# Former Gasholder Station, Oldham Street, Denton, Greater Manchester

## Historic Building Investigation and Recording Phases 1 and 2

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| Prepared by: | Angela Warner (Buildings Archaeologist) |
| Checked by: | Jon Gill (Senior Project Manager, Buildings Archaeology) |
| Edited by: | Jon Gill (Senior Project Manager, Buildings Archaeology) |
| Approved for Issue by: | Jon Gill (Senior Project Manager, Buildings Archaeology) |
| Signature: | |

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**OA South**
Janus House
Osney Mead
Oxford
OX2 0ES

t. +44 (0)1865 263 800

**OA East**
15 Trafalgar Way
Bar Hill
Cambridge
CB23 8SG

t. +44 (0)1223 850 500

**OA North**
Mill 3
Moor Lane Mills
Moor Lane
Lancaster
LA1 1QD
t. +44 (0)1524 880 250

e. info@oxfordarch.co.uk
w. oxfordarchaeology.com
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# Former Gasholder Station, Oldham Street, Denton: 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 two gasholders and their ancillary buildings at the former gasholder station at Oldham Street to the south-west of the town centre of Denton in Greater Manchester.

Denton's gasworks were located to the north-west of the gasholder site and began production in the late 19th century. The gasholder station was added around 1954 prior to the rebuilding of the gasworks. Two gasholders and three ancillary buildings were all that remained of the gasworks and gasholder station.

Gasholders 3 and 4 were above-ground spiral-guided gasholders. Number 3 had three lifts and was constructed in 1954, number 4 had four lifts and was constructed in 1968. The Boiler House, Governor House and Compressor House survived in altered form to the west of the gasholders.

The switch to natural gas in the late 1960s and the 1970s led to the closure and demolition of gasworks across the country, although this gasholder station was retained for storage. Changes in gas distribution in recent decades have rendered gasholders redundant and the gasholders were isolated from the mains and decommissioned some time prior to their 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 gasholders and associated structures in their context prior to work on site and Phase 2 comprised the recording of the gasholders during their 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 gasholders at the former gasholder station at Oldham Street, Denton in two phases: Phase 1 of recording, prior to their demolition, was undertaken and an illustrated report issued; Phase 2 was undertaken during the demolition work and incorporated the internal areas of the gasholders and the information and images used to create this updated report. Three ancillary buildings 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 gasholder station at Oldham Street, hereafter referred to as 'the site', is situated to the south-west of Denton town centre, approximately 1.1km or just under three quarters of a mile south-west of the former town hall on Market Street (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 produced 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. The written record also incorporates documentary research carried out at the Tameside Local Studies and Archives Centre and from 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 19th September 2018. Further visits were carried out on 23rd January 2019 and 21st February 2019 during the demolition of the gasholders.

# 2 HISTORICAL BACKGROUND

## 2.1 Introduction

2.1.1 The town of Denton is now in the Metropolitan Borough of Tameside in the Metropolitan County of Greater Manchester, but until 1974 was in the county of Lancashire. The history of Denton, particularly its hat making and mining industries and its later bisection by the M67, has been widely published and so this historic description will concentrate solely upon the immediate area of the former gasholder station.

2.1.2 There are no Conservation Areas within the vicinity of the site. There are no listed buildings in the immediate vicinity, the closest being the mid 19th-century Christ Church approximately 680m to the north-east and the farmhouse and associated buildings of Hyde Hall approximately 730m to the SSE. Approximately 250m to the south is the location of the 15th-century Denton Hall, demolished in 1931 and the site now partially covered by industrial buildings. None of the heritage assets in the area are associated with or intervisible with the site.

2.1.3 The site lies upon the sedimentary bedrock of the Pennine Upper Coal Measures Formation with superficial deposits of Till. The site was in agricultural use prior to the construction of the gasholder station in approximately 1954. Windmill Lane, the road to the south of the site, appears on the earliest OS map of 1848, although Oldham Lane, to the west of the site, was not constructed until the development of the area in the early 1950s.

2.1.4 There are few surviving documents relating specifically to the extant gasholders, despite a large collection of plans of the wider gasworks held at the local studies archive and several plans held by the National Gas Archive. Plates are attached to the gasholders which contain information regarding size and capacity, although not referring to the manufacturer or date of construction. The dates of the construction of the gasholders were provided to Montagu Evans by National Grid and these dates have been used in this document, all other information is taken from the available documents available at the aforementioned archives.

## 2.2 Denton's Gasworks

2.2.1 Denton's mid to late 19th-century gasworks were approximately 300m to the north-west of the later gasholder station, on the site now occupied by the Dogs Trust Rehoming Centre on Parkway. In the 1950s, the gasworks were rebuilt slightly to the south of the former site, on the site to the immediate west of the current gasholder station site, although the gasworks were demolished in stages between the 1970s and the 1990s. The gasworks are not part of this study which focusses only upon the gasholder station.

2.2.2 Gasholder 3 was constructed in 1954 to provide additional storage for the earlier gasworks to the north-west and Gasholder 4 was constructed in 1968. Some early plans of the site refer to the extant gasholders as numbers 1 and 2, although this convention was later dropped to reflect the gasholders at the gasworks site.

2.2.3 In 1949, the gas industry was nationalised and the gasworks became part of the North Western Gas Board. 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 sites converted to gasholder stations, as was the case at this site. A plan dated 1972 refers to the site as a gasholder station and does not include the adjacent gasworks so it may be inferred that the gasworks had closed by this date. The two gasholders had been decommissioned and isolated from the network for some time prior to their demolition.

# 3 DESCRIPTION OF THE SITE

## 3.1 Introduction

3.1.1 The site is located to the west of Denton within an industrial area constructed on the site of the former gasworks and surrounding land. The industrial area is to the east of the railway line and the M60 and south of the M67. The triangular gasholder station is bounded to the south-east by Windmill Lane, Oldham Street to the west and industrial properties to the north-east (Figure 2). The site boundary along Oldham Street and part of the boundary along Windmill Lane is a concrete post and panel fence which is of the correct period and condition to be the original boundary (Plate 1). The site is covered in stone chippings spread between concrete and tarmacadam areas.

3.1.2 The south-western part of the site has been sub-divided by a metal palisade fence installed at some point between the Google Streetview surveys of May 2016 and June 2017 (Plate 2). The eastern corner of the site is divided from the rest of the site by a concrete post and chain link fence which has evidently been in place for some decades (Plate 3). These separate compounds house the high-pressure pipework and equipment which is still in use by the gas distribution company, Cadent. The northern part of the site, including the site entrance from Oldham Road, is also separated by a palisade fence and the area in separate use as a storage compound (Plate 4).

3.1.3 Pipework between the gasholders was removed at a point between the production of the drawing produced in April 2008, used here as Figure 2, and the Google Streetview survey of June 2009. The concrete bases survived until the demolition of the gasholders (Plate 5).

3.1.1 At the time of the initial survey, there were only three surviving buildings, other than the gasholders, which were associated with the gasworks or gasholder station function, all other structures were post-2003 (according to the earliest satellite image available from Google Earth) modular cabins or shipping container-type storage. The Boiler House was to the west of Gasholder 4 and within the current site boundary. The Governor House and Compressor House are to the west of the site of Gasholder 3 and are enclosed within the high-pressure compound which, at the time of writing, are to be retained by Cadent and so have only a basic description in this document for the general history and context of the site.

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

## 3.2 Gasholder Number 3

3.2.1 The smaller and southernmost gasholder of the two was constructed in 1954 and was an above-ground spiral-guided gasholder with three lifts with an approximate tank diameter of 162 feet 4 inches (approximately 49.5m) (Plate 6). Information from the plate fitted to the tank stated that the capacity was two million cubic feet or 56 thousand cubic metres, presumably to the nearest rounded figure as the conversion does not correlate (Plate 7).

3.2.2 The tank was of riveted construction (Plate 8). Each of the seven bands was joined with one row of rivets to that above and below and each plate was joined to the adjacent

plate with two rows of rivets to the upper band, four rows to the second band from the top, six rows to the third band, seven to the following three and eight to the lowest band. During the dismantling of the gasholder, the lower band of the tank was noted to be approximately 29mm thick and the band above approximately 25mm, no others could be measured. The lifts were approximately 3mm thick, although an accurate measurement could not be taken due to the burring. Brackets were riveted at regular intervals around the tank, supporting the walkway to which the handrail is attached. There are no surviving available records of the builders of the tank.

3.2.3 The cut-off remains of pairs of inlet and outlet pipes were to the north-east and south-west (Plate 9) of the tank and it was evident where the supporting brackets had been removed from the tank. An access hatch was adjacent to the south-west pipes, the surrounding plate was rivetted to the tank and the hatch was bolted at regular intervals around the edge (Plate 10). A steel staircase provided access at the north-west of the tank. The lift steps were in the same area (Plate 11). The lagged anti-freeze pipes ran across from Gasholder 4 at walkway level (Plate 12).

3.2.4 The walkway at the top of the tank was accessible during the Phase 1 survey. The arrangement of the roller carriages indicated the tanks rotated in alternating directions as they rose (Plate 13). The crown was formed from concentric bands of rivetted steel (Plate 14).

*Interior:*

3.2.5 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 prior to the removal of the crown (Plate 15). The personnel access to the interior was via a short scaffolding platform which obscured the view of the interior and is visible in most photographs (Plates 16 and 17).

3.2.6 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 guiding beams were rivetted (Plates 18 and 19). Standards were to the inner face of the inner lift which supported the primary and secondary trusses of the domed crown structure (Plates 20 and 21).

3.2.7 The steel covering of the crown was supported on concentric steel rings supported on the backs of the trusses. Every third truss was a principal truss, its lower chord being braced against a central steel shaft; this structure supported the crown as it rose and fell and was itself supported by a steel frame in the centre of the tank when the gasholder was empty. Each element of the crown structure and shaft was rivetted.

3.2.8 The internal vertical members of the inlet and outlet pipes remained in the interior of the tank. The floor of the tank consisted of rivetted steel sheets over a concrete base (Plate 22).

## 3.3 Gasholder Number 4

3.3.1 The gasholder was constructed in 1968 and was an above-ground spiral-guided gasholder with four lifts with an approximate tank diameter of 185 feet (approximately 56.4m) (Plate 23). Information from the plate fitted to the tank stated that the capacity was three million cubic feet or 84 thousand cubic metres, presumably one of the

figures is to the nearest rounded figure as the figure should be closer to 85 thousand cubic metres (Plate 24).

3.3.2 The tank was of welded construction with six bands of steel sheets forming the tank. During the dismantling of the gasholder, the lower band of the tank was noted to be approximately 30mm thick, the bands above were increasingly thinner but no others could be measured. The lifts were approximately 3-4mm thick, although an accurate measurement could not be taken due to the burring. Standards were welded at regular intervals around the tank, supporting the walkway. Separate brackets supported the handrail (Plate 25). There were no surviving available records of the builders of the tank.

3.3.3 There were the cut-off remains of pairs of inlet and outlet pipes to the north-west (Plate 26) and south-east of the tank. An access hatch was to the west of the north-west pipes, the surrounding plate was welded to the tank and the hatch was bolted at regular intervals around the edge with two handles welded to the hatch (Plate 27). A steel staircase provided access at the south-west of the tank (Plate 28). The lift steps were to the southern part of the tank. The lagged anti-freeze pipe ran around the walkway of the tank, originally connected to the Boiler House, and continued at walkway level around Gasholder 3 (shown in Plates 12 and 28).

3.3.4 The walkway at the top of the tank was accessible during the initial survey visit. The arrangement of the roller carriages indicated the tanks rotated in alternating directions as they rose (Plate 29). The crown was formed from concentric bands of welded steel (Plates 30 & 31).

3.3.5 A methane extraction unit was shown to the east of the tank on the drainage plan used in Figure 2 but had been removed by the time of the initial survey.

*Interior:*

3.3.6 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. Due to structural instability, the crown was partially dismantled prior to arriving on site, allowing low-level fog into the gasholder, affecting the photographs (Plate 32).

3.3.7 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 guiding beams were welded (Plates 33 and 34). Standards were attached to the inner face of the inner lift which supported the trusses of the domed crown structure. (Plate 35). The steel covering of the crown was supported on concentric steel rings supported on the backs of the trusses.

3.3.8 Visibility was poor and structural instability prevented close inspection of the crown structure, however, it appeared that alternating trusses were principal trusses, spanning between the central post and the inner lift, with the intermediate trusses being secondary and spanning between the mid-way point and the inner lift. The central steel shaft supported the crown as it rose and fell and was itself supported by a steel frame in the centre of the tank when the gasholder was empty. Each element of the crown structure and shaft appeared to be bolted.

3.3.9 The floor of the tank consisted of welded steel sheets over a concrete base (Plates 36 and 37).

## 3.4 Boiler House

3.4.1 The boiler house was the only other structure associated with the gasholder station within the site boundary rather than the high-pressure compound. The building was at the western edge of the site, to the west of Gasholder 4 and aligned north to south (Plate 38).

3.4.2 The structure was clad with corrugated metal panels to each elevation and the pitched roof and was set upon a concrete pad (Plates 39 to 41). Two window openings in the west elevation and a double-doorway in the south elevation had been blocked with corrugated metal sheets. Two corrugated plastic window openings and metal double doors were to the east elevation.

3.4.3 There were several outlet pipes in the east elevation, including that connected to the anti-freeze pipes around the gasholders, and a flue in the roof. To the north and to the southern end of the west elevation of the building were brick structures which previously supported and sheltered equipment respectively (Plate 43).

*Interior:*

3.4.4 The interior of the building was not accessible during any visit.

3.4.5 The asbestos survey includes little information of the structure or interior of the boiler house as the majority of the asbestos containing materials consisted of gaskets stored in the building or fitted to the boilers. It can be gleaned from the photographs, however, that the boiler house consisted of a simple metal frame structure to which the corrugated metal was fitted directly, with a painted concrete floor.

## 3.5 Governor House and Compressor House Buildings

3.5.1 As discussed, the buildings are in a fenced-off area and now associated with the high-pressure compound rather than the gasholder station (shown in Plate 2). No access could be gained during any visit to inspect the exteriors of the buildings, although they were visible from the walkways of the gasholder tanks and through the railings.

3.5.2 The buildings were originally one structure, contemporary with Gasholder 3, and at an unknown point in the late 20th century, after 1972 which is the date of the latest available National Gas Archive plan, the central part of the building was demolished and the exposed frames of the bays infilled or partitions made good. The individual structures have since been re-roofed in slightly different styles.

3.5.3 Both remaining parts are flat-roofed single-storey concrete-framed buildings with brick infill panels in English garden wall bond with numerous later alterations in stretcher bond, some in common bricks (Plate 44). The window and door frames are pre-cast concrete, although the main entrance door in the north elevation is set in a brick arched doorway with concrete detailing (visible in Plate 2). The metal-framed windows are glazed with obscure glass blocks (Plate 45).

*Interior:*

3.5.4 The interiors of the buildings were not accessible during any visit and they were not included in the asbestos report.

3.5.5 The drainage plan, used in Figure 2, shows the subdivisions within the buildings and their former functions. The governor house was located in the southernmost square-shaped part of the building with a small WC partitioned-off in the north-east corner; the north to south rectangular range contained the instrument house to the north with the southern half containing the electricity sub-station and the electrical switch room; a store was to the eastern end. The compressor house building contained the compressor house in the western half, the diesel house in the east.

# 4 CONCLUSION

4.1.1 Denton's gasworks were first developed in the late 19th century on agricultural land to the north-west of this later gasholder station. In 1954, the gasworks were expanded by the addition of a third gasholder on a newly developed site on Windmill Lane to its south-east, and the production site was re-built to the immediate south of the original works. An additional larger gasholder was constructed in 1968, however, the switch to natural gas in the 1970s led to the closure of the gasworks and the site was retained as a gasholder station. A new boiler house was constructed as a simple metal-clad shed and later the original compressor house was divided into two buildings. The remainder of the former gasworks site was redeveloped in stages as industrial units and a dog rehoming centre.

4.1.2 Gas distribution has improved in recent decades and the gasholders were rendered redundant and were decommissioned sometime before their demolition in January and February 2019 to allow the site to be prepared for redevelopment.

4.1.3 This Historic Building Recording has focussed upon researching the history of the site and photographing the structures and their context before and during their dismantling. An archive has been collated to provide a permanent record of the structures which will be accessible at both the county 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*

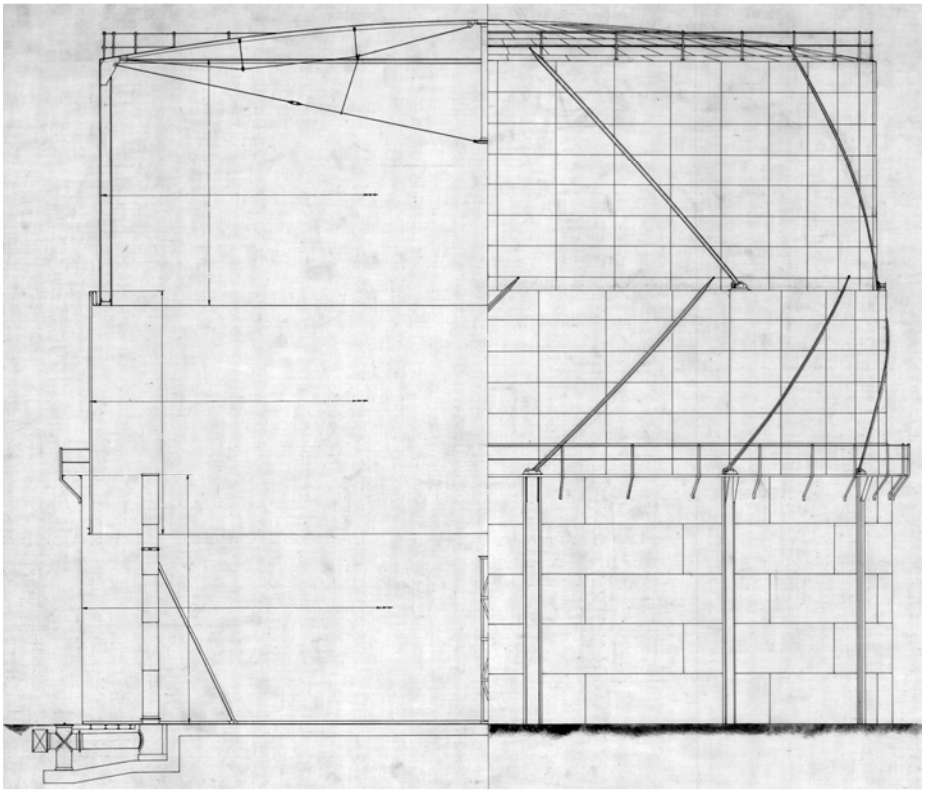
The earliest gasholders were small and built of iron or wood with the moving vessel guided by counter weights on chains. The wooden tanks particularly, sometimes repurposed from the brewing industry, were unreliable and prone to leaking.

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).

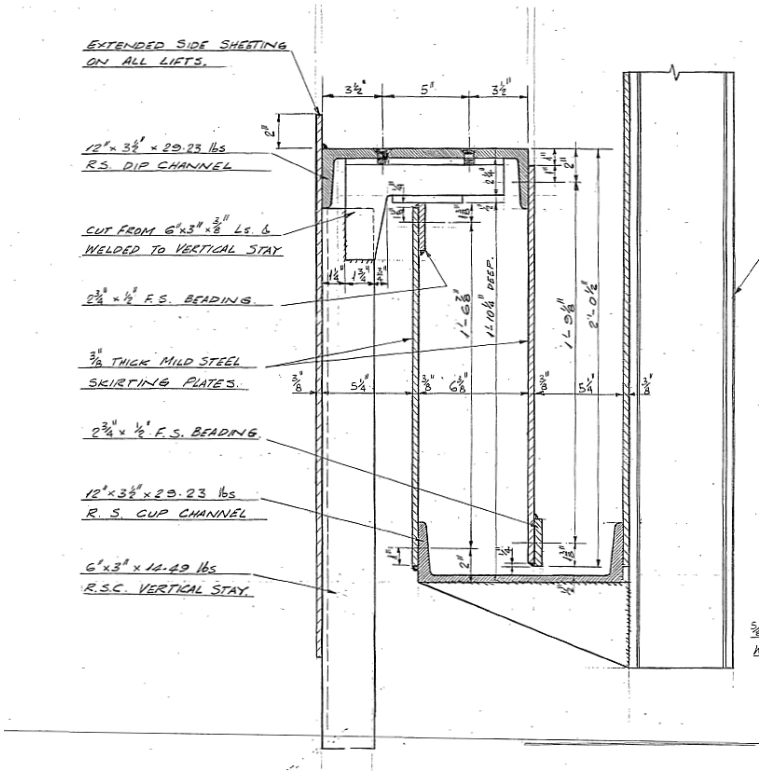
By the time the industry became established, above ground tanks were usually made from steel on a circular concrete slab. The steel floor plate was laid on top of the slab and the steel plates forming the sides of the tank were attached to the floor plate using a steel curb. The sides of the tank were 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 *c*1850 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).

## APPENDIX BIBLIOGRAPHY

### Publications

Meade, A., *Modern Gasworks Practice* (1921) London

Stewart, E.G., *Town Gas: Its Manufacture and Distribution* (1958) Science Museum/HMSO, London

### Unpublished Studies, Articles and Papers

Lancaster University Archaeological Unit *MPP Gas Industry: Step 1 Report* (1997) English Heritage

Thomas, R., *Gasholders and their Tanks* (2014) Private Publication

Thomas, R., *The History and Operation of Gasworks (Manufactured Gas Plants) in Britain* (2014) Private Publication

Thomas, R., *The History of Gas Manufacture in the UK*, lecture notes, Newcomen Society, Birmingham Science Museum, delivered 6 March 2019

Tucker, M. T., *London Gasholders Survey: The Development of the Gasholder in London in the Later Nineteenth Century. Part A: General* (2000/rev. 2014) English Heritage

# APPENDIX B BIBLIOGRAPHY

**Client Documentation**
Montagu Evans LLP *Former Gasholder Station at Oldham Street, Denton: Historic Building Recording Brief* June 2017

SOCOTEC Asbestos Ltd *Asbestos Demolition Report for SWECO UK of Denton, Oldham Street, Denton, Greater Manchester, M34 3RB* November 2017

**Guidance Documents**
Historic England *Understanding Historic Buildings: A Guide to Good Recording Practice* (2016)

**Gas Archive Documents**
Document reference: NW/NC/DEN/E/E/2 *Layout of Surface Water and Soil Drain (Part 1)* (9 September 1955)

Document reference: NW/NC/DEN/E/E/7 *General Arrangement of site for 3 Mill. cu.ft. gasholder* (January 1966)

Document reference: NW/NC/DEN/E/E/8 *Denton (Holder Station)* (November 1972)

**Tameside Local Studies and Archives Centre Documents**
Document reference: CA/DEN/711/1 *Large number of plans of North Western Gas Works – mainly of new works in Denton* (mid 20th-century)

**Maps**
Ordnance Survey 6-inch Edition of 1848
Ordnance Survey 6-inch Edition of 1882
Ordnance Survey 6-inch Edition of 1899
Ordnance Survey 6-inch Edition of 1911
Ordnance Survey 6-inch Edition of 1923
Ordnance Survey 6-inch Edition of 1938
Ordnance Survey 1:10,560 Edition of 1954
Ordnance Survey 1:2500 Edition of 1963
Ordnance Survey 1:10,560 Edition of 1971
Ordnance Survey 1:10,000 Edition of 1982
Ordnance Survey 1:10,000 Edition of 1991-3

**Websites**
British Geological Survey, accessed 7 January 2019
mapapps.bgs.ac.uk/geologyofbritain/home.html

Google Earth, accessed 7 January 2019
earth.google.com

Google Maps, accessed 7 January 2019
google.co.uk/maps

Grace's Guide to British Industrial History, accessed 7 January 2019
gracesguide.co.uk

Heritage Gateway, accessed 7 January 2019
heritagegateway.org.uk

The National Heritage List for England, accessed 7 January 2019
historicengland.org.uk/listing/the-list

Tameside Metropolitan Borough Council, accessed 7 January 2019
www.tameside.gov.uk/conservationareas/locations

# APPENDIX C OASIS FORM

| PROJECT DETAILS | | |
|---|---|---|
| Project name | Building Recording at the Former Gasholder Station at Oldham Street, Denton, Greater Manchester. | |
| Short description | Oxford Archaeology was commissioned by Montagu Evans LLP on behalf of National Grid to create an historic building record of the two surviving gasholders and three ancillary buildings at the former gasworks at Oldham Street, Denton, Greater Manchester, before and during the dismantling of the gasholders. Gasholders 3 and 4 were above-ground spiral-guided gasholders with three and four lifts respectively, constructed in 1954 and 1968. 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 19 September 2018, 23 January 2019 and 21 February 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 Gasholder Station at Oldham Street, Denton, Greater Manchester. | |
| Study area | The enclosure containing the gasholders is approximately 130m x 65m | |
| Site co-ordinates | SJ 91485 94994 | |
| 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 | Greater Manchester Historic Environment Record | Site records, report, notes, digital photos |
| Paper | | |
| Digital | ADS | |


Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 1: Site location

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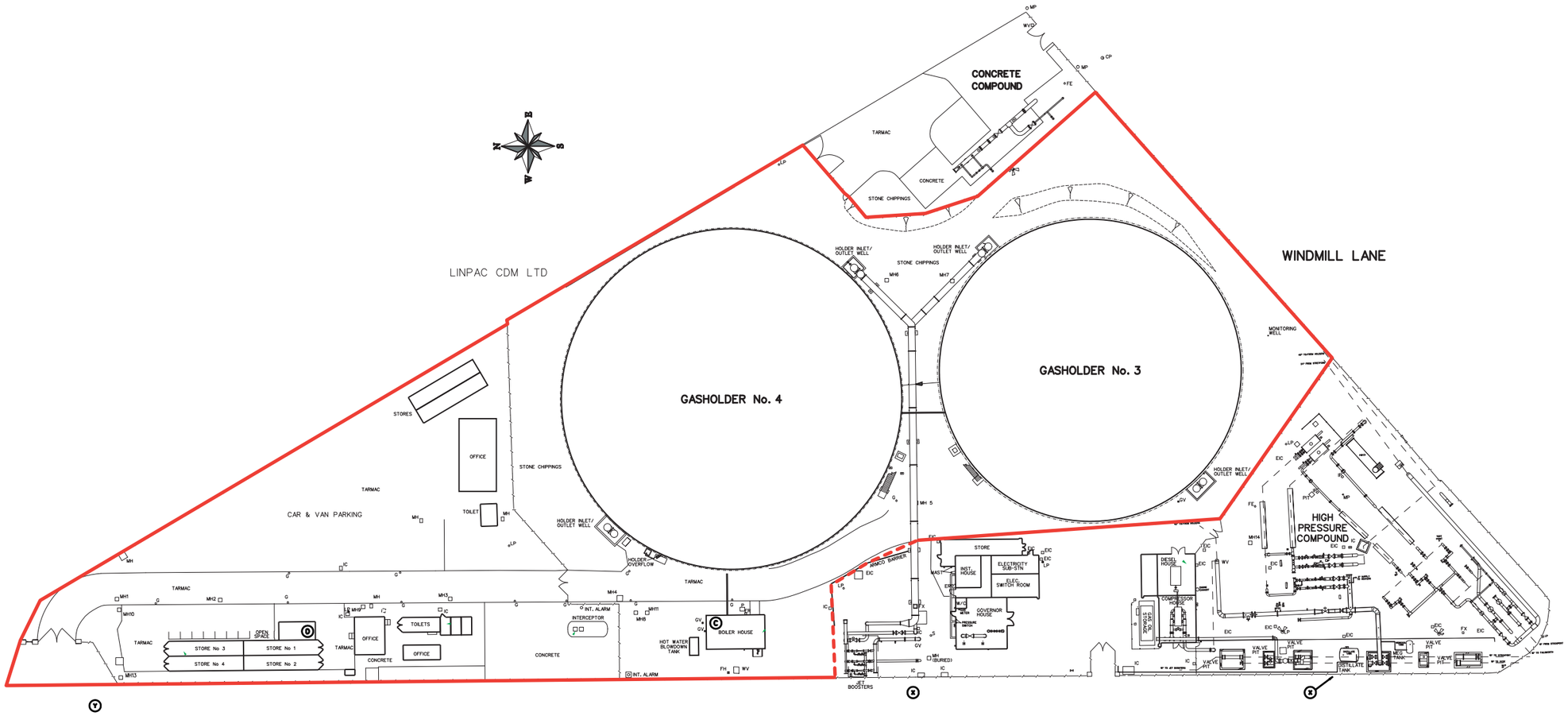


Figure 2: Site plan. Based upon the National Grid Drainage Plan dated April 2008

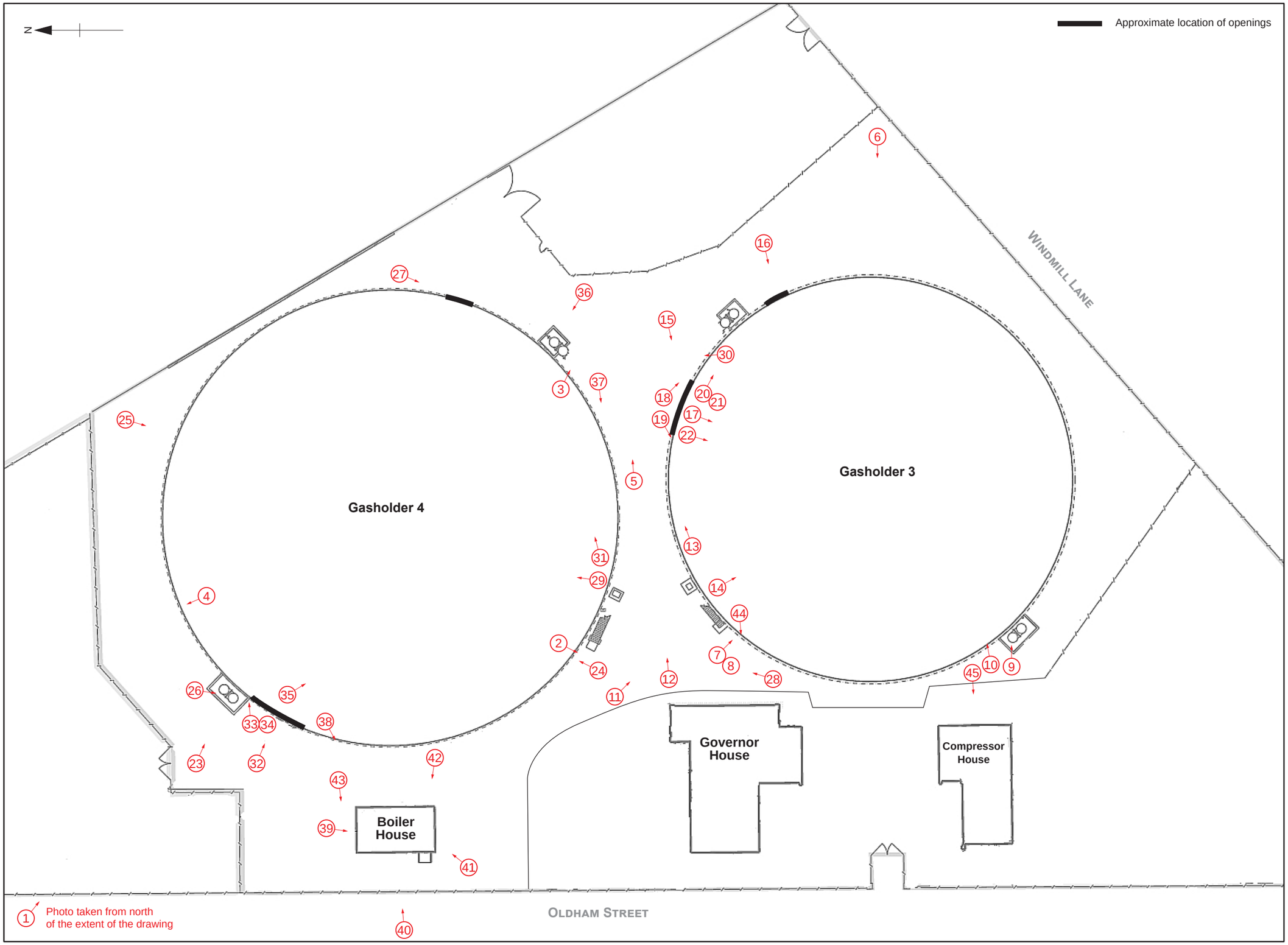


Figure 3: Photograph locations of plates. Plan based upon the National Grid Drainage Plan

Plate 1: The site boundary along Oldham Street, looking approximately south

Plate 2: The compound containing the Governor House and Compressor House


Plate 3: The compound at the east of the site

Plate 4: The compound at the north of the site

Plate 5: An example of a concrete base for the pipework, since removed

Plate 6: Gasholder 3, looking north-west

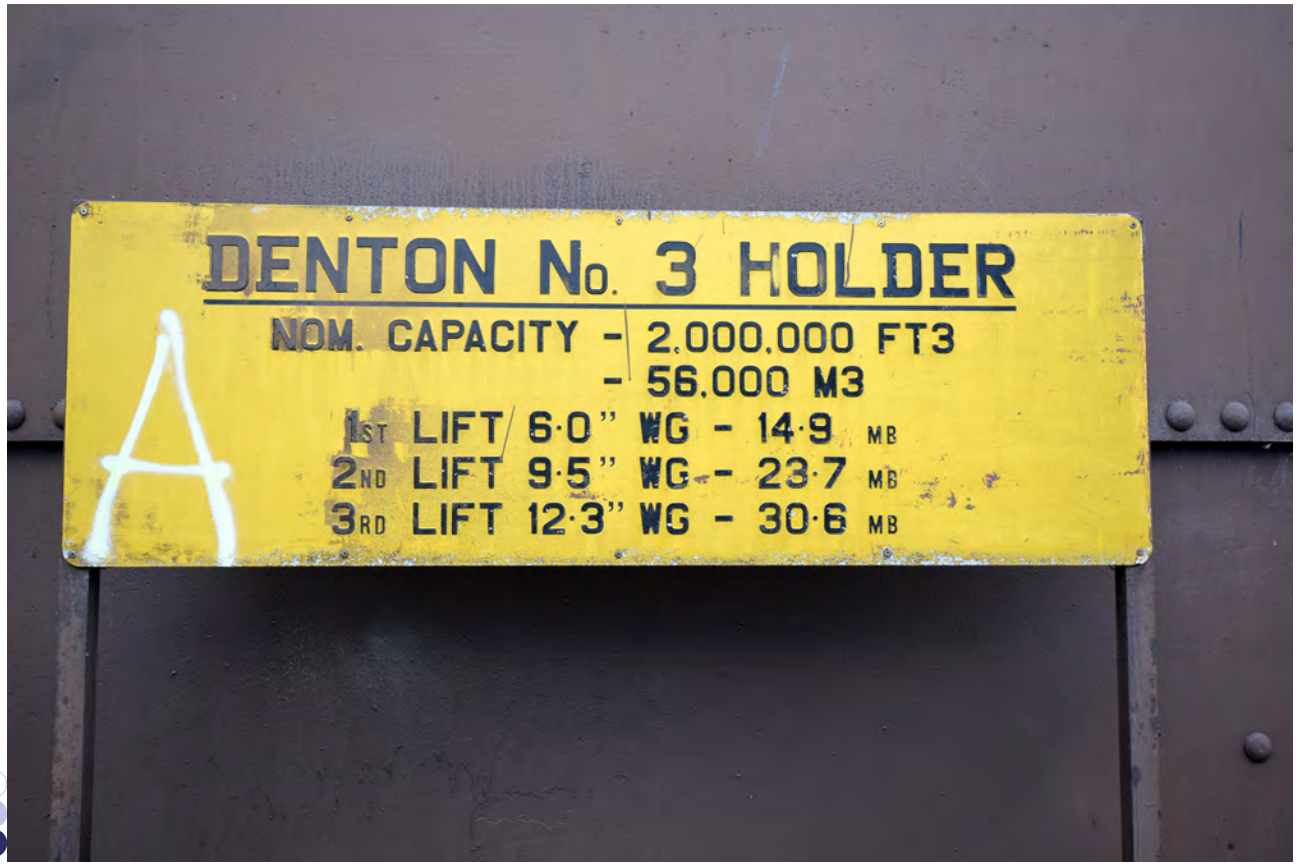


Plate 7: Information plate fitted to Gasholder 3

Plate 8: Example of the riveting of Gasholder 3

Plate 9: The cut-off remains of the inlet-outlet pipes at the south-west of Gasholder 3

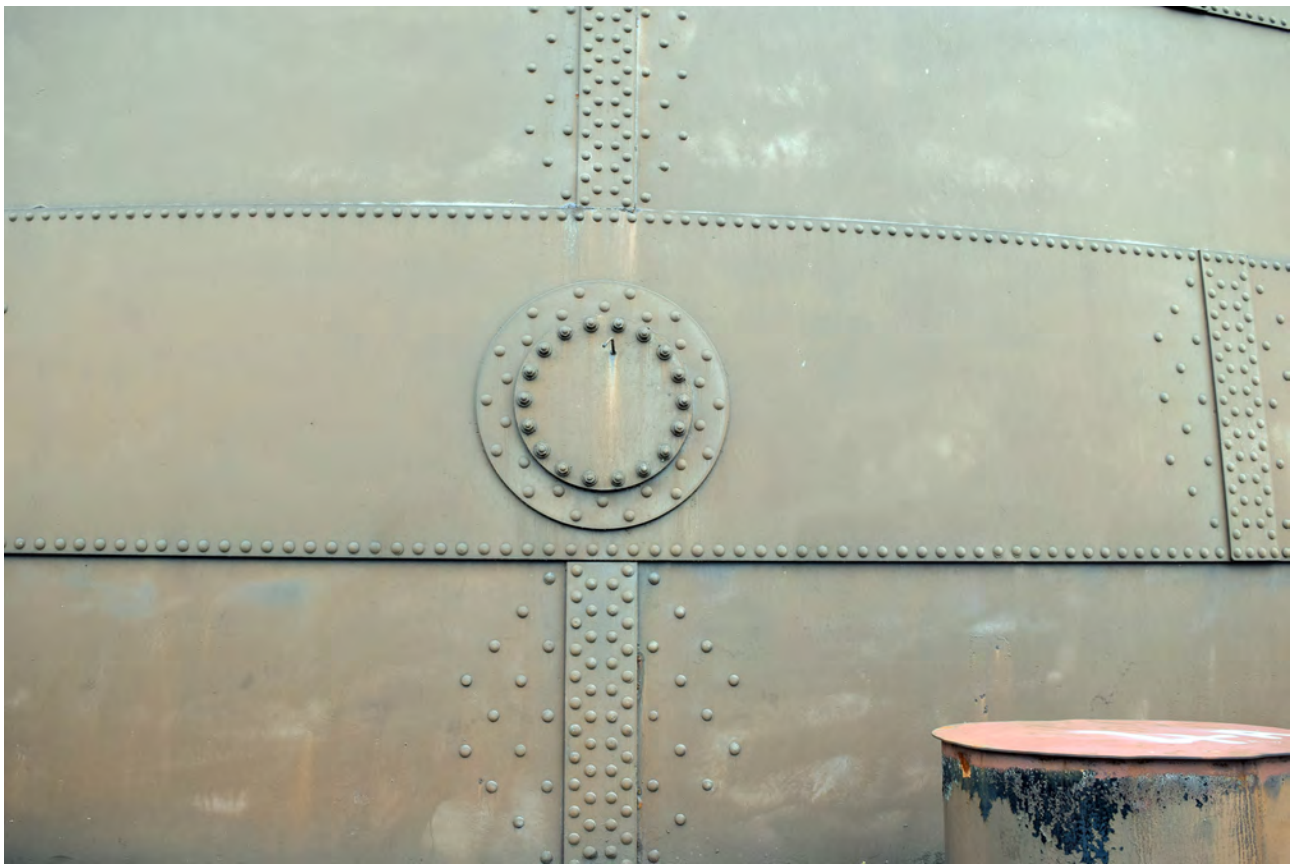

Plate 10: The access hatch to Gasholder 3

Plate 11: The staircase and lift steps of Gasholder 3

Plate 12: The anti-freeze pipes running between the two gasholders

Plate 13: An example of the roller carriages of Gasholder 3

Plate 14: The crown of Gasholder 3


Plate 15: The main opening in Gasholder 3, looking west

Plate 16: The secondary opening in Gasholder 3, looking west

Plate 17: The interior of Gasholder 3

Plate 18: A section through the tank and lifts of Gasholder 3

Plate 19: Examples of the joins and attachments of Gasholder 3

Plate 20: The interior of gasholder 3

Plate 21: The underside of the crown of Gasholder 3

Plate 22: The floor of Gasholder 3

Plate 23: Gasholder 4, looking south-east


Plate 24: Information plate fitted to Gasholder 4

Plate 25: An example of the walkway and railing fittings to Gasholder 4

Plate 26: The cut-off remains of the inlet-outlet pipes at the north-west of Gasholder 4

Plate 27: The access hatch to Gasholder 4

Plate 28: The staircase and lift steps of Gasholder 4

Plate 29: An example of the roller carriages of Gasholder 4

Plate 30: The crown of Gasholder 4

Plate 31: The crown of Gasholder 4

Plate 32: The main opening in Gasholder 4, looking south-east

Plate 33: A section through the tank and lifts of Gasholder 4

Plate 34: An example of the join in panels of the tank of Gasholder 4


Plate 35: A section of the crown structure of Gasholder 4


Plate 36: The partially-demolished Gasholder 4

Plate 37: The partially demolished Gasholder 4

Plate 38: The Boiler House seen from the walkway of Gasholder 4

Plate 39: The north elevation of the Boiler House

Plate 40: The west elevation of the Boiler House

Plate 41: The south elevation of the Boiler House

Plate 42: The east elevation of the Boiler House

Plate 43: The base of a since-removed tank to the north of the Boiler House


Plate 44: The east elevation of the Governor House


Plate 45: The east elevation of the Compressor House

oxfordarchaeology


**Head Office/Registered Office/ OA South**

Janus House
Osney Mead
Oxford OX2 0ES

t: +44 (0) 1865 263 800
f: +44 (0) 1865 793 496
e: info@oxfordarchaeology.com
w: http://oxfordarchaeology.com

**OA North**

Mill 3
Moor Lane
Lancaster LA1 1QD

t: +44 (0) 1524 541 000
f: +44 (0) 1524 848 606
e: oanorth@oxfordarchaeology.com
w: http://oxfordarchaeology.com

**OA East**

15 Trafalgar Way
Bar Hill
Cambridgeshire
CB23 8SQ

t: +44 (0) 1223 850500
e: oaeast@oxfordarchaeology.com
w: http://oxfordarchaeology.com