

Figure X.X Lancashire Site Locations

4. ARCHAEOLOGICAL SURVEY RESULTS: LANCASHIRE

4.1 Introduction

The Lancashire coast is the second largest section of coastline in the study area. Following NWRZCA Phase 1, and further consultation with local authority archaeological officers at Lancashire, the sites and areas outlined in Table 4.1 were selected as 'at risk' and in need of further survey during Phase 2.

County	Site name	SMP 2 policy at this site	Special Interest	Risk
LA	Ribble Estuary shoreline walkover	Largely HTL with NAI at Warton and MR at Hesketh	Medium	Medium
LA	Pilling shoreline for evidence of saltworking	HTL	Medium	Medium
LA	Cockersand Abbey	HTL then MR	High	High
LA	Sambo's Grave, Sunderland Point	MR	Medium	Medium
LA	Heysham Head early medieval graves and chapel and Mesolithic lithic scatters	NAI and HTL	High	Medium
LA	Warton area walkover between the railway line and Crag Foot	NAI	Medium	High
LA	Jenny Browns Point copper smelting site at Silverdale.	NAI	Medium	High
LA	Post-Medieval fish weirs	Inter-tidal	Medium	High

Table 4.1 Sites identified as potentially under threat from current or future coastal erosion in Lancashire.

The specific aims of the survey at these locations were:

- To provide an up-to-date condition assessment of surviving remains
- Identify and record any previously unrecorded heritage assets
- To investigate the extent of erosion, and the risk faced to any surviving remains with reference to the preferred SMP2 policy in that area.

4.2 The Ribble Estuary (Map Figures 4.18 and 4.19)

4.2.1 Location and geology

The towns of Lytham (SD 36044 27667) and Warton (SD 40534 28467) lie on the Fylde Coast, in the outer and middle reaches of the Ribble Estuary respectively. Lytham was founded c.12km southeast of Blackpool and was recorded as *Lidun* in the Domesday Book of 1086 (Hinde 1985, 156). Since the Victorian period, it has grown as a seaside resort, alongside neighbouring St Annes-on-the-Sea (White 1996, 127) and is still regarded as a seaside town, sometimes referred to as Lytham St Anne's. Warton, on the other hand, is recorded as a village in the Domesday book of 1086 (Hinde, 1985, 156) and expanded during the Industrial Revolution, when it was known for cotton spinning and the manufacture of sacking, sailcloth and cordage (Wilson 1870-2). It is now best known for its airfield at BAE Warton.

Hesketh (SD 42084 25947) lies on the southern shore of the Ribble Estuary and is an area of drained agricultural land and saltmarsh. Since 2006, Hesketh Out Marsh has been owned and managed by the Royal Society for the Protection of Birds (RSPB). They have engaged in a programme of Managed Realignment in the area; allowing seawater to flood

some of the land by breaking 1980s sea defences in three places. This has created new saltmarsh that forms improved habitat for birds and also acts as a natural sponge, lessening the effects of coastal squeeze elsewhere in the estuary (www.rspb.org.uk/reserves/guide/h/heskethoutmarsh).

The Ribble Estuary is funnel-shaped and macrotidal. It is one of the longest estuarine systems on the North West Coast (Halcrow 2011). The solid geology on the banks of the River Ribble is predominantly Permian and Triassic Sandstones with the superficial geology consisting of extensive wind-blown sands around Lytham St Annes and low-lying reclaimed saltmarshes, protected by flood embankments in the remainder of the estuary, particularly on its southern shore (Johnson 2010) (Figure 4.2). The Ribble is one of relatively few rivers in the United Kingdom to experience tidal bores and currently has a mean spring tidal range of 7.9m (<http://www.estuary-guide.net>).



Figure 4.2 View of the Ribble Estuary from Warton, looking south.

Land use in the estuary is varied, as are the principal soils which change from Dune Sand on the western shore of the Fylde Coast, Seasonally Wet Deep Sand at Lytham, through to Saltmarsh and Seasonally Wet Deep Silt at Warton (Farewell 2007). Almost 50% of the saltmarsh and inter-tidal sands are contained within the Ribble Estuary National Nature Reserve (NNR) (Skelcher 2010, 1.1/4). Much of the saltmarsh is used for stock grazing, particularly on the Ribble's southern shore, whilst elsewhere the saltmarsh has been improved for agricultural purposes. The northern shore is publicly accessible as part of the Lancashire Coastal Way and is used predominantly by the Lytham and District Wildfowling Association, who own and manage Warton Marsh (Skelcher 2010, 1.6/1). The entire Ribble Estuary is a Site of Special Scientific Interest (SSSI).

4.2.2 Previous research

The NWRCZA Phase 1 study looked at this part of the coastline as part of Block 2 of the study area (Johnson 2011) and did not highlight specific sites in the Ribble Estuary as being potentially under threat of coastal erosion and requiring rapid survey.

The Ribble Estuary NNR management plan provides a short overview of archaeology in the area. It highlights the historical exploitation of the saltmarsh for grazing and also draws attention to its maritime history with the presence of relic sea walls, ship wrecks and old jetties. The presence of more recent World War II features, such as lost aeroplanes, uncovered and recorded by local archaeological groups, is also noted (Skelcher 2010, 1.61). The management plan highlights a general lack of prehistoric evidence recovered from the estuary and this is used to argue that the area was never densely populated. This view is supported by Cowall who states that coastal material is not as frequent in this area as it is further south in Merseyside (Cowall, 1996, 23). Nevertheless occasional flint tools and flakes, some dating as far back as the Mesolithic period, have been recovered from the southern shore at Banks Marsh and Cossens Marsh (Skelcher 2010, 1.6/1). The archaeology and palaeoenvironment of the Lancashire wetlands has been surveyed by Middleton *et al* (1995) as part of the North West Wetlands Survey. This notes several lithic findspots in and around Lytham-St-Annes, largely dating to the Late-Neolithic/Early Bronze Age (Middleton *et al* 1995, 230-237). Estuaries are favoured areas for settlement by Stone Age hunter gatherers, as well as later groups, and the current small quantity of evidence is not necessarily evidence of absence. It should therefore be anticipated that additional finds and sites could come to light as a consequence of coastal erosion and urban development.

4.2.3 NWRCZA Phase 2 Archaeological Investigation

The archaeological survey of this area covered safely accessible land on the north and south banks of the Ribble Estuary, as far inland as Lea Marsh to the east (map Figures 4.18 and 4.19).

4.2.4 Prehistoric

At Hesketh Out Marsh, the managed realignment scheme implemented in 2006 by the RSPB (see Section 4.2.1) has inevitably caused some localised erosion, particularly around the three points where the sea defences were broken through to allow inland flooding.

In recent years a local birdwatcher, Alan Porter, has noted the presence of ungulate tracks preserved in areas of Post Glacial till exposed by erosion on the banks of the Ribble and around natural gullies in the saltmarsh which have been widened by increased flows (Figure 4.3). Porter has consulted with Gordon Roberts who was influential in the study of preserved prehistoric human and animal footprints at Formby Point (see Section 3.6), who has confirmed that the tracks are likely to be red deer (Alan Porter pers. comm.). Whilst no human footprints have been found in association with these tracks, the site is a new hoofprint discovery *c.*17km northeast of Formby and is potentially related to the human remains and red deer bones and antlers discovered during the construction of Preston docks *c.*11km to the east. These have been radiocarbon dated to the Neolithic and Early Bronze Age (Barrowclough 2008, 23). No dating analysis has been undertaken in association with the preserved hoofprints at Hesketh and unfortunately the potential for this is limited, as the tracks are preserved in till (boulder clay), overlain by *c.*20cm of iron panning, below *c.*7m of silty river sediments with no obvious organic content (Alan Porter pers. comm.).

Alan Porter joined the Phase 2 survey team as a field guide around Hesketh Marsh (Figure 4.4). Two areas of exposed boulder clay were recorded (25), where ungulate footprints have been noted previously, however no footprints were exposed at the time of the survey in June 2011. An accretion trend appears to have been re-established in the area, as it has become stabilised following the interventions in 2006. A further visit by Alan Porter in May 2012 confirmed this, as no new erosion had occurred and no hoofprints were exposed (Alan Porter pers. comm.).



Figure 4.3 Red deer hoofprints at Hesketh Out Marsh (© Alan Porter).



Figure 4.4 Recording boulder clay exposures at Hesketh Out Marsh with Alan Porter (left).

4.2.5 Medieval

Warton, on the northern shore of the Ribble Estuary, is listed as a village in the Domesday Book of 1086 (Hinde, 1985, 156). A suspected medieval enclosure is recorded in the Lancashire HER (HER: PRN12820) on the banks of the River Ribble. It is described as a 'possible moated site complex, possibly related to a grange of a monastic house.' The site appears as a boundary on the 1st Edition 1:10560 Ordnance Survey Map of 1847, but is not described as a moat. The Phase 1 aerial photography transcription mapped the moat as a right-angled ditched feature of probable medieval/post-medieval date (NRHE: 1480792).

The field survey recorded the remains of the possible moated site (2) as consisting of two-sides of a rectilinear/square enclosure, marked by a shallow ditched feature running *c.*22m southeast-northwest and turning at a right-angle to run *c.*32m northeast-southwest (Figure 4.5). The other two-sides of the enclosure were not visible as earthwork remains. There is no change in level between the enclosed and unenclosed area, and no associated hollow ways or other earthworks were recorded. There is nothing in the morphology of the site that would identify it as a monastic grange as opposed to a secular enclosure. It is possible that the moated site was a farmstead moat, being the predecessor of Bank Farm that was situated a short distance to the northwest, prior to its demolition between 1955 and 1969. The site is likely to be medieval or post-medieval in date and has been incorporated into the post-medieval field system (NRHE: 1480747).



Figure 4.5 Surveying the earthwork remains of the possible medieval moated site at Warton (scale = 2m).

4.2.6 Post-medieval

The towns of Warton and Lytham developed following the Industrial Revolution as industrial and recreational areas respectively. In both cases it was undoubtedly the proximity to the coast that facilitated development, and there is evidence along the River Ribble of its maritime heritage.

A shipwreck / decayed hulk was recorded in Phase 1 as part of the aerial photography transcription, as a wreck of uncertain date (NRHE: 909254). The Phase 2 survey recorded this site (8) as consisting of a timber-hulled vessel, c.45m in length (Figure 4.6). The vessel is partially buried in silt and is actively eroding, but is still recognisable as a schooner-type vessel.



Figure 4.6 Timber hulled vessel on the southern shore of the River Ribble, looking south.

In the post-medieval period, farming must also have formed an important part of the economy of this area, as several post-medieval fields with post-medieval ridge and furrow were recorded as part of the Phase 1 aerial photography assessment (NRHE: 1480747). The presence of the ridge and furrow mapped as part of Phase 1 was confirmed in fields at Lytham (12), where ridge and furrow with a width of c.4m was recorded as part of the Phase 2 assessment.

Further evidence for farming was recorded at Warton in the form of a small section of walling (3). The walling (3) occurs on the northern shore of the Ribble, northwest of the possible medieval moated site at Warton (see Section 4.2.5). This consisted of a short section of cobbled walling with a concrete mortar, measuring c.8.5m in length and standing to a maximum height of c.1m (Figure 4.7). The wall is possibly the remains of a post-medieval building, now incorporated into a field wall and stands in the location of Bank Farm which was present on the 1st Edition 1:10560 Ordnance Survey Map of 1847, but demolished between 1955 and 1969.

A portent of the importance of military occupations in the Warton and Lytham area can be seen in the presence of a Victorian rifle range on the northern shore of the Ribble. This was recorded in the Phase 1 aerial photography transcription as a Second World War firing range (NRHE: 1480947). However, the Phase 2 survey has reassessed this dating and confirmed that the site probably has its origins in the Victorian era.



Figure 4.7 Section of post-medieval cobbled walling possibly associated with Bank Farm (scale = 1m).

The Victorian rifle range (11) was recorded during the Phase 2 survey as consisting of a firing range butt, 30m in length, constructed of concrete and earthwork banks, and a parallel earthwork bank to the rear with a length of 38.5m (Figure 4.8). It is highly likely that this site continued in use through to the First and Second World War period.



Figure 4.8 Concrete and earthen firing range butt at Lytham, looking northeast.

4.2.7 20th Century

The majority of the 20th century heritage assets recorded during the Phase 2 survey relate to the First and Second World Wars and the Ribble Estuary contains several such assets which as a group testify to the importance of this navigable river channel during this period. These consist of a gun emplacement (1), a sewage works (4) two buildings (5 and 13), a pillbox (6), a ship wreck (7), an airfield (9) and a military camp (10).

During the Second World War air-based attack and defence took over much of the importance that had been placed in naval warfare throughout World War I. This required the construction of new anti-aircraft defences and new airfields and bases. At the height of airfield construction in 1942, a new airfield opened every three days (Osbourne 2006, 128). The airfield at Warton was established on land commandeered by the Air Ministry in 1940. The United States Army Air Force (USAAF) constructed Warton aerodrome as 'Army Air Force Station 582' in 1942 for the assembly and repair of aircraft coming to Europe from the United States (Holmes 1998, 141). It consisted of three runways, nine hangars, fifty dispersal stands, a repair shop, storage spaces and accommodation at ten living sites (Holmes 1998, 141). In 1943 it was renamed 'Base Air Depot 2' and it processed *c.*14000 aircraft before being deactivated in September 1945. Since then the airfield has remained in use in various guises as an aircraft development and testing facility. It is now owned by BAE Systems Military Air Solutions.

The airfield was mapped as part of the Phase 1 aerial photography transcription (NRHE: 1431202) and follows the common Air Ministry plan of three intersecting runways with buildings dispersed around (Figure 4.9).

As the airfield is in private ownership, access was not sought for the purposes of the Phase 2 survey. However the exact location of the airfield was confirmed (9) and can be used to assess any erosion risk at the site.



Figure 4.9 Warton Airfield: NMR RAF 106G/UK/623 4160 10-AUG-1945. Copyright statement: English Heritage (NMR) RAF Photography.

Warton Airfield had several associated military camps in the Warton and Lytham area and these were mapped as part of the Phase 1 aerial photography transcription. The Phase 2 survey recorded one such military camp at Lytham (10). This consisted of an area (c.345m x c.110m) of disturbed ground on the site of the known camp, with no standing remains surviving. One area of partially buried paving was noted that most likely dates to the Second World War (Figure 4.10).



Figure 4.10 Recording the remains of probable wartime paving at Lytham military camp.

Further evidence associated with military camps was also recorded at Warton, c.350 west of the Airfield. This was interpreted as the remains of a possible World War 2 sewage works (4), built to service the military camp that was situated a short distance to the east. The remains consisted of two raised, concrete lined tanks, each with a brick funnel drain cap (Figure 4.11). A brick building with flat concrete roof and concrete window lintels nearby is likely to be a control building associated with it (Figure 4.12).

The remains of two further Second World War structures (5 and 13) were recorded c.70m northwest and c.270m southwest of the sewage works respectively.

The remains of the first structure (5) consisted of concrete foundations marking the position of a demolished building (Figure 4.13). This structure is most likely associated with the nearby military camps.

The remains of the second structure (13) consisted of concrete rubble abutting a coastal defence bund (Figure 4.14). Again, this structure is most likely associated with the nearby military camps.



Figure 4.11 Concrete tanks with brick funnel drains at Warton Marsh. Probable Second World War sewage works on the northern shore of the Ribble Estuary at Warton Marsh (scale=1m).



Figure 4.12 Brick structure with flat concrete roof, possibly associated with Second World War sewage works.



Figure 4.13 Concrete foundations marking the location of a demolished World War II Structure (5) on the northern shore of the River Ribble at Warton Marsh.



Figure 4.14 Concrete foundations marking the location of a demolished World War II Structure (13) on the northern bank of the River Ribble at Lytham Marsh.

The remaining World War heritage assets recorded at Warton are those more actively involved in attack and defence. A shipwreck site (7) was mapped as part of the Phase 1 aerial photography transcription as a wreck of uncertain date (NRHE: 1480755).

This site was recorded during Phase 2 as consisting of a reinforced concrete (ferrocement) and steel-hulled small boat, 8.5m in length (Figure 4.15). The boat was structurally quite well-preserved, with some rusting to the metal fixtures and three small holes in the concrete hull. Ferrocement boats such as the one recorded were developed in France in 1855 and were first used in England in 1910 (www.ferroboats.com). They reached the peak of their popularity during the wartime period, owing to their low cost and simplicity of construction. The boat recorded is therefore likely to be a military vessel dating from the First or Second World War period.



Figure 4.15 Concrete and steel hulled boat on the northern side of the Ribble Estuary, looking southeast.

The Phase 1 aerial photography transcription mapped a Second World War gun emplacement and weapons pit on the northern banks of the River Ribble, accessed via a trackway from Warton Airfield (NRHE: 1480772).

The Phase 2 survey recorded the remains of the gun emplacement (1) as consisting of ruinous concrete foundations, occupying an area of 11m x 9m (Figure 4.16). The identification of these remains as a gun emplacement was only possible due to the aerial photographic transcription.

Finally, on the shoreline southeast of Warton Airfield a further gun emplacement, similar to that outlined above was mapped as part of the Phase 1 aerial photography transcription (NRHE: 1480772).

No remains of this gun emplacement were located during Phase 2, however an area of concrete rubble (6) was recorded in the vicinity of the site's location (Figure 4.17). This has been interpreted as a possible pillbox, but may also be associated with the gun emplacement.



Figure 4.16 Ruinous foundations of Second World War gun emplacement, looking south (scale = 2m x 1m).



Figure 4.17 Ruinous foundations of possible Second World War pillbox.

3.2.9 Threat from erosion

The sites described in the preceding sections lie within the outer, middle and inner zones of the Ribble Estuary in a number of different SMP2 policy units. These are outlined in Table 4.2 below.

Site name	Location	NWRCZA 2 No:	SMP 2 policy unit	SMP 2 policy at this site
Hesketh prehistoric hoofprints	Middle Estuary	25	11b 1.5	MR 0-20 years HTL 20-100 years
Warton medieval moated site	Middle Estuary	2	11b 1.14	NAI
Lea Marsh shipwreck	Inner Estuary	8	11b 1.13	HTL 0-50 years MR 50-100 years
Lytham post-medieval ridge and furrow	Outer Estuary	12	11b 1.15	HTL
Warton post-medieval wall	Middle Estuary	3	11b 1.14	NAI
Lytham Victorian firing range	Outer Estuary	11	11b 1.15	HTL
Warton WW2 Airfield	Middle Estuary	9	11b 1.14	NAI
Lytham WW2 military camp	Outer Estuary	10	11b 1.15	HTL
Lytham WW2 sewage works	Middle Estuary	4	11b 1.15	HTL
WW2 structure	Middle Estuary	5	11b 1.15	HTL
WW2 structure	Outer Estuary	13	11b 1.15	HTL
Lea Marsh WW1/2 boat	Inner Estuary	7	11b 1.13	HTL 0-50 years MR 50-100 years
Warton WW2 gun emplacement	Middle Estuary	1	11b 1.14	NAI
Warton possible WW2 pillbox	Middle Estuary	6	11b 1.14	NAI

Table 4.1 Sites recorded during Phase 2 within the Ribble Estuary.

The Ribble Estuary sits within the wider shoreline and behavioural unit of Liverpool Bay (Halcrow 2011). It has been naturally infilling since the last glaciation as a result of onshore transport of material within Liverpool Bay, alongshore transport from adjacent open coasts, and flood tidal asymmetry within the estuary (Halcrow 2011). Prior to the 19th century, this accretion was largely a slow process, limited by the meandering of the main low water channel. Since the early 1800s, however, human interventions in the form of embankment and reclamation, managed realignment, training of the river channel and dredging, have accelerated this accretion process (Halcrow 2011).

To improve navigability up to the docks at Preston, the river channel was trained and dredged to such a degree that it now runs almost in a straight line through the middle of the estuary. Maintenance of the Ribble's training walls ceased in 1969 and dredging of the river channel and the inner estuary around Preston Docks ceased in 1980 when the Albert Edward Dock was closed (Halcrow 2011). This has led to increased accretion in the inner estuary and the consequential re-opening of secondary river channels at South Gut and Penfold (Halcrow 2011). The estuary appears, however, to be relatively stable implying that the continued accretion is keeping pace with sea level rise. Halcrow argue that this is largely an effect of the training walls of the Ribble, however, and that if these were to be destroyed the river would return to its previous meandering state, impacting on the equilibrium of the estuary and causing localised erosion (Halcrow 2011). The extent of land reclamation in the Ribble Estuary means that it is a viable candidate for managed realignment schemes, which can serve to manage the coastal squeeze associated with continued siltation. One such scheme has been undertaken at Hesketh Out Marsh

(see Section 4.2.4) and more are planned for the future under the current SMP2 policies (see Table 4.2).

The future response of the Ribble Estuary to sea-level rise is uncertain and is dependent upon several factors including the maintenance or destruction of the Ribble's training walls and the potential effects of Estuary 'rollover', both of which will have effects across the whole estuary. In the first instance, the destruction of the training walls would lead to increased erosion in the Outer Estuary and Middle Estuary as the channel configuration shifts, but under the second scenario, of estuary rollover, sea-level rise would cause erosion at the Outer Estuary with resultant sediment deposited in the Inner Estuary.

The SMP2 policies in the Outer Estuary reflect this erosion risk and all of the sites surveyed in this area (Lytham) fall within an SMP2 policy of 'Hold the Line'. These sites (4, 5, 10, 11, 12 and 13) are therefore not considered to be at immediate or longer term threat of coastal erosion.

Within the Middle Estuary the risk of coastal erosion to reclaimed land along the southern shore of the estuary has been recognised and a managed realignment scheme has already been initiated at Hesketh Out Marsh (see Section 4.2.4). This has revealed the presence of prehistoric red deer hoofprints (25). This area has now returned to an accretion trend, however, further Managed Realignment is proposed for the area east of this and may reveal evidence of prehistoric animal and human interactions. The southern shore has the potential to host significant archaeological evidence that will be at risk of coastal erosion under the current management scheme. The northern shore is expected to continue with its pattern of slower-rate accretion, though this is dependent upon the maintenance of the Ribble's training walls. If these walls fail, increased meander would cause localised erosion and sediment redistribution. The SMP2 policy in place at sites recorded on the northern shores of the Middle Estuary is 'No Active Intervention', where erosion risk estimates range from 3.4-6m in the next 100 years. Sites on the northern shore (1, 2, 3, 6 and 9) are therefore not considered to be at immediate or longer term threat of coastal erosion, provided that the training walls of the River Ribble remain in place.

It is predicted that accretion will continue in the Inner Estuary where the greatest amount of dredging took place in the first half of the 20th century, however the rate of accretion will be dependent upon the estuary's response to 'Managed Realignment' schemes in the Middle Estuary (Halcrow 2011). The SMP2 policy in place at sites recorded in the Inner Estuary is 'Hold the Line' for the first 50 years and 'Managed Realignment' for the next 50 years. Neither of these policies will protect the post-medieval timber wreck (8) which is located in the inter-tidal zone and is actively eroding. The WWI/II ferrocement wreck (7) will also be at risk of erosion in 50 years under a 'Managed Realignment' scheme.

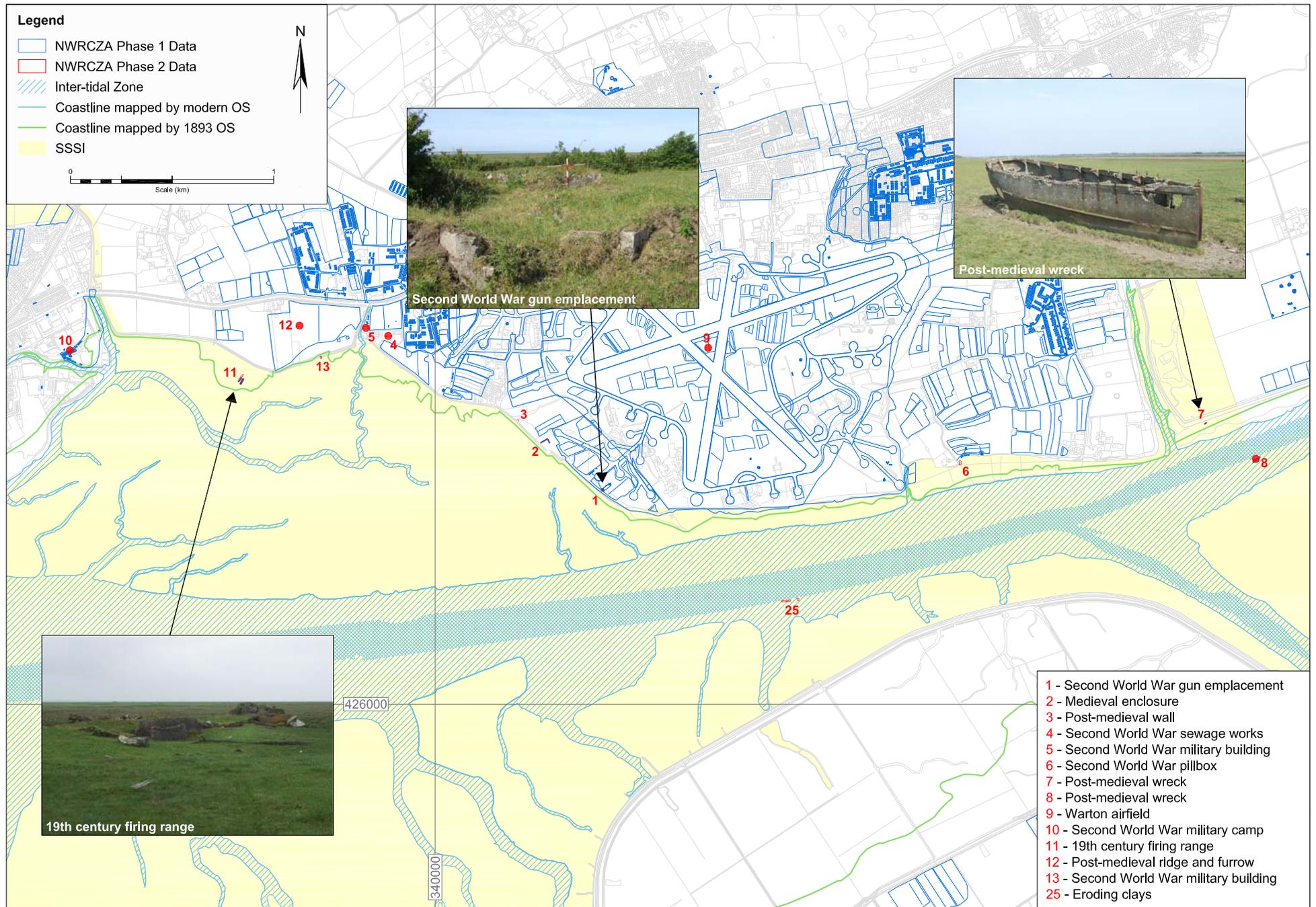


Figure 4.18 Location of sites surveyed at Warton and Lytham

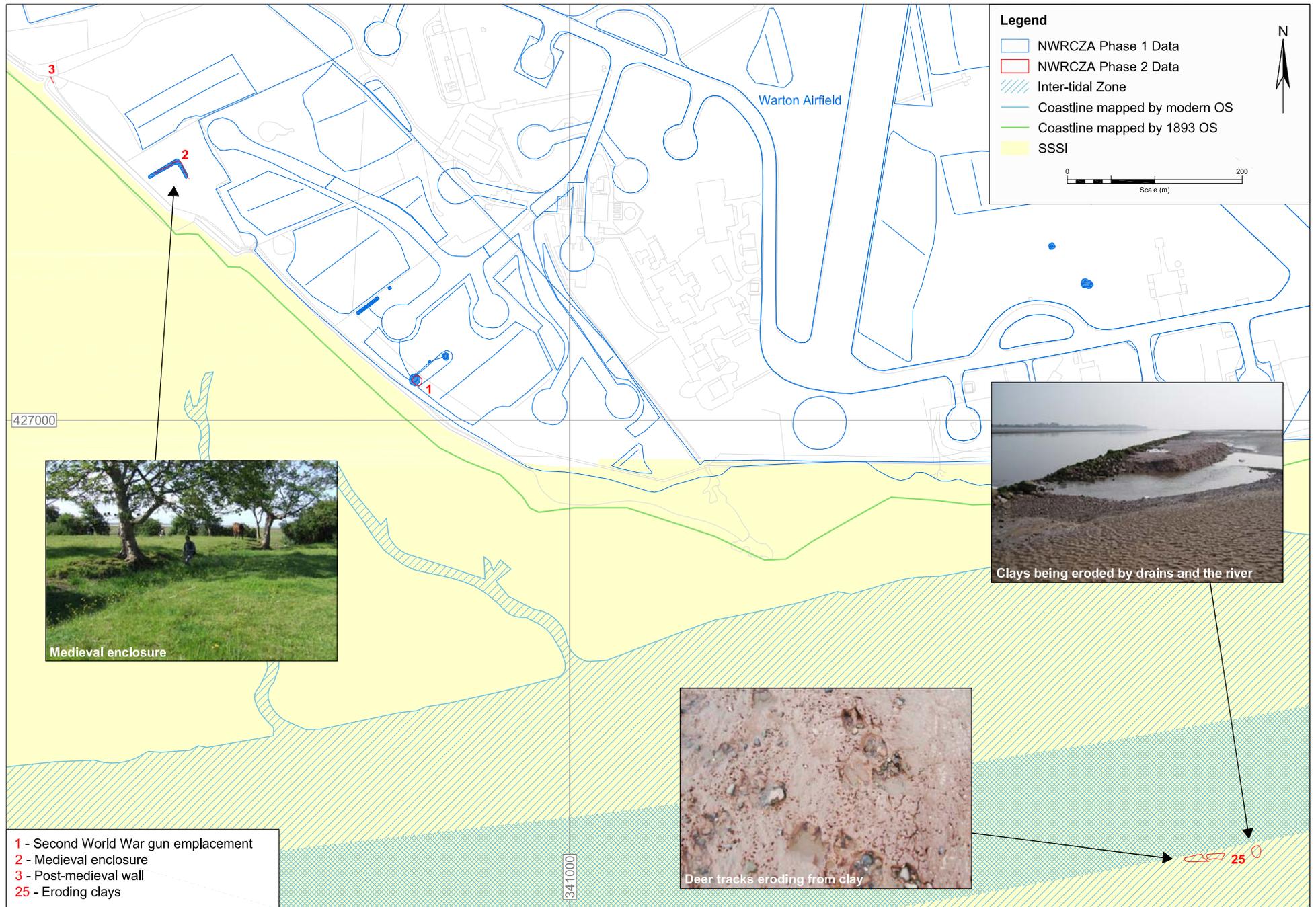


Figure 4.19 Location of sites surveyed at Warton

4.3 Cleveleys (Map Figure 4.22)

4.3.1 Location and geology

Cleveleys (SD 31714 43767) is a seaside town on the western Fylde coast. It can also be known as Thornton-Cleveleys, incorporating the nearby inland village of Thornton that was named in the Domesday Book of 1086 (Hinde 1985, 156). It is $\approx 6.4\text{km}$ north of Blackpool and $\approx 3.2\text{km}$ southwest of Fleetwood.

The Fylde is a coastal plain composed of a $\approx 20\text{km}^2$ square-shaped peninsula, bounded by Morecambe Bay to the north and the Ribble Estuary to the south. The western Fylde coast faces out into the Irish Sea and consists predominantly of Triassic Sidmouth Mudstones. The superficial geology is dominated by Devensian Till deposits in the upper reaches of the Wyre Estuary and tidal silt and clay deposits in the area between Blackpool and Fleetwood. The principal soil in the Cleveleys area varies between Seasonally Wet Deep Silt and Deep Red Loam, both of which are suited to cereal and horticultural crop production (Farewell 2007). The shoreline at Cleveleys has been provided with a substantial sea wall and promenade, whilst the inter-tidal sand and cobble beach deposits have extensive ridge and runnel formations and are managed by a series of groynes (Figure 4.20). Cleveleys is predominantly urban and the shoreline promenade has been provided for recreational use and forms part of the Lancashire Coastal Way. The beach is publicly accessible.



Figure 4.20 Seafront at Cleveleys with promenade, stepped sea wall and groynes in the inter-tidal zone
©Rob Noble.

4.3.2 Previous research

The NWRCZA Phase 1 study looked at this part of the coastline as part of Block 2 of the study area (Johnson 2011). It did not highlight Cleveleys as containing significant heritage assets at risk of coastal erosion. Consultation with Local Authority

Archaeologists, however, identified a newly reattributed shipwreck site and fairly extensive peat exposure at Cleveleys as being at risk of erosion and requiring a rapid survey (Peter Iles pers.comm.). Cleveleys has therefore been included as a survey location in Phase 2. The remains of the shipwreck are discussed in the following sections and the peat exposures are discussed as part of the palaeoenvironmental survey in Chapter 7.

The shipwreck was recorded through the Phase 1 aerial photography transcription as a post-medieval wreck (NRHE: 1483219). Archaeology in the inter-tidal zone is difficult to accurately locate through aerial photography due to the lack of control for the photographs. The Phase 2 survey has more accurately located the wreck site.

4.3.3 NWRCZA Phase 2 Archaeological Investigation

The archaeological survey of this area comprised a walkover of the inter-tidal sands at Cleveleys and Bispham (map Figure 4.22).

4.3.4 Post-Medieval

The shipwreck site at Cleveleys is recorded in the Lancashire HER (HER: PRN35154). It was wrongly identified as the remains of the Foudroyant, Nelson's former flagship built in 1798. This attribution is likely to be incorrect as the remains located at Cleveleys are too far north to be associated with this ship that was wrecked at its mooring off the coast of Blackpool in 1897 (Peter Iles pers. comm.). Peter Iles has recently reattributed these remains to be those of the Abana, a Norwegian barque built in 1874 and wrecked in 1894.

The Abana is described in the Lancashire HER as a, 'three masted Norwegian Barque of 1200 tons, built at St John's Newfoundland in 1874 and she belonged to a company who's home port was Farsund in Norway. Her Captain was a Norwegian, Adolph B. Danielsen and she had a crew of sixteen, thirteen Norwegians and three Swedes, plus a dog and a ship's cat. Records show the Abana had left Liverpool carrying 500 tons of ballast bound for Sapelo, Florida U.S.A. for a cargo of timber, the weather at that time was hazy with a light easterly breeze. A severe storm in the Irish Sea left her without sails and drifting to the east, and, on 22 December 1894 she grounded at Little Bispham. The crew were all saved by the crew of the Blackpool Lifeboat the 'Samuel Fletcher', which had been brought round by road'.

The survey recorded the wreck (16) as the remains of a substantial timber vessel, c.50m in length and c.9m wide. The remains were buried by sands and lying within a shallow pool. There appeared to be four separate rows of timbers, the most seaward of which was the best-preserved consisting of a series of curving timbers with horizontal timbers attached with wooden pegs and iron strapping (Figure 4.21). Peter Iles identified this section as the bottom of the ship, turning up towards the bilge. The remaining three lines of timbers are more difficult to identify (though Peter Iles identifies the vertical timbers as being horizontal deck beams) and the bow and stern of the ship are not present or were not exposed at the time of survey. The original form of the ship cannot be ascertained from the exposed remains. However if the vessel has come to rest slightly keeled over, then a considerable portion of it probably survives buried beneath the sand so there is a high potential for buried remains at this site.



Figure 4.21 Remains of timber vessel identified as the Abana 1874, looking southwest (scale = 2m in background and 1m in foreground).

4.3.5 Threat from erosion

The Cleveleys wreck lies within SMP2 policy unit 11b 2.4, which recommends ‘Hold the Line’ for the next 100 years. This states that existing defences will be maintained and that an investigation will take place into the long-term management of beach erosion (Halcrow 2011).

The Fylde sits between the Ribble Estuary in the south and Morecambe Bay in the north and is backed by the Wyre estuary to the east. It is largely affected by changes within these systems, which have been infilling since the end of the last glaciation and are significant sinks for sediment (Halcrow 2011). The western coastline of the Fylde Peninsula is predominately cut in to glacial sediments and the natural cliffs of glacial till that characterised the northern Fylde coast, prior to the erection of sea defences, are believed to be derived from a single ice-melt (Halcrow 2011). The inter-tidal zone has extensive sand flats with pronounced ridge and runnel systems that serve to dissipate the strength of onshore waves. This is not sufficient to prevent erosion, however, as the sediment sinks to the north and south, coupled with the lack of sediment input caused large-scale erosion of the coastline, particularly around Blackpool, prior to the erection of sea defences in the late 1800s. Beach erosion is still a concern, however, and along the northern Fylde coast groyne have been employed in an attempt to manage this problem.

At Little Bispham, where the shipwreck (16) is located (Figure 4.22), the beach is showing a slow trend of erosion with varying, but generally lowering, beach levels (Halcrow 2011). The remains of the ship are actively eroding out of the inter-tidal sands and the current trend puts the wreck at immediate risk of coastal erosion. Within the SMP2 policy, however, there is scope for management of beach level erosion to be implemented in 20-50 years. Whilst this may protect the remains in the long term, significant damage is likely to occur prior to the implementation of these beach management strategies.

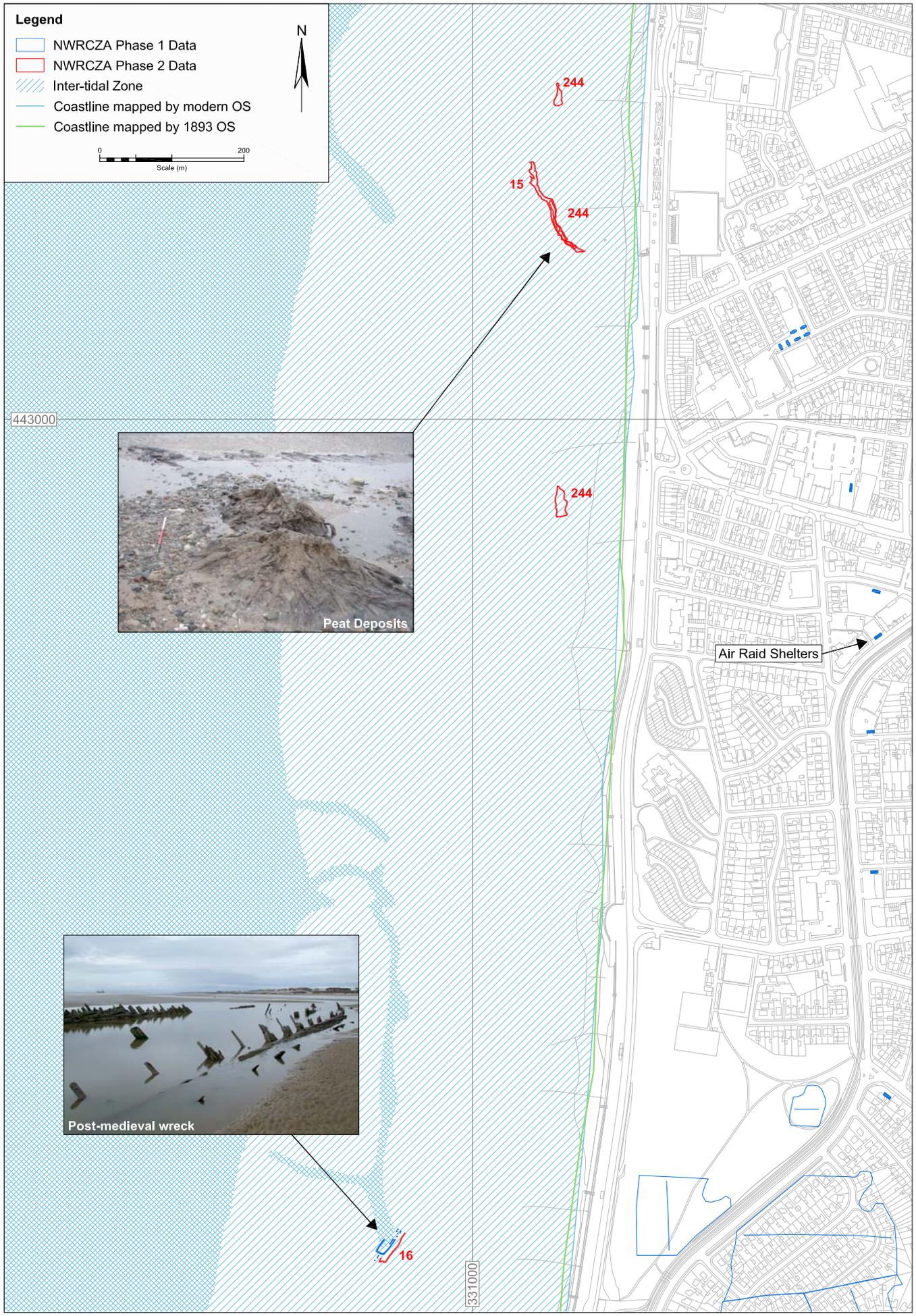


Figure 4.22 Location of sites surveyed at Cleveleys

4.4 Wyre Estuary and Pilling Marsh (Map Figures 4.33 and 4.34)

4.4.1 Location and geology

The Wyre Estuary (SD 34354 47807) and Pilling Marsh (SD 37114 49387) lie on the north side of the Fylde Peninsula which forms the southern extent of Morecambe Bay. The River Wyre runs north-south \approx 2.5km east of Fleetwood and is an estuarine system. Whilst Pilling is a small village fronted by extensive salt marshes (Pilling and Cockerham Marshes) \approx 6.5km to the east of the Wyre, running up to the southern shore of the Lune Estuary at Glasson. Pilling is not listed in the Domesday Book of 1086 (Hinde 1985).

The Northern Fylde coast is characterised by a solid geology of Permian and Triassic Mudstones in the western side of the peninsula around Fleetwood and the River Wyre and Triassic Sandstones to the eastern side of the peninsula around Pilling and Cockerham (Johnson 2011, 25). The superficial geology is dominated by Devensian Till deposits in the upper reaches of the Wyre Estuary and a narrow band of salt marsh around Pilling (BGS 2008) (Figure 4.23). The principal soils along the Wyre Estuary vary from Seasonally Wet Deep Sand at the estuary mouth through to Seasonally Wet Deep silts, Deep Red Loam and even saltmarsh along the river banks. In Pilling saltmarsh forms the predominant coastal soil type backed by Deep Red Loam inland. These soil-types are suited to cereal production and seasonal animal grazing (Farewell 2007).



Figure 4.23 Pilling marsh looking west with the sea-dyke in the foreground.

The Wyre Estuary is not publicly accessible; along its eastern banks for instance a public footpath runs for a short distance along the coast, before skirting inland to make way for a private golf course and a gas storage plant run by Halite Energy Group. In contrast Pilling Marsh is publicly accessible with a large sea dyke built in 1981 that forms a coastal footpath as part of the Lancashire Coastal Way. It is mostly frequented by dog walkers and birdwatchers. The Wyre Estuary and Pilling Marsh are designated SSSIs.

4.4.2 Previous research

The NWRCZA Phase 1 study looked at the Wyre Estuary as part of Block 2 of the study area and Pilling Marsh as part of Block 3 (Johnson 2011). It did not highlight specific sites in the Wyre Estuary or Pilling as being potentially under threat of coastal erosion and requiring rapid survey. However, further consultation with local authority archaeological officers identified the potential for 'at risk' sites at these locations, particularly shipwrecks in the Wyre and saltworking sites at Pilling. These areas were therefore included for a walkover survey as part of Phase 2.

Fourteen post-medieval to 20th century shipwrecks and hulks were recorded in the Wyre Estuary as part of the Phase 1 aerial photography transcription exercise (NRHE: 1483599). Four shipwrecks were recorded in the Lancashire HER during preliminary investigations into sites demarcated for cabling associated with the Barrow-in-Furness wind farm (HER: PRN:26927; PRN:26930; PRN:26931; PRN:26932). Of these four, only one is a known vessel, a late 20th century fishing vessel named 'Our Golden Promise'. According to its description in the Lancashire HER, it appears to have been removed from the estuary in 2002.

There have been no formal investigations into the remains of saltworking at Pilling, however it is known from documentary sources that there were several saltworking sites in that area in the post-medieval period and possibly earlier. The Phase 2 survey of Pilling therefore focused on identifying any remains of this industry.

4.4.3 NWRCZA Phase 2 Archaeological Investigation

The archaeological survey of this area involved a walk-over of publicly accessible areas on the eastern shore of the Wyre Estuary and a full walkover of the Pilling sea-dyke.

4.4.4 Medieval

Studies of medieval saltworking generally use the distribution of salterns (*salinae*) in the Domesday Book as a starting point for analysis (Cranstone 2006, 13). Whilst the method of production is not stated in the Domesday Book, it is assumed that the most common form of medieval saltworking was 'sleeching', where the salt-encrusted surface of intertidal silts or salt marsh was scraped off, the salt content leached out with seawater, and the resulting strong brine boiled in a 'saltcote' (Cranstone 2008, 1). The resultant salt was then sold and the remaining clean silt was piled up into a 'sleeching mound', many of which are still recognisable in the landscape today.

Cranstone (2006) completed a survey of the saltworking sites of the Solway coast in Cumbria and concluded that sleeching mounds are a rare occurrence on the west coast in comparison with their relative abundance on the east coast (Cranstone 2006, 16). He suggests this may be due to increased levels of re-use of the clean silt on the west coast, but it may also reflect differing sleeching practices. Where sleeching mounds were recorded in the Solway, they were usually on the backslope of the saltmarsh, where the current margin of active saltmarsh is located near the backslope (Cranstone 2006, 16).

The survey at Pilling recorded the possible ploughed-out remains of a sleeching mound (14) as consisting of a low undulating and irregular mound, c.200m in length, which is bisected by the A588, near Backsands Lane at Pilling Marsh (Figure 4.24). This is therefore located on the backslope of the active saltmarsh, lending further credence to its

identification as the possible remains of a saltworking industry. No further remains identified with saltworking were recorded as part of the survey of this area.

The attribution of this site to the medieval period comes from the association of medieval saltworking practices and the process of sleetching which would be represented by these remains. Post-medieval saltworking generally involved the use of panhouses and other more permanent structures (Cranstone 2008, 2) that were not identified during the survey. The site at Pilling may therefore have had medieval origins, but it may also have been established in the post-medieval period. A 17th century structure, thought to relate to the salt industry was excavated in 1955 by the Chorley and District Archaeological Society and is recorded in the Lancashire HER (HER: PRN26293). This was located *c.*140m from the recorded sleetching mound. The Salt Tax Duty Survey of 1748 also lists Pilling as a saltworking location with fifteen producers, but interestingly none of these producers are recorded as having had a panhouse.



Figure 4.24 Possible ploughed-out remains of a sleetching mound at Pilling, looking southwest.

4.4.5 Post-medieval – 20th century

Aside from the possible evidence of medieval or post-medieval saltworking, the Phase 2 survey also recorded extensive remains of what is thought to be post-medieval extraction (195). This takes the form of large rectangular shallow cuts into the marsh immediately in front of the sea dyke, separated by trackways of uncut marsh (Figure 4.25). Whilst the exact nature of this extraction is unknown, it was possibly peat or turf cutting, or it may even be associated with the sleetching method of saltworking described above. The most likely explanation of these features is peat cutting, however, as Pilling and Cockerham Mosses are known to have hosted extensive domestic peat cutting (turbarry) and limited industrial-scale extraction (Middleton et al 1995, 78-83). The earthworks are faintly visible on GoogleEarth™ imagery and extend for a length of at least *c.*1.25km along the sea dyke.



Figure 4.25 Remains of large-scale shallow extraction in front of the sea dyke at Pilling, looking northwest.

Further west of the recorded location of shallow extraction, the Phase 1 aerial photography transcription mapped what was thought to be a post-medieval fishtrap (NRHE: 1483674). Inspection of this feature during the Phase 2 survey, however, concluded that it is simply a fence-line extending out into the marsh (Figure 4.26). All records should be amended accordingly.



Figure 4.26 Fence-line incorrectly recorded as a post-medieval fishtrap in the Phase 1 aerial photography transcription, looking northwest.

In the Wyre Estuary, of the fifteen shipwreck and hulk sites identified during Phase 1, twelve were visible during the Phase 2 survey. Of these twelve, only six were recorded in the Phase 2 GPS survey. This was due to the inaccessibility of the inter-tidal zone which necessitated using the locations recorded in the Phase 1 data to record the observations made in Phase 2. This was only carried out when the observed wrecks could be matched to the Phase 1 data with certainty. Of the six wrecks recorded, only two are recorded in the Lancashire HER (HER: PRN:26932; PRN:26927). The majority of wrecks observed were timber-hulled vessels of presumed post-medieval to 20th century date, however there were also at least two iron/steel-hulled vessels of modern date (Figures 4.27-4.32).



Figure 4.27 Timber vessel-eastern bank (PRN:26927). Figure 4.28 Two vessels-western bank (PRN:26932).



Figure 4.29 Timber vessel-western bank.

Figure 4.30 Timber vessel-western bank.



Figure 4.31 Four vessels (two iron/steel)-western bank. Fig. 4.32 Three vessels-western bank.

3.4.7 Threat from erosion

The wreck sites recorded in the Wyre lie within the outer reaches of the Estuary in SMP2 policy units 11c1.4, which recommends 'Hold the Line' for the next 100 years, and 11c1.8, which recommends 'No Active Intervention' for the next 100 years. The sites recorded on Pilling Marsh lie with SMP2 policy unit 11c2.3 which recommends 'Hold the Line' for the next 20 years, 'Hold the Line or Managed Realignment in 20-50 years and 'Hold the Line' thereafter up to 100 years.

The Wyre is a bottle-shaped estuary extending for 18.3km from its mouth, east of Fleetwood, to the normal tidal limit at Little Eccleston. It has a total area of ≈ 635 ha and is macro-tidal, experiencing a spring tidal range of 8.3m and a neap tidal range of 4.3m (Halcrow 2011). Owing to the shape of the estuary and its north-south alignment, wave energy entering the estuary is limited (typically less than 1.6m/s [Wyre Borough Council 202]) and then dissipates upstream as the estuary widens, leading to deposition of sand and mud in the inner reaches.

Studies have shown that in 1850 the Outer Estuary and the main channel were wider than they are today, however dredging and land reclamation since the 1850s has narrowed the mouth of the estuary and created a narrower, deeper channel (Halcrow 2011). The channel follows a roughly 30 year cyclical meander from east to west influencing localised patterns of erosion and accretion accordingly (Halcrow 2011). Currently the sediment inputs have been shown to be keeping pace with sea-level rise and the estuary is generally in a state of equilibrium, however the future response of the estuary to sea-level is still uncertain (Halcrow 2011). Estuary rollover is one possible response and this would lead to erosion in the Outer Estuary with estimates ranging from 3.4m to 6.6m in the next 100 years (NCERM 2012).

The shipwrecks recorded in the Phase 2 survey (196) on the western shore of the River Wyre are partially buried in silts and marsh, whilst those on the eastern shore are being actively eroded. Four of the six wrecks lie within the inter-tidal zone where they will not be protected by the construction or maintenance of coastal defences, where these are proposed. The remaining two wrecks lie on the western shore, 10-15m above MHWS, but still in front of the line of coastal defence (Figure 4.31). It is highly likely that the cyclical nature of the River Wyre's meander will take the main channel closer to the western banks within the next 30 years, meaning that these remaining wrecks will become inter-tidal (Halcrow 2011). All of the wrecks recorded in the estuary are therefore either undergoing coastal erosion currently, or are at risk of coastal erosion within the next 30 years.

Since the last Ice Age, the southern shore of Morecambe Bay has experienced a trend of net accretion, however local patterns of behaviour vary from this norm. At Pilling the shoreline was once fronted by protective sand dune systems, however extraction of material from Fleetwood Point and Rossall Point, in the past 150 years, is believed to have led to large-scale dune erosion (Halcrow 2011). The present coastline consists of a wide sandy inter-tidal zone fronting a narrow band of saltmarsh, backed by low-lying reclaimed land and a sea dyke.

Under the present management scenario, the sea dyke will continue to stabilise the historical erosional trend and protect the low-lying hinterland from flooding. The coastal fringes of the saltmarsh are expected to accrete at a slow rate, provided there is a continuation of sediment input from Morecambe Bay (Halcrow 2011). In 20-50 years,

however, a 'Managed Realignment' Scheme may be introduced which would see the dyke abandoned and new coastal defences erected/repared further inland. The effects of this scenario have yet to be modelled and this is scheduled to take place between 2011 and 2016 under action reference 2.2 which seeks an investigation into the viability of this proposal (Halcrow 2011). No erosion risk predictions have yet been calculated for the 'Managed Realignment' scenario (NCERM 2012).

Based on this information, the sites recorded at Pilling are not considered either to be undergoing coastal erosion, or to be at immediate risk of coastal erosion. The principal vulnerability lies in the possibility of changes in the channel configuration of the marshland which would lead to localised erosion of the evidence for post-medieval extraction (195). The effects of the implementation of the possible 'Managed Realignment' scheme cannot be ascertained with any certainty at the present time, but may place the sleeching mound (14), currently behind the sea dyke, at risk of inundation if the sea dyke is not maintained.

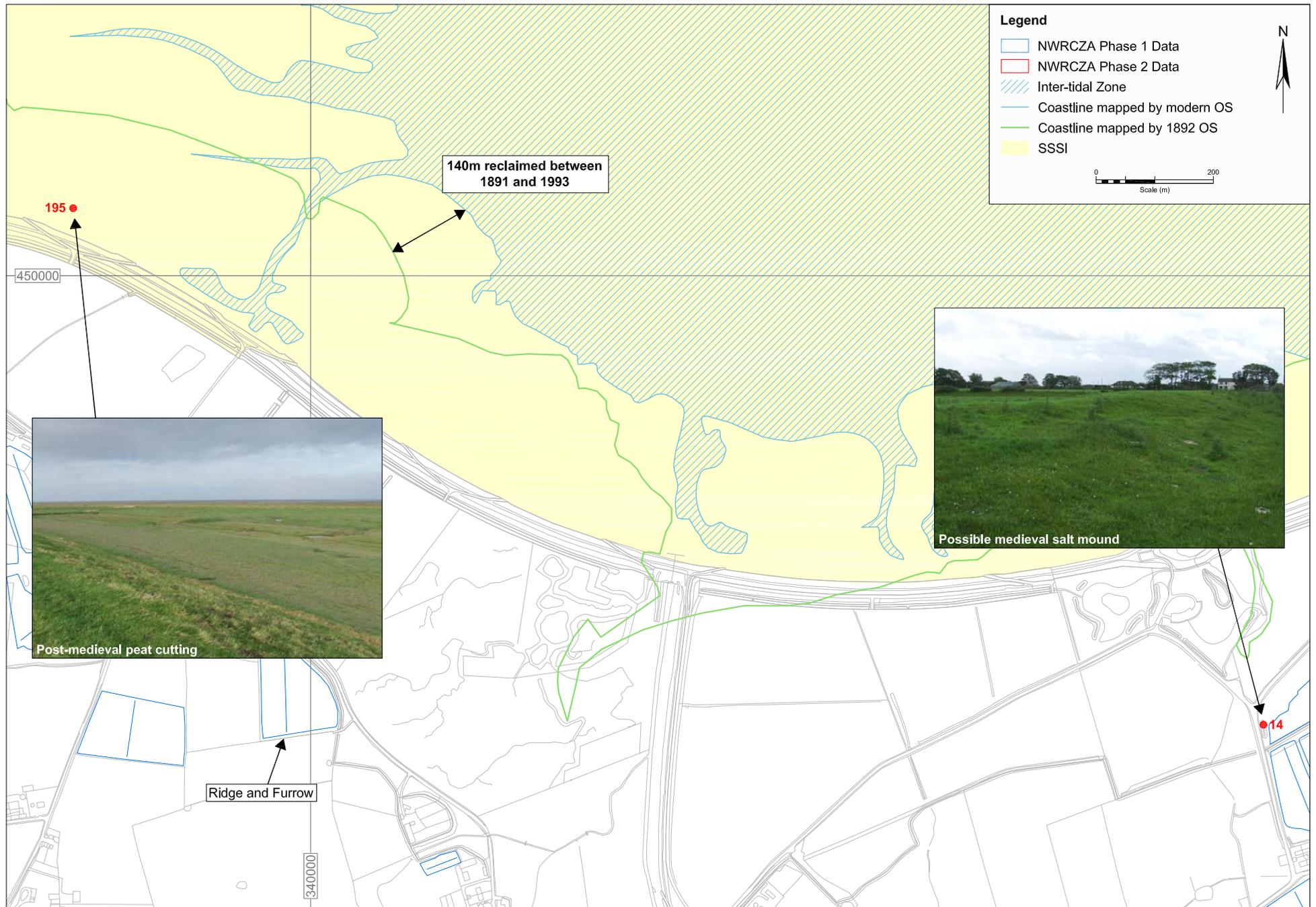


Figure 4.33 Location of sites surveyed at Pilling Marsh

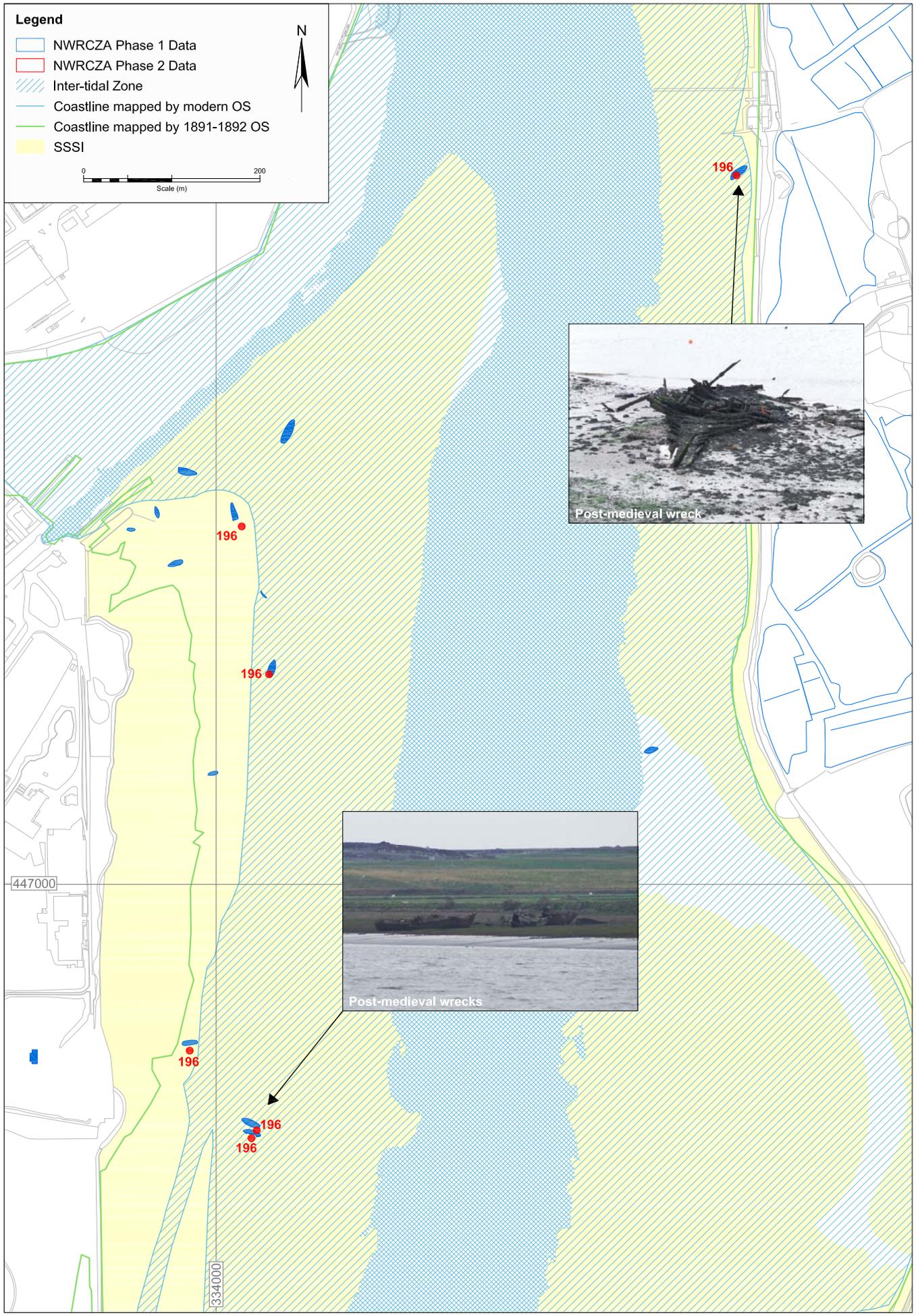


Figure 4.34 Location of sites surveyed in the Wyre Estuary

4.5 Cockersand (Map Figure 4.42)

4.5.1 Location and geology

Cockersand (SD 47784 53602) lies in the southeast corner of Morecambe Bay at Plover Scar, the most northerly point of Cockerham sands. It is c.9.5km southwest of Lancaster on the southern shore of the mouth of the Lune Estuary.

The mouth of the Lune Estuary is characterised by a solid geology of Permian and Triassic Sandstone (Johnson 2011, 25). The superficial geology south of the estuary is dominated by the extensive inter-tidal sands of Cockerham which are backed by saltmarsh in the southern section, but by two resistant scars (Long Tongue and Plover Scar) and an outcrop of sandstone in the northern section. This forms a small headland at the mouth of the estuary. The principal soil on the headland is Seasonally Wet Deep Clay which is suited to the production of cereals, vegetables and horticultural crops (Farewell 2007). The natural clay cliffs that would form the coastal frontage at Cockersand have been provided with coastal defences in the form a patched frontage of red sandstone walling, limestone and concrete (Figure 4.35).



Figure 4.35 Coastal defences at Cockersand, looking southeast.

Current land use in Cockersand is predominantly pastoral agriculture as the marshland have been reclaimed. The coastline and foreshore are publicly accessible as part of the Lancashire Coastal Way. It is mostly frequented by dog walkers and birdwatchers. The Lune Estuary and Cockerham Marsh are designated SSSIs.

4.5.2 Previous research

The NWRCZA Phase 1 study looked at Cockersand as part of Block 3 of the study area (Johnson 2011). It highlighted the Premonstratensian Abbey at Cockersand as being potentially under threat of coastal erosion and requiring rapid survey. It was noted that the rapid survey should focus on the action of erosion at the site (Johnson 2011, 216).

Cockersand Abbey was mapped as part of the Phase 1 aerial photography transcription as the earthwork remains of a medieval abbey (NRHE: 41089). It is a Scheduled Ancient Monument (27855), contains a Grade I Listed Building (182270) and is recorded in the Lancashire HER (HER: PRN:406). It has been placed on the English Heritage 'Heritage at Risk Register' with its principal vulnerability recorded as coastal erosion.

The abbey was excavated from 1923-27 revealing the plan of the church and cloistral buildings, part of the monastic drain and the possible foundations of the infirmary (Sherdley and White 1975, 3). The excavation was largely a wall-chasing exercise and recovered few small finds; limited to pottery, the earliest dating to the mid 13th-14th century, encaustic floor tiles, dating to the 13th century, and metalwork, including a key dating to the 14th-15th century. Despite this excavation, there is still the potential for significant archaeological deposits to remain undisturbed within the various chambers identified, and within the wider the abbey precinct (Sherdley and White 1975, 8).

Limited emergency excavation and recording was carried out by Lancaster University Archaeological Unit (LUAU) in 2000 after storm action exposed a length of c.15m of archaeologically sensitive ground along the top of the cliff edge. This recorded eroding archaeological stratigraphy, but did not recover any small finds (Hair 2000, 1-2).

The Listed standing remains of the Chapter House were repaired by English Heritage Grant Aid in 2007 and an interpretation panel erected.

An analytical earthwork survey was undertaken by English Heritage in 2008 with a focus on determining the extent and nature of the archaeological remains at risk of erosion (Burn *et al.* 2009). The area surveyed followed a previous geophysical investigation of the site, as well as the wider abbey precinct. The survey mapped the remains of the abbey buildings, precinct boundaries, monastic drain and a possible slipway (Burn *et al.* 2009, 15). An assessment into coastal erosion at the site included a limited map regression study that showed a loss of c.5m of land between 1920 and 2008 and a loss of c.3m of land between 1975 and 2008 (Burn *et al.* 2009, 25). In assessing the significance of the remains under threat of coastal erosion, the survey draws attention to John's Hall, which may be related to the western precinct boundary, the monastic drain, which extends out beyond the western boundary and the possible slipway, which would be a rare survival relating closely to the abbey's coastal location. All of these features are noted as being under imminent threat (Burn *et al.* 2009, 26). Finally, the survey also raises the possibility that reports of skeletons eroding from the abbey ruins (Swarbrick 1923, 165) may actually relate to earlier occupation of the site, possibly as a hospital as is attested in documentary evidence (Burn *et al.* 2009, 4). This is because the monastic graveyard would generally be located on the east side of the church, and therefore inland of the eroding western face. These remains, if they exist, would be significant in developing our understanding of the chronology of settlement on this small headland.

4.5.3 NWRCZA Phase 2 Archaeological Investigation

The archaeological survey of this area involved a walk-over of publicly accessible land from Bank Houses to Crook Farm.

4.5.4 Medieval

Hugh Garthe is credited with the first foundation at Cockersand as a hospital and hermitage established sometime before 1184 (Sherdley and White 1975, 1). By 1190, the hermitage was re-established as a Premonstratensian Abbey (named after the mother-house of Premontre in France) named St. Mary-in-the-Marsh, but also continued to serve as a hospital for poor and aged people (Sherdley and White 1975, 1). The abbey does not appear to have been fully established until 1204-5, however, and over the course of the 13th century it gained substantial holdings in coastal and lowland Lancashire and South Cumbria (Sherdley and White 1975, 1-2). It was a successful foundation until its suppression in 1539, when it was despoiled and stone-robbed. It was recorded as ruinous in 1727, but in 1750 the chapter house was renovated and became a mausoleum for the Dalton Family up until 1861, thus securing its preservation as the only remaining standing building at the site (Burn *et al.* 2009, 1).

The survey recorded the remains of the abbey (18) as consisting of the standing remains of the chapter house and extensive earthwork remains of the church, cloistral buildings and abbey precinct (Figure 4.36). These remains have been recorded to English Heritage Level 3 Standard previously and the reader is referred to that survey for a detailed description of these remains (Burn *et al.* 2009).



Figure 4.36 Standing remains of the 13th century chapter house at Cockersand Abbey with earthwork remains of the cloister in the foreground, looking northeast.

The specific aim of the Phase 2 survey at this location was to further assess the action of erosion at the site. As stated, the shoreline is currently protected by a patched covering of sandstone walling, limestone and concrete. This is carried at an angle up the cliff edge, but terminates before it reaches the top of the slope, leaving up to 2m of sandy soil exposed. This has led to localised patches of erosion and landslip above the top of the sea wall (Figure 4.37). The problem is then exacerbated by the presence of cattle on the site as they trample and rub the eroded areas. Historical patches of erosion have been

treated with either a tip of cement from the surface, or with a patch of tarpaulin with a limestone rock facing (Figure 4.38). As it stands, it appears that the concrete patching is the more successful of the two.



Figure 4.37 Localised patches of erosion of exposed sandy soil above the top of the sea wall at Cockersand Abbey.



Figure 4.38 Concrete tips and tarpaulin and rock-facing on historical patches of erosion, looking north.

Erosion is clearly an ongoing problem at this site and at the time of survey a sherd of burnt 13th-14th century Greenglaze Ware in a course light-grey fabric (165) was recovered from the base of one of the localised patches of erosion (Figure 4.39). The location of this findspot (Figure 4.41) coincides with the possible medieval slipway identified in the English Heritage survey of the site in 2008 (Burn *et al.* 2009, 26) which draws attention to the fact that the possible slipway is a rare survival of such a feature in a monastic context; however the recovery of this artefact during Phase 2 shows that this significant feature is actively eroding.



Figure 4.39 Sherd of burnt 13th-14th century Greenglaze Ware in a course light-grey fabric recovered from Cockersand Abbey.

4.5.5 Post-medieval

A post-medieval fishtrap was recorded on Plover Scar to the northwest of the abbey site as part of the Phase 1 aerial photography transcription (NRHE: 1484161). This feature is also recorded as a medieval fish weir in the Lancashire HER (HER: PRN:408). An interpretation panel off the public footpath at Plover Scar describes the fish trap as an ancient fishing baulk constructed of wooden posts with woven wicker/willow panelling. No evidence of this fish trap was observed during the Phase 2 survey, however it must be noted that the survey did not take place during a full low tide when the survival of heavily eroded short posts may have been observed.

Further north of Plover Scar, at Crook Farm, another medieval fish weir is recorded in the Lancashire HER (HER: PRN:391). This is described as two shingle banks placed at right-angles to each other, aligned north-south and east-west respectively, with a gap of 35.3m between their nearest ends. Over 100 vertical wooden posts are described as visible projecting from the shingle banks.

The Phase 2 survey recorded remains (166) which may be related to this feature, however they appeared to the field team to be post-medieval in character rather than medieval.

The remains consisted of a line of vertical timbers projecting from a shallow shingle ridge aligned east-west (Figure 4.40). Once again the survey did not take place during a full low tide so only a small section of the feature was exposed in the inter-tidal zone. Further analysis of the timbers may shed some light on the date of this feature and therefore its potential relationship with the nearby abbey.



Figure 4.40 Recording the remains of a medieval/post-medieval fish weir at Crook Farm.

4.5.6 20th century

The Phase 1 aerial photography transcription recorded the remains of a Second World War observation post south of the abbey ruins (NRHE:1484184). This is also recorded in the Lancashire HER as a range observation building, built to control a documented firing range located on Cockerham Sands (HER: PRN:26071).

The Phase 2 survey recorded the observation post (17) as consisting of a two-storey brick and concrete structure with external steps (Figure 4.41). There is a wide opening projecting from the western elevation at first-floor level which would afford excellent views across the sands. The site appears to conform to a standard plan for Royal Observation Corp Posts in the Second World War which were often built of domestic brick and of two storeys with a crew room on the ground floor and an observation room above (Lowry 2002, 32). The purpose of this type of structure was to visually plot the bearing of enemy aircraft sightings. The association between this building and a firing range may be an error, or perhaps this was a secondary use of the building.

The building is derelict and all doors and windows have been removed. The site was located on private land so an internal examination of the structure was not conducted.



Figure 4.41 Second World War Observation Post, looking southeast.

4.5.7 Threat from erosion

The sites recorded at Cockersand (Figure 4.42) lie to the south of the mouth of the Lune Estuary in SMP2 policy unit 11c2.4, which recommends ‘Hold the Line’ for the next 20 years, then ‘Hold the Line or Managed Realignment’ thereafter up to 100 years.

The coastline at Cockersand is influenced by changes in the ebb/flow regimes of Morecambe Bay and the Lune Estuary and also to a lesser degree by the actions of the now canalised River Cocker (Halcrow 2011). The Cocker outflows into Morecambe Bay meeting the River Lune west of the sites surveyed. It is responsible for the lack of saltmarsh accumulation along its northern banks which would otherwise provide some coastline protection. Nevertheless, the small boulder clay outcrop on which the abbey sits, is provided with some natural protection from wave action owing to its sheltered location, its orientation north-south and the presence of Long Tongue and Plover Scar as resistant shingle scars on its eastern frontage (Halcrow 2011). The northernmost section of this coastline however, is more exposed because of its westerly orientation and the presence of waves propagating down the Lune Channel in this area. Erosion of the resistant scars is a consequence of this and one which will in time lead to increased erosion of the boulder clay outcrop behind. Since the 1800s there has been a net retreat of the outcrop caused by the gradual erosion of these scars, and their influence is set to decrease with continued sea-level rise (Halcrow 2011).

It is stated that under the present management scenario, the sea walls at Cockersand will continue to protect the low-lying hinterland from flooding for the next 20 years. In 20-100 years, a ‘Managed Realignment’ Scheme may be introduced which would see set back defences erected at different locales within this policy unit. The effects of this scenario have yet to be fully modelled, however it is expected that the flooding of land around the abbey will lead to the creation of marshland around the ruins (Halcrow 2011). It is

argued that this will place the abbey within a context that is more in keeping with how it would originally have appeared, as at St Mary-on-the-Marsh (Halcrow 2011). Detailed studies into the effects and viability of a managed realignment scenario are scheduled to take place between 2013 and 2016 under action reference 2.3. It is stated that Cockersand Abbey ‘could be protected by local defences’ (Halcrow 2011), though this non-committal comment gives no indication as to who would be responsible for the upkeep of these defences. No erosion risk predictions have yet been calculated for the ‘Managed Realignment’ scenario (NCERM 2012).

Based on this information, the sites recorded at Cockersand are considered to be at varying degrees of threat from coastal erosion. The most important site in this area is the Scheduled remains of the Premonstratensian Abbey (18) and it appears that the importance of this particular site has been taken into account in the production of the management policies for this area. Should a managed realignment policy be adopted, the ruins at Cockersand will still be protected with ‘local defences’ (Halcrow 2011). Nevertheless it must be stated that the current defences are inadequate for the protection of the abbey ruins. There is ongoing localised erosion of archaeologically sensitive deposits at the top of the cliff face and there is also erosion on the patched sea wall along the frontage (Figure 4.43). With sea-level rise, there will be continued erosion of Plover Scar which currently protects the low-lying boulder clay outcrop on which the abbey sits so the defences may have to protect against ever worsening tidal conditions (Halcrow 2011). This site is therefore viewed as being at immediate risk of coastal erosion and also at risk of damage during the construction and maintenance of sea defences.

The SMP2 assessment of erosion at this site states that it ‘is at high risk of further erosion and loss’ (Halcrow 2011).



Figure 4.43 Erosion and patching of the sea wall at Cockersand Abbey.

Of the remaining sites, the medieval/post-medieval fishtrap (166) is considered to be at immediate risk of coastal erosion as it lies in the inter-tidal zone and will therefore not be protected by SMP2 policies. If this site is medieval and related to the monastic exploitation of fishing resources, then this would be a significant site worthy of preservation. The Second World War Observation Post (17) may be at risk of coastal erosion if a managed realignment scenario is introduced at its location. As yet this is unknown, so erring on the side of caution, the site is considered to be at risk of coastal erosion in the medium term; that is within 50 years.

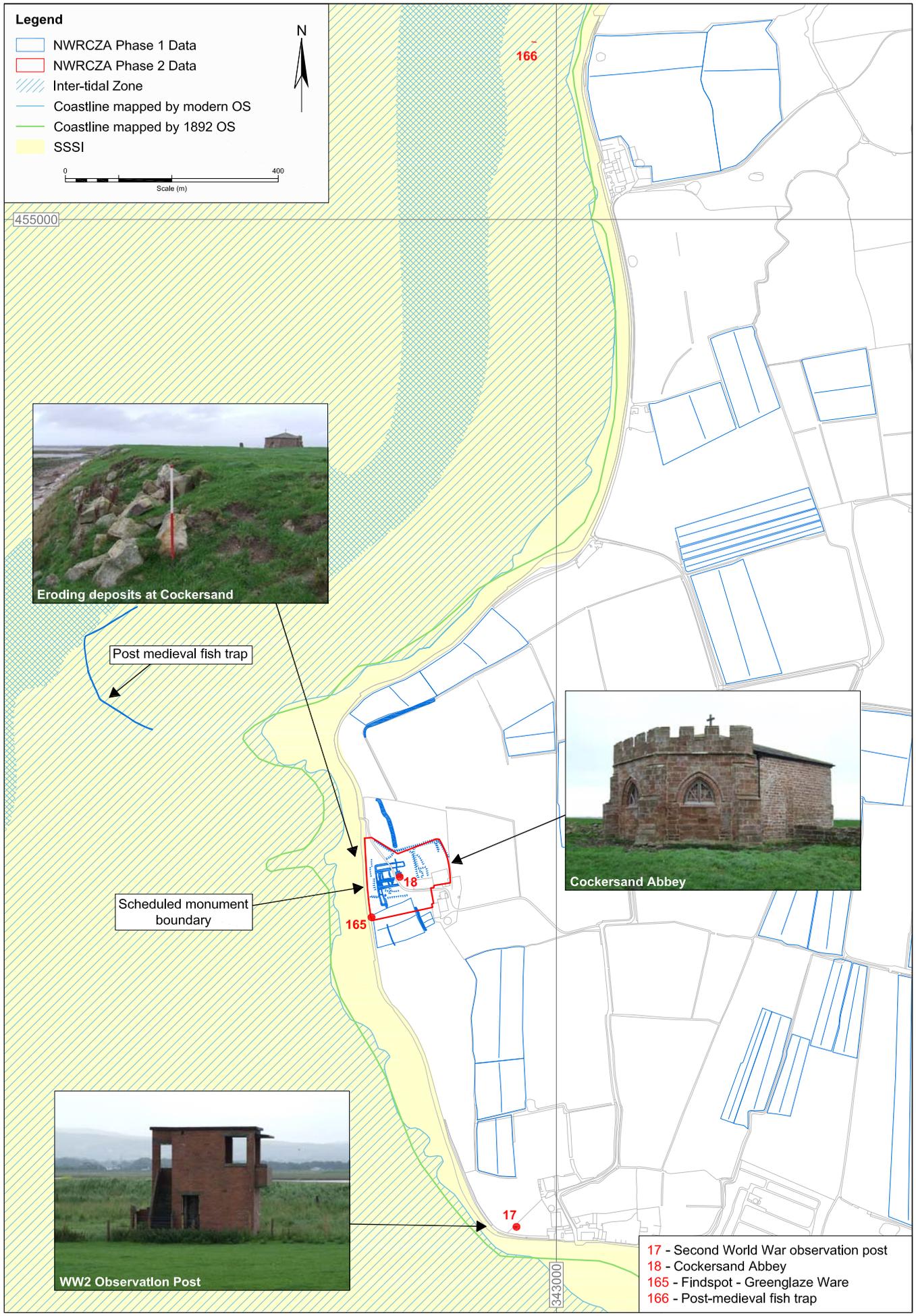


Figure 4.42 Location of sites surveyed at Cockersand

4.6 Sunderland Point (Map Figure 4.48)

4.6.1 Location and geology

Sunderland Point (SD 42294 55367) lies in the southeast corner of Morecambe Bay at Hall End Skear, to the east of the Shoulder of Lune. It is c.9km south of Morecambe and c.6.5km southwest of Lancaster on the northern shore of the mouth of the Lune Estuary. The small village of Sunderland was once an out-port for Lancaster involved in the slave and cotton trades. Its popularity diminished when larger ports came into use at nearby Lancaster and it ceased to operate as a port after Glasson docks was opened in 1787 (Price 1983).

The mouth of the Lune Estuary is characterised by a solid geology of Permian and Triassic Sandstone (Johnson 2011, 25). The sandstone outcrop at Sunderland Point is topped by a low cliff of glacial till with extensive saltmarsh to the west which is fronted by the inter-tidal sand flats of the Shoulder of Lune. The principal soil on the outcrop is Seasonally Wet Deep Clay which is suited to the production of cereals, vegetables and horticultural crops (Farewell 2007). The natural clay cliffs that form the coastal frontage at Sunderland have not been provided with coastal defences (Figure 4.44).



Figure 4.44 Recording erosion on the low-lying till cliffs at the south of Sunderland Point

Current land-use at Sunderland Point is predominantly pastoral agriculture. Much of the shoreline is publicly accessible and is used by birdwatchers, dogwalkers and tourists. The Lune Estuary is a designated SSSI.

4.6.2 Previous research

The NWRCZA Phase 1 study looked at Sunderland Point as part of Block 3 of the study area (Johnson 2011). It did not highlight any specific sites at Sunderland Point as being potentially under threat of coastal erosion and requiring rapid survey (Johnson 2011).

However, further consultation with local authority archaeological officers identified Sunderland point as having the potential to host significant archaeological sites at risk of coastal erosion in relation to the preferred SMP2 policy of 'No Active Intervention' at this location.

4.6.3 NWRCZA Phase 2 Archaeological Investigation

The archaeological survey of this area involved a walk-over of publicly accessible land at Sunderland Point.

4.6.4 Post-medieval

Lancaster was the fourth largest port involved in the UK slave trade from the 17th century to 1807, when the transport of slaves was abolished in all British ships. Sambo's grave is located on the western shores of Sunderland Point. 'Sambo' was the generic name given to this adolescent slave who died in Sunderland in the early 1700s, and was buried in unconsecrated ground in a rabbit warren near to the village. He was brought to England in 1736 from the West Indies as the servant of a captain on an unnamed ship, his story was recorded in the Lonsdale Magazine in 1822 as follows:

'After she had discharged her cargo, he was placed at the inn ... with the intention of remaining there on board wages till the vessel was ready to sail; but supposing himself to be deserted by the master, without being able, probably from his ignorance of the language, to ascertain the cause, he fell into a complete state of stupefaction, even to such a degree that he secreted himself in the loft of the brewhouses and stretching himself out at full length on the bare boards refused all sustenance. He continued in this state only a few days, when death terminated the sufferings of poor Sambo. As soon as Sambo's exit was known to the sailors who happened to be there, they excavated him in a grave in a lonely dell in a rabbit warren behind the village, within twenty yards of the sea shore, whither they conveyed his remains without either coffin or bier, being covered only with the clothes in which he died.'

A local gentleman, James Watson, whose brother, William, was a prominent figure in the Lancaster slave trade, learnt of Sambo's story around 60 years after his death, in 1796. He located the grave and erected a memorial plaque with epitaph at the site.

Sambo's grave has become an important site in memorialising the Lancaster slave trade, which was only formally memorialised in the city of Lancaster with a sculpture, called 'Captured Africans', in 2005. It is not recorded in the Lancashire HER.

The Phase 2 survey recorded Sambo's grave (29) as consisting of a concrete slab with two bronze plaques affixed commemorating the slave boy (Figure 4.45). It was decorated with a small wooden cross bearing the name 'Sambo' in white. Local school children have left various offerings at the grave, mostly painted stones bearing short messages for Sambo, as well as flowers and blackboard bearing the lyrics to 'Amazing Grace' (Figure 4.46).



‘Thoughtless and irreverent people having damaged & defaced the plate, this replica was affixed. *RESPECT THIS LONELY GRAVE*’

Here lies
 Poor SAMBOO
 A faithfull NEGRO
 Who
 (Attending his *Mafter* from the *West Indies*)
 DIED on his Arrival at *SUNDERLAND*

Full sixty Years the angry Winter's Wave
 Has thundering dafhd this bleak & barren Shore
 Since SAMBO's Head laid in this lonely *GRAVE*
 Lies still & ne'er will hear their turmoil more.

Full many a Sandbird chirps upon the Sod
 And many a Moonlight Elfin round him trips
 Full many a Summer's Sunbeam warms the Clod
 And many a teeming Cloud upon him drips.

But still he sleeps _ till the awakening Sounds
 Of the Archangel's Trump new Life impart
 Then the GREAT JUDGE his Approbation found's
 Not on Man's COLOR but his *_*WORTH of HEART

James Watfon Scr.

H.Bell del. 1796

Figure 4.45 The epitaph at Sambo's grave with transcription to the right.



Figure 4.46 Offerings left by local school children and visitors to Sambo's Grave.

4.6.5 20th century

During the Second World War a coastal defence network was established at Sunderland Point, consisting of an anti-aircraft gun battery, a radar station, a military camp and anti-aircraft obstructions on the extensive inter-tidal sands on the Shoulder of Lune. Further to this, two Second World War pill boxes were recorded to the north of Sambo's Grave as part of the Phase 1 aerial photography transcription (NRHE: 1472297). These are not recorded in the Lancashire HER.

The Phase 2 survey recorded the remains of these two pillboxes (26, 27) as consisting of single-storey, brick-built structures with concrete roofs and blast walls covering the entrance. The blast walls rise to full height forming a small porch. Each side, except the entrance, contained a single, concrete-lined stepped machine-gun aperture. The interior was divided into two sections with a brick partition wall.

The most northerly pillbox (26) was the most intact, but was heavily overgrown, whilst at the southern pillbox (27) the blast wall had partially collapsed (Figure 4.47). Both pillboxes are very well preserved and are located in fields used for stock grazing.



Figure 4.47 Recording the brick-built Second World War pillbox at Sunderland Point, facing southeast (scale=1m).

4.6.6 Threat from erosion

The sites recorded on the western shores of Sunderland Point (Figure 4.48) lie in SMP2 policy unit 11c4.3, which recommends 'No Active Intervention' for the next 100 years. This states that the policy will 'allow the shoreline to evolve under natural processes' (Halcrow 2011).

Sunderland Point is effectively a small peninsula bounded by the River Lune on the south and east, and a tidal channel on the west. The level of shoreline exposure is

therefore linked with the amount of protective saltmarsh present along the frontage and the meandering of the tidal channels through the marshes near to the shore. On a wider scale, the coastline is influenced by the dredging of the River Lune, together with the changing position of Heysham Lake and the creation of the artificial promontory of Heysham Harbour to the north (Halcrow 2011). In the late-19th century, Heysham Lake became narrower and deeper than it had been previously and this led to the construction of Heysham Harbour. These changes in the channel configuration led to increased accretion in the area and several periods of land reclamation. The saltmarsh present on the west of Sunderland Point has been accreting at a slow rate as the channel has narrowed. The tidal channel running between the marsh and the shoreline has therefore also narrowed and shortened, though it has shifted closer to the shoreline. This, together with the proximity of the Lune Channel has resulted in erosion at Sunderland Point which has been measured as a loss of *c.*0.5m per year historically (Shoreline Management Partnership, 1999). Significant erosion (28) was recorded during the Phase 2 survey at the southernmost tip of the peninsula (see Figure 4.44).

Future predictions see erosion continue at Sunderland Point (Halcrow 2011). The southernmost tip of the peninsula is most at risk and this will be managed via a 'managed Realignment' scheme that will limit the erosion to 50m over the next 100 years. On the western shoreline, where the recorded sites are located, the 'No Active Intervention' scheme will see estimated erosion of up to 40m in the next 100 years, 8m of which will happen in the next 20 years (NCERM 2012). All of the sites recorded at Sunderland Point (26-29) are therefore considered to be at risk of coastal erosion in the medium term (i.e. within 50 years).

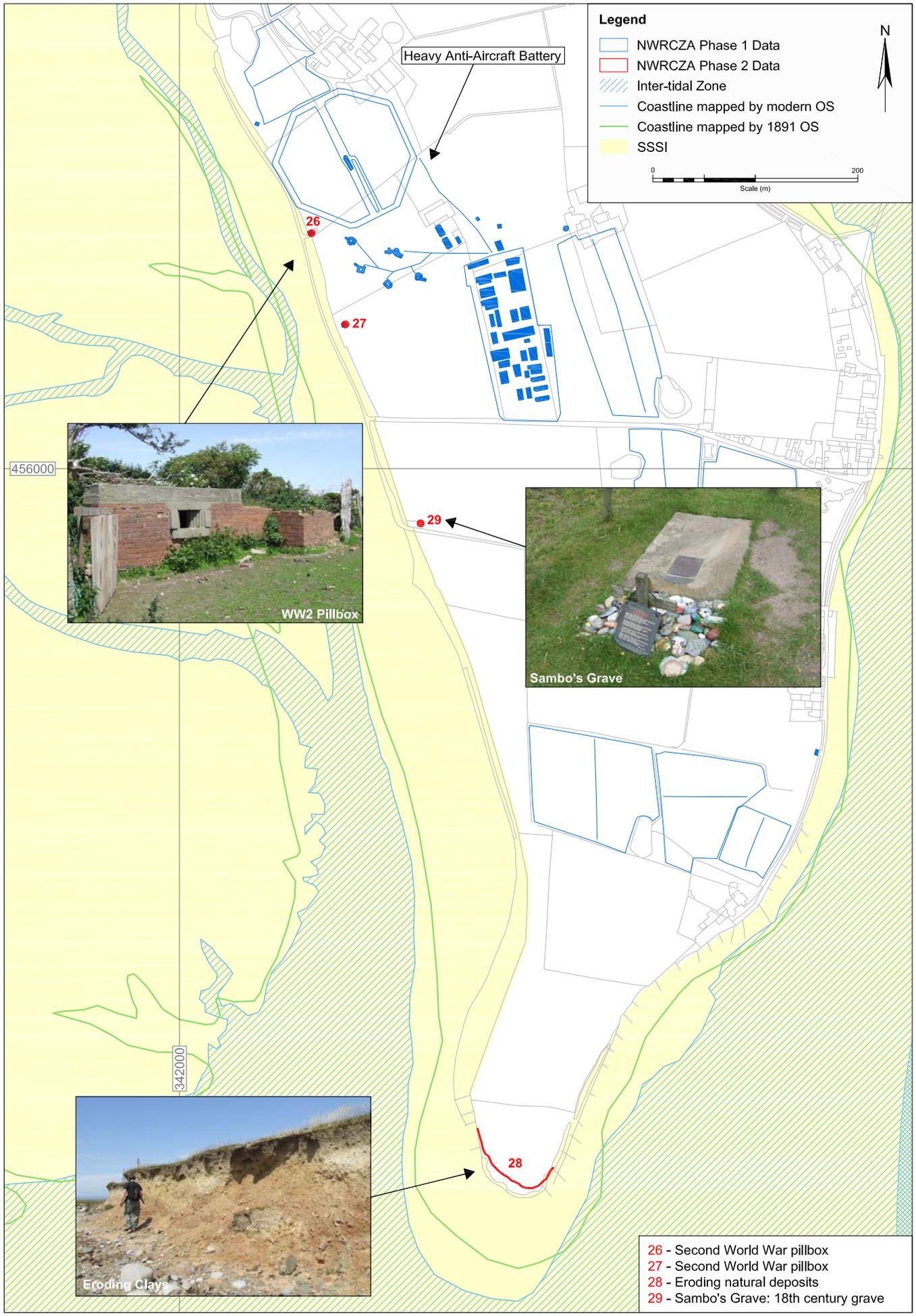


Figure 4.48 Location of sites surveyed at Sunderland Point

4.7 Heysham Head (Map Figure 4.60)

4.7.1 Location and geology

Heysham Head (SD 40494 60527) lies in the southeast corner of Morecambe Bay, effectively dividing the bay into two sections; north and south. It is ≈ 3.8 km southwest of Morecambe town and ≈ 7 km west of Lancaster. Heysham has an important ferry port and two nuclear power stations.

Heysham Head is characterised by a solid geology of Permian and Triassic Sandstone rising to a height of ≈ 10 m aOD (Johnson 2011, 25). The superficial geology is dominated by glacial till deposits rising to a height of ≈ 35 m aOD (BGS 2008). This, together with reclaimed land at Heysham power station and Harbour, forms a small headland jutting out into the inter-tidal sands of Morecambe Bay. The principal soil on the headland is Loam over Red Sandstone which is suited to permanent grassland, dairying and stock rearing (Farewell 2007). There are no coastal defence works around the highest points of Heysham Head as the Sandstone cliffs provide some protection against erosion (Figure 4.49). In the lower lying southern section, however, the shoreline is provided with a concrete revetment and promenade, whilst to the north of the Head the shoreline is protected with limestone rock armouring.



Figure 4.49 Undefended coastline at Heysham Head looking south towards Heysham power station.

Heysham is now largely urbanised and has a significant industrial character around the harbour and power station. The coastline is, however, owned and managed by The National Trust and is open green space that is publicly accessible. It is frequented by dog walkers, fishermen and tourists. Heysham Head sits within the Lune Estuary and Morecambe Bay designated SSSIs.

4.7.2 Previous research

The NWRCZA Phase 1 study looked at Heysham as part of Block 3 of the study area (Johnson 2011). It highlighted the importance of the Anglo-Saxon chapel of St Patrick on Heysham Head, but did not list it as being potentially under threat of coastal erosion and requiring rapid survey (Johnson 2011, 143). Following further consultation with local authority archaeological officers and partners, St Patrick's Chapel was added to the Phase 2 survey as a site potentially under threat of erosion.

St Patrick's Chapel was mapped as part of the Phase 1 aerial photography transcription as the ruined building remains of a medieval chapel (NRHE: 41445). It is a Scheduled Monument (34983), contains three Grade I Listed Buildings (391833; 391834; 391835) and is recorded in the Lancashire HER (HER: PRN:420).

The chapel was surveyed and excavated by the University of Lancaster in 1977 and 1978 when a full record of the structure was made and extensive excavations were undertaken within and around the standing remains (Potter and Andrews 1994). The excavations revealed an earlier structure, thought to date to the 8th century AD, and a complex sequence of burials, including 11th century rock-cut graves, that probably both pre-date and post-date the construction of the chapel (Johnson 2011, 131-2).

Some repairs and consolidation works were carried out on the site in both the 1860s and in 1903, and more recent repair work has been conducted under grant aid from English Heritage, the Diocesan Board of Finance and Lancaster City Council. An interpretation panel has also been erected at the site, presenting some of the results of the survey and excavation.

4.7.3 NWRCZA Phase 2 Archaeological Investigation

The archaeological survey of this area involved a walk-over of publicly accessible land from Half Moon Bay around Heysham Head.

4.7.4 Prehistoric

The earliest traces of settlement at Heysham Head consist of a large assemblage of flint and other stone artefacts recovered during rescue excavation on the Head in 1992 (Salisbury and Sheppard 1993, 142). The excavation was conducted following the discovery of flints and occupation layers eroding from the undefended cliff section between Half Moon Bay and Heysham Head. In total 1262 lithics were recovered from a 32m² area (Salisbury and Sheppard 1993, 145). The artefacts date to the Mesolithic and early Neolithic periods and indicate that tools were manufactured on-site using raw materials brought from elsewhere. The excavators concluded that Heysham was occupied on occasions throughout the whole of the Mesolithic period (Salisbury and Sheppard 1993, 146).

The Phase 2 survey did not record any lithic scatters or artefacts eroding from the undefended cliff section at the north of Half Moon Bay, despite the density of finds recovered during excavation. This suggests that erosion of prehistoric remains may have stabilised for the moment. In saying this, however, there is clear evidence of continued erosion of this cliff section and the potential therefore exists for the loss of previously unrecorded archaeological remains at this site.

4.7.5 Medieval

The excavations and survey conducted at St Patrick's Chapel in 1977 and 1978 revealed the remains of an earlier structure within the present standing building. It measured c.4m in width internally with a possible entrance at its western end. It was also decorated with painted plaster in yellow, red and dark green-brown. This earlier building was extended to form the present structure and its walls are incorporated into the standing structure to a height of 0.7m on the north, south and east sides. Finds associated with the early structure included the painted plaster, which can be stylistically dated to the 8th century AD, and a bird-headed statue of late 7th to early 8th century AD found within a grave of the late 9th to early 10th century (Johnson 2011, 132).

The second phase of construction, that saw the extension of the earlier structure, is thought to either pre-date or be contemporary with the 11th century rock-cut graves to the west of the chapel. This is based on stratigraphic grounds, as well as a radiocarbon date (940±80 BP HAR-2757; AD1010-1185 cal AD) recovered from one of the burials within the chapel. The burial sequence at the site is complex and probably both pre-dates and post-dates the extension of the chapel (Johnson 2011, 132). There were six rock-cut graves to the west of the chapel (Listed Building: 391835); a west cemetery, set in a natural hollow; a central cemetery extending southwards from the chapel; an eastern cemetery; two rock-cut graves to the southeast (Listed Building 391834) and burials within the chapel.

The standing remains at the site consist of the Grade 1 listed chapel (Listed Building: 391833), described as being constructed of sandstone rubble. The east wall is the best preserved and stands to gable height of c.5.5m. Excavation showed that it was built over a possible socket hole for an earlier cross. Partial remains of the north and south walls survive, whilst the west wall survives only as the excavated footings of the first phase of construction. There is an arched doorway in the south wall, built with through stones in long and short work and with a monolithic stone forming the arch typical of the Anglo-Saxon style. To the east of the door a straight joint indicates the possible position of a window (Scheduled Monument description).

The Phase 2 survey recorded St Patrick's Chapel (21) as consisting of the well-maintained remains of the early-medieval chapel and associated rock-cut graves and grave slabs (Figure 4.50). The remains are as described in the Scheduled Monument text.

To the east of St Patrick's Chapel, another important early-Christian ecclesiastical site survives as the Parish Church of St. Peter. It was built in the late 8th or early 9th century, but much of the standing remains are Norman or later (Johnson 2011, 132). The church is a Grade I Listed Building (391836) and is recorded in the Lancashire HER (HER: PRN:419). It is not considered to be at risk of coastal erosion.

Within the churchyard of St Peter's a fragment of an Anglo-Saxon cross shaft, known as the Lazarus Stone, survives and is a Scheduled Monument (23743) recorded in the Lancashire HER (HER: PRN:2407). It is dated stylistically to the 9th century AD.

The Phase 2 survey recorded the remains of the cross shaft, together with a previously unrecorded grave slab of suspected medieval date in St Peter's churchyard (196).



Figure 4.50 Remains of St Patrick's Chapel and associated grave slabs and rock-cut graves. (scale=1m)

The cross shaft is constructed of red sandstone and is set in a modern sandstone base, most likely not in its original location. On the north side of the shaft the decoration depicts a gabled building with a doorway and seven windows or recesses. A human figure, possibly swathed in burial clothing is shown in the doorway (Figure 4.51). This artwork has been interpreted as the Raising of Lazarus (Scheduled Monument description). The sides of the cross shaft are decorated with cabled edging and deeply cut vine scroll, whilst the south face depicts a human figure seated beneath an arch or halo.

The grave slab recorded consisted of a recumbent stone slab with an eroded carved cross on the upper surface (Figure 4.52). It is stylistically similar to those seen in the graveyard around St Patrick's Chapel to the west (see Figure 4.50) and is possibly also Anglo-Saxon in date.



Figure 4.51 North face of cross shaft base in St Peter's churchyard



Figure 4.52 Grave slab with carved cross on upper surface in St. Peter's churchyard.

Both of these heritage assets are suffering from the weathering effects of being located outside and exposed to the elements. Both display moss/algae growth on the surface of the stone that will cause damage to the carved decoration if left untreated, not withstanding potential mechanical weathering caused by freeze thaw action.

4.7.6 Post-Medieval

St. Patrick's Chapel appears to have fallen out of use before any major alterations were made to its fabric. The picture at nearby St. Peter's, however, is a stark contrast with it showing continual structural change over the centuries. It remains in use to this day, as does its graveyard.

The Phase 2 survey recorded the remains of a possible early post-medieval grave slab in the churchyard of St Peter's (196). It consisted of a roughly hewn, recumbent stone slab with a simple hour-glass incised on its upper surface. Above the hour-glass a rough nodule of stone may mark the location of an eroded coat of arms or skull (Figure 4.53). Symbols of mortality, such as the hour-glass, came into popular usage for grave memorials in the 17th century and remained so until the early 18th century (Mytum 2002, 30-1).

Once again, this grave slab shows moss/algae growth on the surface of the stone that will cause damage to the carved decoration if left untreated.



Figure 4.53 Grave slab with incised hour-glass on its upper surface in St. Peter's churchyard.

On the shoreline to the west of both churches, the Phase 2 survey recorded the remains of a probable post-medieval fish trap (221). This may be associated with fishing rights tied to the ecclesiastical sites on Heysham Head. The fish trap consisted of a degraded, truncated V-shaped alignment of upright timber posts, around which a wattle fence would have been constructed to form a barrier trapping fish during the ebb tide (Jecock 2011a, 2). The posts extended for a length of $\approx 1.6\text{m}$ and $\approx 3.4\text{m}$ and survived to a max. height of $\approx 0.55\text{m}$ (Figure 4.54). The fish trap is not recorded in the Lancashire HER.



Figure 4.54 Post-medieval fish trap at Heysham Head, looking southwest (scale=1m).

The final site of potential post-medieval date recorded at Heysham consists of the remains of a stone wall with rock-cut and stone-built steps around the top of the headland to the southwest of St Patrick's Chapel (190). The remains survive as foundations only, running for c.5.5m in their longest continual stretch. It is likely that the wall would have run around the entire headland with the steps giving access to the shore, however the only visible remains occur on the southwest side of the headland (Figure 4.55).

A painting by William Daniell R.A., entitled 'View near Lower Heysham' and held in the Tate Gallery, shows a figure seated on a stone bench next to the rock-cut graves of St. Patrick's Chapel (Daniell and Ayton 1814). In the background, it shows the area to the west of the chapel with a low stone wall around the top of the headland. At Throbshaw Point the wall appears to be battlemented. Although Daniell may have used some artistic licence, the wall depicted around the headland may be this same wall recorded in the Phase 2 survey, dating it to before 1814 when Daniell's '*A Voyage round Great Britain*' was published. Interestingly there is now no evidence of the stone bench depicted next to the rock-cut graves which, if it ever existed, must have been lost through coastal erosion.



Figure 4.55 Remains of stone steps leading from Heysham headland down on to the shore, looking southeast (scale=1m).

4.7.7 20th century

Heysham head was a defended headland in the Second World War and there are features still present on the headland that attest to this period in its history. Two sections of Second World War trenching were mapped during the Phase 1 aerial photography transcription (NRHE: 1485048; 1485052).

The Phase 2 survey recorded two defensive trenches (19, 20) and one small slit trench (191) surviving as earthworks around the top of the headland. The two defensive trenches were each c.20m in length and that on the north of the headland (20) was mapped during Phase 1 as having originally been 30m in length with a typical Second

World War zig-zag pattern in plan (NRHE: 1485052). The trench on the south side of the headland was previously unrecorded. Both trenches were eroded and overgrown with bracken and the zig-zag form was not discernable on the ground (Figure 4.56).



Figure 4.56 Remains of Second World War trench (19) at Heysham Head, looking north (scale = 1m).

The slit trench recorded during the Phase 2 survey (191) was located on the west of the headland and consisted of a small scrape measuring *c.*3.5m in length (Figure 5.57).



Figure 4.57 Remains of Second World War slit trench (191) at Heysham Head, looking northeast (scale = 1m).

One further site associated with the Second World War defence of Heysham Head was recorded south of Heysham at Half Moon Bay. This took the form of a single, cubed anti-tank block of concrete construction with iron hoisting straps (157). It was located on the north side of the slipway, which may itself be of Second World War construction (Figure 4.58). It is uncertain whether the anti-tank block is in its original location.



Figure 4.58 Second World War anti-tank block at Half Moon Bay (157), looking north (scale = 1m).

The Phase 2 survey also mapped a series of earthwork remains along the shore at Half Moon Bay that were thought to relate to extraction works or industrial usage (193). These consisted of building platforms, track ways and an area of quarrying (Figure 4.59). The site covers an area of *c.*200m x *c.*150m.

Map evidence suggests that a quarry existed to the north of the site before the Ordnance Survey 1st Edition map of 1848, however no further industrial activity is noted. However, a miniature golf course is shown in this location on the Ordnance Survey National Grid 1:2500 map of 1963 and it is probable, therefore, that the majority of the earthwork remains relate to this 20th century leisure activity.

4.7.8 Threat from erosion

The majority of sites recorded in the Heysham area (19, 20, 21, 157, 190, 191, 193, 221) lie within SMP2 policy unit 11c6.1 which recommends 'No Active Intervention' for the next 100 years (Figure 4.60). The medieval cross shaft base and grave slabs (192) recorded in St. Peter's churchyard lie within SMP2 policy unit 11c6.2 which recommends 'Hold the Line' for the next 100 years.

Prior to the development of Heysham Harbour and the reclamation of land for Heysham Power Station in the 1940s, this stretch of coastline ran straight from north to south. It



Figure 4.59 Recording the earthwork remains of quarrying, track ways and building platforms at Half Moon Bay, looking west.

was composed of two shallow embayments formed between sandstone outcrops and backed by till cliffs. One to the south between Red Nab and Far Naze and one to the north between Far Naze and Throbshore Point. The artificial development of the coastline has impacted upon the shoreline evolution both north and south of the development (Halcrow 2011). To the north, it is seen to have a negative impact on the Morecambe frontage as it limits net northerly drift causing a reduction of sediment input to the bay. More locally, however, the artificial projection together with Throbshore Point, provide shelter to the till frontage at Half Moon Bay (Halcrow 2011).

The future evolution of this stretch of coastline is linked to the position of the Heysham Lake Channel, which feeds the harbour from the south and moves north along the frontage at Half Moon Bay. Changes in the position of this channel, as have been experienced historically, could cause erosion of the undefended till cliffs (Halcrow 2011). As it stands, however, it is predicted that under the 'No Active Intervention' scenario the shoreline will continue to be fixed by Heysham Harbour, resulting in relative shoreline stability in this area. NCERM predictions for coastal erosion along policy unit 11c6.2 range from 3.4 to 6.6m in the next 100 years, whilst predictions for policy unit 11c6.2 (Hold the Line) stand at 0m, reduced from up to 40m under the unconstrained scenario (NCERM 2012).

The most important heritage assets recorded at Heysham are undoubtedly the Scheduled remains of St Patrick's Chapel and its associated rock-cut graves (21), and the Scheduled cross shaft base in the churchyard of St Peter's (192). The latter is not considered to be at risk of coastal erosion owing to its location c.100m inland from Mean High Water Springs and in a stretch of coastline which will be protected under a 'Hold the Line' scenario. The SMP2 assessment of erosion at this site also concluded that there is 'no risk of flooding or coastal erosion' (Halcrow 2011). St Patrick's chapel, on the other hand, will be at increasing risk of coastal erosion under its SMP2 policy of 'No Active

Intervention' (Halcrow 2011). Although predictions of a loss of 6.6m appear low, this will encroach on the outer extents of the chapel area, as mapped by the Phase 1 aerial photography transcription, but avoids the outer extents of the Scheduled area. This limited erosion does have the potential to impact upon archaeologically sensitive ground and the site is therefore considered to be at risk of coastal erosion in the longer term (i.e. within the next 100 years). The SMP2 assessment of erosion at this site also states that 'the site and its setting is at potential risk from coastal erosion or coastal defence work' (Halcrow 2011).

Depending on the specific action of erosion when it occurs, the damage to St Patrick's Chapel could be minimal erosion and weathering of stone work, or, if the site is undermined for instance, the damage to the site could be very high in proportion to the amount of land actually lost. Figure 4.61 shows the position of the site, on a relatively high eminence with sandstone outcroppings. The area highlighted in red is the sandstone which houses the rock-cut graves and it is clear that any undermining of this outcrop could result in land slippage and the loss of these evocative graves. Similarly undermining of the standing remains of the chapel could cause comparatively large-scale collapse.



Figure 4.61 St. Patrick's Chapel from the shore, looking south.

The remaining sites recorded in this area consist largely of Second World War defensive features (19, 20, 157, 191), all of which are at risk of erosion under the current SMP2 policy. Their significance is debatable, however, and they may represent an acceptable loss. The remains of the potentially post-medieval wall around the headland near to Throbshore Point (190) are also at risk of erosion and could warrant some investigation in order to understand the relationship, if one exists, between these remains and St Patrick's Chapel. The significance of the post-medieval fish trap recorded (221), is currently unknown as it may also have associations with the ecclesiastical occupation of the headland. Documentary research could help to determine if a relationship existed and this would inform appropriate management of the erosion risk to the site.

The final site recorded at Half Moon Bay is thought to represent the remains of a 20th century miniature golf course, alongside post-medieval quarrying remains (196). They are not considered to be at risk of coastal erosion and their significance is considered to be negligible.

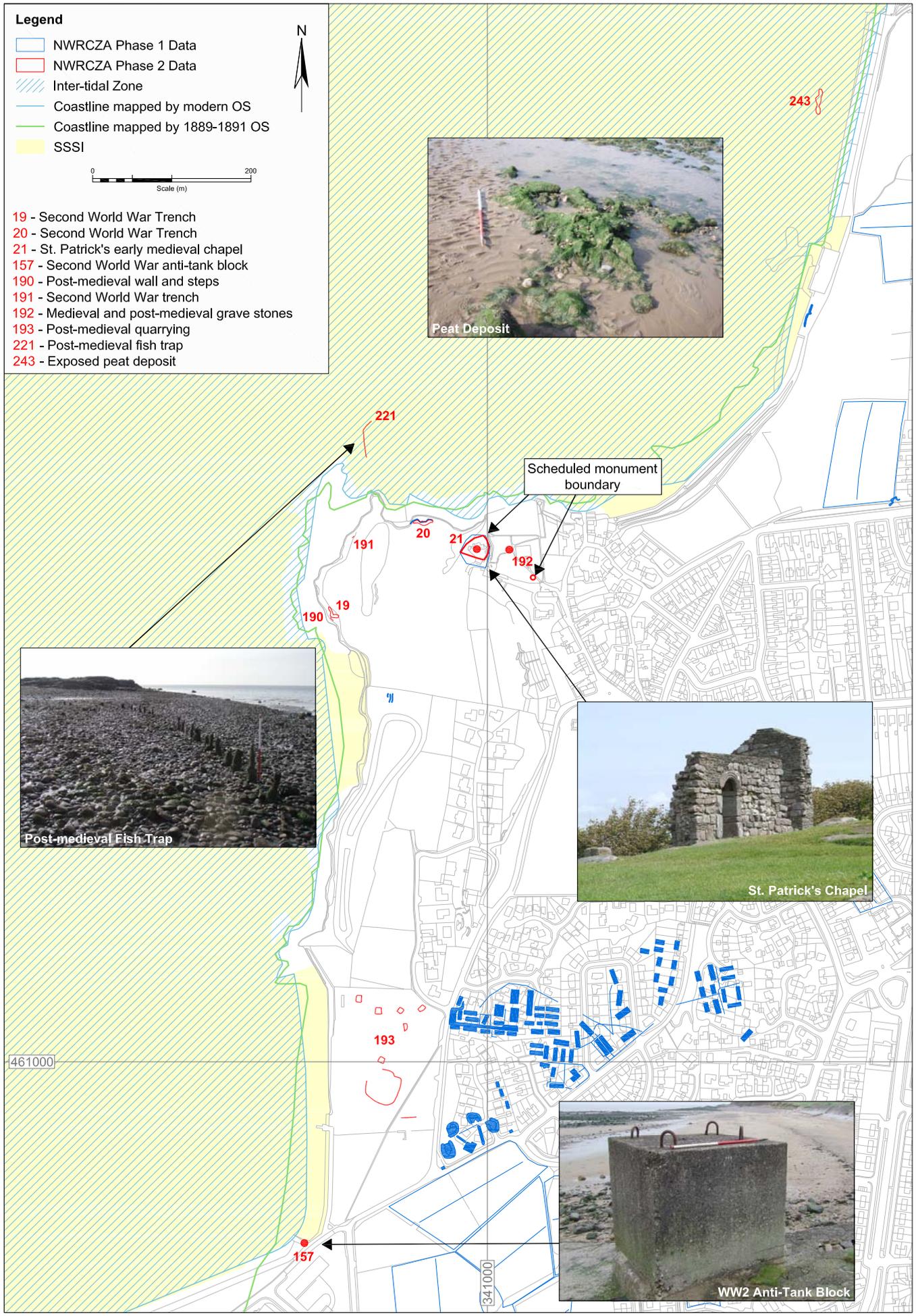


Figure 4.60 Location of sites surveyed at Heysham Head

4.8 Morecambe (Map Figure 4.70)

4.8.1 Location and geology

Morecambe is a resort town (SJ 42181 63370) located on the east side of Morecambe Bay, from whence it gets its name. It is 5.5km northwest of Lancaster and 3.8km northeast of Heysham Head. The town developed in the mid-19th century after the Morecambe Harbour and Railway Company established rail links from Morecambe into Yorkshire. It remained a popular holiday destination until the 1970s when it began a period of general decline due to falling visitor numbers.

Morecambe Bay originally consisted of deep, post-glacial river valleys. These valleys were then infilled by glacial deposits transported by the Rivers Kent, Leven and Lune, and has led to a coastline of predominantly low-lying, gently undulating unconsolidated sediments (Johnson 2011, 126). Large expanses of sand and mud-banks form the inter-tidal deposits, which have been cut and re-cut by the shifting courses of the Kent and the Leven, and moved constantly by a complex wave pattern. This fluctuating process has made charting the sands almost impossible. The solid geology at Morecambe consists predominantly of Millstone Grit with a superficial geology of alluvial deposits and glacial sand and gravel. The shoreline at Morecambe has undergone continued and recent seaward defence works which have significantly altered the natural coastline. The frontage now consists of a series of small embayments defined by projecting arms of large limestone rock armouring, backed by a promenade with occasional sections of rock-armoured sea-wall (Figure 4.62).



Figure 4.62 Example of a rock-armoured embayment at Morecambe.

The principal soil in the Morecambe area is Seasonally Wet Deep Clay which is suited to the production of cereals and horticultural crops (Farewell 2007). However the area is now urbanised, extending as far as Lancaster, with little agricultural production taking place. The shoreline is provided with a public promenade and forms part of the Lancashire Coastal Way. The inter-tidal sands are publicly accessible and are used by dog

walkers, birdwatchers and holiday makers. The Bay is a well-known cockle picking location and suffered a disaster in 2004 when a team of immigrant Chinese cockle pickers were drowned by the incoming tides. There are continued problems relating to the health and safety of workers in the inter-tidal zone and some cockle beds have been closed in an attempt to manage the problem (Kirk 2011). Morecambe Bay is a designated SSSI.

4.8.2 Previous research

The NWRCZA Phase 1 study looked at this part of the coastline as part of Block 3 of the study area (Johnson 2011). It highlighted a series of post-medieval fish weirs as being potentially under threat of coastal erosion and requiring rapid survey.

The fish weirs were mapped as part of the Phase 1 aerial photography transcription (NRHE: 148072; 148073; 148076; 148077). Ten fish weirs are also recorded in the Lancashire HER (HER: PRN:26013; PRN:20557; PRN:20558; PRN:20559; PRN:20694; PRN:20695; PRN:26014; PRN:26015; PRN:23613; PRN:26019).

Following a presentation by the author at the Morecambe Bay Landscape Partnership Project Annual Conference, a local gentleman, Rod Highley, drew attention to Hest Bank Wharf as a 19th century inter-tidal site that is currently undergoing erosion. This site was therefore included in the Phase 2 survey. Highley (2005) has produced a short leaflet about the discovery of the site and its history as a breakwater related to the nearby canal system.

The wharf/jetty is recorded in the Lancashire HER (HER: PRN26016).

The Slyne and West Local History Group has erected an interpretation panel on the foreshore to the south of the site with the aid of Visit Lancashire, the Lancashire and Blackpool Tourist Board and Experience England's North West.

Oxford Archaeology North (OAN) was commissioned by Lancashire County Council to undertake a detailed survey of the remains of Hest Bank wharf in 2009. This contains plans, rectified photographic sections, a map regression and a description of the site (Schofield 2010). The Phase 2 survey was therefore focused on providing an up-to-date assessment of the action of erosion, rather than providing a record of the structure.

4.8.3 NWRCZA Phase 2 Archaeological Investigation

The archaeological survey of this area was a targeted walkover of the safely accessible inter-tidal sands from Sandy Lands to Hest Bank.

4.8.4 Post-Medieval

Current fishing practices in Morecambe Bay show a variation between traditional and modern practices and it has been an important fishing location for generations. The inner reaches are rich in shrimp, cockles, muscles, salmon, oysters, fluke and sea trout, whilst further afield trawlers fish for land sole, plaice, whiting, cod, haddock, herring, rays, scallops and queenies (Davison undated, 21-23). The inter-tidal sands bear witness to this rich maritime history with several surviving fish weirs around the bay. These are often difficult structures to date typologically as the design and construction of fish weirs changed little between the Anglo-Saxon and post-medieval period (Jecock 2011a, 2). The

following structures have been placed in this section as they are considered most likely to be post-medieval in date, however there is every possibility that they had earlier origins, possibly associated with monastic fishing rights.

Two fish weirs recorded in the Phase 1 aerial photography transcription (NRHE 148076; 148077) could not be located during the Phase 2 survey, suggesting that they have been buried in inter-tidal sands, or destroyed by erosion. The field survey recorded the remains of four fish weirs (160, 161, 162 and 163) in varying states of preservation.

The most south-westerly fish weir (160) consisted of a series of highly degraded upright timber posts arranged in a V-shape (Figure 4.63). The posts project from a shallow shingle ridge and stand to a height of $\approx 0.3\text{m}$. The V-shape is oriented with the narrow end facing west and survives to a length of $\approx 7.6\text{m}$ on the northern arm, and $\approx 5.5\text{m}$ on the southern arm. There is a small gap at the narrowest point of the V which would probably have been fitted with a wicker basket to collect the trapped fish (Jecock 2011a, 2). The V-shape is the most common form of post-medieval timber fish trap and the posts would have supported wicker/willow wattle fencing (Jecock 2011a, 2).

Around 0.5km northeast of the fish weir described above, a series of four conjoined V-shaped fish weirs were recorded in a good state of preservation (161). This collection of fish weirs is well known (Jecock 2011a) and it is recorded in the Lancashire HER (HER: PRN:20694; PRN:20695). The fish weirs consist of a series of upright timber posts projecting from a shallow shingle ridge and standing to a height of $\approx 1\text{m}$ (Figure 4.64). The V-shapes are orientated with the narrowest point facing west and either a gap at the narrowest point, or timber boarding that would have been used to house the wicker basket to collect the fish (Figure 4.65). The weirs in this group vary in size from lengths of $\approx 7.0\text{m}$ to $\approx 16.5\text{m}$ and the largest weir also has a short arm along the widest part of the V, presumably to provide some element of entrapment at this end of the weir whilst still allowing water to flow into the V.



Figure 4.63 Heavily degraded V-shaped fish weir (160), looking west (scale = 1m).



Figure 4.64: Example of a well-preserved fish weir (part of a group of four 161), looking north (scale = 1m).



Figure 4.65: Detail of timber boarding at the narrowest point of a V-shaped fish weir (161), looking north (scale = 1m).

Around 3km east of the conjoined fish weirs (161), a linear alignment of upright timber boards was recorded as a possible fish weir (162). The boards stand to a height of between $\approx 0.3\text{m}$ - 0.8m and are aligned southeast-northwest for a length of $\approx 96\text{m}$ (Figure 4.66). The boards are tightly packed and would not require any wattle fencing. It is possible that this site is a groyne or revetment, however no other features such as this were noted in the vicinity, suggesting that it is not part of a sediment trap. Jecock states that similar linear alignments, possibly representing fishing weirs, are known throughout the country though these are sometimes regarded as revetments (Jecock 2011a, 3). This site is recorded as a fish weir in the Lancashire HER (HER: PRN:20559).

Around 1.5km northeast of the linear alignment (162), a further V-shaped fish weir was recorded as being in a heavily degraded state of preservation. This consisted of a series of upright timber posts projecting from a shallow shingle ridge to a height of $\approx 0.2\text{m}$ - 0.5m (Figure 4.67). The narrowest point of the V is orientated north-northwest and has a small gap where a wicker basket would have been located. Only the southeast-northwest arm of the weir was recorded in the Phase 2 survey due to tidal conditions, however the continuation of the weir was observed and photographed. This site is recorded as a fish weir in the Lancashire HER (HER: PRN:26015).



Figure 4.66: Detail of possible post-medieval fish-weir (162), looking northwest (scale = 1m).



Figure 4.67: Detail of post-medieval fish-weir (163), looking northwest (scale = 1m).

Hest Bank Wharf was erected in 1820 by the Hest Bank Canal Company as a breakwater for small ships to discharge cargoes that could then be transported north and south via their canal system (Scholfield 2010, 4). It was only in operation for around 30 years, before the railway overtook much of the canal traffic following its opening in 1846. The wharf went out of use and appears to have rapidly silted-up as sand encroachment is shown on the first edition Ordnance Survey Map of 1848 (Scholfield 2010, 5). The wharf was entirely covered by inter-tidal sands before it was re-exposed in 2004 following changes in the configuration of the Keer Channel (Scholfield 2010, 5).

The OAN survey (Scholfield 2010) of the site records it as retained by a sandstone wall on the northern end and linked to the shore by a cobble-surfaced causeway. It was constructed of a mixture of layers of large and small packed cobbles with evidence that the sloping seaward side of the jetty originally had a well-packed cobble surface to dissipate wave action. Various architectural elements were identified, including a flagpole, or crane, iron plates for an access ramp, anchoring points, a series of iron bracketed wooden fenders or rubbing posts, and possibly the location of railings. The survey also draws attention to damage caused by erosion from storms and tides, as well as stone scavenging (Scolfield 2010).

The Phase 2 survey recorded the remains of the wharf as consisting of a sandstone plinth with timber and iron supports and a laid cobble and flagged-stone floor (189). It is built upon a natural cobbled spur, which may have been artificially levelled to provide a causeway from the wharf to the shore (Figure 4.68). The site has undergone significant erosion and is currently covered with algae and sea weed (Figure 4.69). It is located in the inter-tidal zone and is fully submerged at high tide. Comparison of the OAN survey with the site as surveyed during Phase 2 in November 2011 shows it to have undergone only limited further erosion and the level of the inter-tidal sand around the site, particularly on the southern side, appears to have raised meaning that less of the site is actually exposed at low tide.



Figure 4.68: Hest Bank Wharf from the shore showing the natural cobbled causeway.



Figure 4.69: The eroding remains of Hest Bank wharf, looking west.

4.8.5 Threat from erosion

The fish weirs recorded in the Morecambe area (Figure 4.70) lie within SMP2 policy unit 11c6.2 which recommends 'Hold the Line' for the next 100 years. The wharf at Hest Bank lies within SPM2 policy unit 11c7.1 which recommends 'Hold the Line' for the next 100 years with the possibility of 'Managed Realignment' in 20 to 50 years time.

The mean spring tidal range at Morecambe is 8.40m (Shoreline Management Partnership 1999). Of all of the coastal frontages in the bay, the frontage of the town of Morecambe is the most exposed to wave and storm action. This is because the shoreline here is exposed both to the standard south-westerly waves that affect the whole Bay, but also to westerly waves that are focused on the shoreline by the Lune Deep (Halcrow 2011). There have been several phases of coastal defence works at Morecambe, the most recent of which in the 1980s was constructed to counter-act the adverse effects of previous human interventions and nearshore shingle extraction (Halcrow 2011). This appears to have stabilised beach levels, however the nearshore sediments are finer than the natural course-grained sediments that accumulate elsewhere in the bay (French and Livesey, 2000).

The future response of the Morecambe frontage to sea level rise will depend upon the availability of sediment input and the configuration of the Kent and Heysham Lake channels and other tributaries and banks. The Kent is the nearest tidal channel to the Morecambe frontage and is currently held in place by the presence of resistant scars between it and the coastline (Halcrow 2011). As sea levels increase, however, the protection afforded by the resistant scars will lessen leading to the possibility of coastal erosion. The SMP2 policy of 'Hold the Line' will guard against this, however there may be the requirement for further coastal defence works as sea-levels rise.

All of the sites recorded in this section (160-163, 189) are located in the inter-tidal zone where the SMP2 policy will not protect them from the damaging effects of coastal erosion. Further to this, the erection of sea defences in Morecambe Bay may also change the pattern of deposition of inter-tidal sands and mud that could rebury or damage the sites recorded in this section. All of the fish weirs and Hest Bank Wharf are therefore considered to be at immediate risk of coastal erosion and at risk of damage from human intervention in the form of the erection and maintenance of sea defences.

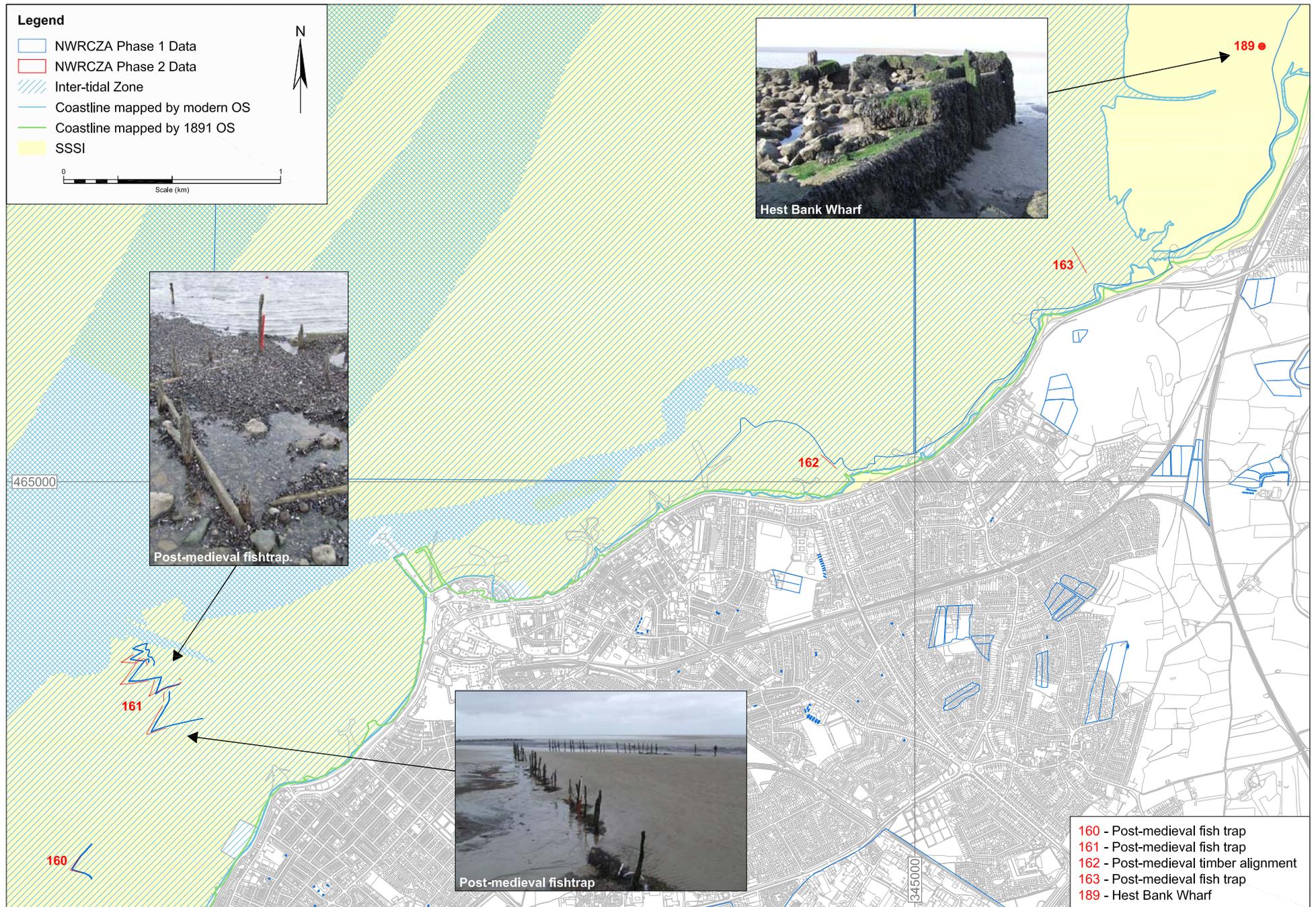


Figure 4.70 Location of sites surveyed at Morecambe

4.9 Warton and Silverdale (Map Figure 4.82)

4.9.1 Location and geology

The small villages of Warton (SD 50159 72662) and Silverdale (SD 45814 75187) form part of the Arnsdale and Silverdale Area of Outstanding Natural Beauty (AONB) in the north-western corner of Morecambe Bay. Warton is located *c.*2.5km northeast of Carnforth, whilst Silverdale lies *c.*6km to the northwest. Although the area has been occupied since prehistoric times, the construction of the Ulverston and Lancaster Railway increased the local population and transformed the area into an industrial centre (Askew 2009, 48). Silverdale, also became a popular 'holiday home' destination for 19th century gentlemen made rich by industrial development in nearby Lancaster (Askew 2009, 48).

Morecambe Bay originally consisted of deep, post-glacial river valleys. These valleys were then infilled by glacial deposits transported by the Rivers Kent, Leven and Lune, and has led to a coastline of predominantly low-lying, gently undulating unconsolidated sediments (Johnson 2011, 126). Large expanses of sand and mud-banks form the intertidal deposits, which have been cut and re-cut by the shifting courses of the Kent and the Leven, and moved constantly by a complex wave pattern. The solid geology at Warton and Silverdale consists of extensive Carboniferous Limestone Pavement with a superficial geology of alluvial deposits and glacial sand and gravel (BGS 2008). The intertidal zone at Silverdale is composed of extensive sand flats known as Warton Sands, with Warton marsh, a large area of salt marsh deposit forming the shoreline west of Warton to the south (Figure 4.71). The principal soil in Silverdale is Shallow Loam over Limestone which is suited to stock rearing, recreation and limited arable in lowland areas (Farwell 2007).



Figure 4.71: View from Warton Crag across Warton Marsh, to the south of Silverdale, looking west.

The small villages of Warton and Silverdale lie within a largely rural environment with good transport links. The coastal fringe at Warton is used for occasional stock grazing

and sections of the marshland are owned and managed by the RSPB as part of the Leighton Moss Reserve. At Silverdale the shoreline is publicly accessible and frequented by walkers, dog walkers and bird watchers. Morecambe Bay is a designated SSSI.

4.9.2 Previous research

The NWRCZA Phase 1 study looked at this part of the coastline as part of Block 3 of the study area (Johnson 2011). It highlighted the remains of a copper smelting works at Jenny Brown's Point, Silverdale as currently undergoing coastal erosion and requiring rapid survey (Johnson 2011, 216). Following further consultation with Local Authority Archaeological Officers, a walkover survey of the area between Crag Foot in Warton and the Ulverston and Lancaster Railway was added to the Phase 2 survey program.

The copper smelting works at Jenny Brown's Point was not mapped as part of the Phase 1 aerial photography transcription, however the surviving chimney is a Grade II Listed Building (181949) and is recorded in the Lancashire HER (HER: PRN:4821). Investigation of this site has been limited to an assessment of mapping evidence and a few historical sources; it is currently ill-understood.

The area between Crag Foot and the railway was thought to have the potential to host further evidence of the past industrial character of the area, though there were no sites recorded in the Lancashire HER for this area.

4.9.3 NWRCZA Phase 2 Archaeological Investigation

The archaeological survey of Warton and Silverdale included a walkover of Warton Crag hillfort, the area between Cray Foot and the railway, from the railway to Jenny Brown's Point and the coastline at Silverdale.

4.9.4 Prehistoric

Warton Crag is a large outcropping of Carboniferous Limestone Pavement, rising to a height of 158m aOD, immediately northwest of the village of Warton. The summit of the hill contains the remains of a multivallate Iron Age hillfort. It is described as a sub-rectangular enclosure of *c.*3.2ha defended by rock scarps and steep slopes to the south and west and by three parallel ramparts, each *c.*50-60m apart on the north and east. A further bank and ditch are located just below the summit on the south side. The enclosed area contains the foundations of three sub-rectangular buildings, built against a low rock escarpment. Two further buildings of similar construction are located just outside the inner rampart. There are antiquarian references to numerous tumuli to the north of the outer rampart, but there are now no above ground remains of these features (Scheduled Monument description).

The hillfort is a Scheduled Monument (23643) and is recorded in the Lancashire HER (HER: PRN:513).

Detailed survey of the hillfort has been hampered by the level of vegetative growth at the site; the most detailed survey available is at 1:2500. The site was visited by English Heritage in 1999 as part of the Scheduled Ancient Monuments Survey Pilot Project where they were able to identify the three ramparts described in antiquarian sources, but questioned whether the outer two ramparts were indeed man-made features. They were

unable to identify hut sites within the enclosed area on the summit, only identifying several stock pens that were likely to post-date the hillfort.

A second site visit was undertaken in 2009 by the Arnside and Silverdale AONB team to determine the feasibility of conducting an archaeological survey. Their visit also highlighted the dense vegetation. They identified the inner and outer rampart, but were unable to locate the middle rampart or any buildings within the enclosed area. The Arnside and Silverdale AONB Management Plan highlights that the site is in need of positive conservation management, however it has not been placed on the English Heritage Heritage at Risk Register (Askew 2009, 68).

The Phase 2 survey recorded the hillfort (164) as consisting of the heavily overgrown remains of an enclosure at the summit of Warton Crag. The survey identified the inner rampart (Figure 4.72) and also recorded the location of an upright stone in the rampart that gives the appearance of an entrance; this was also noted during the AONB visit (Figure 4.73). Definite man-made remains of the middle and outer ramparts were not recorded during the survey, however the bank and ditch to the south of the summit was noted as an artificial feature.



Figure 4.72: The inner rampart of Warton Crag hillfort, looking northwest.

The site is covered in dense vegetation that forms part of the Warton Crag Nature Reserve and this makes the remains of the hillfort difficult to appreciate and also masks the views across Morecambe Bay from the summit. Ecological interpretation panels are located at various points along the public footpaths, but these do not draw attention to the importance of the site as an archaeological monument.

Jecock has suggested that, based on its morphology, the site is actually more likely to date from the Neolithic or Bronze Age (NRHE: 41541, authority 10), however without further survey and analysis, it is impossible to judge this with any degree of certainty.



Figure 4.73: Possible entrance on the inner rampart of Warton Crag hillfort, looking northwest. (scale = 1m).

4.9.5 Post-medieval

The Ulverston and Lancaster Railway was built after 1848 and crosses through the Arnsdale and Silverdale AONB, crossing the Kent Estuary at Arnsdale. It runs north-south between the villages of Warton and Silverdale. The construction of the railway changed the character of this region from a small enclosed farming community, with a developing domestic industry, to a larger scale industrial area concerned with Limestone extraction and lime working, together with mining and metal working (Askew 2009, 48). Several remnants of this industry are apparent in the region and have been mapped as part of the Phase 2 survey.

The copper smelting works at Jenny Brown's Point is believed to have been active between 1780 and 1820 (Bolton and Fogg 1978). The site is marked as 'ruins' on the Ordnance Survey First Edition map of 1919. Little is known of the history of the site and only a short chimney stack survives.

In 1995, a small jetty was revealed in front of the chimney by the action of erosion following the onshore movement of Quicksand Pool. This is thought to have been a jetty for small craft associated with the copper smelting works. Since 1995 erosion has also revealed the remains of further buildings in the vicinity of the chimney.

The Phase 2 survey recorded the remains of the copper works as consisting of the standing remains of the short chimney stack (22), together with the eroding remains of

the small jetty and foundations of associated buildings (158), none of which could be traced in their entirety.

The circular chimney stack is constructed of well-coursed limestone masonry and stands to a height of $\approx 10\text{-}15\text{m}$ above a base plinth (Figure 4.74). It has a small opening in its southeast face and appears well-maintained.



Figure 4.74: The standing remains of the chimney stack at Jenny Brown's Point, looking northwest.

The small jetty in front of the chimney stack is constructed of large, roughly square-cut, limestone boulders which appear to have been laid without mortar (Figure 4.75). The jetty is aligned southeast-northwest and runs towards to the chimney stack suggesting a functional relationship between the two features. The jetty stands to a maximum height of $\approx 1.2\text{m}$ and survives for a length $\approx 17.5\text{m}$. There is no evidence of a flagged surface on the jetty, though this may have been stone-robbled.

The eroding remains of a building, or buildings, were also noted in the Phase 2 survey. These consisted of regular linear alignments of limestone that have the appearance of being man-made (Figure 4.76). They cover an eroded area of $\approx 73\text{m}^2$. The foundations are difficult to understand in their current state and may be the remains of one building or several. Ordnance Survey mapping does not show the form of any buildings at the site.

Both the jetty and the buildings have been revealed by the process of coastal erosion which is ongoing at the site.



Figure 4.75: The eroded remains of a small jetty at Jenny Brown's Point, looking southeast.



Figure 4.76: The eroded remains of building foundations at Jenny Brown's Point, looking northwest.

The Phase 2 survey also recorded the remains of a second jetty (24) only $\approx 64\text{m}$ southwest of the copper smelting chimney. This was much larger and of apparently more recent construction than the small landing jetty beside the chimney (Figure 4.77). The remains consisted of a collapsed stone-built jetty with a flat concrete surface, the accessible parts of which stood to a height of $\approx 1.5\text{m}$ and ran for a length of $\approx 24\text{m}$.

The feature is not shown on Ordnance Survey mapping and is not recorded in the Lancashire HER. The jetty may have been associated with the copper smelting site, however it may simply have been a later access bridge across Quicksand Pool, constructed after the copper works had gone out of use. Regardless of its origins, this jetty/bridge was used by a local farmer in recent years as an access bridge onto the saltmarsh. It is thought that its recent collapse into Quicksand Pool may have negative impacts upon the local erosion cycle.



Figure 4.77: The collapsed remains of a jetty/bridge at Jenny Brown's Point, looking south.

Approximately $\approx 450\text{m}$ northeast of the chimney stack, the Phase 2 survey recorded the remains of a former sluice gate in the flood embankment (159) alongside Quaker Stang. The flood embankment pre-dates the Ordnance Survey First Edition map of 1848 and the sluice gate recorded appears to be contemporary with this embankment. It presumably controlled water levels on the land behind the embankment; its function being to drain water at low tide that had become trapped behind the embankment at high tide. The partially buried sluice gate was constructed of local limestone and provided a break in the embankment measuring $\approx 2\text{m}$ across (Figure 4.78). The grassed-over remains appear to be in good condition.

In 1873 a hugely ambitious land reclamation scheme was initiated by Henry Walduck to run between Silverdale and Hest Bank to the south. The construction of a large breakwater followed, but by 1885 the work programme was abandoned due to lack of funds. The breakwater survives as a raised area of man-made stone cobbles across the

bay, which is revealed and recovered periodically by the shifting sands. The Phase 2 survey noted the remains of part of the breakwater, but these were not mapped with the GPS system as there was no safe access to the remains. Only a small portion of the breakwater was visible in June 2011 when the survey was undertaken (Figure 4.79). This site is recorded in the Lancashire HER (HER: PRN:11302).



Figure 4.78: The partially buried remains of a sluice gate in the flood embankment at Quakers Stang, looking north. (scale = 1m).



Figure 4.79: Remains of the breakwater constructed during the land reclamation, looking south.

The final site of post-medieval date recorded in this area was a lime kiln (30), north of Jenny Brown's Point, at Jack Scout. The kiln had undergone restoration work in 1986 and survives as the well-preserved and well-presented remains of a small Flare Type Limekiln of probable 19th century date (Figure 4.80). The site is owned by the National Trust and is provided with fencing and an interpretation panel showing the remains of the kiln prior to its restoration. This site is recorded in the Lancashire HER (HER: PRN:7701).



Figure 4.80: Recording the remains of a 19th century Flare Type limekiln at Jack Scout.

No industrial remains were recorded during the walkover of the area between Crag Foot and the Ulverston and Lancaster Railway.

4.9.6 20th century

The coastline at Warton and Silverdale is surprisingly free from the remains of Second World War coastal defences which are so prevalent elsewhere along the coast.

Only one site of probable 20th century date was recorded during the Phase 2 survey and this was the remains of a small concrete slipway (23) at Jenny Brown's Point. The heavily eroded slipway is no longer in use for boats but does provide access to the shoreline for walkers as part of a circular route around Jenny Brown's Point and the Nation Trust land at Jack Scout to the north. The slipway survives in a ruinous state to a length of \approx 10m and is constructed of limestone boulders capped with concrete (Figure 4.81).



Figure 4.81: Ruinous remains of stone and concrete slipway at Jenny Brown's Point, looking southeast. (scale = 1m).

4.9.7 Threat from erosion

The sites recorded in Warton and Silverdale (Figure 4.82) lie within SMP2 policy units 11c7.4 and 11c7.5 respectively, both of which recommend 'No Active Intervention' for the next 100 years.

The mean spring tidal range in the northeastern corner of Morecambe Bay is 8.40m (Shoreline Management Partnership 1999) and due to its orientation, it is more exposed to south-westerly storm waves than the southern section of the bay. The main influence on shoreline evolution in this section of the bay is the Kent channel, which forms an estuarine system to the north of Silverdale at Arnside. The Kent is believed to follow a cyclical meander through the bay and this has had profound effects on the development and erosion of saltmarshes, such as that at Warton Marsh (Halcrow 2011). For example, in the 1800s Silverdale was a thriving beach resort, but its popularity diminished when muds and saltmarsh developed along the frontage. Now these saltmarshes have been eroded once again and there is currently no saltmarsh present along the Silverdale frontage. Local knowledge states that there has been a loss of *c.*30-40m of saltmarsh in the last 30 years (Lucy Barron pers. comm.).

Predictions of future shoreline evolution along this frontage are closely linked with the cyclical movement of the Kent Channel, which is thought to run through more than one migration cycle within a 100 year period (Halcrow 2011). The shoreline is currently in an erosional trend and this is predicted to continue, particularly in light of sea level rise (Halcrow 2011). As well as this, the flood embankment alongside Quaker's Stang and the natural topography of this area are predicted to hinder roll-back and cause coastal squeeze, should the saltmarsh along the Warton frontage erode. NCERM predicts that under the current management scenario, the shoreline at Jenny Brown's Point will retreat

by between 3.4m and 6.6m in the next 100 years, whilst the flood embankment to the rear of the saltmarsh at Warton is believed to protect the hinterland behind from any risk of coastal erosion. There is no prediction of the degree of saltmarsh erosion at Warton (NCERM 2012).

Of the sites recorded in this section the most significant is undoubtedly the Scheduled Monument of Warton Crag hillfort (164). It is located behind the flood defences at Warton marsh and sits on a resistant Limestone outcrop just over 1km from the shoreline. For these reasons it is not considered to be at immediate or longer term threat of coastal erosion. The SMP2 assessment of erosion at this site also states that there is 'no risk of flooding or coastal erosion' (Halcrow 2011). It is, however, at risk from erosion by the root action of the dense vegetation cover and from the human traffic on the footpaths that bisect the ramparts.

The post-medieval remains recorded (22, 23, 24, 30, 158 and 159) all relate to the industrialisation of this area in the 19th century and most are poorly understood and undergoing active erosion. The limekiln at Jack Scout is the exception to this rule (30), since it survives in a restored state and is well-presented and well-maintained. It is located c.200m inland from the shore and is not considered to be at immediate or longer term threat of coastal erosion. The sluice gate at Quaker's Stang is also not considered to be at risk of coastal erosion as it lies outside of the normal meander of Quicksand Pool. It has been filled in and survives partially buried within the flood embankment and its main threat is most likely footpath erosion.

The remains of the chimney (22), jetties (23, 24) and buildings (158) at Jenny Brown's Point, together with the noted breakwater associated with land reclamation in 1874, are, as a group, all interesting and significant sites that are undergoing immediate coastal erosion. Despite the remains of the chimney being well-maintained, under current predictions of shoreline retreat over the next 100 years, the chimney and its associated features will be lost. Added to this is the fact that the remains are currently poorly understood with their interpretation as a cooper smelting works being based upon supposition more than evidence from excavation or documentation. The erosion that has caused the revelation of the jetty and associated building foundations offers the possibility to better understand the site and its significance. This would in turn inform appropriate future management of the erosion risk at the site and would also contribute towards interpretation of the site for visitors. This is currently lacking, despite the large numbers of walkers that frequent the area.

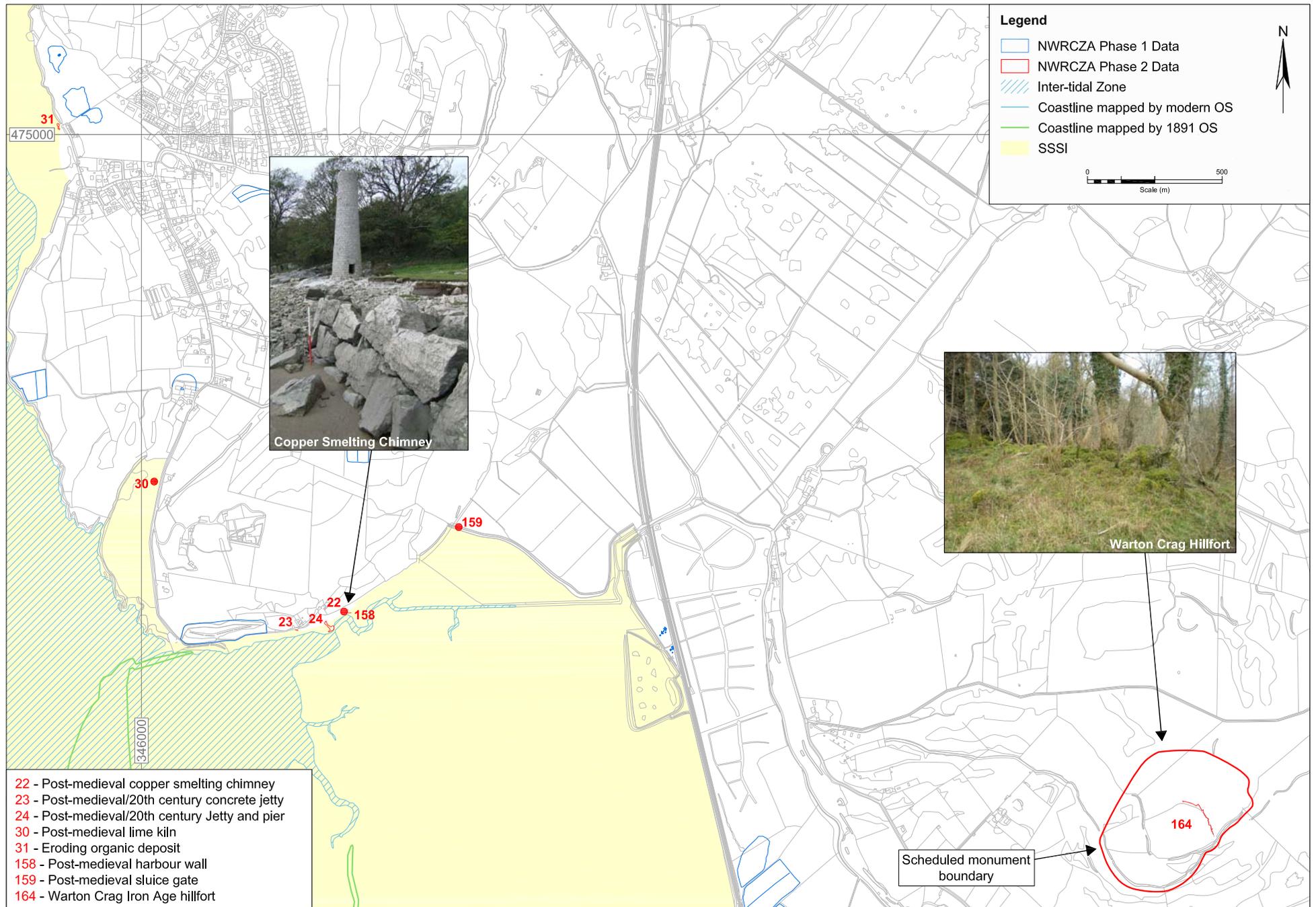


Figure 4.82 Location of sites surveyed at Warton and Silverdale

4.10 Summary

The archaeological survey of targeted sites in Lancashire revealed significant remains of prehistoric, medieval, post-medieval and 20th century archaeology at risk from erosion. These are summarised in Table 4.3 below which also provides an updated assessment of the significance of each site and an updated assessment of the risk of coastal erosion, based on field observations. The assessment of significance is subjective and not absolute, but is based upon the field teams' informed professional judgement. These initial assessments will be further refined in Chapter 7 and used as the basis to assess the level of threat to heritage assets along the entire coastline. This prioritisation will inform future management of the sites.

Site name	NWRCZA 2 No:	SMP 2 policy	Significance	Risk
Hesketh prehistoric hoofprints, Ribble	25	MR 0-20 years HTL 20-100 years	High	Medium
Warton medieval moated site, Ribble	2	NAI	Medium	Low
Lea Marsh shipwreck, Ribble	8	HTL 0-50 years MR 50-100 years	Medium	High
Post-medieval ridge and furrow, Ribble	12	HTL	Low	Low
Warton post-medieval wall, Ribble	3	NAI	Low	Low
Lytham Victorian firing range, Ribble	11	HTL	Medium	Low
Warton WW2 Airfield, Ribble	9	NAI	High	Low
Lytham WW2 military camp, Ribble	10	HTL	High	Low
Lytham WW2 sewage works, Ribble	4	HTL	Medium	Low
WW2 structure, Ribble	5	HTL	Low	Low
WW2 structure, Ribble	13	HTL	Low	Low
Lea Marsh WW1/2 boat, Ribble	7	HTL 0-50 years MR 50-100 years	High	Medium
Warton WW2 gun emplacement, Ribble	1	NAI	Low	Low
Warton possible WW2 pillbox, Ribble	6	NAI	Low	Low
Shipwreck of the Abana, Cleveleys	16	HTL	Medium	High
Shipwrecks, Wyre Estuary	196	HTL & NAI	Medium	High
Post-medieval sleeching mound, Pilling	14	HTL 0-20 years HTL or MR 20-50 years HTL 50-100 years	Medium	Medium
Post-medieval peat cutting, Pilling	196	HTL 0-20 years HTL or MR 20-50 years HTL 50-100 years	Low	Medium
Cockersand Abbey	18	HTL 0-20 years HTL or MR 20-100 years	High	High
Post-medieval fish trap, Cockersand	166	HTL 0-20 years HTL or MR 20-100 years	Medium	High
WW2 Observation Post, Cockersand	17	HTL 0-20 years HTL or MR 20-100 years	Medium	Medium
Sambo's grave, Sunderland Point	29	NAI	High	High

WW2 pillbox, Sunderland Point	26	NAI	Medium	High
WW2 pillbox, Sunderland Point	27	NAI	Low	High
St Patrick's Chapel, Heysham	21	NAI	High	High
Cross shaft base and grave slabs, St. Peter's Church, Heysham	192	HTL	High	Low
Post-medieval fish trap, Heysham	221	NAI	Medium	High
Post-medieval wall, Heysham	190	NAI	Medium	High
WW2 trench, Heysham	19	NAI	Low	High
WW2 trench, Heysham	20	NAI	Low	High
WW2 slip trench, Heysham	191	NAI	Low	High
WW2 anti-tank block, Heysham	157	NAI	Low	Medium
Miniature golf course and quarrying, Heysham	193	NAI	Low	Low
Post-medieval fishtrap, Morecambe	160	HTL	Medium	High
Post-medieval fishtrap, Morecambe	161	HTL	Medium	High
Post-medieval fishtrap, Morecambe	162	HTL	Medium	High
Post-medieval fishtrap, Morecambe	163	HTL	Medium	High
Post-medieval wharf, Hest Bank	189	HTL 0-20 years HTL or MR 20-50 years HTL 50-100 years	Medium	High
Warton Crag hillfort, Warton	164	NAI	High	Low
Copper smelting chimney, Jenny Brown's Point, Silverdale	22	NAI	High	High
Jetty and buildings, Jenny Brown's Point	158	NAI	High	High
Jetty / bridge, Jenny Brown's Point	24	NAI	Low	High
Sluice gate, Jenny Brown's Point	159	NAI	Low	Low
Limekiln, Jack Scout, Silverdale	30	NAI	Medium	Low
Concrete slipway, Jenny Brown's Point	23	NAI	Low	High

Table 4.3 Summary of sites recorded in Lancashire during the Phase 2 archaeological survey.

If you require an alternative accessible version of this document (for instance in audio, Braille or large print) please contact our Customer

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