# Former Gasworks, Pocket Nook Street, St Helens, Merseyside

## Historic Building Investigation and Recording Phases 1 and 2

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# Former Gasworks, Pocket Nook Street, St Helens: Phases 1 and 2

## *Historic Building Investigation and Recording*

*Written by Angela Warner*

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# Summary

Oxford Archaeology was commissioned by Montagu Evans LLP on behalf of National Grid to create an Historic Building Record of a gasholder and its ancillary buildings at the former gasworks at Pocket Nook Street to the north-east of St Helens in Merseyside.

St Helens' earlier gasworks was supplemented by this site in 1946, beginning with the construction of Gasholder Number 5, an above-ground spiral-guided gasholder with four lifts, followed by the new gasworks buildings soon after. The switch to natural gas during the 1970s led to the closure and demolition of the gasworks, although the gasholder at Pocket Nook and at least one gasholder at the earlier gasworks were retained for storage and the sites converted to gasholder stations. Changes in gas distribution in recent decades have rendered gasholders redundant and the gasholder at Pocket Nook Street was isolated from the mains and decommissioned some time prior to its demolition.

The historic building recording focussed upon researching the history of the site and photographing the structures and their context before and during their dismantling. Phase 1 of the project comprised the recording of the gasholder and its associated structures in their context prior to work on site and Phase 2 comprised the recording of the gasholder during its demolition, and the information used to update the Phase 1 report.

The wider programme of recording work of the remaining gasholders across the country will allow a comparison of the structures between sites.

# 1 INTRODUCTION

## 1.1 Project Background

1.1.1 Oxford Archaeology (OA) was commissioned by Montagu Evans LLP, on behalf of National Grid, to undertake historic building recording of the decommissioned gasholder at the former gasworks at Pocket Nook Street, St Helens, Merseyside in two phases: Phase 1 of recording, prior to demolition, was undertaken and an illustrated report issued; Phase 2 was undertaken during the demolition work and incorporated the internal area of the gasholder and the information and images used to create this updated report. The ancillary structures within the site boundary were also recorded during the project.

1.1.2 The work forms part of a wider national project agreed between Historic England and National Grid to record gasholders and gasworks before and during their dismantling, including those which are not listed or of only local interest.

1.1.3 The former gasworks in Pocket Nook, hereafter referred to as 'the site', is situated to the north-east of St Helens town centre, approximately 860m or just over half a mile north-east of the Town Hall (Figure 1).

## 1.2 Aims and Objectives

1.2.1 The principal aim of this project is to document the history and development of the site and to record and interpret the remaining structures before and during their demolition. The information will be presented in the form of a written, illustrated report and archive.

## 1.3 Methodology

1.3.1 This report has been produced in accordance with the brief issued by Montagu Evans LLP on behalf of National Grid and is based upon on-site investigation and documentary research. As specified in the brief, a 'Basic Level 2 survey' was undertaken which was largely photographic and descriptive in nature. The level of recording undertaken in the wider project to record gasworks have previously been agreed with Historic England on a portfolio basis.

1.3.2 The 'Basic Level 2' record is adapted from the Historic England guidelines in *Understanding Historic Buildings: A Guide to Good Recording Practice* which states that a Level 2 is: *'… a descriptive record, made in similar circumstances to Level 1 but when more information is needed. It may be made of a building which is judged not to require a more detailed record, or it may serve to gather data for a wider project. Both the exterior and interior of the building will be seen, described and photographed. The examination of the building will produce an analysis of its development and use and the record will include the conclusions reached, but it will not discuss in detail the evidence on which this analysis is based. A plan and sometimes other drawings may be made but the drawn record will normally not be comprehensive and may be tailored to the scope of a wider project.*'

1.3.3 The work comprises three principal elements: a photographic, a drawn and a written record.

The *photographic record* is intended to act as a general record of the structures and includes photographs of the exterior and interior, and details and fixtures. Digital photographs, in jpeg format, were taken using a camera with up to 24-megapixel capability.

For the *drawn record*, the surviving engineering site plans were made available to OA by the National Gas Archive. These drawings were used as a basis for the archaeological recording; locations of features being verified, the addition of further annotations for interpretation, and recording additional information.

The *written record* consists of field notes and annotations that complement the photographic and drawn records and add further analytical and descriptive detail. Due to structural problems at the Central Library building in St Helens, access to the archives and local studies collections could not be arranged, however, no catalogued items were found which were relevant to the project. This written record, therefore, incorporates documentary research carried out using secondary sources.

1.3.4 This site is not included in Historic England's Monument Protection Plan (MPP) Step 3 report for the gas industry.

1.3.5 The site visit to record the structures in their context was carried out on Thursday 20th September 2018. A further visit was carried out on Wednesday 26 June 2019 during the demolition of the gasholder.

# 2 HISTORICAL BACKGROUND

## 2.1 Introduction

2.1.1 The history of the town of St Helens is well summarised in the town's section of the Merseyside Historic Characterisation Project report which states that the town was originally a small hamlet centred upon a chapel of ease dedicated to St Elyn. The four townships of Eccleston, Parr, Sutton and Windle surrounded the hamlet and were in close proximity to the River Mersey and the River Weaver and had natural resources of coal, fireclay and sand, causing the change in the economy of the area from agriculture supplemented with cottage industries to industrial works in the 18th and 19th centuries and by 1850, St Helens had become a small town.

2.1.2 The site lies upon the undifferentiated sedimentary bedrocks of the Pennine Middle Coal Measures Formation and South Wales Middle Coal Measures Formation which comprises interbedded mudstone, sandstone, siltstone and coal seams. The superficial deposits are recorded as the glacigenic detrital Devensian Till.

2.1.3 There are no records for this site held by the Merseyside Historic Environment Record which have been made available via the Heritage Gateway website; the closest records refer to the industrial history of the wider area.

2.1.4 Three grade II listed buildings are in the wider vicinity; the 18th-century double lock, listed as 'The New Double Lock on the Sankey Canal' is 300m to the NNW of the site; the Church of the Holy Trinity is 515m to the SSE and the Church of the Holy Cross and Saint Helen is 710m to the south-west, both mid 19th-century buildings. None of the listed buildings are associated with the site and none are intervisible with the site. A selection of buildings was still being assessed for the inclusion on a list of Locally Listed Buildings at the time of writing.

2.1.5 The site is not within a Conservation Area and is neither associated with or intervisible with the closest conservation areas: Victoria Square Conservation Area approximately 860m to the WSW and George Street Conservation Area approximately 820 m to the south-west.

2.1.6 Close to the west of the site boundary is the St Helens Canal, labelled on the Ordnance Survey (OS) maps as being disused by the mid-20th century. The railway to the west of the canal is the St Helens branch line of the London and North West Railway, which in its heyday included the large 'Pocket Nook Junction', and an extensive network of sidings and tramways in the vicinity. The gasworks had its own railway sidings constructed at the western part of the site to enable the transport of fuel and by-products.

## 2.2 St Helens' Gasworks

2.2.1 The first gasworks was located to the south-east of the town and to the south of the Pocket Nook site along New Warrington Street, now called Peasley Cross Lane. It appears on the OS map of 1849 at the west of that site and expanded eastwards in later years. An article in the Journal of Gas Lighting, Water Supply, Etc. dated 8 June 1909 states that the site was bought by the St Helens Gas Company in 1875 and had been reconstructed three times by the time of the publication of the article; the OS

maps show the gradual shift eastwards across the site and, eventually, across the railway line to the site along Jackson Street where the last remaining structure, the MAN waterless gasholder (Gasholder Number 6), was dismantled in 2012 (Plate 1).

2.2.2 The Pocket Nook site was in agricultural use between the issue of the 1851 and 1891 editions of the OS maps, although with surrounding industrial works and the canal and railway to the west and north of the site, until the construction of the Union Chemical Works at the south of the site. At the west of the site, in the location of the later gasholder, were structures associated with the chemical works until the edition of 1908, revised two years earlier, which shows a railway siding, a square building and two small structures in the approximate location of the current gasholder. By the time of the 1928 edition, the sidings to this location have been removed, although the structures remain.

2.2.3 The gasholder displays a metal plaque (detailed later) which states that it was constructed in 1946 and the following OS edition ten years later shows the gasholder but few associated buildings, particularly of the quantity which would be expected from a manufacturing gas works. In the absence of surviving or accessible records it appears likely that the Gasholder 5 site at least began as a gasholder station, particularly as the site plans of the earlier gasworks in the 1960s show gas pipes leading to Gasholder 5, however, some of these plans are evidently re-used copies of earlier plans and the later drawings may contain outdated information. By the larger-scale OS editions of the late 1950s or early 1960s, buildings to the south of the gasholder are depicted and the site labelled simply 'Works'. By the OS editions of the 1970s, the site has expanded and the labelling clarifies the site as 'Gas Works' with the buildings to the south of the site labelled as 'Depot' and 'Gas Board Depot'.

2.2.4 In 1949, the gas industry was nationalised and the gasworks became part of the North Western Gas Board. A commemorative pamphlet published by British Gas Northwestern in 1994 states that from 1958, the Pocket Nook depot was the first centralised base for the South Lancashire Group and in 1969, offices were built at the Pocket Nook works and staff from the St Helens area were located in one place. One of the group control centres for the computerised grid control system was also located here. A garage for repairs and maintenance of the Gas Board vehicles was also located at the Pocket Nook works (British Gas Northwestern, 1994).

2.2.5 The change from manufactured town gas to natural gas through the late 1960s to the late 1970s caused gasworks across the country to be decommissioned, although many gasholders were retained for storage and the gasworks sites converted to gasholder stations, as was the case for the Pocket Nook site.

2.2.6 In 2007, the area containing the gasholder was reduced in size and the surrounding area sold off. The road to the east of the site boundary was laid as part of planning application P/2007/0947 but the gantry supporting the elevated pipework over the site was retained. The distribution pipework leading from the gasholder, including the elevated pipework, appears on the Google Streetview image of April 2009 (Plate 2), but had been removed by the following Google Earth image of April 2011.

2.2.7 The gasholder at Pocket Nook had been decommissioned and isolated from the network for some time prior to its demolition.

# 3 DESCRIPTION OF THE SITE

## 3.1 Introduction

3.1.1 The site is located to the north-east of St Helens, separated from the town by the railway and canal, in a formerly industrial area which has been partially redeveloped to include educational and retail buildings. The site is now much-reduced in size as a gasholder station and much of the gasworks site is now in other ownership. The gasholder station is bounded to the south by a driving test centre, to the east by Navigation Road, constructed in 2007, and to the north and west is a waste management depot. The site boundary is marked by metal palisade fencing installed as part of the 2007 division of the site. The original site boundary consisting of a brick wall with attached piers at regular intervals survives to the western original boundary with the canal (Plate 3) and to the north, extending eastwards forming part of the northern boundary of the waste management company's site.

3.1.2 At the time of the Phase 1 survey, the site contained one gasholder, one concrete cabinet, a metal shed and two brick buildings (Figure 2). The site was covered in gravel with occasional pieces of clinker spread between tarmacadam areas. The concrete base of a building was located to the east of the gasholder (Plate 4); this building is visible on the satellite images of Google Earth dated 2000 but has been removed by the following available image of 2005. A mast was constructed at the south-east of the site, to the immediate west of the instrument house and office at some point in the 1960s or 1970s, according to the OS maps available, and was removed at some point between the Google Earth images of April 2011 and March 2012.

3.1.3 The concrete plinths and remains of universal columns indicate the location of the supports of the elevated gas pipe which ran between the gasholder and booster house and led to the south, going underground between the shop and public house to the south-east of the site on Pocket Nook Street (Plates 5-7).

3.1.4 The gasholder was visible from Pocket Nook Street, which is the main road to the south of the site, and from the surrounding industrial areas and canal tow-path. There was a partially-obscured view from some of the houses on Holly Bank Grove to the south-east of the site.

3.1.5 A diagram showing the location and direction of the photographs used in the plates is included as Figure 3.

## 3.2 Gasholder Number 5

3.2.1 The gasholder was a spiral-guided gasholder with four lifts in a steel tank (Plate 8). Information from the site plans provided by the National Gas Archive state that it had a capacity of 3 million cubic feet and the National Grid planning documents associated with the planning application P/2018/0343/DEMPA for prior notification for demolition state that the diameter was approximately 56m and the tank set approximately 2-2.5m below ground. The lowest visible steel ring sat on a narrow plinth of steel and concrete.

3.2.2 The tank was of welded construction with occasional rivets to support the join (Plate 9). Five concentric rings were visible above ground. Each ring was formed from long

strips of steel welded together and reinforced with two small rivets top and bottom of the joint. The lower ring of the tank stood proud of the ring above as did the subsequent ring, but to a lesser extent (Plate 10). Brackets were welded in pairs at regular intervals around the tank to support the walkway (Plate 11). Separate brackets supported the handrail. All surfaces were painted light grey, with the exception of the lower ring of the tank which was dark grey.

3.2.3 Only the tank and crown were visible at the time of the Phase 1 survey as the lifts were retracted into the tank. Two extended lifts can be seen on the February 2007 Geograph image by David Long used in Plate 1. The lift steps were no longer extant by the Phase 1 survey and appear to have been removed at around the same time as the distribution pipework as they appear on the Google Streetview image of April 2009 but have been removed by the Google Earth image of April 2011. They are not depicted on any site plans.

3.2.4 There was an inlet or outlet pipe surrounded by a large, brick-lined siphon pit to the south of the gasholder (Plates 12-13) and a similar siphon pit with a blanked-off remnant of a pipe was to the east of the gasholder (Plates 14-15); cut-off brackets indicating the removal of the pipe were evident beneath the walkway. The staircase to the top of the tank was at the south of the gasholder, to the immediate west of the siphon pit (Plate 16).

3.2.5 A metal plate was fixed to the wall of the siphon pit at the south of the gasholder and read (Plate 17):

*St Helens Corporation*
*Gas Department.*

_____

*Chairman.* *Engineer & Manager.*
*Ald. W Burrows. J.P.* *R.L. Greaves. M. Inst. Gas E.*

_____

*R&J. Dempster Ltd. Manchester.*
*Makers 1946*

R. & J. Dempster Limited was a Manchester family business established in 1884 which manufactured and installed gasworks plant nationwide and abroad. This business originated in their father's company, Robert Dempster and Sons, a similar manufacturer based in Elland, Yorkshire, which was established in 1855.

3.2.6 A free-standing metal tank was to the west of the gasholder with a downpipe leading from the upper part of the tank (Plate 18). The National Grid Drainage Plan labels this as 'holder overflow and methane extraction unit', adjacent to this, below ground, was an Interceptor which allowed debris to settle out of the water across a series of traps.

3.2.7 Other evidence of numerous since-removed fixtures was around the tank. A frame affixed to the tank walkway at the north-east of the gasholder retained the remnants of cables and four switches, and to the inner lift were associated metal bars, all of which appeared to have been curtailed (Plate 19). Although no documents survive

which detail the equipment installed at the site, this apparatus was likely to relate to sensing the height of the lift tanks as they rose. To the east of the extant inlet or outlet pipe was a hole in the walkway with a frame and guard at the top of the tank and remnants of fittings welded to the tank were below; it was no longer evident what equipment this related to. Beneath the walkway to the immediate east of the inlet/outlet pipe was a square, riveted blocking of a former opening. The bracket for the walkway was welded to this and so it had not been in use for some time.

3.2.8 The walkway at the top of the tank was accessible during the initial visit, giving access to the crown (Plate 20). The arrangement of the roller carriages indicated the lifts rotated in alternating directions as they rose (Plate 21). In addition to the evidence of the removal of the lift steps, many of the roller carriage fittings had been partially removed, as had the ends of several of the spiral guide tracks (Plate 22).

*Interior:*

3.2.9 The interior of the structure was photographed from newly-formed openings cut through the tank and lifts, following the dewatering and de-sludging of the tank and during the removal of the crown (Plates 23 to 26).

3.2.10 After the opening in the side of the tank and lifts had been cut, it was apparent that the steel panels of the lifts and the spiral guides were also welded and each lift was approximately 4mm thick (Plate 27). The bottom ring of the tank was approximately 25mm thick and the ring above that was approximately 20mm thick, those above could not be measured. The floor of the tank consisted of welded steel sheets over a concrete base.

3.2.11 Standards were welded to the inner face of the inner lift which supported the brackets and alternating principal trusses of the domed crown structure; the intermediate trusses were supported by the outer concentric ring (Plates 28 to 30). The bottom chords of the trusses were thin steel straps tying the struts and each truss was braced laterally to the adjacent truss with concentric steel rings. The members of the crown roof structure were bolted together. Each truss was attached to a central steel post and frame; this structure supported the crown as it rose and fell. The welded steel sheets covering the crown were approximately 3mm thick and supported on a circular framework of narrow concentric steel angles.

## 3.3 Fan Booster House

3.3.1 The fan booster house was located to the north-east corner of the site. It was a green, flat-roofed, single-storey, pre-fabricated metal shed set on a concrete base. To the north-east elevation were metal double doors with externally mounted hinges and padlock hasp and staple and with a weather strip above (Plate 31). A single door of the same construction was to the south-east elevation (Plate 32). Vents were to all but the north-east elevation. A large metal flue extended through the roof, just to the south-east of the centre (Plate 33 and visible in Plate 5). To the south-west elevation was the remains of the pipe which once connected to the gas distribution system (Plate 34).

*Interior:*

3.3.2 The interior of the structure was not accessible at the time of the initial survey, and the structure had been removed prior to the Phase 2 survey. According to the details contained within the asbestos report, the walls and ceiling were lined with fibreglass panels and the floor was concrete, presumably the concrete plinth on which the structure sat.

## 3.4 Electrical Building

3.4.1 The electrical building was to the north-east of the gasholder and was a flat-roofed, tall cabinet built from pre-cast concrete panels and set on a concrete base. Timber double doors to the north-east elevation were the only opening to the cabinet (Plates 35 to 38), other than vents, one blocked, to the north-west and south-east elevations. A small plastic secure box was fitted to the north-west elevation.

*Interior:*

3.4.2 The interior of the structure was not accessible at the time of the initial survey, and the structure had been removed prior to the Phase 2 survey. According to the details contained within the asbestos report, all internal surfaces were the bare concrete of the panels and base.

## 3.5 Instrument House

3.5.1 The instrument house was to the south-east of the gasholder and was a flat-roofed, single-storey brick building in stretcher bond. The bricks were light grey and bound with orange-grey mortar. A single timber door was to the south-east elevation with a timber step in the doorway (Plate 39). The south-west elevation was obscured by foliage and the proximity of the palisade fence of the former mast enclosure at the time of survey. Terracotta vents were to the north-east and south-west elevations (Plates 40 & 41). The roof sloped slightly to the north-west and was covered with bituminous felt, and white-painted timber fascia boards were to all elevations (Plate 42). A black plastic gutter and downpipe were to the north-west elevation.

*Interior:*

3.5.2 The interior was accessible during the Phase 2 survey. The single room contained the metal housing for some machinery which had previously been removed; dials were labelled ‘Red Phase’, Yellow Phase’ and Blue Phase’ (Plate 43). The floor was painted concrete with a wide central floor duct covered by metal access covers. The walls were unpainted brick and the ceiling was of straw board (Plate 44. NB the lighter areas of brickwork in the image indicate where equipment has been removed and are not blocked features).

## 3.6 Office

3.6.1 The two-roomed small office building was to the south of the gasholder and was a flat-roofed, single-storey brick building in stretcher bond. The bricks were light grey and bound with grey mortar. Timber double doors were to the south-east elevation with a tiled step in the doorway (Plate 45). A large vent was in the south-west elevation (Plate 46); a boarded-over opening and two terracotta vents were in the north-east and the south-west elevations (Plate 47). The concrete roof was hidden behind a small brick

parapet with concrete coping. A grey plastic hopper and downpipe were to the north-east elevation.

*Interior:*

3.6.2 The interior of the structure was accessible during the Phase 2 survey. The building was divided into two rooms with a glazed door between (Plate 48). The room to the rear contained the metal housing for some equipment, since removed, and various cabinets and control boxes (Plate 49). The room to the front had been stripped but appeared to have contained testing equipment as a test tube with an oily substance remained in a rack on the wall.

3.6.3 The concrete floor had narrow floor ducts and had, until the asbestos remediation work, blue vinyl tiles. The walls were painted brick and the ceiling was the underside of the concrete roof.

# 4 CONCLUSION

4.1.1 The construction of the gasworks began in 1946 with Gasholder Number 5 possibly beginning its life as additional storage for the existing gasworks until the remainder of the new gasworks buildings were constructed.

4.1.2 In the late 1960s, natural gas was found beneath the North Sea and during the 1970s supply was switched from manufactured town to natural gas, leading to the closure of gasworks around the country and the conversion of many of the sites, including this, to use as gasholder stations. The gasworks buildings were demolished, the railway sidings removed, and redundant areas of the site were gradually sold off. Gas distribution technology has improved in recent decades and the gasholder was rendered redundant and was decommissioned for some time prior to its demolition in June 2019.

4.1.3 This Historic Building Recording has researched the history of the site and created a photographic record of the structures and their context before and during their dismantling. An archive has been collated to provide a permanent record of the gasholder, the ancillary buildings and the site which will be accessible at both the local and national research centres.

4.1.4 The wider programme of recording work of the remaining gasholders across the country will allow a comparison of the structures between sites.

# APPENDIX A A SUMMARY OF GASWORKS' PLANT AND PROCESSES

## INTRODUCTION

This account of the general development of the gas industry and the functions of gasworks plant and gas holders is based largely on several articles and presentations available online by Professor Russell Thomas, particularly The History and Operation of Gasworks (Manufactured Gas Plants), as well as the Monuments Protection Programme Step 1 report and the London Gasholders Survey by Malcolm Tucker.

Gasworks followed a general form, however, the types of each building, plant and equipment and the layout of each site varied widely according to the location, type of coal available, the likely size of the supply required and the manufacturer of the plant. The advancement of technology and the continuous obsolescence and replacement of plant resulted in a regular rebuilding of many gasworks operations.

This appendix describes the general operation of a gasworks and the principle functions of its plant, however, it does not seek to describe every combination of plant available and research should be carried out when investigating each site.

## DEVELOPMENT OF THE GAS INDUSTRY IN BRITAIN

### *General history*

The origins of the use of gas for artificial lighting lie in the 1790s when William Murdoch first used coal gas to illuminate his house in Redruth, Cornwall. Murdoch produced the gas by burning coal in a small retort in his back yard. In the following years he continued to experiment with gas lighting by improving the technology and in the first decade of the 19th century his methods were used to illuminate various mills and industrial works.

Other important individuals were also helping to develop the industry in this period including Samuel Clegg, an engineer whose work led to several technical advances, and Frederick Winsor who established the Gas Light and Coke Company in 1812. Winsor's vision, which was for an industry where gas was supplied to many customers from a single large gasworks, differed from Murdoch's which was for individual smaller plants supplying single sites.

Initially, gas was used for streetlighting and to light industrial works and the homes of the wealthier population, although municipal operations became widespread and by 1820 the principal English and Scottish towns were lit by gas; by 1830, over 200 and by 1859 there were over 1000 public gasworks built across Britain. The industry developed in the later 19th century with various innovations such as the vertical retort plant, which allowed continuous operation and used gravity to create a process flow, the gas mantle light and the greater use of by-products from the gas production process.

The Second World War had a major impact on the industry, particularly through bomb damage and loss of workers to the war effort and in an attempt to rebuild the industry after the war the Labour Government passed the Gas Act of 1948 which nationalised the 1064 local gas undertakings into 12 area gas boards. The boards would subsequently merge in 1972 to form British Gas, which was privatised in 1986.

In the later 1960s it was decided that the United Kingdom would phase out gas produced from coal and would instead move to an industry based on natural gas, some imported, and some obtained from North Sea gas fields. This led to extensive works during the 1970s to clear redundant facilities from gasworks and adapt or convert other plant which was to be reused; this change also resulted in the physical conversion of every gas appliance in the country. By the mid 1970s there were very few surviving sites where town gas was still being produced; these were mainly in remote parts of Scotland and the last site closed in 1981.

Some gasworks were partially demolished to create a gasholder station to store the natural gas, removing the gas production buildings and equipment but retaining the gasholders, transmission plant and distribution network. By the early 2000s, gas distribution technology had improved which rendered even the gasholder stations redundant and a programme to dismantle the gasholders was commenced.

## ELEMENTS OF A GASWORKS

### *Introduction*

A typical gasworks where coal gas was produced comprised many different elements of plant and processes, and followed the same basic principle, although some of these may only have been included at the larger sites.

Not all coal was suitable for gas manufacture and some coal fields were more suited to different types of retorts and so the gasworks design would be adapted to the coal available. The transport of the coal was also important: the proximity of canals, and later the railways, or sometimes docks in coastal areas, was essential. Many gasworks had their own railway sidings.

### *The retort*

The retort is fundamentally a sealed container where coal would be heated to drive off moisture, gases and various other by-products. The retort house held 'benches' of retorts and the retort construction advanced from cast iron to fireclay to silica giving improved performance and the ability to withstand higher temperatures.

Retorts went through several stages of design; early retorts were horizontal and heated by radiant heat from the furnace below at relatively low temperatures. The coal shrank as it was heated and the resulting coke was raked out of the retort and more coal put in; mechanical stoking equipment was introduced with through-retorts. Inclined retorts were angled at 32° to horizontal, in theory creating less wear and tear and easier to load and unload, but they could be difficult to operate and were only suitable for certain types of coal and so were short-lived.

Vertical retorts were attempted throughout the 19th century but became successful by the turn of the 20th century. There were several types, but the basic principle was that tapered continuous vertical retorts, filled by hoppers above the retort, were heated by burning gas from separate producers. These could carbonise the coal continuously as it descended and the coke was extracted at regular intervals from the bottom of the retort, the residual heat

sometimes being used for other purposes. The coke and breeze (the finer ash) which was not needed for reuse on the site was sold as fuel to industrial and domestic customers.

The gas extracted from the coal rose through an offtake pipe at the top of the retort.

***Condensers***

There were numerous designs for condensers, some using air, some using water, but all of which were used to reduce the temperature of the gas and also begin the process to remove the tarry impurities.

***Exhausters***

Exhausters drew gas off the retorts and pushed it through the purification system. This was essential to prevent the building up of pressure in the retort.

***Cleaning and purification***

The gas produced by heating the coal had many impurities which had to be removed before it could be transferred to the gasholder, including, but not limited to, ammonia, tar, hydrogen, sulphide, benzole and hydrocyanic acid.

Numerous machines and systems were patented for this purpose. The method employed was used according to the impurity, and included passing the gas through water or oil in the form of bubbles (washing) or passing the gas over a large area covered in the solvent liquid (scrubbing); in the later part of the 19th century, the distinction between the two was lost and tended to be referred to simply as 'washing'.

Dry purification involved passing the gas through trays of granular lime or iron oxide.

The impurities extracted were often valuable as by-products, such as coal tar, sulphate of ammonia, sulphuric acid, benzole, hydrocyanic acid and the spent lime from the purification, and these were also sold to other industries.

***Metering, storage and distribution***

The amount of gas produced would then be measured by the station meter before being stored in the gasholder.

The gas was stored in a gasholders to cope with peaks and troughs in demand and to ensure that there was always a ready supply; their form and function will be discussed in the following section

The station governor maintained the pressure of the gas leaving the holder when distributing it into the gas mains. Using a similar principle to the gasholder, the pressure was controlled using weights set onto a floating bell, although as with most other gasworks equipment, designs varied. Booster pumps were later developed to increase the pressure of the gas flowing into the gas main and were particularly used when the area supplied was far from the gasworks or where a gasholder station was used for the storage of gas between the gasworks and the remote location.

# GASHOLDERS

### *Introduction*

The introduction of gasholders removed the need for continuous gas production, the storage also acted as a buffer for periods of high demand and during halts in production and contained enough gas supply for 24 to 36 hours.

The basic principle of a gasholder is that it consists of two parts: a tank containing water and a cylindrical vessel called a 'lift'. The water provided a seal to prevent the gas from escaping and acted as a resisting surface to the incoming and exiting gas; the lift held the gas, rising and lowering according to the volume. The weight of the lift determined the pressure of the gas in the mains - and the back pressure on the gas making plant if no exhauster was used. Weights could be added to the lift or lifts if additional pressure was required, such as at times of high demand.

### *History*

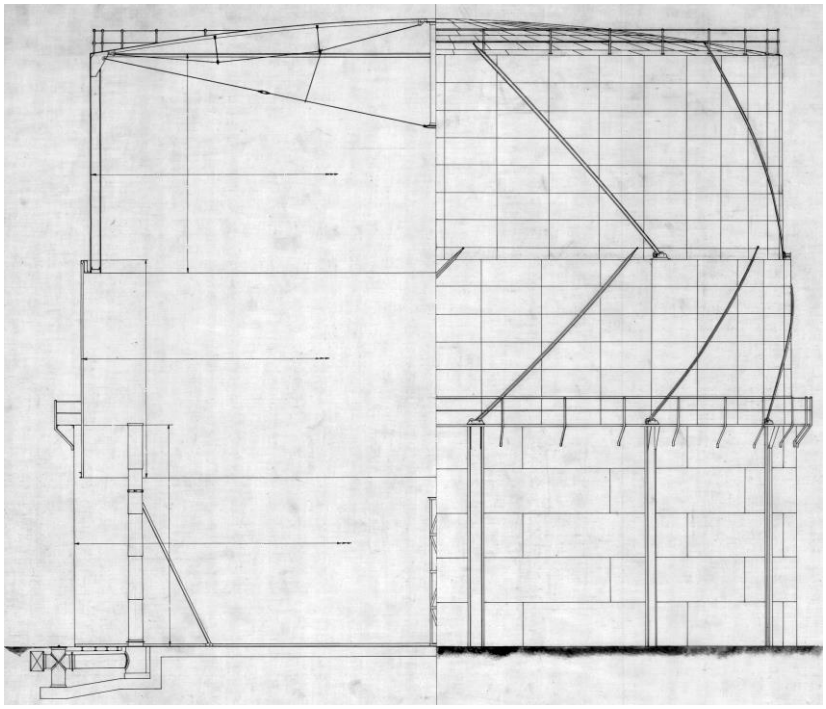
The earliest gasholders were small and built of iron or wood with the moving vessel guided by counter weights on chains. The wooden tanks particularly, sometimes repurposed from the brewing industry, were unreliable and prone to leaking.

From the early 19th century, the gas produced in retorts was stored in large holders and in the early phase of the industry these tended to be housed within separate buildings due to fears of explosion. In truth however the dangers of leaking gas becoming trapped and then exploding was considerably greater when the gasholder was enclosed by a separate building and this gradually led to the external cylindrical gasholder which became the most recognisable feature of any gasworks (Appendix Figure 1).

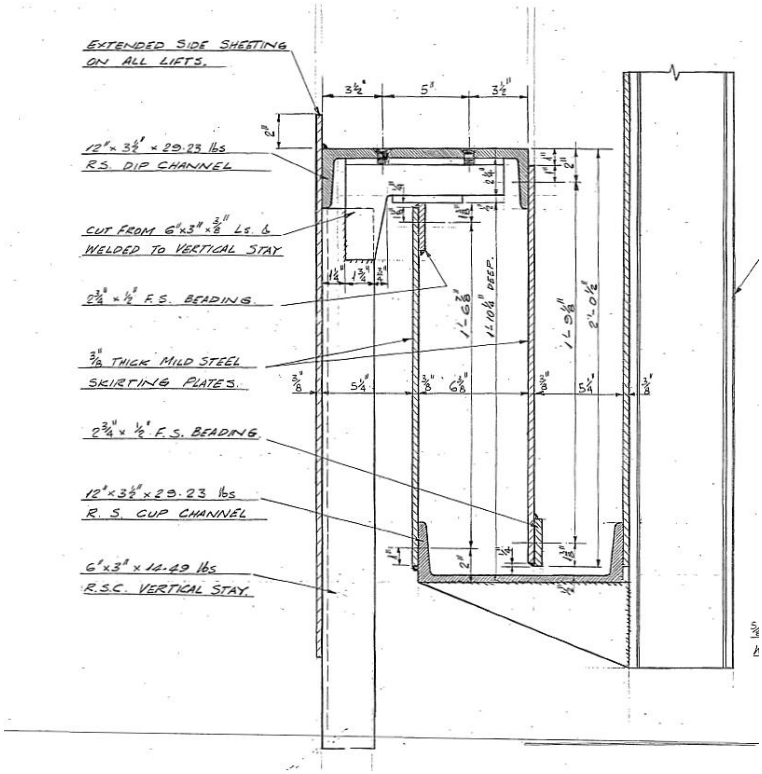
By the time the industry became established, above ground tanks were usually made from steel on a circular concrete slab. The steel floor plate was laid on top of the slab and the steel plates forming the sides of the tank were attached to the floor plate using a steel curb. The sides of the tank were constructed from rows of steel sheets, the bottom row thicker than those above it which often decreased in thickness with the height of the tank. The plates were usually rivetted, although some later tanks were welded.

Below-ground tanks were also used, built of brick, stone or concrete and sometimes cut into bedrock if it was suitable; each method must be made watertight, usually using puddle clay or render. The centre of the tank need not be excavated, leaving a dumpling in the centre of the tank.

The gas was prevented from escaping by a water seal in the tank and around each lift. The top of the tank and each lift returned towards the centre of the gasholder, called a 'dip' and the base of the next lift returned towards the outer edge of the gasholder, called a 'cup' (Appendix Figure 2). When the lifts rose, the cup and dip, which contained water, would interlock and form a seal against the gas within the gasholder.



Appendix Figure 1: A section and elevation of an above-ground two-lift spiral-guided gasholder (Extract of drawing EA/SA/FEG/E/T/1 National Gas Archive)




Appendix Figure 2: A cross-section of the cup and dip seal of the lifts of a gasholder which would be filled with water when the gasholder was in use (Extract of drawing NW/MA/DNE/E/E/6 National Gas Archive)

Originally, gasholders used a single lift, but later the telescopic gasholder was invented whereby separate close fitting vessels would be located within one another so that each inner lift would rise when the outer one reached its capacity. This allowed increased storage on the same footprint.

Initially the upper lifts of the early types of telescopic holders were guided by columns or frames; guide rails on the inner face of the columns guided wheels on arms attached to the top of the lifts, keeping the lift in place as it rose and fell. A short-lived cable-guided gasholder was developed whereby the lift was guided by a system of wire ropes and pulleys, although their use was not widespread.

In the late 1880s the spirally-guided gasholder was invented comprising a series of lifts which would rotate and spiral up or down with each chamber guided by the one below. Each lift would have diagonal guide rails fixed to its side which would engage with roller carriages fixed to the top of the vessel beneath. These guide rails could rotate the lifts in alternating directions or in the same direction, according to the design.

Waterless or Dry Gasholders were developed in the early 20th century which used an internal piston which moved with the aid of guide rollers within a static tank and fixed roof; three main types were developed: the MAN gasholder used a tar or oil seal, the Klonne used a grease seal and the Wiggins used a rubber seal.

There were many styles of gasholders, but with the exception of the waterless gasholders, the chief distinction between the types was regarding the method of guiding and support of the lift or lifts.

***The crown***

The nature of the support for the domed crown is among the most interesting aspects of any gasholder and it is also an area where a variety of approaches evolved in the 19th century.

The interest is partly as a result of the structure being required to function under two quite different conditions. When a holder is inflated the crown is naturally supported by gas pressure so in this situation there is no need for a large superstructure but when the holder is empty the crown needs to be supported.

Early holders tended to have a trussed crown with radial structures where the dome was self-supporting, albeit with a fixed prop which could support the centre of the crown when the holder was lowered. These trussed crowns were often technologically sophisticated and in the middle decades of the 19th century the spans of the larger holders often rivalled or exceeded the largest spans of industrial sheds or railway stations. This is of course a misleading comparison because the structure was supported by pressure when the holder was inflated and when it was deflated there was a fixed stanchion at the centre to help support the crown.

However, in c1850 another approach, that of the 'untrussed crown' was introduced (Tucker, 2000) in which the crown was either supported by gas pressure (when the holder was inflated) or by a fixed 'rest frame' when the holder was empty. The frame, of either timber of ironwork would not rise with the crown when the holder inflated, and this type of holder was widely used in the 1860s and 1870s.

Another slightly different approach to the trussed crown was introduced in the 1870s with 'radial girders'. These were ribs with plates or lattice webs beneath and the central fixed prop as with trussed crowns. All three types of crown continued to be used into the 20th century (Tucker, 2000).

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# APPENDIX B BIBLIOGRAPHY

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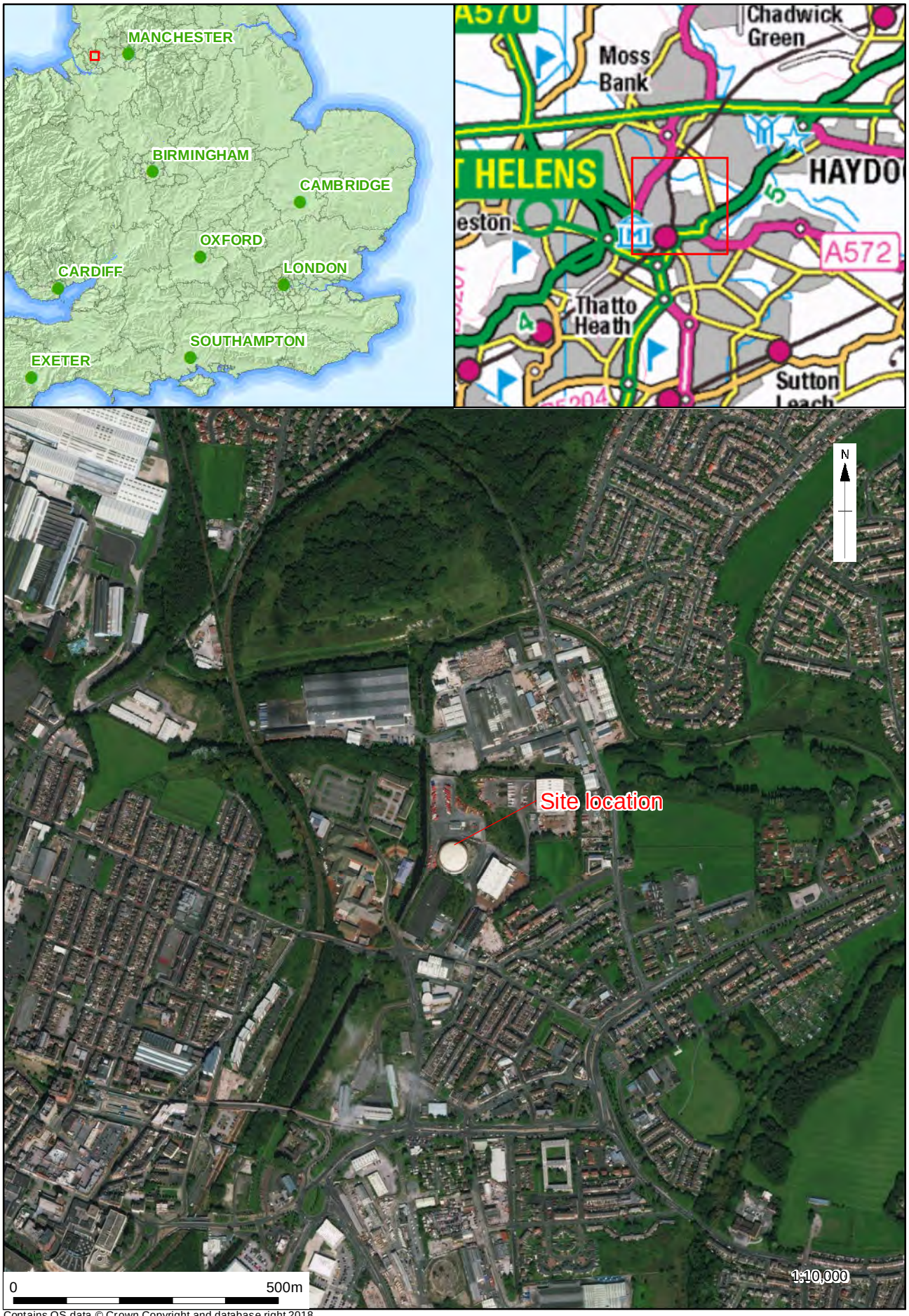
# APPENDIX C OASIS FORM

| PROJECT DETAILS | | |
|---|---|---|
| Project name | Building Recording at the Former Gasworks at Pocket Nook Street, St Helens, Merseyside | |
| Short description | Oxford Archaeology was commissioned by Montagu Evans LLP on behalf of National Grid to create an historic building record of the surviving gasholder and four ancillary buildings at the former gasworks at Pocket Nook Street, St Helens, Merseyside, before and during the dismantling of the gasholder. Gasholder 5 was an above-ground spiral-guided gasholder with four lifts, constructed in 1946. The project has also included research on the history of the site. This forms part of a national programme of recording these distinctive structures which have formed familiar landmarks in towns and cities throughout much of the 19th and 20th centuries. The archive record that is being produced will allow comparison between different sites. | |
| Project dates | Site work was undertaken on 20 September 2018 and 26 June 2019 | |
| Project type | Building recording | |
| Previous work | None | |
| Future work | Potential for further historic investigation | |
| Monument type | Non-listed structure | |
| Significant finds | N/A | |
| PROJECT LOCATION | | |
| Site location | Former Gasworks, Pocket Nook Street, St Helens, Merseyside | |
| Study area | The enclosed area containing the gasholder is approximately 69m x 73m | |
| Site co-ordinates | SJ 52049 95893 | |
| PROJECT CREATORS | | |
| Name of organisation | Oxford Archaeology | |
| Project brief originator | Montagu Evans | |
| Project design (WSI) originator | Jonathan Gill | |
| Project Manager | Jonathan Gill | |
| Project author | Angela Warner | |
| PROJECT ARCHIVE | | |
| | | Content |
| Physical | Merseyside Historic Environment Record | Site records, report, notes, digital photos |
| Paper | | |
| Digital | ADS | |




Contains OS data © Crown Copyright and database right 2018
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA,

Figure 1: Site location

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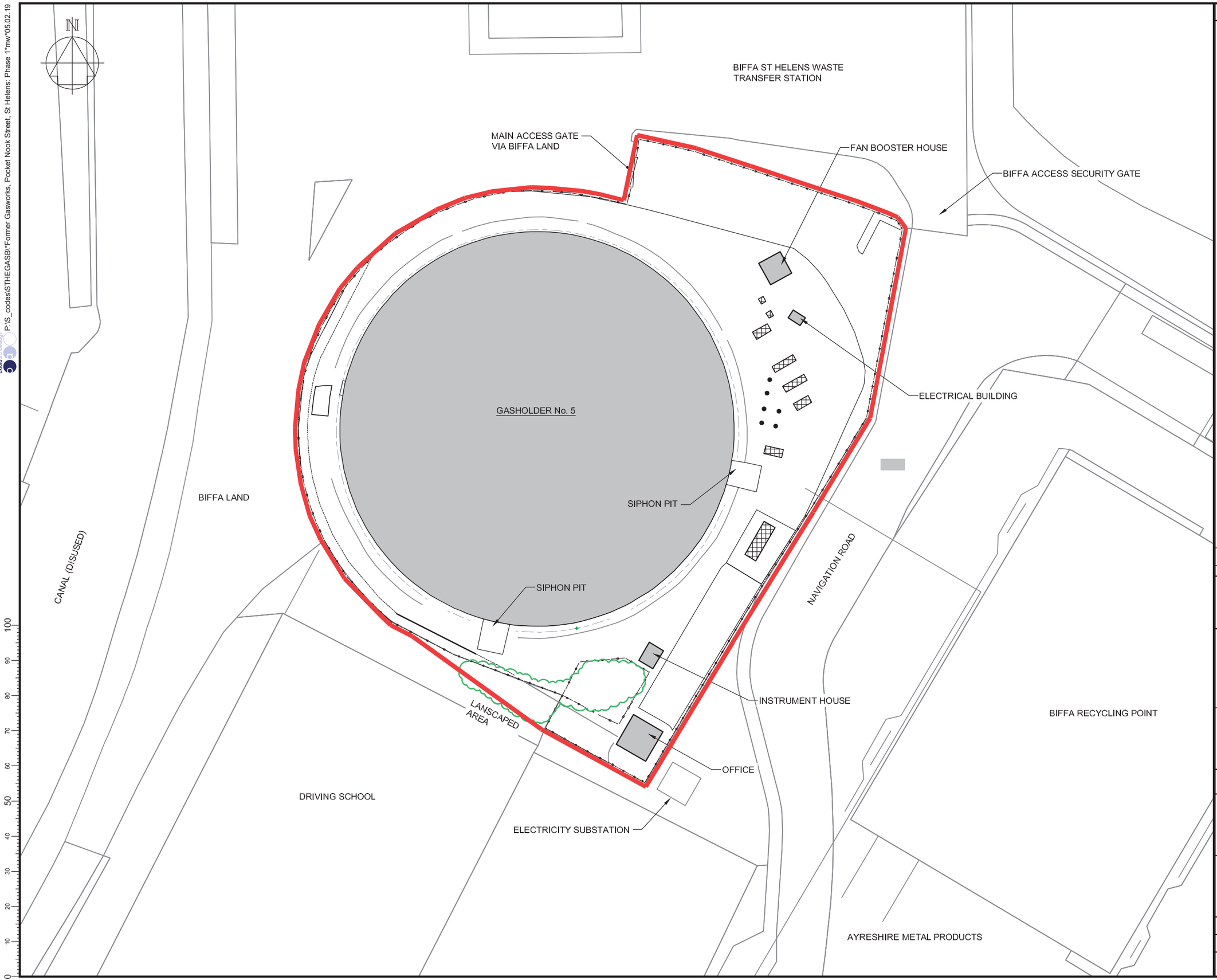


## Notes

LEGEND

- NGP AREA SUBJECT TO PLANNING SUBMISSION
- STRUCTURES TO BE DEMOLISHED (CONCRETE SLAB TO REMAIN)
- HEAVY VEGETATION AND TREES
- PALISADE FENCE
- CONCRETE PLINTH
- GAS PIPES ISOLATED AT GROUND LEVEL

NATIONAL GRID REFERENCE:
E 352060
N 395892

| Rev. | Date | Amendment Details | Orig | Chk'd | App'd |
|---|---|---|---|---|---|



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nationalgrid

Drawing Status
PLANNING

Project Title
POCKET NOOK STREET
ST HELENS
MERSEYSIDE
(LOCATION CODE 0020)

Drawing Title
PLANNING REQUIREMENTS FOR DEMOLITION

| Scale | Originator | Drawn | Checked | Approved |
|---|---|---|---|---|
| 1:500 | ZM | RE | ZM | JD |
| Original Size | Date | Date | Date | Date |
| A3 | APR. 2018 | APR. 2018 | APR. 2018 | APR. 2018 |

Drawing Number: 118638-0020-PP-01
Revision: RA0

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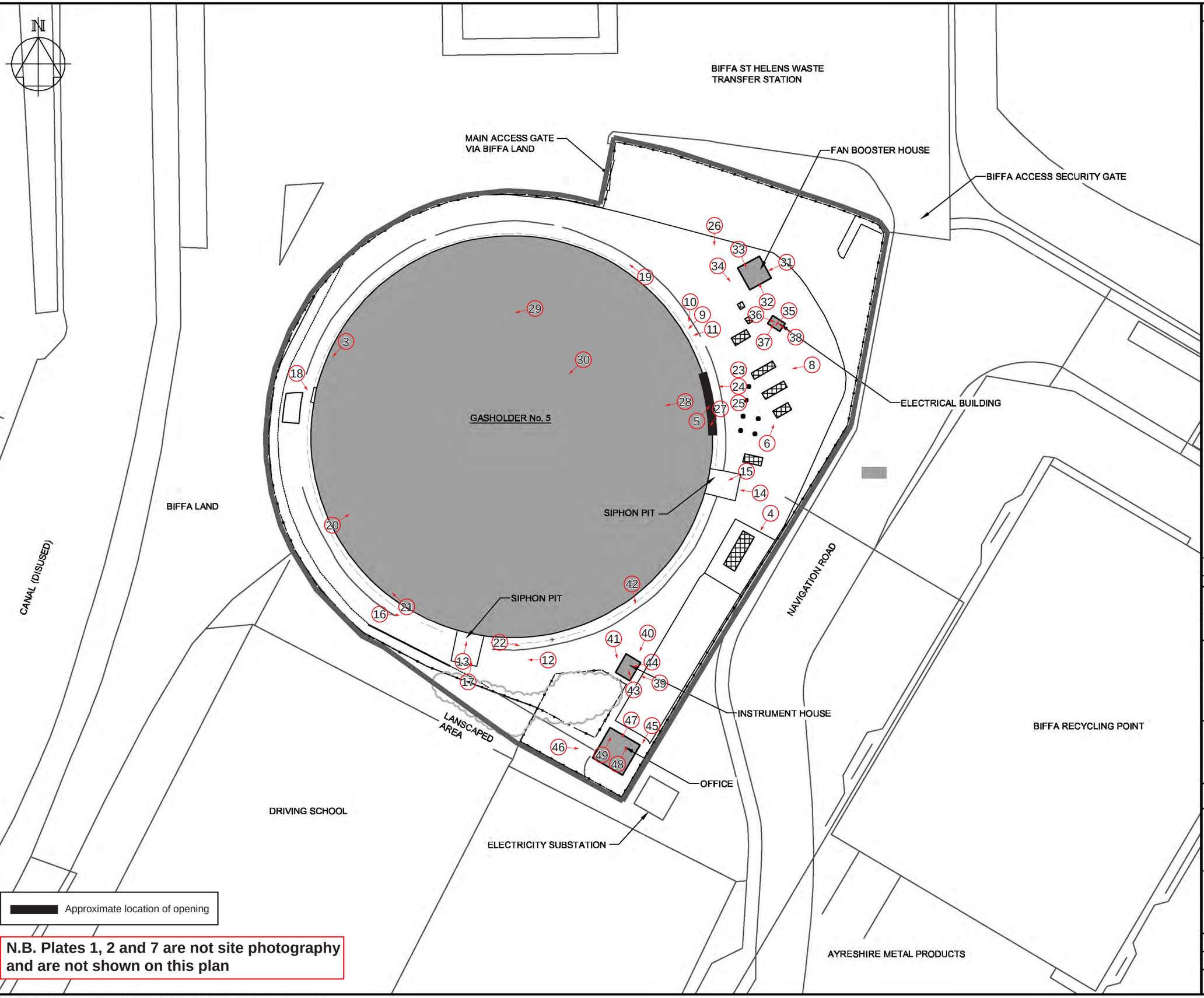
Figure 2: Site plan. Reproduced from the National Grid Demolition Plan submitted as part of Planning Application P/2018/0343/DEMPA




**N.B. Plates 1, 2 and 7 are not site photography and are not shown on this plan**

## Notes

LEGEND

- NGP AREA SUBJECT TO PLANNING SUBMISSION
- STRUCTURES TO BE DEMOLISHED (CONCRETE SLAB TO REMAIN)
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|---|---|---|---|---|---|



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Drawing Status
PLANNING

Project Title
POCKET NOOK STREET
ST HELENS
MERSEYSIDE
(LOCATION CODE 0020)

Drawing Title
PLANNING REQUIREMENTS FOR DEMOLITION

| Scale | Originator | Drawn | Checked | Approved |
|---|---|---|---|---|
| 1:500 | ZM | RE | ZM | JD |
| Original Size | Date | Date | Date | Date |
| A3 | APR. 2018 | APR. 2018 | APR. 2018 | APR. 2018 |

Drawing Number: 118638-0020-PP-01
Revision: RA0

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Figure 3: Photograph locations of plates. Plan based upon the National Grid Demolition Plan


Plate 1: Gasholder 5 with two raised lifts; Gasholder 6 is in the distance. Looking south along the canal, February 2007 ©David Long geograph.org.uk/p/334669 cc-by-sa/2.0


Plate 2: The elevated gas pipeline leading from the gasholder. Looking north-east along Navigation Road. Google Streetview April 2009 ©2018 Google

Plate 3: The original boundary wall between the gasworks site and the canal to the west

Plate 4: A concrete base for an unknown structure to the east of the gasholder

Plate 5: The plinths of the elevated pipeline, fan booster house and electrical building

Plate 6: An example of a plinth of the elevated pipeline


Plate 7: The elevated pipeline joining with the underground pipeline. Google Streetview April 2009 ©2018 Google

Plate 8: Gasholder 5, looking west

Plate 9: The welding and riveting of the tank

Plate 10: The base of the tank

Plate 11: The walkway, handrail and brackets at the top of the tank

Plate 12: The inlet or outlet pipe at the south of the tank

Plate 13: The siphon pit at the south of the tank

Plate 14: The siphon pit at the east of the tank

Plate 15: The siphon pit at the east of the tank

Plate 16: The staircase at the south of the tank


Plate 17: The commemorative plaque at the south of the tank

Plate 18: The holder overflow and methane extraction unit at the west of the tank

Plate 19: The switch apparatus at the north-east of the tank

Plate 20: The crown of the gasholder

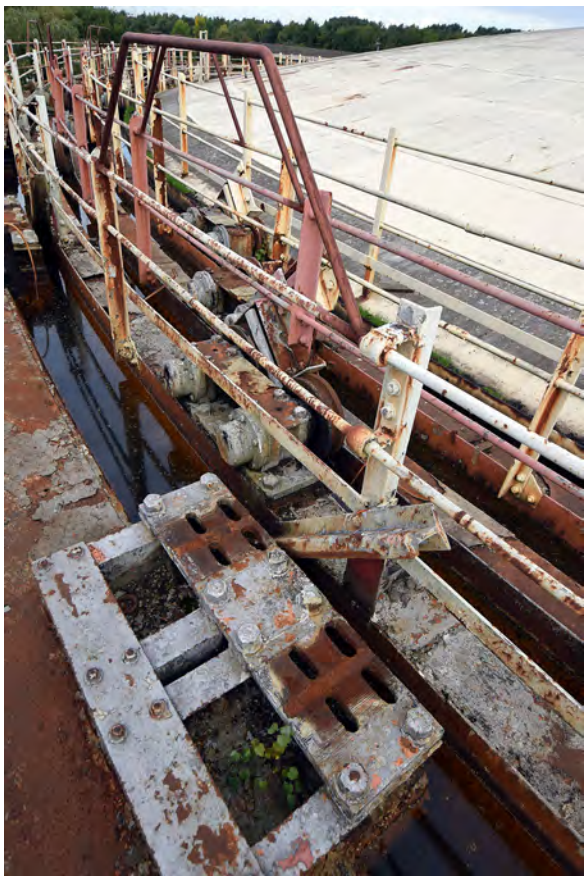

Plate 21: Examples of the roller carriages

Plate 22: Examples of the partially dismantled roller carriages


Plate 23: The cutting sequence of the tank and lifts. Photos provided by John Foster of The Coleman Group

Plate 24: The cutting sequence of the tank and lifts. Photos provided by John Foster of The Coleman Group

Plate 25: The cutting sequence of the tank and lifts. Photos provided by John Foster of The Coleman Group


Plate 26: The opening in the gasholder, looking approximately south

Plate 27: The section through the tank and lifts


Plate 28: The inside of the gasholder following the partial removal of the crown

Plate 29: The structure of a crown truss

Plate 30: The structure of the crown and post

Plate 31: North-east elevation of the fan booster house

Plate 32: South-west elevation of the fan booster house

Plate 33: North-west elevation of the fan booster house

Plate 34: South-east elevation of the fan booster house with remains of pipe outlet

Plate 35: North-east elevation of the electrical building

Plate 36: North-west elevation of the electrical building

Plate 37: South-west elevation of the electrical building

Plate 38: South-east elevation of the electrical building

Plate 39: South-east elevation of the instrument house

Plate 40: North-east elevation of the instrument house

Plate 41: North-west elevation of the instrument house

Plate 42: The roofs of the instrument house and office, looking south

Plate 43: The interior of the instrument house, looking north

Plate 44: The interior of the instrument house, looking west

Plate 45: South-east elevation of the office building

Plate 46: North-west and south-west elevations of the office building

Plate 47: North-east elevation of the office building

Plate 48: The interior of the front room of the office building, looking north-east

Plate 49: The interior of the rear room of the office building, looking north-east

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