

**Former Gasworks, Pride Park, Derby**

**Historic Building Record  
(Historic England Level 2)**

**NGR 437124 335192**



**Project No. 160106  
Report No. 2016052**

**March 2016**



**FORMER GASWORKS, PRIDE PARK,  
DERBY**

**HISTORIC BUILDINGS RECORD  
(HISTORIC ENGLAND LEVEL 2)**

**NGR: 437124 335192**

**Commissioned by  
Montagu Evans  
on behalf of National Grid**

**Project No. 160106  
Report No. 2016052  
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## SUMMARY

*In February 2016 Archaeology South-East (a division of the Centre for Applied Archaeology, UCL) carried out a programme of historic building recording of the gasholder station at Pride Park, Derby, Derbyshire (NGR: 437124 335192). The work was commissioned by Montagu Evans LLP on behalf of National Grid, in advance of the demolition of the structures on the site as part of a scheme to remediate the site ahead of redevelopment.*

*The gasholder compound comprises two large gasholders: No. 6 to the south, and 7 to the north. The gasholders dominate the site, which is primarily paved with hardstanding, with occasional sections of hardstanding. Two ancillary buildings (the antifreeze pump house and boiler house) are situated between the holders to the west. The south end of the site contains a modern gas station, and was not included in the buildings record. Constructed in 1956/7 and 1960/2 the gasholders represent a fairly typical mid-20<sup>th</sup> century water-sealed spiral-guided design, based on a developed design by Gadd & Mason of Manchester (1887).*

*The existing gasholders and plant form the last phase of expansion of an earlier gasworks established by the Derby Gas Light and Coke Company in 1867, originally situated to the west of the current site, the whole being illustrative of the evolution of the gas industry from its origins at the beginning of the 19<sup>th</sup> century, up until the present day.*

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## **1.0 INTRODUCTION**

- 1.1 In February 2016 Archaeology South-East (a division of the Centre for Applied Archaeology, UCL) carried out a programme of historic building recording of the gasholder station at Pride Park, Derby, Derbyshire (NGR: 437124 335192; Figure 1). The work was commissioned by Montagu Evans LLP on behalf of National Grid, in advance of the demolition of the structures on the site as part of a scheme to remediate the site ahead of redevelopment.
- 1.2 The site's redevelopment, including the demolition of the gasholders and the associated non-operational plant, is to be carried out by National Grid under permitted development rights set out in part 17, Class F of the General Permitted Development Order for Statutory Undertakers.
- 1.3 An assessment of the site's significance was conducted in 2014 by Montagu Evans LLP (Montagu Evans LLP 2014), determining that there are no previous or existing planning applications of any relevance to the site, and that the site – comprising two mid-20<sup>th</sup>-century gasholders – is of low heritage value.
- 1.4 The gasholder station is a non-designated site. No designated heritage assets (e.g. scheduled monuments or listed buildings) are located within the site or within 500m of the site, and the land does not lie within a conservation area or archaeological priority area.

## **2.0 SCOPE & METHODOLOGY**

- 2.1 The scope of work and methodology for the building recording is detailed in a brief produced for the work by Montagu Evans LLP, dated November 2014. The work was also carried out in accordance with the relevant ClfA standards and guidance.
- 2.2 The gasholders and associated structures were recorded to Historic England Level 2 as defined in *Understanding Historic Buildings: A guide to good recording practice* (English Heritage 2006a). A Level 2 record is essentially a descriptive record.
- 2.3 The descriptive section of this report uses the gasholder terminology provided in the *London Gasholders Survey* (English Heritage 2000, 7-8). Definitions for the main structural components have been summarised in a separate appendix at the back of this report (see Appendix 1).
- 2.4 The site was visited by Seth Price and Hannah Green on the 16<sup>th</sup> February 2016 in order to carry out the recording work. This entailed the compilation of written notes and the production of a photographic record.
- 2.5 A digital photographic record was made during the site visit. Selected photographs include a 0.4m scale, to provide appropriate reference to detailed shots. Within the report selected digital images have been reproduced as plates, together with a full index of the digital photography and location plots (Figure 12). A full catalogue of all photographs is included in the archive.
- 2.7 In drawing up this report, a variety of cartographic and documentary sources were consulted. Relevant sources were obtained/sought from the National Gas Archive (NGA, Warrington), Historic England Archive (Swindon), the National Archives (NA,

Kew) and the Derbyshire Record Office, Matlock. Additional sources held within the Archaeology South-East library were utilised, and appropriate on-line databases interrogated. A search was made of the aerial photographs held by the Historic England Archive, as well as the Britain from Above website (2015) and Google Earth website. Material from other sources has been referenced separately within the text where necessary. A full list of the cartographic sources used during this assessment can be seen at the end of this report (Section 7.0); where possible, the pictorial sources referred to within the text are reproduced as figures.

### **3.0 SITE LOCATION**

- 3.1 The site occupies an area of land measuring c. 1.6ha. The site is located to the south-east of Derby city centre, just south-west of the Pride Park (iPro) Stadium (Figure 1). The site is bound to the east and south by Royal Way, and west and north by parking associated with Pride Park Stadium (Figure 2). Pride Parkway runs north-west – south-east a short distance to the west of the site. East of the site is the Derby Arena, completed in 2014, and opened in January 2015. The surrounding area comprises a late-20<sup>th</sup> and early-21<sup>st</sup> century commercial landscape. The former gasworks, and Derby Canal branch which formerly serviced it, was formerly situated west of the site though is no longer visible in the landscape. Site boundaries are defined by metal palisade fencing. The site is accessed to its south-west via an access road off Pride Parkway, with internal circulation being defined by a strip of road running north – south, and remnant paved footpaths encircling the gasholders.
- 3.2 The gasholder compound comprises two large gasholders: No. 6 to the south, and No. 7 to the north. Two ancillary buildings (the antifreeze pump house and boiler house) are situated between the holders to the west. The south end of the site contains a modern gas station, and was not included in the building record.
- 3.3 Both gasholders have been isolated from the main grid, via cuts in the connecting pipework, and have been purged of gas. Associated piping and plant (defunct siphon pits and volumetric governors, and piping) run southwards from both holders.
- 3.4 The interiors of the two ancillary buildings were not accessible at the time of the site visit.

### **4.0 HISTORIC BACKGROUND**

- 4.1 The use of gas for street lighting originated during the late 18<sup>th</sup> century in London and was established by Frederic Windsor. By 1823 London had three gasworks, supporting 40,000 street lamps in 213 streets, demonstrating gas as a viable industry and an effective form of lighting. By 1830 gas street lighting had spread with the erection of 200 gas companies operating throughout England.
- 4.2 In response to public demand, the Derby Gas Light and Coke Company (DGLCC) was formed by Act of Parliament on 22<sup>nd</sup> June 1820. The original company gasworks were situated at Cavendish Street. Following the extension of the work's supply area by the Derby Gas Act 1852, and its associated increase in demand, a scheme of new works at the Litchurch site, with access to the London Midlands and Scottish (LMS) railway was instigated. Later, following an agreement with the LMS (which wanted to lay new track along a line coinciding with the Litchurch works) under the Midland Railway (Derby Gas) Act 1867, an exchange of land was agreed, allowing for the



construction of a new and larger gasworks. The new works were opened in 1867 on the west side of the Derby canal, occupying some 10 acres of land. This earlier part of the site was later known as the 'A' works and is depicted on the 1883-4 and 1914 Ordnance Survey maps (Figures 3 & 4). In 1915, following a dramatic increase in demand for gas during the Great War, the 'B' works were constructed opposite the 'A' works on the east bank of the canal. The two works were connected by a high-level road and two foot-bridges. A series of aerial photos from 1926, 1935, and 1946 (Figures 5 – 7) and the Ordnance Survey map of 1950 (Figure 8) show the new 'B' works in relation to the older 'A' works. The photos also show the gradual obsolescence and silting of the former canal. By 1932 Derby was receiving the majority of its gas from Blackwell and Clay Cross, with the Litchurch works providing peak loads only.

- 4.3 The diminishing works were reinvigorated during the Second World War to meet increased demand and, following nationalisation under the 1948 Gas Act, the works were extended east. Under nationalisation the DGLCC became a part of the Derby sub-division of the Nottingham and Derby division of the East Midlands Gas Board (EMGB). The two subject spiral-guided gasholders formed a part of the new extension to the works. Gasholder 6 was constructed in 1956/7 by Clayton, Son & Co. Ltd. (Leeds) and Gasholder 7 was constructed in 1960/2 by Oxley Engineering Co Ltd. (Leeds). The extension of the works is reflected on the 1968 Ordnance Survey map (Figure 9).
- 4.4 The Ordnance Survey mapping demonstrates that by 1973 (Figure 10) the wider gasworks were no longer in use, and all but the two subject gasholders had been decommissioned, though many of the ancillary structures are shown to survive.
- 4.5 Between 1987 (Figure 11) and 1992 however, the former DGLCC and EMGB gasworks were demolished, leaving only the two subject spiral guided gasholders. The 1992 mapping (not reproduced – available at <http://digimap.edina.ac.uk/>) shows the surrounding area as being undeveloped, with some areas being in use as a depot. By 1999 the surrounding area was largely under development, with aerial photography (not reproduced) showing Pride Parkway and the roundabout south of the site under construction. Development has continued into the 21<sup>st</sup> century.

## **5.0 DESCRIPTION OF THE STRUCTURES**

### *The General Design*

- 5.0.1 Gasholder 6 is situated to the south of the site, with Gasholder 7 to its north. Both are linked at tank level by a footbridge. The gasholders represent relatively typical examples of water-sealed gasholders. Gasholder 6 was constructed in 1956/7, while Gasholder 7 was constructed in 1960/2. Both holders were built to a developed design first patented in 1887 by Gadd & Mason of Manchester (English Heritage 2000, 41; Appendix 2). The spiral-guided design features a series of rails arranged in a helical pattern set at 45 degrees around the entire circumference of the bell. This design produces a self-supporting structure eliminating the need for an external guide frame and results in a significant reduction in construction materials required. The economic design and easily maintainable construction increased its popularity, such that by the 1930s the design was commonly used for the construction of new gasholders (English Heritage 2000, 42). Gasholder 6 is constructed of eight tiers of riveted steel sheets, while Gasholder 7 is constructed of eight tiers of welded sheets – welding is generally seen on later gasholders, and is a more efficient means of

sealing the tank. The significantly higher tensile strength of steel, in comparison to iron, led to the construction of above-ground tanks as opposed to the earlier in-ground design that utilised the surrounding ground to oppose the outward compressive force generated by the structure (English Heritage 2000, 59).

### *Operation*

- 5.0.2 During operation, each gasholder was filled overnight using a volumetric governor and its stock utilised during the day to meet peak periods of demand. When a gasholder was filled, the inner lift rose vertically and automatically engaged the annulus ring of the second lift. This process is known as 'cupping'. As the gasholder contents further increased, the second lift engaged the third lift, and the process repeated until the gasholder was full. When gas was extracted, the process worked in reverse with the outermost lift descending until it automatically disengaged or 'uncupped' from the next inner lift (National Grid 1999, 7-8).

## **5.1 Gasholder 6**

### *The Principal Elements*

- 5.1.1 Gasholder 6 (Plate 1) is of a four lift spiral-guided design with an above-ground steel tank (12.80m in height from base to tank platform). The holder has a diameter of 70.10m and a maximum extended height of 56.03m. The maximum working capacity of Gasholder 6 is 6,000,000s.c.f. (standard cubic feet) with lift pressures of 6.5ins.w.g. (inch of water gauge), 9.0ins.w.g, 11.5ins.w.g., and 14.0ins.w.g. in turn. The tank has capacity for c.11,120,000 gallons of water. Its bell has a convex crown constructed of 14 rings of riveted steel plates (Plate 2). The first three rings were of horizontally lain sheets strengthened with additional riveting, with the inner 11 rings being formed of vertically orientated sheets. The interior of the holder can be accessed via circular hatches in the crown (Plate 3) and two access hatches on the south-west and north-east sides of the tank (Plate 4).
- 5.1.2 The top of the lift walls (lift grips) measure 320mm in width. Each lift is separated by a water sealed channel (lute). The outermost lute measures 460mm in width, while the inner lutes measure 170mm (Plate 5). The interior of the holder, and the outer face of each lift are oil filmed to prevent corrosion and facilitate smooth function. An internally fitted filming pipe would have introduced filming oil to the interior of the tank.
- 5.1.3 The gasholder is fitted with Craig & Derricott Ltd I-grab Grabwire emergency switches (Plate 6), monitoring equipment to provide warning for low water levels, and pressure monitoring alarm systems. Hose cables for filling under-filled lutes (with water and anti-freeze), are also present. Cables and hoses associated with the aforementioned systems are guided by four sets of cable guide channel-bar masts as the holder extends (Plate 7) – ensuring cables are not over-strained, caught, or tangled. The pressure monitoring alarm systems are part of a graduated pressure warning and venting system to prevent over pressurisation of the tank. Hoses run up the side of the tank from the ring main in four locations. Associated plant at ground level includes a switch box to vent or process gas from or to the gasholder and presumed apparatus/plant within the antifreeze pump house and boiler house.
- 5.1.4 A series of guide carriages of paired-wheel type are located at regular intervals around the perimeter of each lift excepting the first (Plate 8): 28 on the second lift, 28 on the third lift, 42 on the fourth lift, and 56 on the tank platform. The guide carriages

serving the inner and middle lifts are mounted to the top of the corresponding lift wall (lift grip). The guide carriages serving the outer lift are fixed to the inner edge of the tank platform, set over the width of the outer channel atop steel stanchions. All guide carriages are secured with a bolted footplate. The guide carriages are of a uniform size (990mm x 270mm) excepting the outermost guides which are more substantial and measure 760mm x 360mm. The differing size and construction of the outer guide carriages is due to their function in supporting the greatest weight.

- 5.1.5 Each guide carriage houses its respective guide rail which is inclined at 45°, and gripped between the paired carriage wheels (see Appendix 2). The first spiral-guided designs originally housed the guide rails internally but they were later housed externally for ease of maintenance, giving significant operational advantages over column-guided holders (English Heritage 2000, 42). The lifts alternate in their operational rotation, starting in an anti-clockwise direction from the inner lift outwards.
- 5.1.6 The outer edge of each lift and the tank platform are served by handrails, comprising typical angle-iron uprights and tubular rails. The tank platform walkway is formed of flat steel sheets supported by triangular steel brackets bolted to the side of the tank (Plates 9 and 10). A continuous steel rim accommodates the angle-iron uprights to the handrail protecting the platform above while providing additional structural support.
- 5.1.7 Each lift is served by a narrow steel staircase (Plate 11). The staircases feature slotted grooves along their inner edges, which accommodate the guide rails of the upper lifts as they rise. The direction and form of the stairs curves to match the form and rotation of the gasholder. At the base of each stair is a passing platform, serving as a small landing of sorts, measuring 300mm in width. The stairs are formed of textured steel treads with open risers between flat-iron strings supported by I-girder stanchions braced by flat and angle-iron diagonal and horizontal members.
- 5.1.8 The tank is constructed atop a concrete base which projects by 160mm from the base of the tank (Plate 12). The tank is constructed of eight tiers of riveted steel sheets measuring 7.38m in length, by 1.50m in height. At the intersection of the sheets are riveted buffers (Plate 13), which decrease in width from the base of the holder upwards (being 0.50m in width at the base, 0.36 on the second tier, etc.). The decreasing width of the buffer sheets creates an increased vertical perspective when standing adjacent to the tank base, as well as serving a more practical role in providing sufficient support-to-weight in key areas (with greater support being required towards the base of the tank). The tank is coated in a water-borne acrylic paint covering to minimise corrosion.
- 5.1.9 A staircase located on the south-west edge of the gasholder provides access to the tank platform from ground level (Plate 14). The staircase comprises a two flight dog-leg form, with the intervening landing being supported by a box-lattice stanchion formed of angle-iron uprights and flat-iron cross-bracing atop a concrete base (measuring 2.03m x 1.23m). The upper landing is supported by two brackets formed of angle-iron steels attached to the tank and its platform. The stair is formed of square-mesh steel treads with open risers between channel-bar strings (Plate 15). A downspout to accommodate overflow is situated on the west elevation of the holder descending from beneath the tank platform (Plate 16).
- 5.1.10 Associated pipework, in the form of a siphon pit and volumetric governor lie immediately to the north-west of the holder (Plates 17 and 18). The pipework has been isolated from the main grid by the removal of interconnecting pipework. The

pipework was produced by Donkin (part of AVK UK), with valves, appearing to predate the Donkin pipework (possibly having been reused), constructed by Westwood & Wrights Ltd. Westwood & Wrights Ltd (founded 1830, Brierley Hill, Dudley, Staffordshire) are listed in the 1937 British Industries Fair advert as Gas and Constructional Engineers' Contractors, and in 1961 as general constructional engineers, manufacturing gas plants.

## **5.2 Gasholder 7**

### *The Principal Elements*

- 5.2.1 Gasholder 7 (Plate 19) is of a five lift spiral-guided design, also with an above-ground steel tank (11.27m in height from base to tank platform). It has a diameter of 67.97m and a maximum extended height of 54.66m. The maximum working capacity of the gasholder is 6,000,000s.c.f. (standard cubic feet) with lift pressures of 7.8ins.w.g. (inch of water gauge), 10.0ins.w.g, 12.1ins.w.g., 14.2ins.w.g. and 16.3ins.w.g. in turn. The tank has capacity for c.9,025,000 gallons of water. The bell is of five lifts with a convex crown constructed of 14 rings of welded steel plates (Plate 20). The first four rings were of horizontally lain sheets strengthened with additional riveting, with the inner 10 rings being formed of vertically orientated sheets. The top of the first lift is set above the at-rest level of the outer lifts to form a raised rim/walkway around the edge of the crown (Plate 21). The interior of the holder can be accessed via circular hatches in the crown and two access hatches on the south-west and north-east sides of the tank (Plates 22 and 23).
- 5.2.2 The walls of the lifts measured 330mm in width. Each lift is separated by a lute. The outermost lute measures 460mm in width, while the inner lutes measure 110mm (Plate 24). The interior of the holder, and the outer face of each lift are oil filmed to prevent corrosion and facilitate smooth function. An internally fitted filming pipe would have introduced filming oil to the interior of the tank.
- 5.2.3 As with Gasholder 6, the gasholder is fitted with Craig & Derricott Ltd I-grab Grabwire emergency switches (Plate 25), monitoring equipment to provide warning for low water levels, and pressure monitoring alarm systems. Hose cables for filling under-filled lutes (with water and anti-freeze), are also present. Cables and hoses associated with the aforementioned systems are guided by five sets of cable guide I-section masts as the holder extends (Plate 26). Hoses run up the side of the tank from the ring main at regular intervals, corresponding with the location masts above. Associated plant at ground level includes a switch box to vent or process gas from or to the gasholder and presumed apparatus/plant within the antifreeze pump house and boiler house.
- 5.2.4 A series of guide carriages of Oxley Spring Loaded paired-wheel type are located at regular intervals around the perimeter of each lift excepting the first (Plate 27): 24 on the second lift, 24 on the third lift, 36 on the fourth lift, 48 on the fifth lift, and 60 on the tank platform. The guide carriages serving the inner and middle lifts are mounted to the top of the corresponding lift wall (lift grip). The guide carriages serving the outer lift are fixed to the inner edge of the tank platform, set over the width of the outer channel atop steel stanchions. All guide carriages are secured with a bolted and welded footplate. The guide carriages are of a uniform size (850mm x 240mm) excepting the outermost guides which are more substantial and measure 970mm x 380mm. The differing size and construction of the outer guide carriages is due to their function in supporting the greatest weight.

- 5.2.5 Each guide carriage houses its respective guide rail which is inclined at 45°, and gripped between the paired carriage wheels (see Appendix 2). The guide rails within outer lift guide carriages are capped with moulded stops to prevent over extension of the lift, likewise the inner guide rails are set against angled steel backplates. The lifts alternate in their operational rotation, starting in an anti-clockwise direction from the inner lift outwards.
- 5.2.6 The outer edge of each lift and the tank platform are served by handrails, comprising typical angle-iron uprights and three tiers of tubular rails. The outermost uprights descend at a c.45° angle below the tank platform, serving as brackets to support the walkway above (Plate 28). The tank platform walkway is formed of flat steel sheets riveted to the tank. A continuous steel rim attaches the walkway to the angle-iron uprights/brackets while providing additional structural support. In places on the north-east side of the gasholder the lifts feature rows of heavy metal slats set vertically and bolted to the handrails (Plate 29). The slats provide a counterbalance to the weight of the lift stairs on the opposing side of the holder.
- 5.2.7 Each lift is served by a narrow steel staircase (Plate 30). The direction and form of the stairs curves to match the form and rotation of the gasholder. At the base of each stair is a passing platform measuring 3.34m x 0.3m. The stairs are formed of steel treads (with textured surfaces for traction) with open risers between flat-iron strings supported by composite angle-iron stanchions braced by similar composite angle-iron diagonal and horizontal members (Plate 31). Bolt plates are used to fasten the individual members together.
- 5.2.8 The tank is constructed atop a concrete base which projects by 220mm from the base of the tank (Plate 32). The tank is constructed of eight tiers of riveted steel sheets measuring 6.00m in length, by 1.40m in height. At regular 3.00m intervals are steel stanchions, running from ground level to tank platform (Plate 33). The stanchions, which measure 610mm in width, with a depth of 200mm, are formed of two opposing angle-iron steel elements with tapered bases tied together by welded-on flat steel sheets. The stanchions are in turn welded to the tank by flat steel brackets. The steel elements used to construct the stanchions were produced by Dorman Long & Co. Ltd. (Middlesbrough). The tank is coated in a water-borne acrylic paint covering to minimise corrosion.
- 5.2.9 A staircase located on the south-west edge of the gasholder provides access to the tank platform from ground level (Plate 34). The staircase comprises a three flight dog-leg form, with the intervening landings being supported by channel-bar brackets extended from the tank side. The stair is formed of steel treads (with textured surfaces for traction) with open risers between channel-bar strings. The handrails to the stair differ from those on the tank platform, comprising tubular uprights and rails with ball joints. A bridge spans the gap between Gasholder 6 and 7, having been constructed at the time of the construction of gasholder 7 (Plate 35). The bridge is formed of two I-girder steels supported at either end by triangular brackets (of the type seen on Gasholder 6), overlain with steel sheets, and protected by a continuation of the handrail from Gasholder 6. Steps (of the same construction as those up to Gasholder 6) lead up to the tank platform of Gasholder 7 at the south end of the bridge.
- 5.2.10 Associated pipework, in the form of a siphon pit and volumetric governor lie immediately to the south of the holder (Plate 36). The pipework has been isolated from the main grid by the removal of interconnecting pipework. The pipework was

produced by Donkin (part of AVK UK), with valves constructed by Westwood & Wrights Ltd.

### **5.3 Associated Buildings**

- 5.3.1 Located between the two gasholders, to their west side, are two ancillary buildings: the antifreeze pump house (Plate 37) and the boiler house (Plate 38). The interiors of the buildings were not accessible at the time of the site visit.
- 5.2.2 The antifreeze pump house, situated immediately adjacent to Gasholder 6, is a single-storey flat parapet roofed building constructed in Flemish-bonded brickwork. The building is orientated north-west – south-east (principal elevation to the north-west) and is accessed through a doorway to its south-west. The doorway is set with a simple timber-board door, with a soldier-course lintel and concrete doorstep. The principal elevation is set with two original four-pane metal-framed wire-reinforced windows with soldier coursed lintels and sloped tile sills. A blocked window of presumed similar construction is set in the north-east wall. Ventilation bricks in the principal and north-east walls frame the windows and allow the building to breathe. To the rear of the structure are four pipe openings – two which service the ring mains of both gasholders with antifreeze and water, and two which lead north to the boiler house. The building is presumably of similar date to Gasholder 6.
- 5.2.3 The boiler room is of later construction than the pump house, being constructed of textured bricks in stretcher-bond (presumably overlaying an internal steel frame), with a pitched corrugated metal roof. The building is orientated east – west, with its principal elevation to the west. The building is accessed via three louvred timber doors in its principal elevation. Additional ventilation is provided by louvred openings in the principal elevation, and regularly spaced ventilation bricks around the structure. The building is constructed atop a concrete footing. The building is presumably of similar date to Gasholder 7. Modern uPVC guttering runs along the rear of the building, descending via a downpipe on the northern side of the elevation.

## **6.0 DISCUSSION**

- 6.1 Constructed in 1956/7 and 1960/2 the gasholders represent fairly typical mid-20<sup>th</sup> century water-sealed spiral-guided design, based on a developed design by Gadd & Mason of Manchester (1887). Their steel construction and above ground tanks reflect the culmination of innovation in gasholder design from the late 19<sup>th</sup> century through to the mid-20<sup>th</sup> century.
- 6.2 The existing gasholders and plant form the last phase of expansion of an earlier gasworks established in 1867, originally situated to the west of the current site, the whole being illustrative of the evolution of the gas industry from its origins at the beginning of the 19<sup>th</sup> century, up until the present day. The Litchurch gasworks underwent extensive development throughout its history and as a result reflects the emergence of the town's gas industry, in line with technological advancements in gas lighting and cooking appliances towards the end of the 19<sup>th</sup> century. Associated plant changes coincide with the effects of widespread electricity use during the beginning of the 20<sup>th</sup> century, while the site's further development throughout the post-war period is demonstrative of the utilisation of by-product resources and innovative manufacturing methods as a means of industry growth. The present site, comprising the existing gasholder and associated plant, represents the culmination of the technological development of gasworks in the UK, and their subsequent decline.

- 6.3 In a broader view, the gasworks are illustrative of wider fluctuations of the gas industry throughout periods of both privatisation and nationalisation and its evolving nature throughout the discovery of natural gas reserves and associated nationwide conversion throughout the end of the 20<sup>th</sup> century.
- 6.4 The remaining ancillary structures and associated plant serve to give context to the gasholders, while the nearby former canal (now hidden in the landscape), road and rail connections serve as a reminder of the influence that improved technology and transport links had in advancing the gas industry within Britain.

## 7.0 SOURCES CONSULTED

### **Primary Resources**

See Appendix 4 for available primary sources

### **Secondary Resources**

ClfA, 2014. *Standard and guidance for the archaeological investigation and recording of standing buildings or structures*. Chartered Institute for Archaeologists, University of Reading.

English Heritage, 2000. *London Gasholders Survey: The Development of the Gasholder in London in the Later Nineteenth Century*. Prepared by Malcolm Tucker.

English Heritage, 2002. *Monuments Protection Programme; Gas Industry Step 3 Report*. Prepared by Michael Trueman.

English Heritage, 2006a. *Understanding Historic Buildings: A guide to good recording practice*.

English Heritage, 2006b. *Management of Research Projects in the Historic Environment*.

Montagu Evans LLP, November 2014. *Former Gasworks, Pride Park, Derby, DE24 8XL: National Grid – National Sites Heritage Review*. Prepared by Tim Tatlioglu.

National Grid, May 1999. *Operational Description of Cremorne Lane, Norwich; Gasholder Station Main Items of Plant/Equipment*

### **Internet Resources**

Access to Archives  
<http://www.nationalarchives.gov.uk/a2a/>  
Accessed 9th October 2015:

EM:DEG  
Derby Gas Light and Coke Company.  
<http://discovery.nationalarchives.gov.uk/details/rd/ec713f61-8750-485f-afd9-5eebc373914e>

Digimap  
[http://digimap.edina.ac\\_.uk/](http://digimap.edina.ac_.uk/)  
18<sup>th</sup> February 2016

Promap  
[www.promap.co.uk](http://www.promap.co.uk)  
18<sup>th</sup> February 2016

Google Patents  
<https://www.google.co.uk/patents/US405702>  
18<sup>th</sup> February 2016

The National Gas museum, Leicester  
<http://nationalgasmuseum.org.uk/>  
18<sup>th</sup> February 2016



## **8.0 DEPOSITION OF THE ARCHIVE**

A full archive intended for deposition with a suitable local museum has been prepared. The archive has been assigned the site code PPD16. In addition a digital copy (pdf) of the report will be supplied to Montagu Evans; the Historic England Archive, Swindon; the National Gas Archive, Warrington and the Derbyshire Historic Environment Record. The full site archive will be prepared in accordance with the principles of *Management of Research Projects in the Historic Environment (MoRPHE)* (English Heritage 2006b) and the requirements of the recipient body. The full archive will comprise a hard copy of the full report, a pdf version of the report on CD, the full photographic record with registers, field notes and drawings.

## **9.0 ACKNOWLEDGEMENTS**

Archaeology South-East would like to thank Montagu Evans LLP, for commissioning this Historic Building Record, on behalf of National Grid. The author would like to thank all those who helped with archival enquiries, but particularly Alison Percival (National Gas Archive, Warrington) and Charis Abraham (Historic England Archive, Swindon).

## PLATES



Plate 1: South-west elevation of Gasholder 6 (PPD16-0001)



Plate 2: The crown of Gasholder 6 as seen from Gasholder 7 (PPD16-0170)



Plate 3: Access hatch in crown of Gasholder 6 (PPD16-0224)



Plate 4: Access hatch in tank wall, Gasholder 6 (PPD16-0007)

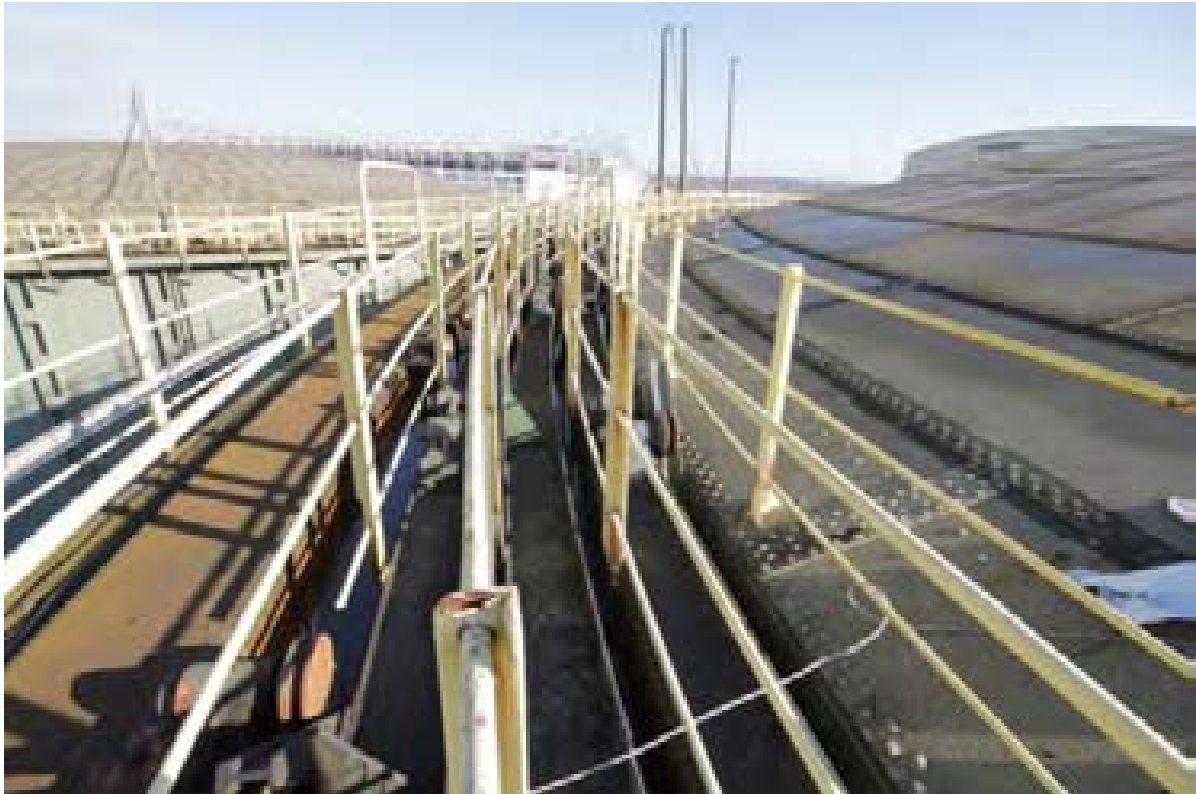


Plate 5: Lift grips and lutes on Gasholder 6 (PPD16-0119)



Plate 6: Craig & Derricott Ltd I-grab Grabwire emergency switches on tank platform, gasholder 6 (PPD16-0126)



Plate 7: Guide masts for antifreeze distribution hoses, Gasholder 6 (PPD16-0125)



Plate 8: Guide carriages, Gasholder 6 (PPD16-0116)



Plate 9: Tank platform walkway (PPD16-0108)



Plate 10: Brackets and rim to tank platform walkway (PPD16-0217)



Plate 11: Lift stairs on Gasholder 6, note the grooved guide rail (PPD16-0083)





Plate 12: Detail shot of the concrete base to Gasholder 6 (PPD16-0045)

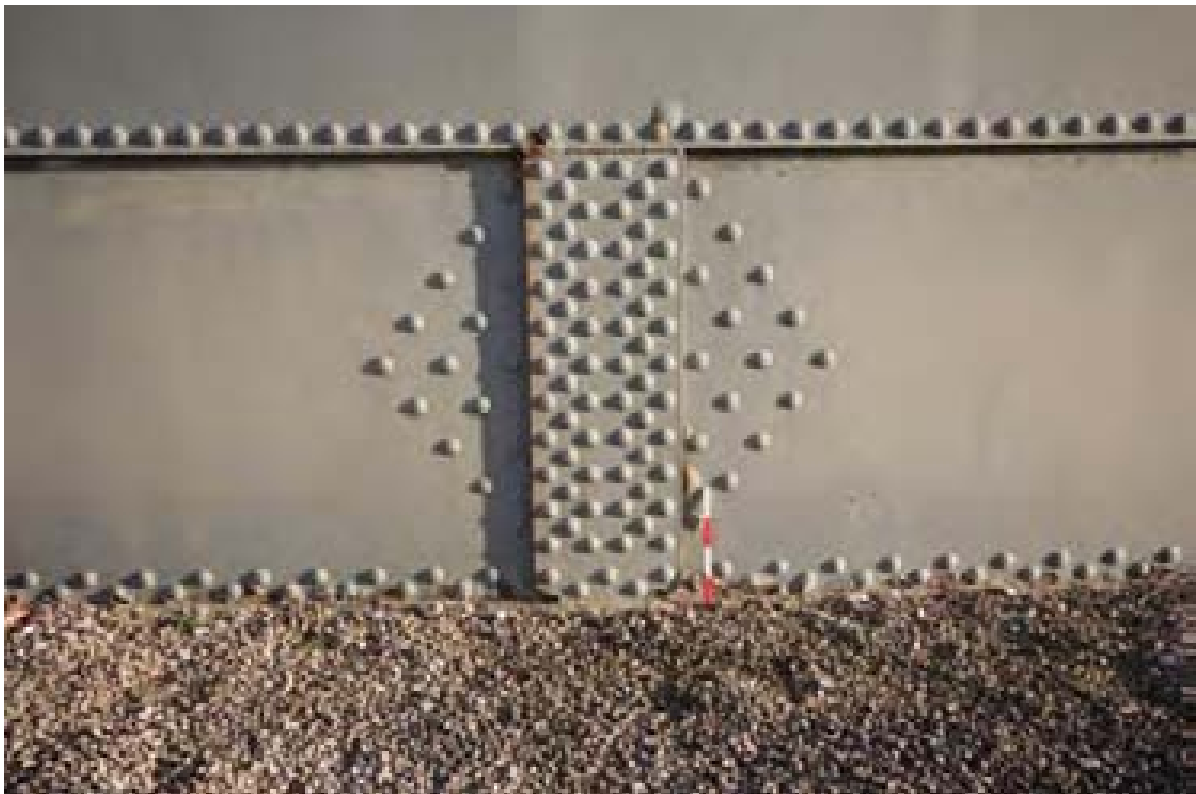


Plate 13: Riveted buffer sheet at base of the tank, Gasholder 6 (PPD16-0009)



Plate 14: Staircase to tank platform, Gasholder 6 (7764\_0005)



Plate 15: Looking down the staircase from the tank platform, Gasholder 6 (PPD16-0088)



Plate 16: Downpipe, Gasholder 6 (PPD16-0015)



Plate 17: Pipework and siphon pit, Gasholder 6 (PPD16-0130)



Plate 18: Volumetric governor, Gasholder 6 (PPD16-0020)



Plate 19: Gasholder 7 (PPD16-0050)

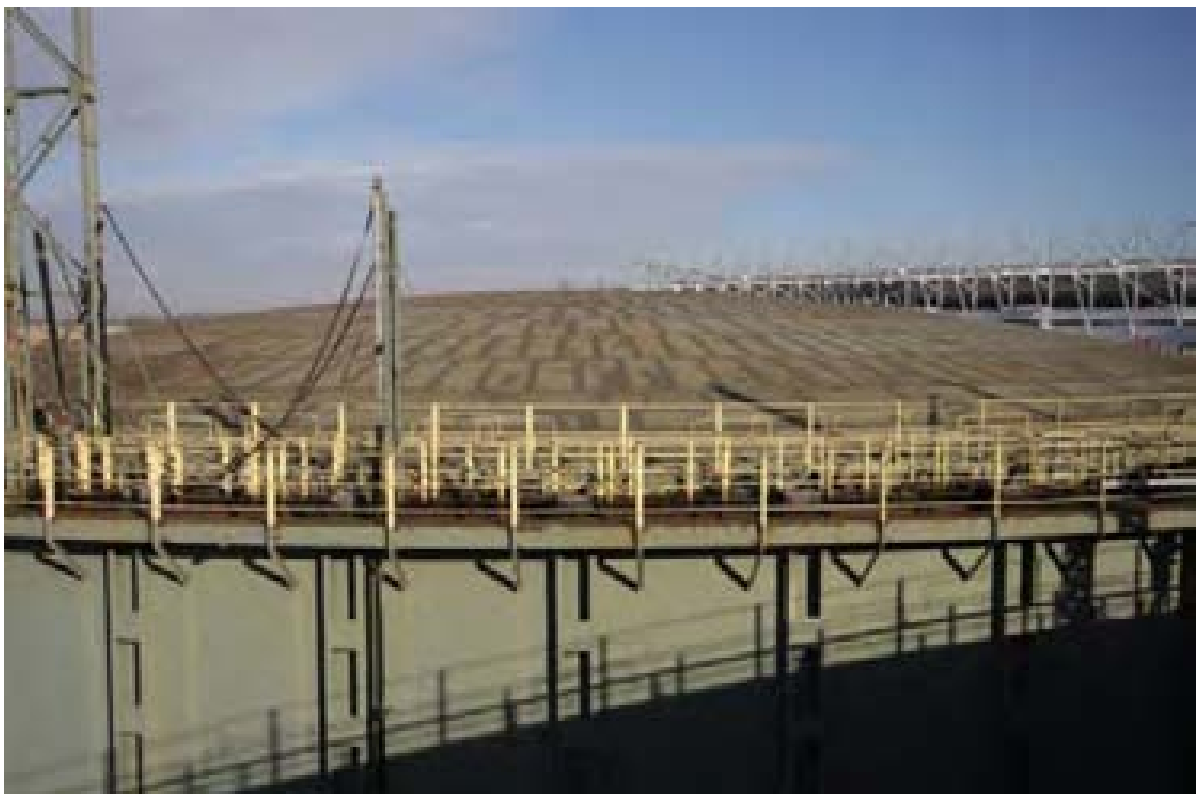


Plate 20: The crown of Gasholder 7 seen from Gasholder 6 (PPD16-0132)



Plate 21: The raised rim to the first lift and crown of Gasholder 7 (PPD16-0200)



Plate 22: Access hatch in the crown of Gasholder 7 (PPD16-0214)



Plate 23: Access hatch in tank wall displaying makers marks, Gasholder 7 (PPD16-0068)

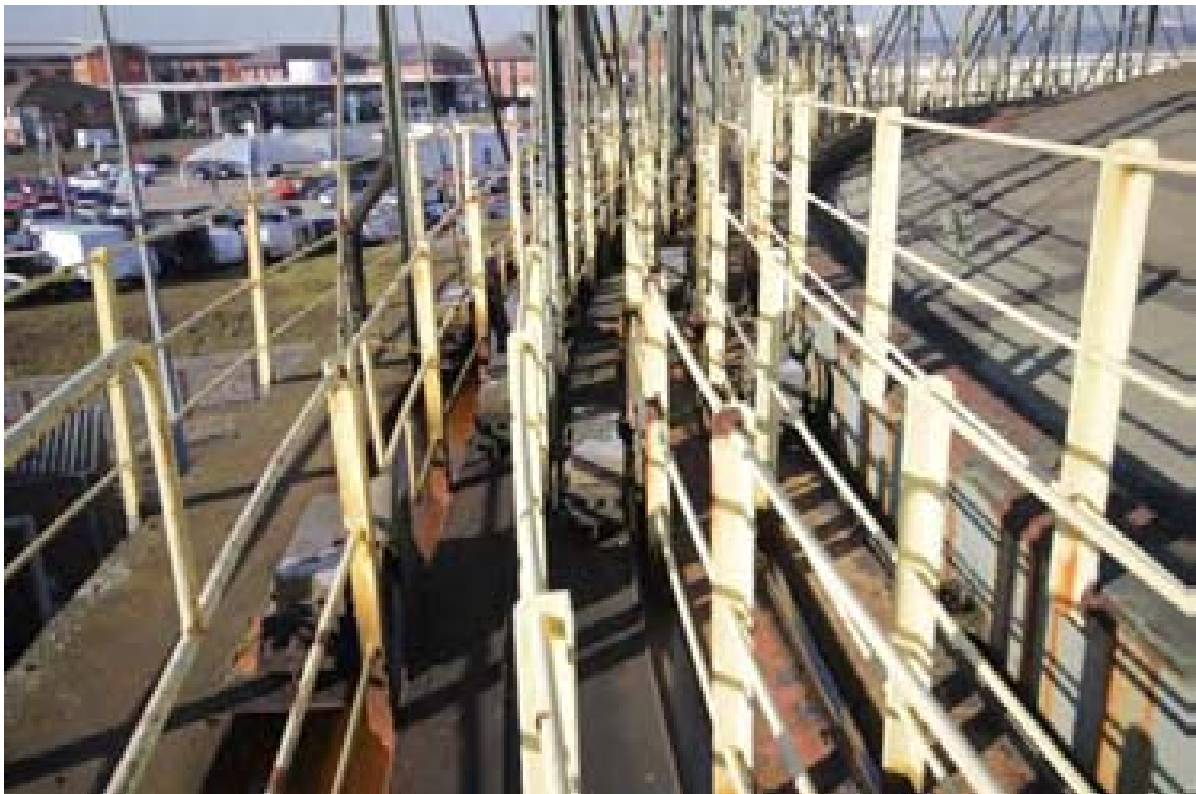


Plate 24: Lift grips and lutes, Gasholder 7 (PPD16-0146)

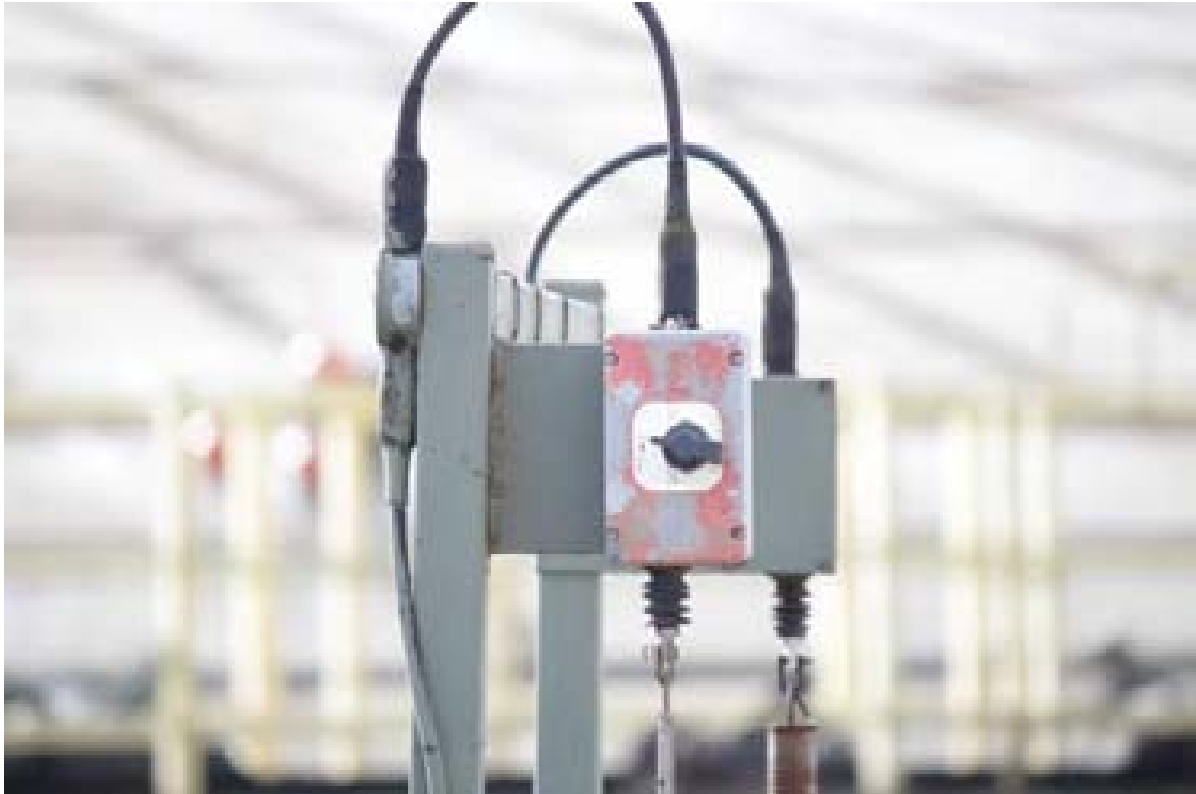


Plate 25: Craig & Derricott Ltd I-grab Grabwire emergency switches on tank platform, Gasholder 7 (PPD16-0208)



Plate 26: Guide masts, Gasholder 7 (PPD16-0209)





Plate 27: Guide carriages, Gasholder 7 (PPD16-0191)



Plate 28: Tank platform walkway and supporting handrails/brackets, Gasholder 7 (PPD16-0222)



Plate 29: Counterweights diametrically opposite the lift stairs, Gasholder 7 (PPD16-0196)



Plate 30: Lift stairs, Gasholder 7 (PPD16-0227)



Plate 31: Construction of the lift stairs, Gasholder 7 (PPD16-0155)



Plate 32: Concrete base to Gasholder 7 (PPD16-0053)



Plate 33: Stanchions on the side of Gasholder 7 (PPD16-0059)



Plate 34: Staircase to tank platform, Gasholder 7 (PPD16-0061)



Plate 35: Bridge between the gasholders (PPD16-0134)



Plate 36: Siphon pit and volumetric governor, Gasholder 7 (PPD16-0076)

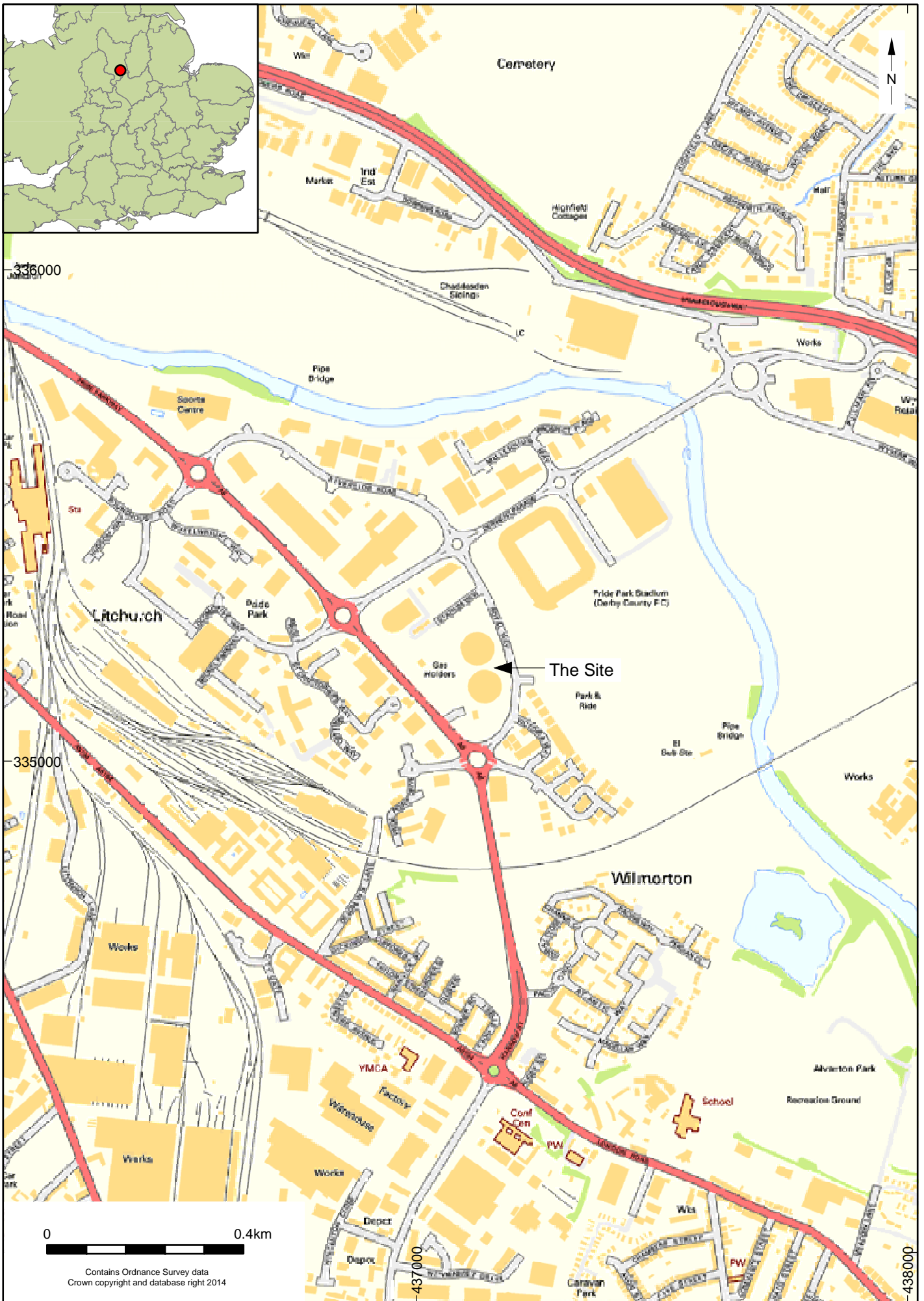


Plate 37: Antifreeze pump house (PPD16-0024)



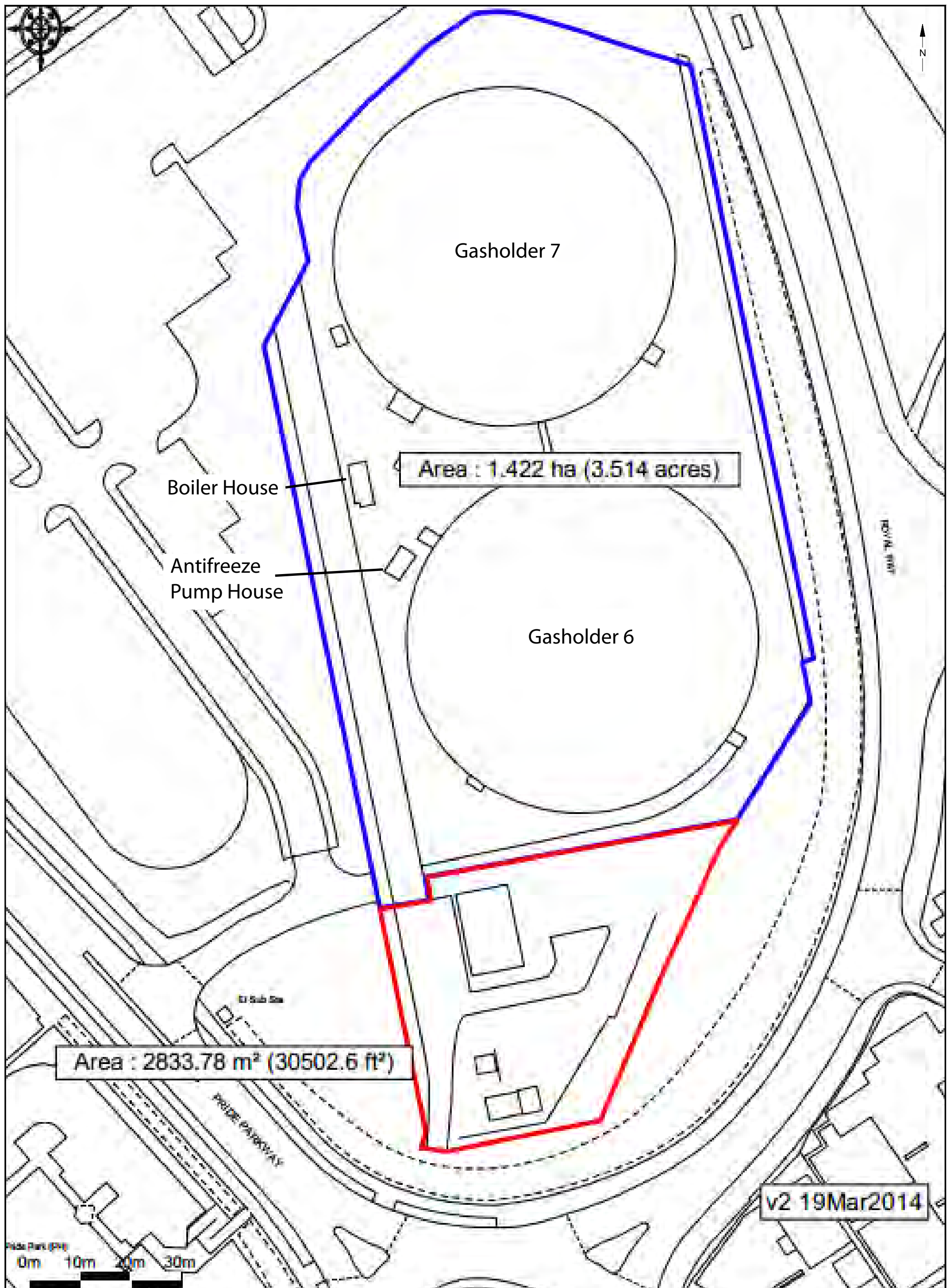
Plate 38: Boiler house (PPD16-0030)

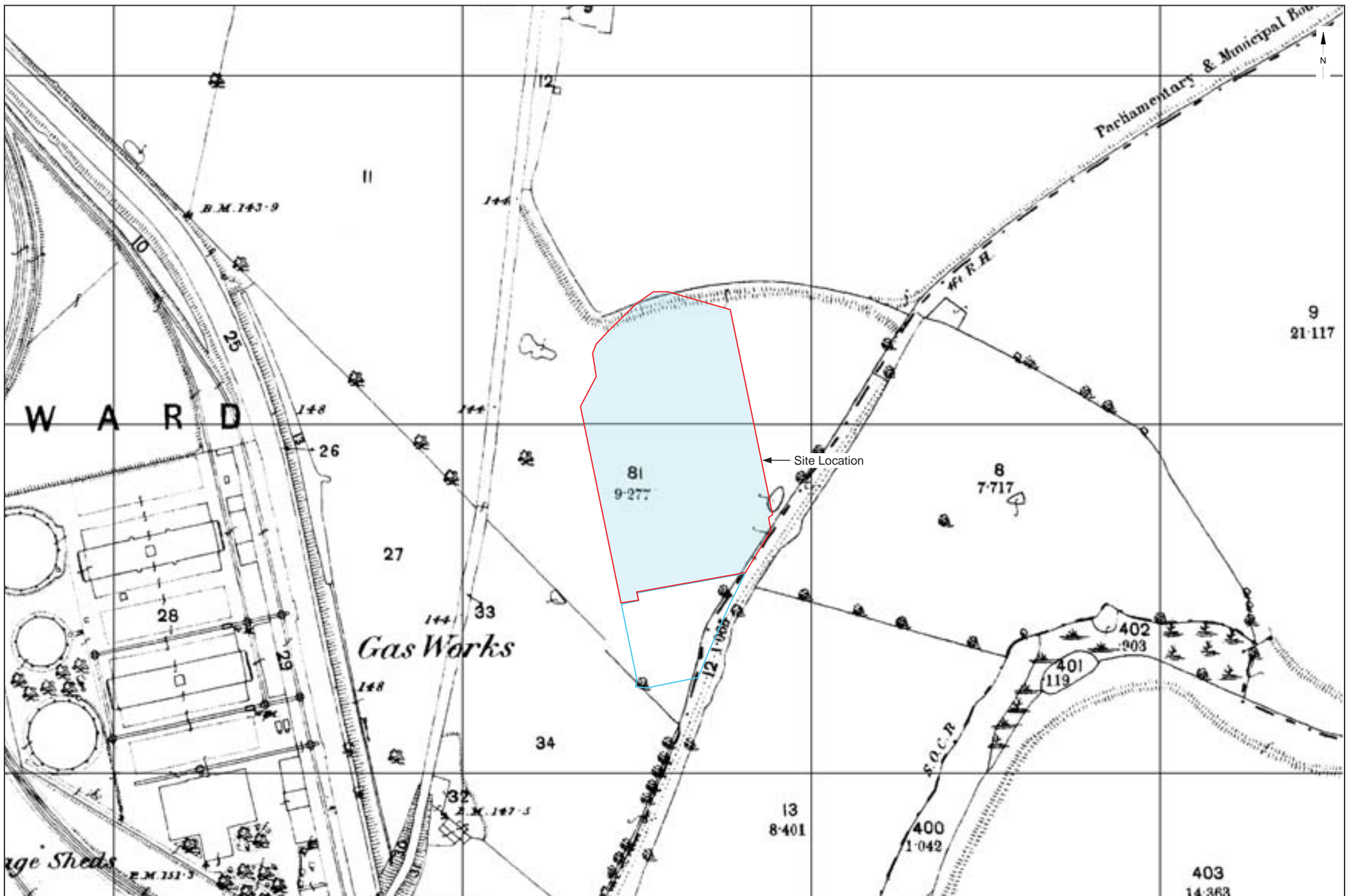




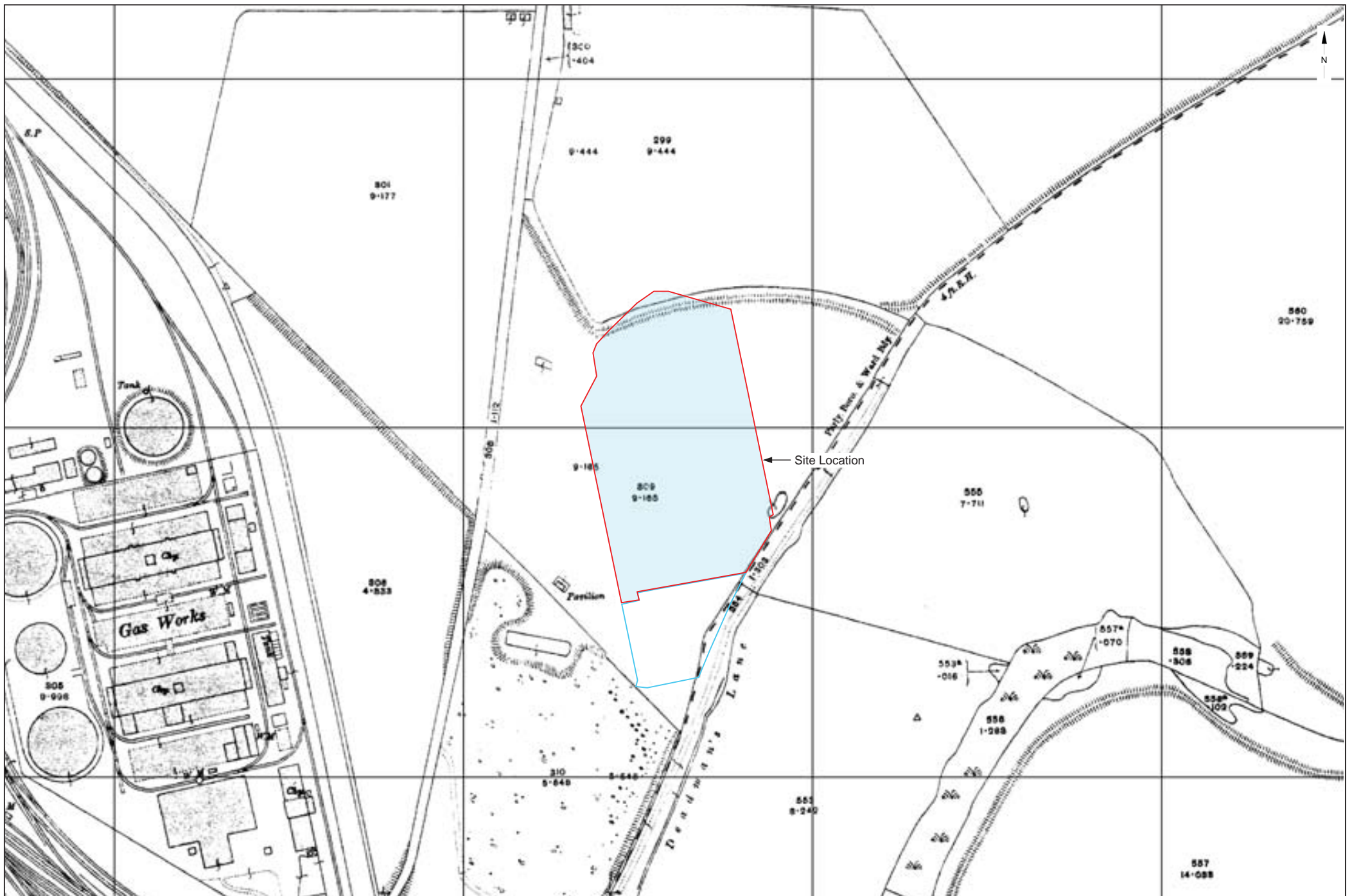
© Archaeology South-East		Former Gasworks, Pride Park, Derby	Fig. 1
Project Ref: 160106	February 2016	Site Location	
Report Ref: 2016052	Drawn by: SP		







© Archaeology South-East		Former Gasworks, Pride Park, Derby	Fig. 3
Project Ref: 160106	February 2016	Ordnance Survey Map, 1883-4	
Report Ref: 2016052	Drawn by: SP		



© Archaeology South-East		Former Gasworks, Pride Park, Derby	Fig. 4
Project Ref: 160106	February 2016	Ordnance Survey Map, 1914	
Report Ref: 2016052	Drawn by: SP		



<http://www.britainfromabove.org.uk/cy/image/EPW017037>

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© Archaeology South-East		Former Gasworks, Pride Park, Derby	Fig. 5
Project Ref: 160106	February 2016	Aerial photograph of the Litchurch Gas Works, 1926	
Report Ref: 2016052	Drawn by: SP		



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© Archaeology South-East		Former Gasworks, Pride Park, Derby	Fig. 6
Project Ref: 160106	February 2016	Aerial photograph of the Litchurch Gas Works, 1935	
Report Ref: 2016052	Drawn by: SP		

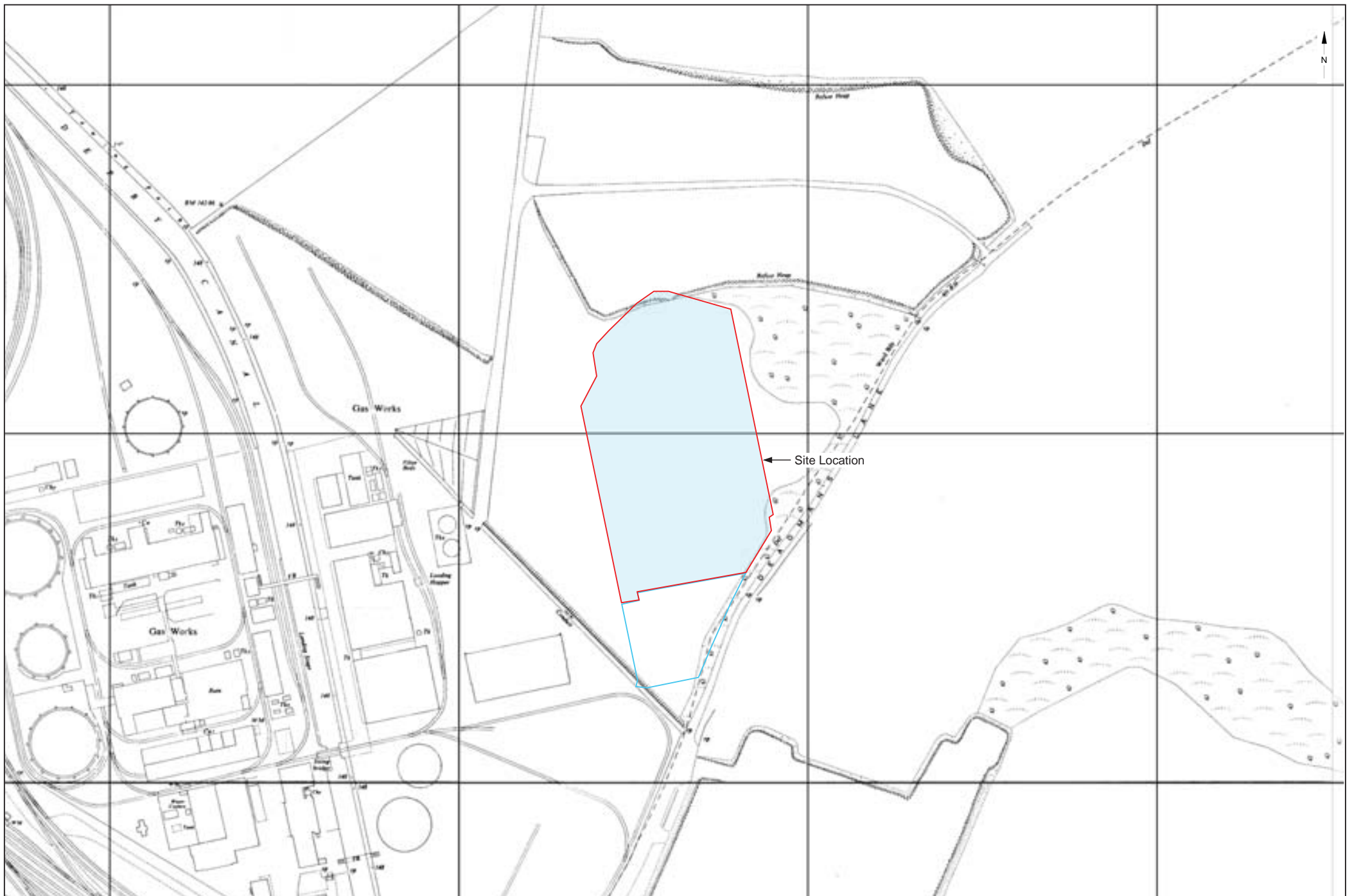




<http://www.britainfromabove.org.uk/image/EAW002482>

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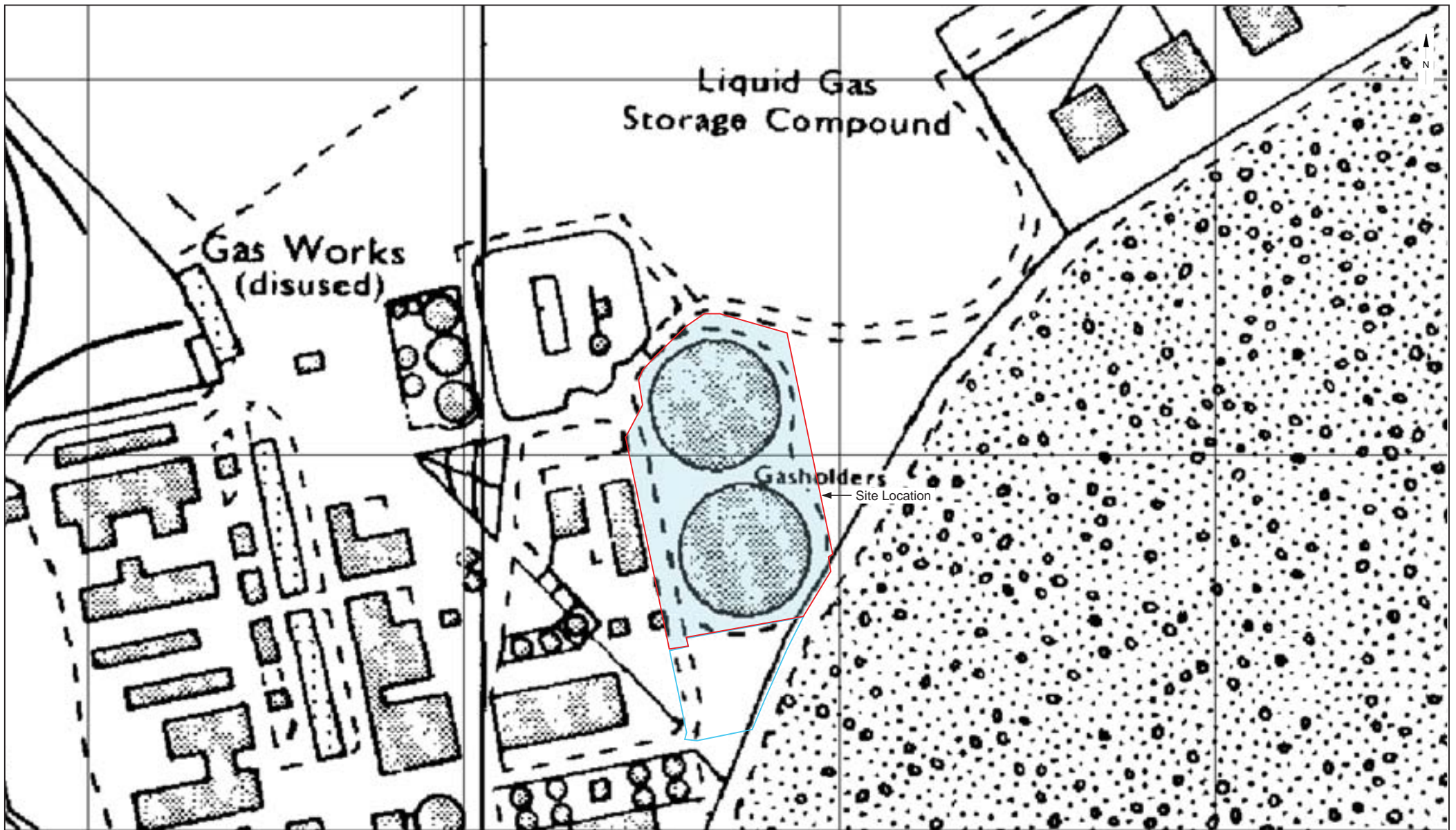
© Archaeology South-East		Former Gasworks, Pride Park, Derby	Fig. 7
Project Ref: 160106	February 2016	Aerial photograph of the Litchurch Gas Works, 1946	
Report Ref: 2016052	Drawn by: SP		

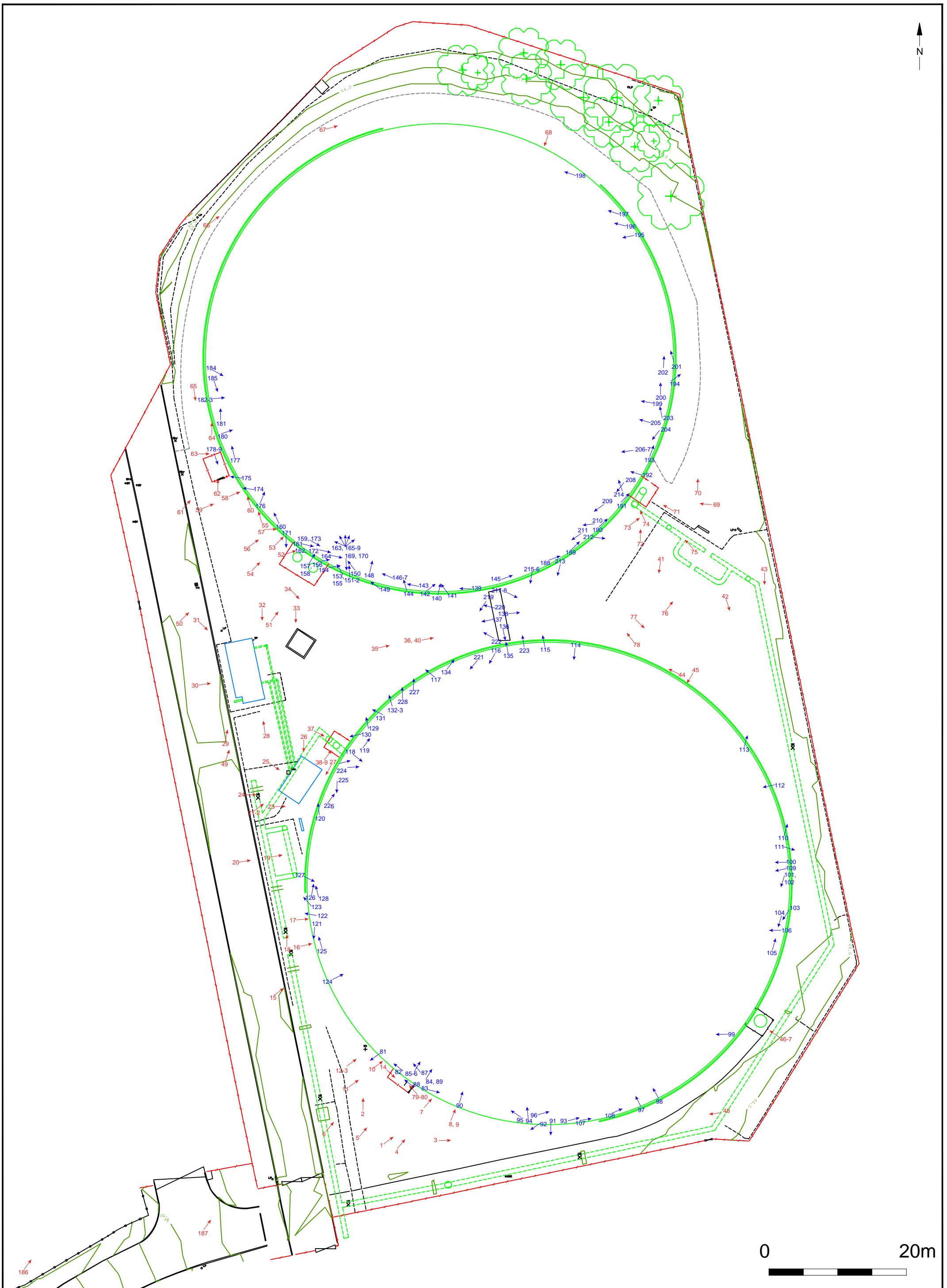












© Archaeology South-East		Former Gasworks, Pride Park, Derby		Fig. 12
Project Ref: 160106	February 2016	Site Plan and Photo Locations		
Report Ref: 2016052	Drawn by: SP			



## **Appendix 1 Glossary of Gasholder Terminology**

**'Guide-frame'** - the circular metal structure of vertical columns or standards linked by horizontal girders and sometimes, diagonal bracing, built around the perimeter of the tank and strongly bolted down.

**'Bell'** – the sheet-metal cylinder with a closed top which contains the gas in all water-sealed holders. It is the moveable part of the gasholder which rises and falls according to the volume of gas stored within. It descends back into the tank as it empties. The bell is usually telescopic and the upper part, known as the 'top curb', is constructed in thicker metal to provide strength.

**'Lift and guide rollers'** – the circumferential sections located around the bell which enable the bell to rise and fall telescopically. Each lift is mounted by a guide roller, which bears against vertical rails mounted on the standards of the guide frame. The guide rollers help to guide the bell by securing it against the wind.

**'Tank'** - the open-topped vessel into which the bell descends when empty of gas, and it is filled with water to provide a seal. Usually the tanks are constructed in cast iron or steel. Larger holders, have their tanks set in the ground in brick or mass concrete construction. The gasholder tank was the part of the gasholder which would house the lifts when down and contain the water in which the holder raised and descended depending on gas flow.

## **Appendix 2 Patent description of spiral-guided gasholder design by Gadd & Mason of Manchester**

### *Patent Specification*

Gasholder - No. 405,702

Patented June 25, 1889.

William Gadd of Manchester, England

Patent Application filed:

February 18, 1889` Serial No. 800,884. Patented in England October 6, 1887, No. 13,521; iii Luxemburg August 13, 1888, No. 1,017; in Belgium August 16, 1888, No. 82,788; iii Turkey August 24, 1888; in Canada August 28, 1888, No. 80,001; in Spain September 27, 1888, No. 8,584; in France October 6, 1888, No. 192,229; in New South Wales October 9, 1888, No. 988; in Gripe of Good Hope October 11, 1888, No. 477; in Italy October 13, 1888, No. 23,942; in Natal October 17, 1888; in Tasmania October 20, 1888, No. 6,278; in Brazil October 31, 1888, No. 626; in Victoria November 13, 1888, No. 628; in Sweden December 20, 1888, No. 1,651, Norway December 29, 1888, No. 1,040.

Be it known that I, William Gadd, a subject of the Queen of Britain, and a resident of the city of Manchester, England, have invented new and useful Improvements in Gasholder, of which the following is a specification.

The improvements relate to the construction of gasholders, and have for their object the supporting of the same in their working position in such a manner as to enable the external or upper guide-framing hitherto employed for that purpose to be dispensed with, and yet to give the requisite stability, although such a modified form of framing may be employed in connection with the improvements herein described when desired, and the present improvements form a modification of an invention for the same purpose, for which I have already applied for Letters Patent, filed August 28, 1888, Serial No. 284,024.

To accomplish these my present improvements, I affix round the well or tank, at or near the upper surface thereof and at any suitable intervals, tangential or angled radial rollers, or both, or in lieu thereof angled fixed friction-pieces. Attached to the outer surface of the bell or holder, and extending from top to bottom thereof, or thereabout, are rails of metal or other suitable substance, which are formed in the shape of quick helices or spirals or curved inclines of any working degree of inclination, which will be determined by the circumstances and design, forty-five degrees and sixty degrees from the horizontal being examples of working angles; but other angles may be employed. The spiral rails on the holder take or gear into the spaces between the rollers or their equivalent friction pieces, or it may be rollers and friction-pieces combined. As these spiral rails round the outer face of the holder rest and move upon the rollers or equivalents placed round the tank-by preference both over and under or between, according to the section of rail employed-it will be seen that as the holder becomes

raised by being filled with gas a screw-like motion is imparted to it, thus causing it to partially turn as it rises, and in similar manner allowing it to fall by gravity as the volume of gas is reduced.

The stability of the holder lies in the fact that it is constantly at all working positions supported at an equal height round its circumference, and thus presents a position of firm resistance to wind-pressure and other lateral strains under conditions somewhat similar to that of a holder placed on the ground and resting on its lower edge or rim.

The wheels, rolling sliding blocks, or equivalent devices may either be fixed tangentially with the side of the tank, and so come in contact with the top, or top and bottom, surfaces of the rails on the holder. Or may be arranged radially with the tank, but at the angle of spiral, or, and by preference, the two kinds may be combined and the rolling-surface of the rails adapted thereto or in any other suitable manner, and the rollers or sliding pieces, or equivalent devices, when placed tangentially, may be employed above and beneath the rails alternately or in couples, or otherwise, the rails being constructed in double line or double headed or faced for the purpose.

The improvements are also applicable to telescopic gasholders by employing similar helical or spiral rails, curved purlins, or grooves attached to the inner lift or lifts thereof, which ride upon or between the rollers or equivalent devices attached to the inner surface of the outer lift or lifts of such telescopic gasholders; but that the invention may be better understood, I will, by the aid of the accompanying drawings, proceed more fully to describe means employed in carrying out the same.

In the drawings, Figure 1 represents an elevation with half-plan of a gasholder in single lift raised to about its full height, and with the tank shown in section, of one arrangement in accordance with my invention; and Fig. 2 shows some detail in application of the method described.

The same letters indicate corresponding parts wherever they occur.

A A is the holder; B B, the tank or well within which the holder rises and falls by means of the helical, spiral, or inclined rails or surfaces E E riding on or between the rollers or equivalents.

C C are the tangential and D D the angled radial rollers, which in Fig. 1 are shown arranged separately from and alternately with the tangential rollers OC; but the two kinds of rollers may be arranged together, as shown in Fig. 2, wherein the rail may be formed of channel or other iron, or other substance, having a tangential roller on each side, with the angled radial roller between or the angled radial rollers may be dispensed with by flanges on the tangential rollers; or other means may be employed for keeping the holder centrally or the rails or guides thereof on or between the rollers or equivalents.

Although, in the interests of safety, I greatly prefer to employ either two sets of roller some above and the other below the inclined or spiral rails-or double rails with one or more sets of rollers between, in order to enable the same to securely grasp or to be grasped by the rails at various points around the edge of the holder, nevertheless it may be possible in some cases to dispense with the under set of

rollers or the over set of rails, as other means may be sufficient to cause the rollers to follow the inclines of the single rails.

Having fully described my invention, what I desire to claim and secure by Letters Patent is. In gasholders, the combination of rollers or equivalent friction-pieces, affixed to the edge or wall of the tank or well, with spiral guides on the outer face of the bell, substantially as set forth.

2. In gasholders, the combination of rollers or equivalent friction-pieces, affixed to the edge or wall of the tank or well, with spiral guides on or in the outer face of the bell, substantially as herein set forth.

3. In gasholders, the combination of angled radial rollers or equivalent friction-pieces, affixed to the edge or wall of the tank or well, with spiral guides on or in the outer face of the bell, substantially as herein set forth.

4. In gasholders, the combination of both angled radial rollers and tangential rollers or their equivalent friction-pieces, affixed to the edge or Wall of the tank or well, with spiral guides on or in the outer face of the bell, substantially as herein set forth.

5. In telescopic gasholders, the combination of rollers or equivalent friction-pieces, affixed to the inner face of an outer lift, with spiral guides on the outer face of an inner lift, substantially as herein set forth.

Signed at Manchester, England, December 31, 1838.

Witnesses:

John Lovelock

Edwin Mansfield

(No Model)

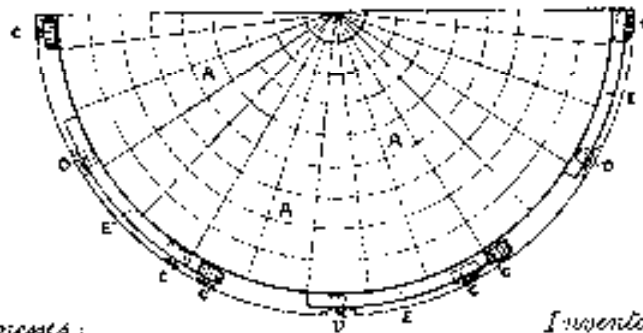
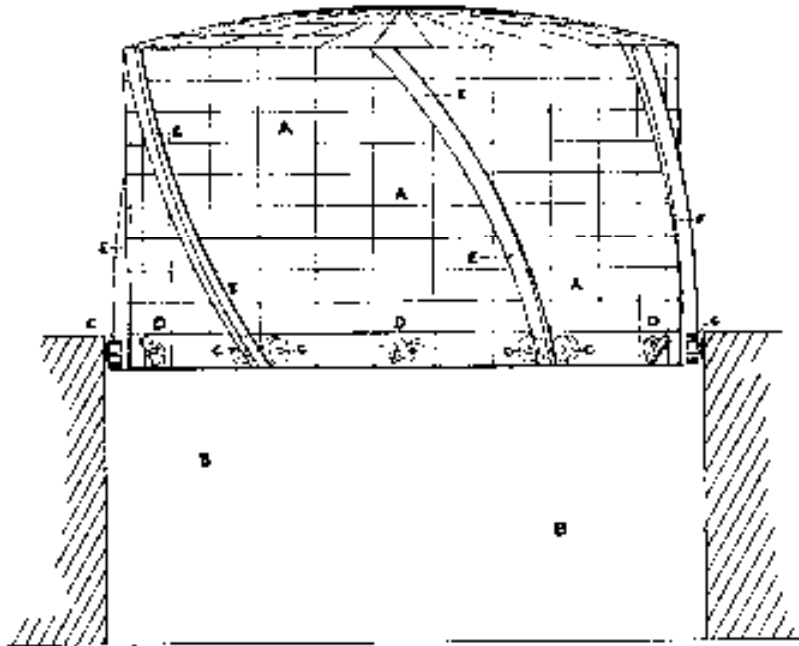
2 Sheets—Sheet 1.

W. GADD,  
GAS HOLDER.

No. 405,702.

Patented June 25, 1889.

FIG. 1.



Witnesses:  
George Frederick Gadd.  
John Alexander Lovelock

Inventor.  
William Gadd.



No Model.

W. GADD.  
GAS HOLDER.

2 Sheets—Sheet 2.

No. 405,702.

Patented June 25, 1889.

FIG 2.

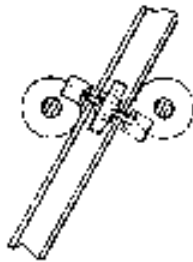


FIG 3.

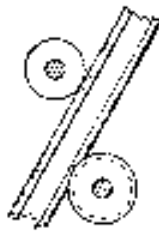


FIG 4.

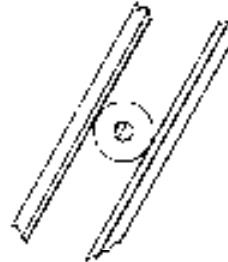


FIG 5.

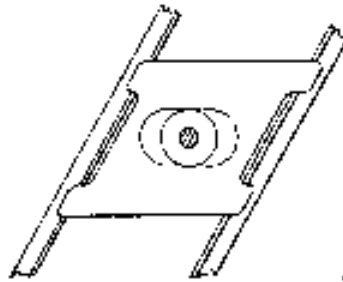


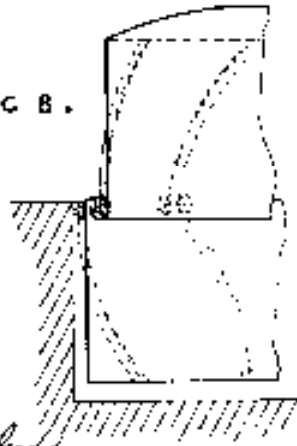
FIG 6.



FIG 7.



FIG 8.



Witnesses:  
George Frederick Gadd.  
John Alexander Lovelock

Inventor.  
William Gadd.

Appendix 3 Gasholder Data Sheets for Litchurch No. 6 and No. 7

SECTION 2

2.1

GASHOLDER DATA SHEET  
LITCHURCH No. 6

4 lift spirally guided-above ground tank.  
Lifts and tank:- All mild steel rivetted construction.  
Date constructed:- 1956/1957.  
Constructed by:- Clayton, Son & Co Ltd

1) DIMENSIONS

	<u>Inner Lift</u>	<u>2nd Lift</u>	<u>3rd Lift</u>	<u>4th Lift</u>	<u>Tank</u>
Diameter	217'-4"	220'-7"	223'-10"	227'-1"	230'-0"
Depth(O/A)	41'-0"	41'-0"	41'-0"	41'-0"	42'-0"
No. Guide Rails	28	28	42	56	(all 60lb/yard section)
No. Guide Carriages	-	28	28	42	56
Lift Rotation (Rising)	Clockwise	Anti-Clockwise	Clockwise	Anti-Clockwise	"
Lift Pressures	6.5ins.w.g.	9.0ins.w.g.	11.5ins.w.g.	14.0ins.w.g.	-
Crown Rise	17'-0"				

2) STRUCTURAL DETAILS

a) Crown Frame:-

- i) Top Curb - 6" x 6" x 1/4" angle.
- ii) Main Rafters - 28 no. - 10" x 5" x 30lb. R.S.J top boom with R.S.A and RSC struts and ties. 3" x 3" x 3/8" back to back R.S.A tension bars.
- iii) Secondary Rafters - 28 no. - 10" x 5" x 30lb. R.S.J's connected between top curb gussets and 10" x 5" x 30lb. R.S.J main purlins.
- iv) Purlins - 21 rows R.S.A sheering purlins
- v) Lateral Bracing - 4 sets constructed in R.S.A.
- vi) King post - 36" dia. welded plate - 36'-0" long.

- b) Crown Sheeting - Curb row - 3/4" thick.  
2nd row - 5/8" thick.  
3rd row - 3/8" thick.  
Intermediate rows - 8 s.w.g.

c) Lift Frames

- 1 inner lift vertical stays - 56 No. 14" x 6" x 46lb R.S.J's
- 2nd lift vertical stays - 56 No. 9" x 3" x 17.46lb R.S.C's
- 3rd lift vertical stays - 56 No. "
- 4th lift vertical stays - 56 No. "

- 2.2
- d) **Lift Sheeting**
- i) **Tower Lift** Top row - 1/2" thick  
Next top row - 1/4" thick  
Bottom row - 3/8" thick  
Next bottom row - 1/4" thick  
Intermediate rows - 9 S.W.G.
- ii) **2nd, 3rd and 4th Lifts**  
Top and bottom rows - 3/8" thick  
Next rows top and bottom - 1/4" thick  
Intermediate rows - 9 S.W.G.
- e) **Caps and Dips:** 12" x 3 1/2" x 32.861b R.S.G. with 3/8" thick skirt plates and 3" x 1/2" flat beads.
- f) **Gasde Rails:** All 60lb/yard flat bottom section riveted to 3/8" thick rail plates.
- g) **Spiral Staircases:** Fitted to tank balcony, 4th, 3rd and 2nd lift dips.  
All inclined at 45° and shaped to lift circumference.  
Counterbalance weights on 2nd, 3rd and 4th lifts diametrically opposite staircases.  
Staircases provided with passing platforms.
- h) **Manholes and Entry Fittings**
- i) **Crows -** 2 x 24" at inlet/outlet main positions.  
ii) **Lifts -** 2 x 24" diametrically opposite on each lift.  
iii) **Tank -** 2 x 24" diametrically opposite and in line with lift manholes when holder at rest.  
Divers access chamber at tank balcony level.
- j) **Inlet/Outlet Mains (Within Tank)**  
1 x 36" W.B. common inlet/outlet at SW.  
1 x 36" S.B. Blanked off at E.
- 3) **CAPACITIES**
- a) **Gas**
- Design Nominal - 6,000,000 s.c.f. (Grounding to blowing)  
Calculated - 6,019,000 s.c.f. (excluding crown volume)  
Crown Volume - 317,960 s.c.f.
- Indicated maximum usable stack (WINTER) 5,100,000 SCF subject to hydrostatic switch settings - See Holder Control Calibration sheet.
- b) **Water:** - (Tank only) approx. 11,120,000 gallons.

4) GENERAL INFORMATION

- a) Holder Internally oil filled. Internal filling pipe fitted.
- b) Part inner lift, 2nd lift, 3rd lift and 4th lift externally oil filled.
- c) All non-oil filled surfaces painted to DCC/PS/PA6 standard.  
Finish Colours - Major surfaces - BS4800.12, B.25  
Handrails and standards - BS4800.10.2, 53.  
Stairtreads and walkways - Black H10.  
Clips and tank wind and water lines - Non-Drying paint.
- d) All cups overflow internally. Depth of seals governed by curtailed cup plate.
- e) Extension plates fitted to inner edge of 2nd, 3rd and 4th lift dips.
- f) Tank overflow - 6" dia. set 10 1/2" below tank top curb discharges to sewer.  
Consent to discharge issued by Severn Trent Water Authority held by Regional Legal Department.
- g) Carriages - 2 roller fixed centre type with cast steel rollers.
- h) All tank plates and lift sheeting laid horizontally.
- j) Inlet/Outlet main passes through external valve pit and tank bottom plates into holder adjacent to antifreeze pump house. Second main now redundant and near to site boundary bleaked off in valve pit. This main passes into holder tank in similar manner.
- k) 2 No. Hydrostatic lines (3/8" W.B. nylon reinforced PVC) installed within holder and connected to individual steel header tanks fitted to crown.
- l) Two sets of booster electro-mechanical cut off switches fitted at diametrically opposite positions on tank balcony. Both Craig and Derricott pull wire type switches actuated by striking arm fitted to the crown.
- m) High level electro-mechanical cut off switch (one set only) - Craig and Derricott pull wire type actuated by striking plate fitted to outer lift side sheeting. - Operates VG Slam Shut valve and both holder valves. Switch assembly fitted on tank balcony.
- n) Limited number of construction drawings retained on microfiche in H.Q. drawing office. - Drawing References L11/1388/-.

5) ANTIFREEZE SYSTEM:-

Water circulating open circuit system.  
3 boiler unit and heat exchanger located in boiler house.  
Secondary circulating pump, standby pump and system control panel located in pump house.  
Tank water (heated or unheated) pumped through ring main and four sets of risers to tank and cup injectors.  
Automatic on/off operation of circulating pump and boilers governed by air temperature and inner lift cup water temperature.  
Both temperature sensors located at inner lift cup level on North side of holder.  
Boilers provided with permanent pilots.

2.4

GASHOLDER DATA SHEET  
LITCHURGH NO. 7

5 lift - Spiral Guided - Above Ground Tank.  
All welded mild steel construction.  
Date Constructed - 1960/62  
Constructed By - Oxley Engineering Co Ltd

1) DIMENSIONS

	<u>Inner Lift</u>	<u>2nd Lift</u>	<u>3rd Lift</u>	<u>4th Lift</u>	<u>5th Lift</u>	<u>Tank</u>
Diameter	208'-0"	211'-0"	214'-0"	217'-0"	220'-0"	223'-0"
Depth(O/A)	36'-0"	36'-0"	36'-0"	35'-0"	35'-0"	37'-0"
No. Guide Rails	24	24	36	48	60 (all 55lb/yard section)	
No. Guide Carriages	-	24	24	36	48	60
Lift Rotation (Rising)	Anti-Clockwise	Clockwise	Anti-Clockwise	Clockwise	Anti-Clockwise	-
Lift Pressures	7.8" w.g.	10" w.g.	12.1" w.g.	14.2" w.g.	16.3" w.g.	-
Crown Rise	15'-0"					

2) STRUCTURAL DETAILS

a) Crown Frame:

- i) Top Curb - Box Sections fabricated from steel plate of varying thickness - details not available.
- ii) Main Rafters - 12 No. 2 back to back 9" x 3" x 17.46 lbs/ft R.S.C. with RSA struts and ties.  
6" x 5/8" flat tension bars.
- iii) Secondary Rafters - 12 No. 2 back to back 5" x 3" x 12.41 lbs/ft R.S.C. with RSA struts and ties.
- iv) Tertiary Rafters - 24 No. 6" x 4 1/2" x 20 lbs/ft R.S.J. with RSA struts and ties.
- v) Purlins - 22 rows - various size steel sections.
- vi) King Post - 3'0" O.D. fabricated steel tube 37'-4 1/2" long O/A

- b) Crown Sheeting - Curb row - 7/8" thick.  
2nd row - 5/8" thick.  
3rd row - 3/8" thick.  
Intermediate rows - 5/16" thick.

c) Lift Frame:

- i) Inner Lift 48 No. 20" x 7 1/2" R.S.J.s vertical stays.  
5 rows 3" x 3" x 1/4" sheering purlins.
- ii) 2nd Lift 48 No. twin 4" x 4" x 1/2" RSA vertical stays.  
5 rows 3" x 2" x 1/4" RSA sheeting purlins.
- iii) 3rd Lift 54 No. twin 4" x 4" x 1/2" RSA vertical stays.  
5 rows 3" x 2" x 1/4" RSA sheeting purlins.
- iv) 4th Lift 60 No. twin 4" x 4" x 1/2" RSA vertical stays.  
5 rows 3" x 2" x 1/4" RSA sheeting purlins.

- 2.5
- 5th Lift      60 No. twin 4" x 4" x 1/2" BSA vertical stays.  
5 rows 3" x 2" x 1/4" BSA sheeting gullies.
- d) Lift Sheeting
- i) Inner Lift      top row - unknown (approx. 1")  
bottom row (cup row) - 5/8" thick  
intermediate sheeting - 3/16" thick
- ii) 2nd lift      top row - 3/8" thick  
bottom row - 1/2" thick  
intermediate rows - 10 BG
- iii) 3rd, 4th & 5th lifts      top row - 3/8" thick  
bottom row - 3/8" thick  
intermediate rows - 10 BG
- e) Cups and Dips      - All lubricate plate sections:  
All cup bottom and dip top plates - 5/8" thick  
Inner lift & 2nd lift cup plate and cup skirt plate 1/2" thick  
3rd & 4th lift cup plate and cup skirt plate 3/8" thick  
Dip plates and dip skirt plates - 3/8" thick throughout.
- f) Guide Rails      - All 55lb/yard section lift bottom section welded to 1'-3" wide x 1/2" thick rail plates.
- g) Spiral Staircases - Fitted to tank balcony, 5th, 4th, 3rd and 2nd lift dips. All inclined at 45° and shaped to lift circumference.  
Counterbalance weights on 2nd, 3rd, 4th and 5th lifts diametrically opposite staircases. All lift staircases have passing platforms.
- h) Manholes      - i) Crown - 4 x 24" dia.  
ii) Lifts - 2 x 24" dia. diametrically opposite on each lift.  
iii) Tank - 2 x 24" dia. diametrically opposite and in line with lift manholes when holder is at rest.
- j) Inlet/Outlet mains (Within Tank)  
1 x 36" N.B. common inlet/outlet at SE.  
2 x 48" N.B. blanked off at SW.
- 3) CAPACITIES
- a) Gas
- Design Nominal - 4,000,000 S.C.F.      }Grounding to blowing  
Calculated      - 6,070,000 S.C.F.      }excluding crown volume  
Crown Volume      -    256,546 S.C.F.

2.6

Indicated maximum usable stock (water) 5,110,000 SCF, subject to hydrostatic switch settings - see holder control calibration sheet.

b) Water (tank only) approx. 9,025,000 gallons.

4) GENERAL INFORMATION

- a) Holder internally oil filled, internal filling pipe fitted.
- b) 2nd lift, 3rd lift, 4th lift and 5th lift externally oil filled. Periodic retreatment necessary due to failure of internal oil film to migrate to cups.
- c) All non oil filled surfaces painted to BCC/PS/PA6 standard. Finish Colours - Major Surfaces BS4800 12,8.25  
Handrails and standards BS4800 10,8.33.  
Stairreads and Walkways - Black M10.  
Cups and Dips wind and water lines - Non drying paint.
- d) Inner, 2nd, 3rd and 4th lift cups overflow internally through 6" x 3" J seals attached to inside face of cup skirting plate. Overflow entries are prechecked to retain excess oil film.
- e) Extension plates fitted to inner edge of 2nd, 3rd, 4th and 5th lift dips.
- f) Down pipes attached to inner lift side sheeting for crown drainage.
- g) Tank overflow - 8" diameter set 4" below tank top curb discharges to sewer.  
Consent to discharge issued by Severn Trent Water Authority held by Regional Legal Department.
- h) Carriages - All two roller Oxley Spring loaded type on sliding lathe bed base.
- i) Tank plates, top rows and bottom rows of lifts laid horizontally. Intermediate sheeting on all lifts laid at 45°.
- k) Inlet/Outlet main passes through external valve pit and tank bottom plates into holder at SE. 2 No. adjacent mains now redundant and blanked off at SW pass into holder tank in a similar manner.
- l) 2 No. Hydrostatic lines (1/8" NB nylon reinforced PVC) installed within holder and connected to individual sheer header tanks fitted to crown.
- m) Two sets of booster electro-mechanical cut off switches fitted at diametrically opposite positions on tank balcony. Both Craig and Derricott pull wire type switches actuated by striking rods fitted to the crown.
- n) High level electro-mechanical cut off switch (one set only) - Craig and Derricott pull wire type actuated by striking) plate fitted to outer lift side sheeting - Operates VG slam shut valves and both holder valves. Switch assembly fitted on tank balcony.
- o) Limited number of construction drawings retained on microfilm @ H.Q. Drawing Office - Drawing References LIT/1382/-

5) ANTIFREEZE SYSTEM

Water Circulating Open Circuit System.

3 boiler unit and heat exchanger located in boiler house.

Secondary circulating pump, standby pump and system control panel located in pump house.

2.7

tank water (heated and unheated) pumped through ring main and live sets  
 of pipes to tank and cup ejectors.  
 Automatic on/off operation of circulating pump and boilers governed by  
 air temperature and inner lift cup water temperature.  
 Both temperature sensors located at inner lift cup level on North Side of  
 boiler.  
 Boilers provided with permanent pilots.



#### Appendix 4 Table of Primary Archive Sources

All documents are held at the National Gas Archive, Warrington

<b>Ref. No.</b>	<b>Title</b>	<b>Description</b>
GJ_1925_V170_P956	Derby, Litchurch gasworks, Cavendish St gasworks, Belper gasworks - history, description, photographs	
GJ_1909_V106_P844	Derby - description, photographs, diagrams, tables	
GJ_1908_V102_P99	Derby, Litchurch & Cavendish St gasworks - description	
EM/DEG/CST/E/E/7	Cavendish Street- Plan of Proposed Siding to Gas Works	Cavendish Street works : Proposed siding to gas works at Derby showing Tar & Liquor storage wells and holders and other buildings (not labelled)
EM/DEG/CST/E/E/8	Cavendish Street- Plan of Proposed Sidings to Gas Works	Cavendish Street works : Proposed siding to gas works at Derby showing holders and other buildings (not labelled)
EM/DEG/CST/E/E/9	Cavendish Street- Plan of Works	Cavendish Street works showing Gasholders, Retort houses, Purifiers & Coal store

Appendix 5 Index of Digital Photographs



PPD16-0001



PPD16-0002



PPD16-0003



PPD16-0004



PPD16-0005



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PPD16-0010



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PPD16-0031



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PPD16-0041



PPD16-0042



PPD16-0043



PPD16-0044



PPD16-0045



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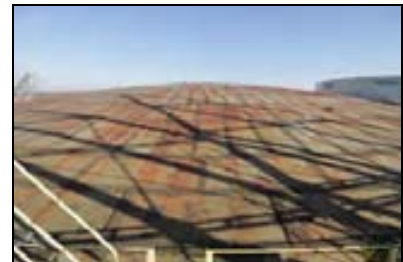
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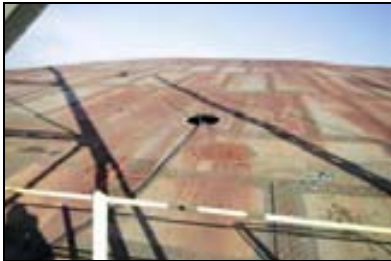
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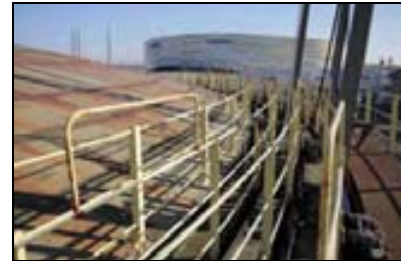
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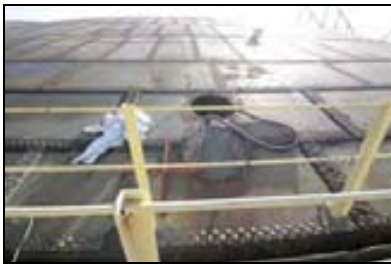
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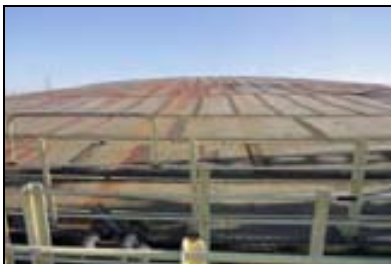
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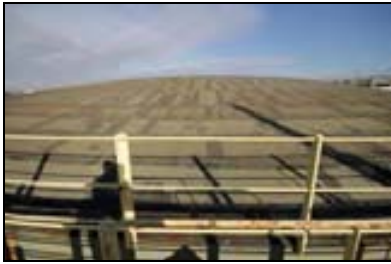
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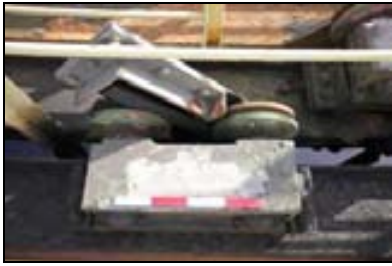
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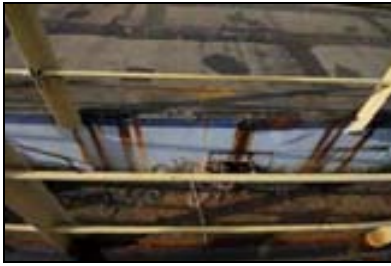


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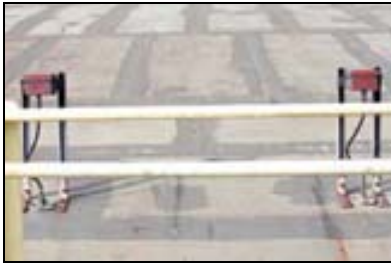
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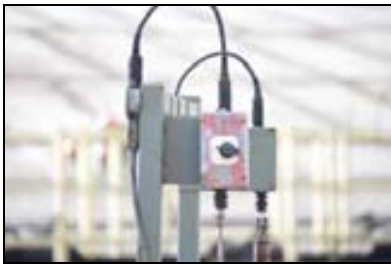
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## Appendix 6 OASIS Data Collection Form

OASIS ID: archaeol6-243144

### Project details

Project name	FORMER GASWORKS, PRIDE PARK, DERBY HISTORIC BUILDING RECORD (HISTORIC ENGLAND LEVEL 2)
Short description of the project	<p>In February 2016 Archaeology South-East (a division of the Centre for Applied Archaeology, UCL) carried out a programme of historic building recording of the gasholder station at Pride Park, Derby, Derbyshire (NGR: 437124 335192). The work was commissioned by Montagu Evans LLP on behalf of National Grid, in advance of the demolition of the structures on the site as part of a scheme to remediate the site ahead of redevelopment. The gasholder compound comprises two large gasholders; number '6' to the south, and '7' to the north. The gasholders dominate the site, which is primarily paved with hardstanding, with occasional sections of hardstanding. Two ancillary buildings (the antifreeze pump house and boiler house) are situated between the holders to the west. The south end of the site contains a modern gas station, and was not included in the building record. Constructed in 1956/7 and 1960/2 the gasholders represent fairly typical mid-20th century water-sealed spiral-guided design, based on a developed design by Gadd and Mason of Manchester (1887). The existing gasholders and plant form the last phase of expansion of an earlier gasworks established by the Derby Gas Light and Coke Company in 1867, originally situated to the west of the current site, the whole being illustrative of the evolution of the gas industry from its origins at the beginning of the 19th century, up until the present day.</p>
Project dates	Start: 01-02-2016 End: 29-02-2016
Previous/future work	Yes / Yes
Any associated project reference codes	PPD16 - Sitecode
Any associated project reference codes	160106 - Contracting Unit No.
Type of project	Building Recording
Site status	None
Current Land use	Industry and Commerce 1 - Industrial
Monument type	GASHOLDER Modern
Monument type	GASHOLDER Modern

Significant Finds	NONE None
Methods & techniques	"Measured Survey","Photographic Survey","Survey/Recording Of Fabric/Structure"
Prompt	Research

---

### Project location

Country	England
Site location	DERBYSHIRE DERBY DERBY FORMER GASWORKS, PRIDE PARK
Postcode	DE24 8AN
Study area	1.6 Hectares
Site coordinates	SK 37124 35192 52.912551139975 -1.447881018295 52 54 45 N 001 26 52 W Point

---

### Project creators

Name of Organisation	Archaeology South-East
Project brief originator	Montagu Evans LLP
Project design originator	ASE
Project director/manager	Amy Williamson
Project supervisor	Seth Price
Type of sponsor/funding body	National Grid

---

### Project archives

Physical Archive Exists?	No
Digital Archive recipient	National Gas Archive
Digital Media available	"Images raster / digital photography","Text"
Paper Archive recipient	National Monuments Record, Swindon and National Gas Archive, Warrington



Paper Media available "Report", "Unpublished Text"

---

### Project bibliography 1

Publication type Grey literature (unpublished document/manuscript)

Title FORMER GASWORKS, PRIDE PARK, DERBY HISTORIC BUILDING RECORD (HISTORIC ENGLAND LEVEL 2)

Author(s)/Editor(s) Price, S.

Date 2016

Issuer or publisher Archaeology South-East

Place of issue or publication Portslade

Description Historic Building Record

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Entered on 19 February 2016

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