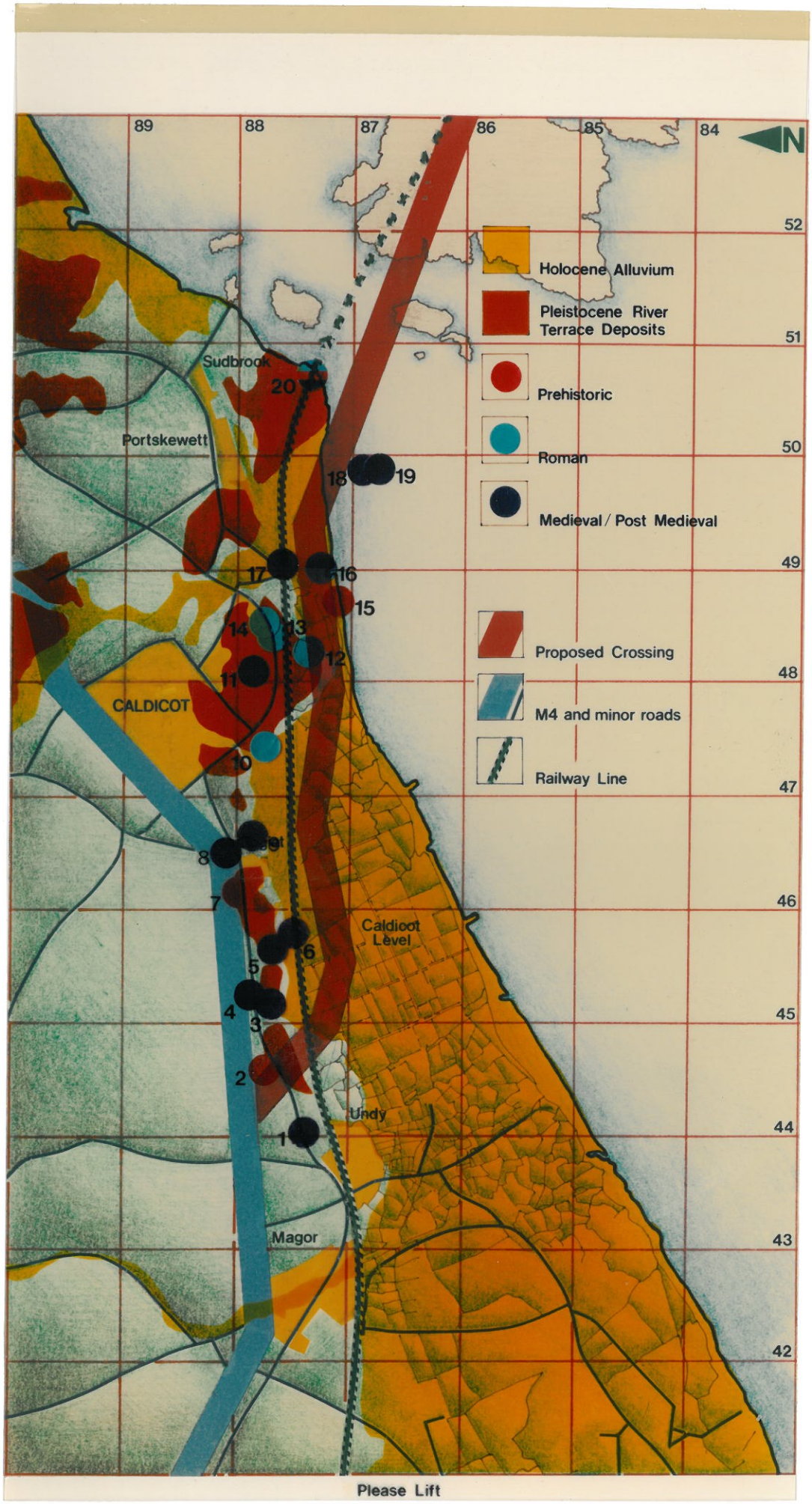
The Glamorgan-Gwent
Archaeological Trust Ltd

A Question Of Time

Archaeological Implications of the Second Severn Crossing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Holocene Alluvium
Pleistocene River Terrace Deposits
Prehistoric
Roman
Medieval / Post Medieval
Proposed Crossing
M4 and minor roads
Railway Line
Sudbrook
Portskewett
CALDICOT
Caldicot Level
Undy
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A Question of Time

Archaeological Implications of the Second Severn Crossing

1. INTRODUCTION

1.1 The proposed Second Severn Crossing is undoubtedly of great importance to the economic growth of the Principality. Nevertheless the route selected crosses an area of very great archaeological sensitivity. This preliminary paper is intended to outline the archaeological problem as far as the Welsh side of the crossing is concerned and to summarise the type of response required. It is not intended to be a detailed research design, which it is proposed will form the subject of a second paper.

1.2 The area concerned may be divided broadly into three distinct archaeological zones:-

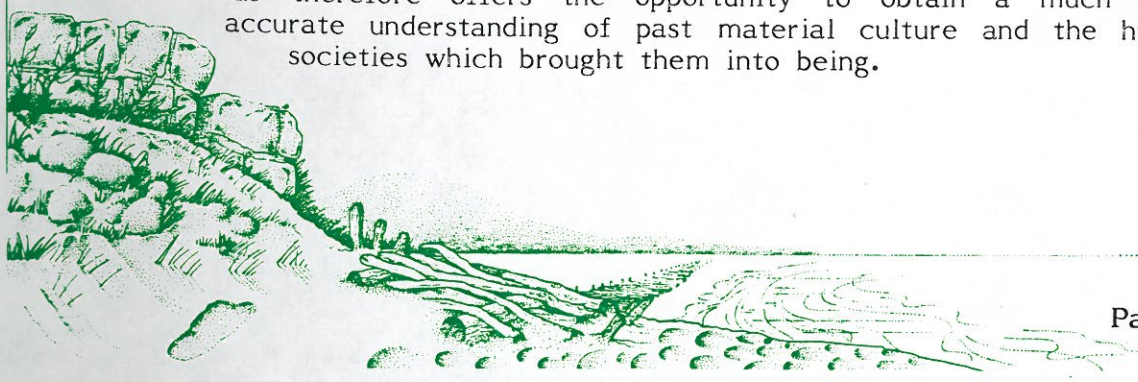
(A) The terrestrial dryland zone
(B) The terrestrial wetland zone
(C) The intertidal zone

The geographical extent of the area and the nature of these three zones will be defined in greater detail later. It is important to note however that zones B and C together (which constitute some 88% of the area affected on the Welsh side of the crossing) are an archaeological **wetland,** a term which demands description at the outset.

1.3 In archaeological terms, a wetland area is one in which the archaeological deposits are wholly or partially waterlogged. In these circumstances anaerobic conditions predominate, resulting in the preservation of organic materials which on 'dryland' sites will have deteriorated or decayed altogether. There are various types of wetland (lakes, marshes, peatbogs, fenlands, coasts and estuaries); in most cases these environments will be the result of complex depositional processes which have occurred over long periods of time. Unfortunately the nature of wetland deposits often severely limits the effectiveness of traditional archaeological survey techniques in detecting the archaeology contained within them. In addition, wetlands will be sensitive to changes in drainage regimes, which may destroy wet sites extremely rapidly.

1.4.1 The recovery of archaeological data from such contexts has several important advantages, amongst which the following may be highlighted:-

1.4.2 Traditional archaeology has for the most part relied upon archaeological data recovered from dryland sites. Established terminologies, such as the "three age system" (stone age, bronze age, iron age), and definitions of cultural systems based on typologies of flints, pots, metal artefacts and conspicuous funerary monuments, all reflect the type of data usually available, which consisted almost entirely of inorganic material. Ethnographers on the other hand have noted that the material culture of virtually all societies is overwhelmingly dominated by organic materials such as wood and textiles; the inorganic artefacts of stone, metal and ceramics only form a small part of the total artefact assemblage. The preservation of organic materials such as wood, leather, hides, textiles, basketry and floral and faunal remains in wetland areas therefore offers the opportunity to obtain a much more accurate understanding of past material culture and the human societies which brought them into being.



1.4.3 These same considerations mean that the actual circumstances of deposition (such as ritual, casual loss, rubbish discard) can be determined more readily, and the effects of post-depositional transforms (such as changes in agricultural regime or drainage) can be more easily assessed. Such studies of the depositional and post-depositional processes allow a radical re-evaluation of data previously recovered from dryland sites.

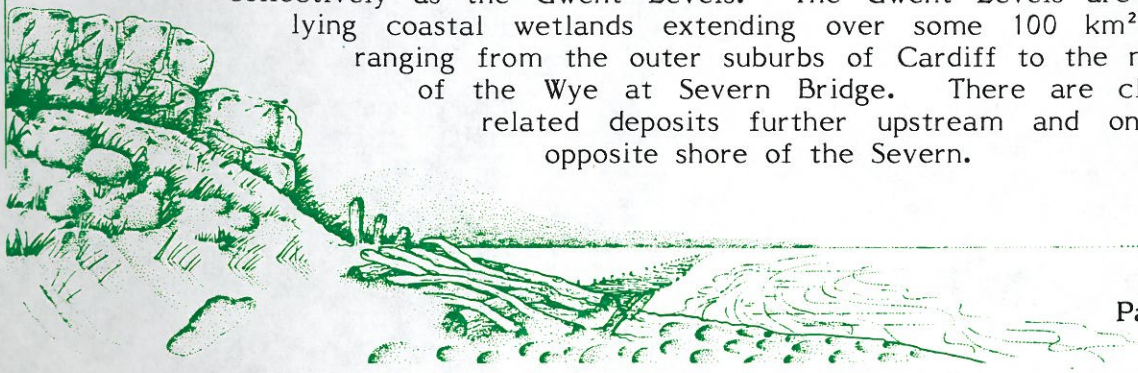
1.4.4 The processes involved in the development of wetland environments are complex, and may represent periods of relatively rapid or even sudden change as well as periods of more gradual change. The evidence for the nature of these changes is frequently registered within the deposits themselves, and may be recovered by studies of sediments and examination of floral and faunal remains which are subject to the same enhanced conditions for preservation as the archaeological artefacts. The range of research options is wide and diverse. For example, examination of species represented in insect populations will provide critical indications of micro-environments, pollen studies will reveal anthropogenic and climatic changes in the extent and type of ancient plant communities, whilst analysis of mollusca and foraminifera will show changes in habitat and salinity associated with changes in estuarine and fresh water deposition.

1.5 Since a major element of archaeology is the study of the relationship between man and the environment, the juxtaposition of cultural remains and environmental data allows studies of cultural change over time and the relationship of those changes to exploitation strategies evolved as a response to changing environments. Wetlands offer the best opportunity in both qualitative and quantitative terms to recover such data. Wetlands however comprise a relatively small proportion of the British Isles in geographical terms; they are particularly vulnerable to changes in land-use and drainage, and must be seen as a dwindling archaeological resource. Sensitive management is vital, and where loss is unavoidable it must be preceded by investigation - the concept of 'preservation by record'.

1.6 (**Note:** In the following paragraphs we refer to archaeological sites. Nevertheless the important concept alluded to above of the relationship between human societies and the environment as a **whole** means that in one sense the area with which this paper is concerned can be considered as (a part of) a **single** site, with varying chronological and spatial concentrations of artefacts (cultural debris) and ecofacts (evidence for palaeoenvironments). In terms of an archaeological research design however, the only areas which can be excluded from consideration are those where the data are known to have been destroyed already. Recovery of a coherent and useable data-set will be achieved by appropriate sampling strategies).

2. THE ARCHAEOLOGICAL STUDY AREA

2.1 The route of the crossing falls within the eastern half of the Caldicot Level, which together with the Wentlooge Level is referred to collectively as the Gwent Levels. The Gwent Levels are low-lying coastal wetlands extending over some 100 km² and ranging from the outer suburbs of Cardiff to the mouth of the Wye at Severn Bridge. There are closely related deposits further upstream and on the opposite shore of the Severn.



2.2 The proposed development will traverse the eastern half of the Caldicot Level from Sudbrook Point (ST 505 871) to Knollbury (ST 435 879). We propose here an **Archaeological Study Area** (hereinafter ASA) embracing the area in which buried archaeological deposits will be threatened by the development.

2.3 In view of the fact that details of the route have not yet been finalised, the ASA allows for a 0.5 km strip to the south of the route illustrated in the figure. The following grid squares, comprising an area of 17 km², are involved:- ST 4387, 4388, 4486, 4487, 4488, 4586, 4587, 4686, 4687, 4786, 4887, 4986, 4987, 5086, 5087.

2.4 The ASA does not take into account subsidiary developments, subsidiary constructions, or raw material extraction sites that may be associated with the main development. In the event of such additional undertakings the ASA would have to be extended accordingly. Similarly, the ASA does not take account of any major changes to the line of the route already selected.

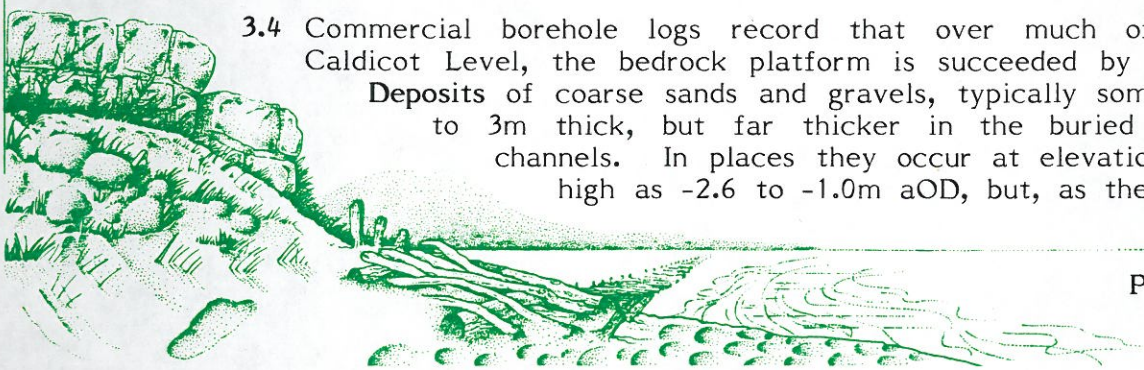
2.5 If the development were to result in major disruption to the existing drainage pattern of the Levels, then the ASA would have to be extended to include those wetland areas affected.

3. DEPOSITIONAL HISTORY OF THE STUDY AREA & ITS ENVIRONS

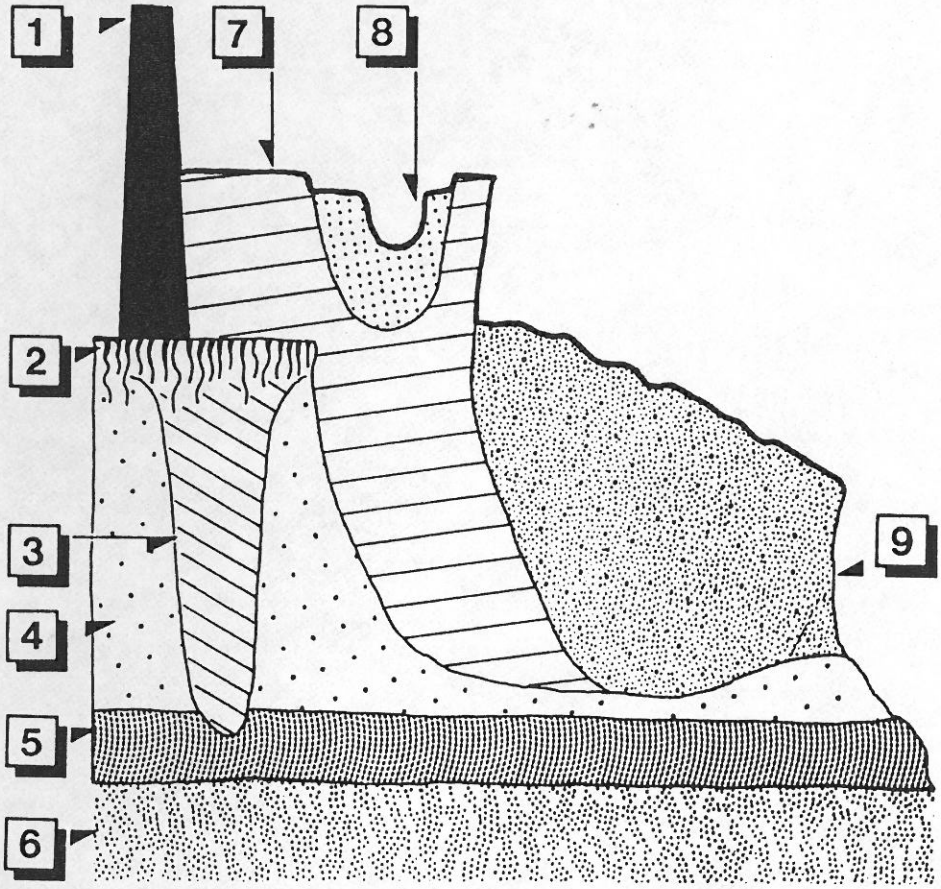
3.1 The analysis of the depositional history will form a vital part of the research design. Some geomorphological work and sedimentological studies have already been undertaken, but far more needs to be done to integrate these studies with the archaeological and palaeoenvironmental sequences. In the archaeological study of a specific settlement site the excavator will relate the chronological and spatial distribution of the various elements of the data-set to the stratigraphic sequence revealed by the series of soil contexts identified. Study of palaeoenvironments is no different, but the stratigraphy occupies a far wider area and its study will therefore demand a rigorous sampling strategy.

3.2 In essence, the area consists of a largely buried solid geology overlain by a series of Pleistocene and Holocene deposits.

3.3 The superficial deposits of the Caldicot Level overlie a dissected undulating **Bedrock Platform** (Silurian and Old Red Sandstone) sloping gently to the south. In the vicinities of the present Usk and Wye estuaries the platform is incised by buried river channels, in places exceeding a depth of -18m aOD; elsewhere the platform depth is in the region of -8m to -4m aOD. To the north the bedrock surface rises abruptly at the margin of the Levels, and the boundary slopes have in fact been identified as a former cliff line. The formation processes responsible for the platform have been variously interpreted as riverine erosion or as marine plantation during the Pleistocene.

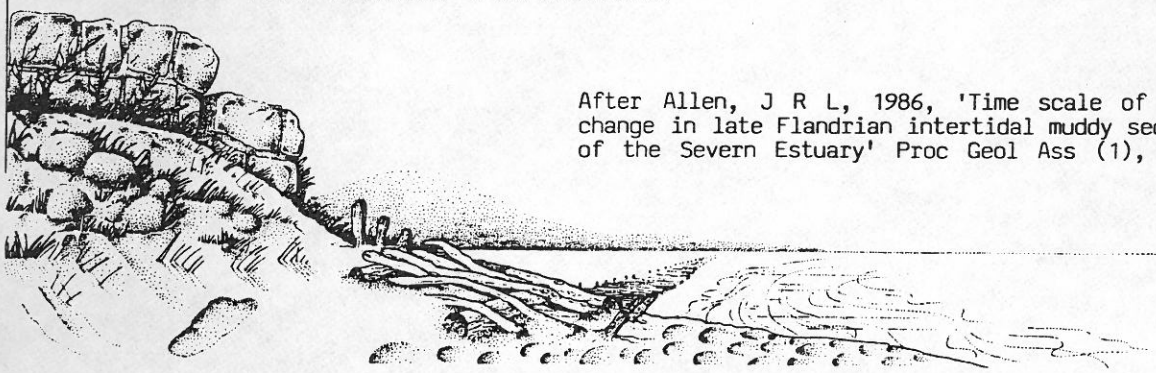


3.4 Commercial borehole logs record that over much of the Caldicot Level, the bedrock platform is succeeded by **Basal Deposits** of coarse sands and gravels, typically some 1.5 to 3m thick, but far thicker in the buried river channels. In places they occur at elevations as high as -2.6 to -1.0m aOD, but, as they are



A COMPOSITE POST-GLACIAL
STRATIGRAPHY OF THE GWENT LEVELS

1 Sea Bank
2 Wentlooge Palaeosol
3 Roman Drainage Ditch
4 Upper Wentlooge Formation Clay
5 Peat
6 Lower Wentlooge Formation Clay
7 Rumney Formation
8 Awre Formation
9 Northwick Formation



After Allen, J R L, 1986, 'Time scale of colour change in late Flandrian intertidal muddy sediments of the Severn Estuary' Proc Geol Ass (1), 23-28.

invariably overlain by several metres of Holocene waterlogged deposits, systematic study has rarely been possible. Until recently the date of the formation of these deposits was assigned to the last glacial or early post-glacial period, but recently amino acid racemisation studies carried out on molluscan samples from the coarse deposits underlying Llanwern have opened the possibility of a considerably earlier origin within the Pleistocene. The deposits may therefore be contemporary with the earliest indications of human presence in Wales.

3.5 The bedrock platform and the coarse basal deposits were drowned by Holocene sea-level rise, resulting in gradual alluviation of the Severn estuary, via the extensive depositions of silts along its margins. Recent studies of these sediments by J R L Allen and his colleagues have led to the identification of four discrete lithostratigraphic units which occur within the ASA. It is these units which form the Holocene stratigraphy of the Caldicot Level, with all **in situ** wet sites being contained by or inscribed into them. The earliest (and volumetrically the most important) of these units has been termed the **Wentlooge Formation,** and dates from the early postglacial to the Romano-British periods. It consists of a sequence of reduced estuarine silts and freshwater peats which underlie the entire Caldicot Level. The embankment and drainage of substantial tracts of the Level during the Romano-British period protected the Wentlooge Formation from further estuarine sedimentation, thus isolating the **Wentlooge Surface,** the presence of which provides a useful indicator of ancient land reclamation. The medieval period bore witness to a phase of coastal retreat, which was followed by the deposition of a second lithostratigraphical unit in those areas not adequately protected from tidal influence by sea banks. This unit is referred to as the **Rumney Formation** and consists of pink estuarine silts and sands. At some localities within the ASA the Rumney silts were reclaimed by the construction of sea defences and the **Oldbury Surface** was created. The frequent association of Ridge and Furrow with this surface indicated that the desire for arable land was an important motivating factor for such reclamations. Similarly in the post-medieval and recent periods two other sedimentary formations developed in the upper reaches of the intertidal zone, the **Awre** and **Northwick Formations.** These recent formations, which developed on expanding saltmarshes, frequently mask the earlier deposits.

4. THE ARCHAEOLOGY OF THE GWENT LEVELS

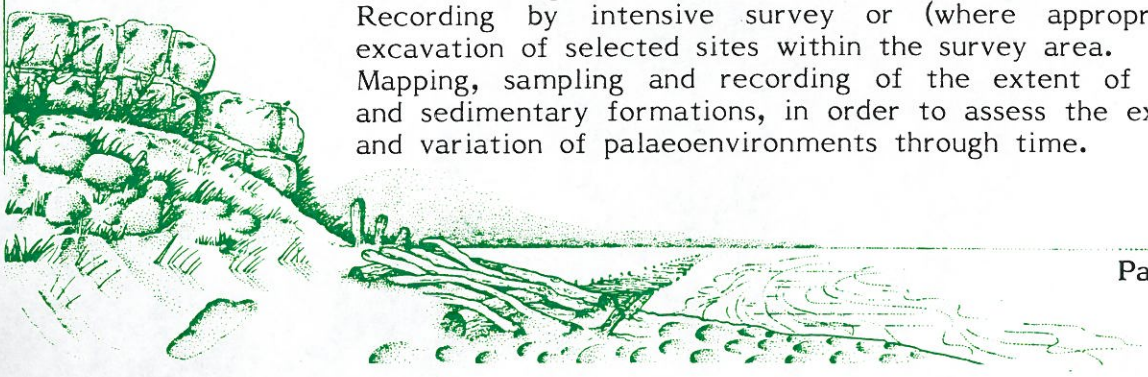
4.1 The Glamorgan-Gwent Archaeological Trust has recently completed the first phase of fieldwork in an intensive survey of the Gwent Levels. Appreciation of the data recovered is still in progress. The objectives of the survey are as follows:-

Identification of sites and areas which are still in a good state of preservation due to burial conditions and/or constant waterlogging.

Assessment of the susceptibility of such sites and areas to damage or total destruction due to change in land-use or drainage.

Recording by intensive survey or (where appropriate) excavation of selected sites within the survey area.

Mapping, sampling and recording of the extent of soils and sedimentary formations, in order to assess the extent and variation of palaeoenvironments through time.



Synthesis of these results, in order to relate human behaviour to reconstructed landscapes rather than isolated sites.

4.2.1 The fieldwork and research undertaken by this Trust as well as by other parties has demonstrated the enormous archaeological potential of the Levels. Many of the phenomena described in the introduction (§ 1.3, 1.4) are applicable to the Gwent Levels; amongst the factors contributing to the overall importance of the Levels are the following (§ 4.2.2 - 4.2.4):-

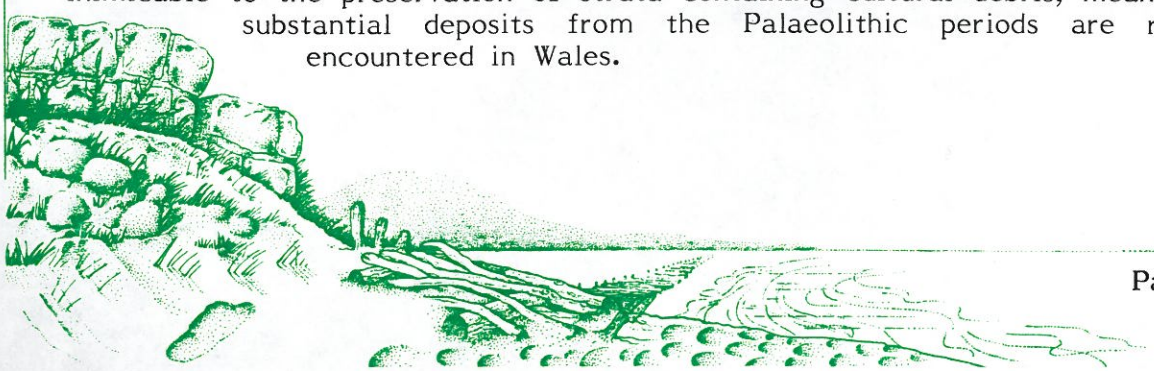
4.2.2 In the past, the Gwent Levels were covered in successive deposits of marine formations (clays and silts) and freshwater bog formations (peats) which have preserved extensive tracts of ancient landscapes. The post-glacial deposits thus represent a series of superimposed palaeoenvironments spanning a period of several thousand years.

4.2.3 The major part (by volume) of the post glacial deposits has been continuously waterlogged since its formation. Waterlogging excludes oxygen from depositional environments, inhibiting bacterial and fungal decay; near-optimum conditions for the preservation of organic materials therefore persist.

4.2.4 Due to severe environmental constraints post-Roman land use has been conservative, focused primarily upon pastoralism. This has protected much of the archaeological material from ploughing and has resulted in the preservation over substantial areas of both the Caldicot and Wentlooge Levels of Romano-British field systems, which have been effectively fossilised within the present landscape by continuous utilisation of the drainage ditches which form their boundaries.

4.3.1 Work undertaken to date on the Levels as a whole has revealed a very wide range of site types. A gazetteer of sites known at present within the ASA is presented below (§ 8). However since the detailed research design for work within the ASA will involve an element of predictive modelling, it will be worthwhile here to present a review (albeit brief and selective) of some of the more significant discoveries from the wider area of the Levels, since this will give an impression of the range of archaeological situations which are likely to occur within the ASA.

4.3.2 The earliest artefacts recovered from the Gwent Levels are two flint handaxes and a flake, which date to c 100-150,000 years before present during the Palaeolithic period. They were recovered from the gravel beds on the foreshore south of Caldicot Pill. These artefacts have been 'rolled' and thus should not be considered as having been found in **situ**. The distance which they had travelled since originally being deposited, however, is open to debate. Gravel beds of Palaeolithic date lie protected below the post-glacial deposits of the terrestrial wetland zone (§ 3, 4); it is quite possible, although as yet unproven, that the intertidal beds in which the flints were discovered are of a similar date. The effects of glacial and periglacial processes, largely inimicable to the preservation of strata containing cultural debris, mean that substantial deposits from the Palaeolithic periods are rarely encountered in Wales.

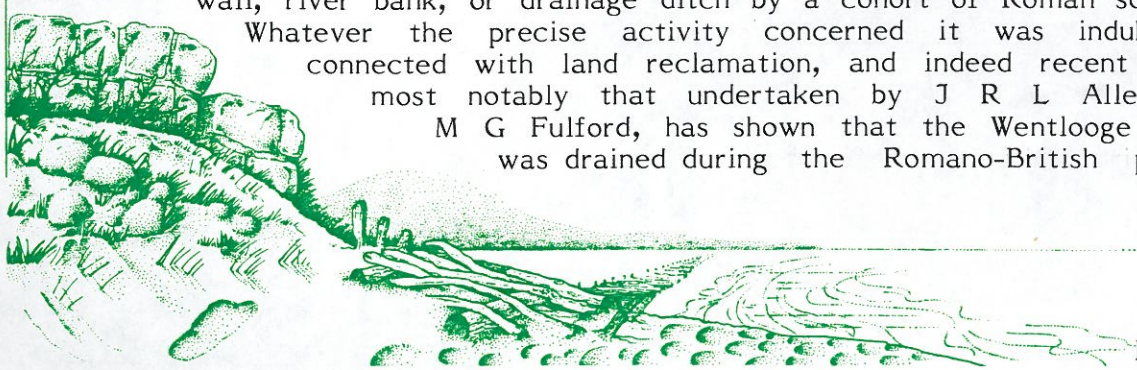


4.3.3 The most striking evidence for the exploitation of the Levels during the early post-glacial period (the 'Mesolithic' period) consists of the human footprints recorded, most notably from the Uskmouth/Nash area, impressed into a low horizon of the blue clays. Animal prints have also been recorded from several locations on the Levels.

4.3.4 Relatively little material has so far been recovered from the Neolithic period, during which agriculture first started to be practised. However several significant finds hae been made dating to the Bronze Age. At Chapel Tump I, near Magor Pill, the remains of timber uprights from a roundhouse were examined during salvage excavation occasioned by tidal erosion. Some 85m to the east at Chapel Tump II, a further area was examined where a relatively large assemblage of middle/late Bronze Age cultural debris was recovered. Recently the Trust has begun a more detailed programme of assessment work at a site close to Caldicot Castle. Preliminary results indicate the presence of a timber platform near the margins of a tidal creek. Apart from a complex sequence of well preserved wooden structures and artefacts, the location has yielded a bronze chape (scabbard-end) closely dateable to the early first millenium BC during the late Bronze Age. Work on sites in the intertidal zone obviously presents logistical problems, not the least of which are coastal erosion and the twice daily deposition of modern mobile sediments. In the terrestrial wetland zone, these problems are considerably reduced, although here the problems have to do with the initial detection of sites below the later depositions. The Caldicot site, situated inland, has therefore provided an opportunity for a more detailed scrutiny of a Bronze Age wet site.

4.3.5 During the middle and late Bronze Age the Caldicot Level appears to have been extensively exploited, perhaps on a seasonal basis, but (as the Chapel Tump sites indicated) desiccated raised peat bogs provided adequate foundations for wooden structures indicative of more permanent settlement. During the succeeding Iron Age important environmental changes were occasioned by marine transgressions. Nevertheless the presence of substantial Iron Age hillforts, notably at Sudbrook and Willcrick on the edge of the Levels, indicates exploitation of the resources available from the wetlands. Near to the Chapel Tump sites, but probably dating to around c 450 BC, a section of what has been provisionally interpreted as a trackway has been recovered; this consisted of at least two woven wooden hurdles, pegged down in a possible former creek bed. The blackthorn, alder, and hazel employed in this structure provide important information concerning woodland management.

4.3.6 The existing anthropogenic landscape originates in part with the massive drainage operations initiated by the Roman army - the length of ditching involved is greater than the length of Hadrian's Wall. A paper written in 1882 by the antiquarian Octavius Morgan (one of the first people to undertake archaeological research on the Levels), reports the discovery of a Roman inscription on a slab of limestone at Goldcliff close to the sea-wall; the inscription records the construction or repair of a length of sea-wall, river bank, or drainage ditch by a cohort of Roman soldiers. Whatever the precise activity concerned it was indubitably connected with land reclamation, and indeed recent work, most notably that undertaken by J R L Allen and M G Fulford, has shown that the Wentlooge Level was drained during the Romano-British period.



There is evidence to show drainage operations of comparable magnitude taking place on the Caldicot Level at this time. A contemporary villa, which would have been a focal point of agricultural activity, is known within the ASA (§ 8 Gazetteer no 12).

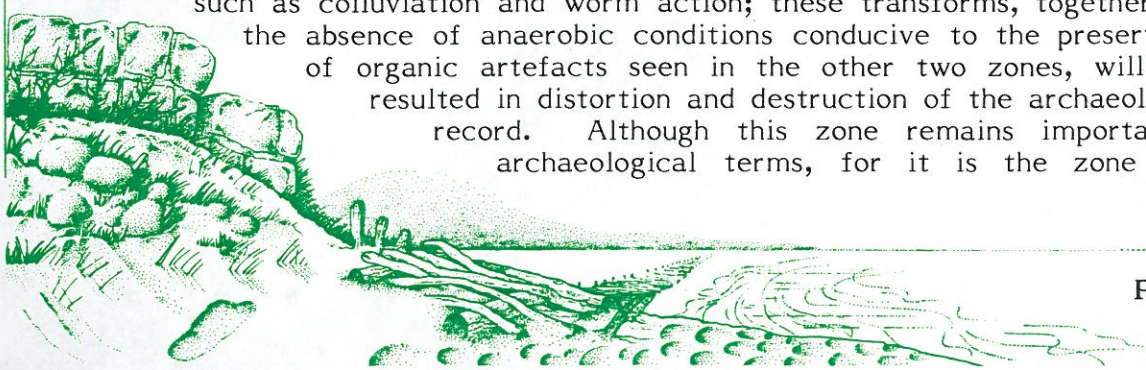
4.3.7 The early medieval period (c AD 400 - 1100) is frequently referred to as the 'Dark Ages', and not without reason, for the usual cultural markers (earthworks, pottery, metalwork) are largely lacking in the archaeological record from Wales as a whole and southeast Wales in particular. The apparent bias against recovery of material from this period is not understood, but may be due in part to cultural processes in which inorganic artefacts did not play a major part and did not therefore enter the archaeological record in any quantity. In this case the wetland areas would appear to offer the best chance for the recovery of data from this period. The fact that large parts of the Roman drainage system survived into and beyond the later medieval period indicates the maintenance of drainage works and sea defences during the interim, activities which would have been of little use unless there was settlement in the area. Further evidence for this period includes fish traps situated in the intertidal zone not far from a trackway radiocarbon dated to the mid tenth century AD, and (again reported by Octavius Morgan) the remains of a wooden boat discovered during the construction of Newport docks in 1878 and described as 'Danish' (ie Viking). Recent analysis of the surviving remnants has not enabled the place of construction to be determined, but a radiocarbon date indicates that the boat was probably built during the tenth century AD; Octavius Morgan is thus partly vindicated.

4.3.8 Occupation of the Levels during the later medieval period (following the Norman penetration of southeast Wales) shows a variety of settlement patterns. The parts of the Levels inundated during the early post-medieval period were recovered and the present agricultural patterns evolved. Larger settlements or villages were situated on the higher land by the edge of the Levels, smaller settlements and farmsteads on the Levels themselves. Monastic settlements also influenced the agricultural regime. The present emphasis on pastoralism reflects earlier practices; nevertheless survey as well as documentary study has revealed the former presence of arable land, with its diagnostic ridge-and-furrow.

5. ARCHAEOLOGY IN THE ASA: THE PRESENT STATE OF KNOWLEDGE

5.1.1 As observed above (§ 1.2) the ASA may be divided into three distinct zones. In each zone conditions of preservation and the nature of the threats posed by the development will differ. The zones are further defined here:-

5.1.2 In the Terrestrial Dryland zone the land lies above 8m aOD beyond present tidal levels and is dominated by the solid geology. It was not susceptible to waterlogging or inundation during the Holocene. Although the heavy estuarine clays and silts are absent, some masking of the underlying archaeological deposits will have been caused by post-depositional transforms such as colluviation and worm action; these transforms, together with the absence of anaerobic conditions conducive to the preservation of organic artefacts seen in the other two zones, will have resulted in distortion and destruction of the archaeological record. Although this zone remains important in archaeological terms, for it is the zone most



likely to have attracted agricultural activity, this same activity will have contributed to the overall archaeological damage.

5.1.3 In the Terrestrial Wetland zone the landscape is dominated by the succession of alluvial deposits (Wentlooge formation). Over much of the area alluviation was arrested by the provision of sea defences and land drainage initiated during the Roman period (§ 4.3.6 above). The intractable estuarine deposits and predominant reliance on pastoralism mean that the archaeology has been protected from ploughing; conversely it is also for the most part invisible except where exposed in drainage ditches (known colloquially as reens). Within the Terrestrial Wetland zone there are in addition several minor knolls where the solid geology protrudes, and these locations will have been obvious focal points for settlement. Waterlogging in this zone, which lies below the mean high tidal level, means that archaeological deposits are generally well-preserved.

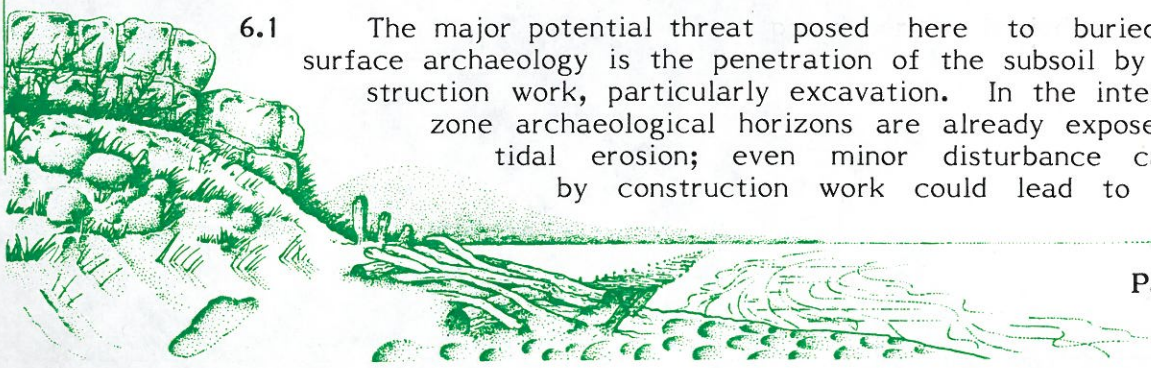
5.1.4 In the Intertidal zone the clays and peats of the Wentlooge and Rumney formations form the substrate, overlain in part by mobile sediments (mudflats, sandflats) and more stable sediments (saltmarsh). The entire area is obviously tidal, and both depositional and erosional phenomena may be observed. The archaeological importance of this area lies in the fact that areas of former land surfaces are frequently and widely exposed, albeit on a tidal basis, including (nearer to the mean low tide level) the earlier Holocene deposits.

5.2 A number of sites are already known within the ASA. The accompanying gazetteer (§ 8) has been compiled from the Trust's Sites and Monuments Record.

5.3 The gazetteer indicates the limitations of our present state of knowledge about the ASA and the sites listed in the gazetteer are effectively a sample. This sample has been biased by several factors, including the burial of sites below intractable clays, the lack of ploughing which renders the area unsuitable for traditional techniques of site detection such as aerial photography and field walking, and water management practices which have resulted in the exposure of underlying deposits within the reens being hidden by vegetation and the seasonal control of water levels. In short, the very factors which have preserved the archaeology have also rendered it very difficult to detect from the surface.

5.4 The limitations and biases noted in 5.3 have been faced in studies concerning other European wetland areas. Detailed survey strategies involving **inter alia** remote sensing (such as infra-red aerial photography), test pits, augur surveys, borehole information, seismic and geophysical survey are necessitated. This detailed survey information will be crucial in determining the most cost-effective research programme.

6. ARCHAEOLOGICAL CONSEQUENCES OF THE DEVELOPMENT



6.1 The major potential threat posed here to buried or surface archaeology is the penetration of the subsoil by construction work, particularly excavation. In the intertidal zone archaeological horizons are already exposed by tidal erosion; even minor disturbance caused by construction work could lead to their

total destruction. In the terrestrial wetland zone weathering of surfaces isolated from subsequent sedimentation by embankment and drainage has reduced the protection given to the buried archaeology by the overlying blanket of superficial deposits. Some archaeological horizons lie as little as 1.5m below the existing ground surface. In the terrestrial zone upstanding prehistoric and medieval monuments (§ 8 Gazetteer site nos 1-6, 8, 9, 11) lie within the ASA and a shallowly buried Roman villa complex (§ 8 Gazetteer no 12) is in the immediate vicinity of the selected route of the motorway link. Other sites and areas, as yet undetected, may lie directly on this route. Thus the possible direct destruction of sites by the development could be considerable in all three zones of the ASA. Furthermore, the indirect effects of the development could be equally detrimental. The following factors raise particular concern (6.2 - 6.4):-

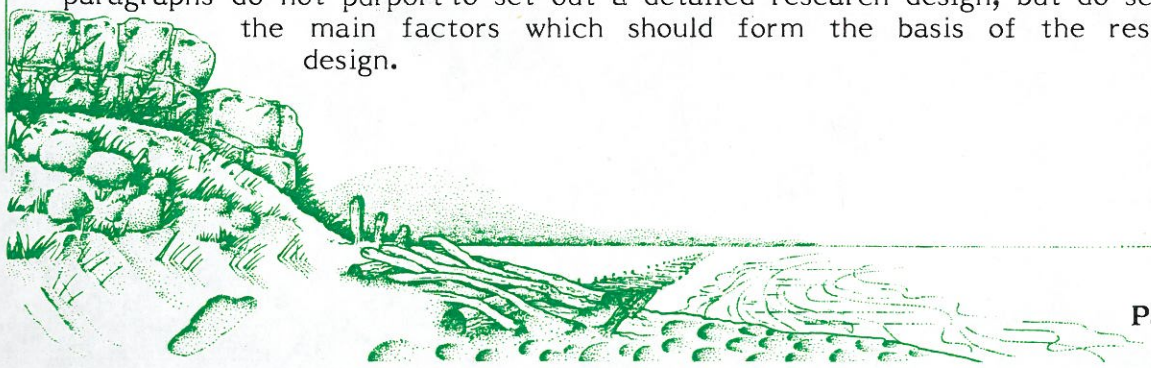
6.2 The proposed development could threaten waterlogged sites by disruption of present drainage systems and consequent desiccation caused by the lowering of the watertable on a local or a wider basis. Programmes of work on other wetland areas have emphasised that the effects of even small-scale and temporary localised de-watering may be complex and severe, resulting ultimately in the destruction of sites. Should pumping be undertaken during construction work in the terrestrial wetland zone, then such threats could be imposed upon waterlogged sites in the vicinity.

6.3 Even if the development did not destroy underlying waterlogged sites, it could by sealing them permanently prevent their recording or investigation in the future. If subsequent developments were to lead to a lowering of the water-table, the desiccation of the sealed sites could take place with no means of effecting any prior investigation.

6.4 Waterlogged sites, and particularly wooden structures, are very susceptible to crushing and pressure deformation caused by the imposition of heavy additional loads on partially consolidated intervening deposits. The pressure exerted by the construction of a dual two-lane carriageway on the Caldicot Level could result in the substantial destruction of wet sites underlying it. The potential damage would be further compounded by the vibrations set up when the carriageway was in use.

7. THE ARCHAEOLOGICAL RESPONSE: STRATEGIES & OBJECTIVES

7.1 It is argued in the preceding paragraphs that the area affected by the Second Severn Crossing is archaeologically extremely sensitive. Depositional factors have caused an unusually high level of preservation of a wide variety of archaeological and environmental deposits covering a long chronological span. These deposits constitute a non-renewable resource, and the proposed development is a unique opportunity to undertake the detailed investigation which this important area demands. Two principal phases of investigation are envisaged, the first concentrating for the most part on survey and the second for the most part on excavation. Our concluding paragraphs do not purport to set out a detailed research design, but do set out the main factors which should form the basis of the research design.



7.2 The first phase of investigation will consist of a problem-orientated survey programme lasting for at least a year. The purpose of this will be to determine key areas where evidence for settlement and exploitation survives. Different areas may have acted as focal points for activity at different periods; for instance the hunter/gatherer strategies of the Mesolithic period will have focused upon areas of maximum ecozonation where the widest variety of habitat types would be accessible, whilst during the Bronze Age areas of dried-out raised peat bog seem to have been important. The fen edge and tidal pills and creeks will probably have been important throughout.

7.3 A key component of this first phase will be the study of the palaeoenvironmental history of the ASA. A programme of pollen analysis and macro-plant analysis will be necessary to show the extent and nature of palaeoenvironments and human influences upon them. Molluscan and sedimentary analyses will also be required in order to study palaeoenvironmental variations and depositional processes. It is envisaged that two environmental specialists will be required for these analyses, together with laboratory facilities. A rather larger full-time team will be required to deal with survey work in the field. Previous experience has shown the value of reen survey, where the depositional stratigraphy can be recorded in the sides of the drainage ditches. This is best accomplished during the winter when the water levels in the reens are maintained at lower levels. This work will be supplemented by the excavation of a series of test-pits. Access to contractors' seismic survey data and borehole data will be important, and also remote sensing by infra-red aerial photography in order to reveal relict landforms. Use of statistical sampling strategies in both the first and second phases will be used to minimise biases.

7.4 The second phase of investigation will involve the detailed problem-orientated excavation of selected areas. Excavation is a lengthy and costly process, particularly on wetland sites. The timescale for this phase will obviously have to meet the overall development schedule, but a period of two years should probably be regarded as a minimum. The detailed research design will be drawn up in the light of the results of the survey programme; however the overall strategy will involve examination of the widest range of habitat sites. This work will involve a large team of full-time field workers together with specialist services, and conservation facilities.

7.5 The final phase will involve appreciation and synthesis of the full range of data, leading to publication in a variety of formats (from specialist fascicules to popular books), the archiving of the full database, and deposition of the conserved artefacts in an appropriate museum or museums.

8. GAZETTEER OF KNOWN SITES WITHIN THE ARCHAEOLOGICAL STUDY AREA

No on plan	PRN	NGR	Site Name/Type/Status/Comment
1	455G	ST 4394 8735	Undy moated site/rectangular moated medieval earthwork/SAM/
2	468G	ST 4451 8776	Standing stone/Bronze Age monument; complex associated structures probable below ground/SAM/close to projected road line; potentially sensitive site.
3	486G	ST 4511 8786	St Michael's Church/medieval church/Listed Building grade 'B'/
4	487G	ST 4512 8785	St Michael's Churchyard Cross/medieval cross/Listed Building grade 2/
5	488G	ST 4564 8763	Manor house/medieval manor house/ /
6	489G	ST 4566 8764	St Mary's Church/medieval church/ /
7	4057G	ST 4610 8794	Find spot/flint scraper (prehistoric)/ /
8	490G	ST 4650 8795	St James' Church/medieval church, possible remains of associated medieval village/ /church not threatened, but possibility of remains associated with former village closer to road line.
9	491 G	ST 4653 8791	Rogiet Manor House/medieval manor house/ /
10	2556G-2560G	ST 474 877	Pottery kilns/five Romano-British pottery kilns/ /
11	503G	ST 481 878	Westmenende/Medieval house/ /
12	482G	ST 483 874	Caldicot Villa/Roman villa complex/SAM/ Potentially sensitive area.
13	3629G	ST 484 876	Findspot/Roman pottery and kiln debris/ /
14	3630G	ST 485 877	Findspot/Roman pottery/ /
15	3998G	ST 488 872	Findspot/Bronze Age spearhead/ /sensitive area
16	483G	ST 489 873	Port/Roman or medieval port/documentary references/ /sensitive area
17	484G	ST 490 874	Findspot/Roman coins/ /sensitive area
18	4326G	ST 4993 8682	Fishtrap/Medieval structure/ /
19	4327G	ST 4986 8671	Fishtrap/Medieval structure/ /
20	1142G	ST 5055 8732	Sudbrook hillfort/Iron Age hillfort together with Roman and Medieval occupation/SAM/ not directly threatened, but environs of site are potentially sensitive.

(NB SAM = Scheduled Ancient Monument; PRN = Primary Record Number in county Sites and Monuments Record).

This list should be seen in the light of our earlier **caveat** (5.3): it is probably an unrepresentative sample of the whole site population in which sites in the Terrestrial Dryland zone are prominent. In reality these sites should be regarded as 'background noise'; nevertheless the standing stone (2) and the Roman villa (no 12) are both scheduled sites which would be likely to feature in future research strategies.