

**ARCHAEOLEG CAMBRIA ARCHAEOLOGY
FIELD OPERATIONS**

**LAND AT MACHYNYS
LLANELLI**

ARCHAEOLOGICAL ASSESSMENT

Report prepared
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Report for

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LAND AT MACHYNYS LLANELLI

ARCHAEOLOGICAL ASSESSMENT

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LAND at MACHYNYS, LLANELLI ARCHAEOLOGICAL ASSESSMENT

INTRODUCTION

The Llanelli coastline is currently undergoing wholesale and massive re-modelling. Construction of the Coastal Millennium Park is transforming this former industrial centre and its environs into a variety of new leisure, business and housing developments. The plans for the park are extensive and far-reaching. They will change forever the landscape around Llanelli which has a legacy dating back to prehistory. This assessment covers c.150ha of that landscape and includes two distinctly different landscape types: Machynys, a former glacial island which was the site of a 17th century, or earlier, house and more latterly an area of industrial works and housing, and the reclaimed agricultural land, part of the former Llanelli Marshes, to the east.

The landscape around Llanelli is the result of several millennia of natural processes and human actions. It is a complex record of the past, reflecting the changing nature of the Llanelli region from early post-glacial forest, through rising sea levels, medieval and later land reclamation, later industrial development and decline to the more recent shift towards leisure centred activities.

THE ARCHAEOLOGY OF LANDSCAPE DEVELOPMENT

The idea of archaeology being the study of individual and unconnected sites has over recent years been replaced by a more landscape orientated approach. It is clear that the patterns of the modern landscape are the result of thousands of years of interaction between natural processes and human actions. Since the end of the last ice age, c.10,000 years ago, people have shaped and modified the landscape to suit their needs and the present landscape is the record of how those needs changed through time and how they were met.

Today there are few, if any, areas in Britain that remain unaffected by peoples' actions. Nowhere is this more evident than in the study area which, apart from Machynys bluff, is entirely artificial, created originally to provide agricultural land from the saltmarshes on the edge of the estuary. The reclamation of coastal marshes through a system of embankment and

drainage is known from around the world. In Britain there is evidence of coastal reclamation from the Romano-British period onwards (see for example Allen and Fulford 1986; Rippon 1996a, 39; Rippon 1996b: Dinnin 1997, 19-22; Champion *et al* 1997, 210). Known reclamation within the study area was carried out in from at least the early 18th century to the early-19th century, although there may have been earlier episodes. The study area has the characteristic appearance of a reclaimed coastal wetland, with regular fields bounded by water-filled ditches and crossed by sinuous channels of old water courses.

THE IMPORTANCE OF WETLAND LANDSCAPES

Wetlands have only been recognised as landscapes and ecosystems worthy of protection since the Ramsar Convention of 1971. Prior to that time they were little understood and undervalued. Similarly the archaeological potential of wetland areas was also unrealised until the early 1970s. Since then archaeological and ecological wetland conservation interests have developed in parallel, but until recently there was little contact between them (Page 1997, 2). Increased cooperation and consultation will lead to a deeper understanding of the character of wetlands and a more unified approach to their management. There is no doubt that archaeologists have much to learn from nature conservation bodies regarding wetland management, but at the same time it has to be emphasised that there are no areas of purely 'natural' wetland. All wetlands, and therefore their ecosystems, have been influenced, and in some cases created, by human actions. Therefore, those actions must be a central part of any discussion about wetland management. Furthermore, with wetlands, in particular coastal wetlands, coming under increasing development pressure it is important that all wetland conservation interests are integrated into a single wetland agenda (Cox *et al* 1996, vii-viii; Page 1996, 31) if these special landscapes are to be properly protected.

ARCHAEOLOGY AND WETLAND LANDSCAPES

Given that all landscapes are the result of peoples' actions what makes wetlands so important for archaeologists?

The principal factor is the survival, often in exceptional condition, of forms of organic evidence (e.g. wood, leather, cloth) not usually recoverable from dry sites. The waterlogged anaerobic conditions present within wetland sites prevent, or at least impede, the fungal and bacterial growth which would otherwise destroy that fragile evidence. Of equal importance, but much more widespread, is the palaeoenvironmental evidence, such as pollen, plant and insect remains, diatoms and foraminifera, preserved in the waterlogged deposits which provide contemporary evidence about former environmental conditions and landscapes (Page 1996, 1 & 1997, 3).

The wide range of evidence available on wetland sites allows a much broader, multi-disciplined approach to the study of wetland sites than is possible for dry sites. It provides an opportunity to use a combination of

traditional archaeological evidence (artifacts, structures, etc.) and environmental evidence to study in great detail how past human actions have affected the landscape. In some cases an object is both archaeological and environmental evidence (for example, a wooden bowl is both archaeological - the bowl - and environmental - the wood). Also the matrix surrounding the object contains contemporary environmental data (Coles 1995, 1). This unique combination of evidence means that it is often possible to gain a wider understanding of past activity on wetland sites than is generally possible for dry sites.

Recent studies of some of the Welsh coastal wetlands have demonstrated that these fragile and complex landscapes are coming under increasing pressures from development. It is no coincidence that the number of significant and spectacular sites and finds from the Severn Estuary have been made during a time of rapid development. The reclaimed land of coastal wetlands has many advantages for developers and is consequently much sought after. Some of the main attractions of coastal wetlands for developers are: a) they are flat, often derelict or abandoned and are generally perceived of as waste land of little value; b) they are cheap in relation to land in other areas; c) they are frequently close to existing transport links; d) they normally have little, if any, statutory protection; and e) coastal locations are attractive for business, housing and leisure developments. It must also be remembered that as well as development pressures, coastal areas are also suffering from the natural threats of rising sea levels and erosion.

PROJECT PROPOSALS

The Millennium Coastal Park is an on-going, multi-million pound re-generation project along the north shore of the Burry Inlet. The Park is being constructed in a series of individual and varied developments. This report includes the results of two separate but interconnected projects: i) proposals for an 18 hole golf course and driving range on land at Machynys and ii) a link road to connect the A484 with the recently constructed Coastal Link Road. Because the new link road will form the northern boundary of the golf course it was decided to combine the two projects to provide a more integrated and coherent approach to the assessment of this important landscape.

i) Golf course and driving range

A planning application (S/01848/RAB) was submitted by the Millennium Coastal Park Project (MCP) to Carmarthen County Council (CCC) in April 1999. Following consultation with Archaeoleg Cambria Archaeology (ACA) - Heritage Management, advisors to the Local Planning Authority (LPA), it was recommended that a desk-based assessment be undertaken on the area of the proposed course and a topographic survey be carried out on part of the site, namely Machynys House and curtilage, to allow adequate evaluation of the potential impact of the proposals on the archaeological resource.

li) Morfa - Berwick Link Road

Prior to submission of a planning application for a new link road from the Berwick Park roundabout on the A484 to Morfa roundabout on the recently constructed Coastal Link Road it was decided to carry out a pre-planning archaeological assessment of the route.

PROJECT OBJECTIVES

The project had a range of objectives:

- To determine, where possible, the development of the present landscape through a programme of documentary research and fieldwork.
- To identify, record and evaluate the individual sites, features and deposits within the landscape, with particular regard to the processes and sequence of reclamation of the Llanelli Marshes.
- To determine, as far as is possible, the development of the former site of the mansion, Machynys House, and its environs.
- To carry out a topographical survey of land around the Machynys House site to record the surviving structure and associated features.
- To assess the results of the above against the known proposals for the area and to provide recommendations for mitigatory measures.
- To prepare a report detailing the results of the project.

PROJECT METHODOLOGIES

The archaeological programme was split into three elements.

1. Documentary research.
2. Walkover survey.
3. Topographic survey of the Machynys House site.

Documentary research

A number of recent projects have been carried out on, or close to the assessment area, so much of the primary documentary and cartographic evidence had been collated and examined. Although this meant that much of the 'leg-work' of data collection had already been done, it was necessary for this study to re-examine some of the source material and to re-assess the conclusions of the earlier projects.

Walkover survey

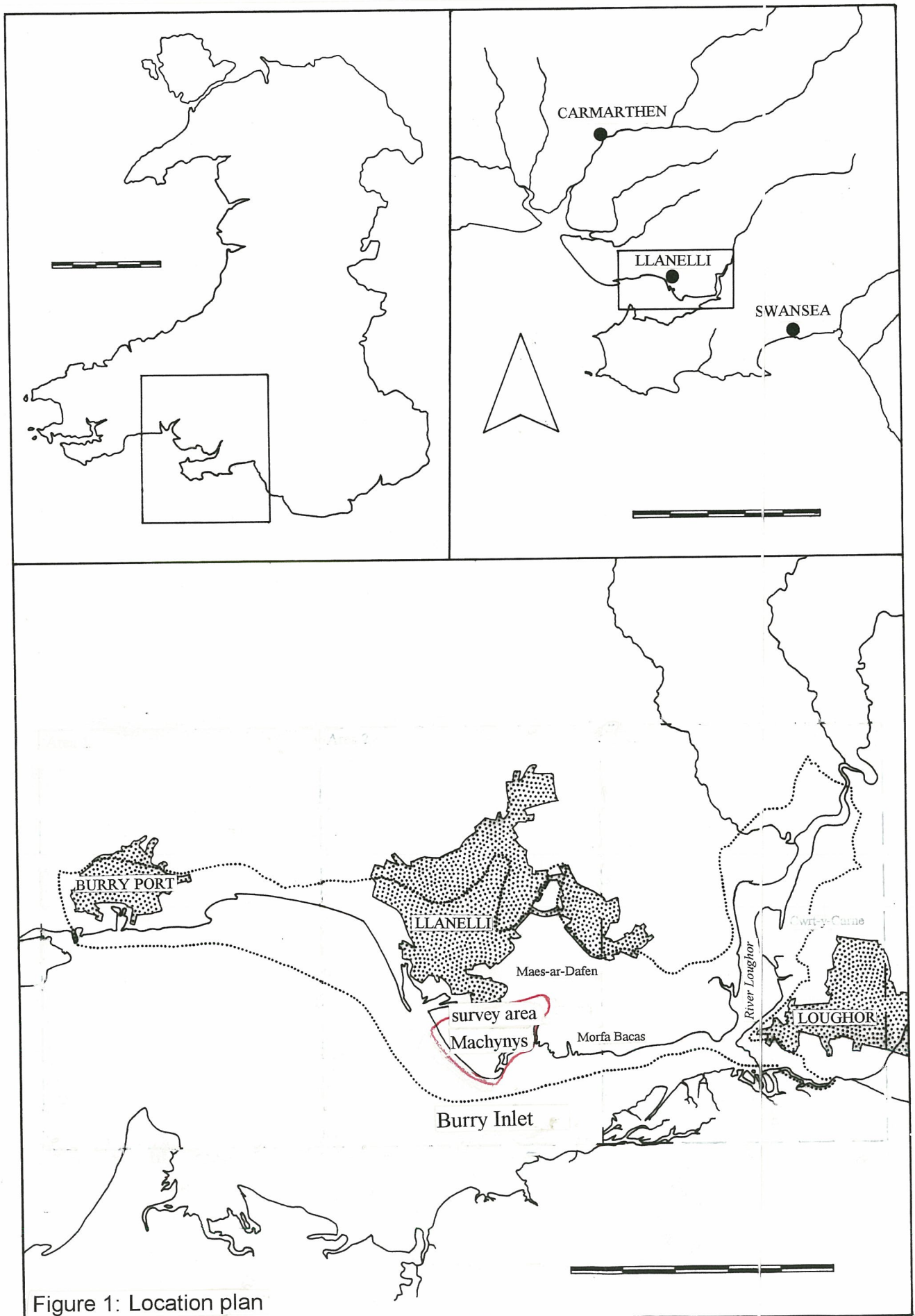
A walkover survey was undertaken to assess the condition of all sites, features and deposits identified by this and earlier projects within the study area. Particular attention was given to trying to establish how the system of sea defences and drainage of the eastern half of the study area was

developed and operated. Site recording was rapid, consisting in most cases of field notes, either in a site notebook or annotations on maps. Significant sites, features or deposits were recorded in more detail using sketch plans, written descriptions and photographs.

TOPOGRAPHICAL SURVEY

Investigation of the house site consisted of documentary searches and topographical survey. The searches were intended to trace the development of the house so the survey could be targeted at features that may have been associated with the house and its gardens, or towards areas where they may survive. A good combination of sources were examined and it has been possible to trace the development of the house from the mid 18th century. There are documentary references to an earlier house at Machynys, dating from at least the 14th century.

The survey was carried out on an area of 15ha using an Electronic Measuring Device (EDM) and datalogger. Survey data was downloaded to computer and edited in the Landscape programme. Final drawings edited and were output through FastCad and MapInfo. Site conditions for the survey were good, although the covering of long grass across the whole of Machynys probably obscured some features. It is not felt that this had a significant effect on the survey results.



THE STUDY AREA

THE PHYSICAL BACKGROUND

The complex geological and geomorphological evolution and formation of the Llanelli area has been well recorded and described by D Q Bowen in '*The Llanelli Landscape*' (1980). The following description relies heavily on that and other works in the area (James 1993; James and Morgan 1994; Page 1997).

Generally, the solid geology underlying the study area belongs to the Pennant Series of shales with coal, and sandstones of the Upper Carboniferous Coal Measures, overlain by drift deposits of glacial boulder clay with alluvium and, on the southern coastal littoral, wind blown sand deposits. The coal measures have undergone much folding, faulting, uplifting, erosional and depositional processes over geological time which have resulted in the complex stratification and landforms we see today.

To the north of the study area there is a discontinuous crescent of high ground, traceable from Pembrey to Bynea, which represents remnants of sea cliffs and raised beaches formed during the last interglacial some 125,000 years ago. This higher ground is composed of Carboniferous Sandstones of the Westphalian 'Coal Measures' and is dissected by small river valleys which drain into the Loughor and the Burry Inlet adding to their contemporary alluviation.

The geological key to an historio-topographic description of the Machynys area is an understanding of the effects of glacial processes on the landscape during the Pleistocene, some 18,000 years ago, and subsequent sea-level changes and depositional processes at work during the Holocene. The ice sheets of the last glaciation completely covered the Llanelli area, spreading from the north and northeast to the south and southwest, and deepened the floor of the Burry Estuary before infilling it with glacial deposits of sand, gravel, and boulder clay on its retreat. The ice retreated in stages, one of which is marked by the probable terminal moraine of linear glacial deposits from Machynys to Penclawdd, leaving behind deposits which survive today as islands of higher ground in the alluvial plain.

It has been observed (Page 1997) that the Holocene sedimentary sequence shows an overall trend of rising sea levels in and around the study area. Generally, the sequence is one of thick deposits of alluvium intercalated with peat beds and, even though the exact sequence is as yet unknown, it is clear that the peat deposits represent drier conditions. Whether those conditions were caused by periodic slowing or regression of sea-level rise or by the rate of sedimentation being more rapid than the rate of sea-level rise remains unclear. No previous observations on sea-level rise have been found for the study area, but work in other areas suggests a rise of about 25m since 9000 BP (radiocarbon years), with a subsequent rise of up to 3.7m since the Roman period (Heyworth and Kidson 1982, 110; Waddelove and Waddelove

1990). A generally accepted picture of sea-level rise shows a mid-Holocene deceleration in the rate of rise, leading to an advancing shoreline, which dates to around 6,000 BP radiocarbon years for the Severn Estuary (Scaife and Long 1995, 81). Analysis, therefore, of the deposits within the study area would reveal any local effects of this deceleration. Any problems which may arise in assessing the rate of sea-level rise in the area of Machynys do not appear to be complicated by any significant post-glaciation isostatic shift.

Borehole data indicates the presence of peat deposits between Burry Port and Bynea in localised pockets of growth. At Burry Port itself peat deposits up to 3.5m thick have been recorded (Archer 1968, 164) although that data appears to be exceptional (Page 1997). From Pwll eastwards the peat seems to occur in a wide undulating band lying between 2m OD and -5m OD, with the borehole data revealing two distinct types one of which is what may be termed as a true peat whilst the other is a mixed clayey peat or peaty clay (Page 1997). The relative quantities of peat to clay varied in these mixed deposits. The sequence recorded in all but one of the borehole logs examined during earlier surveys was that the true peat overlay the clayey peat deposit. The exception, however, is significant for the study area because it was the borehole data (Llanelli South Study, 1987) taken at Machynys which showed in places a sequence of true peat - clayey peat - true peat which suggests an episode of wetter conditions sandwiched between two drier periods. This limited evidence itself may indicate a breach or topping of the Machynys terminal moraine which resulted in the formation of a lagoon behind it. Although there are no dates available for the peat deposits at Machynys, samples recovered from a submerged forest at Morfa Bacas, to the east of the study area, gave a radiocarbon date of 4190 ± 80 BP (SWAN-238). More recent boreholes have revealed the presence of up to 3m thick peat beds along the southeast and eastern edges of the study area and thinner, but still significant beds across the whole site (Mott Macdonald 1995). The presence of peat beds provides an opportunity to analyse the development of the prehistoric landscape and to provide dated indicators of sea-level rise in the eastern part of Carmarthen Bay.

Holocene aggradation has formed the low-lying alluvial plains on either side of the Loughor Estuary, and fluvial deposits throughout the study area, and beyond, have been, and are still being, deposited and modified by the rivers Loughor, Lliw, Lliedi, Dafen, Morlais and their tributaries. The motion of these rivers across the alluvial plains results in a cyclical pattern of erosion and accretion and an ever changing littoral landscape. Extensive saltmarsh growth occurred on the northern bank of the Burry Inlet as the River Loughor formerly followed a more southerly course close to the Gower coast. Indeed, the Loughor estuary and Burry Inlet has the most extensive estuarine saltmarsh in Wales, and is the second largest area of saltmarsh in Britain (Smith and Yonow 1995, 38; Burd 1989, 151). Since about 1830, however, the Loughor has shifted its course further north and has started eroding the saltmarshes along the northern coastline, and has exposed 'islands' of glacial gravels in various locations. The construction of a training wall during the later 19th century, designed to scour and clean the entrance channel into

Llanelli Dock on the ebb tide, forced the River Loughor northwards and led to the rapid growth of the saltmarshes along the north Gower coast. Since the 1950s the wall has fallen into disrepair and has been breached in several places. As the wall deteriorates the main channel of the Loughor will begin to flow further south, its more usual and natural course, which will lead to erosion at some points along the south side of the estuary (Cramp *et al* 1996). This also means that there is likely to be accretion and an increase in the marshes on the Llanelli coast, with the saltmarsh advancing to somewhere close to its former extent.

Prior to land reclamation schemes the area was drained naturally by the numerous pills and creeks which feed the main rivers. This natural drainage was characteristically dendritic in nature and resulted in an irregular landscape. Aerial photographs show that much of the pattern of palaeo-channels and creeks are still visible, and some of those palaeo-channels are still traceable on the ground. It is quite remarkable, furthermore, how clearly the aerial photographs show the superimposition of the artificial landscape upon the irregular natural landscape.

Saltmarsh development is dependent upon certain conditions allowing a net accumulation of sediment, for example shelter from direct wave action, a gently sloping aspect, and a fairly open location. Although saltmarsh development begins below the Mean High Water Mark of Neap Tides, with colonisation of the mud by algae, it is only when the sediment is free from inundation for several days during Neap Tides that true saltmarsh development takes place. Those few tide-free days allow seedlings to germinate and halophytic plants to colonise the mud. Once the plants are established more sediment is trapped and the level of the saltmarsh is raised, this can be by as much as 1cm a year (Small 1978, 476). As the saltmarsh grows to seaward the tidal influence is decreased at the landward edge enabling a wider variety of plant species to thrive and more complex plant and animal communities to develop (Burd 1989, 7).

Estuarine saltmarshes, like those around the study area, are influenced by fresh and salt water and constantly renourished by water-borne nutrients making them amongst the most fertile ecosystems in the world (Davidson 1991, 2). The mix of fresh and salt water environments provides a range of ecozones ranging from the marine, through the intertidal zone, mudflats and saltmarsh to the back fens along the estuary edge, each with its own flora and fauna. It is that extraordinary richness and variety of plant and animal resources found in areas like the Burry Inlet and Loughor Estuary that has attracted people since the earliest of times (Page 1997, 1).

The present landscape: human actions

Early exploitation of estuaries would have been by Mesolithic hunter-gatherer-fisher groups taking advantage of the abundant resources that were available in a relatively small area. It is likely that the early exploitation of the area would have been seasonal to collect new plant growth, shellfish and the

returning fish and wildfowl stocks. A probable prehistoric shell midden (PRN 31237), containing cockle and mussel shells and the skull of a roe deer, recorded in the face of the eroding saltmarsh at Morfa Bacas to the east of the study area (at NGR SS54879793) shows the range of resources locally available in the past (Page 1997, 14).

As the methods of subsistence changed from hunting and gathering to a more sedentary farming lifestyle the wetlands would have played a more permanent, year-round role in the region's economy. Early Neolithic agriculture would have been on a small scale and it is likely to have been secondary to the continued use of the wild resources of the Burry Inlet and Loughor Estuary and its hinterland. The estuary would have formed only a part of the home range of the farming communities, who would also have exploited the valley slopes, the plateaus above the estuary and they may have even reached into the higher ground to the north. Along with the usual resources the saltmarshes were used to provide good grazing land for the domesticated animal stock. The value of saltmarshes for grazing is well known, and the marshes have been, and still are, much sought after land. Common grazing rights on the Burry Inlet marshes date back to the medieval period, it was recorded in the in the early 17th century that the "inhabitants and tenants....tyme owte of mynde have hadd and used to have of right Common for all manner of Beastes without any manner or stint" (Rees 1953, 261) on the marshes around Llanelli.

Prior to reclamation, grazing on the marshes would have been periodic and only possible between tides. It has been noted above that the earliest evidence for embankment and reclamation within the study area dates from the 17th or 18th century, although it had started in other parts of the Llanelli Marshes in the medieval period. At present there is no evidence from the study area of any medieval reclamation, but sampling and analysis of the sediment sequences may reveal when reclamation first took place and any pre-enclosure activity.

The process of land reclamation

Land reclamation is carried out in a three-stage process.

1. Construction of a sea defence along the coastline and along the major rivers crossing the area.
2. The modification of the minor rivers and creeks that cross the area into a rudimentary drainage system.
3. The construction of an artificial drainage system to fully control the flow of water across the embanked land.

Sea defences in the study area (Fig 2)

The present sea defences along the southern edge of the study area consist of a wall constructed from driven sheet steel which appears to have been driven into the existing earth banks. The steel sheeting is capped with

concrete and faced on either side by a sloping earth bank. The earliest known sea defences in the study area appear to date from the later 17th or early 18th century, two phases of embankment (Phases 1 and 2) are clearly shown on a map of Machynys Farm published in 1761 (CRO ref: Stepney mapbook 1761). The rest of the study area was enclosed by the Great Embankment constructed in 1808-9 (Phase 3), which ran from Penrhyngwyn Point on the eastern edge of Machynys to Maes-yr-Dafen, northeast of the study area.

Phase 1 - PRN 31688 - (pre-1761) - this bank still forms the southernmost 300m of the present sea wall, although, was originally much longer and extended into the industrialised area of the former Machynys Brick Works (PRN 9037; NGR SS51229833). To day it only survives for c.400m, with a much eroded section (c.100m long x c.1.7-2m high) surviving inside the modern sea wall. Penrhyngwyn Pill, which is the main watercourse draining the southern half of Machynys, empties through a modern concrete and brick sluice at NGR SS51519735. There may be remains of an earlier sluice incorporated into the modern one.

Phase 2 - PRN 31867 - (pre-1761) - originally this bank extended from a point approximately 500m from the southern end of the phase 1 bank it ran northeast before turning more northerly and terminating at c.NGR SS51509835. For its northernmost 500m the bank ran along the west bank of a large creek, which is still on the main drains in the study area. Only 400m-450m of the bank survive today, the southern 300m of the bank have been incorporated in to the modern sea wall but the rest has eroded and is obscured by thick hedgerow cover. A smaller section of the bank survives as a low mound at approximately NGR SS51629812, and a better preserved section runs from NGR SS51649815, around the eastern edge of a small pond and ends at c.NGR SS51639821.

Phase 3 - PRN 31684 - (1808-9) - this was known as the Great Embankment and extended from the Machynys Sea bank (Phase 2 bank at NGR SS51449762) to the Maesardaven Sea Bank, now beneath the Trostre Steelworks. Proposals for its construction were received by the Enclosure Commissioners in 1808 and the bank was built over the following two years, enclosing some 600 acres of former saltmarsh and tidal flats (James 1993,17). A stone and concrete sluice at NGR SS51829796 empties water through the bank and into a creek in the saltmarsh. The sluice structure appears to be largely original, although some refurbishment work has taken place, a concrete lintel outside the bank has 1953 stamped into it.

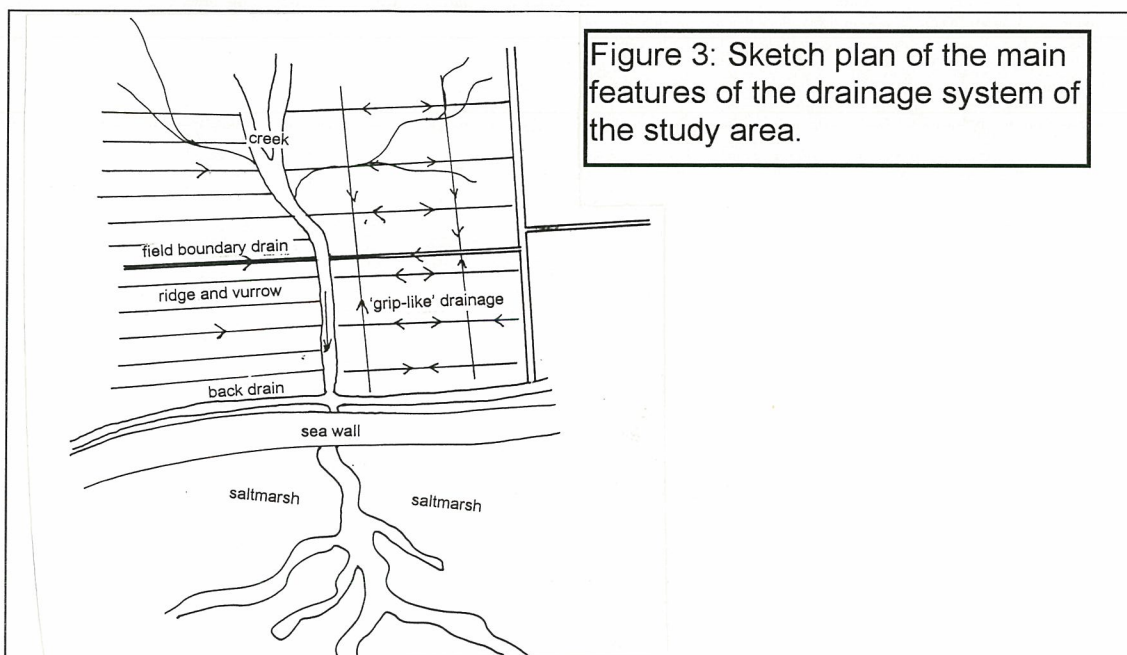
Drainage of the study area

Once embanked the enclosed land had to be drained and in the study area that was achieved through a complex, hierarchical system of drains that combined the natural channels of the former saltmarsh creeks with the artificial drains (fig 2). Previous study of the area (Page 1997, 12) has shown

area: a) natural drainage; b) enhanced natural drainage; and c) artificial drainage.

- a) Natural drainage consists of former saltmarsh creeks and watercourses that drained the unenclosed marshes. The channels are typically serpentine and dendritic in character and give the landscape an irregular appearance.
- b) Enhanced natural drainage channels are existing creeks and watercourses that have been modified in some way, i.e. recutting or rerouting, but still retain some natural characteristics. Enhancement of some the creeks would have allowed a certain amount of control over the movement of water and begun to stabilise the enclosed land.
- c) Artificial drainage is usually straight and uniform resulting in a regular, rectilinear pattern of fields and enclosures. It would have fully stabilised the enclosed land allowing year-round access and production. Artificial drainage includes both soft drainage (open drains) and hard drainage (Buried ceramic or plastic drains). It also includes the main field boundary drains and the field drains.

All three types of drains are evident within the study area. Figure 2 clearly shows the pattern of old tidal creeks and watercourses that existed in the saltmarsh prior to embankment, some of the channels can be traced from inside the Phase 1 bank and across the Phase 2 enclosure. In places, most notably in the Phase 2 enclosure the channels were substantial enough to form field boundaries. Many of the creeks show evidence of enhancement, particularly the creek that feeds out of the sluice in the Great Embankment, which has clearly had its course smoothed to improve the flow of water towards the sluice. The artificial drainage is a combination of field drains, the field boundary ditches, main drains and the back drain which runs along the rear of the sea bank.



The whole drainage system is a complex feat of engineering, but its operation is relatively simple (fig 3): field drains drain water into either the field boundary drains or the existing natural creeks which channel the water into the main drains and the back ditch and out through the sluices in the sea bank. The field drains in the area fall into three categories: i) ridge and vurnow; ii) a 'grip-like' chequer-board layout; and iii) modern buried ceramic and plastic drains (see information box overleaf for discussion). Field boundary ditches were generally 1m-2m wide and 1m-1.5 deep. Some of the boundary ditches had been cleaned out relatively recently, but others had silted up and become blocked with vegetation and some had been deliberately blocked to divert the water flow.

In some places the ridge and vurnow and grip-like drains have apparently been replaced, presumably by modern underground field drains. There is little surface evidence of either form surviving, although the vegetation growth may be obscuring slight ridges and shallow gullies. The terms 'ridge and vurnow' and 'grips' are not necessarily local terms, but in the absence of any other information it was decided to use them for this study in order to be consistent with other work in similar landscapes along the Severn Estuary Rippon 1996b. The ridge and vurnow in the study area can be mostly identified with embankment Phases 1 and 2, although, there may have been some associated with Phase 3 as well. The ridges in Phases 1 and 2 are generally wide spaced and not always straight or parallel, whilst those in Phase 3 are closer together and straighter, presumably because of the improved agricultural technology of the 19th century. A gridded layout of grip-like drainage is more common across the eastern half of Phase 3.

Descriptions of the major field drain types in the study area

'Ridge and vurnow'

Ridge and vurnow is a system of drainage that uses a series of parallel ridges to drain water from the field into the vurnows which channel it away to the field boundary ditches. The ridges are created by ploughing up and down a line always turning the sods to the centre of the ridge, thus raising the ridge and leaving the vurnow in between (Rippon 1996b, 50). This system is created specifically for drainage purposes unlike the similar 'ridge and furrow' which results from long-term ploughing for arable cultivation. The main difference between them is that ridge and vurnow is typically straight, whilst ridge and furrow has a characteristic reverse-S shape caused by the technical difficulties of medieval mouldboard ploughing which meant that the plough team had to start turning before reaching the end of the field (Rackham 1990, 79).

Grips

A grip is a channel cut into the surface of the field as opposed to a vurnow which is formed by raising the ground into ridges on either side. The grip system of drainage works on a grid formation where a series of parallel longitudinal grips drain water from the fields into cross grips which empty into the field boundary ditches. The drainage of the eastern end of the study area is 'grip-like' in its gridded layout, but there are some differences with the grip drainage recorded on the Severn Levels (Rippon 1996). The longitudinal drains of the study area are closer together than the grips in the Severn Levels, but it may be that the grip system replaced some earlier ridge and vurnow, or it was itself replaced by a later system of hard drainage, both eventualities would lead to the appearance of very close-packed longitudinal drains like that in the northern section of the area (fig 2).

LANDUSE OF THE RECLAIMED MARSHES

Agriculture

It has already been seen how agricultural expansion was the driving force behind the reclamation of the Llanelli Marshes and until recently there were three working farms in the area: Machynys Farm (PRN 6995; NGR SS50809822 - see below for a discussion of Machynys Farm); Machynys Fach Farm (PRN 37416; NGR SS51559786); and Ropewalk Farm (PRN 37417; NGR SS51769869). All three have been demolished and apart from the garden walls of Machynys Farm there is no above-ground evidence for any of them. The farms operated a mixed economy of arable and livestock production. On the mid-18th century estate map of Machynys Farm one of the fields is called Cae Rhyg (Rye Field) and another is called Llain-yr-Waren (warren strip), which indicates what some of the fields were used for. The warren may have been associated with an earlier house on the site rather than Machynys Farm.

Little is known of the development of Machynys Fach Farm, which probably dates from the early- to mid-19th century, or Ropewalk Farm, which may take its name from the nearby Morfa Rope Walk and date from the very late 19th century or 20th century. Farming in the area had largely ceased by the 1960s and the farms were abandoned and demolished during the late 1960s and early 1970s.

Industry

The physical and social character of Llanelli has been shaped by its industry. During the boom years of the 19th and early 20th centuries Llanelli was a prosperous and expanding town, new factories and industries were opening all the time and whole communities of new housing were built to accommodate the rapidly increasing workforce. The expansion was fueled by the coal industry, which attracted serious investors to the area during the 18th and 19th centuries, and serviced by the coastal trade from the harbours at Pembrey and Burry Port, landing places at Penrhyngwyn and the Dafen Pill (Symons 1979, 263; James 1993, 14) and later from the extensive docks at Llanelli. The combination of coal and good access to the sea made Llanelli the ideal location for the metal processing industry upon which the fortunes of the town depended for so many years. Llanelli was also popular for business development because at the time it had 'an abundance of flat land at low rent' (Jones 1995, 45-46) which allowed plenty of room for development and expansion. Jones is clearly referring here to the flat coastal marshes and reclaimed lands along the Llanelli coast and it provides an interesting historical parallel with the situation today when the former industrial sites and the coastal wetlands are again the focus for development.

The industrial development of Llanelli is a vast and bewildering subject and one that is far beyond the scope of this study, but even within the boundaries of the study area there was a wide variety of industry developing during the

19th century. On the OS 1st edition 6" map of 1891 there were iron works (30708) tinplate works (PRN 30709), chemical works (PRN 4673 & 34071) and brickworks (PRNs 31420 & 31423), plus the supporting infrastructure of tramways, railways, roads and housing. At that time the works buildings were for the most part confined to an area north and northeast of Machynys Farm, but by 1916 the Burry Works (PRN 30709) had been extended across the southeast corner of the farmyard and the South Wales Iron and Tinplate Works (PRN 30708) had expanded close to the northwest corner of the farm, which by now was surrounded on all but the southwest side.

New housing was another constant requirement to keep pace with the influx of new workers and on Machynys housing developed in two main centres, just north of Machynys Farm around Brick Row (34013) and Cliff Terrace (PRN 34016) and in an area to the south east at Machynys Fach Road (PRN 37415). These were fairly substantial communities with anything up to 30 houses, Cliff Terrace also had a school (PRN 34016), chapel (PRN 34017) and a mission room (PRN 31424). From the early 20th century onwards there was a steady decline in the coal and metal industries and despite the opening of Machynys Foundry in 1952 many of the factory sites were being cleared during the 1950s (Jones 1995, 49; Williams 1995, 18-19). By the mid 1960s the South Wales Iron and Tinplate Works (PRN 30708) had been demolished along with the houses around Brick Row and Cliff Terrace, only the chapel and a couple of houses remained. The last of the small works closed in the 1970s, ironically killed off by the construction of the Trostre Steel Works which still dominates southeast Llanelli, and the last of the housing and factories were levelled and the sites cleared.

Military activity

The southern end of Machynys was used as a rifle range from the 19th century until the 1970s. The butts (PRNs 31689 & 31691), mantelets (PRNs 31692 & 31693) and part of the magazine (PRN 31694) survive outside the sea bank at Penrhyngwyn Point. In 1804 it was reported in the Llanelli Chronicle that there was to be a subscription to collect funds for six 24-pounder guns to be placed on Machynys 'to protect the navigation of the Burry river', but it was never carried out (Hughes 1984, 1).

Other activity

Since the demolition of the factories and housing on Machynys and the abandonment of the farmland on the reclaimed and to the east the area has become a favourite leisure area, principally for walking and the cocklers gain access to some of the beds in the intertidal zone via Machynys. An isolation hospital (PRN 31686) was constructed on the marshes sometime during the 19th century at NGR SS51669834. This site was later a permanent travellers' site with purpose-built caravan bases and toilet blocks.

MACHYNYS HOUSE

A house was present at Machynys sometime in the late 16th or early 17th century. It was not shown on Saxton's map of Carmarthenshire drawn in 1578, although others in Llanelli were shown, and the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) say that the house was constructed in 1627 (RCAHMW 1917, 120). However, Jones (1987, 124) states that the property was purchased in that year by Walter Vaughan of Llanelli House, suggesting that the house was built before 1627. Lloyd (1986) described the house as an early double-pile, a style that was becoming popular in Wales in the later 16th and early 17th centuries (N Ludlow, *ACA - pers. comm*), which would support a construction date sometime between 1578 and 1627, but the earliest depiction of the house itself come from the 18th century and clearly shows the house to be a single-pile, L-shaped building. There is a much repeated theory that an early medieval monastery (PRN 11756) existed on the site in the 6th century, but the only evidence for it comes from single 18th century reference and until other, more reliable, evidence is found the existence of a monastery on the site is considered unlikely.

A house, however, may have been present on the site at an earlier date, Rees (1932) marked Machynys on his map of *South Wales and Borders in the Fourteenth Century* and there are documentary references to a farm at 'Maghenes' from that time (James 1993, 14). Jones (1987, 124) also relates a story of the rafters in the house having AD 1450 carved into them, but that reference appears to be anecdotal and in any case the reuse of building materials, particularly large structural elements, was common practice, so the rafters could have come from anywhere in the Llanelli area to be used in a new house.

The presence of a medieval dwelling may help to explain why Machynys House was built on the bluff in the first place, and it may also reveal something of the true nature of the house. A tidal island in the saltmarsh of an estuary is not the typical location for a house built according to past picturesque philosophy and the fact that the house was called Machynys Farm on the 1761 estate map (CRO ref: Stepney mapbook, 1761) only a few years after it was supposedly built suggests that it was always a working farmhouse. Therefore, it is possible that Machynys House was not a gentry mansion in the true sense, but rather a house built in contemporary style to replace, or to extend an existing farmhouse. The possibility of an earlier, medieval, farm on the site has significant implications for the chronology of embankment and drainage on the peninsula. If there was a medieval embankment it is likely to have been on the line of the phase 1 bank (see fig 2) as that is the natural line for a sea defence for the eastern side of the peninsular. However, any discussion of medieval activity must wait until firm evidence is recovered, possibly through investigation of the site itself.

The prominent position of the house on top of Machynys bluff made it a landmark for ships entering the estuary and it is clearly shown on 18th and 19th century navigation maps of the Burry Inlet and Loughor Estuary.

The standing remains

A topographic survey and structural analysis was carried out on the standing remains. The remains of the house, outbuildings and some of the garden walls were demolished in 1970 and today only a part of the southwest and southeast walls of the garden survive above ground (fig 4; plate 1). The walls were very overgrown which allowed only limited analysis of the structure and fabric of the walls. It was decided on-site that no vegetation would be removed from the walls because in places they seemed unstable and there is currently no conservation plan in place for consolidation.

The southwest wall is of rubble construction and c.23m long and up to 2.5m high. The northwest end of the wall is somewhat complex and contains a surviving gateway (in line with a central doorway in the southwest wall of the former house as shown in historic photographs - CRO ref DX/35/2) and evidence of other possible openings and features. The following description starts from the northwest end of the wall.

The corework of the return (northwest) wall is exposed at the extreme northwest end of the wall. A possible sill extends for c.1.2m from the internal edge of the return wall to the northwest edge of a quoined stop. The quoined stop, which was brick-lined on its interior face, the return wall and the possible sill may have formed an opening which was later blocked with a brick-built wall. A small narrow enclosure on the outer edge of the northwest garden wall is marked in this location on the 1st edition 6" map (fig 6) which lines up with the possible opening and the return wall: the quoined stop represents the end of the garden wall proper. From the quoined stop there is a 1.5-1.7m length of angular rubble face work which stops at a return with secondary brick quoins. The brick quoins were confined to the upper half of the wall and corresponded to an area of brick work, which appears to be infilling a former opening in the wall. There is no facework visible from the brick-quoined stop to the northern gate pillar.

The gateway comprises square brick-built pillars with stepped brick caps (plate 2). Sockets for the gate hinges survive on the inner face of the pillars. Pitched stone coping slopes away from both sides of the gate. The gate had been reduced in width sometime in the past by the insertion of brick blocking, 1m wide, on its southeast side. There is a small stretch of angular stone facework extending some 3m southeast from the brickwork: from this point onwards the facework is missing exposing the random rubble corework. The facework resumes again approximately 4m from the southeast end of the wall where it changes in character, here it comprises large rounded sandstone rubble. The southeast wall appears to be similar to the southeast end of the southwest wall with facework of large rounded stones.

Remnants of two apparently dry-stone enclosure walls which were present on the 1761 estate map were also recorded (fig 4).

Description of Machynys House from photographs

The house was demolished in 1970, but four photographs (CRO ref: DX/35/2) taken shortly before demolition allow some analysis of its final form. The photographs show the house to be a double-pile, twin-gabled structure with a connecting cross gable. The house was of masonry construction with a slate roof, it was rendered externally, so the stone-work was obscured. Each gable was topped by a plain rectangular chimney. All the openings were square-headed and appeared to date from the 18th or 19th centuries, although their form suggests that some may have been modified from earlier openings. The windows were single casement sashes. There are cellars, which have gained much local notoriety and tradition, which are said to have been arched with a cobbled floor (Roger Jones *pers. comm.*; Hughes 1985, 168).

Southwest wall - three-, or five-bayed, single-storey elevation, symmetrical about a central front door. This was known as the front of the house even though there was no path or road to the front gate and it was approached across a field (Roger Jones *pers. comm.*)

Northwest wall - twin-gabled, two-storey elevation. Central door in east gable and two upper storey windows close to and either side of the centre line between the gables.

Northeast wall - two-storey elevation with a slightly off-central doorway, a central upper storey window and a small square window under the eaves towards the north end. There was formerly an extension, constructed sometime in either the later 18th century or the 19th century extending eastwards from its southern end; the joist, roof line and purlin scars were clearly visible.

Southeast wall - twin-gabled elevation with symmetrical pattern of windows, three in each gable. Two upper and two lower storey windows arranged equi-distant and close to the centre line between the gable and two lower storey windows towards the outer edges.

Phases of construction (Figs 4,5 and 6)

From the photographs, maps and paintings depicting the house it has been possible to identify some of the phases of development of the site, at least from the 18th century onwards, although it has not been possible to closely date them.

In the 18th century the house was an L-shaped structure consisting of a northwest-southeast block with a northeast-southwest wing extending from

the south end of its southwest wall. An 18th century painting of the farm, on view in the Parc Howard Gallery, Llanelli, showed the house from the northeast side. The painting shows the northeast gable wall and the northeast wall of the northwest-southeast block. The gable wall had four windows, two upper and two lower, arranged in a regular and symmetrical pattern, whilst the northeast wall had a row of four upper windows, but no openings shown in the lower floor; a wall running at 90 degrees from the house may have obscured the ground floor openings from the artist. All the windows were tall square-headed openings and they were similar to those in the photographs of the house just prior to demolition. Two central chimneys, which may have been hexagonal, that extended through the northeast roof slope indicated the presence of fireplaces in the northeast wall. The chimneys were flanked by two dormer windows for the attic rooms. Only two upper windows and one lower window were visible on the northwest wall of the northeast-southwest wing, the rest of the wall was obscured by a small stone-built building. The windows were of identical to those in the rest of the house.

The painting also showed a range of stone-built outbuildings to the east of the house and three other small buildings to the north and west. On a 1761 estate map of the farm (CRO ref: Stepney mapbook 1761) a further range of outbuildings had been added southeast of the house. Both the painting and the estate map show the garden enclosure to the south of the house, the southwest and part of the southeast wall of which were surveyed during this project. In the painting there is a white decorative gate in the southeast wall which leads out to small avenue of poplar-like trees, which in turn leads into an east-west avenue of larger broad-leaved trees. There was supposed to have been an avenue running from Llanelli House all the way to Machynys House to join the Stepney family households, but it was not clear from the painting where the Machynys avenue led.

Massive changes took place between the mid 18th century and the 1st edition OS 6" maps of 1891 when the house was partly rebuilt as a square double-pile structure. It appears that the northeast-southwest block was demolished and new block built alongside the remaining northwest-southeast block. The chimneys and dormer windows in the northeast roofslope were probably removed and some of the openings in the upper floor blocked during this rebuilding. An extension was also built that connected the house to the first range of 18th century outbuildings. There were also some alterations to the enclosures and smaller outbuildings around the house and the large garden had been sub-divided into three separate compartments. To a large extent this was the final layout of the farm and buildings, there was only some very minor alterations in the early 20th century with one or two small sheds being built and the divisions in the garden being removed to make a large enclosure, which in the latter years of the farm was ploughed.

Another painting (reproduced in McKibbin 1995, 124) said to be of Machynys Farm is very difficult to reconcile with the archaeological and historical evidence and the first hand knowledge of people that lived and worked on the

farm. The date and provenance of the painting are unclear at present and its value as evidence for the development of the farm is uncertain.

Following the abandonment of agriculture on Machynys in the 1960s the site was sold and plans to turn the house into nightclub were abandoned and the place was derelict by the time it was demolished.

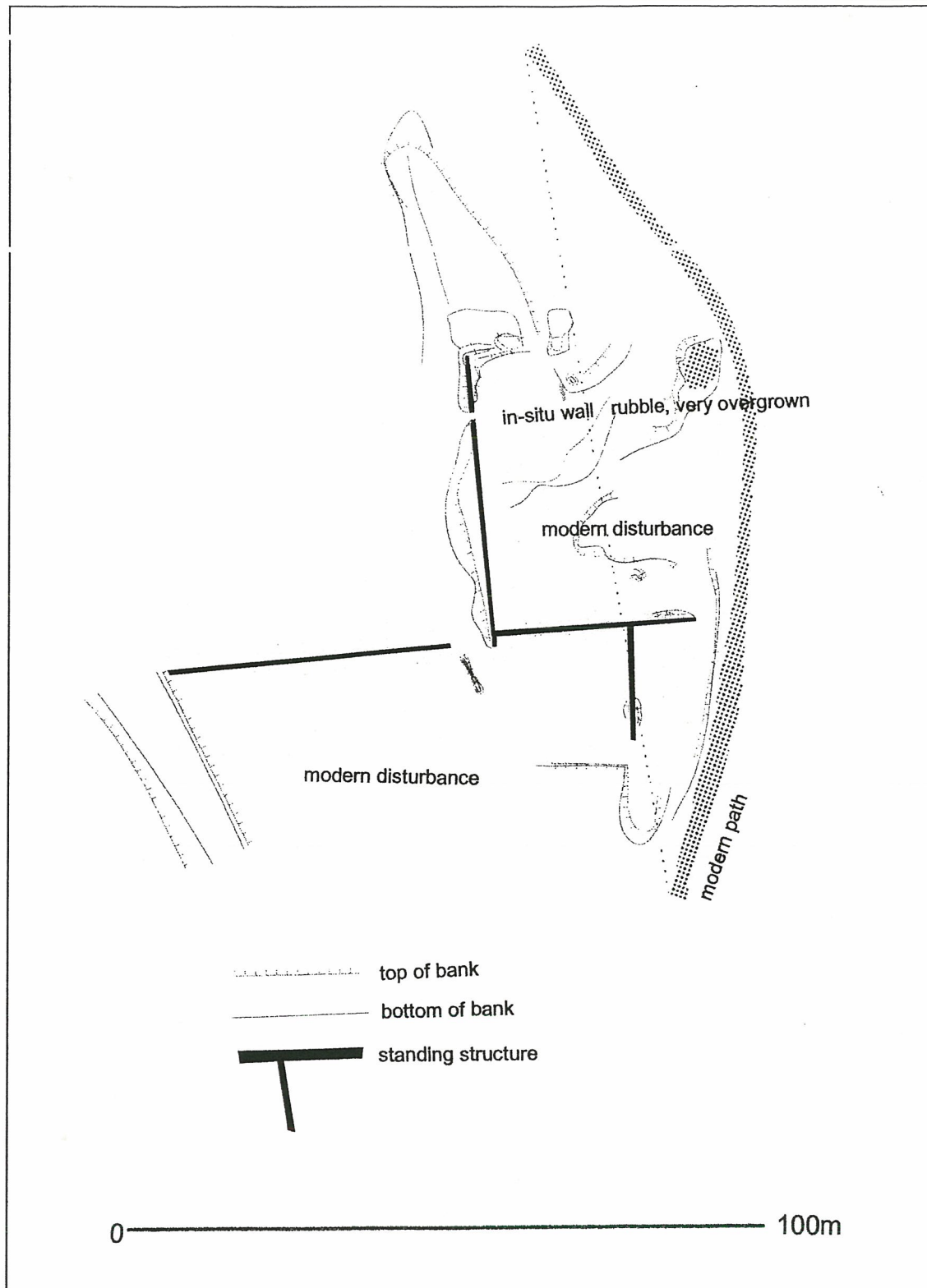


Figure 4: Topographical survey data

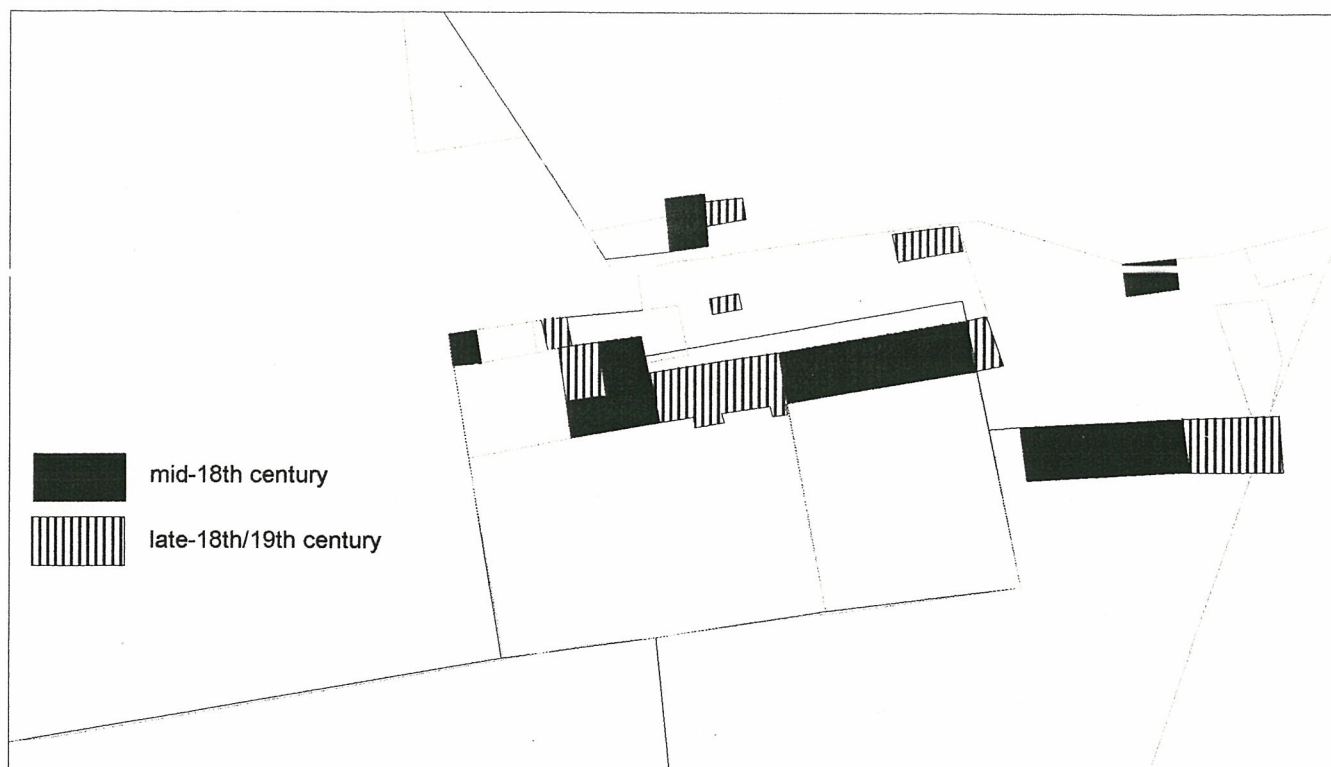


Figure 5: mid-18th century layout of Machynys Farm

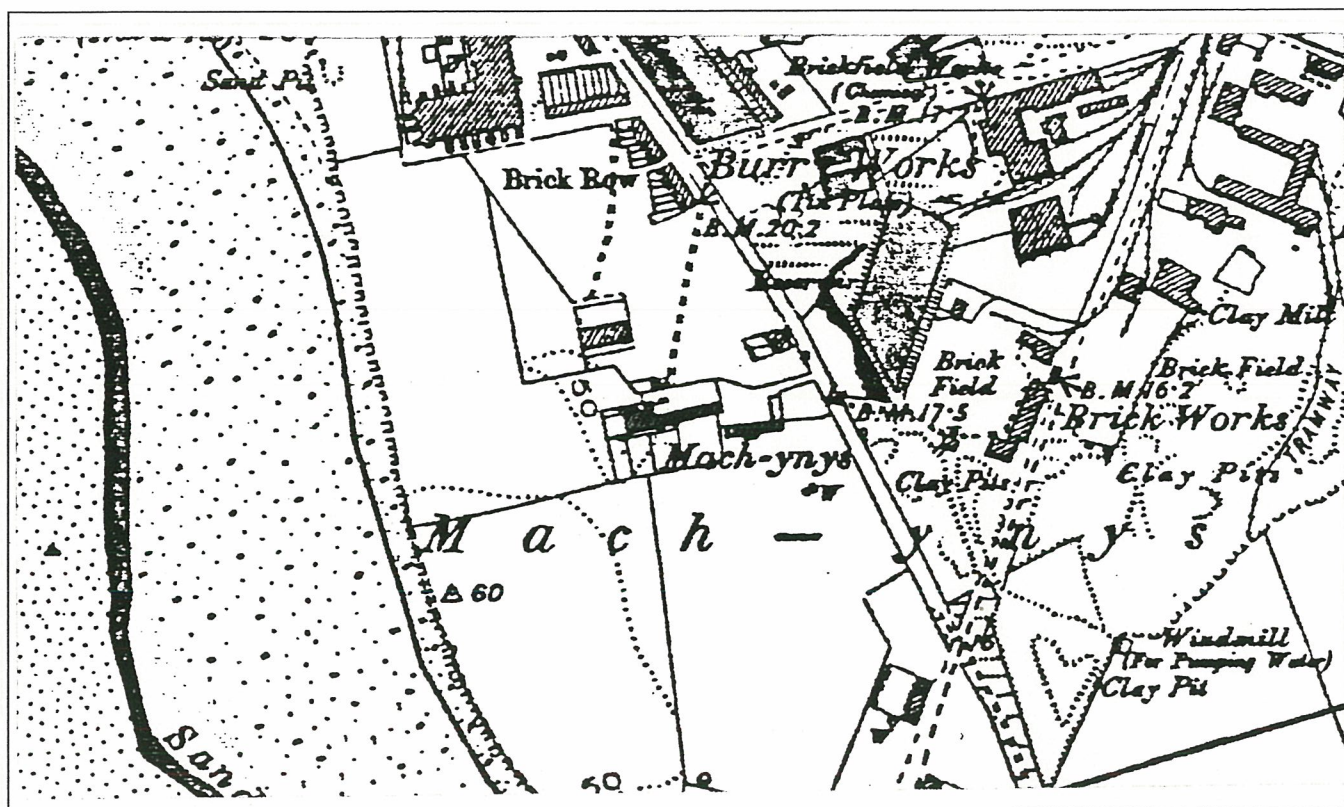


Figure 6: Machynys Farm, 1891. Note the industry to the northeast of the house and the housing beginning to develop to the north.

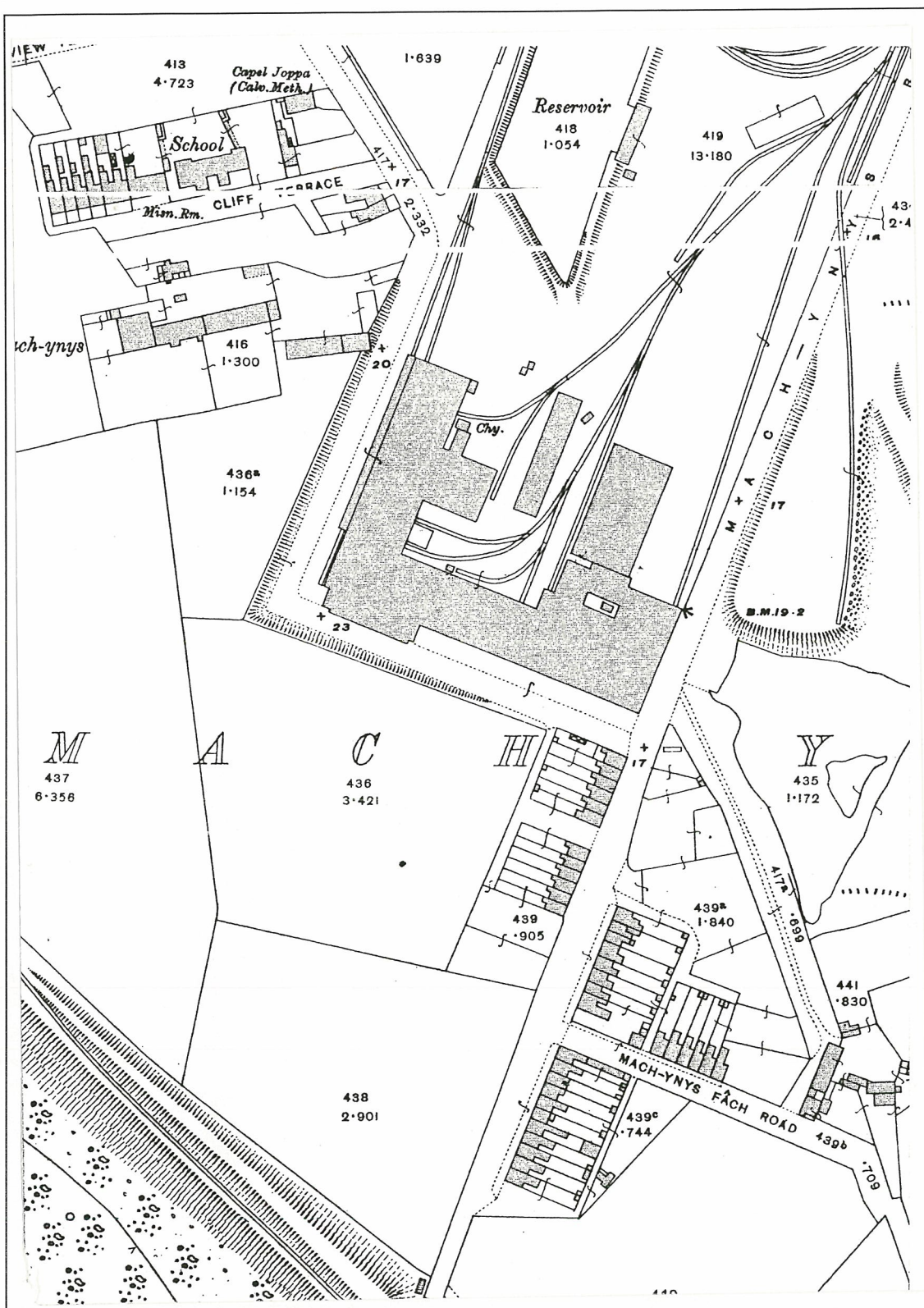


Figure 7: Machynys farm, 1916 (extract from OS 1st ed 1:2500). Note the extensive industrial development around the house and the housing in Cliff Terrace and Machynys Fach Road.

IMPACT OF THE PROPOSALS ON THE ARCHAEOLOGICAL RESOURCE

There is no doubt that until this study and the other recent work in this area the Llanelli wetlands, including Machynys, were undervalued and the historic importance of the area unrealised. It was less than ten years ago that the standing remains of Machynys House were said to be 'of negligible historic interest' (information from DRF files in the county SMR) and only five years ago that a presentation at a symposium on the state of the Burry Inlet and Loughor Estuary stated that there 'are no Ancient Monuments or features of particular historical or cultural interest along the frontage or on the hinterland' at Machynys (Barber and Thomas 1995, 91). Since then it has been shown how the area has been developed over time resulting in the present complex and important landscape and how, along with the added dimension of the environmental evidence contained within its buried deposits, it preserves a record of the development of Llanelli and its environment.

The projected land-take for the two projects covered by this assessment is c.150ha of former industrial and agricultural land. The proposed developments are by their nature intrusive and ultimately destructive, particularly in this case, where the landscape they cross is of such special interest. Both schemes have a range of potential impacts which are detailed below. The assessment was carried out in line with the recommendations laid out in *Golf in Dyfed* (Dyfed County Council 1993) and carried out in accordance with the *Standard and Guidance for Archaeological Desk-Based Assessments* (issued by the Institute of Field archaeologists in 1994).

IMPLICATIONS OF THE PROPOSED SCHEMES ON THE ARCHAEOLOGICAL RESOURCE

The Machynys House site lies outside the northern edge of the golf course and so will not be physically affected by the proposals, but one of the holes is very close to the southern garden wall and will have an impact on the setting of the house site.

Machynys Golf Course

Golf courses are currently a popular way of trying to turn unproductive land into an economically viable option, particularly within the agricultural industry where farmers are increasingly diversifying their interests. This is reflected in the rapid rise in the numbers of applications that have been made for new courses during the last 10-15 years. Golf courses are frequently seen as 'soft' development and a more preferable alternative to a built development, and aesthetically that may sometimes be true, but they are potentially more damaging to the archaeological resource. Few landscapes lend themselves naturally to golf course design or the techniques of construction and the scale of the courses require large amounts of land for the inevitable landscaping works. This is particularly true of flat reclaimed wetlands with their complex

network of field, ditches and banks which divide the area up into small parcels of land, their inherent lack of topography and their buried environmental component.

The potential implications of the scheme are many and varied and are summarized below.

1. Topographical features are the most commonly used method of introducing hazards to a golf course but in this instance they will completely alter the character of the area and divorce any surviving landscape features from their original context.
2. The remodelling required by these proposals will result in the loss or reshaping of most, if not all of the existing banks, hedges, ditches and creeks that make up what is now the only surviving section of the pre-industrial Llanelli landscape.
3. Removal of the hedgerow plants and trees could damage the buried deposits or any material they contain and could lead to the drying out of the upper deposits.
4. Earth moving operations, topsoil stripping, trenching or other deep cutting, will affect any surviving below ground structural remains, particularly around the site of the former terraced housing at Machynys Fach Road (PRN 37415) and the Burry Tinplate Works (PRN 30708). They will also remove some buried deposits and could in places lead to a long term drying out of the waterlogged conditions and the subsequent loss of environmental evidence.
5. Changes to the drainage pattern across the area may cause to changes in the underlying conditions of the buried deposits leading to the degradation or loss of sensitive environmental material.
6. The possibility of contaminants entering the water table and affecting the preservation conditions of the below ground deposits.
7. Construction of the clubhouse and other associated buildings will damage the buried deposits directly and may also influence the underground conditions over quite a wide area leading to changes in preservation conditions.
8. New planting could have an impact on the buried deposits. Some plants, such as reeds for example, have very probing roots and some species of trees and shrubs have root systems that can affect the underground drainage over quite a wide area. Roots can also introduce oxygen into buried deposits destroying the anaerobic conditions necessary for the preservation of organic material.

The Berwick Park-Morfa Link Road

The proposed link road runs for approximately 2km from the Berwick Park roundabout to the Morfa roundabout and has a similar range of potential impacts to the golf course, although on a much smaller scale. It too will remove and reshape parts of the landscape, although the losses will be confined to short sections of a number of field boundaries, the Great Embankment and the line of the old railway line. It is felt that whilst the road

will have an impact on the features it crosses that impact will be slight and the effects can be easily mitigated.

RECOMMENDATIONS for FURTHER EVALUATION AND SUGGESTED MITIGATION MEASURES

This study has shown that the Machynys landscape has a rich and varied history and that the proposed golf course and link road projects will have a significant impact on that landscape, in some cases totally remodelling and re-shaping it. The recommendations below are aimed at mitigating as far as is possible the impact of the schemes, they will also outline some potential opportunities for preservation, interpretation and presentation of this important landscape. The study area has many different facets that present unusual and difficult challenges for developers, planners and archaeologists alike if they are to achieve the Millennium Coastal Park's objectives of sympathetic and sustainable development.

Recommendations on the three elements of the assessment, Machynys House and its gardens, the golf course and the link road are given separately below, but it may be desirable to carry out the suggested works on one or more elements at the same time.

Machynys House

Surface examination during this survey showed that there are extensive remains of buried structures on the site as well as the standing walls. The following recommendations have been made to provide a strategy that not only offers long-term protection for the site, but also provides opportunities for interpretation and presentation within the Park.

- The standing remains of the walled garden and gateway should be retained, cleared of vegetation and consolidation work carried out where necessary to make the exposed structure safe.
- Trial trenching and test pitting should be undertaken on the site of the house and on the suspected positions of the former outbuildings to determine, where possible, their extent, character, condition and date.
- A total area of up to 250m² should be excavated in a combination of trial trenches and test pits.
- The strong interest in the site creates possibilities for organized public and media access during the trial trenching, which could allow everybody to be a part of the discovery process. People would be present as new discoveries were made and the developing story of the site would be unfolding daily. An open, but controlled, excavation would attract many visitors and create and maintain an interest in this part of the Coastal Park.
- A review meeting should be held on site during the trial trenching to assess the potential for preservation and presentation of the site as part of the overall Millennium Coastal Park project. The review should take account of the public and media reaction to the excavation works to help decide on the nature and levels of any preservation and presentation of the site and how it links with other areas within the park and with the wider Llanelli community.

Depending on the final levels of presentation of the site it may be possible to combine the usual form of interpretive displays (panels and leaflets etc.) with newer and more unusual techniques such as video and tape presentations and computer reconstructions. These could include,

- video footage of the excavations and montages of old photographs of the site.
- taped testimony about farming life on Machynys and the marshes to the east to link with the excavation and photographic material.
- a history of the industry of the region through photographs, taped testimonies from the people who lived and worked on Machynys and map-based reconstructions.
- computer reconstructions of the development of Machynys from its glacial origins through its long and varied history to the present day as a way of linking the Millennium Coastal Park project with the changes of the past.
- This type of exciting display should include the wider landscape of the island and the marshes and could be situated in the planned Visitor Centre.

The proposed link road

The impact of the road is considered to be slight and its effects can be easily monitored. Therefore it is recommended that:

- an archaeological watching brief is carried out during road construction. Particular attention should be paid to the points at which the road crosses the Great Embankment and the old railway line.

The proposed golf course

The proposals for the golf course are the most wide ranging and they carry significant archaeological implications. The recommendations below are not to be considered a final solution, rather they should be a starting point for discussions about how best to accommodate the historical importance of the area in the current proposals. The philosophy behind them is to maintain the character of the area whilst providing opportunities for preservation, interpretation and presentation within the constraints of the golf course. It is hoped that they offer an interesting and innovative approach to the problems of managing a large-scale change of land use in a significant historic landscape.

Whatever the final course design the following observations aimed at preservation *in situ*, by record and by interpretation and presentation should be considered.

- No upstanding surface features should be introduced. The flatness of the area is a characteristic of reclaimed coastal wetlands and the course should be made to reflect, as far as possible, the special landscape in which it is being created.
 - Hazards and obstacles could be created by planting, which should be sympathetic to the existing flora of the area, rather than by means of topography.
 - The surviving lengths of the Phase 1 and 2 sea defences should be preserved. This will require some clearance and minor refurbishment works.
 - The lines of the lost sections of sea banks could be delineated by planting, perhaps some form of low bushes or shrubs, so the layout and extent of the early sea defences can be easily understood and appreciated.
 - The major creeks and drains should be retained as surface features.
 - Pre-construction works trial trenching should be carried out to assess the nature of any surviving buried features of the industrial past and to define their extents and character. This should concentrate on the Machynys Fach Road area, but could include the area around Cliff Terrace to the north of Machynys House at this stage.
 - Trial trenching should be carried out on the site of the former Isolation Hospital to assess the survival and extent of any buried remains.
 - Trial trenches on the bluff, in areas to be affected by the groundworks for the golf course to assess the potential of earlier, possibly prehistoric settlement.
 - A programme of boreholing along a transect running from Machynys bluff southeast and crossing the phase 1 and 2 sea defences and extending across the planned lake should be carried out to provide a profile of the buried deposits across the western half of the site.
 - Further boreholes should be sunk in the locations of the other lakes. These would not only provide information on the nature of the deposits to be directly affected by excavation of the lakes, they would also complement the samples taken from the main transect to provide good environmental coverage from across the study area.
 - The recovered material would be used to reconstruct past landforms through an agreed programme of environmental analysis and radiocarbon dating. Unlike the extensive geotechnical boreholing and test pitting previously carried out in the area the transect of boreholes would recover samples of the underlying deposits in a controlled way allowing them to be fully analysed. This would provide an environmental framework in which to determine the impact of the course.
 - Presentation of the industrial history could be combined with the presentation of the Machynys house site in the visitor centre and again taped testimony and photographs could be used to present this aspect of life on Machynys.
 - It may be possible to incorporate the ground plan of the Machynys Fach Road area into the golf course design by planting the lines of the streets and houses with grasses of different colours or variety. This may form enough of a contrast to allow the street pattern to be seen from the raised mound of Machynys House and allow some appreciation of the former vibrancy of life on the peninsula.
-
- The information contained on aerial photographs relating to the former drainage and land use of the area should be rectified and plotted onto a map of the area for use in interpretive material.
 - Interpretation panels and leaflets should be placed at strategic points around the course to explain the long and varied past of the area. Particular attention should be given to describing the processes of reclamation and identifying the major features from the separate phases.
 - The possible provision of personal headsets to give visitors a taped tour explaining the history of the area as they walk, or cycle along the public paths. The tapes would include all aspects of the region e.g. the natural development of the area, the cultural history and the natural history.

APPENDIX ONE: GAZETTEER OF SITES

PRN	SITE NAME	SITE TYPE	PERIOD
4656	Llanelli	Windmill	Post medieval
4662	Morfa foundry	Foundry	Post medieval
4673	Llanelli	Chemical works	Post medieval
6995	Machynys House	Dwelling	Post medieval
7744	Great Western Railway Dock	Scouring basin	Post medieval
8444	Llanelli GWR Turntable	Turntable	Post medieval
8765	GWR general offices	Office	Post medieval
8768	Richard Thomas' Wharf	Wharf	Post medieval
8770	GWR loco depot	Depot	Post medieval
8938	Morfa Tinplate Works	Tinplate works	Post medieval
8939	Morfa Patent Brickworks	Brickworks	Post medieval
8940	Morfa brickworks	Brickworks	Post medieval
9037	Machynys Brickworks	Brickworks	Post medieval
11756	Machynys	Monastery?	Dark age? Mediaeval?
24439	New Dock	Scouring reservoir	Post medieval
25373	Machynys	Dwelling	Mediaeval Post medieval
30708	South Wales Iron & Tinplate Works	Tinplate works	Post medieval
30709	Burry Tinplate Works	Tinplate works	Post medieval
30710	Cambrian Tinplate Works	Tinplate works	Post medieval
31418	Morfa	Building	Post medieval
31419	Machynys	Mill	Post medieval
31420	Brickfield	Brickworks	Post medieval
31422	Machynys	Groyne	Modern
31423	Machynys	Brickworks	Post medieval
31424	Machynys Mission Room	Mission room	Post medieval Modern
31425	Machynys	Lime kiln	Post medieval
31427	Machynys	Reservoir	Post medieval
31684	Morfa Mawr	Sea defences	Post medieval
31685	Morfa Mawr	Sea defences	Post medieval
31686	Morfa Mawr	Hospital	Post medieval
31687	Morfa Mawr	Sea defence	Post medieval
31688	Machynys	Sea defence	Post medieval
31689	Machynys	Rifle butts	Post medieval
31690	Machynys	Building-military	Post medieval
31691	Machynys	Rifle butts	Post medieval

31692	Machynys	Mantelet	Post medieval
31693	Machynys	Mantelet	Post medieval
31694	Machynys	Building-military	Post medieval
31695	Machynys	Building-military	Post medieval
31696	Machynys	Dwelling	Post medieval
31697	Morfa Mawr	Shaft	Post medieval Modern
31699	Machynys	Coal pit	Post medieval
34010	Machynys	Breakwater	Post medieval
34011	Machynys	Terrace	Post medieval Modern
34012	Machynys buildings	Terrace	Post medieval
34013	Brick Row	Terrace	Post medieval
34014	Machynys	Terrace	Post medieval modern
34015	Machynys	Terrace	Post medieval Modern
34016	Machynys	School	Post medieval Modern
34017	Capel Joppa	Chapel	Post medieval Modern
34018	Machynys	Reservoir	Post medieval Modern
34019	Machynys	Reservoir	Post medieval
34020	Machynys	Building	Post medieval Modern
34021	Machynys	Field system	Post medieval
34022	Machynys	Lake	Modern
34023	Machynys	Lake	Modern
34024	Morfa	Lime kiln	Post medieval
34025	Machynys	Sand pit	Post medieval
34026	Cambrian Tin Plate Works	Tinplate works	Post medieval
34027	Machynys	Coalyard	Post medieval
34028	Dock Terrace	Terrace	Post medieval
34070	Machynys	Clay pit	Post medieval
34071	Brickfield Chemical Works	Chemical works	Post medieval

APPENDIX TWO: PROJECT BRIEF AND SPECIFICATION

The project brief and the specification prepared to meet that brief are included here to allow assessment of the effectiveness of the methods used and the results obtained against the stated archaeological objectives and requirements.

PROJECT BRIEF

Brief for Archaeological Desk-top Assessment

LAND AT MACHYNYS , LLANELLI : CONSTRUCTION OF GOLF COURSE AND ARCHAEOLOGICAL INVESTIGATION OF SITE OF FORMER MANSION.

Prepared for: Millennium Coastal Park

Site Location: NGR SS 51 97

Planning application No. S/01840/RAB

This design brief is only valid for six months from the above date. After this period Archaeology Cambria Archaeology- Heritage Management should be contacted. Any specification resulting from this brief will only be considered for the same period. Please note that this document is written for archaeological project managers to facilitate the production of an archaeological specification of works, it is not a tender document. Any response to this brief should follow IFA Standards and Guidelines.

The project manager is strongly advised to visit the site before completing their specification as there may be implications for accurately costing the project. The project manager must consult the County Sites and Monuments Record held by Cambria Archaeology Heritage Management as part of the assessment.

Introduction

This Brief has been prepared for and at the request of the Millennium Coastal Park Project, charged by Carmarthenshire County Council to deliver the Coastal Park project. The Brief has been prepared by the Heritage management section of Cambria Archaeology, funded by Cadw-Welsh Historic Monuments to provide advice on archaeology and planning to the Planning Authorities and others in west Wales. It follows a working meeting held on 19th May 1999 at MCP offices, between Heather James and Louise Austin, Cambria Archaeology, Simon Power, of Ove Arup and Partners, and Mike Hogan, Millennium Coastal Park, at the request of the latter. This followed Cambria Archaeology's initial response to the MCP's planning application S/01840/RAB to Carmarthenshire County Council of 29th April

1999 in respect of the 'construction of golf course and driving range with associated water features being part of the Millennium Coastal Park Development'. Also circulated in advance of the meeting was a draft brief prepared by MCP for 'Machynys Archaeological Investigation'. At the meeting of 19th May it was agreed that an archaeological assessment should be undertaken in respect of the proposed development and archaeological investigation in support of the planning application and in advance of its determination.

Site Description

The brief includes two interrelated areas:

- i) The proposed 18 hole golf course which covers an area of approximately 130 hectares.
- ii) Machynys house and curtilage. This includes the elevated area in the north-western part of the proposal area.

The level and degree of assessment in the two areas will reflect their extent and known history.

The nature of the proposed development and archaeological requirements

The aim of the archaeological assessment is to identify sites, features and landforms of archaeological and historic landscape interest and those areas of buried archaeological potential. In addition it should establish their current condition and any inter-relationships between them. This will be to a sufficient level to allow appropriate enhancement, preservation or mitigation measures to be identified and undertaken within the framework of legislation, guidance and planning policies as well as the overall operating philosophy of sustainable development underpinning the Park.

The assessment will bring together documentary information already available, combined with a topographic survey of the Machynys Bluff and a walk over of the whole of the site to identify visible surviving remains.

Desk-top assessment - This research should:

1. Collate and assess relevant information from documentary sources including cartographic information held in the SMR, National Library of Wales, RCAHM(W) and other relevant collections.
2. Collate, assess and where appropriate rectify information from relevant aerial photographs.
3. Assess the topography and landuse of the area through maps and site visits.
4. Provide a detailed assessment of areas of archaeological potential and survival based on the above research and identify key locations where

investigation and recording would be required to mitigate the impact of the proposed development scheme.

Proposed Golf Course Development

Methodology

For the desktop stage of the Assessment, use should be made of the Dyfed Archaeological Trust's *Sites and Monuments Record* and a survey commissioned by The Countryside Council for Wales from Dyfed Archaeological Trust in 1992, 'Past landuse Survey of the Coastal Area South East of Llanelli'. The Carmarthenshire section of the SMR has been adopted by Carmarthenshire County Council as its archaeological record for planning purposes. A copy of the CCW Report is deposited in the SMR, at MCP offices and at the regional CCW Office in Llandeilo. Recent Cadw funded coastal and wetland rapid surveys have significantly enhanced the SMR in these areas. Work already undertaken therefore is considered adequate to cover the principal archaeological, cartographic and documentary sources.

Whilst some historic air photographs (notably the 1946 RAF vertical black and white survey) are available for inspection at both the SMR and the National Monuments Record Aberystwyth and Welsh Office Air photographs library, Cardiff and have already been utilised for the studies noted above, it is recommended that use also be made more recent colour vertical and oblique air photographs, including those in the possession of the MCP or held by CCW or the County Council, to help establish present condition of sites, features and landforms of archaeological and historical significance.

It is not envisaged that remote sensing surveys will be required at this stage in the assessment to further define areas of buried archaeological potential. Nevertheless it is important to establish the geological and geomorphological processes and deposits that have created and shaped the landform. A key study in this context is *The Llanelli Landscape* by D. Q. Bowen (published by Llanelli Borough Council in 1980). It will also be necessary to make the maximum use possible of all available borehole, test pit and any other below ground surveys; MCP and their consultant engineers will facilitate access to this information.

A rapid walkover survey to check for survival and condition of features will be required. In addition this field survey should make a preliminary classification of the relict sea defence banks, access roads and tracks, field boundaries, drainage ditches and any drainage or cultivation features within the fields - i.e. ridge and furrow and provide an outline explanation of how the relict sea defence, enclosure and drainage system functioned across the low-lying areas east of Machynys. The location of pre-enclosure tidal creeks and pills, particularly those with known historic uses for shipping should be identified. The assessment should attempt to evaluate the potential for buried wooden

structures or features (wrecks, wharves, fish-traps etc.) exposed in the sides of deep cut features, pin-pointing the most likely locations.

Machynys House and Curtilage

In their draft brief, MCP have identified the following objectives for archaeological survey and excavation of the site:

- Do the existing ruins have any value and importance or should they be demolished and the site made safe?
- Are there any features of the site which need to be exposed and preserved?
- Are there any remains of older housing and a monastery on the site and how should they be treated?
- What can and needs to be done with the site to preserve its character and importance within the Millennium Coastal Park?

Cambria Archaeology is in whole-hearted support of these aims and objectives. Whilst recognising the strong local belief in a 'monastery' and the cultural value of such traditional beliefs, we must state that we feel there is no good evidence for such an early phase or use to the site.

Machynys was certainly a medieval manor house and the strong tradition of vaulted cellars points to the interesting possibility that a medieval hall-house may have existed on the site. In addition, from the information already available within the SMR Cambria believes that the Machynys site has exciting potential for remains of late 17th/18th century garden features. Historical sources speak of a fine walled garden and an avenue of trees - this latter feature hints at more extensive park/garden features. Since it ceased to be a gentry mansion by the late 18th century and became a farm there is every possibility that early park or garden features might survive. Even assuming this was so, no doubt a full restoration would be unlikely. But Cambria Archaeology believes that any former terraces, walled enclosures and walks could be exposed and utilised in a sympathetic way. The prospect of an historic garden in such a striking coastal location within the Coastal Millennium Park would be a distinct asset not just to the Park but to the wider landscapes with which it is linked in different ways, notably the National Botanic Garden of Wales and from there Aberglasney and the Tywi Valley.

Methodology

The first stage of the initial assessment of the archaeological importance and potential of the Machynys site and its surrounds should be to gather existing documentary, cartographic and photographic evidence for its precise location, plan and extent and relate this to those features that survive on the ground. This process should start in the SMR.

Although summer vegetation is now obscuring slighter features an attempt should be made, by measurement from known features on both maps and on

the ground to work out where demolished walls and sites of outbuildings might be. Some vegetation clearance will be required to enable a ground contour and feature EDM survey to be undertaken. The contour survey will map contours at 25 cm intervals. During the survey an on site review will be held with representatives from MCP, Cambria Archaeology - Heritage Management and the planning authority present. This review will be held to enable the extent of 18th and 19th century mapped evidence to be identified on the ground. The date of the review will be agreed before the assessment is commenced.

The assessment should also include recommendations for detailed proposals for the next stage of a programme of sample ground clearance, trial trenching and test pitting, with a clear statement of objectives.

Requirements

The project must be undertaken by an archaeological team of recognised competence, fully experienced in work of this character and formally acknowledged by Archaeology Cambria Archaeology - Heritage Management (ACA-HM) the regional archaeological curators. Details, including the name, qualifications and experience of the project director and all other key project personnel (including specialist staff) will be communicated to ACA-HM as part of a **project specification**. The contractor will be expected to produce a reasonably detailed project specification although a full programme of works will not be required.

Arrangements of the long term storage and deposition of the archive must be agreed with ACA-HM before the commencement of fieldwork.

The site archive should conform to the NMR (W) agreed structure (guidelines available) and be deposited within an approved store (normally this will be the appropriate local museum and/or NMR) on completion of site analysis and publication.

Reporting

A full report of the assessment results should be prepared and presented to ACA-HM within 4 weeks of the completion of site works. A report shall be produced that is fully representative of the results of the Assessment.

For the Golf course site the report must include:

A succinct description of the principal stages since the Quaternary period of the development of the landscape of Machynys and the area of Llanelli marshes and a summary of the surviving sites, landforms and features indicating those stages in the present day landscape or their likely or possible location as buried features.

This statement should be accompanied by photocopies of the main, and readily available historic cartographic maps and marine charts which illustrate the above description, similarly photocopies if possible of air photographs and any ground photographs considered necessary to fully identify the location nature and condition of key features.

The report should include a Gazetteer, to SMR format of all existing records, enhanced records or new records of sites or features within the application areas.

The report should include, perhaps by means of an annotated plan or plans, with supporting text, a description and basic classification of the relict and functioning sea defence and drainage system. (It is recommended that a similar record made for the 'Swannery' by Chris Blandford Associates, and deposited in the SMR be consulted as a model.). If possible the plan or plans should be immediately compatible with those in use by the engineers and designers of the golf course, as a CAD drawing.

For Machynys House and curtilage the report must include:-

Location plan of identified features and structures in relation to the proposed development.

Where relevant profiles and plan drawings showing the results of the topographic survey including present ground level with Ordinance Datum, vertical and horizontal scale.

Mapped archaeological potential at least a scale of 1:500.

A model detailing surviving archaeological deposits, features and structures.

General

In addition two copies of the final report should be provided for the Sites and Monuments Record

ACA-HM is responsible for monitoring all archaeological work within the Carmarthenshire area. The contractor must inform ACA-HM in writing detailing proposed start dates for the project. Once notified a Project Record Number will be allocated prior to on site work commencing, to be used in all site records.

Any changes to the specification that the contractor may wish to make after approval should be communicated to the ACA HM and approved.

ACA HM should be kept regularly informed about developments both during the site works and subsequent post-excavation work.

PROJECT SPECIFICATION

Introduction

This project specification has been prepared by Archaeoleg Cambria Archaeology Field Operations in response to a brief set by the regional advisors to the LPA, Archaeoleg Cambria Archaeology - Heritage management and in accordance with the *Standard and Guidance for Archaeological Desk-Based Assessments* (Institute of Field Archaeologists, 1994).

Archaeoleg Cambria Archaeology Field Operations has considerable experience of this type of project and always operates to best professional practice. The conclusions will be based on a considered assessment of the collected data. Archaeoleg Cambria Archaeology Field Operations has its own Health and Safety Policy, and all works are covered by appropriate Employer's Liability and Public Liability Insurances. Copies of all are available on request.

The brief provided for this work is very detailed; it is not proposed to recite it here. All the work detailed in the brief will be undertaken and carried out under the following specification.

1. Project objectives

- 1.1 The examination of existing written, cartographic, pictorial and technical evidence to assess the character, extent, significance and vulnerability of the known archaeological resource within the survey area.
- 1.2 To identify new archaeological sites, features and deposits within the survey area, and to assess their character, extent, significance and vulnerability.
- 1.3 The identification of sites, features or deposits that require further archaeological investigation to fully assess their character, extent, significance and vulnerability.
- 1.4 Topographic survey of the area surrounding the remains of Machynys House.
- 1.5 The preparation of a report fully representative of the information recovered during 1.1, 1.2, 1.3 and 1.4, which places the archaeological resource of the survey area in its local, regional and national contexts and assesses the likely impact of the current proposals.
- 1.6 The preparation of a project archive in accordance with recognised standards and procedures.

2. Documentary and cartographic research

- 2.1 Search of the County Sites and Monuments Record and National Monuments Record for information on known sites within, and around, the survey area.
- 2.2 Search of cartographic sources held in national and county records offices and other repositories for archaeological information.
- 2.3 Searches of primary historic documents held in national and county records offices and other repositories for archaeological information.
- 2.4 Searches of secondary, published sources.
- 2.5 Searches of available technical data (i.e. borehole logs; geological survey data).
- 2.6 Examination of aerial photographic coverage.

3. Field visits

- 3.1 To review the current state of archaeological sites, features and deposits identified during the documentary research, with particular regard to the development of the reclaimed marshland to the east of Machynys.
- 3.2 To identify new archaeological sites, features and deposits, or areas that may contain them.
- 3.3 To carry out rapid recording of archaeological sites, features and deposits by photography, site notes and sketch plans.
- 3.4 To assess the vulnerability of archaeological sites, features and deposits.

4. Topographical survey of Machynys House

- 4.1 Documentary searches will be carried out to collate and assess the available map evidence for the development of Machynys House. A composite plan of the house and surroundings will be compiled using the collected evidence.
- 4.2 A topographical survey of the Machynys House site will be undertaken to record the visible evidence for the house and any associated features.
- 4.3 The survey data will be compared to the collated map evidence to try to, where possible, determine a function and date for the surveyed features.

- 4.4 Survey data will be collected using an EDM and cataloger and downloaded straight to computer. The data will be manipulated through AutoCad r14. Survey drawings will be linked to digital site data supplied by the client.

5. Review Meeting

- 5.1 A review meeting will take place following the documentary and cartographic survey and during the topographic survey. It is not possible to give a precise date for this meeting, though the last week of June has been timetabled for the topographic survey to be undertaken. Arrangements for a specific date will be made once the project commences.

6. Assessment and reporting

- 6.1 Information gathered during the documentary research and fieldwork will be collated into a project archive catalogued in accordance with the National Monuments Record's recommended procedures.
- 6.2 An assessment will be made of the information gathered during the documentary research and fieldwork.
- 6.3 A report that fully represents the information gathered during the documentary research and the fieldwork which details the potential impacts of the proposed scheme on the archaeological resource will be prepared. Any legal constraints such as, Scheduled Ancient Monuments will be identified in the report.
- 6.4 A summary report of the results of the project, excluding any confidential information, will be prepared for publication in an appropriate local, national, special interest or period-specific journal.
- 6.5 A copy of the report will be deposited with the County Sites and Monument Record and the National Monuments Record within six months of completion, unless otherwise requested.
- 6.5 The project archive will initially be held by Archaeoleg Cambria Archaeology Field Operations.

7. Staff

- 7.1 The Project Manager will be N A Page BA AIFA who has extensive experience of this type of project (See attached CV for summary of archaeological experience).

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Plate 1: The southwest garden wall from the southwest.



Plate 2: The gateway in the southwest garden wall. Mid- to late-18th century.