Archaeology South-East

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TAYFEN ROAD GASHOLDER STATION, BURY ST EDMUNDS, SUFFOLK

HISTORIC BUILDING RECORD (HISTORIC ENGLAND LEVEL 2)

NGR: 585134 264854

Commissioned by
Montagu Evans
on behalf of National Grid

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Site Code: TYB15
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SUMMARY

In July 2015 Archaeology South-East (a division of the Centre for Applied Archaeology, UCL) carried out a programme of historic building recording of the Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk, IP33 1TB (NGR: 585134 264854; Fig. 1). The work was commissioned by Montagu Evans LLP on behalf of National Grid, in relation to the proposed redevelopment of the gasworks site.

As existing, the site contains a single gasholder (Gasholder No. 112), a series of ancillary buildings including an office, storage units alongside open storage areas, and open land. In addition, the site comprises associated E & I equipment, including town & district governors and a fan booster with an operational gas compound located along the southern boundary. The gasholder was constructed by 1956 by Firth Blakeley Son & Co Ltd. and represents a typical mid-20th century water sealed holder. The gasholder is based on a British spiral-guided design patented in 1887 by Gadd & Mason of Manchester. Its steel construction and above ground tank is reflective of the continued advances in gasholder innovation.

The extant gasholder and plant which all dates to the 1950s, forms part of an expansion of a former works established in 1834, originally situated to the south of the current site. The gasholder, as part of the wider site to the north of Tayfen road was constructed in response to the need for increased gas storage capacity and manufacture within Bury St Edmunds and the surrounding wider area.

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1.0 INTRODUCTION

1.1 In July 2015 Archaeology South-East (a division of the Centre for Applied Archaeology, UCL) carried out a programme of historic building recording of the Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk, IP33 1TB (NGR: 585134 264854); 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. Further work was undertaken during the demolition of the gasholder in December 2015 to document hitherto-unseen elements of the structure.

1.2 The site's redevelopment, including the demolition of the gasholder 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 Suffolk County Council approved planning permission in November 2014 for the redevelopment of the site (Planning ref: DC/14/1859/DE1). Although no conditions were attached to the planning permission, National Grid commissioned the recording as a voluntary exercise as part of a broader commitment to the stewardship of the heritage assets within their property portfolio.

1.4 The Tayfen Road Gasholder Station is a non-designated site. No designated heritage assets (e.g. scheduled monuments or listed buildings) are located within 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 May 2015. The work was also carried out in accordance with the relevant CIfA standards and guidance.

2.2 The gasholder and associated structures were recorded to Historic England Level 2 as defined in *Understanding Historic Buildings: A guide to good recording practice* (English Heritage 2006). 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 Hannah Green and Seth Price on the 3rd July 2015 in order to carry out the recording work. This entailed the compilation of written notes and the production of a photographic record.

2.5 Due to the degraded nature of the tank platform at the time of the survey, only the eastern edge of the structure was accessed for recording purposes. As a result, the number of carriages could not be verified and the majority of detailed constructional photographs taken of the bell, lifts and stairs are concentrated on the eastern side.

2.6 A digital photographic record was made during the site visit. Selected photographs include a 0.5m 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 2). 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), National Monuments Record, Swindon (NMR, Swindon), the National Archives (NA, Kew) and the Suffolk Record Office and Archives (SRO, Bury St Edmunds). 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 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.

2.8.1 In connection with the redevelopment of the site National Grid have also commissioned a second phase of recording to be made during the demolition of the gasholder in order to record the internal areas within the bell. During the demolition of the gasholder, a subsequent visit to the site was made by Christopher Curtis (16th December 2015) to document hitherto-unseen elements of the structure.

2.9 An operational gas compound is located towards the site's southern boundary (as identified on Figure 2) but does not form part of the planning application; as such the compound does not form part of this record.

3.0 SITE LOCATION

3.1 The site occupies an area of land measuring 1.134 ha (centred at NGR 585134 264854; Figure 1). The site is located to the north of Bury St Edmunds, at the junction of Tayfen Road and St Albans Street North. The site is bound to the north by an area of open land which is bordered by modern residential estates and cut by the A14 road and railway – Bury St Edmunds station is located approximately 0.5km from the site. Land to the south of the site is predominantly residential. An area of industrial land is situated to the west of the site at Oster Road. Tayfen Stream bounds the compound's eastern extent, beyond which the buildings alongside Station Hill are of a more industrial nature. The site is accessed on its southern side via Tayfen Road.

3.2 The gasholder compound comprises a relatively clear area of concrete hardstanding, except for a single decommissioned gasholder (known as Gasholder 112) to the southern boundary. To the east of the holder is associated plant including E & I equipment, comprising a town and district governor and fan booster, in addition to a series of ancillary buildings, including an office and temporary storage units. Areas of vacant grassland form the northern and eastern extent of the wider site. An operational gas compound is located towards the site's southern boundary (see Section 2.9).

4.0 HISTORIC BACKGROUND

4.1 The use of gas for street lighting originated during the late 18th century in London and was established by Frederic Windsor. By 1823 London had three gas works,

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 1811, Bury St Edmunds established Paving and Improvement Commissioners for the town and by 1820 they were given the right to borrow up to £10,000 to repair and light the streets and houses using gas, which included the authorisation of the necessary gas works and pipelines (Figure 3).

4.3 On 11th January 1834, the commissioners signed a contract with John Malam and Thomas S. Peckston for the construction of a gasworks on Tayfen Road to supply the streets and public and private buildings within the town; the works took two years to complete and cost £12,000. One of the first buildings to be supplied with gas lighting from these works was the new Baptist Chapel in 1834, closely followed by St Mary's church in 1837. The original gas works was located to the east of the existing site, to the southern side of Tayfen Road. At this time the site produced gas by heating coal within a closed container and collecting it within two simple single tier gasholders to the rear of the site. The tar produced as a by-product was sold as fuel.

4.4 By January 1835, the gasworks were brought by the newly formed Bury St Edmunds Gas Light Company. At this date the works obtained their coal via canal from the Fornham Wharf along the River Lark. In December 1846 the railway arrived in Bury St Edmunds and soon became the preferred method of coal transport and subsequently reduced the price of coal within the area by 10 percent. As a result the gas works could now obtain its coal from the goods yard at Northgate Station erected in November 1847.

4.5 In *c.*1840 the Bury St Edmunds Gas Light Company was acquired by the Bury St Edmunds Gas Company, established in 1849 by Robert Bevan after the bankruptcy of the Malam and Peckston firm.

4.6 In 1857 the gasworks' capacity increased with the construction of the first telescopic gasholder at £950, with a holding tank costing £619 (Figure 4). A photograph taken in 1871 shows the 1857 telescopic gasholder located to the right, with a single tier 1834 gasholder situated to the left (Figure 5).

4.7 In 1876 the Tayfen works increased its capacity for a second time with the construction of an additional gasholder (Figure 6), located outside the existing restrictive site perimeter to the east of Ipswich Street. During these works, a new gas purifier was built with a series of gas mains, followed by a retort house in 1877. The Ordnance Survey Map of 1886 (1:2500, 1st edition) (Figure 7) shows the three gasholders (dated 1834, 1857 and 1876) and the general site layout during this period.

4.8 Technological advancements in gas lighting in 1887 by Carl Auer and the introduction of gas cooking in Bury St Edmunds in 1897 ensured an ever increasing demand for gas in domestic premises during the end of the 19th century. As a result the gas company opened a showroom in the town (relocated in 1907 to the gasworks itself) to promote the use of gas cookers and to promote a hire service. The emphasis being placed on gas heating appliances, due to the conversion of the town's gas street lighting to electric in February 1901.

4.9 The Ordnance Survey map of 1904 (1:2500, 1st revision – not reproduced) shows the original gasworks site virtually unchanged since 1886. The area occupied by the

current site to the north of Tayfen Road is shown as four parcels of undeveloped land, with a small rectangular building located to the south. This remained unchanged until 1926 when the southern boundary was in use as a timber yard.

4.10 The Ordnance Survey map of 1926 (1:2500, 2nd revision; Figure 8) shows the gasworks following its expansion in 1923, when it underwent an extensive reorganisation. The map shows the works comprised the original site with the demolition of the 1834 holder to provide space for a new fertiliser plant, producing Sulphate of Ammonia from waste products. The original site also contained the telescopic 1857 holder, manufacturing plant, offices and workshops, all located on Tayfen Road, bound by Peckham Street, Ipswich Street and St Andrews Street. To the east of Ipswich Street was the second site, containing a control room and the 1876 holder. Opposite the original site was the third site extension, comprising a tar refining plant and additional storage area for coal and coke. Combined, these works covered 3.28 acres.

4.11 A photograph of the gas works taken in 1933 (Figure 9) shows the construction of the new gasholder completed by this date, located to the immediate west of the 1876 holder, to the east of Ipswich Street. The 1857 holder was de-commissioned as part of these development works. A photograph of the site taken in 1934 (Figure 10) and the Ordnance Survey Map of 1938 (1:10506, 3rd revision – not reproduced) depicts the erection of a new tar refining plant during the same phase of works, situated opposite the original works, replacing the 1920s plant. By 1934 the company supplied the town with road tar and paths, sulphate of ammonia and coke, in addition to gas. The company controlled *c.*22 miles of town gas mains, supplying 3,600 consumers, including 2,660 gas cookers, 1,500 gas fires and heaters and 780 water heating appliances (Bury St Edmunds Gas Company 1834).

4.12 Air photography taken on the 29th August 1946 (Figure 11) shows the site during World War II when the gasworks began to produce 'water gas' due to the shortage of coal reserves; this was produced by blowing steam over hot coke to produce gas. The resulting product was of inferior quality to coal gas but the combination of the two sources ensured demand was met. During 1942, a carburetted water gas plant (C.W.G) was constructed to the north side of Tayfen Road; this site became the main focus for future gas improvements.

4.13 Air photographs taken on the 18th February 1949 (Figure 12) gives a view of the gas works following the Gas Act of 1948 which nationalised 1,064 local gas companies into 12 Area Gas Boards, overseen by the National Gas Council. At this time the site came under the control of the Eastern Bas Board.

4.14 The Ordnance Survey map of 1958 (1:10506 – not reproduced) shows the construction of the exiting three lift, spiral guided gasholder (Gasholder 112), which began in 1951 by Firth Blakeley Son & Co Ltd. and could hold 750,000cf of gas (Figures 13 & 14). Previous to this development, the site's existing holders could store up to 280,000 cf of gas, limiting their supply to just four hours at peak demand. Gasholder 112 was subject to a series of air photographs taken on the 2nd February 1955 (Figure 15) and the 21st January 1959 (Figure 16) which show the constructional arrangement of the holder and its above ground steel tank. In addition to these photographs are two site plans of the complete gasworks, produced in 1957 (Figures 17 & 18) which defined the original site land as the 'former works site' and contains a main office, retort house, water tank, benzole plant and a purifier house. The second site to the east of Ipswich Street comprises a meter house, governor, the 1876 holder (identified as No. 2 Holder with a capacity of 140,000cf) and the 1933

holder (identified as No. 3 Holder, with a capacity of 150,000cf). To the north of Tayfen Road, opposite the original site, is the location of the existing Gasholder 112 (identified as No. 4 Holder) with gas mains, alongside a station governor, a C.W.G steel tank holder (50,000 cf capacity), distribution compound and a C.W.G plant, purifiers and a workshop.

4.15 During the 1960s the cost of gas manufacture became too expensive and a grid main was installed to import gas from North Africa via Canvey Island. A site plan produced in 1961 (Figure 19) and a series of aerial photographs taken of the site on the 3rd December 1962 (Figure 20) and on the 16th September 1963 (Figure 21), show the original works site in more detail. Showing a series of garages, offices, test room and two coal sheds towards the western end, the remaining area comprises the retort house, condenser, exhausts, coke grading shed, water tank, Benzole pant, purifiers and the Board's House situated to the south of the site alongside a former rope walk that has become a garden. A site plan dated 1965 (Figure 22) shows a distribution store replacing the former workshop situated to the north of Tayfen Road and the northern part of the site is identified as a storage area for Coke and Oxide. Beyond the storage compound are allotments and a separate parcel of land to the north-west corner, labelled as Corporation Property (identified as Council Yard in 1966). The gasworks finally ceased gas production on 11th April 1964, though the gasholders continued to store the local gas supply and distribute it to consumers at the correct pressure as part of the integrated national grid service.

4.16 By the completion of the Ordnance Survey map of 1965 (1:1250 – not reproduced) supplies of natural gas had been discovered off the Yorkshire coast. The discovery made the prospect of a national conversion to natural gas viable and the process of converting 20 million gas appliances began in 1967.

4.17 A series of aerial photographs taken on the 3rd May 1970 (Figure 23) of the gas works and the Ordnance Survey map of 1970 (1:1250 – not reproduced) show the works mostly unchanged, except from the demolition of the C.W.G Purifier building. In 1971 Bury St Edmunds was converted to run on natural gas and the Gas Act of 1972 restructured the nationalised British Gas industry with the replacement of the Gas Council with the British Gas Corporation.

4.18 The Ordnance Survey map of 1986 (1:1250 – not reproduced) combined with a series of aerial photographs taken on the 23rd October 1983 and 7th August 1988 (Figures 24 & 25) show the gas works underwent a significant reduction during a period of privatisation in 1986, when many smaller companies were replaced by British Gas PLC. The original works site to the south of Tayfen road was cleared and a bank constructed to the western boundary. The site to the east of Ipswich Road had been redeveloped as a residential cul-de-sac and the two gasholders removed. To the north of Tayfen Road, all that remains is the existing gasholder (Gasholder 112) and the distribution store, following the clearing of the former C.W.G Plant and storage areas.

4.19 A wealth of archival material is available for the site during the 1990s (See Appendix 3), including a collection of aerial photographs taken in 1997 (Figure 26) and 1998 (Figure 27); these sources show the site unchanged since 1986.

4.20 Aerial photography of the gas works taken in 2000 and 2002 (negatives held by Historic England; Appendix 3) show the site unchanged during the transmission of all gas and electricity to the National Grid. In April 2011, the National Grid began a programme of gas mains replacement across Bury St Edmunds. As part of these

improvement works, the existing gasholder (Gasholder 112) was decommissioned and the new gas compound constructed to the southern boundary of the existing site. The former distribution store to the north of Tayfen Road remained *in-situ* until 2014 (Figure 28), when it was demolished. All that remains of the existing site is the area to the north of Tayfen Road, comprising Gasholder 112 and a series of associated E & I equipment, including a town governor, district governor and fan booster. To the east of the holder are areas of concrete hardstanding occupied by an office with storage units and an area of open grassland to the northern and eastern boundaries.

5.0 DESCRIPTION OF THE STRUCTURES

5.1 Gasholder 112

The General Design

5.1.1 Gasholder 112 (Plates 1 and 2 – plate 2 depicts an overview of the interior of the gasholder, provided by the client) represents a relatively typical example of a water-sealed gasholder. The gasholder, constructed between 1951 and 1956 by Firth Blakeley Son & Co Ltd, is a three lift, spiral-guided design with above ground steel tank. The holder was built with a nominal capacity of 750,000 cubic feet (cf) 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). The gasholder is constructed using riveted steel. 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

5.1.2 During operation, the gasholder was filled overnight using a volumetric governor and its stock utilised during the day to meet peak periods of demand. When the 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).

The Principal Elements

5.1.3 The bell is of three lifts with a convex crown (Figure 13) constructed using eight rings of staggered riveted steel plates laid vertically from the centre outwards with the two outer rings set horizontally to provide additional tensile strength (Plate 3). Each ring of the crown increases in width from the centre outwards. The crown is supported within by a series of lightweight steel truss elements formed of flat and angle-iron components tied to a cylindrical central stanchion (Plate 4). The crown is further supported by a series of angle-iron purlins within each segment between trusses.

When the holder is in its emptied state, the central stanchion rests on a tapered square-section box-lattice pedestal (the pedestal is wider at its base) (Plate 5). The crown occupies a surface area of *c.*946.39 sq. m with a diameter of *c.*29.108m. The outer ends of the trusses are fixed by triangular steel brackets to the wall of the first (inner) lift (Plate 6). Every second bracket is larger, and rests atop vertical I-girder ribs which provide additional rigidity to the lift walls. The floor of the gasholder is coated in a layer of riveted steel sheets.

5.1.4 The lift grips at the top of the walls of both the outer and middle lifts measure 270mm in width. Each lift is separated by a water sealed channel; the outer lift is separated from the tank platform by a channel measuring 400mm, a channel measuring 200mm separates the outer and middle lifts and a channel of 150mm separates the middle and inner lifts (Plate 7). The walls themselves are formed of thin steel sheets *c.*10mm thick (Plate 8). The outer tank wall is slightly thicker at *c.*20mm thick. The walls of the second and third lifts are supported by thin vertical ribs within, while the first lift is supported by the larger I-section ribs (see above). In its deflated state, the bases of the two inner lifts sit atop evenly spaced I-girder supports (Plate 9). The lift cups were visible in section during the demolition of the gasholder, being square-sectioned channels, *c.*40mm deep, of thicker steel construction than the lift walls (*c.*20mm thick) (Plate 10).

5.1.5 The gasholder's lift water seals are fitted with continuous monitoring equipment (dated 1988) that, when operational, provide warning for low water levels, each also have a self-monitoring electrical modular heating pump system to prevent the water from freezing, which would inhibit the holder from rising (Plate 11).

5.1.6 A series of guide carriages of paired-wheel type are located at regular intervals around the perimeter of each lift. 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. All guide carriages are secured with a bolted footplate (Plate 12). The guide carriages increase in size from the inner lift outwards, presumably due to their function in supporting the increasing lift weights. Each guide carriage is individually identified with a letter and number: the numbers being assigned in a clockwise direction; the letters corresponding to the individual lifts, A (outer), B (middle) and C (inner).

5.1.7 Each guide carriage houses its respective guide rail which is inclined at 45 degrees, and gripped between the paired carriage wheels (see Appendix 2); the guide rails set within the middle lift guide carriages are set against an additional angled steel backplate (Plate 13). 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. The alignment of the externally mounted guiderails was visible from within the holder during demolition, as scars on the lift walls and where seen in the spaces between lifts (Plate 14).

5.1.8 The outer edge of each lift is served by 3 runs of bolted-on handrails, comprising angle-section uprights and tubular rails; the rails serving lifts A and B measuring 25mm in diameter and standing *c.* 1.5m tall; the uprights to lift C are of the same arrangement but the tubular rails comprise a slightly slender design measuring *c.*20mm in diameter with an additional flat steel plate secured around the base of rail's inner edge (Plate 15).

5.1.9 Each lift is served by a single narrow steel staircase (Plate 16) which is curved to match the profile of the lift; they are all similar in form and supported by bolted-on steel frames comprising paired shallow angle-section uprights, stepped outwards at their base and paired angled girders strengthened at regular intervals with bolted on flat plates, in addition to plain octagonal plates secured at their intersection (Plate 17). The outer edge of each staircase has a bolted handrail of angle-section uprights and tubular rails, which is articulated outwards at the base to allow for ease of passage (Plate 18). The inner carriage of each staircase is grooved to support the travel of a corresponding paired carriage wheel to maintain its position alongside its respective lift, thus providing additional support and stability when operational (Plate 19).

5.1.10 The above-ground tank (Plate 20) measures *c.*34.71m in diameter and rests on a concrete base measuring 300mm in width and 450mm in depth. The tank is constructed with riveted steel sheets arranged over six tiers (Plate 21), each coated with water-borne acrylic paint covering to minimise corrosion. The sheets are strengthened at regular intervals by 20 vertical angled steel uprights reinforced by diagonal flat bar plates at each tier (excluding the uppermost tier, see Section 5.1.11), each upright is secured to the tank via a series of regularly placed L shaped brackets (Plate 22).

5.1.11 A staircase located on the eastern edge (Plate 23) provides access from ground level to a narrow platform that runs around the tank's perimeter. The staircase is of two flights, supported mid-way by a steel framework comprising angle-section uprights with flat bar cross bracing, bolted to a course aggregate concrete base (Plate 24). It is guarded on both sides by simple handrails as elsewhere. The tank platform measuring a width of 750mm is served by a guard rail of identical construction. The platform is supported by angled struts bolted between the underside of the platform and the tank's outer edge, secured to both the exterior plates and the angle-section uprights which form the vertical supports (Plates 25 and 26).

5.1.12 At ground level, to the eastern edge, the gasholder is identified by painted numerals as 'HOL 112' (Plate 27). The tank is flanked to the south-east by two pairs of substantial steel pipes each terminating and joining level with the tank platform (Plate 28). The pipework served as a syphon in relation to an associated dual purpose gas inlet/outlet mains, each set within a concrete base measuring 450mm in depth. The pipework originally extended to the respective plant located to the south-east and south-west of Tayfen Road via a series of brick and concrete piers, as is visible on the works plan of 1950 (Figures 13 & 14). To the north of the pipework is a single inspection hatch with bolt fixings (Plate 29). The northern edge of the tank is fitted with a single steel water overflow pipe, which originally ran to the adjacent drainage system (Plate 30).

5.2 Associated Plant

5.2.1 Located to the south-eastern edge of the gasholder is a concrete structure, with a flat felted roof. The structure rests on a projecting concrete plinth, measuring 3.20m by 2.65m. Each elevation has a cast recessed panel occupying its external face (Plates 31 and 32). The structure is accessible via two timber panel double doors to its northern elevation and a single double door to its south elevation. The structure houses a variety of associated equipment including the electrical modular heating pump system (dated 1988). The system with associated pipework and electric cable casing extends up the holder's south-eastern edge to tank platform level (see Section

5.1.5). The electrical anti-freeze system works in conjunction with the two water circulating pumps to regulate the water temperature between 0.6 degrees Celsius and 1.1 degrees Celsius (National Grid 1999, 20). In addition to this apparatus is the redundant E & I equipment, including station and district governors and fan booster, installed to regulate and maintain a safe gas pressure within the holder and ensure the gas was distributed at the correct pressure to the local area.

Eastern Compound

5.2.2 The land to the east of the gasholder comprises an area of tarmacked hardstanding with wire fencing around its perimeter comprising a main access gate to the site's south-east corner (Plate 33). The compound contains areas of vehicle parking and open storage bays. A series of steel cargo storage units are located along the northern edge of the tarmacked area, in addition to a temporary site office and two small brick built structures, including a Communication Room and Driver's Store. A large rectangular structure located on a plan of the site, in the location of the former Distribution Store (Montagu Evans May 2015, Figure 1, dated 2014) was not present at the time of the survey. See Figure 25 for a site plan detailing the use of all storage units and areas within the compound as of 2nd June 2014. The site is bordered on its northern (Plate 34) and eastern sides (Plate 35) by fenced open grassland, the former location of large open storage areas and a distribution store as recent as 2014.

Site Office

2.2.3 The Site Office comprises a converted steel cargo storage unit, which is accessible from a single flush metal door opening set within the eastern elevation. The interior is lit via two double pane windows located towards the northern end of the east elevation and centrally within the south elevation. Internally, the space is occupied with modern office furniture, including desk, storage and computer facilities.

Communication Room

5.2.4 The Communication Room (Plate 36) is associated with the live operational gas compound located to the site's southern edge (Plate 37). The building is located to the north of the tarmacked area and to the east of the steel container utilised as the site office. The building is a small, rectangular, structure of orange/brown brickwork laid in stretcher bond with a shallow overhung flat concrete roof with felt cover. The structure measures 2.40m by 3.50m and is accessed on its southern elevation via a flush steel door with plain timber frame. The remaining elevations are featureless, except from a small clip-frame safety notice board, CCTV equipment and a steel fire alarm bell, all secured to the building's exterior.

Diver's Store

5.2.5 The Driver's Store (Plate 38) is a small rectangular structure located to the far north-east corner of the tarmacked forecourt. The structure is constructed in a light orange/yellow brick, laid in stretcher bond, with a flat felt roof. The entrance comprises a single flush steel door with flush metal frame and brick soldier head. The remaining elevations are blank.

6.0 DISCUSSION

6.1 Constructed between 1951 and 1956 by Firth Blakeley Son & Co Ltd, the gasholder represents a typical mid-20th century water-sealed spiral-guided design, based on a developed design by Gadd & Mason of Manchester (1887). Its steel construction and above-ground tank reflects the culmination of innovation in gasholder innovation from the late 19th century through to the mid-20th century.

6.2 The gasholder, as part of the wider site to the north of Tayfen road, was constructed in response to the need for increased gas storage capacity and manufacture within Bury St Edmunds and the surrounding area throughout the mid-20th century. The existing gasholder and plant forms the last phase of expansion of an earlier gasworks established in 1834, originally situated to the south of the current site, and is illustrative of the evolution of the gas industry within Bury St Edmunds from its origins at the beginning of the 19th century, up until the present day. The Tayfen Road gasworks, comprising the existing gasholder and associated plant, has undergone 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 19th century. Associated plant changes coincide with the effects of widespread electricity use during the beginning of the 20th century and 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.

6.4 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 20th century.

6.5 The remaining ancillary structures and associated plant serves to give context to the gasholder, while the nearby 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 3 for available primary sources

Secondary Resources

CIfA, 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,2006. *Understanding Historic Buildings: A guide to good recording practice.*

Montagu Evans LLP, May 2015. *Historic Building Recording Brief; Former Tayfen Road Gasworks, Bury St Edmunds*

Internet Resources

Access to Archives
http://www.nationalarchives.gov.uk/a2a/
Accessed 2nd July 2015

Britain from Above
http://www.britainfromabove.org.uk
Accessed 2nd July 2015

www.suffolk.gov.uk/sro
Accessed 6th July 2015

http://www.stedmundsburychronicle.co.uk/gas/gashistory.htm
Consultation of the Bury St Edmunds Gas Company, 1934. *A Century of Progress, 1834-1934*
Accessed 7th July 2015

http://burypastandpresent.org.uk/jarman-images/all-images.shtml
David Addy, May 6th 2012
Accessed 7th July 2015

Digimap Ancient Roam
www.digimap.edina.ac.uk
Accessed 8th July 2015

Google Patents
https://www.google.co.uk/patents/US405702
Accessed 8th July 2015

The National Gas museum, Leicester
http://nationalgasmuseum.org.uk/
Accessed 8th July 2015

8.0 DEPOSITION OF THE ARCHIVE

A full archive intended for deposition at the Local Historic Environment Record Office and Research Centre has been prepared. In addition to a digital copy of the written record intended for deposition to the National Monuments Record, Swindon, Suffolk Council Archive Store and the National Gas Archive, Warrington. The archive has been assigned the site code TYB15. The full site archive will be prepared in accordance with the principles of *Management of Research Projects in the Historic Environment (MoRPHE) (*English Heritage 2006) and the requirements of the recipient museum. 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 Graham Deacon (National Monuments Record, Swindon).

Plates

Plate 1: General view of the gasholder, facing west (TYB15-0001)

Plate 2: General view of the interior of the gasholder, facing west – provided by the client (TYB15-0128)

Plate 3: Detail of the gasholder bell crown construction, facing west (TYB15-0023)

Plate 4: View of the truss construction supporting the bell, facing east (TYB15-0108)

Plate 5: Detail of the central stanchion and pedestal rest, facing south-west (TYB15-0094)

Plate 6: Detail of the inner lift walls and crown intersection, facing north-west (TYB15-0112)

Plate 7: Detail of the three-lift arrangement of the gasholder bell, facing south (TYB15-0028)

Plate 8: Section through the gasholder structure, facing north-west (TYB15-0122)

Plate 9: Detail of the inner lift resting on I-girder support, facing north-east (TYB15-0097)

Plate 10: Section through lift and tank wall sheets – not lift cups, facing south-east (TYB15-0120)

Plate 11: Detail of electrical anti-freeze pump system, dated 1988, located on the middle lift wall, facing west (TYB15-0032)

Plate 12: Detail of carriage wheel construction located on the inner edge of the tank platform, facing south (TYB15-0029)

Plate 13: Detail of carriage wheel and guide rail construction fixed to the second (middle) lift, facing west (TYB15-0031)

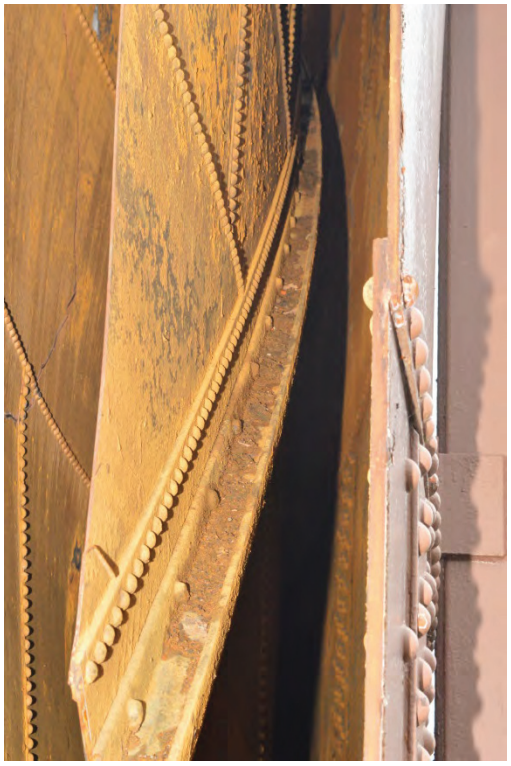


Plate 14: Detail of guiderail seen between lift walls, facing south-east (TYB15-0128)

Plate 15: Detail of outer lift guard rail arrangement, facing west (TYB15-0044)

Plate 16: Detail of lift staircase construction, facing north-west (TYB15-0061)

Plate 17: Detail of middle access stair construction, facing south-west (TYB15-0041)

Plate 18: Detail of angled handrail to the first and third lift access stairs, facing north-west (TYB15-0039)

Plate 19: Detail of staircase guide carriage located on the middle lift, facing south-west (TYB15-0034)

Plate 20: General view of gasholder tank construction, facing north-west (TYB15-0004)

Plate 21: Detail of riveted steel plate tank construction, facing south (TYB15-0014)

Plate 22: Detail of vertical reinforcements situated around the tank's outer edge, facing south (7374_0015)

Plate 23: Detail of staircase providing access to the tank platform from ground level, facing south-west (TYB15-0002)

Plate 24: Detail of staircase base and support standard arrangement, facing north (TYB15-0018)

Plate 25: Detail of staircase landing and tank platform supports, facing west (TYB15-0064)

Plate 26: Detail of tank platform and guard rail, facing north (TYB15-0027)

Plate 27: Detail of the gasholder identification marking and acrylic paint covering, facing west (TYB15-0003)

Plate 28: Detail of the inlet and outlet gas mains pipework to the tank's eastern side, facing south-west (TYB15-0017)

Plate 29: Detail of inspection hatch to the tank's eastern side, facing north-west (TYB15-0016)

Plate 30: Detail of the water overflow pipework and associated ground drainage to the tank's northern edge, facing south (TYB15-0010)

Plate 31: Detail of the concrete housing and pipework for the modular heating pump forming part of the anti-freeze system, facing south (TYB15-0020)

Plate 32: Detail of the concrete housing for the associated plant comprising modular heating pump forming part of the anti-freeze system and E&I equipment, facing north (TYB15-0021)

Plate 33: General view of the site compound containing ancillary brick buildings, cargo storage units and vehicle access areas to the east of the gasholder, facing north-west (TYB15-0062)

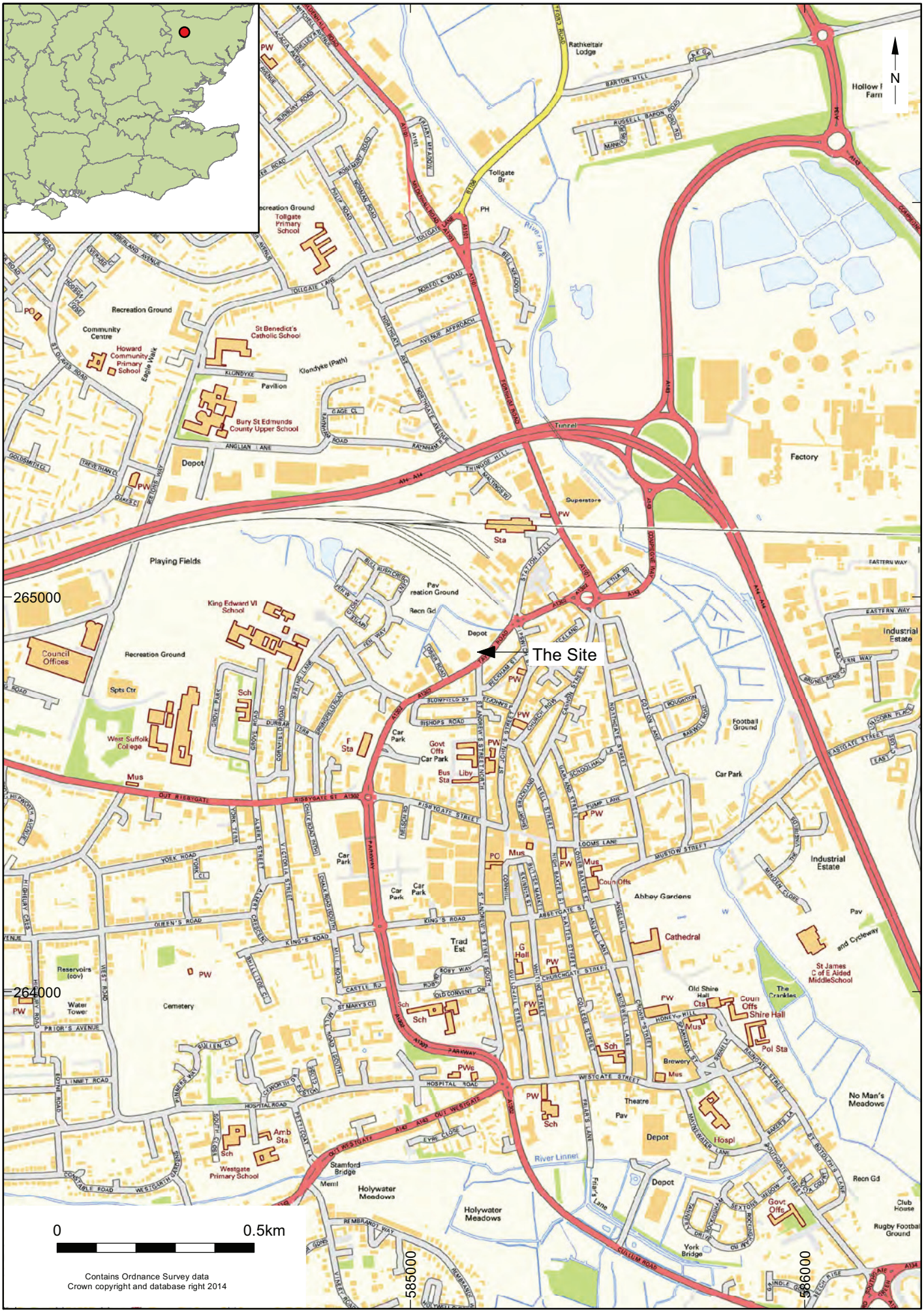
Plate 34: General view of the land to the northern extent of the site, facing north (TYB15-0065)

Plate 35: General view of the land to the eastern extent of the site, showing the former location of the distribution store, facing south-east (TYB15-0066)

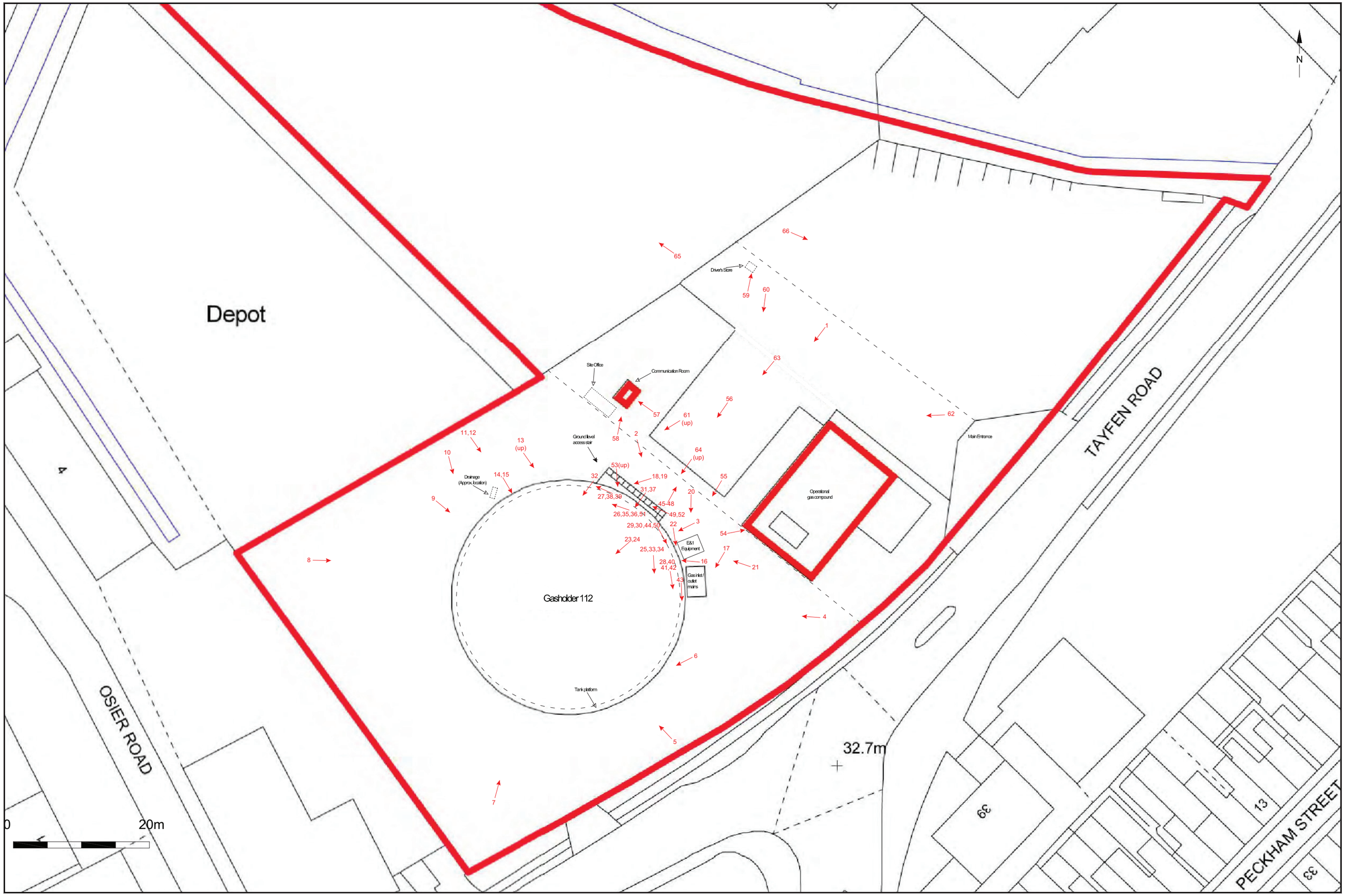
Plate 36: View of the brick built Communication Room, facing north-east (TYB15-0058)

Plate 37: View of the Lorry Driver Store located to the site's eastern boundary, facing east (TYB15-0059)

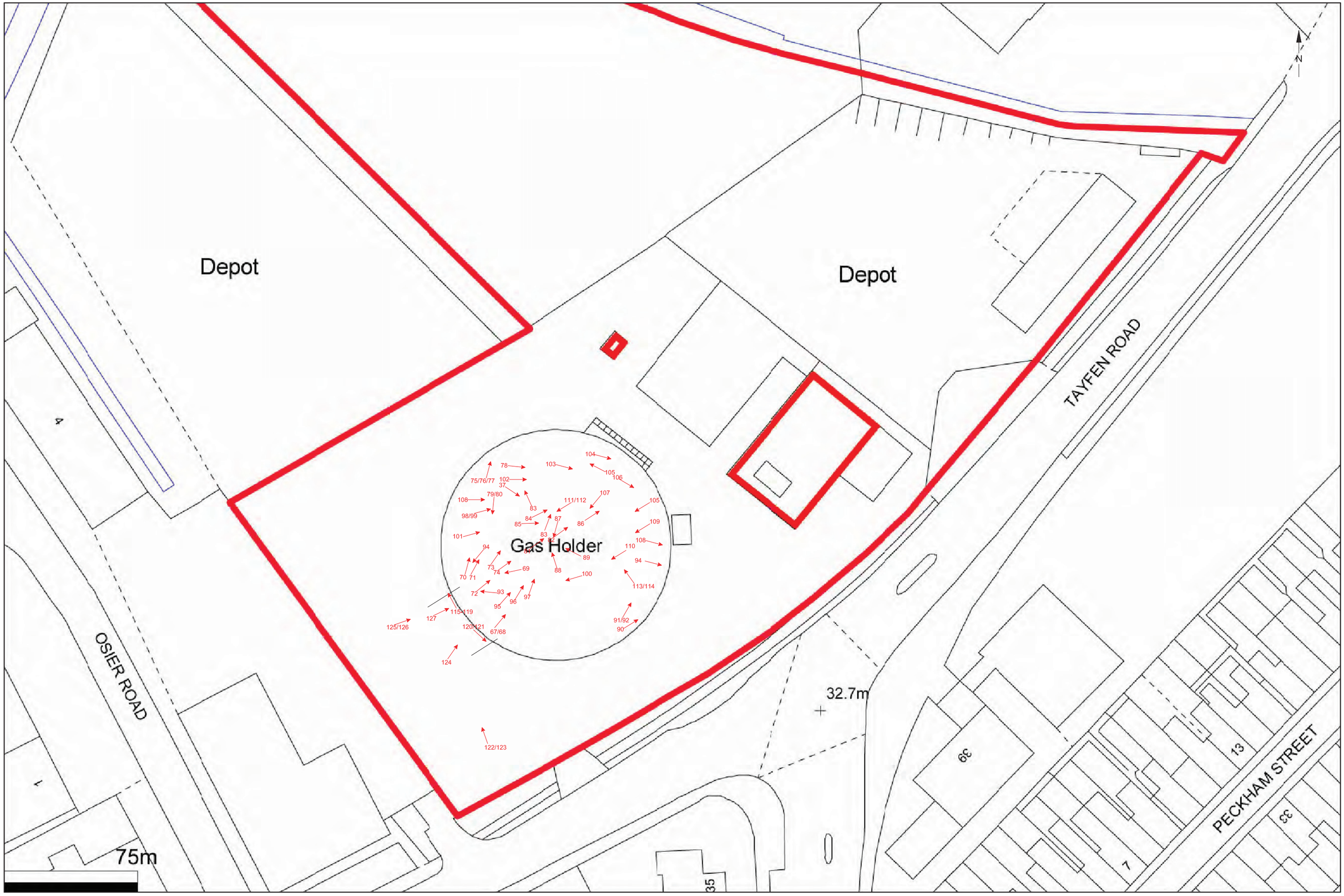
Plate 38: General view of the remaining operational gas compound, facing south-east (TYB15-0054)



© Archaeology South-East		Tayfen Road Gasholder Station, Bury St. Edmunds, Suffolk	Fig. 1
Project Ref: 7605	July 2015	Site location	
Report Ref: 2015238	Drawn by: HG		



© Archaeology South-East		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 2
Project Ref: 7605	2015	Existing Site Plan and Photo Locations	
Report Ref: 2015238	Drawn by: HG		

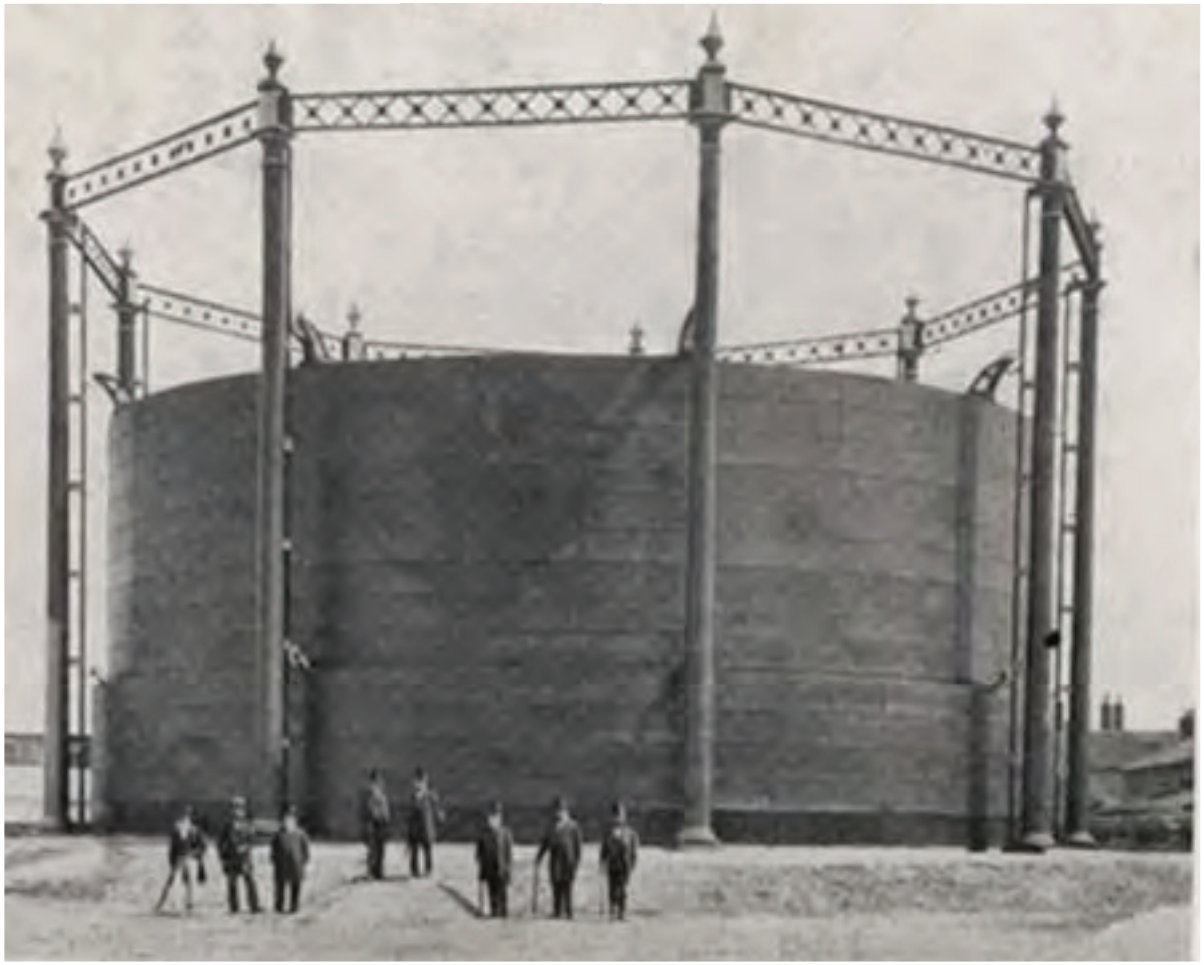


© Archaeology South-East		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 3
Project Ref: 7605	2015	Existing Site Plan and Photo Locations (During Demolition)	
Report Ref: 2015238	Drawn by: SP		

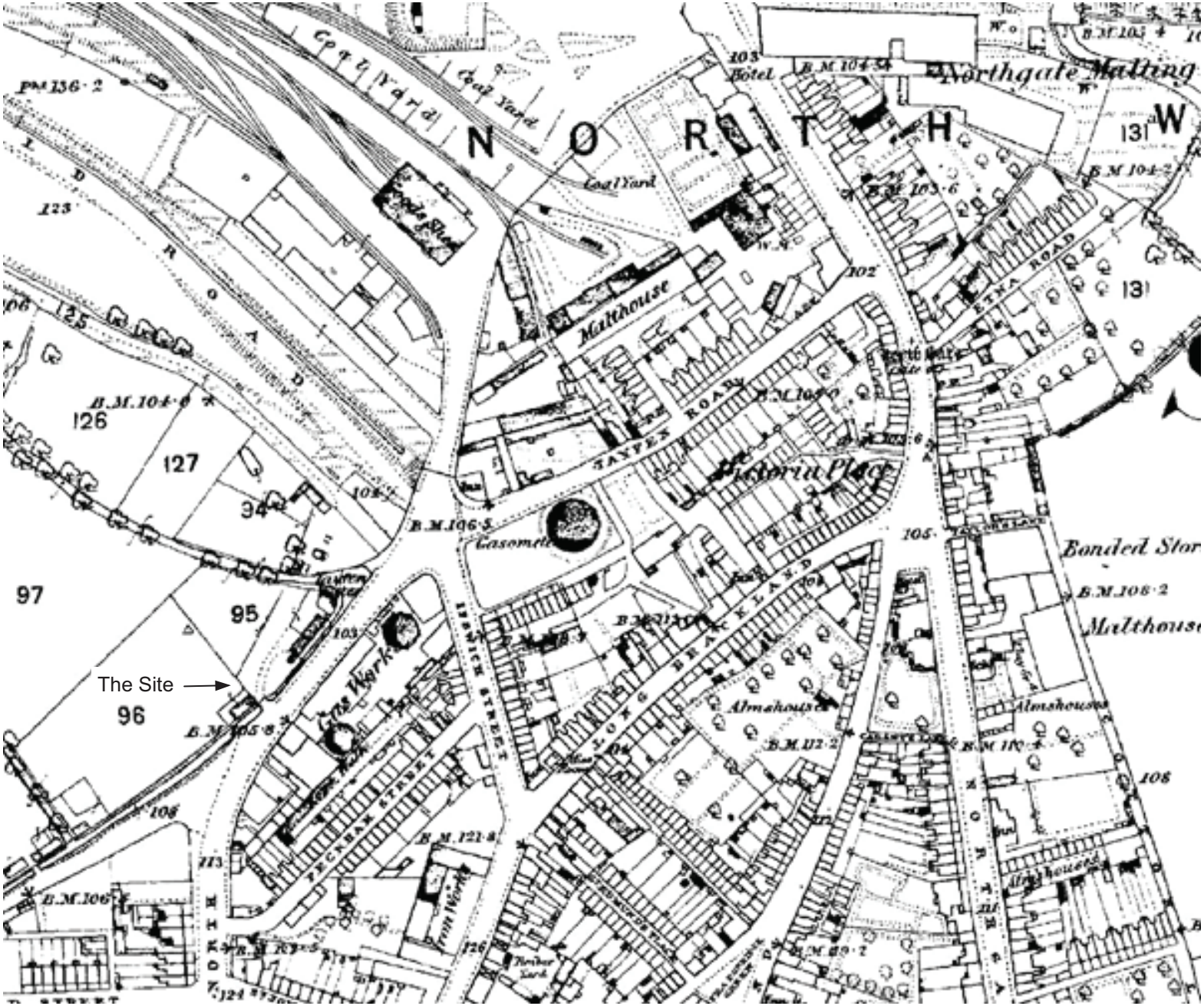
© Archaeology South-East		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 4
Project Ref: 7605	July 2015	Photograph of early gas street lighting in Bury St Edmunds (Suffolk Record Office)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 5
Project Ref: 7605	July 2015	Construction of the 1857 Gasholder (Suffolk Record Office)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 6
Project Ref: 7605	July 2015	Photograph of the site taken in May 1871, showing the 1834 and 1857 Gasholders (Source: www.burypastandpresent.org.)	
Report Ref: 2015238	Drawn by: HG		

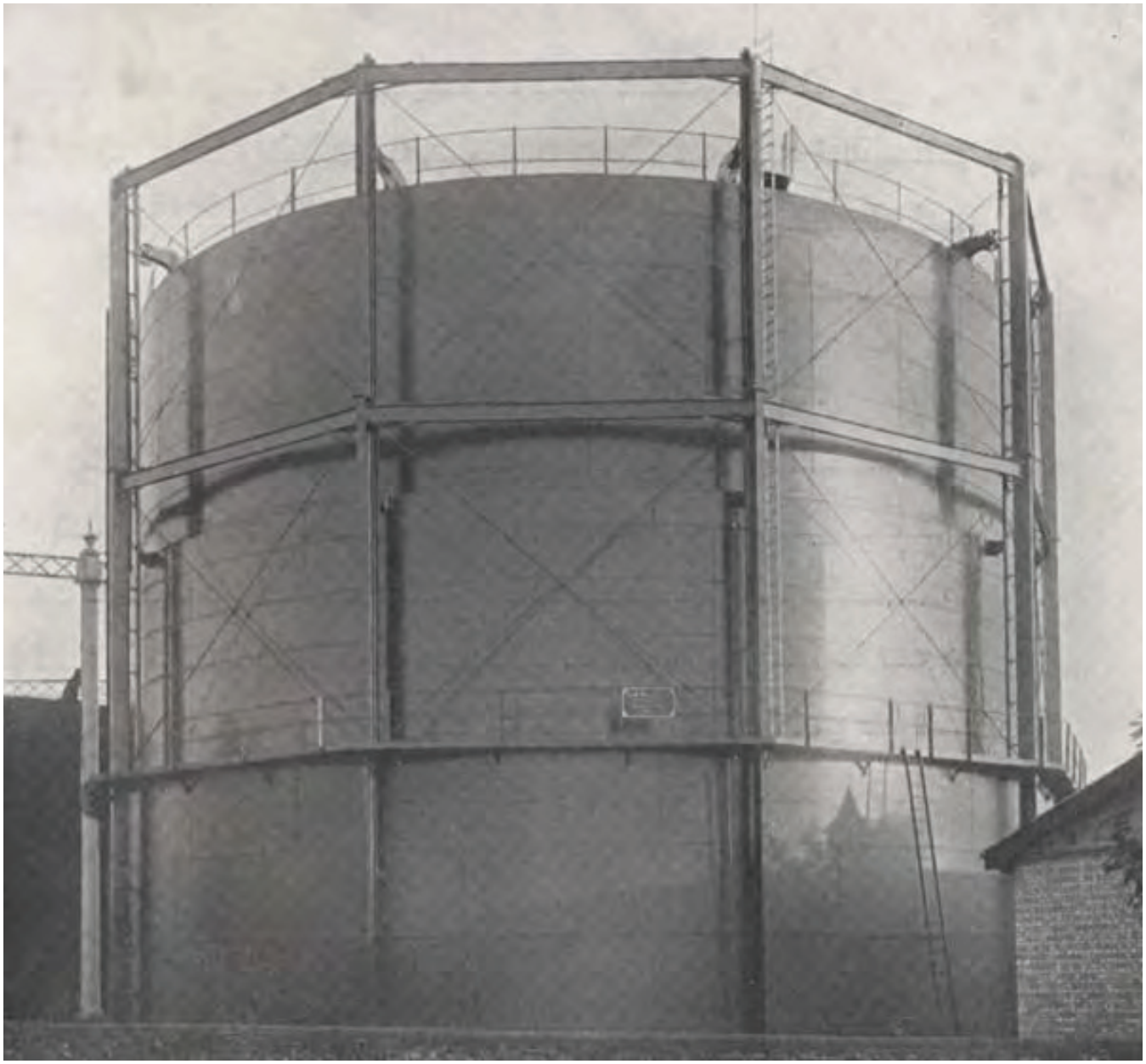


© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 7
Project Ref: 7605	July 2015	Directors and Officials at the opening of the 1876 Gasholder (Source: Addy, D. 2012. 20)	
Report Ref: 2015238	Drawn by: HG		



© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 8
Project Ref: 7605	July 2015	Extract from the 1886 Ordnance Survey Map (Source: www.stedmundsburychronicle.co.uk)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 9
Project Ref: 7605	July 2015	Ordnance Survey Map of 1926 showing the location of the former gasworks and the position of the existing and proposed Gasholders (NGA Ref. EA/BUS/E/E/1)	
Report Ref: 2015238	Drawn by: HG		

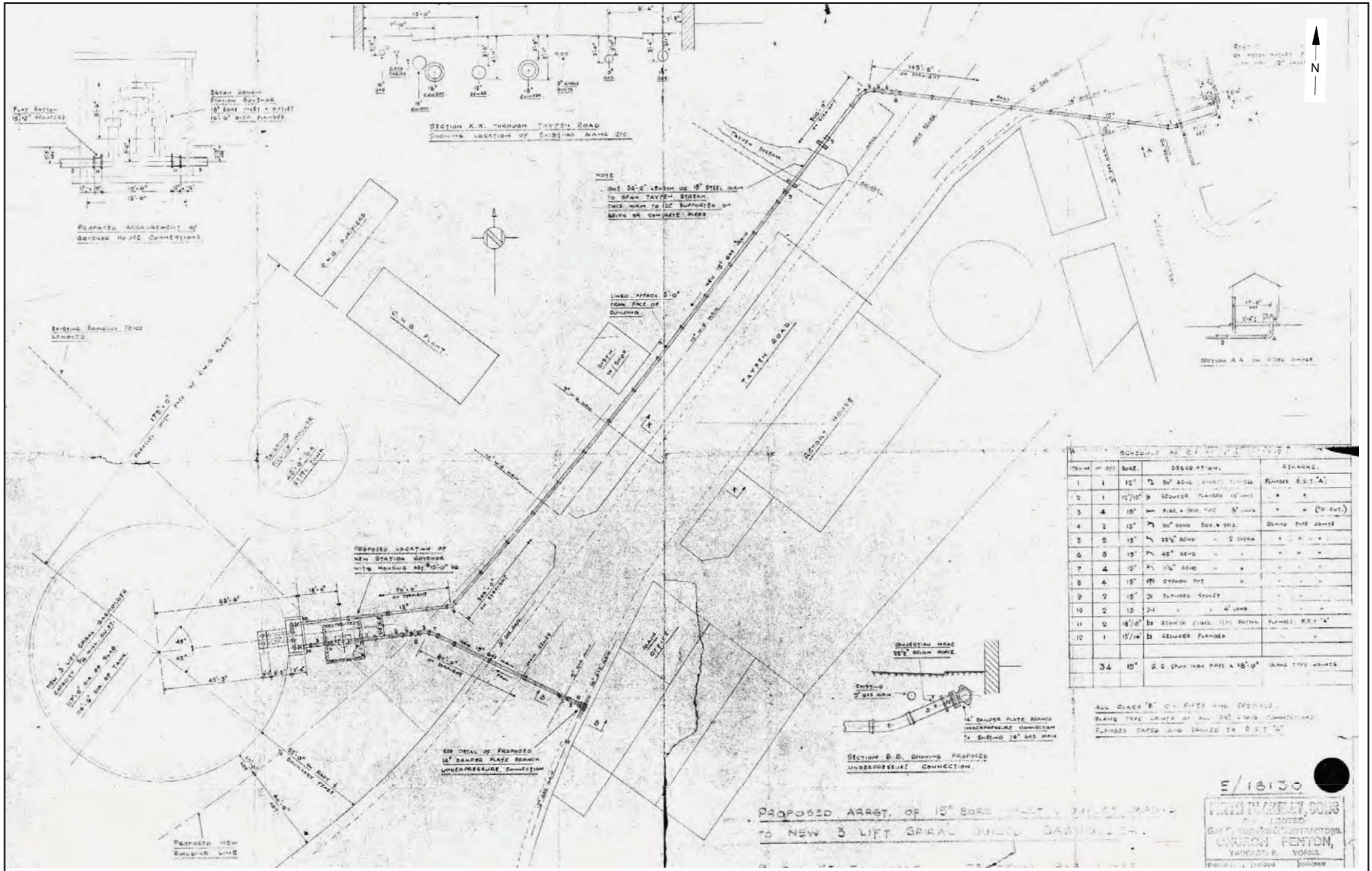


© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 10
Project Ref: 7605	July 2015	Photograph of the completed 1933 Gasholder (Source: Addy, D. 2012. 20)	
Report Ref: 2015238	Drawn by: HG		

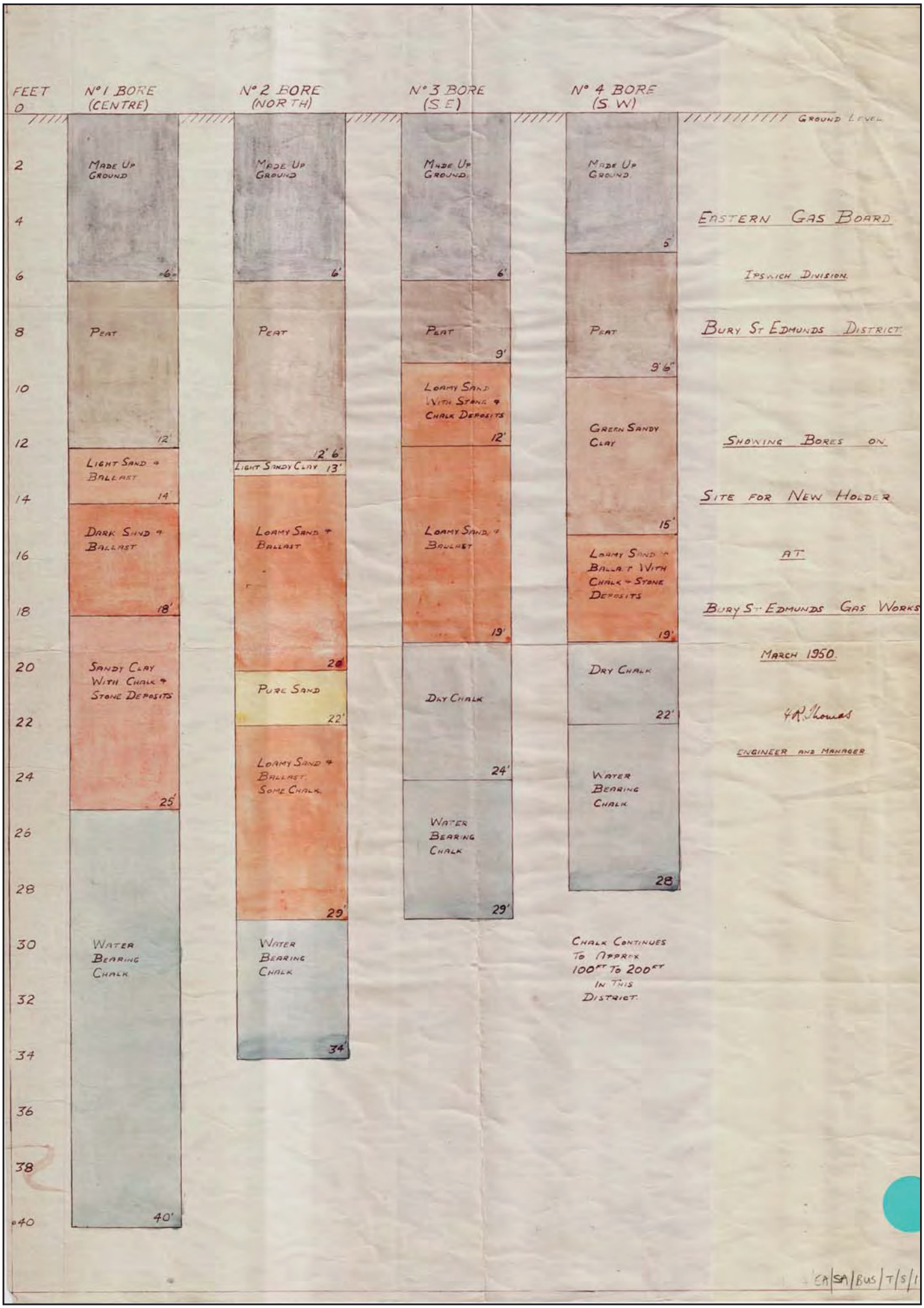
© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 11
Project Ref: 7605	July 2015	Photograph of the site in 1934 (Source: Addy, D. 2012. 10 & 11)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 12
Project Ref: 7605	July 2015	Aerial photograph of the site, dated 29th August 1946 (HE Ref. RAF_106G_UK_1707_RS_4025)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 13
Project Ref: 7605	July 2015	Aerial photograph of the site, dated 18th February 1949 (HE Ref. RAF_58_189_V_5077)	
Report Ref: 2015238	Drawn by: HG		



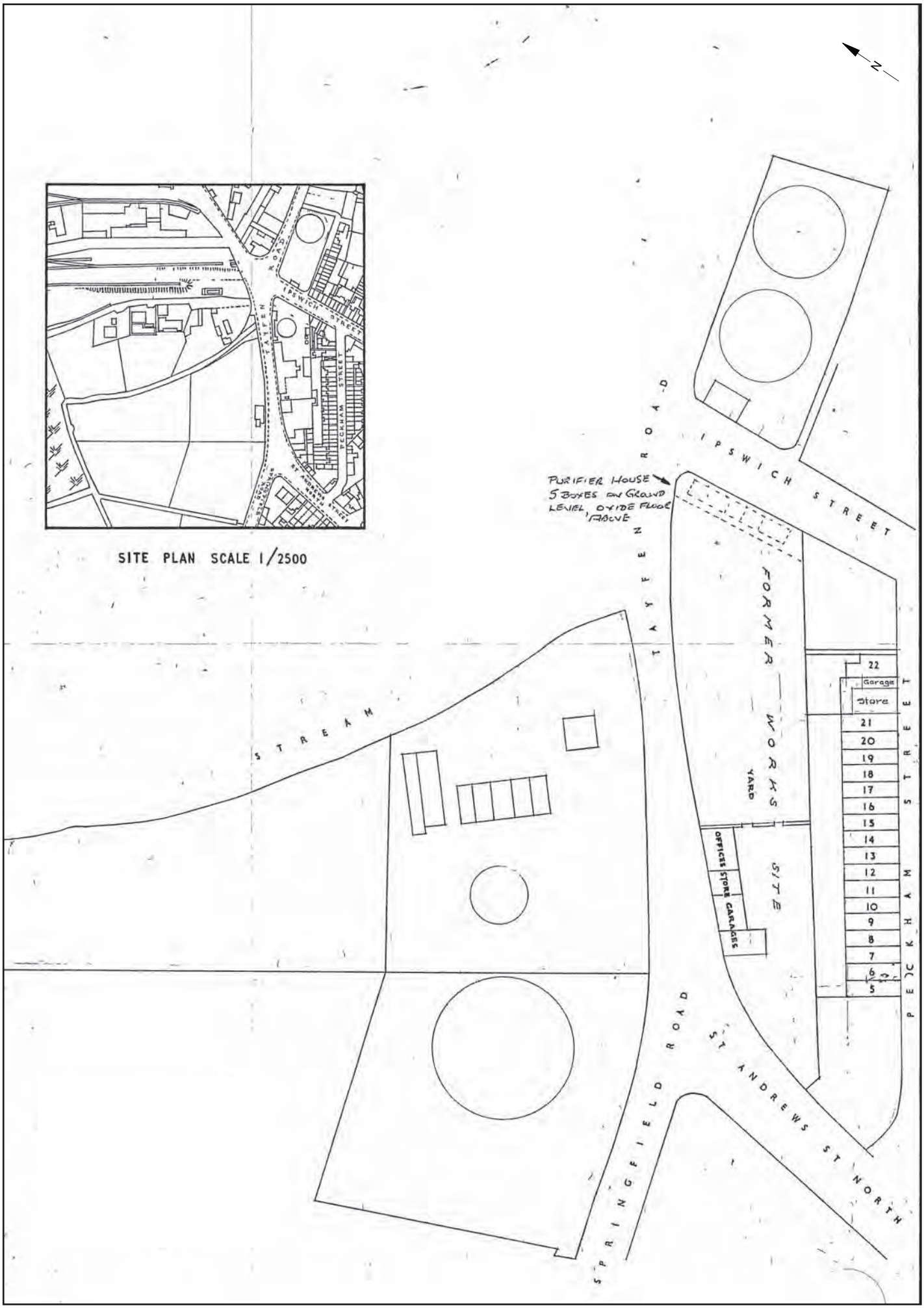
© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk
Project Ref: 7605	July 2015	Drawing showing proposed arrangement of 15 inch bore inlet & outlet mains to new 3 lift spiral guided Gasholder c.1950 (NGA Ref. EA/EA/SA/BUS/E/T/1)
Report Ref: 2015238	Drawn by: HG	Fig. 14



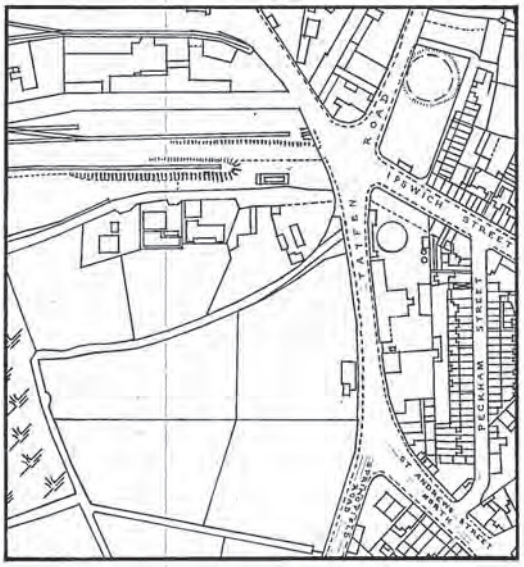
© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 15
Project Ref: 7605	July 2015	Eastern Gas Board's property showing bores on site for the spiral guided gasholder, 1950 (NGA Ref. EA/SA/BUS/T/S/1)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 16
Project Ref: 7605	July 2015	Aerial photograph of the site, dated 2nd February 1955 (HE Ref. RAF_58_1077_F22_0021)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 17
Project Ref: 7605	July 2015	Aerial photograph of the site, dated 21st January 1959 (HE Ref. RAF_58_2677_F22_0180)	
Report Ref: 2015238	Drawn by: HG		

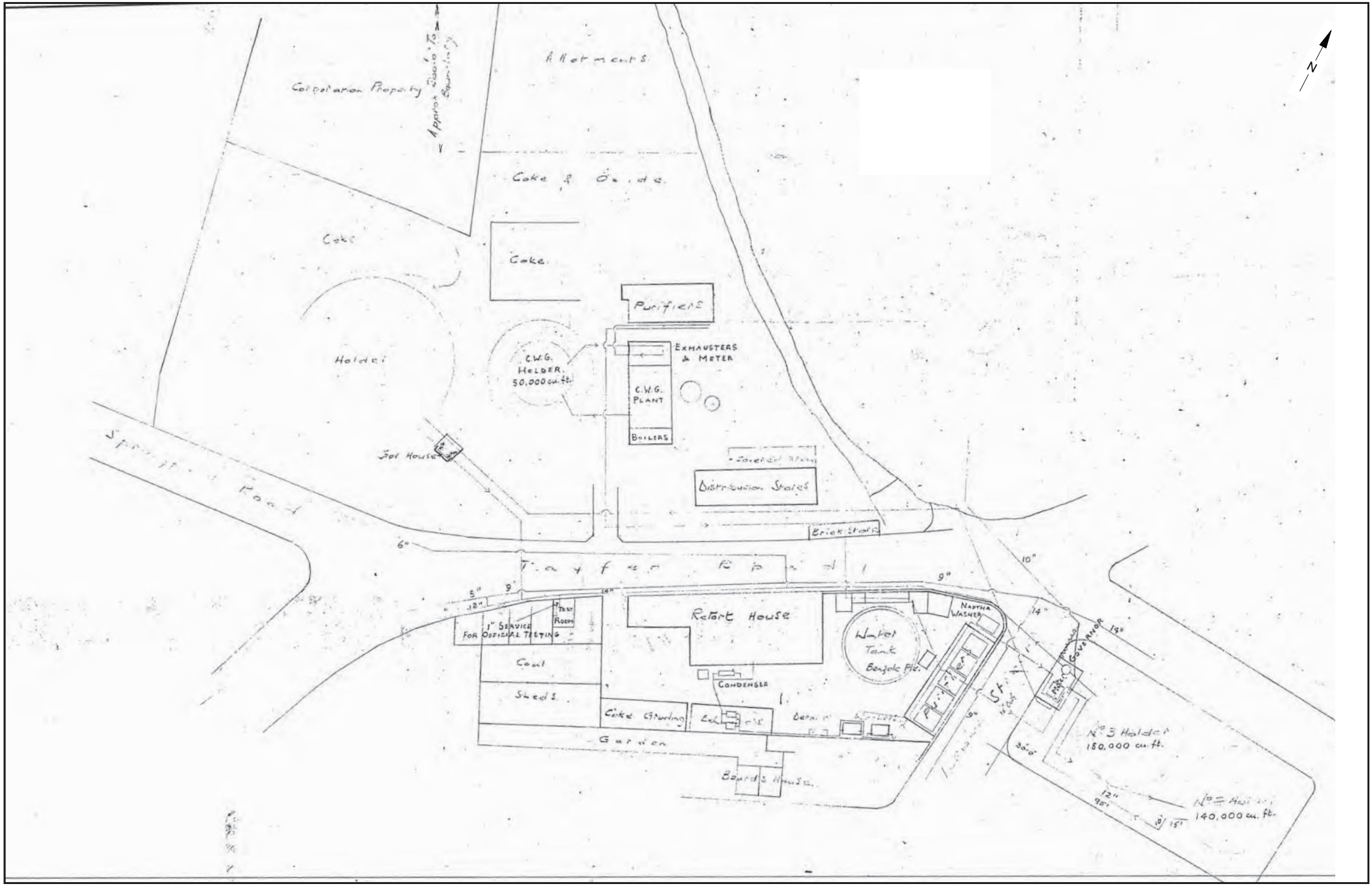


© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 18
Project Ref: 7605	July 2015	Plan of the existing Bury St Edmunds Gasholder Station (1957) (Drawing No. S348/C / NGA Ref. EA/EA/SA/BUS/E/E/1)	
Report Ref: 2015238	Drawn by: HG		

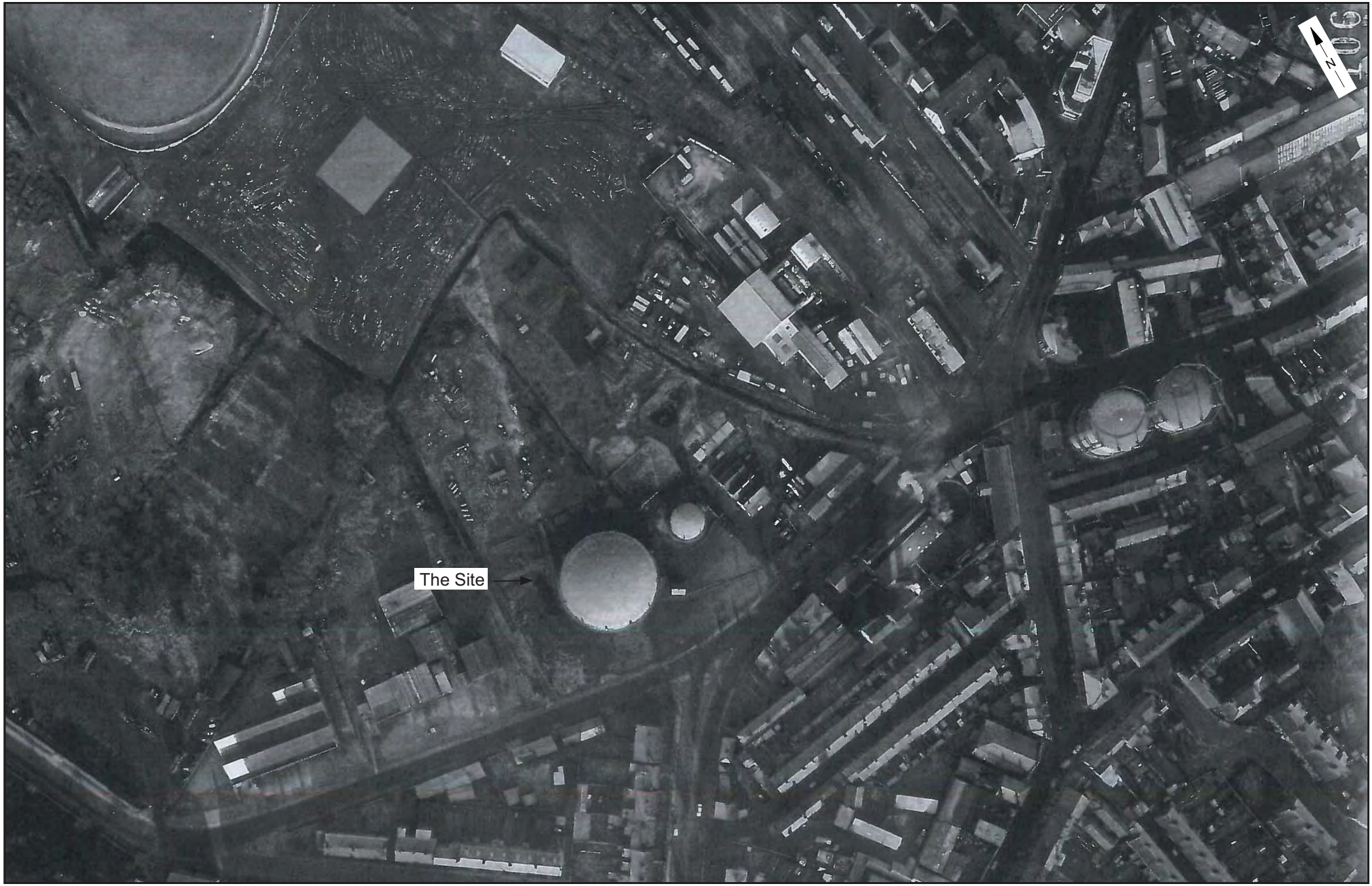


SITE PLAN. SCALE: 1/2500.

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 19
Project Ref: 7605	July 2015	Plan of the existing gasholder and tank (1957) (Drawing No. S348/D / NGA Ref. EA/EA/SA/BUS/E/E/2)	
Report Ref: 2015238	Drawn by: HG		

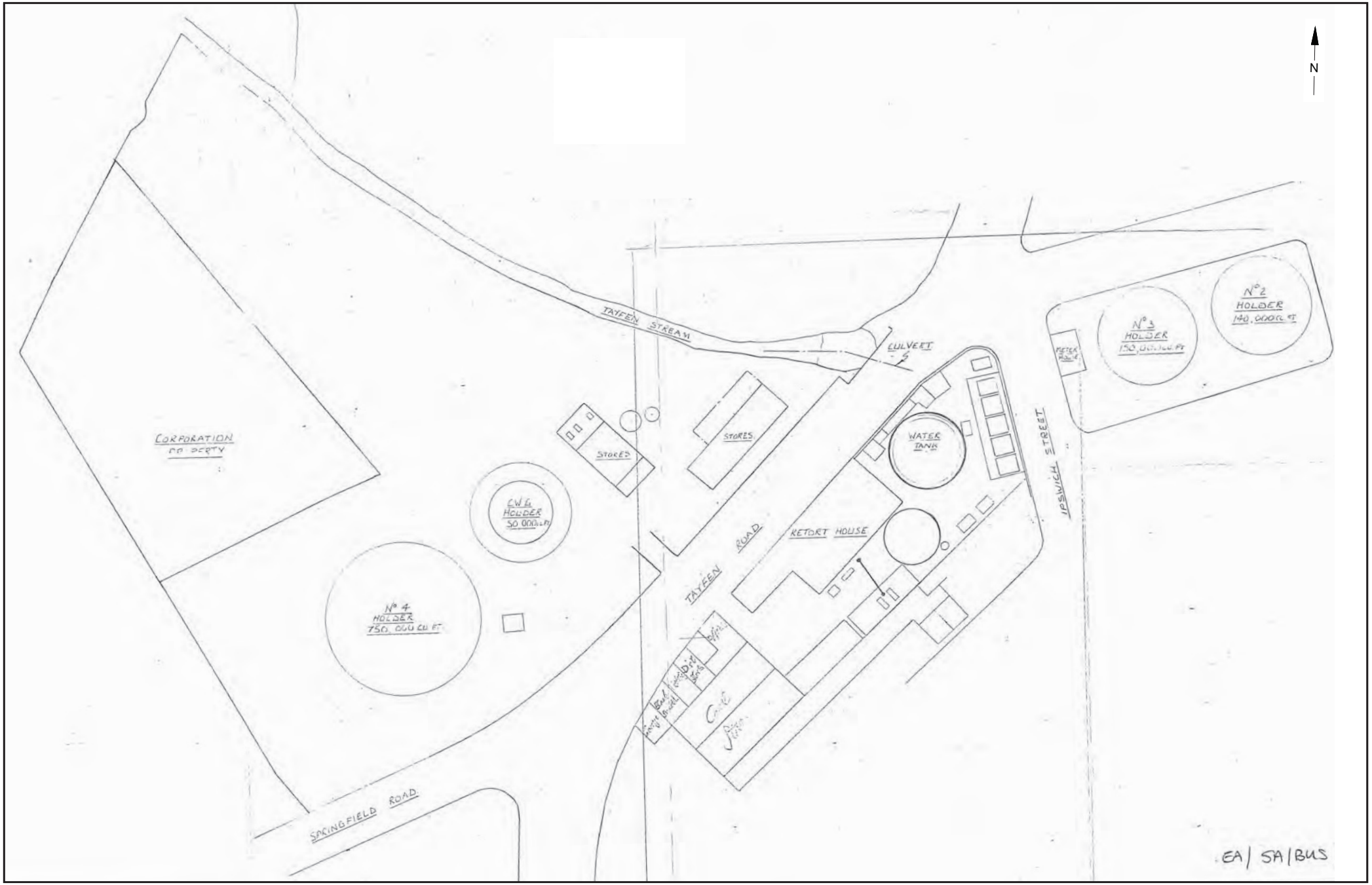


© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 20
Project Ref: 7605	July 2015	Plan of Eastern Gas Board's property: Gasholders, Retort house, Purifiers, Coke stocks & sheds and grading plant, Exhauster and Benzole plant, 1961 (NGA Ref. EA/EA/SA/BUS/E/E/3)	
Report Ref: 2015238	Drawn by: HG		



© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 21
Project Ref: 7605	July 2015	Aerial photograph of the site, dated 3rd December 1962 (HE Ref. MAL_62559)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 22
Project Ref: 7605	July 2015	Aerial photograph of the site, dated 16th September 1963 (HE Ref. RAF_543_2409_2F21_0275)	
Report Ref: 2015238	Drawn by: HG		

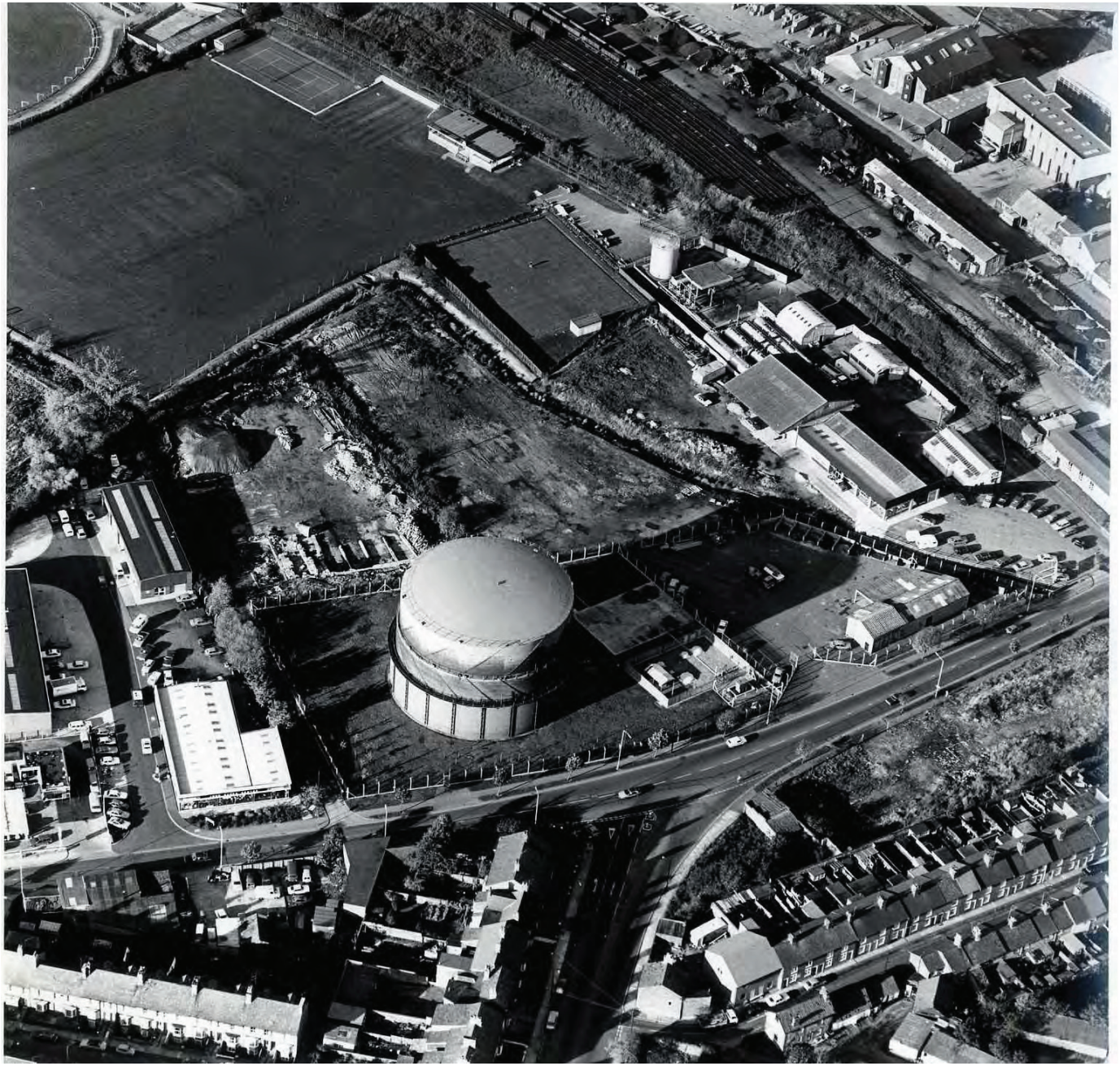


© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 23
Project Ref: 7605	July 2015	Plan of Eastern Gas Board's property showing numbers 2, 3 and 4 Gasholders, Retort house, Coal store and Water tank, 1965 (Drawing No. M46 / NGA Ref. EA/EA/SA/BUS/E/E/4)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 24
Project Ref: 7605	July 2015	Aerial photograph of the site, dated 3rd May 1970 (HE Ref. MAL_70028_V_150)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 25
Project Ref: 7605	July 2015	Aerial photograph of the site, dated 23rd October 1983 (HE Ref. MAL_83025_V_167)	
Report Ref: 2015238	Drawn by: HG		

© Archaeology South-East		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 26
Project Ref: 7605	July 2015	Aerial photograph of the site, dated 7th August 1988 (HE Ref. OS_088224_V_251)	
Report Ref: 2015238	Drawn by: HG		



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© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 27
Project Ref: 7605	July 2015	Aerial Photograph of the site, facing north-west, c.1990 (NGA Ref. EA/DX/E/F/9)	
Report Ref: 2015238	Drawn by: HG		

© **Archaeology South-East**		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 28
Project Ref: 7605	July 2015	Aerial Photograph of the site, facing north-west, c.1990 (NGA Ref. EA/DX/E/F/1)	
Report Ref: 2015238	Drawn by: HG		

© Archaeology South-East		Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk	Fig. 29
Project Ref: 7605	July 2015	National Grid site plan (with individual building identification) 12th June 2014	
Report Ref: 2015238	Drawn by: HG		

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,Nox 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 l 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..l 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 sone 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 isl. 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 Lovelook

Edwin Mansfield

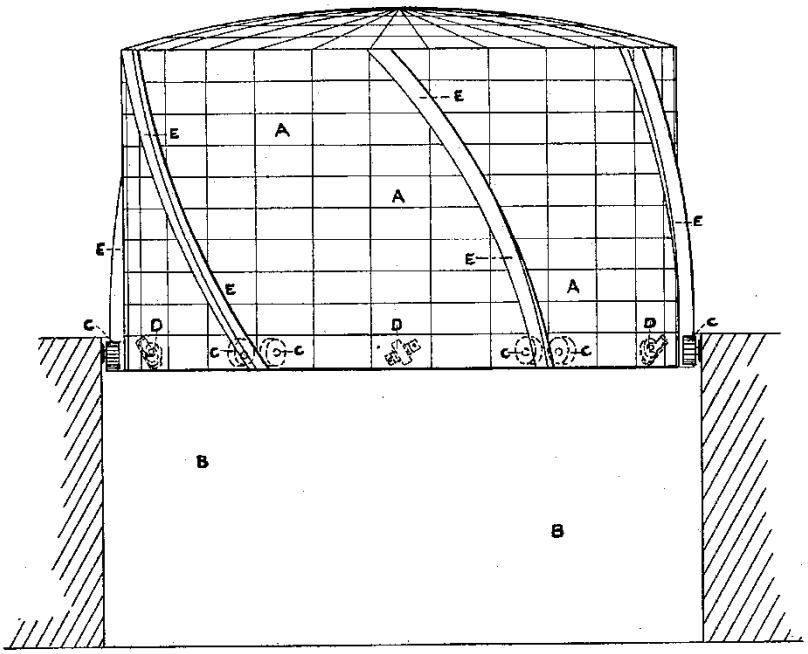
(No Model.) 2 Sheets—Sheet 1.

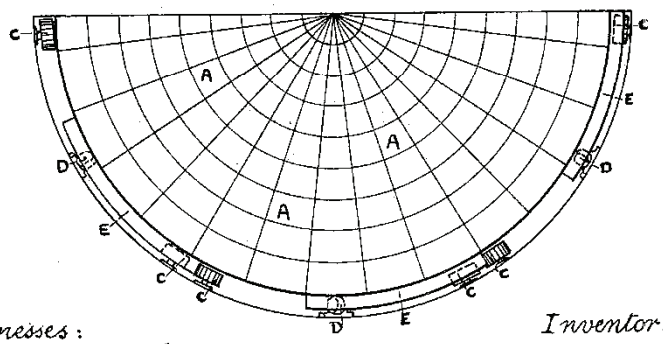
W. GADD.

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. 2 Sheets—Sheet 2.

GAS HOLDER.

No. 405,702. Patented June 25, 1889.

FIG 2.

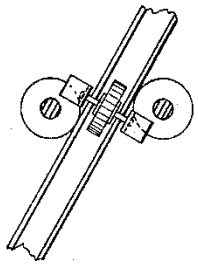


FIG 3.

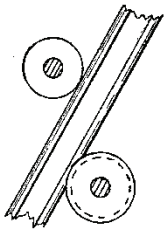


FIG 4.

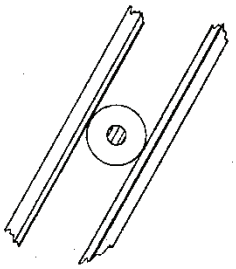


FIG 5.

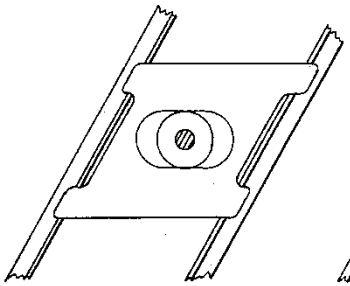


FIG 6.

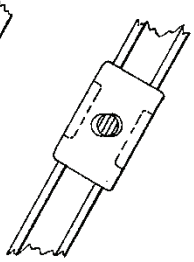


FIG 7.

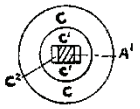
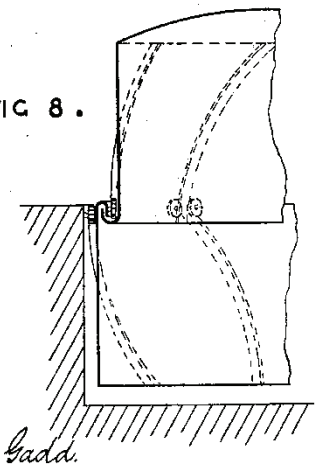


FIG 8.



Witnesses:
George Frederick Gadd.
John Alexander Lovelock

Inventor.
William Gadd.

N. PETERS, Photo-Lithographer, Washington, D. C.

Appendix 3 Table of Primary Archive Sources

Title of Document	Reference	Date	Archive Held by
Album of labelled photographs showing a variety of public events, staff and personnel, showrooms and gas works.	EA/SA/X/P/2	*c.*1950	National Gas Archive
Bury St Edmunds Gas Company – Booklet with photographs and description of the former gasworks plant	GJ_1928_V183_P652	1928	National Gas Archive
O.S. Map showing Gas works, inc. position of existing and proposed new Gasholders	EA/BUS/E/E/1	1926	National Gas Archive
Block plan showing the original Bury St Edmunds Gas works and the location of the existing gasholder	EA/SA/BUS/E/E/1 Drawing No: S348/C	1957	National Gas Archive
Block plan showing location of Gasholder and tank to the north of Tayfen Road	EA/SA/BUS/E/E/2 Drawing No: S348/D	1957	National Gas Archive
Sketch plan of Eastern Gas Board's property showing the Bury St Edmunds Works - Gasholders, Retort house, Purifiers, Coke stocks, Coke sheds and grading plant, Exhauster and Benzole plant	EA/SA/BUS/E/E/3	1961	National Gas Archive
Eastern Gas Board property plan drawing showing the Bury St Edmunds works - numbers 2, 3 and 4 Gasholders, Retort house, Coal store and Water tank	EA/SA/BUS/E/E/4 Drawing No: M46	1965	National Gas Archive
Drawing showing proposed arrangement of 15 inch bore inlet & outlet mains to new 3 lift spiral guided Gasholder	EA/SA/BUS/E/T/1	*c.*1950	National Gas Archive
Eastern Gas Board diagram of the new bores on site for the spiral guided gasholder.	EA/SA/BUS/T/S/1	1950	National Gas Archive
Aerial photograph of the existing Bury St Edmunds Gasworks (area north of Tayfen Road)	EA/DX/E/F/1 (Old Ref: 901-g02929)	*c.*1990	National Gas Archive
Aerial photograph of the existing Bury St Edmunds Gasworks (area north of Tayfen Road)	EA/DX/E/F/9 (Old Ref: 909)	*c.*1990	National Gas Archive
Conveyance of the Bury St Edmunds gasworks and apparatus.	EA/BUS/L/T/1	3/11/1849	National Gas
Photograph of the 1876 gasholder under construction, located to the east of Ipswich Road.	K795/1	1876	Suffolk Record

Title of Document	**Reference**	**Date**	**Archive Held by**
			Office
Photographic prints, looking north across the gasworks, showing gasholder's 1 and 2	K511/1113	1871	Suffolk Record Office
The Spanton-Jarman Collection: Photograph of early gas street lighting in Bury St Edmunds.	K505/1741	*c.*1890	Suffolk Record Office
The Spanton-Jarman Collection: Flooding in Bury St Edmunds, showing the 1857 gasholder	K505/1741	1968	Suffolk Record Office
Ordnance Survey Map of 1886 (1:2500, 1st edition)		1886	Suffolk Record Office
A diver about to descend into a well at the base of a gasholder at the Tayfen Road gasworks.	K564/41-44	1934	Suffolk Record

Aerial Photography – Historic England Archives (Films held by NMR)

Date	**Scale 1:**	**Film Details (inches)**	**Reference**	**Library No.**	**Frame No.**	**Run**	**Centre Point**
29 AUG 1946	9250	B&W 8.25 x 7.5	RAF/106G/UK/1707	459	4025	18	TL 852 653
29 AUG 1946	9250	B&W 8.25 x 7.5	RAF/106G/UK/1707	459	4024	18	TL 857 652
06 SEP 1946	9800	B&W 8.25 x 7.5	RAF/106G/UK/1718	463	3037	4	TL 855 651
13 NOV 1946	9800	B&W 8.25 x 7.5	RAF/CPE/UK/1836	512	4006	8	TL 854 646
18 FEB 1949	5000	B&W 8.25 x 7.5	RAF/58/189	976	5063	4	TL 852 645
18 FEB 1949	5000	B&W 8.25 x 7.5	RAF/58/189	976	5077	5	TL 850 650
06 JUN 1955	10000	B&W 8.25 x 7.5	RAF/58/1780	1650	22	7	TL 851 652
16 SEP 1963	10000	B&W 8.25 x 7.5	RAF/543/2409	2180	274	29	TL 855 652

Title of Document				**Reference**		**Date**	**Archive Held by**
16 SEP 1963	10000	B&W 8.25 x 7.5	RAF/543/2409	2180	275	29	TL 854 644
11 FEB 1955	10000	B&W 8.25 x 7.5	RAF/82/1077	3940	20	5	TL 855 642
11 FEB 1955	10000	B&W 8.25 x 7.5	RAF/82/1077	3940	21	5	TL 849 643
03 MAY 1970	3000	B&W 9 x 9	MAL/70028	5629	150	6	TL 852 648
03 MAY 1970	3000	B&W 9 x 9	MAL/70028	5629	151	6	TL 850 649
03 JUN 1970	7000	B&W 9 x 9	OS/70171	10581	229	4	TL 851 643
23 OCT 1983	10000	B&W 9 x 9	MAL/83025	12538	167	3	TL 860 647
07 AUG 1988	7700	B&W 9 x 9	OS/88223	13333	109	1	TL 851 644
07 AUG 1988	5200	B&W 9 x 9	OS/88224	13334	251	4	TL 850 645
07 AUG 1988	5200	B&W 9 x 9	OS/88224	13334	252	4	TL 854 645
27 JAN 1959	10000	B&W 8.25 x 7.5	RAF/58/2693	15366	45	9	TL 853 648
27 JAN 1959	10000	B&W 8.25 x 7.5	RAF/58/2693	15366	46	9	TL 847 648
21 JAN 1959	9100	B&W 8.25 x 7.5	RAF/58/2677	15372	180	10	TL 850 649
03 DEC 1962	2500	B&W 9 x 9	MAL/62559	21144	106290	4	TL 851 648
06 OCT 1997	5200	B&W 9 x 9	OS/97267	22351	13	2	TL 848 648
06 OCT 1997	5200	B&W 9 x 9	OS/97267	22351	14	2	TL 852 648
30 MAY 1998	6800	B&W 9 x 9	OS/98088A	22596	55	2	TL 850 654
30 MAY 1998	6800	B&W 9 x 9	OS/98088B	22597	279	3	TL 854 645

Title of Document				**Reference**		**Date**	**Archive Held by**
30 MAY 1998	6800	B&W 9 x 9	OS/98088B	22597	280	3	TL 849 645
12 JUN 2000	5200	B&W 9 x 9	OS/00199	23288	70	4	TL 852 649
16 MAY 2002	7700	Colour 9 x 9	OS/02094	23813	125	4	TL 852 650
23 MAR 2002	N/A	Colour neg. 70mm,120,220	TL 8564 / 77	21576	6	N/A	TL 851 649

Appendix 4 Index of Digital Photographs

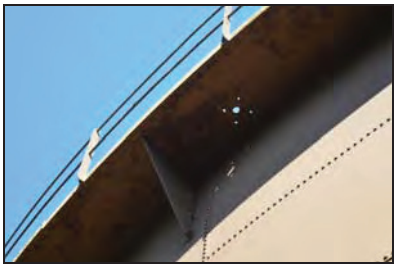
TYB15-0001
Elevation of the Gasholder. Facing south-west

TYB15-0002
Stairs to the gasholder platform. Facing south

TYB15-0003
Gasholder number. Facing south-west

TYB15-0004
Elevation of the Gasholder. Facing west

TYB15-0005
Stanchion detail. Facing north-west



TYB15-0006
Base of tank platform. Facing south-west

TYB15-0007
Elevation of the Gasholder. Facing north

TYB15-0008
Elevation of the Gasholder. Facing east

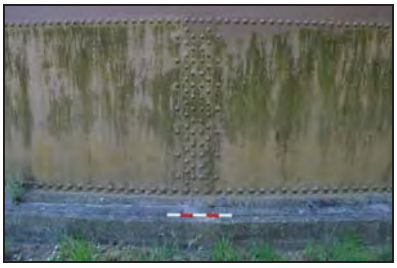
TYB15-0009
Drainage. Facing south-east

TYB15-0010
Water overflow pipework. Facing south

TYB15-0011
Elevation of the Gasholder with steps above. Facing south-east

TYB15-0012
Elevation of the Gasholder. Facing south-east

TYB15-0013
Lift steps. Facing south-east



TYB15-0014
Base of tank. Facing south-east

TYB15-0015
Stanchion detail. Facing south-east

TYB15-0016
Access hatch. Facing west

TYB15-0017
Inlet/outlet gas mains pipework. Facing south-west

TYB15-0018
Stair support detail. Facing south-west

TYB15-0019
Stair support base. Facing south-west

TYB15-0020
Concrete housing for associated plant. Facing south

TYB15-0021
Concrete housing for associated plant. Facing west

TYB15-0022
Concrete housing and pipework for modular heating pump. Facing south

TYB15-0023
Crown. Facing south-west

TYB15-0024
Crown. Facing south-west

TYB15-0025
Tank platform. Facing south

TYB15-0026
Tank platform and lift stairs. Facing west

TYB15-0027
Tank platform. Facing west

TYB15-0028
Three lift arrangement. Facing south

TYB15-0029
Carriage detail. Facing south

TYB15-0030
Carriage detail. Facing south

TYB15-0031
Carriage detail and guiderail. Facing south-west

TYB15-0032
Modular heataing unit. Facing south-west

TYB15-0033
Lift stairs. Facing south

TYB15-0034
Guide rail on lift stairs. Facing south

TYB15-0035
Hand rail to lift. Facing west

TYB15-0036
Lift stairs. Facing west

TYB15-0037
Guide rail on lift stair. Facing south-west

TYB15-0038
lift stair detail. Facing west

TYB15-0039
Lift stairs. Facing west

TYB15-0040
Carriage, guide rails and lift platform. Facing south

TYB15-0041
Deatil of steelwork to lift stairs. Facing south

TYB15-0042
Lift stair framework. Facing south

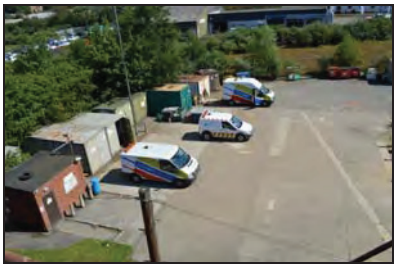
TYB15-0043
Tank platform. Facing south

TYB15-0044
Lift handrail stanchion detail. Facing south-east

TYB15-0045
View. Facing north-east

TYB15-0046
View. Facing north-east

TYB15-0047
View to compound. Facing north-east



TYB15-0048
View to compound. Facing north-east

TYB15-0049
Stairs down from tank platform. Facing west

TYB15-0050
Crown, lift stairs. Facing south-east

TYB15-0051
Lift stairs. Facing west

TYB15-0052
Brackets supporting the tank platform. Facing west

TYB15-0053
Brackets supporting the tank platform. Facing south

TYB15-0054
Modern gasworks. Facing east

TYB15-0055
Concrete housing and tank elevation. Facing south

TYB15-0056
Stairs to tank platform. Facing south-west

TYB15-0057
Communication room. Facing north-west

TYB15-0058
Communication room. Facing north

TYB15-0059
Driver store. Facing north

TYB15-0060
View to the gasholder. Facing south

TYB15-0061
Gasholder lift stairs. Facing south-west

TYB15-0062
Compound overview. Facing west

TYB15-0063
Gasholder elevation. Facing south-west

TYB15-0064
Soffit of the stairs to the tank platform. Facing south-west

TYB15-0065
Overview of associated land to east. Facing north-west

TYB15-0066
Overview of associated land to east. Facing east

TYB15-0067
Crown framework. Facing north-east

TYB15-0068
Interior of the gasholder. Facing north-east

TYB15-0069
Walls of first lift. Facing west

TYB15-0070
Walls of first lift. Facing north

TYB15-0071
Interior of the gasholder. Facing north-east

TYB15-0072
Interior of the gasholder, looking to the crown support. Facing north-east

TYB15-0073
First lift walls and crown framework. Facing north-east

TYB15-0074
Interior of the gasholder. Facing north-east

TYB15-0075
Section through lift sheets and outer tank wall. Facing north

TYB15-0076
Section through lift sheets and outer tank wall. Facing north

TYB15-0077
Section through lift sheets and outer tank wall. Facing north

TYB15-0078
Mixed detritus. Facing east

TYB15-0079
Made opening to Interior of the gasholder. Facing south

TYB15-0080
Interior of the gasholder. Facing south

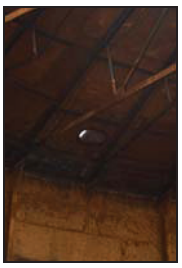
TYB15-0081
Floor of the gasholder. Facing north-east

TYB15-0082
Pipes and roof trusses. Facing north-east

TYB15-0083
Inner rim of the crown. Facing north-east

TYB15-0084
Numbers marked on sheet section within the interior of the gasholder. Facing north-west

TYB15-0085
Pipes. Facing north-east



TYB15-0086
Access hatch in crown. Facing east

TYB15-0087
Crown construction - stanchion and pedestal support. Facing north-east

TYB15-0088
Pedestal base. Facing north-west

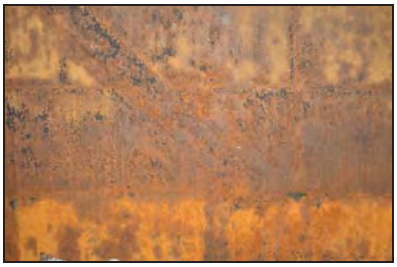
TYB15-0089
Crown stanchion resting on pedestal. Facing north-west

TYB15-0090
Base of lift resting on I-girder support. Facing north-east

TYB15-0091
Brackets to crown rim. Facing north-east

TYB15-0092
Brackets to crown rim. Facing north-east

TYB15-0093
Access hatch to tank interior. Facing west



TYB15-0094
Scar of guide rail. Facing east

TYB15-0095
Overview of the interior of the gasholder. Facing north-east

TYB15-0096
Crown truss construction. Facing north-east

TYB15-0097
Crown stanchion. Facing north-east

TYB15-0098
Crown truss detail. Facing east

TYB15-0099
Crown truss detail. Facing east

TYB15-0100
Lift stair. Facing west

TYB15-0101
Crown truss construction. Facing east

TYB15-0102
Detritus. Facing east

TYB15-0103
Interior of the gasholder. Facing east

TYB15-0104
Pipes within gasholder. Facing east

TYB15-0105
First lift walls and crown. Facing north-west

TYB15-0106
Pipes within gasholder. Facing south-east

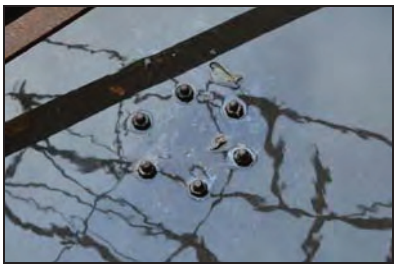
TYB15-0107
Stanchion and pedestal. Facing south-west

TYB15-0108
Base of pipes. Facing east

TYB15-0109
Access hatch. Facing south-west

TYB15-0110
Detritus detail. Facing south-west

TYB15-0111
Part-submerged fitting. Facing south-west



TYB15-0112
Part-submerged fitting. Facing south-west

TYB15-0113
Interior of the gasholder. Facing north-west

TYB15-0114
Interior of the gasholder. Facing north-west

TYB15-0115
Section through lifts and tank wall. Facing north-west

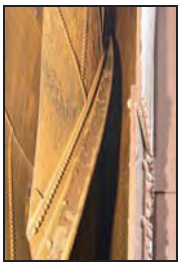
TYB15-0116
Section through lifts and tank wall. Facing north-west

TYB15-0117
Section through lifts and tank wall, note lift cups. Facing north-west

TYB15-0118
Section through lifts and tank wall. Facing north-west

TYB15-0119
Section through lifts and tank wall. Facing north-west

TYB15-0120
Section through lifts and tank wall, note lift cups. Facing south-west



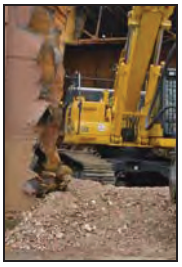
TYB15-0121
Section through lifts and tank wall, note guide rail. Facing south-west

TYB15-0122
View towards breech in gasholder. Facing north-west

TYB15-0123
Breech in gasholder. Facing north-west

TYB15-0124
View to interior of gasholder trough breech. Facing north-east

TYB15-0125
View to breech in gasholder. Facing east



TYB15-0126
View to breech in gasholder. Facing east

TYB15-0127
Interior of the gasholder. Facing east

TYB15-0128
Interior wideangle shot of the gasholder prior to demolition (provided by the client). Facing north-west

Appendix 5 OASIS Data Collection Form

OASIS ID: archaeol6-217249

Project name	Tayfen Road Gasholder Station, Bury St Edmunds
Short description of the project	In July 2015 Archaeology South-East (a division of the Centre for Applied Archaeology, UCL) carried out a programme of historic building recording of the Tayfen Road Gasholder Station, Bury St Edmunds, Suffolk, IP33 1TB (NGR: 585134 264854). The work was commissioned by Montagu Evans LLP on behalf of National Grid, in relation to the proposed redevelopment of the gasworks site. As existing, the site contains a single gasholder (Gasholder No. 112), a series ancillary buildings including a reception and storage units alongside open storage areas and open land. In addition, the site comprises associated E and I equipment, including town and district governors and a fan booster. The gasholder was constructed by 1956 by Firth Blakeley Son and Co Ltd. and represents a typical mid-20th century water sealed holder. The gasholder is based on a British spiral-guided design patented in 1887 by Gadd and Mason of Manchester. Its steel construction and above ground tank is reflective of the continued advances in gasholder innovation. The exiting gasholder and plant dates to the 1950s and forms part of an expansion of a former works established in 1834, originally situated to the south of the current site. The gasholder, as part of the wider site to the north of Tayfen road was constructed in response to the need for increased gas storage capacity and manufacture within Bury St Edmunds and the surrounding wider area.
Project dates	Start: 03-07-2015 End: 09-07-2015
Previous/future work	Not known / Yes
Any associated project reference codes	TYB15 - Sitecode
Any associated project reference codes	7605 - Contracting Unit No.
Type of project	Building Recording
Site status	None
Current Land use	Industry and Commerce 1 - Industrial
Monument type	GASHOLDER Modern
Significant Finds	NONE None

Project location

Country	England
Site location	SUFFOLK ST EDMUNDSBURY BURY ST EDMUNDS Tayfen Road Gasholder Station (National Grid Depot), Bury St Edmunds
Postcode	IP33 1TB
Study area	1.13 Hectares
Site coordinates	585134 264858 585134 00 00 N 264858 00 00 E Point

Project creators

Name of Organisation	Archaeology South-East
Project brief originator	Montagu Evans LLP
Project design originator	Archaeology South-East
Project director/manager	Ron Humphrey/Amy Williamson
Project supervisor	Hannah Green
Type of sponsor/funding body	National Grid
Name of sponsor/funding body	National Grid

Project archives

Physical Archive Exists?	No
Digital Archive recipient	National Monuments Record, Swindon and National Gas Archive, Warrington
Digital Archive ID	TYB15
Digital Contents	"none"
Digital Media available	"Images raster / digital photography","Text"

Paper Archive recipient	National Monuments Record, Swindon and National Gas Archive, Warrington
Paper Archive ID	TYB15
Paper Contents	"none"
Paper Media available	"Aerial Photograph","Correspondence","Notebook - Excavation',' Research',' General Notes","Photograph","Report"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Tayfen Road Gasholder Station (National Grid Depot), Bury St Edmunds
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