BURRY PORT
SOUTHERN DISTRIBUTOR ROAD, CARMARTHENSHIRE

ARCHAEOLOGICAL INVESTIGATION, 2004

Paratowyd gan Archaeoleg Cambria
Ar gyfer Cyngor Sir Caerfyrddin
Prepared by Cambria Archaeology
For Carmarthenshire County Council

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ARCHAEOLEG CAMBRIA ARCHAEOLOGY

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BURRY PORT SOUTHERN DISTRIBUTOR ROAD, CARMARTHENSHIRE ARCHAEOLOGICAL INVESTGATION, 2004

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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

BURRY PORT SOUTHERN DISTRIBUTOR ROAD, CARMARTHENSHIRE

ARCHAEOLOGICAL INVESTIGATION, 2004

Project Record No. 50027

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1.0 SUMMARY

In 2004, Cambria Archaeology undertook an integrated archaeological project in advance of, and accompanying the construction of the new southern distributor road at Burry Port Harbour, Carmarthenshire (centred on NGR SN 445 004). The archaeological work comprised four main elements – an initial desk-top study, standing building recording, targeted evaluation trenches and a watching brief. It was carried out on behalf of Carmarthenshire County Council, Mowlem being the principal contractor for the scheme.

Burry Port Harbour was established between 1830 and 1836. It reached a peak of activity in the second half of the 19th century, as a commercial harbour of national importance. As a result, Burry Port developed as an entirely new town. This activity began a slow decline after World War I, which hastened after World War II. Most of the harbour fittings etc. were removed during the early 1980s.

Only seven sites were directly affected by the scheme. These were –

- *The former Kidwelly & Llanelly Canal and 'sluice pond'*
- *The former Lead and Silver Works*
- *The former Burry Port and Gwendraeth Valley railway sidings*
- *The former Burry Port and Gwendraeth Valley railway station and platform*
- *The former Burry Port and Gwendraeth Valley railway Power House*
- *The former Burry Port and Gwendraeth Valley railway Engine Sheds*
- *The former Burry Port and Gwendraeth Valley railway Goods Shed*

Building recording was undertaken on the remains of two standing buildings - the enclosure wall around the former Lead and Silver Works, from 1864, and the Burry Port and Gwendraeth Valley railway platform, built in 1909. Recording of this nature has significantly advanced our understanding of the development of these structures, particularly the former.

Archaeological evaluation trenching across the two elements of the Kidwelly & Llanelly Canal, initially established in 1837, allowed a picture of the methods of early 19th century canal construction to emerge. The canal became disused when the Burry Port and Gwendraeth Valley Railway established railway lines alongside in 1865-1869.

Features associated with this railway network were recorded in plan, during a watching brief on the turf-stripping for the scheme, but were saved from damage by the superficial nature of the scheme. This included the railway Engine Sheds, probably also from 1865-1869, the Power House, 1900-1901, and the Goods Shed, from c.1909.

A number of drainage trenches were cut to a greater depth, but in the main their impact was minimal. They demonstrated that wind-blown sand lay beneath the site to a depth of over 2.5m

In addition, a programme of palaeoenvironmental sampling was undertaken on salt-marsh deposits affected by the scheme, near Moreb. The organic sediments contained well preserved pollen grains, but only one sample had any diatoms. Analysis of the pollen grains showed that, when the organic unit was deposited, the vegetation growing around the sampling point was typical of fresh-water environments (reed beds, wet alder woodland). This implies that the local relative sea-level was lower than today. There were no strong markers to help find the age of the sediments, but they were probably deposited sometime between 7000 and 3000 years ago.

The road-scheme was undertaken with minimal damage to the underlying archaeological deposits, the majority of the route being laid on made-up ground, rather than in a new excavation. Most of the significant historic features and deposits have therefore been preserved in situ*.*

2.0 INTRODUCTION

Only a limited number of sites, seven in all, were directly affected by the road scheme, and subject to fieldwork. These were -

- The former Kidwelly & Llanelly Canal and 'sluice pond'
- The former Lead and Silver Works
- The former Burry Port and Gwendraeth Valley railway sidings
- The former Burry Port and Gwendraeth Valley railway station and platform
- The former Burry Port and Gwendraeth Valley railway Power House
- The former Burry Port and Gwendraeth Valley railway Engine Sheds
- The former Burry Port and Gwendraeth Valley railway Goods Shed

They are discussed in Sections 4.0 – 10.0 below in relation to the history and development of Burry Port Harbour.

2.1 Site location

Burry Port Harbour, Carmarthenshire, is centred on NGR SN 445 004, in an area of coastal dune slacks, immediately north of the high water mark of the north shore of the Burry Estuary (Fig. 1). The dune slacks (known as Tywyn Bach) developed around the mouth of a small river, the Derwydd River (now beneath the harbour), but form part of a greater complex of slacks and sand-hills (Tywyn Fawr, or Pembrey Burrows) concentrated at the mouth of the River Gwendraeth Fawr. Although they developed over a long period, the dunes appear to be of comparatively recent origin and arise from a series of reclamations around a nucleus formed on dry land to the west, at the foot of Mynydd Penbre. The Burrows themselves have developed since the 17th century at least and, according to James, are no earlier than the medieval period - the earliest date to which shell-midden sites observed within the area can be attributed (James 1991, 159).

2.2 Burry Port Harbour (see Appendix 1)

Burry Port Harbour was established between 1830 and 1836. It reached a peak of activity in the second half of the 19th century, as a commercial harbour of national importance. As a result, Burry Port developed as an entirely new town (Fig. 1). This activity began a slow decline after World War I, which hastened after World War II. Most of the harbour fittings etc. were removed during the early 1980s. A full site history is included as Appendix 1 of this report.

The *raison d'être* behind the establishment of a harbour at Burry Port is to be found within the burgeoning coal industry within southeast Carmarthenshire of the 18th and early 19th centuries. Both Burry Port Harbour, and the slightly earlier Pembrey Harbour, began as coal export ports. The harbour was founded on *de novo* site, within common land comprising the dune slacks, with little prior settlement.

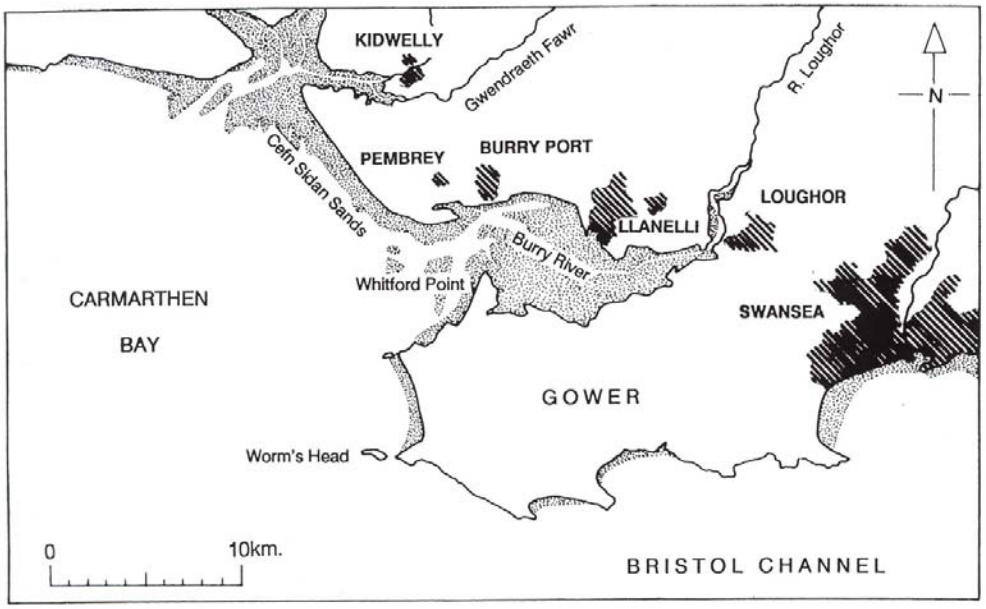
The harbour consists of four main physical elements (Figs. 1 & 2):-

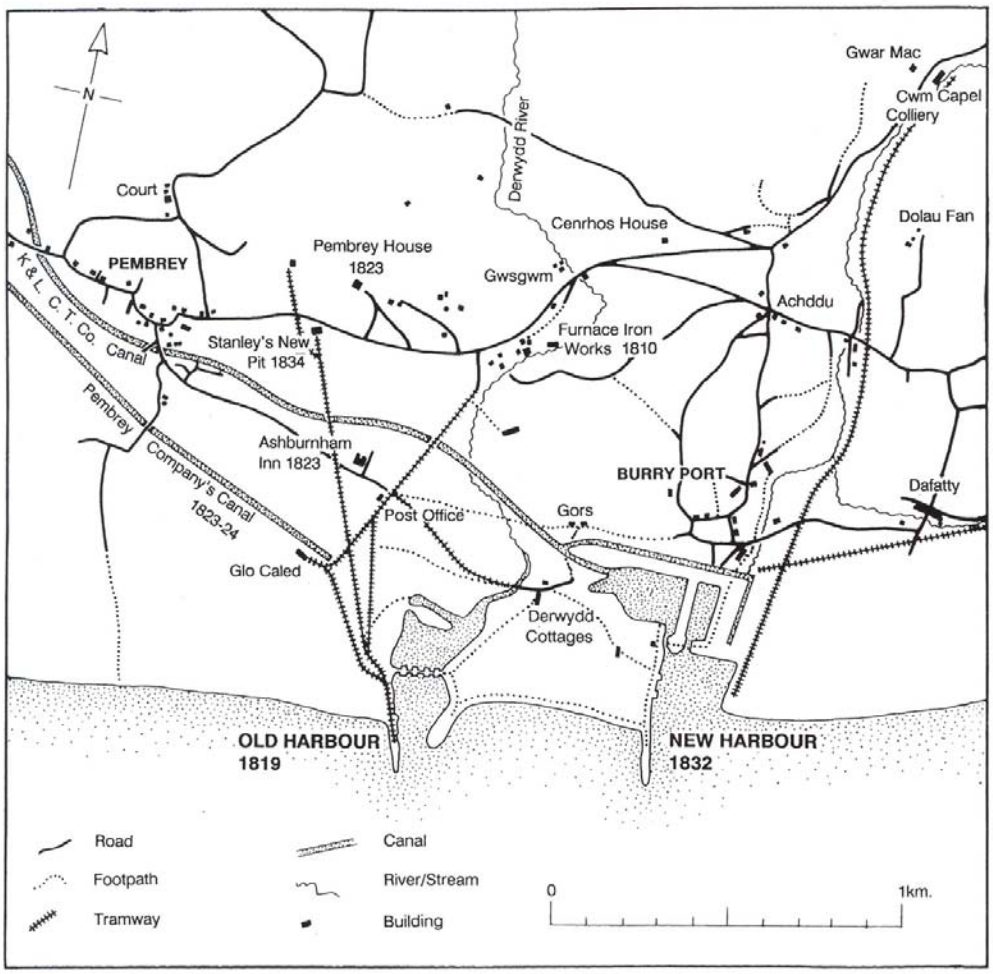
- The harbour itself, which comprises three components - the Outer Harbour which connects with the sea, and East and West Docks, fed by a branch of the Derwydd River, with sluices into the Outer Harbour.
- The transport and communications infrastructure. The harbour and docks were dependent upon a network of communications that began as a canal and tramline network, superseded in part by a rail network, and also featured a turnpike road and trackways.
- The service infrastructure. Ancillary structures associated with the harbour such as the customs house and coastguard station.
- Industries. Served by all the above elements were a number of associated industries including Copper, Lead and Tinplate works.

Other forms of development occurred around the harbour once it was well established.

The first three elements have combined to give the harbour area its character and the pronounced north-south and east-west axes that define both its physical presence and the influences that governed its development.

Fig. 1 - Location map of Burry Port Harbour, showing historic industrial sites c.1840





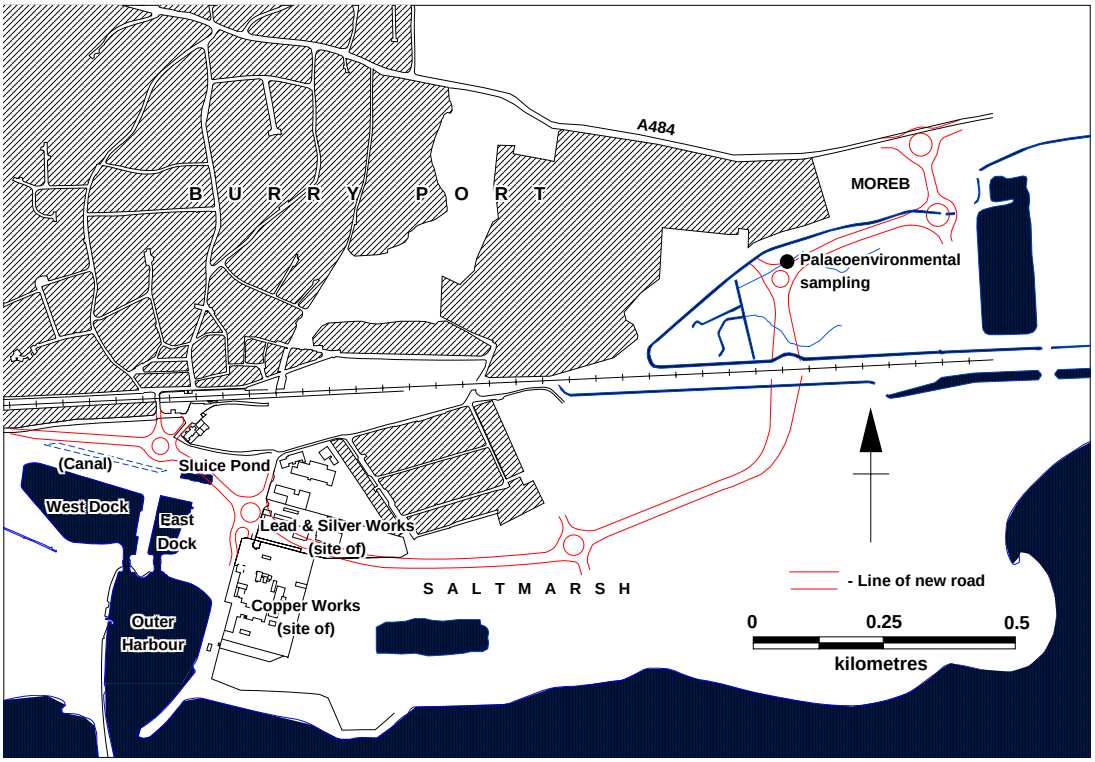
2.3 Development proposals and brief

Carmarthenshire County Council proposed to create a new distributor road through the historic port of Burry Port. The historic and archaeological importance of the Burry Port area meant that a comprehensive preliminary archaeological investigation was required, and a brief was accordingly drawn up by Cambria Archaeology Heritage Management (CA – HM) on 26 February 2003, which was sent out by the Council as a tender document on 18 August 2003. Cambria Archaeology Field Operations submitted a tender in September 2003 but, after consultation between the client and CA-HM, a revised specification was submitted in December 2003. This was accepted on 28 January 2004 and archaeological work began on 5 February 2004.

The proposed Southern Distributor Road Scheme occupied an area running between Ashburnham Road, Burry Port, and the existing A484 at Moreb, 1.8km to the northeast (Fig. 2). It comprised a total length of 3.1km and consisted of a 7.3m wide carriageway, incorporating seven junctions (six of which were roundabouts), three structures, cycle paths and footways, and associated works.

The west end of the route ran through Burry Port Harbour. This area contained a large number of important industrial and commercial buildings, ancillary structures and a complex transport infrastructure (Fig. 2). The buildings were largely demolished during the later 20th century and the area was largely grassed over. However, upstanding remains included limited parts of the White Lead Works, Lead and Silver Works and Copper Works, whilst evidence for all structures and infrastructures, including tram- and railway lines, and canals, may have survived below ground (see Figs. 1 and 2).

Fig. 2 - Plan of southern distributor road in relation to Burry Port Harbour, showing sites mentioned in the text



The central and eastern sections run through what was predominantly coastal salt-marsh, subject to limited 20th century domestic development. The east end of the route crosses a historic tramway and the sites of the New Lodge Colliery and New Lodge Brickworks. These structures have gone, but below ground evidence may have survived. However, in these areas, the scheme was deemed to have a limited impact on the archaeological resource. The archaeological investigation was therefore restricted to the west end of the scheme, with the exception of a programme of palaeoenvironmental sampling that was undertaken on salt-marsh deposits affected by the scheme, near Moreb.

2.4 Objectives

The objectives of the archaeological investigation were –

- To understand the remains of the industrial and related features and deposits, and their relationship to each other.
- To allow the location, extent, date, condition, significance and value of these features and deposits to be determined
- To assess the impact on these features and deposits
- To allow these features and deposits to be set in their regional and national context.
- To understand how the site developed through time, and any changes in its nature and function.

2.5 Abbreviations used in this report

Sites recorded on the Sites and Monuments Record for Carmarthenshire, Ceredigion and Pembrokeshire (SMR) are identified by their Primary Record Number (PRN) and located by their National Grid Reference (NGR) and height above sea level (OD).

3.0 METHODOLOGIES

The archaeological fieldwork was conducted in a series of four, planned stages, as laid out in the brief.

3.1 Stage 1: desk-top study

Documentary research was undertaken prior to the commencement of the scheme, to identify any previously unrecorded archaeological sites, features and deposits in the study are and to enable the results of the investigations to be set in their geographical, topographical, archaeological and historical context. This comprised -

- Search of County Sites and Monuments Record and National Monuments Record for information on known sites within, and around, the route corridor.
- Search of relevant cartographic sources for archaeological information regarding the former land-use of the area.
- Examination of aerial photographic coverage for archaeological information.
- Search of primary historic documents for archaeological information relating to the study area.
- Review of published sources for information relating to the study area.
- A field visit will be made to review the current state of archaeological sites, features and deposits identified during the documentary research, to identify new archaeological sites, features and deposits, or areas that may contain them, to carry out rapid recording of archaeological sites, features and deposits by photography, site notes and sketch plans and to assess the vulnerability of archaeological sites, features and deposits.
- The identification of sites, features or deposits that require further archaeological investigation including intrusive evaluation to fully assess their character, extent, significance and vulnerability.

Copies of historic maps and plans are reproduced in this report as Appendix 1. A comprehensive history and development of Burry Port is reproduced as Appendix 2.

The entire route was also subject to an initial walkover survey, and photographically recorded (see Fig. 2). Starting at the Ashburnham Road this route crosses the old railway sidings north of the docks, through the old Lead and Silver Smelting Works, past the site of the Carmarthen Bay Power Station, across the Dyfatty marshes passing over the railway line and then north the join up with the existing A484 at Moreb. These photographs form part of the project archive.

3.2 Stage 2: topographical survey and standing building recording

Topographical survey was undertaken in the Burry Port Harbour area at the west end of the scheme in order to included the remains of canals, tram- and railways lines, and old works structures. This survey was undertaken using an EDM Theodolite with integral data-recorder, and digital manipulation was undertaken through MS Geosite. The results are available in a number of formats including Autocad and DXF files.

In addition, a standing building record was made of all affected historic structures. It was initially envisaged that the remains of four standing structures would be affected by the scheme - the White Lead Works, the Lead and Silver Works, the Copper Works and the old Burry Port and Gwendraeth Valley Railway station platform. As the scheme design developed, however, it became apparent that the remains of only two structures would be directly affected.

- the Lead and Silver Works (PRN 23878)
- the old railway platform (PRN 51229)

The standing building record was accordingly limited to these two structures. It conformed to a Level 2 as defined by RCHME, 1990, *Recording Historic Buildings: a Descriptive Specification*, comprising photography, taped measurement and written notes that included recording of the existing structure, phasing, and method of construction and fabric type.

3.3 Stage 3: archaeological field evaluation

The majority of the proposed route involved only minimal groundworks excavation due to contamination, existing and proposed site levels. In general excavation was only expected to reach a depth of 100mm. However, there was one area – between NGR SN 4427 0068 and NGR SN 4469 0059 – where excavation was expected to reach a depth of 600mm.

3.3.1 Evaluation test-trenching

This stage therefore included test-trenching within this area. The brief had originally called for two trenches to be placed running the width of the proposed road route in the area just north of the West and East Dock. However the site survey had shown that the majority of the archaeology was only just beneath the turf and would therefore be exposed in its entirety, by turf stripping, prior to the road construction. Moreover the whole area was still actively used as a public park with dog walkers, cyclists and even motorcyclists regularly crossing the area.

Given the difficulty in securely fencing long trenches so that they would not pose a health and safety hazard (especially as the area was still used after dark), and as the restricted access to this area was already an emotive issue, it was decided to restrict the trenches to a total of two (Trench 01 and Trench 02), corresponding with deepest archaeological features on the site. These were -

- the remains of the Kidwelly & Llanelly Canal (PRN 8822)
- the remains of its sluice pond (PRN 51227)

Both features were deep enough not to be revealed by the soil stripping, but still potentially shallow enough to be damaged by the road works.

These smaller trenches were hand-excavated by the archaeologists to a depth of 600mm or the level of the underlying natural. They were then hand-cleaned and recorded. All features and deposits were identified using the open-ended numbering system employed by Field Operations. Significant archaeological features and deposits were drawn at an appropriate scale (no less than 1:20) and photographed in 35mm and digital format. Drawn records were related to Ordnance Survey datum and published boundaries where appropriate. All finds were retained. Both trenches were backfilled by hand and returfed on completion of the excavation.

3.3.2 Bulk environmental sampling

The brief required that the field evaluation should also comprise bulk environmental sampling and assessment of deposits in the salt-marsh area, during the groundworks for the scheme. Astrid Caseldine of Lampeter University, specialist palaeoenvironmentalist and advisor to Cadw, considered that any sample would be too heavily contaminated with industrial effluent, heavy metals etc., and that their worth would be severely limited in the absence of accurate means to date them. Nevertheless, bulk column samples, with a core depth of 1.5m, were taken during the excavation of a balancing pond through salt-marsh deposits near Moreb, towards the east end of the road line, at NGR SN 4575 0102. See Section 11.0.

See also Section 3.4.2 below.

3.4 Stage 4: archaeological monitoring/watching brief

This stage comprised of monitoring through site visits and watching briefs for the remainder of the scheme during any topsoil stripping or groundworks that were likely to have an archaeological impact. This stage was formed around the results of Stages 1 – 3, and its details and extent were discussed with the client and the archaeological curator (CA – HM).

The watching brief comprised a record and interpretation of the character, extent and significance of the archaeological features and deposits exposed during stripping and groundworks in advance of their disturbance or destruction.

According to the original brief the road development was to involve the removal of 0.70m of material from the area between the old lead works and the point where the new road met the Ashburnham Road. This would have removed all the archaeological record for the railway sidings and related structures and so required an extensive watching brief. However a revised plan of 21 March 2004 called only for the turf to be removed, and for the route corridor be built up rather than stripped. This new plan meant that the archaeology would be preserved *in situ* but was still likely to be exposed by the process of turf stripping and therefore the watching brief still needed to be carried out.

An intermittent watching brief was maintained on the turf-stripping for the new road between the old Lead and Silver Works and Ashburnham Road, and on the excavation of a number of service trenches associated with the new road.

3.4.1 Turf stripping

Although the turf layer was remarkably thin throughout the area of the proposed road route, being less than 0.10m in depth, this was sufficient for a number of features to be revealed. In the main, these features were associated with four historic structures, all now gone –

- The former Burry Port and Gwendraeth Valley Railway sidings (PRN 5349)
- The former railway Goods Shed (PRN 51230)
- The former Power House (PRN 8672)
- The former Engine Sheds (PRN 36939)

The top of the Kidwelly & Llanelly canal sluice pond north wall was also exposed (PRN 51227), at the east end of this area, for approximately 6.0m, but was not damaged. In addition, there was also evidence from some of the buildings that once stood in the area, mostly in the form of scattered rubble. This was clear evidence of the extent of demolition that took place when the area was landscaped in the 1980s.

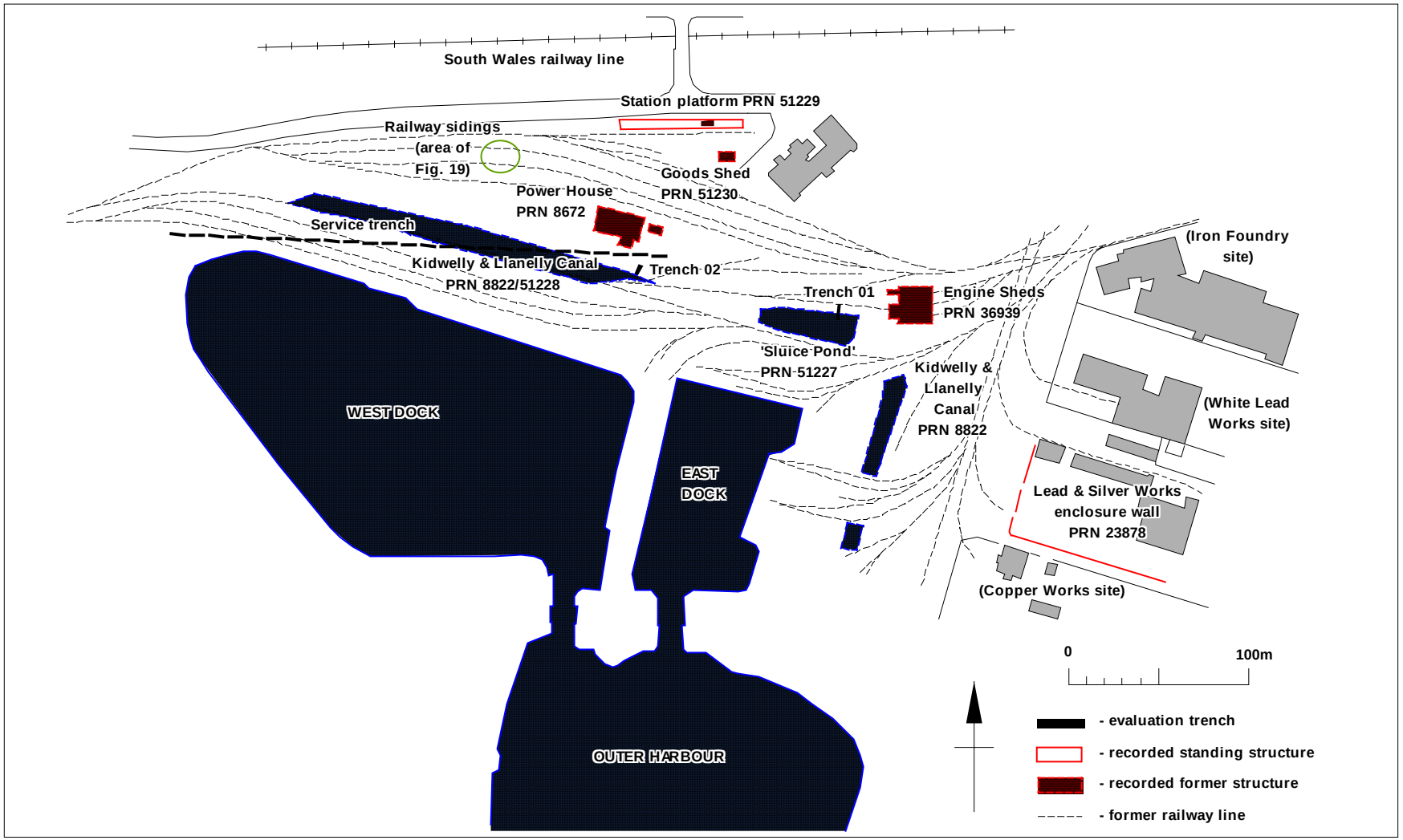
3.4.2 Service Trenches

Five service trenches were excavated along the route between NGR SN 4427 0068 and NGR SN 4469 0059

However, the only trench that appeared to have a potential impact of the archaeological resource was a long drainage trench, up to 3m deep, running between NGR SN 4423 0064 and NGR SN 4451 0064, and cutting through the Kidwelly & Llanelly canal. It was hoped that it might be possible to observe the canal in section during trench excavation, and to retrieve palaeoenvironmental samples from the lower levels. The canal fill was extremely unstable and shuttering was required throughout. Moreover, Cambria were not informed in time to be present on site during the trench excavation itself. However, it appeared that the only deposit exposed was a clean, wind-deposited sand, with no palaeoenvironmental potential.

The drainage trench represented the final stage of deep intrusive activity in the road scheme. Four future service trenches, for telecommunications, gas, electric and water supplies, are expected to go no deeper than 0.50m. They will follow the route of the new road and so will be excavated into either disturbed or made up material. They are therefore not expected to have an adverse impact on the archaeological resource.

Fig. 3 - Plan of harbour area, showing sites mentioned in the text, and archaeological trenches etc.



4.0 THE KIDWELLY & LLANELLY CANAL (PRN 8822; NGR SN 44 00)

The 'Kidwelly & Llanelly Canal' was constructed in 1814-37, to bring coal to Burry Port Harbour for export. Although later disused (and ultimately infilled), it continued to influence the development and layout of the harbour throughout.

Two evaluation trenches were excavated, both 8.0m x 2.0m and aligned N-S. Trench 01, at NGR SN 4463 0061, was located to pick up the northern edge of the Sluice Pond, 40m north of East Dock. Trench 02 was located 113m to the west, at NGR SN 4452 0063, and cut the northern edge of the former canal c.50m north of West Dock. The evidence suggested that a trackway or tow-path originally ran along the south side of the canal here.

4.1 History

The 'Kidwelly & Llanelly Canal and Tramroad Co.' commenced the canal in 1814, starting from the Kidwelly end (James, 1991, 156-7). In July 1833 it was decided to terminate the canal at Burry Port Harbour, rather than Llanelli (Carms. R. O., Cawdor 2/44). However, it was not to reach the harbour until 1837 (Nicholson, 1991, 131).

From 1837-69 the canal carried virtually all the Gwendraeth Valley anthracite production which was brought down the canal in barges to a point, just east of the West Dock, where it divided into two branches constructed by the Pembrey Harbour company (Carms. R. O., Cawdor 2/44). The northern branch ran, through a sluice, to the north of the harbour before turning, at right-angles, to run down its eastern side; from at least 1855 a low bridge crossed this branch north of the present East Dock (Carms. R. O., Cawdor Maps 222, Plan No. 6). The southern branch ran, also through a sluice, alongside the south side of the West Dock, the southeastern corner of which it entered via a further sluice. The coal was unloaded from the barges and stored in heaps on dock-side; ships were then loaded from the heaps with baskets (Thomas, 1937, 4).

The bulk of the canal was replaced by the Burry Port and Gwendraeth Valley Railway (PRN 5349; see Section 6.0 below) between 1865 and 1869, and sections were infilled. However, much of it survives alongside the later railway line; elsewhere it has the rails set in the infilled bed (National Monuments Record). Furthermore, the section within the harbour was bypassed by the railway lines and remained open.

4.2 General description

The canal entered the harbour from the west, where it branched into two limbs either side of West Dock (See Appendix 1.1). The main limb ran E-W along the north side, and 45m north of, West and East Dock. The west half of the northern branch is still open. It emerges from a very poorly constructed culvert beneath the south Wales railway line to the east which has been much rebuilt. It is not closely dateable and lacks fittings. It continues westwards to Gors Bridge (PRN 8675) as a regular earth cutting, approximately 6.00m wide with a steep-sided, V-shaped profile, and still wet.

Sections of this northern branch were infilled when the canal was replaced by the Burry Port and Gwendraeth Valley Railway, between 1865 and 1869, and from 1880 onwards, at least, it existed as three discrete, interrupted sections (Fig. 3) –

- A western E-W section north of West Dock, backfilled in the 1980s. It could be recognised, in 2004, as a shallow linear depression (PRN 51228).
- A central E-W section, north of East Dock, labelled 'Sluice Pond' on the Ordnance Survey, 1:2500, Sheet SN 4400, of 1969 and also backfilled in the 1980s. This too could be recognised, in 2004, as a shallow linear depression (PRN 51227).
- An eastern, N-S section east of East Dock. This was culverted at some time after 1953.

However, the 'sluice pond' PRN 51227 had been described in the 1970s as '*a small basin... (partly) filled with earth and rubble and smothered in vegetation... with indications that it continued further east and west of the exposed section. It seems that the vertically walled masonry basin chamber was partly filled in to accommodate later railway sidings. Water escaped through a sluice in the south quay wall and flowed along a tunnel to emerge in the East Dock'* (National Monuments Record).

4.3 Trench 01 - the 'sluice pond' (PRN 51227; NGR SN 4423 0061) – see Figs. 4 - 6

Trench 01 was positioned N-S, to cross the sluice pond northern wall at a right angle. It originally measured 8.0m x 2.0m, but for the most part only a 1m wide strip was fully excavated, on the eastern side of the trench. The underlying natural soil was a clean pale yellow sand, lying just 0.20m beneath the turf layer in the northern half of the trench.

The earliest archaeological event was the cut for the sluice pond itself, which showed as an extremely steep, near vertical cut [113]. This cut was lined with a very compact band of light blue clay (115), at least 0.20m thick, which presumably lined the entire pond. The clay would not only have provided a watertight lining, essential in such a feature, but would have also consolidated the feature against the surrounding sand. Further consolidation was provided by the construction of a retaining wall (102). This wall was a well-built structure, constructed from fairly well-sorted sandstone rubble which was laid in uneven courses, but with a reasonably flush face. The rubble was bonded with a lime-based mortar, which had frequent ash and coal/cinder inclusions. Although it still had structural integrity, the mortar was heavily eroded on the wall face so that no evidence of pointing remained.

The final fill of the pond/canal construction cut was a 0.40m deep layer of dark brown silty sand (114) which, at some period, appears to have been a biologically active soil. However, it was subsequently sealed beneath a compact layer of small angular slag pieces some 0.17m in depth (117). The soil layer (114) may be contemporaneous with the deposition of a 0.24m thick layer of slag, (104), that extended over the northern half of Trench 01. This compact layer of dark brownish-black industrial waste mostly comprised small, angular pieces of slag averaging 0.03m in diameter, although there were occasional larger pieces, which were up to 0.20m in diameter. The slag material constituted about 90% of this layer, the remainder mostly comprising cinders, with very occasional fragments of building stone and some sand mixed throughout. This layer was probably laid as balllast for the railway lines and was placed directly on the natural sand, with no surviving evidence of a buried soil layer.

Further evidence of the railway, and the close proximity of the contemporary Engine Sheds PRN 36939, which lay 27m to the northeast at SN 4467 0061 (see Section 9.0 below), came from a 0.30m deep band of dark brown mottled sand (105), contaminated by oil, which lay directly beneath the industrial waste layer (104). This layer had been contaminated by oil waste products filtering down from above, rather than having representing a deliberately-laid oily deposit, and so although it has been allocated a context number it actually represents the natural horizon.

Although slag layer (104) was similar in depth to soil layer (114), which also lay directly on the natural sand, their chronological relationship cannot be determined as they as separated by a number of intercutting linear features following the line of the sluice pond wall. The earliest of these [111] was a pipe-trench, 0.84m wide, and 0.68m deep, with near-vertical sides and a shallow concave base. An iron pipe, 0.076m (3 inch) wide, lay *in situ* on the northern side of the base of the trench. The pipe-trench profile was slightly deeper, and concave, on its southern edge. This appears to indicate that the trench had initially been cut to receive an earlier pipe, which had been removed and replaced. The trench fill, (112), was almost entirely made up of mottled brown sand with very occasional angular stone fragments. The mottled nature of the fill resulted from the trench having been cut through oil-contaminated layer (105), which had then been redeposited as the trench fill. This suggests that the pipe-trench was cut after the Engine Sheds had been in use for some time and the oil contamination had time to accumulate. The pipe-trench observed in Trench 02, and in the area of the Power House PRN 8672 (see Section 8.0 below), is probably the same as [111].

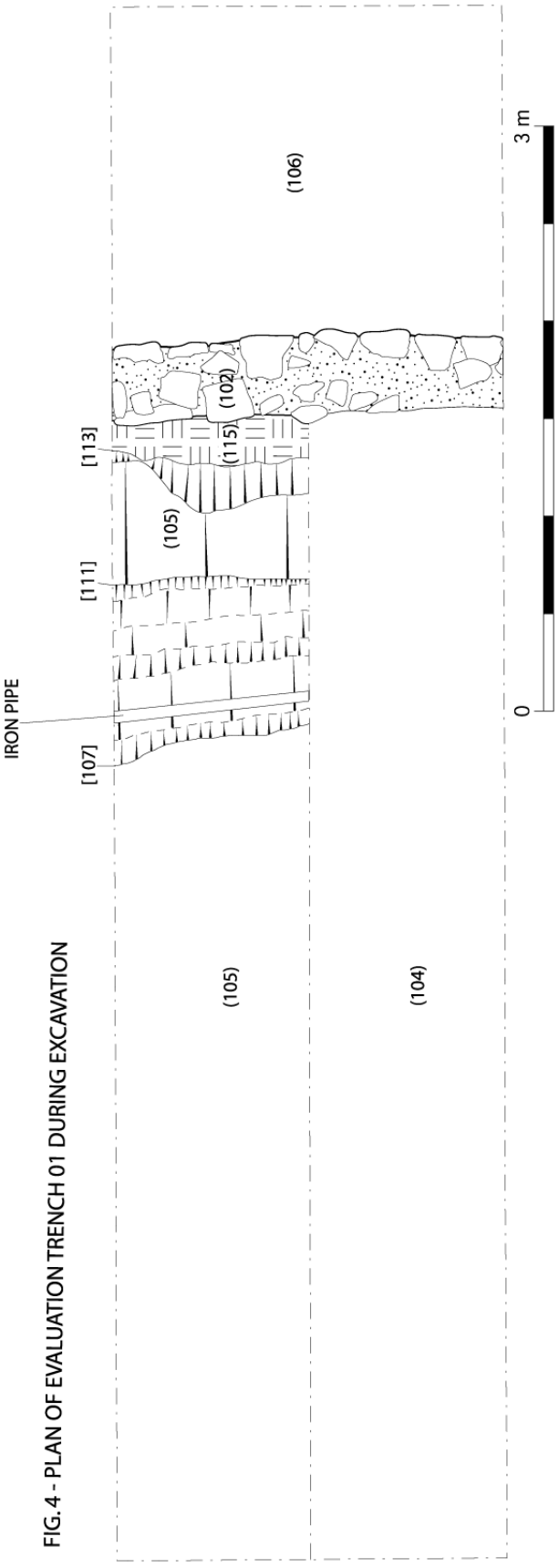


FIG. 4 - PLAN OF EVALUATION TRENCH 01 DURING EXCAVATION

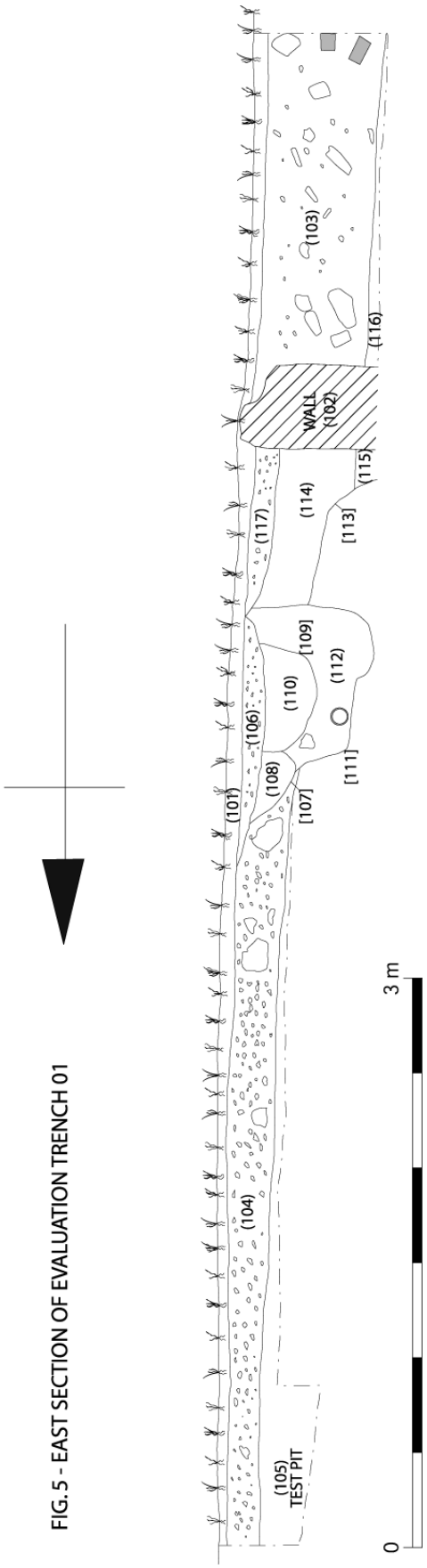


FIG. 5 - EAST SECTION OF EVALUATION TRENCH 01

A smaller, linear trench was later cut along the northern edge of pipe-trench [111], partly cutting through its fill and partly cutting through slag layer (104). This trench was 0.40m wide and 0.15m in depth, with smooth sloping sides, descending to a regular concave base. Its fill (108) was a uniform, light brownish-yellow sand. This feature, as excavated, did not contain any services but the clean nature of fill (108) - which contained none of the surrounding slag or oil-contaminated sand - suggests that it was brought in from elsewhere, possibly to protect a cable or pipe from sharp objects in the ground.

A further, larger linear trench [109] had then been cut roughly down the centre of trench [111], cutting the southern edge of [107]. This feature was 0.50m wide and 0.30m deep, and had steep sides with a shallow concave base. Its fill (110) was a mottled brown and yellow, oil-contaminated sand, with occasional angular slag inclusions. This material was almost certainly the redeposited spoil from the excavation of the trench and, as once again no pipe or cable was present, it is assumed that this was a robber-trench that was cut when the site was abandoned and valuable materials were salvaged.

Overlying all three of these linear features was a thin, dark, blackish layer of slag and cinders (106), which was very similar in depth and material to the layer (117) which overlay soil (114) behind the sluice pond wall (see above). Both layers were probably laid simply to level the area after the underlying fills had compacted and sunk.

Fig. 6 - Photo of evaluation Trench 01, from the south.

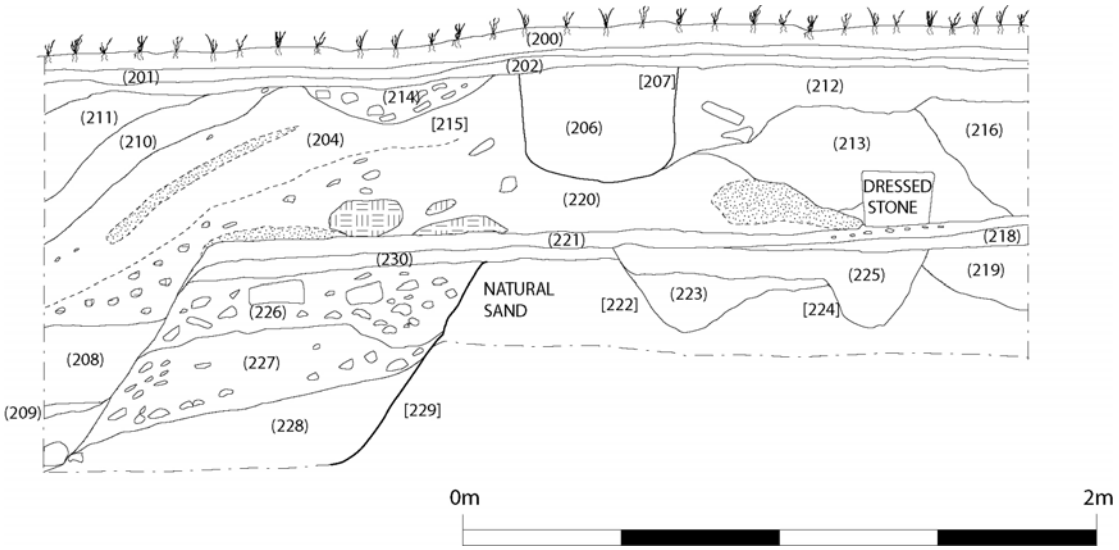
That part of Trench 01 within the sluice pond itself, which remained open until the 1980s, was excavated to a depth of 0.70m. This exposed the top of a mid-greyish brown silty sand, (116), which was mottled in appearance and which contained very little in the way of inclusions other than very occasional small fragments of slag. As this layer was only exposed, and not excavated, its dimensions are not known. However it appeared consistent with a fill created by silt, and wind-deposited sand, that had built up in the sluice pond after its abandonment rather than being a deliberate fill. It was however overlain by a layer of dark blackish brown silty sand (103), 0.60m deep, which contained about 25% large angular fragments of building rubble including brick, concrete and stone, as well as 10% small angular fragments of slag, cinder and cement. Also present were frequent modern artefacts including pieces of railway sleeper, beer cans, crisp packets and plastic bottles. This layer was clearly created when the sluice pond was landscaped over in the 1980s. The building materials were probably residual, from the earlier demolition of the nearby buildings.

4.4 Trench 02 - the canal (PRN 8822; NGR SN 4452 0063) – see Figs. 7 - 11

Evaluation Trench 02 was located between the sluice pond and the central section of the northern branch of the canal, in the area that was infilled between 1865 and 1869. An 8.0m x 2.0m trench, aligned N-S, was laid out to intersect the northern edge of the canal at a right angle. However only the central section, measuring 3.0m x 2.0m, was fully excavated.

The underlying natural soil was a clean pale yellow sand. The earliest archaeological feature evident was the cut for the canal itself [229]. This was represented by a sharp break of slope descending as a steeply-angled, smooth side, which had been lined with a 1.0m width of clay lining. The clay lining was sectioned to a depth of 0.80m, allowing its method of construction to be observed. It appears to have been built up in layers of clay, laid horizontally. The lowest of these layers to be revealed was a 0.90m wide band of compact mottled grey clay (228), that was exposed to a depth of 0.25m. It was free of any inclusions. Above this was a clay layer (227), of very similar dimensions and colour, but containing up to 70% small sub-rounded stones. Above this was an extremely compact layer (226) consisting of 90% angular stones, in a silty sand matrix, that had a very high iron content giving it an orange-brown colour as well as a degree of structural integrity. This pattern may well be deliberate, a solid clay lining giving the canal water retention, but with a much more compact rim able to absorb the wash and wear of a tow-path. However whether this pattern continued to any depth, or was typical of the rest of the canal, is not possible to say. Moreover, the canal and sluice pond formerly represented two sections of a continuous, linear canal, and were contemporary, but the difference in the construction of the clay lining, and the addition of a retaining wall in the pond, may be noted (see Section 4.3 above).

Fig. 7 – West section of evaluation Trench 02



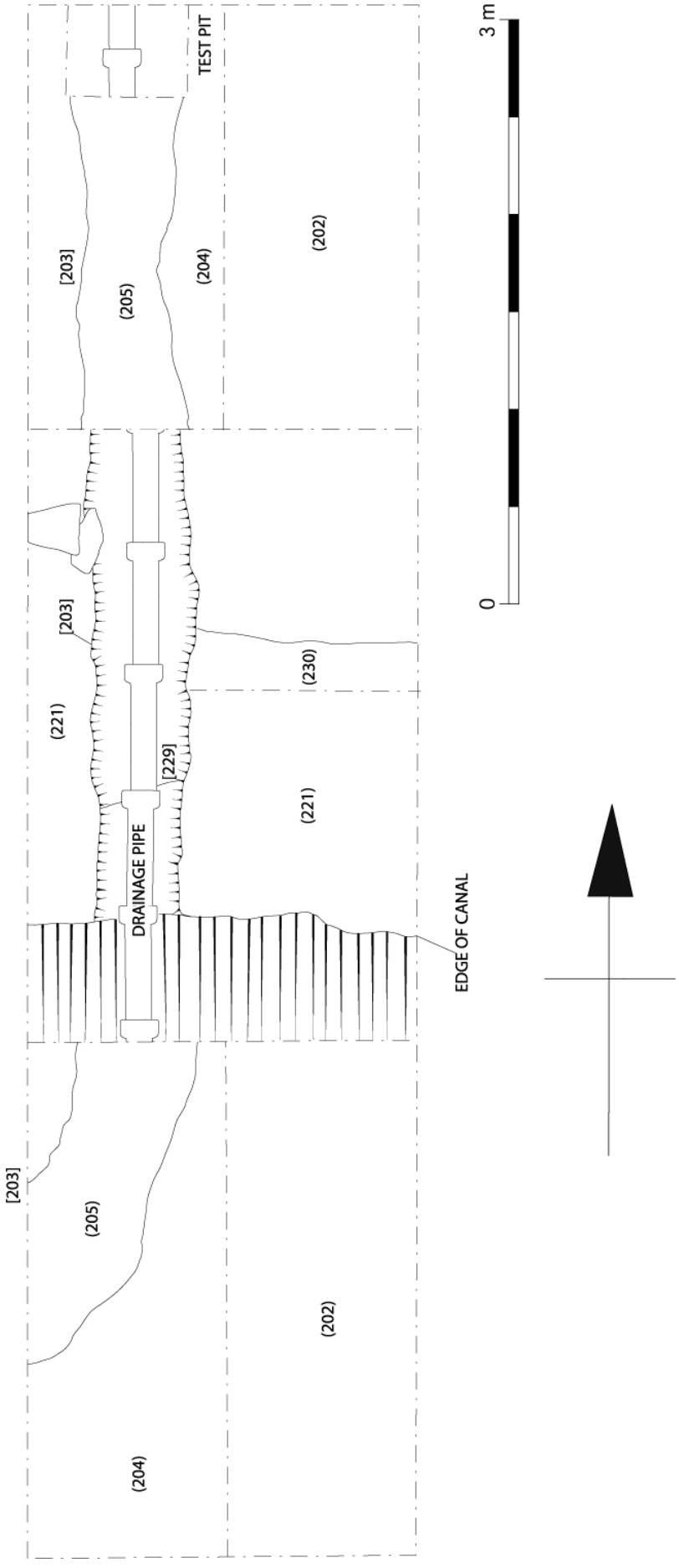


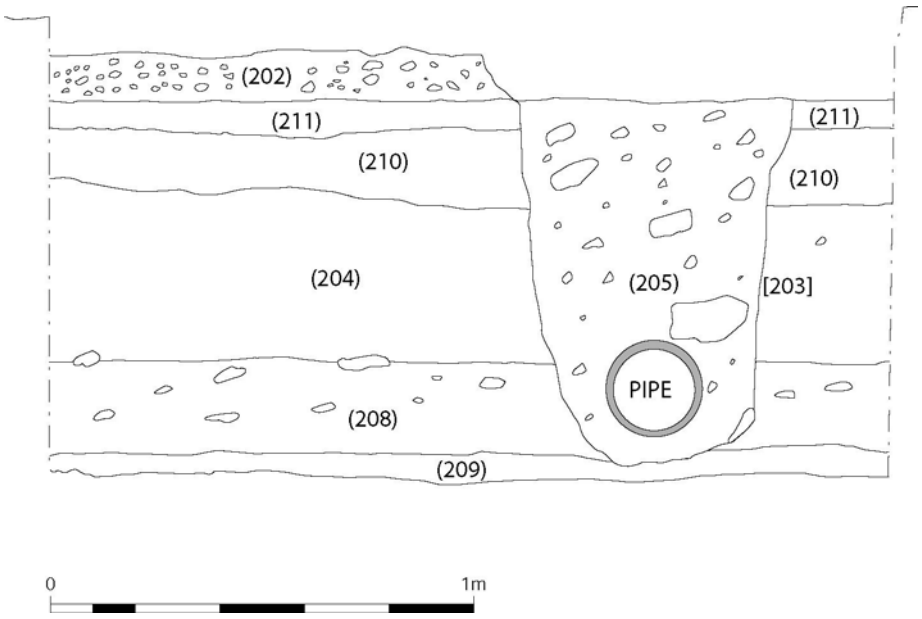
FIG. 8 - PLAN OF EVALUATION TRENCH 02 DURING EXCAVATION

Sealing the upper clay layer, and extending over the natural sand, was a very compact white layer of crushed lime. The purpose of this layer was unclear but it may have been the bed for an original tow-path surface, which had not survived at this point, and although the crushed lime layer was only 0.06m thick it extended north of the canal edge for 1.40m before being removed by a linear cut [222]. This linear feature extended the width of the excavated area. It was 0.60m wide and 0.14m deep, with smooth sides sloping at about 45 degrees to meet at a concave base. The fill of this feature, (223), was a silty sand that had a light brownish-grey colour due to the frequent flecks of burnt lime present throughout.

The purpose of this feature is unclear, but it may have been a small gully demarcating the edge of a tow-path, that subsequently silted up. It was cut by a similar linear feature, [224], that was 1m wide and 0.14m deep at it deepest point, but was only 0.10m deep for most of its width. This second gully was filled with mid-brown silty sand (225), that had occasional flecks of coal, and followed the same course as the earlier gully and so probably served a similar function. There was also a vague feature to the north of these two gullies, that only just extended into the excavated area, and which had been truncated by the second gully [224]. This feature had a silty fill (219), but no clear edges, and so was difficult to interpret, but may have been an earlier gully following the same alignment.

After these gullies had become silted up, a turf line (218) built up over them. This was also found seen in a deeper test-pit that was dug at the northern end of the trench. This showed not only that this turf line extended at least 3m to the north, but also that this level was the ground level at the time the canal was in active use. After this turf had become established a new surface was laid on the towpath extending from the edge of the canal itself up to and over the turf line. The full width of this metalled surface (221) was not determined, as it was not fully exposed. However it was noticeably thinner on its northern edge, and did not appear in the test-pit, so it was probably about 3m wide. The surface was only 0.05m thick, and was constructed from about 80% small rounded pebbles, mixed with coal ash and sand, which created a very compact black surface that was surprisingly solid.

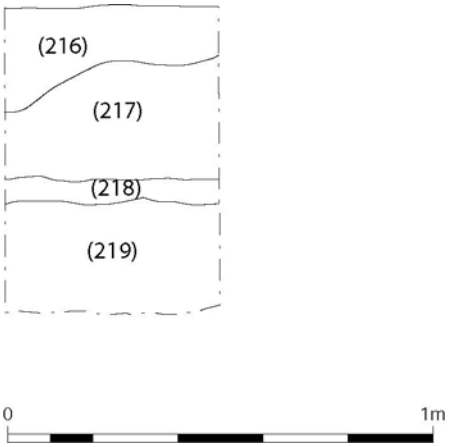
Fig. 9 - North section of evaluation Trench 02



Presumably the canal was still in use at the time the tow-path was resurfaced, but there is evidence that it began rapidly to fill after its abandonment between 1865 and 1869. The lowest fill exposed within the canal was a 0.04m thick lens of yellow sand (209), that appeared to be wind-deposited as it contained no silt or any inclusions. Above this was a 0.30m deep sandy clay silt layer (208) with occasional small, subangular stones throughout. This layer appears to represent natural silting of the canal after its abandonment.

Subsequently, the canal was deliberately backfilled and the ground level raised to its present height throughout. Several, very differing fill layers were evident from this process. The earlier fills - (204), (216), (213) and (220) - were mostly of silty sand. They were very mixed, with frequent lumps of clay, patches of sand and even pieces of building stone in the lower fills. It is worth noting that a piece of dressed stone was recovered from within fill (213), which was lying directly on the towpath surface. It was a well-carved piece of limestone that had formed part of an arch, and gave an indication of the quality of building that must have existed around the time the canal went out of use. The upper two fills, (210) and (211), were of pure sand, varying only in colour, but with very obvious tip-lines revealing their origin as part of the backfilling process. Much of the material used in this backfilling process may have been sourced from the 'tail' of an embankment, approx. 0.5m high, that was laid just to the north of the cannal for the Burry Port and Gwendraeth Valley Railway lines between 1865 and 1869 (see Section 6.0 and Appendix 1).

Fig. 10 - West section of test-pit in evaluation Trench 02



After this area had been levelled off, a building was constructed, at NGR SN 4451 0062. This building may be the one that is marked, but not labelled, on the Ordnance Survey map of 1915 (see Appendix 1.4). Its foundation was created by excavating a linear ditch [207], to the necessary proportions, and filling it with poured concrete (206), demonstrating its late date. This foundation was still *in situ* in 2004, but as only the part that was within the trench was exposed, its dimensions or purpose are unknown. A shallow linear gully [215], 0.50m wide, 0.12m deep and filled with concrete or cement fragments, ran alongside the outside of this building and although its purpose was unclear it was possibly a drip gully. No flooring had survived in the interior of the building, but the internal deposit (212) contained frequent brick, stone and concrete inclusions, and so it probably relates to this building - or possibly its demolition - rather than to the earlier phase of landscaping.

At some point after the building had been demolished, a trench, [203], was cut though the whole of the area in order to lay a 5" (0.127m) ceramic pipe. This pipe runs from the north, in a straight N-S alignment, for about 6m before turning west to run on the same line as the old canal. This appears to be the same as pipe-trench [111] in Trench 01. It presumably carried waste water from the Power House (PRN 8672) and possibly drained into the then still open western end of the canal. Pipe-trench [203] had vertical sides, was 0.64m wide, and had been cut to a depth of 0.84m effectively truncating all the archaeology down to the natural sand beneath. This trench appears to have been dug by hand and backfilled with the spoil removed during its creation.

At some point after the pipe had been laid the whole area was levelled off with a spread of black industrial waste (202) made up from 80% small angular fragments of slag and 20% cinders. In the final stage of landscaping the area was covered with a 0.04m deep layer of clean yellow sand (201) and the turf layer (200) laid on top.

Fig. 11 - Photo of evaluation Trench 02, from the east.

5.0 THE LEAD AND SILVER WORKS (PRN 23878; NGR SN 4481 0040)

The Lead and Silver Works lay to the west of Burry Port East Dock (see Fig. 3), between the former Copper Works (PRN 5339), to the south (NGR SN 4475 0035), which had been established in the 1850s, and the former White Lead Works (PRN 23879) to the north (NGR SN 4480 0055) which was established in 1870.

The works had been largely demolished in the later 20th century. Level 2 building recording was carried out on the surviving elements, which were represented only by the southwest corner of the works enclosure wall.

5.1 History

A silver works had apparently been first established in 1853 by Alexander Parkes, employed by Mason and Elkington at the Copper Works. There, Parkes employed a new process and the works was in joint ownership with the Copper Works under Mason & Elkington (Thomas, 1937, 16). A plot is shown and labelled 'Lead Works' in a map of c.1864 in an area that was to be occupied by the north end of the Copper Works (see Appendix 1.1), and may in fact denote the site of this silver works. However, production ceased after just a year (Thomas, 1937, 16). Slag from the works, with that from the Copper Works, was tipped onto the sea-front to form a strong embankment (ibid.).

In 1864 the present Lead and Silver Smelting Works was commenced by the Burry Port Smelting Co. Ltd., opening in 1865. The plant was traditionally known as the 'Blue Lead works'. It is listed in Worrall's Directory of 1875 (Worrall, 1875, 218, 228) but was not a lasting success and closed down in 1877 (Thomas, 1937, 27). Nevertheless it is shown and labelled on the Ordnance Survey 1:10560 First Edition of 1880 (Appendix 1.2), as three east-west blocks of buildings with the present enclosure boundary. The works was integrated with the harbourside rail network, a spur from which exited through the enclosure boundary to run to a spoil-tip east of the Copper Works.

The works is depicted, unchanged, in 1907 and 1921, but was labelled 'dismantled' on the latter map (Ordnance Survey 1:2500 Second Edition; Ordnance Survey 1:10560, 1921 edition; Appendix 1.5); it was repeatedly shown with an unchanged plan, including the harbour lines, until the Ordnance Survey, 1:10560 Provisional Edition of 1953 (Appendix 1.6) by which time the works buildings had been demolished; some of the present buildings are shown on this map, but in outline only. Most of the present buildings on the site had been erected by 1969 (Ordnance Survey, 1:2500, Sheet SN 4400, 1969).

5.2 General description

The works enclosure was until recently occupied by a number of buildings, mostly constructed between 1953 and 1998; a small, gabled brick office to the north of the site appeared to be early 20th century. A block of prefabricated concrete offices are from 1953-1969, and are depicted on the Ordnance Survey, 1:2500, Sheet SN 4400 of 1969. To the west was a post-1969 brick building ('Unit A'), a contemporary prefabricated concrete building ('R. A. Jones Joinery') and brick WC; the site was also shared by 'Rod's Bait & Tackle', and 'KBS Building Supplies'.

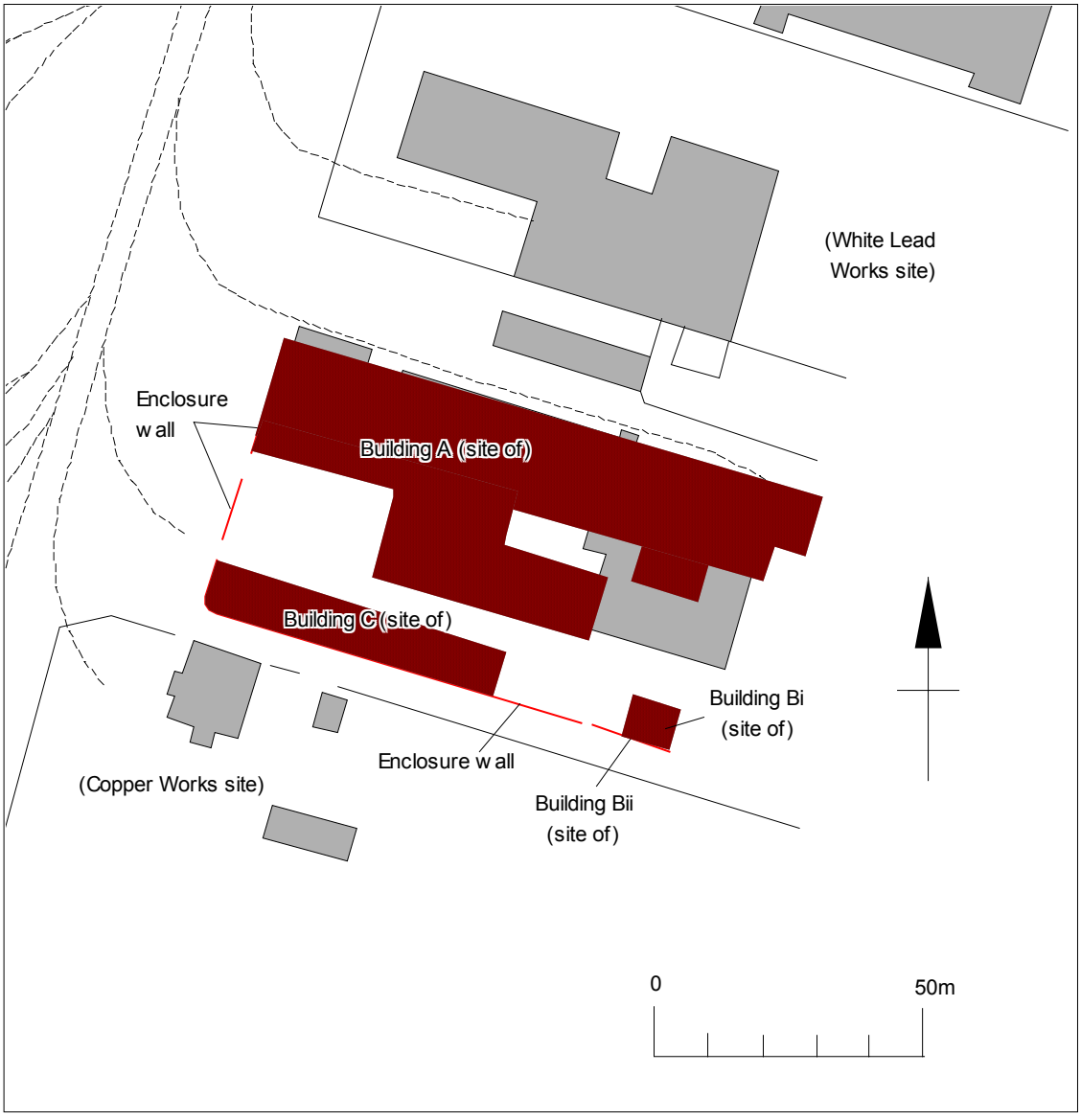
However, part of the 1864 works enclosure wall survived and was of unsquared local rubble, roughly coursed. There are two wide former entries, the southern with masonry post stops, possibly for a railway line, the northern with brick stops and possibly inserted; a concrete hard stand, of unknown function, lies immediately west of the wall in the present tarmac surface. Furthermore, immediately to the south of the present buildings is an east-west stretch of 3' gauge harbour railway, including points, as first depicted on the Ordnance Survey 1:10560 of 1880 (Appendix 1.2).

5.3 The enclosure wall (NGR SN 4473 0048) – see Figs. 12 - 19

Only the southwest corner of the works enclosure wall enclosure had survived (Figs. 12 - 19). It was represented by an 'L' shaped section of wall, the western, N-S line of which survived for a distance of 50m, representing the southern ¾ of the original western wall, while the southern, E-W running section survived for 93m, representing the western third of the original wall (Fig. 12). The wall appears to have been one main build, from 1864, but was later raised and has undergone several other changes through time, most of which were visible as alterations within the fabric of the wall itself although their meanings were not always clear. The average height of the wall overall was, in 2004, 2.70m from the present ground surface (and 3m from the former ground surface).

The wall comprised two main phases, having initially been laid out in 1864 and subsequently heightened by 1.30m, with a number of further alterations. These building phases are contemporary with, and incorporate the end walls and openings from, a number of adjoining works buildings.

Fig. 12 – Plan of Lead and Silver Works area showing modern buildings and buildings shown in 1907 (in red)



5.3.1 Phase 1

The original 1864 build was constructed from iron-rich, brown-grey sandstone blocks, probably Pennant Sandstone, bonded with a lime/slag mix mortar. Although the blocks were poorly-sorted in terms of size and shape, and randomly coursed, they were reasonably well-dressed, creating a good wall face. It was originally 0.60m wide. The southern, E-W section was constructed from the same material, although slightly cruder in appearance. The southwest corner was finished in well-dressed ashlar facework, creating a fine curving face (Fig. 13). The Phase 1 wall enclosure wall averaged, in 2004, 1.30m in height from the built up material against its base. However, judging from the evidence at the western entry, where the tarmac surface probably reflected original levels, the wall was originally 1.70m in height.

Fig. 13 - Photo of the southwest corner of the Lead & Silver Works enclosure wall, from the southwest

The northern half of the western Phase 1 wall (a length of 19.30m) was much higher, rising to 2.80m above present ground level as opposed to 1.30m (Fig. 14). It represented the west end of the former, main Lead and Silver Works building (Fig. 12, Building A), which was clearly contemporary with the wall, ie. from 1864, and which is shown on all editions of the OS map from 1880 until the mid 1953, by which time it had gone (Appendix 1). It was a large building, aligned E-W and measuring 100m by 20m, with a number of adjoining structures to the south by 1880. In 2004, the northwest corner of the building was represented by a line of internal quoins, which corresponded with the truncated end of the present wall. However, there was no corresponding toothing for the southern wall of the building, and this side may therefore have been (at least partly) open. There were no original openings in the west wall of this building. Within the enclosure, an area at the north end of this building was represented by an E-W concrete floor; however, this was only 3m wide and probably belongs to a later phase, possibly even after the building's demolition. The enclosure wall, in 2004, terminated at a secondary, red-brick stop corresponding with the northwest corner of this building, but the truncated masonry above indicated that the Phase 1 wall originally continued north at a height of 1.70m.

Fig. 14 - Photo of the west wall of works Building A, from the west

There appeared to be only two Phase 1 openings in the enclosure wall. Towards its southern end, and 9.25m south of the former works Building A, the western, N-S section was pierced by a fairly elaborate entry lying between 9m and 13m from the southwest corner (Fig. 15). This was an original feature, from 1864, and was 3.96m wide, flanked by large gate pillars built from well-dressed ashlar blocks. Both gate pillars still had large iron gate hooks indicating a double gate with two 6ft gates. A tramway can be seen to enter the works enclosure, through this entry, on the Ordnance Survey first edition map of 1880 (see Appendix 1.2), but possibly not on subsequent maps.

The southern wall featured a single entry, 16.30m from the east end of the wall (Fig. 16), which was smaller than those to the west being 1.83m (6ft) wide. The stops were in crude sandstone ashlar without pillars or gate-posts. This entry is not associated with any building on any edition of the OS map and appears to have been just an entry to the enclosure.

The southern wall, to the east of this entry, formed the south wall of another former building (Fig. 12, Building Bi). The building is similarly shown on all OS editions, from 1880 to 1953, as a block measuring 14m E-W and 7m N-S (see Appendix 1). However, by 1880 the building evidently comprised two elements, only one of which belonged to Phase 1. The eastern element, which formed the east end of the enclosure wall in 2004, was represented by the truncated, south gable end of a N-S building, measuring 7m E-W (Fig. 17). Internal and external facework was identical to that in the remainder of the Phase 1 enclosure wall. The gable had been truncated to a height of 4m, but its roof-pitch indicated that it originally rose to a height of over 6m. The toothing for its western side-wall could be seen on the north face of the wall, suggesting a height of 1.70m, ie. the height of the Phase 1 enclosure wall. The eastern side-wall was obscured by the secondary brick finishing which in 2004 formed the east end of the surviving walling. The gable wall was pierced, at ground floor level, by a secondary archway, later blocked (see Phase 2 below). The flue opening visible above the arch was also secondary, but the flue itself may have belonged to Phase 1 and originally have descended to ground level.

Fig. 15 - Photo of the Phase 1 western entry to the works, from the east

Fig. 16 - Photo of the Phase 1 southern entry to the works, from the north

The second element of the building (Building Bii) lay to the east, and was evidently aligned E-W, the enclosure wall forming its southern side wall. This belonged to Phase 2 (see below).

Fig. 17 - Photo of south wall of works Building Bi, from the north, showing the Phase 2 heightening

5.3.2 Phase 2

Phase 2 was represented by the raising of the majority of the enclosure wall to its 2004 height of 3m (see Figs. 17 & 18). The evidence suggests that it occurred prior to 1880, when a Phase 2 building appears to be shown on the Ordnance Survey map (Appendix 1.2).

Prior to the raising of the wall, the southern enclosure wall entry was blocked in mortared masonry, similar to the Phase 1 fabric, on both faces (see Fig. 16). Subsequently, the majority of the enclosure wall was raised, the western wall now lying about 3m from the original ground surface, rising to 3.20m in the south wall. On the west face this new build was in mortared masonry that was very similar to the Phase 1 fabric, so that the new build blended in very sympathetically with the original. This was particularly noticeable at the curved southwest corner, which was raised to a height of 3.20m (see Fig. 13). However, the section of wall between the Phase 1 entry at the south end of this wall, and the west wall of the Lead and Silver Works Building A, was not raised and remained at its Phase 1 height.

The internal facework of the western wall, and the entire southern wall facework were, in contrast, in a mixture of 80% copper slag (from the adjacent Copper Works PRN 5339 - see Appendix 2), 15% sandstone and 5% yellow brick. The majority of the copper slag was in the form of randomly-sized angular pieces that had been roughly dressed. However, there were bands of regular-sized blocks, where the slag had been cast in moulds. Internally, the blocks had been laid with some consideration to aesthetics, but not the exterior, which suggests that the Copper Works enclosure wall – only 6.5m south of the wall - had already been built, obscuring the view of this wall. Curved, moulded copper slag blocks were used to cap the wall in places, although these were more evident where they had fallen than still *in situ*.

The Phase 1 gabled building at the east end of this wall, Building Bi, was altered during Phase 2. A semicircular-headed brick archway, later blocked, was inserted through the southern gable wall (see Fig. 17). The arch was 2m high and 2m wide, with a yellow brick surround. Above the arch was an area of secondary, yellow brickwork which contained a small, rectangular opening to a flue in the wall thickness, which may represent the raising of a Phase 1 flue (see above). Superficially, the arch appeared to be contemporary with the Phase 1 walling, but the rubble around both the arch and the flue brickwork appears as if it may be secondary infill, while the bricks were bonded with cement rather than mortar. Immediately west of the arch, the scar of another, internal(?) N-S wall, 1.50m high and apparently in yellow brick, could be seen on the north face.

The second element of this building, as shown on the OS maps (see above), was constructed during this phase (Fig. 12, Building Bii). According to the historic map evidence, this appears to have been represented by an E-W block (see Appendix 1), the enclosure wall forming its southern side wall which measured 7m in length (giving a new total E-W dimension of 14m for the building). Only one opening in the wall appeared to relate to this building, later blocked with copper slag (see Fig. 17). It was a rectangular opening, possibly a window, with a yellow brick surround which could be seen on the internal face and was apparently contemporary with the Phase 2 wall raising. Its sill lay 1.5m above internal ground level. Its head had gone, to be replaced by four courses of yellow bricks, but appears to have originally been a segmental head like the windows to the west (see below), or a timber lintel, at wall-top/eaves level. Two yellow-brick lined sockets, in the Phase 1 wall beneath this window, appear to have been contemporary.

Also contemporary with the Phase 2 wall raising was the construction of an E-W building against the internal face of the southern wall (Fig. 12, Building C). This building is also shown on all editions of the OS map, from 1880 to 1953, running eastwards for 62m from the southwest corner of the enclosure wall, and 8.5m wide.

Fig. 18 - Photo of south wall of works Building C, from the northeast, showing the Phase 2 heightening

Building C was apparently divided into various areas by internal walls, but the only physical evidence on the ground or in the wall is for the easternmost area. This was over 20m in length, and defined by the remains of two N-S walls. These were keyed into the Phase 2, upper half of the enclosure wall, but were not evident lower down (where they butted the Phase 1 wall) or on the ground. In addition, this area of the building was lit by five windows in the Phase 2 upper half of the wall, with which they were clearly contemporary (Fig. 18). They were of a regular size, each being 1.17m high, and had yellow brick surrounds with segmental heads. It was evident that the building was roofed, at least in its later years, with corrugated iron sheeting, as the undulations from the sheets were preserved in concrete laid over on the summit of the wall. A series of seven sockets, similar to those in the building to the east (see above), evenly spaced about 4m apart, and approximately 1.50m above ground level, can also be seen inserted into the Phase 1 internal facework beneath the windows. They appear to represent some timber superstructure associated with the building, but are too low to be floor-joist sockets? They were subsequently blocked with yellow brick and lime mortar. A horizontal chase further west, at the same level, may be associated; it was also subsequently filled with yellow brick.

5.3.3 Phase 3

A broad third phase is applied to the lengthy period corresponding with the post World War 1 disuse of the works and its buildings, which were labelled 'dismantled' on the OS map of 1921 (Appendix 1.5), and the subsequent use of the site. The five southern wall windows of Building C, mentioned above, were blocked using red bricks and cement. This use of new materials could be seen in other alterations that may have been contemporary. For instance, an entry in the middle of the west wall (north of the original, Phase 1 blocked entry), 6.60m wide, now blocked, is defined by red and yellow brick gate-posts (see Fig. 19). It may represent the widening of an existing entry, but may have been entirely new. The red brick stops finishing both the east and north ends of the truncated enclosure wall may be broadly contemporary. This enterance was obviously inserted or widened for a tramway or railway to enter the works enclosure through this entry as the rails were still in situ in the tarmac surface of the road.

A semicircular cement roof crease on the internal face of the western wall appears to have been derived from an E-W, corrugated sheet-roofed building, erected over part of the site of the demolished main works Building A (Fig. 12, Building D; see Fig. 19). It is not shown on any of the historic maps.

The blocking of the ?Phase 2 arch in Building Bi is in yellow brick, and may be earlier (see Fig. 17). However, the blocks were bonded with cement and may represent re-used bricks from the demolition of an existing structure.

At a later date, the section of western enclosure wall that was not raised during Phase 2 was finally raised to 2.80m, with breeze-blockwork, which continued as blocking for the two entries (se Figs. 14 and 19). This work was dated, by an inscription in the cement, to 1964.

The copper slag blocking of the Phase 2 ?window in Building Bii presumably pre-dates Phase 3, but cannot be closely dated (see Fig. 17).

Fig. 19 - Photo of the roof-crease for Phase 3 Building D, from the east (also showing Phase 3 western entry to the works, left)

6.0 THE BURRY PORT AND GWENDRAETH VALLEY RAILWAY (PRN 5349; NGR SN 445 006)

Almost the entire area north of West Dock was, by the later 19th century, occupied by a complex of railway sidings established by the Burry Port and Gwendraeth Valley Railway Company (see Fig. 3). No rails survived, or were visible in this area in 2004, but could be seen elsewhere in the harbour.

6.1 History

The Burry Port and Gwendraeth Valley Railway Company was founded in 1866, during the conversion of the Kidwelly & Llanelly Canal (PRN 8822), which had been cut through Burry Port to supply the harbour in 1837, into a railway (PRN 5349). The new railway ran alongside the canal through most of its length, and in the area of the harbour ran E-W between the canal, to the north - which was left open - and the West Dock to the south. In 1880 this comprised just two lines, on an embankment (Ordnance Survey, 1:10560, Carmarthenshire Sheet LVII NE, First Edition, 1880; Appendix 1.2), but by 1907 had multiplied to seven lines, the embankment apparently having been truncated to make room for them (Ordnance Survey, 1:2500, Second Edition, Carmarthenshire Sheet LVII.8, 1907; Appendix 1.3).

This proliferation may have coincided with the final conversion of the West Dock in 1888. Five new E-W lines, presumably sidings, were laid down between the canal and the GWR line to the north, and are shown on the OS map of 1907 (Appendix 1.3).

The Burry Port and Gwendraeth Valley Railway and Dock Company was grouped with the GWR in 1924 (Thomas 1937, 8). The rail network is depicted unchanged on 20th century maps, including the 1953 map (Appendix 1.6), until the Ordnance Survey 1:2500 map of 1969, which shows the harbour lines as almost completely removed, but two lines survived from the complex between the dock and the old canal.

Fig. 20 - Photo of ballast lines from the former Burry Port and Gwendraeth Valley Railway, at NGR SN 4445 0067, from the east, during turf-stripping.

6.2 Description – Fig. 20

The evidence for the railway lines and sidings was, in 2004, mainly in the form of lines of ballast which indicated their route. These were observed before and during the turf strip for the scheme (Fig. 19), in the area north of the canal and sluice pond (NGR SN 4453 0067). The ballast appeared to have been laid directly on the underlying sand. There were also occasional areas of *in situ* railway sleepers, most of which were heavily deteriorated, and iron rail fixings were present randomly scattered throughout the site.

7.0 THE OLD RAILWAY STATION PLATFORM (PRN 51229; NGR SN 4456 0071)

The remains of the Burry Port and Gwendraeth Valley railway station platform were located between the West Dock and the present south Wales main railway line (see Fig. 3). The latter line represents the old Great Western south Wales main line (GWR), established in 1847-50. The station and platform were accessed from Burry Port town, to the north, via a footbridge over the south Wales main line. The station was demolished in the mid 20th century.

The remains of the platform were, along with the Lead and Silver Works, the only standing structure to be affected by the road scheme. Level 2 building recording was accordingly carried out on the surviving elements.

7.1 History

The Burry Port and Gwendraeth Valley Railway was, until 1909, for minerals and goods only, but in that year a passenger service from Burry Port to Pontyberem was established, and in 1913 was extended to Cwmmawr (Thomas, 1937, 8). The OS map of 1915 accordingly shows the harbour line network much as in 1907 (Appendix 1.4), but with a small, rectangular railway station building on a spur of the line at NGR SN 4456 0071 (Ordnance Survey, 1:2500, Carmarthenshire Sheet LVII.8, Edition of 1915; Appendix 1.4).

The station continued to be marked, and labelled 'Station', in 1921 and 1953 (Appendix 1.5 and 1.6) but like the rail network, and many other buildings, it had apparently gone by 1969. There was no evidence, in 2004, for the station, but the remains of the platform survived on the north side of the railway spur line.

Fig. 21 - Photo of the old railway platform, from the southwest

7.2 Description – Figs. 21 and 22

Although the station had gone by 2004, the railway platform survived as an E-W revetted platform, 122m in length and averaging 5m in width. The retaining wall, on the south (trackside) side of the platform, was 1m high and 0.35m thick and constructed from brown-grey sandstone rubble, bonded with a lime slag mix mortar (Fig. 21). The rubble facework was poorly sorted for size and shape and randomly coursed, but was reasonably well dressed and created a good wall face, capped with red brick. This wall retained a bank of silty sand that contained about 25% stone including occasional iron slag fragments, and this material formed the platform. The platform was probably paved with large sandstone slabs up to 0.20m thick as there are several large fragments in the vicinity, but none of them *in situ*.

No physical evidence for the station itself, which was located at NGR SN 4456 0071, was encountered. It may therefore have been a superficial building, constructed on the surfacing of the platform. The only other surviving built feature was the fragmentary remains of a row of two men's urinals, still *in situ* against the rear wall of the platform, at NGR SN 4452 0071 ie. to the west of, rather than within, the former station building (Fig. 22).

Fig. 22 - Photo of the railway platform urinals, from the south

8.0 THE POWER HOUSE (PRN 8672, NGR SN 4451 0065)

The former Power House was also built by the Burry Port and Gwendraeth Valley Railway. It was a large, rectangular building, which measured approximately 25m E-W by 14m N-S, located 15m north of the Kidwelly & Llanelly canal, where it runs north of West Dock, between the two areas of Burry Port and Gwendraeth Valley Railway sidings (see Fig. 3). The building was demolished in the mid 20th century.

The footings of the Power House were exposed during the turf-stripping for the new road, and were recorded photographically, and planned.

8.1 History

The Power House was built in 1900-1901 by the Burry Port and Gwendraeth Valley Railway and Dock Company, between the two branches of the railway (Nicholson, 1991, 135-6). It had three Cornish Boilers and a pair of Armstrong hydraulic steam pumps, and above it was a large tank used both for the hydraulics and for locomotive use (ibid.). The Ordnance Survey 1:2500 Second Edition of 1907 shows the Power House, labelled 'Electric and Hydraulic Engine House' (Appendix 1.3). However, according to Nicholson (ibid.) the harbour did not receive electricity until 1919 when the loco sheds, workshops offices etc. were supplied, and the steam plant in the Power House was replaced by an electric hydraulic pump in 1922 when a high tension cubicle was added to the Power House (ibid.).

The Power House was demolished at some period after the 1953 survey and is not depicted on the Ordnance Survey 1:2500 of 1969. The area was landscaped in the 1980s and there was no above-ground evidence for the building in 2004.

8.2 Description – Figs. 23 and 24

Footings of the Power House, and an adjacent ancillary building, were revealed during turf-stripping (Figs. 23 and 24). The mid 20th century demolition of the Power House was entire, and less than 30% of its footings were seen below the turf. However, in conjunction with the map evidence it is possible to reconstruct some of the elements of the building, even if specific functions cannot be assigned to these elements.

A fairly substantial length of the south wall footing, and parts of the north and east walls, were exposed. They comprised orange/red bricks, laid in English Bond with a hard, pale grey cement mortar, and defined a rectangular space measuring 26m E-W by 14m N-S. Several small annexes from the main building are shown on historic maps, but physical evidence for these was confined to a square projection from the east end of the south wall, and a rectangular annexe from the north end of the east wall. The south wall projection was represented on the ground by a concrete and rubble/sand surface, measuring 5m E-W by 4m N-S. Standing on this surface were the footings of a five-sided structure, with straight east and west walls that stopped short of the south wall of the main building. The structure is shown on the Ordnance Survey map of 1907 map (Appendix 1.3), and on the revised edition of 1915 where it appears to represent a chimney stack (Appendix 1.4). The east wall annexe, which is only depicted on the 1915 edition map, and measured 7m N-S by 2.5m E-W, was represented only by a small area of concrete flooring, measuring 2m x 2m, laid directly on the underlying sand.

The 1907 Ordnance Survey map also showed a second, smaller structure, possibly also a chimney stack, at the west end of the south wall of the Power House building, and two other structures projecting from the north wall. All three appear to have been removed by 1921 as they are not shown on the 1921 OS map, and no physical evidence was observed during the watching brief.

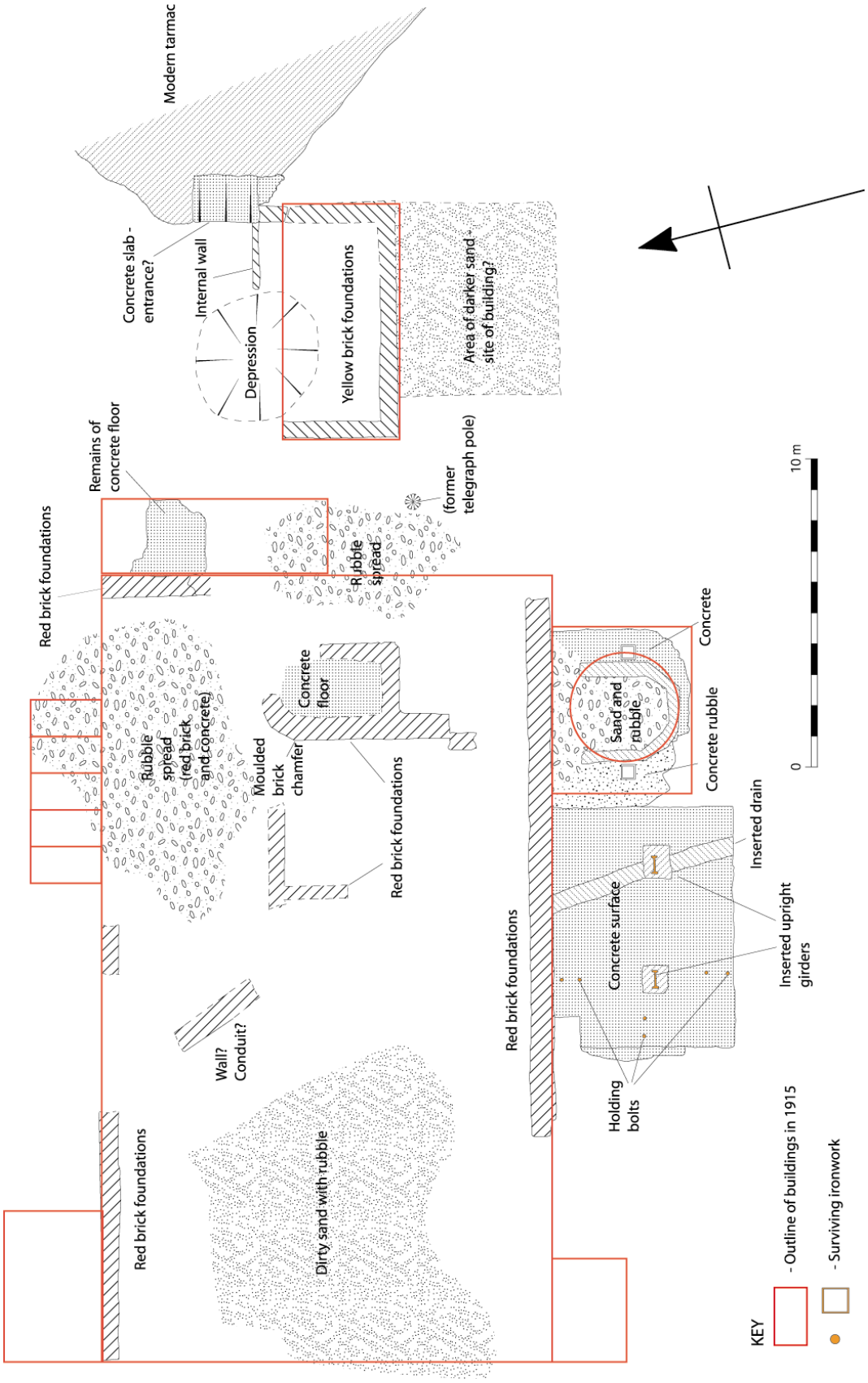
Sections of a number of internal wall footings, also in orange/red brick laid in English Bond with a hard, pale grey cement mortar, were also revealed, but were insufficient to allow the internal arrangements to be suggested. The most substantial occupied the eastern quarter of the building and defined a rectangular (or 'D'-shaped) area or structure measuring 5m N-S and 3m E-W, with an internal concrete surface laid directly on the underlying sand. Externally, its northwest corner was deeply chamfered and constructed from good quality, pre-moulded bricks rather than cut bricks. The function of this area or structure is unknown. A second brick footing, to the northwest, measured 3.5m in length and lay at a 45-degree angle to the main walls. It was very fragmentary and could possibly represent a culvert rather than a wall.

A substantial concrete surface, forming a regular rectangle in plan and measuring 8m E-W by 6m N-S, survived more-or-less complete on the southern side of the Power House, immediately west of the projection. It was almost certainly an external surface, and showed evidence of development over time. Three pairs of large holding bolts, forming a triangle 5m wide and 2.5m tall, were set into the western half of the surface and appeared to be primary. Subsequently a N-S channel, possibly for a drain, was cut through the eastern half of surface, and filled with concrete. At a later date a pair of upright 'H' girders was inserted into the surface, and again they were held in place with concrete. When the building was demolished both the girders and all the holding bolts were cut off flush with the surface, making it impossible to interpret their function.

The footings of a second building, of unknown function, were exposed just over 4m west of the Power House itself. It measured 8m E-W by 4m N-S, and appears consistently on all Ordnance Survey editions from 1907 to 1953 (Appendix 1), without any apparent change in size. However the archaeological evidence seems to indicate that it may have had a complex history. The east, west and south wall footings, in yellow brick, were observed. The north side was open, with a concrete slope or entrance ramp. However, there were also the remains of an E-W footing, possibly representing the internal wall of an earlier phase when the building may have been twice as wide. Much of this area had been truncated by a large, shallow pit which extended over much of the site. Lying up against the south side of the building was a square area of dark contaminated sand, measuring 6m x 6m, that may represent an external yard or the floor of a slightly-built annexe.

Fig. 23 - Photo of the Power House foundations, from the south

Fig. 24 – Plan of the Power House foundations, relative to plan shown on 1915 Ordnance Survey map



9.0 THE ENGINE SHEDS (PRN 36939; NGR SN 4468 0061)

The Engine Sheds were also built by the Burry Port and Gwendraeth Valley Railway. It was a large building of irregular plan, averaging 20m N-S and 35m E-W at its greatest extent, lying immediately northeast of the sluice pond. The building was demolished in the mid 20th century.

The north end of the west wall of the building was exposed during turf-stripping. It was recorded photographically.

9.1 History

The Engine Sheds may have been contemporary with the construction of the Burry Port and Gwendraeth Valley Railway line, along the north side (and south side) of the pond, in 1865-1869. A double-bay engine shed is marked and labelled here on the Ordnance Survey, 1:10560 First Edition of 1880 (Appendix 1.2). The Ordnance Survey 1:2500 Second Edition of 1907 shows the engine shed as triple-bayed (Appendix 1.3); the surrounding harbour lines had proliferated. The shed is shown, with an unchanged plan, through to 1969 (Ordnance Survey, 1:2500, Sheet SN 4400, 1969). The building was demolished after 1969. The area was landscaped, and grassed-over, in the early 1980s, and there was no above-ground evidence in 2004.

9.2 Description – Fig. 25

A 1.0m long section of wall, representing the north end of the west wall of the former Engine Sheds, was exposed during turf-stripping. The remainder, as it lay just beyond the new road groundworks, was actually buried beneath the road make-up and thus preserved *in situ*.

Fig. 25 - Photo of the Engine Sheds west wall, from the north

10.0 THE GOODS SHED (PRN 51230; NGR SN 4457 0069)

The former Goods Shed was also built by the Burry Port and Gwendraeth Valley Railway. It was a small, rectangular E-W building, measuring approximately 8m by 4m, lying 15m south of the old railway platform PRN 51229 (see Fig. 3). The building was demolished in the mid 20th century.

The foundations the Goods Shed were exposed during the turf-stripping for the new road, in better condition than those of the Power House. These foundations were planned and recorded photographically before they were buried under the make up for the new road.

10.1 History

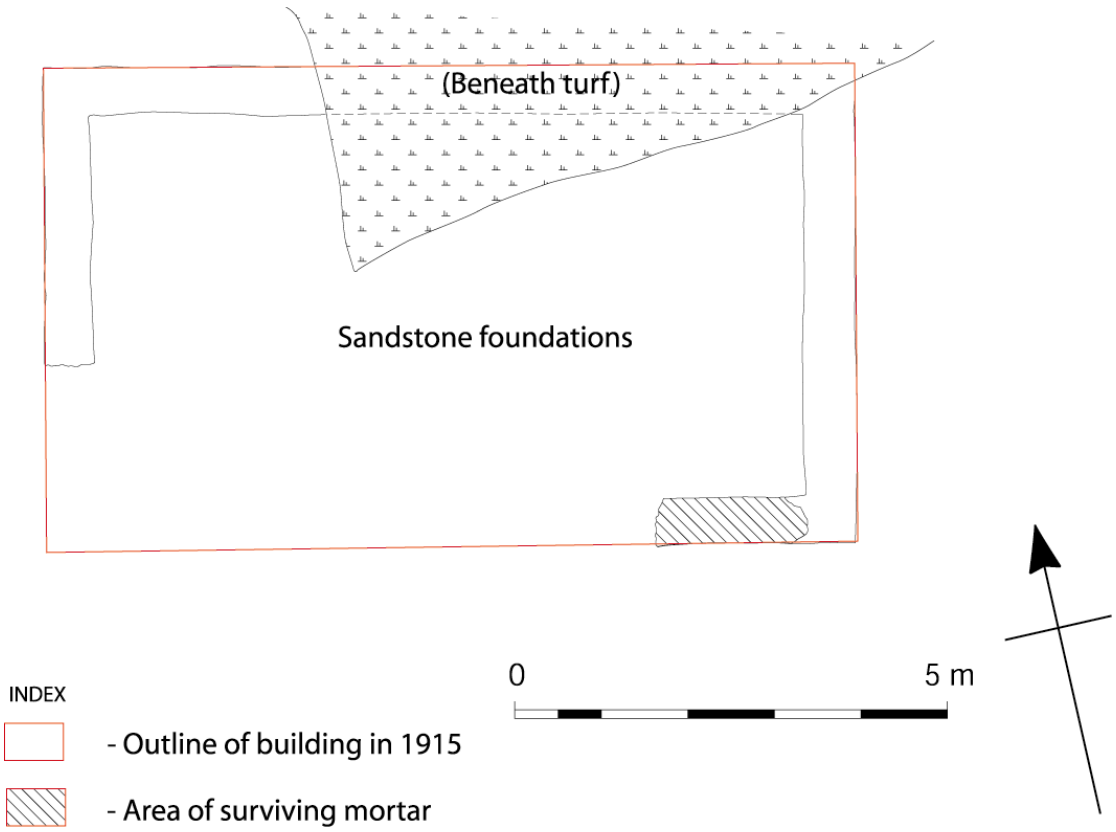
The Goods Shed was built for the Burry Port and Gwendraeth Valley Railway, probably in c.1909, at the same time as the former railway station and platform PRN 51229 (see Section 7.0 above). It is first shown on the OS map of 1915 (Appendix 1.4), lying 15m south of the old railway platform (Ordnance Survey, 1:2500, Carmarthenshire Sheet LVII.8, Edition of 1915). It continued to be marked and is shown on the 1953 OS map, but like so many other buildings had apparently gone by 1969. The area was landscaped, and grassed-over, in the early 1980s, and there was no above-ground evidence in 2004.

10.2 Description – Figs. 26 and 27

Although the Goods Shed had been demolished to below floor level, approximately 80% of the foundation survived. This was constructed from sandstone blocks, dressed to the size and shape of bricks. It survived to a depth of at least two courses, but there was no evidence of any form of bonding material other than oily sand. One more foundation course had survived in the southeast corner, and this was finished with a thick, dark grey layer of mortar on which the above-ground walling was presumably constructed. None of this walling survived, but the surrounding area featured a rubble deposit comprising pale yellow brick, slate and thick window glass, which gave a suggestion of the materials used in the building's construction.

Fig. 26 - Photo of the southeast corner of the Goods Shed foundations, from the south

Fig. 27 – Plan of the Goods Shed foundations, relative to plan shown on 1915 Ordnance Survey map



11.0 THE PALAEOENVIRONMENTAL SAMPLING (Dr M Jane Bunting)

Bulk palaeoenvironmental column samples, in the form of a monolith with a core depth of 1.5m (Fig. 28), were taken during the excavation of a balancing pond through salt-marsh deposits near Moreb, towards the east end of the road line, at NGR SN 4575 0102 (Figs. 2 and 28). The sample was taken from the northern side of the pond cutting, which was 1.6m deep, through a 1.25m depth of peat, overlying a leached, pale grey peaty silty clay. The peat was overlain by a thick clay deposit (Figs. 28 and 29).

The organic sediments contained well preserved pollen grains, but only one sample had any diatoms. Analysis of the pollen grains showed that, when the organic unit was deposited, the vegetation growing around the sampling point was typical of fresh-water environments (reed beds, wet alder woodland). This implies that the local relative sea-level was lower than today. There were no strong markers to help find the age of the sediments, but they were probably deposited sometime between 7000 and 3000 years ago.

The analysis was undertaken by Dr M Jane Bunting of the Wetland Archaeology and Environments Research Centre, Department of Geography, University of Hull, Hull, HU6 7RX.

Fig. 28 – Location plan and schematic illustration of the palaeoenvironmental sample column

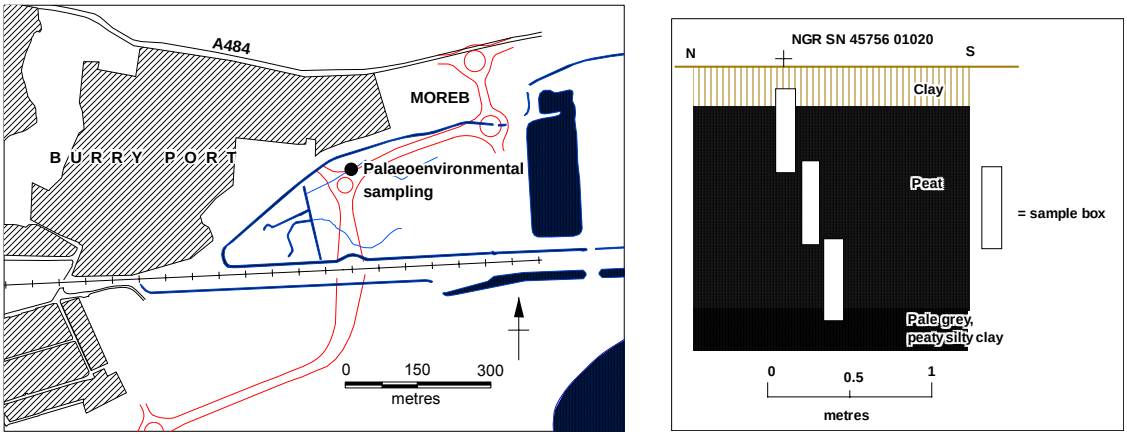


Fig. 29 - General view of sample area, facing northwest

11.1 Methodology

The monolith was collected using three 50cm x 10cm sampling tins, with a 6cm overlap between each tin (Fig. 28). The section was described, and eight samples taken from the major sediment units were prepared for pollen and diatom analysis.

Sediments were described using the Troels-Smith scheme (Troels-Smith 1955), and samples taken from each of the major units for palaeoecological investigation.

Sub-samples were prepared for diatom analysis using standard methods (Berglund 1986) and scanned at x1000 magnification using oil immersion.

Sub-samples were prepared for pollen analysis following standard methods (e.g. Moore *et al.* 1991), including treatment with hot 5% Sodium Pyrophosphate and fine sieving (through a 10 µm mesh) to remove the clay fraction, 'sand swirling' to remove the coarse sand component and hot 40% hydrofluoric acid to remove other mineral components. Tablets containing a known quantity of *Lycopodium* spores were added at the start of the preparation process, to permit calculation of the palynomorph concentration within the sediments (Stockmarr 1972). Residues in silicon oil were mounted onto microscope slides, and counted under x400 magnification. Where possible, a total sum of 300 pollen grains from terrestrial plants was counted, and where this was not possible a total of 100 *Lycopodium* spores was counted. Pollen preservation condition was also recorded using a five-point scale (Moore *et al.* 1991) consisting of 'undamaged', two categories of damage to the grain surface (oxidative damage) 'corroded' and 'degraded', and two categories of mechanical damage, 'crumpled' and 'split'. Identifications were carried out with the aid of standard keys (e.g. Moore *et al.* 1991) and reference to type slides, and pollen taxonomy follows Bennett *et al.* (1994).

11.2 Results

Throughout the report, depths are given in cm below the top of the uppermost monolith tin. The sediment stratigraphy is summarised in Table 1.

11.2.1 Diatoms

Diatoms occurred only in the lowest sample, BP 130. A rich and diverse flora was inferred from the sample, and despite high levels of frustule breakages, many of the more robust specimens were identifiable to species level. The species recorded are indicative of fresh water conditions and the wide range of species including several epiphytes suggests that the water body was highly productive with a healthy littoral zone. Further analysis is not recommended, and species observed are listed in Table 2.

No diatoms were found in the other seven samples. This is probably due to post-depositional dissolution of the frustules, which occurs in either strongly acidic or strongly alkaline conditions. The nature of the sediments suggests that acidity is the most likely cause of dissolution.

11.2.2 Pollen

All samples contained some pollen, and the taxa seen in each sample are shown in Figure 1. Figure 2 shows the percentages of the main taxa, along with information on the total pollen concentration and the state of preservation of the pollen grains counted. The diagram is divided into four sections to aid discussion, labelled BP-1 to BP-4.

BP-1 (sample BP-130)
This sample contained relatively few pollen grains, therefore the assemblage cannot be interpreted in much detail. Pollen concentration is relatively low at 14000 grains cm^{-3}, but above the 3000 grains cm^{-3} threshold which Bunting & Tipping (2000) argue suggests that the pollen and spore assemblage has undergone significant post-depositional damage and biasing. The assemblage is not dominated by a few robust taxa, therefore the sample is not

considered to be too severely biased as a result of poor preservation (Bunting & Tipping 2000).

The pollen assemblage is dominated by grasses (Poaceae), with a noticeable *Pinus* (pine) component, and is the only sample to contain cattail pollen (*Typha latifolia*). Large amounts of microscope charcoal were also noted in this sample, and around 80% of the grains had suffered some kind of damage, 60% of grains showing mechanical damage. High levels of mechanical damage can be interpreted as implying a relatively high energy environment of deposition. Poaceae and *Typha latifolia* can both form important components of high salt marsh and freshwater marsh ecosystems. Counts of *Pinus* pollen are typically higher in open systems with marine or estuarine input, as the buoyancy of these grains is high, so they are preferentially carried long distances in large river and estuarine systems.

This division can therefore be interpreted as indicating an open marsh ecosystem through which water movement occurs regularly, maintaining a higher-energy system, probably in a brackish or fresh-water context with connection to the estuary or marine system.

BP-2 (samples BP-123, BP-113, BP-98 and BP-87)
These samples all have a high concentration of pollen grains (42 000 - 143 000 grains cm^{-3}), and counts of around 300 pollen grains from terrestrial taxa were achieved, therefore this zone can support more detailed interpretation. Pollen grain preservation is generally good, with over 50% undamaged, and mechanical damage remains the main form of damage recorded. However, the uppermost sample (BP-87) has a higher proportion of damaged grains; over 40% of grains have suffered some form of oxidative damage, suggesting perhaps that the sampled sediment accumulated under drier conditions, where oxygen-demanding decay processes could more readily act post deposition.

The sediments become increasingly organic through the unit. The pollen assemblage is characterised by an increase in tree and shrub pollen percentages (mainly alder - *Alnus glutinosa*, birch - *Betula*, hazel - *Corylus avellana*-type and oak - *Quercus*) and a commensurate decrease in the total proportion of herbaceous types. However, the variety of herbaceous taxa increases, including disturbance indicators such as ribwort plantain - *Plantago lanceolata* and dock - *Rumex acetosa/sella*. These types are often interpreted as indicating human activity such as livestock grazing, but are also common in naturally disturbed environments such as coasts and riverbanks. Bog moss (*Sphagnum*) spores are also recorded in this division, with particularly high values in sample BP-98. This taxon is characteristic of highly acidic conditions.

The increase in all tree pollen values and the variety of herbs suggests that the sampling point is now located closer to a dry-land ecotone than in division BP-4. The vegetation is likely to be wet open fen with patches of alder rather than a marsh, and the increasing proportions of alder suggest encroachment of the carr into the marsh over time. The presence of tree taxa typical of the drier margins of the carr, such as ash (*Fraxinus*), oak (*Quercus*) and birch (*Betula*), and of *Sphagnum* moss, also supports this interpretation. Some of the herbaceous and fern taxa are likely to be locally present in the fen-carr environment, such as meadowsweet (*Filipendula*) and *Polypodium vulgare* (polypody), and some in the drier marginal woodland (e.g. foxglove - *Digitalis* and primrose - *Primula*), but others such as plantain (*Plantago lanceolata*) and bracken (*Pteridium aquilinum*) appear to reflect relatively open, better drained communities somewhere in the wider landscape. These communities may also be the source of some of the Poaceae pollen recorded. Two samples contained small amounts of microscopic charcoal.

The abundance of herbaceous taxa decreases in the uppermost sample, and no bog moss (*Sphagnum*) or meadowsweet (*Filipendula*) is present. Coupled with relatively high *Alnus* values and a marked increase in oxidative damage of pollen grains, this can be interpreted as reflecting the establishment of closed carr canopy and drier local conditions, implying continued terrestrialisation of the sampling location.

Table 1 - Description of sediments in Burry Port sequence as recorded from the monolith tins, and location of samples taken for palaeoecological analysis.

Depth (cm)	**Troels-Smith**	**Notes**	**Sub-sample location (pollen & diatom)**
0-11.5	Ag2As2	Grey silty clay with occasional dark streaks. Sharp lower boundary.	5
11.5-48	As1Ag1Sh2Dh+	Dark brown stiff organic-mineral mixture sharp lower boundary.	32
48-66.5	Dl1Dg1Sh1Dh1	Dark crumbly sediment with twigs and thickish bark- fragments - dry. Clear lower boundary.	59
66.5-89	Dg1Sh2Dh1Dl+	Relatively fine, compact and damp brown organic material	87
89-94		Gradual transition into	
94-107	Th1Dh1Sh1Dg1	Dark, crumbly sediment with substantial roots - but no clearly identifiable *Phragmites* remains. Clear lower boundary.	98
107-120	Dg1Sh3Dh+	Relatively fine, compact and damp brown organic material, gradual lower boundary.	113
120-128	Dg1Sh2Dh1	Relatively more macrofossil remains. 138-140 large clump of sand encased within the sediment. Clear lower boundary.	123
128-132.5	As2Ag+Sh2Dg+	Mid brown organic clay. Boundary clear but tilted by approx. 5˚ relative to the base of the monolith tin.	130
132.5-138	As4Ag+	Fawn clay, 'toothpasty' texture.	

Table 2 - Diatom species identified in sample BP-130; a high level of frustule breakage means that this assembly is biased towards more robust types

Achnanthes lanceolata
A. hungarica
A. minutissima

Astronella formosa

Aulacoseira ambigua
A. distans
A. granulata

Caloneis silicula
C. undulata

Cocconeis spp.

Cymbella silesiaca

Cyclotella meneghiniana
C. stelligera

Diploneis elliptica

Epithemia argus

Eunotia bilunaris

Fragillaria capucina var. *capucina*
F. capucina var. *vaucheriae*
F. constricta
F. exigua
F. ulna

Gomphonema angustatum
G. parvulum

Meridion circulare

Nitzschia dissipata
N. linearis

Pinnularia appendiculata
P. divergentissima
P. microstauron

Tabillaria ventricosa

BP-3 (samples BP-59 and BP-32)
Pollen counts are low in this division, and thus the variety of taxa is reduced. The concentration of pollen in sample BP-59 is 1500 grains cm^{-3}, below the 3000 grains cm^{-3} threshold which Bunting & Tipping (2000) argue suggests that the pollen and spore assemblage has undergone significant post-depositional damage and biasing, and all grains recorded showed some damage. Sample BP-32 has a higher concentration and around 40% undamaged grains, but the prepared subsample was very 'dilute' (i.e. there was a lot of other fine organic material which made counting problematic). Interpretation of these assemblages cannot therefore be usefully undertaken, but both contain alder, birch and grass pollen, suggesting that the main components of the landscape are similar to those in BP-3.

BP-4 (BP-5cm)
The uppermost sample, BP-5, is taken from grey silty clay. Pollen concentration is high compared to BP-2 (99 000 grains cm^{-3}), but around 80% of grains are damaged, with slightly more oxidative damage than mechanical damage. A pollen count of over 300 pollen grains from terrestrial plants was achieved, and conditions at the site seem to be wet enough to allow good preservation of pollen again. The assemblage is dominated by trees, mainly alder (*Alnus glutinosa*) and some hazel (*Corylus avelland*-type). Oak (*Quercus*) and Birch (*Betula*) are present at lower values than any other sample except BP-130. Fewer herbaceous taxa are recorded than in BP-3.

This assemblage can be interpreted as showing alder carr conditions continuing at the sample site, but in a wetter context with increased mineral input. Two grains of pine *Pinus*) pollen were recorded which might suggest that some of the water-borne material comes from an estuarine context (see 3.4.1 above). The continued high levels of oxidative damage and low organic content within the mineral might be interpreted as implying that there is strong seasonal variation in the water table, with extended drier periods (perhaps in summer) enabling aerobic decay to take place interspersed by periods when the carr is inundated with sediment-laden water.

11.3 Interpretation and discussion

11.3.1 Possible age of the peat unit

Alder (*Alnus glutinosa*) is present in all samples and dominant in some, suggesting that the sediments cannot be older than the mid-Holocene alder arrival (which occurs at around 8000-7000 BP, with strong local variation). The pollen signal is dominated by taxa which could originate from local wetland elements, and very few anthropogenic indicator species are recorded, making it hard to infer the nature of the wider landscape or to assign a better estimate of sediment age. Given the small proportion of indications of human activity it is tempting to propose deposition before the late Holocene, but this cannot be demonstrated.

11.3.2 Reconstruction of local environment

BP-4 (sample BP-130cm)
The pollen assemblage implies a marsh environment, and the dominance of mechanical damage of pollen suggests relatively high levels of energy within the system. The diatom sample suggests that the marsh was predominantly fresh-water, and supports the interpretation of quite dense vegetation and relatively high energy.

BP-3 (samples BP-123, BP-113, BP-98 and BP-87)
No diatoms were preserved in these samples, which supports the interpretation of relatively acidic alder carr conditions becoming established at the sampling point.

The pollen assemblage implies that, initially, a mosaic of fen and carr is present in the study area, and that the proportion of carr increases in the local area through time, until a closed canopy is present and the sediment surface becomes relatively dry and less suitable for pollen preservation (BP-87). This is also reflected in the bulk sediments, which become

increasingly organic and characterised by larger plant fragments, typical of fen and carr woodland peats.

BP-2 (samples BP-59 and BP-32)
Conditions are not suitable for preservation of pollen or diatoms. The crumbly, woody peat which was sampled for BP-59 suggests that relatively dry carr conditions persisted in the area, and the overlying unit with increased mineral content (sample BP-32) suggests renewed input of water bearing mineral sediments from the wider landscape, but the water table within the carr sediment has not risen sufficiently to preserve pollen well.

BP-1 (BP-5cm)
Conditions remain sufficiently acidic to prevent diatom preservation and the pollen assemblage is dominated by alder, but increased mineral input and improved pollen preservation imply that conditions within the carr are wetter and that there is a greater hydrological connection with wider systems.

11.4 Conclusions

11.4.1 Summary

This peat system appears to have been deposited during the fresh-water part of a relative sea-level transgression-regression event. The mineral unit at the base of the peat (below 128 cm) seems to have been deposited in a slightly brackish or freshwater marsh, with quite strong hydrological connections to a higher energy system, either the estuary or the river feeding it. Relative sea-level is interpreted as having fallen to the point where the sampling location was located in a high salt marsh or back marsh system.

As relative sea-level continued to fall, fen and alder carr colonised the marsh, depositing organic rich peats, too acidic to preserve diatoms. The location of the carr-dry woodland ecotone appears to have been moving towards the sampling location throughout division BP-2, and the carr is becoming increasingly dry. Pollen preservation becomes poor above about 70cm, reflecting drier conditions, and woody, purely organic, crumbly carr peat is deposited at the sampling location.

Above 48cm, the mineral content of the sediment begins to increase and pollen preservation conditions begin to improve, suggesting that the sampling location is becoming wetter and that some externally-sourced material is being carried into the carr. This probably reflects the beginning of a rise in relative sea-level, which continues into division BP-4. Although here pollen is well preserved and reflects a carr environment, too acidic to preserve diatoms, increased external hydrological input is inferred.

11.4.2 Conclusions

- Diatoms were only present in one sample, which had a high degree of breakage.
- Pollen was found in all samples, although 300 pollen grains from terrestrial plants were only able to be counted in 5 of the 8 samples.
- The pollen, diatom and sediment records are all in broad agreement, showing that this peat section represents the low point of a relative sea-level regression event.
- The age of the event is hard to establish, beyond its occurrence after the arrival of alder in this part of the British Isles.
- There is no clear ‘Sea Level Index Point’ within this sediment sequence, as it appears to reflect fresh-water conditions throughout, therefore even were it to be datable by carbon-14, it would not be able to contribute much to regional studies of relative sea-level change.

Fig. 30 - Pollen and spore diagram for the Burry Port monolith, showing all taxa recorded, TLP (total sum of terrestrial plants) and a summary diagram depicting the proportion of arboreal and herbaceous taxa

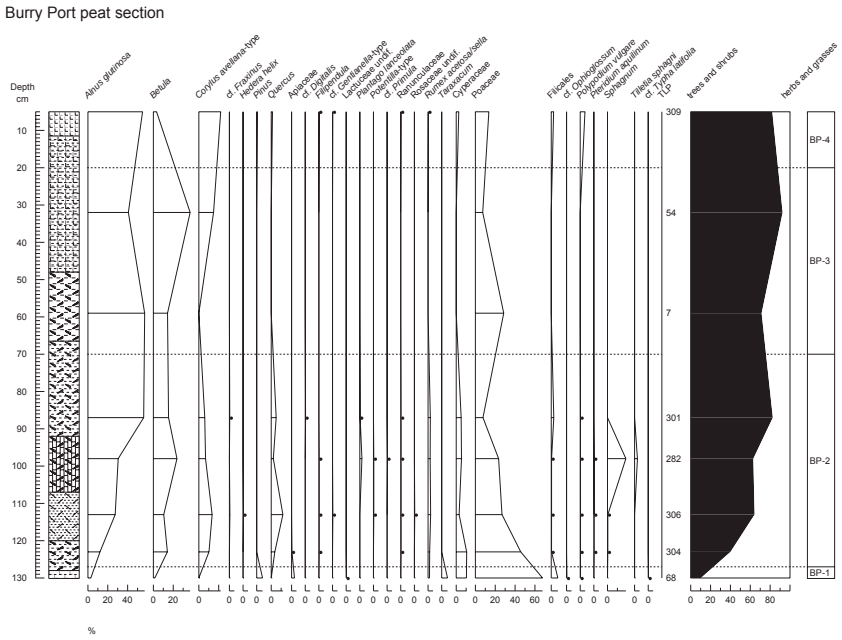
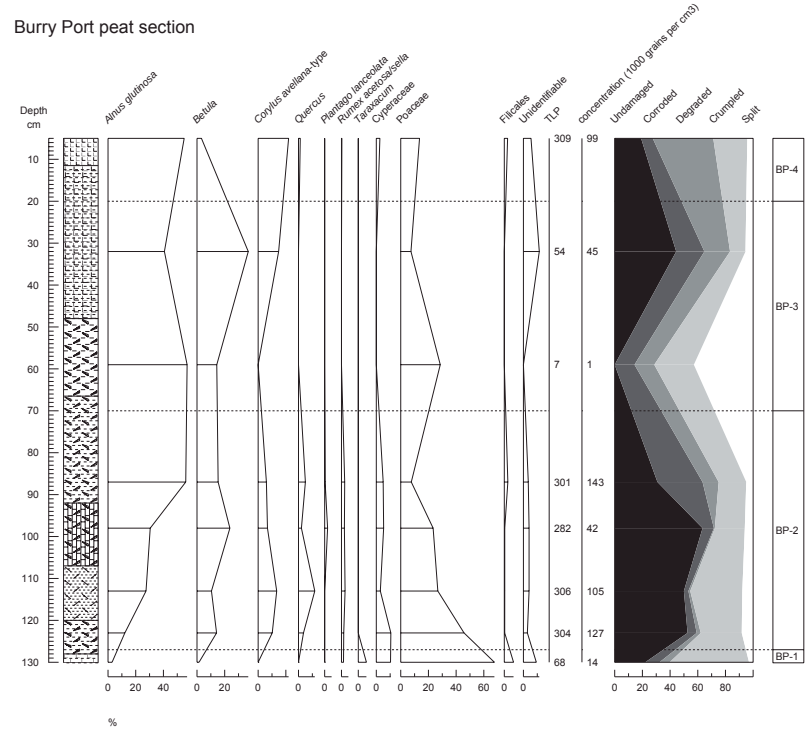


Fig. 31 - Summary pollen and spore diagram for the Burry Port monolith, showing the main taxa, TLP (total sum of terrestrial plants), pollen concentration (number of pollen grains from terrestrial plants per cm^3 of sediment; note units), and a summary diagram depicting the preservation state of the grains seen



12.0 CONCLUSION

The road scheme resulted in the exposure of, and the archaeological recording of, a number of archaeological sites and features, and has improved our knowledge of the history and development of Burry Port Harbour, a historic, early coal-export site of national importance. It was, moreover, undertaken with minimal damage to the underlying archaeological deposits, the majority of the route being laid on made-up ground, rather than in a new excavation. Most of the significant historic features and deposits have therefore been preserved *in situ*, and only seven sites were directly affected by the scheme.

The opportunity was taken to undertake building recording on two important features - the remains of the enclosure wall around the former Lead and Silver Works, from 1864, and the remains of a railway platform belonging to the former Burry Port and Gwendraeth Valley Railway, from 1909. Recording of this nature has significantly advanced our understanding of the development of these structures, particularly the former.

In addition, archaeological evaluation trenching across two elements of the Kidwelly & Llanelly Canal, initially established in 1837, has allowed a picture of the methods of early 19th century canal construction to emerge. The canal became disused when the Burry Port and Gwendraeth Valley Railway established railway lines alongside in 1865-1869.

Features associated with this railway network were recorded in plan, during a watching brief on the turf-stripping for the scheme, but again were saved from damage by its superficial nature. This included the railway Engine Shed, probably also from 1865-1869, the Power House, 1900-1901, and the Goods Shed, from c.1909.

A number of drainage trenches were cut to a greater depth, but in the main their impact too was minimal. They demonstrated that wind-blown sand lay beneath the site to a depth of over 2.5m

The drainage trenches represented the final stage of deep intrusive activity in the road scheme. Future service trenches, for eg. telecommunications, gas, electric and water supplies, are expected to be no deeper than approximately 0.50m. They will be follow the route of the new road and so will be excavated into either disturbed or made up material. They are therefore not expected to have an adverse impact on the archaeological resource.

The palaeoenvironmental analysis showed that between 7000 and 3000 years ago the vegetation growing around Burry Port was typical of fresh-water environments with reed beds and wet alder woodland, implying that the local relative sea-level was lower than today.

13.0 THE FINDS

Few finds were encountered and little of any intrinsic importance. Most were residual. A list of finds forms part of the project archive.

14.0 ARCHIVE DEPOSITION

The archive, which will be indexed according to the National Monuments Record (NMR) material categories, is held by Cambria Archaeology, Llandeilo, and contains the following:-

A. Copy of the final report and disk

B. Context forms and field notes

C. Field and survey drawings

D. Digital photographs

E. List of finds

G. List of references

I. Report drafts (disk and paper)

J. Final drawings

L. General administrative notes

M. Project correspondence and copies of planning specifications

There is no material for classes **F, H, K** and **N**.

15.0 ACKNOWLEDGEMENTS

This report was written by Neil Ludlow with assistance from Tom Jamieson, Site Supervisor (both Cambria Archaeology). Acknowledgements to – Pete Crane (Cambria Archaeology), Project Manager; Gwilym Bere (Cambria Archaeology), Site Assistant. Also to – Carmarthenshire County Council; Mowlem, principal contractor.

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16.0 LIST OF SOURCES CONSULTED

16.1 Databases

National Monuments Record, curated by The Royal Commission for Ancient and Historical Monuments (Wales), Crown Buildings, Plas Crug, Aberyswyth, Ceredigion.

Sites and Monuments Record for Carmarthenshire, Ceredigion and Pembrokeshire, curated by *Archaeoleg Cambria Archaeology*, Shire Hall, 8 Carmarthen Street, Llandeilo, Carmarthenshire.

16.2 Manuscript maps

Carmarthenshire Record Office, Cawdor Maps 222, Plan No. 6, *The Sea Shore from Carmarhenshire to Pontardulais, by David Davies,* 1855

Carmarthenshire Record Office, CRO/AE7, *Map of Towyn Bach Common in the parish of Pembrey, Map of Craig Capel in the parish of Pembrey*, Kidwelly & Co. Inclosure, 1854 (Enclosure awards).

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16.3 Published maps

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Ordnance Survey, 1:10560, Provisional Edition, *Carmarthenshire Sheet LVII NE*, 1953 (revision of 1913, with additions in 1948 and 1952).

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16.4 Prints, photographs etc.

National Library of Wales, A.1595, 1 - 10 (Ten postcard views of Burry Port, late 19th - early 20th century).

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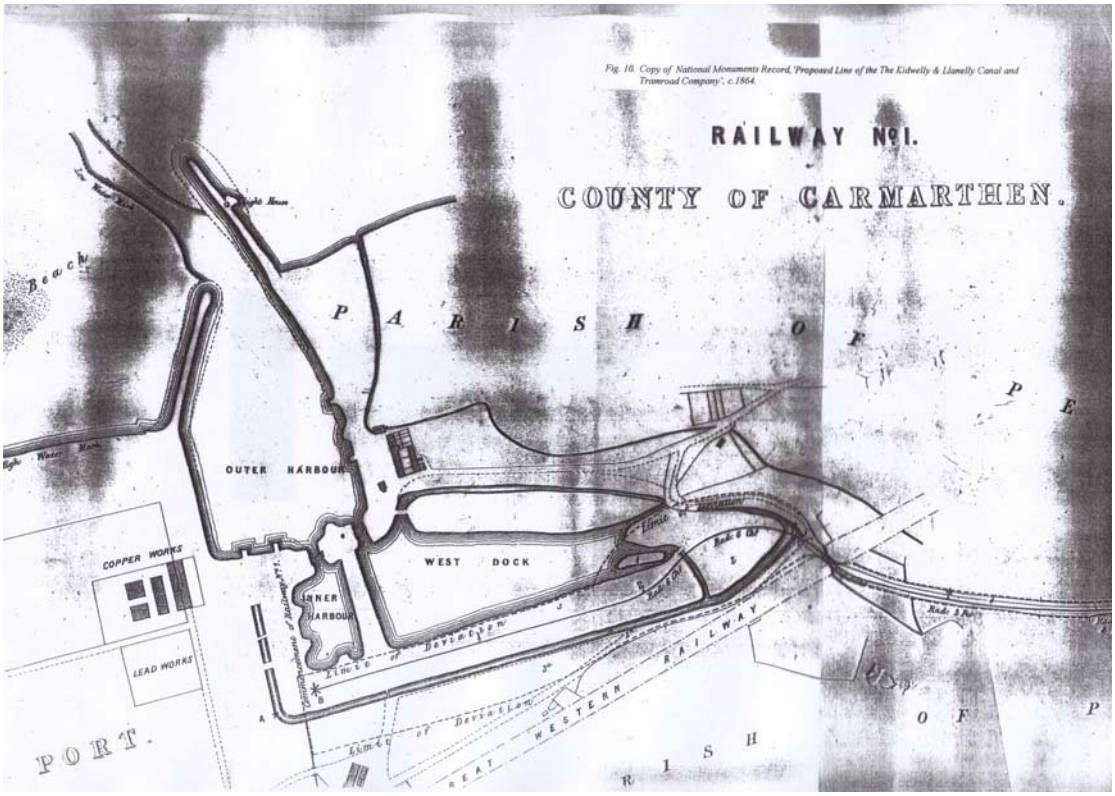
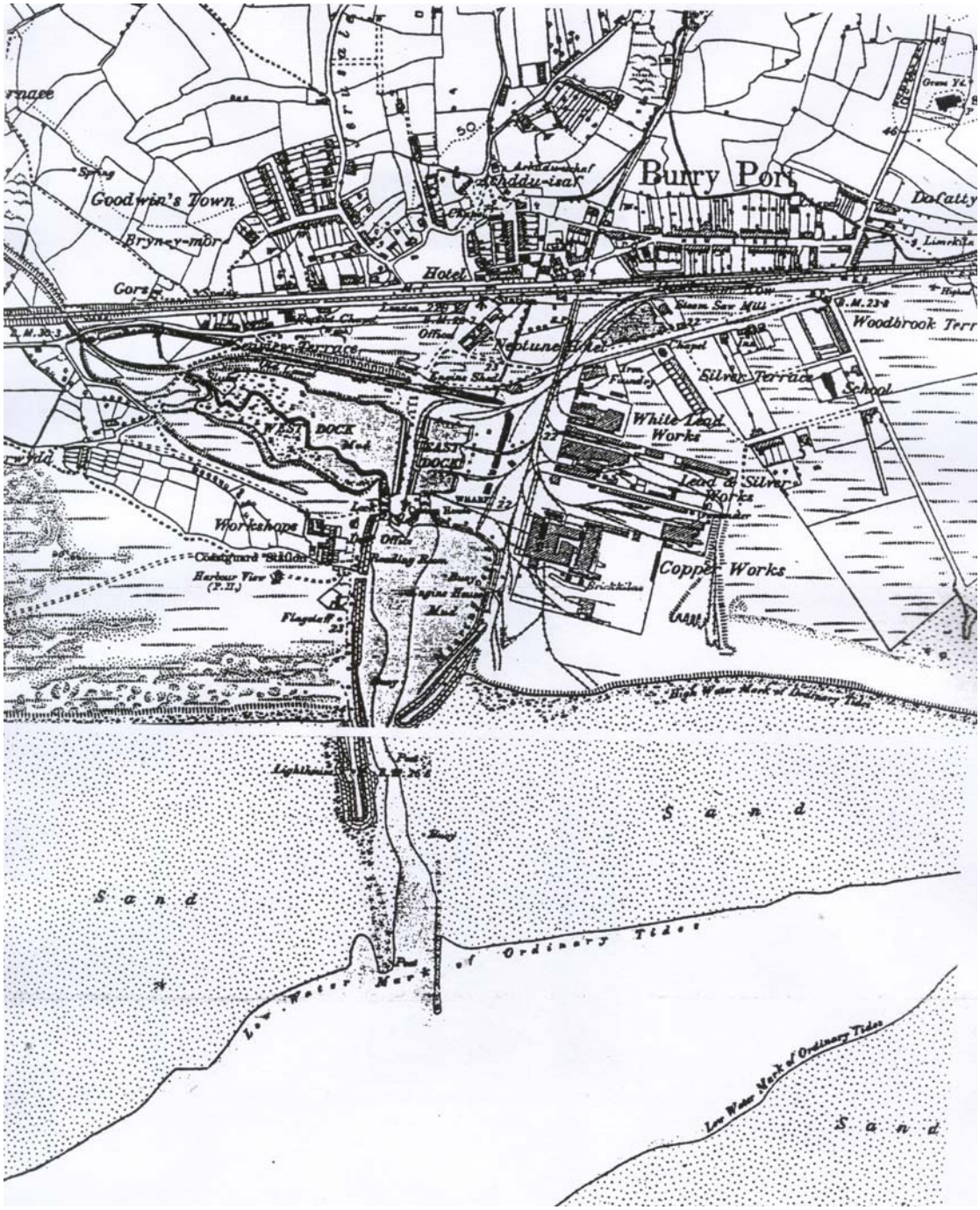
APPENDIX 1: COPIES OF HISTORIC MAPS AND PLANS

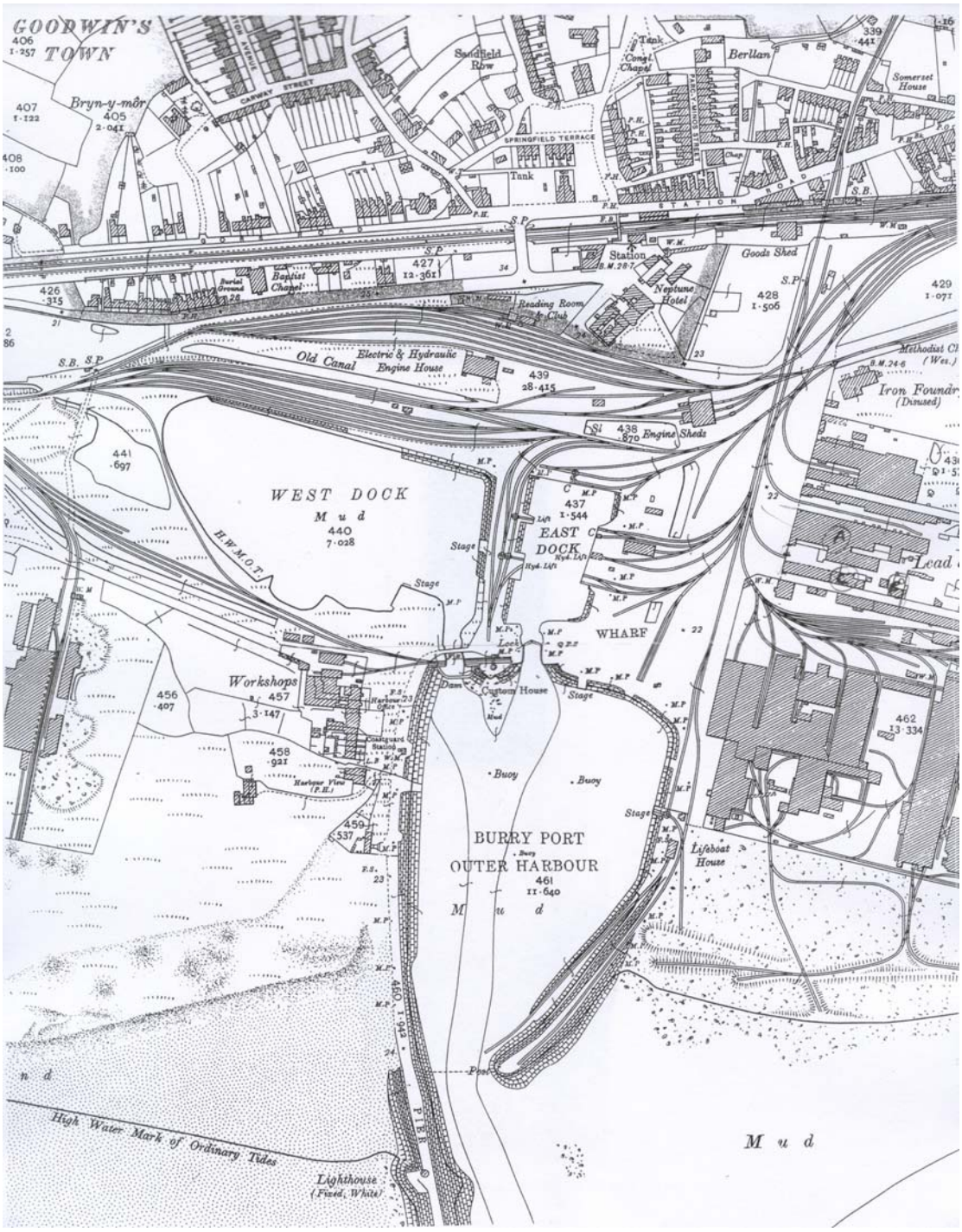
1.1 - Detail from map of line of the Kidwelly & Llanelly Canal, c.1864 (National Monuments Record)



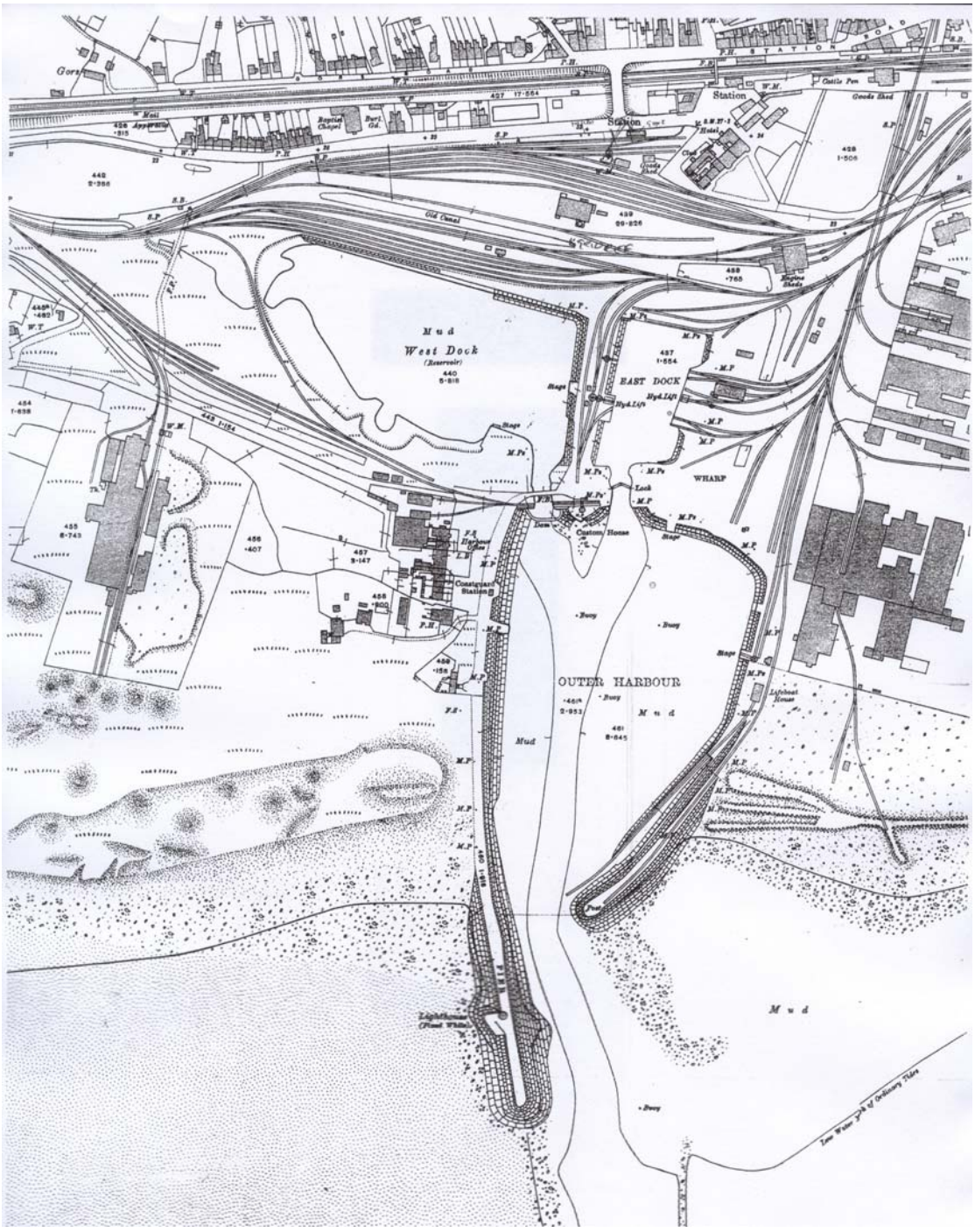
1.2 - Detail from Ordnance Survey, 1:10560, Carmarthenshire Sheet LVII NE, First Edition, 1880 (surveyed 1878).



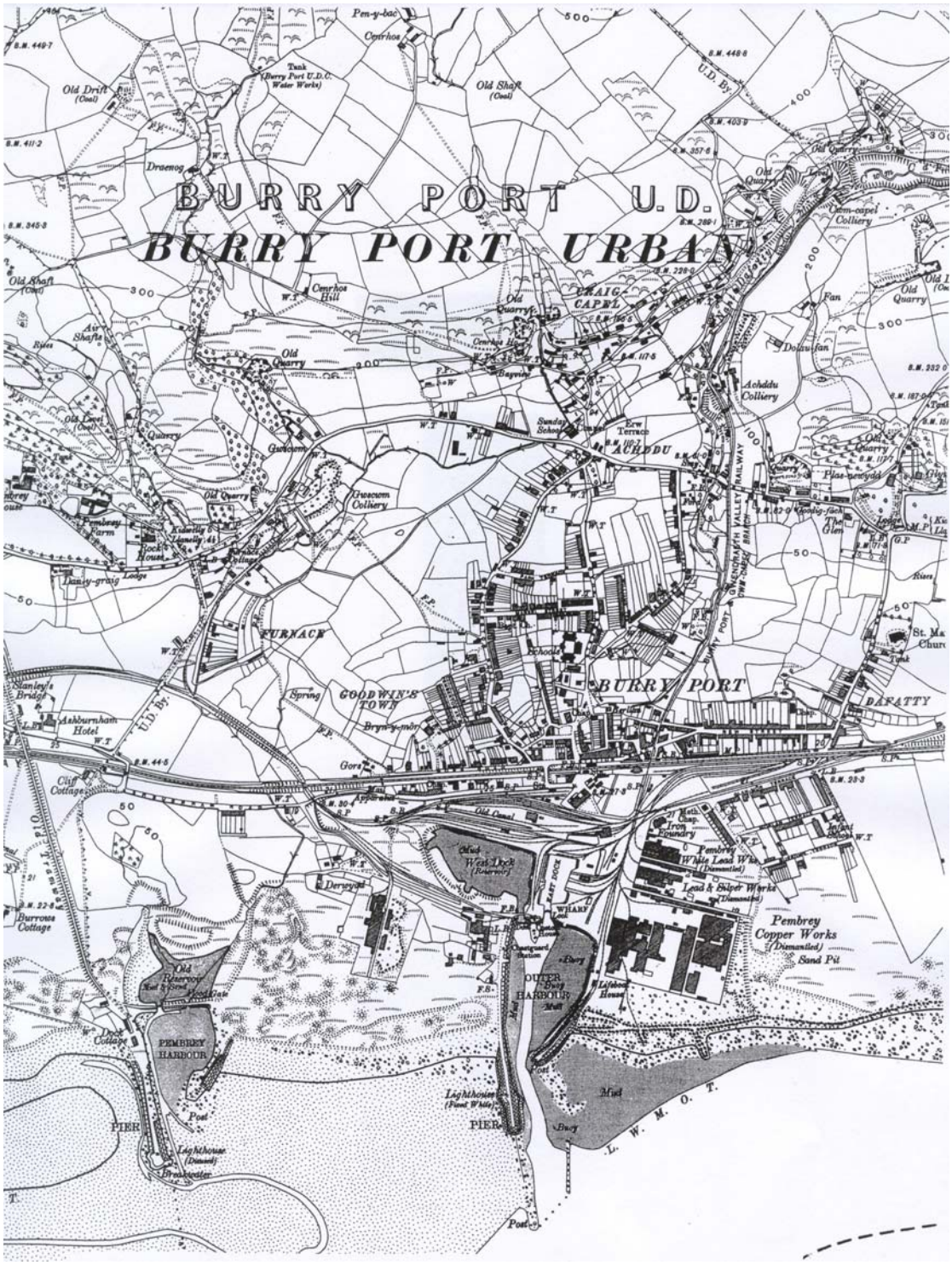
1.3 - Detail from Ordnance Survey, 1:2500, Carmarthenshire Sheet LVII.8, Second Edition, 1907.



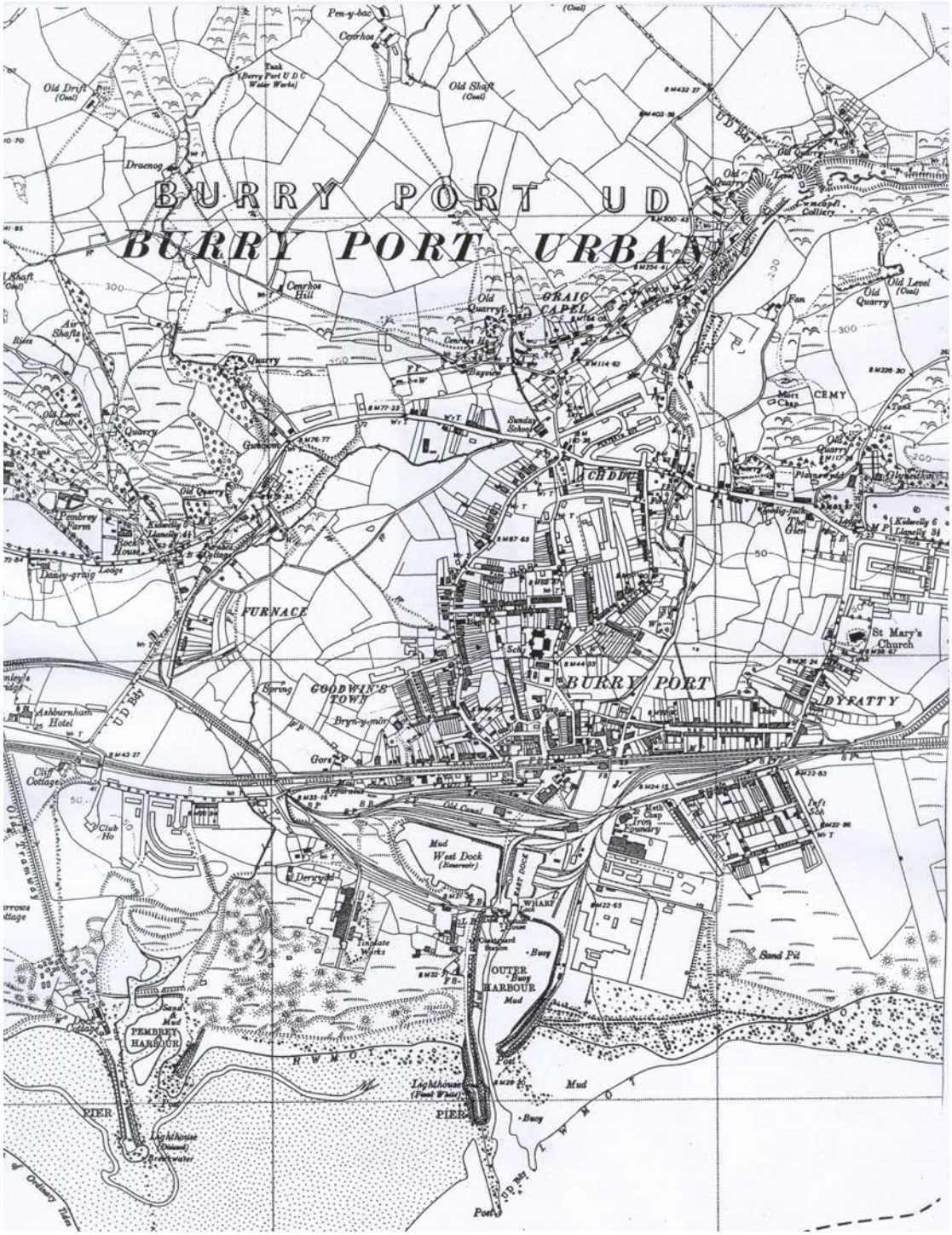
1.4 - Detail from Ordnance Survey, 1:2500, Carmarthenshire Sheet LVII.8, Edition of 1915 (surveyed 1878-86, revised 1913).



1.5 - Detail from Ordnance Survey, 1:2500, Carmarthenshire Sheet LVII.8, Edition of 1921 (surveyed 1878-86, revised 1913).



1.6 - Detail from Ordnance Survey, 1:10560, Provisional Edition, Carmarthenshire Sheet LVII NE, 1953 (revision of 1913, with additions in 1948 and 1952).



APPENDIX 2: THE HISTORY AND DEVELOPMENT OF BURRY PORT

The landscape

There is little surviving evidence for land-use at Burry Port Harbour prior to the 18th century, however peat deposits up to 3.35m thick (PRN 36953), with inherent archaeological potential for all periods, have been recorded in a borehole within 'the Burry Port area' (Page, 1997, 6), presumably within the intertidal zone. No further details are known. In addition a fish weir has been recorded at SN 4420 0007 (PRN 34065); although probably of relatively recent date it illustrates a further use of the Burry Port harbour area, as does cockling at low tide at the harbour, as shown on a postcard of c.1906 (Brian Cripps Collection; copy held by Countryside Commission for Wales).

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Emanuel Bowen's map of 1729 (NLW, 'Emanuel Bowen's Map of South Wales', 1729) depicts a coastline very different from that at present; the changes in the coastline of this part of Carmarthenshire are amply discussed in James, 1991. The dune slacks of Cefn Sidan have both developed and been reclaimed since before the 18th century, but Bowen's map shows the dunes - as 'Kidwelly Marsh' - extending eastwards to an existing mooring at Barnaby Pill (east of Dyfatty), which is labelled. The only other feature in the immediate vicinity of Burry Port to be labelled in Pembrey parish church, but a house or cottage is depicted to the south of Barnaby Pill. Coal pits are labelled south of Trimsaran and at Llanelli, but land use was still primarily agricultural. A later description summarises the situation as it must have existed throughout the 18th century, when the Burry Port area was mainly sandy, uncultivated and unenclosed, though areas were 'in a tolerable state of cultivation'. A 'very extensive sandy common is overflowed occasionally by the tide, but affords good pasturage to numerous flocks of sheep, which the tenants of several farms in this and adjoining parishes have the right of depasturing on for 8 months of the year' (Lewis, 1833). The common, 'Tywyn Mawr', represents the present Cefn Sidan but included the smaller 'Tywyn Bach' which was to become the site of Burry Port, on which there was no settlement prior to the establishment of the harbour. The western boundary of the common followed the course of the Derwydd River and its confluence with Nant Dyfatty (National Library of Wales, Ashburnham II, 31/7), to the west of which lay the Manor of Pembrey, part of an extensive estate which had been held by the Ashburnham family since 1677 (National Library of Wales, Ashburnham II, 50/1-78); however, pasturage rights were maintained on the latter area of dune slacks (National Library of Wales, Ashburnham II, 31/7).

The economic background - the 18th and early 19th centuries

Industrial activity is not recorded in the immediate vicinity of the harbour until the 18th century; however, there is a record of monks working coal in southeast Carmarthenshire early in the 13th century (Thomas, 1937, 35). According to an account written by John Leland's in the mid 16th century *'there lieth a long on eche side of Wendraeth Vawr Pittes, wher menne digge se (sea) Cole'* (Thomas, 1937 2); however, there is no reference to mineral extraction in a survey of the area that was conducted in 1609-13 (Rees, 1953, 175-253). During the 17th century prospecting for a variety of minerals appears to have stepped up and in 1636 *'Henry Murrey was given permission to search, dig and mine for ores and metals in county Carmarthen'* (Thomas, 1937, 2) and according to Blome's 'Britannia' of 1673 *'in the bowels of the earth many places are digg Pitt-coal'* (ibid.).

The produce from such ventures required transportation and from 1770 there were 'shipping places' at both Barnaby Pill and at Pwll Quay, where small vessels of 50 or 60 tons lay in the creeks for a tide or two (Thomas, 1937, 5). An extensive trade in lime had developed between Pembrey and the Gower, the lime being imported with coal taken as a return cargo, and there were formerly several limekilns in the area, including two at Burry Port.

An admiralty chart of 1775 (NLW, 'Carmarthen Bay on the South Coast of Wales, surveyed and navigated by M. Mackenzie Snr.', 1775) depicts the coastline in a little more detail; the small pill at the mouth of the Derwydd River's western branch, which became the basis of Pembrey (Old) Harbour, is clearly shown, lying among dune slacks, and cottages are depicted in the area that was to become Burry Port. The map was intended for navigation use and no industries are shown, but Barnaby Pill is also omitted.

Coal production had intensified during the 18th century and extended from its centre around Trimsaran. Early pits were noted near Pembrey House and Waun Baglan, and the first pits at Gwscwm Colliery immediately north of Burry Port were probably sunk in the opening decades of the 18th century (Thomas, 1937, 10). New Lodge colliery was begun by Colonel Pemberton c.1831, but there had been a coal working near Barnaby Pill, including a quay wall, near the colliery since at least 1767 (Thomas, 1937, 13). Before 1800 there were possibly several openings on the Gwscwm vein in the Gwscwm valley (ibid.). In 1810 Messrs. Farquharson and Simons commenced collieries at Pembrey, and an ironworks, which gave its name to 'Furnace', north of Burry Port, but was soon discontinued. They were succeeded by Gaunt and Co. in c.1814 (ibid.). The latter reopened Gwscwm pits, drove Gwscwm level and in 1824 re-opened and enlarged Furnace Ironworks. They also sank a pit, later known as 'Stanley's New Pit,' in 1834 (ibid.).

Another industrialist, George Bowser, secured a lease on Cwm Capel Colliery (or 'Kenross') immediately north of Burry Port by 1816 and went on to develop a number of smaller mines nearby (Nicholson, 1991, 122). His leases included permission to construct tramways and dig canals to export his coal from the foreshore. New Lodge Colliery, to the east of Burry Port, was opened in around 1830 by Colonel Christopher Pemberton (Thomas, 1927, 49). Both Pemberton and George Bowser played important roles in the development of Burry Port, and as a result of this industrial activity, the population of Pembrey parish increased from 1, 455 in 1801 to 1,733 by 1831 (Thomas, 1927, 40).

The 'Kidwelly & Llanelly Canal and Tramroad Co.' were formed in 1813 for 'improving and maintaining Kidwelly Harbour, Kymer's Canal and the tramroads connecting the collieries etc with it' (Thomas, 1937, 5). Thomas Kymer's canal of 1766-68, the first in South Wales, had been cut in order to connect his collieries in the Trimsaran district with his harbour at Kidwelly, and followed the course of the Gwendraeth Fawr. In 1814 the company commenced to link Kidwelly and Llanelli, via Kymer's canal, to a junction 2km south-east of Kidwelly from which a new canal - the 'Kidwelly & Llanelly Canal' - was continued eastwards; however, it was never to reach Llanelli (James, 1991, 156-7).

Sheet 188 of the Ordnance Survey Original Surveyors' Drawing of 1813, held at the National Library of Wales, depicts enclosed fields in the area that was later occupied by Pembrey Old Harbour, but the site of Burry Port lay within the dune system of Tywyn Bach common, which is labelled. The common extended landward into the course of the Derwydd River and Nant Dyfatty, the streams which formed the basis of Burry Port Harbour, where two farms are depicted, 'Gors' to the west and 'Penycoed' to the east, the latter occupying the site of the later settlement of Burry Port. Dyfatty is shown as a large farm or small hamlet. A trackway crossed the dunes between the Derwydd River's western branch and Dyfatty. Gwscwm (as 'Gouse Cwm') and Craig Capel are both labelled, but not as collieries, although the stippled area around the latter may denote its industrial use. The map was revised in 1827 but the Old Harbour, established in 1819, is not shown. Sheet 188 terminates at Pembrey and no canal systems are included.

Pembrey Old Harbour, 1819 - 1830

In 1819 the industrialists George Bowser and Thomas Gaunt (see above) joined forces, with two other colleagues, to construct a harbour on the Pembrey foreshore (Nicholson, 1991, 123). The harbour would be in direct competition with that at Kidwelly, but the latter had suffered severely from silting and was unable to cope with the increasing traffic in coal. Land for the new harbour was acquired from the Ashburnham estate on a 60 year lease, and the harbour was constructed by deepening the western branch of the Derwydd River where it entered the sea. The harbour, which is situated a mere 2000m west of the present Burry Port Harbour, was complete by 1819 (ibid.).

Bowser, Gaunt *et al.* were incorporated in June 1825 as 'The Pembrey Harbour Co.', and 'authorised to make a and maintain a Harbour at Pembrey, and a canal, and a railway or tramroad to connect Pembrey Harbour with the undertaking of the Kidwelly & Llanelly Canal and Tramroad Company' (Thomas, 1937, 11). In 1823-4 they commenced construction of the

Pembrey Canal which connected Pembrey Harbour with the completed section of the Kidwelly & Llanelly Canal, where the latter terminated at Ty Gwyn farm, 3km south of Kidwelly (Nicholson, 1991, 126). The canal conveyed coal from Gaunt's Cilrhedyn Colliery on the Kidwelly & Llanelly Canal at Llandydry (opened 1824) and ended at the appropriately named Glo Caled ('Hard Coal') cottages, near Pembrey Harbour, from where it was conveyed to the loading stage via tramways. The harbour was also connected, by gravitational tramway, with Furnace Ironworks and Gwscwm Colliery (see above), and with New Pit (later 'Stanley's New Pit') by an long inclined tramway the embankment for which still forms an significant feature of Pembrey's industrial landscape (Nicholson, 1991, 124).

A plan of the Pembrey Canal and Old Harbour was produced in 1825 (copy in National Monuments Record). Pembrey Old Harbour, Pembrey Canal, the above-named collieries, Furnace and the three tramways are clearly depicted on both this plan and the Ordnance Survey map of 1830 (Ordnance Survey 1" to the mile Old Series, Sheet 37, 1830), the latter labelled as 'railroads'. Tywyn Bach common (labelled 'Morfa Bach Tywyn' in 1825) was still undeveloped, and is shown as dune-slacks all the way eastwards to Barnaby Pill. Gors and Pen-y-coed Farms still survived, and 2 additional farms are depicted between them, Achddu-uchaf and Achddu-isaf; Derwydd Cottages, between Pembrey Harbour and the present Burry Port, are also shown. A trackway followed by the present main east-west B4311 (Ashburnham Road) is depicted, with an isolated building labelled 'Coasting Pilot' on the site of the present public house of that name, but this is the only building shown within what is now Burry Port town. Pen-y-coed Farm disappeared during the subsequent growth of Burry Port town; Derwydd, Gors and Achddu survive at least as names. A further map of the 1820s (National Monuments Record, 'Sketch of the Mineral Property thro' which the Kidwelly Company's lines of Canals & Tramroads pass', n.d.) marks the Dyfatty Valley with the label 'Bowser's Level Mouth' ie. Cwm Capel Colliery.

Pembrey New Harbour - the beginnings of Burry Port, 1830 - 1840

It became apparent, almost immediately upon its completion, that Pembrey Harbour was excessively prone to silting and would prove unsuccessful. In addition, several colliery owners, agents and others realised that the harbour, like Kidwelly before it, would be unable to cope with the increasing traffic in coal. This breakaway group formed a separate company to build 'New Pembrey Harbour', ie. Burry Port Harbour. The company was established in 1825, by Act of Parliament, by an unknown syndicate (Nicholson, 1991, 126) but one in which the local landowner and industrialist Col. Christopher Pemberton appears to have played a leading role (Carmarthenshire Record Office Bowser 31, Bowser 33, Bowser 61). The Harbour Company appealed for money, in the press, on 3 August 1830, and acquired what was an area of Tywyn Bach common land 2000m east of the Old Harbour, where the Derwydd River and Nant Dyfatty entered the sea through dune slacks.

The Landscape

George Bowser had acquired a plot on Tywyn Bach immediately west of the Derwydd River, on land demised from the Ashburnham estate in 1810 and 1816. There, before 1824, he had built a Salt Works, on the site if the later 'Harbour View', and a residence, now 'Sandhurst' (National Library of Wales, Ashburnham II, 31/7). At a later date, but before 1830, he had also commenced a small manufactory later known as the 'Old Harbour Works'. His plot was partly claimed for the construction of the new harbour and led to much litigation between the harbour company, Bowser and Ashburnham (Carmarthenshire Record Office Bowser 61; National Library of Wales, Ashburnham II, 30/3).
(See also Appendix III, 'The Bowsers and Burry Port'.)

The Harbour

Burry Port Harbour was initially designed by the marine engineer Sir Joseph Banks (Nicholson, 1991, 129). It was established at the confluence of the Nant Dyfatty, which ran

from north to south, and the Derwydd River. The main, Outer Harbour was formed by deepening the Nant Dyfatty; the west-east flowing Derwydd river, whilst supplying, and influencing the alignment of the docks, was diverted to the south of the harbour and remained open until later in the 19th century.

Captain John Wedge, of nearby Goodig, took an interest in the selection of the site and with Banks himself was appointed resident engineer (Thomas, 1927, 49). However, great difficulties were encountered with both the design and the construction of the harbour. A copy of a plan of 1824 (National Library of Wales, Ashburnham II, 31/7), on the basis of which the Act of Parliament was passed, depicts the plan of the harbour as originally intended, showing to have been a narrow, rectangular cut running north-south, much narrower than the present Outer Harbour, and without a large scouring reservoir but with a dock or reservoir of occupying similar dimensions to the north; no breakwaters are shown. The plans were evidently adapted; the Outer Harbour was constructed with a weir and breakwaters (presumably those still present), but with great difficulties - the breakwaters were continually washed away and the walls of the harbour kept collapsing. Samuel and Robert Bowser, the sons of George Bowser on whose land the harbour encroached, supplied a steady stream of criticism and alternative plans (Carmarthenshire Record Office Bowser 31 and Bowser 53; Countryside Commission for Wales Collection), some of which appear to have been adopted.

The eastern breakwater was complete by February 1831, when the Outer Harbour was well advanced (Nicholson, 1991, 129). In April 1832 the harbour was declared as 'ready' (ibid.) but this was manifestly untrue and in 1833 yet another engineer was engaged, in the person of James Green (Carmarthenshire Record Office CH3), the civil engineer for the Kidwelly & Llanelly Canal and Tramroad Co.. According to Samuel Bowser (Carmarthenshire Record Office Bowser 53), one of the problems with the earlier designs was their ineffectiveness in clearing the Outer Harbour of silt. It appears that Green was responsible for introducing a reservoir, the present West Dock, into the designs, but was himself dismissed in early 1836 (Wakelin, n.d., 2). The harbour may possibly not have been finally opened until January 1836 when the *Ninus* of Scarborough berthed to take on anthracite (Nicholson, 1991, 130); by 1837 'the New Harbour... is so far advanced as to admit the entrance of vessels of up to 400 tons' (Minute to Carmarthenshire Record Office Cawdor Maps 2/44/415).

The opening of 1836 refers to the Outer Harbour only. It is clear from Green's proposed plans (Carmarthenshire Record Office CH3; Carmarthenshire Record Office Cawdor Maps 2/44/415) that the present West Dock, or 'Pond Clai', was designed as a floating harbour, with wharfage around three sides served by twin branches from the Kidwelly & Llanelly Canal, and incorporating the site of the present East Dock. The harbour as completed, however, appears to be depicted on the tithe map of 1839 (NLW, Parish of Pembrey, 1839) which suggests that it was divided by the present quay, into East and West Docks, from at least that date and that the West Dock served merely as a scouring reservoir.

Transport

Until 1849, the harbour was almost exclusively used for the export of coal, which was brought to the harbour from numerous sources including Cwm Capel and Gwscwm collieries (see above). It was unloaded from tramway tubs and stored in piles near the harbour walls.

Of those associated with the failed Old Pembrey Harbour, Thomas Gaunt was to abscond, and in 1840 all of Gaunt & Cos. industrial activities were put up for sale including the Old Harbour, Pembrey Canal, Furnace Iron Works, Gwscwm colliery, and other smaller pits (Nicholson, 1991, 127).). However, before 1835 his former partner George Bowser had, despite legal differences with the harbour company (see Appendix III) constructed a tramway to the New Harbour, on the site of the later railroad from his Cwm Capel colliery. Horses drew the trams up and they were conveyed down by gravity (Thomas, 1937, 16).

A tramway had been established in c.1826 to connect Llanelli with Pwll Quay (Thomas, 1937, 5) and a second tramway was constructed across the marshes east of the harbour, to Col. Pemberton's New Lodge Colliery. The Llanelli - Burry Port connection was completed in 1833-4 when the New Lodge - Pwll Quay tramway was built (Carmarthenshire Record Office

Cawdor 2/44). This connection 'was entirely destroyed by the sea' in the floods of January 1846 (Nicholson, 1991, 131); both the New Lodge and the Cwm Capel tramways went on, however, to form the basis of the harbourside lines that were later to develop (PRN 5349). They are both shown in maps of 1834 and c.1837 (Carmarthenshire Record Office Cawdor Maps 2/44/415; Carmarthenshire Record Office CH3), with a junction just to the north-east of the West Dock, from which point the united tramway ran down the eastern side of the Outer Harbour.

A link with the Kidwelly & Llanelly Canal had been anticipated from the first, and specifications were submitted to the canal Management Committee by the civil engineer James Green in July 1833 within which it was decided to substitute the Llanelli link with the New Lodge-Pwll-Llanelli tramway, terminating the canal at the New Harbour (Carmarthenshire Record Office Cawdor 2/44). However, it was not to reach the harbour until 1837 (Nicholson, 1991, 131). Furthermore, it is apparent from an undated plan by Green (Carmarthenshire Record Office Cawdor Maps 2/44/415) of c.1833 that even upon the completion of the link, work had yet to be undertaken to complete the remainder of the canal. From 1837-69 the canal carried virtually all the Gwendraeth Valley anthracite production which was brought down the canal in barges to a point, just east of the harbour, where it divided into a branch either side of the West Dock, as described above. The coal was unloaded from barges and stored in heaps on the dock-side; ships were then loaded from the heaps with baskets (Thomas, 1937, 4). Four horse-drawn iron barges, probably of rather later construction, still lie on the eastern breakwater of the harbour.

A third line of communication is shown on a plan of the harbour as intended, from 1834 (Carmarthenshire Record Office CH3). The present B4311 (Ashburnham Road), the main road from the west which skirts the northern side of the harbour, is marked as a 'proposed new Turnpike Road' following the line of the trackway depicted in 1825 and 1830 (se above). A number of meandering former roads and tracks are depicted underlying the intended harbour, leading from Tywyn Bach common within which it was built; the edge of the common roughly corresponds with the line of the proposed turnpike/B4311.

Services

The lighthouse was erected on the western breakwater in 1838 and still survives (Nicholson, 1991, 131-2). Until 1855 it may have marked the end of a shorter breakwater (National Library of Wales, Parish of Pembrey, 1839).

Other developments

Few buildings are depicted within the area now occupied by Burry Port town on earlier 19th century maps but the 'Coasting Pilot' was labelled in a map of 1830 (see above), while a 'Steam Mill' is marked and labelled on the site of the present Memorial Hall (Carmarthenshire Record Office, CH3; it is shown again in a map of 1854. A building is shown on the site of the 'Gors Farm' marked on earlier maps.

Consolidation, 1840 - 1864

Pembrey New Harbour had been renamed Burry Port Harbour in 1835, and gave its name to the evolving town (Nicholson, 1991, 130-131). The population of Pembrey parish, 2,650 in 1831, had risen to 2,850 by 1841 (Slater, 1850, 59). However, the urban infrastructure had yet to develop and no chapels or churches are listed in Trade Directories of 1850 (Hunt, 1850; Slater, 1850). The Coasting Pilot public house continued trading (Slater, 1850, 62), and the Steam Mill was still operational in 1854 (Carmarthenshire Record Office CRO/AE7), otherwise the central part of the present town was little developed.

Gaunt & Co. became bankrupt in 1842, and the Furnace Ironworks closed down (Thomas, 1937, 12). Their pits were taken over by John Stanley the following year (ibid.) However, throughout most of the 1840s only one colliery was at work in the parish (Hunt, 1850, 81) and according to 'Slater's Directory' of 1850 'collieries have for a time been suspended, but are

now in active operation' (Slater, 1850, 59); 'Colonel Pemberton, bituminous coal, Burry Port', is listed (Slater, 1850, 60). The Furnace Ironworks had also been reopened by 1850, as the 'Gwendraeth Iron Works' under the Gwendraeth Iron and Coal Co. (Hunt, 1850, 81, 84).

The industrial expansion of Burry Port began in earnest with the construction of the Copper Works, on the east side of the harbour, by Mason and Elkington in 1849. The surrounding area had been acquired by the New Harbour Co. in 1830 and was apparently earmarked for industrial development from the first (Thomas, 1937, 49) and a large industrial complex was to later develop. The west side of the harbour remained in Ashburnham estate ownership and was not available for development. A rail link came to Burry Port in 1852.

Mason and Elkington became the main developers of Burry Port. They took over Pemberton's New Lodge Colliery in 1850 (but gave it up by them in 1863), acquired Cwm Capel Colliery from the Bowser family in 1858 (Thomas, 1937, 16), and were chiefly responsible for the urban development of the town. They sponsored the development of worker housing on New Street, Glanmor Terrace, Morlan Terrace and Burrows Terrace north-west of the Copper Works, on land acquired by parliamentary enclosure and shown as the initial mark-out into lots on the award plan of 1854 (Carmarthenshire Record Office CRO/AE7). The Bowsers remained resident at Burry Port and were living at Harbour View (now 'Sandhurst') in 1860 (Carmarthenshire Record Office, Bowser 67).

The Harbour

The East Dock (PRN 5340) finally opened in 1840, as a wet-dock constructed under William McKiernon, later superintendent of both the harbour and the Kidwelly & Llanelly canal, from stone brought from his Gwar Mac ('Mac's Quarry') near Cwm Capel colliery (Nicholson, 1991, 134). At first it could berth vessels of up to 500 tons only (Hunt, 1850, 81). Three timber coal-wagon tippers were installed, two on the east side, still present in 1900, and one on the north. A steam crane is said to have been situated at the East Dock entrance to the Outer Harbour from at least 1867 (J. Nicholson, pers. Comm.).

Transport

The Kidwelly & Llanelly Canal remained as the chief transport link to the port's hinterland 1850 (Hunt, 1850, 81). However, the South Wales Railway line from Swansea to Carmarthen, through Burry Port, was under construction and the Llanelli to Burry Port railway embankment was built, under William McKiernon, between 1847 and 1850 (Nicholson, 1991); 1847 newspapers reported that the 'South Wales Railway is progressing at Llanelly... walling in the sands between Llanelly and Pembrey' (Thomas, 1937, 6). The establishment of the line truncated the turnpike (on the line of Ashburnham Road/B4311) that henceforth terminated at the Neptune Hotel, and closed both Pwll Quay and New Lodge colliery (ibid.). The line opened in August 1852 with Brunel travelling on first train (Nicholson, 1991, 134). It was broad gauge while the harbour tramways and colliery tracks were standard gauge. It was taken over by the GWR in August 1863 but remained broad gauge until 1872.

Burry Port railway station occupied its present location but was called 'Pembrey'. A plan of 1855 shows the station, while just west of the existing platform footbridge was a level crossing with gates (Carmarthenshire Record Office, Cawdor Maps 222, Plan No. 6), and tramways crossed the main line at Dyfatty and Snook's Crossings (Thomas, 1937 , 6).
In 1855, a railway was established by Mason and Elkington from their Cwm Capel colliery to Burry Port, on the site of Bowser's earlier tramway (Thomas, 1937, 16).

Industries

The Pembrey Copper Works, on the east side of the harbour, was commenced in 1849. It was managed by Alexander Parkes and from the 1850s onwards large quantities of copper ore were imported from both home and abroad *(Thomas, 1937, 15)*. *The chimney-stack, 280ft high, was completed in 1852 and was the 'highest stack in kingdom' (ibid.).* Large quantities of ore were discharged into the Outer Harbour, and also in spoil tips to the south of the works (J. Nicholson, *pers. comm*.). *Parkes left Burry Port in 1856 (Thomas, 1937, 16) but the*

Copper Works continued production and was extended.

George Bowser's saltworks was disused by at least 1855 (Carmarthenshire Record Office, Cawdor Maps 222), but his workshops, as the 'Old Harbor Works', continued operating into the 20th century (ibid.).

Services

The Customs House had been established between the two Dock sluices by 1850 (Hunt, 1850, 90) when a Harbourmaster's Office was also present (ibid.), probably at the present 'Harbour House'. A reading room was established by the company on the west side of the Outer Harbour in 1854-5 (Nicholson, 1991, 138) in a building that was taken over as a Dock office in 1891.

The Neptune Buildings (PRN 8674) were established as a hotel for seamen in 1841 and William McKiernon spent most of his life there until his death in 1881 (Nicholson, 1991, 134); Alexander Parkes was another resident (Thomas, 1937, 16). From at least 1857, it also provided accommodation for tourists visiting Pembrey for the sands and bathing (Nicholson, 1991, 134).

Expansion, 1864 - 1899

During the period 1864-1899 harbourside industries rapidly developed into an extensive complex. In addition, the west side of the harbour, which hitherto had been empty, was developed in 1890 when Lord Ashburnham himself opened a tinplate works.

It was also a period of great urban expansion. By 1875 '*Burry Port.... has of late years become a place of great trade and importance... and the village is rapidly assuming the proportions of a town'* (Worrall, 1875, 218). By 1880 housing had developed on the north side of Ashburnham Road, the present 'Seaview Terrace' being marked and labelled on the Ordnance Survey, 1:10560, First Edition of 1880. Silver Terrace had been developed, but Glanmor, Morlan and Burrows Terraces were still empty. Again the main impetus was from Mason & Elkington who built the Copper Works schools and opened Burry Port St Mary's Church in 1877 (Thomas, 1937, 16). The Burry Port Smelting Co. Ltd., established in 1865, built the houses in Silver Terrace (Thomas, 1937, 27*).* Two chapels had also been founded at Burry Port by 1875, Wesleyan and a Baptist (Worrall, 1875, 218).

Mason & Elkington also established a patent fuel manufactory at Burry Port (Worrall & Co., 1875, 225). They retired in 1884 and the Copper Works - the backbone of Burry Port - and Cwm Capel colliery, were continued by Elliot's Metal Co. (Thomas, 1937, 18).

However, coal-mining in the immediate vicinity was in decline. Stanley's New Pit closed in 1864 (Thomas, 1927, 40), but New Lodge Colliery was still operational in 1875 (Worrall, 1875, 225). Cwm Capel Colliery was abandoned by Elliot's Metal Co. In 1898 (Thomas, 1937, 16).

The Harbour

The harbour company was renamed the 'Burry Port and Gwendraeth Railway and Dock Company' in 1866 (see below) and managed the harbour until taken over by the GWR in 1923.

There was little development of the harbour and docks until 'improvements' were authorised in 1872 (Thomas, 1937, 7). By 1880 the East Dock had been equipped with with more tippers and railways (Ordnance Survey, 1:10560, First Edition, 1880), and was now capable of admitting vessels of 1000 tons burden (Kelly, 1895, 117) but the West Dock scouring reservoir had become an amorphous, sub-triagular pond shown with mudflats (Ordnance Survey, 1:10560, First Edition, 1880). In 1876 the foreshore land adjoining the harbour had

been purchased from the crown by the dock company (Thomas, 1937, 8) and by 1880 the Derwydd River had been entirely culverted.

The scouring reservoir was converted into the West Dock, mainly between 1872 and 1878; however, although the fittings were all in place by the later date, the dock was not finally opened until October 1888 (Nicholson, 1991, 135) and the first cargo was shipped in January 1889. It was also a floating dock with water-tight lock gate and a steel swing bridge. Masonry walls were built to the east and partly to the north, and timber stages projected from the long east wall and short south wall. It was available for ships of 1000-3000 tons burden, and featured a high level stage with steam cranes capable of loading vessels at any time of tide (Kelly, 1895, 117). A swing bridge connected the harbourside railway on both sides of the sluice (Nicholson, 1991, 135).

Transport

The Kidwelly & Llanelly canal had remained operational side-by-side with the South Wales line and minerals etc. had been brought direct to vessels side by railway tram (Worrall, 1875, 218).

However, In 1866 the Kidwelly & Llanelly Canal and Tramroad Company amalgamated with the Burry Port Harbour Co. as 'The Burry Port and Gwendraeth Valley Railway and Dock Company' (Thomas, 1937, 7) who, between 1865 and 1869, replaced the Kidwelly & Llanelly canal with a railway which ran alongside the canal all the way to Pontyberem and later to Cwmmmawr (Thomas, 1937, 7). A further branch of the railway replaced the earlier tramway up the valley of Nant Dyfatty to Cwm Capel Colliery and The old tramway to Pwll colliery was relaid before 1875 (Thomas, 1937, 8).

The line was for minerals and goods only and brought vastly increased quantities of coal to Burry Port, but was standard 4'8" gauge which entailed much unloading and unloading with the broad-gauge South Wales line (Nicholson, 1991, 135). Embanked sidings were established alongside the latter in 1870 to ease this process, and most of the harbourside lines were then fitted with a third rail to accommodate the broad gauge rolling stock (Thomas, 1937, 7). However, when the South Wales line converted to standard gauge in 1872, the harbour was faced with serious competition from rail (Nicholson, 1991).

Under the new company, with its resident harbour and railway superintendent, and dock master (Kelly, 1895, 118), the harbourside rail links, many of which were 3' gauge, proliferated. In addition, most of the trackways around the harbour, docks and industrial sites now represented by tarmac roadways had been established by 1880 (Ordnance Survey, 1:10560, First Edition, 1880).

Industries

The Copper Works expanded by 200% in area between 1864 (National Monuments Record*, 'Proposed Line of the Kidwelly & Llanelly Canal and Tramroad Company'*, c.1864) and 1880 (Ordnance Survey, 1:10560, First Edition, 1880).

In 1864 the Lead and Silver Works was commenced by the Burry Port Smelting Co. Ltd., opening in 1865 and known as the 'Blue Lead works'. It was not a success, and closed down in 1877 (Thomas, 1937, 27). The White Lead Works was begun in 1870 alongside the Blue Lead works by Messrs. Risley and Burgmann; later taken over by the Cambrian Metal Co. (ibid.). The Iron Foundry was established alongside the latter in 1874 but did not last long (Thomas, 1937, 27). All were supplied with rail links.

In 1879 a steam sawmill was established by Messrs. Williams and Powell to the north of the foundry, but was unsuccessful (Thomas, 1937, 27). There was also a smith's forge, near the Neptune Hotel, during the later 19th century (ibid.).

Tinplate, conveyed from Kidwelly Tinplate Works, was exported from Burry Port from 1885 onwards (Nicholson, 1991, 135). Trade increased when the Ashburnham Tinplate Works was

established on the western side of the harbour in 1889-90 (ibid.). At the same time, a pumping works was established pumping water from Gwendraeth along the old canal to Burry Port (Thomas, 1937 5).

Services

The present lifeboat station was established on the eastern pier in 1887.

The club and reading room were moved in 1891 to a new site north of the East Dock, given by the Burry Port and Gwendraeth Valley Railway Co.; It was 'open to the captains of ships, employees of the company and local works, and residents of Burry Port as may be admitted as members' (Kelly, 1895, 118). The old Reading Room became the Coastguard Station (Ordnance Survey, 1:2500, Second Edition, 1907); the new Reading Room itself was demolished in 1909.

'Harbour View', the Bowser residence (now 'Sandhurst'), had become an Inn by at least 1880 (Ordnance Survey, 1:10560, First Edition, 1880), run by George Bowser in 1895 (Kelly & Co., 1895, 118). It reverted to private use when the later Harbour View Hotel, itself now a private house since 1971, was licensed in 1896 (Nicholson, 1991, 130) having been rebuilt from the old saltworks

Other developments

Bowser's Old Harbour Workshops west of the Outer Harbour had been partly converted into cottages by at least 1880 (Ordnance Survey, 1:10560, First Edition, 1880), including the Harbourmaster's House. The two chapels established near the harbour have been mentioned above.

Decline, 1899 - 1998

Overall, the period 1899 - 1998 has been one of decline for Burry Port Harbour, beginning with the closure of the West Dock in 1899. However, this decline did not properly set in until after World War I; when the remaining local collieries were amalgamated as Pembrey Collieries Ltd. (Thomas, 1937, 18). It hastened after World War II. Most of the harbour fittings etc. were removed during the early 1980s.

The dock area and the surrounding land that was owned by the Burry Port and Gwendraeth Valley Railway and Dock Company passed to the GWR in 1923, and was nationalised under British Rail in 1948. Burry Port became an urban district and civil parish in 1903 (Kelly, 1926, 151); in the mid 1960s the British rail owned land became the property of Burry Port Urban District Council which was incorporated within Llanelli Borough Council in 1974 (Nicholson, 1991, 138). In the early 1980s the harbour area was landscaped under Llanelli Borough Council, the Outer Harbour was dredged, the section of Kidwelly & Llanelly Canal north of the docks was infilled, the remains of the rail network, which had already been largely removed, were removed/covered over, and most of the harbourside fixtures and fittings were removed. The latter were offered by the council, and the Llanelli Harbour Trust, to Trinity House, who refused then and they were scrapped (J. Nicholson, pers. comm.).

Since the mid 1990s the council, amalgamated as Carmarthenshire County Council, have treated Burry Port Harbour as one of the priority areas for their Millennium Coastal Park.

The harbour

The West Dock proved unsuccessful and, in 1900-1901, the dock gates were removed and the swing bridge was replaced by a fixed iron bridge and cofferdam. It returned to its function as a scouring reservoir (Nicholson, 1991, 135) and its slow contraction began. The cofferdam was demolished in 1972 (National Monuments Record), and a concrete bridge replaced the

bridge over the sluice in 1989-90 (Nicholson, 1991, 135).

Under the dynamic management of Arthur Morgan, General Manager of the Burry Port and Gwendraeth Valley Railway and Dock Company 1899-1925, Burry Port Harbour remained competitive during the first decade of the 20th century due largely to improvements at the East Dock. The timber coal-tippers were replaced, in 1904, by three hydraulic steel hoists (Ordnance Survey, 1:2500, Second Edition, 1907) powered by a contemporary generating plant. They were made by Tunnett and Walker & Co. of Leeds, who also installed a turntable, weighbridge, hydraulic capstan and a hydraulic crane of both sides of the dock (Nicholson, 1991, 136). New dock gates were fitted in 1905-6, allowing ships of up to 1800 tons to enter (ibid.).

Usage of the harbour declined after World War I and only one hoist remained in 1915 (Ordnance Survey, 1:2500, Edition of 1915). No stages or hoists are shown in later maps.

The battered sea-wall of both docks, and the Outer Harbour, had become unstable by the mid 20th century and was concreted over in the early 1960s (J. M Williams, Burry Port Harbourmaster, *pers. comm*.); the work was very poor quality and is now in poor condition.

Transport

Harbour lines had proliferated between 1880 and 1907, when they reached their maximum extent and a powerhouse and Engine Sheds had been built (Ordnance Survey, 1:2500, Second Edition, 1907). These were still largely in place in 1953 (Ordnance Survey, 1:10560, Provisional Edition, 1953), but much of the network had already been lost by 1969 (Ordnance Survey, 1:2500, Sheet SN 4400, 1969). Some harbour railway lines were visible during the 1970s, but were lost when the harbour area was landscaped during the early 1980s.

The main South Wales line station received the footbridge before 1907, but most of the Station buildings and fixtures had gone by 1969 (Ordnance Survey, 1:2500, Sheet SN 4400, 1969). The B4311 (Ashburnham Road) had finally been connected with Station Road by a bridge by 1907 (Ordnance Survey, 1:2500, Second Edition, 1907).

A rail passenger service from Burry Port to Pontyberem was established in 1909, and in 1913 was extended to Cwmmawr (Thomas, 1937, 8). The small station was built on the site of the 1907 Reading Room and Club; this had gone by the later 20th century.

Industries

The Copper Works had doubled in size between 1880 and 1907 but it closed in 1911, to be sold the following year (Nicholson, 1991, 134). It was dismantled, but the buildings were acquired in 1923 by Frickers Metal co. Ltd., zinc oxide manufacturers (Kelly, 1926, 153). Many of the original buildings had gone by 1953.

The Lead and Silver works closed down c,1900 and was dismantled by 1907 (Ordnance Survey, 1:2500, Second Edition, 1907). The original buildings were removed between 1921 and 1953 (Ordnance Survey, 1:10560, Provisional Edition, 1953), and before 1969 the present large machine/fitting shop had been constructed over the eastern half of the complex. (Ordnance Survey, 1:2500, Sheet SN 4400, 1969).

Pembrey White Lead Works closed between 1907 and 1921 and was a Builder's Yard from 1937 (Thomas, 1937, 27) until recently; it now houses the Millennium Coastal Park Harbour Interpretative Centre. In 1914-18 the Iron Foundry alongside White Lead Works reopened by a local company but closed in 1925 (Thomas, 1937, 27). It has been an engineering works since before 1969 (Ordnance Survey, 1:2500, Sheet SN 4400, 1969). The Steam Saw Mill had gone by 1907 (Ordnance Survey, 1:2500, Second Edition, 1907).

Milling continued at the Ashburnham Tinplate Works until the late 1940s, and was taken over as a shellfish packing plant in c.1950. The Old Harbour Workshops were operational until after 1907 (Ordnance Survey, 1:2500, Second Edition, 1907) but had gone by 1969

(Ordnance Survey, 1:2500, Sheet SN 4400, 1969).

The west side of the harbour was partially reorganised by the construction of Burry Port Power Station in 1952; it was demolished in 1991 (Nicholson, 1991, 138). The Ordnance Survey, 1:2500, Sheet SN 4400 of 1969 depicted several small industries in the vicinity of the Neptune Hotel labelled 'Engineering Works', 'Depot' and 'Works'. All, including the buildings, have gone.

Services

The Coastguard Station and Customs House were both demolished between 1953 and 1969. The lifeboat station was closed in 1914 but since 1973 has been operated by volunteers (Nicholson, 1991, 138).