Gasholders Nos 1 & 2, Canal Road, Gravesend, Kent: Historic Building Recording Final Report

AOC 23686_U

30th June 2021

AOC Archaeology Group

ARCHAEOLOGY | HERITAGE | CONSERVATION

Gasholder Nos 1 & 2, Canal Road, Gravesend, Kent:

Historic Building Recording Final Report

On Behalf of:	**SGN** **2 Woodstock Road** **Yarnton** **OX5 1NY**
National Grid Reference (NGR):	**Gasholder No 1: TQ 65913 74071** **Gasholder No 2: TQ 65859 74063**
AOC Project No:	**23686U**
OASIS No:	**410098**
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Date of Fieldwork:	**14th & 15th December 2020 (Phase I)** **25th February (Phase II)**
Date of Report:	**30th June 2021**

This document has been prepared in accordance with AOC standard operating procedures.

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Draft/Final Report Stage: Draft	**Date: 30th June 2021**

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Summary

AOC Archaeology Group was commissioned by SGN to undertake an historic building survey of redundant Gasholders Nos 1 and 2 in Gravesend, Kent, in advance of and during their demolition.

The Gravesend gasworks was built in 1842 by the Gravesend and Milton Gas Light Company. It quickly expanded with the population of Gravesend and thrived until the use of natural gas in the 1960s. In the 21st century only two gasholders and their associated control structures remained, but were retired around 2010. At the time of survey in 2020/1 only the district governor supplying natural gas to the local area remained in use.

Gasholder No 1 was constructed in the 1890s as a guide framed gasholder designed by Joseph Davis, the engineer and manager of the Gravesend Gasworks at the time, and built by C & W Walker of Midland Iron Works in 1895. It was partially rebuilt between 1945 and 1960. The cast-iron panel tank, derivation of Type 32 latticework standards and Type U castellated girders are all common examples of the periods in which they were constructed. An unusual piece of design are the removable caps set into the dumpling for draining the tank.

Gasholder No 2 is a three-lift, spiral guided holder built between 1949 and 1960 which was commonplace at a time when bigger demands for gas were met with larger holders. At that time steel production was more economical than the earlier cast-iron examples along with lighter, making constructing larger tanks easier.

1 INTRODUCTION

1.1 Project Background

1.1.1 AOC Archaeology Group was commissioned by SGN to undertake a survey of two redundant gasholders at Canal Road, Gravesend in Kent. The work has been undertaken as part of a wider programme involving the decommissioning and dismantling of the remaining redundant gasholders in the UK operated by SGN. This report comprises the results of the Phase I works undertaken prior to demolition and Phase II works undertaken during demolition of Gasholder No 1. The survey consists of archive research, measured survey, written record and photographic survey.

1.2 Site Location

1.2.1 The two gasholders are situated within their own compound at Canal Street in Gravesend in Kent and are centred on NGR: TQ 65887 74069 (Figures 1 & 2). To the west side of the compound is Canal Road, and to the east is the Phoenix One Data Management Ltd warehouse. The area to the south of the compound is occupied by light industrial units, and to the north and north-west there is a large coach park occupying the land all the way up to Canal Basin. This is the area of the original gasworks buildings and earlier gasholders dating from the mid-19th century which were demolished in the late 1960s/1970s.

1.3 Statutory Designations

1.3.1 The two gasholders on the site have no statutory designations. The site is located within 250m of the Gravesend Riverside Conservation Area to the north-west.

2 OBJECTIVES

2.1 The objective of the historic building survey was to create a 'preservation by record' of the redundant gasholders and other structures on the site related to its former operation, prior to and during demolition, through archive research, measured survey, written record and photographic survey.

3 METHODOLOGY

3.1 Introduction

3.1.1 The historic building recording has been undertaken to a methodology outlined by Montagu Evans (2016) as an Enhanced Level II survey for Gasholder No 1, which includes a general and detailed photographic record, written record and a detailed measured survey to produce a drawn ground plan, elevation, section and important feature details. For Gasholder No 2, a Basic Level II survey was required, which included a general and detailed photographic record and written record only. The Phase II works required an inspection of Gasholder No 1 once demolition had commenced. Methodology for the survey was guided by Historic England documents *Gasworks and Redundant Gasholders: Guidelines for their Evaluation and Recording* (2019) and *Understanding Historic Buildings: A Guide to Good Recording Practice* (2016).

3.1.2 For the whole site, archive research was carried out to find early or original plans of the gasholders and gasworks together with an on-site written and photographic record.

3.2 Archive Research

3.2.1 A general map-regression exercise was undertaken to determine the general history and development of the site from its origins to the present day. All publicly accessible pre-Ordnance Survey maps and Ordnance Survey maps were viewed, and a selection have been included in this report in Section 5.

3.2.2 The following archives were consulted to identify early/original archives and drawings of the site/gasholder:

- Historic England Archives

- No records (drawn or photographic) of the gasholder are known to exist in these archives.

- National Archives at Kew
  - No records (drawn or photographic) of the gasholder are known to exist in these archives.
- National Monuments Record (Swindon)
  - No records (drawn or photographic) of the gasholder are known to exist in these archives.
- National Gas Archive, Warrington
  - Several archive sources were located and obtained in this archive, which are listed in Section 7.3 and illustrated in Section 4. A selection of these have been reproduced here as Figures 14a, 14b and 15.
- SGN Archives
  - Several original plans and other drawings for Gasholder No 1 have been located within the SGN archives and these have been reproduced as Figures 8 – 10.

3.3 Photographic record

3.3.1 A general photographic survey was undertaken of the gasholders and ancillary gasworks buildings in colour digital using a digital SLR camera in both JPG and RAW format to a minimum 24 megapixel resolution. In addition, detailed shots of features such as structural elements (standards and framework), pipework, stairs, guided rollers, knock-off switches, valves and other control equipment were also taken. A discreetly placed 1m or 2m ranging pole was placed in all shots where access and health and safety allowed for scale. Photography was carried out on the 14th and 15th December 2020, and 25th February 2021. A register of photographs was taken on site and can be found in Appendix 1, together with site plans showing the location and direction of each photograph (Appendix 2). A selection of digital photographs has also been used as plates to illustrate this report (Plates 1 – 159).

3.4 Written record

3.4.1 A written survey was undertaken of the exterior of the gasholder and gasworks buildings using AOC *pro forma* recording sheets with comment on condition, construction, features, fixtures and fittings, modern interventions, evidence for phasing and function and anything else pertinent to the historic record.

3.5 Measured Survey

3.5.1 The measured survey was undertaken using a Trimble TX8 laser scanner on 14th and 15th December 2020. A detailed description of the measured survey methodology can be found in Appendix 3. From this data, detailed illustrations including line drawings of Gasholder No 1 were created (Figures 17 – 22). Gasholder No 1 was deemed unstable during demolition so a Phase II scan of the tank and bell interior was not carried out.

Figure 1: Site location plan

01/23686U/REP_P2/01/01

Figure 2: Detailed site plan showing outline of the development area 01/23686U/REP_P2/02/01

4 GASWORKS AND GASHOLDERS: AN INTRODUCTION

4.1 An Introduction to the History of the Gas Industry

4.1.1 Dr John Clayton was the first man in England to describe that flammable gas could be produced from coal in 1684 and he even experimented with open retorts (sealed vessels) in which to produce it (Thomas 2020a, 10). The results were later reported by his son in the early 19th century. However, William Murdoch is credited with pioneering coal gas production, a Scotsman who had started to develop experimental plants to manufacture gas from wood and coal (Thomas 2020a, 1). He first lit his house and office in Redruth using this method in 1792 and built the first small gasworks at the Soho Factory of Messrs Boulton and Watt in Smethwick in 1798 (Thomas 2010). In 1805, Murdoch then started to develop and sell commercial gas (*ibid*). His philosophy was to build small gasworks that supported a single establishment, although as the 19th century progressed, larger gasworks were built across the UK to run lighting for multiple mills, factories, streets and eventually homes. Fredrich Winsor was key to the concept of centralised gasworks providing mains delivery to users across large areas. He established the Gas Light and Coke Company in 1812 which lit the cities of London and Westminster and the borough of Southwark. Throughout much of the early-mid 19th century, the gas industry provided lighting in homes, street and in industry. However, after the invention of the Bunsen burner in Germany, it started to later be used for heating and cooking, which was an advantage at the time over its new rival in lighting: electricity. Coal was the primary source for the creation of gas, so gas was hugely influential in the development of the coal industry and gas lighting slowly improved the quality of workers' lives by the lighting of the new large textile factories (*ibid*). The gas industry also created a number of by-products which could also be used in other industries, such as fertiliser, creosote, dyes and drugs (*ibid*, 2).

4.1.2 Gasworks could be established by companies either in private, company or municipal ownership and required an Act of Parliament to supply and open streets to lay gas mains throughout towns and cities (Thomas 2020a, 2). Private gasworks were also constructed in large mills and factories in Britain until they were able to be supplied by the main town or city's larger gasworks (Thomas 2020a, 36). By the early 20th century there were many amalgamations of companies as the gasworks sites expanded to support the growing urban populations.

4.1.3 After the Second World War, the gas industry was heavily restructured and nationalised and twelve regional gas boards were created in England. By the 1950s, there was a decline in the quality and quantity of gas-making coal, which led to the adoption of piping in natural gas from abroad; gas fields were located in the North Sea by the late 1960s (Thomas 2020a, 4). Therefore, between 1967–1977, there was complete conversion from coal gas to natural gas in the UK, which led to the redundancy of all coal-gas production buildings. Gasholders remained to store the natural gas piped in. The last coal-gas gasworks to close was in Millport on the Isle of Cumbrae off the west coast of Scotland in 1981 (*ibid*, 125). Originally manned, it was not long before remote monitoring of these gasholders was put in place, further reducing the number of additional buildings on the sites. All gasholders in England have now been decommissioned.

4.2 The Process of Coal Gas and the Layout of Gasworks in the UK

4.2.1 Thomas (2010; 2020b) summarises the general running of a gasworks into several main structures as seen in Figure 3. Gas was produced by placing coal in buildings called retort houses (sealed vessels) by heating coal in an oxygen-free environment to drive off volatile components, leaving coke as a residue. Multiple retorts (1) were built in 'retort benches' and were originally horizontal, D-shaped, cast-iron structures. They were heated via an external furnace (2) which was controlled by a team of stokers. As gas practices improved, methods in later years included inclined and vertical retorts which could be made of silica.

4.2.2 The produced gas was passed from the retorts through water in the hydraulic main (3) to remove ammonia (Merriam 1913), then cooled in the condensers (4). Three types of condensers were common: atmospheric, annular and water tube, all of which worked to remove coal tars as they cooled the gas, draining it to a tar tank or well.

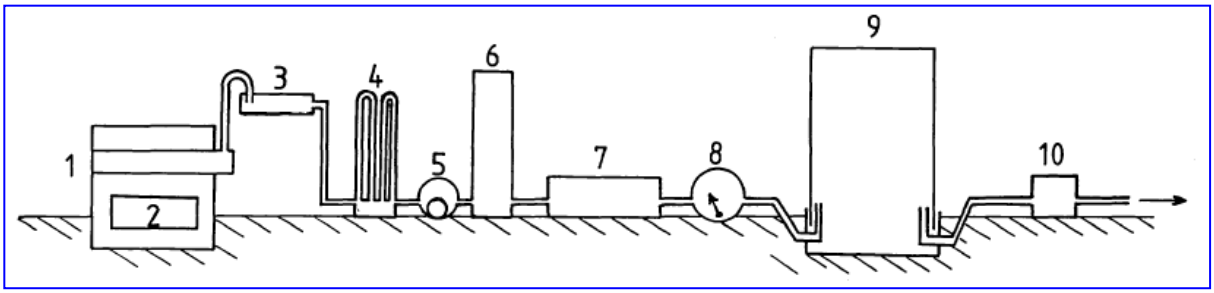

Figure 3: Schematic Layout of gasworks, after Thomas 2010

1 Horizontal Retort; 2 Furnace; 3 Hydraulic Main, 4 Condenser; 5 Exhauster; 6 Scrubber; 7 Purifier; 8 Station Meter; 9 Gasholder and Water Tank; 10 Pressure Governor (after Cotterill 1980)

4.2.3 The quality of the gas produced during the gasification of coal varied, with the highest quality produced at the start of the process and the lowest quality at the end. The exhausters (5) were gas or steam driven pumps which controlled the movement of the gas from the retorts through to storage or use. The exhausters moderated the drawing of gas at different rates to keep the gas produced at the required standard.

4.2.4 Scrubbers (6) and washers removed ammonia and phenol from the gas via two different processes. Washers passed the gas through seals, perforated plate or weirs of liquor and scrubber towers sprayed the gas with water as it moved up the tower, thereby dissolving the ammonium and phenol to form ammoniacal liquor. Combined washers and scrubbers were designed in later years. Purification of the gas to remove hydrogen sulphide and hydrogen cyanide was carried out in the purifiers (7) via the chemical process of precipitation. Originally lime was used in the process, although was superseded by iron ore which facilitated the production of iron ferricyanides and iron sulphides in the precipitation process to purify the gas. The lime and iron ore could be regenerated a couple of times before their concentrations of cyanide or sulphur were too high. After two or three uses the lime was referred to as 'foul' and was used as fertilizer; the oxide was referred to as 'spent' and was used as weedkiller. The purified gas was passed through a station meter (8) to monitor its quality and pressure before being stored in a gasholder (9). Larger gasworks had multiple gasholders which in later years held gas produced by different methods and at different pressures. Before going out to the local grid the pressure of the gas was monitored and modified via a pressure governor (10) to ensure it was at the correct pressure for users.

4.2.5 Underground tanks and wells stored tar and liquors produced in the different stages of the gasworks operations with liquor floating and tar sinking to the bottom. Solid tar was dug out when tanks were full, some stored above ground where it could be sent for refining elsewhere.

4.2.6 Other additional structures on a gasworks site included offices, workshops, dwellings, laboratories and stores as shown in Figure 4 below.

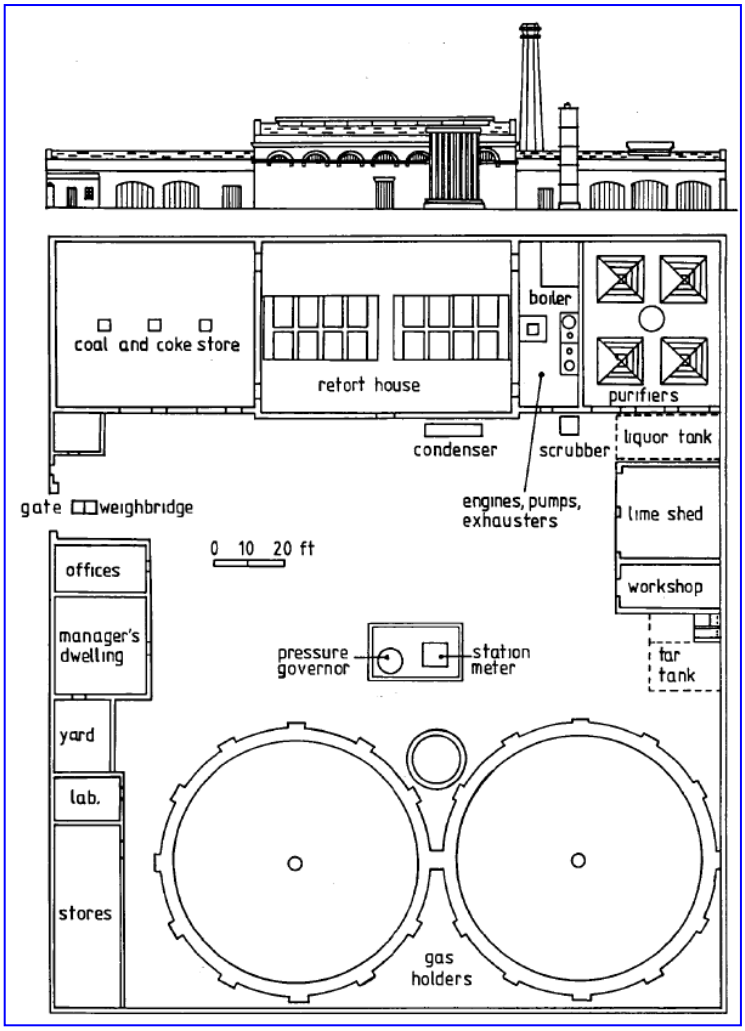

Figure 4: Typical medium-sized gasworks layout from the 1870s (after Newbigging 1879)

4.3 The Evolution, Function and Anatomy of a Gasholder

4.3.1 Gasholders were an essential element of all gasworks to store the resulting gas produced for distribution. The first holders – referred to as gasometers – were over-engineered and rectangular in shape constructed of iron and surrounded by a timber frame (Thomas 2020b, 193). However, this inefficient design was replaced by the cylindrical gasholder by the early 19th century, as they could hold a greater capacity (*ibid*). Early examples were also built within their own buildings due to safety concerns.

4.3.2 Gasholders are used to store gas to meet the daily demands of the local area. Storage capacity in the 19th century was worked out as approximately equal to the maximum consumption on a winter's day of the local area using the gas (Tucker 2000, 7).

4.3.3 The Guide-Framed Holder

The traditional guide-framed gasholder was the predominant type of holder constructed from the mid-late 19th century and into the first decades of the 20th century. As detailed by Tucker (2000, 7–8) it is comprised of three main components: the tank, the bell and the guide-frame. The tank is the open-topped cylinder that houses the bell when it is empty of gas and can be built above or below ground. It is filled with water to provide a seal to stop gas escaping and sometimes has a rest frame built within it to support the crown of the bell when the holder is empty. The bell is the open-bottomed, sheet-metal cylinder which holds the gas. It rises and falls as the gas enters and exits the holder throughout the day. To economise on the depth of the tank some holders are telescopic, meaning the bell sides are split into sections known as lifts. The joint between each lift has a cup-and-grip water seal to stop gas escaping; non-telescopic bells have only a single

lift. As the bell rises and falls it is kept in place by guide rollers mounted on carriages on the top of each lift which run against rails on the guide-frame. The guide-frame is a circular structure comprising columns (in this context called 'standards') which surround the tank. The standards are connected by horizontal girders and sometimes diagonal bracing which together secure the bell and tank from strong winds.

4.3.4 Spiral-Guided Gasholders

Whilst the first large commercial gasholders were guide-framed as described above, spiral-guided holders were a later-evolved type of gasholder first pioneered in the late 1880s. The first was constructed in Norwich, Cheshire by Clayton, Son & Co Ltd in 1890 (Thomas 2020a, 86). It was built and achieved rigidity when rising and lowering through internal supports as opposed to an external guide frame, rising through the use of spiral rails on an angle of 45°, rotating like a corkscrew. The popularity of this type grew due to the relatively simpler nature of its construction, and by the early-mid 20th century, overtook the guide-framed type as the principal style.

4.3.5 Flying Lifts

The 1880s also saw the emergence of 'flying lifts' which was the addition of an inner lift which, instead of running within the guide rails, could extend above the guide frame without its guide wheels being attached to them (hence the name 'flying') (Thomas 2020b, 210). These were pioneered by George and Frank Livesey, the first flying lift added at the Rotherhithe Gasworks in 1887 – 1888 (*ibid*). They exerted extra stress on the guide framing and were a particular risk in high winds, as the guide wheel needed to engage with the guide rails when deflated (*ibid*, 211).

4.3.6 Gasholders and Automation

After the change from producing gas via burning coal to using natural gas, gasholder operations became more automated. A set amount of gas was provisioned for each area daily, which would start entering the gasholder in the early hours of the morning. The gasholders would rise as they filled with gas until residents began using it during the morning peak period, when they would lower in height as they emptied. The gasholders would then remain at relatively the same level of fullness for the entire day until the second peak period of around dinnertime when the level would drop again. In more populated areas the holders would be filled twice daily. The movement of the bell was often controlled via an automated knock-off system. This involved a series of switches at different heights that were triggered by striker plate or arms located on the crown and lift walls. The triggering of knock-off switches either opened or closed the inlet and outlet valves of the bell to ensure that the bell never over-filled in times of low usage or completely emptied in times of high usage. The knock-off system included a sun-stock switch which was activated when the inlet valve was shut, but the bell still rising due to the sun heating up the crown causing the gas inside to expand. When the sun-stock was activated the gas outlet valve was opened to push some of the gas into the mains, ensuring the bell never overfilled risking a leak or explosion.

5 HISTORICAL BACKGROUND

5.1 Given its position on the River Thames coming out of London, Gravesend has been an important strategic military and communication centre from the early medieval period onwards. Tilbury Fort was constructed on the north side of the Thames opposite Gravesend in the Tudor period under Henry VIII. By the late 18th century, Gravesend was an established settlement with the surrounding land used as cultivated fields, as seen on Hyde's 1778 map (Figure 5).

Figure 5: Extract from Hyde's map, 1778

5.2 There are conflicting accounts of the origins of the Gravesend & Milton Gas Light Company. The company may have been founded in 1824, with an original gasworks at Bath Street (Gravesham Borough Council ud). The central location may have prompted land further to the east to open a new gasworks, and in 1842 the present gasworks site at Canal Road was chosen (*ibid*; Thomas 2020c, 330). The Ordnance Survey map of 1874 shows the gasworks site to the north-west of where the present gasholders are located (Figure 6). Three gasometers are depicted and annotated to the south-west corner of a large retort house (also annotated) immediately adjacent to the Thames and Medway Canal (the canal basin is also located to the north-west of the gasworks).

5.3 By the late 19th century, the 1899 Ordnance Survey map shows the expansion of the gasworks (Figure 7). The three gasometers and the retort house are still depicted, although there appears to have been some land reclamation to the north side of the retort house, which now has a larger extension on its north elevation. Another slightly larger gasholder has also appeared to the immediate east of the retort house. The gasworks has also expanded to the land to the SSE with the erection of Gasholder No 1. Gasholder No 1 was constructed in 1895 – 1897 with a capacity of 600,000ft^3 (16,990m^3), designed by Joseph Davis (the engineer and manager of the works at the time) and built by C & W Walker of Midland Iron Works. Archive drawings of

this gasholder produced by the Gravesend and Milton Gas Company have been located and provided by SGN (Figures 8 – 10).

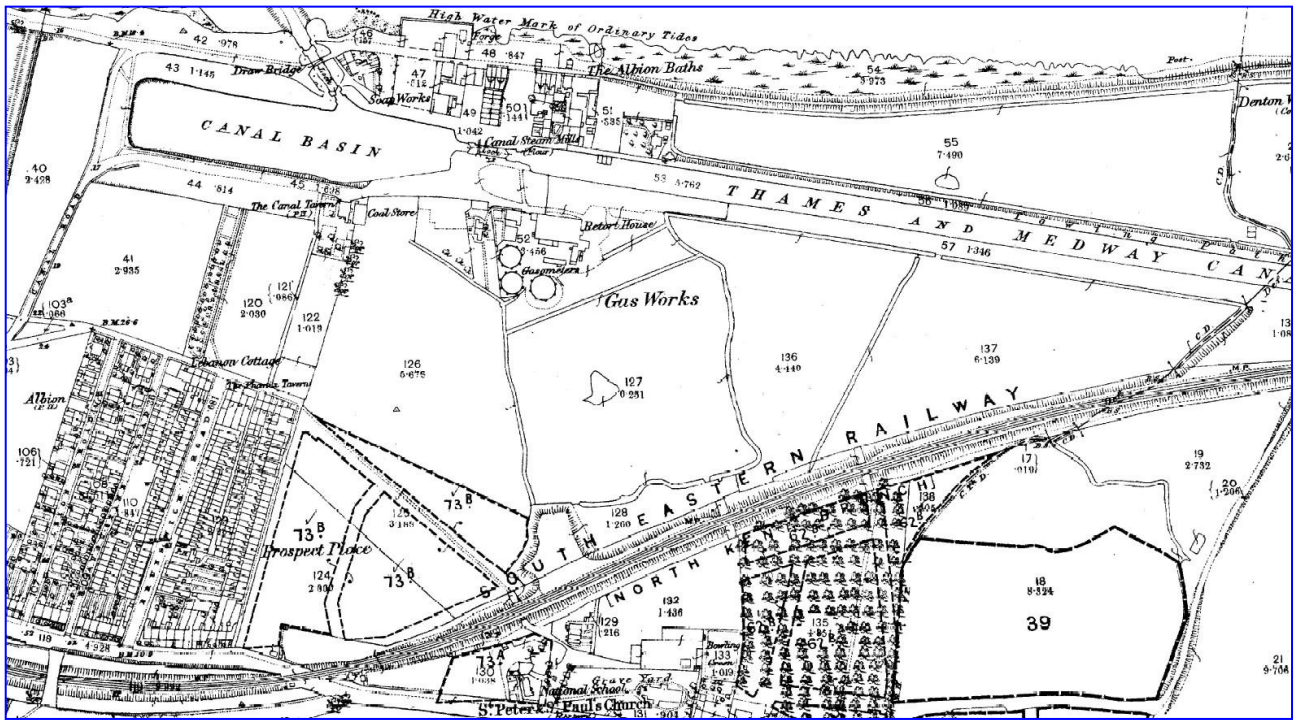

Figure 6: Extract from Ordnance Survey, 1874

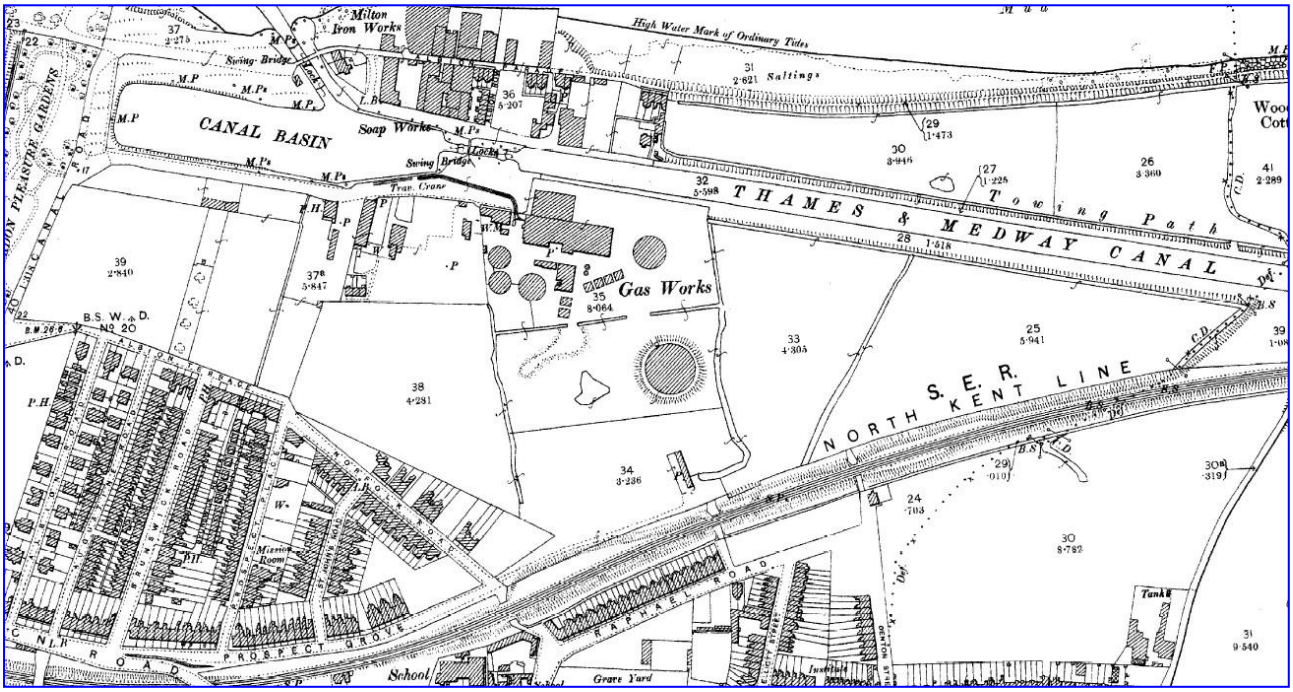

Figure 7: Extract from Ordnance Survey, 1897

5.4 A visit by the Association was made and reported on in 1907, and a photograph was taken of the gasworks at that time (Figure 11). This shows Gasholder No 1 in place together with the associated retort houses (*ibid*). The 'new' gasholder and a carburetted water plant was noted as being amongst the 'latest extensions' (*ibid*). The 1909 Ordnance Survey map shows few changes to the site since the 1897 map, although another retort house has been built to the north of Gasholder No 1 (Figure 12). Here is also little change in the site by the 1930s as seen in the 1936 Ordnance Survey map (Figure 13).

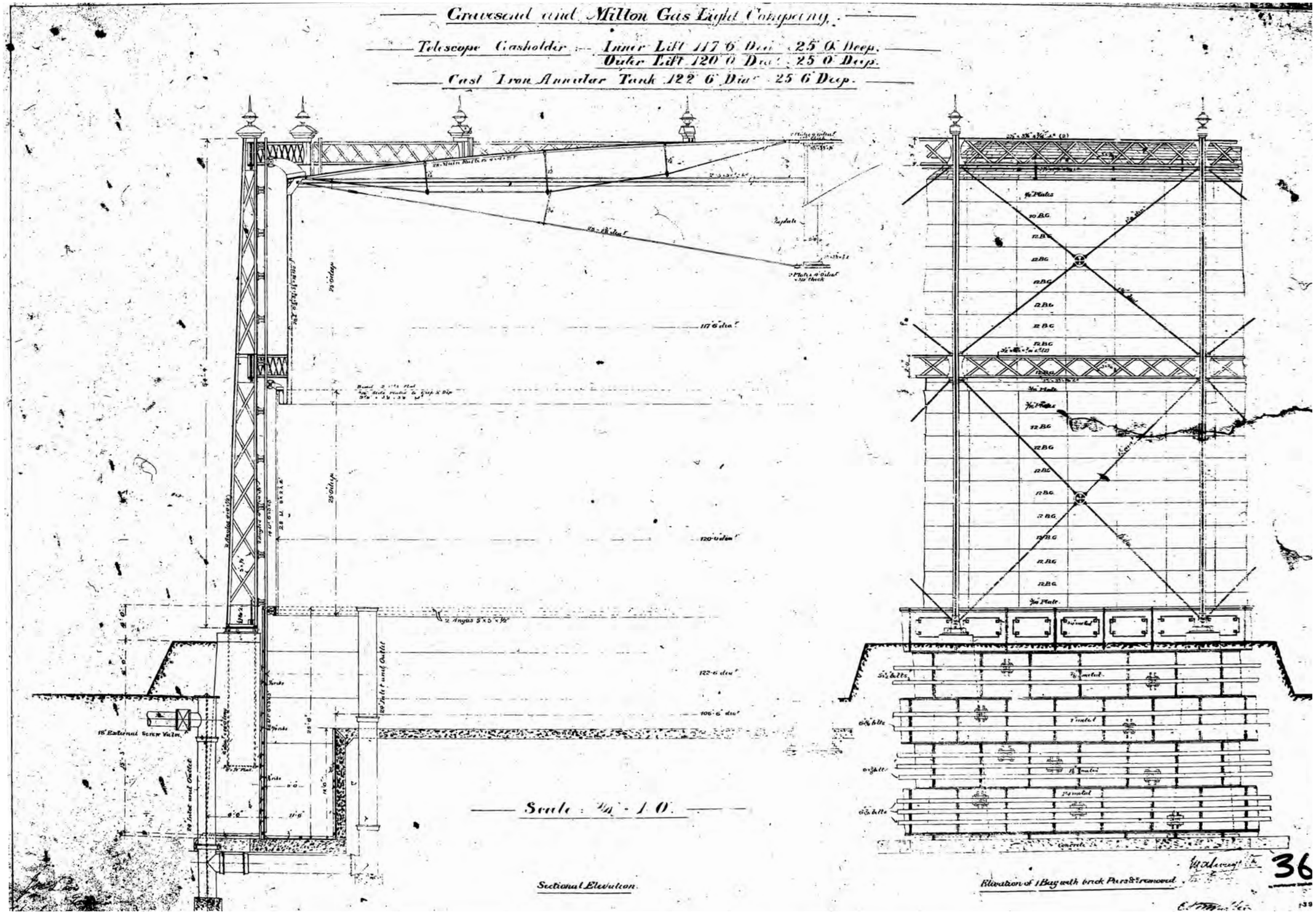

Figure 8: Gasholder No 1, Canal Road, Gravesend, Archive Drawing of Sectional Elevation (SGNA: 369; 386)

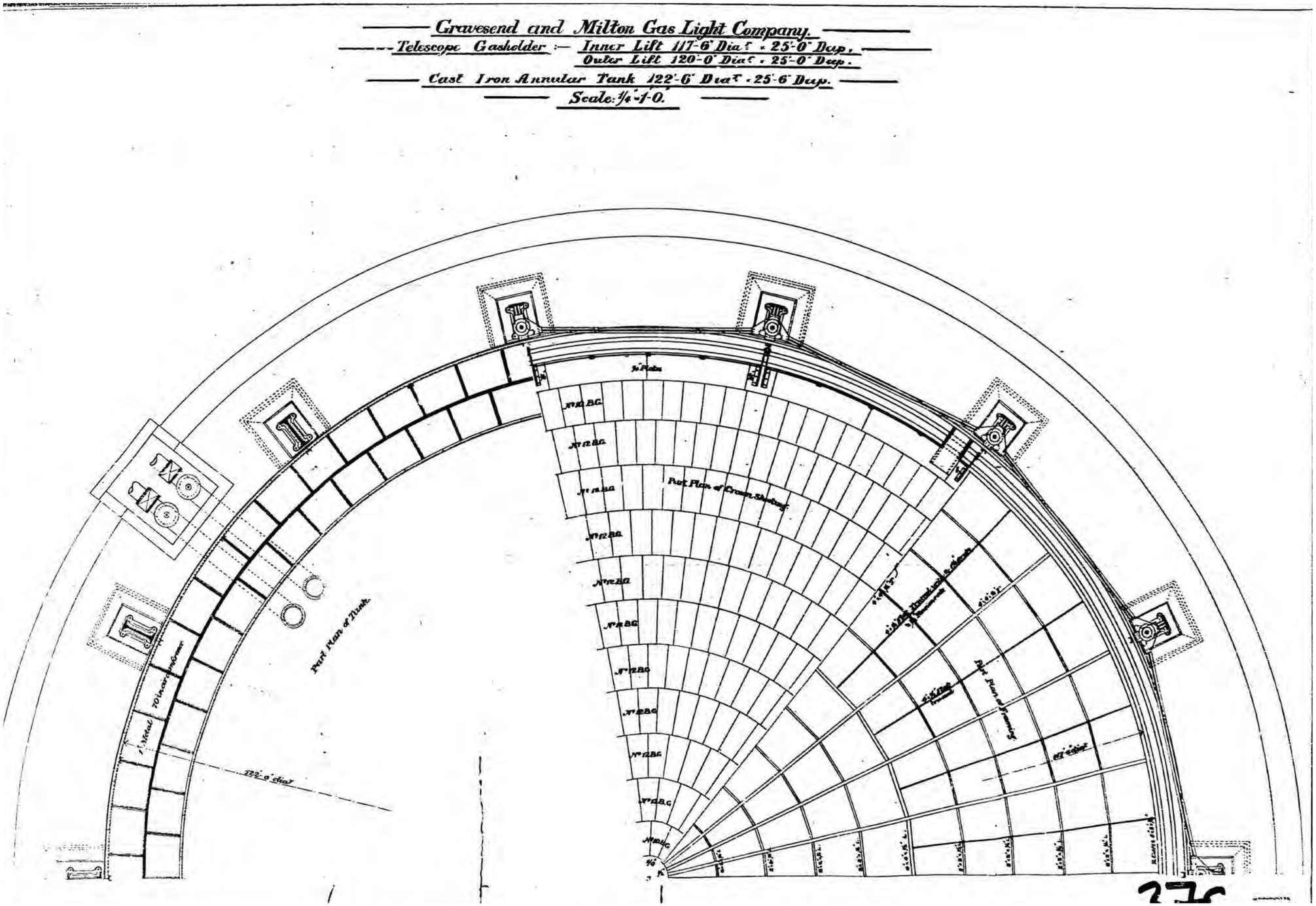

Figure 9: Gasholder No 1, Canal Road, Gravesend, Archive Drawing of Plan of Tank, Crown and Crown Framing (SGNA: 376; 384; 389)

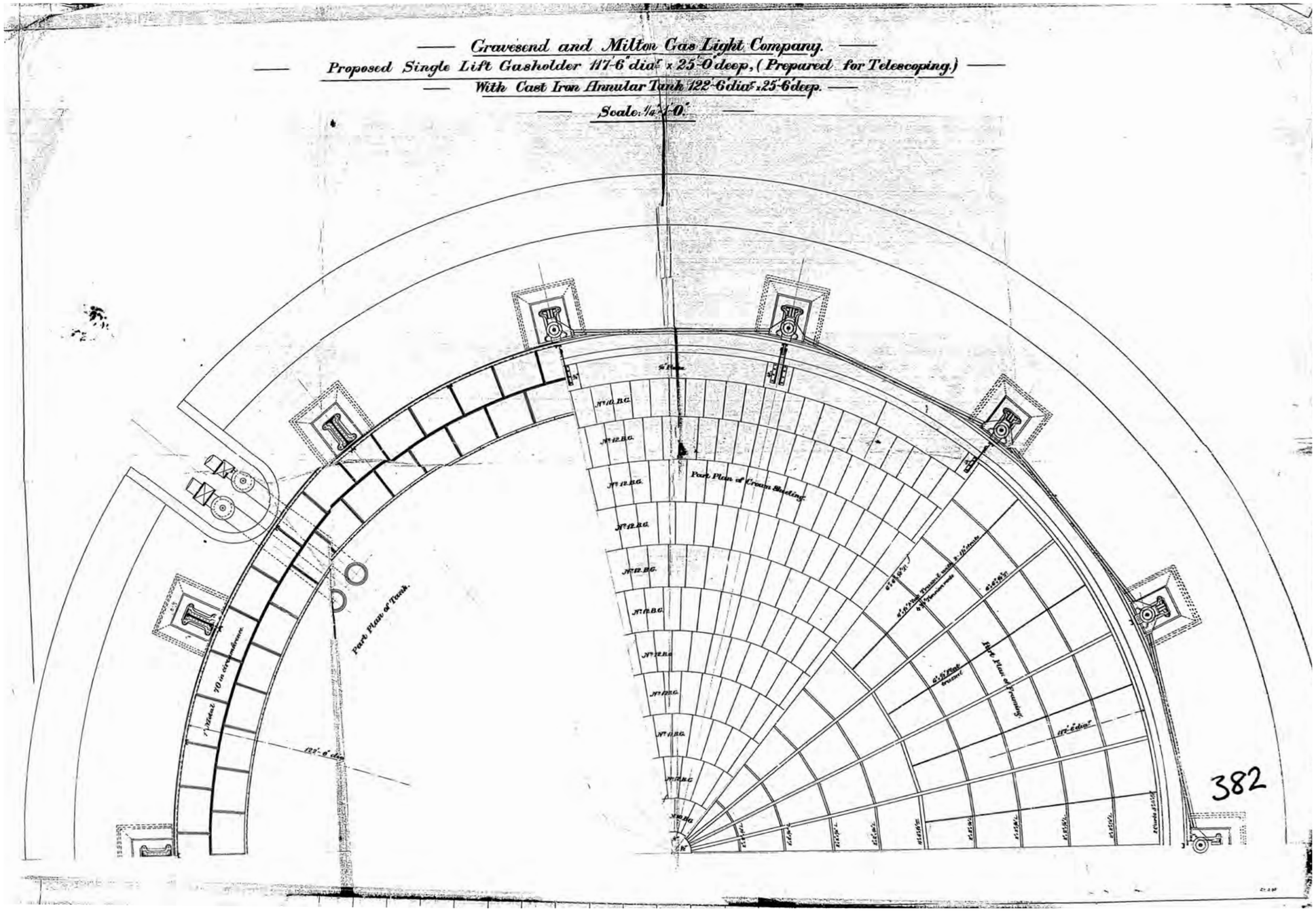

Figure 10: Gasholder No 1, Canal Road, Gravesend, Archive Drawing of Plan of Tank, Crown and Crown Framing (SGNA: 382)

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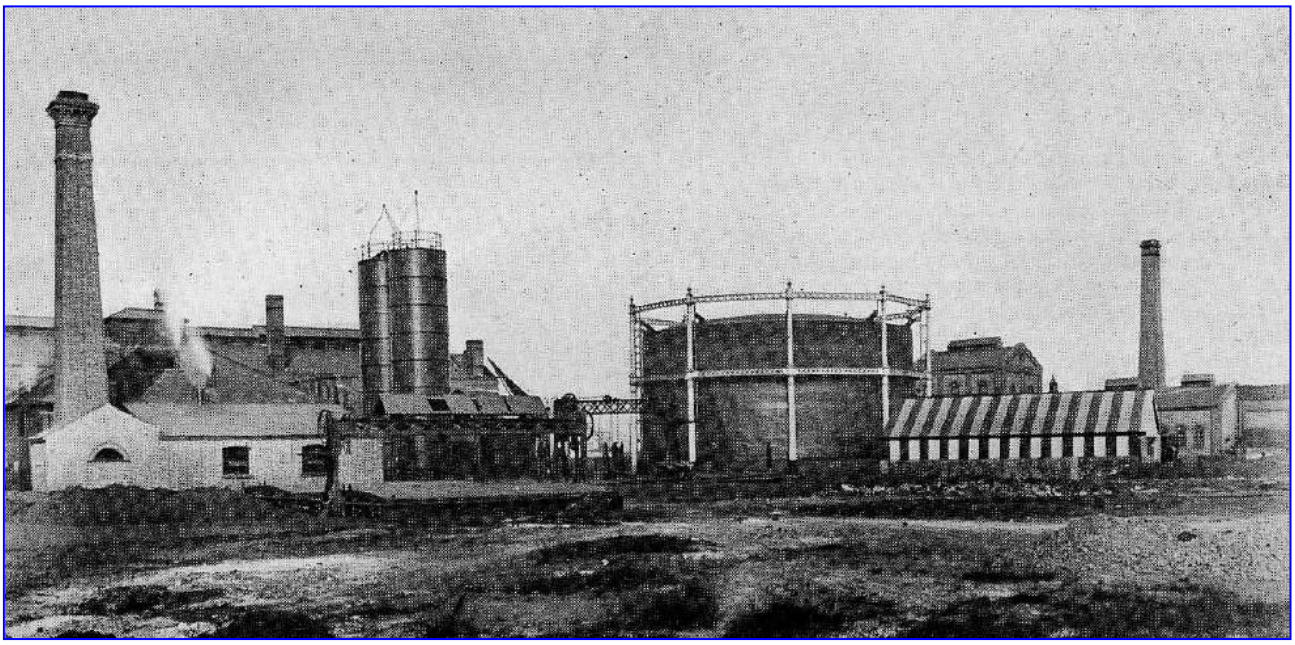

Figure 11: Photograph of the Gravesend Gasworks showing Gasholder No 1 in the foreground, 1907

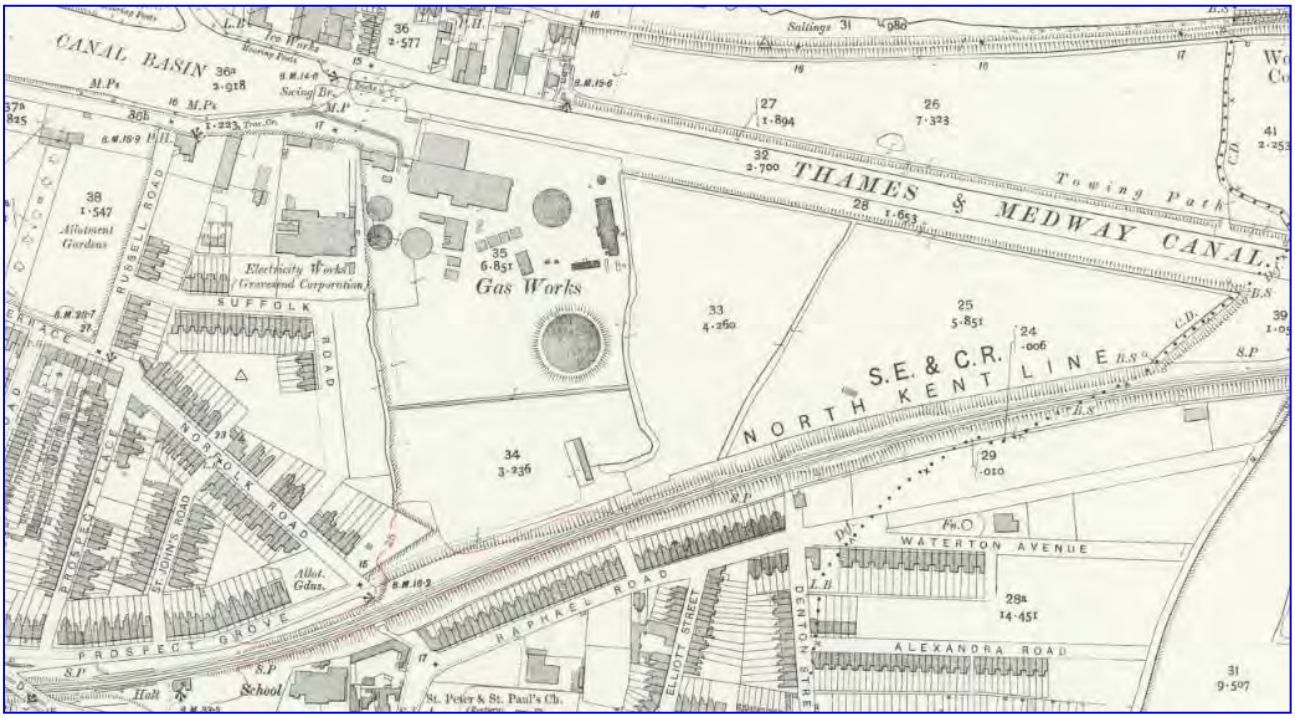

Figure 12: Extract from Ordnance Survey map, 1909

5.5 A controlling interest in the company was acquired by the South East Gas Corporation in 1940. After the nationalisation of the gas industry in 1949, the undertaking formed part of the Kent Suburban Division of SEGB.

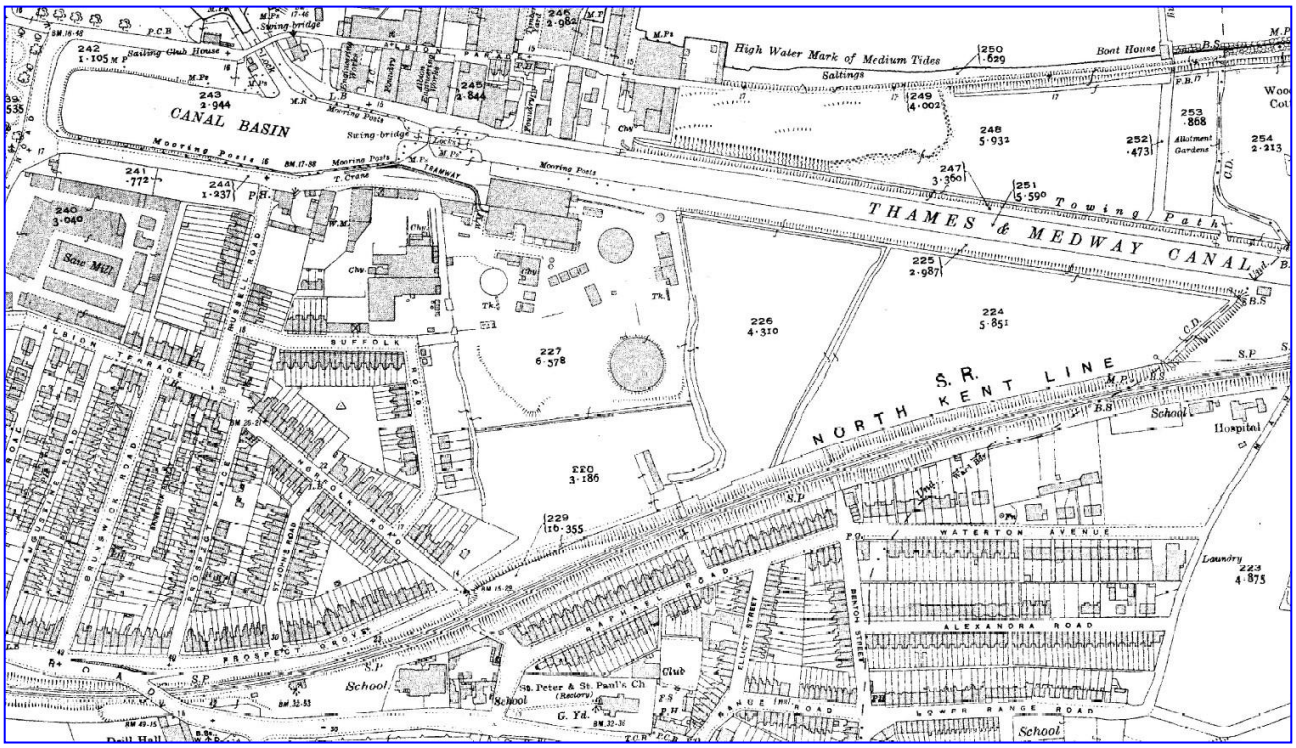

Figure 13: Extract from Ordnance Survey map, 1936

5.6 An archive plan of the gasworks site dating from 1949 shows the site layout and how the gasworks operated (Figures 14a & 14b). Gasholder No 2 is not depicted, so is assumed not to have been constructed by this date. The gasholder to the north of Gasholder No 1 is annotated as 'No 2 Gasholder' and is the holder that was built between 1879 – 1897 although has now been removed. The smaller and earlier gasholder tank, which may have formed part of the original mid-19th gasworks, is also noted, simply annotated as 'Gasholder Tank'. The retort house is still in place between this and 'No 2 Gasholder' with coal sheds in front; there is also a Mess Room, Electricity Room and Water Gas Plant in front to the east side. On the west side is the General Stores building with a liquor tank further to the south. A Boiler House is located to the immediate east of the earlier 'Gasholder Tank' flanked by a Meter House and Laboratory to the west, and a range of Purifier Tanks to the east. Other buildings include a Gasfitters Shop and Stores to the south of the Purifier Tanks and a Plant House, Garage and Stores to the east of 'No 2 Gasholder'.

5.7 In the early 1950s, plans were afoot to extensively expand the gasworks at Gravesend and plans from 1953 have been located in the archive depicted the proposed changes, which were never executed (Figure 15). The proposed changes included a complete removal of the present gasworks site and large expansion, including large coke storage areas (two of which were proposed to the north of the canal) and large carbonising plants. Three new gasholders were also proposed.

5.8 As the 1953 plans in Figure 15 show proposed changes, it is unclear as to whether the present Gasholder No 2 was erected by this time. It may well be that the funding to carry out the proposals never materialised, and the compromise of simply building an additional new gasholder was made. Therefore, based on the historic mapping evidence alone, Gasholder No 2 on the site (not to be confused with the previous 'No 2 Gasholder' constructed in the late 19th century) was built between 1949 – 1957. The 1957 – 1958 Ordnance Survey map shows this gasholder now in place immediately to the west of Gasholder No 1 (Figure 16). None of the proposed works had been executed and the former gasworks buildings were still standing. These were eventually demolished in the late 1960s/early 1970s, the gasholder later enclosed within their own compound. The introduction of natural gas by this time had made coal gas obsolete, and therefore, gas could be brought into the gasholders directly through a gas pipeline. Monitoring buildings were erected around the holders at the same time.

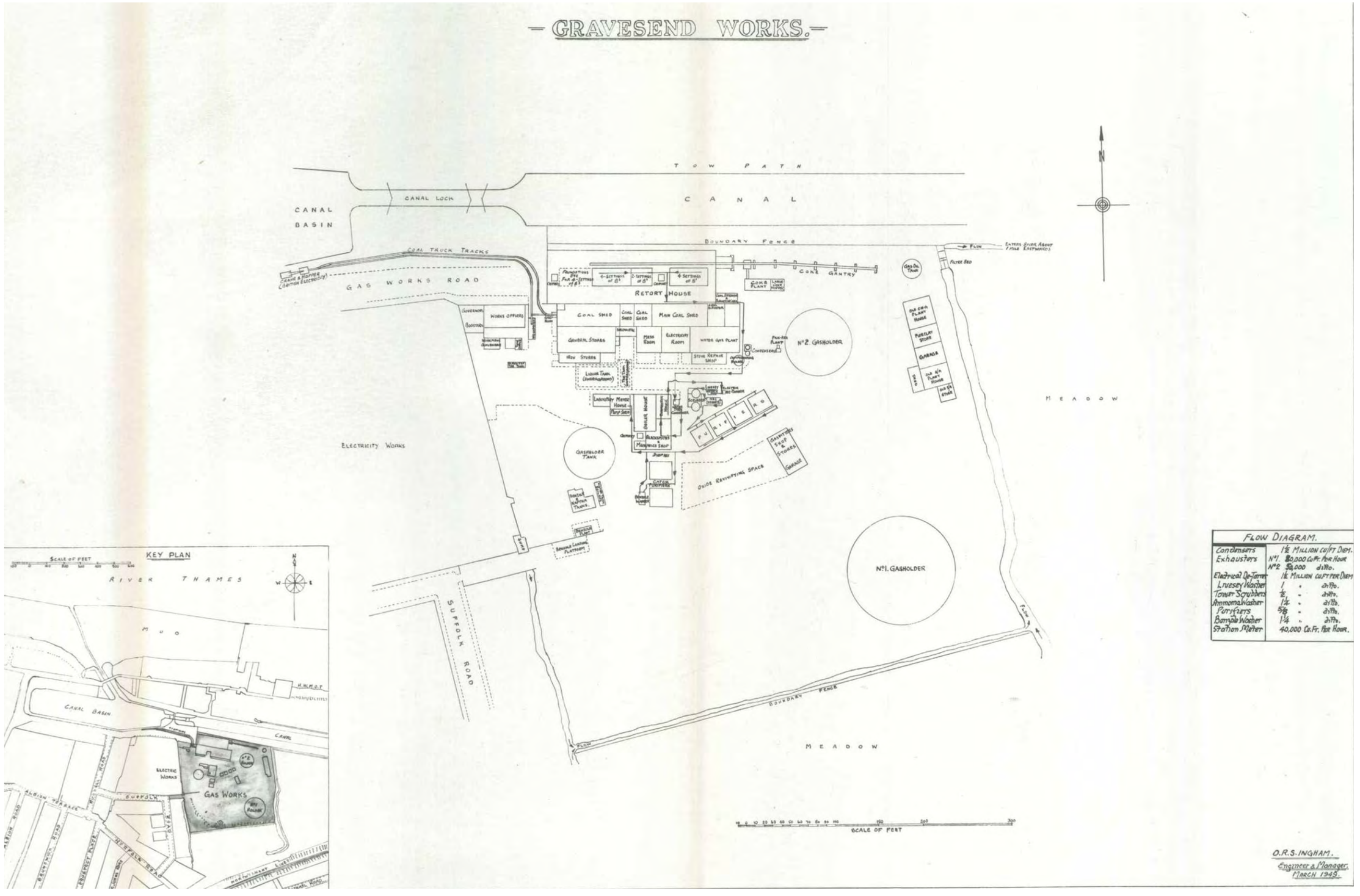

Figure 14a: Archive plan of Gravesend Gasworks, 1949 (NGA: SE_DA_E_E_3_14)

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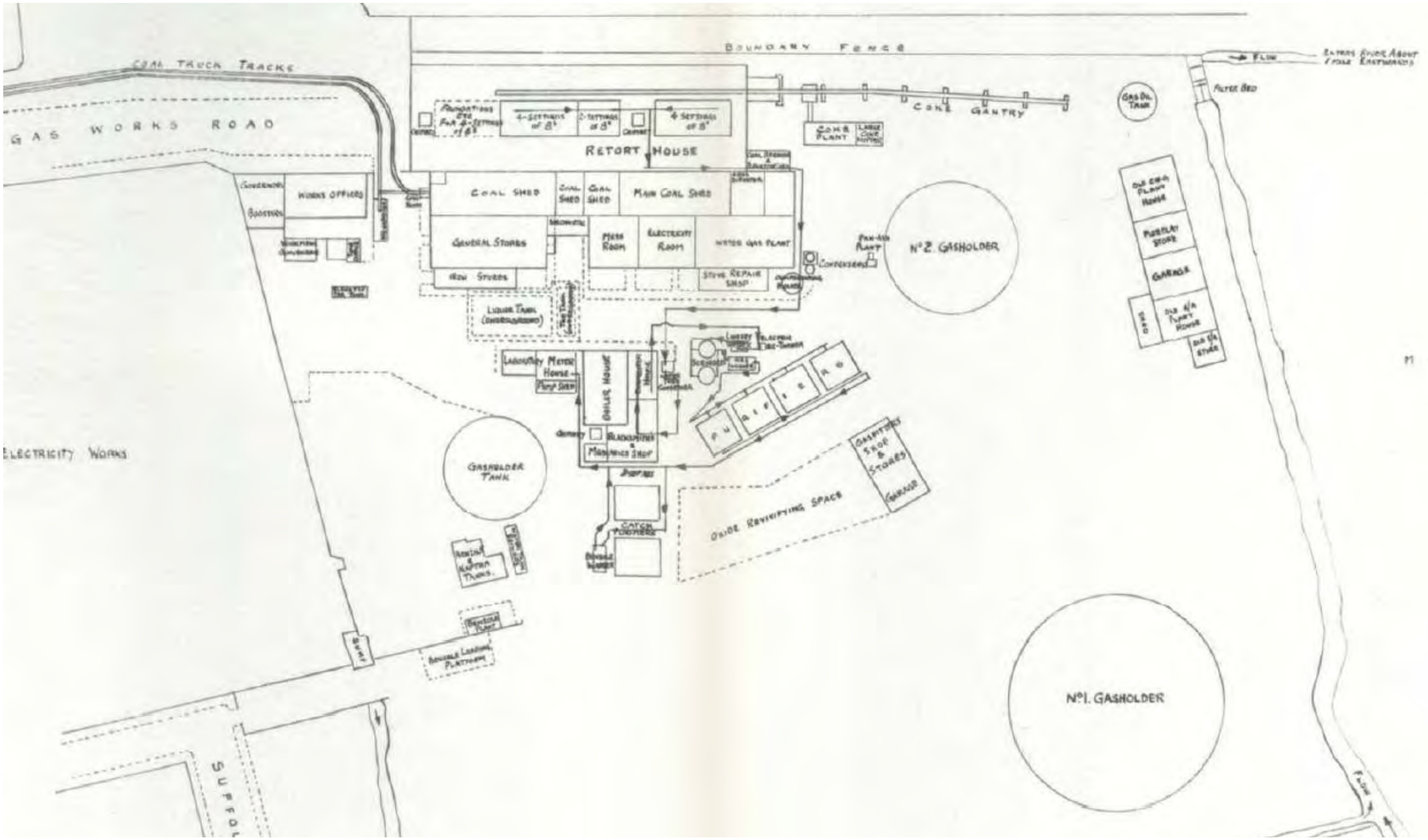

Figure 14b: Archive plan of Gravesend Gasworks, 1949 (NGA: SE_DA_E_E_3_14)

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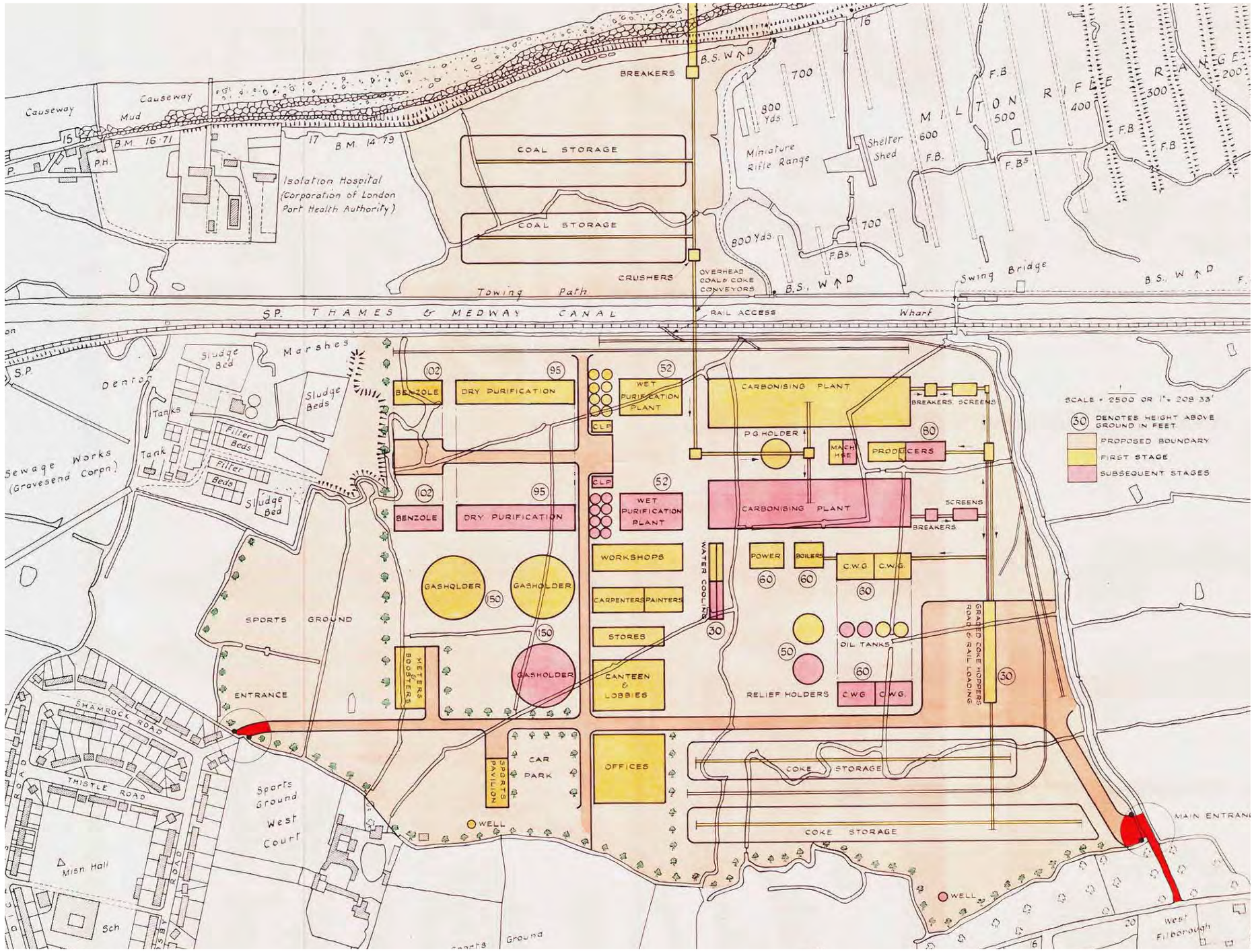

Figure 15: Archive plan of Gravesend Gasworks, Proposed New Gasworks Development, 1953 (NGA: SE_ROD_GRM_E_E_1B)

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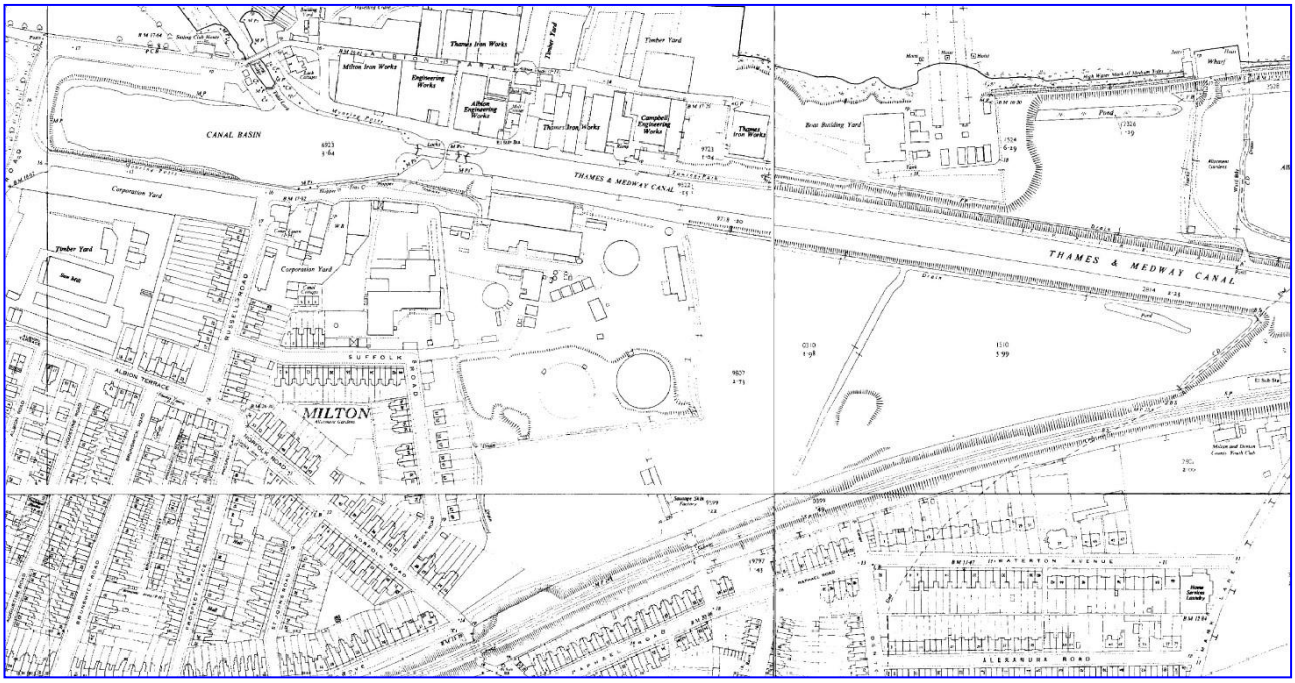

Figure 16: Extract from Ordnance Survey map, 1957 – 1958

6 RESULTS: THE SITE

6.1 Introduction

6.1.1 The gasholder site at Canal Road, Gravesend houses the remains of Gasholders Nos 1 and 2 with various operational buildings housing equipment related to their operation and one modern district governor house still in use. The site is accessed via Canal Street where both gasholders are visible due to their height (Plate 1). However, the site is unobtrusive in the landscape due to large, light industrial buildings and trees obscuring the holders in an area of flat topography (Plates 2 & 3). The site is well integrated in the town with building developments enclosing it on all sides except the north which is bordered by a coachworks (Figure 2). The gasholders may be clearly visible from the raised railway line to the south of the site, and from tall cruise ships on the River Thames to the north (Plate 4).

6.1.2 The Thames and Medway Canal is no longer continuous from Canal Road but starts 400m to the west of the site, with a sign noting its opening in 1824 (Plate 5).

6.1.3 The present SGN site is rectangular in shape with an internal irregular division separating the gasholders and their associated structures into a compound covering most of the area (Figure 17). To the west of the compound is a coach car parking area and to the north-east is an area of wasteland (Plates 6 & 7). The gasholder compound has a central gate in the north side, allowing vehicle access via a short track following the north boundary from Canal Road. A pedestrian gate is in the north-west corner of the compound. Once within the compound there are no further fences separating the structures.

7 RESULTS: GASHOLDER NO 1

7.1 Introduction

7.1.1 Gasholder No 1 is on the east side of the compound (Figure 17). It is surrounded by grassy land on all sides and is 12.5m from Gasholder No 2 to the west. The gasholder is a two-lift, guide-framed holder of 600,000ft³ (16,990m³) nominal capacity with a derivation of Tucker's Type 32 guide frame with I-section, lattice standards (Tucker 2000; Plate 8). The height of the gasholder from the ground, at the edge of the tank, to the top of the guide frame is approximately 15.5m (Figures 19 & 20). The total width of the structure when measured from the exterior base of two opposite standards is approximately 40.75m (Figure 18).

7.1.2 The gasholder is identified as No 1 by the steel '1' welded to the exterior north side of the NNW standard (Plate 9). No numbers were visible identifying the standards so for clarity they have been assigned in a clockwise direction starting from the NNW standard (Figure 18).

7.1.3 On the west side of standard 9 is a maker's plate showing the structure was originally constructed in 1895 by C & W Walker of Midland Iron Works in Donnington, Shropshire (Plate 10).

7.2 The Guide Frame

7.2.1 The derivation of Type 32 design guide frame is comprised of fourteen, equal-I-section, steel lattice standards. Each standard measures approximately 17.9m in height (Plate 11). The base of each standard is a cuboid, brick block measuring 1.5m x 0.5m in plan, capped with a 0.3m-high concrete block with chamfered top. Due to the uneven sloping ground around the tank the bases appear to vary in height but they all extend below ground by several metres (Plates 12 & 13). The blocks are set into the sloped ground perpendicular to the tank wall (Figure 18). A cast steel block is bolted to the concrete cap and forms the base for the steel structure (Plate 12).

7.2.2 Each standard is I-shaped in section with the top and bottom parts of the I formed of four L-shaped rolled steel stanchions riveted together in pairs forming small T-shapes. A latticework pattern of crossed narrow panels is riveted between the verticals forming the central line of the I (Plate 14). The lowest section of the

standards is wider than the top forming a more secure base with the addition of a trapezoidal flange plate riveted to the cast iron base block (Figure 20; Plate 12). Additional rigidity is given to the standards via small, staple-shaped girders welded horizontally every 1.3m between the top and bottom of the I. At each small girder level a flange plate is welded to the exterior face of the standards, securing the L-shaped stanchions together (Plate 15). Each standard has nine brackets bolted to its interior face which are welded to a vertical guide rail (Plate 16).

7.2.3 The standards are spaced 8.6m apart, measured from their centres, and are each joined to their neighbour via two Type U castellated, I-section girders (typology by Tucker 2000; Plate 17). The girders are bolted to the standards via their short ends and via triangular gusset plates above them (Plate 18). They separate the frame into two tiers with the lower tier measuring 9.4m from the top of a standard base to the top of the lower girder, and the upper tier measuring 7.3m between the top of the two girders (Figure 19). At the level of the lower girder there is an additional flange plate bolted to the exterior of the standards (Plate 15).

7.2.4 Four diagonal tie bars brace the frame between neighbouring standards at each tier and are secured centrally via circular tension rings (Plate 19). The tie-bars are bolted to the lowest part of the steel standards and girders using additional metal fixtures (Plate 20).

7.2.5 On the north side of the frame between standards 14 and 1 are three ladders joined via two standing platforms on top of the tank and the lower girder (Figure 19, Plate 21). Safety cages surround all but the interior side of the middle and top ladders and access onto the middle ladder is restricted by a padlocked guard box at the base.

7.3 The Tank

7.3.1 The gasholder has a tank measuring approximately 36.5m in diameter which is visible above ground up to a height of 1.7m (Figure 18). The tank is mostly below ground with a total depth of 7.6m (Figure 20). It is constructed of cast iron panels each measuring 1.7m wide by 1.5m high which are bolted together, in a brick stretcher-bond arrangement, to form a circle in plan (Plate 22). The sloping made-ground surrounding the tank helps secure the tanks rigidity along with several wrought-iron belt rings encircling the tank below ground level (Plate 23). A simple geometric design is embossed on the exterior of each tank panel with an embossed ‘E’ beneath (Plates 24 & 25).

7.3.2 The Phase II works allowed the inspection of the tank. Within the tank is a concrete-surfaced dumpling with a vertical edge, shallow slope with a rise of 1.2m and a flat top (Plate 26). Metal caps are situated in lines of three just anti-clockwise of the cardinal points on the dumpling (Plate 27). The caps are leak-proof due to the wrapping of bitumen-covered cloth wrapped around them (Plate 28).

7.4 The Bell

7.4.1 The bell is comprised of two telescopic lifts referred to as the top (or crown) lift and the bottom lift. The lifts are leak-proof while in operation due to square cup-and-grips (Plate 29). Handrails bound the lift tops for safety (Figure 19). The lift walls are constructed of riveted iron sheets with 28 staple-section stanchions welded vertically to the interior of the top lift wall for rigidity, which were viewed during the Phase II works (Plate 30). Several welded repair patches are visible on the top lift wall from the tank interior and a circular cotter plate used during construction and maintenance is situated on the north-east side (Plates 31 & 32). At the base of the top lift wall interior are short lengths of overflow pipe coming out from the grip between the two lifts (Plate 33).

7.4.2 The Guide Rollers

The two lifts of Gasholder No 1 are topped with radially mounted guided rollers, on carriages, that run up and down within the guide rail on the inward-facing side of the standards (Plate 34). The roller of the top lift is 0.38m in diameter and the bottom middle lift is 0.3m in diameter (Plate 35). The carriages are comprised of two mirror image horn-shaped iron sheets bolted to horizontal bars which separate the sheets to fit the guide

roller between (Plate 36). They are bolted to the lifts via additional iron cleats. Grease lines are present on some of the top carriages.

Additional roller wheels are located at the base of the bottom lift wall exterior that are guided by rails bolted to the tank wall between the standards (Plate 37).

7.4.3 The Crown

The crown is comprised of trapezoidal, iron sheets in six concentric rings forming a dome of 1.5m rise (Figure 18). The two outermost rings are comprised of sheets arranged horizontally around the dome, that are perpendicular to the vertically arranged sheets of the inner four rings. The horizontal rings of sheets are riveted together with additional flange plates on the short joints (Plate 38). The inner four rings of sheets are welded together along with two semi-circular sheets making up a central circle (Plate 39). There are areas of rust over the whole crown.

Features on the crown include two central valves, a different valve type on the NNW and a glycol pot on the WNW (Plates 40–42). Decommissioning works removed two cotter plates located on the NNW and SSE side of the crown and added purge points, additional aeration holes and a dewatering hole (Figure 19; Plate 43).

Access onto the crown is via a platform located on the west side of standard 1 (Plate 44). The handrail encircling the top lift is interrupted at this point and an additional handrail added to the platform. Two footings of a previous handrail are visible to the SSE of the existing platform (Plate 41).

The crown has a truss frame, which was viewed during the Phase II works, and comprised of a central column with 28 trusses radiating from it in an umbrella-like formation (Plate 45). The truss frame is supported when the bell is grounded by a brick pier in the centre of the dumpling (Plate 46). The tops of the trusses are comprised of T-section iron lengths bolted to their neighbour with L-section iron lengths in between to form a dome frame on which the crown sheets rest. Each truss also has two iron bars in alignment with the ribbon above, between the central column and the top lift wall interior (Plate 47). One bar is bolted to the top of the central column and the other is bolted to the bottom of the central column. Additional iron bars are bolted vertically between them as well as to the dome frame above. Both the iron bars are bolted to a triangular fixture at the top of each I-section stanchion lining the top lift wall interior (Plate 48). A variety of bolted joint types exist on the truss frame, each specific to their location (Plates 49 & 50).

7.5 The Gas Inlet and Outlet

7.5.1 The gas inlet and outlet pipe are situated on the NNW side of the holder with the control valves in a building situated between standards 14 and 1 (Plate 51). The building is brick-built with a concrete render finish. It measures 3.5m x 3.2m externally, in an ENE/WSW alignment, and has two sets of steps built onto the exterior to give access up onto the gasholder (Figure 19).

7.5.2 On the interior ENE wall is a maker's plate showing C & W Walker as the builders (Plate 52). The tops of the inlet and outlet are just visible through the debris along with manual valves for each (Plates 53 & 54). Two brick-lined valve pits related to the inlet and outlet are situated to the north and covered with weather-proof lids (Plate 55).

7.5.3 During the Phase II works, the inlet and outlet pipes could be viewed from within the tank on the NNW side. Each comprised of cast-iron pipe lengths connected by bell-spigot joints (Plate 56). An iron ribbon connects the two pipes which is attached to three iron bars bolted to the dumpling to secure the pipes upright.

7.6 Fixtures and Fittings

7.6.1 Knock-Off Switches

Two types of knock-off switch are present on Gasholder No 1. Elevated on the north-east side of standard 14 and on the top of the tank to the west of standard 1 are two gasmatic knock-off switches (Plate 57). The switch on standard 14 can be accessed via a ladder (Figure 19). More modern electronic knock-off switches are present on the north-west and south-east sides of the gasholder between standards 12–14 and 5–7 respectively (Plates 58 & 59).

7.6.2 Anti-Freeze Room and Elements

Heating elements are clipped to the lower lift and tank walls around the entire holder (Plate 60). These are monitored and controlled via the anti-freeze room on the west side of the holder (Plates 61 & 62).

7.6.3 Water Monitoring Devices

On the west side of the holder to the south of standard 12 is a float switch monitoring the level of water within the tank (Plate 63). There is another float switch attached to the lower lift inner wall between standards 12 and 13. On the north side of standard 12 is a swan neck missing its original hose and electronic controls below (Plate 64). There are several electrical boxes related to the automated running of the holder which have been blanked and their signage removed (Plate 65).

7.6.4 Interceptor Tanks

On the south-west side of the holder between standards 9 and 10 there is an overflow pipe which exits near the top of the tank and to a raised pipe (Plate 66). The pipe goes to a brick-built interceptor tank in the south-west corner of the compound. It measures 4.8m x 1.8m in an ENE/WSW alignment with several manholes on top to inspect the various sediment settling chambers (Plate 67).

Cut-off pipework on the east side of the holder to the north of standard 5 may relate to a previous overflow and interceptor system (Plate 68).

7.6.5 Oil Pipework

Pipe for replacing the oil for the oil-filmed tank is situated between standards 1 and 2 on the north side of the holder (Plate 69).

7.6.6 Winch

Just below the lower girder level on the exterior of standard 12 is a hook which may be part of a winch system (Plate 70).

8 RESULTS: GASHOLDER NO 2

8.1 Introduction

8.1.1 Gasholder No 2 is a three-lift, spiral-guided design of approximately 950,000ft³ (26,900m³) nominal capacity, which was constructed between 1949–1957 (Figure 21; Plate 71). It is situated on the west side of the compound on relatively flat ground. It is identified as No 2 by the steel '2' welded to the exterior north-west side (Plate 72).

8.2 The Tank

8.2.1 The above-ground tank is constructed of riveted steel sheets measuring approximately 38.3m in diameter and 9.7m in height. The sheets measure approximately 7.5m x 1.6m in six courses in a 'brick stretcher' bond alignment. The horizontal seams all have a single row of rivets, although the vertical seams have two rows of rivets on the top two courses with flange plates and additional rows of rivets on the lower courses (Plate 73).

8.2.2 Rigidity is added to the tank via an array of 24 vertical braces that are welded to its exterior and do not reach the ground (Plate 74). Each brace comprises two rolled steel, staple-shaped stanchions which are secured together via narrow horizontal sheets. The braces were made by Dorman Long & Co, identified by their embossed maker's mark on the edge of the stanchions (Plate 75). The tops of the standards are riveted to triangular gusset plates which are in turn riveted to the underside of a walkway projecting out from the top of the tank (Plate 76). The walkway around the top of the tank is made of riveted steel sheets which protrudes outside the top of the tank by approximately 0.7m. It is bounded by a steel, safety handrail, with each upright of the handrail bent beneath the walkway and riveted to the tank exterior acting as a supportive bracket.

8.2.3 On the south side of the tank there is an oval-shaped cotter plate for access and egress during construction and maintenance operations (Plate 77).

8.2.4 Access to the top of the tank is via a stair on the north side of the structure (Plate 78). The stair has two flights of steps with a platform in between and a platform at the top. The bottom step and vertical supports for the structure are all set within concrete blocks on the ground. Additional supports are welded to the tank exterior wall. A padlock-secured gate with associated grating is located at ground level to prohibit access.

8.3 The Bell

8.3.1 The Lifts and Guide Rollers

The bell is comprised of three lifts referred to as the top (or crown) lift, the middle lift and the bottom lift. The three lifts allow the telescopic bell to rise and lower via helical guiderails gripped by guide rollers (Plate 79). The tangential guide rollers are bolted to the lift tops in pairs with one either side of each guide rail. The guide rails are I-shaped with one cross bar of the 'I' riveted to the tank wall, and the other set into grooves in the rollers. The rails are set at a 45° angle, allowing the rollers to raise the bell up in either a clockwise or anti-clockwise direction. The top and bottom lifts rise in a clockwise direction with the middle lift rotating up in an anti-clockwise direction (Plate 80). The rollers are equally spaced around the structure related to the position of the guiderails on the lift walls.

On the east, NNW and SSW sides of the structure there are sections of guide-frame built above the walkway, bottom lift and middle lift respectively (Figure 21). The structures are triangular, formed of latticework, steel uprights riveted together and braced horizontally (Plate 81). They have steps and a guiderail running up the hypotenuse side. To reach the crown when the bell is raised a worker would walk up a set of stairs then around the lift to the top of the next set of stairs and so on. There are gaps in the handrails on the lift tops to allow this route up the structure with access onto the crown from the structure on the SSW (Plate 82).

The lifts could be walked on while the holder was in operation and therefore have steel, safety handrails surrounding them. The lift walls are constructed of riveted iron sheets and have square cup-and-grips (Plate 83).

8.3.2 The Crown

The crown is comprised of trapezoidal, steel sheets riveted together in a radial pattern, forming a dome shape of 2.4m rise (Plate 84). The steel sheets form eight concentric rings around a central circle (Plate 85). As with the tank, the crown panels have more rivets in the outer panels for stability at the crown top curb. The outer two rings have sheets lying perpendicular to the other rings and the outermost ring has an additional flange plate over its vertical seams.

Three types of vents are present on the crown situated on the south, south-east and centrally (Plates 86–88). A glycol pot is present on the west that is situated within a line of anti-slip paintwork which provides safe access across the crown (Plate 89). Decommissioning works removed three cotter plates located on the north-west, north-east and south side of the crown and added purge points, additional aeration holes and a dewatering hole (Plate 90). The handrails on the lift tops were also cut through on the east and west sides of the holder during decommissioning works.

The crown is in good condition with no visible areas of repair although there are patches of rust across it, especially along riveted sheet seams. The interior of the gasholder was not accessed during the Phase II survey, but the crown is presumed to be trussed with a central supporting pier similar to those found at other spiral-guided holders such as at Poole and Redhill (Sproat et al 2019; Hudson et al 2019).

8.4 The Gas Inlet and Outlet

8.4.1 The gas inlet is situated on the north-west side of the holder and the outlet is on the north-east (Figure 21). They are constructed in a tall, inverted-U shape comprised of welded steel sheet sections connected via single, bolted-flange joints (Plate 91). A bracket is welded to the outside of the pipes just beneath the curve of the U which secures them to the gasholder via the underside of the walkway. Both are set within brick-

lined pits with a grated safety cover, have vents on the sides of the pipes and manual open/shut valve wheels (Plates 92 & 93); the wheel has been displaced on the outlet.

8.4.2 The inlet and outlet pipes both have associated brick-lined valve pits situated close by with weighted, diaphragm valves made by Peebles & Co (Plates 94 & 95).

8.5 Fixtures and Fittings

8.5.1 Knock-Off Switches

Two types of knock-off switch are present on Gasholder No 2. On the north-west and north sides of the holder are two gasmatic knock-off switches (Plate 96). More modern electronic knock-off switches are present on the north and south sides of the gasholder (Plate 97).

8.5.2 Anti-freeze System

When the holder was in use an anti-freeze system was in operation to stop the water in the tank and cup-and-grips from freezing in cold weather. The system was controlled via the anti-freeze control room (Structure 1) which powered and monitored the heading elements on the holder. Electrical cabling connected the system and distribution boards are present on each lift (Plate 98).

A previous anti-freeze system is present on the holder in the form of a heating motor on a platform off the access stairs used to circulate warm water through a pipe in the tank (Plate 99).

On the north-east side of the holder is an electrical device which may be related to monitoring the tank water temperature to trigger the anti-freeze systems (Plate 100).

8.5.3 Possible Water Monitoring Systems

On the west side of the holder is a tank water level float device (Plate 101). Two swan necks with rubber hoses which monitor and supply water to the cup-and-grips while the bell is raised are also present on the west side (Plate 102). There are several electrical boxes identified as 'radial' boxes on the holder which may be related to this system (Plate 103).

8.5.4 Interceptor Tanks

The overflow pipe for discharging water from the tank is situated on the south-west side. This goes into the same interceptor tank as previously mentioned for Gasholder No 1 (Plate 104).

On the SSE side of the holder is a bunged circular hole and bracket fixtures on the exterior side of the tank which may be related to a previous overflow pipe (Plate 105).

8.5.5 Oil Pipework

A pipe for replacing the oil for the oil-filmed tank is situated on the north side of the tank (Plate 106).

8.5.6 Winch

On the east side of the access stairs is a support post which is all that remains of a winch system (Plate 107).

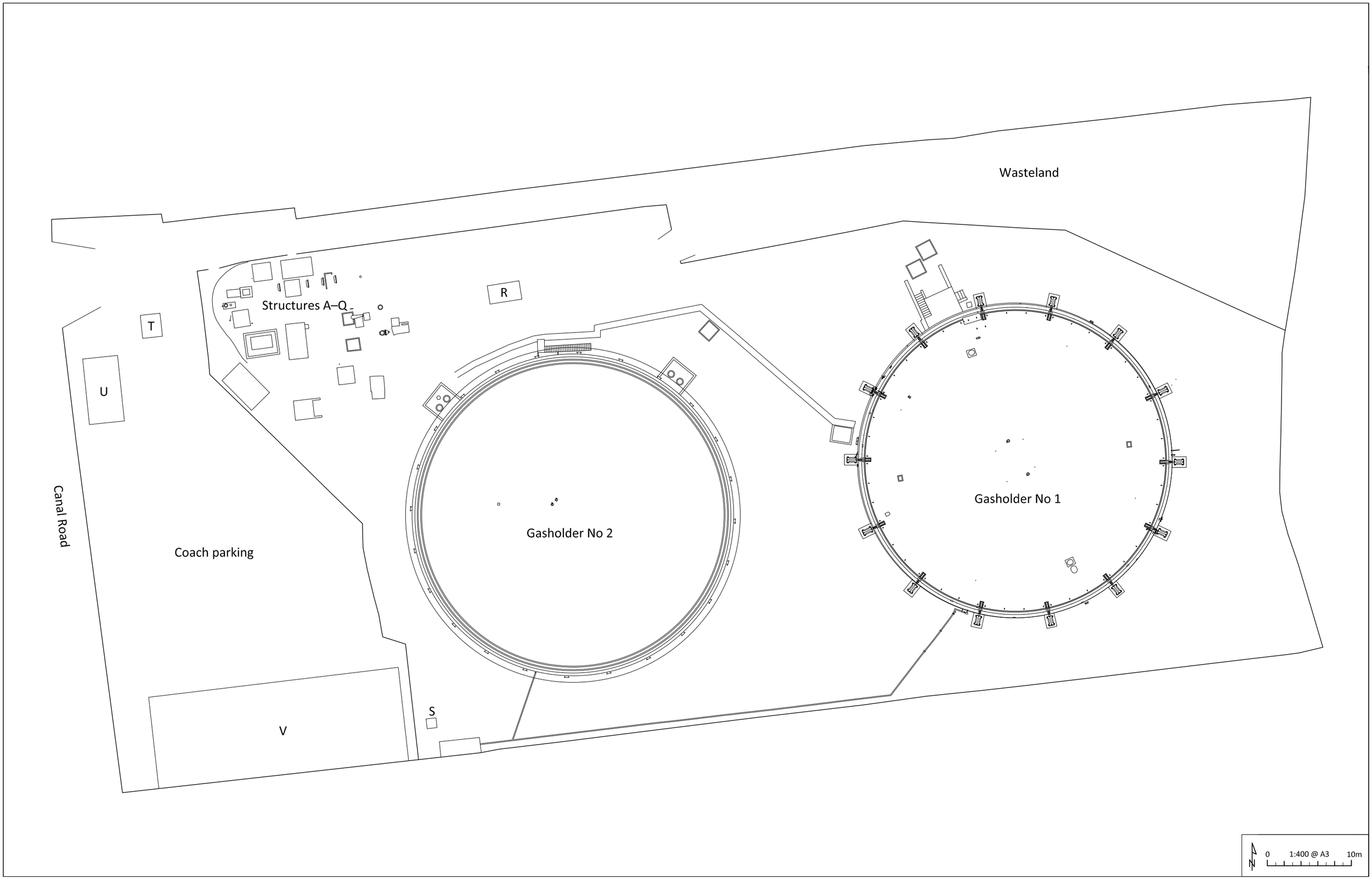

Figure 17: Site plan

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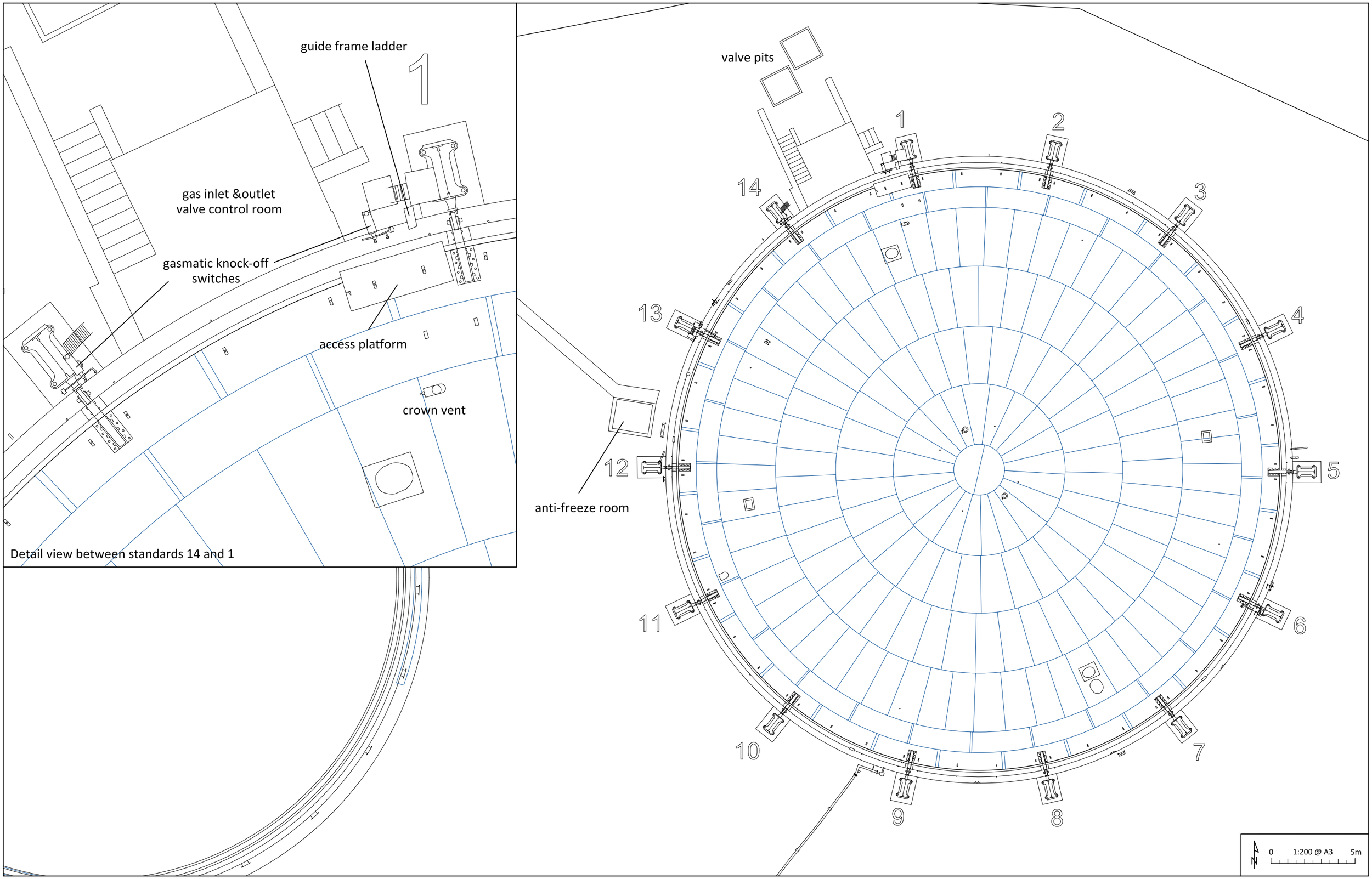

Figure 18: Gasholder No 1, ground plan

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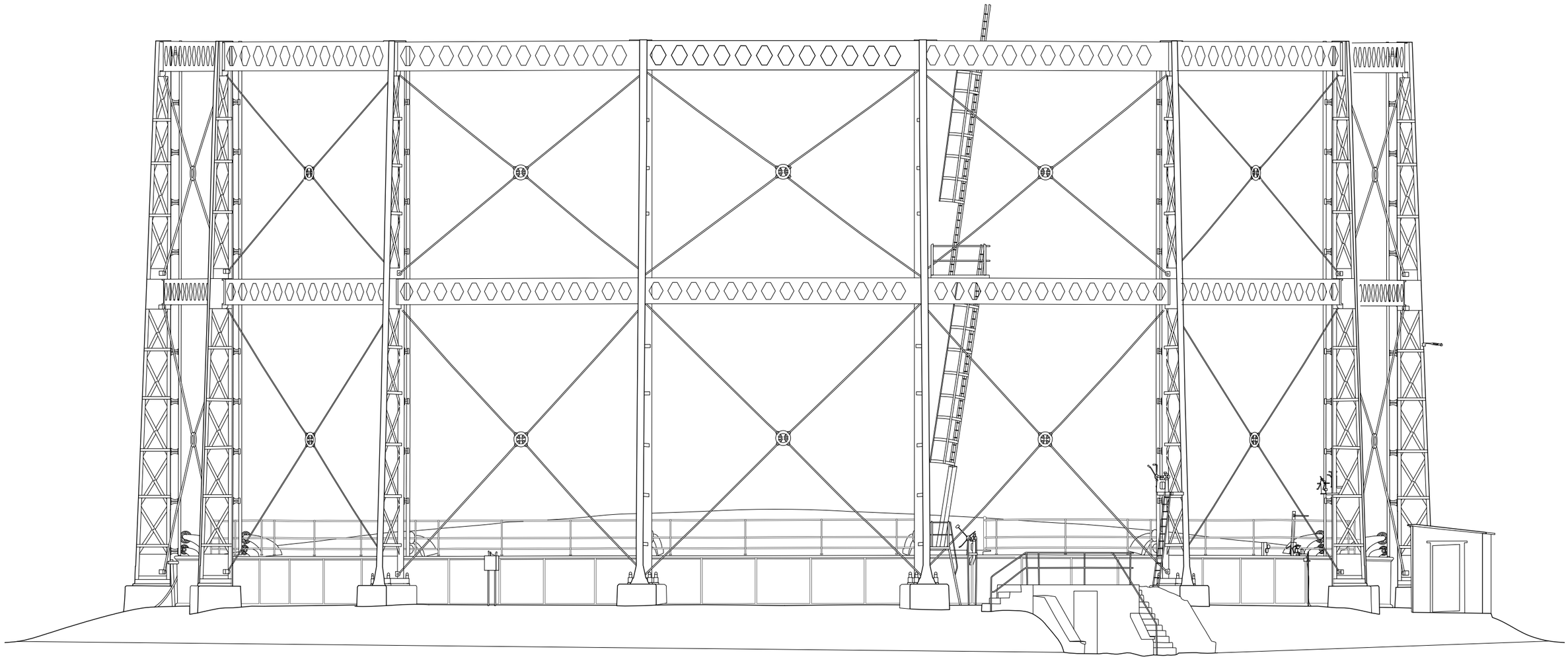

Figure 19: Gasholder No 1, north elevation

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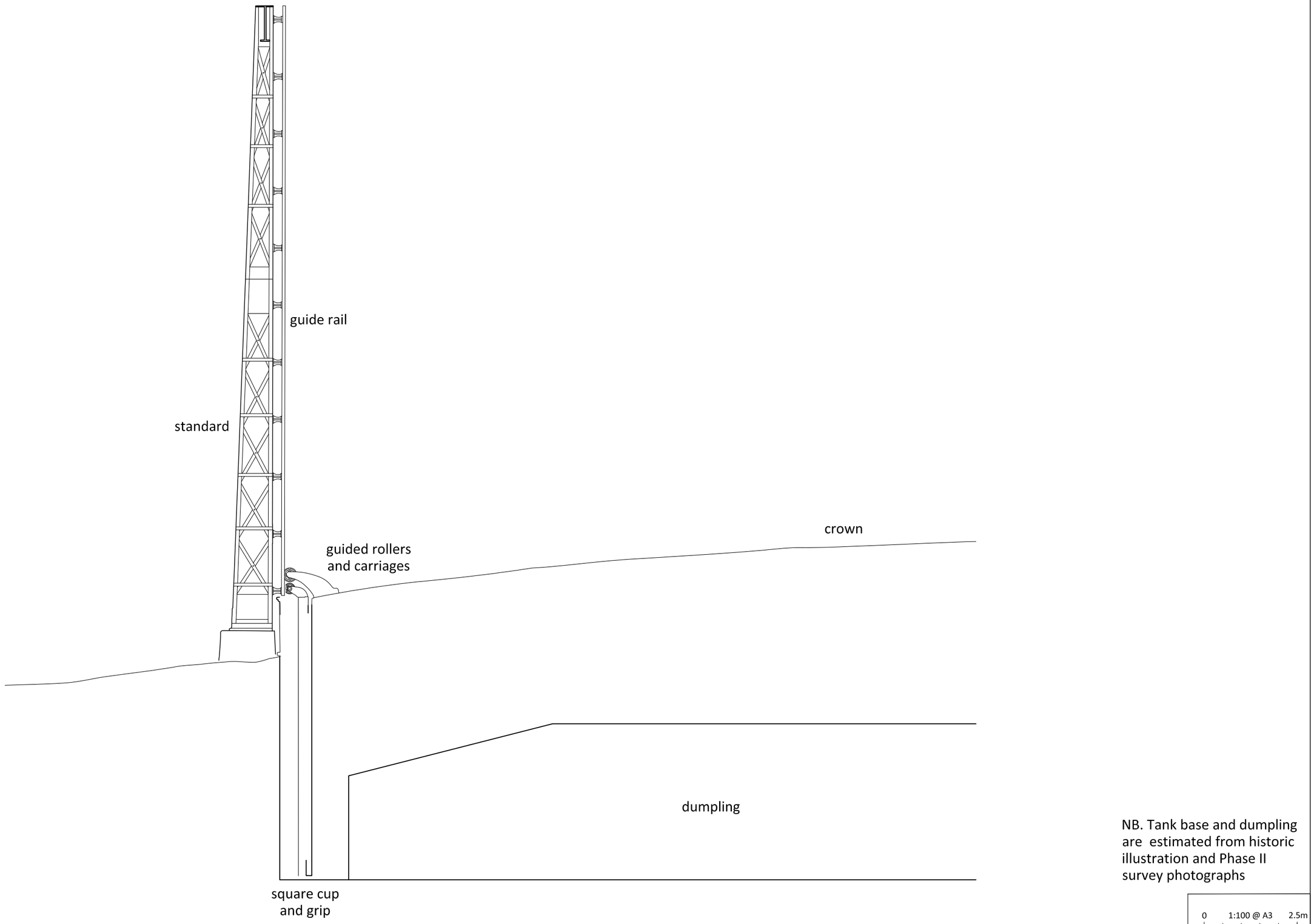

Figure 20: Gasholder No 1, partial section

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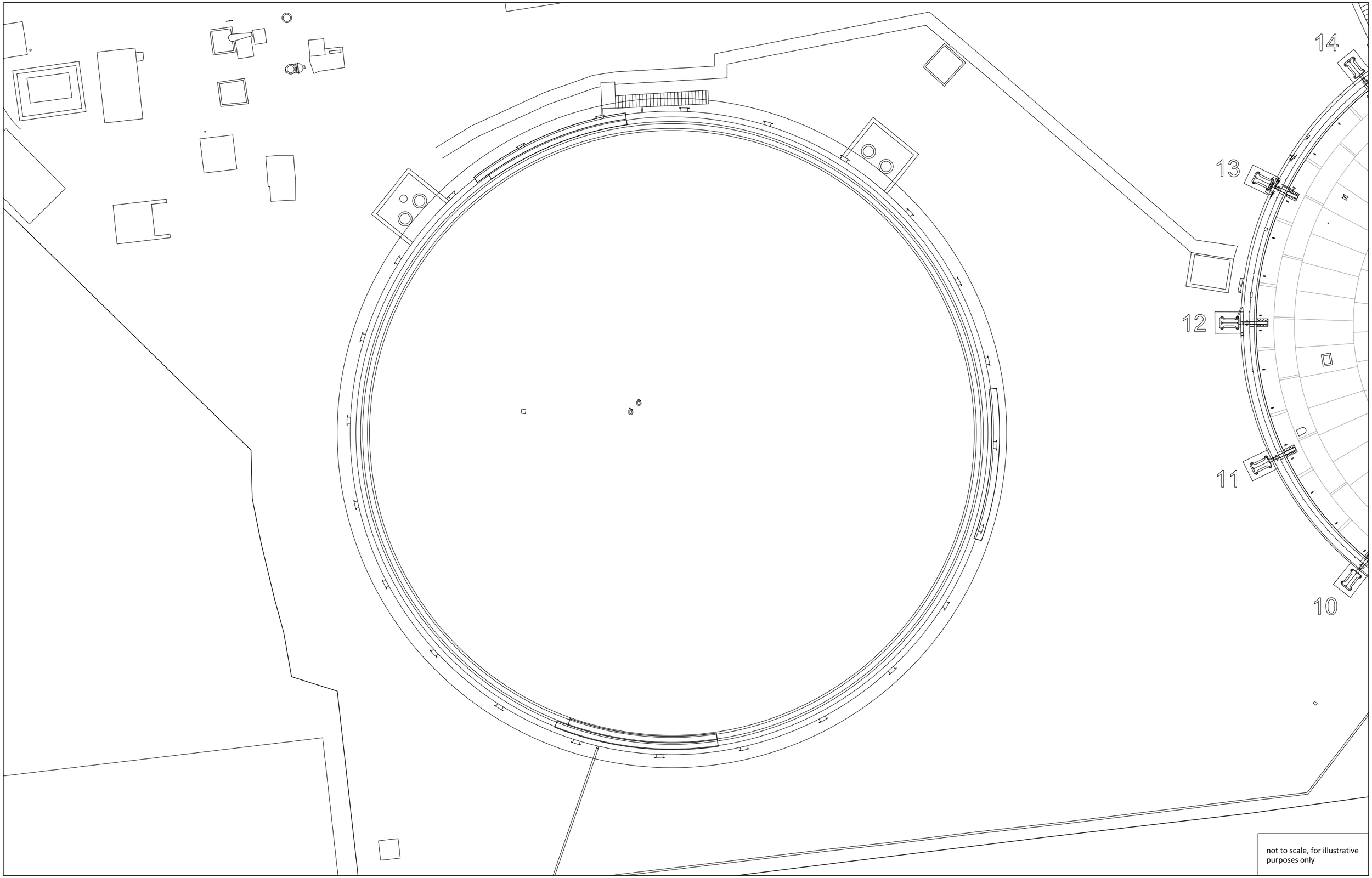

Figure 21: Gasholder No 2, plan

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9 RESULTS: ADDITONAL STRUCTURES

9.1 Introduction

9.1.1 There are nineteen structures (A–S) within the site compound in addition to the two gasholders. There are an additional three structures (T–V) within the site boundary outside the gasholder compound, two of which are still in use.

9.1.2 The structures have been labelled as Structures A–V on Figures 17 & 22. They were all added after the demolition of the main gasworks to the north-west and therefore date from the late 1960s onwards.

9.2 Structure A: Anti-freeze Switch Room

9.2.1 Structure A is a rectangular, steel-panelled building measuring 5m x 3m in a north-west/south-east alignment (Plate 108). It is a prefabricated building with a flat roof which sits on a concrete foundation platform with steel sheets covering gullies for electrical cabling going underground.

9.2.2 The structure houses monitoring and control devices for the automation systems of Gasholder No 2 including the anti-freeze system and top-up pump (Plates 109 & 110).

9.2.3 Structure A was also used as an office and mess room with maintenance record cupboards and sign-in sheets at the south-east end (Plate 111).

9.3 Structure B: Control Room

9.3.1 Structure B is brick-built and measures 3.2m x 2.3m. It is an ENE/WSW-aligned building with a lean-to roof (Plate 112). The west end of the structure is a 1.9m square room and the east end of the building is an open shelter housing various pressure regulators (Plates 113 & 114). The pressures are read on gauges within the room which also houses override panels for the booster motor and volumetric governor (Plate 115).

9.3.2 The north side of the building has a glass block window and the south wall has a satellite dish attached to the exterior (Plate 116).

9.4 Structure C: Booster Motor

9.4.1 Structure C is a booster motor set upon a concrete base measuring 2.7m x 1.7m in a north/south alignment (Plate 117). The maker's mark 'DONKIN' is visible at the south end of the motor (Plate 118).

9.5 Structure D: Valve Pit

9.5.1 Structure D is 2m square brick-lined pit containing a straight section of pipe and valve (Plate 119).

9.6 Structure E: Diesel Tank

9.6.1 Structure E comprises two concrete blocks and a manual valve which are the remnants of a diesel tank (Plate 120). A steel pain cover was discarded to the west which may have been covering the structure. The valve has 'No 2' embossed on it (Plate 121).

9.7 Structure F: Valve Pit

9.7.1 Structure F is a brick-lined valve pit measuring 1.6m x 1.5m aligned ENE/WSW. It contains a curved section of pipe and two valves, one of which is a gate valve, with manual control wheel (Plate 122).

9.8 Structure G: Standby Generator and Valve Pit

9.8.1 Structure G comprises a brick-lined valve pit and standby generator (Plate 123). The generator is diesel powered and made by Ruston and Hornsby (Plate 124). The generator may have powered another booster motor, or alternative device, as there is an empty concrete setting on its east side.

9.8.2 The brick-lined valve pit measures 1.5m x 1.3m in a NNW/SSE alignment and contains a weighted valve and gate valve with manual control wheel (Plate 125).

9.9 Structure H: Electrical Services Room and Instrument Room

9.9.1 Structure H is a brick-built structure measuring 4.2m x 2.3m in a NNW/SSE alignment. The building is divided into two rooms: an electrical services room to the south and an instrument room to the north, both with entrances on the west side (Plate 126). Both rooms have a glass brick window with one on the north elevation and one at the south end of the east elevation (Plate 127).

9.9.2 The electrical services room is empty except for a Paul & Loughran Ltd E.V. control panel related to monitoring and overriding the temperature and pump systems (Plate 128).

9.9.3 The instrument room contains pressure regulators controlled by Bryan Donkin electroclocks which are attached to additional pressure regulators on the exterior east side of the building (Plates 129, 130 & 127 respectively). On the exterior east wall of the instrument room is the emergency fogger stop button and on the exterior north wall is an alarm.

9.10 Structure I: Meg Tank

9.10.1 Structure I is a Meg Tank measuring 2.5m x 1.5m in an ESE/WSW alignment, surrounded by a brick wall measuring 4m x 3m (Plate 131).

9.11 Structure J: Grid/District Pit 1

9.11.1 Structure J is a brick-lined valve pit measuring 1.9m square (Plate 132). The rain cover could not be removed during the survey.

9.12 Structure K: Fogger System

9.12.1 Structure K is a Paul and Loughran Ltd fogger system measuring 1.5m x 0.7m in plan, aligned ENE/WSW (Plates 133 & 134).

9.13 Structure L: Flow-rate Meter and Pit

9.13.1 Structure L is a brick-lined pit housing a flow-rate meter with manual valve control wheel (Plate 135). The flow-rate meter is surrounded by a Bryan Donkin steel setting which has a missing cover (Plate 136).

9.14 Structure M: Grid/District Pit 2

9.14.1 Structure M is a brick-lined pit measuring 2.2m x 2.1m in an ENE/WSW alignment (Plate 137). It is covered by a tarpaulin roof which slides off in sections to access the pipework and weighted-diaphragm Bryan Donkin valve within (Plate 138).

9.15 Structure N: Volumetric Governor House

9.15.1 Structure N is a rectangular, flat-roofed, brick building measuring 3.7m x 2.2m in an ENE/WSW alignment (Plate 139). It is accessed via a door in the centre of the north wall which is reached via a gap in the north fence of the compound (Plate 140). There are two steps down below ground level into the building. All the walls have small glass brick windows (Plate 140).

9.15.2 The building houses the Bryan Donkin volumetric governor with ENE/WSW aligned pipework, gate valve at the east end and other valve type made by Westwood and Wrights at the west end (Plates 140–145). The volumetric governor pipework is connected to the pipework with the grid/district pit 2 (Structure M) to the west. Within the volumetric governor house there were some manual hand-crank devices use to open and shut the valves (Plate 146).

9.16 Structure O: Station Governor Pit

9.16.1 Structure O was not accessed during the survey but is assumed to be a brick-lined valve pit housing the station governor. It measures 1.9m x 1.8m in a NNW/SSE alignment (Plate 137). It has a tarpaulin cover and there are Westwood and Wright Ltd valves to the east and west of the structure.

9.17 Structure P: Valve Pit

9.17.1 Structure P is a 1.9m x 0.9m, NNW/SSE aligned, brick-lined pit housing a valve. The brick wall has collapsed onto the valve within (Plate 147). There are Westwood and Wright Ltd valves to the west and east of the structure.

9.18 Structure Q: Pipework

9.18.1 Structure Q comprises two blanked sections of pipe that would previously have joined to either each other or some of the other surrounding structures (Plate 148). The southern section of pipe contains a Donkin gate valve (Plate 149).

9.19 Structure R: Concrete Platform

9.19.1 In the centre of the north side of the site is a concrete platform measuring 3.8m x 2.2m in an ENE/WSW alignment (Plate 150). It may previously have been the foundation for a structure.

9.20 Structure S: Portaloo

9.20.1 In the south-west corner of the site is a Portaloo measuring 1.2m square (Plate 151).

9.21 Structure T: Electrical Control room

9.21.1 To the west of the gasholder compound in the coach parking area is a brick building, with sloping tarpaulin roof, which houses electrical panels including sump pump controls (Plate 152). The building is brick, with protruding brick column corners, which measures 2.8m x 2.4m in a NNW/SSE alignment. The entrance is on the NNW wall and there are no windows (Plate 153). Additional electrical panels are present on the exterior SSW and WSW walls, and there are remnants of previous fixtures in the centre of the WSW wall (Plate 154).

9.22 Structure U: District Governor House

9.22.1 In the coach parking area to the west of the gasholder compound is a pre-fabricated steel panel structure acting as the district governor house (Plate 155). It is rectangular in shape and measures 7.8m x 4.2m in a NNW/SSE alignment. It houses the district governor that was in use at the time of the survey to lower and regulate the pressure as well as filter the gas before it goes out to the district supply (Plate 156).

9.23 Structure V: Offices

9.23.1. At the south end of the coach parking area is a disused office building measuring 30m x 11m in an ENE/WSW alignment. The building is single-story with high windows (Plate 157). It is clad with pebbledash panels and a timber fascia (Plate 158). The interior is divided into offices and a lockable, grated space which is presumed to have housed some instrumentation panels originally (Plate 159).

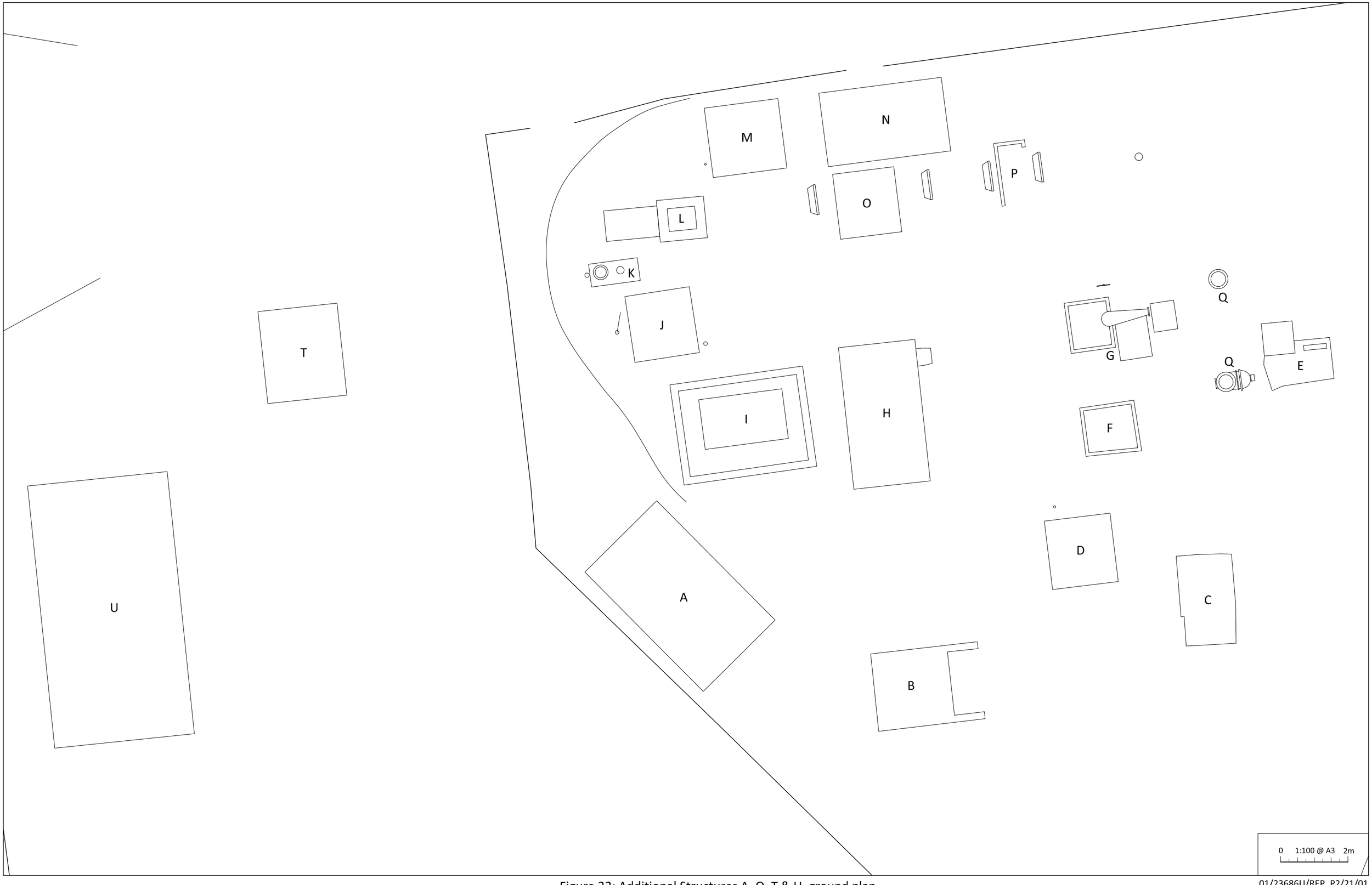


Figure 22: Additional Structures A–Q, T & U, ground plan

01/23686U/REP_P2/21/01

Plate 1: The site at Canal Road, Gravesend, from the WNW

Plate 2: Gasholders Nos 1 & 2, obscured from view by trees in the flat landscape, from the north-west

Plate 3: Gasholder No 1, unobtrusive in the flat landscape due to large, light industrial buildings, from the ESE

Plate 4: View to the River Thames from Gasholder No 2, from the south

Plate 5: General view of the Thames and Medway Canal west end, from the west

Plate 6: The site, general view of coach car parking to the west of the gasholder compound, from the NNW

Plate 7: The site, general view of wasteland to the north-east of the compound, from the west

Plate 8: Gasholder No 1, general view of the north-west side, from the north-west

Plate 9: Gasholder No 1, detail view of welded, steel sign on standard 1 identifying the structure as Gasholder No 1, from the NNW

Plate 10: Gasholder No 1, maker's plate on the west side of standard 9 identifying C & Walker as the builders in 1895, from the WNW

Plate 11: Gasholder No 1, general view of the south side of standard 12, from the SSW

Plate 12: Gasholder No 1, detail view of the base of standard 1, from the north-east

Plate 13: Gasholder No 1, detail view of section through tank showing below ground brick footing of standard 14, from the south-west

Plate 14: Gasholder No 1, detail view of the lattice work on standard 5, from the NNW

Plate 15: Gasholder No 1, detail view of the south-east side of standard 6 showing welded flange plates and central bolted flange plate, from the ESE

Plate 16: Gasholder No 1, detail view of bracket bolted to standard 5 and welded to a vertical guide rail, from the NNW

Plate 17: Gasholder No 1, detail view of the guide frame between standards 7 and 8 showing tie-bars and castellated girders, from the SSE

Plate 18: Gasholder No 1, detail view of girder bolted to standard 3 and gusset plate above, from the NNW

Plate 19: Gasholder No 1, detail view of tension ring between standards 2 and 3, from the SSW

Plate 20: Gasholder No 1, detail view of steel fixture bolted to tie-base and standard 12, from the south-west

Plate 21: Gasholder No 1, general view of two middle and upper ladder on the exterior north side of the guide frame, from the south-west

Plate 22: Gasholder No 1, general view of the panelled tank exterior between standards 8 and 9, from the WSW

Plate 23: Gasholder No 1, detail view of section through made-ground showing broken wrought iron bands helping secure the tank, from the north-east

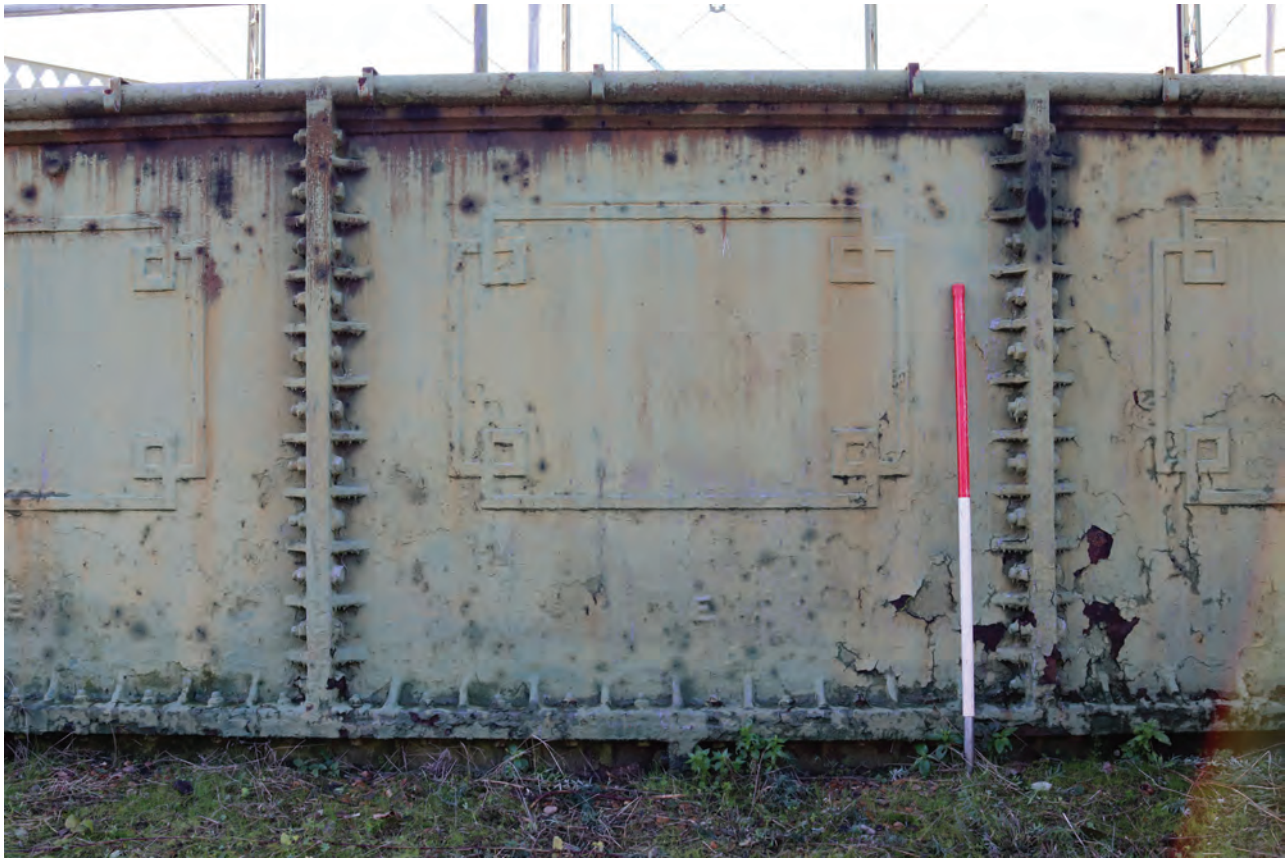


Plate 24: Gasholder No 1, detail view of rectangular intertwined pattern visible on each tank panel

Plate 25: Gasholder No 1, detail view of embossed ‘E’ near the base of each tank panel

Plate 26: Gasholder No 1, general view of sloped dumpling, from the west

Plate 27: Gasholder No 1, general view of the metal cap line, from the east

Plate 28: Gasholder No 1, detail view of metal cap with removed bitumen-soaked cloth, from the south

Plate 29: Gasholder No 1, general view of the top of the tank showing lower lift with square grip and top curb of the bell between standards 8 and 9, from the east

Plate 30: Gasholder No 1, detail view of the top lift wall interior showing riveted sheet and rigid stanchion design, from the north-east

Plate 31: Gasholder No 1, detail view of welded repair patches on the top lift wall interior, from the south

Plate 32: Gasholder No 1, detail view of cotter plate on the north-east side of the top lift wall interior, from the south-west

Plate 33: Gasholder No 1, detail view of grip overflow pipes situated at the base of the top lift wall interior, from the north

Plate 34: Gasholder No 1, detail view of guide rollers and carriages at standard 23, from the WSW

Plate 35: Gasholder No 1, detail view of guide rollers at standard 12, from the south

Plate 36: Gasholder No 1, detail view of top guide roller at standard 2 showing bolted bar construction, from the south

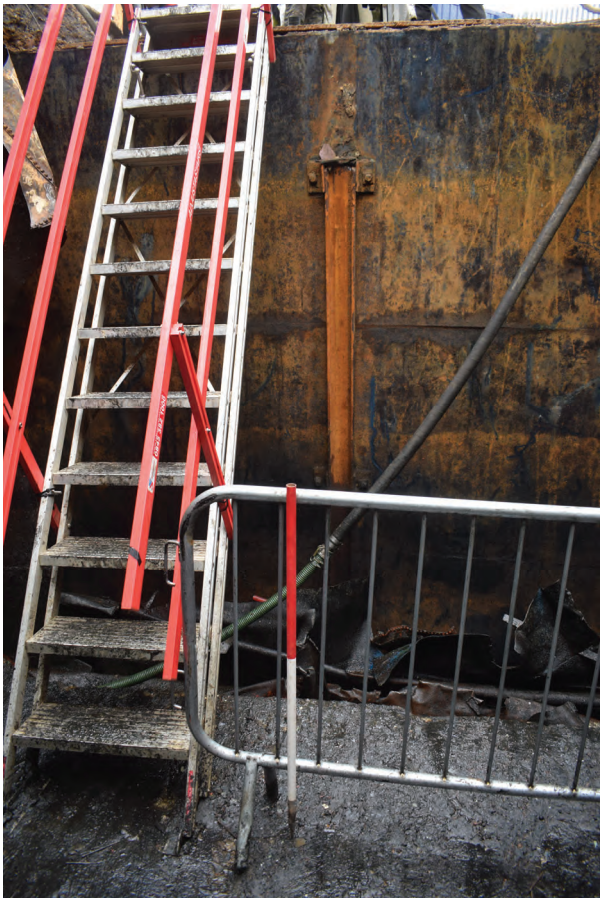


Plate 37: Gasholder No 1, detail view of guide rail bolted to the tank wall, from the south-east

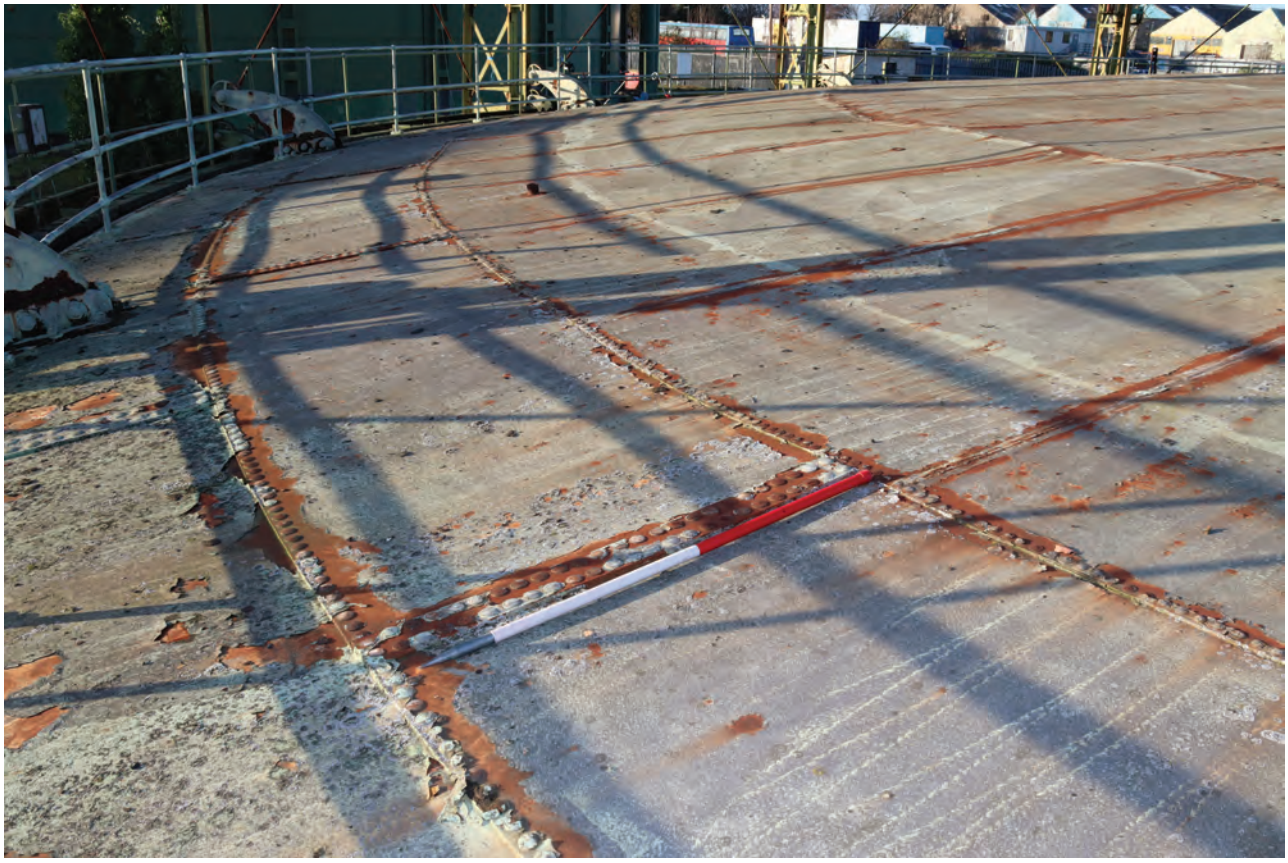


Plate 38: Gasholder No 1, general view of the south side of the crown showing riveted and welded sheets, from the ESE

Plate 39: Gasholder No 1, general view of the centre of the crown showing semi-circular iron sheet, crown vents and purge points, from the south

Plate 40: Gasholder No 1, detail view of crown vent just south-east of the centre of the crown, from the south-east

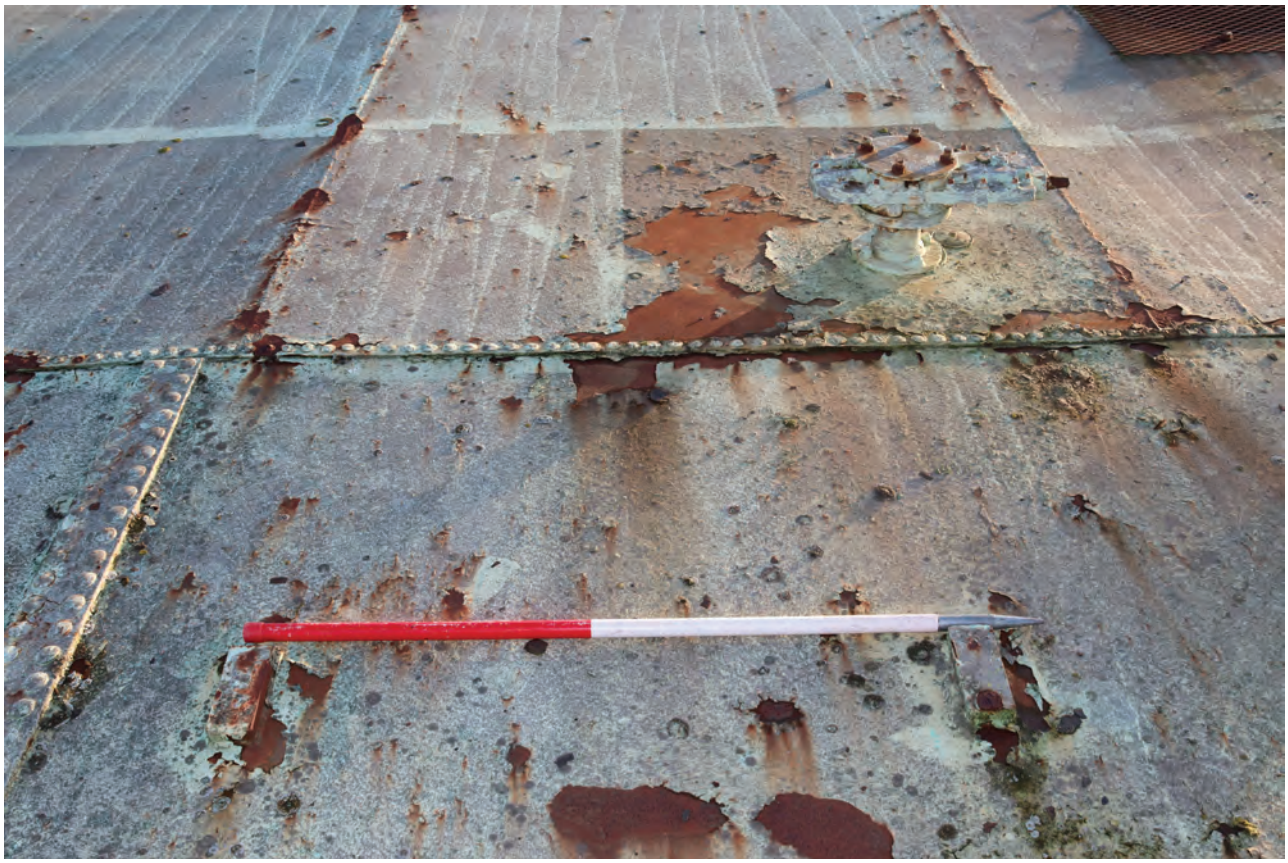


Plate 41: Gasholder No 1, detail view of crown vent and footings of previous handrail on the NNW, from the NNW

Plate 42: Gasholder No 1, detail view of the glycol pot on the WNW, from the WNW

Plate 43: Gasholder No 1, detail view of removed cotter plate and aeration grate added on the SSE of the crown, from the SSE

Plate 44: Gasholder No 1, detail view of access platform onto the NNW side of the crown, from the south-west

Plate 45: Gasholder No 1, general view of the crown truss frame, from the south-east

Plate 46: Gasholder No 1, detail view of the brick support block on the dumpling, from the WSW

Plate 47: Gasholder No 1, detail view of truss, from the north

Plate 48: Gasholder No 1, detail view of triangular fixture at the top of the top lift wall interior, from the north

Plate 49: Gasholder No 1, detail view of bolted joint between T-section iron ribbon and iron bar

Plate 50: Gasholder No 1, detail view of various bolted joint designs on the truss frame

Plate 51: Gasholder No 1, general view of the inlet/outlet building exterior NNW side, from the NNW

Plate 52: Gasholder No 1, detail view of C & W maker's mark within the inlet/outlet building, from the west

Plate 53: Gasholder No 1, detail view of northernmost inlet/outlet pipe, from the north-west

Plate 54: Gasholder No 1, detail view of northernmost inlet/outlet valve control, from the north-west

Plate 55: Gasholder No 1, detail view of valve pits related to the inlet and outlet pipes, from the south-east

Plate 56: Gasholder No 1, detail view of gas inlet and outlet pipe within the tank, from the SSE

Plate 57: Gasholder No 1, detail view of gasmatic knock-off switch on the east side of standard 14, from the SSE

Plate 58: Gasholder No 1, detail view of knock-off switch attached to the tank to the north of standard 6, from the ESE

Plate 59: Gasholder No 1, detail view of knock-off switches and associated striker plate at standard 13, from the ENE

Plate 60: Gasholder No 1, detail view of heating elements clipped to the lower lift and tank wall between standards 5 and 6, from the SSW

Plate 61: Gasholder No 1, general view of the anti-freeze room, from the north-west

Plate 62: Gasholder No 1, detail view of gauges for the anti-freeze system in the tank rim and lift seal, from the north-west

Plate 63: Gasholder No 1, detail view of tank float switch on the south side of standard 12, from the SSE

Plate 64: Gasholder No 1, detail view of the north side of standard 12 showing swan neck with missing hose and missing electrical controls below, from the WNW

Plate 65: Gasholder No 1, detail view of blanked electronic box between standards 2 and 3 related to automated gasholder running procedures, from the NNW

Plate 66: Gasholder No 1, detail view of overflow pipe leaving the gasholder between standards 9 and 10, from the SSE

Plate 67: Gasholders Nos 1 & 2, general view of the interceptor tank, from the north-east

Plate 68: Gasholder No 1, detail view of previous overflow pipe to the north of standard 5, from the north

Plate 69: Gasholder No 1, detail view of pipe used for oil, from the north

Plate 70: Gasholder No 1, detail view of hook as part of a winch system on standard 12, from the WSW

Plate 71: Gasholder No 2, general view of the exterior, from the north-west

Plate 72: Gasholder No 2, detail view of '2' on the north-west side, from the north-west

Plate 73: Gasholder No 2, detail view of tank sheet construction, from the east

Plate 74: Gasholder No 2, detail view of the base of a vertical brace welded to the tank, from the south-west

Plate 75: Gasholder No 2, detail view of maker's mark 'DORMAN LONG & CO' on the vertical braces, from the north

Plate 76: Gasholder No 2, detail view of triangular top to the vertical braces and floodlight on the west side of the holder, from the south

Plate 77: Gasholder No 2, detail view of cotter plate on the north side of the structure, from the north

Plate 78: Gasholder No 2, general view of the access stair on the north side of the holder, from the NNE

Plate 79: Gasholder No 2, general view of the lift tops showing pairs of tangential rollers, from the NNW

Plate 80: Gasholder No 2, detail view of the different directional guide rails and guide roller pairs, from the south-east

Plate 81: Gasholder No 2, detail view of guide rail and stair structure on the east side of the holder, from the north

Plate 82: Gasholder No 2, general view of the guide rail and stair structure on the south side of the holder with access onto the crown, from the ENE

Plate 83: Gasholder No 2, general view of the lift tops showing square grips, from the NNE

Plate 84: Gasholder No 2, general view of the domed crown constructed of riveted steel sheets, from the NNE

Plate 85: Gasholder No 2, general view of the centre of the crown, from the north

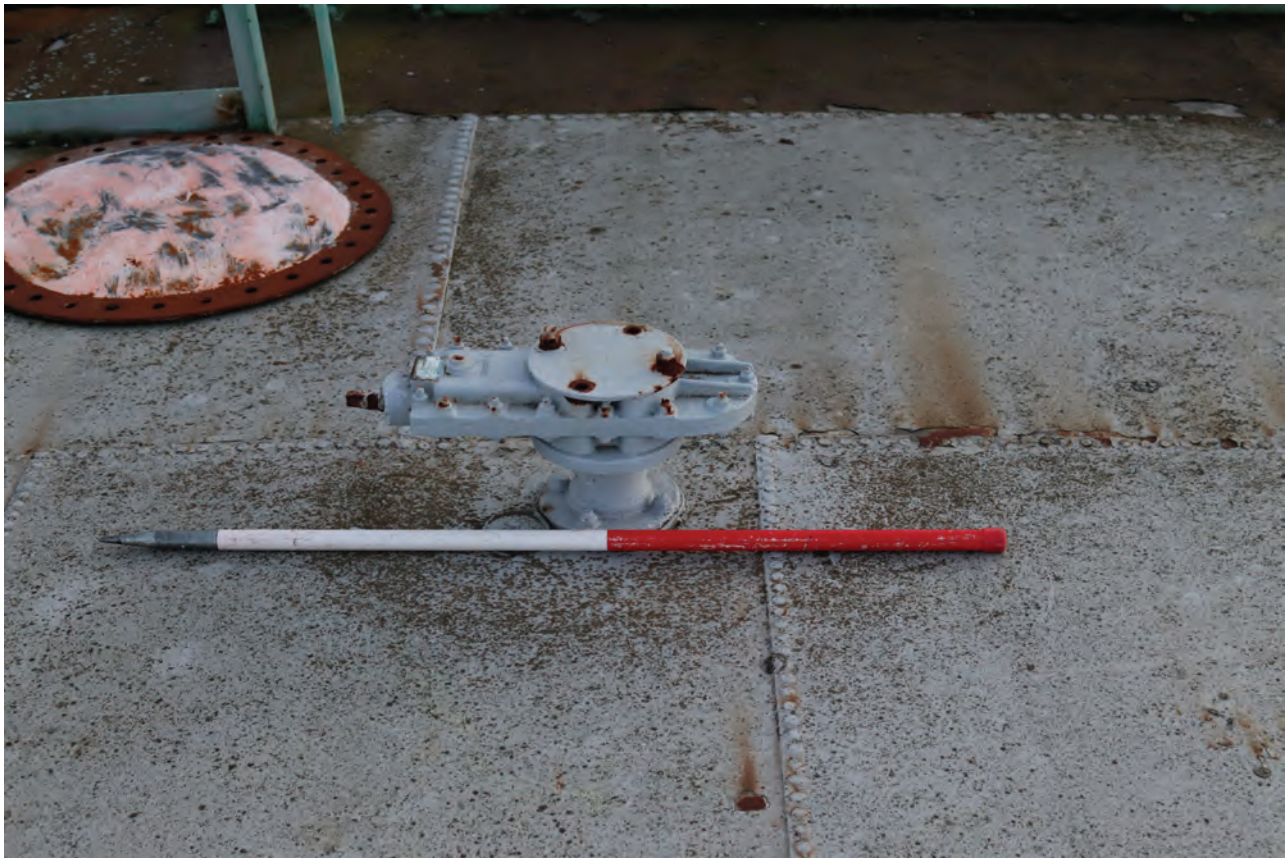


Plate 86: Gasholder No 2, detail view of crown vent on the south side, from the north

Plate 87: Gasholder No 2, detail view of crown vent on the south-east side, from the north

Plate 88: Gasholder No 2, detail view of two crown vents on the north-west side of the crown centre, from the north-west

Plate 89 Gasholder No 2, detail view of the glycol pot on the west side of the crown situated within an area of non-slip paint, from the south

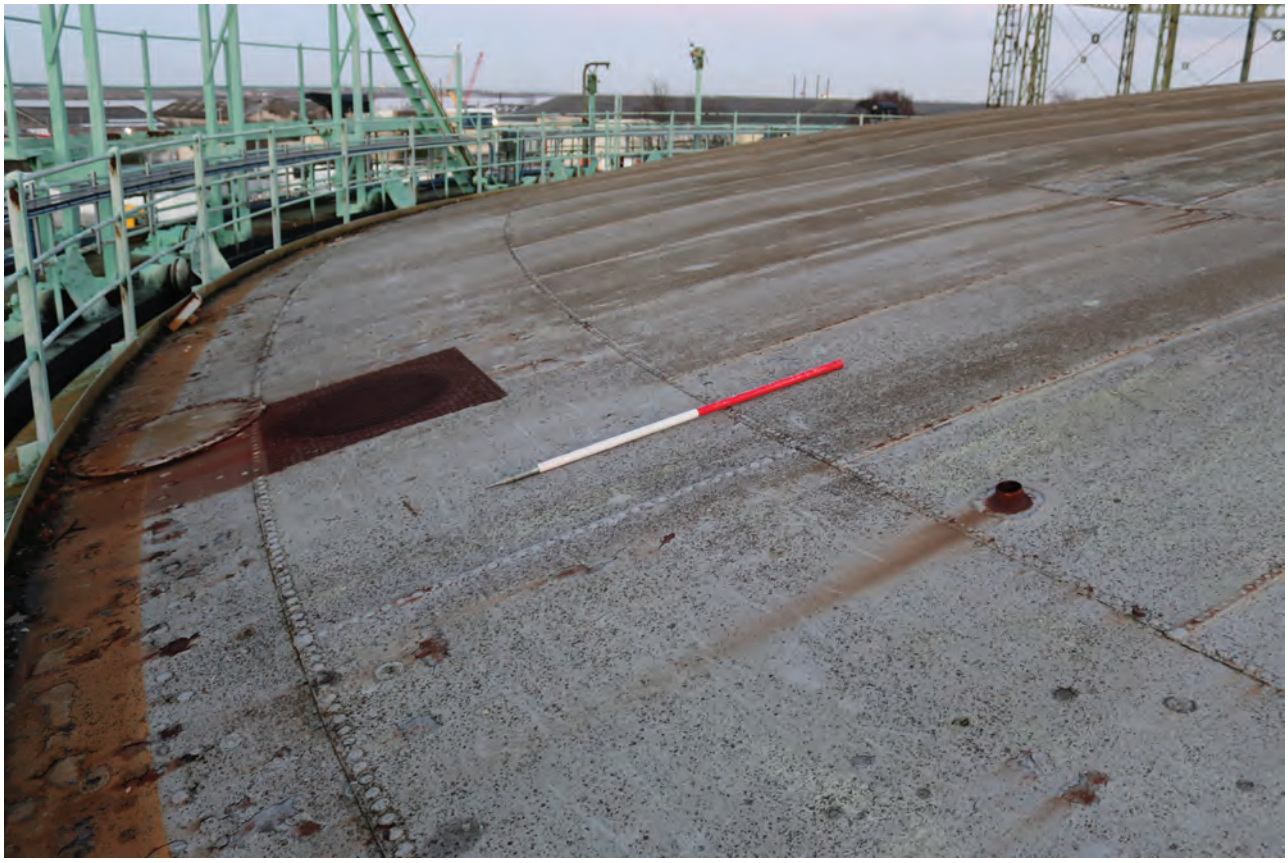


Plate 90: Gasholder No 2, general view of the north-west side of the crown showing removed cotter plate and purge point added during decommissioning works to aerate the bell, from the west

Plate 91: Gasholder No 2, general view of the gas outlet pipe on the north-east side of the holder, from the north-west

Plate 92: Gasholder No 2, detail view of the base of the gas inlet pipe set within a pit with pipe vents and manual valve control wheel, from the west

Plate 93: Gasholder No 2, detail view of the open/shut manual valve control wheel at the gas outlet, from the NNW

Plate 94: Gasholder No 2, general view of the brick-lined valve pit associated with the gas inlet pipe, from the north

Plate 95: Gasholder No 2, detail view of the weighted diaphragm valve made by Peebles & Co associated with the gas outlet pipe, from the south-west

Plate 96: Gasholder No 2, detail view of gasmatic knock-off switch and associated striker arm on the north-west side of the holder, from the SSW

Plate 97: Gasholder No 2, general view of the knock-off switches on the south side of the holder, from the north-east

Plate 98: Gasholder No 2, detail view of the bottom lift antifreeze distribution board, from the north

Plate 99: Gasholder No 2, detail view of heating motor, from the north-east

Plate 100: Gasholder No 2, detail view of possible tank water temperature monitoring device, from the north-west

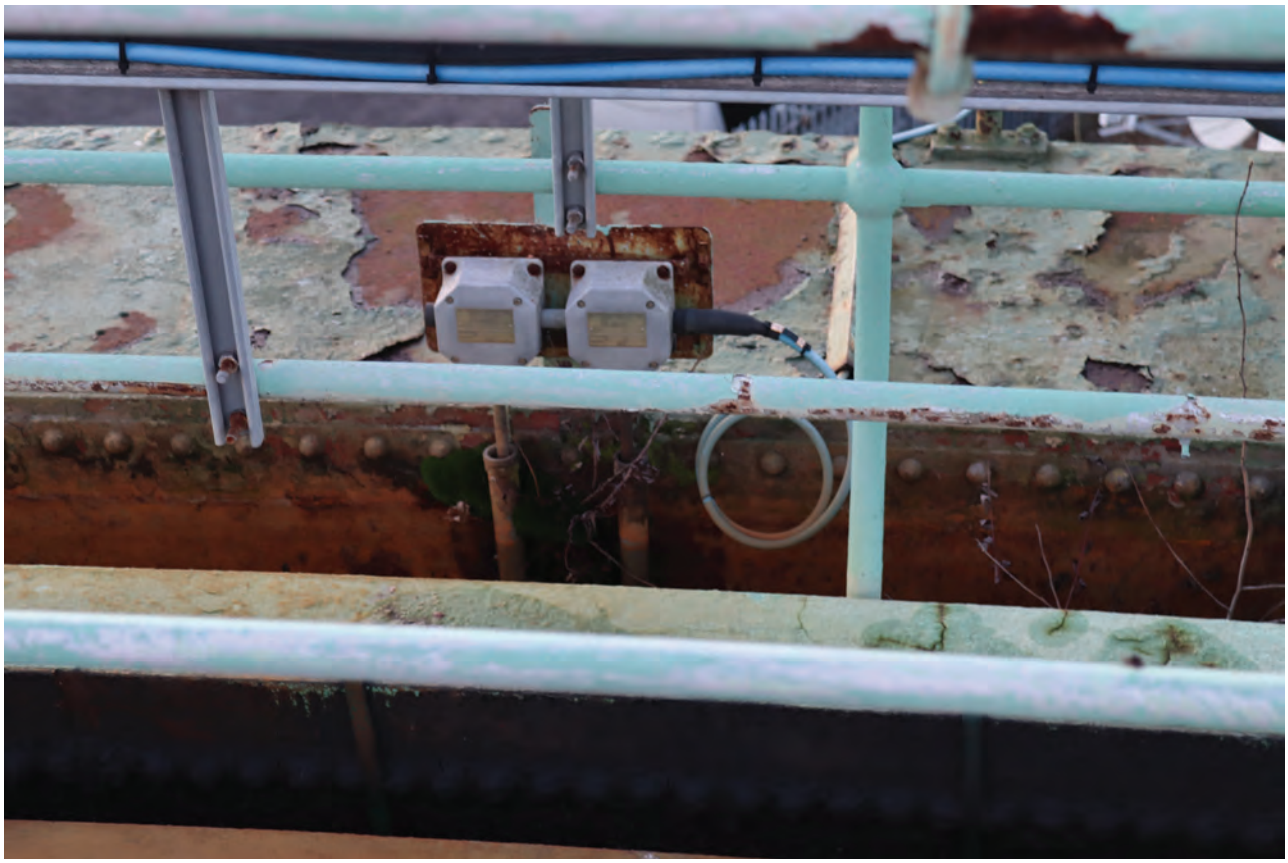


Plate 101: Gasholder No 2, detail view of float switch monitoring the tank water level on the west side of the holder, from the east

Plate 102: Gasholder No 2, detail view of swan necks on the west side of the holder, from the south-east

Plate 103: Gasholder No 2, detail view of radial box 1 on the north side of the holder related to the bottom cup-and-grip, from the south-west

Plate 104: Gasholder No 2, detail view of overflow pipe on the south-west side of the holder, from the south-east

Plate 105: Gasholder No 2, general view of the SSE side of the holder showing fixtures for possible previous overflow pipe, from the south-east

Plate 106: Gasholder No 2, detail view of oil pipe, from the west

Plate 107: Gasholder No 2, detail view of winch support post, from the SSW

Plate 108: Gasholder No 2 & Structure A, general view of Structure A exterior north-east wall, from the ENE

Plate 109: Gasholder No 2 & Structure A, general view of the interior north side showing electrical panels, from the east

Plate 110: Gasholder No 2 & Structure A, detail view of monitoring and control device relating to the anti-freeze system and top-up pump of Gasholder No 2, from the north-east

Plate 111: Structure A, general view of the south-east end of the structure showing record cupboards, from the north-west

Plate 112: Structure B, general view of the exterior west wall showing entrance door and satellite dish attached to the south wall, from the west

Plate 113: Structure B, general view of the shelter at the east end of the building, from the north-east

Plate 114: Structure B, detail view of pressure monitoring devices within the shelter at the east end of the building, from the ESE

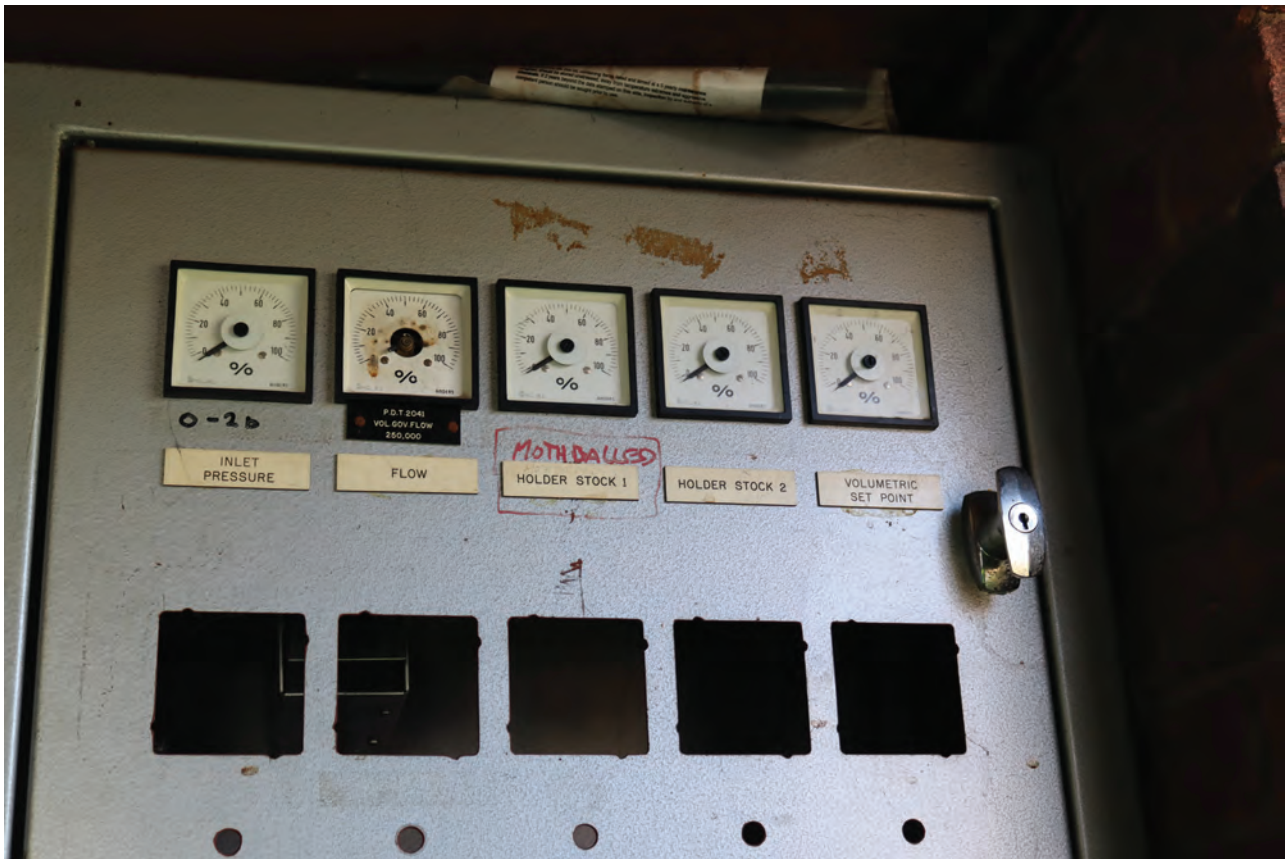


Plate 115: Structure B, detail view of pressure monitoring gauges, from the north

Plate 116: Structure B, general view of the exterior north elevation showing glass block window, from the north

Plate 117: Structure C, general view of booster motor, from the south-east

Plate 118: Structure C, detail view of 'DONKIN' maker's mark, from the south-east

Plate 119: Structure D, general view of brick-lined pit with pipe and valve, from the south

Plate 120: Structure E, general view of diesel tank setting remnants, from the NNE

Plate 121: Structure E, detail view of 'No 2' embossed on the diesel tank valve, from the NNE

Plate 122: Structure F, detail view of brick-lined valve pit containing gate valve and # valve, from the north

Plate 123: Structure G, general view of standby generator and valve pit showing yellow manual valve control wheel, from the north-east

Plate 124: Structure G, detail view of oil gauge on the standby generator, from the west

Plate 125: Structure G, detail view of valve pit and valve, from the south-west

Plate 126: Structure H, general view of the exterior west wall showing entrance doors, from the south-west

Plate 127: Structure H, general view of the exterior north and east walls showing glass block windows and instrumentation, from the north-east

Plate 128: Structure H, detail view of E.V. controller in the electrical services room, from the north

Plate 129: Structure H, general view of instrumentation in the instrument room, from the WSW

Plate 130: Structure H, general view of instrumentation in the instrument room, from the south-east

Plate 131: Structure I, general view of the meg tank, from the north-east

Plate 132: Structure J, general view of the grid/district pit 1, from the east

Plate 133: Structure K, general view of the fogger system, from the south-west

Plate 134: Structure K, detail view of Paul & Loughran Ltd specification on the fogger system, from the north

Plate 135: Structure L, general view of flow meter, from the east

Plate 136: Structure L, detail view of 'DONKIN' maker's mark on the flow meter surround, from the east

Plate 137: Structures M–O, general view, from the south-west

Plate 138: Structure M, detail view of Bryan Donkin weighted diaphragm valve within the grid/district pit, from the WSW

Plate 139: Structure N, general view of the WSW and SSE walls, from the south-west

Plate 140: Structure N, general view of the gap in the fence access, from the north-east

Plate 141: Structure N, general view of ENE exterior wall showing glass brick windows, from the east

Plate 142: Structure N, general view of the volumetric governor and governor house east end, from the west

Plate 143: Structure N, detail view of 'DONKIN' maker's mark on the volumetric governor, from the WNW

Plate 144: Structure N, detail view of gauge on the volumetric governor, from the west

Plate 145: Structure N, detail view of the west end of the volumetric governor pipework with valve, possible filter and manual hand crank apparatus, from the NNE

Plate 146: Structure N, detail view of 'WESTWOOD & WRIGHTS LTD' maker's mark on the valve at the west end of the volumetric governor house, from the east

Plate 147: Structure P, general view of valve pit with collapsed brick wall surround, from the north-east

Plate 148: Structure Q, general view of two blanked pipe sections, from the north

Plate 149: Structure Q, detail view of 'DONKIN' maker's mark on the gate valve, from the WSW

Plate 150: Structure R, general view of the open area in the north of the site with concrete platform Structure R in the centre, from the west

Plate 151: Structure S, general view of the portaloo, from the north-east

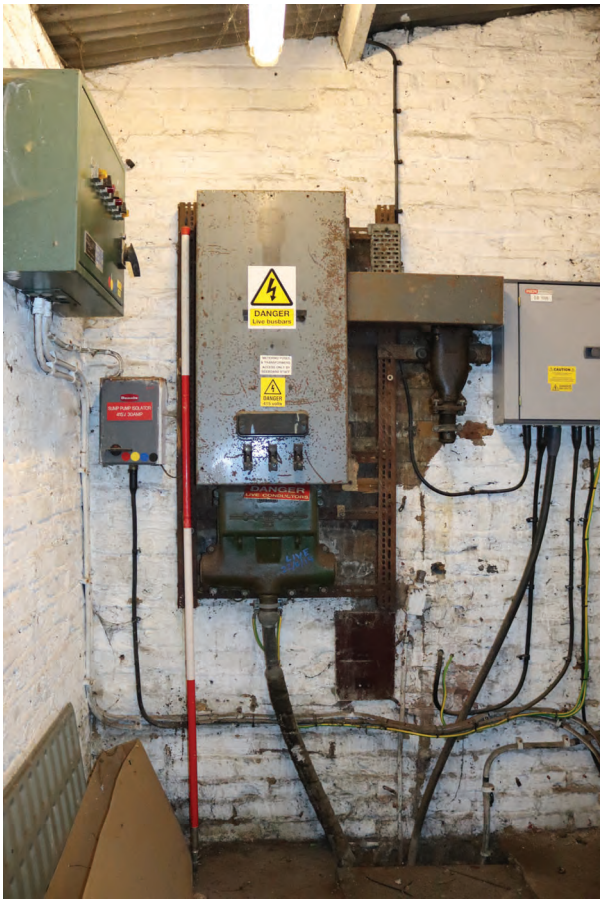


Plate 152: Structure T, general view of the exterior NNW and ESE walls, from the north

Plate 153: Structure T, general view of the interior showing electrical panels, from the NNW

Plate 154: Structure T, general view of the exterior SSE and WSW walls showing exterior electrical panels, from the south-west

Plate 155: Structure U, general view of the exterior NNW and ESE walls, from the NNE

Plate 156: Structure U, general view of the district governor including filter and pressure reducing valves, from the south-east

Plate 157: Structure V, general view of the NNW exterior wall, from the west

Plate 158: Structure V, detail view of exterior NNW wall showing pebbledash cladding, entrance and high windows, from the NNW

Plate 159: Structure V, general view of the interior gated area, from the NNE

10 DISCUSSION

10.1 Gasholders Nos 1 & 2 along with twenty-two additional structures are all that remain of the site in 2020 compared to the large array of gasworks structures present in the late 19th century.

10.2 Gasholder No 1 is a two lift, guide-framed holder built in 1895. The castellated design of the girders between the standards follows Tucker's Type U girder design which is associated with reconstructions, so the structure may have been rebuilt. The derivation of the Type 32 latticework standard was common between ca. 1880–ca. 1930 although the castellated girders were commonly seen on reconstructions ca. 1945–ca. 1960. Figure 8 shows an elevation and section drawing of Gasholder No 1 but it is unclear if it is an original construction design, a reconstruction design or a survey of the existing holder. The illustration shows latticework standards but without the small staple-section, welded, structural girders on the standards (para 7.2.2). A decorative statue design is also present at the top of the standards in Figure 8 that matches the photograph of Gasholder No 1 in the photograph of Figure 11. It is suggested that the standards are original and have been later modified with the additional of the welded staple-section girders, removal of the decorative tops and replacement of the girders between the standards. The latticework design of the standards was developed from the later 1870s as a cheaper and lighter method of construction to the earlier cast iron, solid standards.

10.2 The dumpling within Gasholder No 1 is a common design of the early tanks over 18m in width, where the ground conditions were favourably hard meaning it was more economical to leave the central soil as a dumpling than remove it (Thomas, 2020). The concrete skin on the dumpling made it watertight along with the bitumen-soaked cloths sealing the 12 caps located at the cardinal points. The caps are not commonly present on gasholders surviving into the 21st century. It is presumed they were removed during maintenance operations to drain the water from the tank, but it is unclear if the water drains away beneath into a separate tank or just a sump.

10.3 Gasholder No 2 is a three lift, spiral-guided holder built between 1949 and 1960. It is a very common example of its type seen across the south of England in this period. This was ca. 60 years after the first of its type although the design is very similar to other examples built a decade before, such as at Redhill and Poole, or the first of its kind at Northwich, Cheshire (Hudson *et al* 2019; Sproat *et al* 2019). The larger spiral-guided, steel holders were common at the time due to higher gas demands and cheaper steel production methods.

10.4 The ground slopes up around Gasholder No 1 as made-ground with encircling iron ribbon to support its iron tank, which is original. This is due to iron sheets needing extra stability from the ground surrounding them rather than the modern steel sheets being rigid allowing for the ground to be levelled around later tanks (Tucker 2000). This is seen with Gasholder No 2 whose steel tank is entirely above ground.

10.5 Both gasholders have identical automated processes including for filling and emptying gas, keeping the tank water level and the maintaining the water temperature. They both show development in the methods used with both gasmatic and electronic knock-off switches. The controls of these systems seem largely run from external structures meaning the later operations on site were much safer than earlier methods of often climbing the gasholders when they were raised. Later additions of safety rails and ladder cages are also present.

10.6 A lot of the instrumentation and building materials used on site are standard within the gas industry such as Bryan Donkin governors and boosters, Westwood and Wright Ltd or Peebles Co valves and Dorman Long & Co steel stanchions. Many of these companies were based in the industrial midlands with Donkin in Chesterfield, Dorman Long in Middlesbrough and Westwood and Wright in Staffordshire. Their parts were manufactured to a standard and used on multiple gasholder sites across Britain. The site at Canal Road has multiple versions of these standard parts.

11 CONCLUSIONS & ADDITIONAL WORKS

11.1 The Gravesend gasworks was built in 1842 by the Gravesend and Milton Gas Light Company. It quickly expanded with the population of Gravesend and thrived until the use of natural gas in the 1960s. In the 21st century only two gasholders and their associated control structures remained, but were retired around 2010. At the time of survey in 2020/1 only the district governor supplying natural gas to the local area remained in use.

11.2 The two-lift, guide-framed Gasholder No 1 at Canal Road, Gravesend was built in 1895 but partially rebuilt between 1945 and 1960. The cast-iron panelled tank, derivation of Type 32 latticework standards and Type U castellated girders are all common examples of the periods in which they were constructed. An unusual piece of design are the removable caps set into the dumpling for draining the tank.

11.3 Gasholder No 2 is a three-lift, spiral guided holder built between 1949 and 1960 which was commonplace at a time when bigger demands for gas were met with larger holders. At that time steel production was more economical than the earlier cast-iron examples along with lighter making constructing larger tanks easier.

12 REFERENCES

12.1 Bibliographical references

Cotterill M S 1981 'The Development of Scottish Gas Technology 1917-1914: Inspiration and Motivation' in *Industrial Archaeology Review. Vol. 5, Number 1*, p19 – 40. Oxford University Press.

Gravesham Borough Council ud *Discover Gravesham.* https:\\www.discovergravesham.co.uk\gravesend-chronology/gravesend-chronology/Page-7.html, Accessed 7th December 2020

Historic England 2016 *Understanding Historic Buildings: A Guide to Good Recording Practice.* https://content.historicengland.org.uk/images-books/publications/understanding-historic-buildings/heag099-understanding-historic-buildings.pdf/, Accessed 3rd March 2021

Historic England 2019 *Gasworks and Redundant Gasholders: Guidelines for their Evaluation and Recording.* Historic England: Swindon

Hudson, G; Capon, L; Wright, P 2019 *Gasholder Nos 1 & 2, Hooley Lane, Redhill, Surrey: Historic Building Recording Phase II Report.* AOC Archaeology: Edinburgh (grey literature report for SGN).

.

Journal of Gas Lighting 1907 'Eastern Counties Gas Managers Association: Meeting at Gravesend', in *Journal of Gas Lighting*, 1st October 1907, p 26

Meade, A 1921 (2nd Edition) *Modern Gasworks Practice.* Ben Brothers Ltd: London, Chapter XIX 'The Storage of Gas', pp 621-688

Merriam Co, G & C 1913 *Webster's Revised Unabridged Dictionary.*

Newbigging, T 1879 *King's Treatise on the Science and Practise of the Manufacture and Distribution of Coal Gas (1878–1882)*

Sproat, D; Humble, J; Hudson, G 2019 *Gasholders 1 – 3, Yarmouth Road, Poole, Dorset: Historic Building Recording Final Report* AOC Archaeology: Edinburgh (grey literature report for SGN).

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

Thomas R 2020a *The Manufactured Gas Industry: Volume 1 History.* Historic England Research Report Series No: 182-2020 (Volume 1)

Thomas R 2020b *The Manufactured Gas Industry: Volume 2 Gasworks.* Historic England Research Report Series No: 182-2020 (Volume 2)

Thomas R 2020c *The Manufactured Gas Industry: Volume 3 Gazetteer.* Historic England Research Report Series No: 182-2020 (Volume 3)

Thomas R 2020d *The Manufactured Gas Industry: Volume 4 List of Manufacturers of Gas Plant.* Historic England Research Report Series No: 182-2020 (Volume 4)

Tucker, M T 2000 *London Gasholders Survey: The Development of the Gasholder in London in the Later Nineteenth Century. Part A: General.* Grey Literature Report for Historic England/English Heritage

12.2 Cartographic references

1774	Thomas Hyde Page	*Gravesend and Parts Adjacent*
1874	Ordnance Survey	*Kent Sheet X.7*
1897	Ordnance Survey	*Kent Sheet X.7*
1909	Ordnance Survey	*Kent Sheet X.7*
1936	Ordnance Survey	*Kent Sheet X.7*
1957 – 1958	Ordnance Survey	

12.3 National Gas Archive Records

Reference	*Title*	*Description*
GJ_1907_V100_P26	Gravesend - brief description, photographs (1907)	Gravesend - brief description, photographs
SE/DA/E/E/3/14	Plan of Gravesend (SCANNED) – (1949)	Showing holders and buildings.
SE/ROD/GRM/E/E/1A	Gravesend- Plan of Proposed Gas Works Layout (1953)	Gravesend. Plan of provisional layout of proposed gasworks at Gravesend, Kent County Division SEGB. Details holders, purifiers, benzole plant and buildings - (Image is Colour)
SE/ROD/GRM/E/E/1B	Gravesend- Colourised Plan of Proposed Gas Works Layout (1953)	Gravesend. Plan of provisional layout of proposed gasworks at Gravesend, Kent County Division SEGB. Details holders, purifiers, benzole plant and buildings - (Image is Colour)

APPENDIX 1: PHOTOGRAPHIC RECORD

Photo No.	*Structure*	*Description*	*Taken from*	*Date*
GRA001	Site	General view of the site from Canal Road	NW	14/12/20
GRA002	Surrounding area	General view of moored boats to the north-west of the site	SE	14/12/20
GRA003	Site	General view of the site from the Industrial Estate to the north	N	14/12/20
GRA004	Site	General view of the site from Norfolk Road to the south	S	14/12/20
GRA005	Site	General view of the site from Norfolk Road to the south	SE	14/12/20
GRA006	Surrounding area	General view of the railway embankment to the south of Norfolk Road	W	14/12/20
GRA007	Site	General view of the site from Norfolk Road to the south	ESE	14/12/20
GRA008	Surrounding area	Detail view of Canal sign "THAMES AND MEDWAY CANAL OPENED 1824"	W	14/12/20
GRA009	Surrounding area	General view of the Thames and Medway Canal to the east of the site	W	14/12/20
GRA010	Surrounding area	General view of the Thameslink railway line to the south of the site	E	14/12/20
GRA011	Surrounding area	General view of large boats on the River Thames to the north of the site	SE	14/12/20
GRA012	Surrounding area	General view of Canal Road to the west of the site	SSE	14/12/20
GRA013	Site	General view of the site from Canal Road to the west	W	14/12/20
GRA014	Site	General view of the site including the entrance on Canal Road	WNW	14/12/20
GRA015	Site & Surrounding area	General view of the site from Canal Road showing Brian Jones Coaches to bordering the north side of the site	NW	14/12/20
GRA016	Surrounding area	General view of the River Thames to the north-west of the site	SE	14/12/20
GRA017	Surrounding area	General view of the River Thames with boat traffic to the north of the site	WSW	14/12/20
GRA018	Surrounding area	General view of mud flats in the Thames basin	ESE	14/12/20
GRA019	Surrounding area	General view of the River Thames with boat traffic and crane operations to the north of the site	SW	14/12/20
GRA020	Site / Surrounding area	General view of the site from the junction of Prospect Grove and Norfolk Road to the south-west of the site, showing industrial estate with car garages bordering the south side of the site	SSW	14/12/20
GRA021	Anti-freeze Switch Room	General view of exterior north-east and south-east elevations	ENE	15/12/20
GRA022	Anti-freeze Switch Room	General view of the interior west corner	E	15/12/20
GRA023	Anti-freeze Switch Room	Detail view of booster interface panel in the west corner	NE	15/12/20
GRA024	Anti-freeze Switch Room	Detail view of Erskine electrical panel and frame which previously housed backup battery packs, to the north-west of the entrance door	SW	15/12/20
GRA025	Anti-freeze Switch Room	General view of the interior south-east area	NW	15/12/20
GRA026	Anti-freeze Switch Room	Detail view of records & spares cabinet	NW	15/12/20
GRA027	Anti-freeze Switch Room	Detail view of electrical maintenance records and drawings cabinet	NW	15/12/20
GRA028	Anti-freeze Switch Room	General view of Gasholder No 2 monitoring panel	NE	15/12/20
GRA029	Anti-freeze	Detail view of Gasholder No 2 pump controls and monitoring panel	NE	15/12/20

	Switch Room			
GRA030	Anti-freeze Switch Room	Detail view of Gasholder No 2 lift monitoring and control panel	NE	15/12/20
GRA031	Electrical Services Room & Instrument Room	General view of the exterior north and east walls	NE	15/12/20
GRA032	Electrical Services Room & Instrument Room	General view of the exterior east wall	E	15/12/20
GRA033	Electrical Services Room	Detail view of glass block window and valves on the exterior east wall	E	15/12/20
GRA034	Instrument Room	Detail view of valves and pressure monitors on the exterior east wall	E	15/12/20
GRA035	Instrument Room	Detail view of pressure monitor on the exterior east wall	E	15/12/20
GRA036	Instrument Room	Detail view of pressure monitor on the exterior east wall	E	15/12/20
GRA037	Electrical Services Room & Instrument Room	General view of the exterior south and west walls	SW	15/12/20
GRA038	Instrument Room	Detail view of Fogger emergency stop button at the north end of the exterior west wall	W	15/12/20
GRA039	Electrical Services Room	Detail view of E.V. controller panel on the interior south wall	N	15/12/20
GRA040	Electrical Services Room	General view of the north-east interior corner	SW	15/12/20
GRA041	Electrical Services Room	Detail view of glass block window on the east elevation	W	15/12/20
GRA042	Instrument Room	General view of the interior east wall	W	15/12/20
GRA043	Instrument Room	Detail view of valves and pipework on the interior east wall	W	15/12/20
GRA044	Instrument Room	Detail view of pressure monitoring instrumentation	W	15/12/20
GRA045	Instrument Room	Detail view of pipework, valves and electroclocks	SE	15/12/20
GRA046	Instrument Room	Detail view of glass brick window on the north wall	S	15/12/20
GRA047	Instrument Room	Detail view of valve plan	N	15/12/20
GRA048	Instrument Room	Detail view of valve plan	N	15/12/20
GRA049	Instrument Room	Detail view of isolation notice	N	15/12/20
GRA050	Instrument Room	Detail view of valve plan	N	15/12/20
GRA051	Instrument Room	Detail view of rivet sheet	N	15/12/20
GRA052	Meg Tank	General view	NNE	15/12/20
GRA053	Fogger Unit	General view	SW	15/12/20
GRA054	Fogger Unit	Detail view of maker's mark and technical specification	N	15/12/20
GRA055	Flow Meter	General view	E	15/12/20
GRA056	Flow Meter	Detail view of instrument	E	15/12/20
GRA057	Flow Meter	Detail view of DONKIN maker's mark	E	15/12/20

GRA058	Flow Meter	Detail view of maker's mark 'DONKIN ENGLAND'	E	15/12/20
GRA059	Volumetric Governor House, Grid/District Pit 2 & Station Governor Pit	General view with grid/district pit 2 on the left, painted-brick volumetric governor house in the centre and station governor pit on the right	SSW	15/12/20
GRA060	Grid/District Pit 2	General view into the pit	W	15/12/20
GRA061	Grid/District Pit 2	Detail view of valve diaphragm with maker's mark 'DONKIN CHESTERFIELD ENGLAND'	W	15/12/20
GRA062	Grid/District Pit 2	Detail view of valve diaphragm and pipework	W	15/12/20
GRA063	Volumetric Governor House	General view of the exterior WSW and SSE walls	SW	15/12/20
GRA064	Volumetric Governor House	General view of the exterior SSE and ENE walls	SE	15/12/20
GRA065	Volumetric Governor House	General view of the exterior ENE wall	ENE	15/12/20
GRA066	Volumetric Governor House	Detail view of three openings in the ENE wall	ENE	15/12/20
GRA067	Volumetric Governor House	General view of the gap in the steel fence leading into the NNW wall of the volumetric governor house	NE	15/12/20
GRA068	Volumetric Governor House	General view of the interior east end	W	15/12/20
GRA069	Volumetric Governor House	Detail view of maker's mark on the volumetric governor 'DONKIN CHESTERFIELD ENGLAND'	WNW	15/12/20
GRA070	Volumetric Governor House	Detail view of gauge on the volumetric governor	SW	15/12/20
GRA071	Volumetric Governor House	General view of the interior east end	WSW	15/12/20
GRA072	Volumetric Governor House	Detail view of pipework and gate valve at the east end of the building interior	SW	15/12/20
GRA073	Volumetric Governor House	Detail view of gate valve, pipework and volumetric governor at the east end of the building	NW	15/12/20
GRA074	Volumetric Governor House	Detail view of cut-off pipework	NW	15/12/20
GRA075	Volumetric Governor House	Detail view of the steps down from the entrance door on the NNW wall	SW	15/12/20
GRA076	Volumetric Governor House	Detail view of pipework and fixtures at the west end of the building	NE	15/12/20
GRA077	Volumetric Governor House	Detail view of maker's mark on the valve at the west end of the building 'WESTWOOD & WRIGHTS LTD PAT N 514732 BRIERLEY-HII'	ENE	15/12/20

GRA078	Volumetric Governor House	Detail view of timber apparatus used to open and shut valves	E	15/12/20
GRA079	Volumetric Governor House	Detail view of pipework and valves on the SSE interior wall	NNW	15/12/20
GRA080	Volumetric Governor House	Detail view of pipework going through the SSW wall to the exterior	NNW	15/12/20
GRA081	Volumetric Governor House	General view of the south-west interior corner	NE	15/12/20
GRA082	Volumetric Governor Return Valve 1	General view	W	15/12/20
GRA083	Volumetric Governor Return Valve 1	Detail view showing maker's mark 'WESTWOOD & WRIGHTS LTD PAT NO 314732 BRIERLEY-HII'	W	15/12/20
GRA084	Volumetric Governor Return Valve 1	General view	S	15/12/20
GRA085	High Vent	General view	SSW	15/12/20
GRA086	Valve pit	General view of valve pit with surrounding red-brick wall and return valves to the east and west of the structure	NE	15/12/20
GRA087	Gas Valve Sign	General view	NNE	15/12/20
GRA088	Gas Valve Sign	Detail view of sign identifying low pressure gas valve 25 at Gravesend with code 'GRSLP25'	N	15/12/20
GRA089	Valve Pit 7	General view of return valve and control rod of Valve Pit 7 mostly covered over by earth	N	15/12/20
GRA090	Standby Generator & Valve Pit 5	General view	NE	15/12/20
GRA091	Valve Pit 5	General view of weighted valve	SW	15/12/20
GRA092	Standby Generator & Valve Pit 5	Detail view of manual valve open/shut wheel	N	15/12/20
GRA093	Standby Generator	Detail view of maker's mark sign 'RUSTON & HORNSBY'	WSW	15/12/20
GRA094	Standby Generator	Detail view of oil measurement dial	WSW	15/12/20
GRA095	Other structures	General view of area showing remains of diesel tank, blanked non-return valve and pipework, and	N	15/12/20
GRA096	Diesel Tank	General view of remains	NNE	15/12/20
GRA097	Diesel Tank	Detail view of manual controlled valve	N	15/12/20
GRA098	Diesel Tank	Detail view of manual controlled valve with embossed 'No 2'	NE	15/12/20
GRA099	Gate Valve	General view	SW	15/12/20
GRA100	Gate Valve	Detail view of maker's mark 'DONKIN'	WSW	15/12/20
GRA101	Standby Generator	General view	SE	15/12/20
GRA102	Valve Pit 14	General view showing red-brick pit	WNW	15/12/20
GRA103	Valve Pit 14	General view showing red-brick pit	W	15/12/20
GRA104	Valve Pit 14	Detail view of two valves and curved pipe	N	15/12/20
GRA105	Valve Pit 1	General view showing red-brick pit	NE	15/12/20
GRA106	Valve Pit 1	General view showing red-brick pit, valve and pipework	SW	15/12/20
GRA107	Valve Pit 1	General view showing red-brick pit, valve and pipework	SSE	15/12/20
GRA108	Valve Pit 1	Detail view of valve and pipework	SSE	15/12/20
GRA109	Valve Pit 1	Detail view of small valve	SW	15/12/20

GRA110	Booster	General view	SE	15/12/20
GRA111	Booster	Detail view of 'DONKIN' maker's mark	SE	15/12/20
GRA112	Booster	General view	SW	15/12/20
GRA113	Valve Pit 1	Detail view of submerged ceramic pipe set within square metal pipe	S	15/12/20
GRA114	Control Room	General view of the exterior north and east walls	NE	15/12/20
GRA115	Control Room	General view of the exterior west wall showing central entrance door	W	15/12/20
GRA116	Control Room	General view of the exterior south wall showing satellite dish at the west end	S	15/12/20
GRA117	Control Room	General view of pressure monitoring devices within the shelter on the exterior east side of the structure	ESE	15/12/20
GRA118	Control Room	Detail view of inlet and flow pressure monitoring devices	E	15/12/20
GRA119	Control Room	General view of exterior north wall showing glass brick window	N	15/12/20
GRA120	Control Room	General view of pressure gauges and electrical override panels for the booster motor and volumetric governor	N	15/12/20
GRA121	Control Room	Detail view of pressure gauges	N	15/12/20
GRA122	Control Room	Detail view of electrical wiring relating to pressure monitoring	N	15/12/20
GRA123	Control Room	Detail view within the override panels for the booster and volumetric governor	N	15/12/20
GRA124	Control Room	Detail view of LDU display list	W	15/12/20
GRA125	Control Room	Detail view of LDU display list	W	15/12/20
GRA126	Control Room	General view of electrical apparatus on the internal north wall including buttons for cup alarm and extra high knock-off resets and electrical trip panel	S	15/12/20
GRA127	Control Room	General view of the interior east end	W	15/12/20
GRA128	Site	General view of the pedestrian gate at the north-west corner of the small interior area	SSE	15/12/20
GRA129	Valve	Detail view of valve situated to the east of the volumetric governor pit	ESE	15/12/20
GRA130	Site	General view of the site from the north-west corner	NW	15/12/20
GRA131	Meg Tank, Grid/District Pit 1, Fogger Unit & Flow Meter	General view of other structures in the north-west corner of the site	ENE	15/12/20
GRA132	Other Structures	General view of other structures including booster motor, standby generator and valve pits situated to the north-west of Gasholder No 2	NW	15/12/20
GRA133	Site	General view of open area to the north of Gasholder No 2, including central concrete platform	W	15/12/20
GRA134	Concrete Platform	Detail view of concrete platform situated to the north of Gasholder No 2	SW	15/12/20
GRA135	Anti-freeze Switch Room	Detail view of loose site valve plan	N/A	15/12/20
GRA136	Anti-freeze Switch Room	Detail view of loose plan	N/A	15/12/20
GRA137	Anti-freeze Switch Room	Detail view of Gasholder cup data sheet	N/A	15/12/20
GRA138	Site	General view of disused area on the north-east boundary of the site	W	15/12/20
GRA139	Site	General view of coach car parking area in the west area of the site	NNW	15/12/20
GRA140	Sump Pump Room	General view of the exterior north and east walls showing entrance door at the east end of the north wall	NNE	15/12/20
GRA141	Sump Pump Room	General view of the exterior south and west walls	SSW	15/12/20
GRA142	Sump Pump Room	General view of interior south end showing electrical panels	N	15/12/20
GRA143	Sump Pump Room	General view of the interior south-east corner showing electrical panels	NW	15/12/20
GRA144	Sump Pump Room	Detail view of sump pump isolator switch	NNW	15/12/20

GRA145	Sump Pump Room	Detail view of metering fuses and transformers box	N	15/12/20
GRA146	Sump Pump Room	Detail view of steel panels overlying floor gully	NNE	15/12/20
GRA147	District Governor House	General view of the exterior north and west walls	NNE	15/12/20
GRA148	District Governor House	Detail view of district governor showing gate valve, filter and pressure reducing apparatus	ENE	15/12/20
GRA149	District Governor House	Detail view of district governor showing filter and pressure reducing apparatus	ESE	15/12/20
GRA150	Gasholder No 1	Detail view of sign on standard 1 articulating the holder as No '1'	NNW	15/12/20
GRA151	Gasholder No 1	Detail view of the lower east side of standard 1	ENE	15/12/20
GRA152	Gasholder No 1	Detail view of the upper east side of standard 1	ENE	15/12/20
GRA153	Gasholder No 1	Detail view of the upper east side of standard 1	ENE	15/12/20
GRA154	Gasholder No 1	Detail view of the base of standard 1	NE	15/12/20
GRA155	Gasholder No 1	Detail view of pipe between standards 1 and 2 used for replacing the oil in the tank	NE	15/12/20
GRA156	Gasholder No 1	General view of empty space to the north of and slope surrounding the holder	WNW	15/12/20
GRA157	Gasholder No 1	Detail view of junction box between standards 2 and 3	NNW	15/12/20
GRA158	Gasholder No 1	Detail view of horizontal girder bolted to the west side of standard 3	NNW	15/12/20
GRA159	Gasholder No 1	General view of empty space to the east side of the holder	N	15/12/20
GRA160	Gasholder No 1	Detail view of tank exterior between standards 4 and 5 with intertwined embossed design	E	15/12/20
GRA161	Gasholder No 1	Detail view of pipes to the north side of standard 5	E	15/12/20
GRA162	Gasholder No 1	Detail view of the lower half of standard 4 south-east side	SSE	15/12/20
GRA163	Gasholder No 1	Detail view of the upper half of standard 4 south-east side	SSE	15/12/20
GRA164	Gasholder No 1	Detail view of horizontal girder bolted to the south-east side of standard 4	E	15/12/20
GRA165	Gasholder No 1	General view of the north-east side of the holder	SE	15/12/20
GRA166	Gasholder No 1	Detail view of knock-off switch situated to the north-east side of standard 6	ESE	15/12/20
GRA167	Gasholder No 1	Detail view of clips on the exterior of the tank between standards 5 and 6 which hold heating elements on the interior of the tank	S	15/12/20
GRA168	Site & Gasholder No 1	General view of open area in the south-east corner of the site	NW	15/12/20
GRA169	Gasholder No 1	Detail view of the south-east side of standard 6	ESE	15/12/20
GRA170	Gasholder No 1	Detail view of the upper half of standard 6 south-east side	ESE	15/12/20
GRA171	Gasholder No 1	Detail view of the middle height of standard 6 south-east side	ESE	15/12/20
GRA172	Gasholder No 1	General view of the east side of the holder between standards 4 and 6	SE	15/12/20
GRA173	Gasholder No 1	General view of the south-east side of the holder between standards 6 and 8	E	15/12/20
GRA174	Gasholder No 1	Detail view of the base of standard 6, south-west side, with knock-off switch, striker arm and electrical wiring	S	15/12/20
GRA175	Gasholder No 1	Detail view of extra low knock-off switch and associated striker arm on the south-west side of standard 6	S	15/12/20
GRA176	Site & Gasholder No 1	Detail view of slope up to the holder on the south-east side	SW	15/12/20
GRA177	Gasholder No 1	General view of the open area to the east of the holder	SSW	15/12/20
GRA178	Gasholder No 1	General view of the tank between standards 7 and 8	SE	15/12/20
GRA179	Gasholder No 1	General view of the east side of standard 8	SE	15/12/20
GRA180	Gasholder No 1	Detail view of the guide frame between standards 7 and 8 showing horizontal girders and tie bars	SSE	15/12/20
GRA181	Gasholder No 1	Detail view of lower horizontal girder between standards 7 and 8	SSE	15/12/20
GRA182	Gasholder No 1	Detail view of upper horizontal girder between standards 7 and 8	SSE	15/12/20

GRA183	Gasholder No 1	Detail view of lower tension ring between standards 7 and 8	SSE	15/12/20
GRA184	Gasholder No 1	General view of tank exterior between standards 8 and 9	S	15/12/20
GRA185	Gasholder No 1	Detail view of intertwining pattern on the tank exterior between standards 8 and 9	S	15/12/20
GRA186	Gasholder No 1	General view of tank exterior between standards 8 and 9	WSW	15/12/20
GRA187	Gasholder No 1	General view of the south side of the holder	WSW	15/12/20
GRA188	Gasholder No 1	Detail view of maker's plate on the west side of standard 9	WNW	15/12/20
GRA189	Gasholder No 1	Detail view of maker's plate on the west side of standard 9 'C & W WALKER MIDLAND IRON WORKS DONNINGTON NEWPORT SHROPSHIRE 1895	WNW	15/12/20
GRA190	Gasholder No 1	General view of tank exterior between standards 9 and 10 showing overflow pipe leaving the tank	SSE	15/12/20
GRA191	Gasholder No 1	Detail view of elevated overflow pipe on the south side of the holder and against the south site boundary	NNE	15/12/20
GRA192	Site & Gasholders Nos 1 & 2	General view of the south side of the site showing open area of ground, overflow pipe from Gasholder No 1 against the south side site boundary and Gasholder No 2 to the west	E	15/12/20
GRA193	Gasholder No 1	Detail view of the base of standard 10 showing overgrown ivy coverage	S	15/12/20
GRA194	Gasholder No 1	Detail view of embossed 'E' as part of the tank exterior design to the east of standard 10	SSW	15/12/20
GRA195	Gasholder No 1	Detail view of the south-east side of standard 11 showing cross-lattice pattern	SE	15/12/20
GRA196	Gasholder No 1	Detail view of guide rail attached to the north-east (interior) side of standard 11 via bolt and welded fixture	SE	15/12/20
GRA197	Gasholder No 1	Detail view of tie bar bolted to the north-west side of standard 11 base	NW	15/12/20
GRA198	Gasholder No 1	Detail view of fixture which previous secured a length of pipe to the north-west side of standard 11	NW	15/12/20
GRA199	Gasholder No 1	Detail view of the north-west side of standard 11 at the base	NW	15/12/20
GRA200	Site & Gasholders Nos 1 & 2	General view of the open area in the centre of the site between the two holders	S	15/12/20
GRA201	Gasholder No 1	General view of the south-west exterior side of the holder	NW	15/12/20
GRA202	Gasholder No 1 & No 1 Holder Anti-Freeze Room	General view of the west side of the holder and related anti-freeze room	SSW	15/12/20
GRA203	Gasholder No 1	General view of the exterior south-west side of standard 11	WSW	15/12/20
GRA204	Gasholder No 1	General view of the west side of the holder	WSW	15/12/20
GRA205	Gasholder No 1	General view of the west side of the holder	WSW	15/12/20
GRA206	Gasholder No 1	Detail view of hook on the west side of standard 12 just below the lower horizontal girder level	WSW	15/12/20
GRA207	Gasholder No 1	Detail view of tie bar bolted to the south side of standard 12	SW	15/12/20
GRA208	Gasholder No 1	Detail view of swan neck and cable route on the north side of standard 12	WNW	15/12/20
GRA209	Gasholder No 1	Detail view of brick and concrete-built base of standard 12	WNW	15/12/20
GRA210	No 1 Holder Anti-Freeze Room	General view of the exterior north and west walls showing entrance door in the centre of the north wall	NW	15/12/20
GRA211	Gasholder No 1	Detail view of room sign 'No1 HOLDER ANTI-FREEZE ROOM'	NNE	15/12/20
GRA212	Gasholder No 1	General view of the interior	NNE	15/12/20
GRA213	Gasholder No 1	Detail view of gauges measuring electric current in various parts of the anti-freeze system	NW	15/12/20
GRA214	Gasholder No 1	General view of the tank exterior between standards 12 and 13 showing junction box	NNE	15/12/20
GRA215	Gasholder No 1	General view of area of knock-off switches situated on the north-east side of standard 13	N	15/12/20
GRA216	Gasholder No 1	Detail view of knock-off switch situated on the top of the tank between standards 13 and 14	NW	15/12/20

GRA217	Gasholder No 1	Detail view of knock-off switch situated on the top of the tank to the north-east of standard 13	NW	15/12/20
GRA218	Gasholder No 1	Detail view of gasmatic knock-off switch attached to the north-east side of standard 13, with associated striker arm situated on the crown	NNW	15/12/20
GRA219	Gasholder No 1	Detail view of the brick and concrete base of standard 14	WNW	15/12/20
GRA220	Gasholder No 1	Detail view of disused iron fixture situated on the tank exterior between standards 13 and 14		15/12/20
GRA221	Site and Gasholders Nos 1 & 2	General view of the open area between Gasholders Nos 1 & 2 on the east side of the site	E	15/12/20
GRA222	Gasholder No 1	General view of the area to the NNW side of the holder showing valve pits and brick structure covering the gas inlet and outlet	WNW	15/12/20
GRA223	Gasholder No 1 gas inlet/outlet structure	General view of the exterior NNW wall	NNW	15/12/20
GRA224	Gasholder No 1 gas inlet/outlet structure	Detail view of Valve No 5 manual control wheel related to the gas inlet/outlet	NW	15/12/20
GRA225	Gasholder No 1	Detail view of Valve No 10 manual control wheel related to the gas inlet/outlet	NNE	15/12/20
GRA226	Gasholder No 1	Detail view of maker's mark 'C & W WALKER MIDLAND WORKS DONNINGTON WORKSOP SHROPSHIRE'	W	15/12/20
GRA227	Gasholder No 1	Detail view of the top of the gas inlet/outlet pipe	NW	15/12/20
GRA228	Gasholder No 1	Detail view of the top of the gas inlet/outlet pipe	NNE	15/12/20
GRA229	Gasholder No 1	Detail view of valve pits to the NNW of the holder	SE	15/12/20
GRA230	Gasholder No 1	Detail view of the base of standard 14, north-east side, showing gasmatic knock-off switch attached to the standard and access ladder	NE	15/12/20
GRA231	Gasholder No 1	Detail view of the base of standard 1, west side, showing access ladder onto the crown and gasmatic knock-off switch located on the exterior of the tank to the west of standard 1	WNW	15/12/20
GRA232	Gasholder No 1	Detail view of gasmatic knock-off switch located on the exterior of the tank to the west of standard 1	W	15/12/20
GRA233	Gasholder No 1	Detail view of pipe used to change the oil within the tank situated between standards 1 and 2	WSW	15/12/20
GRA234	Gasholder No 1	Detail view of guide rollers and carriages at standard 1	SE	15/12/20
GRA235	Gasholder No 1	Detail view of guide rollers and carriages at standard 2	WSW	15/12/20
GRA236	Gasholder No 1	Detail view of previous fixture attached to handrail	SSW	15/12/20
GRA237	Gasholder No 1	Detail view of top guide roller and carriage at standard 2	S	15/12/20
GRA238	Gasholder No 1	Detail view of lower tension ring between standards 2 and 3	SSW	15/12/20
GRA239	Gasholder No 1	Detail view of the lower half of standard 3, north-west side	WSW	15/12/20
GRA240	Gasholder No 1	Detail view of the lower half of standard 3, south-east side	S	15/12/20
GRA241	Gasholder No 1	Detail view of junction box to the north-west of standard 4	WSW	15/12/20
GRA242	Gasholder No 1	Detail view of pipes going through the tank wall to the north of standard 5	NNW	15/12/20
GRA243	Gasholder No 1	Detail view of bolted and welded connection between standard 5 and the guide rail	NNW	15/12/20
GRA244	Gasholder No 1	Detail view of bolted and welded connections between standard 5 and the guide rail	NNW	15/12/20
GRA245	Gasholder No 1	Detail view of knock-off switch on the north-east side of standard 6	NW	15/12/20
GRA246	Gasholder No 1	Detail view of lift tops between standards 5 and 6	SSW	15/12/20
GRA247	Gasholder No 1	Detail view of the tank top between standards 5 and 6 showing heating device clips and internal tank wall guide rail	SSW	15/12/20
GRA248	Gasholder No 1	Detail view of knock-off switch and associated striker arm situated on the south-west side of standard 6	WSW	15/12/20
GRA249	Gasholder No 1	Detail view of junction box between standards 6 and 7	W	15/12/20
GRA250	Gasholder No 1	Detail view of cotter plate removed during decommissioning works and grate added for aeration	SSE	15/12/20
GRA251	Gasholder No 1	Detail view of junction box situated on the outside of the tank between	WNW	15/12/20

		standards 7 and 8		
GRA252	Gasholder No 1	Detail view of junction box situated on the outside of the tank between standards 7 and 8	W	15/12/20
GRA253	Gasholder No 1	Detail view of junction box situated on the outside of the tank between standards 7 and 8	WNW	15/12/20
GRA254	Gasholder No 1	General view of the south side of the crown showing riveted iron sheets	ESE	15/12/20
GRA255	Gasholder No 1	General view of the top of the tank and lifts between standards 8 and 9	E	15/12/20
GRA256	Gasholder No 1	Detail view of large rivets on the top curb of the bell	E	15/12/20
GRA257	Gasholder No 1	Detail view of rivets and bolts of the top (crown) lift wall	E	15/12/20
GRA258	Gasholder No 1	Detail view of overflow pipe emerging from the tank between standards 9 and 10	WNW	15/12/20
GRA259	Gasholder No 1	Detail view of unidentified fixtures on the west side of standard 9	WNW	15/12/20
GRA260	Gasholder No 1	Detail view of junction box between standards 9 and 10	NE	15/12/20
GRA261	Gasholder No 1	General view of dewatering works	ESE	15/12/20
GRA262	Gasholder No 1	Detail view of tank water float device situated on the interior of the tank to the south side of standard 12	SSE	15/12/20
GRA263	Gasholder No 1	Detail view of guide rollers at standard 12	S	15/12/20
GRA264	Gasholder No 1	Detail view of guide rollers at standard 12	S	15/12/20
GRA265	Gasholder No 1	Detail view of junction box situated between standards 12 and 13	ESE	15/12/20
GRA266	Gasholder No 1	Detail view of swan neck situated on the north side of standard 12	NE	15/12/20
GRA267	Gasholder No 1	Detail view of float device in the internal wall of the bottom lift between standards 12 and 13	NNE	15/12/20
GRA268	Gasholder No 1	Detail view of knock-off switches on standard 13	ESE	15/12/20
GRA269	Gasholder No 1	Detail view of knock-off switches and striker arm at standard 13	ENE	15/12/20
GRA270	Gasholder No 1	Detail view of lumps beneath standard 14	ENE	15/12/20
GRA271	Gasholder No 1	General view of the north-west side of the crown showing welded and riveted iron sheets and glycol pot	NE	15/12/20
GRA272	Gasholder No 1	Detail view of glycol pot	WNW	15/12/20
GRA273	Gasholder No 1	General view of the internal north side of the guide frame showing ladders on the west side of standard 1	SW	15/12/20
GRA274	Gasholder No 1	Detail view of junction between standard 14 and lower horizontal girder with riveted flange plate	S	15/12/20
GRA275	Gasholder No 1	General view of knock-off switches and striker plate on standard 13	SSE	15/12/20
GRA276	Gasholder No 1	General view of standard 14 on top of the tank showing gasomatic knock-off switch and access ladder	ENE	15/12/20
GRA277	Gasholder No 1	Detail view of gasomatic knock-off switch on the north-east side of standard 14	SSE	15/12/20
GRA278	Gasholder No 1	Detail view of access platform onto the crown on the west side of standard 1	SSW	15/12/20
GRA279	Gasholder No 1	Detail view of gasmatic knock-off switch on the west side of standard 1	S	15/12/20
GRA280	Gasholder No 1	General view of the north side of the crown	W	15/12/20
GRA281	Gasholder No 1	Detail view of riveted and welded iron sheets of the crown, crown vent and iron bars of previous fixture	NNW	15/12/20
GRA282	Gasholder No 1	General view of the north-east side of the crown showing riveted and welded iron sheets	W	15/12/20
GRA283	Gasholder No 1	General view of the centre of the crown showing iron sheets, crown vents and purge points added during decommissioning works	S	15/12/20
GRA284	Gasholder No 1	Detail view of crown vent just south-east of the centre of the crown	SE	15/12/20
GRA285	Gasholder No 1	Detail view of crown vent just north-west of the centre of the crown	NW	15/12/20
GRA286	Gasholder No 1	Panorama from the centre of the crown	NW	15/12/20
GRA287	Gasholder No 1	Panorama from the centre of the crown	NNE	15/12/20
GRA288	Gasholders No 1 & 2	Panorama from the centre of the crown showing Gasholder No 2	E	15/12/20
GRA289	Gasholder No 1	Panorama from the centre of the crown	SE	15/12/20
GRA290	Gasholder No 1	Panorama from the centre of the crown	SSE	15/12/20
GRA291	Gasholder No 1	Panorama from the centre of the crown	S	15/12/20
GRA292	Gasholder No 1	Panorama from the centre of the crown	SW	15/12/20

GRA293	Gasholder No 1	Panorama from the centre of the crown	WSW	15/12/20
GRA294	Gasholder No 1	Detail view of the upper south-east and south-west sides of standard 3	SSW	15/12/20
GRA295	Gasholder No 1 & Gas Inlet/Outlet Structure	General view of the north side of the holder and the brick structure covering the gas inlet and outlet	WSW	15/12/20
GRA296	Gasholder No 1	General view of the north-west side of the holder	NW	15/12/20
GRA297	Gasholder No 1	General view of the south-west side of the holder	SW	15/12/20
GRA298	Gasholder No 2 & Valve Pit 3	General view of valve pit associated with gas flow of the holder	SW	15/12/20
GRA299	Gasholder No 2 & Valve Pit 3	General view of valve pit associated with gas flow of the holder	S	15/12/20
GRA300	Gasholder No 2 & Valve Pit 3	Detail view of valve with maker's mark 'PEEBLES & CO LTD EDINBURGH'	SW	15/12/20
GRA301	Gasholder No 2 & Valve Pit 3	Detail view of valve and, pipework and pressure monitoring devices	S	15/12/20
GRA302	Gasholder No 2 & Valve Pit 3	Detail view of pressure monitoring devices	SSE	15/12/20
GRA303	Holder Valve Pit 2	General view of red-brick valve pit with steel panel top	W	15/12/20
GRA304	Holder Valve Pit 2	Detail view of valve and pipework	N	15/12/20
GRA305	Holder Valve Pit 2	Detail view of maker's mark on the valve 'PEEBLES & CO EDINBURGH'	N	15/12/20
GRA306	Gasholder No 2	General view of the exterior north-west side of the holder	N	15/12/20
GRA307	Gasholder No 2	General view of the exterior north side of the holder including access stairway onto the raised walkway	NNE	15/12/20
GRA308	Gasholder No 2	General view of the exterior north-east side of the holder including access stairway onto the raised walkway	NE	15/12/20
GRA309	Gasholder No 2	General view of the gas inlet/outlet pipe on the north-east side of the holder	NNW	15/12/20
GRA310	Gasholder No 2	Detail view of corrosion on the NNE side of the holder exterior	E	15/12/20
GRA311	Gasholder No 2 and Holder Valve Pit 3	General view of the concrete lined pit with grated top	N	15/12/20
GRA312	Gasholder No 2 and Holder Valve Pit 3	Detail view of pipework with blanked valve situated at the base of the outlet pipe	NE	15/12/20
GRA313	Gasholder No 2	General view of open area to the south of the holder including elevated overflow pipe	W	15/12/20
GRA314	Gasholder No 2	General view of the small open area and concrete platform between the holder and the west boundary of the site	SSE	15/12/20
GRA315	Gasholder No 2 and Holder Valve Pit 3	General view of the base of the outlet pipe showing flange connection and vent pipework	SE	15/12/20
GRA316	Gasholder No 2	Detail view of narrow pipe emerging from the ground on the north-east side of the holder and going anti-clockwise around the holder propped up by welded brackets	ESE	15/12/20
GRA317	Gasholder No 2	Detail view of the west side of the holder exterior showing rectangular steel sheet construction with flange plates on the bottom four courses and additional rivets lower down the structure	WSW	15/12/20
GRA318	Gasholder No 2	Detail view of the guide rail and stair structure on the west side of the holder at the walkway level	WSW	15/12/20
GRA319	Gasholder No 2	Maker's mark on rolled steel stanchion 'DORMAN LONG & CO LTD'	NNE	15/12/20
GRA320	Gasholder No 2	General view of the south-east side of the holder showing disused fixture brackets	SE	15/12/20
GRA321	Gasholder No 2	General view of the open land to the south of the holder with elevated	E	15/12/20

		overflow pipe meeting the overflow pipe from Gasholder No 1 and then the interceptor tank in the south-west corner of the site		
GRA322	Gasholder No 2	Detail view of closed off circular hole in the tank south-east exterior wall from a previous pipe entering or exiting the holder at this point	SE	15/12/20
GRA323	Gasholder No 2	Detail view of bracket remains of previous pipe fixture at mid-level height on the south-east side of the holder exterior	SE	15/12/20
GRA324	Gasholder No 2	Detail view of bracket remains of previous pipe fixture at the base of the south-east side of the holder exterior	SE	15/12/20
GRA325	Gasholder No 2	General view of the exterior south side of the holder showing knock-off switch at the walkway level	ESE	15/12/20
GRA326	Gasholder No 2	General view of the south-east side of the holder exterior	SW	15/12/20
GRA327	Gasholder No 2	Detail view of void in ground from previous pipework	SE	15/12/20
GRA328	Gasholder No 2	Detail view of projecting walkway	SW	15/12/20
GRA329	Gasholder No 2	Detail view of overflow pipe on the SSW side of the holder and brackets from additional previous fixture	SE	15/12/20
GRA330	Gasholders Nos 1 & 2 & Interceptor Tank	General view of the brick and concrete block tank	NE	15/12/20
GRA331	Gasholder No 2	General view of the brick and concrete block tank	E	15/12/20
GRA332	Gasholder No 2	General view of the south-west exterior of the holder showing areas of rust	S	15/12/20
GRA333	Gasholder No 2	Detail view of the guide rail and stair structure at walkway level on the SSW side of the holder	SSW	15/12/20
GRA334	Gasholder No 2	General view of the south-west corner of the site showing interceptor tank and portaloo	NE	15/12/20
GRA335	Portaloo	General view	NE	15/12/20
GRA336	Gasholder No 2	Detail view of floodlights on the west side of the holder at the walkway level	SSW	15/12/20
GRA337	Gasholder No 2	General view of the west side of the holder	SSW	15/12/20
GRA338	Gasholder No 2	Detail view of the base of a roll steel stanchion structure used for rigidity	SW	15/12/20
GRA339	Gasholder No 2	Detail view of welded brackets which would previously have supported some pipework	SW	15/12/20
GRA340	Gasholder No 2	Detail view of track on the north-west side of the holder	WNW	15/12/20
GRA341	Gasholder No 2	Detail view of swan necks and knock-off switch on the north-west side of the holder at walkway level	NW	15/12/20
GRA342	Gasholder No 2	General view of the north-west side of the holder	W	15/12/20
GRA343	Gasholder No 2	Detail view of electrical cabling	W	15/12/20
GRA344	Gasholder No 2	General view of the gas inlet pipe on the north-west side of the holder	W	15/12/20
GRA345	Gasholder No 2	Detail view of the gas inlet pipe at ground level going into a concrete lined pit with grate cover	W	15/12/20
GRA346	Gasholder No 2	Detail view of 'open/shut' markings on the manual valve control wheel	NW	15/12/20
GRA347	Gasholder No 2	General view of the north-west side of the holder	NW	15/12/20
GRA348	Gasholder No 2	General view of the north side of the holder including access stair and triangular guide rail and stair at walkway level	WNW	15/12/20
GRA349	Gasholder No 2	General view of the north-west side of the holder including gas inlet pipe, triangular guide rail and stair, and '2' sign	NNW	15/12/20
GRA350	Gasholder No 2	Detail view of '2' sign on the NNW side of the holder		15/12/20
GRA351	Gasholder No 2	Detail view of two types of pipework on the north-west side of the holder	NE	15/12/20
GRA352	Gasholder No 2	Detail view of the access stair on the north side of the holder	NNE	15/12/20
GRA353	Gasholder No 2	Detail view of the north side of the holder at walkway level showing access stair, winch system and knock-off switch	NNE	15/12/20
GRA354	Gasholder No 2	Detail view of floodlights at walkway level to the west of the gas outlet pipe	NNW	15/12/20
GRA355	Gasholder No 2	Detail view of cotter plate situated on the exterior tank walk beneath the access stair	N	15/12/20
GRA356	Gasholder No 2	Detail view of locked security gate at the base of the access stair	ENE	15/12/20

GRA357	Gasholder No 2	Detail view of heating system motor	NE	15/12/20
GRA358	Gasholder No 2 walkway	Detail view of knock-off switches situated to the east of the access stair	WNW	15/12/20
GRA359	Gasholder No 2 walkway	Detail view of four knock-off switches and the winch at the top of the stairs	W	15/12/20
GRA360	Gasholder No 2 walkway	Detail view of gasmatic knock-off switch and oil pipe	WNW	15/12/20
GRA361	Gasholder No 2 walkway	Detail view of the top of the gas outlet pipe structure	S	15/12/20
GRA362	Gasholder No 2 walkway	General view of the walkway and lift tops showing twin guide rollers and electrical boxes	NNW	15/12/20
GRA363	Gasholder No 2 walkway	Detail view of electrical boxes and cables	NNW	15/12/20
GRA364	Gasholder No 2 walkway	Detail view of electrical box with float device	NNW	15/12/20
GRA365	Gasholder No 2 walkway	Detail view of helical guide rail on the external wall of the bottom lift	NNW	15/12/20
GRA366	Gasholder No 2 walkway	Detail view of twin guide rollers	N	15/12/20
GRA367	Gasholder No 2 walkway	Detail view of internal tank support for the twin guide rollers	N	15/12/20
GRA368	Gasholder No 2 walkway	Detail view of walkway and lift tops showing anti-freeze tube sat within support bracket, riveted steel panels of the bottom lift wall and hole in the walkway for previous pipe	N	15/12/20
GRA369	Gasholder No 2 walkway	General view of walkway on the east side of the holder showing handrails cut during decommissioning works	S	15/12/20
GRA370	Gasholder No 2 walkway	Mosque	ENE	15/12/20
GRA371	Gasholder No 2 walkway	Mosque	ENE	15/12/20
GRA372	Gasholder No 2	Panorama from the centre of the crown – start then clockwise	E	15/12/20
GRA373	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA374	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA375	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA376	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA377	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA378	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA379	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA380	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA381	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA382	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA383	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA384	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA385	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA386	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA387	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA388	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA389	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA390	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA391	Gasholder No 2	Panorama from the centre of the crown		15/12/20
GRA392	Gasholder No 2	General view of the WSW side showing elevated knock-off switches and guide rail and stair structure		15/12/20
GRA393	Gasholder No 2	General view of the centre of the crown showing steel sheet construction, crown vents and purge points	N	15/12/20
GRA394	Gasholder No 2	Detail view of crown vents to the west of the crown centre	NNW	15/12/20
GRA395	Gasholders Nos 1 & 2 walkway	General view of the east side of Gasholder No 2 showing triangular guide rail and stair structure with Gasholder No 1 in the background	W	15/12/20

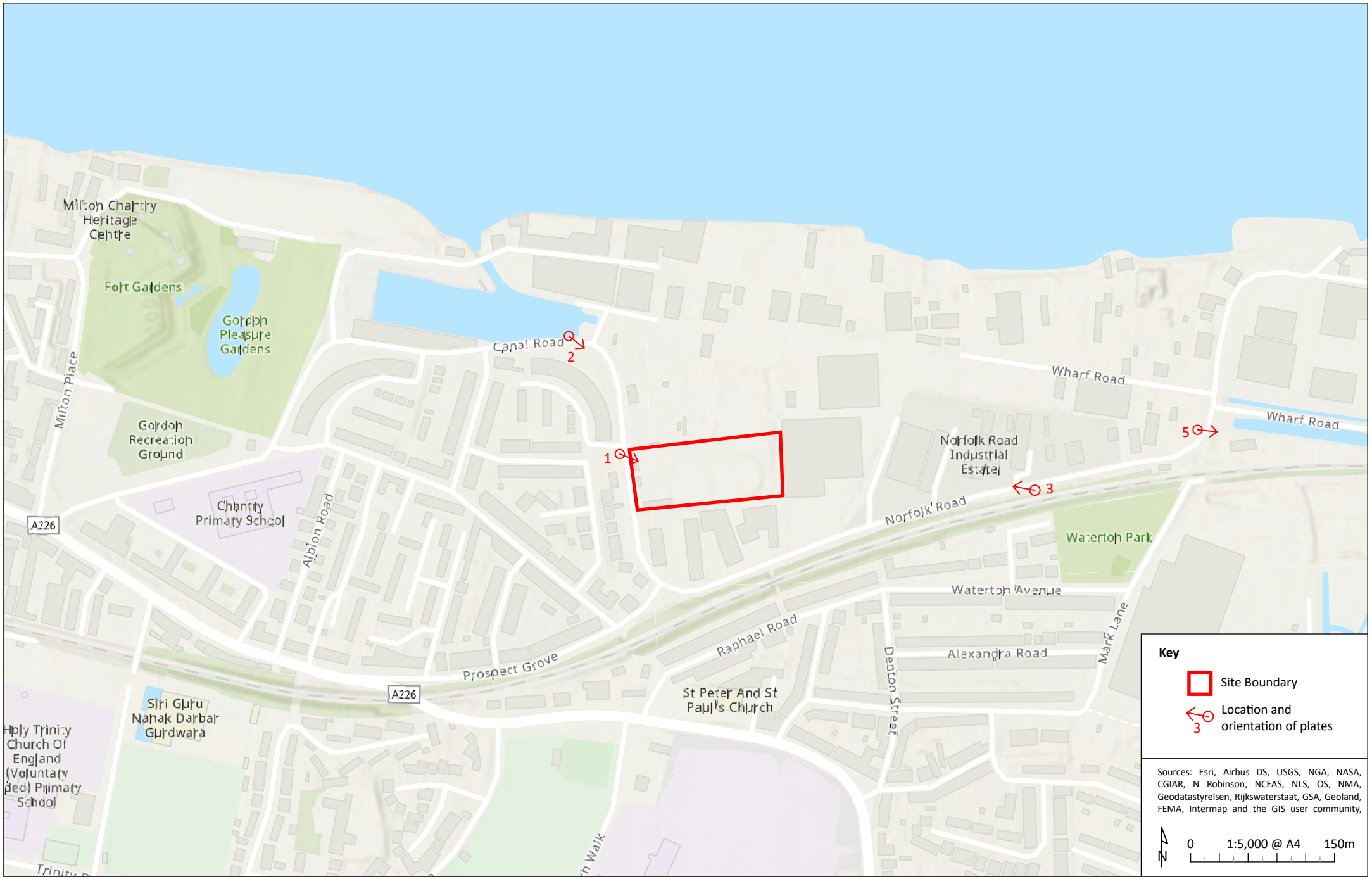
GRA396	Gasholder No 2	Detail view of the glycol pot on the west side of the crown	S	15/12/20
GRA397	Gasholder No 2	Detail view of the triangular guide rail and stair structure on the east side of the holder	N	15/12/20
GRA398	Gasholder No 2	Detail view of hole in the walkway ENE side	WSW	15/12/20
GRA399	Gasholder No 2	Detail view of lift tops showing riveted steel sheet construction	N	15/12/20
GRA400	Gasholder No 2	Detail view of dual guide rollers	W	15/12/20
GRA401	Gasholder No 2	General view of the south-east side of the crown showing riveted steel sheet construction	NNE	15/12/20
GRA402	Gasholder No 2	General view of the lift tops on the south-east side of the holder	NNE	15/12/20
GRA403	Gasholder No 2	Detail view of bottom lift radial box	N	15/12/20
GRA404	Gasholder No 2	Detail view of bottom cup radial box sign	NNW	15/12/20
GRA405	Gasholder No 2	Detail view of Cooper Crouse-Hinds maker's sign on the bottom cup radial box	NNW	15/12/20
GRA406	Gasholder No 2	Detail view of bottom lift radial box	N	15/12/20
GRA407	Gasholder No 2	Detail view of lift tops and top curb showing large rivets	ENE	15/12/20
GRA408	Gasholder No 2	Detail view of crown vent	N	15/12/20
GRA409	Gasholder No 2	General view of the knock-off switches on the south side of the holder	ENE	15/12/20
GRA410	Gasholder No 2	Detail view of disused bracket on the top lift	N	15/12/20
GRA411	Gasholder No 2	Detail view of triangular guide rail and stair structure on the south side of the holder	ENE	15/12/20
GRA412	Gasholder No 2	Detail view of ladder on the west end of the triangular guide rail and stair structure on the south side of the holder	NNW	15/12/20
GRA413	Gasholder No 2	General view of the west side of the holder at the walkway level showing swan necks and knock-off switch	SSE	15/12/20
GRA414	Gasholder No 2	Detail view of bottom lift anti-freeze distribution board	NE	15/12/20
GRA415	Gasholder No 2	Detail view of bottom lift anti-freeze distribution board sign	ENE	15/12/20
GRA416	Gasholder No 2	Detail view of guide rollers on the lift tops	NW	15/12/20
GRA417	Gasholder No 2	Detail view of guide rollers on the lift tops	NW	15/12/20
GRA418	Gasholder No 2	Detail view of top lift anti-freeze distribution board	SSE	15/12/20
GRA419	Gasholder No 2	Detail view of bottom lift anti-freeze distribution board sign	E	15/12/20
GRA420	Gasholder No 2	General view of dewatering equipment	ESE	15/12/20
GRA421	Gasholder No 2	General view of the WNW side of the holder showing swan neck, dewatering equipment and handrails cut through during decommissioning works	SE	15/12/20
GRA422	Gasholder No 2	Detail view of gasmatic knock-off switch and associated striker plate on the north-west side of the holder	SE	15/12/20
GRA423	Gasholder No 2	General view of electrics on the north-west side of the holder	ESE	15/12/20
GRA424	Gasholder No 2	Detail view of float switches within the tank on the north-west side of the holder	E	15/12/20
GRA425	Gasholder No 2	Detail view of holder anti-freeze tank level box on the north-west side of the holder	ESE	15/12/20
GRA426	Gasholder No 2	Detail view of gasmatic knock-off switch and associated striker plate on the north-west side of the holder	E	15/12/20
GRA427	Gasholder No 2	Detail view of sets of guide rollers on the lift tops on the north-west side of the holder	SE	15/12/20
GRA428	Gasholder No 2	General view of the north side of the crown showing riveted steel sheet construction, purge point and removed cotter plate	WSW	15/12/20
GRA429	Gasholder No 2	Detail view of the triangular guide rail and stair structure on the north side of the holder	WSW	15/12/20
GRA430	Gasholder No 2	General view of the north-west side of the holder showing floodlights and the top of the gas inlet pipe	SSE	15/12/20
GRA431	Gasholder No 2	Detail view of pipework on the NNW side of the walkway	SE	15/12/20
GRA432	Gasholder No 2	Detail view of pipework on the NNW side of the walkway	W	15/12/20
GRA433	Gasholder No 2	General view of the lift tops on the north-west side of the holder showing handrails	ENE	15/12/20
GRA434	Gasholder No 2	Detail view of bottom cup radial box	ESE	15/12/20
GRA435	Gasholder No 2	Detail view of bottom cup radial box sign	S	15/12/20

GRA436	Gasholder No 2	Detail view of anti-freeze pipe system appearing through a hole in the walkway from the motor on the stairs	W	15/12/20
GRA437	Gasholder No 2	Detail view of striker arm remnants on the north side of the holder	NW	15/12/20
GRA438	Gasholder No 2	General view from the top of the holder to the River Thames	SE	15/12/20
GRA439	Gasholder No 2	Detail view of winch support at the top of the access stairs	S	15/12/20
GRA440	Gasholder No 2	Detail view looking down the stairs on the north side of the holder	E	15/12/20
GRA441	Gasholder No 2	Detail view of crown vent on the south side of the crown	N	15/12/20
GRA442	Gasholder No 1	General view towards opening between standards 13 and 14	NW	25/02/21
GRA443	Gasholder No 1	General view towards opening between standards 13 and 14	NW	25/02/21
GRA444	Gasholder No 1	General view towards opening between standards 13 and 14	N	25/02/21
GRA445	Gasholder No 1	General view of crown support truss from opening between standards 13 and 14	NW	25/02/21
GRA446	Gasholder No 1	General view of crown support truss from opening between standards 13 and 14	NW	25/02/21
GRA447	Gasholder No 1	General view of outlet and inlet pipes on north side of dumpling	W	25/02/21
GRA448	Gasholder No 1	General view of outlet and inlet pipes on north side of dumpling	W	25/02/21
GRA449	Gasholder No 1	Detail view of section through lift walls at standard 14	SW	25/02/21
GRA450	Gasholder No 1	Detail view of section through lift walls at standard 14	SW	25/02/21
GRA451	Gasholder No 1	Detail view of section through lift walls at standard 14	SW	25/02/21
GRA452	Gasholder No 1	Detail view of section through lift walls at standard 14	SW	25/02/21
GRA453	Gasholder No 1	Detail view of section through lift walls at standard 13	NE	25/02/21
GRA454	Gasholder No 1	Detail view of section through lift walls at standard 13	NE	25/02/21
GRA455	Gasholder No 1	Detail view of section through lift walls at standard 13	NE	25/02/21
GRA456	Gasholder No 1	Detail view of section through made ground at standard 13	NE	25/02/21
GRA457	Gasholder No 1	Detail view of central pier of truss above brick plinth	NW	25/02/21
GRA458	Gasholder No 1	Detail view of central pier of truss above brick plinth	NW	25/02/21
GRA459	Gasholder No 1	Detail view of central pier of truss above brick plinth	NW	25/02/21
GRA460	Gasholder No 1	Detail view of central brick plinth	SW	25/02/21
GRA461	Gasholder No 1	Detail view of central brick plinth	SW	25/02/21
GRA462	Gasholder No 1	Detail view of the underneath of the crown centre	SW	25/02/21
GRA463	Gasholder No 1	Detail view of the underneath of the crown centre	SW	25/02/21
GRA464	Gasholder No 1	Detail view of the underneath of the crown centre	SW	25/02/21
GRA465	Gasholder No 1	Detail view of pipe in crown to north of centre	SW	25/02/21
GRA466	Gasholder No 1	Detail view of pipe in crown to north of centre	SW	25/02/21
GRA467	Gasholder No 1	Detail view of truss base above brick pier base, with gap between	SW	25/02/21
GRA468	Gasholder No 1	General view of top lift wall interior between standards 10 and 11	NE	25/02/21
GRA469	Gasholder No 1	General view of top lift wall interior between standards 10 and 11	NE	25/02/21
GRA470	Gasholder No 1	General view of top lift wall interior between standards 10 and 11	NE	25/02/21
GRA471	Gasholder No 1	General view of top lift wall interior between standards 10 and 11	NE	25/02/21
GRA472	Gasholder No 1	General view of top lift wall interior between standards 10 and 11	NE	25/02/21
GRA473	Gasholder No 1	Detail view of possible overflow pipes on inside of cups viewed between standards 10 and 11	NE	25/02/21
GRA474	Gasholder No 1	Detail view of possible overflow pipes on inside of cups viewed between standards 10 and 11	NE	25/02/21
GRA475	Gasholder No 1	Detail view of possible overflow pipes on inside of cups viewed between standards 10 and 11	NE	25/02/21
GRA476	Gasholder No 1	Detail view of possible overflow pipes on inside of cups viewed between standards 10 and 11	N	25/02/21
GRA477	Gasholder No 1	General view of dumpling and lift wall from standard 13	N	25/02/21
GRA478	Gasholder No 1	General view of dumpling and lift wall from standard 13	N	25/02/21
GRA479	Gasholder No 1	General view of dumpling and lift wall from standard 13	N	25/02/21
GRA480	Gasholder No 1	Detail view of top lift internal wall stanchion at standard 13	SE	25/02/21
GRA481	Gasholder No 1	Detail view of section through lift walls at standard 14	SW	25/02/21
GRA482	Gasholder No 1	Detail view of section through lift walls at standard 14	SW	25/02/21
GRA483	Gasholder No 1	Detail view of gas inlet/outlet on north edge of the dumpling	W	25/02/21
GRA484	Gasholder No 1	Detail view of gas inlet/outlet on north edge of the dumpling	W	25/02/21
GRA485	Gasholder No 1	Detail view of gas inlet and outlet pipes with supports on north edge of	S	25/02/21

		the dumpling		
GRA486	Gasholder No 1	Detail view of gas inlet and outlet pipes with supports on north edge of the dumpling	S	25/02/21
GRA487	Gasholder No 1	Detail view of the top of the gas inlet and outlet pipes	S	25/02/21
GRA488	Gasholder No 1	Detail view of the top of the gas inlet and outlet pipes	S	25/02/21
GRA489	Gasholder No 1	General view of the north side of the dumpling showing gas inlet and outlet pipes and row of caps to the east	S	25/02/21
GRA490	Gasholder No 1	Detail view of sealed cap in dumpling (screw cap sealed with cloth and bitumen)	W	25/02/21
GRA491	Gasholder No 1	Detail view of sealed cap in dumpling (screw cap sealed with cloth and bitumen)	W	25/02/21
GRA492	Gasholder No 1	Detail view of internal lift wall construction and repairs between standards 1 and 2	S	25/02/21
GRA493	Gasholder No 1	Detail view of internal lift wall construction and repairs between standards 1 and 2	S	25/02/21
GRA494	Gasholder No 1	Detail view of internal lift wall repairs between standards 1 and 2	S	25/02/21
GRA495	Gasholder No 1	General view from standard 1 showing shape of dumpling	W	25/02/21
GRA496	Gasholder No 1	General view from standard 1 showing shape of dumpling	W	25/02/21
GRA497	Gasholder No 1	General view from standard 1 showing shape of dumpling	W	25/02/21
GRA498	Gasholder No 1	General view from standard 1 showing shape of dumpling	W	25/02/21
GRA499	Gasholder No 1	Detail view of cotter plate at base of internal lift wall between standards 2 and 3	SW	25/02/21
GRA500	Gasholder No 1	Detail view of cotter plate at base of internal lift wall between standards 2 and 3	SW	25/02/21
GRA501	Gasholder No 1	General view of opening in the tank wall between standards 13 and 14 from inside the gasholder	SE	25/02/21
GRA502	Gasholder No 1	General view of opening in the tank wall between standards 13 and 14 from inside the gasholder	SE	25/02/21
GRA503	Gasholder No 1	Detail view of guide rail with capped top, bolted to the interior of the tank wall between standards 13 and 14	N	25/02/21
GRA504	Gasholder No 1	Detail view of crown support truss in line with standard 12	N	25/02/21
GRA505	Gasholder No 1	Detail view of bracket fixing crown support truss to top of vertical stanchion	N	25/02/21
GRA506	Gasholder No 1	Detail view of bracket fixing crown support truss to top of vertical stanchion	N	25/02/21
GRA507	Gasholder No 1	Detail view of bracket fixing crown support truss to top of vertical stanchion	N	25/02/21
GRA508	Gasholder No 1	Detail view of crown interior side near to standard 12	N	25/02/21
GRA509	Gasholder No 1	Detail view of crown interior side near to standard 12	N	25/02/21
GRA510	Gasholder No 1	Detail view of crown support truss ex-situ (girder at top removed from crown)	N/A	25/02/21
GRA511	Gasholder No 1	Detail view of crown support truss ex-situ (girder at top removed from crown)	N/A	25/02/21
GRA512	Gasholder No 1	Detail view of join between two lengths of crown support truss girder	N/A	25/02/21
GRA513	Gasholder No 1	Detail view of join between two lengths of crown support truss girder	N/A	25/02/21
GRA514	Gasholder No 1	Detail view of crown support truss removed from crown	SW	25/02/21
GRA515	Gasholder No 1	Detail view of fixture at base of crown support truss	SW	25/02/21
GRA516	Gasholder No 1	Detail view of fixture at base of crown support truss	SW	25/02/21
GRA517	Gasholder No 1	General view of crown support truss from near standard 6	SE	25/02/21
GRA518	Gasholder No 1	General view of crown support truss from near standard 6	SE	25/02/21
GRA519	Gasholder No 1	General view showing vertical stanchion on top lift interior wall in alignment with standard 9	N	25/02/21
GRA520	Gasholder No 1	General view showing vertical stanchion on top lift interior wall in alignment with standard 9	N	25/02/21
GRA521	Gasholder No 1	General view showing vertical stanchion on top lift interior wall in alignment with standard 9	N	25/02/21
GRA522	Gasholder No 1	General view of south-east ventilation grill covering removed cotter plate	NW	25/02/21

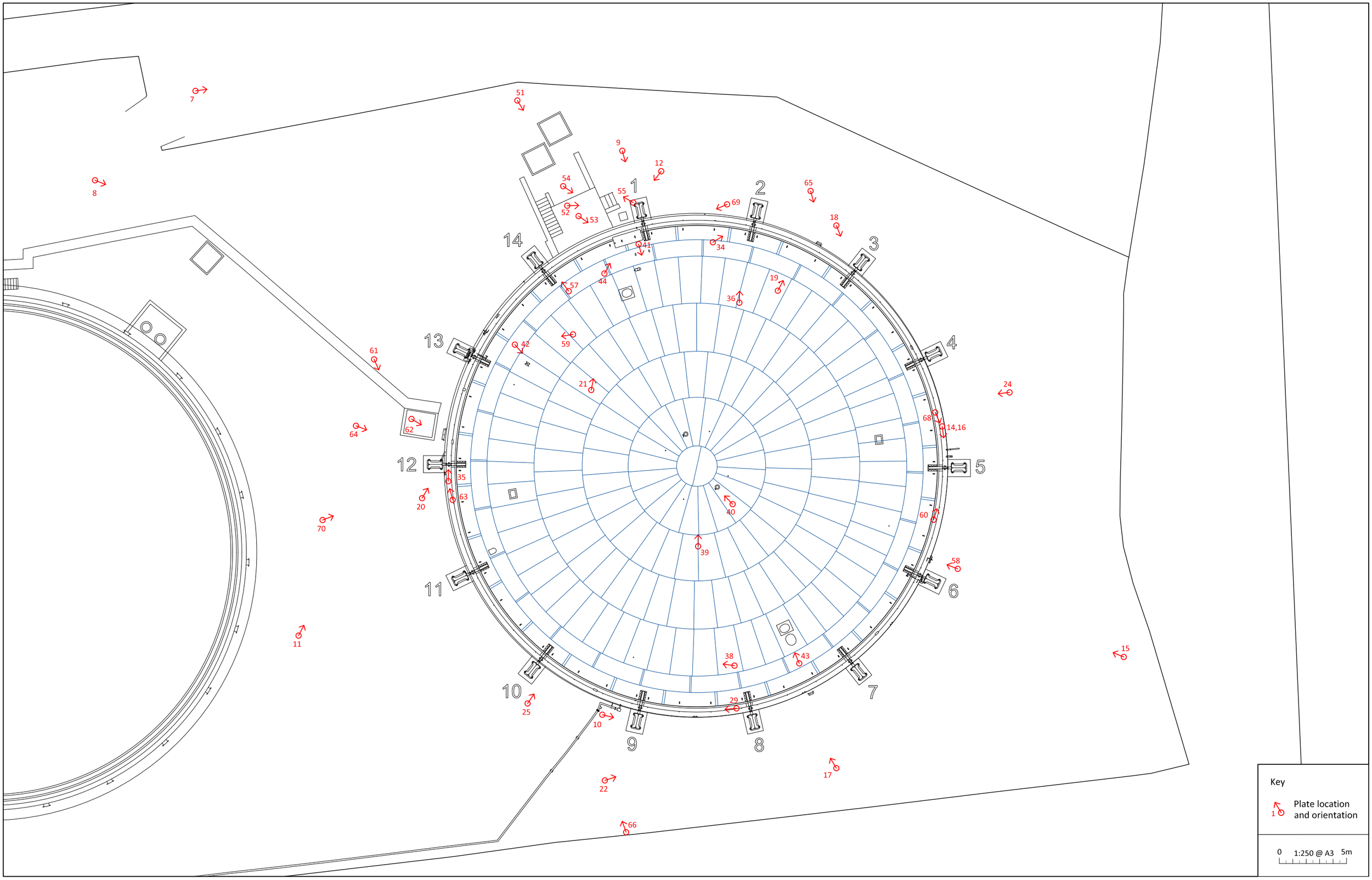
		on crown		
GRA523	Gasholder No 1	General view of south-east ventilation grill covering removed cotter plate on crown	NW	25/02/21
GRA524	Gasholder No 1	General view of ventilation hole cut in the east side of the crown	W	25/02/21
GRA525	Gasholder No 1	General view of ventilation hole cut in the east side of the crown	W	25/02/21
GRA526	Gasholder No 1	General view of ventilation hole cut in west side of the crown	W	25/02/21
GRA527	Gasholder No 1	General view of ventilation hole cut in west side of the crown	E	25/02/21
GRA528	Gasholder No 1	General view of the crown between standards 1 and 14	N	25/02/21
GRA529	Gasholder No 1	General view of the crown between standards 1 and 14	N	25/02/21
GRA530	Gasholder No 1	General view	SE	25/02/21
GRA531	Gasholder No 1	General view	SW	25/02/21
GRA532	Interceptor Tank, Structure S & Structure V	General view of the south-west corner of the site	E	25/02/21
GRA533	Structure V	General view of the ENE exterior elevation	NE	25/02/21
GRA534	Gasholder No 1	General view towards opening in the tank and lift walls between standards 13 and 14	SW	25/02/21
GRA535	Gasholder No 1	Detail view of bitumen cloth sealing caps in the top of the dumpling	N	25/02/21
GRA536	Gasholder No 1	Detail view of bitumen cloth sealing caps in the top of the dumpling	N	25/02/21
GRA537	Gasholder No 1	Detail view of cap in the top of the dumpling with sealing removed	N	25/02/21
GRA538	Gasholder No 1	Detail view of cap in the top of the dumpling with sealing removed	N	25/02/21
GRA539	Gasholder No 1	Detail view of cap in the top of the dumpling with sealing removed	S	25/02/21
GRA540	Gasholder No 1	Detail view of cap in the top of the dumpling with sealing removed	S	25/02/21
GRA541	Gasholder No 1	General view of row of caps on the west side of the dumpling	E	25/02/21
GRA542	Gasholder No 1	General view of row of caps on the west side of the dumpling	E	25/02/21
GRA543	Gasholder No 1	General view of row of caps on the west side of the dumpling	S	25/02/21
GRA544	Gasholder No 1	Detail view of adjustable join between rods forming the base of the truss	N/A	25/02/21
GRA545	Gasholder No 1	Detail view of cup at the base of the top lift wall with square profile	NE	25/02/21
GRA546	Structure V	General view of exterior NNW elevation	W	25/02/21
GRA547	Structure V	Detail view of entrance in the NNW elevation	N	25/02/21
GRA548	Structure V	General view of the interior from the doorway	N	25/02/21
GRA549	Structure V	Detail view of the centre of the exterior NNW elevation	N	25/02/21

APPENDIX 2: SITE PLANS SHOWING POSITION AND DIRECTION OF PHOTOGRAPHS & PLATES



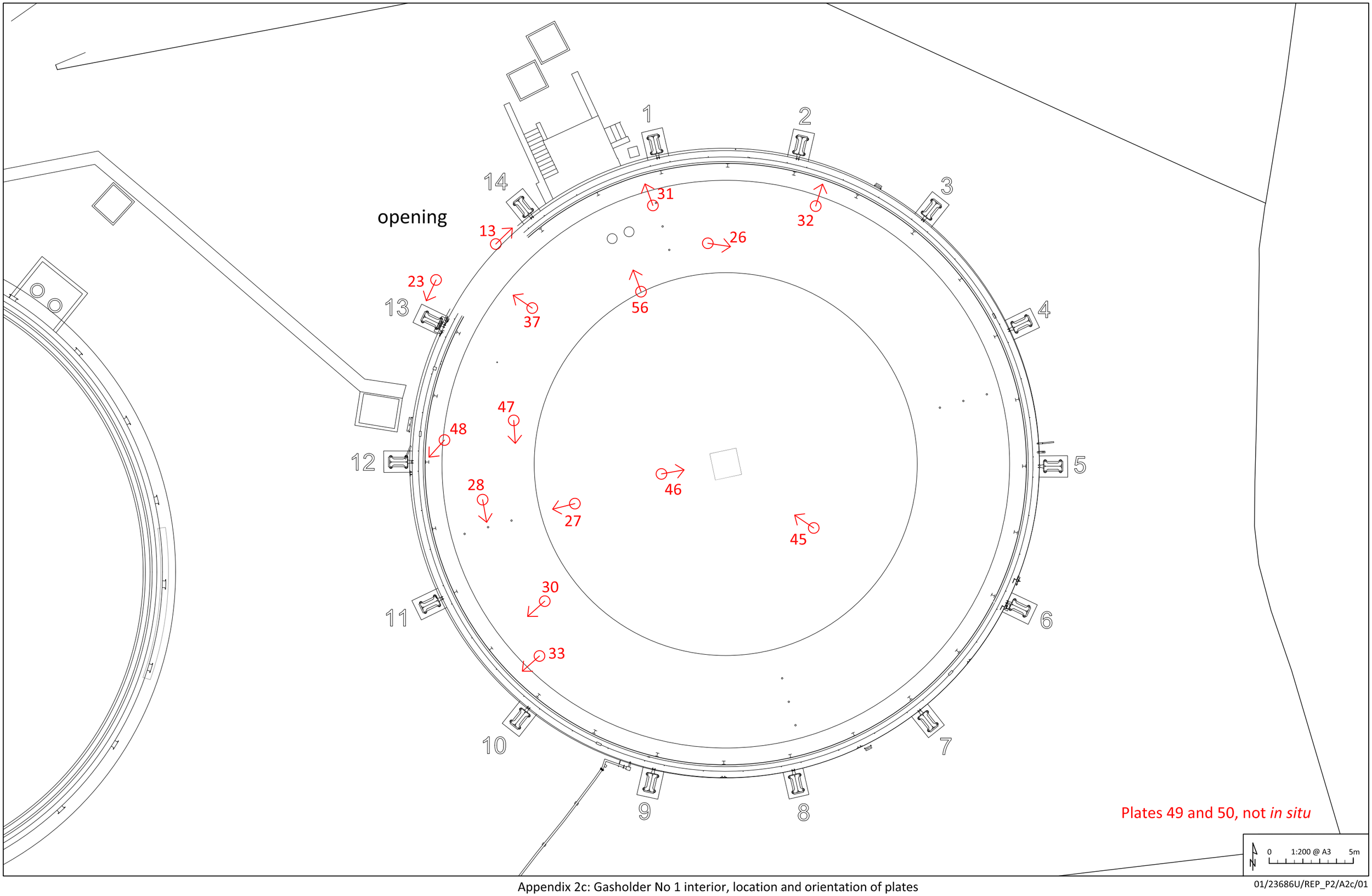
Appendix 2a: The site, location and orientation of plates

01/23686U/REP_P2/A2a/01



Appendix 2b: Gasholder No 1, location and orientation of plates

01/23686U/REP_P2/A2b/01



Appendix 2c: Gasholder No 1 interior, location and orientation of plates

01/23686U/REP_P2/A2c/01

Gasholder No 2

Structure V

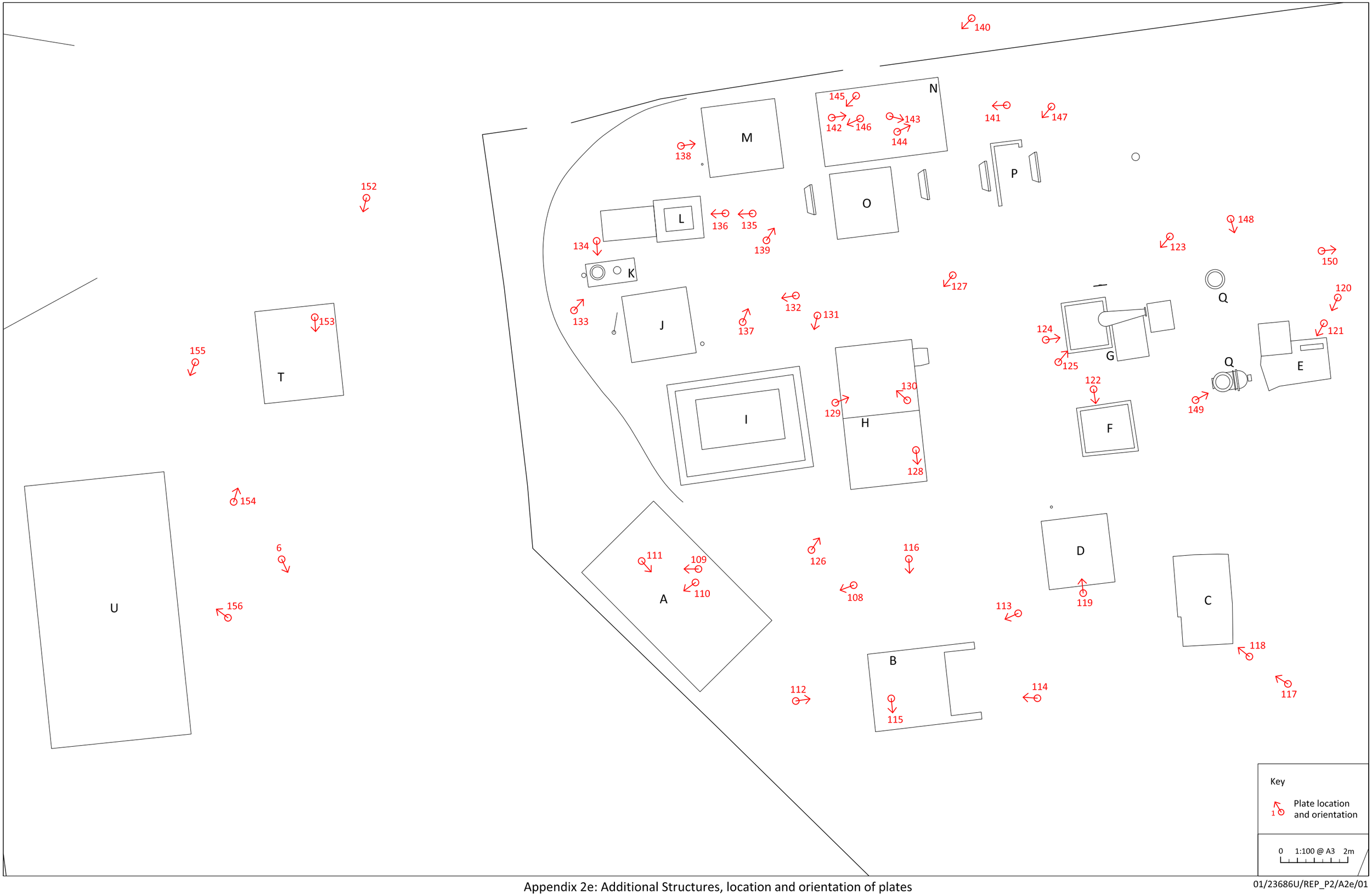
Key

Plate location and orientation

not to scale, for illustrative purposes only

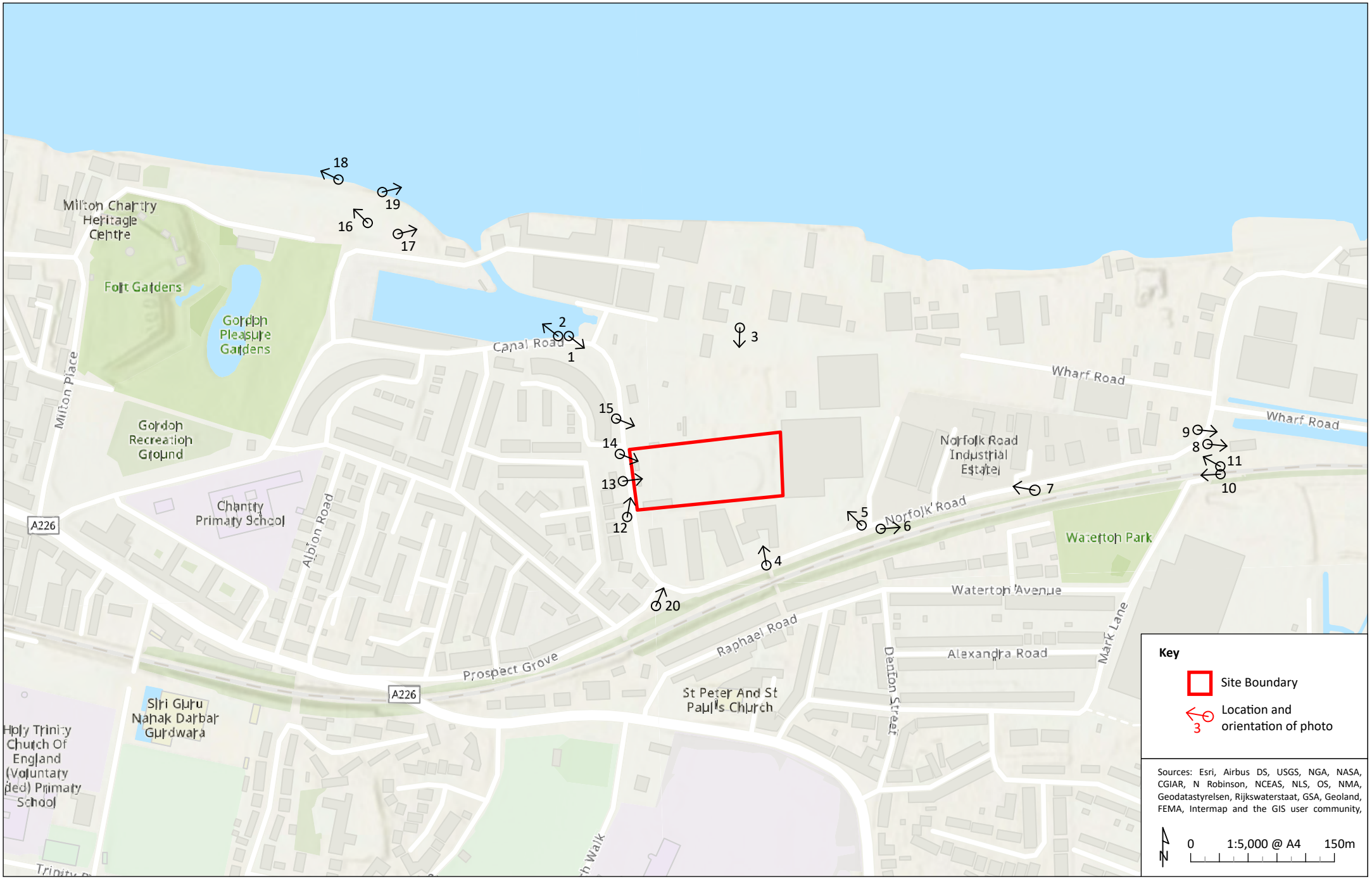
Appendix 2d: Gasholder No 2 and Structure V, location and orientation of plates

01/23686U/REP_P2/A2d/01



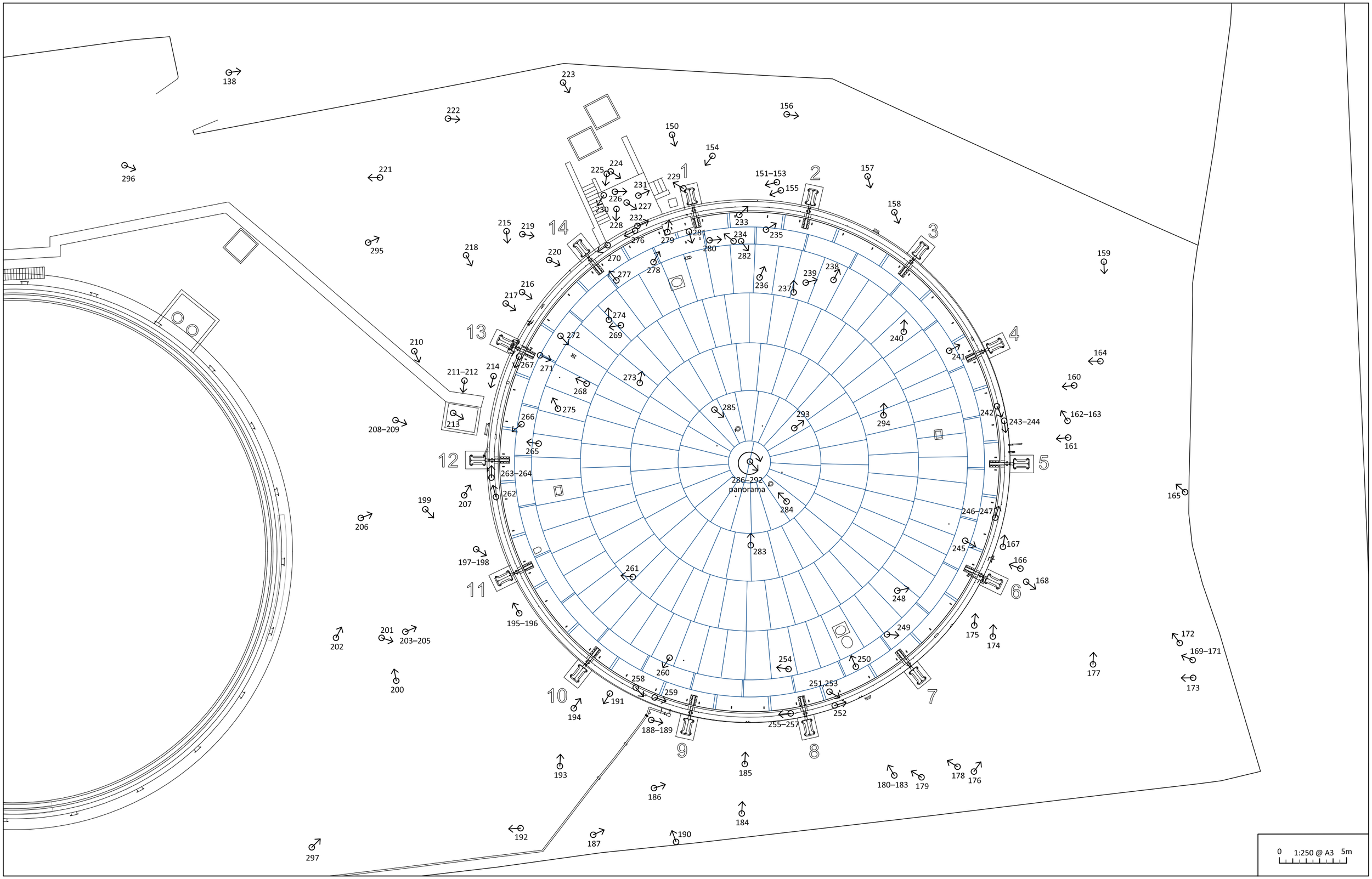
Appendix 2e: Additional Structures, location and orientation of plates

01/23686U/REP_P2/A2e/01



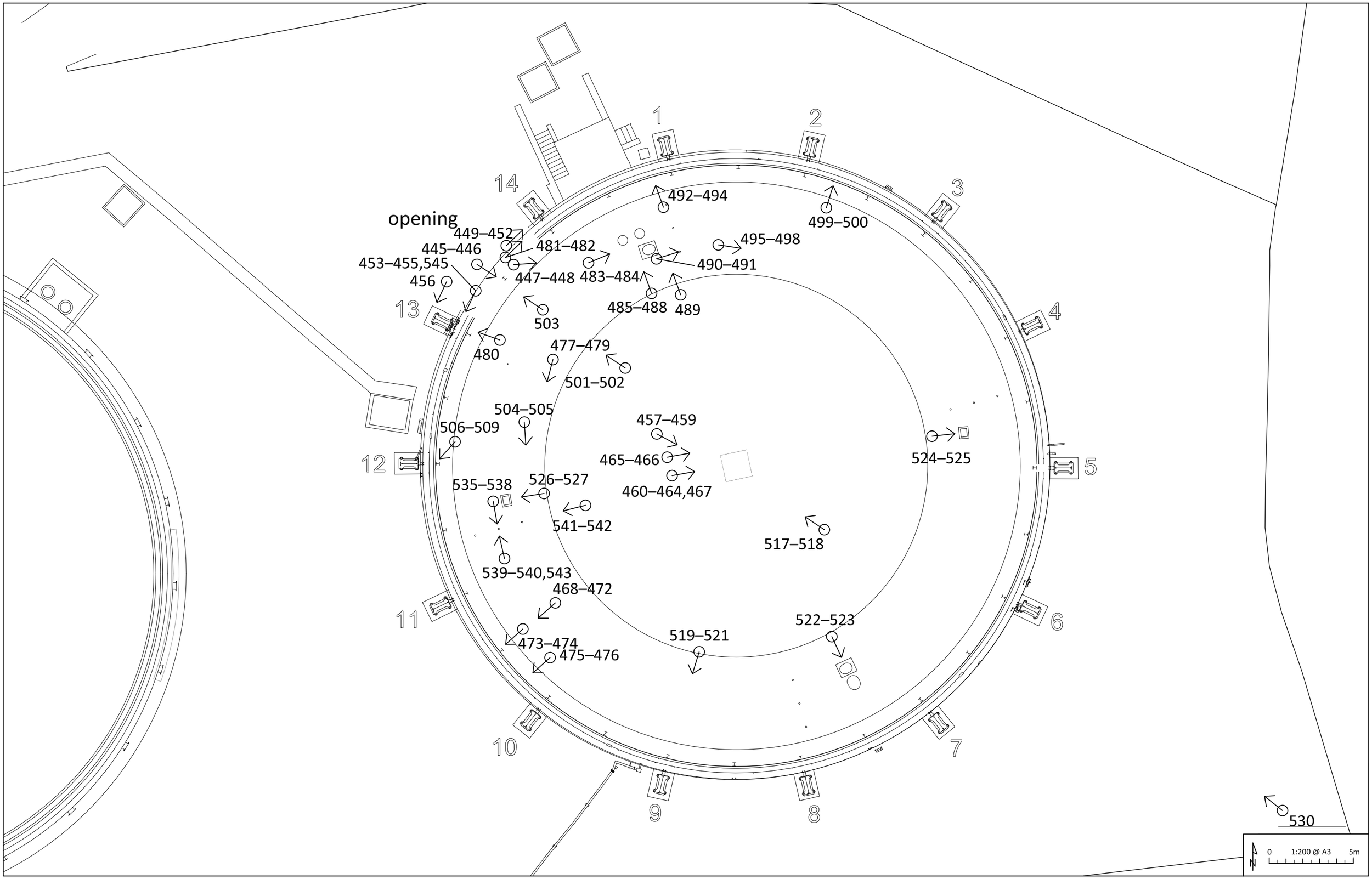
Appendix 2f: The site, location and orientation of photographs taken during the Phase I survey

01/23686U/REP_P2/A2f/01



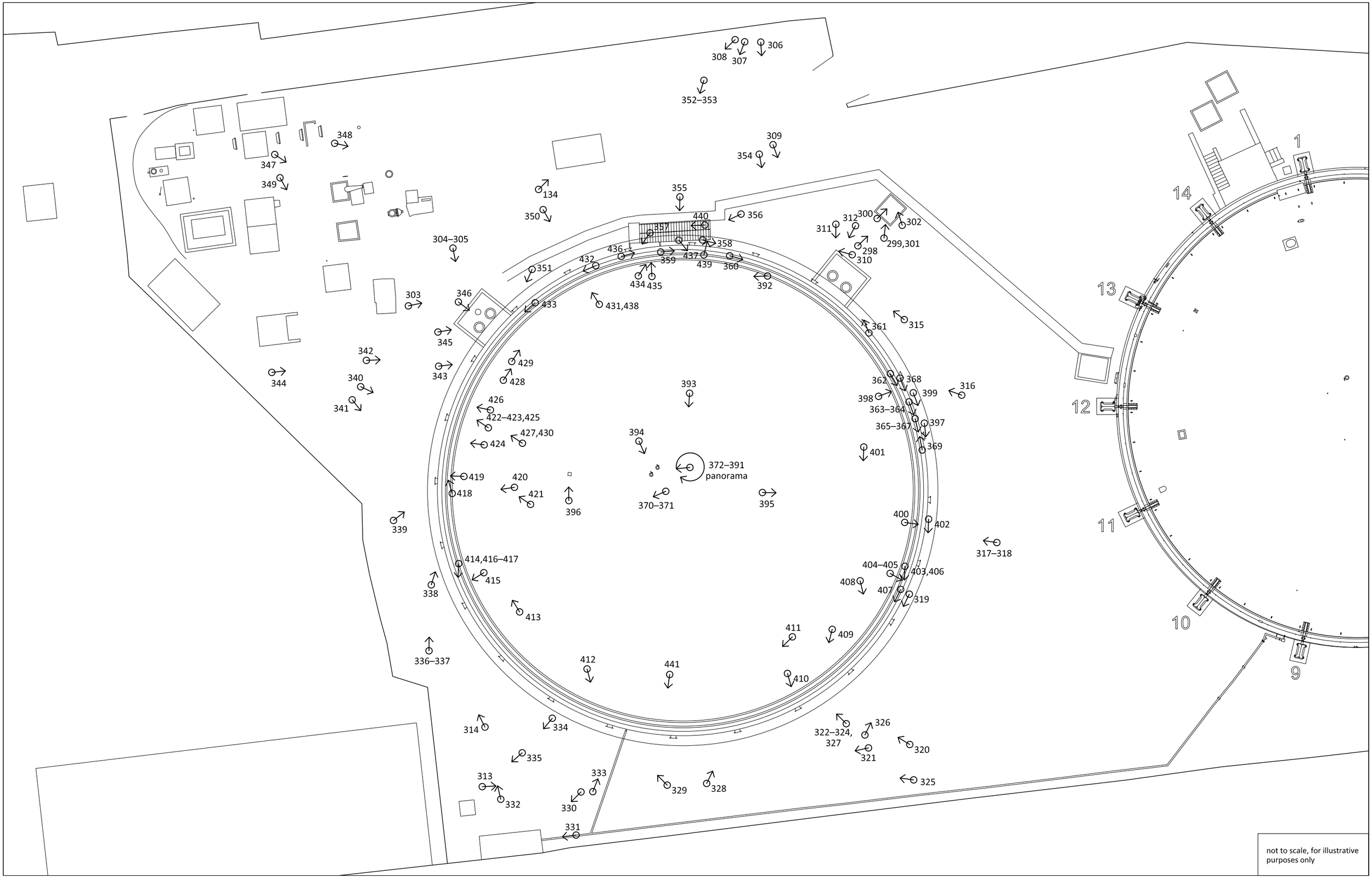
Appendix 2g: Gasholder No 1, location and orientation of photographs taken during the Phase I survey

01/23686U/REP_P2/A2g/01



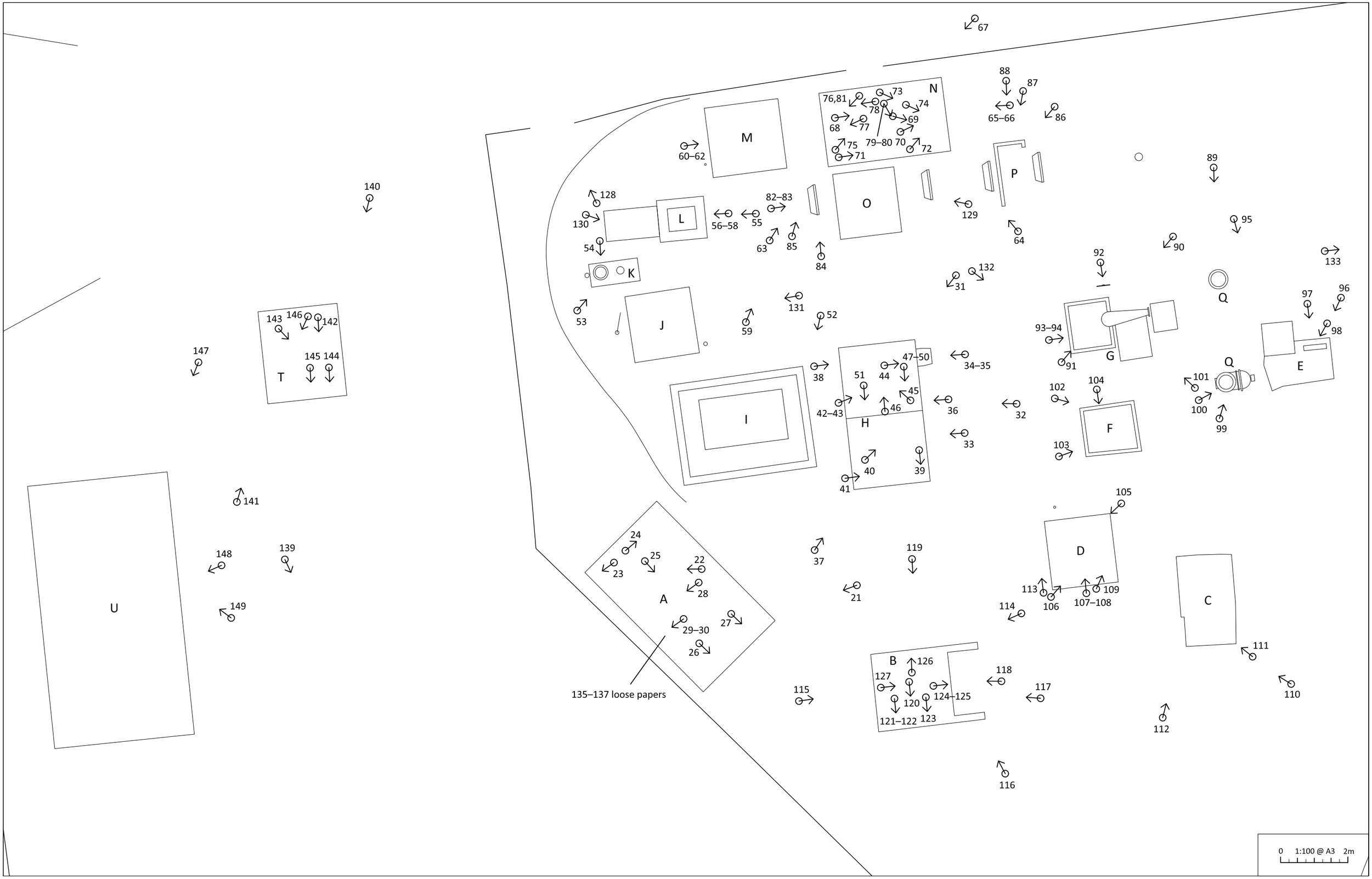
Appendix 2h: Gasholder No 1, location and orientation of interior photographs taken during the Phase II survey

01/23686U/REP_P2/A2h/01

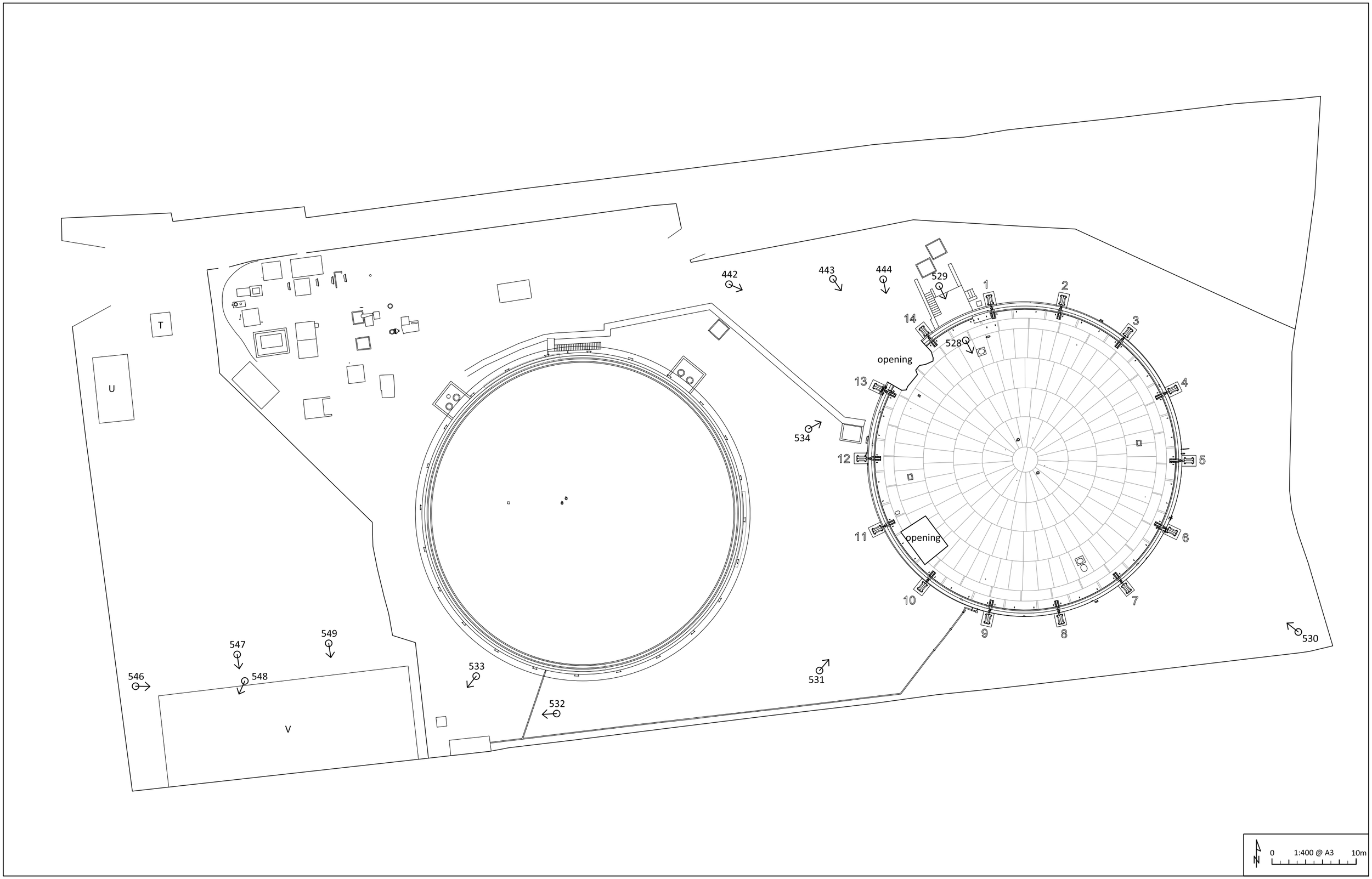


Appendix 2i: Gasholder No 2, location and orientation of photographs taken during Phase I survey

01/23686U/REP_P2/A2i/01



Appendix 2j: Additional Structures, location and orientation of photographs taken during Phase I survey



Appendix 2k: The site, location and orientation of photographs taken during the Phase II survey

APPENDIX 3: MEASURED SURVEY METADATA

The measured survey of Gasholder No 1 at Canal Road, Gravesend was undertaken using a Trimble TX-8 laser scanner. The TX-8 scanner is a time of flight system, capable of full dome scanning at ranges of ca. 0.6m to 120m and at resolutions of up to 92 lines per degree. Scanning was undertaken on site using resolutions as recorded below yielding a typical point-cloud resolution of between 22.6mm and 5.7mm at 30m from the instrument. Overlapping stations mean that the majority of the site is scanned at a greater resolution. The survey was controlled via spherical target control carried out with a Trimble S6 total station with site control provided by a Trimble R6 GPS using the 'vrs now' service.

The laser scan data was registered via auto-matching by plane in Trimble Realworks 11.0. The site drawings were produced using Rhino 7.0, AutoCAD LT 2021 and Arcmap 10.6.1.

Station Name	No of Points	Resolution
Station 001	25,922,461	Level 2
Station 002	58,973,768	Level 2
Station 003	63,599,421	Level 2
Station 004	62,707,859	Level 2
Station 005	56,559,585	Level 2
Station 006	62,410,831	Level 2
Station 007	63,906,709	Level 2
Station 008	264,768,731	Level 3
Station 009	61,848,859	Level 2
Station 010	63,944,702	Level 2
Station 011	65,214,406	Level 2
Station 012	248,563,245	Level 3
Station 013	63,449,930	Level 2
Station 014	65,443,005	Level 2
Station 015	66,692,050	Level 2
Station 016	238,350,757	Level 3
Station 017	65,701,902	Level 2
Station 018	61,720,121	Level 2
Station 019	59,399,367	Level 2
Station 020	59,991,955	Level 2
Station 021	45,077,249	Level 2
Station 022	59,737,580	Level 2
Station 023	VOID	Level 2
Station 024	59,989,177	Level 2
Station 025	59,997,575	Level 2
Station 026	60,290,439	Level 2
Station 027	61,027,563	Level 2
Station 028	61,230,716	Level 2
Station 029	61,279,268	Level 2
Station 030	61,142,841	Level 2
Station 031	61,188,209	Level 2
Station 032	61,579,219	Level 2
Station 033	62,036,664	Level 2
Station 034	62,892,756	Level 2
Station 035	61,729,785	Level 2
Station 036	60,789,520	Level 2
Station 037	59,563,795	Level 2
Station 038	56,019,787	Level 2
Station 039	56,440,330	Level 2
Station 040	60,597,981	Level 2
Station 041	48,114,763	Level 2
Station 042	193,716,850	Level 3
Station 043	48,223,907	Level 2
Station 044	63,725,728	Level 2
Station 045	149,790,173	Level 3
Station 046	57,525,865	Level 2
Station 047	58,191,029	Level 2
Station 048	57,262,327	Level 2
Station 049	57,128,809	Level 2
Station 050	58,499,944	Level 2
Station 051	59,998,994	Level 2
Station 052	303,599,791	Level 3
Gravesend_Station 053	57,619,836	Level 2
Gravesend_Station 054	58,362,403	Level 2
Gravesend_Station 055	59,214,346	Level 2
Gravesend_Station 056	59,695,367	Level 2
Gravesend_Station 057	62,354,712	Level 2
Gravesend_Station 058	46,121,173	Level 2
Gravesend_Station 059	61,589,967	Level 2
Gravesend_Station 060	60,950,734	Level 2

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