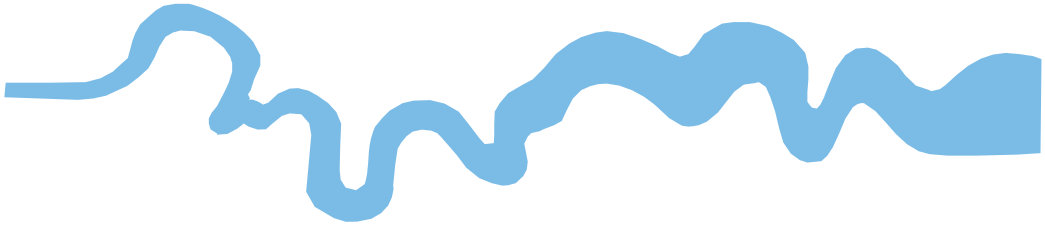
T V A S



SOUTH

River Arun Tidal Defence Scheme, Arundel, West Sussex

Building Recording

by Sean Wallis

Site Code: ATD 19/176bld

(TQ 0171 0688)

River Arun Tidal Defence Scheme, Arundel, West Sussex

Building Recording

For J T Mackley and Co Ltd

by Sean Wallis

TVAS South Ltd

Site Code ADT 19/176

August 2020

Summary

Site name: River Arun Tidal Defence Scheme, Arundel, West Sussex

Grid reference: TQ 0170 0691

Site activity: Building Recording

Date and duration of project: 18th November 2019 - 2nd July 2020

Project manager: Steve Ford

Site code: ATD 19/176

Summary of results: A 100m long section of Arun river wall was recorded during the building survey. The wall was constructed in separate sections of sandstone blocks and brickwork. Parts of the wall have failed in the past, as evidenced by historic repair work. It is likely that much of the wall dates from the 19th century and has been added to or replaced in places during the 20th century. Some surviving timbers at the eastern end of the surveyed section may represent an earlier embankment.

Location and reference of archive: The archive is presently held at TVAS, Brighton and will be deposited at West Sussex Record Office in due course.

Report edited/checked by:	Steve Ford✓ 28.08.20
	Steve Preston✓ 28.08.20

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River Arun Tidal Defence Scheme, Arundel, West Sussex
Building Recording

by Sean Wallis

Report 19/176

Introduction

This report documents the results of building recording in respect of a section of the Arun river wall, at Arundel, West Sussex (TQ 0170 0691) (Figs. 1 and 2). The work was commissioned by Mr Paul White of Ecus Ltd, Unit 1 Woodlands Business Village, Coronation Road, Basingstoke, Hampshire, RG21 4JX, on behalf of J T Mackley and Co Ltd.

The Environment Agency commissioned a programme of improvement works for the Arun River Tidal Defence Scheme. It was originally planned to carry out work in six zones (1-6) along the river, but a decision was made to delay work in Zones 1 and 4. For the remaining zones (2, 3, 5 and 6) only Zones 2 and 5 had any heritage implications. A written scheme of investigation (WSI) was prepared by Royal HaskoningDHV in March 2019. This stipulated that a programme of building recording be carried out in Zone 2, prior to a 93m long section of Steel Sheet Piling cantilever floodwall being installed, so that a record of the existing wall could be made before it was obscured behind the new steel wall. The WSI also required an archaeological watching brief in Zone 5, which is covered by a separate report.

This is in accordance with the Environment Agency's policies on the historic environment. The fieldwork was undertaken by Sean Wallis and Charlotte Brown between 18th November 2019 and 2nd July 2020, and the site code is ATD 19/176.

The archive is presently held at TVAS, Brighton and will be deposited at West Sussex Record Office and a copy sent to the Historic England Archive (formerly National Monuments Record) in due course.

Location, topography and geology

The site is located within the historic core of Arundel, and consists of a section of river wall behind properties which front onto River Road (Fig. 2). As the site is on the River Arun, it could only be viewed in detail by boat, preferably at low water. The river is one of the fastest flowing in the country, and is tidal where it flows through Arundel. The effect of the tides on the river is quite pronounced, with the difference between high water and low water being nearly 3m on average. Unsurprisingly, the British Geological Survey records the underlying geology

along the river as being Alluvium, but in the area where the project took place the River Arun cuts through an outcrop of Spetisbury Chalk Member, which overlies the Tarrant Chalk Member (BGS 1996).

Historical Background

The town of Arundel is first mentioned in Domesday Book (1086), as *Harundel*, which probably means 'valley where the plant horehound grows'. As a result, the River Arun clearly takes its name from the town, and not vice versa (Mills 1993). It is likely that the castle was established in the second half of the 11th century, shortly after the Norman Conquest, to defend against shipborne attacks up the river. Undoubtedly the town developed around the castle, and it became an important port during the medieval period. It continued to flourish up until the Civil War, when the castle was besieged by a Parliamentarian army between 19th December 1643 and 6th January 1644. Some domestic buildings to the west and south of the castle were destroyed during the siege, and the castle itself was 'slighted' in 1653 following an order from Oliver Cromwell. Although the castle remained a ruin until restoration began by the Howard family in the late 18th century, the town grew from the mid 17th century onwards, and became a flourishing market town. The town continued to grow following the introduction of the railway in the 1860s, and has subsequently developed into a major tourist attraction.

The River Arun's floodplain was clearly wider in the distant past, as numerous embankments and flood defences have been built along its length, particularly where it passes through Arundel. Documentary sources suggest that flood defences, river improvement and land reclamation were issues as long ago as the 14th century, and a number of serious floods are recorded throughout the 15th to 20th centuries, which caused significant damage. It is therefore likely that flood defences would have been constructed throughout the town's history, and these enabled a number of quays and wharves to develop along both banks of the river during the 18th and 19th centuries. The existing flood defences along the section of river covered by this project consist of a mixture of stone blockwork, brickwork and concrete walls. There is also some steel sheet piling immediately to the west of the section of wall covered by this report, which is known to have been erected in the early 1950s. Large portions of the brickwork flood walls along the northern bank are likely to relate to the residential and commercial buildings that front onto River Road, which are of 19th and 20th century date. The same is probably true of the flood defences on the southern bank of the river, in this part of the town. The earthen banks to the north and south of Arundel are more difficult to date, although historic maps indicate that they were extant by the late 19th century. However, they could have potentially originated at any time from the medieval period onwards, perhaps developing alongside the town itself.

A serious breech in the flood wall occurred in January 2016, after a period of high tides and heavy rainfall, and the owners of the property were initially informed that they were responsible for the repair and upkeep of the entire section of wall behind their house. After much debate, it was agreed that the Environment Agency would repair the breech as part of their programme of improvements to the Arun Flood Defences.

Methodology

The survey was carried out in accordance with guidelines set out by the Royal Commission on Historic Monuments (RCHM(E) 1996) and Historic England (HE 2015) for a level 2 record. The survey comprised a fully analytical record of the wall's development, a comprehensive photographic survey, paying attention to the methods of construction, chronological development and alterations, and features of special interest. The wall has been recorded photographically using digital media which is catalogued (Appendix 1), whilst a set of detailed photographs which were taken using a drone prior to the commencement of the project will be supplied to the West Sussex HER in due course, as part of the site archive.

The section of wall covered by this report had been surveyed previously on behalf of the Environment Agency. The survey drawing established a number of set chainage points, from 0m to 100m, along the wall, and these were used by the contractors on site. These chainage points are clearly shown on Figure 3, and are referred to throughout the text below.

The TVAS survey was carried out on 18th November 2019, when the river was at its lowest point. It was important to view the wall at low water as certain elements were only visible at this time, such as the series of timber posts behind 19a and 19b River Road. A subsequent visit was made on 2nd July, again at low water. As the wall was only accessible by boat, it was quite difficult to measure features along its length, particularly as the River Arun is one of the fastest flowing in the country. As a result, health and safety concerns had to take precedence during the survey.

Description

The section of wall which will be obscured by the new steel sheet piles will be described from west to east, using the established chainage as reference points. The whole section of wall is visible on the collection of photographs which were taken during the survey, and these are detailed in Appendix 1.

The westernmost part of the wall consists of steel sheet piles, that stop at c. 6m, and are believed to have been erected in the early 1950s. From c. 6m to c. 35m the lower section of the wall is comprised of large

sandstone blocks, which appear to have been laid in courses of varying size. As the survey was carried out during low water, the visible stonework measured approximately 2.8m in height above the water. Interestingly, from c. 6m to c. 17m the lower four or five courses were made up of smaller stone blocks, whilst the upper two courses were noticeably larger in size. Some of the stonework in the lower courses exhibited a substantial amount of wear, due to the fact that they spend much of the time submerged below fast flowing river water. Between c. 15m and c. 16m the top two courses of stonework have been replaced by a small section of brickwork, constructed from alternate courses of headers and footers. It is not clear whether this section of brickwork represents a repair to the earlier stone wall, or whether it is associated with the outflow pipe visible behind the ladder. The section of wall between c. 17m and c. 24m has clearly been altered in the past, and the presence of some large sandstone blocks on the foreshore suggest that this part of the flood wall was breached at some point in the past. There actually appear to be two separate episodes of repair in this part of the wall, separated by a very small area where the original stonework seems to have survived. The western area, between c. 17m and 22m, appears to be associated with the rubble on the foreshore, and was filled in with a mixture of small sandstone blocks and bricks, which are randomly coursed. The repair of the eastern area, between c. 23m and c. 25m, seems to have been carried out in a far more meticulous manner. The lower section of the repair consists of equally sized sandstone blocks, laid in relatively neat courses. The upper section consist of a mixture of materials, and is slightly more random in nature, perhaps representing a repair to the repair. It may be significant that the upper brickwork of the flood wall changes at the point where the eastern repair appears to end, and there is also a noticeable difference in the lower stonework from c. 25m onwards. In the section of flood wall from c. 6m to c. 25m, the upper brickwork appears to be of one uniform build, consisting of alternate courses of headers and footers. At c. 25m the upper brick wall starts with a small buttress, and continues eastwards until it reaches another small buttress at c. 34m. The section of upper brickwork from c. 25m to c. 34m also consists of alternate courses of headers and footers, and runs along the top of the stonework section of the wall. This section of stonework actually runs from c. 25m to c. 35m, and varies slightly in construction from the section seen between c. 6m and c. 17m in that the lower courses are comprised of the larger sandstone blocks, and the upper courses of smaller stones. This is the opposite of what was observed in the section between c. 6m and c. 17m. There are a couple of wall braces present in the section of wall from c. 25m to c. 35m, close to where the top (brick) and bottom (stone) sections of wall meet. A number of outflow pipes were noted in the upper brickwork sections of the wall between c. 6m and c. 35m.

Along the flood wall between c. 35m and c.55m, the lower section consists wholly of brickwork, of which just over 3m was visible at low water. This lower section is constructed with alternating courses of headers and footers, and the high water mark is clearly visible as the brickwork has been stained green. A couple of mooring rings and an outflow pipe with an iron valve flap, were noted along this section of the wall. The upper brickwork section of the flood wall between c. 35 and c. 55m consists of two separately built sections, with the change occurring at c. 48m. At c. 55m there is a clear change in the lower brickwork section of the wall, and it appears that this part of the wall may have been rebuilt when an outflow pipe was inserted. It appears that this section of brickwork may have failed at some point in the past, as the lower section of wall immediately to the east is constructed from large sandstone blocks. The fact that some of the stonework overlies the brickwork indicates that the brickwork is almost certainly earlier. The section of the wall from c. 57m to c. 67m is where is latest serious breech took place in January 2016, after a period of high tides and heavy rainfall. The breech affected the section of stonework that actually ran from c. 55m to c.68m, and the surviving sections either side of the breech suggest that this section was quite poorly built in the first place. This idea is supported by the fact that there is a clear difference in the stonework at c. 68m, with the section of stonework from c. 68m to c. 76m appearing far more sturdy. The vertical break at c. 68m indicates that the two sections of stonework were built at different times. At the time of the survey, the breech in the wall between c. 57m and c. 67m had been temporarily filled with sandbags and large 'Kyowa' bags. The latter are large mesh bags filled with rocks, which are specially designed to protect from flooding. The name Kyowa derives from the Japanese company which pioneered these type of bags, which are also referred to as 'filter units'. Traditional sandbags had been placed in the eastern part of the breech to prop up a surviving section of the stonewall which was liable to collapse. Unsurprisingly, the breech also removed a large section of the upper brick wall, which had largely been covered in render in this area.

As mentioned above, the lower section of floodwall between c. 68m and c. 76m is constructed from large sandstone blocks. The courses appear to be of roughly equally sized stones, and there appears to be a possible repair, in brick, at c. 71m. The stonework is topped with a later wall, the western part of which is constructed from flint, and the eastern part from brick. This later wall appears to have been rendered in the past, although much of the render has fallen off. It is topped by a modern wall, which is fully rendered. There is quite a lot of rubble on the foreshore below the section of the wall between c. 68m and c. 76m, although it is not clear where this has come from.

The final section of the flood wall covered by the survey, between c. 76m and c. 97m, is wholly constructed from equally sized stone blocks. There are four outflow pipes visible in this part of the wall. The stonework extends all the way to the top of the wall, and this is the only section of the surveyed wall which was not topped with brick.

One of the most interesting features about the eastern part of the area covered by the survey was the presence of a number of timbers on the foreshore. These consist of twenty-five short upright 'stakes' and one larger 'post", which vary in diameter from about 0.08m to 0.25m. These appear to be the remains of an earlier flood wall or embankment, which presumably would have been much higher, and wholly constructed from wood. Some surviving horizontal timbers were visible behind the uprights, and the later stonework wall abutted them. These timbers are only visible at low water and have, unsurprisingly, been heavily worn from being in the fast flowing river for so long. We were advised that, as part of the improvement works, the timbers will be preserved behind the new steel sheet piles, and the space between the existing stone wall and the piles filled with shingle. As a result, no attempt was made to remove any of the timbers for further analysis.

Conclusion

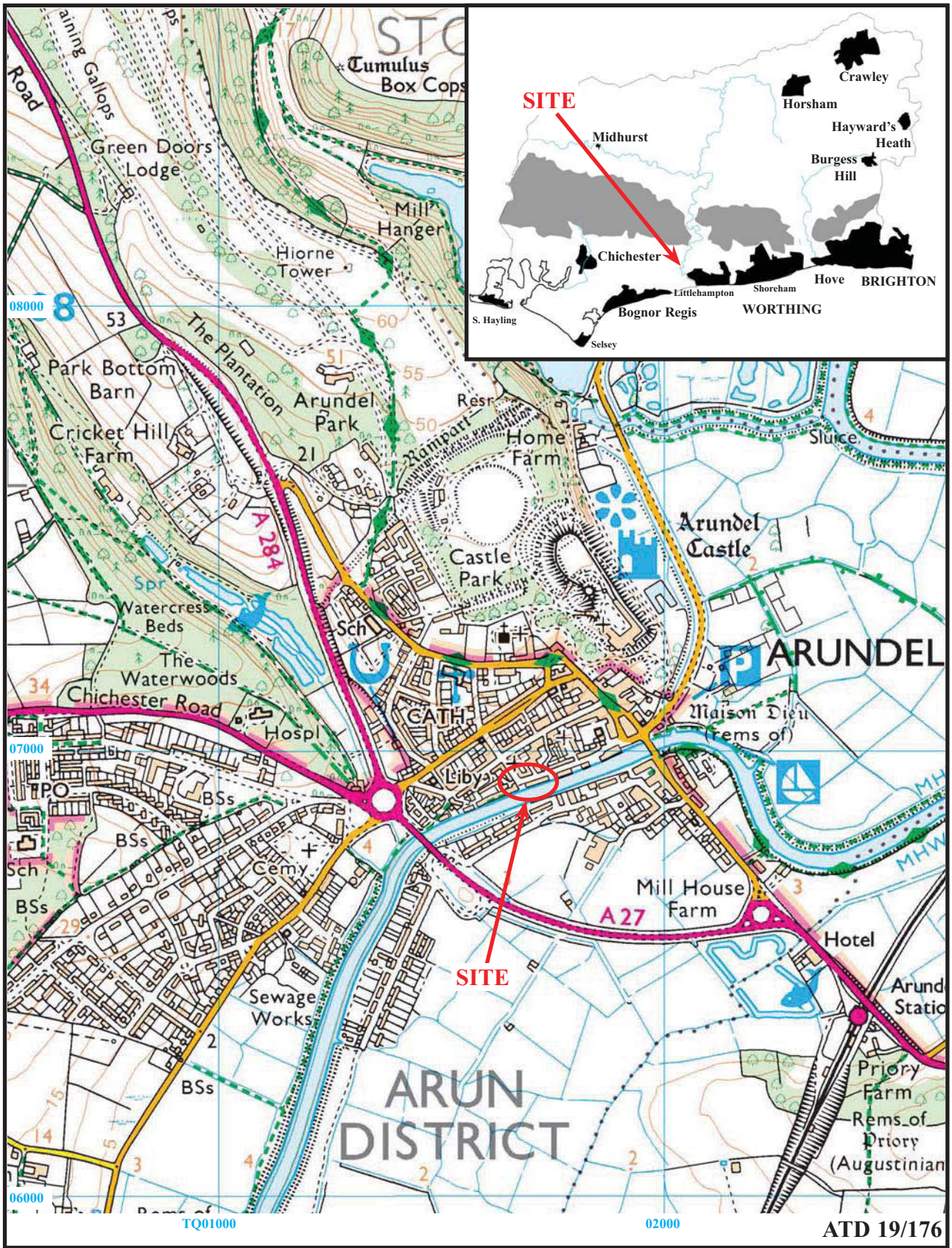
A 100m long section of Arun river wall, which will be obscured by new Steel Sheet Piling cantilever floodwall, was recorded during the building survey. The wall was clearly constructed in separate sections, as some parts are built using large sandstone blocks topped with brickwork, whilst other parts consist solely of brickwork. Parts of the wall have obviously failed in the past, as evidenced by some historic repair work. More recently, the section of wall behind 23-29 River Road collapsed in January 2016, and the breech was filled with large 'Kyowa' bags. It is difficult to date the separate sections of the wall, although it is likely that much of it dates from the 19th century and has been added to or replaced in places during the 20th century. Some surviving timbers at the eastern end of the surveyed section may represent an earlier embankment.

References

BGS, 1996, *British Geological Survey*, 1:50,000, Sheet **317/332**, Solid and Drift Edition, Keyworth.
HE, 2015 *Understanding Historic Buildings, a guide to good recording practice*, Historic England, Swindon
Mills, A D, 1993, *English Place-names*, Oxford.
RCHME, 1996, *Recording Historic Buildings: a descriptive specification*, 3rd edn, Roy Comm Hist Monuments (England), London

APPENDIX 1: Photographic Catalogue

Cat. No.	Direction	Description
1	NNE	Wall section (c. 5m - 10m). **[Pl. 1]**
2	NE	General view. **[Pl. 2]**
3	NNE	Wall section (c. 15m - 25m). **[Pl. 3]**
4	NNW	General view. **[Pl. 4]**
5	NNW	General view. **[Pl. 5]**
6	WNW	Wall section (c. 10m - 15m). **[Pl. 6]**
7	NNW	Wall section (c. 18m - 23m). **[Pl. 7]**
8	NNW	Wall section (c. 23m - 27m). **[Pl. 8]**
9	NNE	General view. **[Pl. 9]**
10	W	Wall section (c. 15m - 27m). **[Pl. 10]**
11	NNW	Wall section (c. 18m - 22m). **[Pl. 11]**
12	NNE	Wall section (c. 37m - 50m). **[Pl. 12]**
13	NNW	Wall section (c. 41m - 43m). **[Pl. 13]**
14	NNW	Wall section (c. 43m - 47m). **[Pl. 14]**
15	NNE	Wall section (c. 52m - 62m). **[Pl. 15]**
16	NNW	Wall section (c. 57m - 67m). **[Pl. 16]**
17	NW	Wall section (c. 55m - 63m). **[Pl. 17]**
18	NNW	Wall section (c. 62m - 67m). **[Pl. 18]**
19	NNW	Wall section (c. 68m - 72m). **[Pl. 19]**
20	NE	General view. **[Pl. 20]**
21	NE	General view. **[Pl. 21]**
22	NE	Wall section (c. 86m - 97m). **[Pl. 22]**
23	NNW	Wall section (c. 85m - 97m). **[Pl. 23]**
24	NNW	General view. **[Pl. 24]**
25	NNW	General view. **[Pl. 25]**
26	NNW	General view. **[Pl. 26]**
27	E	General view. **[Pl. 27]**
28	E	General view. **[Pl. 28]**
29	ENE	General view. **[Pl. 29]**

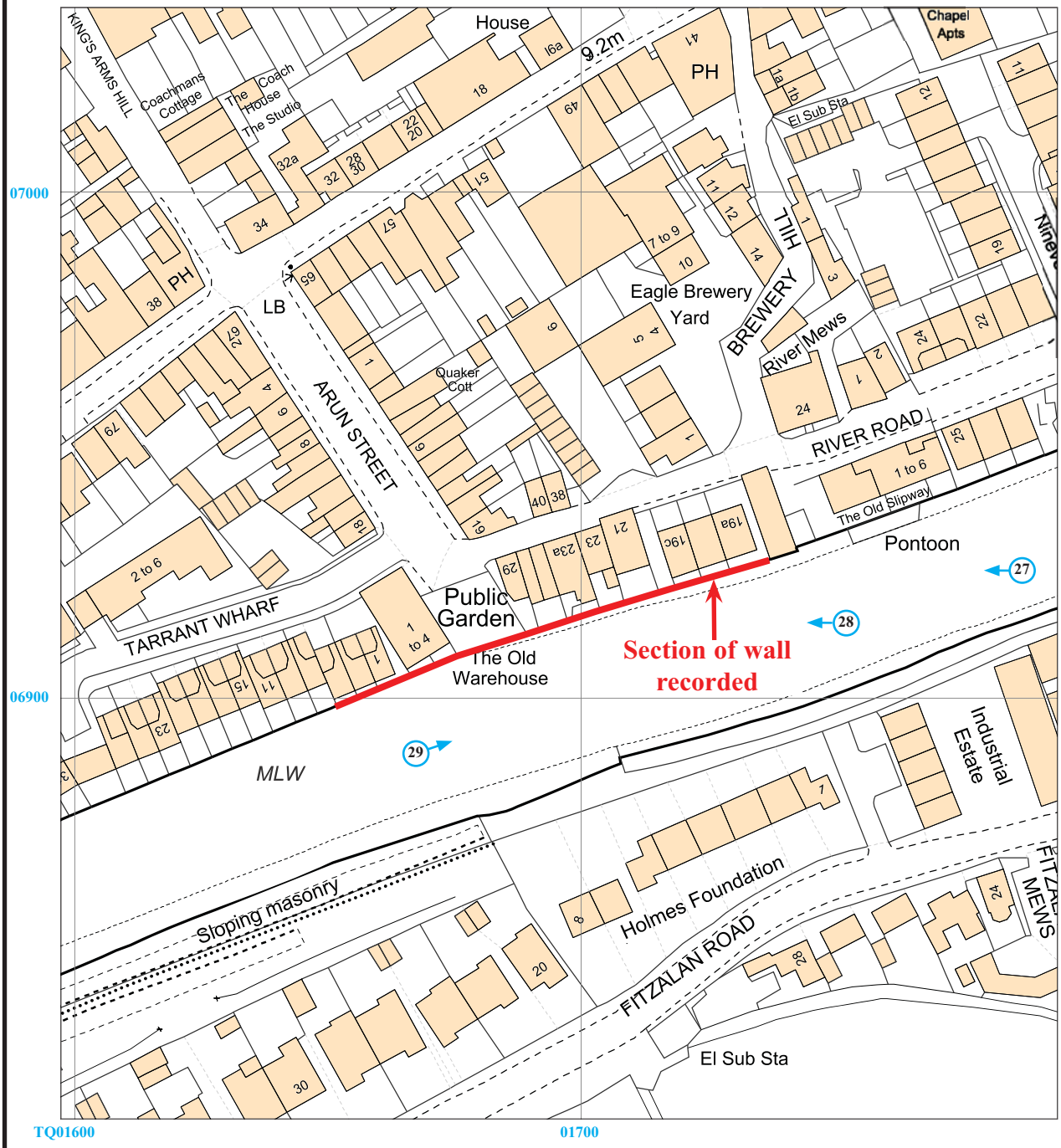


ATD 19/176

River Arun Tidal Defence Scheme,
Arundel, West Sussex, 2020
Building Recording

Figure 1. Location of site within Arundel and West Sussex.

TVAS SOUTH



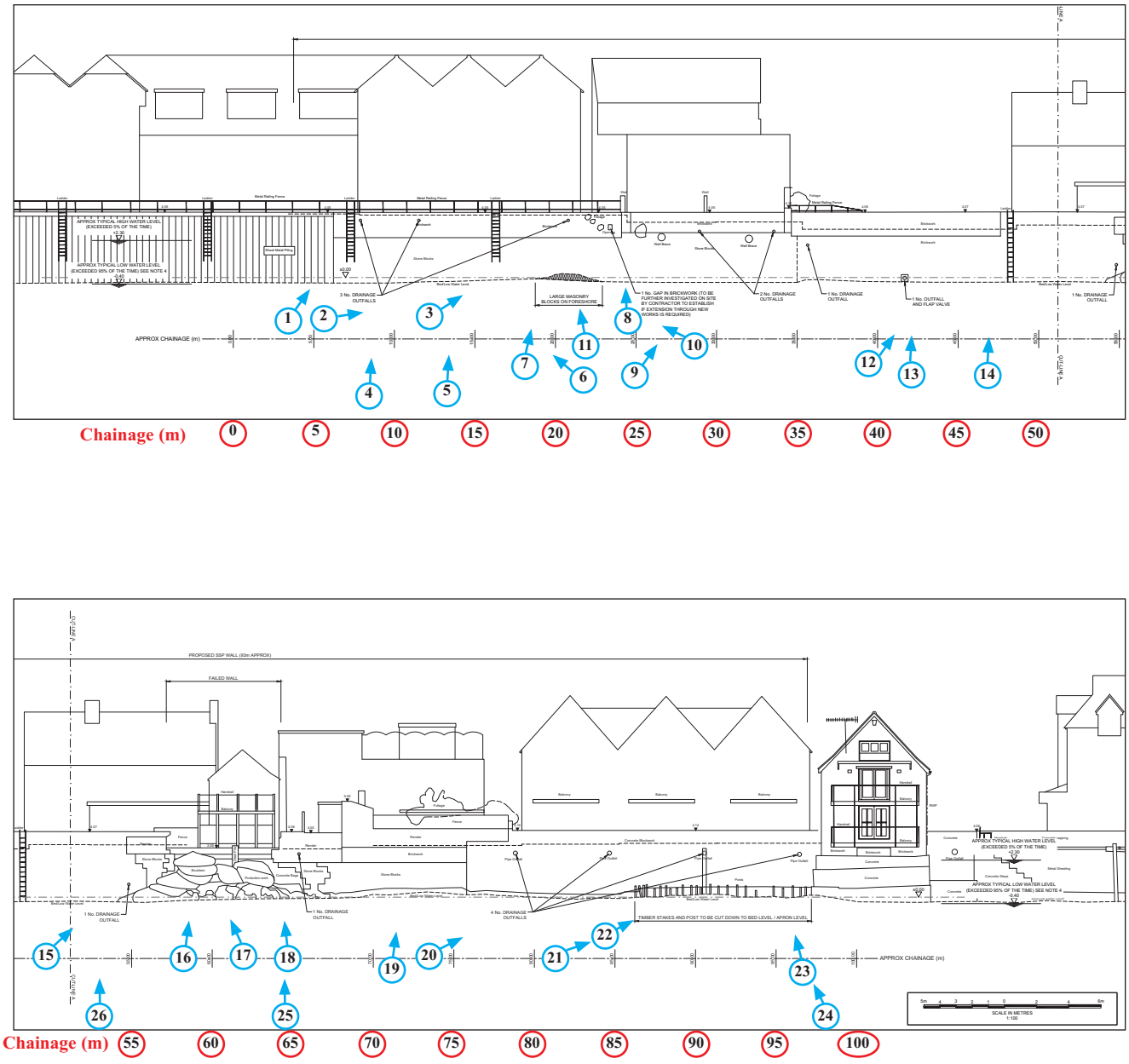
ATD 19/176

N

River Arun Tidal Defence Scheme,
Arundel, West Sussex, 2020
Building Recording

Figure 2. Detailed site location, showing the location of some photographs (general views).

TVAS SOUTH



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Building Recording

Figure 3. Elevations of river wall, showing location of photographs taken.

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Plate 1. Wall section (c. 0-5m), looking NE.

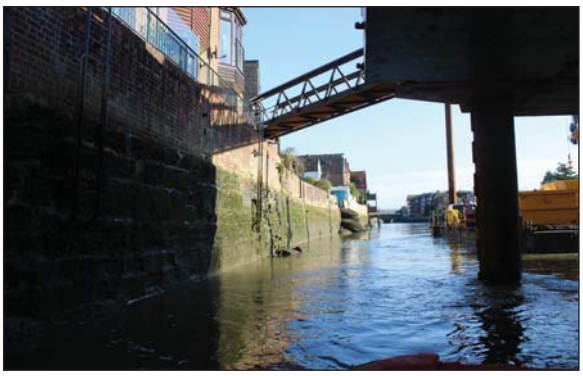

Plate 2. Wall section (c. 5m-10m), looking ENE.

Plate 3. Wall section (c. 10m-15m), looking NE.

Plate 4. Wall section (c. 5m-10m), looking N.

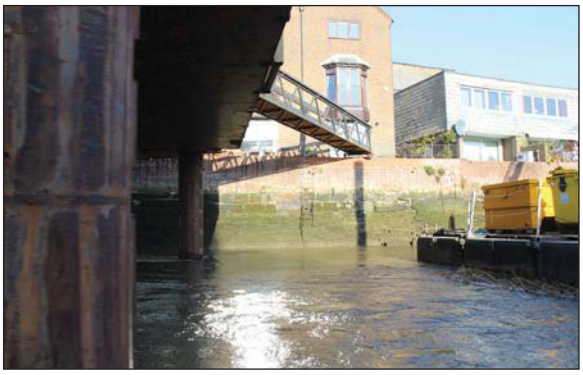

Plate 5. Wall section (c. 10m-15m), looking N.

Plate 6. Wall section (c. 15m-20m), looking NW.

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River Arun Tidal Defence Scheme,
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Building Recording
Plates 1 to 6.

TVAS SOUTH

Plate 7. Wall section (c. 18m-23m), looking NNW.

Plate 8. Wall section (c. 23m-27m), looking NNW.

Plate 9. General view, looking NNE.

Plate 10. Wall section (c. 15m-27m), looking W.

Plate 11. Wall section (c. 18m-22m), looking NNW.

Plate 12. Wall section (c. 37m-50m), looking NNE.

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River Arun Tidal Defence Scheme,
Arundel, West Sussex, 2020
Building Recording
Plates 7 to 12.

TVAS SOUTH

Plate 13. Wall section (c. 41m-43m), looking NNW.

Plate 14. Wall section (c. 43m-47m), looking NNW.

Plate 15. Wall section (c. 52-62m), looking NNE.

Plate 16. Wall section (c. 57m-67m), looking NNW.

Plate 17. Wall section (c. 55m-63m), looking NW.

Plate 18. Wall section (c. 62m-67m), looking NNW.

ATD 19/176

River Arun Tidal Defence Scheme,
Arundel, West Sussex, 2020
Building Recording
Plates 13 to 18.

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Plate 19. Wall section (c. 68m-72m), looking NNW.

Plate 20. General view, looking NE.

Plate 21. General view, looking NE.

Plate 22. Wall section (c. 86m-97m), looking NE.

Plate 23. Wall section (c. 85m-97m), looking NNW.

Plate 24. General view, looking NNW.

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Plates 19 to 24.

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Plate 25. General view, looking NNW.

Plate 26. General view, looking NNW.

Plate 27. General view, looking E.

Plate 28. General view, looking E.

Plate 29. General view, looking ENE.

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River Arun Tidal Defence Scheme,
Arundel, West Sussex, 2020
Building Recording
Plates 25 to 29.

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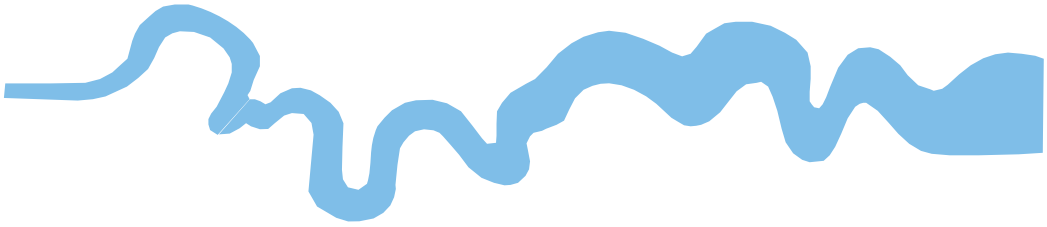
TIME CHART

	Calendar Years
Modern	AD 1901
Victorian	AD 1837
Post Medieval	AD 1500
Medieval	AD 1066
Saxon	AD 410
Roman	AD 43
Iron Age	AD 0 BC 750 BC
Bronze Age: Late	1300 BC
Bronze Age: Middle	1700 BC
Bronze Age: Early	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC



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