EAST QUAY, CARMARTHENSHIRE DOCK, LLANELLI: ARCHAEOLOGICAL WATCHING BRIEF

DAT Archaeological Services

Prepared by Dyfed Archaeological Trust
For: Morgan Sindall

REGISTERED ORGANISATION CIfA

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SUMMARY

An archaeological watching brief was undertaken during groundworks associated with the installation of a new outfall pipe trench across the top of East Quay, at Carmarthenshire Dock, Llanelli, Carmarthenshire. The area of the proposed outfall lay at NGR SS 49990 99554.

Planning permission had been granted by Carmarthenshire County Council for the works (Planning Application No. S/33446), with a condition stating that a professionally qualified archaeologist should be present during the undertaking of any ground works in the development area, so that an archaeological watching brief could be carried out. DAT Archaeological Services were commissioned to do the work by Morgan Sindall.

In the development phase for the scheme a Heritage Statement had been prepared by Cotswold Archaeology which recorded the present state of the quay wall and determined the level of impact that the works would have upon it. The Cotswold Archaeology report indicated that overall the proposed development would cause disturbance to only a very small part of the structure as a whole and it was considered appropriate that archaeological mitigation works comprised a watching brief during construction to record any remains identified.

Carmarthenshie Dock East Quay is a grade II listed building (no. 18043), because it is an important surviving structure from Llanelli's early industrial development, and linked the first public railway opened in Britain. It was built c.1799 by Alexander Raby for the transport of his coal and iron, and in 1803 the tramroad opened. Carmarthenshire dock was later enlarged and was busy throughout the nineteenth century. In modern times the dock has been used to moor small boats.

One visit was made to the site during the excavation of a trench behind the quay wall that the outflow pipe would go through. The top two metres of the quay wall in this area was seen to be patched on its outer face, with original walling below.

The inner face of the quay wall was of rougher construction than the outer face, and showed a change of construction at roughly the same depth as the outer face, thus suggesting that the whole thickness of the wall had been patched at the same time. The inner face of the wall was stepped and also thickened below this level towards the base of the trench. The thickness of the wall was less than 0.45m at the top and about 0.7m at the bottom of the trench.

Part of the inner face of the quay wall had been cut through, probably by a later electrical service cable from the top of the quay, exposing its inner construction of coursed rounded sandstone.

The trench contained various deposits, the majority of which were of loose industrial waste, used to backfill the space behind the wall after its construction. Redeposited boulder clay 0.7m deep appeared to represent the fill behind the original wall. Above this was waste from Iron and Copper production of nearly 2m depth covering this was probably introduced after the wall rebuild. The wall rebuild can thus be dated to after the period when iron works began operating in the town, estimated to be between the mid 1850s and 1860s by Robert Protheroe-Jones (Curator of Heavy Industry at the National Museum of Wales).

1 INTRODUCTION

1.1 Project Commission

1.1.1 DAT Archaeological Services were commissioned by Morgan Sindall to undertake a watching brief during groundworks associated with the installation of a new outfall pipe across the top of East Quay, at Carmarthenshire Dock, Llanelli, Carmarthenshire (Figures 1 & 2). The area of the proposed outfall lay at NGR SS 49990 99554 (Figures 3 & 4).

1.1.2 Planning permission had been granted by Carmarthenshire County Council for the works (Planning Application No. S/33446). The proposed works comprised the digging of an outfall pipe trench across the top of the quay, the removal and reinstatement of a small section of the dock wall to accommodate the outfall, and the addition of scour protection to the base of the wall in the form of rock rolls, rock mattresses and chestnut stakes.

1.1.3 The planning application was supported by a Heritage Statement prepared by Cotswold Archaeology (Davenport 2016). This considered that the proposed works were minor in scale, with the majority of the listed quay remaining unaffected. It concluded that it could be appropriately and proportionately mitigated by means of a programme of industry-standard archaeological monitoring (e.g. watching brief), thus preserving by record any affected architectural elements.

1.1.4 A condition relating to archaeology was placed on the planning application which stated: *The developer shall ensure that a professionally qualified archaeologist is present during the undertaking of any ground works in the development area, so that an archaeological watching brief can be carried out. The archaeological watching brief will be undertaken to the standards laid down by the Chartered Institute for Archaeologists. The Planning Authority will be informed, in writing at least two weeks prior to the commencement of the development, of the name of the said archaeologist.*

1.1.5 The condition was placed on the development by Carmarthenshire County Council following advice from the Development Management section of Dyfed Archaeological Trust, in their capacity as archaeological advisors to the planning authority.

1.1.6 In addition, the Heritage Statement considered that *sensitive reconstruction of the stonework, including the replacement of the original stones in as close to their original positions as possible, and the restriction of the use of concrete to hidden parts of the new structure, would further mitigate for any loss of aesthetic value, and any resulting residual harm.* Development Management at DAT recommended to the Council that such works should be discussed and agreed with the Authority's Conservation Officer, and thereafter conditions were put into place concerning the reconstruction of the dock in a manner sympathetic to its original character.

1.1.7 The majority of the works for the installation of the pipe were not covered by this watching brief as they occurred prior to DAT Archaeological Services being commissioned. Only the excavation of the trench against the internal face of the quay wall was observed by DAT Archaeological Services. This was the trench for the outfall pipe to travel through and also for the construction of a new, toed retaining wall, cast in concrete behind the existing wall.

1.2 Scope of the Project

1.2.1 A Written Scheme of Investigation (WSI) document for a watching brief was prepared by DAT Archaeological Services prior to the commencement of the works (Appendix I). The WSI outlined methodologies for:

- Monitoring groundworks in order to identify the presence/absence of any archaeological deposits;
- Establishing the character, extent and date range for any archaeological deposits to be affected by the proposed groundworks;
- Appropriately investigating and recording any archaeological deposits to be affected by the groundworks;
- Producing an archive and report of any results.

1.2.2 The overall work was summarised as: *Archaeological attendance during ground works associated with the installation of new outfall pipe, outfall exit through the existing quay wall and associated drainage alterations at Carmarthenshire Dock East Quay, Llanelli which are likely to expose, damage or destroy archaeological remains. Appropriate investigation and recording of any such remains will be undertaken if revealed. A report and archive of the results of the works will be prepared.*

1.3 Report Outline

1.3.1 This report provides a summary and discussion of the archaeological watching brief and its results. Some archaeological background is included.

1.4 Abbreviations

1.4.1 Sites recorded in the regional Historic Environment Record (HER) are identified by their Primary Record Number (PRN). Sites recorded on the National Monument Record (NMR) held by the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) are identified by their National Primary Record Number (NPRN). Scheduled Ancient Monument (SAM), Listed Building (LB). Sites are located by their National Grid Reference (NGR). Altitude is expressed to Ordnance Datum (OD).

1.5 Illustrations

1.5.1 Photographic images are to be found at the back of the report. Printed map extracts are not necessarily reproduced to their original scale.

1.6 Timeline

The following timeline (Table 1) is used within this report to give date ranges for the various archaeological periods that may be mentioned within the text.

Period	Approximate date	
Palaeolithic –	*c.*450,000 – 10,000 BC	Prehistoric
Mesolithic –	*c.* 10,000 – 4400 BC	
Neolithic –	*c.*4400 – 2300 BC	
Bronze Age –	*c.*2300 – 700 BC	
Iron Age –	*c.*700 BC – AD 43	
Roman (Romano-British) Period –	AD 43 – *c.* AD 410	Historic
Post-Roman / Early Medieval Period –	*c.* AD 410 – AD 1086	
Medieval Period –	1086 – 1536	
Post-Medieval Period[1] –	1536 – 1750	
Industrial Period –	1750 – 1899	
Modern –	20th century onwards	

Table 1: Archaeological and Historical Timeline for Wales

[1] *The post-medieval and Industrial periods are combined as the post-medieval period on the Regional Historic Environment Record as held by Dyfed Archaeological Trust*

2 THE SITE

2.1 Location

2.1.1 East Quay, Carmarthenshire Dock, is located at SS 49970 99506 in Llanelli, Carmarthenshire (Figures 1 and 2). It lies on the east side of the River Lliedi, which soon after meets the Loughor Estuary. The Dock is situated at the western edge of Llanelli, about 1km southwest of the town centre. The works took place adjacent to Tramroad Bridge, which crosses Carmarthenshire dock from East Quay to West Quay, and on towards North Dock.

2.1.2 Figures 3 & 4 show detailed plans of the works supplied by the client. The watching brief took place at the area of the proposed outfall through the quay wall, at NGR SS 49990 99554.

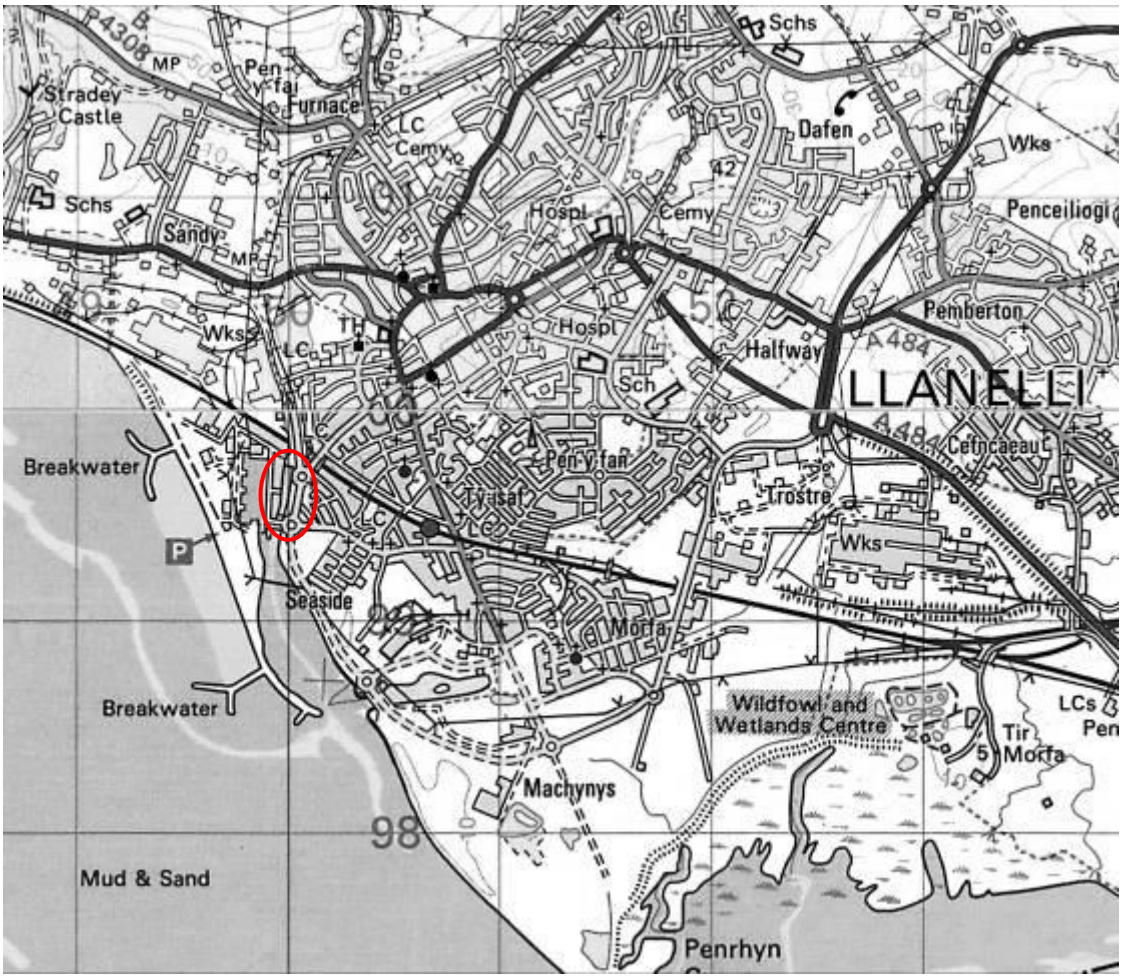

Figure 1: Location Map for East Quay, Carmarthenshire Dock, Llanelli, Carmarthenshire. Carmarthenshire Dock is circled in red.

Figure 2: Location Map for East Quay, Carmarthenshire Dock, Llanelli, with the location of the works at East Quay marked with a red star

Figure 3: Overall Plan of Proposals, with a red box showing the location of the watching brief (Plan supplied by Morgan Sindall)

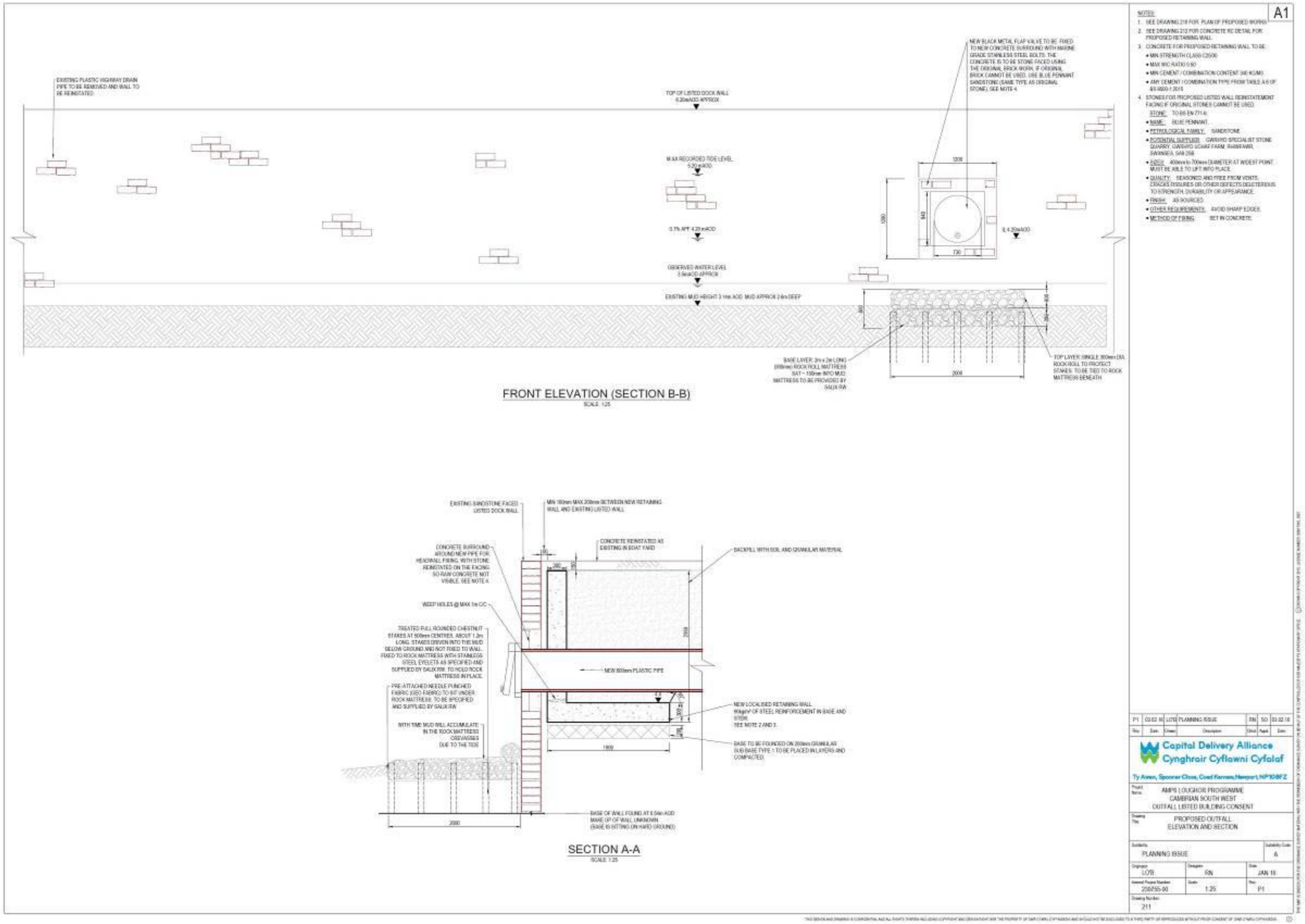

Figure 4: Elevation of East Quay Wall (top) and Section through Proposed Works (bottom) (Plan supplied by Morgan Sindall)

2.2 Archaeological and Historical Background

2.2.1 The following history of Llanelli is summarised from Poucher (2009):

Little is known of the history and development of Llanelli prior to its rapid industrial-led expansion in the 18th and 19th centuries. Although prehistoric archaeology in the immediate area is scarce this does not preclude prehistoric human activity ….. In the 1st century AD the Romans arrived in the area, establishing a fort at nearby Loughor. A Roman road may have passed through Llanelli. St Elli/Ellyw (after whom Llanelli is named*) was a 7th century Celtic saint, which may be an indication of a pre-Norman religious foundation. There is no indication of the extent of activity surrounding any religious sites. The castle is first mentioned in 1190 when it was destroyed, and again in 1215. There are several descriptions of Llanelli as a small town in medieval and post-medieval times.*

Although coal mining had been underway for centuries, the quality and availability of Llanelli coal attracted other large industries to the area during the early 19th century including copper, iron, lead, tin and brick works. This also led to the creation of extensive docks and a network of canals and tramways throughout the Llanelli area. A general industrial decline from the 1970s onwards resulted in the eventual closure of many of Llanelli's industries.

2.2.2 Carmarthenshire Dock East Quay is a grade II listed building (no. 18043), because it is an important surviving structure from Llanelli's early industrial development, and linked the first public railway opened in Britain. The Cadw listed building database for the Wales HER describes it thus (referencing Price 1992):

History: *Carmarthenshire Dock was built c.1799 by the local industrialist Alexander Raby as a shipping point for his coal and iron. A tramroad was built from the canal to Raby's furnace at Cwmddyche at the same time. In 1802 the Act was passed for the 'Carmarthenshire Railway or Tramroad' to be built from the dock to limestone quarries west of Llandybie. The tramroad was opened in 1803, making it by a few weeks the earliest autonomous public railway in Britain. The engineer was James Barnes, who was also responsible for the company's reconstruction of Carmarthenshire Dock in 1804-6 which included constructing a new quay on the west bank of the river, a connecting wall to the east quay, and later a weir and reservoir. The dock remained busy throughout the nineteenth century. A patent slip for raising large vessels was built in the eastern quay by E W Jobling, shipbuilder, in 1845. The dock continues to be used to moor small boats.*

Exterior: *A well-constructed stone quay built c.1799 and altered in 1845 to construct a slipway. The quay is straight from its northern end at the former tramroad bridge and extends for some 120m roughly southwards. It is crossed near its southern end by a modern road bridge. It is constructed of coursed rubble sandstone with large sandstone copings. The wall is approximately 6m high from the current silt level in the Afon Lliedi at its northern end, and after a short level section slopes steeply to form the slipway. The quay has been raised above most of the slipway in concrete, but the original wall is clearly visible. It is thought to be tied to a concealed stone dock floor. A set of stone steps at its northern end descends through the wall and turns at a right angle projecting parallel with it to the silt level.*

2.2.3 More detailed descriptions of the quays historical development and construction are contained in the Cotswold Archaeology Heritage Statement (Davenport 2016) and in a forthcoming paper by Robert Protheroe-Jones.

2.2.4 East Quay is also recorded as a heritage asset in the Regional Historic Environment Record ~~(PRN 61027)~~ and as part of Carmarthenshire Dock in the National Monument Record (NPRN 34193).

2.2.5 Figure 5 shows a map of the area in 1880 when the quay was beginning to be constructed, and Figure 6 shows the next available map of 1907 after substantial development of the docks.

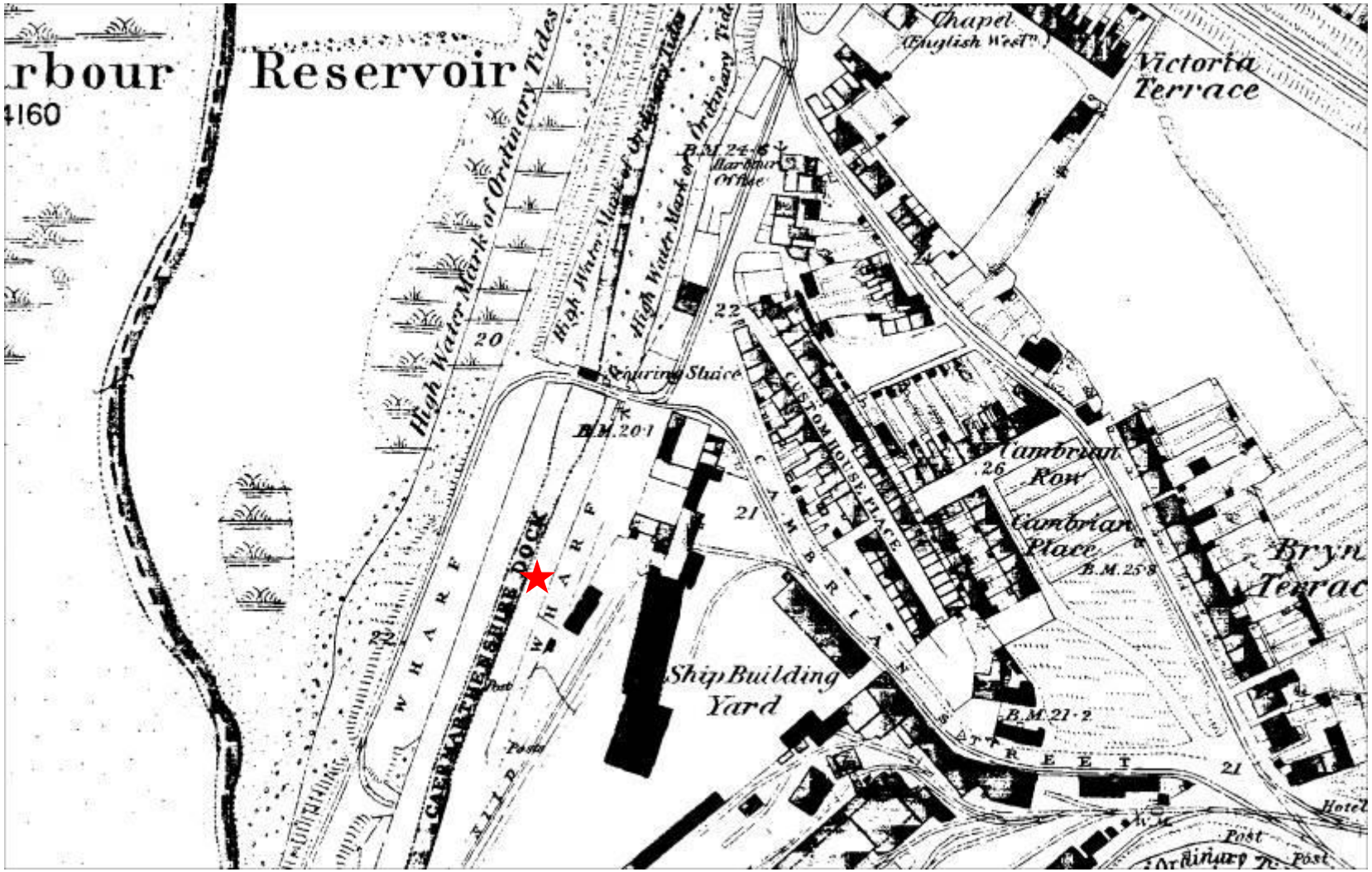

Figure 5: Extract from the First Edition 1:2500 Ordnance Survey Map of 1880, showing East Quay marked with a red star

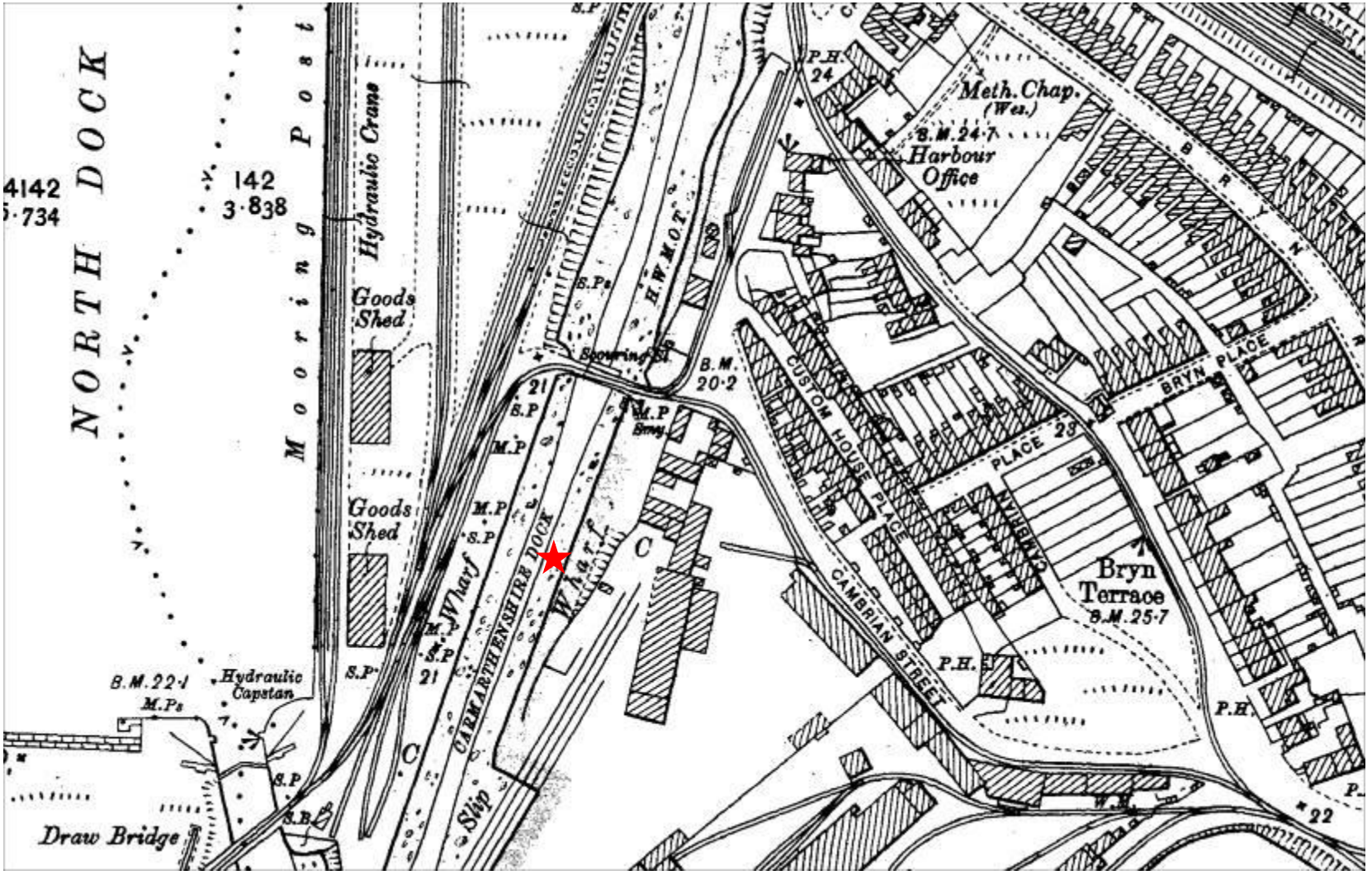

Figure 6: Extract from the Second Edition 1:2500 Ordnance Survey Map of 1907, showing East Quay marked with a red star

3 WATCHING BRIEF METHODOLOGY

3.1 Fieldwork

3.1.1 This watching brief was undertaken in accordance with the Chartered Institute of Archaeologists' (CIfA) Standard and Guidance for an Archaeological Watching Brief (2014). The Written Scheme of Investigation (Appendix I), detailing the archaeological works proposed, was approved by the Development Management section of the Dyfed Archaeological Trust.

3.1.2 Recording of all archaeological features or deposits conformed to best current professional practice and was carried out in accordance with the Recording Manual[2] used by DAT Archaeological Services.

3.2 Timetabling of Fieldwork

3.2.1 The watching brief took place at East Quay Carmarthenshire Dock, Llanelli, on the 3rd of August 2016.

3.3 Post-Fieldwork Reporting and Archiving

3.3.1 All data recovered during the fieldwork will be collated into a site archive structured in accordance with specifications in Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation (Brown 2011), and the procedures recommended by the National Monuments Record, Aberystwyth.

3.3.2 The results of the fieldwork have been assessed in local, regional and wider contexts. The report includes a desk-based research element to ensure that the site is placed within its wider archaeological context.

3.3.3 A report fully representative of the results of the fieldwork has been prepared.

[2] DAT Archaeological Services have adopted the Recording Manual developed by English Heritage Centre for Archaeology. A copy will be available on-site for inspection if required.

4 RESULTS AND DISCUSSION

4.1 Photos 1-3 show Carmarthenshire Dock and the position of the works. In the section of the quay where the works took place (Photo 3), the top two metres of the wall had been repaired. The older phase of wall below this was made up of neatly cut and coursed cuboid blocks of Pennant Sandstone in courses of 18cm on average. The repair was of the same stone and also neatly cut, but in larger blocks up to 36cm tall and with less variable course heights. The upper three of eight courses were thinner.

Photo 1: Carmarthenshire Dock looking south-southwest. The metal barriers on the quay at the top left of the picture indicate the position of the trench

Photo 2: Carmarthenshire Dock East Quay looking east-northeast. The metal barriers and red box at the right of the picture indicate the position of the trench

Photo 3: Carmarthenshire Dock East Quay looking south. The taller metal barriers and the digger indicate the position of the trench

4.2 The works involved the excavation of a rectangular trench approximately five metres long against the internal wall of the quay, using a seven-ton digger with a toothless bucket. The trench stretched away from the quay wall by three metres – far enough to reach the section of the outflow pipe that had already been installed two metres below the surface of the quay some months previously (not observed by DAT Archaeological Services). The excavation of the new trench had also already been commenced at that time before proceedings were suspended, to a depth of 0.9m. Photo 4 shows the trench at the commencement of the watching brief.

Photo 4: The partially excavated trench against the internal face of the quay wall, looking northwest

4.3 The concrete top of the quay appeared in section to have two phases, the top one of better quality levelling than the previous surface. Together they formed a deposit approximately 0.4m deep. Beneath the concrete a thin layer of ash/cinders (*c.*10am deep) overlay a light brownish-yellow clay deposit with an average depth of 20cm. This overlay deep deposits of loose industrial waste and presumably had been introduced in order to seal and level the deposits and provide firmer footing. Photo 4 shows these deposits in the east-facing section of the trench, before they were scraped away by hand with a spade to reveal the inner face of the quay wall.

4.4 Further excavation of the trench continued to a depth of *c.*2.8m. At a depth of about 2.2m the relatively flat surface of a layer of re-deposited boulder clay was reached, and no further deposits were found during its removal. Photos 5 and 6 show the two shorter trench edges and all the aforementioned deposits after the groundworks were finished. It can be seen that the clay layer capping the dark industrial material is thickest at the wall and then diminishes in depth until it is absent about 1m away from the wall. In profile it is a flat-topped layer but its bottom edge slopes, and this seems due to the fact that all of the bands of industrial wastes also slope. This would be consistent with the wall having been built first and then the space behind it infilled with dumps of different material.

4.5 The deepest layer of industrial fill was mainly iron slag (including tap slag with sub-aerial flow patterns) and coal ashes. Between this layer and the clay capping was a less deep and lighter layer containing a far higher percentage of ash. Below the iron slag deposit, a thin layer of pinkish ash separated it from another deep layer of mainly copper slag, ash, and a small amount of copper ore. Photo 7 shows the composition of the thick copper slag layer, mixed up by the digger with a little of the boulder clay, and a typical piece of the slag found in the trench is shown in Photo 8.

4.6 Robert Protheroe-Jones, Curator of Heavy Industry at the National Museum of Wales, visited the site briefly and added the following insights to the interpretation of the remains:

The use of boulder clay as fill is eloquent evidence of the paucity of industrial fill material in the town in the very early nineteenth century. The boulder clay in the trench is thought to represent the original infill behind the original dock walling. It would be instructive to trench further east of this excavation to attempt to clarify whether the slag and ashes comprise an isolated pocket behind the repair to the dock walling, as seems likely.

The presence of iron slag usefully dates the repair to the dock walling to after the period when iron and tinplate works began operating in the town. Old Lodge Works was the first to open an iron forge in 1854 and was, significantly, located along the Llanelly Copperworks Railway system which also connected to this dock, so any of the works possessing a forge and a rail connection to this dock might have supplied the slag: Marshfield (Western) 1863, Old Castle 1869. These three works are the only realistic contenders to have supplied the slag; their forges closed in 1884, probably early 1890s, and (1886-91) respectively, which provides a likely end date for the period in which this area of walling repairs would have been constructed. The absence of firebricks, a ubiquitous admixture to late C19 and C20 slag deposits, strongly suggests a date decidedly early in the period 1854 - early 1890s: say mid 1850s - 1860s.

The workmen reported that when test-pitting within the dock, immediately alongside the quay wall, that they struck the pitched stone base of the dock at around 5m to 6m depth below the top of the quay wall.

Photo 5: The south-facing section of the trench (quay wall to left), showing the sloping layers of material making up the quay on top of a relatively flat layer of re-deposited river material

Photo 6: The north-facing section of the trench (quay wall to right), showing the sloping layers of material making up the quay on top of a relatively flat layer of re-deposited river material

Photo 7: The material of the thick copper slag layer, mixed up by the digger with a little of the yellow boulder clay

Photo 8: A typical piece of slag found in the trench

4.7 A ceramic drainage pipe of *c.*10cm in diameter was discovered at a depth of about 1.5m below the top of the trench (Photo 9). Its presence was not wholly unexpected as its exit could be seen in the outer face of the quay wall (see Photo 3). It ran roughly east-west through the trench close to its northern edge. It no longer flowed and was removed. It is thought to have been an outflow pipe for an office building that once stood 5m east of the trench, which is shown on 1970s OS mapping.

Photo 9: The disused ceramic drainage pipe near to the northern trench-edge, looking west-northwest

4.8 The inner face of the quay wall was cleared of loose fill material using a shovel and then cleaned up further using a trowel (Photos 10 and 11). The wall had a stepped construction, with two steps showing (Photo 12). The first was at 0.3m below the top of the wall/base of the concrete. The width of this step was not established as the clay layer infilled it and supported the concrete cap that had been left above and it seemed wise not to disturb it. The width of the wall below this step was estimated to be *c.*0.45m. The second step was 0.3m below the first, and was 12cm wide, making the wall about 0.57cm thick at this point. The wall then gently increased in thickness by about 10cm to the bottom of the trench.

4.9 The wall construction was of the same material as seen on the outer face, but with rougher coursing and a greater variety of stone in shape and size. The odd brick and lumps of lime mortar and slag were included in the build. It is not possible to say whether this phase of construction was concurrent with the patching to the outside face, which may just have been a facing patch. However, the construction of the inner face does change slightly at a similar depth to that of the outer face, at about 2m below the top of the wall, implying that the whole thickness of the wall may have been re-built. The lower coursing of the inner face is

comparatively more regular, with larger more angular stones and less small stones in between them (Photo 12).

4.10 A disturbance to the inner face of the wall was seen in the northern 1.2m of the trench, leaving it only about 0.35m thick and showing a much rougher interior construction to the wall. An old iron pipe containing an electrical cable hung down in this area from the beneath the concrete, giving the impression that the disturbance was probably due to a cut being made from the top of the quay in order to install a cable run, perhaps for former lighting on the quay. Stone rubble, probably from cutting into the inner face of the wall from above, comprised the backfill for the void created as well as at ~~. There was at~~ least one concrete block ~~too~~. Photos 11 and 12 show the disturbed area. Stone rubble was removed from this area during excavation.

Photo 10: Inner face of the quay wall, southern end of the trench, looking west

Photo 11: Inner face of the quay wall, northern end of the trench, looking west-northwest

Photo 12: The inner face of the quay wall near to the northern edge of the trench. On the left side of the image the wall's stepped construction can be seen along with the change in coursing towards the base. On the right, the disturbed area of the wall shows, backfilled with stone and with the old metal pipe containing an electrical cable hanging down beneath the concrete.

4.11 Photo 13 shows the pipe that had already been installed to the rear of the trench. Its diameter was 0.7m and its depth at the top lip was about 1.8m. This diameter of hole at this same depth was needed to be inserted through the quay wall for the pipe outflow. This was not observed during the watching brief as the inner face of the wall had already been recorded during the watching brief, and the outer face by Cotswold Archaeology. The inner core of the wall had also already been observed in the disturbed area.

Photo 13: The eastern face of the trench, showing the previously installed pipe, 0.7m in diameter with its top lip at a depth of about 1.8m.

5 CONCLUSIONS

5.1 The watching brief at East Quay, Carmarthenshire Dock, Llanelli took place over one day during the excavation of a rectangular three by five metre trench against the inner face of the quay wall. The purpose of the trench was to provide room for the installation of an outflow pipe through the quay wall into the dock, and to accommodate the addition of scour protection to the base of the wall in the form of rock rolls, rock mattresses and chestnut stakes.

5.2 The inner face of the quay wall was revealed, showing a rougher construction than the outer face. A change in construction was visible at roughly the same depth as could be seen in the outer face. This suggests that the whole thickness of the wall had been patched at the same time. The inner face of the wall had two steps in it near the top, and then subtly thickened towards the base of the trench. The thickness of the top of the wall could not be determined, but was less than 0.45m. At the bottom of the trench it was *c.*0.7m thick.

5.3 Part of the inner face of the quay wall had been cut through from the top of the quay, leaving it only about 0.35m thick and exposing its inner construction of coursed rounded sandstone. An electrical cable hanging into this space indicated the probable purpose of this disturbance.

5.4 The base of the wall was not reached, but workmen reported that they had struck the pitched stone base of the dock immediately alongside the quay wall at around 5m to 6m depth below the top of the quay wall during initial test-pitting of the site.

5.5 The trench contained various deposits, the majority of which were industrial waste, that had had been used to backfill the space behind the wall after its construction. Redeposited boulder clay 0.7m deep seemed to represent the original fill behind the original wall, and waste from Iron and Copper production nearly 2m deep covering this was probably introduced after the wall-rebuild. The wall rebuild can thus be dated to after the period when iron works began operating in the town in 1854.

5.6 The watching brief undertaken by DAT Archaeological Services was undertaken only in the area of the groundworks adjacent to the inner face of the quay wall. The remainder of the outfall pipe and other drainage connectors associated with the works had been previously installed. The area of most archaeological interest was that behind the quay wall, as had been identified by Cotswold Archaeology within the initial Heritage Statement.

6 SOURCES

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Database

Dyfed Archaeological Trust Historic Environment Record, housed with Dyfed Archaeological Trust in Shire Hall, Llandeilo, Carmarthenshire, SA19 6AF

Cartographic

1st edition 1:2500 OS Map	1880
2nd edition 1:2500 OS Map	1907

APPENDIX I:

CARMARTHENSHIRE DOCK, EAST QUAY, LLANELLI, CARMARTHENSHIRE: PLANNING APPLICATION No. S/33446 ARCHAEOLOGICAL WATCHING BRIEF WRITTEN SCHEME OF INVESTIGATION

INTRODUCTION

This written scheme of investigation (WSI) has been prepared by DAT Archaeological Services in response to a request from Morgan Sindall to provide an archaeological watching brief during the installation of a new outfall pipe trench across the top of the quay, removal and reinstatement of a small part of the dock wall for the outfall and protection of the lower part of the dock wall from scouring. The area of the proposed outfall lies approximately at NGR SS 4998 9953 (Figure 1).

A Heritage Statement was prepared by Cotswold Archaeology in February 2016 (CA Report: 16028) which described the historical background of East Quay as:

> "East Quay, first built in 1799, is Listed Grade II as is West Quay, added in 1805. The bridge at the north end of East Quay was constructed to take the tramway over the river at the same time. It is described in the RCAHMW database as *"A well-constructed single-arched stone bridge, believed to date from 1805, which carried [the] Nevill Druce Railway over the northern end of the Carmarthenshire Dock (NPRN 34193) on the New Cut Canal of 1839 (NPRN 34397), at the south end of the Scouring Dock (NPRN 34206). The bridge is of carefully dressed sandstone, with a shallow segmental arch, now of red brick. On the north elevation there is evidence of the former scouring sluice installed in 1858"*. Changes to the canal in 1839 and 1858 and the re-engineering of the railway for its 1883 re-opening, suggest that the surviving fabric of the bridge may not all date to 1805. In particular, the triple brick archivolt looks as if it might be later.
>
> "The New Cut Canal (not itself listed) was *"built in 1839 built to carry coal. It was formed by diverting the lowest part of the Afon Lliedi and stretches 1km from just north of Old Castle Road Bridge (NPRN 43106), through the Scouring Dock (NPRN 34206) to the Carmarthenshire Dock (NPRN 34193)"* (RCAHMW database and nos). The line of the river previous to this is not known, but it can hardly have been very different, constrained at both ends of its short length by existing structures. However, it seems possible that changes to the wharf and bridge were carried out at this time, as well as during the fitting of the scouring sluice to the north side of the bridge in 1858." (Cotswold Archaeology Report 16028)

The Cotswold Archaeology report indicated that overall the proposed development will cause disturbance to only a very small part of the structure as a whole and it was considered appropriate that archaeological mitigation works comprised a watching brief during construction to record any remains identified. It also notes that the observation and recording of the necessary excavations behind the wall could add to our understanding of the structural history of the quay. Where the quay wall will be directly disturbed by the works, it corresponds with an area of previous repair work and so original fabric will not be disturbed. Appropriate reconstruction of the wall using correct materials and style is a condition of the listed building and planning consent.

As a consequence of the findings of this report the archaeological advisor to the local planning authority (Development Control section of Dyfed Archaeological

Trust) has requested that an archaeological watching brief is undertaken during the groundworks associated with the installation of the new outfall pipe and associated works.

This written scheme of investigation outlines the methodology through which DAT Archaeological Services would undertake an archaeological watching brief during ground works at the site, which have the potential to expose, damage or destroy archaeological remains. This document has been prepared for the client and is specifically prepared for DAT Archaeological Services to undertake the required archaeological works. The WSI cannot be used by any third party.

The proposed works were described in the Cotswold Archaeology report as follows:

> *"The works will involve the excavation of a trench approximately 0.75m wide across the quay, connecting a drain under Cambrian Road to a new outfall in the quay wall* (Figures 2 and 3) [Figures 3 and 4 in main report]*. The trench will be over 2m deep as the pipe will have an invert at 4.2m aOD, 2m below the upper surface of the quay. An existing rain water drain at the north is to be diverted to join the new drain* (Figure 2) [Figure 3 in main report]*. Its western half will be removed, necessitating excavating its trench, and a new manhole inserted at the turn to join the new trench. This and the connecting length of trench will require excavation in the quay. The small area of wharf wall where the plastic pipe protrudes will be made good to match the existing masonry.*
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> *"The pipe is at approximately 0.8m deep. The trench to remove it will obviously be in disturbed ground. The connecting trench and the new manhole may intrude into undisturbed quay structure. The depth of the new run is not currently known, except that it will start at c.0.8m deep.*
>
> *"A new localised, toed retaining wall will be cast in concrete behind the existing wall, approximately 4m long and 0.1-0.2m back from the internal face (presumed) of the present quay wall. The toe of the wall and its sub-base will be at 3.5m aOD and will run back c. 2m from the internal face of the quay wall. Thus, excavations will be required against the internal face of the wall, nominally 4m north/south by 2m east/west and 2.7m deep.*
>
> *"The new connecting drain will require a trench of uncertain width (likely to be around 0.75m) about 10m long running along the centre of the quay, plus the disturbance for a new manhole.*
>
> *"To allow the flap valve to be inserted a hole will need to be cut through the quay wall* (Figure 3) [Figure 4 in main report]*. It is possible that this hole may need to be 1.6m square, though it would not be anticipated to exceed this. These excavations will affect the 1799 construction deposits, and any subsequent construction deposits, removing and revealing the construction methods used.*
>
> *"The excavations will reveal the rear face of the quay, which, in this location, are mostly of the later phase repair masonry. At their fullest depth, the excavations are also likely to affect part of the original masonry, which is externally evident at this depth. The insertion of the flap valve will also remove a section of the repaired wall.*
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> *"To prevent scour in the geological deposits at the base of the quay wall, it is proposed to lay a 2m long rock mattress, set c.0.1m into the surface of these deposits. This will be held in place by chestnut paling driven into the substrate. Its junction with the base of the wall will be protected by a rock roll tied to the mattress. These elements will have no physical impact on the quay wall."* (Cotswold Archaeology Report 16028)

The written scheme of investigation is in accordance with the *Standard and Guidance for Archaeological Watching Briefs* (Chartered Institute for Archaeologists (CIfA 2014). DAT Archaeological Services has considerable experience of this type of project and always operates to best professional practice. DAT Archaeological Services is the contractual arm of Dyfed Archaeological Trust that has its own Health and Safety Policy, and all works are covered by appropriate Employer's Liability and Public Liability Insurances. Copies of all are available on request.

Dyfed Archaeological Trust is a CIfA Registered Organisation.

All permanent staff are CSCS registered.

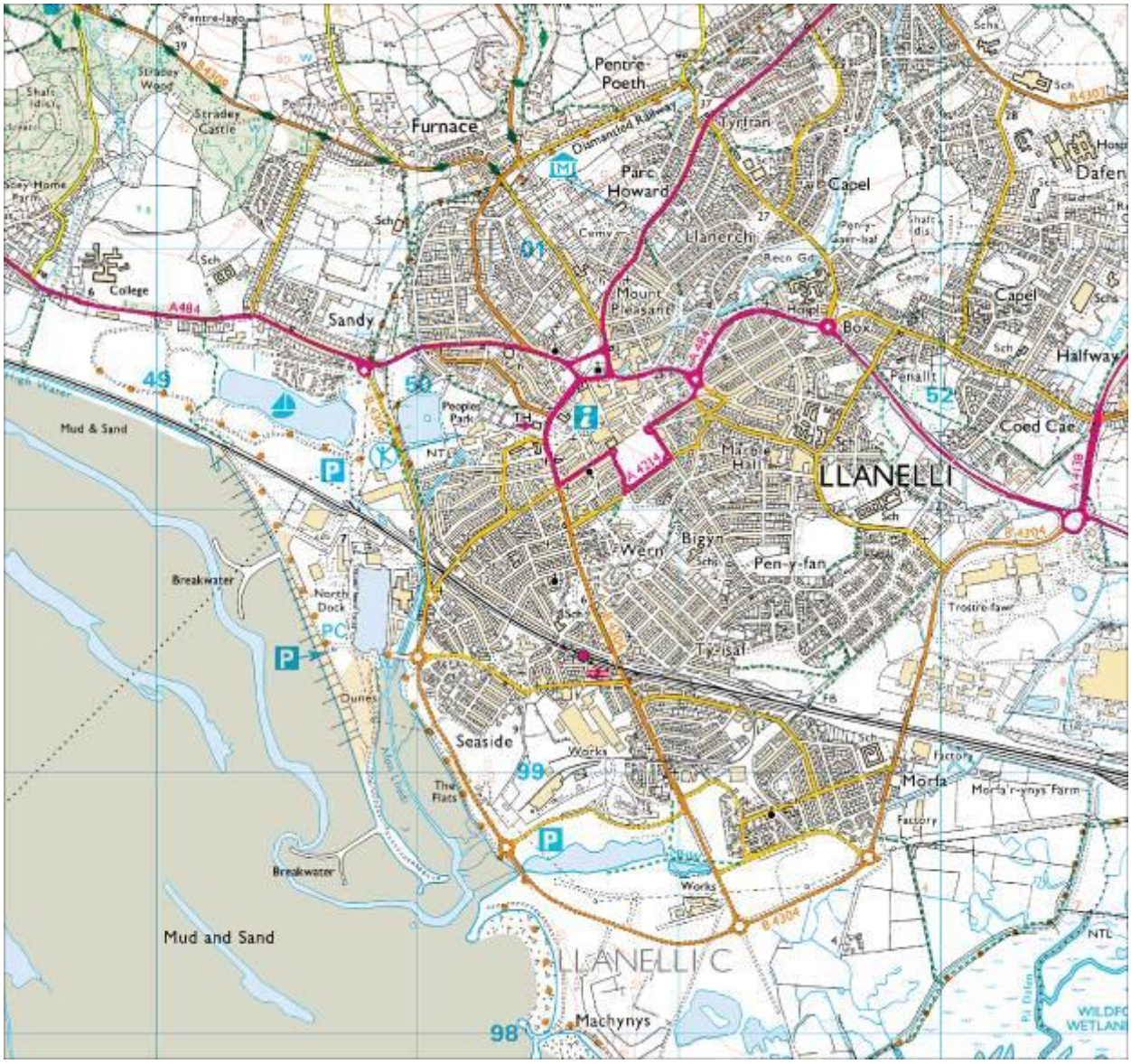

Figure 1: Location of Carmarthenshire Dock East Quay

1. WATCHING BRIEF

1.1 The definition of archaeological watching brief, taken from the Chartered Institute for Archaeologists Standards and Guidance: for Archaeological Watching Briefs (CIfA S&G: AWB 2014) is a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.

1.2 The purpose of a watching brief, as laid down in the CIfA S&G AWB is:

> *..to allow, within the resources available, the preservation by record of archaeological deposits, the presence and nature of which could not be established (or established with sufficient accuracy) in advance of development or other potentially disruptive works;*
>
> *…to provide an opportunity, if needed, for the watching archaeologist to signal to all interested parties, before the destruction of the material in question, that an archaeological find has been made for which the resources allocated to the watching brief itself are not sufficient to support treatment.*

1.3 This document provides a scheme of works for:

> ***Archaeological attendance during ground works associated with the installation of new outfall pipe, outfall exit through the existing quay wall and associated drainage alterations at Carmarthenshire Dock East Quay, Llanelli which are likely to expose, damage or destroy archaeological remains. Appropriate investigation and recording of any such remains will be undertaken if revealed. A report and archive of the results of the works will be prepared.***

2. PROJECT OBJECTIVES

2.1 Provision of a written scheme of investigation to outline the methodology by which DAT Archaeological Services will undertake the archaeological watching brief.

2.1 To monitor ground works in order to identify the presence/absence of any archaeological deposits.

2.2 To establish the character, extent and date range for any archaeological deposits to be affected by the proposed ground works.

2.3 To appropriately investigate and record any archaeological deposits to be affected by the ground works.

2.4 To produce an archive and report of any results.

3. FIELDWORK

3.1 The watching brief would entail an archaeologist being present during all ground works where there is a potential for archaeological remains to be exposed, damaged or destroyed. This will be carried out during any

groundworks associated with the excavation of the new outfall pipe trench and works to the rear of the quay wall. The west face of the east Quay wall has already been described and photographed by Cotswold Archaeology, and it is not anticipated that this will be subject to any further detailed recording although photographs of the process of breaching this wall for the installation of the new outfall will be made.

3.2 Much of the works will be undertaken at substantial depths and it will not be possible for an archaeologist to access the deeper areas of trench (unless safely shored up and permission given by the site contractor). Recording of the deeper parts of the trench will thus need to be undertaken remotely (through photographic and written descriptions). A photographic record may be the most useful means of recording the rear of the quay wall as it is exposed by the excavations. Much of the areas of excavation have been previously disturbed during repair work to the quay wall and so it is possible the area has already been disturbed.

3.3 It is essential that coordination between the site contractor's and archaeologist is established at the outset to avoid any potential disturbance to archaeology without an archaeologist being present, or unnecessary visits to the site when works are being carried out that do not require the presence of an archaeologist.

3.4 Adequate time must be made available to the visiting archaeologist to ensure that appropriate recording can be undertaken of any archaeological features or deposits exposed during ground works.

3.5 Recording of all archaeological features or deposits will conform to best current professional practice and be carried out in accordance with the Recording Manual[3] used by DAT Archaeological Services. Significant archaeological features or deposits will be drawn at a suitable scale (no less than 1:20 – ***where appropriate and safe to do so***) and photographed in an appropriate format.

3.6 All archaeologically significant finds will be retained and, where possible, related to the contexts from which they derived. Finds will be temporarily stored by DAT Archaeological Services in stable conditions. All finds, except those deemed to be Treasure, will remain the property of the landowner.

3.6 Under the 1996 Treasure Act, "treasure" can be summarised as:

- Any object other than a coin containing at least 10% gold or silver and at least 300 years old;
- Any prehistoric assemblage of base metal;
- Coins found together which contain 10% gold or silver (but no single coins) and groups of at least 10 coins of other metals, provided they are at least 300 years old;
- Any object found associated with treasure except unworked natural objects; and
- Any object which would have been Treasure Trove before the 1996 Act but not covered above.

3.7 In the event that unforeseen archaeological discoveries are made during the development, or that archaeological remains of high significance are exposed, DAT Archaeological Services shall have the power to halt any

[3] ***DAT Archaeological Services have adopted the Recording Manual developed by English Heritage Centre for Archaeology. A copy will be available on-site for inspection if required.***

ground works and shall inform the site agent/project manager and the curatorial officer, and prepare a written statement with plan detailing the archaeological evidence. Following assessment of the archaeological remains by the curatorial officer, DAT Archaeological Services shall, if required, implement on behalf of the Client a contingency scheme for salvage excavation of affected archaeological features. In these instances it would be necessary to employ extra resources to record such features to an appropriate standard.

3.8 In the very unlikely event that human remains are encountered, the District Coroner's Office and the Police will be notified immediately. All human remains will, where possible, be left *in situ*. If preservation *in situ* is not possible all statutory permissions will be obtained in writing before removal begins.

4. POST-FIELDWORK REPORTING AND ARCHIVING

4.1 All data recovered during the fieldwork will be collated into a site archive structured in accordance with the specifications in *Archaeological Archives: a guide to best practice in creation, compilation, transfer and curation* (Brown 2011), and the procedures recommended by the National Monuments Record, Aberystwyth.

4.2 The results of the fieldwork will be assessed in local, regional and wider contexts. The report will include a desk-based research element to ensure that the site is placed within its wider archaeological context. A report that is fully representative of the results of the fieldwork will be prepared and digital and hard copies will be sent to the client for dissemination to all relevant parties.

4.3 A summary of the project results, excluding any confidential information, may be prepared for wider dissemination (e.g. Archaeology in Wales and special interest and period-specific journals).

4.4 The project archive, including all artefacts and ecofacts (excepting those which may be deemed to be Treasure) will be deposited with an appropriate body following agreement with the landowner.

4.5 A copy of the final report will be deposited with the regional HER within six months of the completion of the project.

5. STAFF

5.1 This project will be managed by James Meek, Head of DAT Archaeological Services.

5.2 Archaeological attendance during the watching brief will be undertaken by staff drawn from the team of archaeologists employed by DAT Archaeological Services.

6. MONITORING

6.1 The fieldwork may need to be monitored by the archaeological advisors to Western Power and the Head of DAT Archaeological Services, who should be provided access to the site at any time during the watching brief works.

7. HEALTH AND SAFETY

7.1 All DAT Archaeological Services staff are CSCS[4] registered.

7.2 DAT Archaeological Services will carry out a health and safety risk assessment to ensure that all potential risks are minimised.

7.3 All relevant health and safety regulations must be followed.

7.4 All site inductions, H&S procedures and site rules of the site contractor will be made known to DAT Archaeological Services staff prior to them commencing work on-site.

7.5 Safety helmets, safety boots and high visibility vests are to be used by all site personnel as necessary. The site contractors will make all archaeological staff aware of any other PPE[5] that may be required and provide them. Archaeological staff must not enter any area where there is a considered to be a health and safety risk that has not or is not being appropriately mitigated against.

7.6 DAT Archaeological Services staff must ensure that their presence on site is communicated to all relevant site staff, especially machine operators.

7.7 Much of the proposed works will be involve excavation at substantial depths. Access into the trench will not be possible unless it is safely shored and the site contractor gives permission. As noted above it is more likely that remote archaeological recording will be undertaken from the sides of the trench, rather than direct access into it.

[4] ***Construction Skills Certification Scheme (Health and Safety Tested)***

[5] ***Personal Protection Equipment***

EAST QUAY, CARMARTHENSHIRE DOCK, LLANELLI: ARCHAEOLOGICAL WATCHING BRIEF

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Paratowyd yr adroddiad hwn gan
/ This report has been prepared by

ALICE DAY

Swydd / Position: ARCHAEOLOGIST

Llofnod / Signature Date 6/SEP/2016

Mae'r adroddiad hwn wedi ei gael yn gywir a derbyn sêl bendith
/ This report has been checked and approved by

JAMES MEEK

ar ran Ymddiriedolaeth Archaeolegol Dyfed Cyf.
/ on behalf of Dyfed Archaeological Trust Ltd.

Swydd / Position: HEAD OF DAT ARCHAEOLOGICAL SERVICES

Llofnod / Signature Date 6/SEP/2016

Yn unol â'n nôd i roddi gwasanaeth o ansawdd uchel, croesawn unrhyw sylwadau sydd gennych ar gynnwys neu strwythur yr adroddiad hwn

As part of our desire to provide a quality service we would welcome any comments you may have on the content or presentation of this report.

ymddiriedolaeth archaeolegol

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