



THE
ENVIRONMENT
PARTNERSHIP



STANMORE, GREATER LONDON MARSH LANE GASHOLDER STATION HISTORIC BUILDING SURVEY

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Document Title	Historic Building Survey
Prepared for	Atkins Ltd
Prepared by	TEP - Warrington
Document Ref	7801.002

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Date	September 2019
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Amendment History					
Version	Date	Modified by	Check / Approved by	Reason(s) issue	Status
1.0	27/09/19	AB	IG	Draft for client review	Draft
2.0	10/10/09	AB		Final report	Final



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OASIS Report Form

The Environment Partnership (TEP)

Job Number:	7801
Project Name:	Marsh Lane, Stanmore
OASIS Number:	theenvir1-436457

PROJECT DETAILS:		
Short description	The historic environment team at TEP carried out archaeological recording of gasholders and gasworks buildings at the former Marsh Lane Gasholder Station, Stanmore, Harrow, ahead of planned demolition works. Gasholder 1 was built by R and J Dempster in 1939, Gasholder 2 by Clayton Son and Co in 1928, and Gasholder 3 by S Cutler and Sons in 1959. All three were spirally-guided gasholders with below-ground tanks. As well as the gasholders a domestic building 'the Cottage' and a booster house were recorded	
Project type	Historic building recording	
Previous work	Historic building recording	
Current lane use	Industrial, derelict	
Future work	Unknown	
Monument type and period	Modern gasholders	
Significant finds	None	
PROJECT LOCATION:		
County	Greater London	
Site address	Marsh Lane, Stanmore, Harrow, HA8 6RR	
Easting Northing	TQ 1769 9152	
Area (sq ,/ha)	-	
Height aOD	-	
PROJECT CREATORS:		
Organisation	The Environment Partnership (TEP) Ltd	
Project brief originator	Montagu Evans	
Project design originator	TEP	
Director/Supervisor	Amir Bassir	
Project manager	Jason Clarke	
Sponsor or funding body	National Grid	
PROJECT DATE:		
Start date	04-09-2019	
End date	10-10-2019	
ARCHIVES:	Contents	Location (Accession No.)
Physical	None	
Paper	None	
Digital	Photographs	
BIBLIOGRAPHY:		
Title	Stanmore, Greater London, Marsh Lane Gasholder Station, Historic Building Recording	
Serial title & volume	7801.002	
Author(s)	Bassir, A,	
Page numbers	58	
Date	10-10-2019	

Executive Summary

1. The Environment Partnership (TEP) Ltd was instructed by Atkins Ltd on behalf of National Grid to undertake archaeological recording of gasholders and gasworks buildings at the Marsh Lane Gasholder Station, Stanmore, Harrow, Greater London, (TQ 1769 9152) ahead of planned demolition works. The gasholders had previously been assessed as having low heritage value and the recording was undertaken as a basic Level 2 survey in-line with Historic England guidelines. Recording encompassed three gasholders and associated pipework and infrastructure, as well as a domestic building referred to as 'the Cottage', and 'Booster House'.
2. The gasholders, designated as 1, 2 and 3, were low-pressure and water-sealed, spirally-guided gasholders with below-ground tanks and four lifts. Gasholder 1 was constructed by R & J Dempster Ltd in 1939, Gasholder 2 by Clayton So & Co Ltd in 1928, and Gasholder 3 by S Cutler & Sons Ltd in 1959.
3. The gasholders were found to be in good condition and were of a consistent overall design with minor variations visible in the fittings. The general uniformity of the gasholders' design and construction was consistent with the wider national trend for spirally-guided gasholders in the period of their construction.
4. The Cottage comprised a two-storied domestic residence located adjacent to the site entrance and likely housed the site manager. The core of the building, based on map evidence and architectural features, appears to date to the mid-19th century, with alterations and extensions evident. An Air Raid shelter was also formerly located adjacent to the Cottage but was not evident during this survey.
5. The Booster House was likely constructed in the 1930s and replaced an earlier structure. The interior was not accessed but plans denote the internal subdivisions as consisting of Booster Room, Engine Room, and Stores and Offices.

1.0 Introduction

- 1.1 The Environment Partnership (TEP) Ltd was instructed by Atkins Ltd on behalf of National Grid to undertake archaeological recording of gasholders and gasworks buildings at the Marsh Lane Gasholder Station, Stanmore, Harrow, Greater London, HA8 6RR (TQ 1769 9152), ahead of planned demolition works. The gasholders had previously been assessed as having low heritage value and the recording was undertaken as a basic Level 2 survey in-line with Historic England guidelines. Recording encompassed three gasholders as well as associated pipework and infrastructure, as well as a domestic building, 'the Cottage', and a Booster House. This survey is a voluntary exercise commissioned by National Grid as part of their commitment to the heritage of their broader estate. This report has been produced in accordance with current best archaeological practice as defined in the Chartered Institute for Archaeologists' *Standard and Guidance for the Archaeological Investigation of Standing Buildings or Structures* (ClfA 2019) and the Historic England document *Management of Research Projects in the Historic Environment* (HE 2015a).
- 1.2 A Heritage Appraisal document (Montagu Evans, Undated), assessing the heritage significance of the gasholders, and concluded them to be of low heritage significance and recommended a basic Level 2 recording as set out in the document *Understanding Historic Buildings, A Guide to Good Recording Practice* (HE 2015a) and the draft document *Guidelines for Evaluating and Recording England's Former Gasworks and Redundant Gasholders* (HE 2019). This report follows an approved Written Scheme of Investigation (TEP 2019) and was produced by TEP and reviewed by Atkins Ltd.
- 1.3 The gasholder station is in the district of Stanmore in the London Borough of Harrow. The gasworks site is on the west side of Marsh Lane and occupies an irregular parcel of land in the midst of mid-20th century residential development from which it is largely hidden by dense trees (Stanmore Marsh). To the south-west of the site is Whitechurch Primary School and playing fields. There are rail lines a short distance to the east of the site with Stanmore Station to the north and Cannons Park Station to the south-east of the site.
- 1.4 The gasholders, designated as 1, 2 and 3, were low-pressure and water-sealed, spirally-guided gasholders with below-ground tanks and four lifts. Gasholder 1 was constructed by R & J Dempster Ltd in 1939, Gasholder 2 by Clayton Son & Co Ltd in 1928, and Gasholder 3 by S Cutler & Sons Ltd in 1959.
- 1.5 The local planning authority is Harrow Council and the historic environment record is held by the Greater London Historic Environment Record (HER).

2.0 Objectives and Methodology

- 2.1 The objectives of the archaeological work were as follows:
- Produce a drawn, photographic, and written record of the gasholders and associated infrastructure;
 - Produce a photographic and written record of the cottage and booster house;
 - Provide a written account of the site, analysing any features of archaeological, historic or architectural interest, and to disseminate these findings in the form of a report and orderly archive.
- 2.2 The objective of Level 2 historic building recording is to provide a descriptive record of an extant structure, before and during demolition or conversion, where the building is known or suspected to retain limited historic significance. This provides a basic record in accordance with the Historic England document *Understanding Historic Buildings: A guide to good recording practice* (HE 2015a). Draft guidelines for evaluating and recording former gasworks and gasholders recommend Level 1 or Level 2 recording for spiral guided gasholders or those of which there are numerous examples (HE 2019).
- 2.3 The survey was undertaken on the 4th September 2019 and included a photographic survey comprising general views of the site and gasholders, as well as detailed views of features of structural, historic or architectural interest such as the spiral guidance system and operating elements. Measured sketches were produced of an example roller carriage of each gasholder. Access was possible around all sides of both of the gasholders.
- 2.4 The survey also included photographic recording of the cottage and booster house. The buildings were found to be in poor condition with known asbestos hazards; only limited parts of the cottage interior were accessed and all recording of the booster house was carried out externally.
- 2.5 Photography was carried out using a Nikon D90 camera equipped with a Nikon 18-70mm lens. Photographic scales were included in all shots where practical or appropriate.
- 2.6 This report also includes an overview of documents held at the National Gas Archive.
- 2.7 Constructional specifications for the three gasholders are available in the Gasholder Operational Data Sheets which are included as an appendix to this report. Measurements are provided as metric or imperial or both as shown.

3.0 Historic Background

- 3.1 The heritage appraisal document suggests that the Stanmore Gasworks was opened in 1858 as the Great Stanmore Gas Co. Ltd, and the works was constructed by Mr Penny on behalf of J. W. Chapman who also operated a works in Harrow. The Ordnance Survey map of 1865-76 shows that the works was relatively small and in an isolated position on the edge of Stanmore Marsh. The surrounding landscape was primarily agricultural, comprising enclosed fields, with the small settlement of Stanmore located to the north and Edgware to the east. Marsh Lane formed a route from Stanmore and led through the rural landscape towards London. The gasworks was located close to Canons Park, whose westward tree-lined access with Lodge House joined Marsh Lane just to the north of the works. To the west of the works was Old Church Farm, with Old Church Lane joining Marsh Lane close to the gasworks. The map labels the '*Site of a Church*' and remains of a Moat adjacent to the farm. Marsh Farm was located a short distance to the east of the gasworks.
- 3.2 At this time the works was shown to have comprised of a single gasholder and adjacent tank. The Cottage, recorded during this survey, is seen to have been extant since this earliest phase of the gasworks. A larger building, presumably comprising retort house etc., was in the south-west corner of the site. The present access from Marsh Lane had been established during this early phase.
- 3.3 The small size of the gasworks, and isolated position with no access to either rail or waterway infrastructure would suggest a fairly localised service, servicing Stanmore, Canons Park and nearby farmsteads; a review of wider mapping does not indicate any other gasworks sites in the vicinity.
- 3.4 By 1896 the site had been rearranged with the former gasholder and tank having been removed and two new gasholders having been constructed. The gas manufacturing buildings had been considerably expanded, likely incorporating the earlier buildings rather than replacing them.
- 3.5 By 1914 the site had again been rearranged; the western gasholder was removed and a new one constructed at the far east of the site. The buildings in the south-west corner of the site were reduced in size, likely fully replacing the earlier structures.
- 3.6 In 1928 a new Gasholder, designated No.2, was constructed. It is probable that the previous gasholders were column or frame-guided as was common practice in the 19th and early 20th century. The new gasholder was built in the spirally-guided design this having been patented by W Gadd, with the first example being constructed in 1888. The construction of spirally-guided gasholders became common-place from c1920s onwards and rapidly became the preferred design, particularly for replacing earlier gasholders.
- 3.7 The heritage assessment notes that the Stanmore Gasworks became amalgamated with the Harrow District Gas Company, becoming Harrow and Stanmore Gas Company. By 1924 the works was taken over by the Brentford Gas Company which became amalgamated with the Gas Light and Coke Company in 1926.

- 3.8 In the wider area, the expansion of Stanmore and Edgware in the late 19th and early 20th century had been relatively small-scale and localised; from the 1930s a much more rapid and significant expansion of residential development is evident on historic mapping, with the area surrounding the gasworks being changed from a rural to an urban environment. Stanmore Marsh, presumably by virtue of being difficult to develop, remained largely unchanged through this period.
- 3.9 In 1939, the gasholder at the eastern side of the site was replaced with a new, much larger and spirally-guided gasholder, designated No.1. An undated plan of the works, drafted subsequent to 1939 (ref: NT/NW/SNM/E/E/2), highlights the area to the immediate south of the gasworks as *Proposed Area of Gas Lands*, with the area to the north as *Alternate to the Above Extension*. As discussed further in Section 4 of this report, the Cottage was subject to alterations and expansion during this period and the Booster House, located in the south-west corner of the site was also altered or re-built.
- 3.10 During the 1950s plans were put in place to expanded the works northwards with the construction of a new 98' tall and 122' diameter gasholder (ref: NT/NW/SNM/E/E/3); the construction of this gasholder was completed in 1959 by S Cutler & Sons.
- 3.11 Whilst the early gasworks appears to have included capacity for on-site production of gas, from the early 20th century onwards the site likely served as a distribution centre, however no detailed information about the site was available during the course of writing this report.
- 3.12 Following Nationalisation in 1949 the site came under the control of the North Thames Gas Board which took over many local authority and privately operated works.

4.0 Historic Building Recording

- 4.1 The three gasholders formed a roughly triangular arrangement with Gasholders 1 and 2 at the south of the site and Gasholder 3 at the north. The cottage and booster house were at the western side of the site adjacent to the site entrance from Marsh Lane. An active Pressure Reduction Station (PRS) compound was located at the north-western side of the gasholder station. The gasholders and the site in general were found to be in a generally good condition with only minor vegetation overgrowth around the gasholder perimeters.
- 4.2 A boiler house was formerly located between gasholder 1 and 2 along with fuel storage buildings; these were demolished shortly after 1970. The three gasholders formerly utilised steam anti-freeze and were later fitted with electrical anti-freeze systems. In the position of the former boiler house were found an arrangement of above-ground pipes fitted with Donkin flow valves and monitoring equipment as well as electrical junction boxes.
- 4.3 A steel frame gantry was located between gasholders 1 and 2, carrying lagged steam pipes and electrical mains between the two. Following the demolition of the boiler house and construction of the new booster house the steam main pipes were redirected via overhead gantries to the new building. Detailed plans of the arrangement of anti-freeze infrastructure were not available and it is unclear when the gasholders were switched to an electrical system.

Gasholder 1

- 4.4 Gasholder 1 was at the eastern corner of the gasholder station; it was constructed in 1939 by R & J Dempster Ltd of Manchester, one of the major manufacturers of gasholders and gas works plant through the late 19th and throughout the 20th century. The gasholder was a low pressure, water-sealed holder with below-ground tank and four lifts. The tank was constructed of reinforced concrete and was c35m (115') in diameter and excavated to a depth of 8.8m (29'); its construction was undertaken by Holst & Co. The four lifts, when raised, reached a height of c32m including the 2.1m crown rise (7' 0"). The gasholder had a nominal storage capacity of c1 million cubic feet (cu. ft).
- 4.5 The gasholder operational data sheet provides the following information regarding the tank and lift dimensions

Table 1 - Gasholder 1

Lifts	1st (inner)	2nd	3rd	4th (outer)	Tank
Diameter	31.69m 104' 0"	32.61m 107' 0"	33.52m 110' 0"	34.44m 113' 0"	35.05m 115' 0"
Depth	8.53m 28' 0"	8.53m 28' 0"	8.53m 28' 0"	8.53m 28' 0"	8.83m 29' 0"

- 4.6 Dumphing surveys had been undertaken of the three gasholders prior to the archaeological survey and provide the tank volume as 8,684m³ and the dumphing volume as 2,433m³. The annulus was c2m in width and the dumphing sides were measured as c8m, rising approximately 5.5m from the annulus to a flat base of c14m diameter. Within the annulus were rest blocks of 1' 0" in height. The top kerb of the tank was measured as 800mm width with a distance of 300mm to the first lift (the lute).
- 4.7 The tank roller carriages were seated on the edge of raised square concrete blocks. The rollers were measured as c340mm in diameter and the axles or spindles were held in separate housings with removable end caps. The axle houses were joined to each other by a bolted top plate and fixed to an underlying base plate. Six anchor bolts secured the carriage footings into the tank. It was noted that the cardinal compass directions were denoted by the appropriate letter engraved into the concrete carriage blocks. The spiral rails appeared to be of a standard gauge; the lift carriage were of the same general design as the those on the tank and the lift spiral rails were fitted with run-out stops.
- 4.8 The lifts were constructed of steel sheets with riveted joins and the cup and grips were square profile. The width of the cup and grip annulus is given as 11" each with an overlap of 2' 7 1/2".
- 4.9 The crown measured c32m in diameter and the crown rise was c2.1m. The crown sheets were joined with riveted edges and arranged into six concentric rings with a central plate. No additional bracing plates were added to the outer ring sheet seams. At the crown apex were two 6" valves. A designated walkway led from the crown edge to the apex, crossing from the north-east to south-west when in the rest position. A circular manhole was located at the crown edge on the east side and a circular and square lids were located towards the west where the common inlet / outlet pipes were located. A syphon valve was located close to the inlet / out lets at the western side of the crown.
- 4.10 The crown frame was not visible during this survey and no description of the crown frame was found in available documentation.
- 4.11 The lifts, tank and crown were fitted with circular profile handrails to which the various monitoring and telemetry equipment, as well as electrical anti-freeze equipment, were fitted.
- 4.12 The lift stairs had been completely removed prior to this survey with only the former stair guide carriages remaining in place.
- 4.13 The gasholder was fitted with an electrical anti-freeze system, replacing the former steam anti-freeze system for which the pipework and pipe trays remained in place. Two sets of pipe trays were located at the north and south sides of the gasholder; a hand operated valve was located adjacent to the southern trays but it was unclear if this was linked to the anti-freeze or to the tank overflow system. Lagged pipes encircled most the tank perimeter.

- 4.14 The common inlet and outlet mains comprised 24" pipes and entered the gasholder at its western side. A covered well was located over the pipes and included an above-ground syphon pump enclosed within a cage. A stop-start switch and electrical junction boxes were also located here. Hi-Low alarms with maglocks and lift knock-off arms were also located here.
- 4.15 Details of the gasholder overflow system were not provided in the data sheet but the pipe work and manual operating vales were visible on the tank edge and on the lifts.
- 4.16 A large steel numeric designation sign was located at the tank edge at the north-western side of the gasholder.

Gasholder 2

- 4.17 Gasholder 2 was a spirally-guided, water-sealed holder with below-ground tank and four lifts. It was the earliest extant gasholder on the site and was constructed in 1928 by Clayton Son & Co Ltd of Leeds, one of the principal manufacturers of gasholders who constructed the earliest spirally-guided gasholder in Northwich in 1888.
- 4.18 The internal diameter of the tank was c35m (115') and the four lifts rose to c34m including crown rise. The gasholder had a nominal capacity of c1,025,000 cu. ft. A design drawing showing the cross-section and plan of the gasholder is available at the National Gas Archive (ref: NT/NW/SNM/E/T/2). A large free-standing numeric designation plaque was located at the northern side of the gasholder adjacent to the tank.

Table 2 - Gasholder 2

Lifts	1st (inner)	2nd	3rd	4th (outer)	Tank
Diameter	32.25m 105' 10"	32.99m 108' 3"	33.70m 110' 7"	34.44m 113' 0"	35.05m 115' 0"
Depth	8.53m 28' 0"	8.53m 28' 0"	8.53m 28' 0"	8.53m 28' 0"	8.83m 29' 0"
No. roller carriages	-	12	16	16	24

- 4.19 The tank was constructed of reinforced concrete and was built by T. Vale & Son. The annulus is recorded as c2.2m in width with the sides of the dumpling rising to a height of c6m over a distance of c9m, with a flat dumpling platform of c14m. The volume of the tank is calculated at 8,684m³ and the volume of the dumpling at 2,055m³. The tank kerb was measured as 600mm in width and was edged with bricks.

- 4.20 The tank roller carriages were set on concrete footing blocks extending back from the tank kerb. The rollers were measured as 250mm in diameter and the axles or spindles were held in single-piece carriages mounted onto tapered footing plates with three anchor bolts securing the roller carriages to the tank. The lift roller carriages were of the same design as those on the tank. The specification of the spiral rails is not given in the gasholder data sheet; the ends of the spiral rails were tapered at their distal ends and were not fitted with run-out stops. Twenty-four roller carriages were fitted around the tank, sixteen on the two subsequent lifts and twelve guiding the crown.
- 4.21 The lifts were each comprised of eight tiers of steel sheets with riveted seams, and the cup and grips were square profile and measuring 9" in width with engaged overlap of 2' 0". As was common practice, the top and bottom plates of each lift comprised longer and thicker plates with the intermediate tiers comprising of smaller sheets, likely of a thinner gauge. The lifts were fitted with circular profile hand rails supported on steel stanchions. The spiral stairs had been entirely removed prior to this survey with the stair roller carriages remaining in place. The distance between the tank and first lift (the 'Lute') was measured as 300mm.
- 4.22 The crown was comprised of eight concentric rings and a central plate and the sheets had a riveted construction. The seams of the outer plates were strengthened with overlapping plates coincident with the location of the underlying crown frame rafters. The specification of the crown top curb is not provided on the gasholder data sheet, but as was common practice can be seen to have comprised steel angles with the crown outer plates and top plates of the lift riveted to them. No valves were noted at the crown apex. Paired circular manholes were located at the edge of the crown at its north-western side, over the inlet and outlet pipes and a circular manhole was located at the opposing side of the crown.
- 4.23 The cross-section drawing of the gasholder depicts the crown frame as comprising a typical arrangement of principal rafters radiating from a central pipe to gussets at the crown top curb. The rafters appeared to comprise steel tees and were joined by struts to flat bar lower chords. The frame was tensioned by means of chords spanning between the top curb and the bottom of the central pipe. The section also shows channel stiffeners supporting the lift walls.
- 4.24 The gasholder formerly utilised steam anti-freeze and was subsequently fitted with an electrical anti-freeze system. A gantry carried elevated lagged pipes between gasholders 1 and 2 and the steam pipes were carried overhead around the eastern perimeter of gasholder 2. Pivoting pipe trays were located at the north and sides of the gasholder, supporting the flexible steam pipes as the lifts were raised. Lagged steam pipes were carried around each of the lifts, suspended from each lift's handrails.
- 4.25 The 18" separate inlet and outlet pipes entered the gasholder at its north-western side where a dry-well and above-ground pump were located. Electrical cables were carried to the gasholder at this position and the syphon pump controls with stop-start buttons, as well as junction and switching for the electrical anti-freeze were located here, along with Hi-Low alarms, maglocks and associated lift knock-off arms.

- 4.26 Due to the close proximity of the gasholder to the vehicular access track a vehicle crash barrier had been installed around the northern perimeter.

Gasholder 3

- 4.27 Gasholder 3 was a water-sealed spirally-guided holder with below-ground tank and four lifts. It was constructed in 1959 by S Cutler & Sons Ltd and had a diameter of c38m and a storage capacity of c1 million cu. ft. The lifts had a net height of 7.3m (23' 11") each, reaching a total height of c32m including the 2.3m (7' 6") crown rise. A large free-standing numeric designation plaque was located adjacent to the gasholder at its southern side and a smaller plaque was fixed to the tank rails nearby.

Table 3 - Gasholder 3

Lifts	1st (inner)	2nd	3rd	4th (outer)	tank
Diameter	34.16m 112' 1"	35.18m 115' 5"	36.20m 118' 9"	37.19m 122' 0"	38.10m 125' 0"
Depth	7.93m 26' 0"	7.93m 26' 0"	7.93m 26' 0"	7.93m 26' 0"	8.23m 27' 0"

- 4.28 The tank was constructed of reinforced concrete by J. L. Kier & Co. Ltd.; a survey of the dumpling noted the annulus width as c2.5m and the dumpling as rising to c5.5m over a distance of c11m to a flat platform c12m in diameter. The volume of the tank was calculated as 9889m³ and the dumpling as 2344m³. Unlike gasholders 1 and 2, the tank of gasholder 3 was elevated 0.7m above the surrounding ground level, forming a raised concrete wall 0.9m in width. Concrete footings blocks carrying the tank roller carriages projected forward and upward from the tank wall.
- 4.29 The roller carriages were of a design not uncommon on later spiral-guided gasholders, comprising 300mm diameter rollers with the axles or spindles held in single-piece housings with detachable end plates. The carriage housings were elevated just above and secured to steel footings plates with anchor bolts passing through into the concrete carriage block. The lift roller carriages were of the same design, with more compact footings matching the width of the lift grips. The spiral rails appeared to be of a fairly standard gauge with no run-out stops fitted.
- 4.30 As noted on gasholder 2, a vehicle crash barrier had been installed around the gasholder tank.
- 4.31 The lifts were constructed of steel with the sheets being riveted; the arrangement and sheet specifications is not provided on the gasholder data sheet and was not visible during the survey.

- 4.32 The crown was comprised of seven concentric rings of sheets and a central plate. The outer two plates were riveted and overlap plates were placed on the outer ring seams where the principal rafters were located. The intermediate sheeting was welded rather than riveted. At the crown apex were two manually operated 6" valves. A designated walkway to the crown apex crossed from the north-east to south-west sides of the crown and platforms through the lift handrails were located at these positions. Approximately midway to the crown, at both the north and south sides of the walkway, there were two small square raised manholes alongside a valve or syphon.
- 4.33 No information about the crown-frame was available at the time of this survey. It is assumed that the crown was trussed in a similar arrangement to gasholder 2, this also being the common method of crown framing in later gasholders.
- 4.34 The 30" common inlet and outlet main entered the gasholder from its southern side and paired square and circular manholes were located over these pipes on the crown. A circular manhole was located at the opposite side of the crown to these pipes. A dry well with above ground syphon pump within a cage was located at the south side of the tank with vehicle crash posts at the corners of the well. Pump controls and a stop-start button were located alongside the drywell.
- 4.35 Hi-Low alarms with maglocks were also located at the south side of the gasholder with the associated lift knock-off arms in the same position when at rest and engaging when the lifts were raised. A circuit box and separate junction box were also located here and the electrical cables were carried around the gasholder via cable trays attached to the raised tank wall.
- 4.36 The gasholder had been fitted with electrical anti-freeze and as also noted on gasholders 1 and 2 retained the pipework for the former steam anti-freeze system. Pivoting trays with manually operated valves were located at the south-west and north-east sides of the gasholder and lagged pipework remained in place around the tank perimeter and carried to the gasholder via an overhead gantry at the south.

The Cottage

- 4.37 The Cottage was a former domestic residence located adjacent to the site entrance from Marsh Lane. At the time of this survey the building was derelict and in an unsafe condition with parts of the structure inaccessible due to asbestos. The survey was limited to the external elevations and a rapid examination of certain areas of the interior.
- 4.38 Available historic map evidence suggests that this structure has been extant since c1870 at which time it was shown as a linear building with small extensions or outbuildings on the west, north and south sides. This arrangement remained in place until c1930 when the building footprint was expanded into a rectangular block with a new extension along its northern side. A separate air raid shelter was subsequently constructed to the north-east of the cottage; this likely comprised a buried pre-cast concrete structure. No evidence for the air raid shelter was apparent during this survey.
- 4.39 The cottage was two-storied and occupied a double-pile, central passage plan with rectangular footprint c11 x 5m on an east-west alignment. The principal elevation was presented to the south, facing the site entrance track. The building showed clear evidence for a phase of expansion in which the main part of the building was extended eastward and with a single-storey outbuilding constructed as part of this expansion. A second phase of alteration, likely post-1960s comprised the construction of a canted bay window at ground level on the west side of the south elevation. The earlier part of the elevation comprised three bays with a central door flanked by six-over-six un-horned sash windows, with matching sashes at first floor level. The brickwork comprised pale red-yellow hand-made bricks with horizontal skintle marks laid in Flemish bond. The window and door lintels were formed of brick in flat arches.
- 4.40 A clear vertical line (straight joint) delineated the eastern extension to the building. The brickwork here comprised machine-produced gault brick with red brick used for the window lintel flat arches. The two windows, one at ground and one at first floor, comprised six-over-six horned sashes.
- 4.41 A modern uPVC drain pipe spanned with length of the elevation under the eaves, with a downpipe at the far eastern end of the wall.
- 4.42 The north-facing elevation provided further information as to how the building was altered in the 1930s, with the outline of the former outbuildings remaining evident on the wall. This elevation was essentially blank except for a narrow window lighting the central staircase of the house. It is evident here that on this side of the building the later re-build was, at first floor only, lifting a formerly single-storied structure to two-stories and also expanding a small single storey outbuilding to the full width of the house and providing it with a cat-slide roof. The outline of the former northern extension was also evident on the elevation.
- 4.43 The house had two chimneys, each with two flues and terracotta pots, and these were located flush with the northern wall, serving fireplaces at ground and first floor level.

- 4.44 The roof was gabled and surfaced with clay tiles. The western gable elevation was largely hidden by trees but appeared to comprise of red facing bricks with brick kneelers to raised brick and stone coping. This was not matched with the later expansion. The roof structure was not evident during this survey.
- 4.45 At ground floor were two rooms separated by a central porch and stair with under-stair storage. The bay window served the living room in which there was a simple 1930s tiled fireplace. A sash window also lit the living room from the west. The fireplace was flanked by shelves and cupboards; no other fixtures or fittings were present. The east side of the ground floor included a kitchen and storage containing only modern fittings.
- 4.46 At first floor were two bedrooms, one containing a built-in corner cupboard. Both contained simple fireplaces with basic wooden surrounds. No other features of interest remained in either room. The western room was also lit by a sash window in the western gable elevation.

Booster House

- 4.47 This building was situated opposite to the Cottage, adjacent to the site access from Marsh Lane. The interior was not accessed during this survey.
- 4.48 The current building appears to have been constructed c1930, replacing an earlier structure and was itself subject to subsequent minor extensions and alterations. The building occupied an irregular footprint in the south-western corner of the site and measured approximately 24m x 8-10m. A plan of 1969 (ref: NT/NW/SNM/E/E/5) labels the internal subdivisions as *Booster Room, Stores & Offices, Lobby, and Engine Room*, with the Stores and Offices occupying the largest area of the building. By the time of this survey the Lobby and an external stair had been removed and made good. The building had flat roofs with the walls forming parapets.
- 4.49 The building's design was purely function with no decorative elements. The walls were faced with modern brick in Flemish Bond, with simple brick lintels over door and window openings. The various elevations included an irregular arrangement of louvered ventilation openings, doorways and windows, with the windows primarily opening to the stores and offices. Other openings denoted insertion points for former pipes to the Booster Room. A number of blocked openings were evident, particularly on the northern elevation where pipework had been rearranged likely on multiple instances.
- 4.50 A steel gantry carried lagged pipes and electrical cables from the Booster Room to the gasholders. Various miscellaneous equipment was attached to the external walls including pressure gauges and electrical switches.

5.0 Discussion

- 5.1 The gasworks was established at Marsh Lane in the mid-19th century and occupied a relatively remote position in a rural landscape, with no immediate access to rail or water transport routes. The works can be seen to have undergone several stages of development during the later 19th century and by the early 20th century map evidence suggests that the site was serving principally as a distribution centre rather than manufacture. The works responded to the expansion of the surrounding residential area and increase for demand by upgrading its storage and distribution capability through the phased construction of new gasholders. The new gasholders were of the spirally-guided design which allowed for significant storage capacity and were cost-effective to build and maintain.
- 5.2 The siting of spirally-guided gasholders in below-ground tanks is more commonly found where the gasholders are replacing or upgrading earlier column or frame-guided holders. The use of below-ground tanks at Marsh Lane may be a measure to mitigate the visual prominence of the gasholders within the landscape, dropping their height by c9m each.
- 5.3 The gasholders presently on the site date to the 1920s, 1930s and 1950s and the general overall uniformity in their design demonstrates the consistency of approach to the construction of these gasholders in the 20th century. The two earlier gasholder had an entirely riveted construction whilst Gasholder 3 utilised both rivets and welding. The trussed crown construction of Gasholder 2 was the standard approach on most gasholders, both spirally and frame-guided, during the 20th century, with many earlier gasholders being untrussed and the crown being supported on a static frame when at rest. It is assumed that Gasholders 1 and 3 likely utilise a similar framing system.
- 5.4 As was common practice the gasholders were latterly fitted with electrical anti-freeze and a range of monitoring, telemetry, and safety systems, allowing for remote control and monitoring of the gasholders and site.
- 5.5 Recording also encompassed a domestic residence, likely serving the works manager, which dated to c1870 and was part of the earliest phases of the gasworks. The building was found to have been expanded in c1930.
- 5.6 The site also included a large building constructed c1930 and formerly serving as a Booster Room, Engine House, and Offices. The interior of the building was not accessed during this survey due to safety reasons. As is common for utilitarian industrial structures, the building was simply constructed with no decorative embellishment and with its form dictated by functional requirement and often adapted to changes in layout of plant and infrastructure.
- 5.7 The site is not included in the 151 sites covered in the Step 3 Monuments Protection Programme (Trueman 2002).

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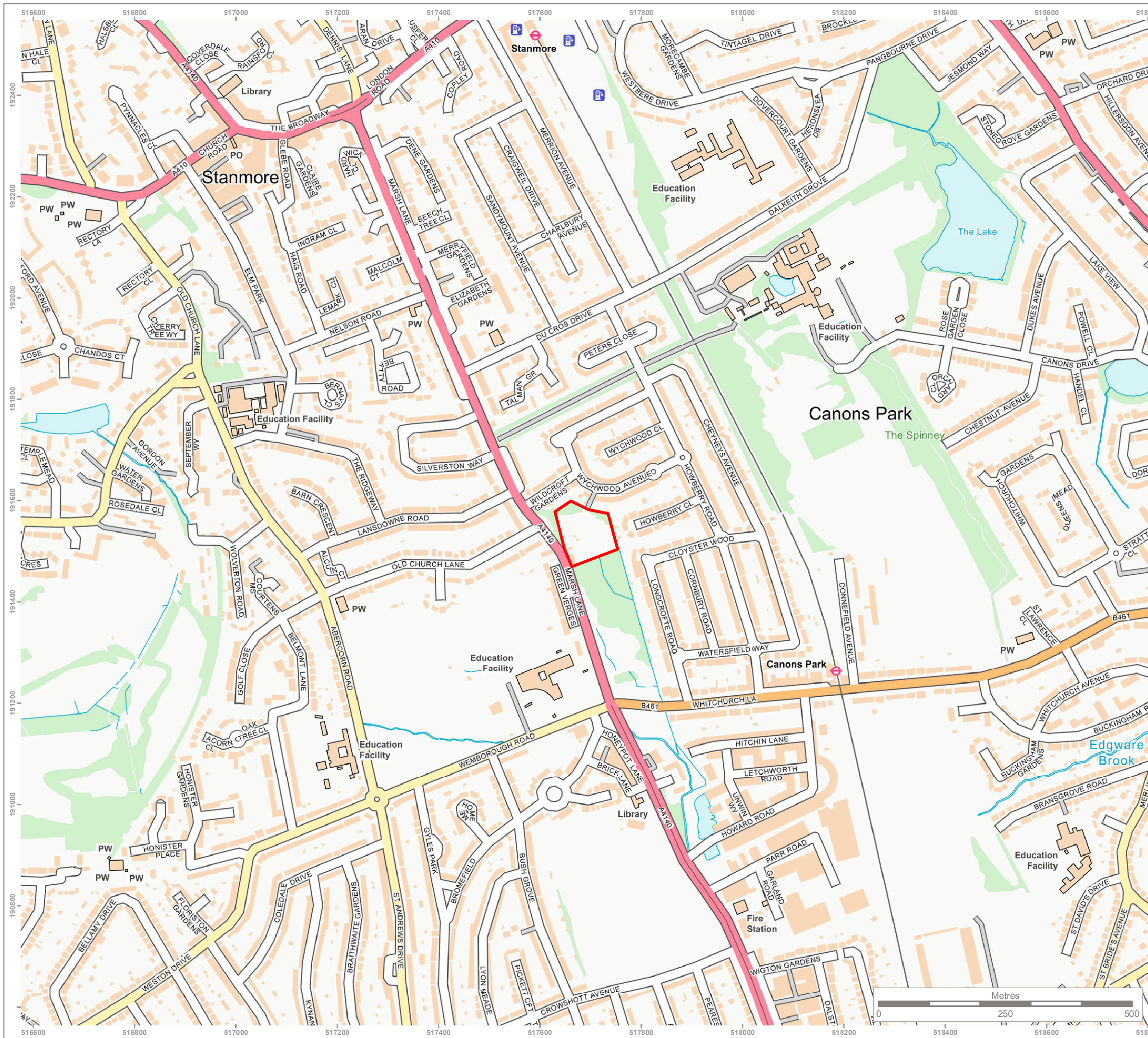
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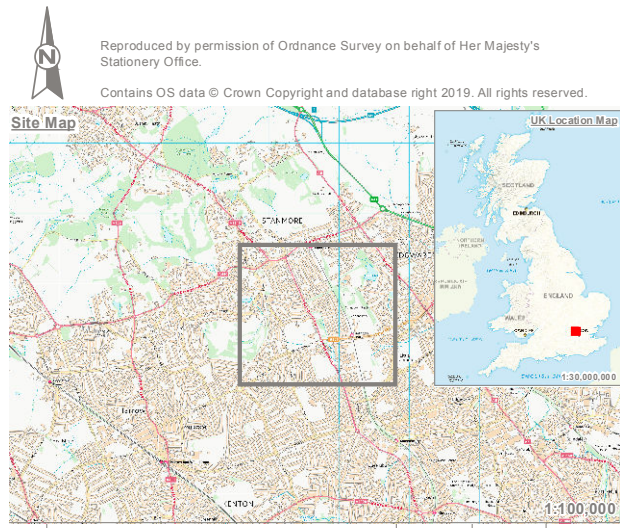
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KEY
 Site location



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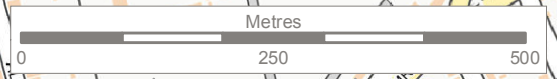
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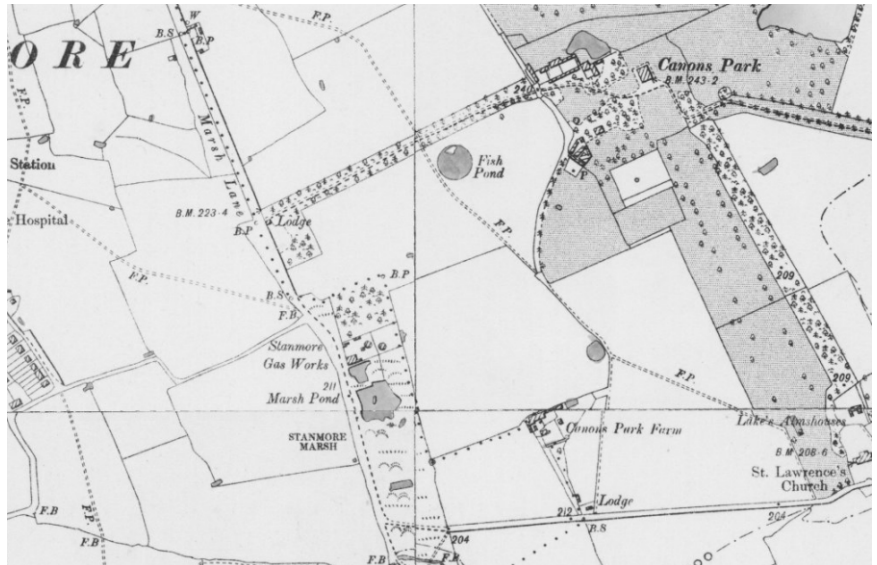
Project
Stanmore, Marsh lane

Title
Site location

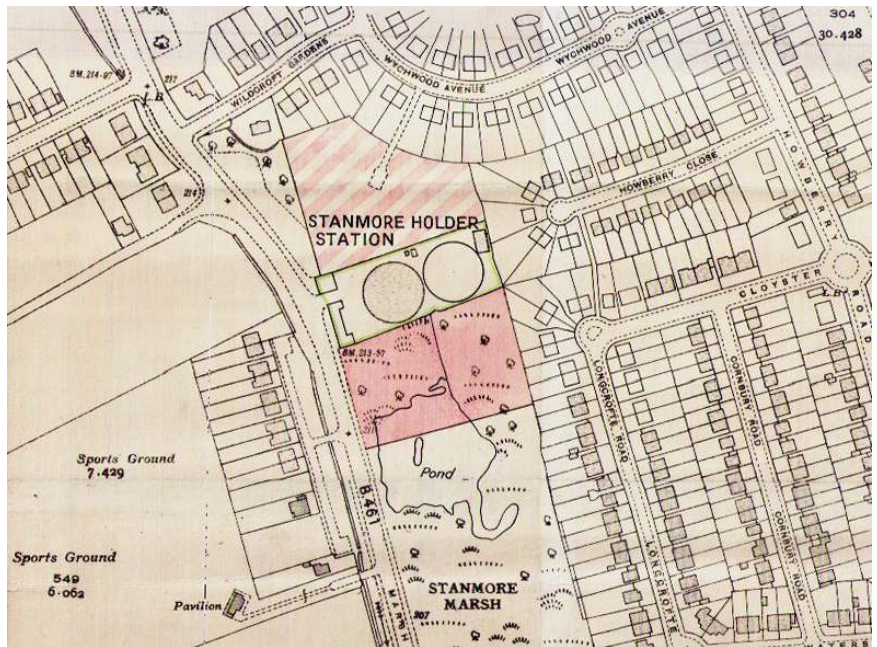
Drawing Number
G7801.001

Drawn	Checked	Approved	Scale	Date
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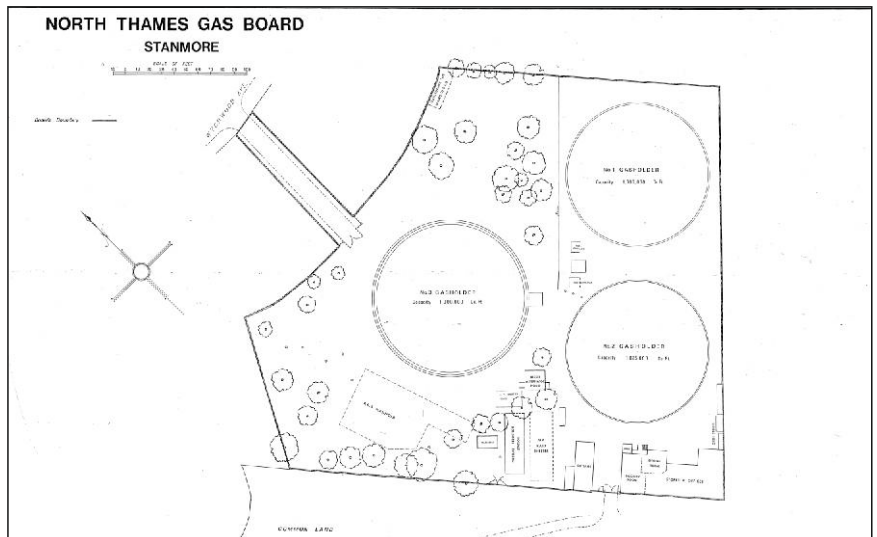




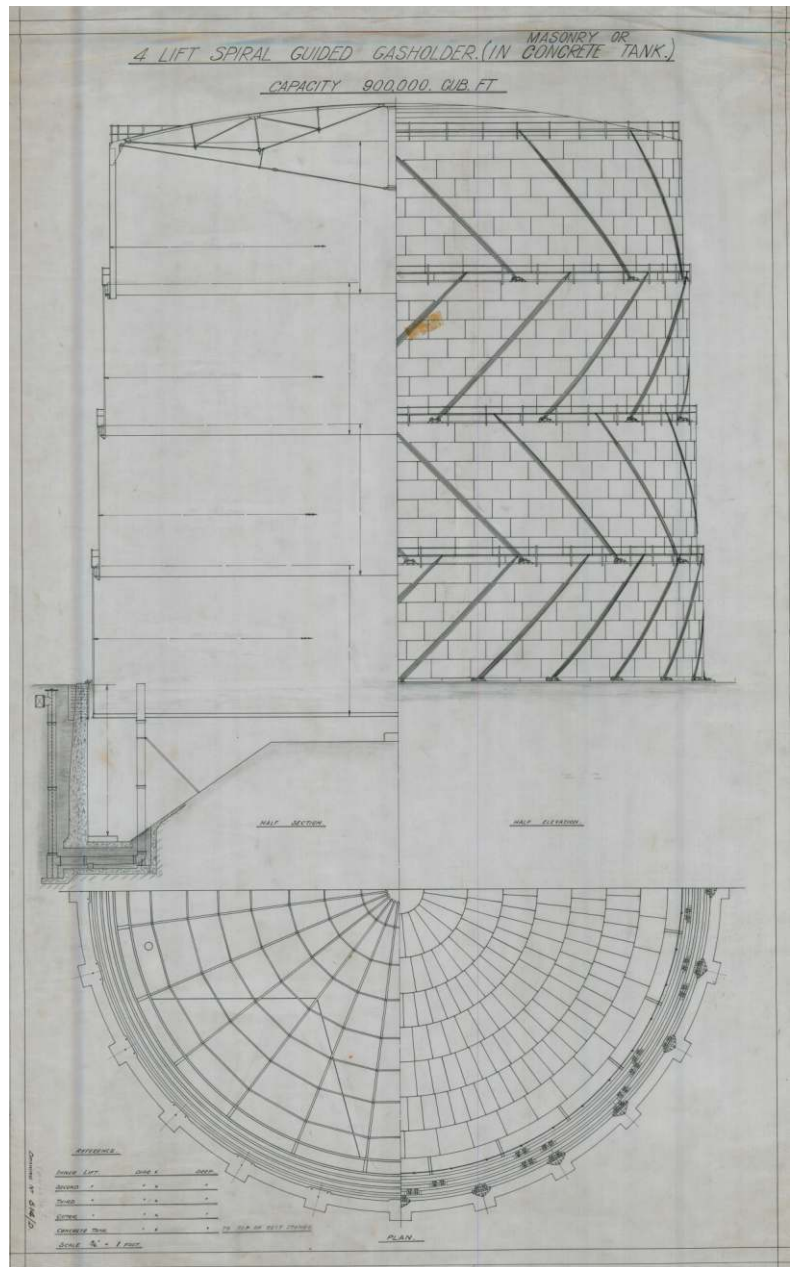
Ordnance Survey map of Stanmore, showing the Gasworks to the west of Canons Park Fig 2



Plan of c1940 showing the existing gasholders and proposed areas of expansion (NT/NW/SNM/E/E/2) Fig 3



1972 plan of the site (NT/NW/SNM/E/E/6) Fig 4



Plan and cross-section of Gasholder 2 (NT/NW/SNM/E/T/1) Fig 5



General view of Gasholder 1, looking south-east Fig 6



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



General view of the crown, looking east Fig 8



View of the crown, showing access and walkway to centre plate Fig 9



Valves at the crown apex Fig 10



View of the tank kerb, lift grips and roller carriages Fig 11



Dry well and syphon pump, as well as electrical cables at the east side of the gasholder Fig 12



Pivoting steam pipe trays at the south side of the gasholder Fig 13



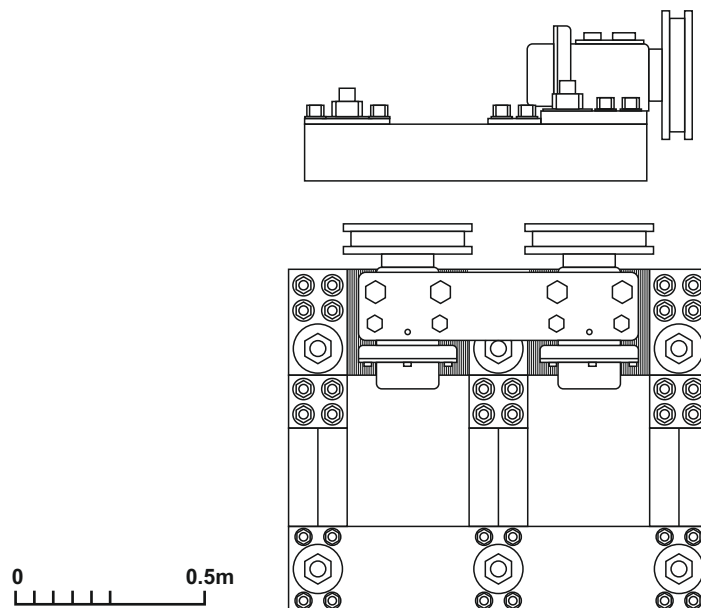
Detail of hammer switch / maglocks Fig 14



Electronic monitoring and telemetry and anti-freeze units Fig 15



Example of the roller carriages Fig 16



Measured drawing of an example roller carriage Fig 17



General view of Gasholder 2, looking south-west Fig 18



Detail of signage, also showing vehicle barrier and overhead cable tray Fig 19



Elevated maglocks and lift knock-off arms, also showing lagged pipes to Booster House Fig 20



View of the crown, looking north Fig 21



Detail of crown vent Fig 22



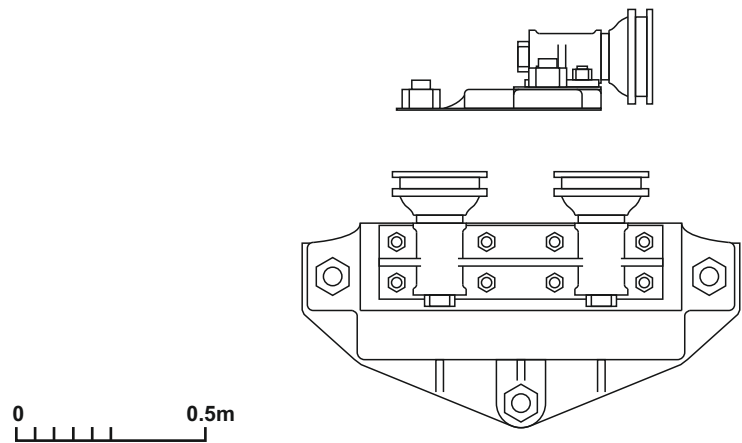
Pivoting steam pipe trays and overhead lagged pipes at the south of the gasholder Fig 23



Manually operated overflow pipe valve Fig 24



Example of the roller carriages, showing the tank kerb Fig 25



Measured drawing of an example roller carriage Fig 26



General view of Gasholder 3, looking west Fig 27



View of signage, crash barrier and tank handrails Fig 28



Dry-well and syphon pump at the south side of the gasholder Fig 29



Detail of electric cables and maglocks Fig 30



Pivoting steam pipe trays Fig 31



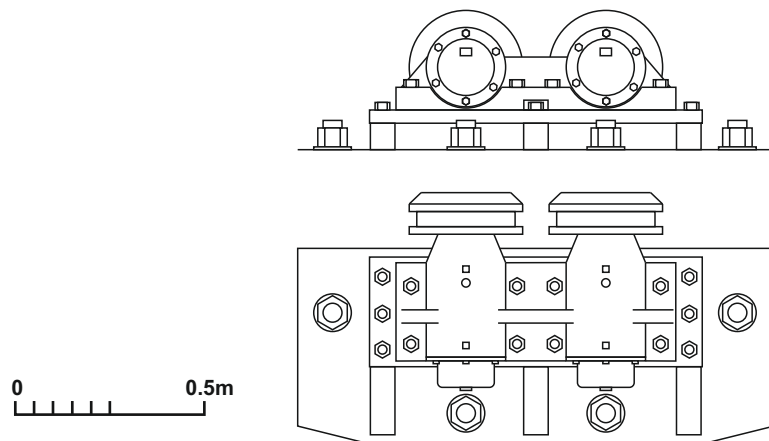
General view of the crown, looking south-west Fig 32



Detail of crown manhole Fig 33



Example of the roller carriages Fig 34



Measured drawing of an example roller carriage Fig 35



The raised tank kerb with access to well Fig 36



Detail of the lift grips, showing roller carriage and lagged pipe Fig 37



View towards PRS compound and pipes / valve house Fig 38



Overhead pipe and cable gantry between Gasholder 1 and 2 Fig 39



View of pipes and valves adjacent to Gasholders 1 and 2 Fig 40



The Booster House, looking south, showing lagged pipe from Gasholder 2 Fig 41



General view of the south elevation of the Booster House Fig 42



Entrance to the office area of the Booster House Fig 43



The south and east elevations of the Cottage; note vertical change in fabric Fig 44



The main entrance with adjacent modern bay window Fig 45



First floor sash window Fig 46



The north elevation; note joins denoting alteration of the building Fig 47



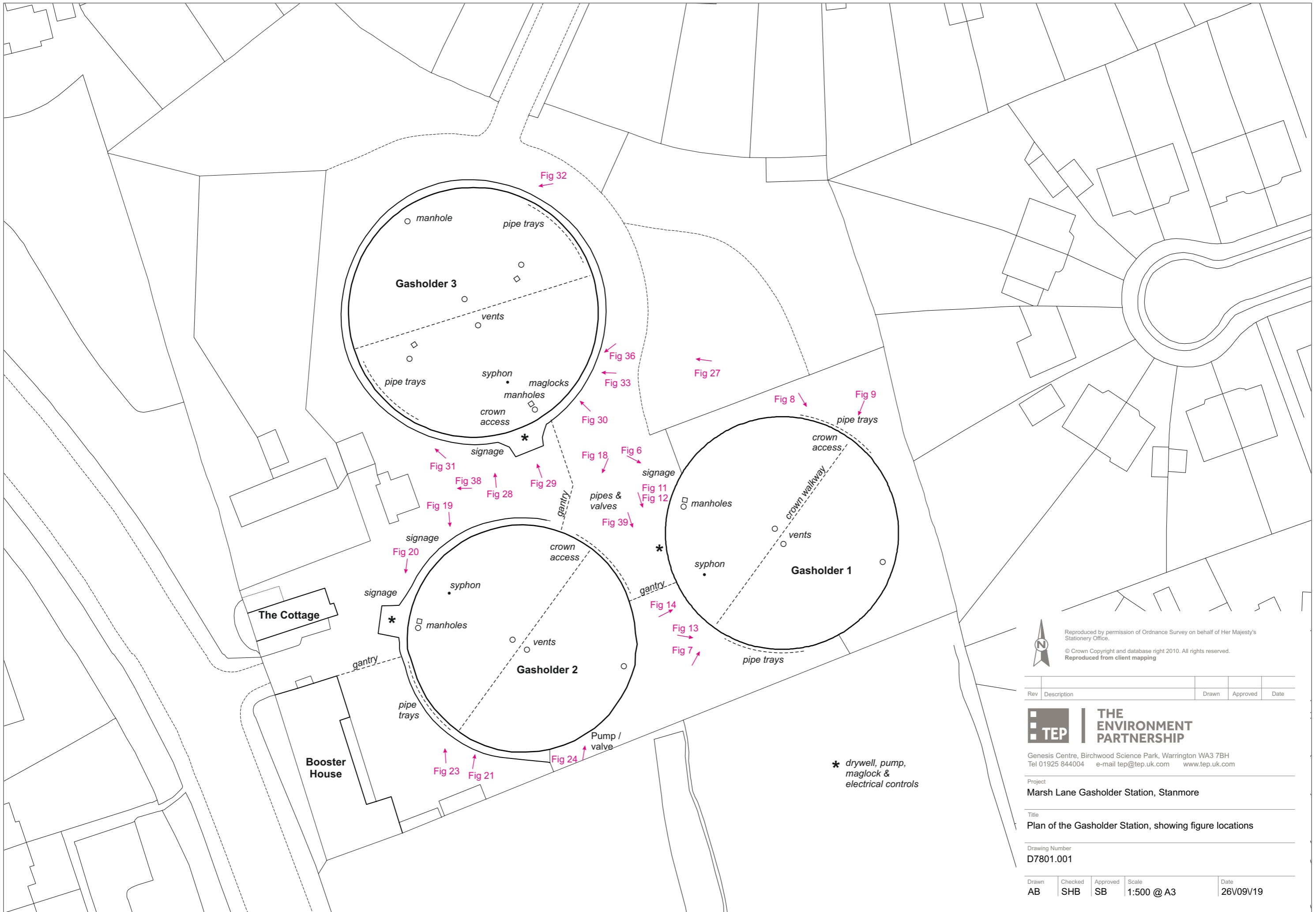
The ground floor living room with central tiled fireplace Fig 48



Understairs cupboard with stairs to first floor Fig 49



First floor bedroom Fig 50



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Project
Marsh Lane Gasholder Station, Stanmore

Title
Plan of the Gasholder Station, showing figure locations

Drawing Number
D7801.001

Drawn	Checked	Approved	Scale	Date
AB	SHB	SB	1:500 @ A3	26V09V19

* drywell, pump, maglock & electrical controls

Stanmore, Marsh Lane Gasholder Station

Photographic Register

4th September 2019

Nikon D3500, Nikon 18-70mm Lens

File / Photo No.	Description
DSC8813	View of Gantry between GH1 and GH2
DSC8815	View of pipes between GH1 and GH2
DSC8817	View of pipes and PRS compound
DSC8889	Electric substation at N of site
DSC8928	Pipe / Valve House at PRS compound
DSC8931	Door to pipe house
DSC8932	PRS compound
DSC8941	View towards Booster House and GH2
DSC8942	View towards Booster House and GH2
DSC8943	N elevation The Cottage
DSC8944	The Cottage, chimneys
DSC8945	The Cottage N elevation window
DSC8946	The Cottage, N elevation, join
DSC8947	The Cottage, east extensions
DSC8949	The Cottage, S elevation
DSC8950	The Cottage, S elevation
DSC8951	The Cottage, signage
DSC8952	The Cottage, bay window
DSC8953	The Cottage, first floor window
DSC8954	The Cottage, door
DSC8955	The Cottage, ground floor
DSC8956	The Cottage, ground floor
DSC8957	The Cottage, ground floor
DSC8958	The Cottage, ground floor
DSC5989	The Cottage, stairs up
DSC8960	The Cottage, first floor
DSC8961	The Cottage, first floor
DSC8962	The Cottage, first floor
DSC8963	The Cottage, first floor
DSC8964	The Cottage, first floor
DSC8965	The Cottage, stair
DSC8966	The Cottage, ground floor
DSC8967	The Cottage, ground floor
DSC8968	The Cottage, ground floor
DSC8969	The Cottage, ground floor
DSC8971	The Booster House
DSC8972	The Booster House
DSC8973	The Booster House
DSC8975	The Booster House
DSC8976	The Booster House
DSC8977	The Booster House
DSC8979	The Booster House
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DSC8990	The Booster House
DSC8991	The Booster House
DSC8992	The Booster House
DSC8994	The Booster House
DSC8995	The Booster House

Gasholder 1	
DSC8755	Gasholder 1, General view to SE
DSC8756	Gasholder 1, signage
DSC8758	Gasholder 1, roller carriage
DSC8759	Gasholder 1, roller carriage
DSC8760	Gasholder 1, roller carriage
DSC8761	Gasholder 1, roller carriage
DSC8762	Gasholder 1, tank kerb and lutes, to SW
DSC8763	Gasholder 1, general view to W
DSC8764	Gasholder 1, general view to E
DSC8766	Gasholder 1, crown apex
DSC8767	Gasholder 1, general view to W
DSC8769	Gasholder 1, view of crown, to N
DSC8770	View of pipes and valves adjacent to GH1 and GH2
DSC8772	View of pipes and valves adjacent to GH1 and GH2
DSC8773	Gasholder 1, drywell, pump and electrics
DSC8774	Gasholder 1, Manholes over mains pipes
DSC8776	Gasholder 1, Maglocks at E of tank
DSC8777	Gasholder 1, Maglocks at E of tank
DSC8778	Gasholder 1, Maglocks at E of tank
DSC8780	Gasholder 1, Maglocks at E of tank
DSC8781	Gasholder 1, general view from W to E
DSC8782	Gasholder 1, Crown syphon
DSC8783	Gasholder 1, General view to NE
DSC8784	Gasholder 1, pipe trays, at SE
DSC8785	Gasholder 1, pipe trays, at SE
DSC8786	Gasholder 1, pipe trays, at SE
DSC8787	Gasholder 1, crown walkway
DSC8789	Gasholder 1, pipe trays, at SE
DSC8790	Gasholder 1, handrails
DSC8791	Gasholder 1, general view to W
DSC8793	Gasholder 1, Lift roller carriages
DSC8794	Gasholder 1, Lift roller carriages
DSC8795	Gasholder 1, Lift roller carriages
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DSC8797	Gasholder 1, General view to W
DSC8799	Gasholder 1, Lagged pipes and tank kerb
DSC8800	Gasholder 1, Manhole at E of crown
DSC8801	Gasholder 1, View of crown to W
DSC8805	Gasholder 1, Roller carriage
DSC8806	Gasholder 1, Roller carriage
DSC8807	Gasholder 1, Crown apex
DSC8808	Gasholder 1, Steam pipes at NE of tank
DSC8810	Gasholder 1, Crown access
DSC8812	Gasholder 1, Electrics, telemetry, anti-freeze
DSC8891	Gasholder 1, General view from NE to SW
DSC8893	Gasholder 1, General view from NE to SW
Gasholder 2	
DSC8818	Gasholder 2, General view and signage at NW side
DSC8820	Gasholder 2, General view to E
DSC8821	Gasholder 2, General view to W
DSC8823	Gasholder 2, General view to SE
DSC8825	Gasholder 2, crown syphon at NW
DSC8826	Gasholder 2, Maglocks and gantry
DSC8828	Gasholder 2, Maglocks and gantry
DSC8829	Gasholder 2, Electric switching
DSC8830	Gasholder 2, Pump and electrics
DSC8832	Gasholder 2, Maglocks
DSC8833	Gasholder 2, Maglocks
DSC8834	Gasholder 2, Drywell and pump
DSC8835	Gasholder 2, View of crown, E
DSC8836	Gasholder 2, Lagged pipes, steam trays, to S
DSC8837	Gasholder 2, View to S
DSC8838	Gasholder 2, Signage, pump and electric

DSC8839	Gasholder 2, roller carriage
DSC8840	Gasholder 2, roller carriage
DSC8841	Gasholder 2, roller carriage
DSC8842	Gasholder 2, roller carriage
DSC8843	Gasholder 2, roller carriage
DSC8844	Gasholder 2, roller carriage
DSC8845	Gasholder 2, tank kerb
DSC8846	Gasholder 2, tank kerb
DSC8847	Gasholder 2, General view to NE
DSC8848	Gasholder 2, Steam trays at SW
DSC8849	Gasholder 2, S side of tank
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DSC8852	Gasholder 2, lift roller carriage
DSC8856	Gasholder 2, stair roller carriage
DSC8857	Gasholder 2, view of crown, to N
DSC8859	Gasholder 2, view of crown, to N
DSC8862	Gasholder 2, Steam trays and pumps
DSC8863	Gasholder 2, Steam trays and pumps
DSC8864	Gasholder 2, Steam trays, lagged pipes at SE of tank
DSC8865	Gasholder 2, Steam trays, lagged pipes at SE of tank
DSC8866	Gasholder 2, manhole
DSC8868	Gasholder 2, View of crown
DSC8870	Gasholder 2, View of crown
DSC8871	Gasholder 2, View of crown
DSC8872	Gasholder 2, Tank kerb and lutes
DSC8873	Gasholder 2, Truncated stair
DSC8875	Gasholder 2, Steam trays, lagged pipes at NE of tank
DSC8876	Gasholder 2, Steam trays, lagged pipes at NE of tank
DSC8879	Gasholder 2, telemetry and electrics
DSC8880	Gasholder 2, telemetry and electrics
DSC8881	Gasholder 2, telemetry and electrics
DSC8882	Gasholder 2, Steam trays
DSC8883	Gasholder 2, Steam trays
DSC8885	Gasholder 2, stair roller carriage
DSC8886	Gasholder 2, General view to SW
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DSC8948	Gasholder 2, Dry well pump switch
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DSC8892	Gasholder 3, General view from E to NW
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DSC8901	Gasholder 3, Maglocks
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DSC8904	Gasholder 3, roller carriage
DSC8905	Gasholder 3, roller carriage
DSC8906	Gasholder 3, General view at S side looking W
DSC8907	Gasholder 3, View of lutes, hand rails and rollers
DSC8908	Gasholder 3, Crown, lagged pipes and handrails at E, looking N
DSC8909	Gasholder 3, Manholes at S
DSC8910	Gasholder 3, Lifts and grips
DSC8911	Gasholder 3, crown apex
DSC8912	Gasholder 3, tank concrete kerb
DSC8913	Gasholder 3, Electrics and telemetry
DSC8914	Gasholder 3, Steam trays at NE of tank
DSC8915	Gasholder 3, Crown fittings
DSC8916	Gasholder 3, View of crown from N to SW
DSC8917	Gasholder 3, Crown apex
DSC8918	Gasholder 3, Crown apex
DSC8919	Gasholder 3, Steam trays at NE of tank



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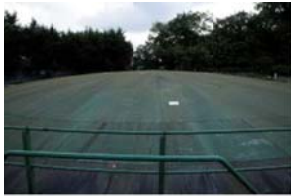
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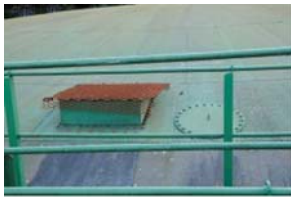
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NORTH THAMES GAS

RETYPE JANUARY 1973

GASHOLDER OPERATIONAL DATA SHEET No.1

(Sketch Sheet No. MC/1261/5/2)

Constructional and Dimensional Details

(See also Sketch Sheet No. MC/1261/5/1)

No. 1 Holder at Stanmore

TANK DETAILS		HOLDER DETAILS.				
Manufacturer	Holst & Co.	Manufacturer	R. & J. Dempster Ltd.			
Year of completion	1939	Year of completion	1939			
Type: Brick/R.C./M.S./C.I.	RC	Type: Column/Spiral	S			
: Rivetted/Welded/Bolted		: Rivetted/Welded	Rivettted			
Internal diameter	115'0"	: Station/Relief holder	S			
Heights: Total	29'0"	Sealing-plate thickness	Not fitted			
: Portion below ground	29'0"	Rise of 1st Lift off rest-blocks at sealing-point				
: Rest-blocks above base	1'0"	Crown valve sizes: Gas vent	6"			
: Main(s) above rest-blocks	28'1 $\frac{3}{4}$ "	: Air vent	6"			
: Tank top above rest-blocks	28'0"	Antifreeze: Steam/Hot water/Electric	E			
: Overflow	27'7"	Oxley-type oil return ducts fitted	No			
: Zero Datum Pointer above tank top	Not fitted					
Diameter of inlet main	24"					
Diameter of outlet main	COMMON					
CUP & GRIP DETAILS		Type: Curved/Square section				Sq.
		Width of Cup annulus				11"
		Width of Grip annulus				11"
		Overlap of Cup and Grip when engaged				2'7 $\frac{1}{2}$ "
LIFT DETAILS		1st	2nd	3rd	4th	5th
Lift heights : Total	28'0"	28'0"	28'0"	28'0"		
(excluding Crown) : Net		25'4 $\frac{1}{2}$ "	25'4 $\frac{1}{2}$ "	25'4 $\frac{1}{2}$ "		
Internal diameter	104'0"	107'0"	110'0"	113'0"		
Cross-sectional area	8,495	8,992	9,503	10,029		
Net Lift volume (excluding Total Crown Gas for 1st lift)	223,344	228,172	241,139	254,486		
Pressure thrown (cumulative)	0.0"		14.6"	17.9"		
Tank annulus water-level below overflow (zero for outer lift)	15.5"		3.0"	0.0"		
Inner water-level below overflow	15.5"		17.6"	17.9"		
Crown Rise	7'0"	Spherical segment only				
Upper Crown Gas Volume	29,912					
Lower Crown Gas Height	1'8.5"	Cylindrical shell height and volume above level gauge water when depressurised.				
Lower Crown Gas Volume	14,512					
Total Crown Gas Volume	44,424					

NORTH THAMES GAS

REVISED JANUARY 1991

GASHOLDER OPERATIONAL DATA SHEET No. 2

(Sketch Sheet No. MC/1261/3/3)

Standard Capacities & Control Data

(See also Sketch Sheet No. MC/1261/5/1)

No. 1 Holder at Stanmore

PRESSURES AT EACH LIFT FOR ALL THE STATION HOLDERS ON THE SAME SITE							
Holder	Number	1	2	3			
Pressures: "Owing to Dist. Pressures Unable to drop into 1st and 2nd lifts.	5th Lift	17.9"	16.5"	15.8"			
	4th Lift	14.6"	13.4"	13.0"			
	3rd Lift *		10.0"	"			
	2nd Lift *		6.4"	"			
	1st Lift						
Lightest 1st Lift holder which normally operates the booster trip							
Working capacity for each holder		SUMMER	854,039	WINTER	893,562		

CUMULATIVE GAS VOLUMES (Including total crown gas) FOR No. HOLDER	Height of curb reference point above Zero Datum	Cumulative gas volume above actual inner water - level	Travel & volume change between stated points	
			VERTICAL TRAVEL	VOLUME CHANGE
Total Crown Gas / AT LEVEL GAUGE	- 2' 0"	44,424 [1]	1' 11"	
AT FIRST LIFT PRESSURE		[2]		
AT EXTRA-LOW LEVEL SWITCH	- 1"	[3]	1"	
AT ZERO STOCK POSITION	ZERO	[4]	9"	
AT LOW LEVEL SWITCH	9"	[5]		
AT MAX. STOCK POSITION Summer	93' 8.5"	894,337 [6]	3' 10"	38,466
----- Winter	97' 6.5"	932,803 [7]		
AT HIGH LEVEL SWITCH	Not fitted	[8]		
AT BLOWING-POINT	100' 5"	961,653 [9]		

DECLARED VOLUMES	Summer	Winter
Total Crown Gas A = (1)	44,424	44,424
Deflated Safety Margin B = (4) - (1)		= (4) - (1)
Working Capacity C = (6) - (4)		= (7) - (4)
Inflated Safety Margin D = (9) - (6)	67,316	= (9) - (7) 28,850
DSM contraction allowance = 100B / (A+B)		= 100B / (A+B)
ISM expansion allowance = 100D / (A+B+C+D)	7.0 %	= 100D / (A+B+C+D) 3.0 %

NOTE

a) A temp. drop of 20.0° C (36° F) requires a DSM allowance of 7.5 %

b) A temp. rise of 21.7° C (39° F) requires an ISM allowance of 7.0 % (Summer)

c) A temp. rise of 8.9° C (16° F) requires an ISM allowance of 3.0 % (Winter)

Volume charged to Capital on initial filling or Maintenance on refilling	= (A + B) = (4)
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Unable to calculate 'C' as cannot calculate No 1st lift press.

NORTH THAMES GAS

RETYPE JANUARY 1974

GASHOLDER OPERATIONAL DATA SHEET No.1

(Sketch Sheet No MC/1261/5/2)
(See also Sketch Sheet No. MC/1261/5/1)

Constructional and Dimensional Details

No. 2 Holder at Stanmore

TANK DETAILS		HOLDER DETAILS.				
Manufacturer	T. Vale & Son	Manufacturer	Clayton Sons & Co. Ltd.			
Year of completion	1928	Year of completion	1928			
Type: Brick/R.C./M.S./C.I.	RC	Type: Column/Spiral	S			
: Rivetted/Welded/Bolted	-	: Rivetted/Welded	R			
Internal diameter	115'0"	: Station/Relief holder	S			
Heights: Total	29'0"	Sealing-plate thickness	Not fitted			
: Portion below ground	29'0"	Rise of 1st Lift off rest-blocks at sealing-point				
: Rest-blocks above base	1'0"	Crown valve sizes: Gas vent	2" cock only			
: Main(s) above rest-blocks	28'13"	: Air vent				
: Tank top above rest-blocks	28'0"	Antifreeze: Steam/Hot water/Electric	E			
: Overflow	27'6 1/2"	Oxley-type oil return ducts fitted	No			
: Zero Datum Pointer above tank top	Not fitted					
Diameter of inlet main	18"					
Diameter of outlet main	18"					
CUP & GRIP DETAILS		Type: Curved/Square section	S			
		Width of Cup annulus	9"			
		Width of Grip annulus	9"			
		Overlap of Cup and Grip when engaged	2'0"			
LIFT DETAILS		1st	2nd	3rd	4th	5th
Lift heights: Total			28'0"	28'0"	28'0"	
(excluding Crown): Net	28'0"		26'0"	26'0"	26'0"	
Internal diameter	105'10"		108'3"	110'7"	113'0"	
Cross-sectional area	8,630		9,203	9,477	10,029	
Net Lift volume (excluding Total Crown Gas for 1st lift)	227,616		239,278	246,402	260,747	
Pressure thrown (cumulative)	0'0" 6.4"		10'0"	13.4"	16.5"	
Tank annulus water-level below overflow (zero for outer lift)	14'0" 8.6"		5.8"	2.9"	0"	
Inner water-level below overflow	14'0" 15.0"		15.8"	16.3"	16.5"	
Crown Rise	6'10"	Spherical segment only				
Upper Crown Gas Volume	27,623					
Lower Crown Gas Height	1'7 1/2"	Cylindrical shell height and volume above level gauge water when depressurised				
Lower Crown Gas Volume	14,024					
Total Crown Gas Volume						

NORTH THAMES GAS

REVISED JANUARY 1974

GASHOLDER OPERATIONAL DATA SHEET No. 2

(Sketch Sheet No. 1)

Standard Capacities & Control Data

(See also Sketch Sheet No. 1)

No. 2 Holder at Stanmore

PRESSURES AT EACH LIFT FOR ALL THE STATION HOLDERS ON THE SAME SITE							
Holder	Number	1	2	3			
Pressures:	5th Lift						
	4th Lift	17.9"	16.5"	15.8"			
* Owing to	3rd Lift	14.6"	13.4"	13.0"			
Dist. Pressures	2nd Lift	"	10.0"	"			
unable to drop	1st Lift	"	6.4"	"			
into 1st and							
the lifts							
Lightest 1st Lift holder which normally operates the booster trip							
Working capacity		SUMMER	854,039				
for each holder		WINTER	893,562				

Unable to calculate as cannot calculate for 1st lift

CUMULATIVE GAS VOLUMES (Including total crown gas) FOR No. HOLDER	Height of curb reference point above Zero Datum	Cumulative gas volume above actual inner water level	Travel & volume change between stated points	
			VERTICAL TRAVEL	VOLUME CHANGE
Total Crown Gas / AT LEVEL GAUGE	- 2' 0"	43,647 (1)	1' 11"	
AT FIRST LIFT PRESSURE		47,531 (2)		
AT EXTRA-LOW LEVEL SWITCH	- 1"	64,072 (3)	1"	20,425
AT ZERO STOCK POSITION	ZERO	64,863 (4)	9"	7,473
AT LOW LEVEL SWITCH	9"	71,336 (5)	94' - 9 1/2"	847,566
AT MAX. STOCK POSITION Summer	95' 5 1/2"	913,902 (6)	3' - 11 1/2"	39,562
Winter	99' 5"	953,425 (7)		
AT HIGH LEVEL SWITCH	Not Fitted	(8)		
AT BLOWING-POINT	102' 4 1/2"	983,067 (9)		

DECLARED VOLUMES		Summer		Winter
Total Crown Gas	A = (1)	43,647	= (1)	43,647
Deflated Safety Margin	B = (4) - (1)	21,216	= (4) - (1)	21,216
Working Capacity	C = (6) - (4)	854,039	= (7) - (4)	893,562
Inflated Safety Margin	D = (9) - (6)	69,165	= (9) - (7)	29,642
DSM contraction allowance	= 100B / (A+B)	32.7	= 100B / (A+B)	32.7
ISM expansion allowance	= 100D / (A+B+C+D)	7.0 %	= 100D / (A+B+C+D)	3.0 %

NOTE

- a) A temp. drop of 20.0° C (36° F) requires a DSM allowance of 7.5 %
- b) A temp. rise of 21.7° C (39° F) requires an ISM allowance of 7.0 % (Summer)
- c) A temp. rise of 8.9° C (16° F) requires an ISM allowance of 3.0 % (Winter)

Volume charged to Capital on initial filling or Maintenance on refilling	=	(A + B) = (4)	64,863
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NORTH THAMES GAS

Re-typed 1st January, 1974.

GASHOLDER OPERATIONAL DATA SHEET No.1

(Sketch Sheet No. MC/1261/5/2)

Constructional and Dimensional Details

(See also Sketch Sheet No. MC/1261/5/1)

No. 3 Holder at Stanmore

TANK DETAILS		HOLDER DETAILS.				
Manufacturer	J. L. Keir & Co. Ltd.	Manufacturer	S. Cutler & Sons Ltd.			
Year of completion	1959	Year of completion	1959			
Type: Brick/R.C./M.S./C.I.	RC	Type: Column/Spiral	S			
Rivetted/Welded/Bolted		: Rivetted/Welded	R - but crown welded except for R 2 outer			
Internal diameter	125'0"	: Station/Relief holder rings	S			
Heights: Total	27'0"	Sealing-plate thickness	Not known			
: Portion below ground	24'10 1/2"	Rise of 1st Lift off rest-blocks at sealing-point	?			
: Rest-blocks above base	1'0"	Crown valve sizes: Gas vent	6"			
: Main(s) above rest-blocks	No dwgs.	: Air vent	6"			
: Tank top above rest-blocks	26'0"	Antifreeze: Steam/Hot water/Electric	E			
: Overflow	25'9"	Oxley-type oil return ducts fitted.	No			
: Zero Datum Pointer above tank top	Not fitted					
Diameter of inlet main	30"					
Diameter of outlet main	-----					
CUP & GRIP DETAILS		Type: Curved/Square section	S			
		Width of Cup annulus	12"			
		Width of Grip annulus	12"			
		Overlap of Cup and Grip when engaged	2'1"			
LIFT DETAILS		1st	2nd	3rd	4th	5th
Lift heights : Total	26'0"	26'0"	26'0"	26'0"		
(excluding Crown) : Net		23'11"	23'11"	23'11"		
Internal diameter	112'1"	115'5"	118'9"	122'0"		
Cross-sectional area	9,736	10,324	11,075	11,690		
Net Lift volume (excluding Total Crown Gas for 1st lift)	240,238	246,910	264,884	279,582		
Pressure thrown (cumulative)	0'0"	Cannot bring		13.0"	15.8"	
Tank annulus water-level below overflow (zero for outer lift)	12.9"	holder down to		2.5"	0"	
Inner water-level below overflow	12.9"	take press		15.5"	15.8"	
Crown Rise	7'6"	Spherical segment only				
Upper Crown Gas Volume	37,000					
Lower Crown Gas Height	1'3.9"	Cylindrical shell height and volume above level gauge water when depressurised				
Lower Crown Gas Volume	12,900					
Total Crown Gas Volume						

NORTH THAMES GAS

DATE: 01 JULY 1997

GASHOLDER OPERATIONAL DATA SHEET No. 2

(Sketch Sheet No. MC/1261/5/1)

Standard Capacities & Control Data

(See also Sketch Sheet No. MC/1261/5/1)

No. 3 Holder at Stanmore

PRESSURES AT EACH LIFT FOR ALL THE STATION HOLDERS ON THE SAME SITE						
Holder	Number	1	2	3		
Pressures:	5th Lift					
	4th Lift	17.9"	16.5"	15.8"		
Dist. Pressures unable to drop into 1st and 2nd lifts	3rd Lift	14.6"	13.4"	13.0"		
	2nd Lift	*	10.6"	"		
	1st Lift	*	6.4"	"		
Lightest 1st Lift holder which normally operates the booster trip						
Working capacity for each holder	SUMMER	∅	854,039	∅		
	WINTER		893,562			

Dist. Pressures unable to drop into 1st and 2nd lifts

Unable to calculate 'C' as cannot calc. 4 - No 1st lift Press

CUMULATIVE GAS VOLUMES (including total crown gas) FOR No. HOLDER	Height of curb reference point above Zero Datum	Cumulative gas volume above actual inner water - level	Travel & volume change between stated points	
			VERTICAL TRAVEL	VOLUME CHANGE
Total Crown Gas / AT LEVEL GAUGE	- 2' 0"	49,900 [1]	1' 11"	
AT FIRST LIFT PRESSURE		[2]		
AT EXTRA-LOW LEVEL SWITCH	- 1"	[3]	1"	
AT ZERO STOCK POSITION	ZERO	[4]	9"	
AT LOW LEVEL SWITCH	9"	[5]		
AT MAX. STOCK POSITION Summer	88' 2"	971,398 [6]	3' 7"	41,781
Winter	91' 9"	1,013,179 [7]		
AT HIGH LEVEL SWITCH	Not fitted	[8]		
AT BLOWING-POINT	94' 5"	1,044,514 [9]		

DECLARED VOLUMES		Summer		Winter
Total Crown Gas	A	= (1)	49,900	= (1)
Deflated Safety Margin	B	= (4) - (1)		= (4) - (1)
Working Capacity	C	= (6) - (4)		= (7) - (4)
Inflated Safety Margin	D	= (9) - (6)	73,116	= (9) - (7)
DSM contraction allowance		= 100B / (A+B)		= 100B / (A+B)
ISM expansion allowance		= 100D / (A+B-C-D)	7.0 %	= 100D / (A+B-C-D)

NOTE

a) A temp. drop of 20.0° C (36° F) requires a DSM allowance of 7.5 %

b) A temp rise of 21.7° C (39° F) requires an ISM allowance of 7.0 % (Summer)

c) A temp rise of 8.9° C (16° F) requires an ISM allowance of 3.0 % (Winter)

Volume charged to Capital on initial filling or Maintenance on refilling = (A + B) = (4)



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