamp was present; it has two lines of text of which the upper line is illegible; the lower line reads '...OURBRIDGE'. This is likely to be 'Stourbridge' as the Stourbridge fire-brick industry was a major manufacturer of such products throughout the 19th century. These fire-bricks were supplied to railway companies to be used as linings for cupolas and furnaces, boiler seatings, flue coverings etc; there is no reason to suggest that the object was directly related to the Crewe Works brick kiln.

7. Summary & Conclusions

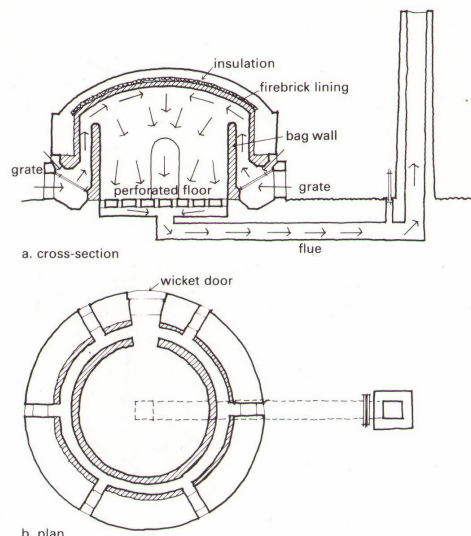
- 7.1. The archaeological works carried out at Bombardier Transportation, Dunwoody Way, Crewe between the 12th and 19th February 2014 were intended to investigate and record the archaeological remains of a brick kiln and associated structures shown on the 1st edition OS map of 1874-6.
- 7.2. Trench 1 successfully located part of the brick kiln structure itself; when the location of the trench is overlain on to earlier OS maps (FIGURE 7) it appears likely that the wall and associated brick floor surface encountered during the works are internal features of a larger structure. Based upon the date at which the brick kiln was constructed (prior to 1874-6) and the circular shape of the structure in plan, two options are possible for the type of brick kiln present: a downdraught kiln which could be circular and is often referred to as a 'beehive' kiln; or an early Hoffman type kiln.
- 7.3. The downdraught kiln was a technological advance on the more traditional updraught or horizontal kilns owing to the more efficient use of fuel in a more easily controlled manner. The typical downdraught or 'beehive' kiln was circular in plan with fire holes on the perimeter of the brick wall and a saucer-domed brick roof. On the interior, beneath a perforated tile floor, there was a flue which led to a chimney stack which acted as a draw for the hot gases generated from the fires on the perimeter wall. The cycle of burning took about 14 days from filling and curing time, through heating to full temperature, to cooling and emptying the kiln. The main disadvantage was that they were intermittent kilns which produced bricks infrequently but in large batches so many brick works had several downdraught kilns operating at the same time. The main advantage of the intermittent kilns was their simplicity of operation and low cost of construction (BRUNSKILL, 1990, 29-30). A good example of a brick works deploying multiple downdraught kilns is the complex at Grotton, Mossley where the kilns had an outer diameter of about 10 meters (NEVELL AND WALKER, 2004, 50-54). Upstanding remains of such kilns can still be seen on sites such as the Porth Wen brick works on Anglesey (North Wales) which was in production from the late 19th century until the outbreak of the First World War.



photo © D Sallery

Plate 7 - View of the three beehive brick kilns at Porth Wen, Anglesey

30 Brickmaking



6. Diagram. Downdraught kiln firing.

b. plan

Plate 8 - Section and plan of a typical beehive kiln (BRUNSKILL, 1990, 30)

7.4. The design of the Hoffman kiln was developed in Germany by Friedrich Hoffman, who first patented the design in 1857 for the firing of bricks. The earliest Hoffman kilns were circular, later developing into larger, elliptical or rectangular structures. An English patent was taken out by Humphrey Chamberlain in 1868, with the first kiln built in Nottingham in that year. The significance of the Hoffman kiln is that it allowed for more extensive continuous operation, with the kiln comprising a continuous tunnel which was divided into a series of chambers separated by temporary paper dampers.

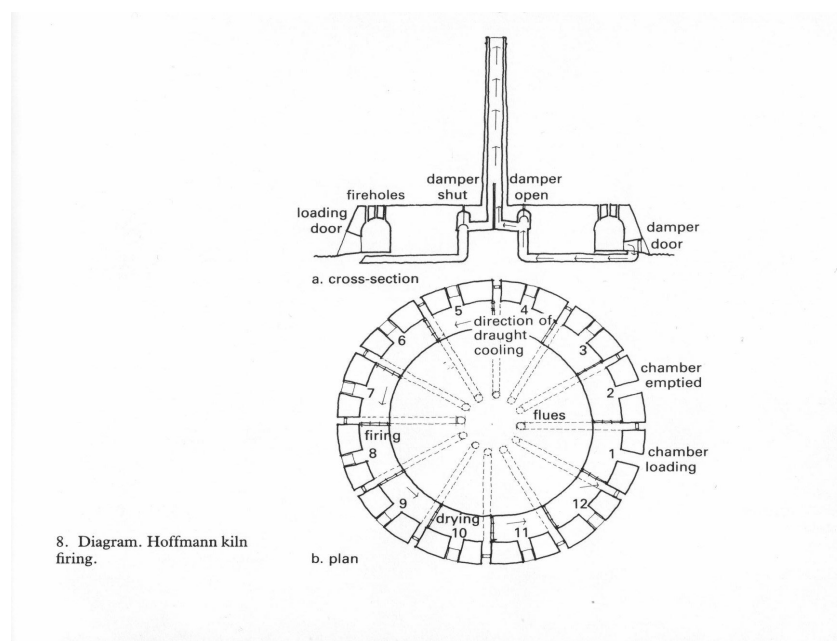


Plate 9 - Section and plan of a typical circular Hoffman kiln (BRUNSKILL, 1990, 31)

7.5. Typically, circular Hoffman kilns had 12 annular chambers divided by brick partitions with small openings at the bottom and with barrel-vaulted roofs. Each chamber had an opening in the outer wall through which it could be charged with green bricks. A system of flues led from the chambers to a tall central chimney. By operating the dampers the draught was led in an anti-clockwise direction as successive chambers were warmed, heated to firing temperature and then cooled. A light-weight timber and corrugated iron roof protected the top of the kiln. This system allowed four kiln chambers to be loaded with bricks in various stages of drying and pre-heating, two chambers containing bricks being fired to high

temperatures and four chambers with bricks cooling at various rates. It was essential for the efficient working of the Hoffman kiln that firing was continuous, kilns being in operation for years until they had to be taken out of service for maintenance (BRUNSKILL, 1990, 31-32).

7.6. Revisiting the cartographic evidence for the brick kiln the earliest depiction on the first edition 1874-6 OS map suggests that the structure had an outer diameter of about 35 meters. The external railway/tram lines are not depicted until the second edition 1897 OS map; possibly implying that the kiln was not fully operational when the 1874-6 map was surveyed. The third edition 1908 OS map shows more detail than the earlier editions and represents the outer wall (which is still about 35 meters in diameter) with a dashed line; it is possible that this dashed line is not simply a drawing convention but rather indicates the openings for the firing chambers and associated flues (17 gaps are shown). The inner wall which is shown as a hard line on the third edition OS map has a diameter of about 26 meters. The size of the kiln, together with the external rail/tram lines and the later depiction of a broken outer wall, would suggest that it was of the Hoffman type.

7.7. Based upon the archaeological evidence recorded in Trench 1 the location of wall (4) and its projected diameter of 12.714m makes it unlikely to be either of the walls shown on the third edition 1908 OS map. Internal wall (4) could represent the inner wall of the continuous tunnel at the rear of the firing chambers in a Hoffman type kiln. The small section of internal brick surface (5) did not appear to represent a perforated floor which would argue against a downdraught kiln but would be in keeping with a Hoffman type kiln.

7.8. Trench 2 successfully located the rectangular structure shown to the south of the brick kiln on the first edition 1874-6 and later OS maps. This structure had been interpreted as a possible engine house associated with brick production at the kiln. The internal brick structure (21) would appear to represent a mounting block for a steam engine and this would confirm the primary function of the building. The proximity of engine mounting block (21) to wall foundation (11) might suggest that wall (11) had originally served to support part of the engine apparatus. A good comparable mounting block arrangement can be seen at the Porth Wen brick works at [HTTP://WWW.PENMORFA.COM/PORTHWEN/FIVE.HTML](http://www.penmorfa.com/porthwen/five.html)



Plate 10 - View of the remains of a steam engine attached to a mounting block at Porth Wen, Anglesey

7.9. Neither a downdraught kiln or a Hoffman kiln necessarily require an engine in order to facilitate their operation. This raises questions about the purpose of the engine house so close to the brick kiln; particularly given that it appears to be contemporary with the kiln structure. The engine at the Porth Wen brick works was used to power a stone breaker associated with the preparation of raw materials in the brick making process. However, at the Crewe kiln the first and third edition OS maps depict dashed and solid lines (respectively) connecting the engine house to the brick kiln suggesting a direct link. The most likely explanation is that the engine was providing an additional power to either heat or circulate air within the kiln.

7.10. Looking at the brick kiln in the wider context of the Crewe Works site it can be seen to be a significant element of a brick manufacturing operation which has developed organically over time. The first edition 1874-6 OS map indicates a large rectangular building adjacent to the Crewe to Chester main line which is labelled as 'brick kilns'. The building has what appears to be a chimney at the eastern end and could well be a type of updraught kiln known as a 'Scotch' kiln or a 'Newcastle' kiln variant. To the

north of the Crewe Works large (clay?) extraction pits may have provided the raw material for brick manufacture and were linked to the brick kilns via a branch line or tramway running parallel to Goddard Street.

7.11. The second edition 1897 OS map indicates that the brick kilns adjacent to the Crewe to Chester main line have been replaced with a larger building (possibly a locomotive shed?) and that the branch line/tramway serving the extraction pits to the north has been removed. The circular brick kiln now appears to be connected to the main line via a branch line/tramway which circumnavigates the kiln structure; probably serving to bring in fuel and raw materials and take away finished bricks. Another branch line terminates in an area labelled as 'brick field'. It has been suggested that the name 'brick field' often refers to the location of more primitive clamp kilns; perhaps indicating the need for a greater output than could be supplied by the main kiln. Four circular buildings to the south of the main kiln may represent smaller downdraught or beehive kilns, although they are not specifically labelled as such.

7.12. The third edition 1908 OS map indicates that there are now only three rather than four circular buildings (or beehive kilns) remaining and that one of the branch lines/tramways has been extended to pass through the middle of these structures. The open area to the southeast of the main kiln is no longer labelled as 'brick field'; perhaps suggesting that the use of clamp kilns had ceased and that output could be satisfied by the more permanent kiln(s).

7.13. The Northwest Regional Research Framework does not address all aspects of industry specific production technology; however, initiative 7.38 states “there is a need to source the products of brick and tile kilns and to establish typologies. Early brickfields seldom survive but the below ground investigation of such sites, as well as surveys of later extant brickworks, should be a priority to understand the technological development of the industry within the region” (NEWMAN & MCNEIL 2007, PP 154). The recent archaeological investigation at Bombardier Transportation, Dunwoody Way, Crewe has recorded evidence associated with the transition from intermittent to continuous brick production; which is important to the understanding of the development of the brick making industry (PALMER, NEVELL & SISSONS 2012, PP 119).

7.14. As much of the kiln itself was not subject to investigation, confirmation of the form and kiln type remains tentative. The damaged and truncated nature of the the remains for the associated 'engine house' have left the function of the building unclear. Furthermore, no wasters or moulds were recovered from the investigation and therefore, there is no potential for further scientific analysis to elucidate sources of material, fuel types or chronology.

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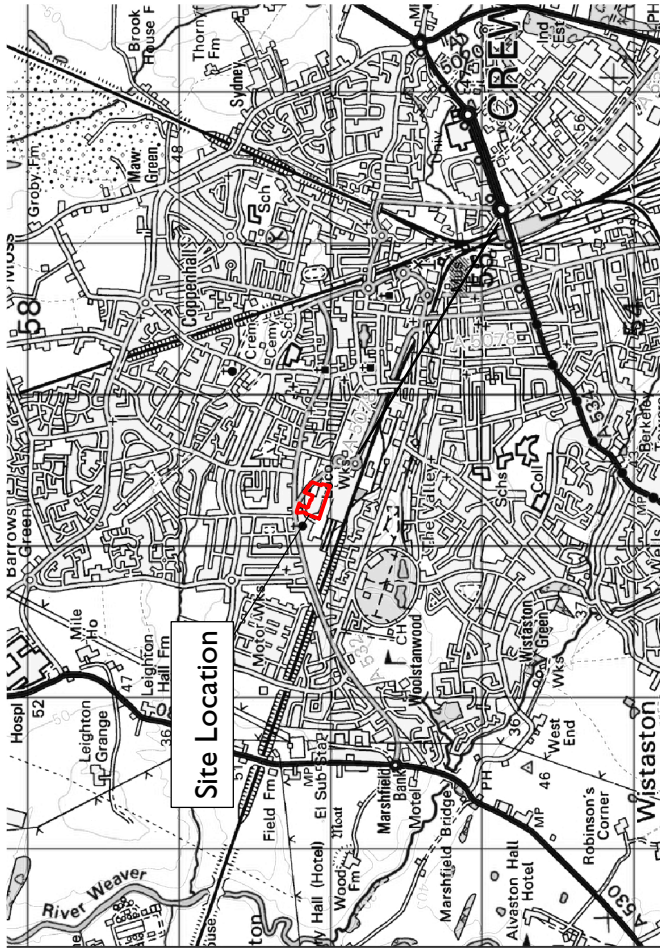
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CARTOGRAPHIC

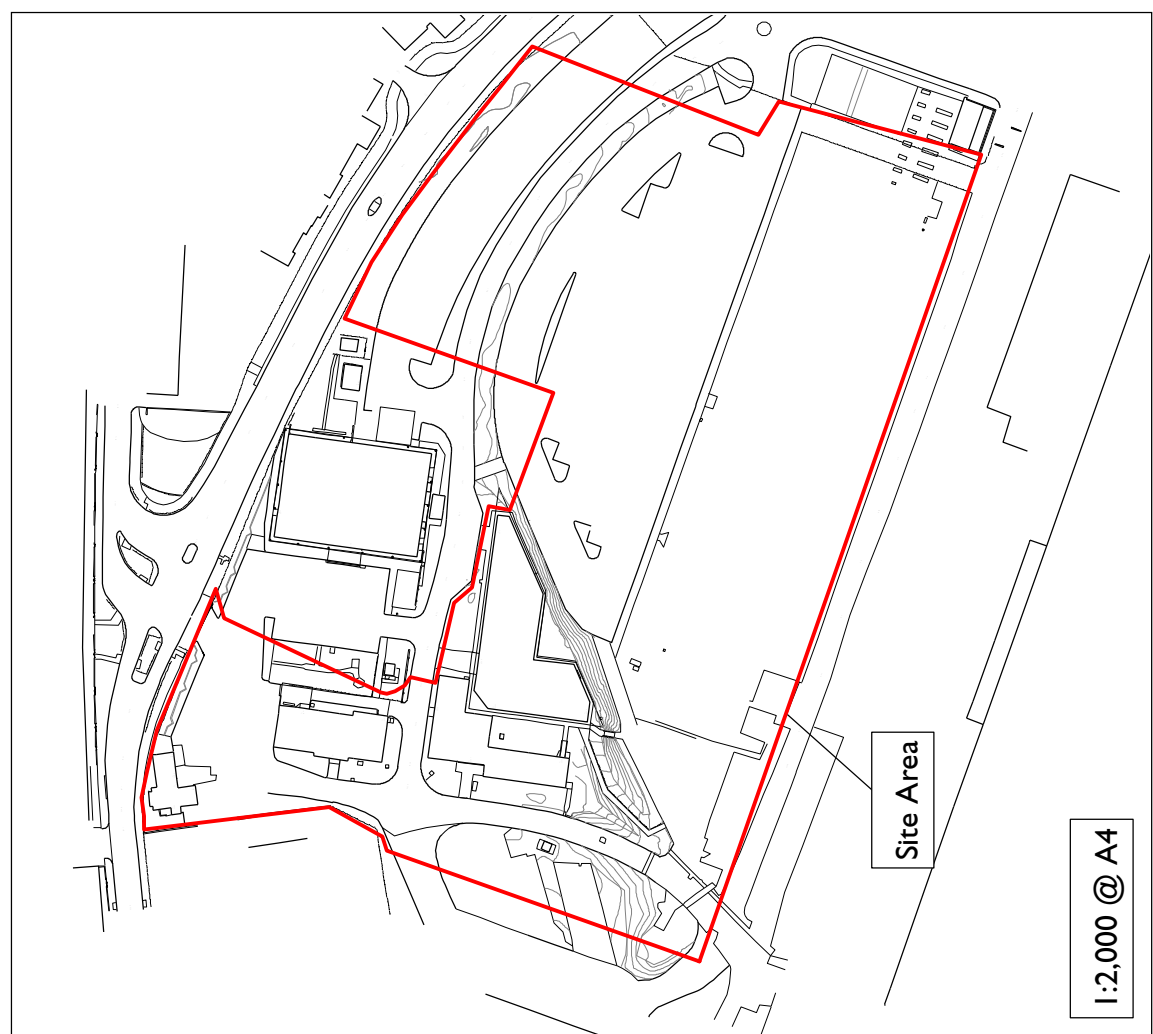
- TITHE MAP, 1839, *Monks Coppenhall Township*
- ORDNANCE SURVEY, 1874-6, 25" Scale map of Crewe
- ORDNANCE SURVEY, 1897, 25" Scale map of Crewe
- ORDNANCE SURVEY, 1908, Scale map of Crewe
- ORDNANCE SURVEY, 1938, 1:10,000 Scale map of Crewe

FIGURES

FIGURE I // Site Location



1:50,000 @ A4



1:2,000 @ A4

PROJECT // 1655C - Dunwoody Way, Crewe

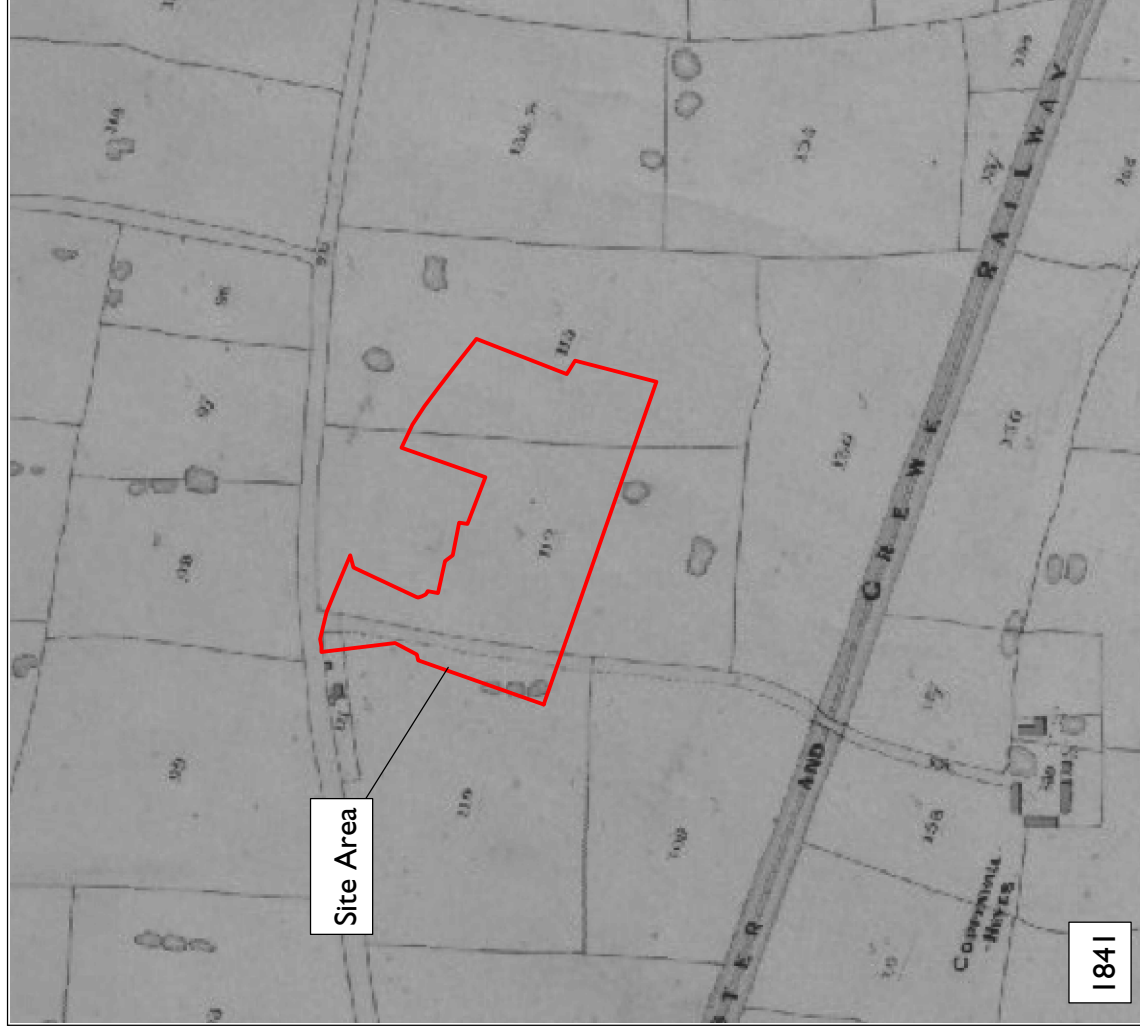
DESCRIPTION // Site Location and Area

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DOC REF // LPI1655C-AMR-v1

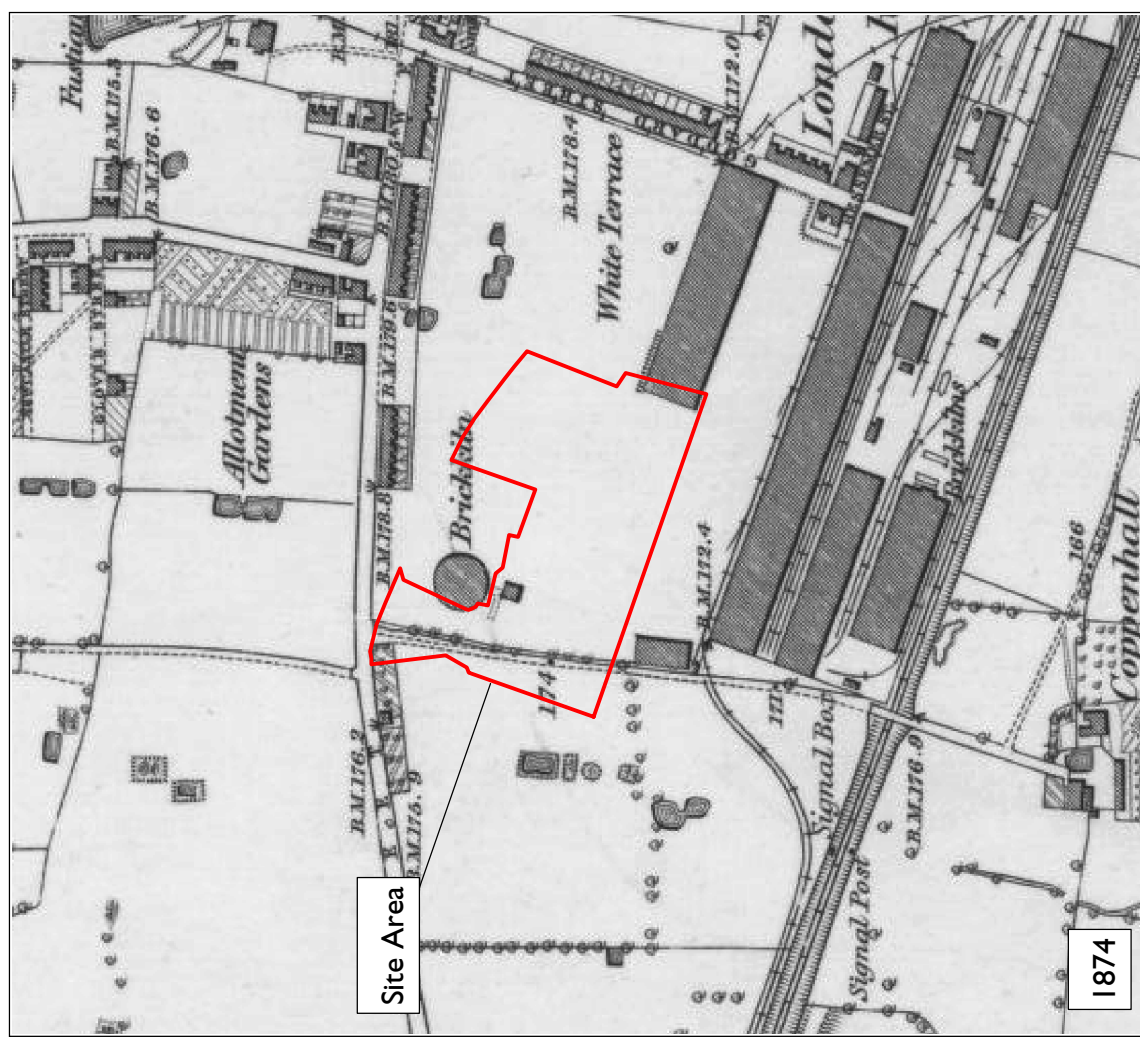
L-P:ARCHÆOLOGY

FIGURE 2 // Historic Maps



Scale 1:5,000 @ A4

0 200m



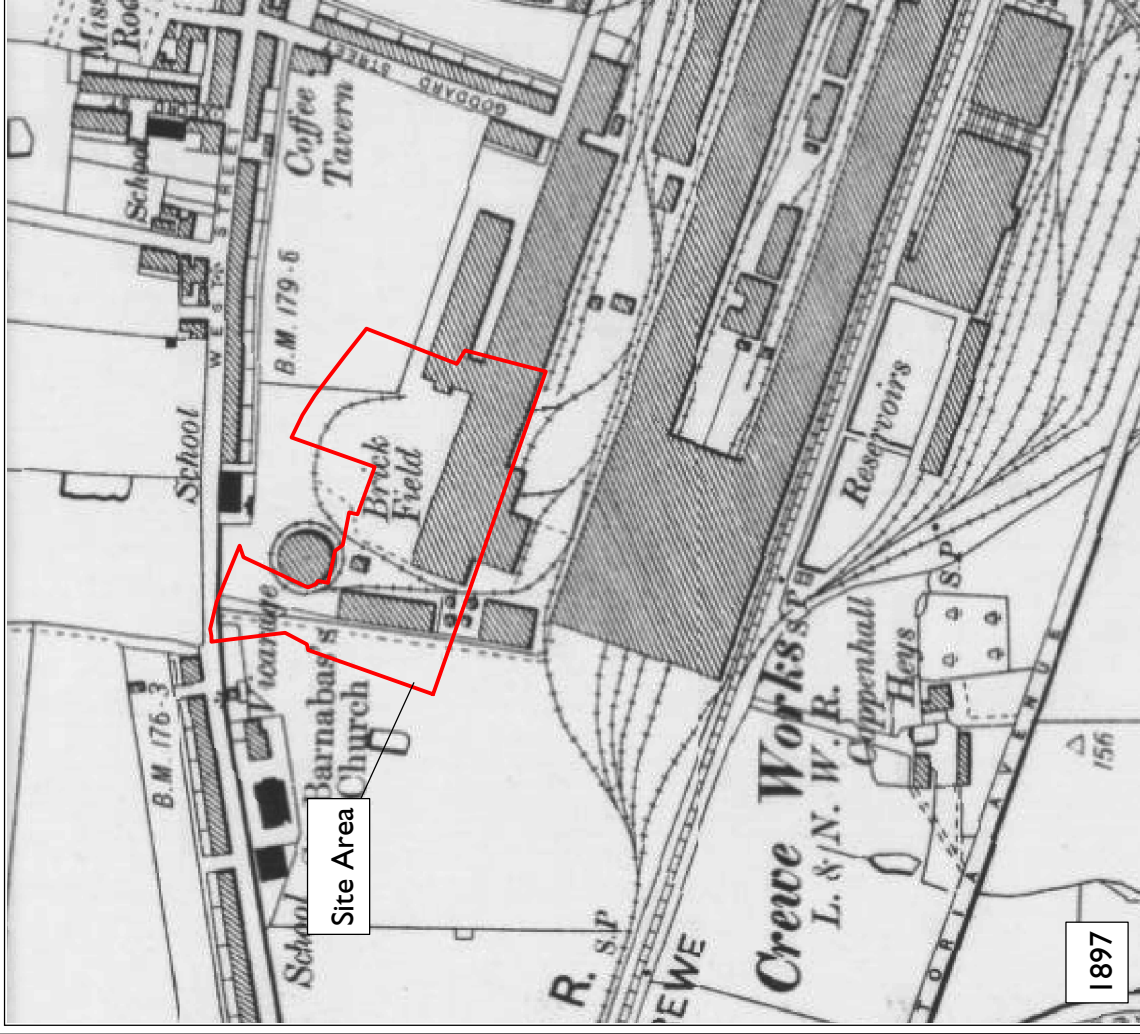
PROJECT // 1655C - Dunwoodway Way, Crewe

DESCRIPTION // 1841 Tithe Map and 1874 Ordnance Survey Map

DOC REF // LPI1655C-AMR-v1

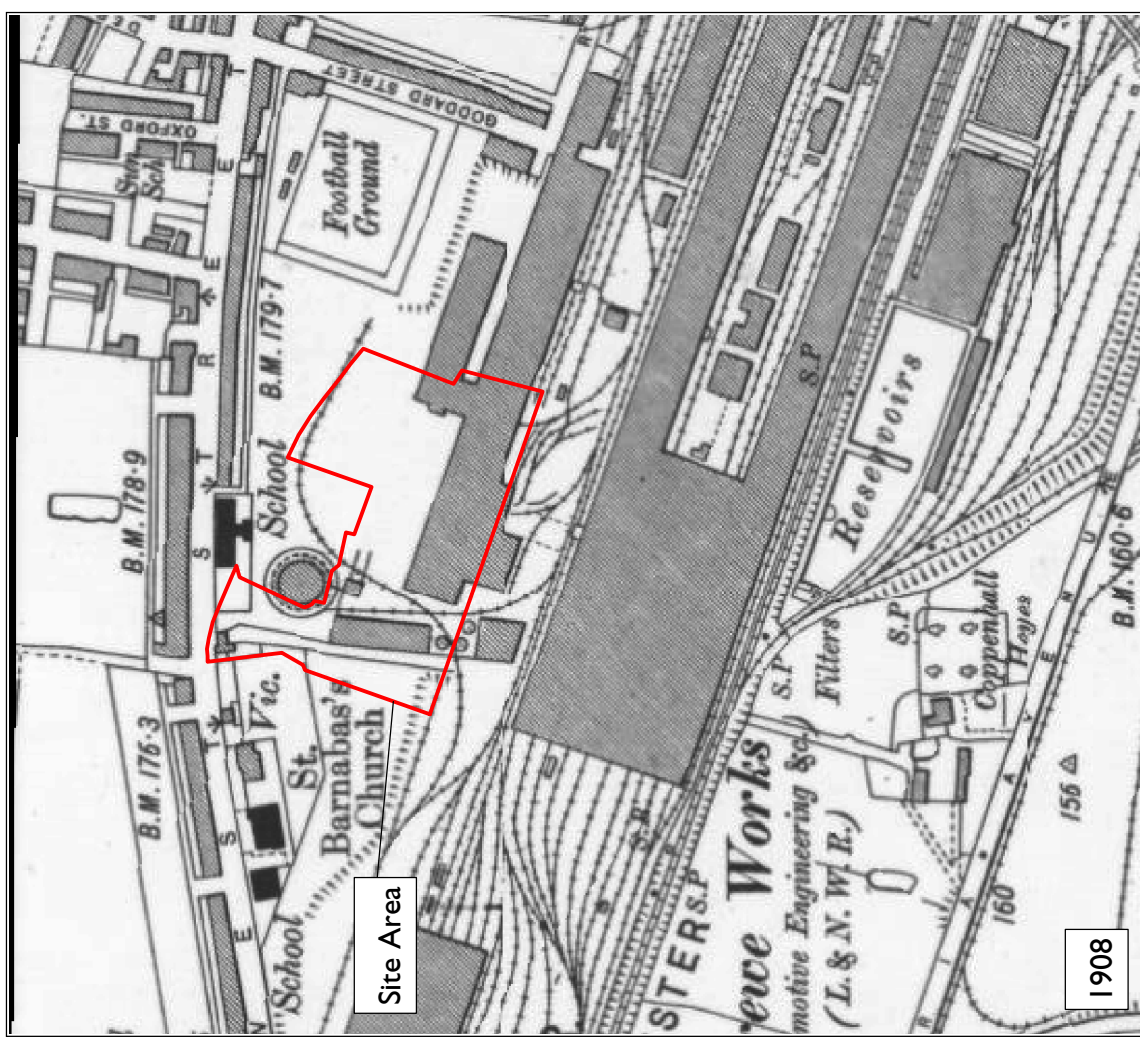
L-P: ARCHAEOLOGY

FIGURE 3 // Historic Maps



Scale 1:5,000 @ A4

0 200m



1908

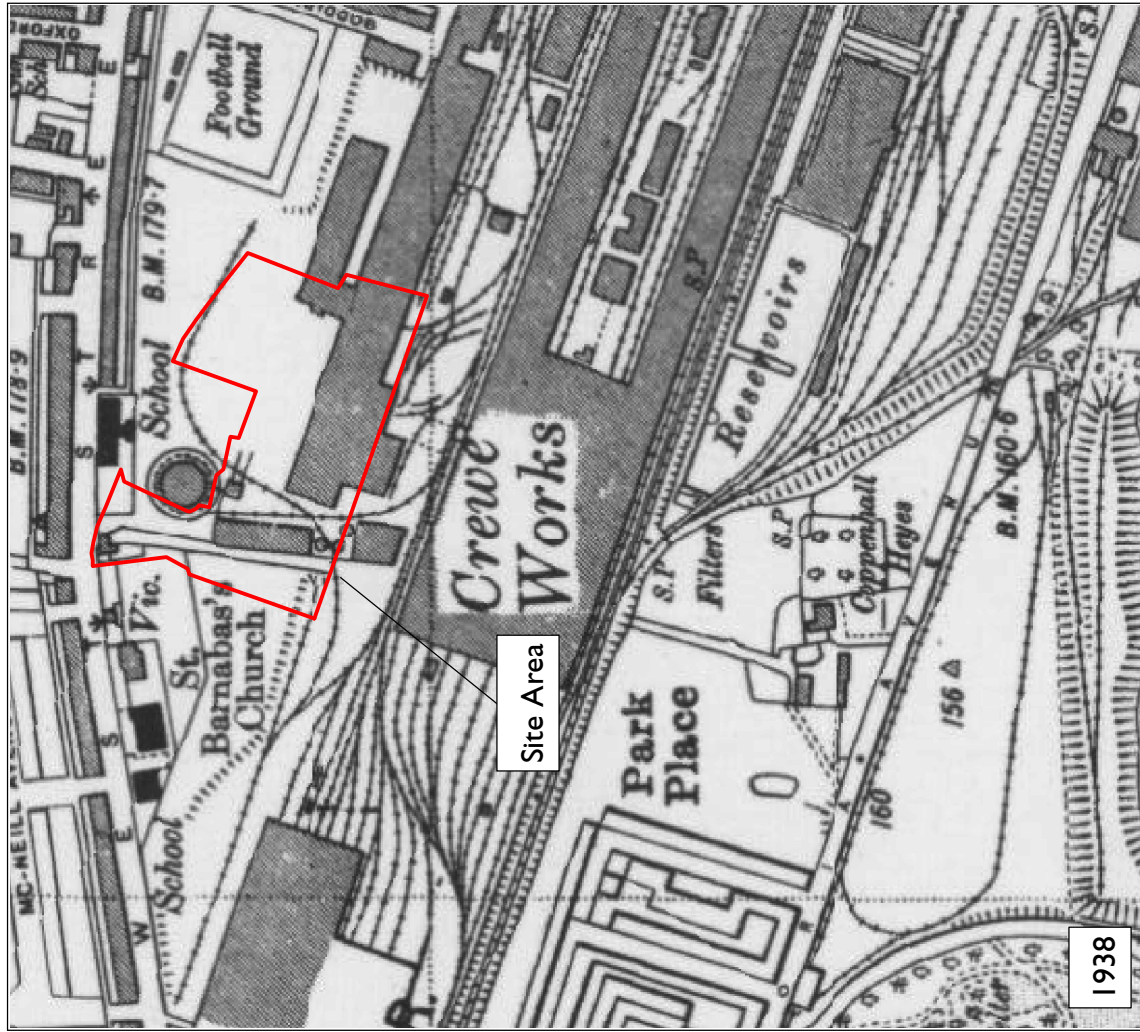
PROJECT // 1655C - Dunwoody Way, Crewe

DESCRIPTION // 1897 and 1908 Ordnance Survey Maps

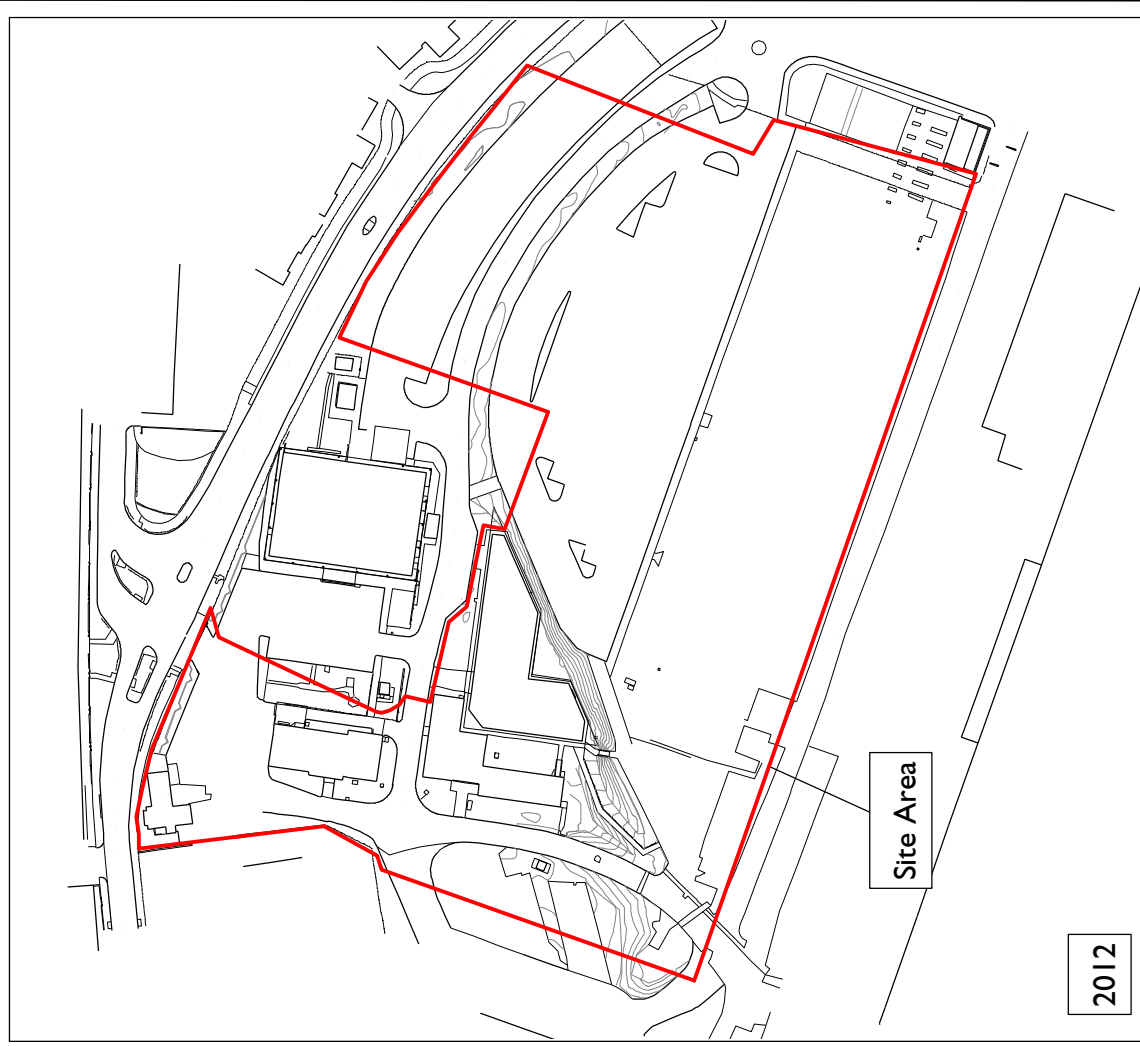
DOC REF // LPI655C-AMR-v1

L-P:ARCHAEOLOGY

FIGURE 4 // Historic Maps



1938 map at a scale of 1:5,000 @ A4
2012 map at a scale of 1:2,000 @ A4



PROJECT // 1655C - Dunwoody Way, Crewe

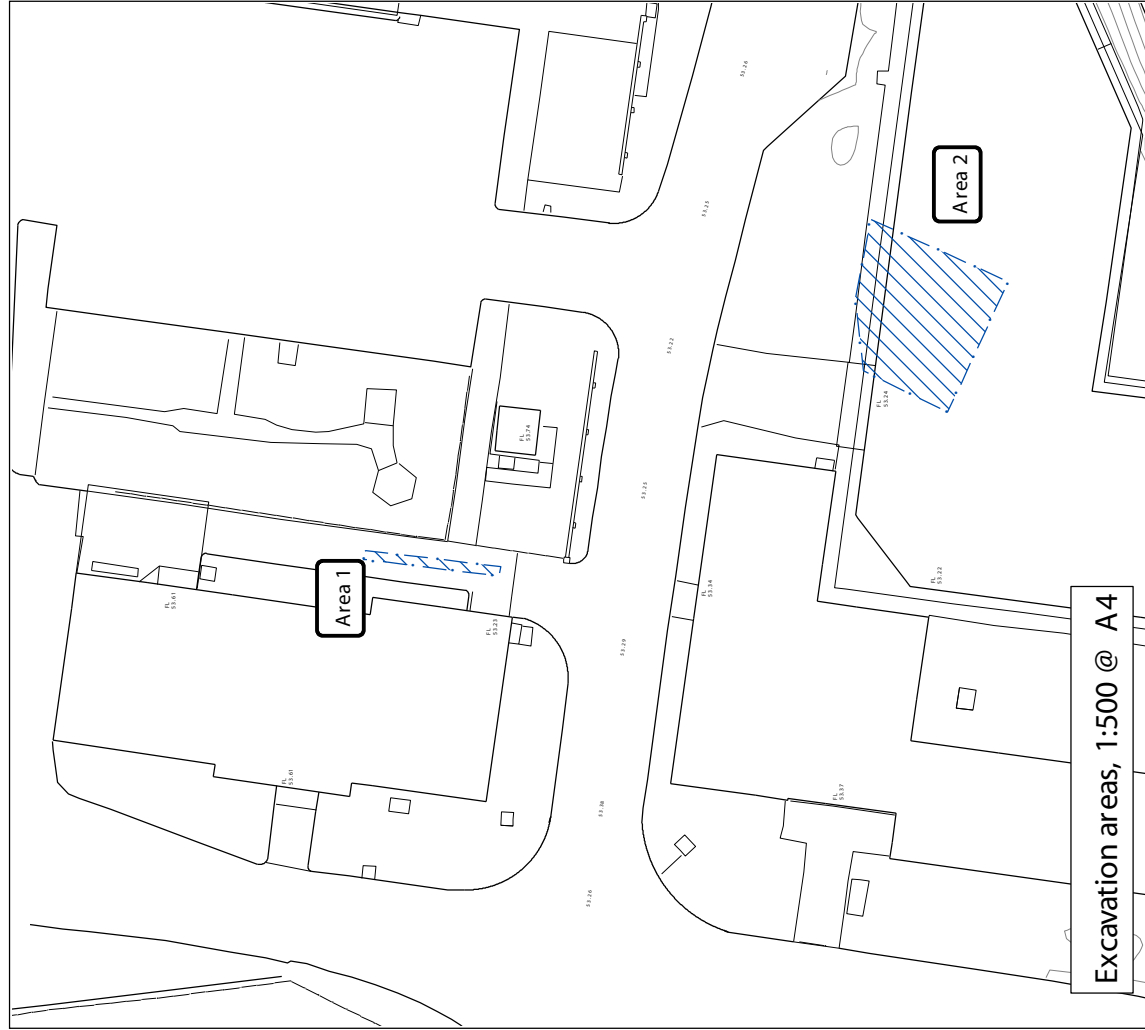
DESCRIPTION // 1938 and 2012 Ordnance Survey Maps

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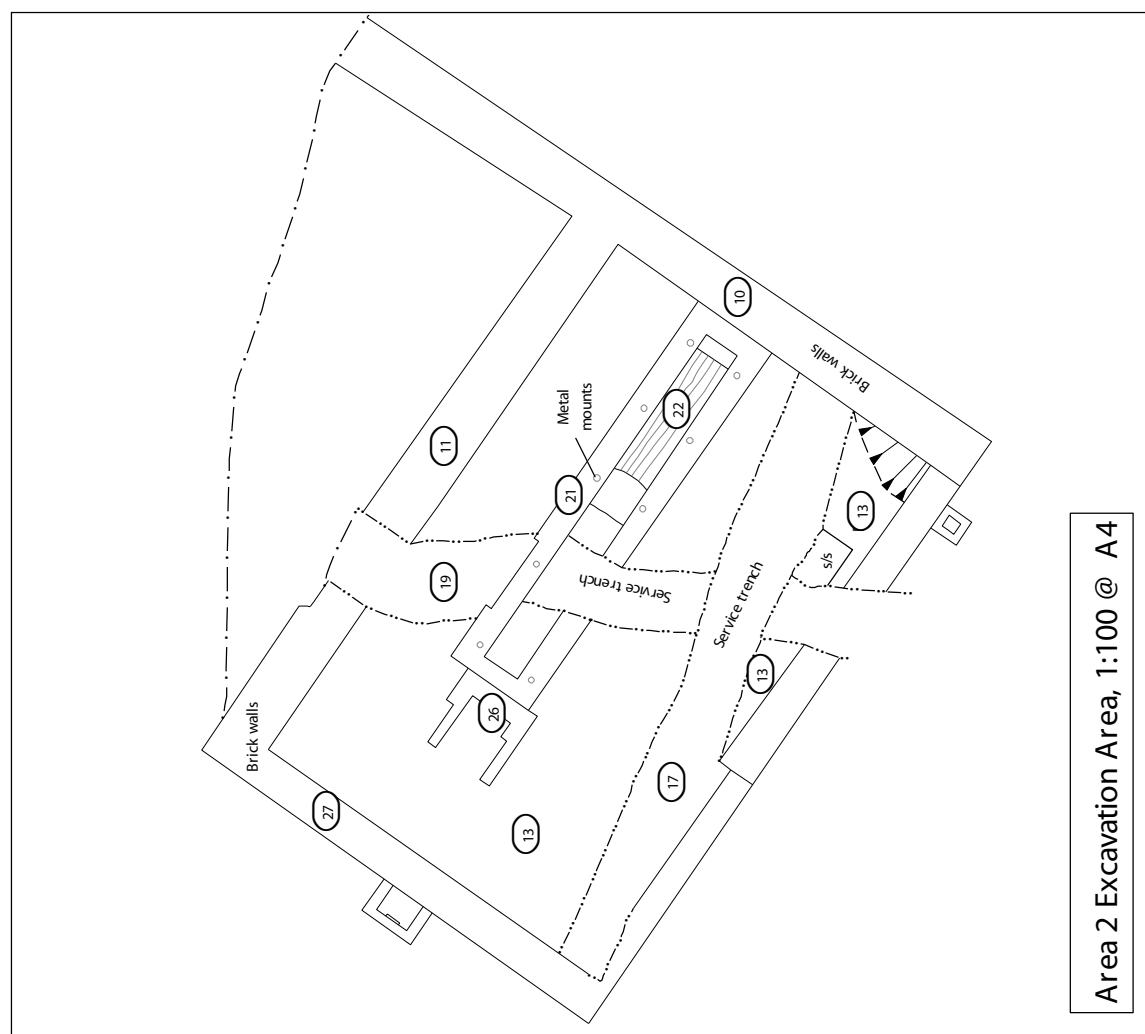
FIGURE 5 // Excavation Areas



Area 1

Area 2

Excavation areas, 1:500 @ A4



Area 2 Excavation Area, 1:100 @ A4

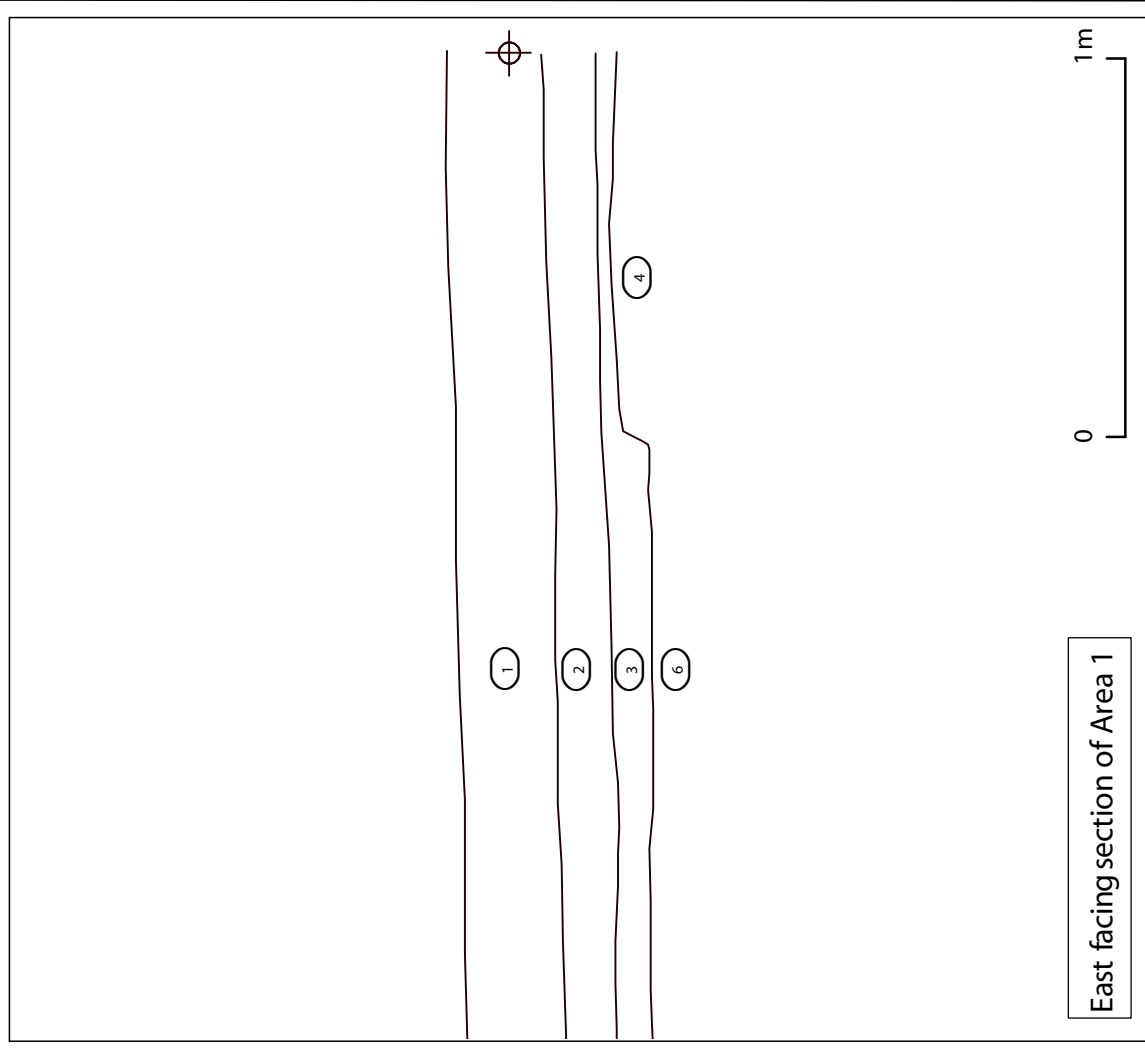
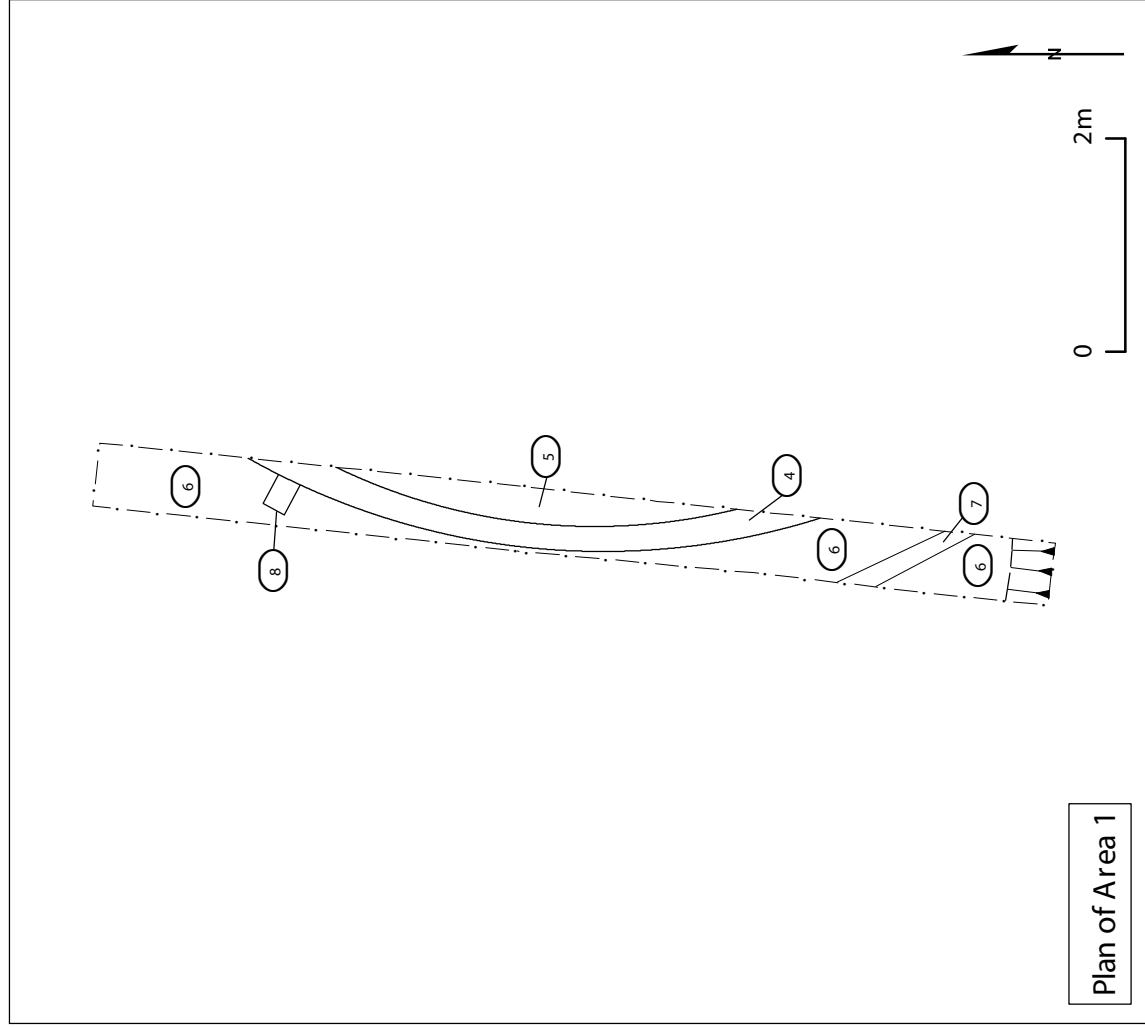
PROJECT // 1655C - Dunwoody Way, Crewe

DESCRIPTION // Excavation Areas

DOC REF // LP1655C-AMR-V1

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FIGURE 6 // Area 1



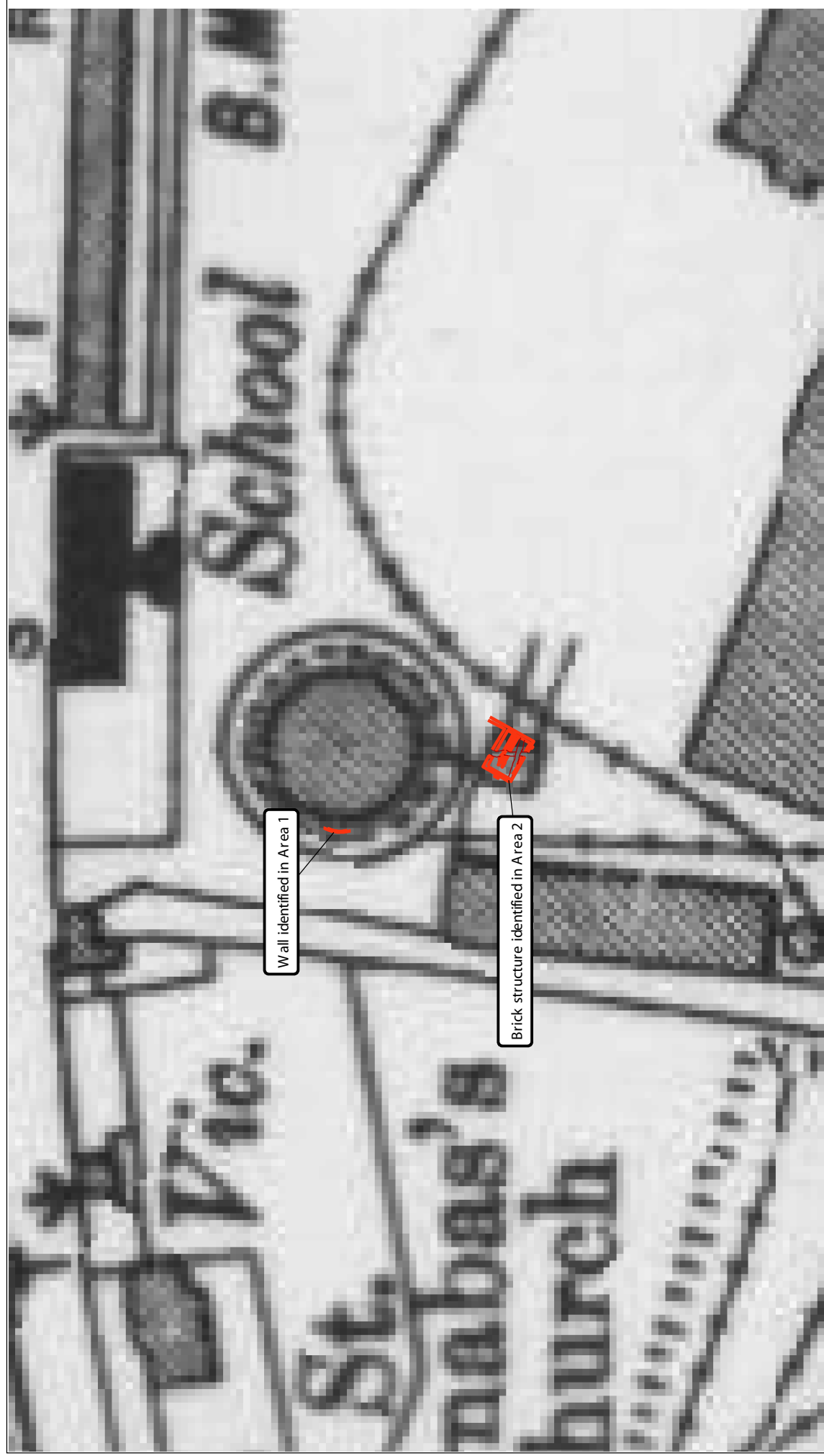
PROJECT // 1655C - Dunwoody Way, Crewe

DESCRIPTION // Excavation Area 1

DOC REF // LP1655C-AMR-v1

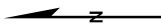
L-P:ARCHAEOLOGY

FIGURE 7 // O overlay



Base map is 1938 Ordnance Survey

0 50m



PROJECT // 1655C - Dunwoody Way, Crewe

DESCRIPTION // Overlay of Excavation Results

DOC REF // LP1655C-AMR-v1

L-P:ARCHÆOLOGY

OASIS FORM

APPENDIX I

OASIS DATA COLLECTION FORM: England

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Printable version

OASIS ID: Iparchae1-177200

Project details

Project name	Dunwoody Way
Short description of the project	Archaeological strip and map at Dunwoody Way, Crewe.
Project dates	Start: 12-02-2014 End: 15-04-2014
Previous/future work	No / No
Any associated project reference codes	CRW/DWW 14 - Sitecode
Any associated project reference codes	13/3102N - Planning Application No.
Type of project	Recording project
Site status	None
Current Land use	Industry and Commerce 1 - Industrial
Monument type	BRICK KILN Post Medieval
Monument type	ENGINE HOUSE Post Medieval
Significant Finds	FIRE BRICK Post Medieval
Investigation type	"Part Excavation"
Prompt	National Planning Policy Framework - NPPF

Project location

Country	England
Site location	CHESHIRE CREWE AND NANTWICH CREWE Dunwoody Way
Postcode	CW1 3AW
Study area	2.50 Hectares
Site coordinates	SJ 369341 356075 52.9138662431 -2.93797041908 52 54 49 N 002 56 16 W Point
Height OD / Depth	Min: 52.00m Max: 54.00m

Project creators

Name of Organisation	Nexus Heritage
Project brief originator	Local Planning Authority (with/without advice from County/District Archaeologist)
Project design originator	Nexus Heritage
Project director/manager	Anthony Martin
Project supervisor	Dan Garner
Type of sponsor/funding body	Developer
Name of sponsor/funding body	Nexus Heritage

Project archives

Physical Archive Exists?	No
Digital Archive Exists?	No
Paper Archive recipient	Cheshire Museum Service
Paper Contents	"none"
Paper Media available	"Context sheet", "Drawing", "Plan", "Report", "Section"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Archaeological Strip, Map and record on Land at Dunwoody Way, Crewe
Author(s)/Editor(s)	Garner, D.
Other bibliographic details	LP1655C-AMR-v1.4
Date	2014
Issuer or publisher	L - P : Archaeology
Place of issue or publication	Chester
Description	Results of the archaeological strip and map at Dunwoody way, Crewe. Results showed the survival of part of a 19th century brick kiln and engine shed.
Entered by	D. Garner (chester@lparchaeology.com)
Entered on	15 April 2014

OASIS:

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