



**Historic Building Recording of Gasholders
at the Denham Holder Station, Amersham Road
Denham, Buckinghamshire
September 2018**

Report No. 18/133

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Project Manager: Anthony Maull
NGR: TQ 0206 8754
National Gas Archive Ref: 0425

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OASIS REPORT FORM

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| Project title | Historic Building Recording of Gasholders at the Denham Holder Station, Amersham Road, Denham, Buckinghamshire, September 2018 | | |
| Short description | <i>MOLA (Museum of London Archaeology) carried out a programme of historic building recording of Gasholders 1 and 2 at the Denham Holder Station, Amersham Road, Denham, Buckinghamshire. Gasholder 1 was built in 1926 and was a frame-guided gasholder with above-ground tank. Gasholder 2 was a spiral-guided gasholder with above-ground tank and was built in 1967 following the conversion to Natural Gas and significantly increased the site's storage capacity. Neither gasholder was considered to have architectural or heritage significance.</i> | | |
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| Future work | Unknown | | |
| Monument type and period | Gasholder of 1926 and 1967 | | |
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| Site address | Amersham Road, Denham | | |
| NGR | TQ 0206 8754 | | |
| Area | 0.9 hectares | | |
| PROJECT CREATORS | | | |
| Organisation | MOLA Northampton | | |
| Project brief originator | Atkins Ltd on behalf of National Grid | | |
| Project Design originator | MOLA Northampton | | |
| Supervisor | Amir Bassir | | |
| Project Manager / Director | Anthony Maull | | |
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Contents

| | | |
|---|-------------------------------|----|
| 1 | INTRODUCTION | 1 |
| 2 | OBJECTIVES AND METHODOLOGY | 3 |
| 3 | SITE LOCATION AND TOPOGRAPHY | 4 |
| 4 | HISTORICAL BACKGROUND | 5 |
| 5 | HISTORIC BUILDING RECORDING | 8 |
| | 5.1 Gasholder 1 | 8 |
| | 5.2 Gasholder 2 | 10 |
| | 5.3 Miscellaneous | 11 |
| 6 | DISCUSSION | 12 |
| | BIBLIOGRAPHY | |
| | APPENDIX – Basic Record Forms | |

Figures

- Fig 1: Site location
- Fig 2: The recording area (image © Google Earth)
- Fig 3: First edition Ordnance Survey map, c1880s
- Fig 4: Ordnance Survey map of 1899
- Fig 5: Ordnance Survey map of 1938, showing Gasholder 1
- Fig 6: Plan of the Gasholder Station, dated 1971 (NGA Ref: NT/SW/DEN/E/E/6)
- Fig 7: General view of Gasholder 1, looking north-east
- Fig 8: General view of Gasholder 1, looking south
- Fig 9: Detail of the tank and standard bases
- Fig 10: Detail of the standard and mid-tank collar
- Fig 11: The underside of the tank walkway, showing brackets and bracing
- Fig 12: Example of the roller carriage sets
- Fig 13: View of the roller carriages (undated photograph NGA Ref: XG01090)
- Fig 14: General view of the framing
- Fig 15: Detail of the first tier nodes
- Fig 16: Detail of the upper framing
- Fig 17: The additional horizontal framing member at the south-east side of the gasholder
- Fig 18: Hammer switches on the tank; note also overlap plate between the framing members
- Fig 19: Detail of lagged pipes and overflow pipes
- Fig 20: General view of Gasholder 2, looking north-west
- Fig 21: Detail of the welded sheets
- Fig 22: Lagged pipes, overflow pipes and interceptor; note adjacent access point
- Fig 23: Access point on the north-east side of the gasholder, also showing the concrete base
- Fig 24: The walkway and supporting brackets
- Fig 25: The inlet and outlet and pipes
- Fig 26: The lift stairs
- Fig 27: Detail of anti-freeze valves and supporting trays
- Fig 28: View of the pipes adjacent to the gasholders
- Fig 29: The former Boiler House, looking north-east
- Fig 30: Plan of the recording area, showing photograph locations

Tables:

Table 1: Gasholder 1, lift dimensions

Table 2: Gasholder 2, lift dimensions

Historic Building Recording of Gasholders at the Denham Holder Station, Amersham Road Denham, Buckinghamshire September 2018

Abstract

MOLA (Museum of London Archaeology) carried out a programme of historic building recording of Gasholders 1 and 2 at the Denham Holder Station, Amersham Road, Denham, Buckinghamshire. Gasholder 1 was built in 1926 and was a frame-guided gasholder with above-ground tank. Gasholder 2 was a spiral-guided gasholder with above-ground tank and was built in 1967 following the conversion to Natural Gas and significantly increased the site's storage capacity. Neither gasholder was considered to have architectural or heritage significance.

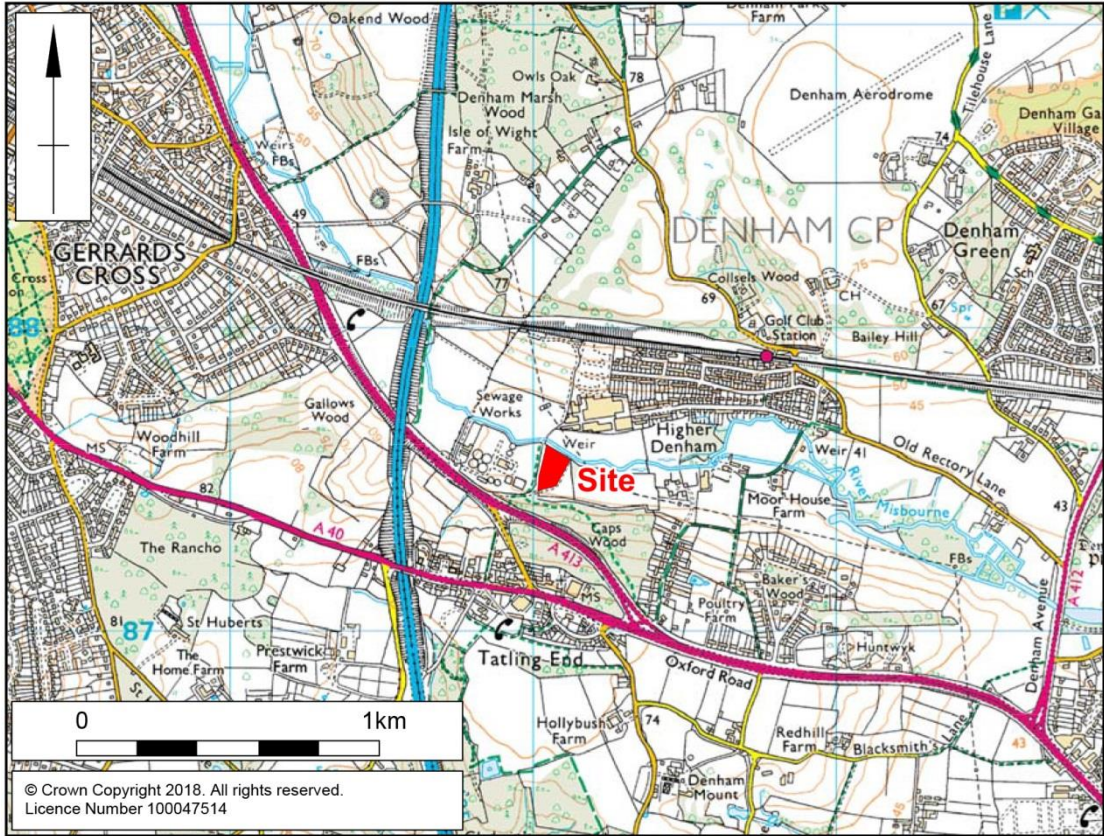
1 INTRODUCTION

MOLA (Museum of London Archaeology) was commissioned by Atkins Ltd, acting on behalf of National Grid, to undertake a programme of historic building recording of two Gasholders at the Denham Holder Station, Amersham Road, Denham, Buckinghamshire (NGR TQ 0206 8754, Figs 1 and 2).

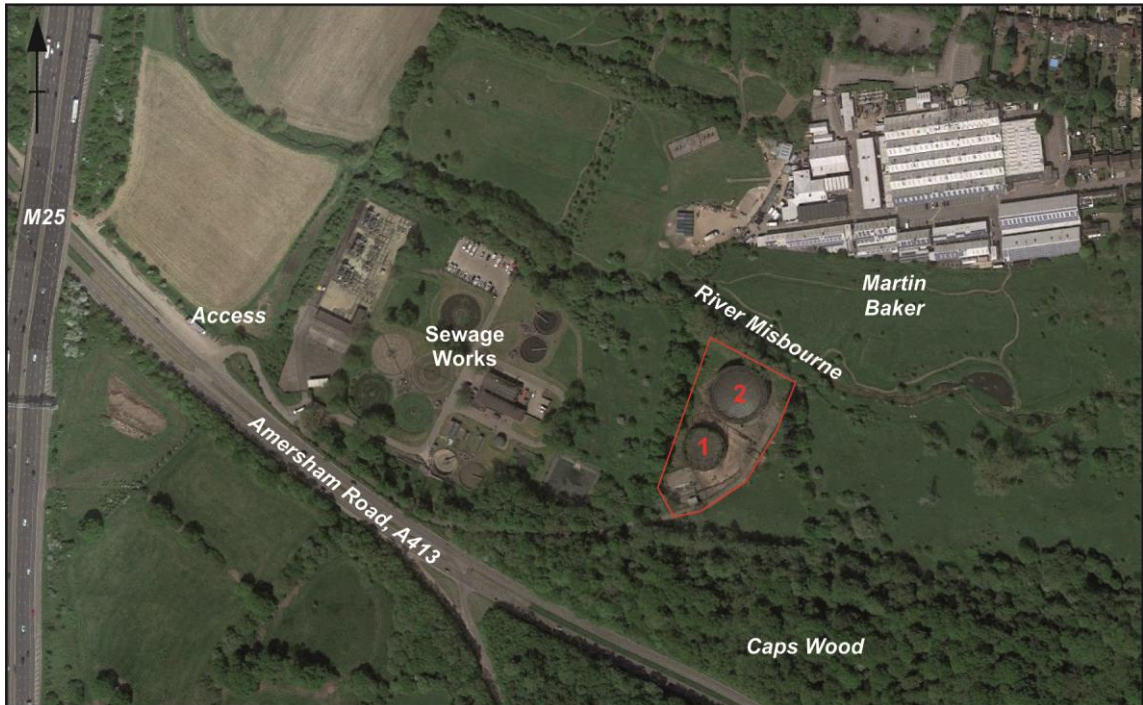
This survey is a voluntary exercise commissioned by National Grid as part of their commitment to the heritage of their broader estate. This report is in accordance with current best archaeological practice as defined in the Chartered Institute for Archaeologists' *Standard and Guidance for the Archaeological Investigation and Recording of Standing Buildings or Structures* (CIfA 2015). This report follows an approved Written Scheme of Investigation which set out the proposed aims and recording methodology (MOLA 2018). A heritage assessment of the site determined that the site does not include any designated heritage assets and concluded that the gasholders were of minimal heritage significance (Montagu Evans, undated).

The site was not assessed as part of the Gas Industry Step 3 Report (Trueman 2002).

DENHAM HOLDER STATION



Site location Fig 1



The recording area (image © Google Earth) Fig 2

2 OBJECTIVES AND METHODOLOGY

The objectives of this survey were to:

- Produce an illustrated, written document detailing the fabric, appearance and form of the gasholders and associated infrastructure;
- Provide historical survey drawings (or sketches) for comparable investigation relating to building form and function, identification of fixtures and fittings where visible or accessible;
- Provide an account of historic fixtures, fittings and architectural features where visible or accessible;
- Provide a photographic record of the structures in context.

The level of recording was specified as basic Level 2 in accordance with the Historic England document *Understanding Historic Buildings, A Guide to Good Practice* (HE 2016), and as specified in the site specific *Heritage Review* (Montagu Evans, undated) which concluded that the gasholders were of minimal heritage significance.

Recording was carried out on the 11th September 2018 and encompassed the two gasholders and related pipework. A visit was made to the Centre for Buckinghamshire Studies in order to examine mapping, literature and documentary evidence, and documents held by the National Gas Archive were also examined.

The site was photographically recorded to include general views of the gasholders and their setting, as well as detailed views of any structural, historic or architectural features. The elevated walkways were inaccessible due to the removal of the gasholder ladders, and all recording was carried out from the ground. The area around the gasholders had become overgrown, preventing numerous trip hazards and further limited access around the recording area.

Photography was carried out using a Nikon D7200 DSLR equipped with Sigma 10-20mm and Nikon 18-105mm lenses. Supplementary photography was undertaken using a Panasonic Lumix FZ1000. Photographic scales were included in views where practical.

The National Gas Archive reference for this project is 0425.

3 SITE LOCATION AND TOPOGRAPHY

The site occupied a fairly isolated position between the towns of Denham and Gerrards Cross and was located next to a Sewage Treatment Works on the northern side of Amersham Road. The Martin Baker headquarters building was located a short distance to the north-east of the gasholders in the Higher Denham area. The minor settlement of Tatling End lay a short distance to the south. The M25 motorway crossed Amersham Road to the east of the site on a north-south alignment, and to the north of the site was the Chiltern Main Line which ran east to west. A small area of woodland was located to the immediate south of the site and the general surrounding landscape was comprised of agricultural fields with small copses, and with a large golf course to the north-east. The River Misbourne lay a short distance to the north of the northern site boundary and flowed east to west.

The site was accessed via an access track which branches from Amersham Road and which was shared by the sewage works. The site occupied an irregular rectangular plot which was bisected by the access track. There were two gasholders positioned on the western side of the access track in an area of hard standing. The eastern part of the site had become overgrown with vegetation and the site was surrounded on all sides by established trees. An active gas compound owned by Cadent Gas Ltd was located to the south of the gasholders and was enclosed from them by fencing. The compound comprised an active Pressure Reduction Station. Scottish and Southern Electricity owned an electrical transformer in the north-east of the site.

The site lay at approximately 45m aOD and had a slight northward descent towards the river as well as a marked upward slope at the southern site boundary towards Caps Wood. The underlying geology has been mapped as comprising sedimentary strata of the Lower Eocene Lambeth Group (BGS 2018). The earlier strata of the Seaford and Newhaven Chalk Formations of the Cretaceous period is revealed as a linear belt along the course of the River Misbourne. Overlying the bedrock are superficial alluvial deposits of the Quaternary period.

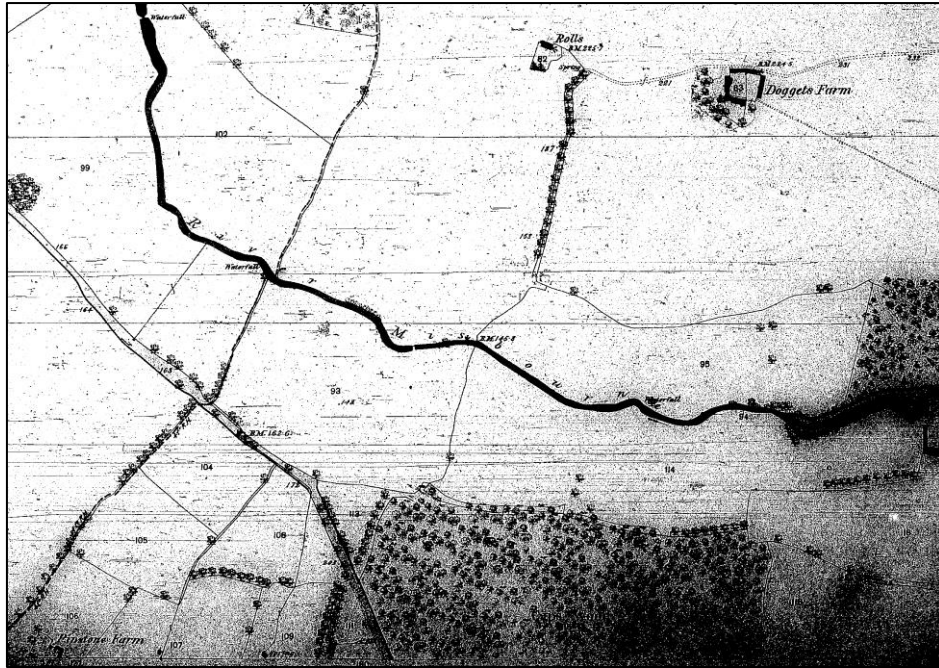
4 HISTORICAL BACKGROUND

No documentary evidence directly referencing this site was found during the course of research for this project and as such it was not possible to determine the relationship between this site and the wider gas industry. The site lay between the spheres of the former Uxbridge Gas Company, the Amersham Gas Light and Coke Company and the Beaconsfield Gas Company. In July 1910 the Uxbridge Gas Company purchased the whole of the share capital of the Amersham Gas Light and Coke Company for the sum of £2625, pending an application to Parliament for an Act authorising the Company to extend its area and acquire the undertakings of the Amersham Company (U/1/2, 1910). Shortly prior to this the Uxbridge Gas Company had also taken over the Beaconsfield Gas Company, acquiring their works and gasholders (NA 2018). Various other local gas companies were also amalgamated during the early 20th century and in 1936 the Uxbridge, Maidenhead, Wycombe and District Gas Company came under the control of the South Eastern Gas Board Corporation and eventually became vested in the North Thames Gas Board following nationalisation of the gas industry in 1949 (NA 2018).

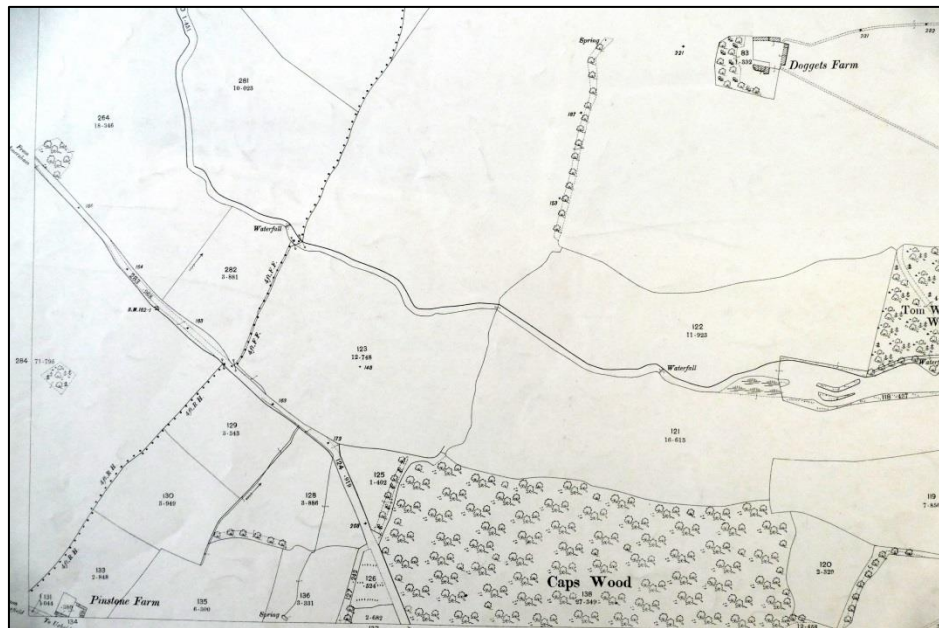
Through to the late 19th century the area between Denham and Gerrards Cross remained undeveloped and primarily comprised agricultural fields interspersed with parcels of woodland and with isolated farmsteads scattered in the landscape (Figs 3 and 4). The site of the later gasholder station was the eastern end of a linear field defined along its southern edge by Caps Wood, to the north by the River Misbourne and to the east by Moorhouse Farm. Amersham Road was in existence during this period but instead of bisecting Caps Wood was angled to the south-east to pass around the western edge of the wood. To the north-east was a farmstead called Dogget's Farm which was to be intruded upon by the embankments of the railway line when it was laid down in the very early 20th century.

A sewage treatment works was established by the early to mid 1920s but the site of the gasholder station remained undeveloped until 1926 when a single gasholder, Gasholder 1 was constructed (Fig 5). The site did not include any gas production facilities and served as a distribution centre. It is not apparent where the gas was being produced as an examination of Ordnance Survey mapping of this period shows no gasworks in the immediate vicinity of Gerrards Cross or Denham. The storage and distribution capacity of the site was expanded in 1967 with the construction of Gasholder 2 which occupied a larger footprint than Gasholder 1, and provided significantly greater storage capacity (Fig 6). By this time the production of town gas had ceased in favour of Natural Gas and Gasholder 1 was converted to distribute this rather than town gas.

DENHAM HOLDER STATION

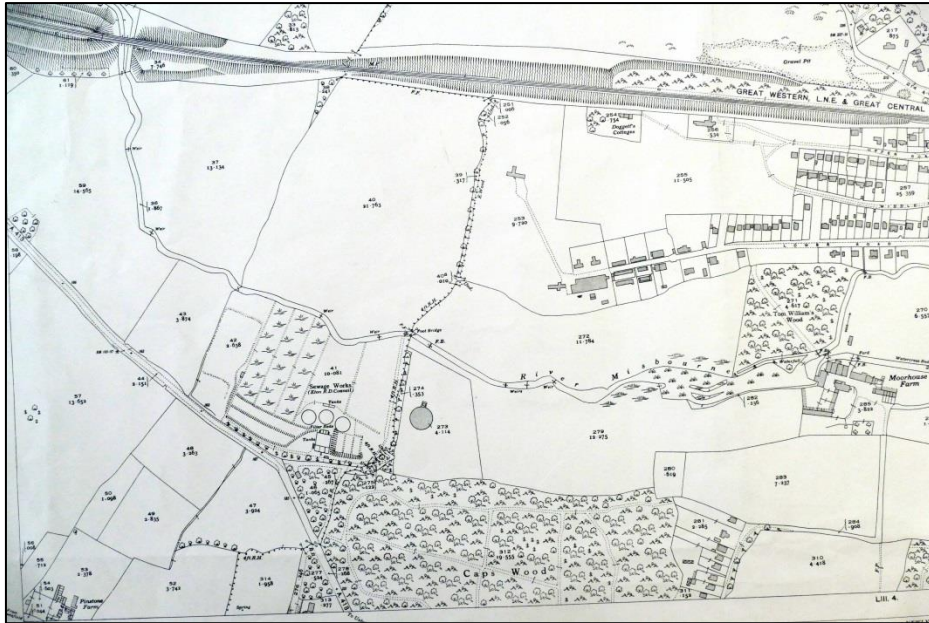


First edition Ordnance Survey map, c1880s (scan from microfilm) Fig 3

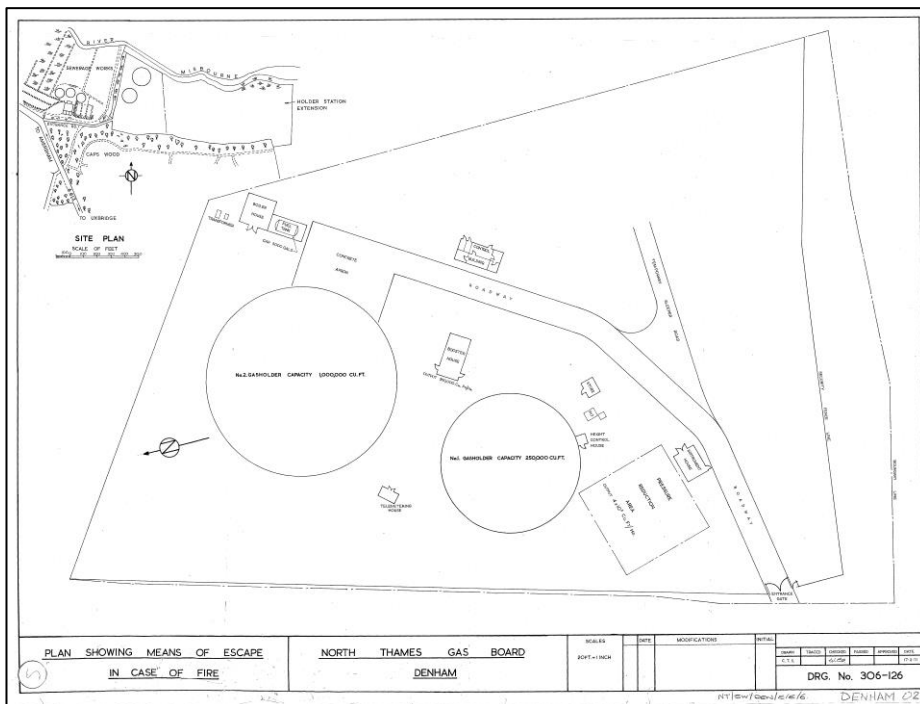


Ordnance Survey map of 1899 (25" Sheet XLVIII, 16) Fig 4

DENHAM HOLDER STATION



Ordnance Survey map of 1938, showing Gasholder 1 Fig 5



Plan of the Gasholder Station, dated 1971 (NGA Ref: NT/SW/DEN/E/E/6) Fig 6

5 HISTORIC BUILDING RECORDING

5.1 Gasholder 1 (Figs 7 – 19)

Gasholder 1 was a two-lift frame-guided holder with an above-ground tank. It was built by R. Dempster and Son and construction was completed in 1926. The tank had an internal diameter of 30.5m (100' 0") and was 5.7m (17' 1") in height. The frame rose to a height of 62m (20' 0"). The gasholder had a total storage capacity of 7647 cu. m (270,050 cu. ft). The tank, frame, handrails and all major external components were painted an olive green colour matching that of Gasholder 2; it is unclear if this was the original coloration of the gasholder or was provided at a later date.

Table 1: Gasholder 1 lift dimensions

| | Outer lift | Inner lift |
|----------|----------------|----------------|
| Diameter | 29.1m (95' 6") | 28.3m (93' 0") |
| Depth | 5.3m (17' 5") | 5.8m (19' 0") |

The tank was comprised of riveted steel sheets arranged in five courses. The lowest course was measured as 0.8m in height, the second course as 1.27m and the 3rd course as 1.20m in height. The sheets were approximately 4m in width and were overlapped and tightly riveted at the edges. Example rivet heads were measured as 40mm in diameter.

The gasholder frame comprised 18 vertical columns or standards each formed of two lengths of I-section steel beams. The joints of the beam segments were braced by overlap plates and these were tightly riveted. The inner and outer flanges of the standards were each 155mm in width and the web 250mm. The standards were braced by two tiers of I-section beams set at midway and at the top of the elevated frame. The girders were joined to the standard webs by means of pairs of bolted angles. The frame was cross-braced by means of diagonal tie rods or wind braces. These were connected to plates fixed to the outer standard flanges and met at circular couplers. Additional girders were set between standards 17 and 18 and a small pulley attached to the lower girder. The gasholder tank, frame and most of the ancillary components had been painted green, of the same shade as that on Gasholder 2; this paintwork was rapidly deteriorating at the time of this survey. Manufacturer's stamps were visible on the standard webs and although mainly obscured by thick paint and erosion the stamps likely read Appleby Frodingham, a steelworks located in Scunthorpe.

At the south-east side of the gasholder the designation number '1' was stencilled onto the side of the tank. Although the standards have not been given individual numeric designation it was common practice on frame-guided holders for the standards to be numbered beginning with that to which the ladder was attached. Numbering may progress clockwise or anti clockwise. A vertical continuous ladder was fixed to the edge of standard 1 (immediately adjacent to the stencilled '1') and was supported by means of projecting brackets. The ladder had no rest platforms but was fitted with a simple back guard. The ladder to access the tank walkway was formerly located adjacent to standard 1 and the concrete pad for the ladder was noted during this survey.

The standards were set at a distance of 90mm from the tank face and were joined by a continuous strap or collar at mid-height on the tank. This comprised a steel angle riveted to the tank and joined by gusset plates to each of the standards.

The roller carriages could be partly viewed from the ground and a photograph of them was provided by the National Gas Archive (xg01090, Fig 13). The lifts were guided by *goose-neck* cantilevered roller carriages which interacted with shallow channels fixed to the back of the standards. Each carriage was formed of a pair of curving solid plates which tapered from the base to the roller. The side plates were joined by cross bars riveted through angles at the edges of the side plates. Roller carriages of a similar design were recorded on a frame-guided gasholder of a contemporary date at Gasholder 5 of the Oswald Street Gasworks, Burnley (Bassir 2016). Angled struts were fitted to each roller carriage to provide lateral support. The undated photograph of the roller carriages also shows a wooden walkway encircling the outer edge of the crown; due to the elevation of this walkway from the crown surface the adjacent hand rails would have been fairly ineffectual and of little protection for workers and engineers.

The tank walkway was comprised of steel sheets supported by angled brackets projecting outward from the top of the tank, with additional brackets at the intersections with the standards. Tapered gusset plates were also fixed to the underside of the walkways where the standards passed through. The walkway had a simple toe guard and hand rails, comprising circular bars passing between stanchions, was installed at the outer edge of the tank and also at the edge of the lifts and crown.

The gasholder utilised a closed-circuit hot water anti-freeze system. The boiler house was located to the north-east of Gasholder 2 and lagged pipes encircled the east and south sides of that gasholder and passed overhead to Gasholder 1. A number of anti-freeze control valves could be seen at the eastern side of Gasholder 1.

Water overflow pipes emerged at the south-east side of the gasholder and were carried below the walkway to the north-east side of the gasholder. From here they passed overhead to Gasholder 2 and were carried to a waste water tank / interceptor located alongside that holder. A blanked pipe / possible former valve was installed in the side of the tank adjacent to standard 1.

Electrical cable trays were installed on the outside of the tank walkway railings and led to hammer switches / maglocks at standard 17. Various other controls, switches and telemetry could be seen around the perimeter of the tank.

An enclosed compound was former located at the south side of the gasholder and contained a Governor House, and a Height Control House which was located immediately adjacent to the gasholder. Neither of these building remained extant at the time of this survey. A number of defunct pipes and flow valves and a brick-lined buried pipe pit marked the position of the former Governor House. The 16" inlet and outlet pipes were located together at the south side of the Gasholder and passed below-ground into the tank. Their position was marked by a dry-well covered by a timber roof.

5.2 Gasholder 2 (Figs 20 – 27)

Gasholder 2 was a four-lift spiral-guided holder with an above-ground tank. It was constructed in 1967 by S. Cutler and Sons of Millwall and was intended to store Natural Gas rather than town gas whose production was nationally ceasing by this date. The tank had a diameter of 41.5m (136' 1") stood at a height of 8.2m (27' 0"). The gasholder's total storage capacity was 36,257 cu. m. (1,280,415 cu. ft), over four times the capacity of Gasholder 1. The tank, handrails, stairs and roller carriages, as well as the vents were all painted a uniform olive green colour, matching the paint scheme of Gasholder 1. The crown does not appear to have been painted, or the paint had been eroded away by the time of this survey. An aerial view of the gasholder with the first lift raised shows that the lift sides were not painted.

Table 2: Gasholder 2 lift dimensions

| | 1st / Outer lift | 2nd lift | 3rd lift | 4th / Inner lift |
|----------|------------------|-----------------|----------------------|-----------------------|
| Diameter | 40.5m (133' ¼") | 39.5m (129' 8") | 38.5m (126' 3 ¼") | 37.4m (122' 10 ¾") |
| Depth | 7.2m (23' 7") | 7.2m (23' 7") | 7.2m (23' 7") | 7.9m (26' 0") |

The tank comprised five courses of welded steel sheets which were measured as approximately 1.6m x 8m. The tank was built onto a round concrete base of which only the upper edge was visible through the gravel which surrounded the gasholder. At the top of the gasholder were projecting brackets that supported the tank walkway. These comprised pairs of triangular steel plates joined by flat bars. It is probable that these brackets also supported similar but smaller brackets on the inner face of the tank which braced the outer ring of roller carriages. Small intermediate brackets supporting the walkway were interspersed with the main brackets. The walkway had a simple toe guard and hand rails. The tank stair had been removed prior to this survey and the upper part of the gasholder could not be accessed. The lift stairs were of a standard design, being angled at approximately 45°, and comprising simple treads with handrails on the outer edge.

Tank access points were located at the south and north sides of the gasholder. These comprise circular manholes elevated slightly from the ground and sealed with bolted steel lids. Each of the lifts would have a similar access and all would align when the gasholder was deflated, allowing access through to the tank interior.

From a distance it could be seen that the gasholder utilised dual roller carriages of a fairly generic and common design. The spiral guide rails were not equipped with run out stops.

The crown comprised concentric rings of welded steel sheets. Close to the crown apex were two crown valves and other smaller valves could be seen on the crown surface. Aerial views show manholes at the east, north and south sides of the gasholder, of which the eastern one was positioned over the inlet and outlet pipes.

The inlet and outlet pipes were located together at the north side of the gasholder. The pipes were looped to the height of the tank, a feature were provide protection from flooding. The pipes rose from a drywell which was sealed with a steel lid and a range of flow valves were fitting to the base of the pipes. The valves carried the manufacturer stamp of Westwood and Wrights and Donkin.

The gasholder shared a closed-circuit hot water anti-freeze system with Gasholder 1. The Boiler House was located close to the east side of the gasholder and overhead lagged pipes were carried around the east and south sides of the gasholder. The anti-

freeze pipes rose vertically to join the manual valves and controls located on the tank walkway. The flexible pipes were supported in pivoting steel trays, one for each lift, and these came to rest at the south-east side of the gasholder when at rest.

An overflow pipe dropped vertically at the south side of the gasholder to join a waste water tank / interceptor which was also used by Gasholder 1.

5.3 Miscellaneous

The Boiler House was located in the north-eastern corner of the site in close proximity to Gasholder 2 (Figs 29 and 30). The area around the structure had become overgrown and the interior was not accessed. It was a simple roughly square-plan, single-storey, brick-built structure measuring approximately 5m x 5m, and was likely built in the late 1960s, contemporary with the construction of Gasholder 2. An external fuel tank was formerly located adjacent to the building but had been removed prior to this survey, leaving only the concrete pads visible. The building had a flat roof of sheets with fascia boards. A double-width door with concrete sill was located centrally to the west wall and a tall opening with louvered panels was located in the south wall. The lagged anti-freeze pipes were carried to the building on steel posts but the connection between pipes and building had removed prior to the survey.

6 DISCUSSION

Gasholder 1 was an interesting example of a less commonly surviving form of gasholder which combined an above ground tank with telescoping frame-guided lifts. While this provided an advantage to excavating a below ground tank, the size and capacity of the gasholder would naturally be limited by the height and diameter which could be achieved using this design. In this case the storage capacity of 270,050 cu. ft. was markedly small at a time when much greater capacities had been achieved since at least the 1890s. Whether this choice of design was due to costs, or that this capacity was perceived as adequate to satisfy the supply requirements of gas use at that time is unclear. The simplicity of the framing members, i.e. generic I-section steel beams, when compared to a similar gasholder at Wharf Road, Chelmsford, may indicate that cost may have played a large role in the choice of design.

Gasholder 2, constructed in 1967, provided four times the storage capacity of Gasholder 1. The austere welded tank with brackets at the upper level was typical of spiral-guided gasholder design of this period when gasholders had become purely utilitarian and functional as well as much more systematised and formulaic with less variation in components.

This survey was not able to examine the upper parts of the gasholders and it is recommended that an archaeologist be present to record the interior structures and framing of the gasholders when they are dismantled, as well as examples of the upper level components such as the roller carriages.

The site appears to have been fairly peripheral and no reference to it could be found in literature relating to gasworks in Buckinghamshire and very little documentary evidence relating to the site was held at the National Gas Archives. It is not clear which company operated this site prior to Nationalisation, mostly likely the former Uxbridge Gas Company, however the limited scope of this project did not allow for a thorough examination of all possible documentary sources such as Company minutes, and a closer examination of relevant archives may yield more background and historic information about the site.



General view of Gasholder 1, looking north-east Fig 7



General view of Gasholder 1, looking south Fig 8



Detail of the tank and standard bases Fig 9



Detail of the standard and mid-tank collar Fig 10



The underside of the tank walkway, showing brackets and bracing Fig 11



Example of the roller carriage sets Fig 12



View of the roller carriages (undated photograph NGA Ref: XG01090) Fig 13



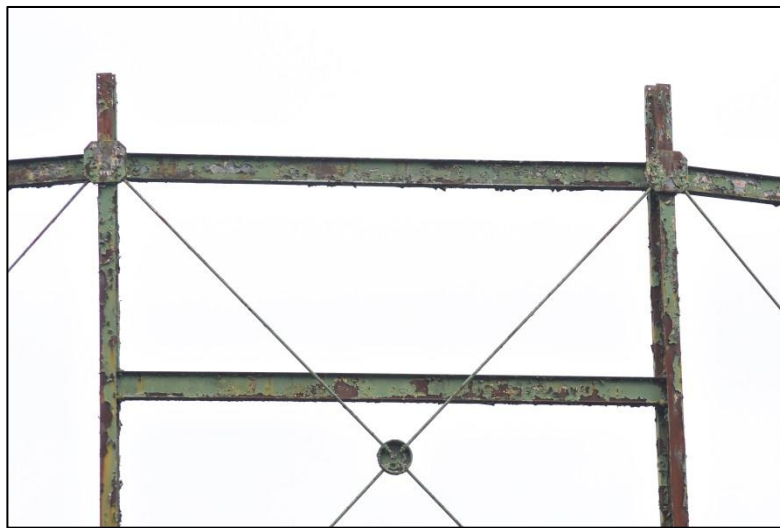
General view of the framing Fig 14



Detail of the first tier nodes Fig 15



Detail of the upper framing Fig 16



The additional horizontal framing member at the south-east side of the gasholder Fig 17



Hammer switches on the tank; note also overlap plate between the framing members
Fig 18



Detail of lagged pipes and overflow pipes Fig 19



General view of Gasholder 2, looking north-west Fig 20



Detail of the welded sheets Fig 21



Lagged pipes, overflow pipes and interceptor; note adjacent access point Fig 22



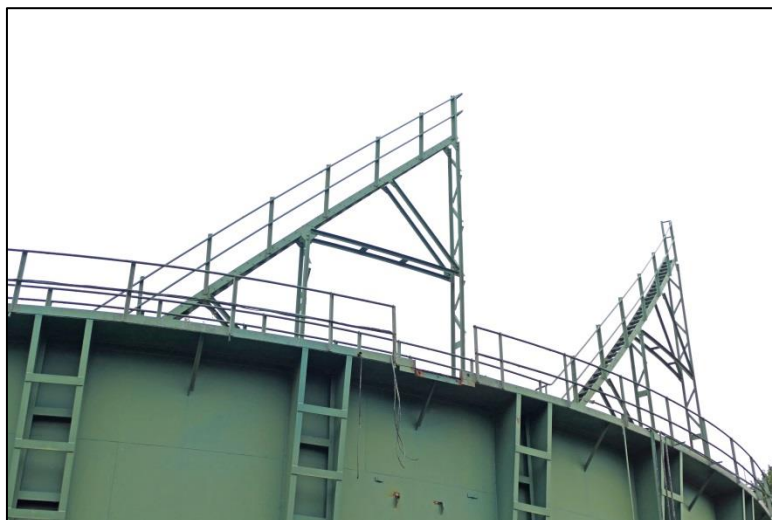
Access point on the north-east side of the gasholder, also showing the concrete base Fig 23



The walkway and supporting brackets Fig 24



The inlet and outlet and pipes Fig 25



The lift stairs Fig 26



Detail of anti-freeze valves and supporting trays Fig 27



View of the pipes adjacent to the gasholders Fig 28

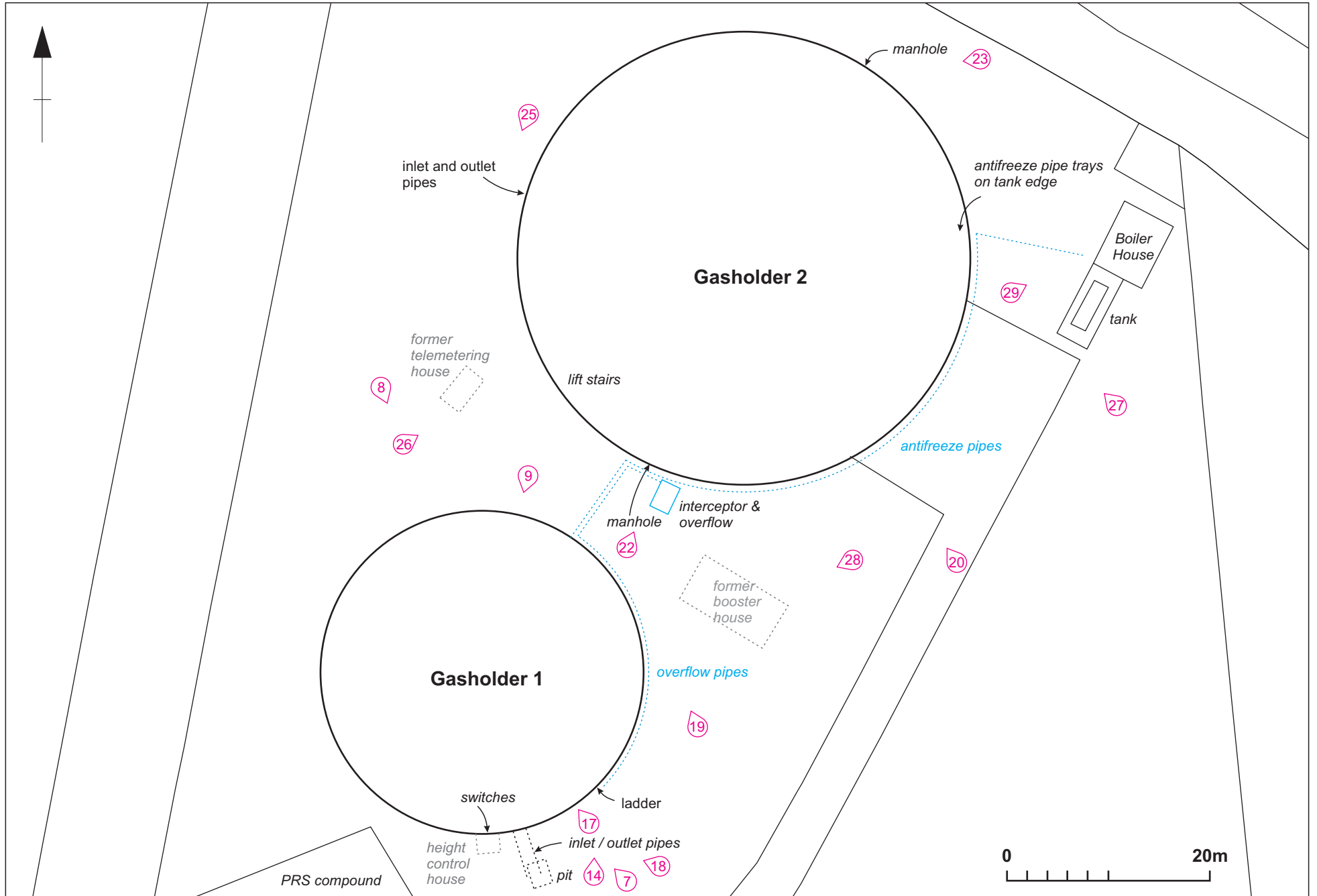


The former Boiler House, looking north-east Fig 29

Scale 1:500 (A4)

Plan of the recording area, showing photograph locations

Fig 30



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MOLA
October 2018

Appendix I – Gasholder data sheets

NORTH THAMES GAS
DENHAM HOLDER STATION

No.1 Watersealed Gas Holder

Above Ground Tank Constructed of rivetted steel plates by Messrs. R. Dempster & Sons Ltd. in 1926. Diameter 100'- 00" x 20' high.

30.8 6.2

Gas Holder

2 lift column guided holder constructed of rivetted steel plates by Messrs. R. Dempster & Son Ltd. Completed in 1926. Total capacity - 270,050 s.c.f.t.
Normal working capacity - Winter - 223,000 s.c.f.t.
Summer - 183,000 s.c.f.t.

57.50

Lift Details

| | 1st | 2nd |
|------------------------|--------------|--------------|
| Lift Height | 19'- 0" 5.8 | 5.6 17'- 5" |
| Internal Diameter | 93'- 0" 28.6 | 29.4 95'- 6" |
| Lift Volume (c.ft) | 120,292 | 124,756 |
| Pressure Thrown (w.g.) | 0'- 6" | 9" |

Crown Valves

- 1 = No. 2½ n.b.

Inlet/Outlet Valve

- 16" n.b.

A.H.V.

- 12" Peebles single Diaphragm Type.

Stock Indicator

- Hydrostatic Transducer, remote indication.

A/F Equipment

- Closed circuit, hot water system.

Usage

- Natural Gas Storage

NORTH THAMES GAS
DENHAM HOLDER STATION

No.2 Watersealed Gas Holder

Above Ground Tank Constructed of welded steel plates by Messrs. Cutler & Sons Ltd. in 1967.
Diameter 136'- 1" x 27' high.

418 83

Gas Holder

4 lift spiral-guided holder, constructed of welded steel plates by Messrs. Cutler & Sons Ltd. in 1967.
Total Capacity - 1,280,415 s.c.f.t.
Normal working capacity - Winter - 1,159,000 s.c.f.t.
- Summer - 1,140,000 s.c.f.t.

325779

Lift Details

Lift Height
Internal Diameter
Lift Volume (c.ft)
Pressure Thrown (w.g.)

| | 1st | 2nd | 3rd | 4th |
|------------------------|---------------------|--------------------|----------------|-------------------------|
| Lift Height | 8'- 26" - 0" | 7'- 23" - 7" | 7'- 23" - 7" | 7'- 23" - 7" |
| Internal Diameter | 37'- 122" - 10 1/4" | 37'- 126" - 3 1/2" | 37'- 129" - 8" | 37'- 133" - 0 1/2" 40 9 |
| Lift Volume (c.ft) | 287,825 | 295,353 | 311,484 | 327,780 |
| Pressure Thrown (w.g.) | 0' - 7.4" | 11.4" | 14.4" | 17.4" |

Crown Valves

Inlet/Outlet Valve

A.H.V.

Stock Indicator

A/F Equipment

Usage

- 2 in No.6" n.b.
- 30" n.b.
- 24" Peebles Single Diaphragm Type.
- Hydrostatic Transducer, Remote Indication.
- Closed Circuit, Hot Water System.
- Natural Gas Storage.



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