

# Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

**Environmental Statement** 

# Volume 3

Appendix 21.3 - Aerial Photography and Historic Map Regression Addendum

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Page 2 of 20

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Rev. no. 1

#### **Table of Contents**

21.3	AERIAL PHOTOGRAPHY AND HISTORIC MAP REGRESSION ADDENDUM	6
21.3.1	Sources of Data	7
21.3.2	Aims and Objectives	7
21.3.3	Methodology	8
21.3.4	Interpretative Mapping and Assumptions and Limitations	9
21.3.5	Environment, Land Use and Previously Recorded Heritage Assets	9
21.3.6	Results	10
21.3.7	Conclusion	17
21.3.8	ADDENDUM TO THE MAP REGRESSION ANALYSIS: Additional maps	18
Refere	1ces	20
Table	of Tables	
Table 2	1.3-1: Sites Recorded During the Addendum Survey	11
	1.3-2: Estate and Other Maps Which Were Consulted During the Addendum Map Regi	
		18

#### **Figures**

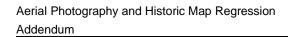
- Figure 21.3-1: Addendum Area Location for Heritage Mapping.
- Figure 21.3-2: Historic England Archive aerial photographs Within 1km of the Order Limit in the Addendum Area.
- Figure 21.3-3: Norfolk Historic Environment Record Oblique Aerial Photos Within1km of the Order Limits in the Addendum Area.
- Figure 21.3-4: Heritage Map book Index for Addendum Area.
- Figure 21.3-5: Addendum Study Area Location Sheets 1 10.
- Figure 21.3-6: Index to 17-19<sup>th</sup> Century Maps.
- Figure 21.3-7.1: Map of An Estate in Dunston, Stoke Holy Cross, Swainsthorpe, Newton Flotman, Mulbarton and Bracon Ash, Showing Crops.
- Figure 21.3-7.2: Map of Mulbarton, 1831.
- Figure 21.3-7.3: Map of the River Wensum from Taversham to Attlebridge 1849.
- Figure 21.3-7.4: Plan of an Estate lying in Heveringland, Cawston, Brandistonand Swannington, Norfolk.
- Figure 21.3-7.5: Map of the Parish of Cawston.
- Figure 21.3-7.6: Map of Waborne, 1704.
- Figure 21.3-8: Faden's Map of Norfolk, 1797 Sheets 1 4.



Rev. no.1

## **Glossary of Acronyms**

AP	Aerial Photography
APS	Air Photo Services Ltd
CUCAP	Cambridge University Collection of Aerial Photography
DCO	Development Consent Order
DEP	Dudgeon Offshore Wind Farm Extension Project
EIA	Environmental Impact Assessment
ES	Environmental Statement
GIS	Geographic Information System
HE	Historic England
LiDAR	Light Detection and Ranging
NGR	National Grid Reference
NHER	Norfolk Historic Environment Record
NMP	(Historic England) National Mapping Programme
NRO	Norfolk Record Office
OS	Ordnance Survey
PrefRef	NHER site reference
RAF	Royal Air Force
SEP	Sheringham Shoal Offshore Wind Farm Extension Project
UK	United Kingdom
WWI	World War One (1914 – 1918)
WWII	World War Two (1939 – 1945)





## **Glossary of Terms**

Addendum Area	Area where new aerial photo data has been added to the original survey.				
Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.				
Dudgeon Offshore Wind Farm Extension site	The Dudgeon Offshore Wind Farm Extension offshore wind farm boundary.				
The Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension offshore and onshore site including all onshore and offshore infrastructure.				
Study area	Area where potential impacts from the project could occur, as defined for each individual Environmental Impact Assessment (EIA) topic.				
Sheringham Shoal Offshore Wind Farm Extension site	Sheringham Shoal Offshore Wind Farm Extension lease area.				
The Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension offshore and onshore site including all onshore and offshore infrastructure.				

Page 5 of 20

Rev. no.1



#### 21.3 AERIAL PHOTOGRAPHY AND HISTORIC MAP REGRESSION ADDENDUM

- Air Photo Services Ltd (APS) was commissioned to undertake an assessment of Aerial Photographic (AP), Light Detection and Ranging (LiDAR) and satellite imagery, alongside historic map regression analysis, for the Development Consent Order (DCO) order limits for the Sheringham Shoal Wind Farm Extension Project (SEP) and Dudgeon Offshore Wind Farm Extension Project (DEP) (Appendix 21.2), in 2020.
- 2. This Addendum report, **Appendix 21.3**, covers additional aerial photographs and historic maps. It was researched and produced in 2021-2022, to supplement **Appendix 21.2** to the Environmental Statement (ES) to:
  - Update the assessment of aerial photographs from specific data sources which were not available for consultation during 2020; and
  - Update the historic map regression using pre-19th century cartographic sources which are now available for consultation at the Norfolk Record Office (NRO) and in one case as digital data.
- 3. This addendum does not address LiDAR survey data as these were analysed over the entire DCO order limits and buffer area in 2020 (Appendix 21.2).
- 4. The analyses were undertaken to provide updated aerial and satellite imagery interpretation and historic map regression data only, for the following areas:
  - The DCO order limits for online satellite imagery and pre-19th century map data;
     and
  - The Study Area within a 100m buffer to the onshore DCO order limits, with specific reference to 'the Addendum Area' where Historic England National Mapping Programme (NMP) survey has not yet been undertaken and it had not been possible to access the required specialist aerial photographs for consultation in 2020.
- 5. The locations of the DCO order limits and Addendum Area are presented on **Figure 21.3-1**.
- 6. This Addendum is required as part of the overall baseline data compilation to which it forms a Technical Appendix to **ES Chapter 21 Onshore Archaeology and Cultural Heritage**. It is undertaken in accordance with the specification for Onshore Archaeology and Cultural Heritage: Analysis of Aerial Photographic and LiDAR data and Historic Map Regression (Royal HaskoningDHV, 2020).
- 7. This technical report represents additional work undertaken by Air Photo Services (APS) between November 2021 and January 2022 within the Addendum Area.

Page 6 of 20



Rev. no.1

#### 21.3.1 Sources of Data

- 8. The Addendum assessment has systematically examined the following sources of data:
  - Historic and modern aerial photographs and satellite imagery data accessioned to online sources between July 2020 and January 2021;
  - Specialist oblique and vertical aerial photographs held at the Historic England (HE) Archive in Swindon, which cover the Addendum Area and have not yet been considered and by the Norfolk NMP. The distribution of these vertical and specialist oblique aerial photographs is shown at Figure 21.3-2.
  - Specialist oblique aerial photographs supplied by the Norfolk Historic Environment Record (NHER) which cover the Addendum Area. The distribution of these specialist aerial photographs is shown at **Figure 21.3-3**.
  - Updated NHER data within the Addendum Area; and
  - Additional historic maps held at the NRO as original documents and, in the case
    of Faden's Map of Norfolk, as digital data (Figures 21.3-7 and 8).

#### 21.3.2 Aims and Objectives

#### 21.3.2.1 Aerial Photographic Analysis

- 9. The aim of the survey is to:
  - Provide information on the location and nature of buried and upstanding archaeological features visible on historic aerial photographs to assess the buried, topographic and micro-topographic features within the Addendum Area; and
  - Assess newly accessioned satellite imagery at online sources and indicate any updates to the analysis over the entire Study Area.
- 10. The assessment also considered the landscape changes wrought by a high concentration of defensive features dating to World Wars One and Two (WWI and WWII) and intense arable farming over much of the open land in this area of Norfolk. The objective of this survey is to identify the potential for heritage asset presence and preservation through the assessment of aerial and satellite imagery.

Page 7 of 20

Rev. no.1

#### 21.3.2.2 Historic Map Regression Analysis

11. The aim of the Addendum to the map regression analysis was to collect and present additionally available historic maps within the Study Area. The objective was to investigate and demonstrate landscape changes up to the mid-19<sup>th</sup> Century using cartographic sources derived from the archives listed above. The maps presented in this assessment are those which were made available for consultation in November 2021 at the NRO under some residual ongoing COVID-19 restrictions to allow controlled in-person access to original documents, and digital and online resources.

#### 21.3.3 Methodology

#### 21.3.2.3 Data Type and Sources

- 12. This Addendum has used a range of sources and archives in order to identify, interpret and map heritage features from the air, from satellites and from cartographic sources. This section gives details about the methodology employed to search each archive, the type of data available for study and the interpretation methods applied to each data set.
- 21.3.2.4 Modern Digital Aerial and Satellite-Derived Imagery and Data: Types and Sources Used for this Addendum

#### 21.3.3.4.1 Online Aerial and Satellite-Derived Images

13. Since 1999, digital mosaics of multiple timelines of georeferenced aerial photographs have been uploaded to geoportals such as Google Earth and at Bing.com. The dates attributed to these images are not 100% assured or authenticated, but for heritage survey purposes this has no legal implication in this instance. They are available in real time as open-source imagery online, with some copyright requirements. The imagery may change when new sources are uploaded, and the 2021 timeline at Google Earth was examined and used in the same way as described in the main Appendix 21.2.

#### 21.3.3.4.2 Norfolk NMP Data

14. There are as yet no NMP data for the Addendum area.

#### 21.3.3.4.3 Environment Agency LiDAR Data

15. All data had been assessed over the entire Study Area in 2020, therefore there was no requirement for further work, but the visualised LiDAR data were compared to other data where appropriate.

Page 8 of 20



#### 21.3.2.5 Data Processing

16. The collected digitised photographs and images were processed in the same manner as described in **Appendix 21.2**.

Rev. no.1

#### 21.3.2.6 Data Presentation

- 17. The data were presented in shapefile data format within the project Geographic Information System (GIS) in the same manner as described in **Appendix 21.2**.
- 18. In addition to the shapefile data, the data derived from the survey are presented in the Technical Mapbooks Figures 21.3-5,7 and 9 which are indexed at Figures 21.3-4. 6 and 8.
- 19. The mapbooks present indexed, keyed, labelled and individually numbered illustrations at a consistent scale.
- 20. The Addendum heritage data are also presented as a gazetteer of sites at **Table 21.3-1**. This gazetteer is derived from selected attributes within the extent of area mapping shapefile. It summarises the location, type, condition and interpretation of each individually identified site or area.

#### 21.3.4 Interpretative Mapping and Assumptions and Limitations

21. The mapping, assumptions and limitations to the data are the same as those discussed in **Appendix 21.2**.

#### 21.3.5 Environment, Land Use and Previously Recorded Heritage Assets

22. The environmental, land use and heritage asset data are presented in **Appendix** 21.2.

Page 9 of 20

Rev. no.1

#### **21.3.6 Results**

#### 21.3.3.1 Aerial Photography and Satellite Imagery

- 23. The analysis of additional specialist oblique and vertical aerial photos alongside recent satellite imagery added mapped data to the area where NMP had not been completed.
- 24. Twelve areas of interest were added to both unknown and previously recorded sites within the Addendum area and one site, part of a former runway at Weybourne Camp, was recorded outside the addendum Area as a crop marked feature.
- 25. The Addendum data are presented and concorded to the NHER and SEP and DEP IDs over the page in **Table 21.3-1**.

Page 10 of 20



Rev. no.1

Table 21.3-1: Sites Recorded During the Addendum Survey

MBID	APS ID main report App 21.2	SEPDEP ID	Monument type	Condition	Period	NHER PrefRef	Source	Comments	Easting	Northing	NGR	Within DCO Application boundary	Figure 21.3-5 sheet number
APS_001A	APS_089	1342	MILITARY AIRFIELD	NO LONGER EXTANT	MODERN	7465	US 31GR LOC17 063 1944 04 18	WWII military airfield at Swannington. Extensive groundworks over area of dispersals and runway visible in 1944.	613824	320657	TG138 206	Υ	1
APS_002A			DITCH	CROPMARK	ROMAN		www.google.com/earth 2020 08 07 accessed January 2022	Ditch associated with Roman military and possible settlement remains outside and to the west of the DCO order limits at this location.	614470	324476	TG144 244	Buffer	3
APS_003A		1412	DITCHES	CROPMARK	UNKNOWN	14397	TG1425/3, 15 www.google.com/earth 2020 08 07 accessed January 2022	Cropmarked ditches of uncertain origin.	614848	325521	TG148 255	Y	3
APS_004A		1341	MILITARY SITE WWII	REMOVED	MODERN	7364	RAF 106G UK 1428 3283 1946 04 16	Areas of former concrete dispersals, structures and runway at Oulton Airfield which was in use during WWII. Structures and surfacing now removed within the DCO order limits and buffer and land returned to arable use.	614500	327271	TG145 272	Buffer	3, 4



Rev. no.1

MBID	APS ID main report App 21.2	SEPDEP ID	Monument type	Condition	Period	NHER PrefRef	Source	Comments	Easting	Northing	NGR	Within DCO Application boundary	Figure 21.3-5 sheet number
APS_005A		1359	ENCLOSURES, FIELD SYSTEM	CROPMARK	UNKNOWN	24975	NHER obliques TG1327/1, 7, 9,15 1993 and 1996	Ditched enclosures, boundaries and field system which form part of a wider landscape associated with further ditches at APS_100 and 101.	613309	327559	TG133 275	Buffer	4
APS_006A		1421	FIELD SYSTEM, ENCLOSURE	CROPMARK	UNKNOWN	36408	TG 1228_E_HYQ10- DE	Undated boundaries and a possible enclosure over a wide area of land.	612976	328156	TG129 281	Υ	4
APS_007A	APS_107	596	SETTLEMENT, TRACKWAY, FIELD SYSTEM, ENCLOSURES	CROPMARK	ROMAN/MEDIEVAL	11339	www.google.com/earth 09-10-2006, HE TG1232/1,7,9,10,16, NHER TG1231 A GLV 1/309, all 1992 -2009	Buried eroded settlement enclosures with a central trackway and other outlying enclosures and boundaries, recorded previously as APS107 and added to from HE sources. The site contains numerous pits and anomalies and will be more extensive than indicated by cropmarks.	612767	332140	TG127 321	Y	5,6
APS_008A	APS_107, APS_108	749 (findspot)	SETTLEMENT	CROPMARK	UNKNOWN	28024 (findspot, multiperiod)	TG1332 3 1981	Ditches and pits which add to the known extent and understanding of sites	613256	332436	TG132 324	Y	6



Rev. no.1

MBID	APS ID main report App 21.2	SEPDEP ID	Monument type	Condition	Period	NHER PrefRef	Source	Comments	Easting	Northing	NGR	Within DCO Application boundary	Figure 21.3-5 sheet number
								APS_107 and 108.					
APS_009A		477, 491	FUNERARY SITE AND DITCHES	CROPMARK	UNKNOWN	28025	TG1332/5 (1981) also recorded as CUCAP AQW 17	Ring ditch which may be the remains of a Bronze Age funerary site, ditches and extensive hydrological features and pits across the site. Associated with sites APS_108, 109, 110.	613579	332760	TG135 327	Y	6
APS_010A	APS_111		FIELD SYSTEM	CROPMARK	UNKNOWN		RAF FNO 65 6077 1942 07 02, www.google.com/earth 2006 10 09 accessed January 2022	Part of a former field system and possible trackway and other ditches show as cropmarks in an area where the NHER records the findspot of Roman-Medieval artefacts.	613429	333112	TG134 331	Y	6
APS_011A	APS_116	1418	TRACKWAY	CROPMARK	UNKNOWN	30317	HE TG1337/1 and 2	Double ditched trackway which is a continuation of a previously recorded SEPDEP site, APS_116, sketch plotted due to lack of	613281	337380	TG132 373	Υ	8



Rev. no.1

MBID	APS ID main report App 21.2	SEPDEP ID	Monument type	Condition	Period	NHER PrefRef	Source	Comments	Easting	Northing	NGR	Within DCO Application boundary	Figure 21.3-5 sheet number
								mapping control points.					
APS_012A	APS_160	1228	AIRFIELD	FOUNDATION	MODERN	11335	www.google.com/earth 2021 07 08 accessed January 2022	Clear outline in grass of part of an airfield and dispersal at the site of Weybourne Camp.	609952	343478	TG099 434	Y	10



Rev. no.1

#### 21.3.3.2 Discussion of Addendum Sites Recorded within the DCO Order Limits

- 26. The aerial photos and satellite imagery which were examined for the Addendum project provided:
  - Additional features at some known sites;
  - Additional mapping at sites where just the image location was identified by the NHER; and
  - Additions to the recording of residual buried surface features at three military airfields at Swannington, Oulton and within the western part of Weybourne Camp.
- 27. The majority of non-military sites are of unknown date, but some are likely to derive from the prehistoric-Roman periods and form additions to nearby known and dated buried archaeological landscapes.

#### 21.3.2.7 Undated, and Possibly Prehistoric - Roman Sites within the DCO Order Limits

- 28. An undated site, APS\_009A (Figure 21.3-5, sheet 6), contains a cropmarked ring ditch which may be the remains of an eroded Bronze Age funerary site known as a 'round barrow'. However, the diameter of this feature is only 10m, which is smaller than the usual diameter of the enclosing ditch around a barrow, so this interpretation must remain as an undated circular enclosure rather than a well-defined funerary site. There is potential in this area for prehistoric funerary sites and landscapes, alongside further buried ditched features which are described below, and lie to the immediate south of APS 009A.
- 29. Buried ditches were recorded as marks in crops to the south of Southgate Bridge, at APS\_002A (Figure 21.3-5, sheet 3). These additional ditches are likely to be part of a buried Roman military site and Vicus, a settlement area which is associated with Roman military sites, which lies c.350m to the north of and outside the DCO order limits. Roman features in this general area were recorded during the main assessment (Appendix 21.2) as APS\_098, with outlying small enclosures and ditches at APS\_096, 097 and 098 to its west and north. Oblique aerial photos held at NHER and HE record more detailed elements of the Roman military site to the west of the DCO order limits and buffer area, which are noted but not mapped for this assessment. The area at and around APS\_002A carries further potential for the presence of buried features which may show as crop marks under favourable environmental conditions, and there are likely to be more buried features than are currently visible on aerial and satellite images.

Page 15 of 20



- 30. A ditched trackway with surrounding agglomerated and attached enclosures, boundaries and other access ways was recorded as APS\_107 and 108, to the north of Mossymere Wood. Additional boundary ditches, and ditches and pits, were recorded from specialist oblique aerial photos at this site during this Addendum survey, as APS\_008A and 009A (Figure 21.3-5 sheets 5 and 6). This extensive buried settlement site lies within the DCO order limits, where NHER PrefRef 11339 records finds comprising Roman-Medieval artefacts. The site contains many pits and anomalies and will be more extensive than presently indicated by cropmarks seen on aerial imagery.
- 31. A field system, possible trackway and other ditches are visible as cropmarks at APS\_010A (Figure 21.3-5 sheet 6) which adds to the extent of APS\_0111 which was recorded during the main assessment, to the southwest of Little Barningham. Whilst undated, some elements of the cropmarked features align with the postenclosure modern land divisions, whilst others may be earlier.

# 21.3.2.8 Undated and Likely Medieval and Medieval-Post Medieval Sites within the DCO Order Limits

- 32. Whilst medieval settlements and a moated site are recorded in the wider Study Area, no Medieval settlement sites are recorded from airborne remote sensing sources directly within the DCO order limits, and none have been added during the Addendum survey.
- 33. Other sites dated to this period comprise boundaries, tracks and possible headlands to medieval ploughing.
- 34. It is noteworthy that there were few traces of extant or eroded ridge and furrow field systems recorded during this assessment, and no further areas of Medieval agricultural features have been added during the addendum survey.
- 35. The post medieval landscape and the enclosed fields are best represented by the 18<sup>th</sup> and 19<sup>th</sup> Century Enclosure maps which are presented and discussed in the Map Regression Analysis within the main report, **Appendix 21.2**. Some traces of the former boundaries are visible as cropmarks where they have been removed to facilitate modern agriculture.

#### 21.3.2.9 Modern Sites within the DCO Order Limits

- 36. The area within the DCO order limits formed part of Britain's front line coastal and hinterland defence area, particularly during WWII (1939 1945) and beyond into the 1950s and Cold War. Defensive training areas, camps, training airfields, pillboxes, coastal and land defences and ordnance training sites are recorded in detail by the NMP and within the main report **Appendix 21.2**.
- 37. The DCO order limits contains remains of a military airfield at APS\_001A (Figure 21.3-5, sheet 1), which was previously recorded as APS\_089 and 90, at former Royal Air Force (RAF) Swannington (NHER PrefRef 7465) where grass and cropmarked remains of access and runways are currently visible. This Addendum survey allowed access to the 1940s vertical aerial photos at this site and recorded the extent of the runways and associated structures within the DCO order limits and buffer areas which have now been removed.

Page 16 of 20



Rev. no.1

38. Similarly, the areas of former runways and associated surfacing were recorded during the Addendum survey during groundworks at the former military airfield at Oulton (NHER Prefref 7364), from aerial photos taken in 1946 as site APS\_004A (Figure 21.3-5, sheets 3 and 4).

39. At the northern end of the DCO order limits, part of a former runway and dispersal pad were recorded as marks in grass over the removed surfacing, at APS\_012A within the area of Weybourne Camp, **Figure 21.3-5**, **sheet 10**). Military remains at Weybourne in this location are recorded under NHER PrefRef 11335 and were previously recorded as APS\_160.

#### 21.3.7 Conclusion

- 40. Aerial photographs and newer satellite imagery gathered between the 1940s and the present time have added some new sites and enhanced the recorded extent and type of sites within the Addendum area and at Weybourne.
- 41. The NHER oblique aerial photos taken by Derek Edwards and the obliques at Historic England are instrumental to the accurate recording of sites within the DCO order limits and buffer areas, in an area which is yet to be surveyed by the HE Norfolk NMP. The NMP in this area will no doubt expand upon this survey, which concentrates only on a narrow corridor of land traversing a diverse area of archaeological interest.
- 42. Similarly, the vertical aerial photos provided by Historic England Archive had as expected added perspective to the older landscape features, particularly at the military sites as expected, at Swannington and Oulton.
- 43. As previously stated, it is obvious that the below-ground archaeological deposits which cause the marks in crops and grass in this area are more extensive, both horizontally and vertically, than shown *via* the aerial imagery. Absence of cropmark evidence, due to the limitations detailed above, does not necessarily indicate an absence of archaeological deposits in apparently blank areas.
- 44. The separation of dating into specific periods of prehistory and history can only be confirmed by ground-based or documentary analyses, but some dating evidence for sites within the Study Area has been proposed by the NHER and by observation of morphological characteristics of crop marked sites.
- 45. From an aerial perspective, this landscape may be analysed in a 'living' manner as one which developed over time and contains many multi-period elements. These will be more deeply stratified and extensive below the ground than is apparent in the results of the survey. The remains visible as cropmarks are all likely to have been impacted by agricultural cultivation, to some degree, with little or no microtopographic features visible on the ground.
- 46. This Addendum assessment has identified a range of features and has again highlighted the potential for heritage assets within the Study Area and its immediate environs.

Page 17 of 20



#### 21.3.8 ADDENDUM TO THE MAP REGRESSION ANALYSIS: ADDITIONAL MAPS

Rev. no.1

- 47. The main report and this Addendum have benefited from a concurrent study of historic maps, which detail the development of the landscape over the past three centuries. The 19<sup>th</sup> and 20<sup>th</sup> century elements of map regression study, which comprise available Enclosure and first and subsequent editions of Ordnance Survey (OS) maps are presented with the main report, **Appendix 21.2**. The Addendum study allowed additional sources to be consulted in November 2021 as original documents which were available at the NRO, and from a digitally transcribed version of Faden's map of Norfolk (Williamson and MacNair, 2010), which was used to assess this large county-wide document in a safe and timely manner outside of the necessarily limited in-person access at the NRO.
- 48. Maps which were consulted are listed below in **Table 21.3-2**.

Table 21.3-2: Estate and Other Maps Which Were Consulted During the Addendum Map Regression Analysis

Date	Title	Figure	NRO document ref
Mid-19 <sup>th</sup> century	Map of an estate in Dunston, Stoke Holy Cross and Swainsthorpe, Mulbarton, Newton Flotman and Bracon Ash, showing crops.	21.3-7.1	DUN (B) 266, 498X9
1831	Map of Mulbarton Surveyed by Thomas Folkard for James Balls (Gentleman).	21.3-7.2	FONDS MC 1831 and FX390
1849	Map of the River Wensum from Taversham to Attlebridge	21.3-7.3	MC2535
1841	Map of estate in Haveringland, Cawston, Brandiston and Swannington, the property of W.H. Fellowes Esq. Maps of Haveringland.	21.3-7.4	MC1773/1
1840	Map of the Parish of Cawston, from Planbook of the Estates of Paston Herne, surveyed from 1738.	21.3-7.5	MC2885
1704	Survey of the Manor of Waborne (18 <sup>th</sup> century spelling) in Norfolk, for the Rt. Hon. Charles L Cornwallis surveyed by R Nicholson and dated 30 <sup>th</sup> May 1704.	21.3-7.6	MC2443
1797	Digitally transcribed version, for clarity. Faden's Map of Norfolk.	21.3-7.7 sheets 1-4	Williamson and MacNair (2010)

- 49. The additional maps show that, in common with the Enclosure and OS mapping, the Order route traverses rural land prior to the expansion of towns and villages and the installation of railways and modern trunk routes.
- 50. The 1704 map of Waborne (modern Weybourne), **Figure 21.3-7.6**, shows all the very detailed strip field boundaries in place, with details of hedges, trees and vegetation, in the parish of Waborne only. This level of detail is unusual in such early maps. Later maps, such as those surveyed in the estates of Paston Herne at Cawston (**Figure 21.3-5**) maps show the individual field boundaries and main hamlets and structures with clarity.

Page 18 of 20

Aerial Photography and Historic Map Regression Addendum Doc. No. C282-RH-Z-GA-00137 6.3.21.3

Rev. no.1

51. William Faden's Map of Norfolk was surveyed in 1797 and is shown at **Figure 21.3-8, sheets 1-4**. It records the outline of a rural landscape, with few field boundaries as this is an overview map rather than a specific survey of the assets of an Estate.

52. Earlier maps show only the outline and major landmarks in the county, rather than the details of particular estates and parishes which have been presented in this Addendum Survey where they are available for consultation.

Page 19 of 20



Aerial Photography and Historic Map Regression Addendum Doc. No. C282-RH-Z-GA-00137 6.3.21.3

Rev. no.1

#### References

Royal HaskoningDHV. 2020. Specification for Onshore Archaeology and Cultural Heritage: Analysis of Aerial Photographic and LiDAR data and Historic Map Regression. Royal HaskoningDHV document reference PB8164-RHD-ZZ-OF-SP-PM-0009, March 2020.

Williamson, T. and MacNair, A., 2010. William Faden and the Norfolk 18<sup>th</sup> Century Landscape. Windgather press. DVD and online access

Page 20 of 20

Rev. no.1



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#### **List of Figures**

Figure 21.3-1: Addendum Area Location for Heritage Mapping.

Figure 21.3-2: Historic England Archive aerial photographs Within 1km of the Order Limit in the Addendum Area.

Figure 21.3-3: Norfolk Historic Environment Record Oblique Aerial Photos Within1km of the Order Limits in the Addendum Area.

Figure 21.3-4: Heritage Map book Index for Addendum Area.

Figure 21.3-5: Addendum Study Area Location Sheets 1 – 10.

Figure 21.3-6: Index to 17-19<sup>th</sup> Century Maps.

Figure 21.3-7.1: Map of An Estate in Dunston, Stoke Holy Cross, Swainsthorpe, Newton

Flotman, Mulbarton and Bracon Ash, Showing Crops.

Figure 21.3-7.2: Map of Mulbarton, 1831.

Figure 21.3-7.3: Map of the River Wensum from Taversham to Attlebridge 1849.

Figure 21.3-7.4: Plan of an Estate lying in Heveringland, Cawston, Brandistonand

Swannington, Norfolk.

Figure 21.3-7.5: Map of the Parish of Cawston.

Figure 21.3-7.6: Map of Waborne, 1704.

Figure 21.3-8: Faden's Map of Norfolk, 1797 Sheets 1 - 4.

