



Former Gasworks, Clayton Road, Lincoln

Historic Building Investigation and Recording Phases 1 and 2

September 2019

Client: Montagu Evans LLP

Issue No: 1

OA Reference No: LINGASBS

NGR: SK 97183 68722



Client Name: Montagu Evans LLP
Document Title: Former Gasworks, Clayton Road, Lincoln: Phases 1 and 2
Document Type: Historic Building Investigation and Recording
Grid Reference: SK 97183 68722
Planning Reference: 2018/0624/PAD
Site Code: LINGAS18
Invoice Code: LINGASBS

OA Document File Location:

OA Graphics File Location:

Issue No: Issue 1
Date: September 2019
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:

.....

Disclaimer:

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Oxford Archaeology being obtained. Oxford Archaeology accepts no responsibility or liability for the consequences of this document being used for a purpose other than the purposes for which it was commissioned. Any person/party using or relying on the document for such other purposes agrees and will by such use or reliance be taken to confirm their agreement to indemnify Oxford Archaeology for all loss or damage resulting therefrom. Oxford Archaeology accepts no responsibility or liability for this document to any party other than the person/party by whom it was commissioned.

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

Oxford Archaeology is a registered Charity: No. 285627



Former Gasworks, Clayton Road, Lincoln: Phases 1 and 2

Historic Building Investigation and Recording

Written by Angela Warner

Contents

Summary.....	vii
1 INTRODUCTION.....	1
1.1 Project Background.....	1
1.2 Aims and Objectives	1
1.3 Methodology	1
2 HISTORICAL BACKGROUND.....	3
2.1 Introduction.....	3
2.2 'Bracebridge' Gasworks, Lincoln	4
3 DESCRIPTION OF THE SITE	6
3.1 Introduction.....	6
3.2 Gasholder Number 3	6
3.3 Gasholder Number 4	8
3.4 Control Block	9
3.5 Office	10
4 CONCLUSION	11
APPENDIX A A SUMMARY OF GASWORKS' PLANT AND PROCESSES	12
APPENDIX B BIBLIOGRAPHY	19
APPENDIX C OASIS FORM	21

List of Figures

- Fig. 1 Location plan
Fig. 2 Site plan. 1958 with alterations of 1962. National Gas Archive ref: EM/LIC/E/E/1
Fig. 3 National Grid Site Drainage Layout showing the extant structures
Fig. 4 Photograph locations of plates. Plan based upon the National Grid Site Drainage Layout

List of Plates

- Plate 1 Gasholder 4. Taken from the inauguration pamphlet of 1940. National Gas Archive ref: G11/LIN/5414
Plate 2 Aerial photo of the site taken between 1940-1952. National Gas Archive ref: AA1204P
Plate 3 Distribution plant to the east of the gasholders
Plate 4 An example of the polycarbonate kiosks
Plate 5 Gasholder 3 taken from the top of the tank of Gasholder 4, looking north
Plate 6 The commemorative plaque on Gasholder 3
Plate 7 The bund surrounding Gasholder 3
Plate 8 Gasholder 3, looking east.
Plate 9 The blanked-off pipe at the north of Gasholder 3
Plate 10 The east cutting through the tank and lifts of Gasholder 3
Plate 11 The interior of Gasholder 3, looking west
Plate 12 A cross-section of the tank and lifts of Gasholder 3
Plate 13 A cross-section of the tank and lifts of Gasholder 3
Plate 14 An example of the rivetted join between steel plates of a lift in Gasholder 3
Plate 15 The columns supporting the crown structure of Gasholder 3
Plate 16 The crown structure of Gasholder 3
Plate 17 The remains of an inlet/outlet pipe in Gasholder 3
Plate 18 The concrete base of Gasholder 3 following the removal of the tank
Plate 19 Gasholder 4, looking south
Plate 20 An example of the lift steps of Gasholder 4
Plate 21 The commemorative plaque on Gasholder 4
Plate 22 The bund surrounding Gasholder 4
Plate 23 The inlet and outlet pipes at the north-east of Gasholder 4
Plate 24 The staircase of Gasholder 4
Plate 25 The crown of Gasholder 4
Plate 26 An example of the roller carriages of Gasholder 4
Plate 27 The north-west cutting through the tank and lifts of Gasholder 4
Plate 28 The interior of Gasholder 4, looking north
Plate 29 A cross-section of the tank and lifts of Gasholder 4
Plate 30 A cross-section of the lifts of Gasholder 4
Plate 31 An example of a former access between the lifts of Gasholder 4
Plate 32 A cross-section of a guide of Gasholder 4
Plate 33 An example of the rivetted join between plates of the tank of Gasholder 4

Plate 34	The columns supporting the crown structure of Gasholder 4
Plate 35	The crown structure of Gasholder 4
Plate 36	The manufacture's name on a column in Gasholder 4
Plate 37	The floor of Gasholder 4 with a removed section of the crown
Plate 38	The two ancillary buildings in relation to Gasholder 4, looking south
Plate 39	The west elevation of the control block
Plate 40	The interior of the boiler house
Plate 41	The south elevations of the ancillary buildings
Plate 42	The west elevation of the office building
Plate 43	The interior of the office

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 gasworks in Bracebridge to the south of Lincoln city centre.

Gasholders 3 and 4 were above-ground spiral-guided gasholders; number 3 had three lifts and was constructed in 1931, number 4 had four lifts and was constructed in 1940. The gasworks was constructed on land purchased in 1874 to supplement the gas produced at the earlier works in Newlands, which later closed. The switch to natural gas in the late 1960s and the 1970s led to the closure of the gasworks, although the gasholders were retained for storage and the site converted to a gasholder station. 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 3 and 4 at the former gasworks in Clayton Road, Bracebridge, Lincoln 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.
- 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 at Clayton Road in the suburb of Bracebridge in Lincoln, hereafter referred to as 'the site', is situated to the south of Lincoln city centre, approximately 3.2km or two miles south of Lincoln Cathedral (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, however, this site also had the requirement of a Level 2 survey as condition 3 of Lincoln Council's consent for planning application 2018/0624/PAD, which states:

'Prior to the demolition hereby approved, all of the affected buildings on site should be subject to a Level 2 analytical record, as described in Understanding Historic Buildings...

Reason: In order to provide a reasonable opportunity to record the history of the site.'

- 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 Lincolnshire County Archive 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 Thursday 12th July 2018. Further visits were carried out on 8th February and 18 April 2019 during the demolition of the gasholders.

2 HISTORICAL BACKGROUND

2.1 Introduction

- 2.1.1 The history of the town of Lincoln has been extensively studied and published and so this historic description will concentrate solely upon the history of the former Bracebridge Gasworks and the immediate area.
- 2.1.2 The site lies upon the sedimentary mudstone bedrock of the Charmouth Mudstone Formation. No superficial deposits have been recorded on this part of the former gasworks, although fluvial sand and gravel deposits of the River Terrace Deposits have been recorded to the western area of the former gasworks.
- 2.1.3 There are no records for this site held by the Lincolnshire Historic Environment Record which have been made available via the Heritage Gateway website. The route of the Fosse Way, the major Roman route between Exeter and Lincoln, runs along the Newark Road to the west of the site. The closest find spot noted in this resource is the find spot of a Roman coin found in 1974 in the allotments (now wasteland) just to the south of the site. A fieldwalking exercise on common land approximately 275m to the north-east of the site produced a quantity of 16th-century brick and tile fragments with some Roman fragments.
- 2.1.4 No listed buildings are in the vicinity; two 19th-century grade II listed buildings are approximately 700m to the south-west of the site; a 19th-century grade II listed church is approximately 850m to the north; and a 19th-century grade II listed park and garden is approximately 500m to the west, beyond the river. None of the designated heritage assets are associated with or intervisible with the site. There are locally listed buildings within the vicinity of Newark Road, although these are not associated with or intervisible with the site.
- 2.1.5 The St Catherines Conservation Area is to the north and east of the site and is set along the A15 and incorporates the houses along the route. There are some glimpsed views of the site from the public areas of the conservation area and uninterrupted views from the properties. The industrial history of the area is not associated with the designation of the conservation area.
- 2.1.6 The open areas, including wooded areas, playing fields and open wasteland, to the east and south of the site are designated as 'green wedges' and areas of landscape value. There is intervisibility with much of this land and the site, although no known association.
- 2.1.7 The railway which lay to the east of the original gasworks, and ran through the centre of the gasworks site once Gasholders 3 and 4 were constructed, was the Lincoln to Honington branch of the Great Northern Railway (part of the London and North Eastern Railway after 1923). Sidings were added when the gasworks was constructed. The line first opened in 1867 and was closed to passengers in 1965 and the lines had been removed by the mid-1970s editions of the Ordnance Survey (OS) maps.

2.2 'Bracebridge' Gasworks, Lincoln

- 2.2.1 Lincoln's first gasworks was located in Newlands, to the west of the city centre, and began production in 1830. Following several phases of expansion, it was decided that an additional site was needed. Land at Bracebridge, to the south of the city and to the west of the railway line, was purchased; work began on the second gas works in 1874 and production began in 1876. The plans and specifications for the first gasholder were drawn up by William Throsby, and it was erected by Daniel Howard of West Bromwich; the building of the new works was planned by Messers. Bellamy and Hardy and these and the retort house were constructed by Samuel Sherwin of Boston (Roberts, 1981, 20). A second gasholder was added within a decade. The gasworks had its own railway sidings, to the east of the works.
- 2.2.2 By the first edition of the OS maps, the gasworks is well-established on the site. The first two gasholders, which were below-ground column-guided gasholders, were located to the north-western part of the site. The manufacturing plant was based mainly to the southern end, with the railway sidings leading to the coal-handling plant. By the following edition of 1907, two small tanks, likely to be for the by-products, and several small buildings have been erected on the site. Throughout the following decades the plant is regularly extended and updated.
- 2.2.3 A third gasholder, giving an additional 1.5 million cubic feet storage capacity, with a boiler house to its south-west and sidings to the railway line, was completed in October 1931 and was constructed on agricultural land, possibly in use as allotments, to the east of the railway line. The gasworks plant was reconstructed in 1932 and from their completion in October began to produce all of the area's gas and the Newlands gasworks closed in the November. The conversion of the Newlands works to a distribution centre and showrooms began. An official inauguration was held at the Bracebridge works on the 28th June 1933.
- 2.2.4 The gasworks also had its own gardens: the land surrounding the two original gasholders was planted by older employees who were retained on light duties until they were of pensionable age. Flowers and shrubs were planted and waste material and rubble from plant which had been replaced was used for creating sunken rose gardens and rockeries.
- 2.2.5 The Bracebridge site was further extended in 1938 following increased consumption of gas by industry. During the Second World War, an air raid in January 1943 caused damage to a main, but the gasworks was largely unscathed by bombing. A further spiral guided gasholder was constructed in 1940, providing a further 3 million cubic feet of capacity (Plate 1). This was located to the south of the third gasholder to the east of the gasworks plant. An official inauguration ceremony was held on 9th July 1940 for this gasholder. The pamphlet of the inauguration of further new plant in 1946 stated that the gasholders were all camouflaged around this time, although later photographs indicate that the new gasholder was not camouflaged (Plate 2).
- 2.2.6 In 1939, an application was made to the Ministry of Health for permission to expand the carbonising plant, but this was turned down. Increased gas manufacture continued and in 1944, the Ministry of Fuel and Power granted permission for a new vertical retort which was constructed in 1946, capable of increasing the output of gas by 50%.

New railway sidings were completed first to enable the remainder of the scheme to be erected.

- 2.2.7 In 1949, the gas industry was nationalised and the gasworks became part of the East Midlands Gas Board. A continuous rise in demand caused the works to be further expanded in 1952-54.
- 2.2.8 An East Midlands Gas Board site plan dated 1958 with revisions dated May 1962 show the southernmost of the earlier gasholders as having been dismantled and the below-ground tank having been partially infilled (Figure 2). The 500,000 cubic feet gasholder to its north is labelled simply as 'Gas Holder Base' in an East Midlands Gas site plan which appears to have been revised in 1963.
- 2.2.9 A plan of the sidings held at the Lincolnshire County Archive [document reference 7-MLL/8] contains a later annotation which states that the gasworks closed on 31 March 1970. The railway line had already closed to passengers in 1965 and the OS edition of 1976 indicates that the rails have been removed and the gasworks site to the east of the former track is depicted as vacant.
- 2.2.10 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. Following the conversion to natural gas, this site was used as a gasholder station and depot.
- 2.2.11 The majority of the buildings formerly associated with the gasworks and gasholder station, including the booster house, governor house and operational building, remain to the north and north-east of the gasholders in the occupancy of Cadent. 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 south of Lincoln in the suburb of Bracebridge. The gasholder station is less than half of the size of the former gasworks site and the remainder of the gasworks site is now in other use. The gasholder station is aligned roughly north to south and surrounded by modern metal security fencing which encloses the gasholders in an irregularly-shaped enclosure (Figure 3). To the west and south of the site boundary is an access road with school grounds beyond; to the east are further school buildings and sports courts; to the north is a Cadent gas distribution company compound.
- 3.1.2 The site contained two gasholders and two brick buildings. Open-air distribution plant was to the east of the gasholders in a separate enclosure accessed from within the gasholder station (Plate 3). Two small white polycarbonate telemetry kiosks were to the west of Gasholder 3 and north-west of Gasholder 4 (Plate 4). The site was covered in clinker and had become overgrown.
- 3.1.3 A diagram showing the location and direction of the photographs used in the plates is included as Figure 4.

3.2 Gasholder Number 3

- 3.2.1 The gasholder was an above-ground spiral-guided gasholder in a steel tank with three lifts (Plate 5). The inauguration pamphlet detailed the new spiral-guided gasholder's specification as: a mild steel tank of 160 feet in diameter and 26 feet and 8 inches deep. Each annular band of steel 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 two bands and four rows to the four lower bands. Standards were welded at regular intervals around the tank, supporting the walkway. Separate brackets supported the handrail. The three lifts were 158 feet, 155 feet and 152 feet in diameter. The lifts rotated in alternating directions, the outer lift on 24 carriages and the inner and middle lifts on 16 carriages. Two sets of lift steps were to the west of the gasholder and one set was to the east.
- 3.2.2 The gasholder was constructed by Newton Chambers and Co Ltd of Thorncliffe near Sheffield, manufacturers of gas works and chemical plant, heating apparatus and, amongst other things, Izal disinfectant.
- 3.2.3 Only the tank and crown were visible at the time of the Phase 1 survey as the lifts were all retracted in the tank. Aerial photographs dated 1933, available via the Britain from Above website, depict the word 'LINCOLN' painted across the crown. The aerial photograph of 1946 supplied by the National Gas Archive (Plate 2) shows that Gasholder 3 had been painted with camouflage to the tank and lifts.
- 3.2.4 Two metal plates were fixed to the south-west of the gasholder commemorating its opening (Plate 6). They read:

*Corporation of Lincoln
Gas Department.
Gasholder 1 ½ million cubic feet capacity
Made & erected by
Newton Chambers & Co, Ltd.
Sheffield 1931
Councillor CH Doughty. JP Mayor.
Councillor AL Bower. Chairman.
George Wright AMIME City Sheriff,
Gas Engineer and Manager*

*Opening ceremony performed
by
Mrs George Wright
October 26th 1931*

- 3.2.5 Surrounding the gasholder was a narrow dry bund formed from concrete slabs (Plate 7). Inside the bund, fitted to the base of the tank, was a lagged pipe which was part of the antifreeze system. There were three pairs of anti-freeze pipe supports to the top of the tank, at the north, south-east and south-west (Plate 8). There was a pair of inlet and outlet pipes to the west of the tank, set in a brick-lined dry well. A further dry well with a blanked-off pipe was to the north of the tank (Plate 9). A steel staircase provided access at the west of the tank.
- 3.2.6 The walkway at the top of the tank was not accessible during the Phase 1 survey due to nesting kestrels, but the crown was photographed from the adjacent gasholder.
- Interior:*
- 3.2.7 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 (Plates 10 & 11).
- 3.2.8 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 12 to 14). The lower band of the tank was 28mm thick, the band above was 22mm and the following band 20mm, no others could be measured. The overlap between bands two and three was 80mm. The steel sheets forming the lifts were 5mm thick. Columns were attached to the inner face of the inner lift which supported the trusses of the domed crown structure; intermediate horizontal and vertical bracing arrangements were rivetted to the outer ring supporting the crown (Plates 15 & 16).
- 3.2.9 The domed structure of the crown was supported on concentric steel rings braced to the trusses which in turn were braced against a central steel shaft; this structure supported the dome 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.
- 3.2.10 The internal vertical members of the inlet and outlet pipes remained in the interior of the tank (Plate 17). The floor of the tank consisted of rivetted steel sheets over a concrete base (Plate 18).

3.3 Gasholder Number 4

- 3.3.1 The gasholder was an above-ground spiral-guided gasholder in a steel tank with four lifts (Plate 19). The pamphlet for the official inauguration of the gasholder details the gasholder as having had a capacity of 3 million cubic feet. The steel tank was 180 feet in diameter and 34 feet 7 inches deep. The steel sheets which made up the tank were between three-eighths of an inch and one and three-sixteenths of an inch thick. The tank alone used 63,300 rivets, with 325,000 used in total. Each annular band of steel 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 two bands, three rows to the third band from the top of the tank and six rows to the four lower bands. Standards were riveted at regular intervals around the tank, supporting the walkway. Separate brackets supported the handrail. Only the tank and crown were visible as the lifts were all retracted in the tank. The aerial photograph of 1946 supplied by the National Gas Archive shows that, although Gasholder 3 had been painted with camouflage to the tank and lifts, Gasholder 4 was not camouflaged (visible in Plate 2).
- 3.3.2 The outer lift was 180 feet in diameter, decreasing slightly with each lift, with the inner lift being 168 feet 6 inches in diameter; all lifts were 33 feet 9 inches deep. The spiral guides ranged from 18 on the inner lift to 48 on the outer. Two sets of lift steps were to the west of the gasholder and one set was to the north, south-west and south-east (Plate 20).
- 3.3.3 A metal plate was fixed to the north-west of the gasholder commemorating its opening (Plate 21). It read:

*Corporation of Lincoln
Gas Department.
Gasholder 3 million cubic feet capacity
Constructed by
Newton Chambers & Co, Ltd.
Sheffield 1940
Councillor AL Bower. JP Mayor.
George Wright MIME MICE MIBE MIWE,
Gas Engineer & Manager
Opening ceremony performed by
Mrs AL Bower. Mayoress
9th July 1940*

- 3.3.4 Surrounding the gasholder was a dry bund formed from concrete slabs (Plate 22). Inside the bund, fitted to the base of the tank, was a lagged pipe which was part of the antifreeze system. There were two pairs of anti-freeze pipe supports to the top of the tank, at the north and south. There were two pairs of inlet and outlet pipes, one pair to the north-west and one pair to the north-east of the tank (Plate 23). A steel staircase provided access at the west of the tank and also led down into the bund (Plate 24).
- 3.3.5 The walkway at the top of the tank was accessible during the initial visit (Plate 25). The arrangement of the roller carriages indicated the tanks rotated in alternating directions as they rose (Plate 26).

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 and prior to the removal of the crown (Plates 27 & 28).
- 3.3.7 After the opening in the side of the tank and lifts had been cut, it was shown that the steel panels of the lifts and the spiral guiding beams were rivetted (Plates 29 to 33). The lower band of the tank was 30mm thick and the second band 28mm. The lower bands of the lifts were thicker than those above as they incorporated the cups; the third band of each was 3mm thick. Columns were attached to the inner face of the inner lift which supported the trusses of the domed crown structure; intermediate horizontal and vertical bracing arrangements were riveted to the outer ring supporting the crown (Plates 34 & 35). The internal columns were marked *Appleby-Frodingham England* and *British Steel* (Plate 36). The Appleby-Frodingham Steel Company was based in Scunthorpe.
- 3.3.8 The crown structure was itself supported by a steel post and frame in the centre of the tank when the gasholder was empty.
- 3.3.9 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 37).

3.4 Control Block

- 3.4.1 The control block is the larger of the two ancillary buildings and is the northernmost of the two which are located to the west of the gasholders (Plate 38). It is a flat-roofed, single storey brick building in stretcher bond with terracotta vents in the north and east elevations. A single timber door is to the northernmost room, the control room, and timber vented double doors are to the southernmost, the boiler house (Plate 39). The building stands on a large concrete base which may be associated with a previous building due to its size, although not the building shown on the 1940s aerial photograph which is set closer to Gasholder 3. A cluster of buildings on a similarly-sized footprint first appears on the OS edition of 1968. The base has been cast in situ and the shuttering for the north-east corner is still in place and is a corrugated asbestos cement sheet. The roof has a slight parapet and slopes slightly to the rear where it drains into black plastic rainwater goods. Two aluminium flues are to the centre and southern part of the building.

Interior:

- 3.4.2 The interior of the control room was not accessible. The asbestos report indicates that there is blue lino to the floor and a straw board ceiling, but no other information could be gathered.
- 3.4.3 The interior of the boiler house was accessible. The partition and the internal skin of the external walls are in common brick. The floor is concrete and painted in places, the ceiling is straw board supported on a steel joist. Two boilers, pumps and other plant are in the room (Plate 40).

3.5 Office

3.5.1 The office, labelled as a store on the 1999 site plan, is the smaller and southernmost of the two ancillary buildings. It is a flat-roofed, single storey brick building in stretcher bond with terracotta vents in the north, east and south elevations. It is of the same facing bricks and engineering brick DPC as the control block (Plate 41). The roof has white-painted timber fascia boards and drains to the east elevation into black plastic rainwater goods. A single timber door is to the west elevation (Plate 42). The building stands on a large concrete base which may be associated with a previous building due to its size.

Interior:

3.5.2 The internal skin of the external walls is painted common brick (Plate 43). The floor is painted concrete; the ceiling is plasterboard. The fixtures and fittings in the room are modern.

4 CONCLUSION

- 4.1.1 The Bracebridge Gasworks began production in 1874, initially working concurrently with the older, smaller gasworks close to the city centre. By the beginning of this project nothing remained of the Bracebridge Gasworks other than two later gasholders constructed in 1931 and 1940 on an adjacent plot of land acquired for the expansion of gas storage.
- 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 to use as gasholder stations. In Lincoln, this conversion occurred early in the process and the gasworks closed in 1970. The gasworks plant was demolished, the railway sidings removed and redundant areas of the site sold off or used for other purposes. A new control building and a small store were constructed and it is probable that it was at this time that the distribution plant was installed to the east of the gasholders. Gas distribution has improved in recent decades and the gasholders had been rendered redundant and decommissioned for some time prior to their demolition in February and April 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 gasholders, the ancillary buildings and the site 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 exhaustor was used. Weights could be added to the lift or lifts if additional pressure was required, such as at times of high demand.

History

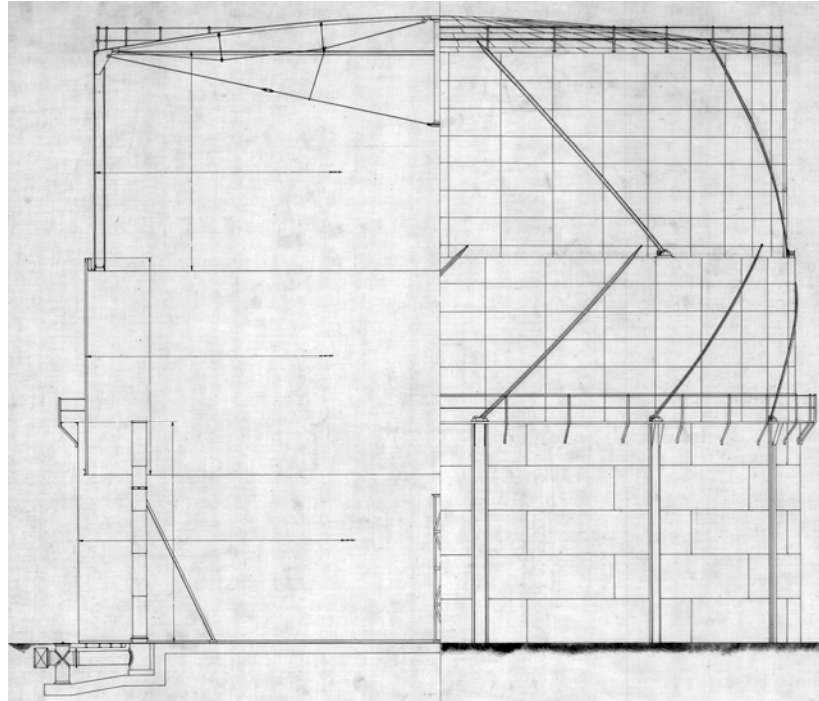
The earliest gasholders were small and built of iron or wood with the moving vessel guided by counter weights on chains. The wooden tanks particularly, sometimes repurposed from the brewing industry, were unreliable and prone to leaking.

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).

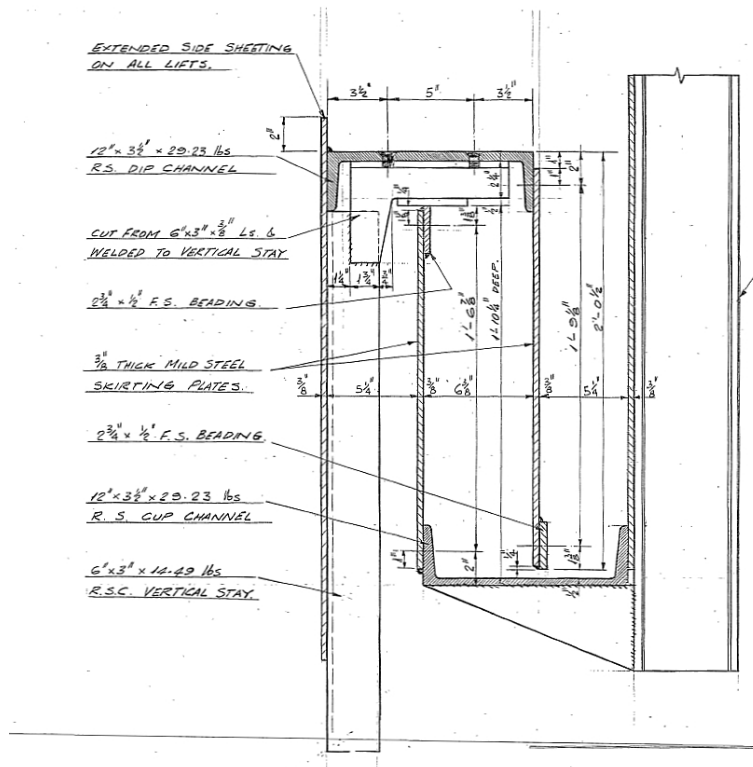
By the time the industry became established, above ground tanks were usually made from steel on a circular concrete slab. The steel floor plate was laid on top of the slab and the steel plates forming the sides of the tank were attached to the floor plate using a steel curb. The sides of the tank were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

Unpublished Documentation

Montagu Evans LLP *Gasholder Station, Clayton Road, Lincoln: Historic Building Recording Brief* April 2018

Oxford Archaeology *Former Gasworks, Clayton Road, Lincoln. Phase 1. Historic Building Investigation and Recording* September 2018

WYG Environment *National Grid Property Holdings, Clayton Road, Lincoln, LN5 8QB: WYG Asbestos Demolition Survey Report* August 2017

Guidance Documents

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

Published Sources

Pevsner, N., Harris, J., Antram, N., *The Buildings of England: Lincolnshire* (1989) Harmondsworth

Roberts, D. E. *The Lincoln Gas Undertaking 1828 – 1949* (1981) Leicester

Ruddock, J.G., Pearson, R.E. *The Railway History of Lincoln* (1985) Lincoln

Pamphlet

Bracebridge Gasworks, Lincoln: Visit of The Institution of Gas Engineers Eastern Section (8th April 1954)

City of Lincoln Gas Department: Official Inauguration of the Reconstructed Bracebridge Works (Wednesday 28th June 1933)

City of Lincoln Gas Department: Official Inauguration of the New Carbonising Plant (Wednesday 2nd October 1946)

Inauguration of the New Gasholder by The Mayoress of Lincoln at the Works of the City of Lincoln Gas Department (Tuesday 9th July 1940)

Articles

Unattributed 'The Bracebridge Gas-Works of the Lincoln Corporation' *Journal of Gas Lighting, Water Supply etc.* 23 April 1907 226-228

Unattributed 'Lincoln Looks Ahead: A Big Gas-Works Reconstruction Scheme' *Gas Journal* 5 July 1933 29-34

Maps

Ordnance Survey 25 inch Edition, surveyed 1886, published 1889

Ordnance Survey 25 inch Edition, revised 1904, published 1907

Ordnance Survey 25 inch Edition, revised 1930, published 1932

Ordnance Survey 6-inch Edition, Edition of 1956

Ordnance Survey 1:2500, Edition of 1968

Ordnance Survey 1:2500, Edition of 1971

Ordnance Survey 10,000 Edition of 1976

Ordnance Survey 10,000 Edition of 1989

Lincolnshire Archive Documents

37-MLL/8 - Hand Drawn Plan of the Bracebridge Gas Sidings

MISC DON 1197/2 - Brochure Issued to Mark Inauguration of a New Carbonising Plant at the Bracebridge Gasworks

MISC DON 1517 - Plans of Bracebridge Gas Works

MISC DON 1887 - Bound Volume of Photographs of Bracebridge Gasworks

Websites

British Geological Survey, accessed 11 July 2018
mapapps.bgs.ac.uk/geologyofbritain/home.html

Google Earth, accessed 11 July 2018
earth.google.com

Google Maps, accessed 11 July 2018
google.co.uk/maps

Grace's Guide to British Industrial History, accessed 06 August 2019
gracesguide.co.uk

Heritage Gateway, accessed 21 August 2018
heritagegateway.org.uk

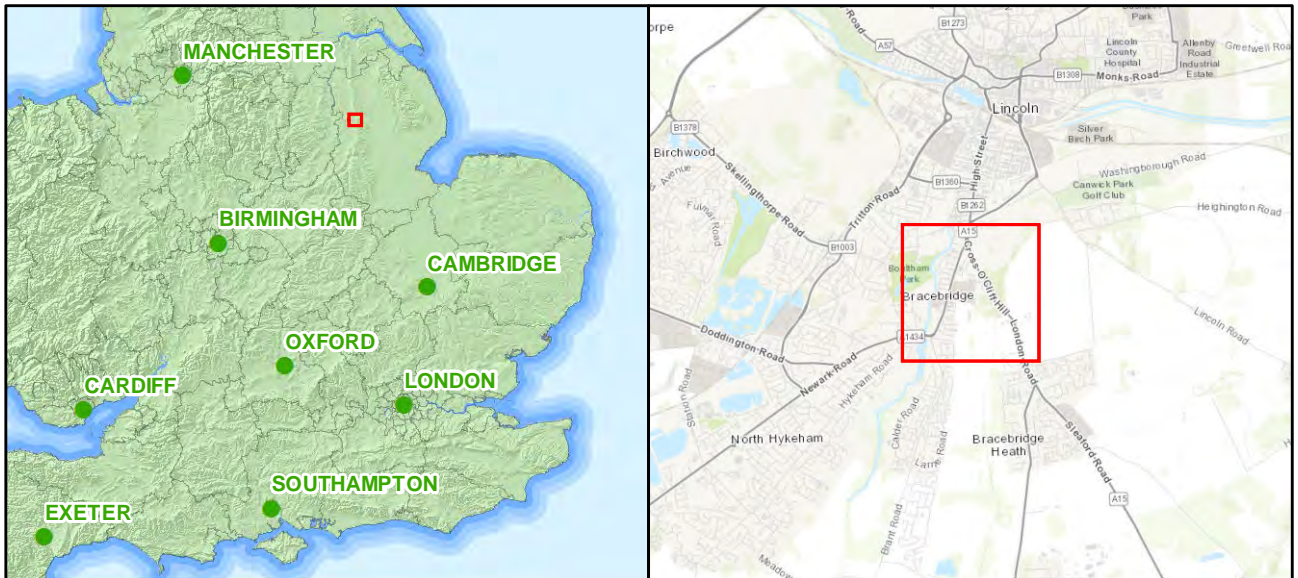
Rail Map Online, accessed 11 July 2018
railmaponline.com

The National Heritage List for England, accessed 21 August 2018
historicengland.org.uk/listing/the-list

City of Lincoln Council, accessed 11 July 2018
lincoln.gov.uk/resident/planning/conservation-archaeology-and-heritage/conservation-areas/

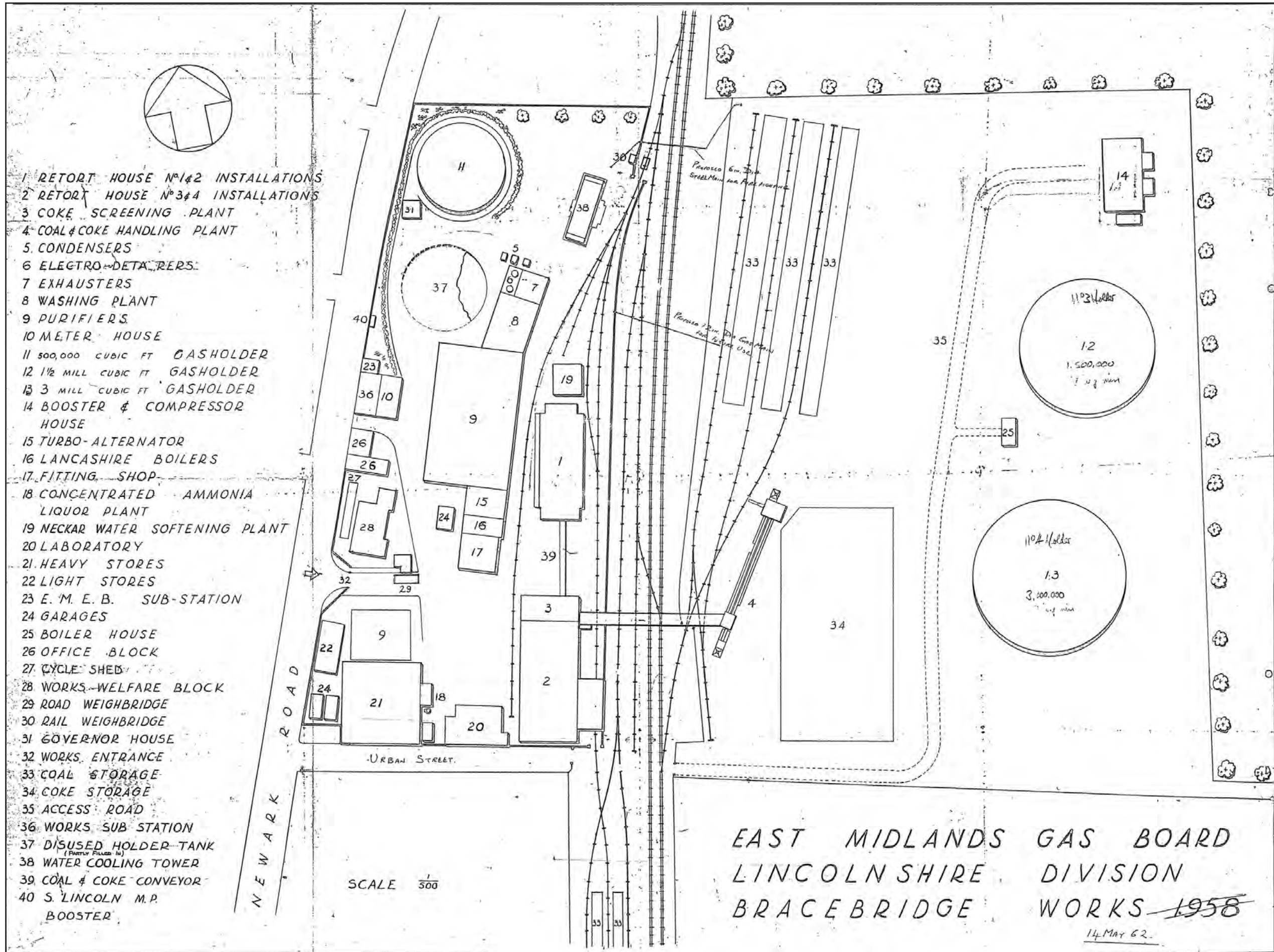
APPENDIX C OASIS FORM

PROJECT DETAILS		
Project name	Building Recording at the Former Gasworks at Clayton Road, Lincoln	
Short description	Oxford Archaeology was commissioned by Montagu Evans LLP on behalf of National Grid to create an historic building record of the surviving gasholders and two ancillary buildings at the former gasworks at Clayton Road, Lincoln, Lincolnshire, before and during the dismantling of the gasholders. Gasholders 3 and 4 were above-ground spiral-guided gasholders with three and four lifts respectively and constructed in 1931 and 1940. 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 12 July 2018, 8 February 2019 and 18 April 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 at Clayton Road, Lincoln	
Study area	The enclosed area containing the gasholders is approximately 150m x 73m	
Site co-ordinates	SK 97183 68722	
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	Lincolnshire Historic Environment Record	Site records, report, notes, digital photos
Paper		
Digital	ADS	



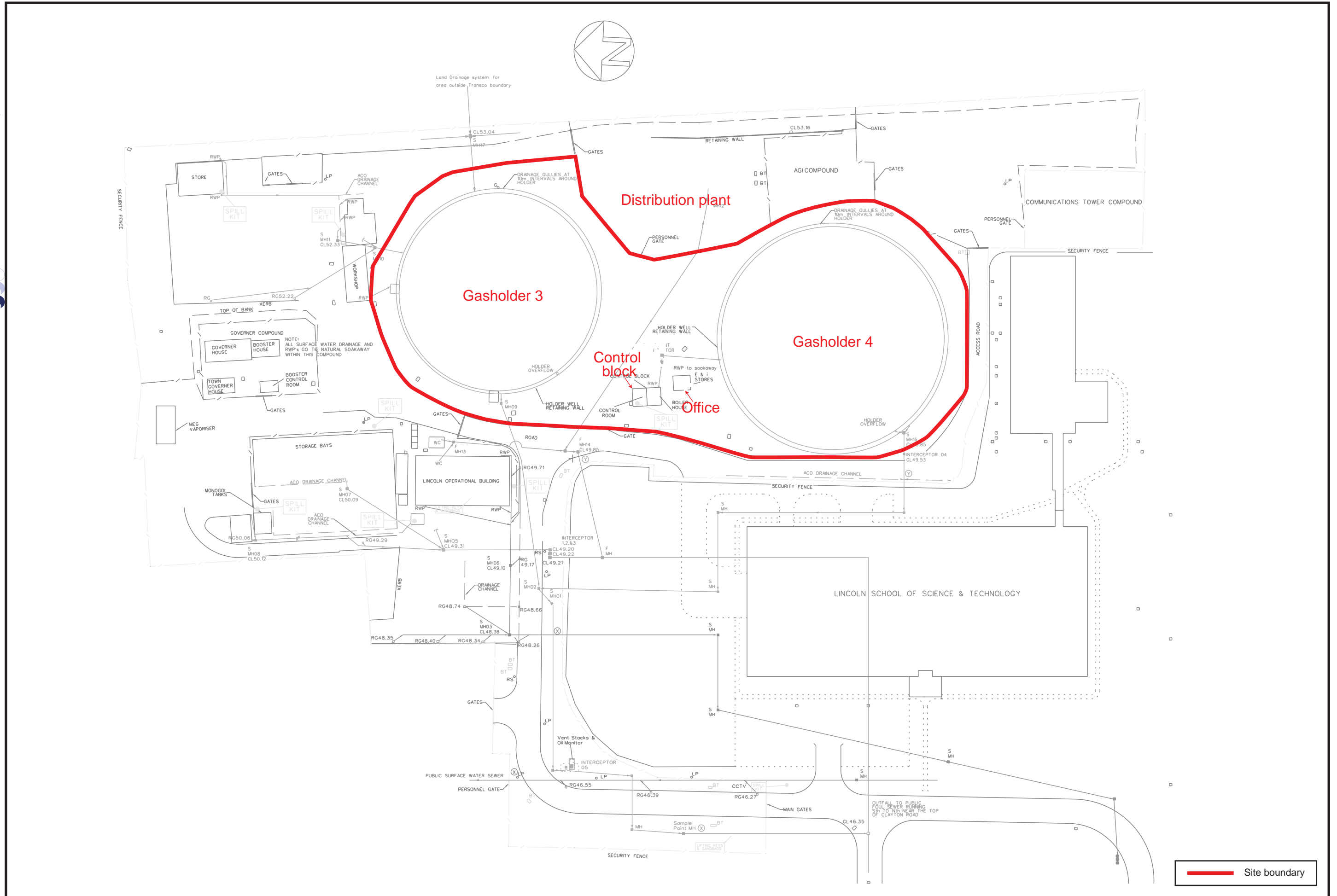
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri

Figure 1: Site location



Not to scale

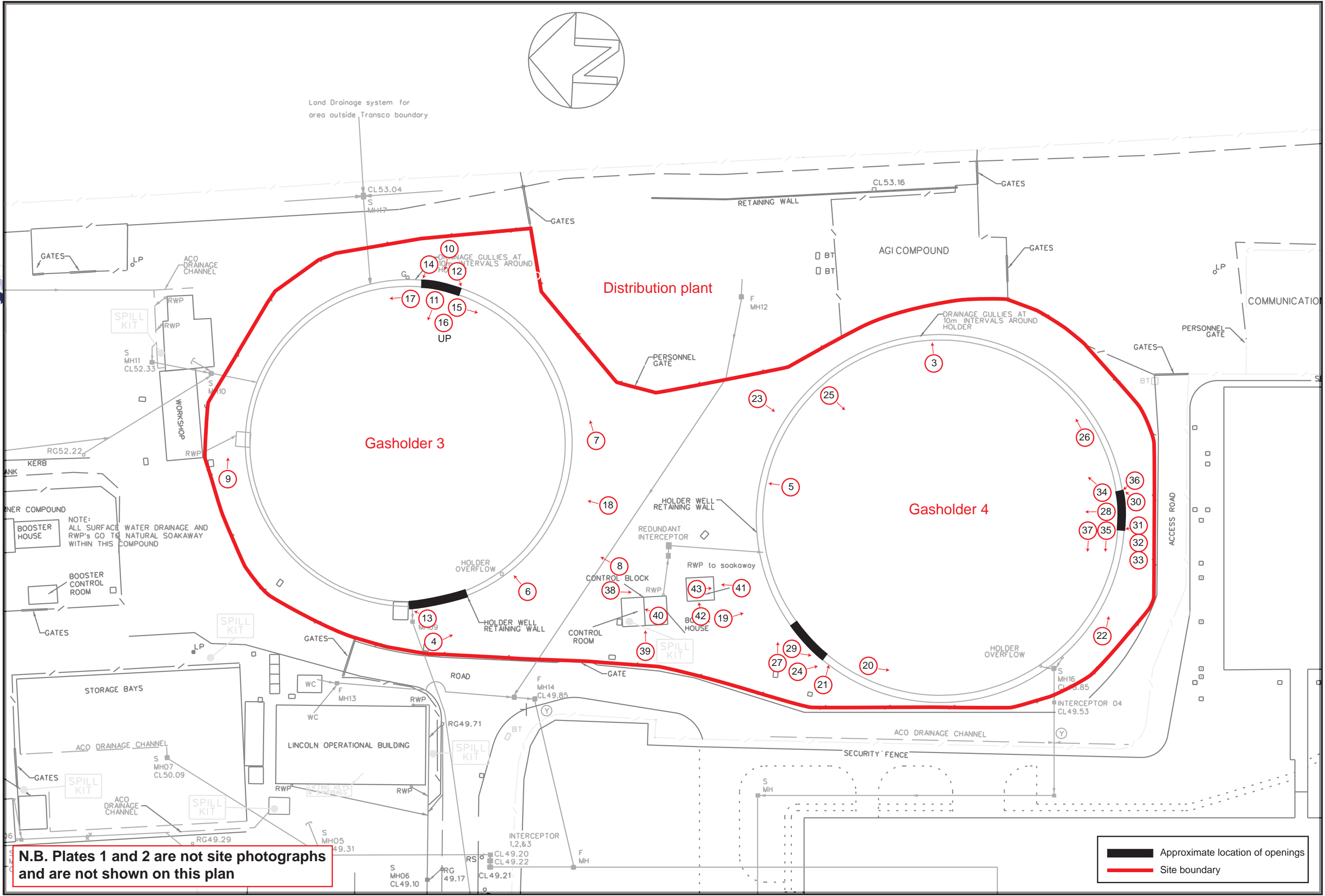
Figure 2: Site plan. 1958 with alterations of 1962. National Gas Archive ref: EM/LIC/E/E/1



Not to scale

Figure 3: National Grid Site Drainage Layout showing the extant structures

0:_codes\LINGASBS\Former Gaswork, Clayton Road, Lincoln\CDP\29.08.19



Not to scale

Figure 4: Photograph locations of plates. Plan based upon the National Grid Site Drainage Layout

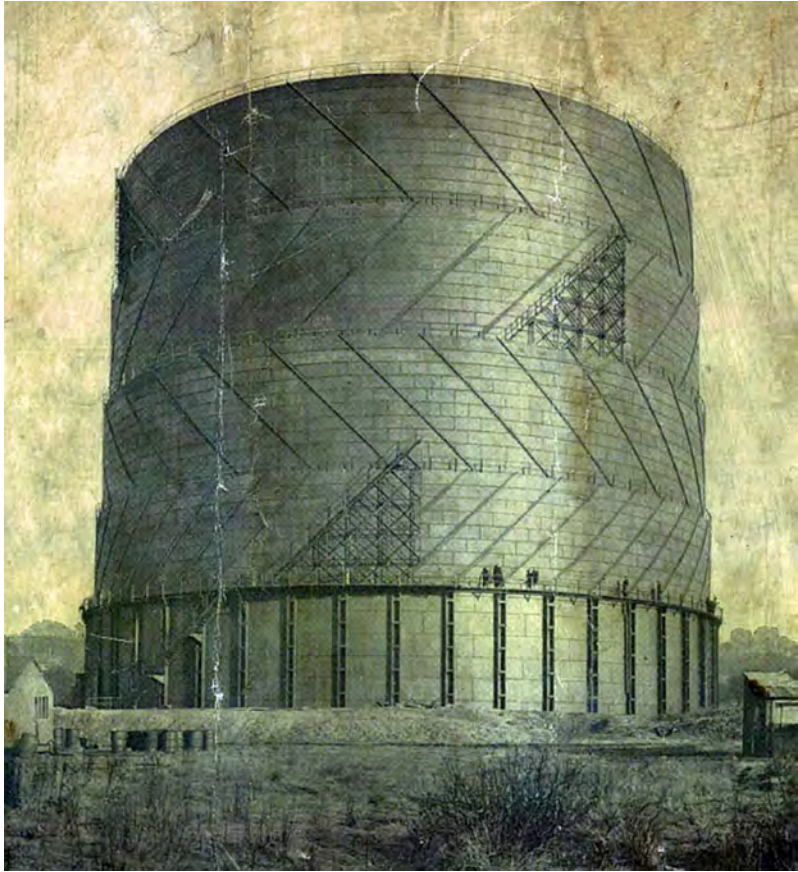


Plate 1: Gasholder 4. Taken from the inauguration pamphlet of 1940. National Gas Archive ref: G11/LIN/5414



Plate 2: Aerial photo of the site taken between 1940-1952. National Gas Archive ref: AA1204P



Plate 3: Distribution plant to the east of the gasholders



Plate 4: An example of the polycarbonate kiosks



Plate 5: Gasholder 3 taken from the top of the tank of Gasholder 4, looking north



Plate 6: The commemorative plaque on Gasholder 3



Plate 7: The bund surrounding Gasholder 3



Plate 8: Gasholder 3, looking east.



Plate 9: The blanked-off pipe at the north of Gasholder 3



Plate 10: The east cutting through the tank and lifts of Gasholder 3



Plate 11: The interior of Gasholder 3, looking west



Plate 12: A cross-section of the tank and lifts of Gasholder 3



Plate 13: A cross-section of the tank and lifts of Gasholder 3



Plate 14: An example of the rivetted joint between steel plates of a lift in Gasholder 3

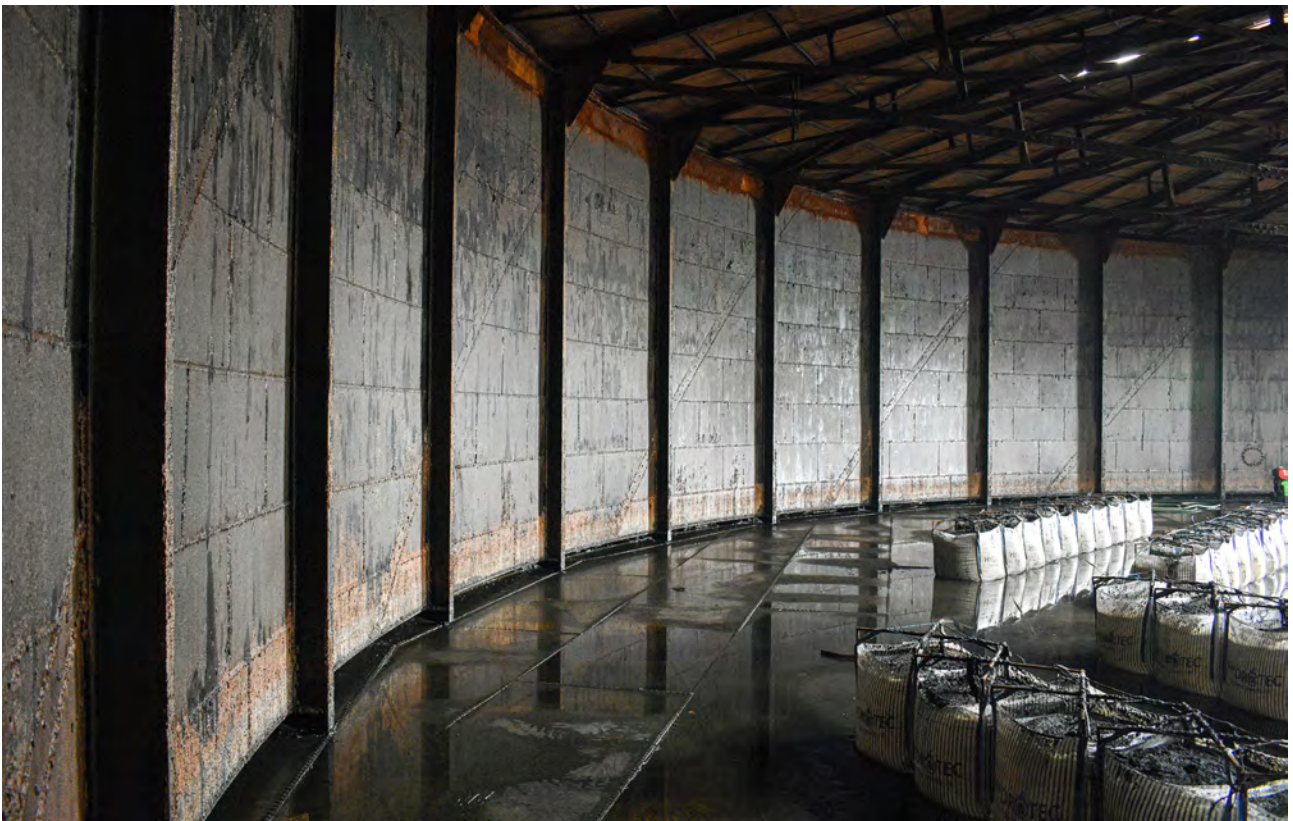


Plate 15: The columns supporting the crown structure of Gasholder 3



Plate 16: The crown structure of Gasholder 3



Plate 17: The remains of an inlet/outlet pipe in Gasholder 3



Plate 18: The concrete base of Gasholder 3 following the removal of the tank



Plate 19: Gasholder 4, looking south



Plate 20: An example of the lift steps of Gasholder 4



Plate 21: The commemorative plaque on Gasholder 4



Plate 22: The bund surrounding Gasholder 4



Plate 23: The inlet and outlet pipes at the north-east of Gasholder 4



Plate 24: The staircase of Gasholder 4



Plate 25: The crown of Gasholder 4



Plate 26: An example of the roller carriages of Gasholder 4



Plate 27: The north-west cutting through the tank and lifts of Gasholder 4



Plate 28: The interior of Gasholder 4, looking north



Plate 29: A cross-section of the tank and lifts of Gasholder 4



Plate 30: A cross-section of the lifts of Gasholder 4



Plate 31: An example of a former access between the lifts of Gasholder 4



Plate 32: A cross-section of a guide of Gasholder 4



Plate 33: An example of the rivetted joint between plates of the tank of Gasholder 4



Plate 34: The columns supporting the crown structure of Gasholder 4



Plate 35: The crown structure of Gasholder 4

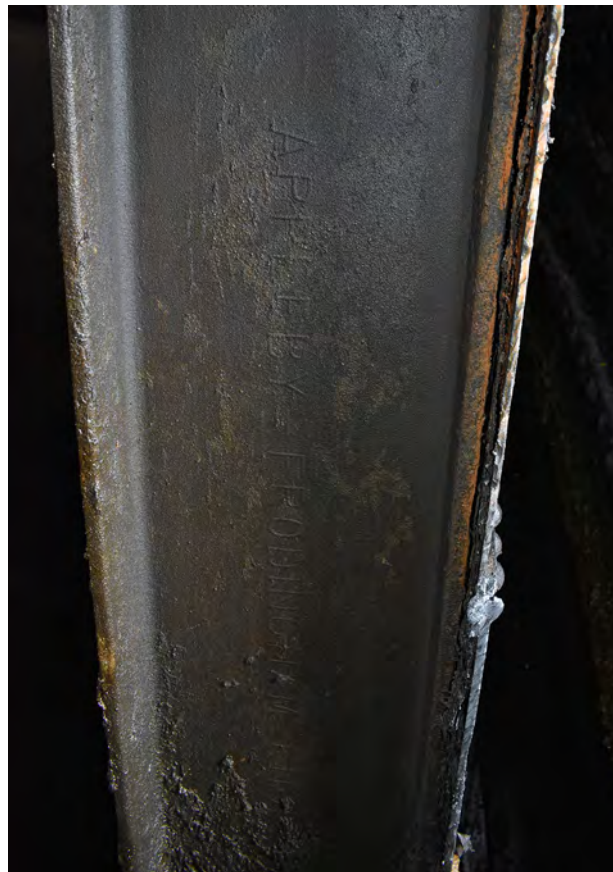


Plate 36: The manufacturer's name on a column in Gasholder 4



Plate 37: The floor of Gasholder 4 with a removed section of the crown



Plate 38: The two ancillary buildings in relation to Gasholder 4, looking south



Plate 39: The west elevation of the control block



Plate 40: The interior of the boiler house



Plate 41: The south elevations of the ancillary buildings



Plate 42: The west elevation of the office building



Plate 43: The interior of the office



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

Janus House
Osney Mead
Oxford OX20ES

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](mailto: 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](mailto: oaeast@oxfordarchaeology.com)
w: <http://oxfordarchaeology.com>



Director: Gill Hey, BA PhD FSA MCIfA
*Oxford Archaeology Ltd is a
Private Limited Company, N^o: 1618597
and a Registered Charity, N^o: 285627*