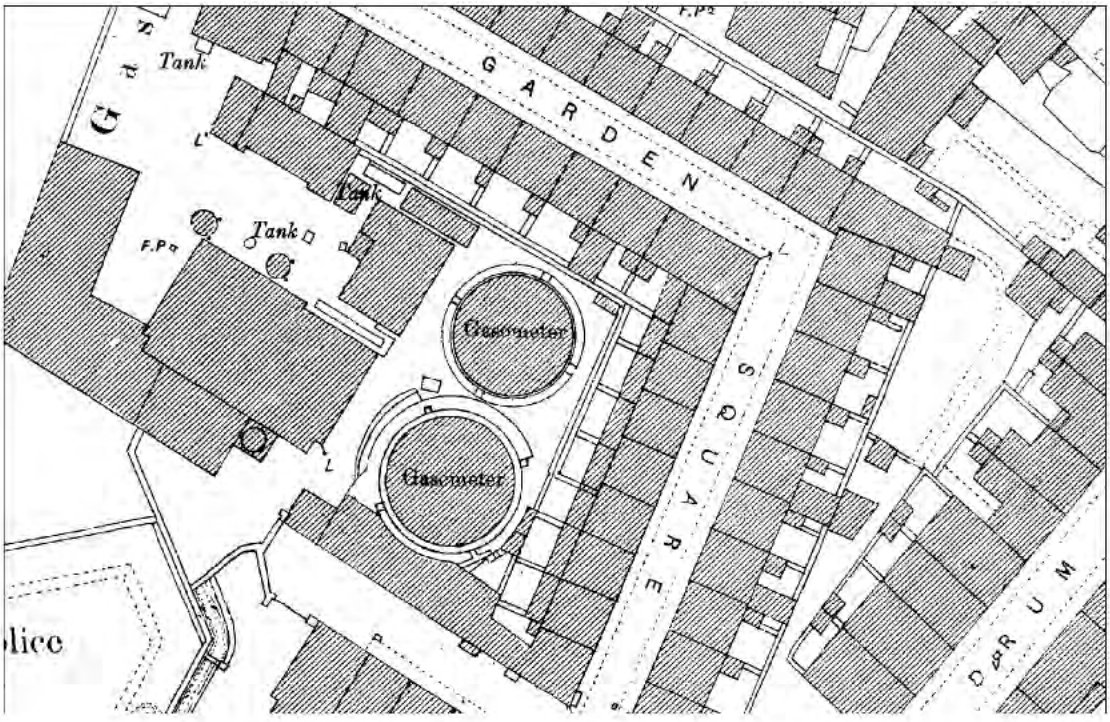
DEAN STREET CAR PARK, BANGOR.
BANGOR GAS WORKS REMEDIATION

ARCHAEOLOGICAL ASSESSMENT AND WATCHING BRIEF

GAT Project no. G1880

Report No. 660



Prepared for Shepherd Gilmour Environment Ltd
January 2007

By G.H. Smith

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Cover: The first Bangor Gas Works as recorded on the Ordnance Survey 1889 1:500 map

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1. SUMMARY

A watching brief was carried out, which recorded various structures forming part of the first Bangor Gas Works, constructed in 1843 and of other structures built after the demolition of the gas works about 1890. These included foundations of a large building, possibly a retort house, forming part of the second gas works and part of the preserved surface of the yard of one of a row of early 19th century small terraced houses that bordered the site until their demolition in the mid 1930s. The deeper layers were of natural organic clay silts associated with the flood plain of the River Adda, which ran along the north side of the gas works until it was culverted about 1874.

2. INTRODUCTION

This report describes the results of an archaeological watching brief carried out during excavation of trial trenches to assess the requirements for possible decontamination works, prior to building on the site of a former early 19th century gas works at Dean Street, Bangor. This was an early example of a town gas works and survived until the 1890s when it was replaced by a larger and improved works on a site to the north.

The work was required as part of archaeological mitigation in advance of construction of a new multi-storey car park on the site, part of a larger development of the former Wellfield centre. An initial archaeological assessment of the whole area of this project was carried out by Cambria Archaeology (Page 2003). The watching brief was required as part of the planning development control process and monitored by Gwynedd Archaeological Planning Services. The work was requested by Shepherd Gilmour Environmental Ltd and was carried out on 21st and 22nd December 2006.

3. SPECIFICATION

The work required attendance during machine excavation of several trial trenches by QDS Environmental, to assess remediation requirements of polluted ground.

4. METHODS AND TECHNIQUES

Seven trenches were excavated as a sample of the area according to a sampling design produced by QDS. The trenches were cut by a 360^0 rubber-wheeled excavator with a 65cm toothed bucket. In some places a breaker had to be used because of the strength of the brick structures encountered. Trenches were of varying length and depth, depending on the types of structures or subsoil encountered but all of one bucket width. Most of the trenches could only be observed from above either because of depth or because of toxic contamination. The locations of trenches were measured in from the car park boundaries and the position and depth of significant structures and layers recorded and photographed.

5. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Medieval Origins

Bangor as a settlement has its origins in the ecclesiastical community founded around the middle of the 6th century AD by Deiniol, reputed to be a descendant of the royal family of Rheged, the ancient British kingdom around the Solway Firth (Roberts 1994, 20). The site had no previous historic significance because it was not a strategic location for communication or defence. The community established in the 6th century occupied a small enclosed valley with a stream, the Afon Adda, and this land was probably a gift of Maelgwn, the ruler of Gwynedd. The earliest settlement would have been monastic and there is a note in the Irish Annals of the sack of the monastery in AD 634. This original settlement would have been focussed on a chapel within an enclosure, from which the town takes its name – Bangor, meaning ‘Wattle fence’, and other settlements have derived their name similarly at Bangor-on-Dee, Cheshire and Bangor, Co. Down, Northern Ireland. White (1984) and Longley (1994), have argued that this early enclosure (Fig. 3) may have been the same as the oval area that was still the focus of the town as recorded by Speed in his map of the town in 1610 (Fig. 2). However, it is recorded that Edward 1 erected some town defences in 1283-4 and these may have had some effect on the subsequent

development of the town plan (*Annales Cambriae*, 108). None the less, excavations in this same area, north of the High Street and east of the cathedral between 1981-9 (Longley 1995) identified several early boundaries, the earliest a curvilinear 'slot' dated to between the 6th to 8th centuries AD (*ibid* 56) just east of the cathedral. Numerous early graves were also recorded further east, some of which predated a rectilinear boundary ditch dated to around the mid 10th century (*ibid* 65).

There is good evidence then that this area was a centre of ecclesiastical activity prior to the establishment of the present cathedral in the early 12th century by Bishop David, who was consecrated in 1120 (Carr 1994, 28). However, some pre-12th century buildings are recorded as having survived until at least the late 13th century before falling into decay (Soulsby 1983, 76). It had previously been thought that the early monastic community was located on the north side of the Afon Adda, on the terrace at the foot of the slopes below the main university building (RCAHMW 1960, Fig. 17), where buildings and burials had been found in 1924 (Hughes 1924). Excavations were carried out prior to the construction of the university students' union building and on the hillside close to the 1924 discoveries (Alcock 1964) and prior to the construction of the theatre (White 1971) but no medieval remains, or other burials were found. It has been suggested therefore that the principal monastic community must have been on the south other side of the Adda Valley, in the vicinity of the present cathedral and that the remains found in 1924 were those of a subsidiary parish church, Llanfair Garth Brannan, mentioned in 1291.

There were other ecclesiastical buildings in the valley, including another chapel, Capel Gorfyw, a friary and several houses for the clergy such as the dean, canons, vicars choral, which were clustered around the cathedral, where the High Street is now. The friary was of the Dominican order and was established about 1250. Its original site was by the mouth of the Afon Adda, close to Seiriol Road. It later moved to a new site in Hirael and after its dissolution in 1538 its buildings became a school by private bequest.

The secular settlement of Bangor was subsidiary to the ecclesiastical, both in terms of function and importance, and probably had its origins in the employment deriving from the services required by the ecclesiastical community. The houses of the city in fact developed on the fringes of the ecclesiastical community because the majority of the land around the cathedral belonged to one or other of the diocesan incumbents. Never the less, there were 53 burgesses or tenants named in a survey of the Bishop's lands in Bangor of 1306, although eleven of these were clerics (Carr 1994, 29).

Bangor was not a centre of secular authority, although a motte was built in the late 11th century, possibly on the Aethwy ridge north of the present town and above Garth (Soulsby 1983, 76). Even so the town suffered during many hostilities, probably because of the varying loyalties of the bishop. It flourished under the Welsh princes but was burned by King John in 1211. It was later damaged during Edward's campaign, possibly by the Welsh because the bishop had supported the English. It was attacked by Glyndwr in 1402 and 'the cathedral had been partly destroyed and probably the houses of the cathedral clergy had been laid waste' (Pryce 1923). The cathedral was supposed to have remained in ruins for nearly 90 years until the end of the fifteenth century when restoration was begun.

Post medieval development

The area later to be occupied by the first Bangor gas works and workers' housing lay between the medieval centre of Bangor, around the cathedral and a secondary centre around the Friary (Fig. 1). It adjoined the Afon Adda, which was prone to seasonal flooding and so was avoided by settlement. It was still an area of fields in the early 17th century, as shown on Speed's map of Bangor of 1610 (Fig. 2) and in the mid 18th century as shown on Lewis's view of Bangor of 1740 (Fig. 3). The area that was to become the site of the Dean Street community was a large field called Cae Sgybor (Barn Field). It was bought by the Dean of Bangor in 1808 who subdivided it into plots clearly designed for resale for development.

The town developed first alongside the main highways, towards Conway to the east and towards Caernarfon in the west. Rapid expansion in the 19th century concentrated around three foci – first around the cathedral and market cross, second around Dean Street and third around Hirael. The first houses in Dean Street and Well Street were built about 1814. 'During the following fifteen years upwards of eight hundred houses were erected in the town (Ingman 1952, 38). By the time of the first proper survey of the town carried out by John Wood in 1834, much of the Dean Street area was already built up with terraced housing (Fig. 4). The area of the present development was still largely an open field at that time although two streets had been built - Garden Street and Brook Row, the first with two

terraces, the second with one row backing onto the Afon Adda. These terraces were some of the earliest speculative workers' housing in Bangor, constructed about 1825, and described as '10 dwellings along Garden Street and six dwellings fronting Brook Row (Jones 1989, Table 1). Not long after, in 1832, part of the field to the west, belonging to John Jones, was sold to Robert Roberts, builder, who constructed 34 similar small houses around the edges of the field and called Garden Square, leaving a paddock at the rear. However, these houses were not shown on the Tithe map of 1841, which had probably been surveyed before the houses had been constructed (Fig. 5). The name Garden Square became unfortunate when in 1843 the remaining paddock was sold to James Smyth Scott as a site to build the first Bangor gas works (*ibid*). The houses were stone-built and the L-plan wall that forms the boundary between the east and west parts of the present car-park (Fig. 13) incorporates the remains of the front wall and one of the party walls of the eastern Garden Square terrace.

The houses built in this area, such as Brook Row (Fig. 6), Garden Street (later to be re-named Dean's Court, Fig. 7) and Garden Square (Fig. 8), were the smallest possible houses that could be built to house a family and were built at the highest possible density. They consisted of one living room with one bedroom over. The gaps between the fronts of the terraces were no more than 12-17ft and 80% of each plot was built over, leaving outside only a small yard with an ash-pit and midden. There was no sanitation, no wash-house and no water supply. The Afon Adda was used for the dumping of rubbish, excrement and waste from slaughterhouses etc. The housing quickly became a disease-prone slum and was eventually demolished by the town council in the 1930's, when new estates were built on higher ground on the fringes of the city. The first was at Maes Tryfan to the west and, perhaps not surprisingly, the first people to be moved there in 1935 were the occupants of Brook Row (Jones 1986, 159).

The Gas Works

The discovery of production of coal gas for lighting in this country is attributed to William Murdock who was principal engine erector for Boulton and Watt in Cornwall. He first demonstrated his ideas by lighting his room in Redruth with gas in 1792. After further development he lit the Boulton and Watt factory in 1802 and soon after the company began marketing a complete small gas generating plant. The first company that produced and sold gas to private customers for lighting was established in London in 1812, and by the 1820's works had been built in the majority of major industrial urban centres, including Cardiff, Swansea, Wrexham and Holywell. Gasworks were established in the majority of smaller towns between 1830 and 1860. In north-west Wales the first commercial plant was established in Caernarfon in 1833, Bangor in 1843 and Holyhead, Llangefni, Llanrwst and Pwllheli in the 1850's (Gwyn 2006, 142). In the 1860s gas began to be used for other purposes, such as heating and cooking, and this increased demand often led to new works being constructed in the later 19th century (Cossons 1975, 220).

Very few remains of the earliest gas works survive because they were mainly in urban areas and were soon redeveloped. No comprehensive assessment of remains has been undertaken on a national level, so a complete inventory of comparable works is not currently possible. The earliest surviving remains are those of a gas holder of the 1830's at Fulham, London. Another was built at Salisbury in 1833 (Watts 1991) and the best preserved is a complete small gas works of 1846, now a scheduled ancient monument, at Fakenham, Norfolk. A complete small gasworks of comparable size and date to the Bangor example has been recorded at Inveraray (Hay and Stell 1986, 176-7)

The main elements of a gas works were a retort house for heating the coal to allow distillation, a purifier for cleaning the gas and extracting by-products and a gas-holder to store the gas. The gas was moved through the system by exhausters, a fan system, driven by a steam engine (before electric power was available), so there would also be an engine and boiler house. Large amounts of good quality (low ash) coal were needed as the raw material so there would be a large coal store. Various by-products were removed from the gas during cleaning, these included tar – sold for road-making, and sulphate of ammonia – used as an agricultural fertilizer and there were tanks to collect these.

The need for gas in Bangor arose out of a need for better lighting of the streets, which, because of the unrestricted building, lack of surfacing, dumping of rubble and refuse and lack of public amenities had become a hazard at night. The first use of gas in the city was in 1822, by an ironmonger on the High Street, Robert Jones, who installed a small plant in his yard to light his shop (Ingram 1952, 40). The first public street lighting was by oil lamps, installed in 1830 but was not very successful (*ibid* 39). The first gas works of commercial size in the area was installed at Caernarfon in 1833, along the railway at

the slate quay, where it could easily be supplied with coal. The need for street lighting in Bangor, and the demand provided by areas of dense housing, was sufficient reason to ensure the construction of a works within the city.

The Bangor gas works were established by an Irishman, James Smyth Scott who began construction in the field at the back of Garden Square in September 1843, to the dismay of the local inhabitants (Ingram 1952, 40). The gas works consisted of ...'a gasometer, and all other fittings, buildings and offices necessary and essential to the manufacture and preparation of Gas for supplying the Town and liberties of Bangor.' (UWB Ms. 10068, Gill 1937, 2). The gas works were conveniently situated to supply the nearby housing and High Street (Figs 10 and 11). It was also adjoining a route that had been proposed by George Stephenson for a railway through Bangor, which would have been able to supply coal, although the railway eventually took a different route. The Bangor Gas and Coke Company was established in 1845 with ownership in shares divided between Scott and several local businessmen. Initially, up to 1849 its only purpose was to supply 40 street lamps. At the same time as constructing the gas works the enterprising Scott also constructed a reservoir above Glanadda to supply the town with clean drinking water. This was something that was sorely needed because the few private wells and polluted Afon Adda were inadequate. The health of the town was poor because of the lack of a sewerage system, the lack of public refuse collection, overcrowding and the custom of many households of keeping pigs in their yards. Toxic residues from the gas works were also dumped in the river, which sometimes flooded, contaminating the nearby houses.

The need for water in the town eventually led to an Act for the establishment of the private Bangor Waterworks Co. in 1854, which was later merged with the gas works to form the Bangor Gas and Water Co. (Jones 1986). After problems with the supply, general ill-health, cholera and typhoid outbreaks, the company was eventually bought out by the Town Council in 1878, which immediately started to improve both the gas and water works (UWB Ms. 10068). The increasing demand for gas for heating and cooking led to the need for a larger works, which was eventually built on the north side of the Adda between 1878 and 1890 (Fig. 11). The old gas works were demolished between 1890 and 1900 (Fig. 12). The western part of the site was used for a chapel, Capel Penuel. The gas works building immediately east of it was probably the retort house with its banks of ovens and it is interesting to think of sermons being preached about hellfire with a close approximation to it working busily on the other side of the wall.

Demand for gas continued to increase with the growth of the town, and the increased use for cooking and heating. By 1895 the new gas works could not cope with demand and the council decided to construct an electricity generating plant, which would be cheaper than building yet another new gas works. This was constructed on the east side of Dean Street. The electricity works was run by two steam generators fuelled by a rubbish incinerator. This was a great success, but despite this the demand for gas still increased and the gas works continued in use until the 1960s when natural gas became available.

6. RESULTS OF THE WATCHING BRIEF (Figs 13-21)

6.1 Trench Ex1

Description

Trench at west side of car park, 21.60m long, *c*. 1.7m wide, oriented north-south. The upper part of the exposed ground immediately below the asphalt car park surface, to a depth of -0.60m was of modern made-ground consisting of mixed building rubble, bricks, concrete and broken asphalt.

At the north end of the trench a solid laid brick foundation platform/surface was uncovered, built of modern frogged bricks, cement-laid in courses to -0.80m. This was 0.80m deep over brick rubble to -1.10m over 19th century brick, cement-laid to -1.30m over brick rubble which continued to the base of excavation here at -2.30m. The brick foundation/platform was probably part of a yard or floor surface belonging to a large building, function unknown, but part of the second gas works, that was built here after demolition of the original gas works *c*.1890 and shown on the 1:1250 map of 1900 (Figs 12 and 15). Possibly a coal yard for the later gas works.

At the base of the trench, under the brick rubble a brown organic clayey silt layer was reached. This included well-preserved wood fragments, some whole twigs with bark, probably of birch. This was a waterlogged ancient alluvial deposit similar to those encountered close to the Afon Adda during previous excavations further to the west in 2004 and probably earlier than AD 15th century in date (Smith 2005).

At the south end of the trench was part of the arc of a large circular brick-built structure, loosely filled with building rubble. This was running with tarry liquid and was clearly the base of one of the 1843 gas holder tanks. Its base was not reached at the maximum depth of excavation, which was -3.0m. The brick platform had been built over the north side of the backfilled tank.

6.2 Trench Ex2

Trench at east-centre of car park. A short trench, 6m long, oriented east-west. Excavation through made-ground of building rubble revealed liquid coal tar at -0.6m and this continued to -1.2m when the trench began to fill with water and tar and was abandoned.

The trench was cut over the position of the eastern of the two gasholders of the early gas works.

6.3 Trench Ex3

Trench at east side of car park. 7m long, oriented north-south.

At the south end mid-grey clay was reached at -1.2m and excavation was stopped at -1.8m where stony grey clay was reached.

At the north end mid-grey clay was reached at -1.6m, possibly capped with a darker peaty silt horizon. The excavation was stopped at -3.2m in clay that included preserved wood/root fragments.

6.4 Trench Ex4

Trench at north centre of car park. Trench 13m long, oriented east-west.

At the east end the tops of two brick-built, strongly cemented arched structures oriented north-south across the trench were uncovered at -0.85m. One of these was drilled through, showing it was hollow but with tarry liquid lower down within it. These were not further disturbed. They were probably conduits taking gas from the retorts to the purifier or culverts to take tar to a storage tank.

At the west end was the remains of a brick building foundation and made-ground to -0.90m down to grey clay at -1.35m at which point excavation was stopped.

6.5 Trench Ex5

Trench at north-west corner of car park. Trench 3.4m long, oriented east-west.

Mortar-laid brick structural foundations were uncovered at the north edge down to -0.8m over mixed layers of brick rubble with lime and a slate slab down to -1.6m. This lay over mid-grey natural clay and this continued to the base of the excavation at -3.2m where the clay was silty, brown-grey with preserved twigs or roots.

6.6 Trench Ex6

Not excavated

6.7 Trench Ex7

Trench in the north centre of the car park. Trench 2m long, oriented north-east to south-west, not as shown on original trench design.

A substantial brick foundation was uncovered and clay was reached at -1.6m. Base of excavation at -2.7m in brown silty clay with preserved twigs/roots.

The trench was expected to be in the back yard of a terraced house but clearly showed part of a more substantial structure that must be part of the gas works. Later plotting of the trench position showed it cut the site of an outbuilding of one of the Garden Square houses and a building belonging to the gas works, identified as a possible engine house (Fig. 14).

6.8 Trench Ex 8

Trench at south centre of car park. Trench 4m long, oriented east-west.

Made-ground of rubble overlay a thin layer of concrete, which overlay at -0.5m a well-preserved surface of bricks laid on edge and set in orange sand. Comparison with the 1889 town map shows that this brick surface was part of the floor of yard or outbuilding of one of the Garden Square houses (Fig. 14).

This overlay another made-ground layer of rubble including some roofing slate.

This overlay at -0.9m a layer of red-brown silt and gravel with roots.

This overlay clay at -1.5m which continued to the base of the excavation at -2.0m.

7. CONCLUSIONS AND RECOMMENDATIONS

The conclusions stated here are limited to the results of the watching brief undertaken during the excavation of test pits to inform the de-contamination process, and a desk-based assessment that was undertaken following the watching brief. Additional evaluation of the workers housing is to be undertaken, which when complete will allow more informed conclusions to be made for that area.

The gas works

The desk based assessment has established that the first gas works were built in 1843 and remained in use until 1878-90. The works were demolished by 1900, and subsequently built over. The works consisted of two gas holders, retort house, purifier house and stores.

The watching brief showed that some subterranean features survive, including the base of the gas holders, metal pipes and brick-built culverts that perhaps passed ‘raw’ gas from the retorts to the purifiers or acted as tar drains. However, all traces of the above-ground structures were cleared away during demolition in 178-90, after which the area was built over with new buildings and yards associated with the second gas works.

Potential

The potential for the recovery of additional useful information concerning the gasworks is low, owing to the removal of the above-ground structures *c*. 1900. The results of the excavations showed that some subterranean features survive, including the base of the gas holders, metal pipes and brick-built culverts. A watching brief undertaken during decontamination of the works would enable a more thorough record to be made of these features.

The pre-19th century deposits

Waterlogged clays, with remains of twigs and larger woody elements were noted during the watching brief beneath the remains of the former gas works. None of these contained any other archaeological information, but it does show that there is potential for waterlogged remains within this area from

periods before the gas works and 19th century housing. Excavation close to the Bishop's Palace, 250m to the west in 2004, showed similar clays with medieval pottery and preserved timbers. No post-medieval or medieval structures are known in the area of Dean Street but there is potential for waterlogged remains and a watching brief would ensure any such information was recorded.

The early 19th century housing

The assessment has shown that terraced housing was built here between 1825 and 1832. The majority were two storey houses with a single downstairs room and a single upstairs room and small back yards. These were demolished in 1935. Whilst the majority of the early housing was subsequently built over, parts of Garden Square, Brook Row and Deans Court lie buried beneath the existing car park (Fig. 9). The plans of the dwellings are well recorded on the earliest large scale Ordnance Survey town map of Bangor (Fig. 14) and there are some photographs (e.g. Figs 6-8). However, the houses have at least a local value and the internal details of lay-out, if they survive, are not something of which there is any visual record.

Potential

A more thorough potential of the remains of the housing will be undertaken following the completion of the evaluation trenches.

8. ARCHIVE

Field Notes.
Plan of trenches.
Photographs, Digital and Film.

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Maps

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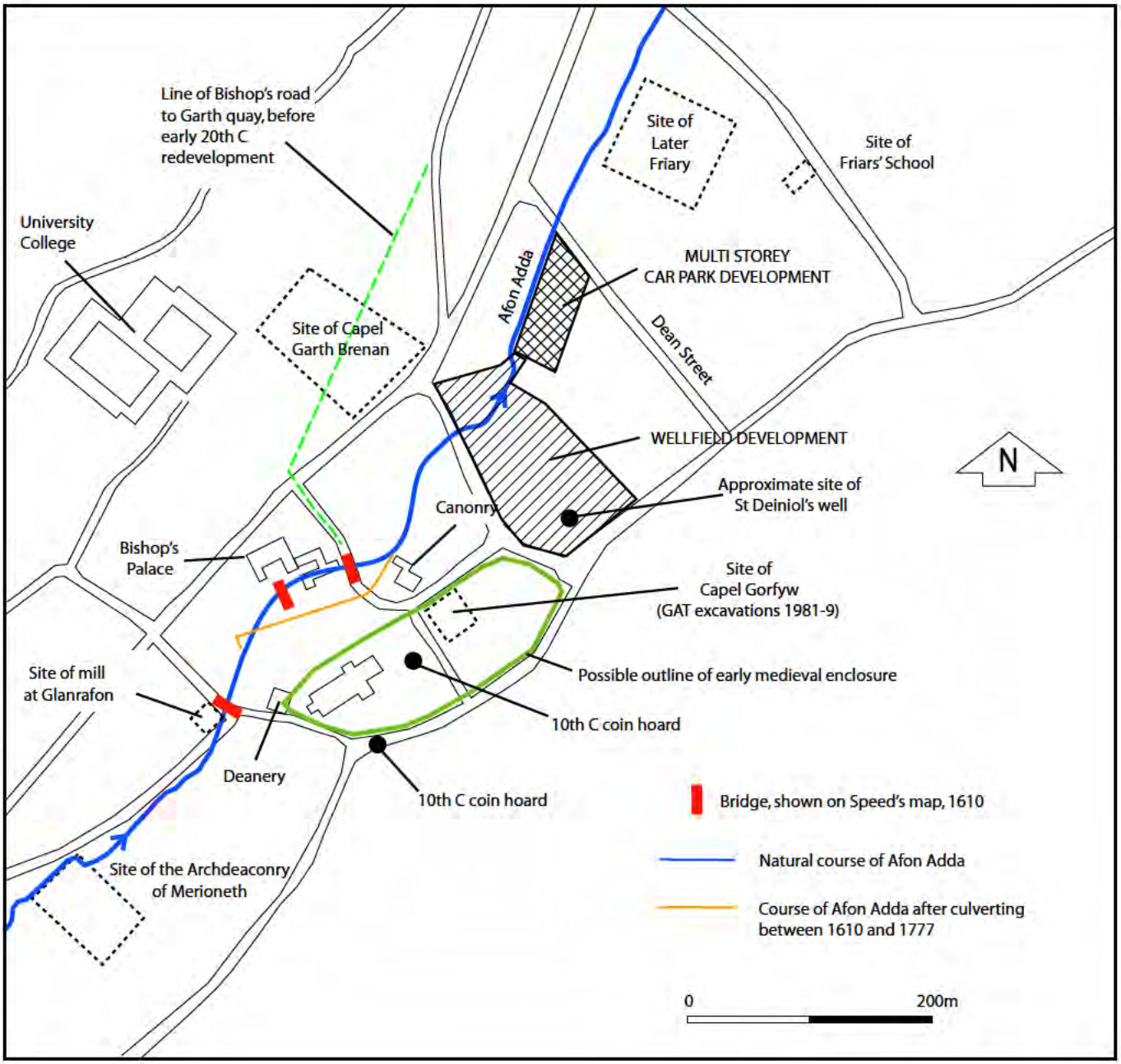

Fig. 1 Location of the development area in relation to historical features and finds in Bangor

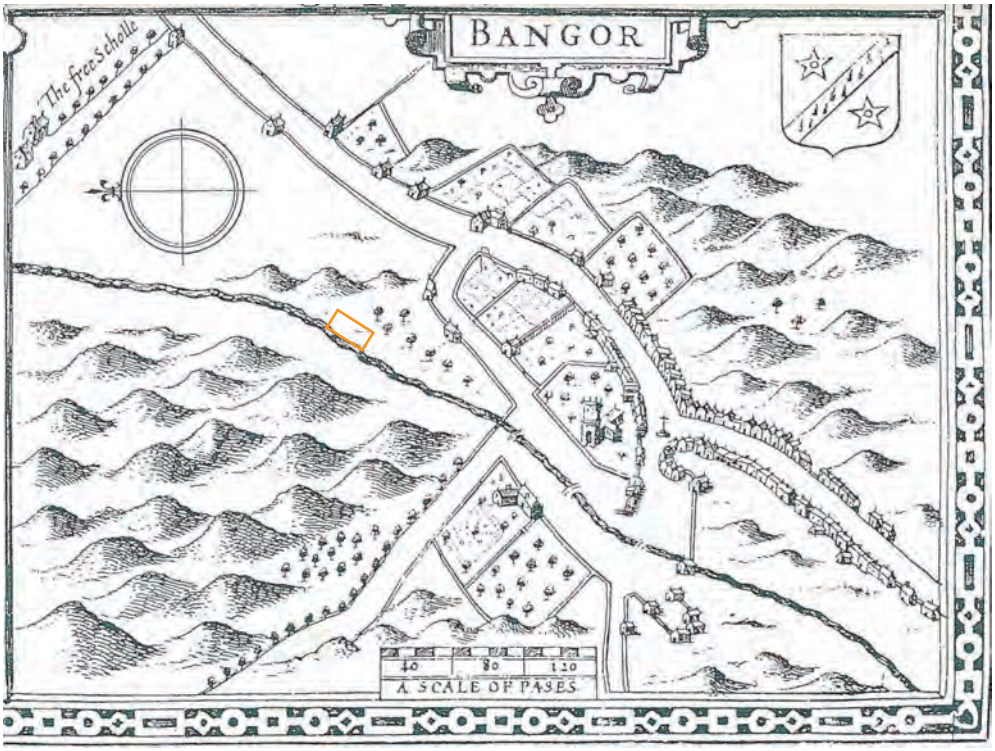

Fig. 2 Speed's map of Bangor of 1610
showing the approximate location of the development area (orange)

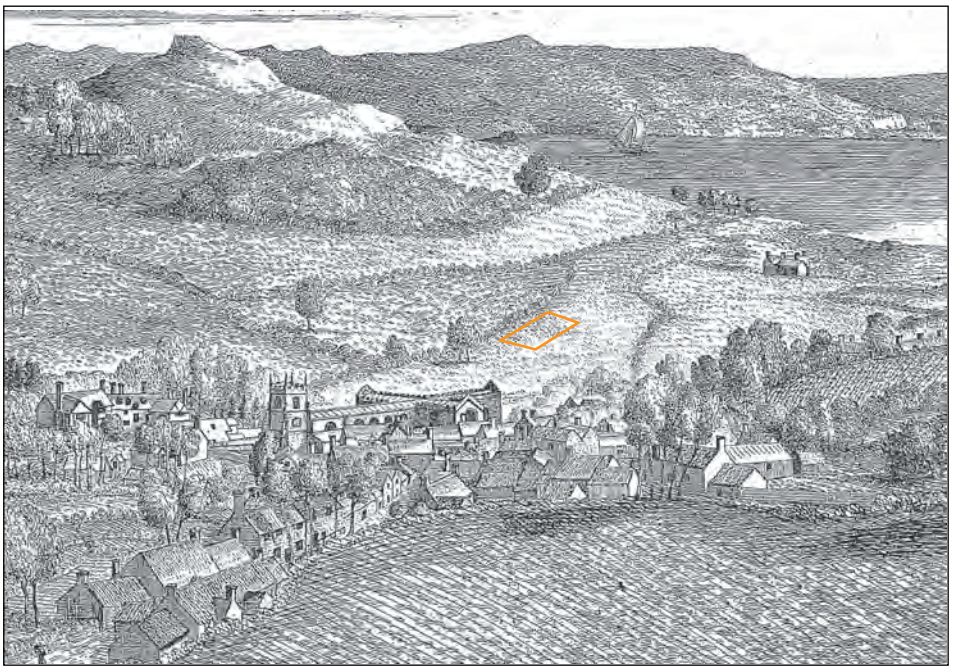

Fig. 3 Lewis's drawing of Bangor of 1740, from the south-west,
showing the approximate location of the development area (orange)

Fig. 4 The Dean Street area of Bangor on Wood's map of 1834
showing the development area (orange)

Fig. 5 The Dean Street area of Bangor on the Tithe map of 1841
showing the development area (orange)

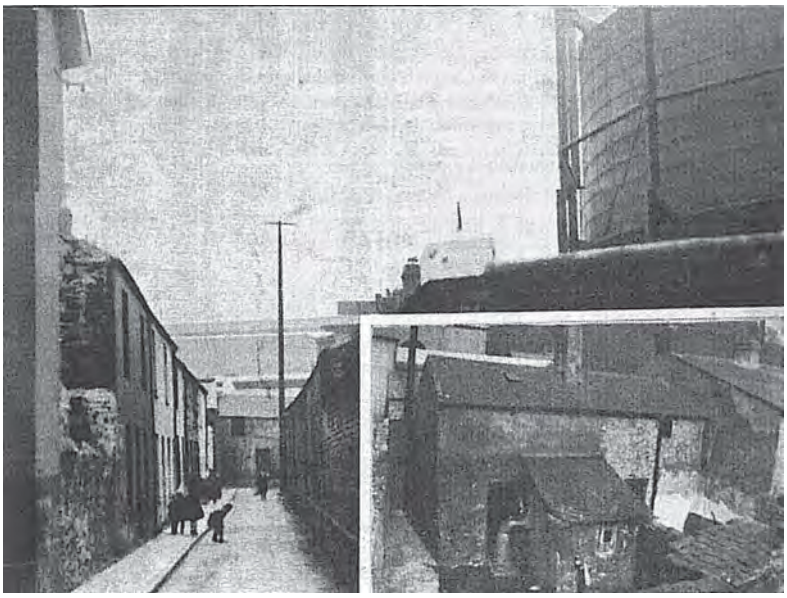

Fig. 6 Brook Row from Dean Street, Gas holder of later gas works on right.
(Inset: Back of the westernmost two houses of Brook Row)

Fig. 7 Garden Street (Dean's Court), from the west

Fig. 8 Garden Square, from Well Street

Fig. 9 Garden Square from the west in the mid-1930s after clearance, before construction of the car park. Dean Street and Snowdon Flour Mill beyond.

Fig. 10 The 1854 map of Bangor showing the earliest gas works lay-out, with a single gas holder

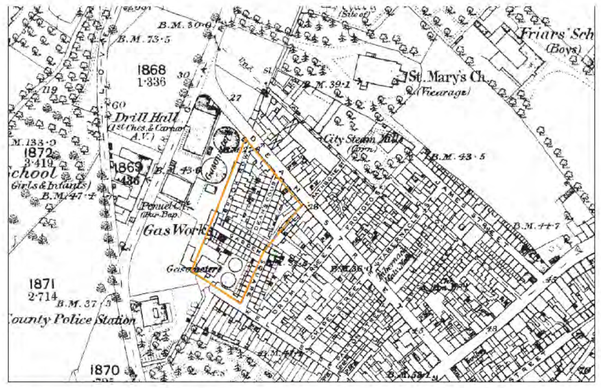

Fig. 11 The Dean Street area in 1889, showing the first and second gas works, in relation to the development area (orange)

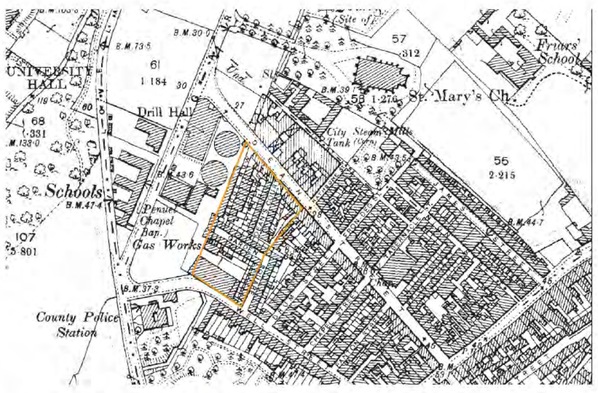

Fig. 12 The Dean Street area in 1900, after demolition of the first gas works, in relation to the development area (orange)

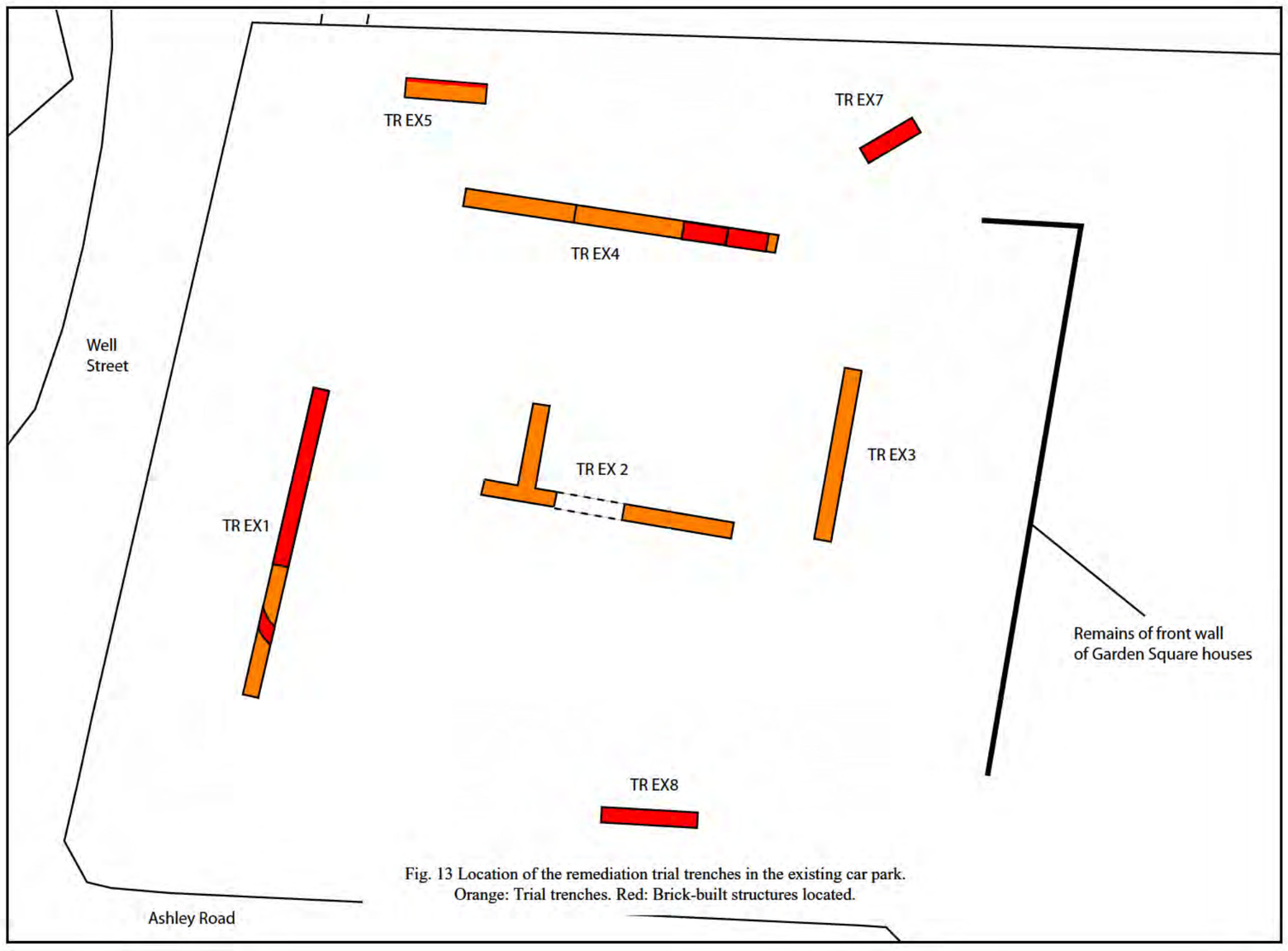

Fig. 13 Location of the remediation trial trenches in the existing car park.
Orange: Trial trenches. Red: Brick-built structures located.

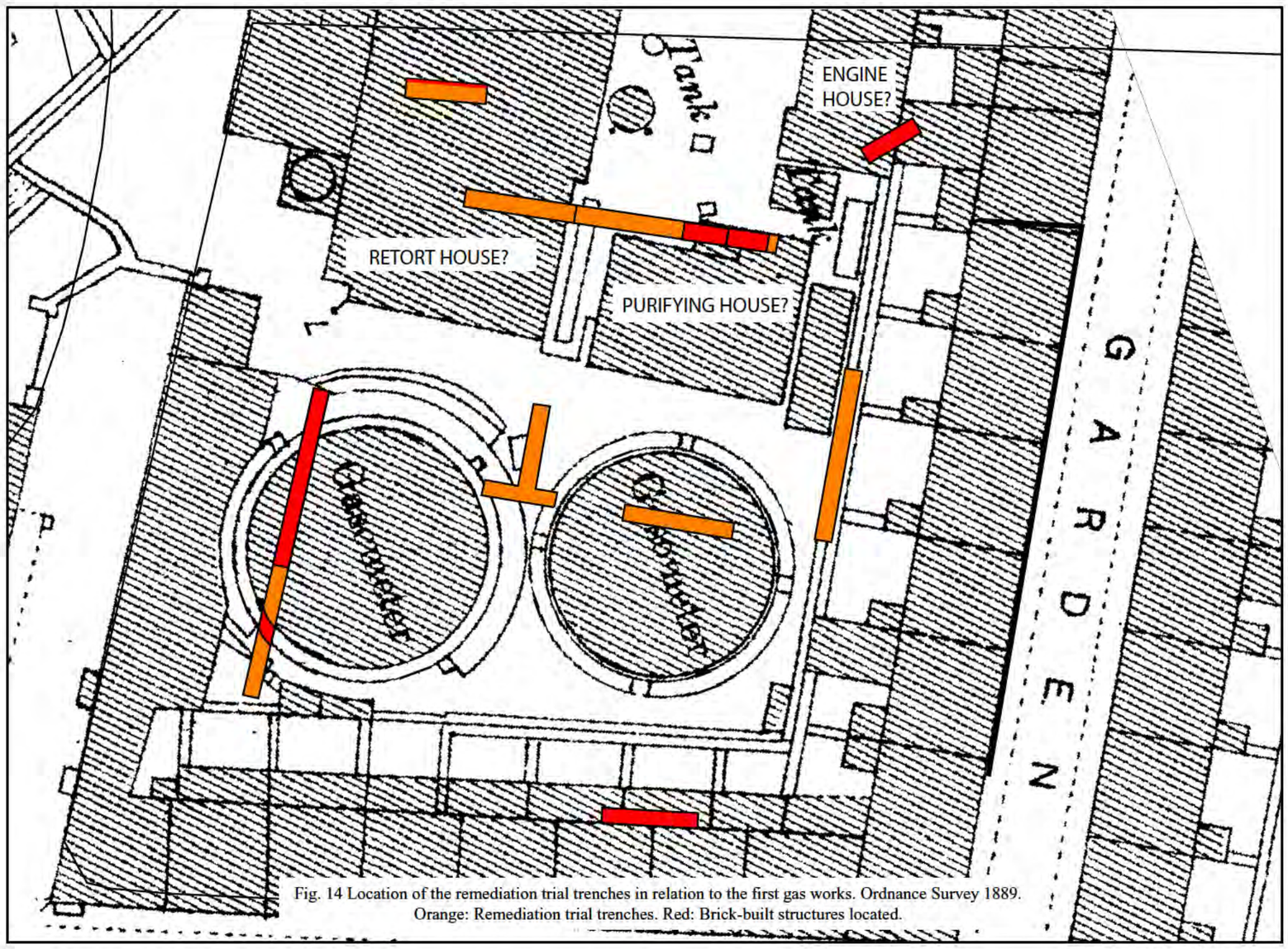

Fig. 14 Location of the remediation trial trenches in relation to the first gas works. Ordnance Survey 1889.
Orange: Remediation trial trenches. Red: Brick-built structures located.

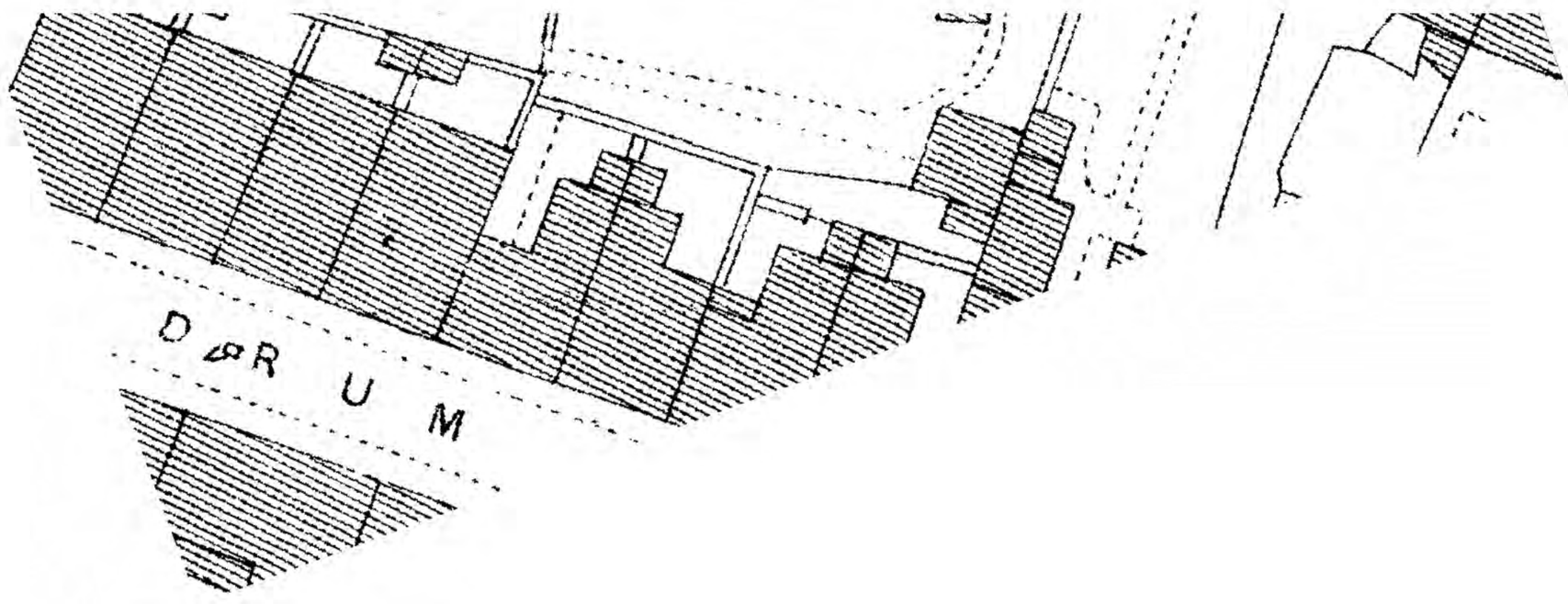

Fig. 16 Trench Ex1 south end from the south-east, showing the buried remains of the first gas works gas holder base.

Fig. 17 Trench Ex1 north end from the south-east, showing the buried remains of the deep brick foundations infilling part of the gas holder tank base of the first gas works.

Fig. 18 Trench Ex2 from the west, showing the extent of tar deposits.

Fig. 19 Trench Ex4 from the west, showing the tops of the two brick-arched culverts.

Fig. 20 Trench Ex5 from the west, showing the edge of a shallow brick-built floor on the left with underlying alluvial clays containing preserved wood fragments.

Fig. 21 Trench Ex8 from the south-west, showing a floor of bricks laid in yellow sand, forming the back yard of a house of Garden Square. Below the floor is a layer of made-ground that in turn overlies natural red-brown gravelly silt.