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A Survey of the Hydraulic System at Sheffield Park Gardens, Sheffield Park, East Sussex

by
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1.0 Introduction

- 1.1 Chris Butler Archaeological Services Ltd (CBAS) was commissioned by Tom Dommett of The National Trust to carry out a survey of the Hydraulic System in Walk Wood at Sheffield Park Gardens (Fig. 1). The specification for the project was set out in a National Trust Brief, as subsequently amended.
- 1.2 The survey was carried out on the 27th January 2015 by the author, Andy Bradshaw and Jan Oldham, assisted by volunteers Jennie Williamson and Jessica Butt, with a second visit paid to the sit by the author on the 15th April 2015. The project was managed by Chris Butler MCIfA for CBAS.



Fig 1: Site location map

2.0 Archaeological Methodology

- 2.1** The survey comprised of the recording and planning of three elements of the hydraulic system in Walk Wood at Sheffield Park Gardens. Each of the structures was measured using hand tapes, with plans and sections being drawn to a scale of 1:20 on permatrace. The structures were also surveyed using a Topcom GTS 212 Total Station, with the results being used to construct the Site Plan (Fig. 2).
- 2.2** The construction of the Wheel Pit was only visible to a depth of 1.67m, to the then existing water level; however, using a sounding rod the total depth of the Pit was found to be approximately 4.5m. At the time of the survey there was water still running into the wheel pit from the ceramic water inlet pipe in the northern wall of the pit. The walls of the Wheel Pit were cleared of vegetation, and the interior faces of the structure were trowelled back to clear the ferns and lichens. The interior of the Valve Pit to the West of the Wheel Pit was emptied of debris down to the soil base. No other intrusive work was undertaken during the survey.

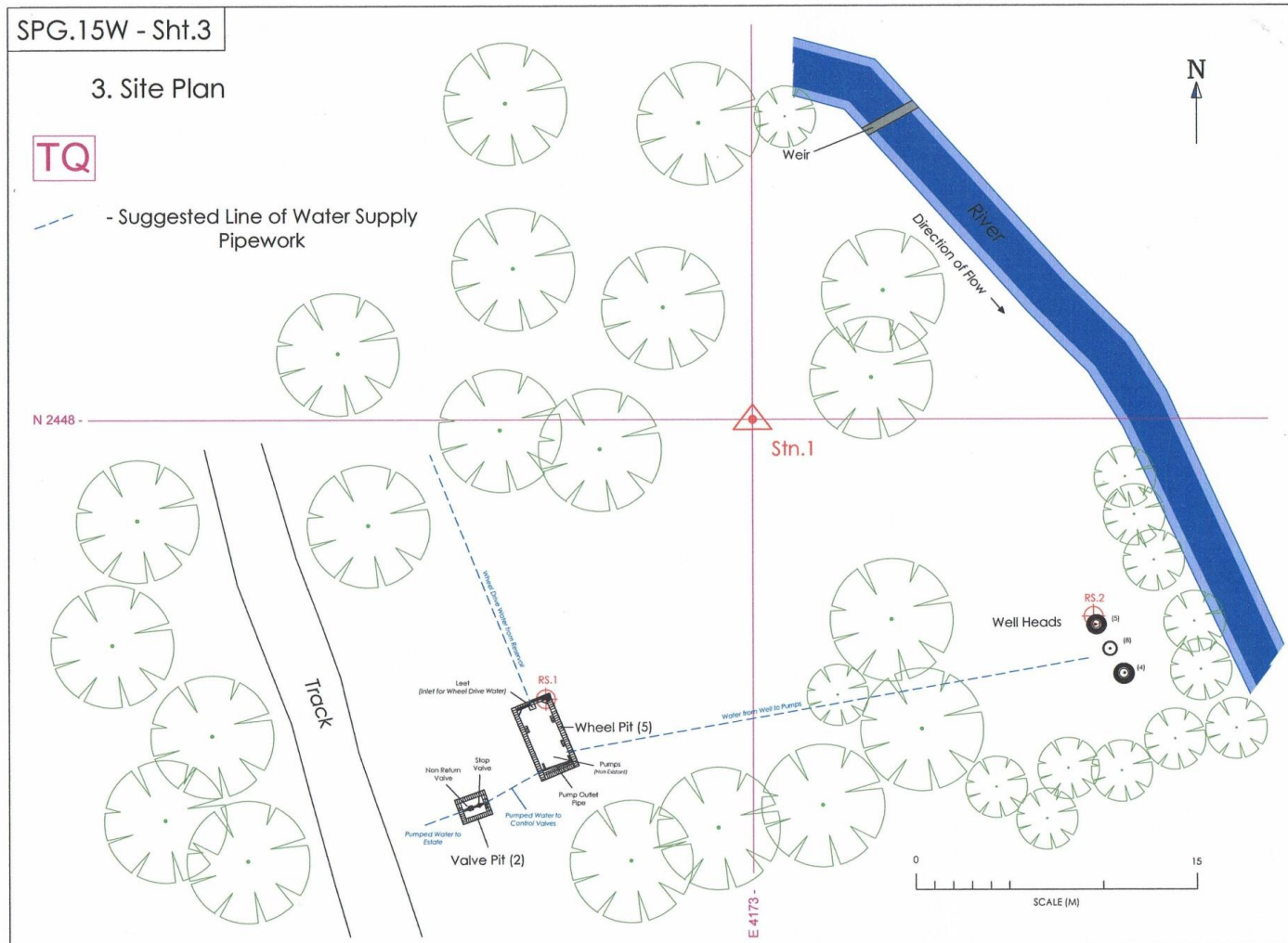


Fig. 2: Site Plan

3.0 Results

3.1 The Wheel Pit (Context 1) was rectangular in plan and had the external measurements of 4.07m north to south by 2m east to west, and internally 3.05m north to south and 1.53m east to west (**Plate 1** & Fig. 3). The full depth of the Wheel Pit was approximately 4.5m (ascertained by sounding rod) with only the upper 1.67m being visible above the water level. The water level remained at a constant level throughout the survey although there was a constant flow of water into it from the ceramic inlet pipe set in the northern wall of the structure (**Plate 2**), suggesting that there was a drain or outlet pipe below the current water level. The Wheel Pit was of redbrick construction with the bricks having shallow frogs and the dimensions of 230mm for the stretchers, 110mm for the headers and having a thickness of 65mm. The bricks were bonded with a hard light yellowish grey mortar with no apparent inclusions. The bricks were laid in English bond (alternating course of stretcher and headers).



Plate 1: The Wheel Pit taken from the South (Context 1)

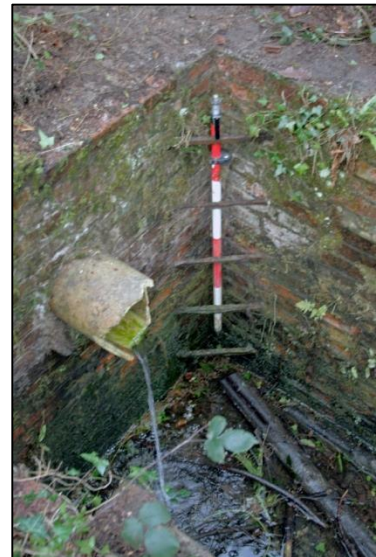


Plate 2: Water Inlet in North Centre of North Wall (Context 1)

3.2 There were two brick built piers built into the eastern wall of the Wheel Pit with the lower part of the northern pier appearing to have been removed. There was only a single pier built into the northern end of the western wall with its lower part removed (**Plate 3**). The pier at the southern end of this wall appearing to have been completely removed, but no scar was apparent due to the eroded state of the brickwork in this area. Both the lower part of the north wall and southern end of the western wall were highly eroded presumably by water movement (**Plates 3 & 4**). Set into the northern wall was the ceramic inlet pipe which had a 280mm external diameter, the southern end of this pipe was broken and would appear to have extended further into the wheel pit originally (**Plate 2**). The ceramic pipe was supported on its underside by two bricks projecting from the face of the wall and acting as corbels. In both the internal north-western and north-eastern corners of the pit there were five horizontal metal square sectioned iron rods fixed into the brickwork, which served as access ladders into the

Wheel Pit (**Plate 2**). Adjacent to the southern wall was a horizontal length of metal pipe with an external diameter of 50mm, which slopes downward at approximately 45° at its eastern end. The end of the pipe is built into the southern end of the western wall, with a second downward angled pipe joined to the main pipe 200mm in from the western wall (**Plate 5**). Although the full depth of these pipes was obscured by the water level and the debris in the wheel pit, the pipes were very firm suggesting that a pump may still be *in situ*.



Plate 3: Brick Piers and Eroded Brickwork South Wall (Context 1)



Plate 4: Eroded Brickwork South End of Western Wall (Context 1)



Plate 5: Pipe-work at the Southern End of Wheel Pit (Context 1)

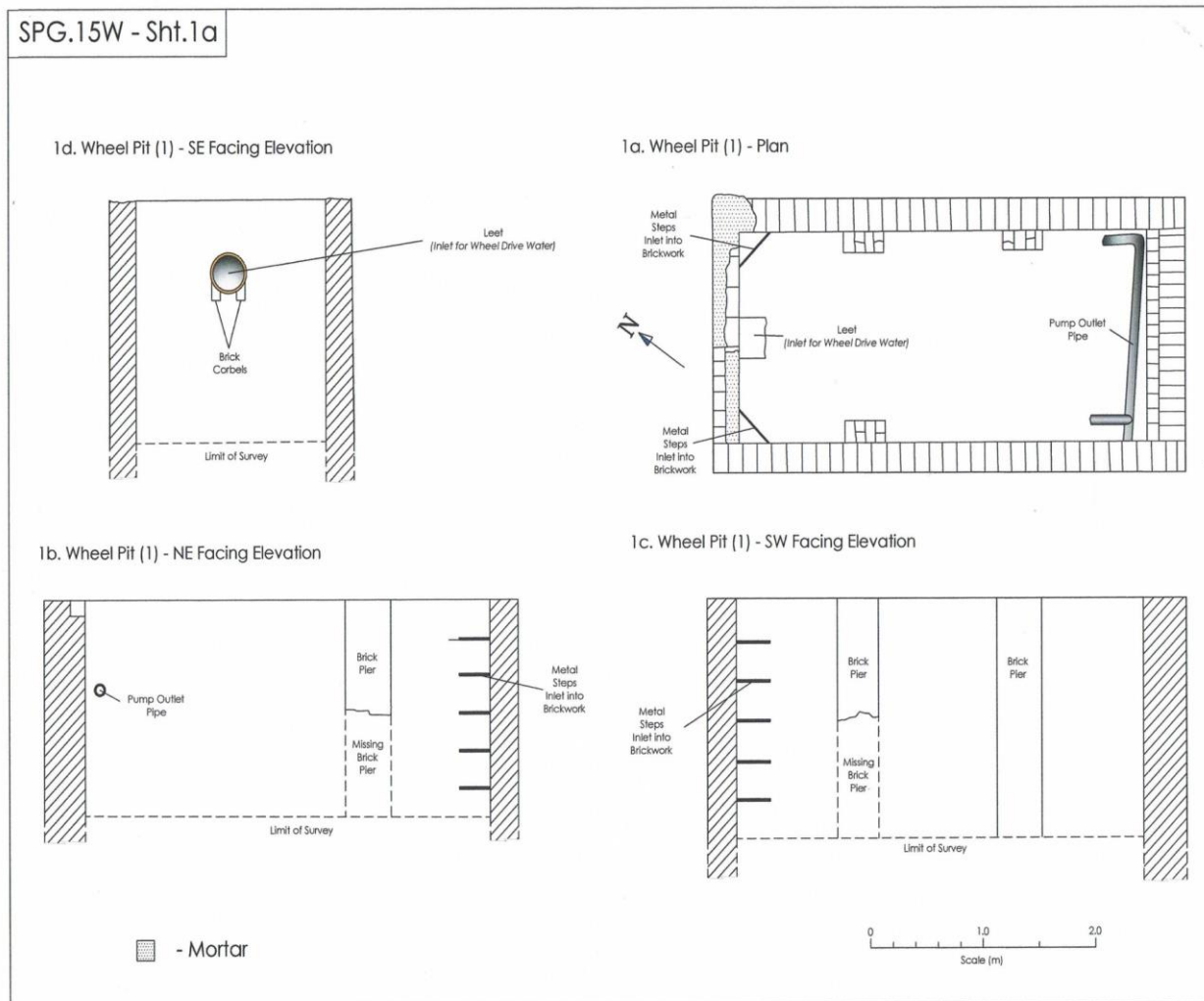


Fig. 3: Plan and elevations of Wheel Pit

3.3 Context 2 was a Valve Pit (**Plate 6** and Fig. 4) located to the west of the Wheel Pit (Context 2), (Fig. 2). The pit was rectangular in plan and had the external measurements of 1.3m north to south by 1.68m east to west and internal dimensions of 920mm north to south by 1.22m east to west, and was 820mm deep. The pit was of red brick construction laid in a random bond. The frogged bricks had the dimensions of 220mm for the stretchers, 110mm for the headers and having a thickness of 60mm, with a bonding material of a yellowish grey sandy mortar with no inclusions. Running through the centre of the pit on an east to west alignment was a metal pipe of external diameter of 75mm. This, although of a larger external diameter, lined up with the pipe inset into the western wall of the Wheel Pit. At the western end of the this pipe there was the Stop Valve for the flow of water from the Wheel Pit (**Plate 7**). At the eastern end of the pipe there was cast iron casing possibly containing a Non-Return Valve. This has a square cover plate bolted to the top of the casing with a two diagonal strengthening ribs on it (**Plate 8**). The pipe was supported on its underside on two bricks, which were laid directly onto the silty clay natural (**Context 3**). Context 3 was only apparent in the base of the Valve Pit and was an orange-brown colour. Although not excavated, the silty clay appeared to have no inclusions.



Plate 6: Valve Pit (Context 2)

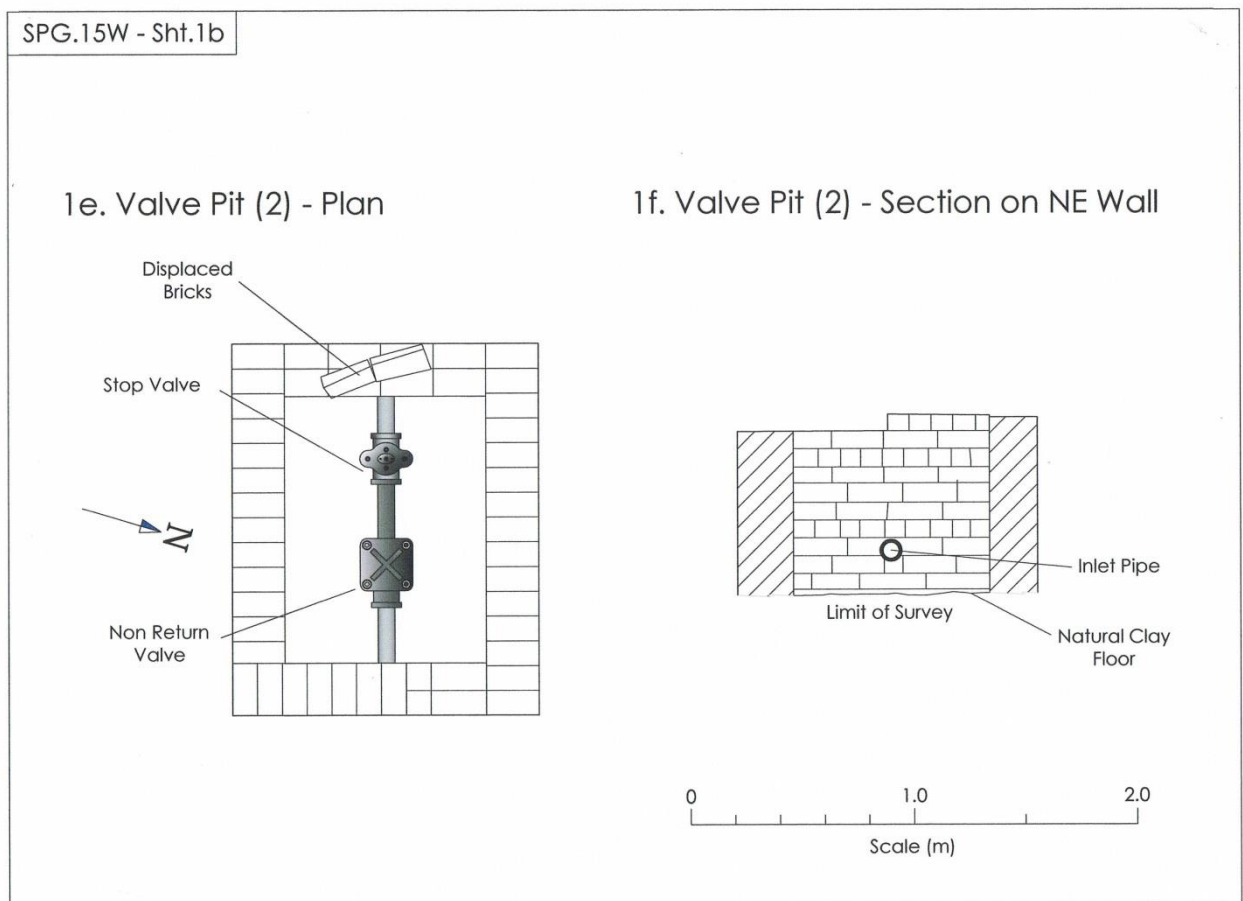


Plate 7: Stop Valve (Context 2)



Plate 8: Possible Non-return valve (Context 2)

Fig. 4: Valve Pit Plan and section



3.4 To the east of the Wheel Pit (Fig. 2) was an underground reservoir, which appeared to be divided into three Chambers (Contexts **4**, **5** and **8**), Fig. 5. The Chambers could only be observed through the openings at Well Heads in the top, so it is impossible to discuss the interior features and number of reservoir Chambers (**Plate 9**). Context **4** was the opening to the northern Chamber which was raised above the ground level in a 'beehive' like structure (**Plate 10**). The structure was of red brick construction, the bricks having a curved shaped outer surface; with a stretcher length of between 225mm and 120mm. The brickwork stood to a height of 480mm above the ground surface and was circular in plan with an external diameter of 860mm at the visible base reducing to 710mm at the top of the structure. The opening at the top of the feature was 540mm, and had a collar of cement rendering around the opening which was angled in to the centre of the opening (**Plate 9**). The cement used for both the collar and the bonding of the bricks was a pinky grey mortar. The brickwork of the feature stepped-in five times, with the top two courses being cement rendered on their outer surface. The opening had a stone cap with a rounded outer edge and a metal ring handle in its centre. The depth of the reservoir below the northern opening was 4.9m, which was measured with a surveyor's staff.



Plate 9: View from Opening in Context **4**



Plate 10: Raised Reservoir Opening Context **4**

3.5 Context **5** was a similar raised opening to the reservoir (**Plate 11**) as Context **4**, and was located 1.9m to the south of Context **4**. The southern raised opening had a height above ground level of 520mm and was circular in plan. The base of the feature was 720mm wide at its base and 680mm at the top. The southern raised opening was constructed of red bricks which had a variable stretcher length of between 240mm to 110mm and had curved outer surfaces. The brickwork stepped in six times, with the top course having a cement rendered finish. The inner surface of the opening was also cement render to form a collar for the stone cap. The cement render and bonding material for the brickwork was the same pinky grey mortar as used in the construction of Context **4**. The cap was of stone with a rounded outer face and a metal ring handle in its centre. The depth of the southern reservoir was measured by surveyor's staff at 3.9m.



Plate 11: Southern Raised
Opening Context 5

3.6 Context 8 is located between the raised openings to the reservoir Contexts 4 and 5, and is a third opening to the reservoir or reservoirs. This opening consists of a slightly raised collar of red brick construction with a cement render finish (**Plate 12**). The collar has an external diameter of 800mm and is fitted with a stone cap with an external diameter of 600mm. The cap covering the opening was fitted in a closed position by a large square headed bolt with a metal washer between the nut and the stone surface of the cap. No attempt was made to remove the stone cap.



Plate 12: Reservoir Opening
Context 8

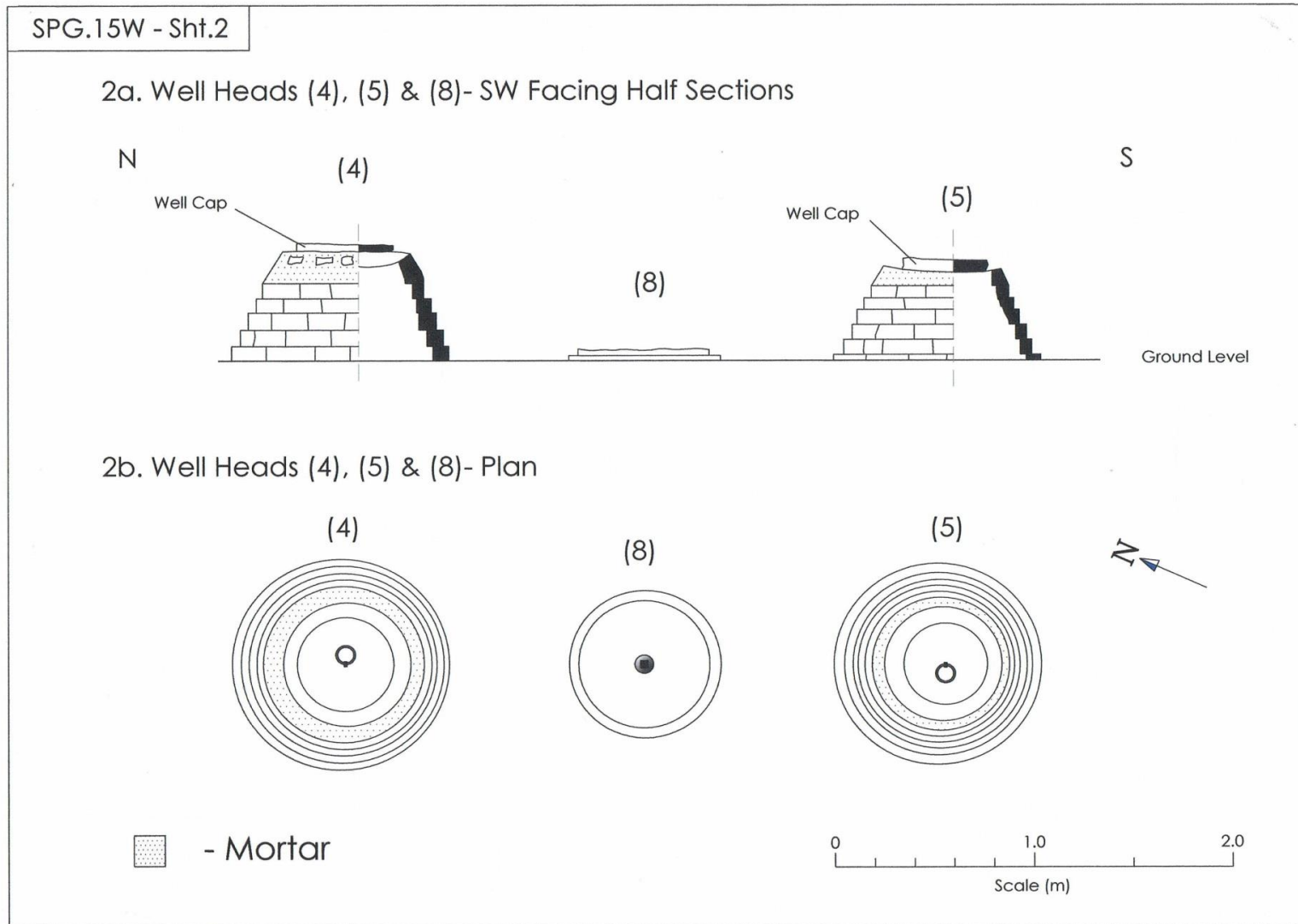


Fig. 5: Well Heads Plan and sections

- 3.7** Context 6 was a weir (**Plate 13**) which was possibly connected with the hydraulic system or the maintenance of the water table. The weir comprised a 500mm thick concrete wall with cracked iron sheeting covering its southern face (downstream). The weir crosses the stream on an east to west alignment. Both the eastern and western ends of the weir are angled to the north at approximately 20°, with the eastern angled section retaining its sandstone or concrete block capping above the concrete and cranked iron wall.



Plate 13: Weir Context 6

- 3.8** Context 7 appeared to be the remains of an earlier weir which was replaced by Context 6. The second weir was located 6.7m to the south (downstream) of the later weir (Context 6). Only a small amount of the structure can be seen above the water level but this weir appears to have been simply constructed of concrete blocks. The weir has been breached in the centre.



Plate 14: Earlier Weir Context 7

4.0 Discussion

- 4.1** The hydraulic system located in the woods to the north-east of Sheffield Park Gardens consists of two elements with the reservoir possibly being a third. The central structure is the Wheel Pit. The Wheel Pit (Context **1**) originally had two built-in piers on both the eastern and western walls. The northern pair of the piers has had the lower part removed, and the southern pier on the western side is missing completely. However, it was noted during the survey that there was a great deal of water erosion apparent on both the south and the southern end of the western walls of the Wheel Pit. This has removed any evidence for a pier to be located at the southern end of the western wall. It is thought that the damage done to the base of the northern pier on either side of the wheel pit is due to the removal of the water wheel
- 4.2** From the position of the water inlet pipe and the depth of the wheel pit itself, it would appear that the water wheel was an overshot wheel or possibly a breastshot wheel. However, this interpretation must remain conjecture due to the high water level and rubbish in the pit. It was however noted that amongst the rubbish that had been put into the wheel pit were a number of metal objects that could be associated with the water wheel or parts of the water wheel itself. It is also thought that there is a strong possibility that the pump is still *in-situ* under the water at the southern end of the wheel pit. The inlet for the water wheel in the northern wall of the pit would appear to be supplied from another water source to the north of the wheel pit. This could possibly be a small reservoir, which may still be in existence, but no trace was visible.¹ To understand the wheel pit fully the debris would have to be cleared and the water drained, as at the time of the survey only the upper part of the wheel pit was visible.
- 4.3** The valve pit was used to regulate the flow of water from the water pit to the estate, and comprised piping with a stop valve and non-return valve. This pit would have originally been covered.
- 4.4** To the east of the Wheel Pit there is an underground water reservoir or reservoirs. Measurement of the depth of the structure through the two raised opening revealed different depths which suggests that there is more than one Chamber making up the reservoir. There are three openings to the below ground reservoirs, two of which were raised (Contexts **4** & **5**) the third opening at ground level between them was secured closed and could not be opened (Context **8**). It is thought that the water wheel was used to drive the pump which delivered the water from the reservoir to the house. It is also thought that the water is supplied to the underground reservoir from the stream to its east. The stream bank was inspected to see if an inlet to the reservoir could be located, but from the small area that could be seen none were found. The earlier (Context **7**) and the later weir (Context **6**) were possibly constructed to keep the water level of the stream high enough to supply the reservoir.

¹ Sheffield Park Staff- *pers comm*

5.0 Finds - Sheffield Park Gardens Hydraulic System Site.

MIDDEN - SURFACE FINDS by Dick Nesbitt-Dufort

A large scattering of broken pottery and glass was noted at a site in woods adjacent to the northern boundary of the gardens (Grid ref: TQ 41712449), and a selection was made of items on the surface. It appeared to be a kitchen midden, as the pottery appeared to be almost exclusively good quality kitchenware and householdware, with very few fragments of what could be described as high quality “above stairs” ware. As all other items were relatively small fragments, these were only grouped by material, counted and weighed. A brief examination indicated that it was all probably late 19th to mid 20th century in date. No excavation was carried out.

It is known that some complete bottles, and a few decorated pottery sherds, were collected and removed from this site over ten years ago (pers comm).

POTTERY

a) Undecorated White Glazed Ware. These were all fragments of various tableware items, such as plates, cups and saucers, as well as fragments of more substantial vessels, such as mixing bowls and storage jars. There was one large complete pot lid with minor chips, dia: 9.5cm.

Number: 150 Weight: 5218gm.

b) Decorated White Glazed Ware. A few fragments could be identified as from one vessel, but there were no even nearly complete vessels. Of interest were the following

—
Four base fragments marked “PLANT TUSCAN WARE Made in England”, with a winged crown motif in green. This is the mark of R H & S Plant Ltd, a Staffordshire factory, used in the late 1930s.

Two fragments of a coarse white china marmalade jar with black print.

Five fragments of jars with a dark green, dark brown or light brown exterior glaze.

Seven fragments from a set of plates, cups or saucers with a single thin red line round the rim.

Nine fragments of plates with a wide blue lined rim.

Seven fragments of a large fluted edge dish with a dark blue transfer printed floral pattern around the rim.

Two fragments of a plate with light blue floral design.

One fragment of a large cream glazed dish with a transfer printed leaf design in shades of pink on the inside.

Two fragments of small colander or drainer dishes, ramekin size, one with a dark green rim, the other slightly smaller with a lighter green rim.

One small fragment of blue willow pattern china.

One fragment of a cup handle with an irregular green glaze pattern.

Three fragments of a cosmetic cream jar of white translucent china.

One fragment of white glazed wall tile, probably from a sink surround.

Total fragments: 46 Wt: 360gm.

c) Glazed Stoneware.

Three fragments of brown glazed blacking jars.

33 fragments of dark cream salt glazed stoneware, two with a smooth dark brown glazed inner surface, and one part base fragment impressed "PORTOBELL..." with part of a number.

Number: 36 Wt: 382gm.

GLASS

a) Brown and Green Glass.

All bottle fragments, mainly wine and beer bottles.

Five brown fragments, including two short neck and rims, one part base and side marked "HAST.... & BEXH...." and "877" on base. Two side fragments.

Number: 7 Wt: 141gm.

Thirty three green glass fragments, mainly wine bottles, including three complete bases, two concave and one flat marked "NBS", one side fragment of a ribbed medicine bottle marked "...E TAKEN.....", one of a square sided bottle marked "ESTAB...." and one side fragment marked "...ILLING.... BRIGHTON". One base and part side of small square medicine bottle, base marked "ORIOLI".

Number: 32 Wt: 1684gm.

b) Light Green Glass.

All mineral water bottle fragments. Seven base fragments marked "GRANDE SOURCE – SOURCE HEPAR-VITTEL" with one number in the centre "6,24,46,54,102,126". One unnumbered. The Societe-Generale de Vittel is a long established French mineral water producer.

Four neck and top fragments, and twenty-three miscellaneous side fragments.

Number: 39 Wt: 887gm.

c) Clear Glass

Miscellaneous bottle and tumbler fragments.

Three bases – one ribbed medicine bottle, one milk bottle marked with a NF monogram and "U S B 6..5..9..8..2", another milk bottle base marked "WILKIN" and one small Shippam's jar marked with a double M monogram and number 320.

Two small bottle necks and tops, one with a metal screw cap in place, one small fragment of plate glass and one small fragment of window glass.

Ten complete jars and bottles, including three flat sided medicine bottles, one marked "TABLE SPOONS" and a scale on the side, two Shippams jars, one large and one small, and four small jam or ointment jars, and with its metal screw top in place, and lastly a complete mineral water bottle marked "HOOPER STRUVE" with a moulded quilting pattern around the shoulder and above the base; wt 662gm. This company was well known for bottling Brighton Spa water.

Number: 61 Wt: 5780gm.

To summarise, the collected glass and pottery remnants represent domestic refuse of late 19th and early 20th century date and require no further analysis beyond the scope of this report.

Metal by Jan Oldham

During the archaeological survey a household midden yielded a quantity of general refuse as surface finds, amongst which an animal trap was recovered. This was heavily corroded iron and still 'set'. The item is probably a rabbit/small mammal trap and is likely to be of late 19th – early 20th century date.

The trap is 300mm long, width 110mm and the crossbar/plate is 30mm x 140mm, with a weight of 673g. No further analysis is required.