Former Gasworks, Common Lane, Partington: Phase 2

Historic Building Investigation and Recording

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Historic Building Recording and Investigation

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Summary

Oxford Archaeology (OA) was commissioned by Montagu Evans LLP, on behalf of The National Grid, to undertake historic building recording at the site of the former gasworks in Partington, Greater Manchester. This is prior to and during the demolition and removal of two former gasholders and a series of bullet tanks for the purposes of redevelopment. The work forms part of a wider national project agreed between Historic England and The National Grid to record gasholders (and Gasworks) prior to their loss even when these are not listed or of only local interest.

Manchester Corporation acquired the site for Partington Gasworks in the early 1920s and it opened for operation in May 8th 1929. It became a part of the North West Gas Board in 1948. The structures that are the subject of this report are Gasholder No. 1, built between 1952 and 1954, Gasholder No. 2, built between 1965 and 1969, and the bullet storage tanks, built between 1966 and 1967. These are all located on the north-east side of a disused railway line that crosses the site from north-west to south-east.

The gasholders were above ground, spirally-guided gasholders. Advancements in technology in the later 20th century had rendered them redundant and prior to the survey, they had been isolated from the network and purged of gas. They were the only gasholders remaining on the site, the others and their associated structures having been removed in the 1990s.

OA has previously produced the report for Phase 1 of the recording of the structures at Partington in September 2018. This focused on historical research, and the recording of the exterior of the gasholder tanks and bullet tanks, their structure and their condition, prior to demolition. The findings of Phase 1 are incorporated into this report for context.

This report concerns Phase 2 of the recording of the Gasholders at Partington, that which was carried out during their demolition. The interior structures and mechanisms associated with their operation were exposed during works and subject to analysis and photographic record.

1 INTRODUCTION

1.1 Project Background

1.1.1 Oxford Archaeology (OA) was commissioned by Montagu Evans LLP, on behalf of National Grid, to undertake historic building recording at the site of the former gasworks in Partington, Greater Manchester. This is prior to the demolition and removal of two former gasholders and a series of bullet tanks for the purposes of redevelopment.

1.1.2 The work forms part of a wider national project agreed between Historic England and National Grid to record gasholders (and gasworks) prior to their loss even when these are not listed or of only local interest. A brief for the work was produced by Montagu Evans, which specified that a basic Level 2 survey on this site should be undertaken.

1.1.3 OA has previously produced the report for Phase 1 of the recording of the structures at Partington in September 2018. This focused on historical research, and the recording of the exterior of the gasholder tanks and bullet tanks, their structure and their condition, prior to demolition. The findings of Phase 1 are incorporated into this report for context.

1.2 Aims and Objectives

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

1.3 Methodology

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

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

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

1.3.4 The ***photographic record*** is intended to act as a general record of the building prior to demolition and includes photographs of the exterior and interior where possible, and architectural detail and fixtures. Digital photographs, in jpeg format, were taken using a camera with up to 24-megapixel capability.

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

1.3.6 The ***written record*** consists of field notes and annotations that complement the photographic and drawn records and add further analytical and descriptive detail. The written record also incorporates research carried out using archive material from the National Archives, the National Gas Archive at Partington and other secondary sources.

1.3.7 The initial recording at Partington was undertaken on 11 July 2018 while the Phase 2 recording (during demolition) was undertaken on 23 July 2019 and 13 September 2019.

2 BACKGROUND HISTORY

2.1 The Gasworks on Common Lane, Partington

2.1.1 The National Archives provides the following summary of the Manchester Corporation:

"The first Manchester gas works was built in 1817 by the Manchester Police Commissioners at Water Street (closed in 1837) to supply gas for street lamps and police offices on a commercial basis […] On 24th June 1843 responsibility for the entire Manchester Gas Undertaking was transferred from the Police Commissioners who had been the governing body of the town to the Manchester Corporation. […]

The last gas station to be acquired by the Manchester Corporation was Partington, which opened in May 1929. The site was 175 acres and took over production from the Gaythorn Station which then became a distribution point, connected by mains to Partington, and later offices.

The Gas Department began to hire out meters in 1861, stoves from 1885 and fires from 1911. The Cambridge Street Depot was opened to salvage, convert and repair gas appliances and a showroom was opened in Deansgate in 1895."

2.1.2 In the 1920s, Manchester Corporation's Gas Department acquired a 175-acre green field site in Partington, and plans were drawn for the town's first gas manufacturing plant. A Manchester Corporation map dating to 1921, based on the current OS map, shows the proposed diversion of public footpaths for the purposes of the plant's construction (Figure 4). Partington Gasworks officially opened on May 1929.

2.1.3 The site was built around Cheshire Lines Committee's railway, which was useful for transport of coal to the site before the exploitation of natural gas began in 1966. According to a brochure produced in 1948 for visiting members of the Manchester City Council, 550 tonnes of coal per day was passing through the gasworks. The brochure also mentions plans for further development at the site to meet the increasing demand in the surrounding area.

2.1.4 When it was nationalised in 1949, the Manchester Corporation Gas Undertaking became part of the North West Gas Board. The series of OS maps produced between 1848 and 1952 shows that there were no gas holders on the site during this period.

2.1.5 Gasholder No. 1 was constructed on site between 1952 and 1953 and a plan of the site dating to the early 1950s shows it in its current location (Figure 5). In 1954, there were two gasholders at Partington gasworks; the second, which is now gone, was located to the south of Gasholder No. 1. The compressor house, which now holds the National Gas Archives, was built on the west side of Gasholder No. 1 in 1963. An undated photo that was taken after 1953, as the compressor house is present, and before 1967, as the bullet storage tanks are not present, shows Gasholder No. 1 with its lifts extended (Figure 6). In the background of this photo, to the south of Gasholder No. 1, the associated structure associated with the gasworks that once existed to the south of the railway line can be viewed.

2.1.6 The site appears to have remained the same until 1965 when the construction of Gasholder No. 2 began. A further photo that must date to either 1965 or 1966 (as the bullet storage tanks are not present) shows Gasholder No. 1 and Gasholder No.2 in their current location, as well as the now demolished third gasholder to the south (Figure 7).

2.1.7 A plan dating to 1965 shows a proposed third gasholder in the area where the bullet storage tanks are located today (Figure 8, in red). However, by the time a plan of the site was drawn in 1966 (Figure 8), the bullet storage tanks had already been partially installed on the site in its place (Figure 9). A plan dating to 1970 shows all structures as they exist today (Figure 10).

2.1.8 In the 1960s, the Gas Council took the decision to construct an LNG (liquefied natural gas) facility on the 55 acres to the south of the railway. By 1981, the entire site was in use as a gas works but many of the ancillary buildings in their environs had been removed. By 1996, three gasholders that had existed to the south of Gasholder No. 1 and No. 2 had been removed from the southern part of the site. These were replaced with solid tanks. Many of the structures and buildings located in the north of the site were demolished after 1996.

2.1.9 Today, Gasholder No. 1 and No. 2 are now redundant, isolated from the network and purged of gas. They are not statutorily listed, locally listed, or situated within a conservation area.

3 DESCRIPTION OF FORMER GASWORKS

3.1 Introduction

3.1.1 The former gasworks site at Partington is situated on the east side of Manchester Road A6144 and is accessed from Common Lane to its north-east. At the time of survey, the site largely comprised scrubland with a number of red brick buildings and other storage structures associated with the former gasworks situated in its wide open spaces (Plates 1 and 2). An access road ran south-west from Common Lane, and had roads running south-eastwards from it across the site. The two gasholders and the bullet storage tanks were situated towards the south-west edge of the site (Figure 2), on the south-west side of the southern-most access road. They were bounded by a dismantled railway to the south-west, beyond which is former gasworks land and Partington Village. Between the sites of the former bullet tank enclosure and Gasholder No. 1 is a compound with a large 20th century red brick building that was previously a compressor house and regulator station but now houses the National Gas Archives.

3.1.2 There were no designated heritage assets within the Partington Gasworks site but a Grade II listed building, St Mary's church is within 500 metres of its boundaries.

3.1.3 The site is orientated north-east to south-west but for ease of description, it has been re-orientated in this text with the railway line that bounds the south-western extent of the site becoming its southern boundary.

3.2 Gasholder No. 1

General Description

3.2.1 Gasholder No. 1 was an above ground, spirally-guided gasholder with four lifts and capacity of 5,000,000 cubic feet, constructed between 1952 and 1954. It was 32.4 metres in diameter. It was situated in the south-eastern corner of the site in its own fenced-off enclosure at the east end of the southern east to west orientated access road (Plate 3, Figures 2 & 3). The enclosure was accessed through a narrow pedestrian gateway from a gated access lane-way that ran east to west along the north side. The ground surface around the gasholder was rough and uneven with a covering of gravel and scrub vegetation (Plate 4).

3.2.2 The gasholder consisted primarily of two parts; a tank, which contained water, and the vessels, or lifts, which contained the gas. The four interior, interconnected (telescopic), cylindrical vessels would rise and fall within the tank, depending on how much gas was being stored. At the time of the Phase 1 survey, the interior and the top of Gasholder No. 1 could not be viewed but the exterior tank was recorded.

Description of Exterior Structure

3.2.3 The gasholder sat slightly below ground level and was surrounded by a shallow bund containing water, the embankment of which was largely overgrown with vegetation (Plate 5). On the north side of the gasholder, a platform built of red brick with a grill on top and key clamp rail extended into the bund (Plate 6). This featured a pump and

some machinery associated with the gasholder. The remains of a similar structure could be seen on the south side, but this had mainly broken away. On the south-west side of the gasholder was a further concrete platform with key clamp rails that partially extended into the bund (Plate 7).

3.2.4 The tank was constructed of panels of steel plates, the rows of which were staggered one on top of the other. They were riveted along their horizontal seams and further diamond shaped plates were fixed to their vertical seams with up to seventy-four rivets holding them in place (Plate 5).

3.2.5 Access to the top of the gasholder was gained on the north side by means of a steel, open-tread stairway with a steel hand rail. This stairway ascended north to south, and then east to west against the side of the tank to a small platform. There was a panel of steel fencing on the east to west ascent of the stairway with a door that restricted access to the platform and walkway on the top of the gasholder (Plate 6). Where the stair turned, it was supported by a steel-framed structure that rose from the bund. The walkway that encircled the top of the gasholder was supported by triangular steel plates riveted to the tank with further trellis-style brackets between them (Plate 8). The walkway was enclosed by a steel handrail. A further stairway that ascended north-east to south-west on top of the gasholder was supported by a steel-frame, trellis structure (Plate 4).

3.2.6 The site around Gasholder No. 1 was otherwise featureless except for a small red brick platform with concrete coping, covered with a grill and enclosed with an iron handrail inside the southern fence (Plate 9).

Description of Interior Structure

3.2.7 Phase 2 of the survey was carried out during demolition so that the interior of Gasholder No. 1 could be viewed and its tank and vessels could be observed in section. Two openings were made through the sides of the gasholder while it was being desludged, the process by which toxic by-products are removed before the gasholder is demolished to completion. A small opening for access on foot was made on the east side and a larger opening for plant access was cut on the north-east side.

3.2.8 Inside the fixed outer tank, there were a further four close-fitting cylinders, or vessels (Plate 10), although the inner most had been removed in its entirety at the time of survey. It was observed that the interior of the outer tank, like its exterior, featured diamond shaped plates riveted to the vertical seams (Plate 11). The interior vessels were thinner in section than the outer tank but had a similar construction. They comprised panels of steel plates, the rows of which were staggered one on top of the other. They were riveted along their horizontal and vertical seams. They did not feature the diamond shaped plates, having a smoother surface so that the diagonally running rails of the spiral guided mechanism could be riveted to their exterior sides (Plate 12). These would have engaged with the steel multiple roller carriages on the crown and ran in diagonal opposition to those on the vessel next to them.

3.2.9 The vessels were braced on their interior sides with a series of rolled steel columns and the impression of the rails on their exterior sides could be seen (Plate 13). There was a band of steel around the interior of the top of the vessel, on top of which were

the tracks that the multiple roller carriages ran along when engaging with the rails to lift the vessels. Outside of the tracks, on the exterior of the tops of the vessels, were the hand rails. At the time of survey, the third inner most vessel was being removed from the inside of the tank (Plate 14), and where this and the inner most vessel was removed, the series of stepped steel blocks that the bottom of the vessels rested on were viewed (Plate 15). The ground surface of the interior of the gasholder was seen to be a series of steel plates, riveted together (Plate 16).

3.2.10 The site of the Gasholder No. 1 was revisited during the demolition of Gasholder No. 2, and at this time, only the ground surface and the bottom of the outer rim of the tank remained (Plate 17). The shallow, concrete bund around the exterior of the former gasholder has been cleared (Plate 18).

3.3 Gasholder No. 2

General Description

3.3.1 Gasholder No. 2 was an above ground, spirally-guided gasholder with three lifts and capacity of 2,000,000 cubic feet, constructed between 1965 and 1969. It was 24.2 metres in diameter. It was situated in the south-west corner of the site, at the south end of the north to south orientated access road to the immediate west of the enclosure for the bullet storage tanks (Plate 19). The steel-fenced enclosure was accessed from the access road running east to west along the north side, through a wide gateway designed for vehicular access. The gasholder sat in the middle of the site, surrounded by scrub vegetation and gravel (Plate 20). Along the west and south sides of the enclosure was an uneven covering of young deciduous trees (Plate 21). To the immediate east was the enclosure containing the bullet storage tanks.

3.3.2 The gasholder consisted primarily of two parts; a tank, which contained water, and the vessels, or lifts, which contained the gas. The three interior, interconnected (telescopic), cylindrical vessels would rise and fall within the tank, depending on how much gas was being stored. At the time of survey, the interior and the top of Gasholder No. 2 could not be viewed but the exterior tank was recorded.

Description of Exterior Structure

3.3.3 The tank sat in a shallow, concrete lined bund that was largely overgrown with vegetation (Plate 22). On the south-west side of the tank, a concrete platform with a key clamp rail partially extended into the bund. The tank was constructed with rectangular steel plates, joined by rivets that were flush with the sides, the rows of which were staggered one over the other, giving the exterior of the tank a surface smooth in appearance. On the west side of the tank (Plate 23) was an embossed, metal plaque that reads

R &J. DEMPSTER LTD

MANCHESTER

MAKERS 1954

3.3.4 Access to the top of the gasholder was gained on the north-west side by means of a steel, open-tread stairway with a steel hand rail. This stairway ascended roughly east to west, and then north to south to meet the top of the tank. There was a panel of

steel fencing on the north to south ascent of the stairway with a door that restricted access to the walkway on the top of the gasholder (Plate 24).

3.3.5 Around the top of the tank was a walkway with a rail that was supported by diagonal brackets, riveted to the sides, and extending upwards around the outside of the walkway, forming the uprights of the railing. Two series of steel rods between these uprights enclosed the walkway (Plate 25). A small platform that held utilities extended from the walkway on the east side of the tank. Two further stairways rose from the walkway on top of the tank in opposing directions on the north and north-west sides. These were supported by steel-frame, trellis structures.

3.3.6 On the north of the site of Gasholder No. 2 was a rectangular red brick building with a flat roof and door and windows along its north side (Plates 19 & 26).

Description of Interior Structure

3.3.7 Phase 2 of the survey was carried out during demolition so that the interior of Gasholder No. 2 could be viewed and its tanks and lifts could be observed in section. Two openings were made through the sides of the gasholder while it was being desludged, a small opening for access on foot on the north side and a larger opening for plant access on the south-east side.

3.3.8 Inside the fixed outer tank, there were a further three close-fitting cylinders, or vessels, which were made from slightly thinner sheets of steel (Plate 27). Like the outer tank, they are constructed from rows of steel plates, riveted together. The diagonally running rails of the spiral guided mechanism (which would have engaged with the steel multiple roller carriages on the crown) were also observed on the inner vessels (Plates 28 & 29). The rails ran in diagonal opposition to those on the vessel next to it.

3.3.9 The interior of the inner most vessel was seen to be braced with a series of rolled steel columns, the brackets on top of which provide support for the structure of the crown (Plate 30). The impression of the rivets of the diagonally running rails could be seen on the interior of the inner most vessel from inside the gasholder. The ground surface inside the tank is made up of sheets of steel riveted together.

3.3.10 At the time of survey, some metal plates had been removed from the crown but it was still largely intact. It comprised steel trusses radiating from a central cylindrical shaft that rested on a steel, trellis frame tower in the centre of the tank (Plate 31). The trusses comprised rolled steel joist ‘rafters’ extending from the top of the shaft, their outer ends resting on the brackets at the top of the rolled steel columns. Steel straps also ran from the brackets to the centre, where they were bolted to a disc at the bottom of the cylindrical shaft. Between the steel straps and the rafters of the trusses was a web like structure made of transverse struts and braces, fixed in place with bolted gusset plates. The trusses support a series of concentric steel ‘purlins’ that circle the dome with two larger ‘principal’ purlins. From the inner principal purlin, intermediary trusses extend outwards and are fixed to the top of the tank between the brackets of the rolled steel columns.

3.3.11 On the north-east and south-west sides of the interior of the tank are large vertical inlet and outlet pipes, braced with steel straps fixed to the ground (Plate 32)

3.4 Bullet Storage Tanks

3.4.1 Bullet storage tanks were a later form of gas storage than the adjacent gasholders. They were static vessels with no moving parts, and received and stored gas at a much higher pressure than the gasholders. The bullet storage tanks appear on the plans for Partington Gasworks between 1966 and 1967.

3.4.2 The bullet storage tanks were enclosed in an area to the immediate east of the site of Gasholder No. 2 (Plate 33). They were arranged in two rows, six over six, orientated north to south, and were supported on a large concrete and steel frame. Steel, open-tread stairways gave access to walkways along the north and south ends of each row of tanks (Plates 34 & 35). Further curved ladders gave access from the walkways to the top of each tank on the north side (Plate 36).

3.4.3 The frame that the upper tanks rested on comprised two rows of seven concrete uprights supporting east to west running concrete beams (Plates 37 & 38). Both the upper and lower tanks sat in curved steel cradles that supported them and prevented them from rolling.

3.4.4 In the north-west corner of the site was a small red brick building, described as H. P. bullet boiler house in plans dating to 1975 (Plate 39). To the east of this, along the south of the enclosure, were gas pipeworks rising from the ground (Plate 40).

4 CONCLUSION

4.1.1 Partington Gasworks opened in May 1929 and after nationalisation in 1948, Gasholder No. 1 was constructed between 1952 and 1954 and Gasholder No.2 was constructed between 1965 and 1969. There appears to have been plans for a further gasholder to the immediate east of Gasholder No. 2 in 1966, but instead the bullet storage tanks had been installed by 1967, perhaps showing the development in technology of gas storage. As this technology continued to develop, the gasholders had become obsolete as a form of storage by the late 20th century and at the time of the initial survey in 2018, the gasholders at Partington were redundant, isolated from the network, and purged of gas.

4.1.2 Phase 1 of the historic buildings recording at Partington Gasworks focused on historical research, and the recording of the exterior of the gas tanks and bullet storage tanks, their structure and their condition. Phase 2 was carried out during the demolition of Gasholder No. 1 and Gasholder No. 2. During this phase, the interior structures and mechanisms associated with their operation were analysed and recorded for posterity prior to their removal.

4.1.3 The gasholders were above ground, spirally-guided holders, Gasholder No. 1 having four lifts, or vessels, and Gasholder No. 2 having three. The tank of Gasholder No. 1 featured rust around many of its rivets and there was a large spread of rust on the south-west side where it appeared water may have leaked from the top (Plate 4). The platform on the side, which presumably would have held machinery like that on the north side, was mostly broken away and appears to have been in poor condition for some time. Otherwise, Gasholder No. 1 was in moderately good condition. The tank of gasholder No. 2 shows a similar spread of rust on its south-west side but was otherwise in good condition. The interiors of the tanks of both Gasholder No. 1 and Gasholder No. 2 were subject to a lot of rusting but their vessels and the crown of Gasholder No. 2 were otherwise intact.

APPENDIX A BIBLIOGRAPHY

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Document Reference: NWMAC/PAR/E/E/1/3 Partington- Book of Deposited Plans for Site-Sheet 1 (1/3)

APPENDIX B A SUMMARY OF GASWORKS' PLANT AND PROCESSES

INTRODUCTION

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

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

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

DEVELOPMENT OF THE GAS INDUSTRY IN BRITAIN

General history

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

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

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

The Second World War had a major impact on the industry, particularly through bomb damage and loss of workers to the war effort and in an attempt to rebuild the industry after

the war the Labour Government passed the Gas Act of 1948 which nationalised the 1064 local gas undertakings into 12 area gas boards. The boards would subsequently merge in 1972 to form British Gas, which was privatised in 1986.

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

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

ELEMENTS OF A GASWORKS

Introduction

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

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

The retort

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

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

Vertical retorts were attempted throughout the 19th century but became successful by the turn of the 20th century. There were several types, but the basic principle was that tapered continuous vertical retorts, filled by hoppers above the retort, were heated by burning gas

from separate producers. These could carbonise the coal continuously as it descended and the coke was extracted at regular intervals from the bottom of the retort, the residual heat sometimes being used for other purposes. The coke and breeze (the finer ash) which was not needed for reuse on the site was sold as fuel to industrial and domestic customers.

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

Condensers

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

Exhausters

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

Cleaning and purification

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

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

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

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

Metering, storage and distribution

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

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

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

GASHOLDERS

Introduction

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

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

History

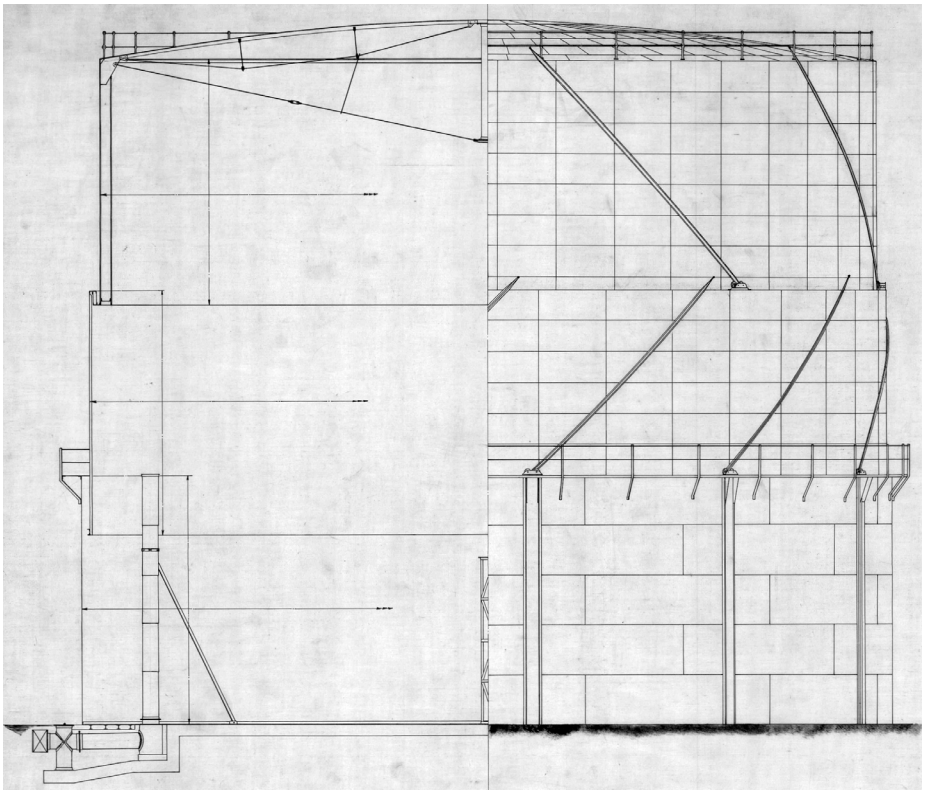
The earliest gasholders were small and built of iron or wood with the moving vessel guided by counter weights on chains. The wooden tanks particularly, sometimes repurposed from the brewing industry, were unreliable and prone to leaking.

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

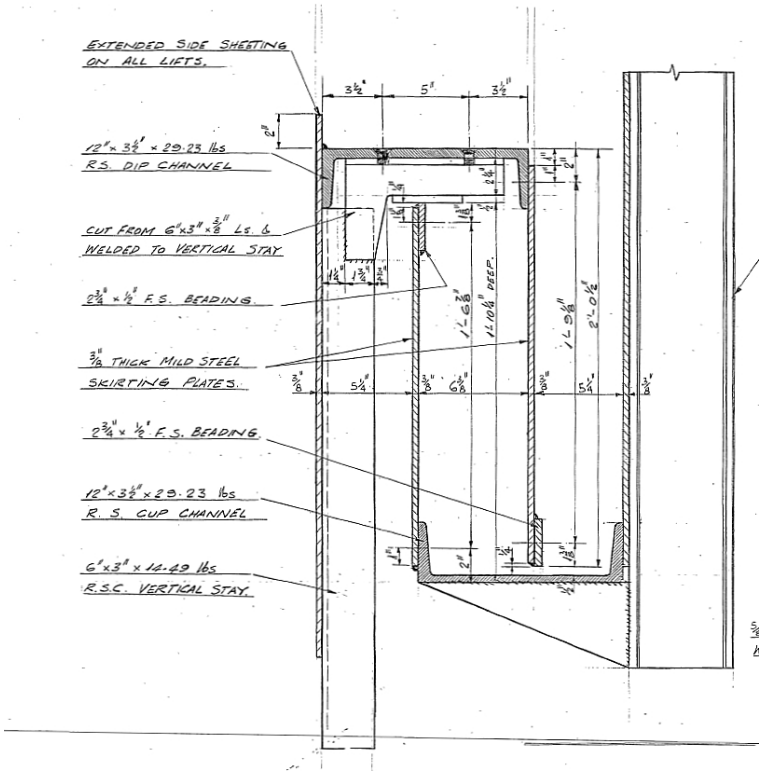
By the time the industry became established, above ground tanks were usually made from steel on a circular concrete slab. The steel floor plate was laid on top of the slab and the steel plates forming the sides of the tank were attached to the floor plate using a steel curb. The sides of the tank were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

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

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



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



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

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

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

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

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

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

The crown

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

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

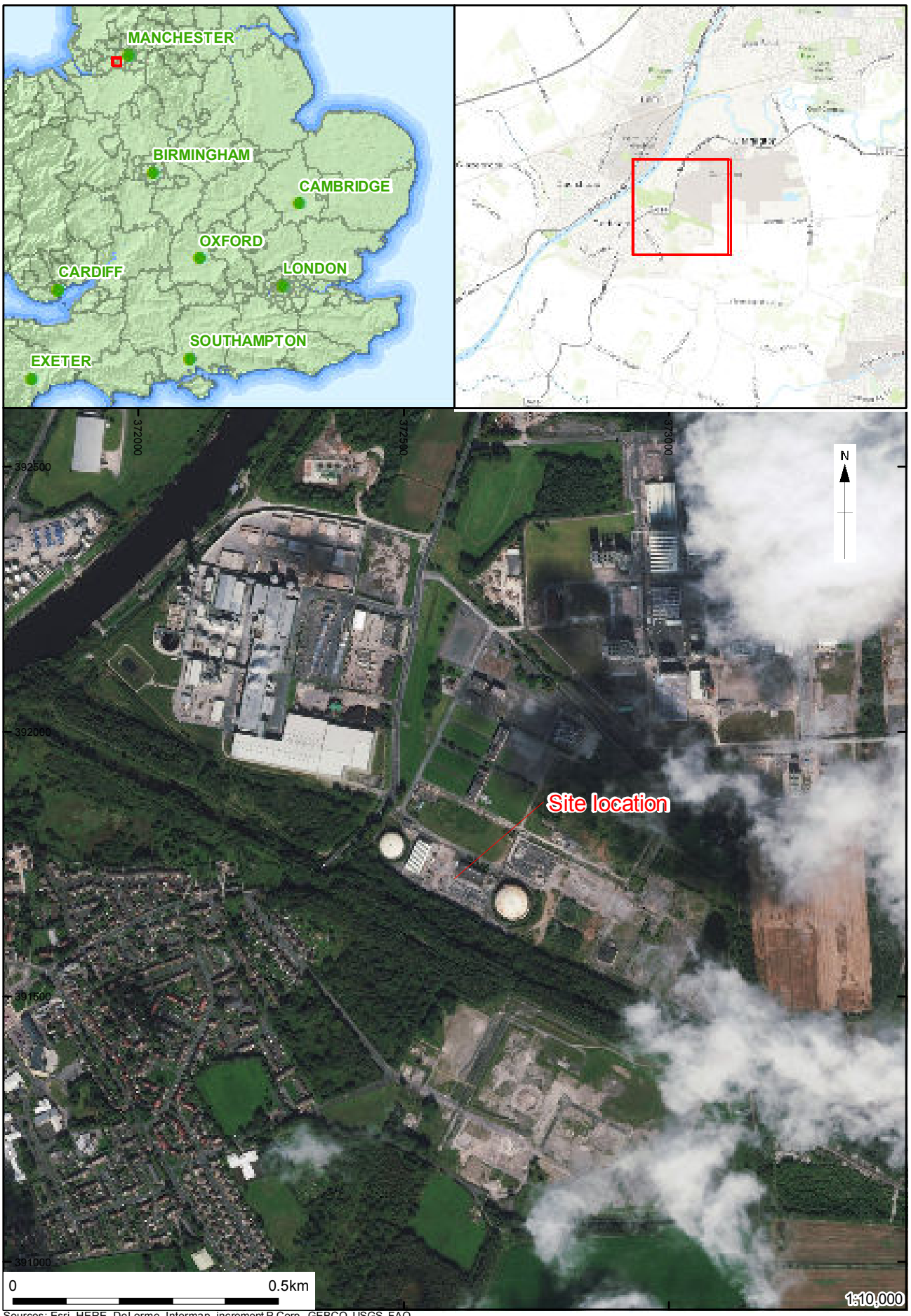
Early holders tended to have a trussed crown with radial structures where the dome was self-supporting, albeit with a fixed prop which could support the centre of the crown when the holder was lowered. These trussed crowns were often technologically sophisticated and in the middle decades of the 19th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

However, in *c*1850 another approach, that of the 'untrussed crown' was introduced (Tucker, 2000) in which the crown was either supported by gas pressure (when the holder was inflated) or by a fixed 'rest frame' when the holder was empty. The frame, of either timber of ironwork would not rise with the crown when the holder inflated, and this type of holder was widely used in the 1860s and 1870s.

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

APPENDIX C OASIS FORM

PROJECT DETAILS		
Project name	Building Recording of gasholders at Common Lane, Partington, Manchester.	
Short description	Oxford Archaeology was commissioned by Montagu Evans LLP on behalf of National Grid to create an historic building record of the surviving structures at the former gasworks at Partington, Manchester, during the dismantling of the two gasholders at the site. This forms part of a national programme of recording these distinctive structures which have formed familiar landmarks in towns and cities throughout much of the 19th and 20th centuries. The archive record that is being produced will allow comparison between different sites. The project has also included research on the history of the site. The two gasholders were both 20th century in date; one constructed between 1952 and 1954, and the other between 1965 and 1969. They were each spiral guided, above ground gasholders.	
Project dates	Initial recording: 11/7/18. Further WB recording: 23/7/19 and 13/9/19	
Project type	Building recording	
Previous work	None	
Future work	Potential for further historic investigation	
Monument type	Non-listed structure	
Significant finds	N/A	
PROJECT LOCATION		
Site location	Gasworks, Common Lane, Partington, Manchester	
Study area	The areas containing the gasholders are approximately c.50m x c.50m	
Site co-ordinates	SJ 72596 91760	
PROJECT CREATORS		
Name of organisation	Oxford Archaeology	
Project brief originator	Montagu Evans	
Project design (WSI) originator		
Project Manager	Jonathan Gill	
Project author	Deirdre Forde	
PROJECT ARCHIVE		
		Content
Physical	Greater Manchester HER and ADS	Site records, report, notes, digital photos
Paper		
Digital		



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

Figure 1: Site location

O:\P_codes\PARGASBS\Figure1_Master.mxd*charles.rousseaux*28/09/2018

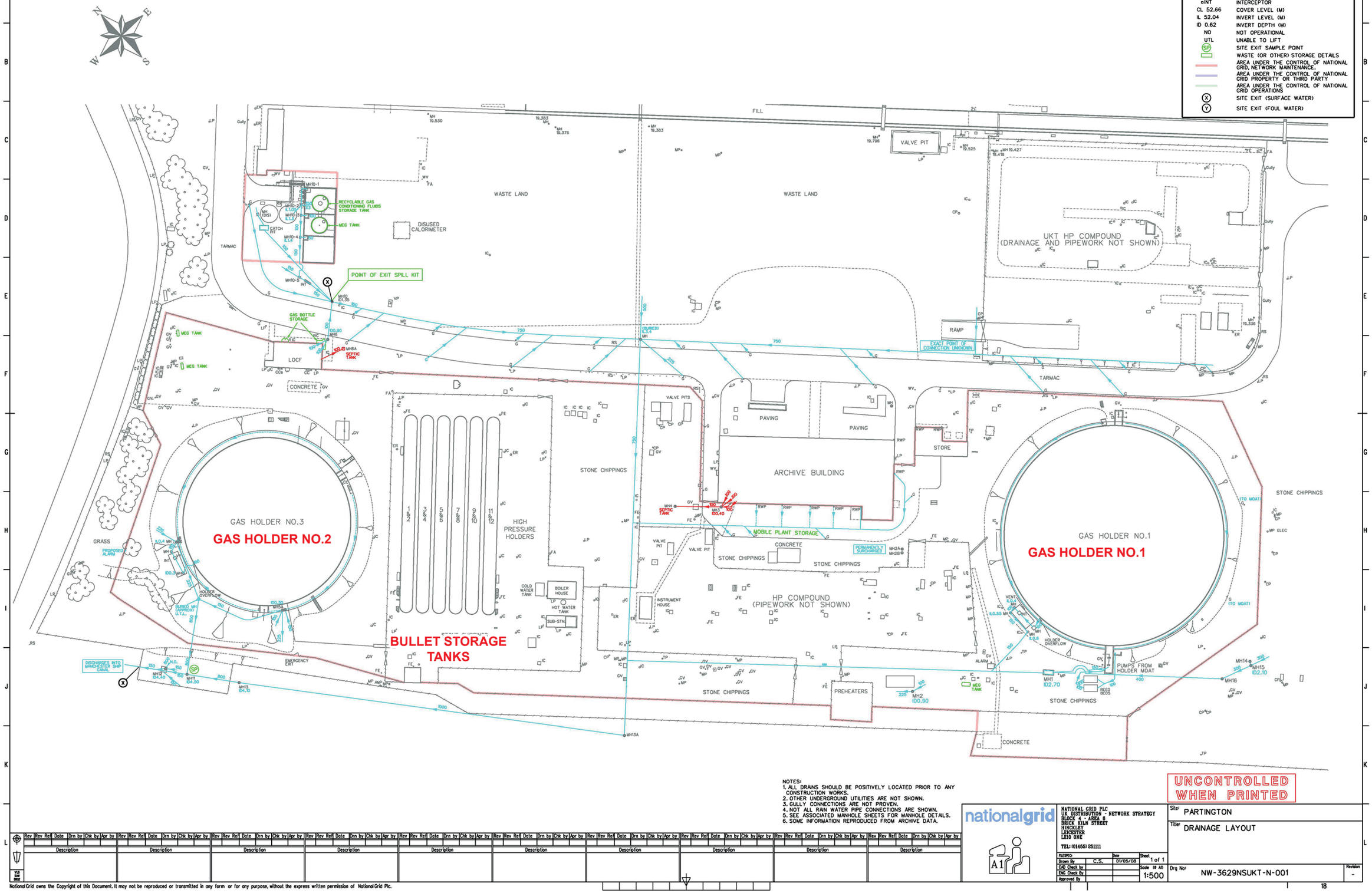
Figure 2: Plan of the site showing property boundaries and areas surveyed in blue

Drg No: 3629NSUKT-N-001 | Site: PARTINGTON | Title: DRAINAGE LAYOUT

DO NOT SCALE. IF IN DOUBT ASK. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

KEY

- 225 — FOUL DRAIN (DIA. IN MM)
- 225 — STORM DRAIN (DIA. IN MM)
- DIRECTION OF FLOW
- MH2 — MANHOLE COVER (WITH REF NO.)
- DRAIN / GULLY COVER
- INT — INTERCEPTOR
- CL 52.66 — COVER LEVEL (M)
- IL 52.04 — INVERT LEVEL (M)
- ID 0.62 — INVERT DEPTH (M)
- NO — NOT OPERATIONAL
- UTL — UNABLE TO LIFT
- SP — SITE EXIT SAMPLE POINT
- WASTE (OR OTHER) STORAGE DETAILS
- AREA UNDER THE CONTROL OF NATIONAL GRID, NETWORK MAINTENANCE.
- AREA UNDER THE CONTROL OF NATIONAL GRID PROPERTY OR THIRD PARTY
- AREA UNDER THE CONTROL OF NATIONAL GRID OPERATIONS
- X — SITE EXIT (SURFACE WATER)
- Y — SITE EXIT (FOUL WATER)



NOTES:
1. ALL DRAINS SHOULD BE POSITIVELY LOCATED PRIOR TO ANY CONSTRUCTION WORKS.
2. OTHER UNDERGROUND UTILITIES ARE NOT SHOWN.
3. GULLY CONNECTIONS ARE NOT PROVEN.
4. NOT ALL RAIN WATER PIPE CONNECTIONS ARE SHOWN.
5. SEE ASSOCIATED MANHOLE SHEETS FOR MANHOLE DETAILS.
6. SOME INFORMATION REPRODUCED FROM ARCHIVE DATA.

UNCONTROLLED WHEN PRINTED

Rev	Rev Ref	Date	Drn by	Chk by	Apr by	Description

nationalgrid

NATIONAL GRID PLC
UK DISTRIBUTION - NETWORK STRATEGY
BLOCK 4 - AREA 6
BRICK KILN STREET
HINCKLEY
LEICESTER
LE10 0NE
TEL: (01455) 251111

		Date	Sheet
FILEPED			
Drawn By	C.S.	01/05/08	1 of 1
CAD Check by			Scale @ A1
ENG Check By			1:500
Approved By			

Site: PARTINGTON
Title: DRAINAGE LAYOUT
Drg No: NW-3629NSUKT-N-001
Revision: -

Figure 3: Plan of the site showing locations of Gasholder No. 1, Gasholder No. 2, and bullet storage tanks

COPY.

IN PARLIAMENT—SESSION 1921.

MANCHESTER CORPORATION (GENERAL POWERS).

GAS WORKS SITE.

Sheet No. 1.

PLAN REFERRED TO IN THE SECTION OF THE MANCHESTER CORPORATION (GENERAL POWERS) ACT 1921 OF WHICH THE MARGINAL NOTE IS "DIVERSION OF FOOTPATHS"

(SIGNED) WM MIDDLEBROOK
Chairman.
27th July 1921.

COUNTY OF CHESTER

RURAL DISTRICT OF BUCKLOW

Site location

TOWNSHIP OF PARTINGTON

TOWNSHIP OF CARRINGTON

COUNTY OF LANCASTER

MANCHESTER SHIP CANAL

PARTINGTON COAL BASIN County Boundary

FERRYMEN'S FERRY

SHIP CANAL SIDINGS

COMMON LANE FARM

LANDFIELD FARM

BRIDGE FARM

ASPHODEL FARM

SITE OF NEW PUBLIC FOOTPATH 9 feet wide

Public Footpath between A and B to be stopped up and diverted along line ACDF

Public Footpath between D and E to be stopped up and diverted along line DF

NEW PUBLIC FOOTPATH 9 feet wide

O.S.M. 72·40

PARTINGTON STATION

NEW FOOTBRIDGE

MANCHESTER SHIP CANAL COMPANY'S RAILWAY

CHESHIRE LINES RAILWAY

Land to be acquired

NOTE,

SITES, OR NEW PUBLIC FOOTPATHS SHOWN BY DOTTED RED LINES.

EXISTING PUBLIC FOOTPATHS TO BE STOPPED UP COLOURED BROWN.

INTENDED NEW FOOTPATH D TO F TO BE ABANDONED.

Scale, 208·33 Feet to an Inch.

FEET 100 50 0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400 FEET

Based upon the Ordnance Survey Map, with the sanction of the Controller of H.M. Stationery Office.

NWMAC/PAR/5/6/1/3

Figure 4: Manchester Corporation map, based on OS maps, dating to 1921 showing public footpath diversions for the proposed gasworks site

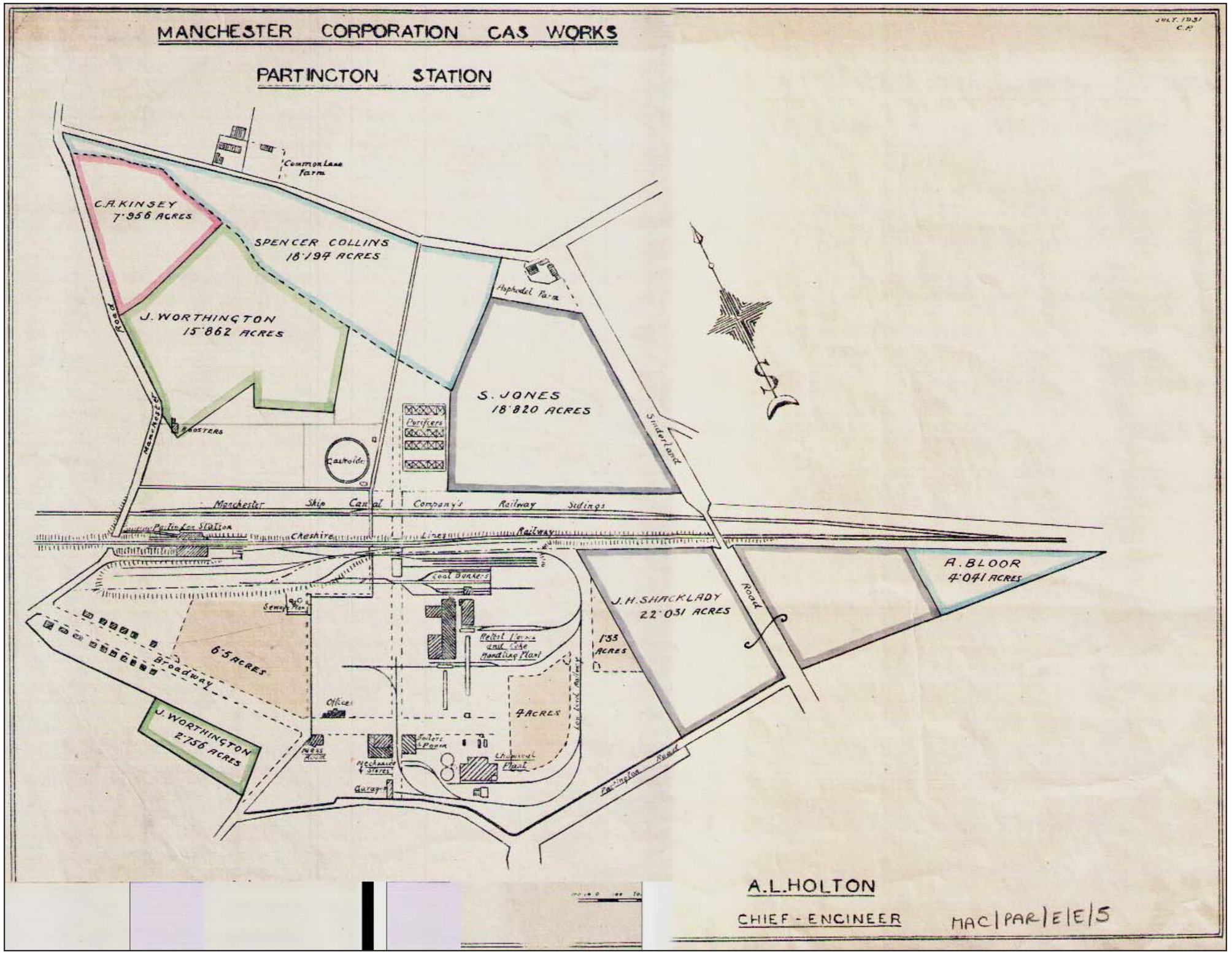


Figure 5: Engineers plan of the site dating to 1931, before the construction of Gasholder No. 1, Gasholder No. 2, and the bullet storage tanks

Figure 6: Undated photo of Gasholder No. 1 at almost full capacity, looking south-east

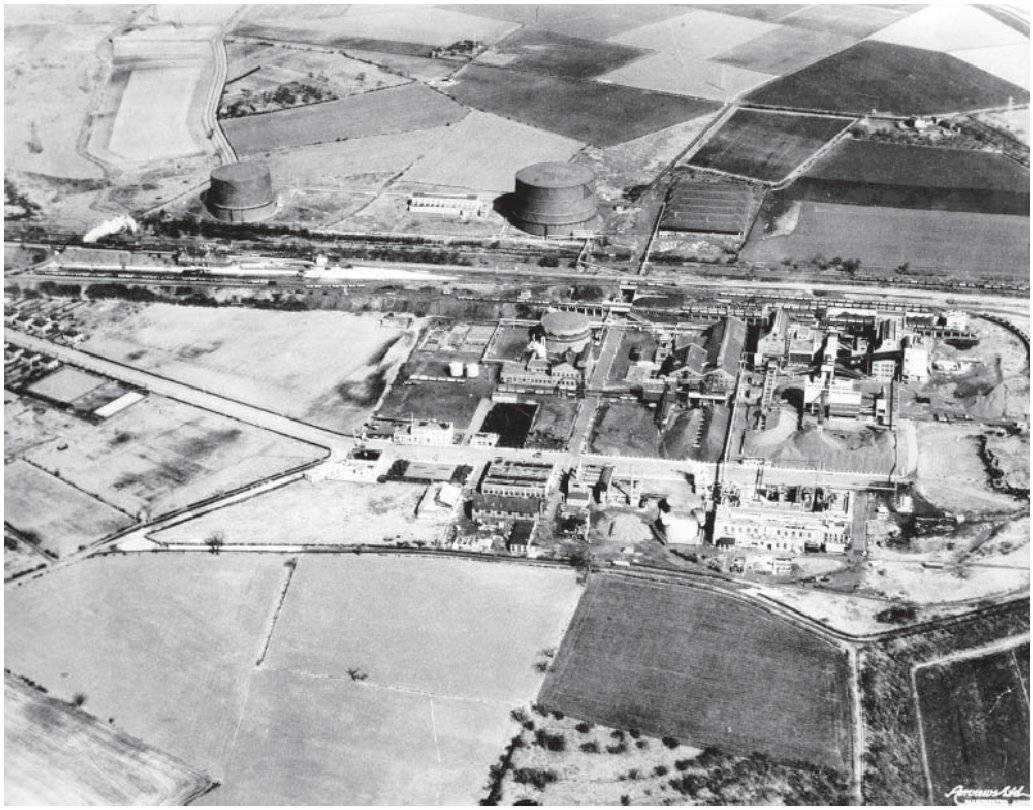


Figure 7: Undated aerial photograph showing Gasholder No.1 on the right and Gasholder No. 2 on the left, looking north

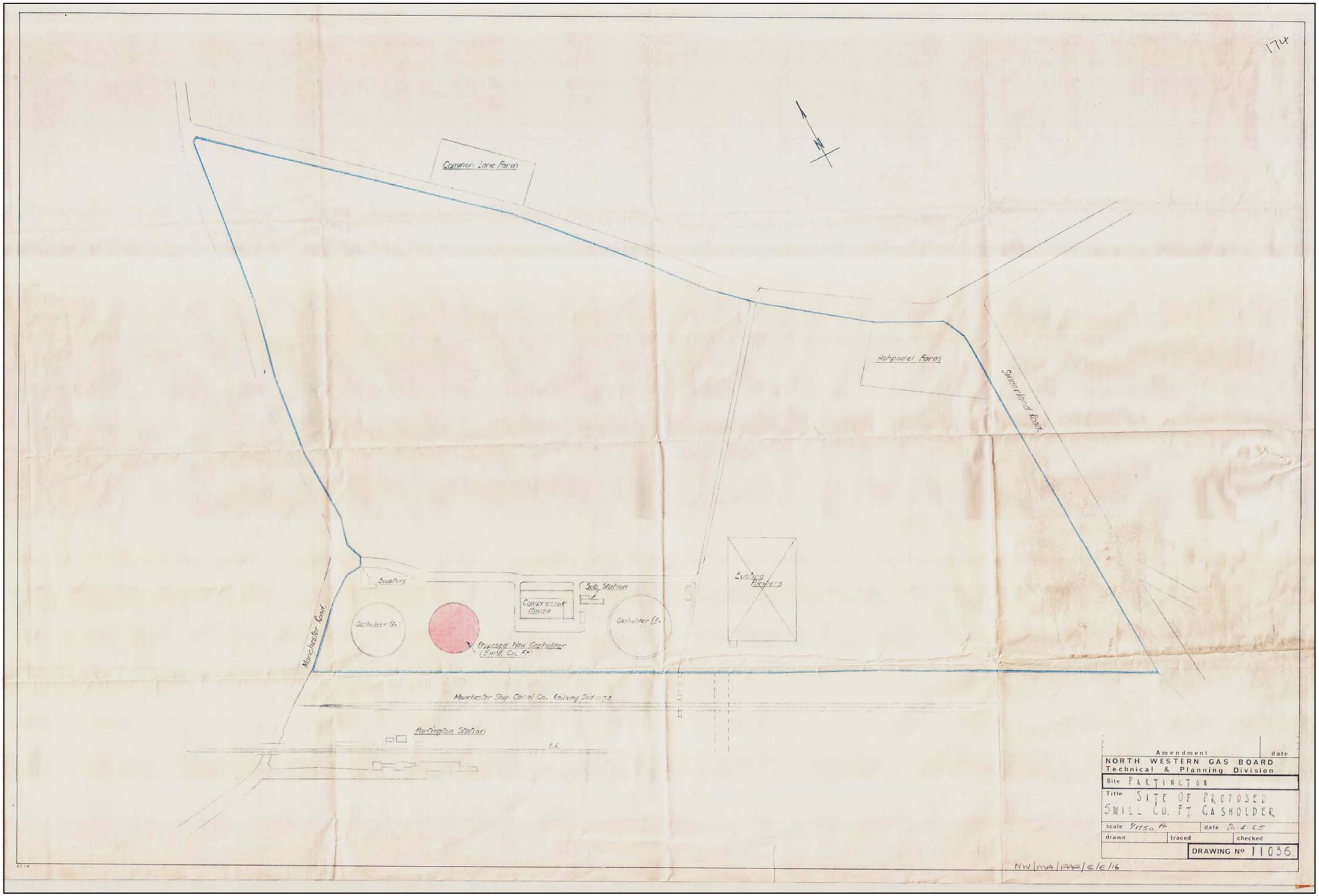


Figure 8: Plan of the site dating to 1966 showing a proposed third gasholder to the immediate east of Gasholder No.2, on the site of the existing bullet storage tanks

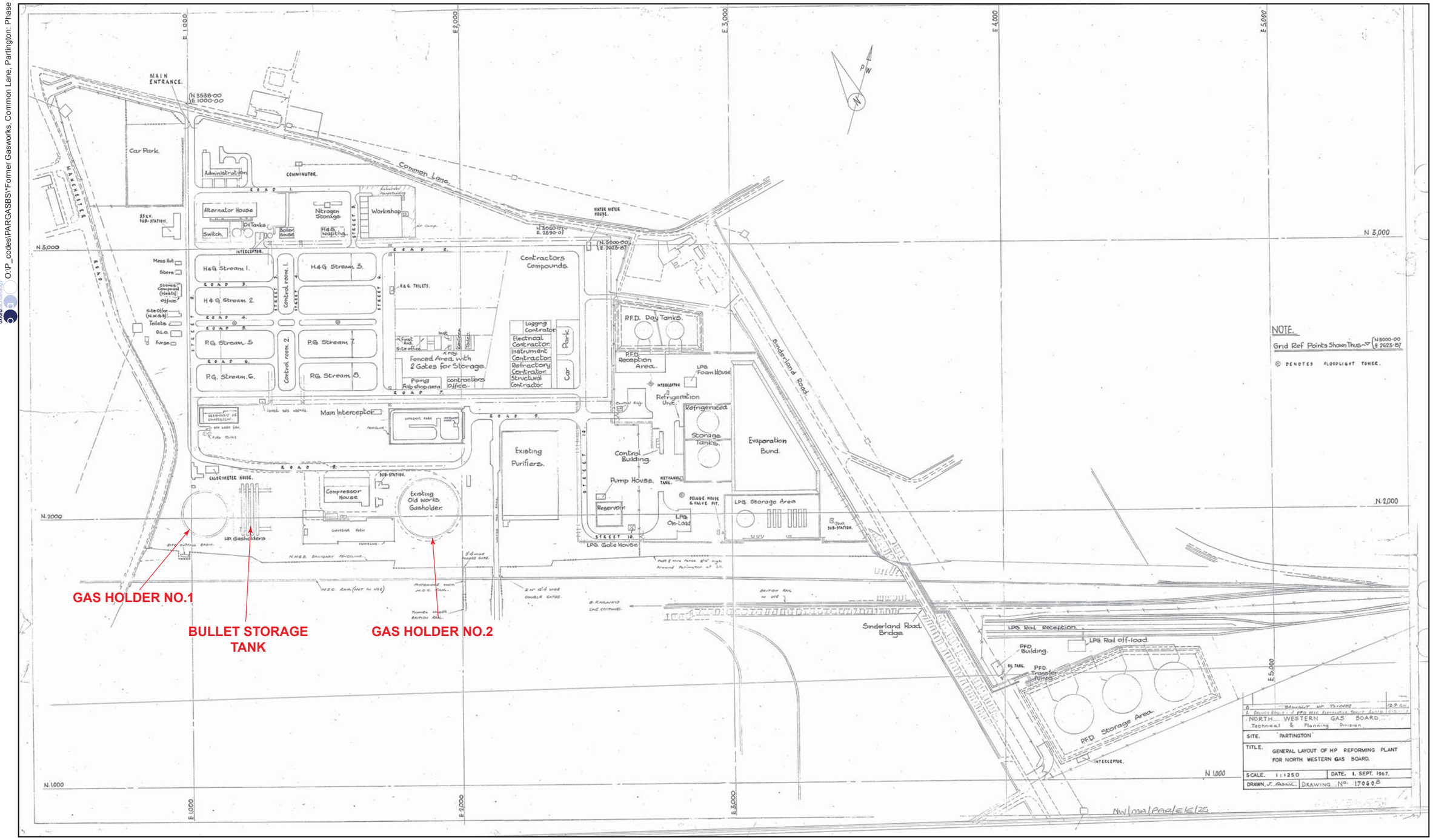


Figure 9: Plan of the site dating to 1967 showing the bullet storage tanks under construction

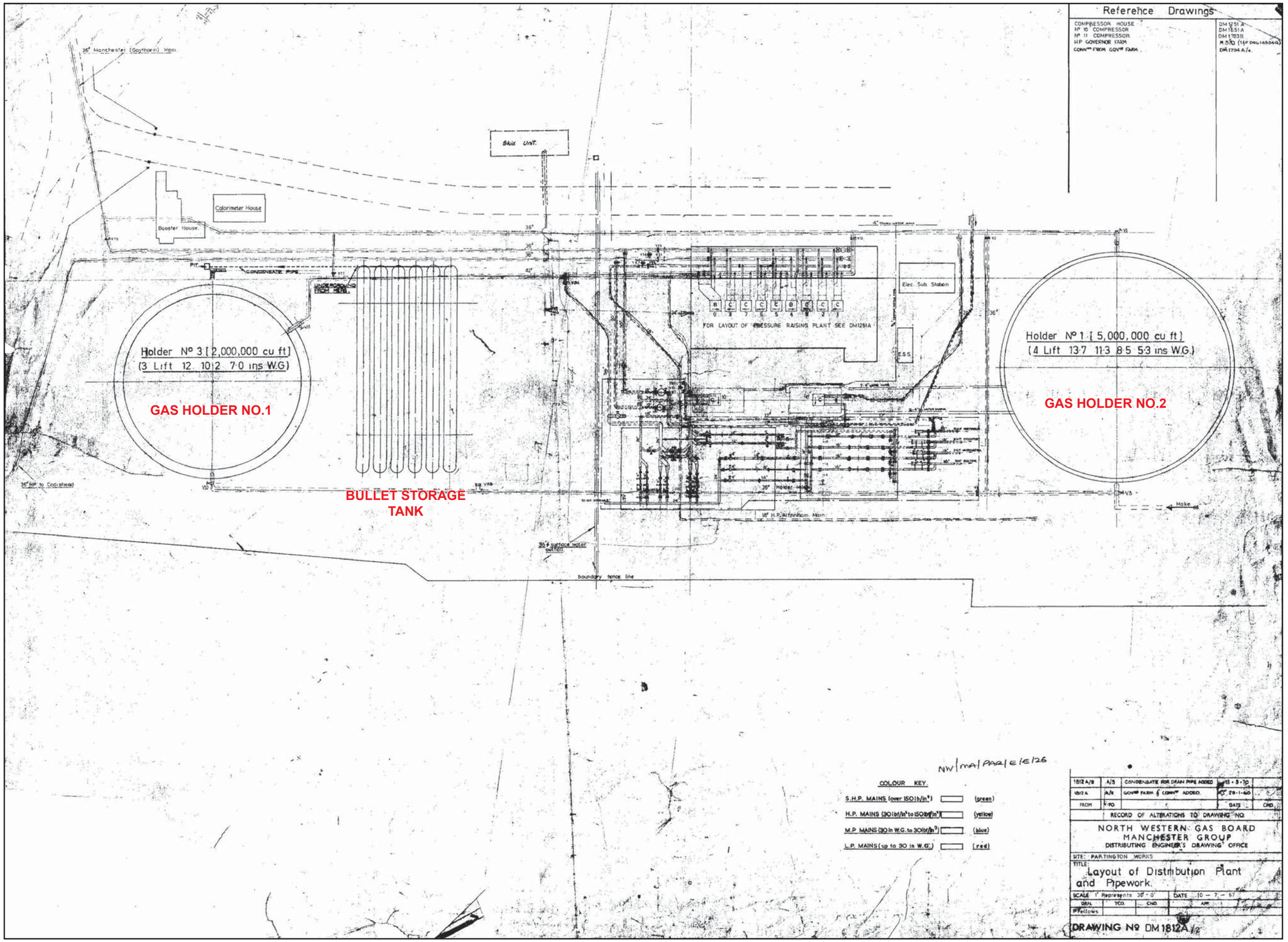


Figure10: Plan dating to 1970 showing Gasholder No. 1, Gasholder No. 2, and the bullet storage tanks as they exist today

Plate 1: Partington Gasworks site, looking north-east

Plate 2: Partington Gasworks site, looking east

Plate 3: Approach to Gasholder No. 1 enclosure, looking south-east

Plate 4: Gasholder No.1, looking north-east

Plate 5: Bund around Gasholder No. 1, looking north-east

Plate 6: Red brick platform and stairway on north side of Gasholder No. 1, looking west

Plate 7: Concrete platform on south-west side of Gasholder No. 1, looking south, east

Plate 8: Walkway around the top of the north-west side of Gasholder No.1 , looking south-west

Plate 9: Red brick platform inside the southern fence of the enclosure of Gasholder No. 1, looking east

Plate 10: Gasholder No. 1 during demolition, looking west

Plate 11: Gasholder No. 1 during demolition, looking north-west

Plate 12: Gasholder No. 1 during demolition, looking west

Plate 13: Gasholder No. 1 during demolition, looking south-west

Plate 14: Gasholder No. 1 during demolition, looking south

Plate 15: Gasholder No. 1 during demolition, looking south-east

Plate 16: Ground surface of Gasholder No. 1 during demolition, looking north

Plate 17: Gasholder No. 1 after demolition, looking south

Plate 18: Gasholder No. 1 after demolition, looking south

Plate 19: Approach to Gasholder No. 2 enclosure, looking south

Plate 20: Gasholder No. 2, looking south-east

Plate 21: Gasholder No. 2, looking east

Plate 22: Bund around Gasholder No. 2, looking north-west

Plate 23: Metal plaque on the west side of Gasholder No. 2, looking east

Plate 24: Stairway on north-west side of gasholder No. 2, looking south-west

Plate 25: Walkway around the east side of Gasholder No. 2, looking north-west

Plate 26: Red brick building on north side of Gasholder No. 2, looking north-west

Plate 27: Gasholder No. 2 during demolition, looking south-west

Plate 28: Gasholder No. 2 during demolition, looking north-east

Plate 29: Gasholder No. 2 during demolition, looking north

Plate 30: Gasholder No. 2 during demolition, looking north-west

Plate 31: Gasholder No. 2 during demolition, looking north-west

Plate 32: Gasholder No. 2 during demolition, looking west

Plate 33: Bullet storage tank enclosure, looking south-west

Plate 34: North end of bullet storage tanks, looking south-west

Plate 35: South end of bullet storage tanks, looking north-east

Plate 36: North end of a bullet storage tank, looking south

Plate 37: Supporting structure of bullet storage tanks, looking south

Plate 38: Supporting structure on west side of bullet storage tanks, looking south

Plate 39: Red brick building in south-west corner of bullet storage tank enclosure, looking south

Plate 40: Pipe fixtures in the south side of the bullet storage tank enclosure, looking south-east

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