



AIR PHOTO MAPPING,
INTERPRETATION AND
ANALYSIS FOR ALL
ARCHAEOLOGICAL APPLICATIONS
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The Yorkshire Coast and Humber Estuary
Rapid Coastal Zone Assessment Project
(3729)

Air Photo Mapping Project

MANAGEMENT OVERVIEW:
SUMMARY OF RESOURCES AND RESULTS

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SUMMARY

The Yorkshire Coast and Humber Estuary Rapid Coastal Zone Assessment Survey is funded by English Heritage and operated by Humber Field Archaeology. The air photo element was undertaken for Humber Field Archaeology by Alison Deegan and Archaeological Services WYAS.

The air photo mapping project area takes in the coastline between Whitby in North Yorkshire and Donna Nook in Lincolnshire including part of the Humber Estuary. This area was surveyed to English Heritage's National Mapping Programme standards from existing air photographs. Digital maps, at a nominal scale of 1:10,000, and supporting records were created by a team of three aerial investigators. This team was based with English Heritage's Aerial Survey and Investigation team at Tanner Row, York.

New National Monument Record entries were created for 577 monuments or monument groups and a further 466 existing monument records were amended or enhanced.

NMR Parent Collection UID:	EHC01/066
NMR Event UID:	1442220
Project dates:	May 2006 to May 2007
Project authors:	Alison Deegan Cinzia Bacilieri Heather Adams

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1 INTRODUCTION

This air photo mapping project is an element of the Yorkshire Coast and Humber Estuary Rapid Coastal Zone Assessment Survey (hereon YC&HE RCZAS). This is a desk-based survey that aims to improve the archaeological coverage of the coastal zone within the various Local Authority HERs and to assist in the formulation of long-term strategies for the management of that resource, especially in the light of the current Shoreline Management Plans. The YC&HE RCZAS is operated by Humber Field Archaeology (HFA) and the work is funded by English Heritage (EH).

The air photo mapping element was carried out to EH's standard National Mapping Programme (NMP) specification by a small team of interpreters. This team was based with EH's Aerial Survey and Investigation team at Tanner Row, York.

The NMP is ongoing and is generating a comprehensive record of the archaeology that is visible on air photographs for the whole of England. So far, approximately 33% of the country has been covered by the programme.

The air photo mapping project began in May 2006 and was completed in May 2007.

2 AIMS AND OBJECTIVES

The aims of the YC&HE RCZAS air photo mapping project are consistent with those of the National Mapping Programme. That is to produce a comprehensive record of the archaeology of England, from prehistory to modern times through the interpretation and mapping of remains that are visible as earthworks, crop marks, parchmarks and soilmarks on air photographs.

3 SCOPE OF THE SURVEY

3.1 Geographical scope of the survey

The YC&HE RCZAS is concerned with the coastline between Whitby in North Yorkshire and Donna Nook in Lincolnshire and includes the mouth of the Humber Estuary as far as Sunk Island on its north bank and Grimsby on the south. The air photo mapping project area consists of the whole 1km squares that cover a 1km wide strip of land from the coast inland and the ground between the coast and the low water mark. This is a total area of c. 332km² of which c. 240km² is coastal hinterland and 92km² lies between the coast and the low water mark (Figure 1).

The project covers small parts of North Yorkshire, the East Riding, North-East Lincolnshire and Lincolnshire and also encroaches on the North York Moors National Park.

3.2 Archaeological scope

The scope of the NMP is documented in the 1997 RCHME Sphere of Interest draft report.

3.3 Coastline mapping exercise

This air photo mapping project also undertook to record the position of the coastline from some of the earliest and latest NMR vertical air photographs for sample areas of the eroding coastline.

4 SOURCES

4.1 Air Photographs

The collections listed in Table 1 were consulted by the air photo mapping project, full contact details for each collection are given in Appendix 1.

Collection Name	Quantity consulted	
	oblique air photos	vertical air photos
National Monuments Record	2053 specialist 1884 military obliques	7889
Unit for Landscape Modelling	532	320
North Yorkshire HER	45	None
Humber SMR	25*	3
North York Moors National Park	10	Seamless coverage of georectified colour images
Lincolnshire HER	None	<25
North-East Lincolnshire HER	-	229
* excludes duplicates of ULM or NMR held prints		

Table 1. Air photo collections and summary of material consulted.

This project was carried out in collaboration with Cambridge University's Unit for Landscape Modelling (ULM): their contribution being the loan of air photographs from their collection to English Heritage. Unfortunately this loan arrangement was suspended from November 2006 until May 2007 whilst ULM & EH re-negotiated its terms. To ensure that all the relevant material was consulted before this project's end of May deadline the work on these photographs was sub-contracted to Rog Palmer, who, being based in Cambridge had ready access to the ULM collection. Rog Palmer examined all the photographs that had not already been loaned to the project team and identified those that required further work, these were then borrowed and dealt with by the project team in the usual manner.

4.2 Light Detection and Ranging (Lidar) Data

Although it was not within the remit of this project to consult Lidar data its use was discussed by the YC&HE RCZAS team. Phil Catherell, Environment Agency kindly provided a sample of data in a raster format for the area around the mouth of the Humber

Estuary in Lincolnshire. A rapid review of this sample suggested that because a proportion of the data was collected at high tide it was of limited use in identifying features in the inter-tidal zone. Where the tide was low, the resolution of these samples was too coarse to show small discrete features like wrecks but showed major natural features with good clarity. Furthermore because the coastal hinterland of this immediate area was largely reclaimed in relatively recent history it was not felt that this was the most appropriate project in which to test the potential of this data to its fullest. This is not to say that Lidar data does not have a contribution to make to future coastal or inland archaeological surveys.

4.3 Existing records

The National Monuments Record database was routinely consulted and spatial data from English Heritage's GIS was downloaded for use in the Autodesk Map® environment. Existing NMR monument records were updated with new information from the air photos. Where there was no existing monument record pertaining to archaeological features mapped from the air photos then a new record was created.

Data for the project area from the local authority and national park SMRs/HERs was provided to Humber Field Archaeology and made available to the air photo mapping project. Where possible the records that were created or enhanced by this project were concorded with the existing HER/SMR records.

5 METHODOLOGY AND RECORDING

5.1 Mapping Methods

All the available air photographs from the specified sources were examined under magnification and stereoscopically where possible. Photographs selected for transcription (rectification and mapping) were scanned at a suitable resolution, this was usually 300 dpi, and output as uncompressed TIFF format images (.TIF). Where permission to scan was not forthcoming from the copyright holder the necessary information was traced onto acetate sheets and these were scanned and rectified.

Scanned images were rectified using the specialist software AERIAL5.29. Control information was mostly derived from the Ordnance Survey Land-Line™ 1:2500 scale vector maps, which were also used as a base for mapping. Height information from the OS Land-form Profile™ (5m vertical interval, 1:10,000 scale) was used to create Digital Terrain Models in AERIAL, where the topography rendered this necessary.

Accuracy for the Ordnance Survey raster 1:2500 maps is in the range of ±2m and rectification of photographs is normally within ±2.5m.

Rectified images were output from AERIAL in uncompressed TIFF format at a resolution of 300 dpi and a scale of 1:2500. A World file (.TFW) was created alongside each TIFF file and the control information was retained in the AERIAL RDA file (.RDA).

Individual digital drawings were created for each OS 1: 10 000 scale quarter sheet covered by the project in Autodesk Map®. The rectified image was placed into the relevant map drawing, the information in the World file determined the image's correct position and scale. The archaeological features were then digitised from the photograph into the standard NMP layers using the established NMP conventions (see Appendix 2).

5.2 Recording Strategy

There are two strands to the NMP recording strategy and these were both employed for this project. The main strand is the creation of new or the enhancement of existing monument records in the National Monument Record (NMR) database. The NMP-generated entries or enhancements for each monument or monument group in this database record the location, the monument types present and their dating, the nature of the evidence, a free text description of the monument or monument group, the source of record information (i.e. photograph and any bibliographic or cartographic references) and administrative details such as concordance with SMR/HER records, record authorship, and links to NMR event records and archives.

To assist in the management and querying of the actual map data in the Autodesk Map® or a GIS environment a summary of some of the database information is attached to each individual mapped feature. Two tables of data are attached to each feature, the content of these tables is listed Appendix 3.

6 PROJECT MANAGEMENT

This project started at the beginning of May 2006. The mapping and recording for the project was carried out by principally by Cinzia Bacilieri and Alison Deegan and, from July to October 2006, by Heather Adams. Alison Deegan was the project team leader, reporting to Trevor Brigham, HFA and Marcus Jecock, EH Project Officer.

The overall time spent on this air photo mapping project was allocated to the different tasks as follows:

Tasks	Total person days
Mapping & recording	260
Project Management (including quality assurance)	28
Management report	4
Data export & dissemination	6
Other tasks: Management of NMR & ULM loans Training Preparation for & attendance at Liaison Group meetings Preparation of material for EH website Coastline mapping exercise Receiving and assisting visitors Recruitment	58
Total	356

Table 2. Summary of project tasks.

This summary does not include the day to day contribution made to the project in terms of support, advice and assistance from English Heritage's Aerial Survey and Investigation team.

Given that 260 days were dedicated to mapping and recording an area of land and inter-tidal zone totalling 332km² this averages at 19.5 days per whole OS 1:10 000 scale quarter sheet (25km², the unit of measure for most inland NMP projects). This is an exceptionally efficient result particularly in light of the many problems and issues encountered during the course of this project including loss of staff, problems with ULM loans (see above) and re-current complications arising from the nature of the existing data in the National Monuments Record.

7 QUANTIFICATION AND OVERVIEW OF PROJECT RESULTS

7.1 AP Mapping Project

This project has created 577 new NMR monument records and made amendments or enhancements to a further 466 monument records. A breakdown of the number of new and amended records by map sheet is provided in Appendix 4 and the monument types that were indexed in the records are listed in Appendix 5.

Of the new and amended records almost one third are located partially or wholly within the current inter-tidal zone, the other two-thirds are on the coastal hinterland. The features recorded in the inter-tidal zone fall into two groups: those that originally stood on coastal hinterland but have now been wholly or partially destroyed or damaged due to erosion of the land surface and those that are in situ on the inter-tidal rock, mud or sand.

The former group includes some possible Iron Age or Roman period enclosures and ditches at Barmston and medieval earthworks in the parishes of Rimswell, East Garton and Mappleton as well as a great many twentieth century military sites such as pillboxes, weapons pits and barbed wire defences. Some of these more recent features have been damaged and displaced but still survive in some form. Features that are now displaced on the inter-tidal zone or coastal cliffs were recorded in their original position rather than their current location (unless specifically stated otherwise in the individual monument record).

The most prevalent in situ features that are visible in the inter-tidal zone are again defences built in the Second World War particularly anti-tank cubes, pillboxes and barbed wire obstruction. However this project has also recorded earlier features such as fish traps, wrecks and rock-cut rutways. Of special note are an artificial rock-cut inlet at Ravenscar, North Yorkshire and the remains of a now-abandoned harbour a little further up the coast at Saltwick Bay. Both are associated with the transport of materials for the alum industry, which thrived along this stretch of coast from the seventeenth century until its decline in the late nineteenth century.

Turning to the coastal hinterland, the distribution of visible prehistoric and Roman remains is generally rather sparse. Between Whitby and Reighton just two or three crop marked enclosures and a handful of known or potential barrows were mapped. From Bempton to Barmston, where the freely-drained soils of the Yorkshire Wolds meet the coast, there is a greater concentration of crop marked sites, many of which are probably prehistoric or Roman. Moving into East Yorkshire there are small discrete sites in most parishes as far south as Hollym. The north and south banks of the Humber Estuary have been substantially reclaimed in recent history and the apparent absence of pre-medieval remains in this section is unsurprising. However the nature of two small groups of crop marked features at Sunk Island that resemble prehistoric sites is puzzling in this respect.

Medieval and post medieval ridge and furrow together with a narrower form that is probably post medieval or later in date is prevalent along most of this coast and is particularly extensive in the East Yorkshire parishes. However a rapid assessment of the condition of these remains from the most recent photographs available suggests that only a few pockets survive as earthworks. It is quite likely that levelled and extant ridge and furrow as well as other medieval earthworks and later features conceal some earlier archaeological features.

Whilst ridge and furrow is probably the most extensive type of archaeological monument recorded by this project it is the military remains of the first half of the twentieth century that are the most numerous and the most diverse. As Table 3 below shows, almost three-quarters of the monument records generated or amended by this project have been

attributed to this period. Naturally the types of military sites that are present and the combinations in which they occur was greatly influenced by their context within the wider defence infrastructure but it is clear that they were planned and positioned with respect to the natural defences provided by this coastline. So for example barbed wire was used very extensively as coastal protection and around pillboxes and other installations (this project recorded 212km) where there was little or no coastal cliff but very little was seen around Flamborough Head and north of Filey.

Period	No. of NMR monument records *
Prehistoric	9
Bronze Age	9
Iron Age or Roman	33
Medieval	76
Post medieval	174
20th century/Second World War	731
Uncertain	44
* some records may be attributed to more than one period	

Table 3. Summary of records by period.

7.2 Coastline mapping exercise

Almost 30% of the coastline between Bempton Cliffs and Spurn Point was sampled for the coastline mapping exercise (see Figure 1). This found that over 50-60 years the coast in the parishes of Easington and Mappleton and had been eroded by 95m and 155m respectively (see Appendix 6).

In practice this exercise proved to be difficult to implement because inevitably some of the control points required to accurately position the historic vertical photographs were not on the modern maps because they had eroded away.

8 DATA ARCHIVING AND DISSEMINATION

8.1 Copyright

The copyright of the air photo mapping and associated records produced by this project lies with English Heritage. Licence to use this data has been extended to Humber Field Archaeology, North Yorkshire HER, North York Moors National Park, Humberside SMR, North East Lincolnshire HER and Lincolnshire HER.

8.2 Project Archive

This project produced 52 Autodesk Map® drawing files, one for each OS 1: 10 000 scale quarter sheet that was wholly or partly covered by the project area. These will be

deposited with the NMR archive and the Aerial Survey and Investigation shall also retain digital copies.

There is no precedent for the formal archive deposition of other digital data associated with the project: the scanned image files (.TIF), rectified image files (.TIF), World files (.TFW), AERIAL rectification files (.RDA) and lists of consulted material (.XLS). For the time being this information will be retained by the Aerial Survey and Investigation team.

A single standalone Autodesk Map® drawing file contains the results of the coastline mapping exercise. This too will be retained by the Aerial Survey and Investigation team.

8.3 Project dissemination

During the course of this project progress reports were shared with heritage partners and stakeholders through Monitoring Point meetings and disseminated by email. The air photo mapping team attended three Monitoring Point meetings held on 7th July 2006, 26th September 2006 and the 13th November 2006 and gave Powerpoint presentations of interim results at the first and last of these.

To allow a smooth progression of the RCZAS work the maps and records were passed to HFA as each block was completed. The air photo mapping results will be integrated into the RCZAS and that data then disseminated as specified in the project design.

A project overview and select interim results are featured in English Heritage's NMP web pages (<http://www.english-heritage.org.uk/server/show/nav.10728>)

The maps and records generated by this air photo mapping project will also be available directly through the NMR.

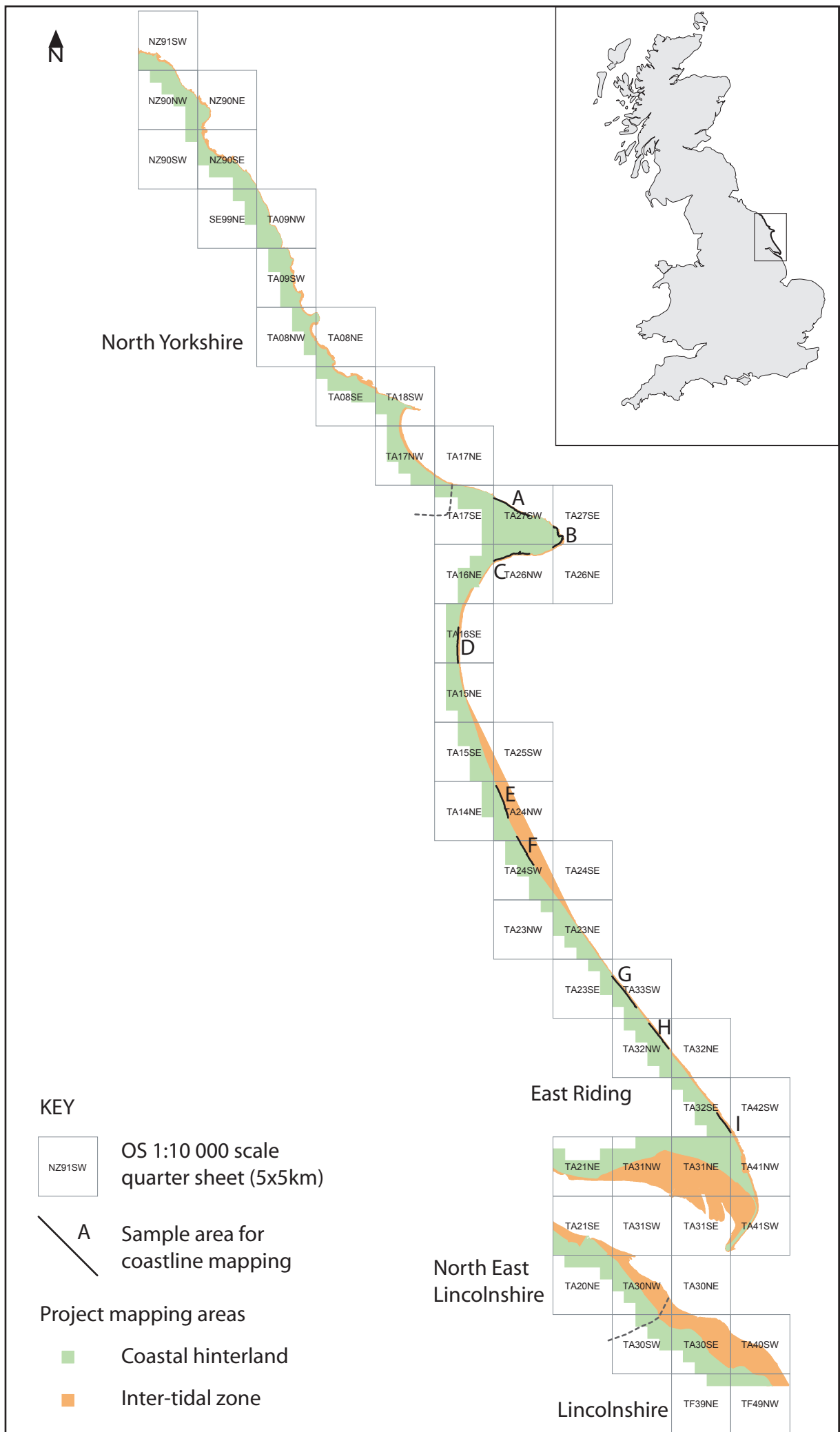


Figure 1. Location plan of the air photo mapping project for the Yorkshire Coast and Humber Estuary RCZAS

APPENDIX 1 AIR PHOTO COLLECTION DETAILS

Humber SMR Humber Archaeology Partnership, The Old School, Northumberland Avenue, Hull HU2 0LN

Lincolnshire HER Planning and Conservation Group, Lincolnshire County Council, Development Directorate, Witham Park House, Waterside South, Lincoln.

National Monument Record English Heritage, National Monuments Record Centre, Great Western Village, Kemble Drive, Swindon SN2 2GZ

North East Lincolnshire HER Environmental Services, Civic Offices, Knoll Street, Cleethorpes, North East Lincolnshire DN35 8LN

North York Moors National Park SMR The Old Vicarage, Bondgate, Helmsley, York, YO62 5BP,

North Yorkshire HER Heritage Unit, North Yorkshire County Council, County Hall, Northallerton, North Yorkshire DL7 8AH

Unit for Landscape Modelling University of Cambridge, Air Photograph Library, Sir William Hardy Building, Tennis Court Road, Cambridge CB2 1QB
<http://www.uflm.cam.ac.uk>

APPENDIX 2 AUTODESK MAP® LAYER CONTENT AND DRAWING CONVENTIONS

Layer Name	Layer content	Attached data tables	Layer colour and linetype
BANK	closed polygons for supra-surface earthen features such as banks, platforms, mounds and spoil heaps	MONUMENT & MONARCH	1 (red) continuous
BANKFILL	solid fill for bank layer polygons	MONUMENT & MONARCH	1 (red) continuous
DITCH	closed polygons for cut or wear features such as ditches, ponds, pits or hollow-ways	MONUMENT & MONARCH	3 (green) continuous
DITCHFILL	solid fill for ditch layer polygons	MONUMENT & MONARCH	3 (green) continuous
EXTENT OF AREA	closed polygons outlining complex or extensive remains such as mining or army camps	MONUMENT & MONARCH	8 (grey) dashedx2
GRID	grid lines at 1km intervals	NONE	7 (white) continuous
MONUMENT POLYGON	closed polygons encircling all the features comprised within a single NMR record.	MONARCH ONLY	7 (white) continuous
RIGARREWK	polyline showing the direction of ploughing in outlines of extant ridge and furrow	MONUMENT & MONARCH	4 (cyan) continuous
RIGARRLEVEL	polyline showing the direction of ploughing in outlines of levelled or crop mark ridge and furrow	MONUMENT & MONARCH	6 (magenta) acad_iso03w100
RIGDOTSEWK	closed polygon defining the furlongs or extent of area of extant ridge and furrow	MONUMENT & MONARCH	4 (cyan) dotx2
RIGDOTSLEVEL	closed polygon defining the furlongs or extent of area of levelled or crop mark ridge and furrow	MONUMENT & MONARCH	6 (magenta) dotx2
STRUCTURE	for all stone, concrete, metal and timber features, structures and erections	MONUMENT & MONARCH	52 (white)
T HACHURE	t-hachure convention to schematise sloped features indicating the top of slope and direction of slope.	MONUMENT & MONARCH	5 (blue)

APPENDIX 3 AUTODESK MAP® ATTACHED DATA TABLES

MONUMENT DATA TABLE

The Monument Data Table consists of five fields that are input directly through Autodesk Map®. The contents of the MONARCH, PERIOD, TYPE and EVIDENCE fields duplicate that of the related fields in the corresponding NMR monument record. In this context the PHOTO field identifies the photograph from which the feature was actually traced. This may not reflect the reference given in the monument record as the latter is intended for the “best illustrative” photograph of the archaeology.

Field name	Field content	Sample data
MONARCH	NMR Unique Identifier (UID)	1043117
PERIOD	date of features (EH Thesaurus)	NEOLITHIC
TYPE	monument type (EH Thesaurus)	HENGE
EVIDENCE	Form of remains (EH Thesaurus)	CROPMARK
PHOTO	NMR or other reference for the photograph from which the feature was plotted and its date of photography	ULM BTY/043 05-Jul-1975

MONARCH DATA TABLE

The Monarch Data Table comprises just one field which records the NMR Monument UID. Although this information duplicates one of the fields of Monument Data Table it is required in this way for the scripts that have been generated to take the NMP data into the EH GIS environment.

Field name	Field content	Sample data
MONARCH	NMR Unique Identifier (UID)	1043117

APPENDIX 4 MAP SHEET INFORMATION

Block	OS quarter sheet	Area of		County	Author	NMR records		No. of days for		Date completed
		Coastal hinterland	Inter-tidal zone			new	enhanced	map	records	
1	TA14NE	2.99	0.00	EAST RIDING	DVDT+AD	6	5	2	0.5	28/09/2006
1	TA15NE	6.53	0.61	EAST RIDING	HA	61	2	13	3	03/08/2006
1	TA15SE	7.62	0.46	EAST RIDING	CB	19	25	7	3.5	17/08/2006
1	TA16NE	7.10	0.58	EAST RIDING	AD	5	17	3.5	1	28/09/2006
1	TA16SE	5.13	1.09	EAST RIDING	HA	53	10	12.5	3.5	31/08/2006
1	TA17SE	9.76	0.17	NORTH YORKSHIRE +EAST RIDING	AD	12	18	3	1.5	28/09/2006
1	TA23NE	8.03	0.82	EAST RIDING	CB	11	23	6.5	2	20/06/2006
1	TA23NW	1.00	0.00	EAST RIDING	CB	2	1	1.5	0.5	15/06/2006
1	TA23SE	3.29	0.15	EAST RIDING	CB	9	4	2	1	29/05/2006
1	TA24NW	5.34	0.63	EAST RIDING	CB	20	44	7.5	3	31/07/2006
1	TA24SE	0.14	0.10	EAST RIDING	CB	2	3	0	0.5	11/07/2006
1	TA24SW	8.34	0.58	EAST RIDING	CB	15	6	7	1.5	11/07/2006
1	TA25SW	0.00	0.04	EAST RIDING	CB	0	1	0.5	0	17/08/2006
1	TA26NE	0.05	0.11	EAST RIDING	HA	1	0	0.5	0.5	27/09/2006
1	TA26NW	4.25	0.67	EAST RIDING	HA	11	4	3	0.5	27/09/2006
1	TA27SE	0.79	0.23	EAST RIDING	CB	2	6	0.5	0.5	06/09/2006
1	TA27SW	13.61	0.29	EAST RIDING	CB	13	14	7.5	1.5	06/09/2006
1	TA33SW	4.11	0.54	EAST RIDING	CB	10	35	4	3	24/05/2006
2	TA20NE	4.94	0.04	NE LINCOLNSHIRE	CB	0	0	5	1.5	09/01/2007
2	TA21NE	7.92	1.58	EAST RIDING	AD	18	3	2	1	02/11/2006

Block	OS quarter sheet	Area of		County	Author	NMR records		No. of days for		Date completed
		Coastal hinterland	Inter-tidal zone			new	enhanced	map	records	
2	TA21SE	5.32	3.14	NE LINCOLNSHIRE	CB	16	5	5.5	2	09/01/2007
2	TA30NE	0.00	0.70	LINCOLNSHIRE	AD	0	1	0.5	0	16/02/2007
2	TA30NW	6.87	7.57	NE LINCOLNSHIRE	CB	15	7	7.5	3	01/02/2007
2	TA30SE	9.56	10.89	LINCOLNSHIRE	AD	36	5	4	2.5	16/02/2007
2	TA30SW	5.14	0.84	NE LINCOLNSHIRE	CB	2	17	6	2.5	15/02/2007
2	TA31NE	10.35	14.38	EAST RIDING	HA	10	3	5	1	11/10/2006
2	TA31NW	7.40	10.46	EAST RIDING	AD	1	1	1.5	0.5	16/11/2006
2	TA31SE	0.17	1.21	EAST RIDING	CB	1	12	0.5	2	30/11/2007
2	TA31SW	0.00	0.57	NE LINCOLNSHIRE	CB	0	0	0.5	0	16/11/2006
2	TA32NE	1.52	0.54	EAST RIDING	CB	8	11	1	0.5	29/09/2006
2	TA32NW	8.79	0.47	EAST RIDING	CB	17	17	4	3	29/09/2006
2	TA32SE	9.06	1.11	EAST RIDING	CB	12	45	5	3	12/10/2006
2	TA40SW	0.83	8.67	LINCOLNSHIRE	AD	16	0	0.5	1	16/02/2007
2	TA41NW	4.05	2.88	EAST RIDING	CB	15	32	10	5	30/11/2007
2	TA41SW	0.59	6.06	EAST RIDING	CB	11	23	4	3	30/11/2007
2	TA42SW	0.00	0.16	EAST RIDING	CB	2	0	0.5	0.5	12/10/2006
2	TF39NE	1.99	0.00	LINCOLNSHIRE	AD	3	3	0.5	0.5	16/02/2007
2	TF49NW	3.00	1.67	LINCOLNSHIRE	AD	28	0	2.5	1.5	16/02/2007
3	NZ90NE	1.50	0.53	NORTH YORKSHIRE	AD	3	1	1.5	0.5	26/04/2007
3	NZ90NW	8.11	0.27	NORTH YORKSHIRE	AD	12	2	1.5	0.5	26/04/2007
3	NZ90SE	8.12	1.18	NORTH YORKSHIRE	AD	24	11	1.5	1	25/05/2007
3	NZ90SW	1.00	0.00	NORTH YORKSHIRE	AD	4	0	1.5	1	05/04/2007
3	NZ91SW	2.82	0.66	NORTH YORKSHIRE	AD	18	2	2	1	25/05/2007

Block	OS quarter sheet	Area of		County	Author	NMR records		No. of days for		Date completed
		Coastal hinterland	Inter-tidal zone			new	enhanced	map	records	
3	SE99NE	3.99	0.00	NORTH YORKSHIRE	AD	3	3	1.5	1	25/05/2007
3	TA08NE	1.97	0.64	NORTH YORKSHIRE	CB	2	4	4	1	11/04/2007
3	TA08NW	4.54	0.59	NORTH YORKSHIRE	CB	1	0	1	0.5	11/04/2007
3	TA08SE	7.04	1.00	NORTH YORKSHIRE	CB	6	7	3	1.5	28/03/2007
3	TA09NW	5.67	0.39	NORTH YORKSHIRE	AD	10	0	1.5	1	05/04/2007
3	TA09SW	7.36	0.82	NORTH YORKSHIRE	CB	4	4	4.5	1	26/04/2007
3	TA17NE	0.48	0.26	NORTH YORKSHIRE	CB	5	4	2.5	1	13/03/2007
3	TA17NW	8.22	1.20	NORTH YORKSHIRE	CB	13	24	6	4	12/03/2007
3	TA18SW	4.30	0.69	NORTH YORKSHIRE	CB	9	1	2.5	1.5	20/03/2007

APPENDIX 5 EH THESAURUS TERMS INDEXED BY THE PROJECT

- A AIRCRAFT OBSTRUCTION
 - AIRFIELD
 - ALUM HOUSE
 - ALUM QUARRY
 - ALUM WORKS
 - ANTI AIRCRAFT BATTERY
 - ANTI BOAT LANDING OBSTACLE
 - ARMY CAMP
 - ARTILLERY SCHOOL
 - B BANK (EARTHWORK)
 - BARBED WIRE OBSTRUCTION
 - BARRACKS
 - BARRIER
 - BARROW
 - BEACH DEFENCE
 - BEACH DEFENCE BATTERY
 - BLAST WALL
 - BLOCKHOUSE
 - BLOODHOUND MISSILE SITE
 - BOMB CRATER
 - BOMBING DECOY
 - BOMBING RANGE
 - BOMBING RANGE MARKER
 - BOUNDARY
 - BREAKWATER
 - BRICKWORKS
 - BRIDGE
 - BUILDING
 - BUILDING PLATFORM
 - BUTTS
 - C CASTLE
 - CAUSEWAY
- D
- E
- F

	FORMAL GARDEN		MOAT
	FORT		MOLE
G	GROYNE		MOUND
	GUN EMPLACEMENT	N	NARROW RIDGE AND FURROW
	GUNPOST		NATURAL FEATURE
H	HALL HOUSE		NISSEN HUT
	HANGAR	O	OBSERVATION POST
	HARBOUR		OFFICERS QUARTERS
	HARD%STANDING	P	PARADE GROUND
	HEAVY ANTI AIRCRAFT BATTERY		PILLBOX
	HOLIDAY CAMP		PIT
	HOLLOW		PIT CLUSTER
	HOLLOW WAY		PLATFORM
	HOUSE PLATFORM		PLOUGH HEADLAND
	HUT		POND
	HUT CIRCLE		POUND
J	JET WORKINGS		POWER STATION
	JETTY		PRACTICE TRENCH
L	LANDING POINT	Q	QUARRY
	LIME%KILN	R	RADAR BEACON
M	MANOR HOUSE		RADAR STATION
	MARKER CAIRN		RADIO STATION
	MILITARY AIRFIELD		RAILWAY
	MILITARY AIRFIELD SITE		RAMP
	MILITARY BASE		RECTANGULAR ENCLOSURE
	MILITARY BUILDING		RECTILINEAR ENCLOSURE
	MILITARY CAMP		RESERVOIR
	MILITARY COASTAL DEFENCES		RESORT VILLAGE
	MILITARY HEADQUARTERS		RETAINING WALL
	MILITARY HOSPITAL		RETTING POND
	MILITARY INSTALLATION		REVETMENT
	MILITARY TRAINING SITE		RIDGE AND FURROW
	MINEFIELD		RING DITCH
	MINERAL RAILWAY		ROAD

	ROAD BLOCK		STACK STAND
	ROBBER TRENCH		STRIP FIELD
	ROUND BARROW		STRUCTURE
	ROUND HOUSE (DOMESTIC)	T	TANK TRAP
	ROYAL OBSERVER CORPS MONITORING POST		TARGET
	RUNWAY		TAXIWAY
	RUTWAY		TERRACE
S	SALTERN		TERRACED GROUND
	SALTERN MOUND		TOFT
	SCARP		TRACKWAY
	SEA DEFENCE%		TRAMWAY
	SEARCHLIGHT BATTERY		TRENCH
	SEARCHLIGHT EMPLACEMENT	U	UNCERTAIN
	SETTLEMENT	V	VILLAGE
	SHELTER	W	WALL
	SIGNAL STATION		WATER CHANNEL
	SIGNAL TOWER		WATER TANK
	SLIPWAY		WEAPONS PIT%
	SOUND MIRROR		WRECK
	SPOIL%HEAP		
	SQUARE BARROW		

Use wildcards as indicated (%) when searching the Autodesk map® data because of some minor inconsistencies in the form of words use.

APPENDIX 6 COASTLINE MAPPING SAMPLE AREAS AND SUMMARY OF RESULTS

Sample area	Parish	Sample length	NGR to		NGR		Reference years		Summary of Loss
A	Bempton Flamborough	3.46	520006	473896	523009	472431	1940	1995	Some small localised landfalls but no large scale loss.
B	Flamborough	2.8	525060	471523	525007	469746	1938	1994	Some small localised landfalls but no large scale loss.
C	Flamborough Bridlington	3.49	523000	469203	520005	468594	1940	1994	Some small localised landfalls and up to 15m large scale regression towards southern end of sample area.
D	Barmston	3.03	517020	463000	516985	459999	1928	1992	Large scale regression ranging from less than 10m at northern end to over 90m at southern end of sample area.
E	Hornsea	2.91	520205	449629	521200	446922	1928	1994	Large scale regression generally less than 20m and possibly some reclamation in parts.
F	Mappleton	2.85	521949	445336	523355	442958	1945	1994	Large scale regression of up to 115m.
G	Roos	3.38	529988	433546	532039	430916	1946	1994	Large scale regression of 40-60m.
H	Withernsea	2.67	533112	429561	534754	427462	1941	1994	Large scale regression of up to 35m.
I	Easington	2.00	538838	422003	539988	420380	1941	1994	Large scale regression of up to 95m.

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