‘DUNES OF BARROW’ – WALNEY NORTH END, BARROW-IN-FURNESS, CUMBRIA

Archaeological Evaluation

Client:
Cumbria Wildlife Trust

NGR:
317957 473593 (centre)

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Contents

Illustrations

List of figures

List of plates

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Non-Technical Summary

As part of a proposed scheme of habitat improvement works to a number of areas on Walney Island and Foulney Island, as part of the 'Dunes of Barrow' project being carried out by the Cumbria Wildlife Trust, Greenlane Archaeology was commissioned to carry out a desk-based assessment and walkover survey of the site in January 2015. This revealed that significant archaeological deposits were liable to be adversely affected by the proposed works, in particular, a large area known for finds of prehistoric date on the north end of Walney Island. There is evidence for settlement from at least the Neolithic period in this area, and various stray finds of prehistoric date are recorded as well as possibly later industrial activity, and the walkover survey also revealed slag and associated material on the surface. It was decided that the archaeological potential of the areas affected should be evaluated by the excavation of a series of 1m^2 test pits. The work was undertaken by Greenlane Archaeology between 20th February and 3rd March 2015 and comprised the excavation of 28 test pits; 12 in the North Area and 16 in the South Area.

In the North Area in almost every case the test pit encountered layers of sand with dark bands running through them, below which was sand containing slag and other industrial residue. Where sondages were excavated through this the surface of the original cobble beach was encountered. Finds were very few, although two iron 'boxes' were found in association with the slag, as well as a deposit of haematite. In the South Area the same bands of dark sand were encountered, although in some cases below a considerable build-up of dune sand. Beneath these bands, typically at a depth of more than 1m below the surface, a deposit of dark sand containing fire-cracked stone was encountered in some of the test pits, and in some cases this contained animal bone and a single piece of worked flint was recovered.

Assessment of the industrial material found in the North Area revealed that it is all likely to have derived from the slag banks on the nearby mainland, which were produced as a result of the development of the steel works in the late 19th century. All of deposits in the North Area are therefore likely to be quite late in date. In the South Area the dark sand with fire-cracked stone is likely to be the source of the previous discoveries of flint artefacts and animal bones found in this area in the early 20th century and demonstrates the presence of deposits of archaeological significance, albeit at considerable depth, in this area. While it is considered unnecessary to carry out further archaeological work in the North Area, in the South Area, depending on the technique used to remove the Japanese Rose, it is considered that significant archaeological deposits would be affected should deep excavation be carried out and further archaeological work would therefore be necessary.

Acknowledgements

Greenlane Archaeology would like to thank Cumbria Wildlife Trust for commissioning the project, in particular Matthew Lipton for his assistance, and also Louise Martin at the Morecambe Bay Partnership, and Mark Brennand, Senior Historic Environment Officer at Cumbria County Council, for their useful information. Thanks are also due to Steve Benn at Natural England for help with transport, and Karl Taylor at Oxford Archaeology North for organising the GPS survey.

The evaluation was carried out by Dan Elsworth, Karen Mason, and Tom Mace. This report was co-written by Dan Elsworth and Tom Mace, the latter of whom also produced the illustrations. All of the finds and samples were processed and assessed by staff at Greenlane Archaeology. The test pits were located by a GPS survey carried out by Beck Wegiel of Oxford Archaeology North. The industrial residue was assessed by Gerry McDonnell. Jo Dawson edited the report and the project was managed by Dan Elsworth.

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1. Introduction

1.1 Circumstances of the Project

1.1.1 As part of a proposed scheme of habitat improvement works to a number of areas on Walney Island and Foulney Island, as part of the 'Dunes of Barrow' project being carried out by the Cumbria Wildlife Trust (hereafter 'the client') a request was made by the Historic Environment Service at Cumbria County Council for an archaeological desk-based assessment and walkover survey to be carried out for the affected sites. This work was carried out by Greenlane Archaeology in January 2015 (Greenlane Archaeology 2015) and revealed that significant archaeological deposits were liable to be particularly adversely affected by the proposed works, in particular, a large area known for finds of prehistoric date and a possible bloomery site, associated with a range of finds, on the north end of Walney Island.

1.1.2 As a result, it was agreed that a further phase of archaeological evaluation should be carried out at the north end of Walney in the area where excavation of up to *c*1m of sand would be required to remove the roots of an invasive Japanese Rose (Greenlane Archaeology 2015, 5; figure 1, Area A). Due to the logistical difficulty of reaching the site and the need to commence before the beginning of the bird nesting season, it was agreed that the most suitable methodology was to excavate a series of 1m^2 test pits. An initial total of 30 test pits was agreed, to be spread proportionally across the two parts of the area (12 in the north and 18 in the south). Ultimately, following discussions with the Senior Historic Environment Officer at Cumbria County Council, this was reduced to 28 test pits (12 in the north and 16 in the south) on account of the unsuitable topography in the southern part of the area and the delays caused by the unfavourable weather conditions.

1.2 Location, Geology, and Topography

1.2.1 Walney Island is a sandbar (Countryside Commission 1998, 28), approximately 13km long, and is connected to Barrow-in-Furness on the mainland by the Jubilee Bridge, which joins the island at Vickerstown, *c*2km south of the Barrow/Walney Island Airport (Ordnance Survey 2011). The north end is essentially a single large dune system with the Irish Sea to the west and Walney Channel to the east, and is all less than 10m above sea level (*ibid*; Figure 1).

1.2.2 The solid geology of the area comprises Triassic Mercian Mudstones with a thick overlay of glacial boulder clays (Moseley 1978, plate 1), with large areas of mud, sand and shingle.

1.2.3 The north end of Walney comprises an area of scrub, grassland, and sand dunes with associated wetland areas. The dune landscapes of Walney, and the wetter lower areas associated with them, provide the habitat for the rare natterjack toad (Countryside Commission 1998, 25).

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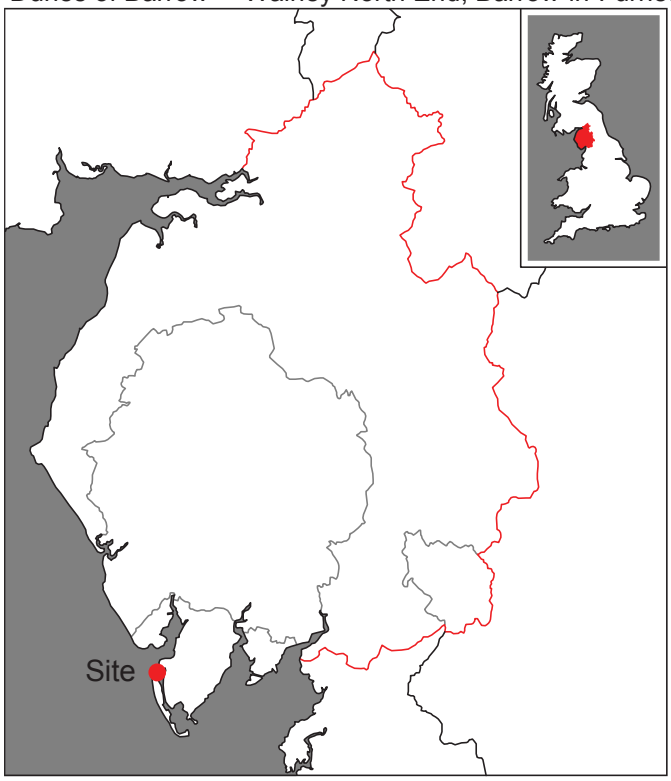

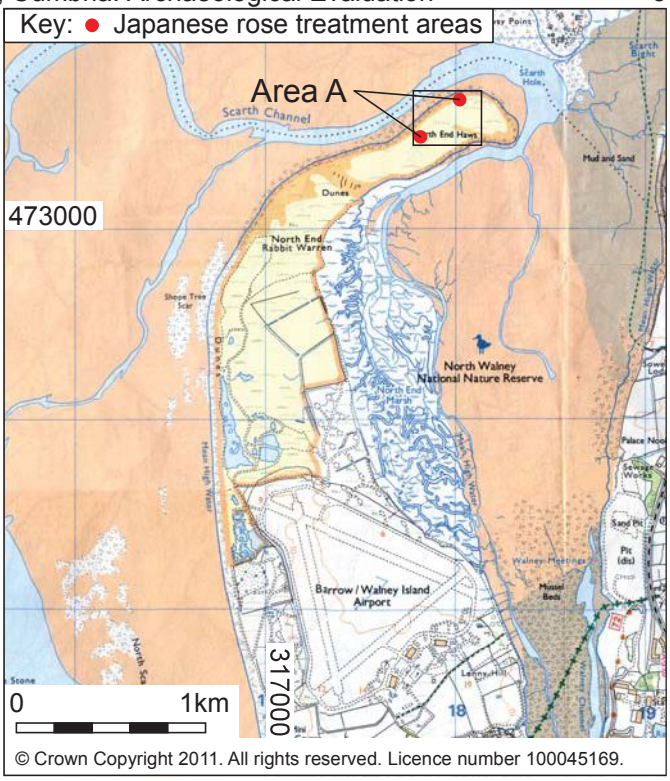

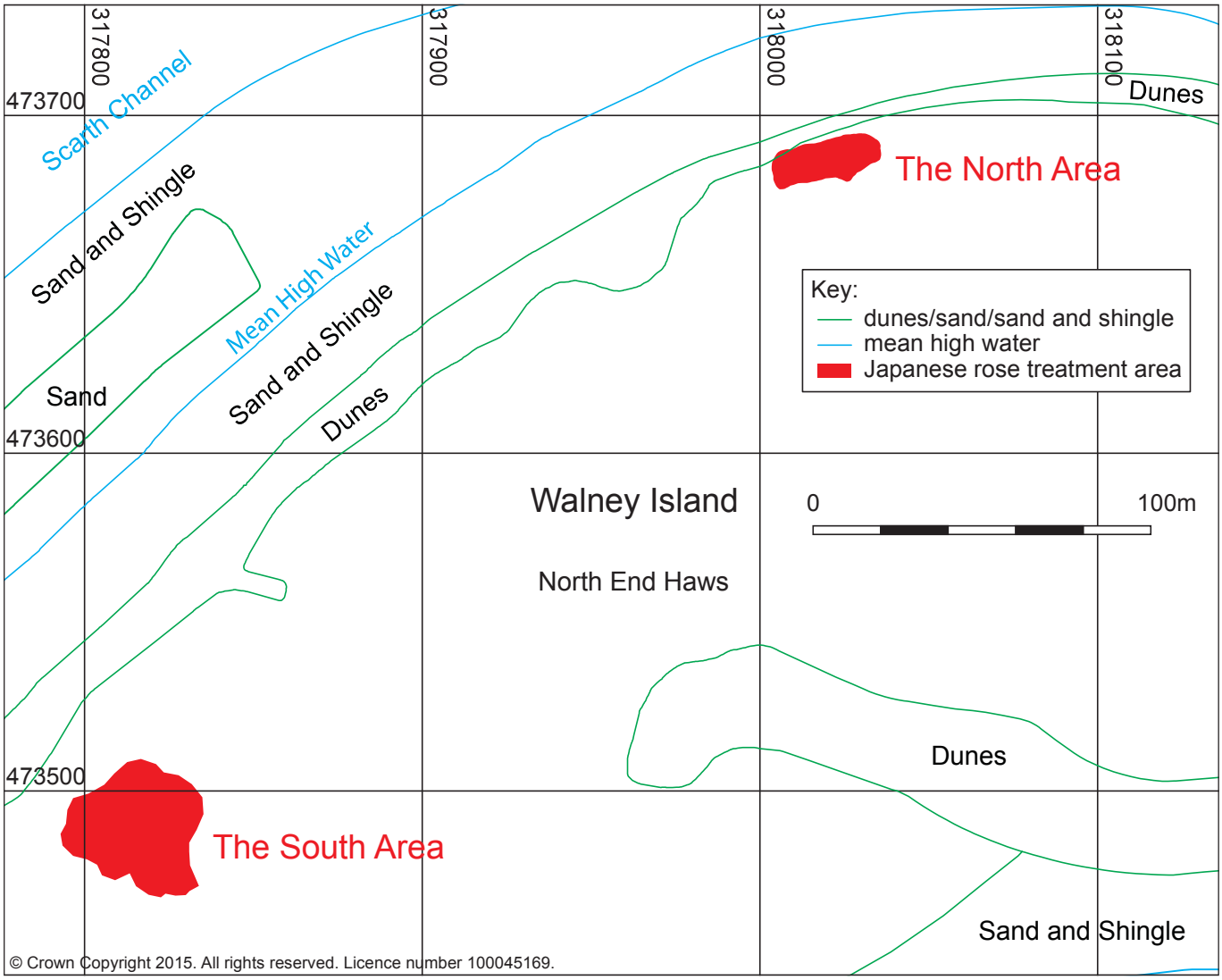

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Figure 1: Site location

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2. Methodology

2.1 Introduction

2.1.1 All aspects of the evaluation were carried out according to the standards and guidance of the Chartered Institute for Archaeologists (CIfA 2014) and according to Greenlane Archaeology's own excavation manual (Greenlane Archaeology 2007).

2.2 Desk-Based Assessment

2.2.1 The earlier desk-based assessment (Greenlane Archaeology 2015) was consulted in order to provide information about the development of the site, relevant sections of which are reproduced in this report, most prominently in *Section 3*. As a result the site is referred to as Area A in *Section 3*.

2.3 Archaeological Evaluation

2.3.1 The proposed scheme of habitat improvement works relating to the removal of the invasive Japanese Rose (Greenlane Archaeology 2015, 5; figure 1, labelled Area A) comprises two main areas: the North Area and the South Area (Figure 1). The Japanese Rose treatment area occupies *c*350m^2 in the North Area and *c*1150 m^2 in the South Area; the North Area was a relatively flat area amongst the dune system, separated by the shingle beach by a sand bank along the north side, while the South Area was more undulating and within an area of higher dunes. Altogether 28 one metre square test pits were excavated in a random sample (taking into account the difficult topography in the South Area) across the two areas (Figure 2 and Figure 3). Test pits (TPs) 1 to 12 were excavated in the North Area and TP 13 to 28 were excavated in the South Area. In each case excavation was continued until the first deposit thought to be of archaeological interest was encountered or to the point *c*0.1m below the roots of the Japanese Rose, although this was difficult to determine in many areas and excavation was therefore only halted once the depth of the test pit exceeded 1.2m.

2.3.2 All deposits were excavated by hand using a variety of tools, as appropriate. All finds were collected from all deposits, as far as was practical. The following recording techniques were used during the evaluation:

- ***Written record***: descriptive records of all deposits and features (see *Appendix 2*) were made using Greenlane Archaeology *pro forma* record sheets, generally a single trench record sheet for each test pit as well as photographic index records;
- ***Photographs***: photographs in both 35mm colour print and colour digital format were taken of all archaeological features uncovered during the evaluation, as well as general views of the site, the surrounding landscape, and working shots. A selection of the colour digital photographs is included in this report and the remainder are included in the archive. A written record of all of the photographs was also made using Greenlane Archaeology *pro forma* record sheets (Greenlane Archaeology 2007);
- ***Survey***: the test pits were located by hand relative to a grid laid out on site using a series of pegs. The position of these pegs was recorded using a survey grade GPS, so they could be used as temporary bench marks and allowed the pegs and therefore the test pits to be located on digital Ordnance Survey mapping. Levels were recorded on site to within approximately ± 0.03m relative to these pegs using a dumpy level. Due to the location, however, the GPS survey was only able to provide heights accurate to 0.6m in the South Area, which should be taken into account even though the spot heights there have been presented to two decimal places;
- ***Drawings***: a section of each test pit that contained any features of archaeological interest was produced at a scale of 1:10. Plans of features within individual test pits were also produced, where necessary, at a scale of 1:10, while plans locating the test pits relative to the pegs were produced at a scale of 1:100. The Japanese Rose treatment area was also planned at a scale of

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1:125. When it was considered necessary, additional sketches were made on trench record sheets.

2.4 Finds

2.4.1 ***Collection***: all of the finds were recovered by hand and stored in self-seal bags with white write-on panels on site before being removed for processing and assessment.

2.4.2 ***Processing***: artefacts were washed (or dried and dry brushed in the case of glass and metal), dried in a drying oven or naturally air-dried, and packaged appropriately in self-seal bags with white write-on panels.

2.4.3 ***Assessment and recording***: the finds were assessed, identified where possible, and a list of them was compiled (see *Appendix 3*).

2.5 Environmental samples

2.5.1 ***Strategy***: samples were taken from deposits that was deemed to have the potential for the preservation of organic matter or that might provide information about the local environment, dating evidence, or industrial activity. Initially samples were taken of layers thought to be potentially of interest in terms of the third of these criteria, but it soon became apparent that such deposits were ubiquitous across the site (Samples 1-3 and 5-6) and so further samples were concentrated on deposits likely to contain useful dating material. A total of 14L of samples were retained and a summary of the samples taken is provided in *Appendix 4*.

2.5.3 ***Processing***: due to lack of funding none of the samples have been processed. They will, however, be retained so that they are available for future research.

2.6 Archive

2.6.1 The archive, comprising the drawn, written, and photographic record of the evaluation, formed during the project, will be stored by Greenlane Archaeology until it is completed. Upon completion it will be deposited with the Cumbria Archive Centre in Barrow-in-Furness (CAC(B)). The archive has been compiled according to the standards and guidelines of the CIfA (Brown 2007), and in accordance with English Heritage guidelines (English Heritage 1991). In addition details of the project will be submitted to the Online Access to the Index of Archaeological Investigations (OASIS) scheme. This is an internet-based project intended to improve the flow of information between contractors, local authority heritage managers and the general public.

2.6.2 A copy of the report will be deposited with the archive at the Cumbria Archive Centre in Barrow-in-Furness, one will be supplied to the client, and within one month of the completion of fieldwork, a digital copy will be provided for Cumbria County Council Historic Environment Service (CCCHES). In addition, Greenlane Archaeology will retain one copy and a digital copy will be for the OASIS scheme.

2.6.3 The client will be encouraged to transfer ownership of any finds suitable for retention to an appropriate museum, most likely the Dock Museum in Barrow-in-Furness. If no suitable repository can be found the finds may have to be discarded, and in this case as full a record as possible would be made of them beforehand.

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3. Historical and Archaeological Background

3.1 Site History

3.1.1 Several 'conceivably Mesolithic' (*c*8,000 – 4,000 BC) worked flints have been found at North Walney (Cross 1938, 163) and there is evidence for activity in this period around Morecambe Bay (Elsworth 1998). In the Neolithic period (*c*4,000 – 2,500 BC), the polished stone axe is found in large numbers across the county and a polished stone celt, similar to those from the Langdale axe factory sites in the central Lake District (see Hodgson and Brennand 2006, 45), was found on a scar on the mainland side of Walney Channel in 1934 (Barnes and Hobbs 1952) and other stray finds of this date have been found nearby (Greenlane Archaeology 2015, 21). Extensive Neolithic/Bronze Age (*c*2,500 – 600 BC) flint working and settlement sites were discovered in the sand dunes at North Walney between 1936 and 1956 (Cross 1938; 1942; 1946; 1948; 1949; 1950) and prehistoric pottery has also been found in the general area (Barnes 1956). Associated finds include midden refuse, containing shells, charcoal, and animal bones (Cross 1939, 277).

3.1.2 In rural areas, initially at least, the Roman invasion had minimal impact on the native population in the North West (Philpott 2006, 73-74) and although evidence for Roman military activity in the immediate area is very limited (Shotter 2004, 53), a recent reinterpretation of evidence from Furness has suggested that they may have had a presence in the area (Elsworth 2007). Walney may have been a likely spot for a Roman coastal signal station along the western coast (Trescatheric 1984, 7).

3.1.3 Continuity into the post-Roman early-medieval period is potentially very likely, although physical evidence relating to this period is very scarce in the region as a whole. Place-name evidence is perhaps a good indicator of the arrival of the Norse in Furness in the late ninth or more likely early 10th century (*ibid*). Walney contains the Norse suffix '*ai*' meaning island; Walney evidently originally being Hougunai meaning the island of Hougun, an estate based largely on Furness (*op cit*, 3). No certain finds of early medieval date are known from the area, although two whetstones of possible early medieval type are recorded among the otherwise prehistoric material discovered at the North End of Walney (Cross 1948, 73; they are suggested in her account as being potentially Bronze Age (*op cit*, 76)). The possible bloomery identified at the North End of Walney is potentially also early medieval although it has not been properly dated and slag is said to have been spread over much of that part of the island (Cross 1948, 77).

3.1.4 North End was a grange of Furness Abbey, recorded in 1247 (Barnes 1978, 30), when it was probably farmed by lay brethren, but they seem to have been let out to tenants within the next fifty years (Trescatheric 1984, 11). During the medieval period, agriculture followed a broadly three-field system of crop rotation and ploughing has left distinctive ridge and furrow lines which can still be traced (Trescatheric 1984, 8). The bloomery at North End may also be of medieval date (Barnes 1956).

3.1.5 The extent of coastal erosion along the west coast of Walney Island is well documented while at the north end there has been some accretion of sand and shingle (Phillips and Rollinson 1971, 4, 10). The map evidence demonstrates that the evaluation area had reached approximately its present state by the beginning of the 19th century.

3.1.6 The land around Walney was enclosed during the 18th and 19th centuries. Walney was a high producer of wheat and has been referred to as 'the granary of Furness' (Trescatheric 1984, 11).

3.1.7 The post-medieval history of Walney Island is tied to the growth of industries in Barrow-in-Furness and it became part of the borough of Barrow-in-Furness in 1872 (Trescatheric 1984, 24).

3.1.8 The Air Force base was created in 1942 and more recently Walney North End was designated a Site of Special Scientific Interest (Trescatheric 1984, 52-3, 57).

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3.2 Map Regression

3.2.1 ***Hennet's map, 1830***: Hennet's map is of limited use because of the scale at which it was produced. The north end of Walney at this time appears fairly undeveloped (Plate 1).

3.2.2 ***Estate plans of the Isle of Walney belonging to CD Archibald Esq, 1833 (CAC(B) BD/BUC/67/Plan 3 1833)***: Area A is described as 'sand hills, part of the rabbit warren' (Plate 2).

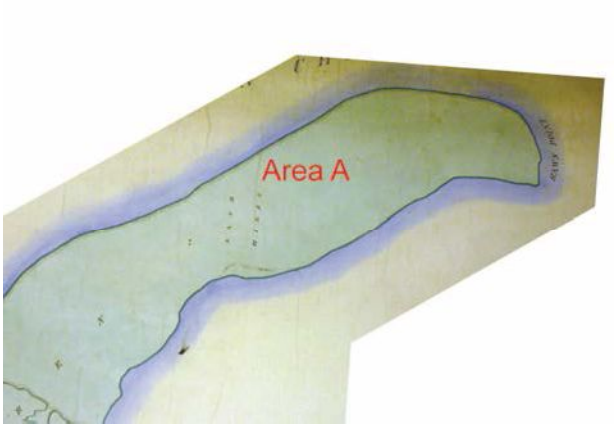

Plate 1 (left): The north end of Walney shown on Hennet's map, 1830

Plate 2 (right): Extract of the estate plan, 1833 (CAC(B) BD/BUC/67/Plan 3 1833)

3.2.3 ***Tithe map, 1842 (CAC(B) BPR/1/I/3/1/2, 1842)***: the tithe map (CAC(B) BPR/1/I/3/1/2 1842), which is held at the archive centre in Barrow-in-Furness, is covered in protective plastic, which means that photographs of it are unavoidably of very poor quality. At the north end of the area, the division of the fields is the same as on the estate plan of 1833 (CAC(B) BD/BUC/67/Plan 3 1833).

3.2.4 ***Ordnance Survey 1850***: North End Haws (Area A) is undeveloped (Plate 3).

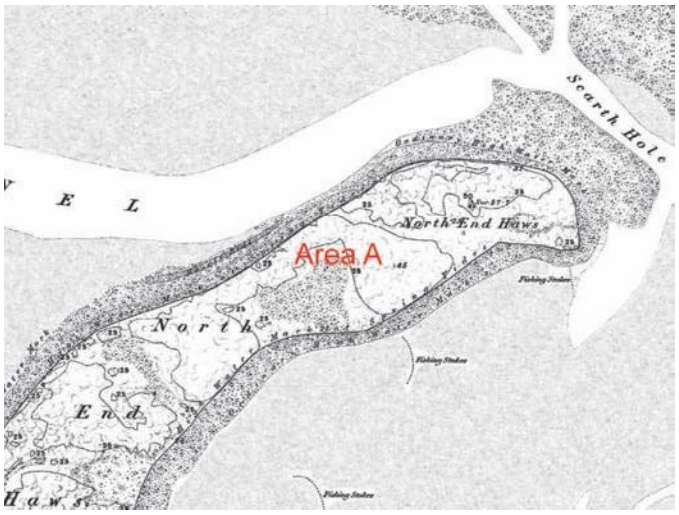

Plate 3: Ordnance Survey, 1850

3.2.5 ***Ordnance Survey 1891***: the north end of Walney is unchanged (Plate 4).

3.2.6 ***Ordnance Survey 1913***: again, the north end of Walney appears unchanged (Plate 5).

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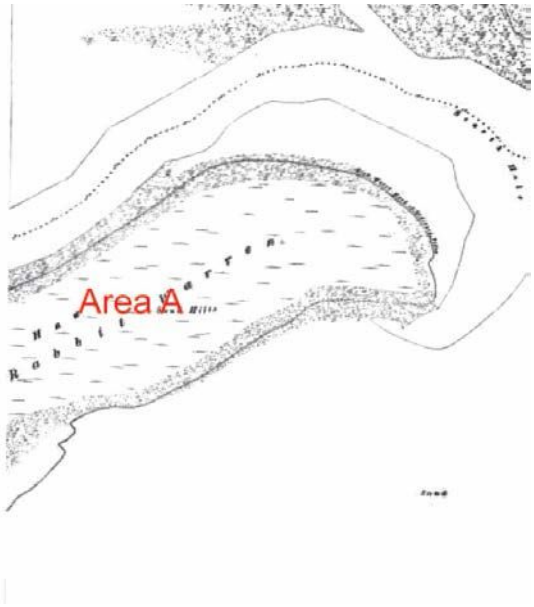

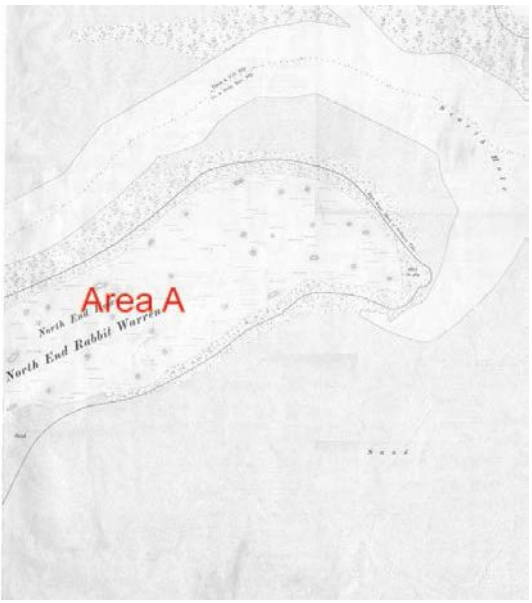

Plate 4 (left): Ordnance Survey, 1891

Plate 5 (right): Ordnance Survey, 1913

3.3 Conclusion

3.3.1 The desk-based assessment carried out in January 2015 highlighted the considerable potential for archaeological remains to be present within the area, in particular those relating to the Neolithic and Bronze Age periods (Greenlane Archaeology 2015, 26). Areas affected by the proposed scheme of habitat improvement works at the north end of Walney Island, where the removal of invasive Japanese Rose through excavation is required (Area A), are situated within or adjacent to a large area of archaeological interest: there is evidence for settlement from at least the Neolithic period, continuing into the Bronze Age, and various stray finds of prehistoric date are recorded (Greenlane Archaeology 2015, 20).

3.3.2 The walkover survey revealed slag and associated material on the surface of the northernmost area (The North Area), although without further analysis it was not certain what date it was or whether it came from elsewhere such as the slag banks on the mainland (Greenlane Archaeology 2015, 26). The South Area also had small amounts of fire-cracked stones on the surface, something that had been previously recorded in association with archaeological remains in the area (*ibid*).

3.3.3 The map regression shows that North End Haws has been rabbit warrens since at least the 1830s.

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4. Fieldwork Results

4.1 Test Pit 1 (TP 1)

4.1.1 The uppermost, loose layer of pale yellowish sandy-topsoil (***100***) was 0.2-0.25m thick and heavily rooted (Figure 4). Below that were darker bands of sand (***101***) within a layer of a similar thickness to the topsoil (***100***), with some root penetration (Plate 6). Darker bands of sand (***102***) were again encountered within another layer *c*0.2m thick below that, which contained slag. Water-worn cobbles were encountered at the base of the trench (Plate 7), at a maximum depth of 0.8m below the current ground surface, in a darker, greenish sand (***103***), which also contained some marine shell.

Plate 6 (left): Test Pit 1 partially excavated

Plate 7 (right): Beach cobbles at the base of Test Pit 1

4.2 Test Pit 2 (TP 2)

4.2.1 The top layer of turf and topsoil (***200***) was a fine, mid-greyish-brown, *c*0.1m thick, held together by roots and short moss, and had no obvious inclusions (Figure 4). Below that was a fine, fairly loosely compacted, pale, beige / light brown sand layer (***201***), 0.1m thick, with no inclusions and some rooting action. Below that was a striated layer (***202***) of soft mid grey-brown and paler beige-brown deposits with no inclusions, *c*0.16m thick. Excavation was discontinued at the top of a layer (***203***) which contained possible slag. This layer was a similar colour and composition to one of the darker striations in the layer above. These small fragments of possible slag were 0.02-0.05m long and spread across the area of the test pit, although covering less than 1% of its area. There were no other obvious inclusions in this deposit. A small, possibly iron, box-like object (***204***), 0.13m long by 0.12m wide, was exposed at the base of the trench within the basal layer (***203***) (see Figure 5). It was aligned north-west/south-east and was considered too fragile to be removed at this stage. Some patchy pinkish-red haematite (***205***) was exposed in the south-west corner, forming an irregularly-shaped 0.3m by 0.4m wide area (Plate 8).

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4.3 Test Pit 3 (TP 3)

4.3.1 The uppermost 0.1m of friable, mid grey-brown sand (***300***) was held together by roots and moss with no inclusions (Figure 4). Below that was a fairly loose, pale beige / light brown sand (***301***), 0.14m thick, with no inclusions. Below that, two thin layers of mid-to-dark grey-brown sand, separated by a paler sandy layer (with a combined thickness of 0.1m), lay above another layer of pale sand, which comprised a striated layer *c*0.2m thick (***302***). Similar deposits of two or three darker bands separated by two paler bands (comprising context ***303***) underlay the lower paler sandy deposit of the banded layer above (***302***), with an overall thickness of 0.13m. The lowest dark band contained fairly abundant industrial material (coke or charcoal) and directly overlay the sub-rounded beach cobbles (***304***), typically *c*0.10-0.15m (Plate 9). The lowest band was *c*0.03m thick and the maximum depth of the test pit was *c*0.55m.

Plate 8 (left): Haematite exposed in the base of Test Pit 2

Plate 9 (right): Beach cobbles at the base of Test Pit 3

4.4 Test Pit 4 (TP 4)

4.4.1 The topsoil (***400***) was *c*0.08-0.10m thick above a sand (subsoil) layer (***401***), 0.15-0.20m thick (Figure 4). Below that was a stripy layer (***402***), made up of various pale and darker sandy deposits, totalling 0.10-0.15m thick (Plate 10). Below that was a distinct dark layer (***403***), *c*0.10-0.15m thick, on top of a light sand (***404***), 0.50m thick, on top of the pebble beach (***405***) (Plate 11). A very slag-rich deposit was noted at the base of the test pit (at the bottom of ***404***) on top of the beach pebbles.

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Plate 10 (left): Test Pit 4 partially excavated

Plate 11 (right): Beach cobbles at the base of Test Pit 4

4.5 Test Pit 5 (TP 5)

4.5.1 The mossy turf and sand of the 0.2m thick topsoil (***500***) was very heavily rooted. Below that was a loose sand layer, with two dark bands, overall 0.2m thick (***501***; Figure 4; Plate 12). There was another darker, greyish sand band on top of sand below that, c0.3m thick (***502***). Beach cobbles (***503***) were encountered at the base of the test pit (Plate 13).

Plate 12 (left): Test Pit 5 partially excavated

Plate 13 (right): Beach cobbles at the base of Test Pit 5

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4.6 Test Pit 6 (TP 6)

4.6.1 This test pit had a sandy loose topsoil (***600***), up to 0.4m thick, with lots of roots but no turf as such (Figure 4). Below that was a loose, dark yellow sand with two darker grey bands (***601***), with a total thickness of 0.15-0.20m. Below that was a dark greyish-yellow loose sand, 0.1m thick, with possible slag, and layers of yellow sand between (0.1m thick) (***602***). The pit was excavated to 0.75m deep (Plate 14).

4.7 Test Pit 7 (TP 7)

4.7.1 The uppermost layer (***700***) was a rooted, mid grey-brown, silty-sand, 0.13m thick, with no inclusions (Figure 5). Below that was a pale beige sand, 0.2m thick, with no inclusions (***701***). Beneath that was a striated layer (***702***), which was 0.14m thick overall, made up of two bands of mid grey-brown sand separated by thin pale sand deposits, with no inclusions, above another pale sand layer 0.07m thick. Below that was another group of banded deposits (***703***), comprising possibly three sub-layers: a darker layer, c0.06m thick, above a pale layer, 0.03m thick, above the lowest dark layer (Plate 15). There was a small concentration of charcoal-rich sand mainly to the base of the test pit within this lowest group of deposits.

Plate 14 (left): Test Pit 6

Plate 15 (right): Test Pit 7

4.8 Test Pit 8 (TP 8)

4.8.1 This test pit contained a similar sequence of deposits to those observed elsewhere in the North Area. It had a layer up to 0.2m thick layer of heavily rooted sand (***800***), a sandy subsoil 0.25m thick (***801***), and a stripy sandy layer (made up of various banded deposits) (***802***) 0.3m thick, above a dark sand (***803***) at the base (Figure 5; Plate 16). There was some industrial material in the lowest deposit (***803***), at which point excavation was discontinued.

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4.9 Test Pit 9 (TP 9)

4.9.1 Test pit 9 was similar to 8 (Figure 5). There was a heavily rooted topsoil layer 0.1-0.15m thick (***900***) above the sandy subsoil 0.3m thick (***901***) (Plate 17). Below that, a (grouped) stripy sandy layer (***902***) up to 0.3m thick and a distinct dark sand layer less than 0.1m thick (***903***) above another light sand layer at least 0.1m thick (***904***) (Plate 18). A large quantity of slag and charcoal was recovered from the distinct dark sand layer (***903***) as well as an intact iron object (Plate 19) and large lumps of slag continued to be found in the paler sand layer below (***904***).

Plate 16 (left): Test Pit 8

Plate 17 (right): Test Pit 9 partially excavated

Plate 18 (left): Test Pit 9 fully excavated

Plate 19 (right): Iron object *in situ* in deposit *903* in Test Pit 9

4.10 Test Pit 10 (TP 10)

4.10.1 The top 0.1m of turf, moss, and mid grey-brown silty-sand of the test pit (***1000***) was very rooted. Below that, to a depth of *c*0.5m, was a fairly loosely compacted, pale, light-brown sand layer (***1001***). The test pit was heavily rooted to 0.3m from the ground surface. There was a sequence of dark and light bands of sand below that (***1002***), starting with a dark grey band at the top, then a thin plain sand below that, then another mid grey-brown sand. The thickness of these three layers was 0.09m overall, on top of a clean sand layer *c*0.11m thick, with no inclusions. A similar group of banded deposits (***1003***) was dug out beneath that, comprising possibly three sub-layers: thin lenses of pale sand and darker grey-brown

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sand (Figure 5). The bottom band had abundant slag in it with small concentrated areas to the east and north edges. The maximum depth of the test pit was approximately 0.75m (Plate 20).

Plate 20: Test Pit 10

4.11 Test Pit 11 (TP 11)

4.11.1 The topsoil and turf (***1100***) was 0.3m thick. It was heavily rooted and contained plastic and polystyrene material. Below that was a darker greyish-yellow sand with a single band of darker material, 0.1m thick (***1101***) (Figure 5). Below that was a dark greyish band at the base of the test pit, 0.05m thick (***1102***) (Plate 21). The test pit was stepped at 0.45m deep. The sondage on the east side showed that the dark layer at the base of the test pit continued more than another 0.2m. There were further dark bands of sand (***1103***) to a depth of 0.7m below the surface, but no finds (Plate 22).

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Plate 21 (left): Test Pit 11 partially excavated

Plate 22 (right): Test Pit 11 fully excavated

4.12 Test Pit 12 (TP 12)

4.12.1 The upper layer (topsoil) was a loose pale yellow sand (***1200***) and contained plastic, polystyrene and wood to a depth of 0.6m. This overlay a loose, dark, greyish-brown sand (***1201***), 0.05m thick, which contained slag. The test pit was excavated to the top of a mottled surface (***1201***) at a depth of 0.65m (Plate 23).

4.13 Test Pit 13 (TP 13)

4.13.1 A heavily-rooted, loose, pale yellow sand (***1300***), 0.4m thick, overlay two dark bands of greyish sand either side of a darker yellow sand, 0.2m thick (***1301***) (Figure 6). Below that was a darker sand (***1302***), 0.35-0.40m thick, with some less evident grey bands. This was on top of another dark grey, slightly gritty, sand layer (***1303***) (Plate 24), with 2% fire cracked stone (possibly granite) and some shell inclusions and one large animal tooth.

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Plate 23 (left): Test Pit 12

Plate 24 (right): Test Pit 13

4.14 Test Pit 14 (TP 14)

4.14.1 The topsoil (***1400***) was a very rooted, friable, sandy layer, with no inclusions, 0.14m thick (Figure 6). Below that was a thick layer of soft / loose, pale sand (***1401***), with no inclusions, to a maximum depth of 0.5-0.6m. There was possibly a darker layer (***1402***) of slightly darker brown sand within this layer, *c*0.04m thick, with no inclusions, above another band of sand *c*0.1m thick (***1403***). There was a clearer dark band below that (***1404***), *c*0.03m thick, of soft/moist, mid grey-brown sand, with no inclusions. Below that was a clean layer of fine sand, *c*0.44m thick (***1405***). Another browner layer of soft brown sand with infrequent sub-rounded cobbles was encountered. Rooting action was still apparent at the base of the test pit, which was discontinued at a depth of 1.2m (Plate 25).

4.15 Test Pit 15 (TP 15)

4.15.1 The rooted topsoil (***1500***) 0.2-0.3m thick overlay a sandy subsoil (***1501***) 0.15m thick on top of a striped layer of sand (***1502***) 0.25m thick above a pale sand (***1503***) 0.3m thick over another sandy layer (***1504***) containing fire-cracked stone (Figure 6; Plate 26). The whole test pit was approximately 1m deep.

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Plate 25 (left): Test Pit 14

Plate 26 (right): Test Pit 15

4.16 Test Pit 16 (TP 16)

4.16.1 The topsoil (***1600***), 0.50-0.55m thick, was a heavily-rooted, loose, pale yellow sand, becoming darker and wetter to the base of the test pit (Figure 7). There were grey bands of sand with dark sand between in the layer below this (***1601***). Below that was a dark brown sand layer, 0.45m thick (***1602***). The lowest layer encountered was mottled, dark brown and orange sand (***1603***) (Plate 27), with 2% angular and rounded stones, 0.05m thick, containing bone and a single small piece of flint.

4.17 Test Pit 17 (TP 17)

4.17.1 The mid grey-brown sand and turf of the topsoil (***1700***) was 0.18m thick and heavily rooted (Figure 7). A fine, pale brown / beige sand (***1701***) with no inclusions was present below that to a depth of 0.7m and heavily rooted to 0.3-0.4m deep. There was a thin, darker, grey-brown sand layer (***1702***), with no inclusions, below that, 0.03-0.04m thick, above another pale sand layer (***1703***), *c*0.3m thick. There was another dark, grey-brown sand layer (***1704***) below that, 0.02-0.03m thick, at a depth of *c*1m, above a fine, clean sand layer with no inclusions (***1705***). Excavation of the test pit was halted at what may have been the uppermost extent of another darker deposit (***1706***), encountered at the base of the trench, at a depth of *c*1.3m (Plate 28).

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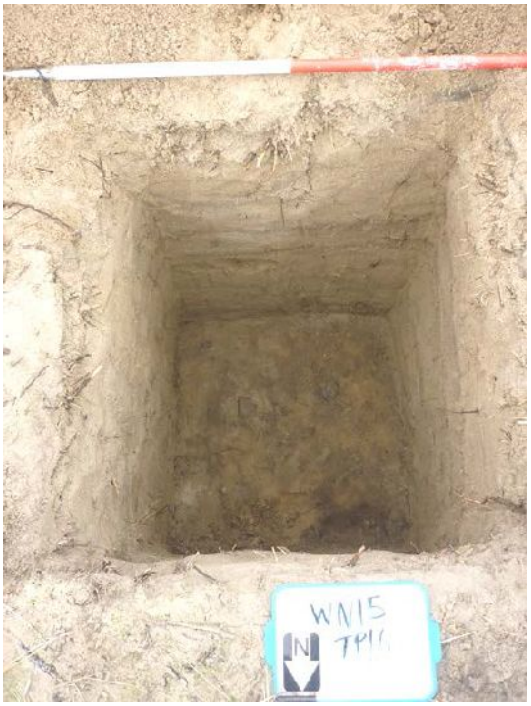

Plate 27 (left): Test Pit 16

Plate 28 (right): Test Pit 17

4.18 Test Pit 18 (TP 18)

4.18.1 This test pit was near the peak of one of the dunes and no topsoil was noted. 0.4m of subsoil (***1801***) overlay a banded layer of deposits (***1802***), 0.4m thick, on top of a pale sand (***1803***). The test pit was excavated to 1.3m deep before it was abandoned (Plate 29). No archaeology was present.

4.19 Test Pit 19 (TP 19)

4.19.1 This test pit had a heavily rooted topsoil 0.15m thick (***1900***) and subsoil (***1901***) 0.3-0.4m thick above a deposit (***1902***) 0.7m thick, comprising light sand and darker stripes (Figure 7). The subsoil and striped layers had been burrowed into by animals (Plate 30). The darker stripes were noted to be less clear than they had been in other test pits. Below this striped layer was another deposit (***1903***) which contained burnt stone and a piece of animal tooth.

Plate 29 (left): Test Pit 18

Plate 30 (right): Test Pit 19

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4.20 Test Pit 20 (TP 20)

4.20.1 The topsoil (***2000***) contained plastic and was a heavily-rooted, loose, dark, orange-yellow sand below the turf to a depth of 0.85-0.90m (Figure 8). There were two bands of darker sand divided by a layer of dark yellow sand (***2001***), with a total thickness of 0.2m, below that, and rooting action was still apparent. Below that was a dark yellow sand (***2002***), 0.2m thick. There were still some roots in the 0.05m thick greyish sand at the base of the test pit (***2003***), which was discontinued at a depth of *c1*.35m (Plate 31).

4.21 Test Pit 21 (TP 21)

4.21.1 Thick roots continued *c*0.6m below the turf and topsoil (***2100***). There were two bands of a darker material deposited at c0.7m and *c*0.9m from the surface (***2101***) and the roots continued through a light sand underlying these darker bands (***2102***). No archaeology was observed within the test pit, which was stopped when it became unsafe and impractical to excavate further at a depth of *c*1.35m (Plate 32).

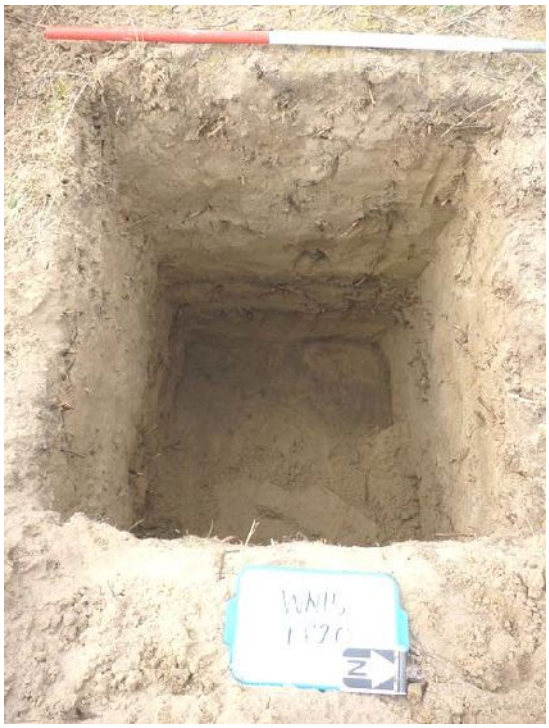

Plate 31 (left): Test Pit 20

Plate 32 (right) Test Pit 21

4.22 Test Pit 22 (TP 22)

4.22.1 The heavily-rooted, darker grey-brown sand of the topsoil (***2200***) was *c*0.2m thick (Figure 8). Below that was a fine, pale beige / light brown sand (which also contained no inclusions) to a depth of *c*0.7m (***2201***). There was a darker grey-brown band (***2202***) below that (c. a few centimetres thick) on top of another layer of sand (***2203***) to a depth of *c*1m. There was a second, clearer (sharper-edged) band of darker sand below that, 0.02-0.03m thick (***2204***), and another layer of clean sand to the base (***2205***). The test pit was discontinued on top of a slightly stonier layer of darker, grey-brown sand (***2206***) at a depth of *c*1.5m (Plate 33). No finds were recovered.

4.23 Test Pit 23 (TP 23)

4.23.1 A loose pale yellow sand (***2300***) extended the full depth of the test pit, becoming darker and damper towards the base of the pit at *c*1.2m. There was a lens of gritty shell and sand on the west side.

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The first 0.3m of the test pit was thickly rooted and continued to the base of the pit which was discontinued at 1.2m (Plate 34).

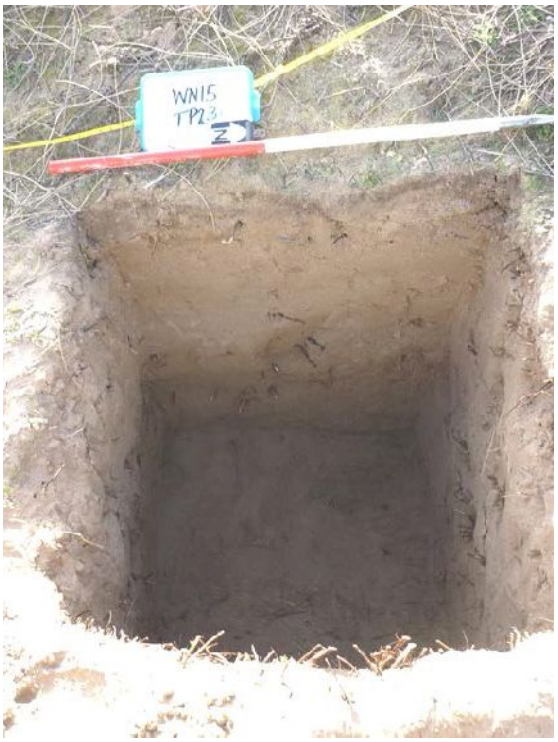

Plate 33 (left): Test Pit 22

Plate 34 (right): Test Pit 23

4.24 Test Pit 24 (TP 24)

4.24.1 The loose, mid orange-brown sand topsoil (***2400***) was up to 0.6m thick and was heavily rooted (Figure 8). Below that was a layer (***2401***), 0.25m thick, comprising darker sand with thin greyish bands above and below. Below that was a greyish orange sand layer (***2402***), 0.4-0.5m thick, and a pale yellow sand (***2403***) to the base of the pit at a depth of *c*1.3m (Plate 35).

4.25 Test Pit 25 (TP 25)

4.25.1 The topsoil (***2500***) was 0.45m thick above a subsoil layer (***2501***). This sandy layer was 0.3-0.5m thick above a slightly greyer sand (***2502***). No finds or features were observed to a depth of *c*1.35m (Plate 36).

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Plate 35 (left): Test Pit 24

Plate 36 (right): Test Pit 25

4.26 Test Pit 26 (TP 26)

4.26.1 The topsoil was a dark grey-brown sand (***2600***), with no inclusions, up to 0.15m deep, and was heavily rooted (Figure 9). Below that was clean sand (***2601***) to a depth of *c*0.5m with no inclusions. Below that was a thin band of darker brown, fine sand (***2602***), *c*0.04m, which was loosely compacted on top of clean sand (***2603***). Below that was a second 0.02-0.03m thick, darker grey-brown band of sand (***2604***), approximately 1m deep, with no finds or inclusions. There was a pale, light brown, clean sand (***2605***) to the base of the test pit at a maximum depth of *c*1.4m (Plate 37). At the very base there were possible shell fragments and the sand was perhaps getting firmer and darker but excavation was discontinued due to the depth of the test pit.

4.27 Test Pit 27 (TP 27)

4.27.1 The topsoil (***2700***) was a heavily-rooted, loose, pale yellow, sand, between 0.55m and 0.75m thick (Figure 9). There were dark bands (***2701***) below that, of darker orangey sand with thin bands of greyer material at the top and base, sloping down to the north, between 0.8m thick on the south side and 0.6m thick on the north. There was clean, pale yellow sand (***2702***) at the base of the test pit, which was halted at *c*1.4m (Plate 38).

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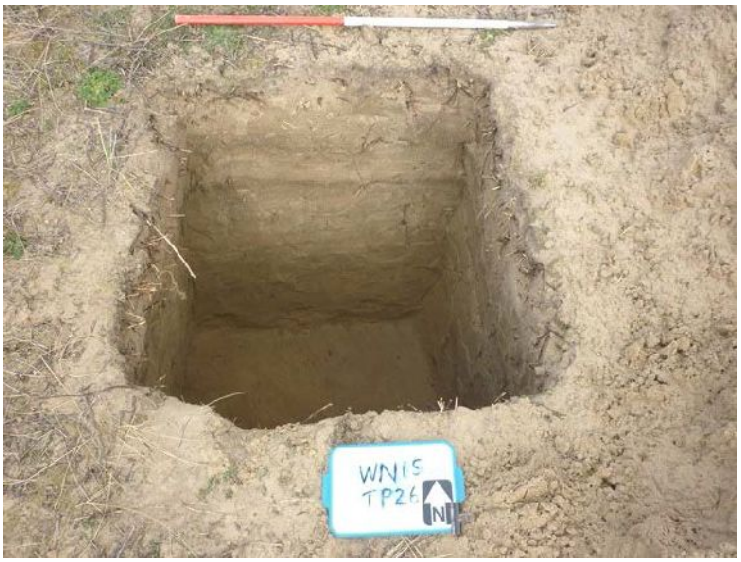

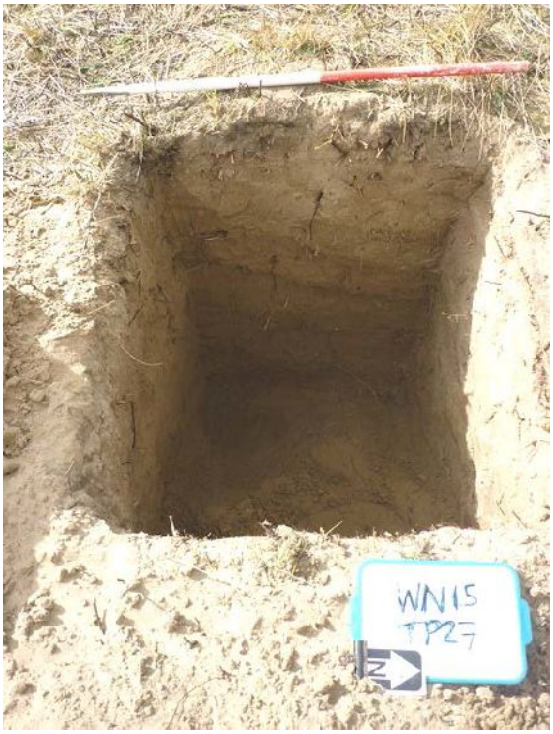

Plate 37 (left): Test Pit 26

Plate 38 (right): Test Pit 27

4.28 Test Pit 28 (TP 28)

4.28.1 There was 0.10-0.25m of topsoil (***2800***) above *c*1.05-1.10m of sand (***2801***), revealing a darker sand (***2802***) at a depth of *c*1.15-1.30m (Plate 39). This deposit was more than 0.1m thick and continued beyond the base of the test pit, which was discontinued at that point. There were no finds or features.

Plate 39: Test Pit 28

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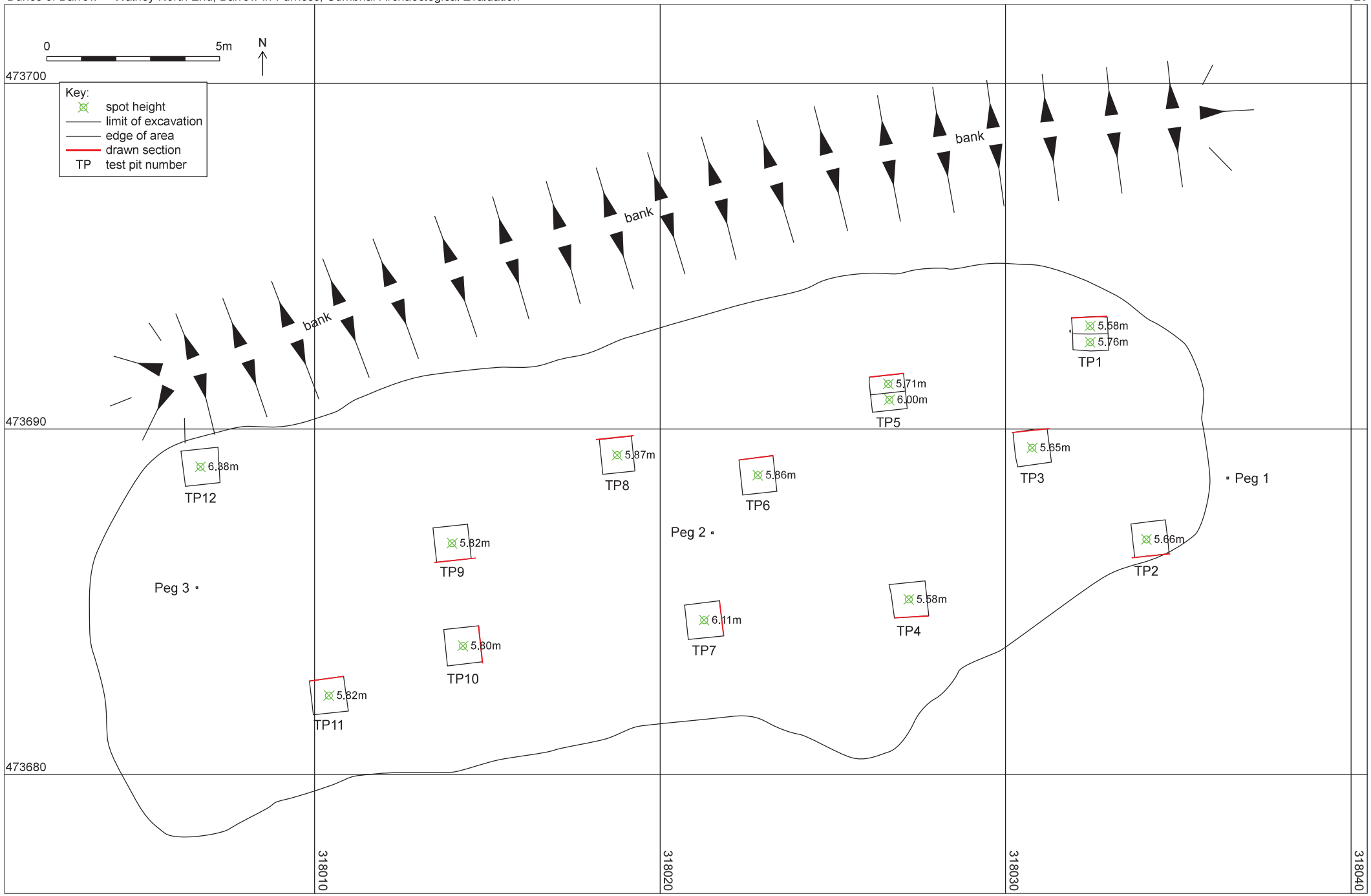

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Figure 2: Plan of The North Area

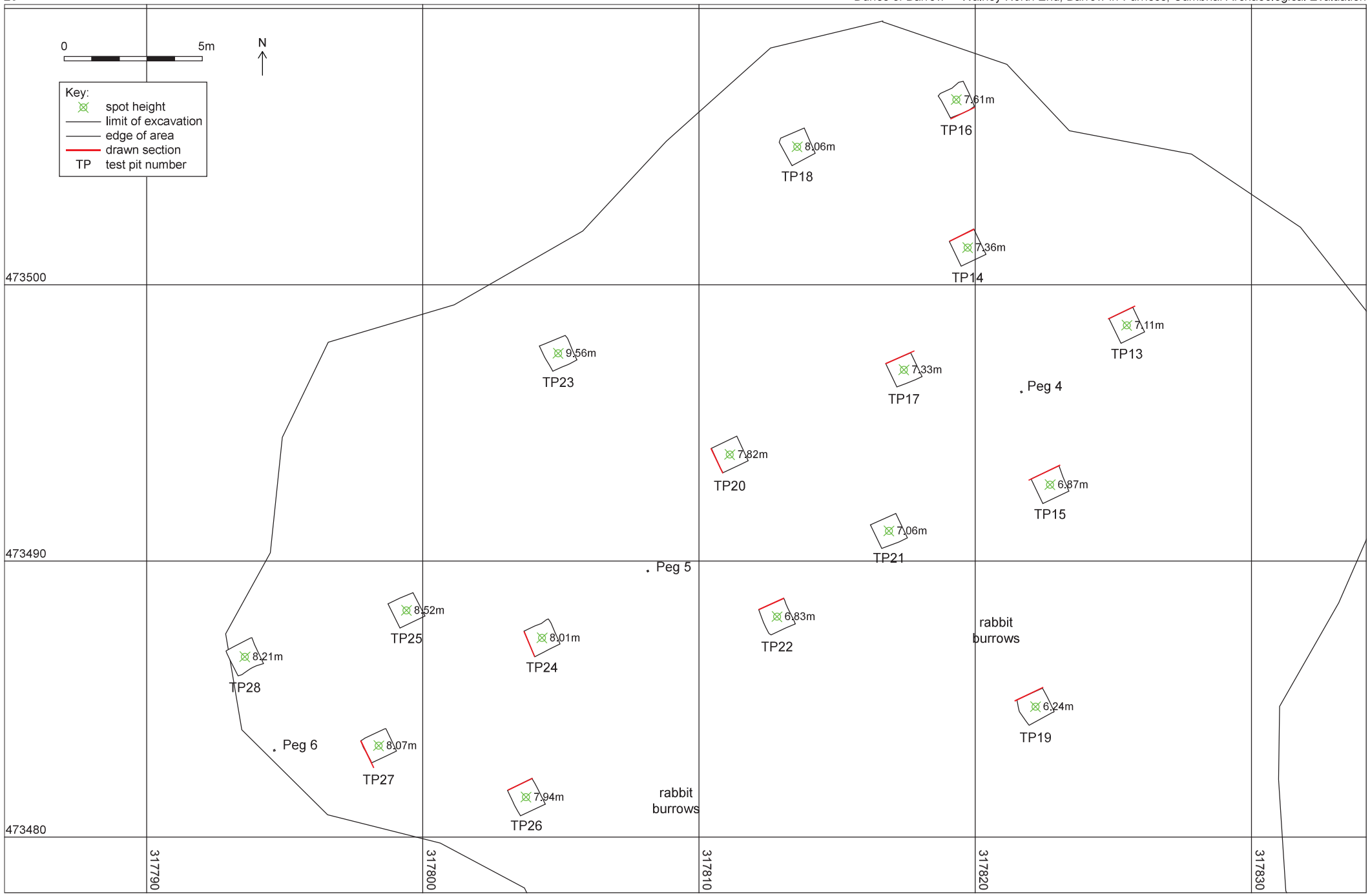

Figure 3: Plan of The South Area

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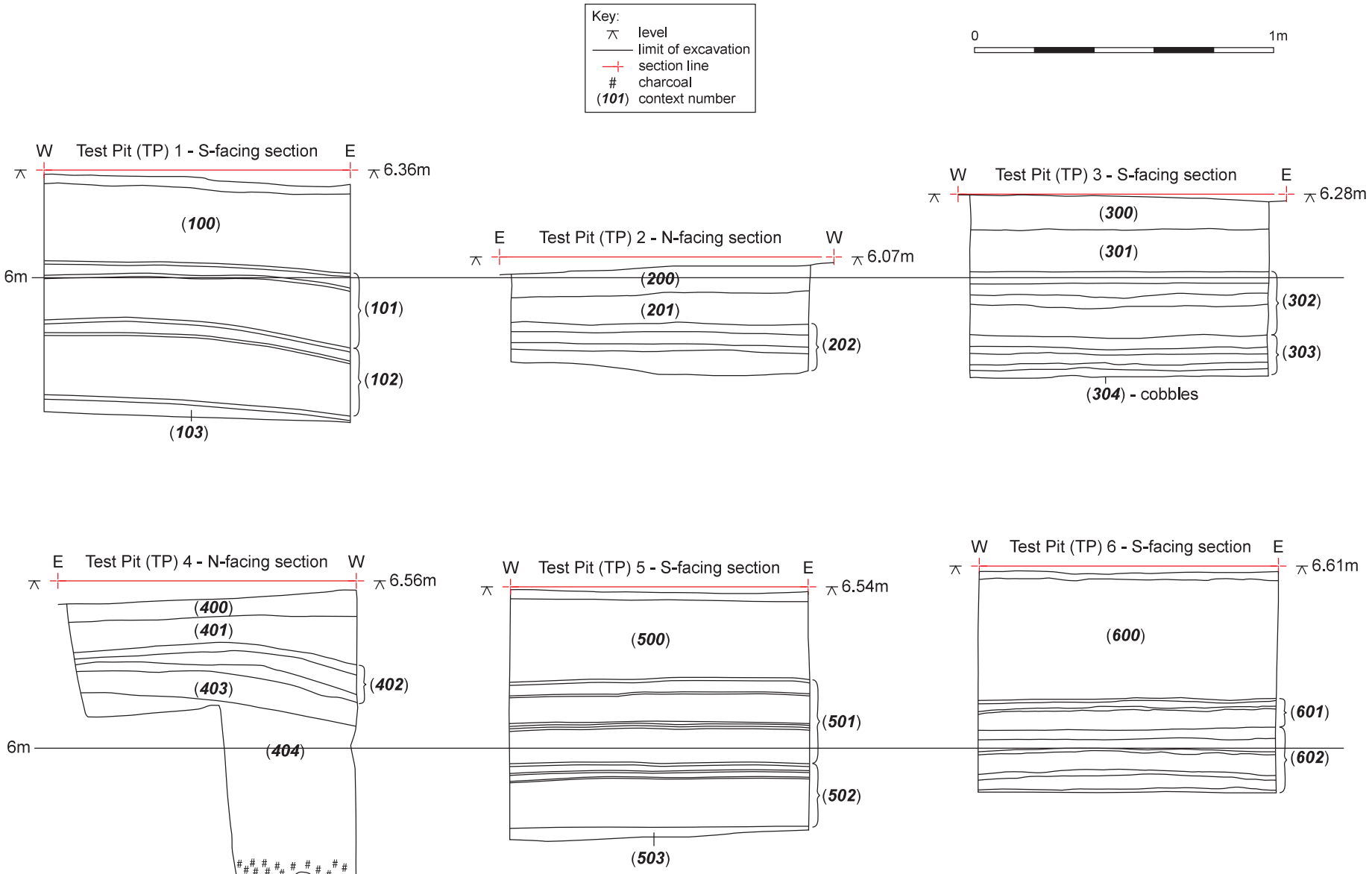

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Figure 4: Test pit (TP) 1 to 6 sections

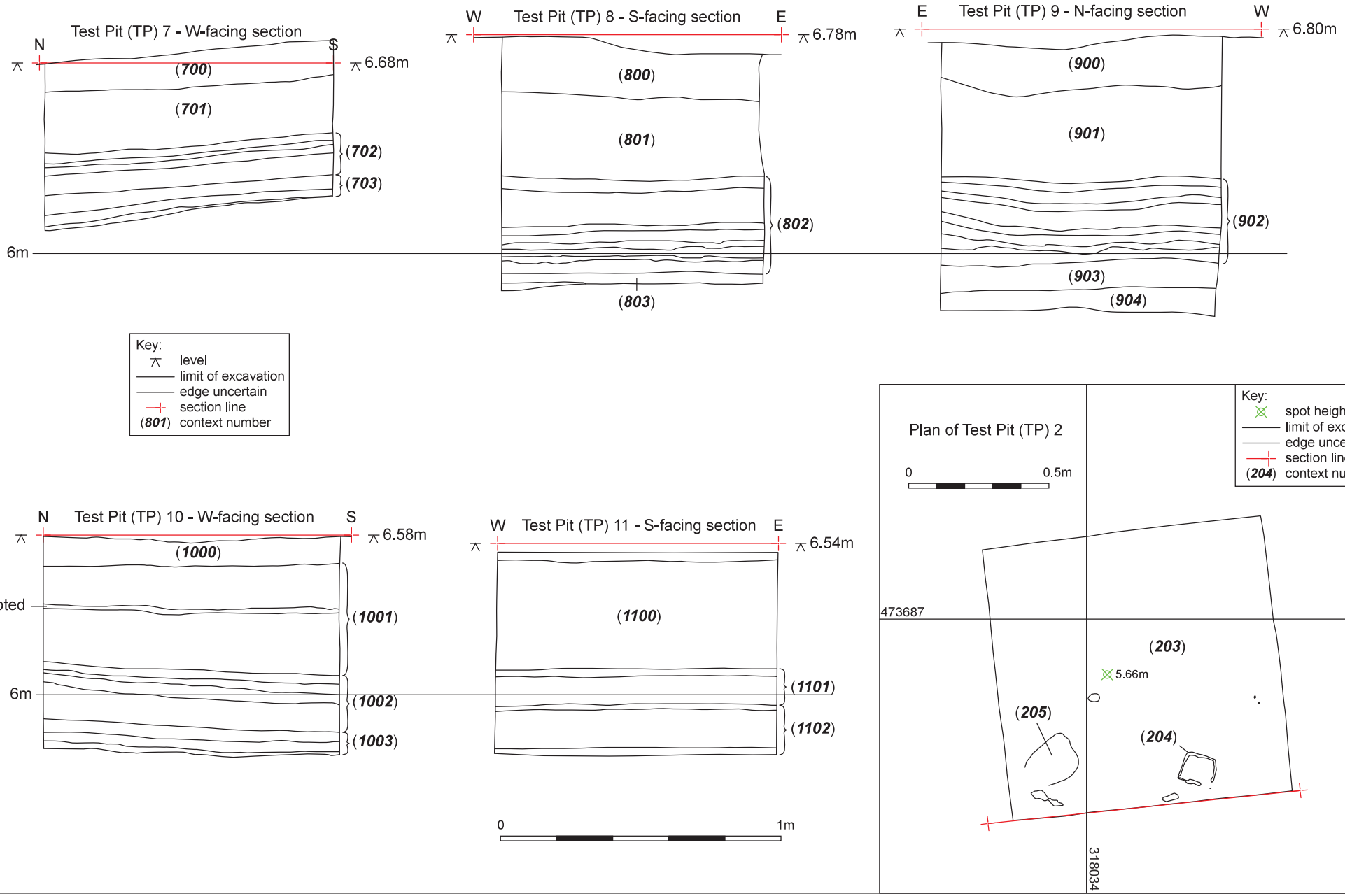

Figure 5: Test pit (TP) 7 to 11 sections and plan of TP 2

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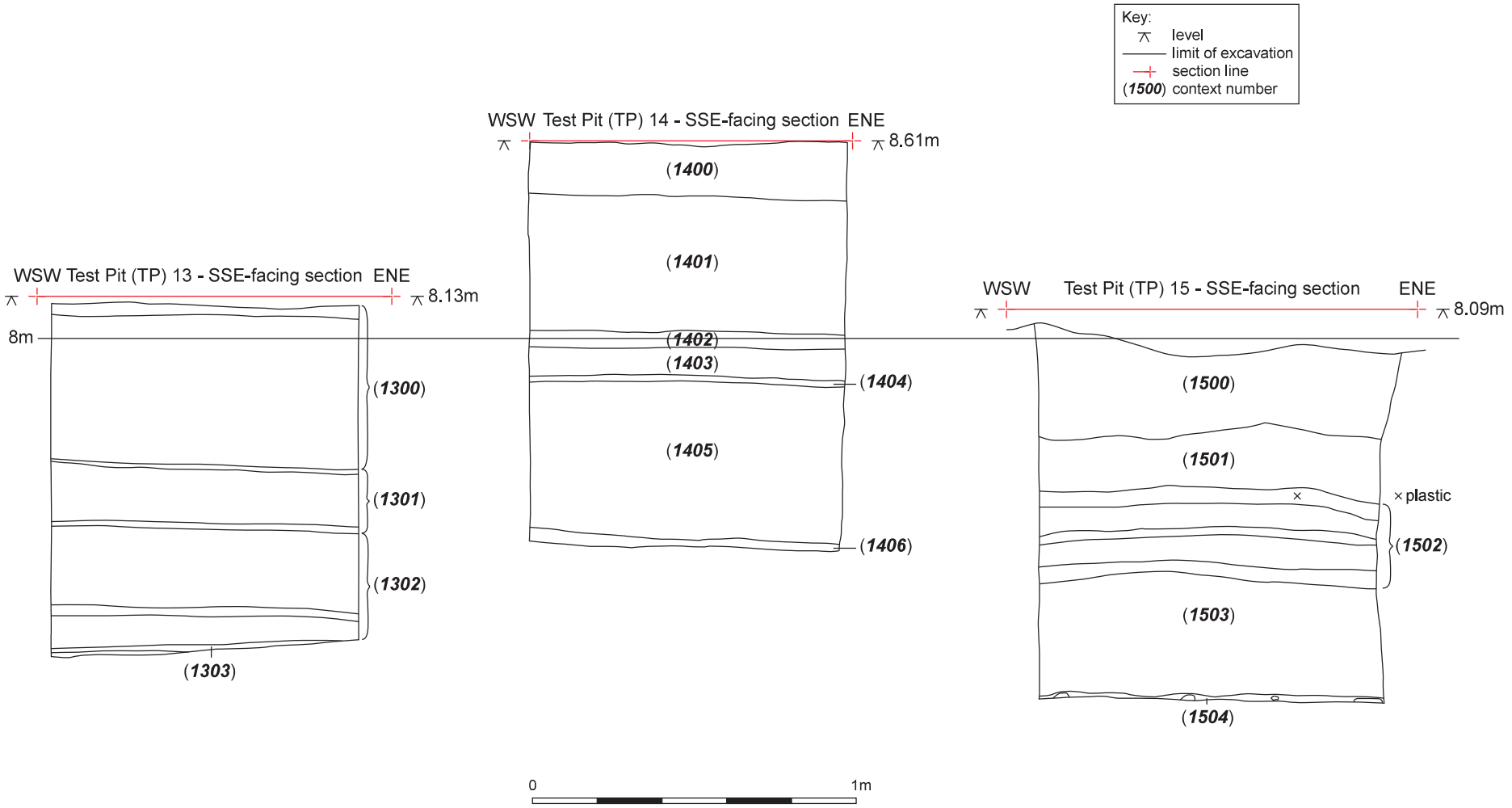

Figure 6: Test pit (TP) 13 to 15 sections

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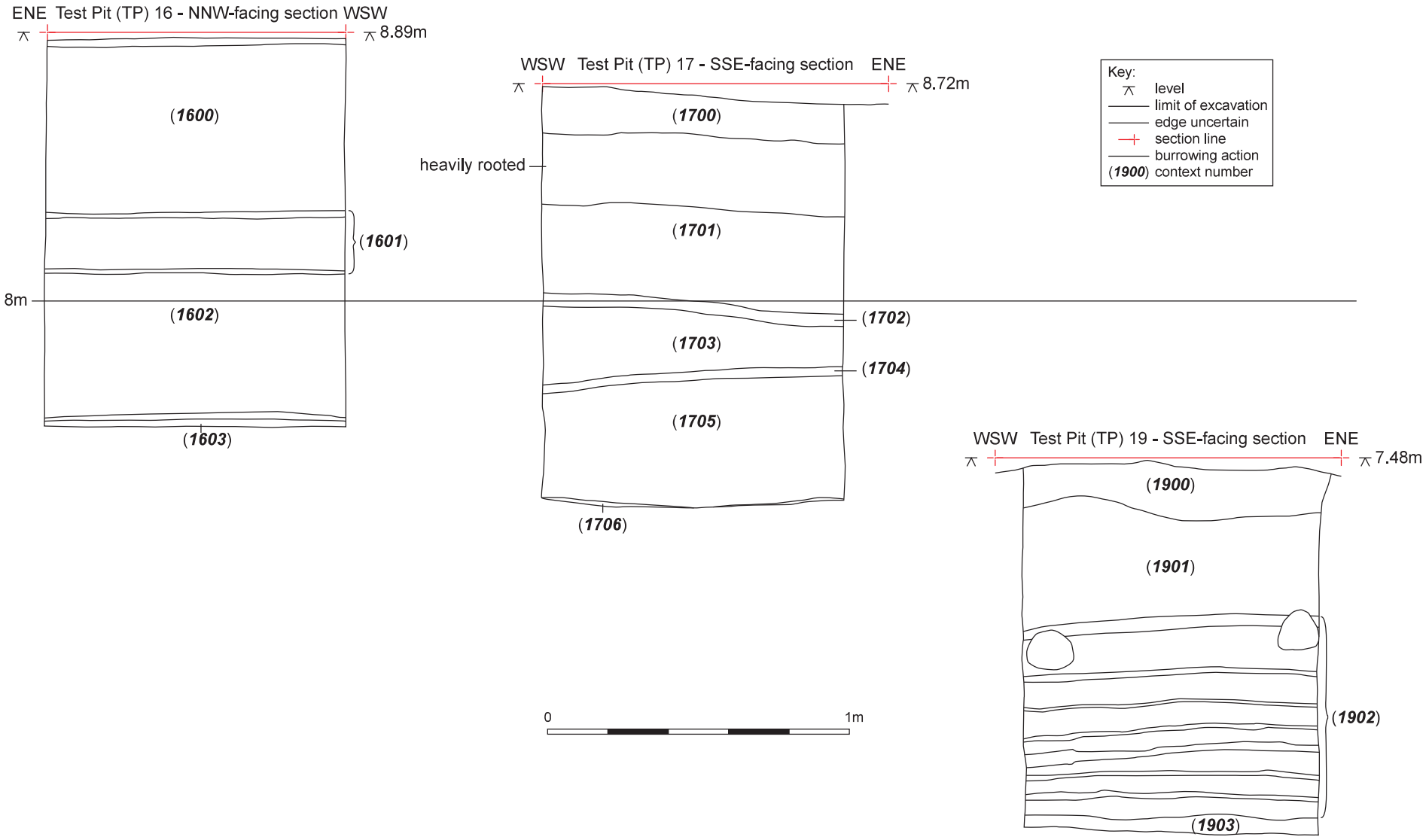

Figure 7: Test pit (TP) 16, 17 and 19 sections

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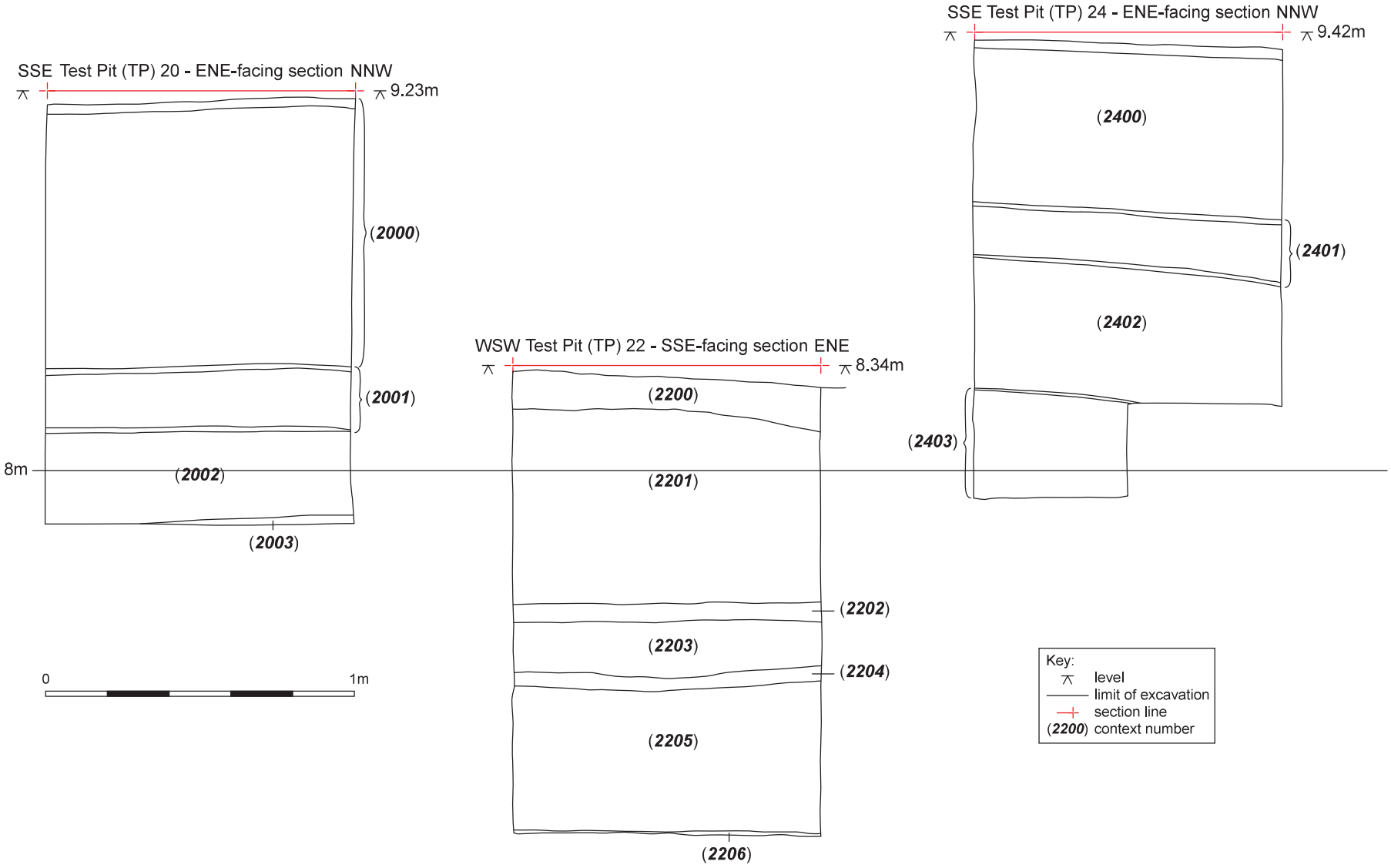

Figure 8: Test pit (TP) 20, 22 and 24 sections

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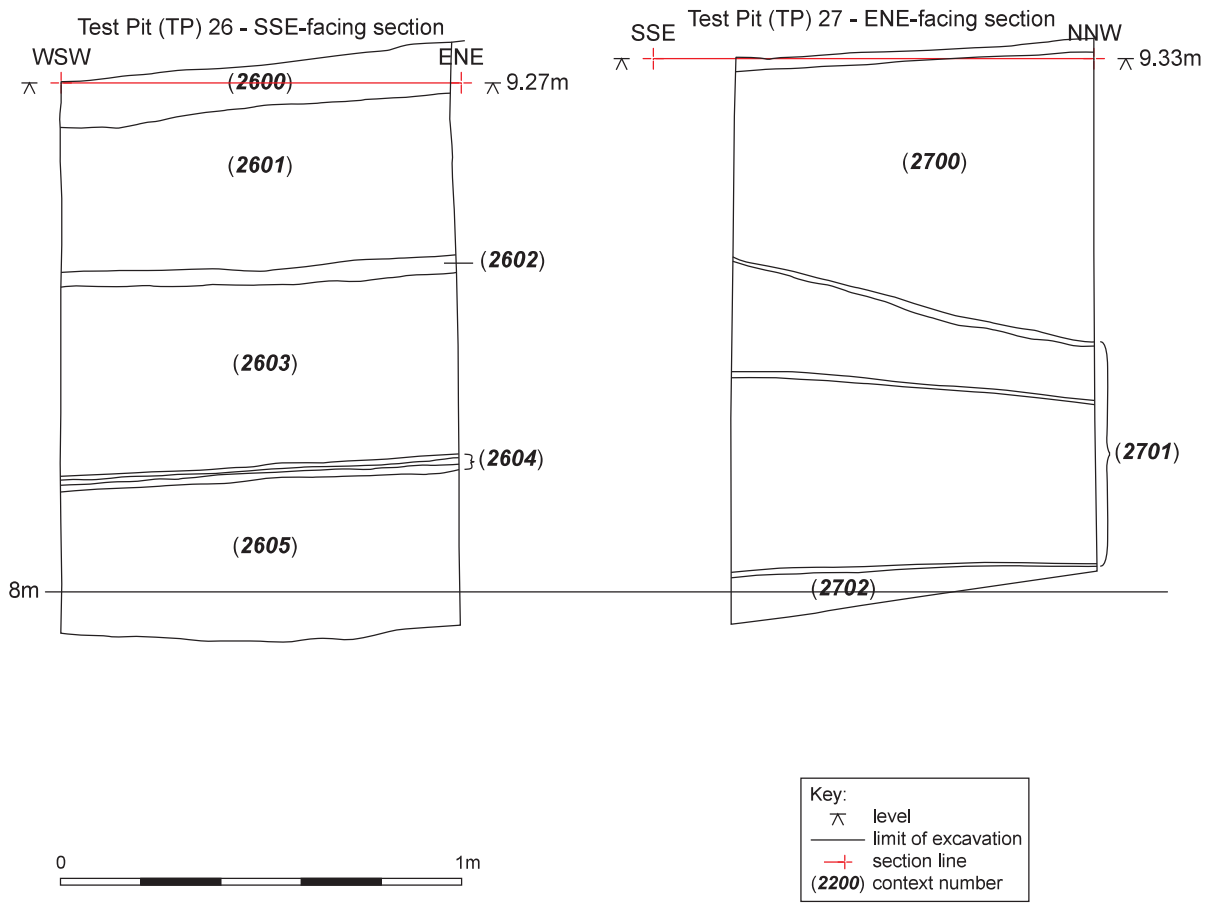

Figure 9: Test pit (TP) 26 and 27 sections

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4.29 Finds

4.29.1 ***Introduction***: in total, 20 individual artefacts were hand recovered during the evaluation but a further 3kg of industrial residue was also retrieved from 15 contexts and this has essentially been treated as a series of bulk samples. The finds are dealt with by category in the following sections. A complete list is provided in *Appendix 2*, with a brief report into the slag in *Appendix 4*.

4.29.2 ***Worked stone***: a single small piece of pale creamy white flint was recovered from deposit ***1603*** in Test Pit 16. This is clearly worked and part of an artefact, although its small size makes a definite identification difficult. It is most likely the tip of an arrowhead of indeterminate type, and as such could date from as early as the late Mesolithic to the Early Bronze Age.

4.29.3 ***Animal bone***: a total of 24 fragments of animal bone were recovered from The South Area; none was recovered from The North Area. Amongst the material recovered was a large equine tooth (probably horse) from context ***1303*** and another complete tooth from context ***1603*** (not identified). The rest of the material was very fragmentary. One fragment showed signs of butchery and a small fragment from ***1603*** may have been worked (Plate 40). Similar worked pieces of bone, described as '*points of trimmed bone… probably used as awls or arrowtips*', have been found at North Walney before (Cross 1948, 73 and 76; Plate 41: Worked bone points previously found at the site (after Cross 1948, 73)).

Plate 40: Possibly worked bone fragment from context *1603*

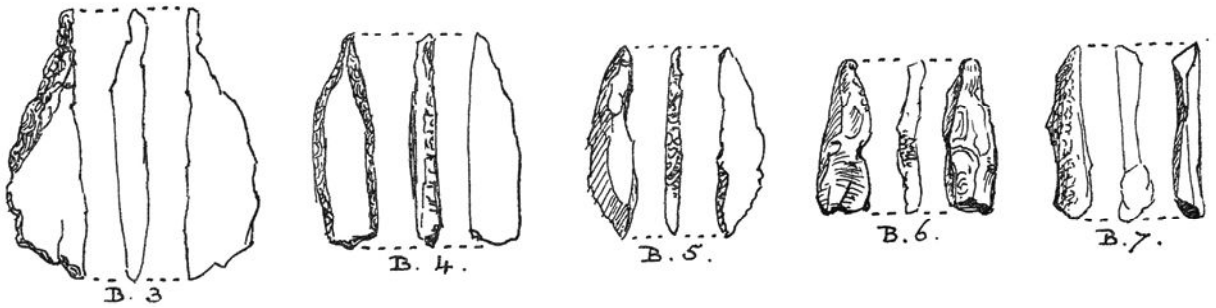

Plate 41: Worked bone points previously found at the site (after Cross 1948, 73)

4.29.4 ***Iron objects***: with the exception of the iron 'box' found in Test Pit 2, which was left *in situ*, a total of eight iron objects were recovered. Of these the six small fragments recovered from context ***203*** in Test Pit 2 are almost certainly piece of the 'box' left *in situ*. A further box, probably of identical form to that in Test Pit 2 was recovered from context ***903*** in Test Pit 9, and an iron ring was recovered from context ***404*** in Test Pit 4. Although difficult to date, all of these objects are likely to be post-medieval, probably even 20th century, on account of the evidently machine manufacturing used and evidence of welded joints.

4.29.5 ***Industrial Residue***: industrial residue weighing *c*3km was recovered from 13 different contexts in 11 of the test pits (see *Appendix 2*). A brief examination of the slag and associated industrial residue, all of which was found in the north area (Test pits 1-12), was carried out by Dr Gerry MacDonnell and report is presented in *Appendix 4*. In summary it is apparent that much, and probably all, of the industrial material was a by-product of the blast furnace process and so most likely derived from the slag banks produced by the Barrow Steel Works, which are situated on the mainland on the opposite side of Walney

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Channel. All of the material appears to float in water and this is presumably how it came to be deposited on the site.

4.13 Environmental Samples

4.13.1 A total of seven bulk environmental samples from seven contexts were recovered during the evaluation (see *Appendix 5*). None of these have been processed due to lack of funding for post-excavation work, but of these samples only Sample 7 was likely to be of any great archaeological significance.

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5. Discussion

5.1 Results

5.1.1 The evaluation produced some remarkably different results across the two areas, but also some deposits that were seemingly present across the whole area. In almost every test pit thin bands of dark sand were present, often in one or more pairs. The cause of these bands is not certain, but it is presumably staining generated by an increase in charcoal or humic soil, but this could only really be determined by processing the samples. However, it is evident from the presence of plastic in the layers of sand immediately overlying these bands in several cases, that they are the result of relatively recent activity. Their presence, which is relatively consistently between 6m and 6.5m AOD in the North Area, and between 8m and 8.5m in the South Area, also appears to indicate that much of the current dune system is quite recent. Indeed in some of the test pits on the north side of the South Area these bands were not even reached before the pit became too deep to excavate further. In addition, the industrial material found in the North Area is evidently no earlier in date than the late 19th century. This was, in some cases, discovered directly overlying what are clearly the original beach pebbles – the height of the existing beach to the north was recorded as approximately 6m AOD, which corresponds to these deposits, which demonstrates that virtually all of the deposits encountered in this area post-date the late 19th century. The iron boxes and deposit of haematite are therefore also late in date, although what activity they therefore relate to is difficult to determine.

5.1.2 It is only in the South Area that any finds of archaeological interest were identified. In Test Pits 13-17 and 19 a layer of dark sand, often with fire cracked stone and sometimes with charcoal, was present, usually at considerable depth. Although there were few finds recovered from these layers those that were included fragmentary animal bones and whole teeth, thought to include horse, as well as a single fragment of what is most likely a flint arrowhead. These deposits are therefore very likely to represent the source of the archaeological material that has been found in this area since at least the early 20th century and is probably therefore Neolithic in date, although the nature of the activity that has been taking place is difficult to determine on the basis of the available evidence.

5.1.3 It is also apparent in the South Area that the roots of the Japanese Rose penetrate in places to a considerable depth, in some cases at least into significant layers of archaeological material. However, across both areas the densest concentration of root material is in the first 0.3-0.5m of each test pit.

5.2 Conclusion and Recommendations

5.2.1 In the North Area, while there are deposits of archaeological interest present they are clearly relatively late and comprise only material washed to the island from the nearby slag banks on the mainland. Below these deposits are the remains of the earlier shingle beach, and it is apparent that all of the overlying deposits are apparently quite late. The presence of this industrial material does leave some questions about the supposed bloomery site found previously nearby (Cross 1948; Barnes 1955) and it would be useful to be able to compare the material, if possible.

5.2.2 The South Area clearly has *in situ* deposits of archaeological interest present, although these are at a considerable depth. These are likely to correspond with the discovery of large amounts of flint artefacts and animal bone made in the 1930s to 1950s and clearly represent a significant archaeological resource.

5.2.3 As far as further archaeological work as part of the project is concerned, and assuming this would involve excavation by depth to fully remove the roots of the Japanese Rose, it is considered unlikely that any deposits of archaeological interest would be affected in the North Area. However, in the South Area should excavation be necessary beyond a depth of approximately 6.2m-7.61m AOD (ranging from perhaps as much as *c*3.35m below the current surface level on the north-west side of the area and *c*1.3m below the current surface level on the east side of the site; Figure 3) then further archaeological work would be necessary. Given the nature of the deposits this further work would need to take the form of archaeological excavation, although this would be most efficiently carried out once the overlying deposits had been removed by machine. All of the finds and samples recovered during the evaluation,

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should be deposited in the Dock Museum, in Barrow-in-Furness so that they are available for future research.

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Appendix 1: Project Design

'DUNES OF BARROW' - WALNEY NORTH END, BARROW-IN-FURNESS, CUMBRIA

Archaeological Evaluation Project Design

Client: Cumbria Wildlife Trust

NGR: 317957 473593 (centre)

February 2015

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1. Introduction

1.1 Project Background

1.1.1 As part of a proposed scheme of habitat improvement works to a number of areas on Walney Island and Foulney Island, as part of the 'Dunes of Barrow' project being carried out by the Cumbria Wildlife Trust (hereafter 'the client') a request was made by the Historic Environment Service at Cumbria County Council for an archaeological desk-based assessment and walkover survey to be carried out for the affected sites. Greenlane Archaeology was commissioned to carry out the work and this project design outlines the manner in which the work will be undertaken. This work was carried out by Greenlane Archaeology in January 2015 (Greenlane Archaeology 2015).

1.1.2 This revealed that of the various areas at which work would take place archaeological remains were likely to be present at several, but at Walney North End (NGR 317957 473593 (centre)) there was considerable potential for prehistoric and possibly later material being present and, given the nature of the work proposed in this area (the eradication of invasive Japanese Rose by excavation to remove the underlying root structure), any such remains would be adversely affected. As a result it was proposed that a programme of archaeological evaluation be carried out in order to reveal the presence or otherwise of archaeological remains in this area.

1.2 Greenlane Archaeology

1.2.1 Greenlane Archaeology is a private limited company based in Ulverston, Cumbria, and was established in 2005 (Company No. 05580819). Its directors, Jo Dawson and Daniel Elsworth, have a combined total of over 18 years continuous professional experience working in commercial archaeology, principally in the north of England and Scotland. Greenlane Archaeology is committed to a high standard of work, and abides by the Chartered Institute for Archaeologists' (CIfA) Code of Conduct. The evaluation will be carried out according to their standards and guidance.

1.3 Project Staffing

1.3.1 The project will be managed and supervised by ***Dan Elsworth (MA (Hons), CAIfA)*** with suitably qualified assistance. Daniel graduated from the University of Edinburgh in 1998 with an honours degree in Archaeology, and began working for the Lancaster University Archaeological Unit, which became Oxford Archaeology North (OA North) in 2001. Daniel ultimately became a project officer, and for over six and a half years worked on excavations and surveys, building investigations, desk-based assessments, and conservation and management plans. These have principally taken place in the North West, and Daniel has a particular interest in the archaeology of the area. He has recently managed a number of similar archaeological excavation projects in the region including evaluation and excavation at the former Lowwood Gunpowder Works in Haverthwaite (Greenlane Archaeology 2010; 2011a), evaluation at Salthouse Farm, Millom (Greenlane Archaeology 2011b), and evaluation in Cartmel (Greenlane Archaeology 2011c), as well as several more projects over the last six years ranging from large excavations, to building recordings, surveys and desk-based assessments.

1.3.2 All artefacts will be processed by Greenlane Archaeology, and it is envisaged that they will initially be assessed by Jo Dawson, who will fully assess any of post-medieval date; medieval pottery will be assessed by Tom Mace. Finds of earlier date will be assessed by specialist sub-contractors as appropriate. The Cumbria County Council Historic Environment Service (CCCHES) will be notified of any other specialists, other than those named, who Greenlane Archaeology wishes to engage, before any specialist contracts are awarded, and the approval of the (CCCHES) will be sought.

1.3.3 Environmental samples, and faunal or human remains will be processed by Greenlane Archaeology. It is envisaged that any environmental samples would be assessed by staff at Headland Archaeology, Roman pottery by Ruth Leary, and animal bones by Jane Richardson at ASWYAS. Other remains, such as industrial material, will be assessed by specialist sub-contractors as appropriate and the CCCHES will be informed and their approval will be sought for these arrangements.

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2. Objectives

2.1 Archaeological Evaluation

2.1.1 To excavate evaluation trenches totalling 30m^2, depending on the nature of any on site constraints. This will assess the presence or absence of features of archaeological interest within the area, their extent, date, nature, and significance.

2.2 Report

2.2.1 To produce a report detailing the results of the evaluation, that will present the results, and assess the potential of the site and significance of the remains.

2.3 Archive

2.3.1 Produce a full archive of the results of the evaluation.

3. Methodology

3.1 Archaeological Evaluation

3.1.1 Evaluation trenching amounting to 30m^2 will be excavated, and it is envisaged that this will comprise 30 1m square test pits excavated by hand, targeting the areas of Japanese Rose, which has already been chemically treated. These will be excavated until significant archaeological deposits, the base of the root system (anticipated as being 1m deep, with a buffer of 0.1m below this), or the natural geology are reached, or to a depth at which it is no longer safe to excavate (typically taken as 1.2m although in sand it is likely to be before this) at which point the test pit will be stepped if further excavation is necessary. The trenches will be positioned to target any features of possible archaeological interest identified during the desk-based assessment where applicable, but otherwise positioned randomly across the two areas in order to get a relative sample. It is anticipated that the evaluation will take five days on site with two archaeologists (totalling 10 person days).

3.1.3 The evaluation methodology, which is based on Greenlane Archaeology's excavation manual (Greenlane Archaeology 2007c), will be as follows:

- Each trench will be excavated with regard to the position of any known constraints, focussing on the areas of high archaeological interest or potential, and avoiding areas which are likely to have been severely damaged or truncated by later activity, unless they are considered to have a high potential;
- All deposits will be excavated and examined by hand in a stratigraphic manner, using shovels, spades, mattocks, or trowels as appropriate for the scale. Deposits will only be sampled, rather than completely removed, below the first identified level of archaeological interest, unless specified by the CCCHES, with the intension of preserving as much *in situ* as possible. Where suitable, deposits considered to be of archaeological interest will be riddled in order to maximise the retrieval of finds;
- The position of any features, such as ditches, pits, or walls, will be recorded and where necessary these will be investigated in order to establish their full extent, date, and relationship to any other features. Negative features such as ditches or pits will be examined by sample excavation, typically half of a pit or similar feature and approximately 10% of a linear feature;
- The location of the test pits will be recorded by hand relative to a grid established on site, which will then be located through the use of a survey-grade GPS. Heights above ordnance datum will also be recorded relative to the grid using a dumpy level;
- All recording of features will include hand-drawn plans and sections, typically at a scale of 1:20 and 1:10, respectively, and photographs in both 35mm colour print and colour digital format;

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- All deposits, trenches, drawings and photographs will be recorded on Greenlane Archaeology *pro forma* record sheets;
- All finds will be recovered during the evaluation for further assessment as far as is practically and safely possible. Should significant quantities of finds be encountered an appropriate sampling strategy will be devised;
- All faunal remains will also be recovered by hand during the evaluation, but where it is considered likely that there is potential for the bones of fish or small mammals to be present appropriate volumes of samples will be taken for sieving;
- Deposits that are considered likely to have, for example, preserved environmental remains, industrial residues, and/or material suitable for scientific dating will be sampled. Bulk samples of between 20 and 60 litres in volume (or 100% of smaller features), depending on the size and potential of the deposit, will be collected from stratified undisturbed deposits and will particularly target negative features (e.g. gullies, pits and ditches) and occupation deposits such as hearths and floors. An assessment of the environmental potential of the site will be undertaken through the examination of samples of suitable deposits by specialist sub-contractors (see *Section 1.3.3* above), who will examine the potential for further analysis. All samples will be processed using methods appropriate to the preservation conditions and the remains present;
- Any human remains discovered during the evaluation will be left *in situ*, and, if possible, covered. The CCCHES will be immediately informed as will the local coroner. Should it be considered necessary to remove the remains this will require a Home Office licence, under Section 25 of the Burial Act of 1857, which will be applied for should the need arise;
- Any objects defined as 'treasure' by the Treasure Act of 1996 (HMSO 1996) will be immediately reported to the local coroner and securely stored off-site, or covered and protected on site if immediate removal is not possible;
- Each test pit will be backfilled following excavation although it is not envisaged that any further reinstatement to its original condition will be carried out.

3.1.4 Should any significant archaeological deposits be encountered during the evaluation these will immediately be brought to the attention of the CCCHES so that the need for further work can be confirmed. Any additional work will be carried out following discussion with the CCCHES and subject to a new project design, and the ensuing costs will be agreed with the client.

3.2 Report

3.2.1 The results of the evaluation will be compiled into a report, which will include the following sections:

- A front cover including the appropriate national grid reference (NGR) and planning application number;
- A concise non-technical summary of results, including the date the project was undertaken and by whom;
- Acknowledgements;
- Project Background;
- Methodology, including a description of the work undertaken;
- Results of the evaluation, incorporating the results of the desk-based assessment, including descriptions of any deposits identified, their extent, form, and potential date, and an assessment of any finds or environmental remains recovered during the evaluation;
- Discussion of the results including an assessment of the significance of any archaeological remains present within the study area, and areas of further archaeological

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potential. Any recommendations for further work, and appropriate types of further work, will be provided separately;

- Bibliography, including both primary and secondary sources;
- Illustrations at appropriate scales including:

  - a site location plan related to the national grid;

  - copies of early maps, plans, drawings, photographs and other illustrations of elements of the site collected as part of the desk-based assessment as appropriate to aid the understanding of the results of the evaluation;

  - a plan showing the location of the evaluation trenches in relation to nearby structures and the local landscape;

  - plans and sections of the evaluation trenches showing any features of archaeological interest;

  - photographs of the evaluation, including both detailed and general shots of features of archaeological interest and the trench;

  - illustrations of individual artefacts as appropriate.

3.3 Archive

3.3.1 The archive, comprising the drawn, written, and photographic record of the evaluation, formed during the project, will be stored by Greenlane Archaeology until it is completed. Upon completion it will be deposited with the Cumbria Archive Centre in Carlisle (CAC(C)). The archive will be compiled according to the standards and guidelines of the IfA (Brown 2007), and in accordance with English Heritage guidelines (English Heritage 1991). In addition details of the project will be submitted to the Online AccesS to the Index of archaeological investigationS (OASIS) scheme. This is an internet-based project intended to improve the flow of information between contractors, local authority heritage managers and the general public.

3.4.2 A copy of the report will be deposited with the archive at the Cumbria Archive Centre in Carlisle, one will be supplied to the client, and within two months of the completion of fieldwork, one paper and one digital copy will be provided for CCCHES. In addition, Greenlane Archaeology will retain one copy, and a digital copy will be deposited with the OASIS scheme as required.

3.4.3 The client will be encouraged to transfer ownership of the finds to a suitable museum. Any finds recovered during the evaluation will be offered to an appropriate museum, most likely Tullie House in Carlisle. If no suitable repository can be found the finds may have to be discarded, and in this case as full a record as possible would be made of them beforehand.

4. Work timetable

4.1 Greenlane Archaeology will be available to commence the project from the **20th February 2015**, or at another date convenient to the client. The project will comprise the following tasks:

- ***Task 1***: archaeological evaluation;
- ***Task 2***: post-excavation work on archaeological evaluation, including processing of finds and production of draft report and illustrations;
- ***Task 3***: feedback, editing and production of final report and archive.

5. Other matters

5.1 Access

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5.1.1 Access to the site for the evaluation will be organised through co-ordination with the client and/or their agent(s).

5.2 Health and Safety

5.2.1 Greenlane Archaeology carries out risk assessments for all of its projects and abides by its internal health and safety policy and relevant legislation. Health and safety is always the foremost consideration in any decision-making process.

5.3 Insurance

5.3.1 Greenlane Archaeology has professional indemnity insurance to the value of **£1,000,000**. Details of this can be supplied if requested.

5.4 Environmental and Ethical Policy

5.4.1 Greenlane Archaeology has a strong commitment to environmentally and ethically sound working practices. Its office is supplied with 100% renewable energy by Good Energy, uses ethical telephone and internet services supplied by the Phone Co-op, is even decorated with organic paint, and has floors finished with recycled vinyl tiles. In addition, the company uses the services of The Co-operative Bank for ethical banking, Naturesave for environmentally-conscious insurance, and utilises public transport wherever possible. Greenlane Archaeology is also committed to using local businesses for services and materials, thus benefiting the local economy, reducing unnecessary transportation, and improving the sustainability of small and rural businesses.

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Appendix 2: Summary Finds List and Quantities of Industrial Residue

Context	Type	Qty	Description	Date range
203	Fe	6	Fragments of iron sheet, heavily corroded but some with edge surviving. Probably parts of the 'box' left *in situ*	Post-medieval
404	Fe	1	Heavily corroded iron ring; 2cm internal diameter so about the size of a finger ring, but more likely a section of pipe or a related fitting	Post-medieval
903	Fe	1	Iron box or tray with three complete sides and base and part of fourth side with circular 'fitting' attached. 14cm by 10cm, sides 5cm tall. Sides are complete as edge has a smooth finish. Sheets very thin and joints welded.	Post-medieval
1303	Animal bone	3	Fragments (two refitting) of an equine tooth (probably horse). The other fragment is probably from the same animal.	Not closely dateable
1603	Animal bone	20	Eight larger pieces, including complete tooth, plus smaller fragments; one fragment possibly butchered; one small fragment may have been worked – it appears similar to material previously recovered from North Walney (Cross 1948)	Not closely dateable
1603	Terrestrial shell	1	Complete snail shell	Not closely dateable
1603	Stone	1	Pale creamy white flint point, worked on both sides – probably the tip of an arrowhead	Late Mesolithic – early Bronze Age
1903	Animal bone	1	Very small ?bone fragment; unidentified	Not closely dateable

Table 1: Summary Finds List

Context	Quantity of Industrial Residue	Context	Quantity of Industrial Residue
102	0.04kg	***703***	0.15kg
203	0.21kg	***803***	0.02kg
303	0.08kg	***903***	0.65kg
403	0.01kg	***904***	0.30kg
404	0.57kg	***1003***	0.52kg
502	0.10kg	***1201***	0.07kg
602	0.14kg		

Table 2: Quantities of Industrial Residue

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Appendix 3: Summary Assessment Report on Industrial Residues

Initial Comments on the slags and other material recovered from the Walney Island Site Code WN15

Dr Gerry McDonnell

Friday, 19th June 2015

Comments

There are 15 samples weighing *c*3kg. There are several types of material, but there are two dominant types, a low density vesicular cream coloured 'slag' and a black 'clinker'. A sample of each was analysed by hand-held XRF (Accelerating Voltage 15kV). Figure 1 is the spectrum of the cream coloured material and shows that it is dominated by calcium, with significant levels of silicon, aluminium, phosphorus, sulphur, manganese and a little iron. Table1 gives the composition of modern blast furnace slag showing the dominance of calcium and silica. The cream coloured is modern blast furnace slag. The spectrum of the black clinker is shown in Figure 2 and shows the clinker is rich in iron and it is not diagnostic of a particular material. The overall count rate from the sample was high and it is therefore not organic.

Overview

All the material is probably derived from the modern blast furnace operations at Barrow-in-Furness. Samples of both the cream slag and the black clinker float in tap water (and hence easily float in sea water).

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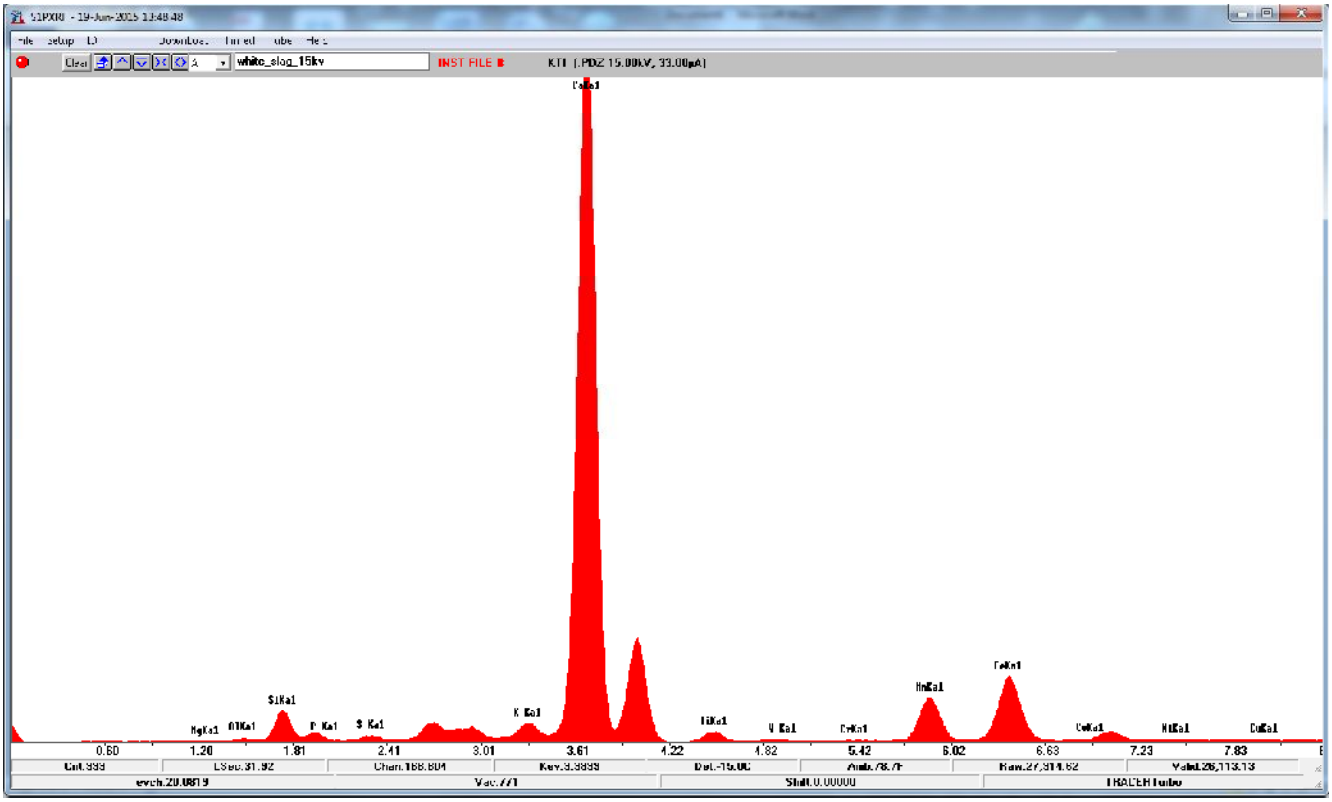

Figure 10: XRF spectrum of cream/white slag

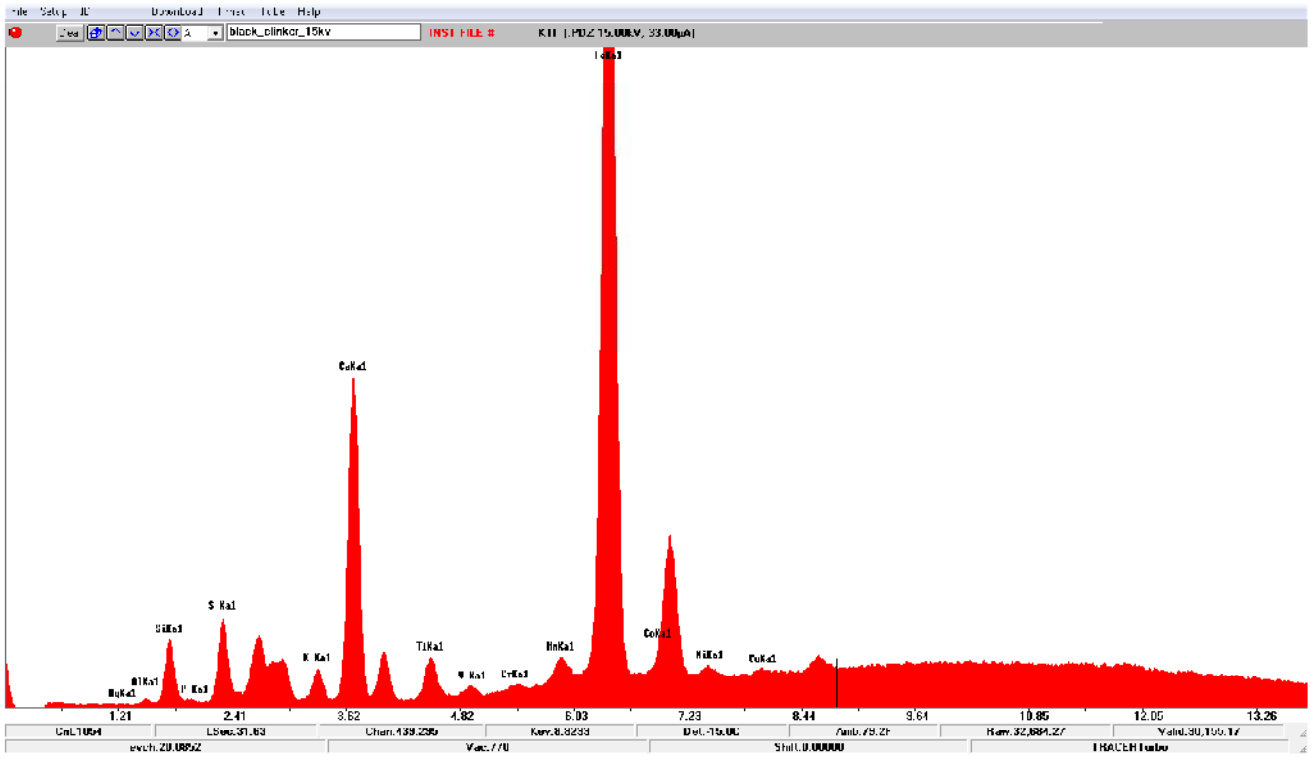

Figure 11: Black clinker XRF spectrum

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Constituent	**Blast furnace slag**	**Steel Slag**
	wt. %	wt. %
CaO	35 - 42	35 - 45
SiO_2	33 - 38	11 - 17
Al_2O_3	10 - 15	1 - 6
MgO	7 - 12	2 - 9
FeO	≤ 1,0	16 - 26
MnO	≤ 1,0	2 - 6
P_2O_5	-	1 - 2
S_{total}	1 - 1,5	≤ 0,2
Cr_2O_3	≤ 0,1	0,5 - 2

Table 3 Modern slag analysis

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Appendix 4: Summary List of Environmental Samples

Sample No.	*Context No.*	*Location*	*Quantity*	*Description*
1	***101***	TP 1	2L	Dark bands of sand
2	***102***	TP 1	2L	Dark bands of sand with slag
3	***203***	TP 2	2L	Dark sand with slag
4	***205***	TP 2	2L	Dump of haematite
5	***502***	TP 5	2L	Dark greyish sand
6	***404***	TP4	2L	Sand with slag
7	***1603***	TP 16	2L	Dark brown sand with animal bone, charcoal, and flint

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