FIVE ESTUARIES
OFFSHORE WIND FARM

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ENVIRONMENTAL STATEMENT

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WILD FRONTIER ECOLOGY

Holland Haven Marshes SSSI and adjacent land

NVC Survey

October 2021

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The data which we have prepared and provided are accurate, and have been prepared and provided in accordance with the CIEEM's Code of Professional Conduct. We confirm that any opinions expressed are our best and professional bona fide opinions.

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Non-Technical Summary

A National Vegetation Classification (NVC) Survey, with both terrestrial and aquatic elements, was undertaken of Holland Haven Marshes Site of Special Scientific Interest (SSSI) in July and August 2021 by Wild Frontier Ecology, in order to inform the ecological baseline for an environmental impact assessment for the proposed North Falls Offshore Wind Farm project. The survey covered terrestrial habitats inside the SSSI and within 50 metres of its boundary. The aquatic plant survey covered aquatic habitats inside the SSSI, and extended to suitable habitat within 200 metres of the site boundary. Surveys were undertaken at a time of year suitable for identifying the majority of plant species present, were led by an experienced NVC surveyor and undertaken by competent botanists. Standard methodologies were followed for NVC surveys, with mapping based largely on recent aerial photographs and ground-truthed by surveyors.

130 terrestrial quadrats were sampled, all of which were assigned to an NVC community.

93 ditch samples were taken. All but 2 of these were assigned an emergent vegetation community, while 51 of the 93 were assigned an aquatic vegetation community. The unassigned aquatic samples largely indicate an absence of aquatic vegetation.

A total of 32 NVC sub-communities were recorded from the site, with 7 mesotrophic grassland communities, 11 swamp communities, 4 saltmarsh communities, 4 woodland/ scrub communities, 5 aquatic communities and an open vegetation community.

A number of the rare/ scarce species mentioned in the SSSI citation were recorded, although some were not. Overall 21 species with elevated conservation status were recorded, of which six are mentioned on the SSSI citation. A further 21 species mentioned on the SSSI but of lower conservation concern were recorded. The remaining three species mentioned on the SSSI citation were not recorded in 2021.

Although the majority of the SSSI footprint comprises habitats of lower conservation value (e.g. MG7c), the SSSI continues to hold habitats that are important in a national context, together with a number of species with elevated conservation status. There are minor extensions of ditch habitat outside the SSSI. The most important communities in this respect are:

- A3 *Spirodela polyrhiza* community.
- Saltmarsh communities SM24, SM16b and SM23.
- Mesotrophic grasslands MG5a, MG12a and MG13.
- Swamp community S19a.

The data contained in this report is considered to be a thorough investigation of the vegetation on this site, albeit over an extensive area.

1. Introduction

The North Falls Offshore Wind Farm project (herein 'the project') is a proposed extension to the Greater Gabbard offshore wind farm, which is located off the east coast of England in the Southern North Sea and was opened in 2013. The project is being developed by North Falls Offshore Wind Farm Ltd. (NFOW), a joint venture between SSE Renewables and RWE.

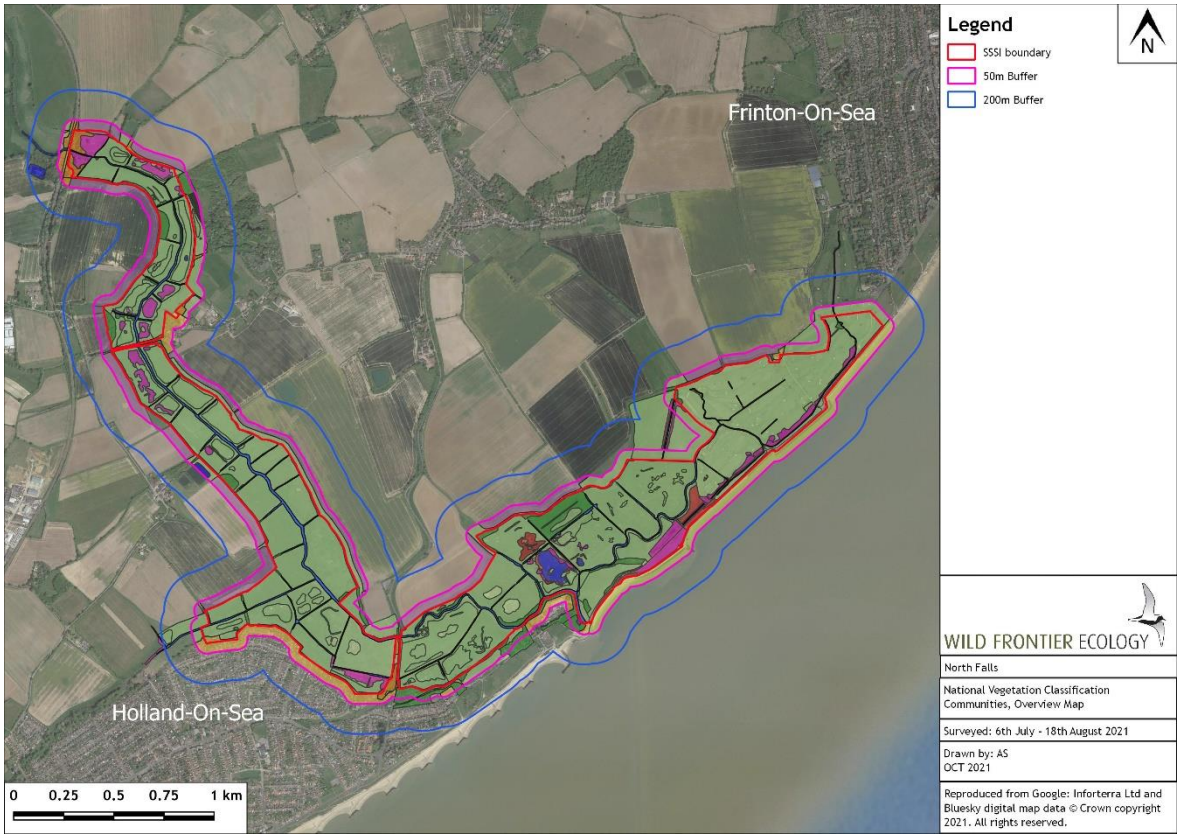
The project is proposed in response to The Crown Estate's (TCE) extension leasing round, launched in 2017, with TCE recognising that extensions to operational wind farms are proven to be a successful way of efficiently developing more offshore generating capacity. NFOW was awarded an Agreement for Lease (AfL) from TCE in September 2020. NFOW have begun the process of baseline data collection to inform an EIA for the project in support of a Development Consent Order (DCO) application proposed to be submitted to the Planning Inspectorate in 2023.

NFOW is currently awaiting a grid connection offer from National Grid, which will then inform the detailed site selection of the offshore cable corridor, landfall location, onshore cable route and onshore substation location. Whilst this process is ongoing, in order to ensure that adequate baseline data is collected to inform the project's EIA, NFOW have undertaken a suite of ecological surveys in 2021 so that baseline data for the project can be gathered.

In the first instance, NFOW is targeting an area immediately landward of the coast between the settlements of Clacton-on-Sea and Frinton (herein the 'cable landfall search area', see **Figure 1**). Due to the presence of the Holland Haven Marshes Site of Special Scientific Interest (SSSI) within the cable landfall search area, NFOW intends to undertake targeted Phase 2 ecology surveys of the SSSI during 2021 in order to inform earlier consultation with stakeholders regarding potential impacts of the project upon the SSSI.

This NVC survey covers the area of Holland Haven Marshes SSSI, plus a 50 metre / 200 metre buffer outside the SSSI for terrestrial / aquatic habitats respectively. The SSSI area is defined within the red line, as shown in **Figure 1**, with the 200 metre buffer shown in blue. The survey was carried out by Wild Frontier Ecology. The objectives of the survey was to map all vegetation communities to sub-community level, record the presence / absence of botanical interest features and species of elevated conservation significance (as defined in **Section 3.3**).

Figure 1. Site boundary.



2. Brief

2.1 Terrestrial botanical surveys

The scope of the terrestrial botanical surveys is to undertake surveys of the following:

- all terrestrial habitats of the Holland Haven Marshes SSSI which are both capable of supporting the botanical interest features of the SSSI and which fall within 50m of the SSSI boundary and within the cable landfall search area (the 'terrestrial botanical survey area').

The terrestrial botanical survey area is shown in **Figure 1**.

The aims of the terrestrial botanical survey are to:

- map the botanical communities present within the terrestrial botanical survey area;
- record the presence / absence of botanical interest features of the Holland Haven Marshes SSSI, within 50m of the SSSI boundary and within the cable landfall search area. This will inform the project's ecological impact assessment (EcIA), and the development of outline mitigation.

2.2 Aquatic botanical surveys

The scope of the aquatic botanical surveys is to undertake surveys of the following:

- all aquatic habitats of the Holland Haven Marshes SSSI which are both capable of supporting the botanical interest features of the SSSI and which fall within 200m of the SSSI boundary and within the cable landfall search area (the 'aquatic botanical survey area').

The aquatic botanical survey area is shown in **Figure 1**.

The aims of the aquatic botanical survey is to:

- Map the botanical communities present within the aquatic botanical survey area;
- Record the presence / absence of aquatic botanical interest features of the Holland Haven Marshes SSSI within 200m of the SSSI boundary and within the cable landfall search area. This will inform the project's EcIA, and the development of outline mitigation.

3. Methodologies

3.1 Terrestrial Survey Methodology

The NVC survey fieldwork was carried out over 7 days between 6th July and 18th August 2021, spread over 3 visits. The NVC survey has covered all of the terrestrial botanical and aquatic botanical survey areas. Surveys were carried out by Robert Yaxley BSc (Hons) CEcol CEnv MCIEEM (lead surveyor), Adam Stickler BSc MSc ACIEEM and Alex Lowe BSc MArborA. The lead surveyor's previous professional experience includes NVC surveys of coastal habitats within the North Norfolk Coast SSSI, and in recent times wetland habitats at Thompson Common, Water and Carr SSSI/ Special Area of Conservation (SAC), Dereham Rush Meadows SSSI, and coastal habitats at Weybourne, North Norfolk.

The survey required an amount of desk-based preparation and ongoing desk-based evaluation, using freely available satellite images of the site (mostly Google satellite images from 2020) which were compiled and studied for the entire area. Using GIS imagery, the whole site was divided into areas of homogeneous-looking stands of vegetation, and divided into GIS polygons. In the field, the polygons indicated above were validated by visiting each one, and the boundaries re-mapped where necessary. These polygons were then used in the field to guide the locations of quadrat sampling. Overall, 130 quadrats were sampled (see maps 3a-3g, Appendix 1).

Within representative homogeneous stands, 2x2m quadrats were sampled, with selected information being taken from each quadrat. This information comprised:

- Quadrat location recorded by marking the location on an aerial photograph.
- A single photograph of the vegetation;
- A unique reference number;
- A generalised name for the stand type, to allow rapid grouping of quadrat data;
- Plant species present, with cover values (see Domin scale below);
- Amounts of bare ground or standing water, where present.

Not all homogeneous stands (polygons) were sampled, for example where the stand was obviously similar to other sampled stands.

Domin Scale

- Cover of 91-100% = Domin 10
- Cover of 76-90% = Domin 9
- Cover of 51-75% = Domin 8
- Cover of 34-50% = Domin 7
- Cover of 26-33% = Domin 6
- Cover of 11-25% = Domin 5
- Cover of 4-10% = Domin 4
- Cover of <4% with many individuals = Domin 3

- Cover of <4% with several individuals = Domin 2
- Cover of <4% with few individuals = Domin 1

"Cover" refers to the percentage of the quadrat occupied by the species. Total cover of all species within a quadrat can add up to over 100% where species vertically overlap, or under 100% where there is bare ground or standing water.

Quadrats were mapped and classified. The statistical tool available to aid classification was the MAVIS tool devised by the Centre for Ecology and Hydrology (CEH)[1] specifically for use with NVC data. However, in this case the assigning of communities was largely performed using direct reference to the NVC literature; equal weight was given to the NVC written descriptions and maps in the literature, the keys in Rodwell et al (1991-2000)[2] and the frequency tables also in Rodwell et al (1991-2000).

Constancy

Constancy was determined, in line with Rodwell et al (1991-2000). Constancy is an expression of the frequency that a species occurs within quadrats of the same NVC community. Values are denoted in the tables as follows:

- 80-100% of quadrats = V (constant)
- 60-80% of quadrats = IV (constant)
- 40-60% of quadrats = III (frequent)
- 20-40% of quadrats = II (occasional)
- 0-20% of quadrats = I (infrequent)

Constancy and cover values are therefore expressed thus: e.g. IV(3-8), where IV indicates the species was present in 60-80% of sampled quadrats, and within those quadrats the DOMIN cover value varied between 3 and 8 (or from <4% with many individuals to 51-75% overall cover).

The number of quadrats obtained to assess each community is denoted at the top of the table by an 'n' value.

The survey findings have been used to create an NVC communities map for the survey area, and the precise location of all notable species recorded. Floristic tables will be generated for each community type that summarises the abundance and constancy values of constituent species among the samples.

3.2 Ditch Survey Methodology

Ditch vegetation was sampled by examining 20 metre stretches of ditch habitat. All the emergent species were recorded for each stretch, and cover estimated using the DOMIN scale. Similarly, aquatic species cover was estimated in the same way. Grapnels were used where necessary to examine and sample aquatic vegetation[3]. Vegetation samples were taken from the Holland Brook and all the side drains encountered at the rate of at

[1] www.ceh.ac.uk/services/modular-analysis-vegetation-information-system-mavis

[2] Rodwell, JS, ed (1991-2000). British plant communities, Volumes 1-5. Cambridge, Cambridge University Press

[3] Consent was granted by Natural England for extracting vegetation from ditches within the SSSI on 7 June 2021 (Reference: 2605211648BL). Consent forms for fifteen landowners are held by Royal HaskoningDHV and available on request.

least one per section of watercourse (a section was defined here as the length of watercourse between intersections).

The brief describes a ditch classification methodology devised by Leach and Doarks (1981)[4]. However, this reference was not available to the surveyors during survey or reporting; therefore the report analysis has instead used the standard NVC community classification, which provides a detailed alternative assessment of the habitats present. The methodology described above was used so that vegetation could be classified using the NVC should the Leach and Doarks classification not be available.

3.3 Species Conservation Status

Some species were specifically mentioned in the Holland Haven Marshes SSSI citation as having importance within a county context (as opposed to species mentioned in the citation as being components of the habitat). These are:

- *Oenanthe lachenalii* (Parsley Water Dropwort)
- *Scirpus tabernaemontani* (Grey Bulrush)
- *Ranunculus baudotii* (Brackish Water Crowfoot)
- *Carex divisa* (Divided Sedge)
- *Oenenthe fistulosa* (Tubular Water Dropwort)
- *Eleocharis uniglumis* (Slender Spike-rush)
- *Ceratophyllum submersum* (Soft Hornwort)
- *Spirodela polyrhiza* (Greater Duckweed)
- *Lemna gibba* (Fat Duckweed)
- *Hordeum marinum* (Sea Barley)
- *Puccinellia fasciculata* (Borrer's Saltmarsh Grass)
- *Parapholis incurva* (Curved Hard Grass)

The conservation status of other plant species found on the site has been determined by reference to the following: any nationally scarce species will be noted with reference to The Vascular Plant Red Data List for England[5]; any locally scarce species were noted with reference to the Red Data list of Plants for Essex[6].

[4] Leach, S. and Doarks, C. (1991) A botanical survey of ditches on coastal grazing marshes in Essex and Suffolk. Nature Conservancy Council, Peterborough (England Field Unit Project Report, No. 49).

[5] P.A. Stroh, S.J. Leach, T.A. August, K.J. Walker, D.A. Pearman, F.J. Rumsey, C.A. Harrower, M.F. Fay, J.P. Martin, T. Pankhurst, C.D. Preston, I. Taylor (2016) A Vascular Plant Red List for England. BSBI, Bristol.

[6] Essex Red Data List (essexfieldclub.org.uk)

3.4 Survey Limitations

All areas within the SSSI were available to survey with landowner consent, and most of the land within the buffer was also available for access. One exception was an area of land beyond the western spur of the SSSI – however this could be viewed from adjacent land with access.

The extensive nature of the site meant that surveyors had to rely on visual changes in vegetation and patterns shown in aerial photographs to pick out changes in vegetation community. It was not possible to closely examine every field in fine detail, although every field was walked through and most had at least one representative quadrat. It is therefore possible that small areas of different vegetation communities may has been overlooked, though these might well be at the sub-mappable scale.

Grazing cattle provided a legitimate, though temporary, constraint in some areas and could largely be avoided by timing of visits. The presence of Schedule 1 nesting birds meant that the area around the open water fields in the east of the site could not be surveyed until mid-August. However, this did not prevent most plant species still being identifiable at this date.

An area of grassland above the floodplain adjacent to Vesey Farm in the north of the site was not surveyed in detail due to a misinterpretation of the SSSI boundary. Although outside of the floodplain, this small area could be occupied by valued habitat, so should be treated at this stage in a precautionary manner (labelled on the map as “dry grassland”, Appendix 1 Map 2c). If the project is likely to affect the habitats in this area of the SSSI, it is recommended that this area is also surveyed to add to the baseline for this area.

4. Findings

4.1 Vegetation Communities

130 terrestrial quadrats were sampled, all of which were assigned to a community.

93 ditch samples were taken. All but 2 of these were assigned an emergent vegetation community, while 51 of the 93 were assigned an aquatic vegetation community. The unassigned aquatic samples largely indicate an absence of aquatic vegetation.

The site largely consists of grassland, much of it grazed and managed as traditional grazing marsh by cattle. The Holland Brook drains the marsh, the Brook entering the sea at a controlled sluice north of Holland Haven Country Park. The marsh is divided by ditches which are mostly connected to the Brook. The eastern, seaward end demonstrates a clear saline influence. The eastern section of the site is used as a golf course, and the terrestrial and emergent vegetation there has been significantly modified.

A total of 32 different vegetation communities were identified on the site. These are listed in Table 1, below. Table 2 gives a full species list with conservation status, and also indicates species named in the SSSI citation.

Constancy tables for communities are given in Appendix 2.

Table 1. NVC Communities in the Terrestrial and Aquatic Survey Areas

NVC community
Mesotrophic Grasslands
MG1 *Arrhenatherum elatius* grassland, no sub-community (watercourse banks)
MG1a *Arrhenatherum elatius* grassland, *Festuca rubra* sub-community (coastal grassland)
MG5a *Cynosurus cristatus - Centaurea nigra* grassland, *Lathyrus pratensis* sub-community
MG7c *Lolium perenne – Alopecurus pratensis – Festuca pratensis* grassland
MG10b *Holcus lanatus – Juncus effusus* rush pasture, *Juncus inflexus* sub-community
MG12a *Festuca arundinacea* grassland, *Lolium perenne – Holcus lanatus* sub-community
MG13 *Agrostis stolonifera – Alopecurus geniculatus* grassland
Swamp communities
S4a *Phragmites australis* reedbed, *Phragmites australis* sub-community
S6 *Carex riparia* swamp
S7 *Carex acutiformis* swamp
S14c *Sparganium erectum* swamp, *Mentha aquatica* sub-community
S14d *Sparganium erectum* swamp, *Phalaris arundinacea* sub-community
S19a *Eleocharis palustris* swamp, *Eleocharis palustris* sub-community
S19c *Eleocharis palustris* swamp, *Agrostis stolonifera* sub-community
S20 *Scirpus tabernaemontani* swamp
S21a *Scirpus maritimus* swamp, *Scirpus maritimus* dominated sub-community.
S22 *Glyceria fluitans* swamp
S28a *Phalaris arundinacea* swamp, *Phalaris arundinacea* sub-community

Saltmarsh communities
SM12 *Aster tripolium* saltmarsh community
SM16b *Festuca rubra* saltmarsh, sub-community with *Juncus gerardii* dominant
SM23 *Spergularia marina – Puccinellia distans* saltmarsh community
SM24 *Elytrigia atherica* saltmarsh community
Woodland Communities
W21 *Crataegus monogyna – Hedera helix* scrub
W22 *Prunus spinosa – Rubus fruticosus* scrub
W23 *Ulex europaeus – Rubus fruticosus* scrub
W24 *Rubus fruticosus – Holcus lanatus* scrub
Open Vegetation Communities
OV25 *Urtica dioica – Cirsium arvense* community
Aquatic Communities
A1 *Lemna gibba* community
A2a *Lemna minor* community, typical sub-community
A3 *Spirodela polyrhiza – Hydrocharis morsus ranae* community
A5b *Ceratophyllum demersum* community, *Lemna minor* sub-community
A12 *Potamogeton pectinatus* community

4.2 Species List

A number of the rare/ scarce species mentioned in the SSSI citation were recorded, although some were not. Overall 21 species with elevated conservation status were recorded, of which six are mentioned on the SSSI citation. A further 21 species mentioned on the SSSI but of lower conservation concern were recorded. The remaining three species mentioned on the SSSI citation were not recorded in 2021.

Species with elevated conservation status are highlighted in orange. The full list is given in Table 2.

Table 2. Full Species List

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[7][8]
Acer campestre	Field maple	✓		Lower concern
Acer pseudoplatanus	Sycamore	✓		Not listed (non-native)
Achillea millefolium	Yarrow	✓		Lower concern
Aesculus hippocastanum	Horse chestnut	✓		Not listed (non-native)
Agrostis capillaris	Common bent	✓		Lower concern

[7] P.A. Stroh, S.J. Leach, T.A. August, K.J. Walker, D.A. Pearman, F.J. Rumsey, C.A. Harrower, M.F. Fay, J.P. Martin, T. Pankhurst, C.D. Preston, I. Taylor (2016) A Vascular Plant Red List for England. BSBI, Bristol.

[8] http://jncc.defra.gov.uk/page-3425 (nationally scarce plants)

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[7][8]
Agrostis stolonifera	Creeping bent	✓	✓	Lower concern
Alisma plantago-aquatica	Water plantain	✓		Lower concern
Allium ampeloprasum	Wild leek	✓		Lower concern
Alnus glutinosa	Alder	✓		Lower concern
Alopecurus geniculatus	Marsh foxtail	✓	✓	Lower concern
Alopecurus pratensis	Meadow foxtail	✓		Lower concern
Ammophila arenaria	Marram	✓		Lower concern: Essex Red Data Book (RDB)[9]
Angelica sylvestris	Angelica	✓		Lower concern
Anthoxanthum odoratum	Sweet vernal grass	✓		Lower concern
Anthriscus sylvestris	Cow parsley	✓		Lower concern
Apium nodiflorum	Fool's watercress	✓		Lower concern
Arctium minus	Lesser burdock	✓		Lower concern
Arenaria serpyllifolia	Thyme-leaved sandwort	✓		Lower concern
Arrhenatherum elatius	False oat	✓		Lower concern
Artemisia vulgaris	Mugwort	✓		Lower concern
Aster tripolium	Sea aster	✓		Lower concern
Atriplex hastata	Spear-leaved orache	✓		Lower concern
Atriplex prostrata	Common orache	✓		Lower concern
Azolla filiculoides	Water fern		✓	Non-native invasive species
Calliergon cuspidatum	Pointed spear-moss	✓		Lower concern
Callitriche sp.	Water-starwort	✓		Lower concern
Callitriche platycarpa	Various-leaved water starwort		✓	Lower concern
Calystegia silvatica	Large bindweed	✓		Lower concern
Campanula glomerata	Clustered bellflower	✓		Lower concern
Carex acutiformis	Lesser pond-sedge	✓		Lower concern
Carex divisa	Divided sedge		✓	RDB vulnerable (LC in England)
Carex hirta	Hairy sedge	✓		Lower concern
Carex otrubae	False fox sedge	✓		Lower concern
Carex riparia	Greater pond sedge	✓		Lower concern
Castanea sativa	Sweet chestnut	✓		Lower concern
Catapodium marinum	Sea fern grass	✓		Lower concern; Essex RBD
Centaurea nigra	Knapweed	✓		Lower concern

[9] Essex Red Data List (essexfieldclub.org.uk)

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
Cerastium fontanum	Common mouse-ear	✓		Lower concern
Ceratophyllum demersum	Rigid hornwort	✓	✓	Lower concern
Chenopodium rubrum	Red goosefoot	✓		Lower concern
Cirsium arvense	Creeping thistle	✓		Lower concern
Cirsium palustre	Marsh thistle	✓		Lower concern
Cirsium vulgare	Spear thistle	✓		Lower concern
Convolvulus arvensis	Field bindweed	✓		Lower concern
Cornus sanguinea	Dogwood	✓		Lower concern
Cotula coronopifolia	Buttonweed	✓		Not listed (non-native)
Crassula helmsii	New Zealand pigmyweed	✓		Non-native invasive species
Crataegus monogyna	Hawthorn	✓		Lower concern
Crithmum maritimum	Rock samphire	✓		Lower concern; Essex RDB
Cynosurus cristatus	Crested dogstail	✓	✓	Lower concern
Dactylis glomerata	Cocksfoot	✓		Lower concern
Daucus carota	Wild carrot	✓		Lower concern
Dryopteris dilatata	Broad buckler-fern	✓		Lower concern
Eleocharis palustris	Common spike-rush	✓	✓	Lower concern
Eleocharis uniglumis	Slender spike-rush		✓	Lower concern
Elodea nuttallii	Nuttall's waterweed	✓		Non-native invasive species
Elytrigia atherica	Saltmarsh couch	✓		Lower concern
Elytrigia repens	Common couch	✓		Lower concern
Epilobium hirsutum	Great willowherb	✓		Lower concern
Epilobium parviflorum	Hoary willowherb	✓		Lower concern
Equisetum fluviatile	Water horsetail	✓		Lower concern: Essex RDB
Equisetum palustre	Marsh horsetail	✓		Lower concern
Eupatorium cannabinum	Hemp agrimony	✓		Lower concern
Festuca arundinacea	Tall fescue	✓		Lower concern
Festuca pratensis	Meadow fescue	✓		Lower concern
Festuca rubra	Red fescue	✓	✓	Lower concern
Filipendula ulmaria	Meadowsweet	✓		Lower concern
Fraxinus excelsior	Ash	✓		Lower concern
Galium aparine	Cleavers	✓		Lower concern
Galium palustre	Marsh bedstraw	✓	✓	Lower concern
Galium verum	Lady's bedstraw	✓		Lower concern

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[7][8]
Geranium dissectum	Cut-leaved cranesbill	✓		Lower concern
Geranium molle	Dove's-foot cranesbill	✓		Lower concern
Geranium robertianum	Herb robert	✓		Lower concern
Glaux maritima	Sea milkwort	✓		Lower concern
Glyceria fluitans	Floating sweet-grass	✓		Lower concern
Halimione portulacoides	Sea purslane	✓		Lower concern
Hedera helix	Ivy	✓		Lower concern
Helictotrichon pubescens	Downy oat	✓		Lower concern; Essex RDB
Helminthotheca echioides	Bristly oxtongue	✓		Lower concern
Heracleum sphondylium	Hogweed	✓		Lower concern
Holcus lanatus	Yorkshire fog	✓		Lower concern
Hordeum marinum	Sea barley	✓	✓	RDB vulnerable: Essex RDB
Hordeum secalinum	Meadow barley	✓		Lower concern
Hypericum perforatum	Perforate St Johnswort	✓		Lower concern
Hypochaeris radicata	Common catsear	✓		Lower concern
Iris pseudacorus	Yellow flag iris	✓		Lower concern
Juncus acutiflorus	Sharp-flowered rush	✓		Lower concern
Juncus articulatus	Jointed rush	✓		Lower concern
Juncus bufonius	Toad rush	✓		Lower concern
Juncus effusus	Soft rush	✓		Lower concern
Juncus inflexus	Hard rush	✓		Lower concern
Juncus gerardii	Saltmarsh rush	✓		Lower concern
Juncus maritimus	Sea rush	✓		Lower concern
Knautia arvensis	Field scabious	✓		Lower concern
Lathyrus nissolia	Grass vetchling	✓		Lower concern
Lathyrus pratensis	Meadow vetchling	✓		Lower concern
Lemna gibba	Fat duckweed	✓	✓	Lower concern, scarce in Essex[10]
Lemna minor	Lesser duckweed	✓		Lower concern
Lemna minuta	Least duckweed	✓		Not listed
Lemna trisulca	Ivy-leaved duckweed	✓		Lower concern
Lepidium latifolium	Dittander	✓		Lower concern: Essex RDB

[10] SSSI Citation

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
Leontodon autumnalis	Autumnal hawkbit	✓		Lower concern
Leontodon hispidus	Hairy hawkbit	✓		Lower concern
Lolium perenne	Rye-grass	✓	✓	Lower concern
Lonicera periclymenum	Honeysuckle	✓		Lower concern
Lotus corniculatus	Bird's-foot trefoil	✓		Lower concern
Lotus pedunculatus	Greater bird's-foot trefoil	✓		Lower concern
Lotus tenuis	Slender bird's-foot trefoil	✓		Lower concern
Lycopus europaeus	Gipsywort	✓		Lower concern
Medicago lupulina	Black medick	✓		Lower concern
Mentha aquatica	Water mint	✓		Lower concern
Myosotis laxa caespitosa	Tufted forget-me-not	✓		Lower concern
Myriophyllum spicatum	Spiked water milfoil	✓		Lower concern
Nasturtium officinale	Watercress	✓		Lower concern
Nymphaea alba	White water-lily	✓		Lower concern
Oenanthe fistulosa	Tubular water-dropwort	✓	✓	RDB vulnerable – Essex RDB
Oenanthe lachenalii	Parsley water-dropwort	✓	✓	RDB Near-threatened (England)
Oenanthe pimpinelloides	Corky-fruited water dropwort	✓		Lower concern: Essex RDB
Ononis spinosa	Spiny rest-harrow	✓	✓	Lower concern
Origanum vulgare	Marjoram	✓		Lower concern
Parapholis incurva	Sea hard-grass		✓	Lower concern: Essex RDB
Parapholis strigosa	Hard grass	✓		Lower concern
Persicaria amphibia	Amphibious bistort	✓		Lower concern
Persicaria hydropiper	Water pepper	✓	✓	Lower concern
Persicaria lapathifolia	Pale persicaria	✓		Lower concern
Peucedanum officinale	Hog's fennel	✓		Lower concern: Essex RDB
Phalaris arundinacea	Reed canary-grass	✓	✓	Lower concern
Phleum bertolonii	Small timothy	✓		Lower concern
Phragmites australis	Common reed	✓	✓	Lower concern
Picea abies	Norway spruce	✓		Not listed (non-native)
Plantago coronopus	Buck's horn plantain	✓		Lower concern
Plantago lanceolata	Ribwort plantain	✓		Lower concern
Plantago major	Greater plantain	✓		Lower concern
Poa pratensis	Smooth meadow-	✓		Lower concern

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
	grass			
Poa trivialis	Rough meadow-grass	✓		Lower concern
Polygonum aviculare	Knotgrass	✓		Lower concern
Potamogeton berchtoldii/ pusillus	Small pondweed sp.	✓		Lower concern; Essex RDB (both)
Potamogeton crispus	Curled pondweed	✓		Lower concern
Potamogeton obtusifolius	Broad-leaved pondweed	✓		Lower concern
Potamogeton pectinatus	Fennel pondweed	✓		Lower concern
Potentilla anserina	Silverweed	✓		Lower concern
Potentilla reptans	Creeping cinquefoil	✓		Lower concern
Prunella vulgaris	Self-heal	✓		Lower concern
Prunus spinosa	Blackthorn	✓		Lower concern
Puccinellia distans	Reflexed Saltmarsh-grass		✓	Lower concern
Puccinellia fasciculata	Borrer's Saltmarsh-grass		✓	RDB vulnerable; Essex RDB
Pulicaria dysenterica	Fleabane	✓		Lower concern
Quercus robur	Pedunculate oak	✓		Lower concern
Ranunculus acris	Meadow buttercup	✓		Lower concern
Ranunculus aquatilis	Common water-crowfoot	✓		Lower concern
Ranunculus baudotii	Brackish water-crowfoot		✓	Lower concern
Ranunculus flammula	Lesser spearwort	✓		RDB vulnerable (England)
Ranunculus repens	Creeping buttercup	✓		Lower concern
Ranunculus sceleratus	Celery-leaved crowfoot	✓	✓	Lower concern
Rhinanthus minor	Yellow rattle	✓		Lower concern: Essex RDB
Rosa canina	Dog rose	✓		Lower concern
Rubus agg.	Bramble	✓		Lower concern
Rumex acetosa	Common sorrel	✓		Lower concern
Rumex conglomeratus	Clustered dock	✓		Lower concern
Rumex crispus	Curled dock	✓		Lower concern
Rumex obtusifolius	Broad-leaved dock	✓		Lower concern
Sagittaria sagittifolia	Arrowhead	✓		Lower concern
Salix alba	White willow	✓		Lower concern
Salix cinerea	Grey willow	✓		Lower concern
Salix fragilis	Crack willow	✓		Lower concern
Sambucus nigra	Elder	✓		Lower concern

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
Scirpus maritimus	Sea club rush	✓	✓	Lower concern
Scirpus tabernaemontani	Grey bulrush	✓	✓	Lower concern (scarce in Essex)
Scrophularia auriculata	Water figwort	✓		Lower concern
Scutellaria galericulata	Skullcap	✓		Lower concern
Senecio aquaticus	Marsh ragwort	✓		Lower concern; Essex RDB
Senecio erucifolius	Hoary ragwort	✓		Lower concern
Senecio jacobaea	Common ragwort	✓		Lower concern
Senecio viscosus	Sticky groundsel	✓		Lower concern
Silaum silaus	Pepper saxifrage	✓		Lower concern; Essex RDB
Solanum dulcamara	Bittersweet	✓		Lower concern
Sonchus arvensis	Perennial sowthistle	✓		Lower concern
Sonchus asper	Prickly sowthistle	✓		Lower concern
Sonchus oleraceus	Smooth sowthistle	✓		Lower concern
Sparganium erectum	Branched bur-reed	✓	✓	Lower concern
Spergularia marina	Lesser sea spurrey	✓		Lower concern
Spergularia media	Greater sea spurrey	✓		Lower concern
Spirodela polyrhiza	Greater duckweed	✓	✓	Lower concern: Essex RDB
Stachys palustris	Marsh woundwort	✓		Lower concern
Stachys sylvatica	Hedge woundwort	✓		Lower concern
Stellaria graminea	Lesser stitchwort	✓		Lower concern
Taraxacum agg.	Dandelion	✓		Lower concern
Tilia cordata	Small-leaved lime	✓		Lower concern
Tragopogon porrifolius	Salsify	✓		Not listed (non-native)
Trifolium dubium	Lesser trefoil	✓		Lower concern
Trifolium fragiferum	Strawberry clover	✓		RDB vulnerable
Trifolium pratense	Red clover	✓		Lower concern
Trifolium repens	White clover	✓		Lower concern
Trifolium squamosum	Sea clover	✓		Lower concern: Essex RDB
Typha latifolia	Reedmace	✓	✓	Lower concern
Ulex europaeus	Gorse	✓		Lower concern
Ulmus sp	Elm	✓		Lower concern
Urtica dioica	Stinging nettle	✓		Lower concern
Veronica anagallis-aquatica	Blue water-speedwell	✓		Lower concern

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
Veronica beccabunga	Brooklime	✓		Lower concern
Vicia cracca	Tufted vetch	✓		Lower concern
Vicia hirsuta	Hairy tare	✓		Lower concern
Vicia sativa	Common vetch	✓		Lower concern
Vicia tetrasperma	Smooth tare	✓		Lower concern

The three species of elevated status which were not recorded in 2021, but have specific mention in the SSSI citation are *Carex divisa*, *Parapholis incurva* and *Puccinellia fasciculata*. These are all species of brackish habitats.

5. Community Descriptions

5.1 Introduction

Community descriptions are given below. The quadrat data is given in Appendix 1. Quadrat numbers are cross-referenced below, and shown on Figures 1a -1g, and 3a-3g.

Table 3 gives the percentage cover of the SSSI of each community/ stand type. The SSSI is dominated by mesotrophic grassland communities.

Table 3. Percentage Cover of Vegetation within Holland Haven Marshes SSSI.

Habitat Category	Area (ha)	Percentage of SSSI area
Arable	**0.170**	**0.06**
Mesotrophic grassland	**197.049**	**74.95**
MG unassigned	2.128	0.81
MG1	2.059	0.78
MG10b	2.477	0.94
MG12a	0.575	0.22
MG13	29.728	11.31
MG1a	5.866	2.23
MG5a	0.095	0.04
MG7c	154.123	58.62
Open Vegetation	**1.121**	**0.43**
OV25	1.121	0.43
Swamp communities	**17.871**	**6.80**
S14	0.006	0.002
S19a	2.129	0.81
S19c	0.204	0.08
S21a	0.504	0.19
S22	0.047	0.02
S28a	4.013	1.53
S4a	10.825	4.12
S6	0.048	0.02
S7	0.095	0.04
Saltmarsh Communities	**8.041**	**3.06**
SM12a	0.007	0.00
SM16b	4.243	1.61
SM23	1.056	0.40
SM24	2.735	1.04

Habitat Category	Area (ha)	Percentage of SSSI area
Tall herb	**0.424**	**0.16**
Woodland	**24.210**	**9.21**
Plantation	3.880	1.48
Scrub	1.595	0.61
W21	0.744	0.28
W22	10.241	3.90
W23	0.225	0.09
W24	2.196	0.84
Willow scrub	2.480	0.94
Other Woodland	2.849	1.08
Watercourse	**11.752**	**4.47**
Open water (non-watercourse)	**2.287**	**0.87**
Grand Total	**262.924**	**100.00**

5.2 Mesotrophic Grasslands

5.2.1 MG1/ MG1a Arrhenatherum elatius grassland, Festuca rubra sub-community

Typical appearance on site:

Data MG1: 7 MG1a Pure stand quadrats: R10-14, R20, A4.

1 Mixed stand: MG1a/ S4 – A3.

4 MG1 Pure stand quadrats: A57, A65, R40, AL7.

The MG1 community was found in two main habitats. Firstly, in the Country Park areas adjacent to upper saltmarsh vegetation, where the community could be picked out by the abundance of species such as *Festuca rubra* and *Daucus carota*. This aligned more closely with MG1a.

Secondly along the raised edges of the Holland Brook where (presumably) the ground stays free from regular flooding and there may have been some previous intentional raising of banks or unintentional raising by reprofiling of the watercourse. These areas were more species poor and problematic to assign to sub-community. *Arrhenatherum* itself is

intolerant of grazing or regular cutting, so the community was most often found where these were absent or very infrequent. The coastal MG1a grassland tended to be more species rich with an open sward and low amounts of *Arrhenatherum*, but also appeared in places to have been supplemented by wildflower sowing with abundant *Rhinanthus minor* and *Campanula glomerata*.

5.2.2 MG5a Cynosurus cristatus - Centaurea nigra grassland, Lathyrus pratensis sub-community

Data MG5a: 5 Pure stand quadrats: R33-37

Mixed quadrats: none

Typical appearance on site:

This is a species rich community occupying a small area in a meadow at the northern end of the site. It is the sole focus on the site for the uncommon *Silaum silaus*, and is adjacent to a small stand of MG12a *Festuca arundinacea* grassland, *Lolium perenne – Holcus lanatus* sub-community. This suggests that this meadow has different environmental conditions from other parts of the site, possibly through different management or (more likely) from groundwater or soil influence. It stands out among the generally species poor grassland over much of the SSSI.

5.2.3 MG7c Lolium perenne – Alopecurus pratensis – Festuca pratensis grassland

Data MG7c: 48 Pure stand quadrats: R1, R2, R3, R7, R16, R18, R23, R25, R26, R28-31, AL8, A1, A2, A9, A10, A12, A14, A17, A19, A22, A24, A26-28, A31-33, A35, A38-40, A44-46, A49-51, A53, A58, A59, A64, A66-68, A70.

Mixed quadrats: MG7c/ MG10b – A34
MG7c/ S19 – A52, A54
MG7c/ SM16 – A29
MG7c/ SM24 mosaic – R8
MG7c/ S28 – AL1

Typical appearance on site:

This is the most widespread community in the SSSI, occupying the bulk of the grazing marsh. It is dominated by a few grass species, most notably *Hordeum secalinum*, *Elytrigia repens*, *Alopecurus pratensis* and *Agrostis stolonifera*, with smaller amounts of *Holcus lanatus*, *Lolium perenne* and *Phleum bertolonii*. There are generally few herb species in the sward, although this community is the location for some of the scarcer species such

as *Peucedanum officinale* and *Trifolium fragiferum*. The community is generally grazed by cattle, though in a few fields this is supplemented by mowing in late summer. It is suspected that the community is formed largely by natural processes, and is consistent with the reference community type. It is probably subject to occasional flooding in winter months, though those lower lying areas, which hold water for longer, transition to MG13 *Agrostis stolonifera – Alopecurus geniculatus* grassland or even swamp communities such as S19 *Eleocharis palustris* swamp. Towards the upstream end of the SSSI, there is a tendency for S28 *Phalaris arundinacea* swamp to occupy low-lying field interiors, although MG13 is still present in the lowest grips and swales.

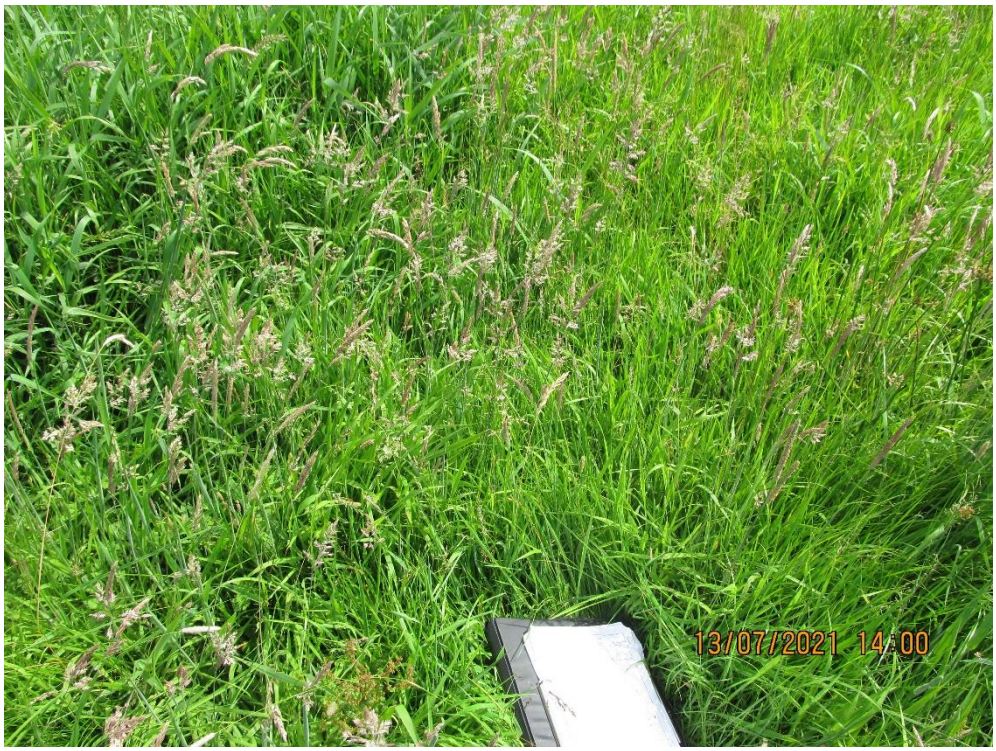
On the golf course, this community is still present, though it has been substantially altered because of the course landscaping and management. *Agrostis capillaris* all but replaces *Agrostis stolonifera* in the "rough" areas, but *Alopecurus pratensis*, *Hordeum secalinum* and *Lolium perenne* are still present in significant cover values. Some of the "rough" areas near the sea wall transition towards the MG1a community with more herbs such as *Ononis repens* and *Daucus carota* present. The intensively mown fairways and green were not surveyed in detail.

5.2.4 MG10b Holcus lanatus – Juncus effusus rush pasture, Juncus inflexus sub-community.

Data MG10b: 4 pure stand quadrats: A25, A41, A43, A47.

1 Mixed stand quadrat: MG7c/ MG10b – A34.

Typical appearance on site:



This community is restricted to small areas within the grazing marsh, often alongside ditches or in damp field corners, where there is tussocky *Juncus inflexus* growth and a predominance of *Holcus lanatus* in the sward. It is not clear what factors produce this community. Some areas of MG13 also have amounts of tussocky rush vegetation (and can be picked out by this), though usually *Juncus effusus* rather than *Juncus inflexus* and grasses consistently dominated by *Agrostis stolonifera* and *Alopecurus geniculatus*.

5.2.5 MG12a Festuca arundinacea grassland, Lolium perenne – Holcus lanatus sub-community

Data MG12a: 6 pure stand quadrats: R38, R39, AL3-5, A55.

1 mixed stand quadrat: MG12a/ MG13 – AL6.

Typical appearance on site:

This is a small stand adjacent to the MG5 grassland in a gentle slope on a field in the north of the site. It is picked out by its dark green colour, caused by abundant *Juncus acutiflorus*. It is quite species rich, with plants such as *Lotus pedunculatus*, *Pulicaria dysenterica* and *Stachys palustris* forming significant cover in places. As with the MG5a, there is no obvious determining factor in the formation of this community, and different soils or groundwater conditions from the rest of the site are suspected.

5.2.6 MG13 Agrostis stolonifera – Alopecurus geniculatus grassland

Data MG13: 16 pure stand quadrats

1 mixed stand quadrat – MG13/ SM16b

Typical appearance on site:

This community occupies the lowest lying land within the grazing marsh, although in the more brackish areas nearer the sea there are other communities that are also associated with basins and dried pools – SM16b *Juncus gerardii* saltmarsh and SM23 *Spergularia marina* saltmarsh. The second of these may occupy areas which have standing water for longer periods, based on the generally low plant cover. MG13 tends to consist of a dense mat of *Agrostis stolonifera* with varying proportions of *Alopecurus geniculatus* and often reasonable cover of *Potentilla anserina*. *Juncus gerardii* is present in varying amounts, and there is also a sharp or gradual transition into the adjacent MG7c grassland depending largely on topography.

5.3 Swamp Communities

5.3.1 S4a Phragmites australis swamp, Phragmites australis sub-community

Data S4a: 1 pure stand quadrat (A13) and 26 pure ditch emergent stands. 4 mixed stand quadrats – MG1/ S4a, MG1a/ S4a, MG7c/ S4a, SM24/ S4a.

Typical appearance on site:

These are stands of species poor reedbed habitat, most frequent in the east of the site. There are many stands lining ditches, although there are also stands in wet places next to pools and occupying shallow water areas. Generally, the stands consist of very dense *Phragmites australis*. Where there is open water underneath, this is usually dominated by *Lemna* species, either *minor* or *minuta*. Stands often provide a very dense shade and are likely to inhibit growth of aquatic plants where water is covered. Often the community occurs where ditches are fenced from livestock.

5.3.2 S6 Carex riparia swamp

Data S6: No quadrats, 8 pure ditch emergent stands (RD25, RD36, AD21, AD24-27, ALD2). 4 mixed stand ditches – S6/ S4a (AD30), S6/ S14c (AD28), S6/ S14d (RD35, RD42).

Typical appearance on site:

This community is restricted to ditch edges on the site, and is dominated by thick growth of *Carex riparia*. Ditches with an emergent community of this kind seem to be relatively species poor in aquatic vegetation. The community is mainly found in the mid-upper reaches of the grazing marsh and along the Holland Brook itself. It does not appear to support any of the rarer plant species found on the site.

5.3.3 S7 Carex acutiformis swamp

Data S7: No quadrats. One stand in a mosaic with S28 *Phalaris arundinacea* swamp.

Typical appearance on site:

Carex acutiformis was generally rare on the site, but there was one area where this species formed a stand in the open marsh together with *Phalaris arundinacea* towards the top end of the grazing marsh. The closely related *Carex riparia* was more widespread, and was the dominant sedge in ditch emergent stands. These habitat preferences for the two species (*C. acutiformis* in open marsh/ fen and *C. riparia* along watercourses) have also been noted by the author on Norfolk sites.

5.3.4 S14c Sparganium erectum swamp, Mentha aquatica sub-community

Data S14c: 10 pure ditch emergent stands - RD21-RD24, AD34-35, AD40, ALD5-6. Three mixed stand ditches – SM14c/ S19c – RD34 and RD46, S14c/ S6 – RD35. Typical appearance on site:

This is the species rich version of the *Sparganium* swamp, and is a common community in ditches in the upper part of the marsh. Common species in this community aside from *S. erectum* were *Carex riparia, Phalaris arundinacea, Myosotis laxa, Mentha aquatica* and *Galium palustre*.

5.3.5 S14d Sparganium erectum swamp, Phalaris arundinacea sub-community

Data S14d: 10 pure ditch emergent stands – RD26, RD27, RD30, RD37, RD41, RD43, RD45, RD47, AD32, AD36.
Four mixed stand ditches – S4a/ S14d – RD32, RD36, and S6/ S14d – RD35, AD42.

Typical appearance on site:

This community is only found along ditches within the SSSI in continuous or broken stands. There is a species rich sub-community and a species poor one (often with frequent *Phalaris arundinacea*), both communities being found largely in ditches and along the Holland Brook in the upper area of the SSSI above the B1032 Clacton Road. The community (especially the more species rich S14c) is a location for the RDB vulnerable umbellifer *Oenanthe fistulosa* (tubular water dropwort). Where there are mixed ditch sample data for this community, it is usually because the *Sparganium* swamp occupies one side of a ditch and a different community the other side rather than truly mixed stands of vegetation.

5.3.6 S19a Eleocharis palustris swamp, Eleocharis palustris sub-community.

Data S19a: 5 quadrats (R46-50)

No mixed stands.

Typical appearance on site:

This community was only found in three horse-grazed fields to the north of Great Holland Common Road. It consisted largely of close-grazed damp pasture with a constant and often abundant presence of *Eleocharis palustris* as well as other inundation species such as *Alopecurus geniculatus* and *Potentilla anserina*. It was the only location on site for the RDB (England) vulnerable *Ranunculus flammula*.

5.3.7 S19c Eleocharis palustris swamp, Agrostis stolonifera sub-community.

Data S19c: 2 quadrats (R32, A62).

2 mixed emergent ditch stands – with S14c (RD34, RD36)

Typical appearance on site:

This community was found in permanently or semi-permanently wet areas within the grazing marsh, grading to the slightly drier MG13 community where there was less standing water or moisture underfoot. Smaller stands of this community were also found along the damp banks of ditches. Generally dominated by *Eleocharis palustris*, often with frequent *Agrostis stolonifera*. No rare species were associated with this community.

5.3.8 S20a Scirpus tabernaemontani swamp, Scirpus tabernaemontani dominated sub-community.

Data S20a: No quadrats

Typical appearance on site:

Stands of this community were generally very small, either in ditches or within other wetland communities, especially S21a *Scirpus maritimus* swamp. They generally consisted of single species stands of *Scirpus tabernaemontani*. There were no rare species associated with this community, except *S. tabernaemontani* itself which the SSSI citation states as being scarce in Essex.

5.3.9 S21a Scirpus maritimus swamp, sub-community dominated by Scirpus maritimus

Data S21a: 2 pure stand quadrats (R42, A11), 9 ditch emergent stands (RD4, RD7-8, RD12, AD5, AD12-14, AD16).

Mixed quadrats: one – S22b/ SM21a (RD19).

Typical appearance on site:

Stands of pure *Scirpus maritimus* in wet areas, generally towards the eastern, seaward end of the site reflecting the stronger saline influence there. Ditches where this species is emergent tends to be poor for aquatic plants. There are no rare plant species associated with this community.

5.3.10 S22 Glyceria fluitans water-margin vegetation

Data S22c: No quadrats. One ditch emergent stand (AD33) and one mixed emergent stand – S22/ S21a (RD19).

Typical appearance on site:

This community occurs in a small number of places on the site, mostly in unmanaged ditches. Dominance of *Glyceria fluitans* identifies it, and it does not support any rare species.

5.3.11 S28a Phalaris arundinacea swamp, Phalaris arundinacea sub-community

Data S28a: One pure stand quadrat (A56) and one mixed quadrat with MG7c (AL1). Five ditch emergent stands (R38-39, ALD1, ALD3-4).

Typical appearance on site:

Stands of *Phalaris arundinacea* become more frequent at the upper (north-west) end of the site, where in places it occupies large stands in field interiors, often in mosaic with MG13 or MG7c. It is also found as a component of ditch bank communities in these upper marshes. It is almost or completely absent from the lower marshes at the eastern end of the site. There are no rare species associated with this community.

5.4 Saltmarsh Communities

5.4.1 SM12 Rayed Aster tripolium saltmarsh

This community is present in one discrete stand in the eastern area of the site. No quadrats.

Typical appearance on site:

The community appears in a periodically inundated area surrounded by MG7c dominated by *Elytrigia repens*. There are no rare species associated with this community.

5.4.2 SM16b Festuca rubra saltmarsh, sub-community with Juncus gerardii dominant

Data SM16b: Two pure stand quadrats (A16, A18). One mixed quadrat with MG7c (A29), one mixed quadrat with MG13 (R22).

Typical appearance on site:

Juncus gerardii is widely distributed in the eastern (seaward) part of the site, but usually forms a mosaic or is a component of other communities, particularly MG7c, MG13 and SM24. Only rarely does it become sufficiently abundant to form stands of the SM16b saltmarsh. It tends to occupy low-lying ground which presumably holds relatively high levels of salinity compared with stands of MG13, for example.

5.4.3 SM23 Spergularia marina – Puccinellia distans saltmarsh community

Data SM23: Three pure stand quadrats (R43, R44, R45).

Appearance on site:

This community is found in dried pools in the brackish part of the marsh. It is a focus for populations of the introduced *Cotula coronopifolia* as well as the RDB vulnerable *Hordeum marinum*. There is often a high proportion of bare ground or prostrate vegetation which can be a good indicator of stands of this community. There is a transition to *Agrostis stolonifera* dominated MG13 and MG7c upslope.

5.4.4 SM24 Elytrigia atherica saltmarsh

Data SM24: 7 pure stand quadrats (R3a, R4-6, A5, A7). Two mixed stand quadrats, S4a/ SM24 (A8) and SM24/ MG7c (R8).

Typical appearance on site:

This community is found close to the sea defences and can be picked out by the silvery leaves of *Elytrigia atherica*. There are some areas where there is a transition to SM16b *Juncus gerardii* vegetation, or to MG1a grassland, or to dry S4a reedbed. The community, which largely lies within publicly accessible areas, is a focus for the Essex RDB species *Trifolium squamosum*, and scarce species such as *Lotus tenuis* and *Parapholis strigosa*. The adjacent sea defences hold a few plants of Essex RDB species *Crithmum maritimum* and *Catapodium marinum*.

5.5 Woodland Communities

Woodland communities occurred within the site in three main forms:

1. Plantations, presumably for game cover. These were generally broad-leaved plantings, with *Quercus robur* and *Castanea sativa* often the main species. There has been some secondary growth of shrub species particularly *Prunus spinosa* and *Crataegus monogyna* which may have self-seeded. The ground layer in all these plantations tends to be dominated by *Urtica dioica* and *Rubus* spp, with smaller amounts of *Heracleum sphondylium* and other common species including *Arrhenatherum elatius*.

2. Small areas of woody vegetation within the marsh which have developed despite grazing and management. Sometimes these are fenced areas along ditches or relict sections of hedgerow. The vegetation has been variously assigned to W21, W22, W23 or W24 communities largely depending on the dominant shrub present. W22 *Prunus spinosa – Rubus fruticosus* agg scrub is by far the most common.

3. At the topmost (north-west) end of the SSSI there is an area of willow carr with *Salis cinerea* and *Salix fragilis* abundant, encroaching on areas of S4a reedbed and S28a *Phalaris* swamp. Access to this area was difficult, and an assignment to W2a *Salix cinerea – Betula pubescens – Phragmites australis* woodland, *Alnus-Filipendula* sub-community is tentative without sufficient data on the ground flora.

5.6 Aquatic Communities

5.6.1 A1 Lemna gibba community

Data A1: 2 pure stand quadrats – AD40, RD47.

Typical appearance on site:

Lemna gibba is quite common in the upper parts of the ditch system, especially above Great Holland Common Road, but it rarely achieves dominance. The two ditches noted as A1 community also both had small amounts of *Ceratophyllum demersum*, *Elodea nuttallii* and other *Lemna* species.

5.6.2 A2a Lemna minor community, typical sub-community

Data A2a: 24 pure stand quadrats - RD21, RD34, AD32, AD1, ALD4, RD33, RD15, RD29, AD6, AD7, AD9, AD11, AD19, AD23, RD18, RD31, RD32, RD16, RD17, RD20, AD21, AD26, AD27, RD23, AD30.

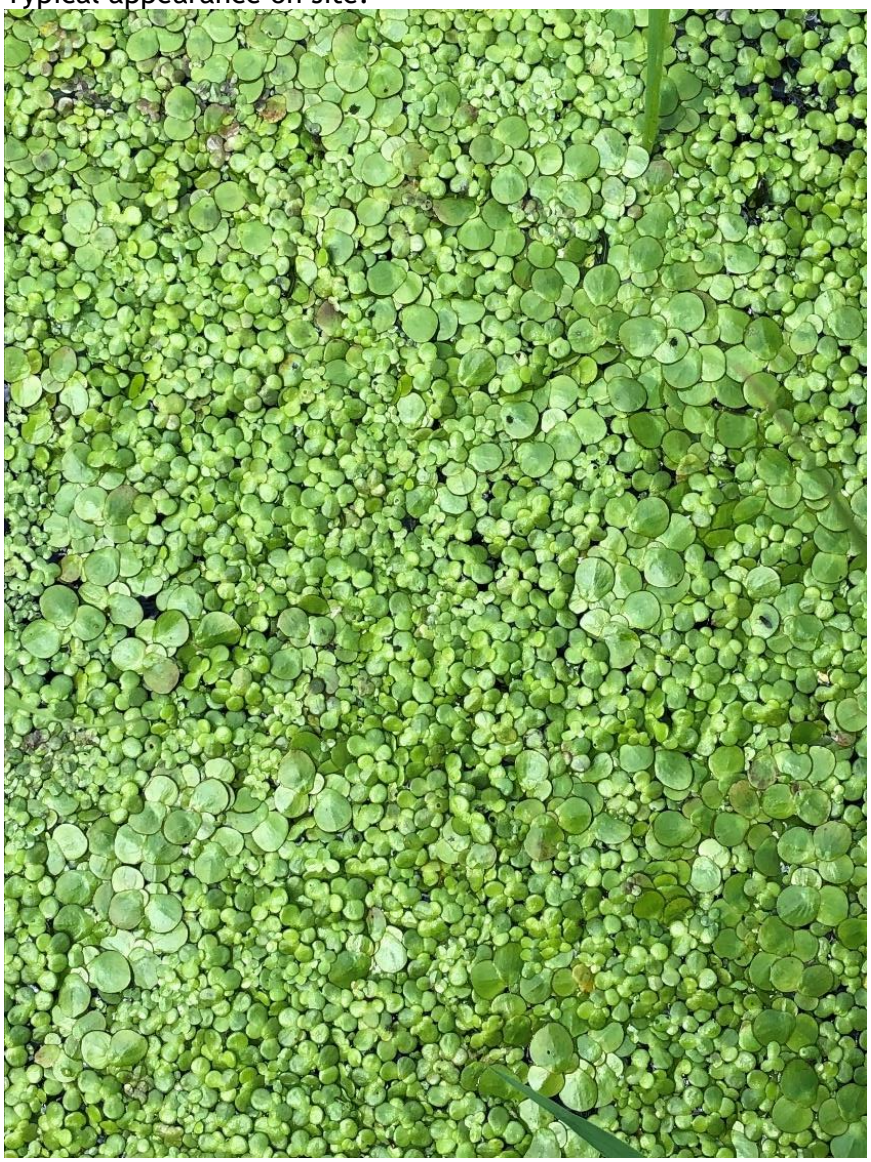
Typical appearance on site:

This community was associated largely with the S4a species-poor reedbed emergent community, and also occasionally with emergent stands of *Carex riparia*. It was mainly found towards the eastern/ southern end of the grazing marshes, and hence in ditches more likely to have a brackish influence. In some ditches *Lemna minor* was replaced by the non-native *Lemna minuta*, and in some places the non-native invasive *Crassula helmsii* was recorded in abundance within these ditches.

5.6.3 A3 Spirodela polyrhiza – Hydrocharis morsus-ranae community

Data A3: 15 pure stands in ditches. RD24, AD35, ALD5, ALD6, RD26, RD27, RD30, AD36, AD33, ALD3, AD22, AD20, RD25, ALD2, RD28.

Typical appearance on site:



This community is indicative of good water quality, and is found largely in the upper areas of grazing marsh. The large discs of *Spirodela* are always present, often accompanied by other *Lemna* species in abundance. Below the surface there are occasionally large amounts of *Ceratophyllum demersum* and *Potamogeton crispus*.

5.6.4 A5b Ceratophyllum demersum community, Lemna minor sub-community

Data A5b: 5 pure stands in ditches. ALD1, AD29, AD25, AD34, RD46.
Typical appearance on site:

This community has been identified on the basis of dual abundance of *Ceratophyllum demersum* and *Lemna minor*. It is confined to the upper sections of the grazing marsh, mainly south of Great Holland Common Road.

5.6.5 A12 Potamogeton pectinatus community

Data A12: 4 pure stands in ditches. AD12, RD14, AD17, AD38.

Typical appearance on site:

This community is identified by the abundance of *Potamogeton pectinatus*, and occurs in the lower grazing marsh where there is some brackish influence.

5.7 Aquatic Habitats within the 200 metre buffer

There are five places where aquatic habitats of the Holland Haven Marshes SSSI which are capable of supporting the botanical interest features of the SSSI were found within 200 metres of the SSSI boundary. These are listed below:

TM22341822 (Figure 1g) – Ditches in grazing marshes west of golf course. Ditch AD15 supported S4a reedbed emergent community and no aquatic species. Ditches AD14 and AD16 on the southern boundary of this area supported S21a *Scirpus maritimus* emergent community and no aquatic species. These ditches are similar to those within the SSSI which are described in the citation.

TM23181899 (Figure 1h) – Ditches in the golf course northern section – generally with banks managed by mowing. Ditch sample RD1 (not assigned) represents the ditches in this area, with a diverse mixture of emergent species, often including an abundance of *Nasturtium officinale*. There were no aquatic species noted in these ditches, *Lemna minor* only appearing further west.

TM19871717 (Figure 1d) – Picker's Ditch. The ditch is similar to sample RD22 from just inside the SSSI. There is an emergent community with stands of *Sparganium erectum* and *Carex riparia*, but no aquatic community except at the west end of the ditch (TM19861716) where *Potamogeton crispus* is frequent.

TM19251962 (Figure 1a) – Great Holland Brook, upstream of the SSSI. Access was limited in this area, but the emergent community (as seen from a distance) was dominated by *Epilobium hirsutum*. The aquatic species are not known but could be similar to ditch samples further downstream which would indicate A3 *Spirodela* community.

TM20021919 (Figure 1a) – Grazing marsh ditch between SSSI and Great Holland Pits Nature Reserve. This small length of ditch connected to the SSSI ditches, ending in a small pond, was dominated by *Sparganium erectum* (S14c), with frequent *Glyceria fluitans* and some *Alisma plantago-aquatica* and *Juncus effusus*.

These areas represent small additional areas of notable habitat located immediately outside the SSSI boundary.

6. Conclusions

Although the majority of the SSSI footprint comprises habitats of lower conservation value (e.g. MG7c), the SSSI continues to support habitats that are important in a national context, together with a number of species with elevated conservation status. There are minor extensions of ditch habitat outside the SSSI, which also support such habitats. The most important communities (and the ones which fit most closely with the descriptions in the SSSI citation) in this respect are:

- A3 *Spirodela polyrhiza* community.
- Saltmarsh communities SM24, SM16b and SM23 (total 8.034ha, or 3.05% of the site area).
- Mesotrophic grasslands MG5a, MG12a and MG13 (total 30.398ha, or 11.57% of the site area).
- Swamp community S19a (2.129ha, or 0.81% of the site area).

Much of the site has grassland of lower conservation value, such as MG7c, but it is considered that this community is the result of natural processes and was most likely

present at the point of designation, rather than the result of degradation since designation. The SSSI citation also includes a number of bird species which would use the extensive grasslands for breeding and overwintering. Lower quality grassland of this type is often included within conservation designations (such as some of the SSSI in the Broads) where the overall value of the site is dependent, for example, on an extensive ditch system or where the SSSI designation includes extensive habitat for bird species such as breeding waders.

Ditch habitats in places are fenced off from the grazing cattle, which has almost certainly resulted in a reduction in their conservation value. The fenced ditches tend to be densely shaded by reeds or scrub, and are not able to realise their full potential in terms of aquatic plant species as a result. Removal of some fencing to allow grazing of the banks and more regular rotational cleaning out of ditches would re-invigorate the aquatic plant community. Some of the aquatic plants in the ditches on the golf course have, to some extent, benefitted from the lack of shading of the banks (caused by regular mowing), but other ditches in the golf course area (including those parallel with the sea wall) are deeply shaded by dense reed growth and would benefit from periodic cutting of the reed.

The cattle grazing of the grasslands is considered to be appropriate for the site and is probably the only practical way to manage such an extensive area. However, the fields which are horse-grazed north of Great Holland Common Road have produced a sward with greater variation which supports a good range of grazing marsh plants including *Ranunculus flammula*. Horse grazing or mixed grazing could be considered in other parts of the site where the sward is currently very species poor in order to encourage a more varied and species rich sward. Fields which have a late hay cut do not appear to have a different plant community from cattle-grazed areas.

Species of elevated conservation status found on the site were as follows:

- *Ammophila arenaria* (Marram Grass)
- *Catapodium marinum* (Sea Fern Grass)
- *Crithmum maritimum* (Rock Samphire)
- *Equisetum fluviatile* (Water Horsetail)
- *Helictotrichon pubescens* (Downy Oat Grass)
- *Hordeum marinum* (Sea Barley)
- *Lemna gibba* (Fat Duckweed)
- *Lepidium latifolium* (Dittander)
- *Oenanthe fistulosa* (Tubular Water Dropwort)
- *Oenanthe lachenalii* (Parsley Water Dropwort)
- *Oenanthe pimpinelloides* (Corky-fruited Water Dropwort)
- *Peucedanum officinale* (Hog's Fennel)
- *Potamogeton berchtoldii/ pusillus* (Small pondweed)
- *Ranunculus flammula* (Lesser Spearwort)

- *Rhinanthus minor* (Yellow Rattle)
- *Scirpus tabernaemontani* (Grey Bulrush)
- *Senecio aquaticus* (Marsh Ragwort)
- *Silaum silaus* (Pepper Saxifrage)
- *Spirodela polyrhiza* (Greater Duckweed)
- *Trifolium fragiferum* (Strawberry Clover)
- *Trifolium squamosum* (Sea Clover)

Three further species, *Carex divisa*, *Parapholis incurva* and *Puccinellia fasciculata*, were listed in the SSSI citation but not located during the NVC surveys.

The data contained in this report is considered to be a thorough investigation of the vegetation on this site, albeit over an extensive area.

Appendix 1. Maps

Provisional maps for NVC communities are shown in Appendix 1 (separate document).

Appendix 2. Constancy Tables

Constancy tables are given in Appendix 2 (separate document).

WILD
FRONTIER
ECOLOGY

Holland Haven Marshes SSSI, Clacton, Essex

NVC Survey – Appendix 1 - Maps

October 2021

WILD FRONTIER ECOLOGY

Holland Haven SSSI and adjacent land

Appendix 2
NVC Constancy tables

October 2021

MG1

Quadrat number	A57	A65	R40	AL7	Constancy (n=4)	Domin range
Vegetation height low cm	150	30	50	50		
Vegetation height high cm	150	100	100	100		
Bare ground %	0	0	0	0		
Standing water %	0	0	0	0		
Litter %	0	0	0	0		
NVC	MG1	MG1	MG1	MG1		
Arrhenatherum elatius	10	8	8	8	V	8-10
Urtica dioica			7	4	III	4-7
Cirsium arvense		4		5	III	4-5
Elytrigia repens			5	4	III	4-5
Alopecurus pratensis			3	4	III	3-4
Hordeum secalinum		4			II	4
Juncus effusus				4	II	4
Phleum bertolonii		3			II	3
Agrostis stolonifera				3	II	3
Dactylis glomerata		2			II	2
Epilobium hirsutum				2	II	2

MG10b

Quadrat number	A25	A41	A43	A47	Constancy (n=4)	Domin range
Vegetation height low cm	100	20	75	60		
Vegetation height high cm	100	50	75	60		
Bare ground %	0	2	0	0		
Standing water %	0	0	0	0		
Quadrat number	A25	A41	A43	A47		
Litter %	0	0	0	0		
NVC	MG10b	MG10b	MG10b	MG10b		
Holcus lanatus			8	8	III	8
Juncus inflexus	8	6			III	6-8
Lolium perenne		7		4	III	4-7
Elytrigia repens	4		3		III	4-3
Ranunculus repens			4	3	III	4-3
Juncus effusus			4	3	III	4-3
Agrostis stolonifera			3	3	III	3
Rumex conglomeratus			4	1	III	4-1
Urtica dioica	2	2			III	2
Phleum bertolonii		4			III	4
Alopecurus pratensis			4		II	4
Atriplex prostrata	4				II	4
Persicaria lapathifolia			3		II	3
Rumex crispus		2			II	2

MG12a

Quadrat number	R38	R39	AL3	AL4	AL5	A55	Constancy (n=6)	Domin range
Vegetation height low cm	10	10	50	25	50	75		
Vegetation height high cm	50	50	100	75	100	75		
Bare ground %	0	0	0	0	0	0		
Standing water %	0	0	0	0	0	0		
Litter %	0	0	0	0	0	0		
NVC	MG12a	MG12a	MG12a	MG12a	MG12a	MG12a		
Potentilla anserina		7	3	4	4	4	V	4-7
Lotus pedunculatus	2	3	4	4		3	V	2-4
Cirsium arvense	3	2	2	3	2		V	1-3
Alopecurus pratensis		1	3	2	3		IV	1-3
Juncus acutiflorus	8	9				7	III	7-9
Stachys palustris			6	3	5		III	5-6
Holcus lanatus	5	5			3		III	3-5
Juncus effusus			4	5	4		III	4-5
Agrostis stolonifera	3			2		5	III	2-5
Pulicaria dysenterica	1			4	4		III	1-4
Arrhenatherum elatius		1	3			4	III	1-4
Geranium dissectum		1			1	1	III	1
Phalaris arundinacea			5			4	II	5-4
Ranunculus repens			3		3		II	3
Urtica dioica			2		3		II	2-3
Rumex crispus			3		2		II	2-3
Carex otrubae				2	2		II	2
Mentha aquatica			6				I	6
Calystegia sepium				4			I	4
Lathyrus pratensis						3	I	3
Epilobium hirsutum					3		I	3
Phleum bertolonii						2	I	2
Ranunculus acris						2	I	2
Galium palustre			2				I	2
Galium aparine				2			I	2
Scutellaria galericulata	1						I	1
Taraxacum agg	1						I	1
Vicia tetrasperma	1						I	1

MG13 (Continued next page)

Quadrat number	A16	R19	R27	R15	R17	R21	R24	R41	AL2	A15	A20	A21	A23	A30	A36	A37	A48
Vegetation height low cm	10	2	30	10	5	2	30	20	20	50	30	50	15	5	5	10	40
Vegetation height high cm	25	20	60	70	20	50	50	70	40	50	30	50	15	5	20	125	40
Bare ground %	5	0	0	0	0	0	0	10	0	0	2	0	5	80	0	0	0
Standing water %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Litter %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NVC	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13	MG13
Agrostis stolonifera	6		7	7	7	8	8	7	9	9	9	7	5	4	4	8	3
Alopecurus geniculatus	3			5	7	5	7	8		3	5	4	3	5	7		8
Potentilla anserina	5	9	8	6	5			3		5			6			6	
Juncus gerardii		7								4	4	7					
Elytrigia repens			5	7						3						6	
Juncus effusus					2			3								3	
Ranunculus repens						7			4								
Atriplex prostrata	3												4	4			
Trifolium repens				3					3							3	
Cotula coronopifolia							5						7				
Polygonum aviculare	3														6		
Rumex crispus				4													3
Glyceria fluitans								3									3
Plantago major				3											3		
Hordeum secalinum				3	2												
Cirsium arvense				4					1								
Eleocharis palustris											3				2		
Juncus inflexus						2	2										
Chenopodium rubrum		2					1										
Phalaris arundinacea								7									
Alopecurus pratensis																	
Persicaria lapathifolia								5									
Spergularia marina															4		
Phleum bertolonii	3																
Atriplex patula															3		
Apium nodiflorum																	3
Poa trivialis																	
Cirsium vulgare				2													
Helminthotheca echioides					1												

MG13 (Continued)

Quadrat number	A61	A63	A71	Constancy (n=20)	Domin range
Vegetation height low cm	50	30	10		
Vegetation height high cm	100	30	10		
Bare ground %	0	0	0		
Standing water %	0	0	0		
Litter %	0	0	0		
NVC	MG13	MG13	MG13		
Agrostis stolonifera	7	9	8	V	3-9
Alopecurus geniculatus	3	3	5	IV	3-8
Potentilla anserina			4	III	3-9
Juncus gerardii				I	4-7
Elytrigia repens				I	3-7
Juncus effusus	4			I	2-4
Ranunculus repens			4	I	4-7
Atriplex prostrata				I	3-4
Trifolium repens				I	3
Cotula coronopifolia				I	5-7
Polygonum aviculare				I	3-6
Rumex crispus				I	3-4
Glyceria fluitans				I	3
Plantago major				I	3
Hordeum secalinum				I	2-3
Cirsium arvense				I	1-4
Eleocharis palustris				I	2-3
Juncus inflexus				I	2
Chenopodium rubrum				I	1-2
Phalaris arundinacea				I	7
Alopecurus pratensis	5			I	5
Persicaria lapathifolia				I	5
Spergularia marina				I	4
Phleum bertolonii				I	3
Atriplex patula				I	3
Apium nodiflorum				I	3
Poa trivialis		2		I	2
Cirsium vulgare				I	2
Helminthotheca echioides				I	1

MG1a (Continued next page)

Quadrat number	R10	R11	R12	R13	R14	R20	A4	Constancy (n=7)	Domin range
Vegetation height low cm	30	20	20	30	20	20	50		
Vegetation height high cm	50	70	70	80	60	60	100		
Bare ground %	0	0	0	0	0	0	0		
Standing water %	0	0	0	0	0	0	0		
Litter %	0	0	0	0	0	0	0		
NVC	MG1a	MG1a	MG1a	MG1a	MG1a	MG1a	MG1a		
Holcus lanatus	3	5	4	3	5	7		V	3-7
Festuca rubra	7	7	5	5	5			IV	5-7
Agrostis capillaris		5	3	5	8	7		IV	3-8
Daucus carota	3	7	3	3			3	IV	3-7
Vicia sativa	2	1	1	1		1		IV	1-2
Elytrigia repens	7		2	5		3		III	2-7
Dactylis glomerata	1		1	5			6	III	1-6
Phleum bertolonii		2	1	2	3			III	1-3
Festuca pratensis		5	7				6	III	5-7
Vicia cracca	5		4				3	III	3-5
Helminthotheca echioides	3	5			2			III	2-5
Jacobaea vulgaris			2		2	6		III	2-6
Plantago lanceolata		4	1		2			III	1-4
Cirsium arvense			1	2			2	III	1-2
Anthoxanthum odoratum		3	4					II	3-4
Ranunculus acris		4	3					II	3-4
Lotus corniculatus			2		5			II	2-5
Alopecurus pratensis			3			3		II	3
Vicia hirsuta		3	2					II	2-3
Achillea millefolium					2	2		II	2
Cerastium fontanum					2		2	II	2
Trifolium dubium		1	1					II	1
Convolvulus arvensis				1	1			II	1
Arrhenatherum elatius				7				I	7
Rubus agg.	5							I	5
Lathyrus pratensis	4							I	4
Ononis repens							4	I	4
Senecio erucifolius							3	I	3

MG1a (Continued)

Quadrat number	R10	R11	R12	R13	R14	R20	A4	Constancy (n=6)	Domin range
Poa pratensis			2					I	2
Agrostis stolonifera							2	I	2
Cynosurus cristatus			2					I	2
Hypochaeris radicata					2			I	2
Leontodon autumnalis						2		I	2
Phragmites australis							2	I	2
Leontodon hispidus					1			I	1
Senecio viscosus	1							I	1

MG5a

Quadrat number	R33	R34	R35	R36	R37	Constancy (n=5)	Domin range
Vegetation height low cm	10	10	10	10	10		
Vegetation height high cm	50	50	50	50	50		
Bare ground %	0	0	0	0	0		
Standing water %	0	0	0	0	0		
Litter %	0	0	0	0	0		
NVC	MG5a	MG5a	MG5a	MG5a	MG5a		
Festuca rubra	7	7	7	5	5	V	5-7
Hordeum secalinum	6	5	7	7	5	V	5-7
Holcus lanatus	3	5	3	5	3	V	3-5
Agrostis stolonifera	3	2	5	3	5	V	2-5
Geranium dissectum	3	1	2	2	2	V	1-3
Ranunculus acris		5	5	6	7	IV	5-7
Potentilla reptans	3		5	5	5	IV	3-5
Carex hirta	3	3	3	1		IV	1-3
Geranium molle	1		1	1	1	IV	1
Cirsium arvense		1	2		2	III	1-2
Trifolium repens	3			3		II	3
Poa pratensis	3			3		II	3
Silaum silaus	3	3				II	3
Ranunculus repens	3	2				II	2-3
Cerastium fontanum	3		2			II	2-3
Vicia hirsuta		1			1	II	1
Cynosurus cristatus	1			1		II	1
Cirsium vulgare	1				1	II	1
Pulicaria dysenterica		1		1		II	1
Epilobium parviflorum			1		1	II	1
Achillea millefolium		5				I	5
Lotus pedunculatus	4					I	4
Juncus acutiflorus	3					I	3
Alopecurus pratensis		2				I	2
Phleum bertolonii		1				I	1
Potentilla anserina				1		I	1
Juncus effusus		1				I	1

MG7c (Continued next page)

Quadrat number	R1	R2	R3	R7	R16	R18	R23	R25	R26	R28	R29	R30	R31	AL8	A1	A2	A9
Vegetation height low cm	10	10	10	30	30	10	10	10	30	10	30	30	40	25	10	20	50
Vegetation height high cm	40	40	40	70	70	40	50	50	80	60	60	70	90	75	30	30	100
Bare ground %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Standing water %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Litter %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NVC	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c
Agrostis stolonifera					8	5		3	4	8	7	1	2				4
Elytrigia repens					3		5	7	9	2	7	8	8	8			3
Hordeum secalinum	7	6	3		9	7		7		7		1	3		3	3	6
Alopecurus pratensis	3	5	4	3	3		7	5			7	7	6	4	5		
Holcus lanatus	5	4	3	2			5		5	3			3	4	2	4	2
Cirsium arvense	5	3					4			3			1				
Phleum bertolonii	2	2	2			5			2		1				4	5	1
Lolium perenne	7		6		2	5	3								4		
Festuca rubra		5	3	4			5	4							5	3	
Ranunculus repens							2							2			
Trifolium repens	2	3	3							7							
Dactylis glomerata									2								5
Geranium dissectum					1												1
Agrostis capillaris	5	8	8	4											8	8	
Festuca pratensis				9													4
Cynosurus cristatus					2	3											
Vicia hirsuta				1	4												1
Arrhenatherum elatius																	
Potentilla anserina												1					
Lathyrus pratensis				2													
Alopecurus geniculatus						3											
Juncus effusus														2			
Poa pratensis			2												2		
Peucedanum officinale																	
Helictotrichon pubescens																	6
Lathyrus nissolia																	
Leontodon hispidus		3														2	
Vicia tetrasperma																	
Poa trivialis	2						2										

MG7c (Continued)

Quadrat number	R1	R2	R3	R7	R16	R18	R23	R25	R26	R28	R29	R30	R31	AL8	A1	A2	A9
Daucus carota		1	3														
Vicia cracca																	2
Carex hirta																	
Lotus tenuis																	
Phragmites australis																	
Phalaris arundinacea														4			
Elytrigia atherica				3													
Juncus gerardii																	
Helminthotheca echioides																	
Rumex conglomeratus																	
Jacobaea vulgaris																	
Juncus inflexus																	
Oenanthe pimpinelloides									2								
Rumex crispus																	
Rumex obtusifolius																	
Solanum dulcamara																	
Oenanthe lachenalii																	

MG7c (Continued)

Quadrat number	A10	A10	A12	A14	A17	A19	A22	A24	A26	A27	A28	A31	A32	A33	A35	A38	A39
Vegetation height low cm	50	50	40	50	75	75	100	75	75	10	10	10	50	10	10	50	30
Vegetation height high cm	100	100	75	50	75	75	100	75	75	75	50	70	100	50	30	100	75
Bare ground %	0	0	0	0	0	0	0	0	0	5	0	2	0	2	0	0	0
Standing water %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Litter %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NVC	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c
Agrostis stolonifera	5	5	7	8	6	2	5	5		4	8	4	6	6	8	7	7
Elytrigia repens	5	5			5	5	8	6	8			3			3	5	
Hordeum secalinum	5	5	6	6	6	6	5	5		3							
Alopecurus pratensis			4						5	3		5				6	5
Holcus lanatus			3					6					6	3		3	
Cirsium arvense										2	3			3		3	3
Phleum bertolonii								5				5					
Lolium perenne			5							5	6			6			3
Festuca rubra										7		3					
Ranunculus repens																1	3
Trifolium repens						1					4	1			4		
Dactylis glomerata	4	4												4			
Geranium dissectum	3	3	3										1				
Agrostis capillaris																	
Festuca pratensis	6	6	4			6											
Cynosurus cristatus										5	3	4					
Vicia hirsuta	3	3	2														
Arrhenatherum elatius					5							5					
Potentilla anserina				5												3	3
Lathyrus pratensis					2	3							3				
Alopecurus geniculatus							3					5					
Juncus effusus																1	
Poa pratensis															3		
Peucedanum officinale					1				2								
Helictotrichon pubescens	6	6															
Lathyrus nissolia						3							3				
Leontodon hispidus																	
Vicia tetrasperma				2									3				
Poa trivialis																	

MG7c (Continued)

Quadrat number	A10	A10	A12	A14	A17	A19	A22	A24	A26	A27	A28	A31	A32	A33	A35	A38	A39
Daucus carota																	
Vicia cracca		2															
Carex hirta																	
Lotus tenuis											5						
Phragmites australis																	
Phalaris arundinacea																	
Elytrigia atherica																	
Juncus gerardii					3												
Helminthotheca echioides												3					
Rumex conglomeratus																	
Jacobaea vulgaris												2					
Juncus inflexus															2		
Oenanthe pimpinelloides																	
Rumex crispus																	
Rumex obtusifolius																	
Solanum dulcamara							1										
Oenanthe lachenalii																	

MG7c (Continued)

Quadrat number	A40	A44	A45	A46	A49	A50	A51	A53	A58	A59	A64	A66	A67	A68	A70	Constancy (n=6)	Domin range
Vegetation height low cm	30	40	20	40	50	30	30	50	100	75	50	20	30	20	50		
Vegetation height high cm	75	40	40	40	100	30	30	50	100	75	100	40	75	50	50		
Bare ground %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Standing water %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Litter %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
NVC	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c	MG7c		
Agrostis stolonifera	6	7	9	10	5	10	10	8		8	4				5	IV	1-10
Elytrigia repens	5				8				10			10	9	9	7	III	2-10
Hordeum secalinum								5		4			2		6	III	1-9
Alopecurus pratensis			3		8				3		4					III	3-8
Holcus lanatus	4	5	3							2	7					III	2-7
Cirsium arvense					1					3	3			3	2	II	1-5
Phleum bertolonii		4				2								2		II	1-5
Lolium perenne		5									4					II	2-7
Festuca rubra															6	I	3-7
Ranunculus repens	3		3	2			3	4		3						I	1-4
Trifolium repens			2													I	1-7
Dactylis glomerata		1											3	1		I	1-5
Geranium dissectum									1		2					I	1-3
Agrostis capillaris																I	4-8
Festuca pratensis																I	4-9
Cynosurus cristatus																I	2-5
Vicia hirsuta																I	1-4
Arrhenatherum elatius											4		4			I	4-5
Potentilla anserina																I	1-5
Lathyrus pratensis																I	2-3
Alopecurus geniculatus																I	3-5
Juncus effusus	5															I	1-5
Poa pratensis																I	2-3
Peucedanum officinale													4			I	1-4
Helictotrichon pubescens																I	6
Lathyrus nissolia																I	3
Leontodon hispidus																I	2-3
Vicia tetrasperma																I	2-3
Poa trivialis																I	2-2

MG7c (Continued)

Quadrat number	A40	A44	A45	A46	A49	A50	A51	A53	A58	A59	A64	A66	A67	A68	A70	Constancy (n=48)	Domin range
Daucus carota																I	1-3
Vicia cracca																I	2
Carex hirta										6						I	6
Lotus tenuis																I	5
Phragmites australis	5															I	5
Phalaris arundinacea																I	4
Elytrigia atherica																I	3
Juncus gerardii																I	3
Helminthotheca echioides																I	3
Rumex conglomeratus											3					I	3
Jacobaea vulgaris																I	2
Juncus inflexus																I	2
Oenanthe pimpinelloides																I	2
Rumex crispus									2							I	2
Rumex obtusifolius								1								I	1
Solanum dulcamara																I	1
Oenanthe lachenalii															1	I	1

S19c

Quadrat number	R32	Constancy (n=1)	Domin range
Vegetation height low cm	30		
Vegetation height high cm	60		
Bare ground %	0		
Standing water %	0		
Litter %	0		
NVC	S19c		
Eleocharis palustris	9	V	9
Agrostis stolonifera	5	V	5
Elytrigia repens	3	V	3
Potentilla anserina	3	V	3
Rumex conglomeratus	1	V	1

S21

Quadrat number	R42	Constancy (n=1)	Domin range
Vegetation height low cm	60		
Vegetation height high cm	60		
Bare ground %	0		
Standing water %	0		
Litter %	50		
NVC	S21		
Scirpus maritimus	10	V	10
Scirpus tabernaemontani	2	V	2
Potentilla anserina	6	V	6

S21d

Quadrat number	A11	Constancy (n=1)	Domin range
Vegetation height low cm	10		
Vegetation height high cm	30		
Bare ground %	0		
Standing water %	0		
Litter %	0		
NVC	S21d		
Agrostis stolonifera	7	V	7
Scirpus maritimus	6	V	6

S28

Quadrat number	A56	Constancy (n=1)	Domin range
Vegetation height low cm	30		
Vegetation height high cm	200		
Bare ground %	0		
Standing water %	0		
Litter %	0		
NVC	S28		
Phalaris arundinacea	8	V	8
Agrostis stolonifera	4	V	4
Juncus acutiflorus	4	V	4
Mentha aquatica	4	V	4
Cirsium arvense	3	V	3
Pulicaria dysenterica	3	V	3
Rumex crispus	3	V	3
Ranunculus repens	2	V	2
Scutellaria galericulata	1	V	1

S4di

Quadrat number	A13	Constancy (n=1)	Domin range
Vegetation height low cm	200		
Vegetation height high cm	200		
Bare ground %	0		
Standing water %	0		
Litter %	0		
NVC	S4di		
Phragmites australis	10	V	10
Poa trivialis	4	V	4
Atriplex prostrata	4	V	4

SM16

Quadrat number	A6	A18	Constancy (n=2)	Domin range
Vegetation height low cm	15	5		
Vegetation height high cm	30	50		
Bare ground %	10	30		
Standing water %	0	0		
Litter %	0	0		
NVC	SM16	SM16		
Juncus gerardii	8	7	V	7-8
Elytrigia atherica	5		III	5
Atriplex prostrata		5	III	5
Agrostis stolonifera		4	III	4
Elytrigia repens		3	III	3
Alopecurus geniculatus		3	III	3
Plantago coronopus	3		III	3
Spergularia maritima		3	III	3

SM24

Quadrat number	R3a	R4	R5	R6	R9	A5	A7	Constancy (n=7)	Domin range
Vegetation height low cm	10	2	2	30	20	10	20		
Vegetation height high cm	30	20	30	50	40	40	40		
Bare ground %	1	0	0	0	0	0	2		
Standing water %	0	0	0	0	0	0	0		
Litter %	0	0	0	0	50	0	0		
NVC	SM24	SM24	SM24	SM24	SM24	SM24	SM24		
Elytrigia atherica	6	2	5	8	8	4	8	V	2-8
Festuca rubra	5			7		6	5	III	5-7
Juncus gerardii	2	7	8			4		III	2-8
Plantago coronopus		7	5				3	III	3-7
Parapholis strigosa	1	7	5					III	1-7
Lotus tenuis	4		4			4		III	4
Agrostis stolonifera				2	3	5		III	2-5
Trifolium squamosum	7					3		II	3-7
Agrostis capillaris	3			5				II	3-5
Leontodon hispidus	3					3		II	3
Daucus carota	1				1			II	1
Sonchus asper	1					1		II	1
Moss							4	I	4
Trifolium repens						3		I	3
Juncus maritimus					3			I	3
Medicago lupulina						3		I	3
Scirpus maritimus					2			I	2
Vicia sativa					1			I	1
Aster tripolium		1						I	1
Helminthotheca echioides					1			I	1
Carex otrubae	1							I	1
Phragmites australis							1	I	1
Ononis repens						1		I	1

Report produced by	Submitted to
Written by: Robert Yaxley BSc (Hons) CEcol CEnv MCIEEM Checked by: Adam Stickler BSc MSc ACIEEM Authorised by: Robert Yaxley BSc (Hons) CEcol CEnv MCIEEM 19th October 2021	Royal Haskoning Contact: Gordon Campbell 74/2 Commercial Quay, Commercial Street, Leith, Edinburgh EH6 6LX, United Kingdom
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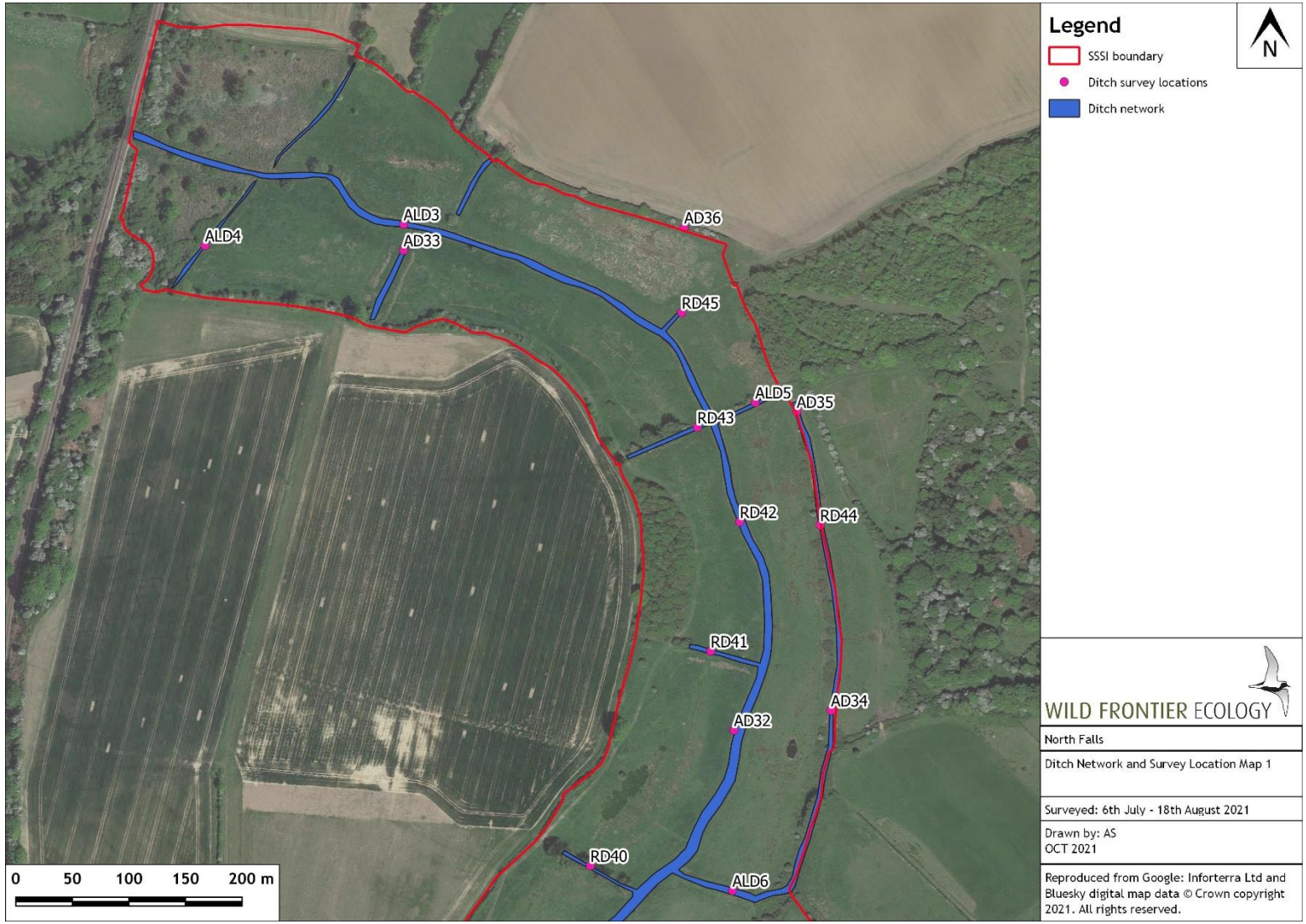
Director Robert Yaxley BSc (Hons) CEcol CEnv MCIEEM.

The data which we have prepared and provided is accurate, and has been prepared and provided in accordance with the CIEEM's Code of Professional Conduct. We confirm that any opinions expressed are our best and professional bona fide opinions.

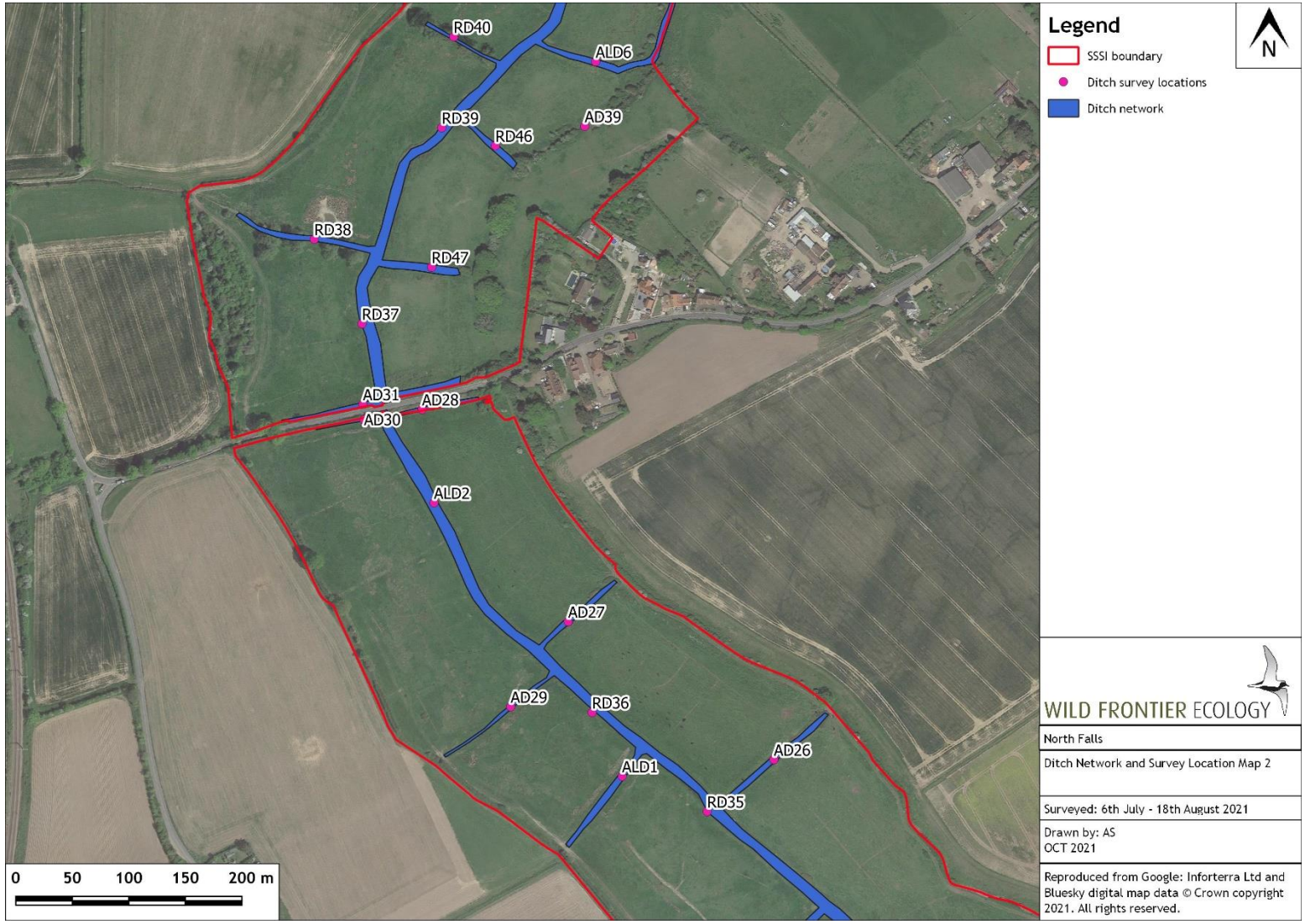
This report conforms to the British Standard 42020:2013 Biodiversity – Code of practice for planning and development.

Contents

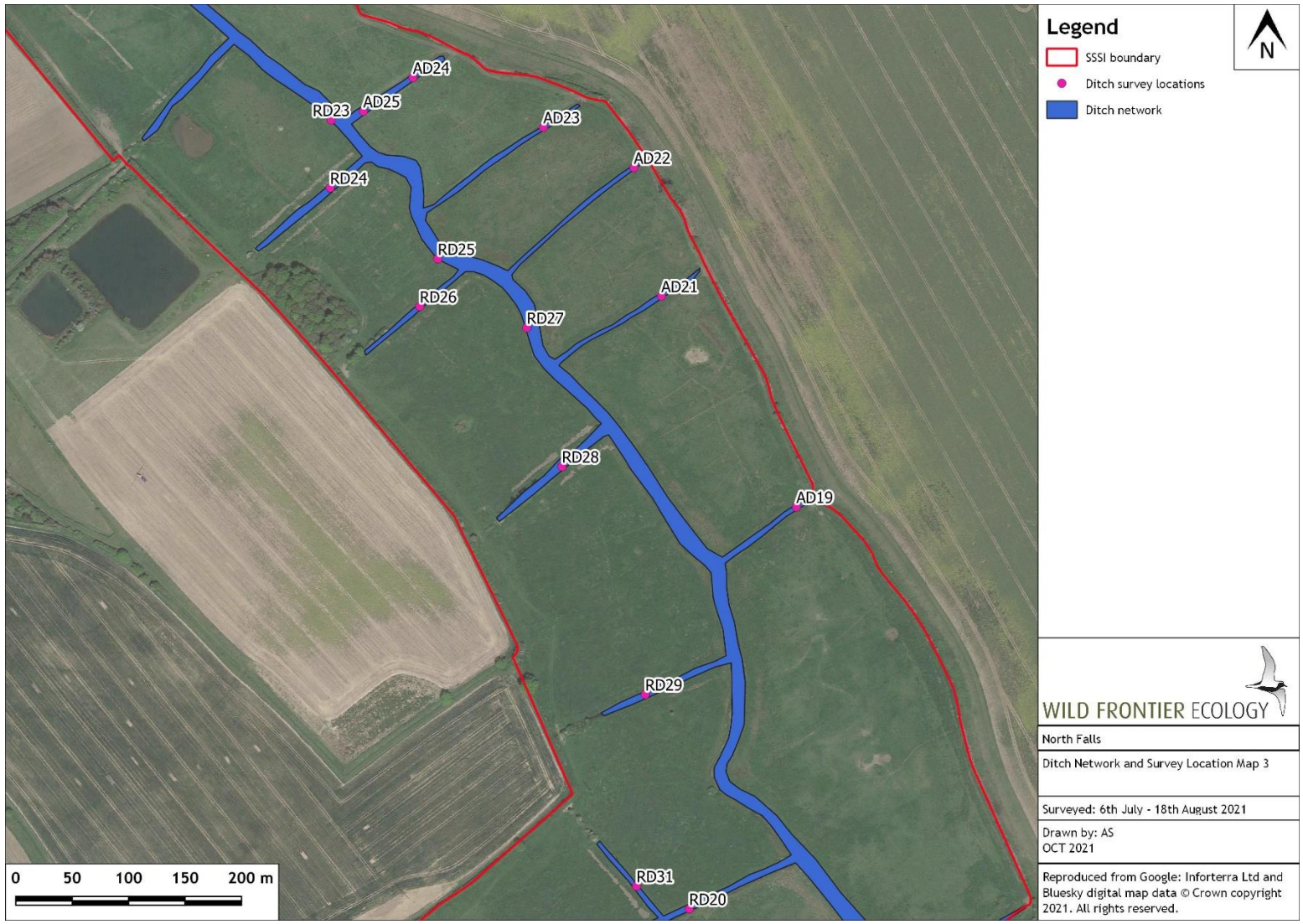
Map 1a: Ditch Network and Survey Locations



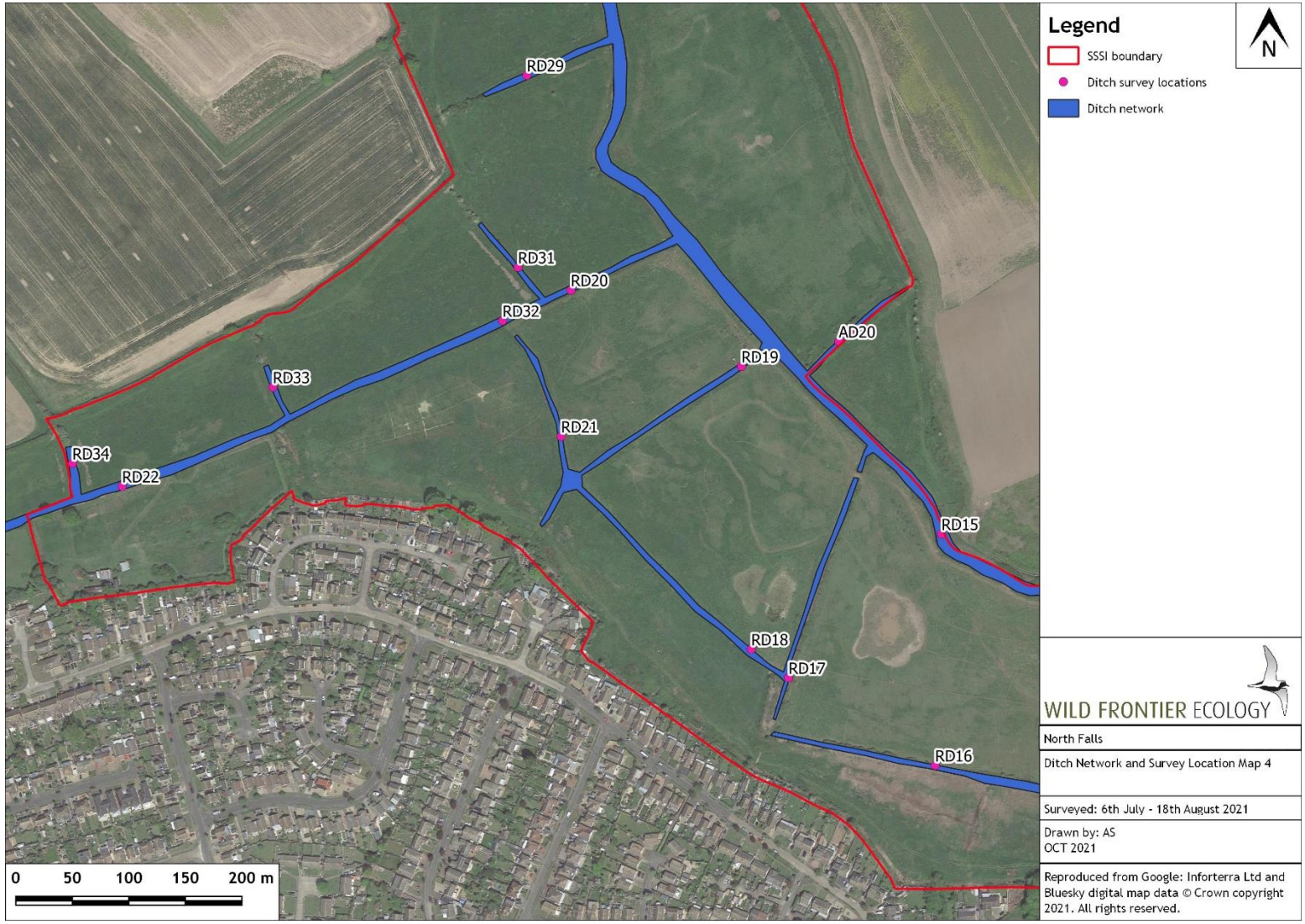
Map 1b: Ditch Network and Survey Locations



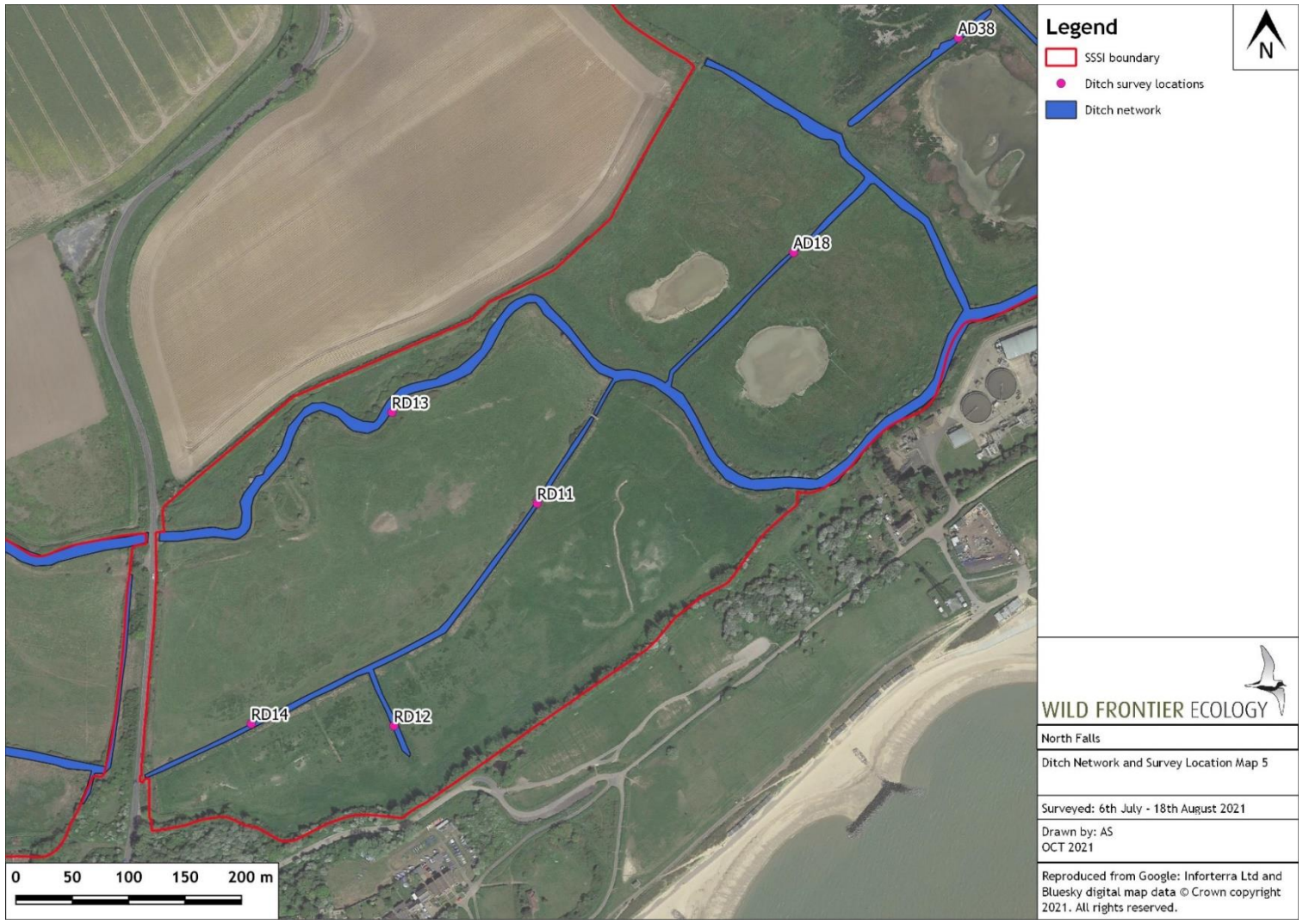
Map 1c: Ditch Network and Survey Locations



Map 1d: Ditch Network and Survey Locations

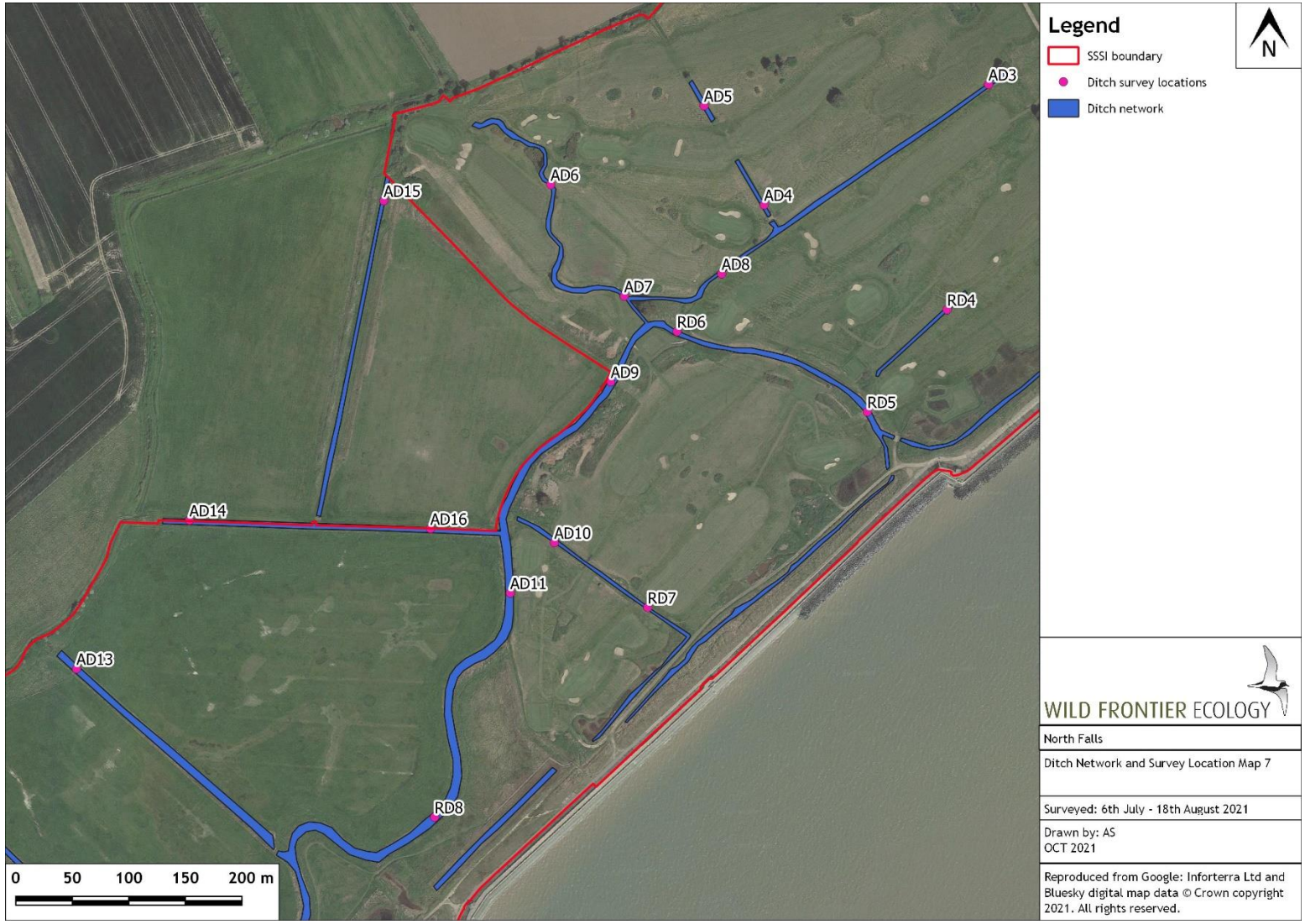


Map 1e: Ditch Network and Survey Locations



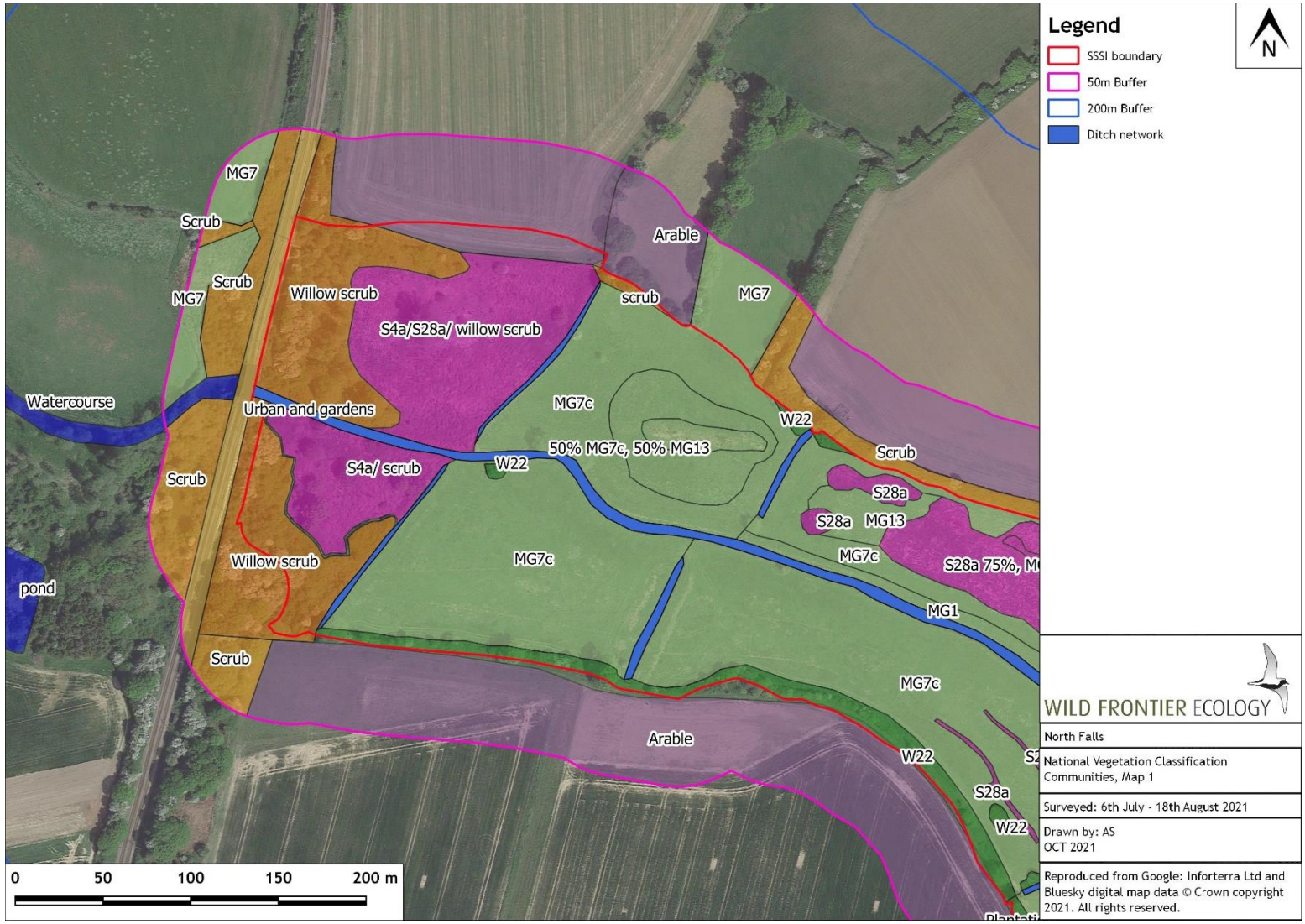
Map 1f: Ditch Network and Survey Locations

Map 1g: Ditch Network and Survey Locations

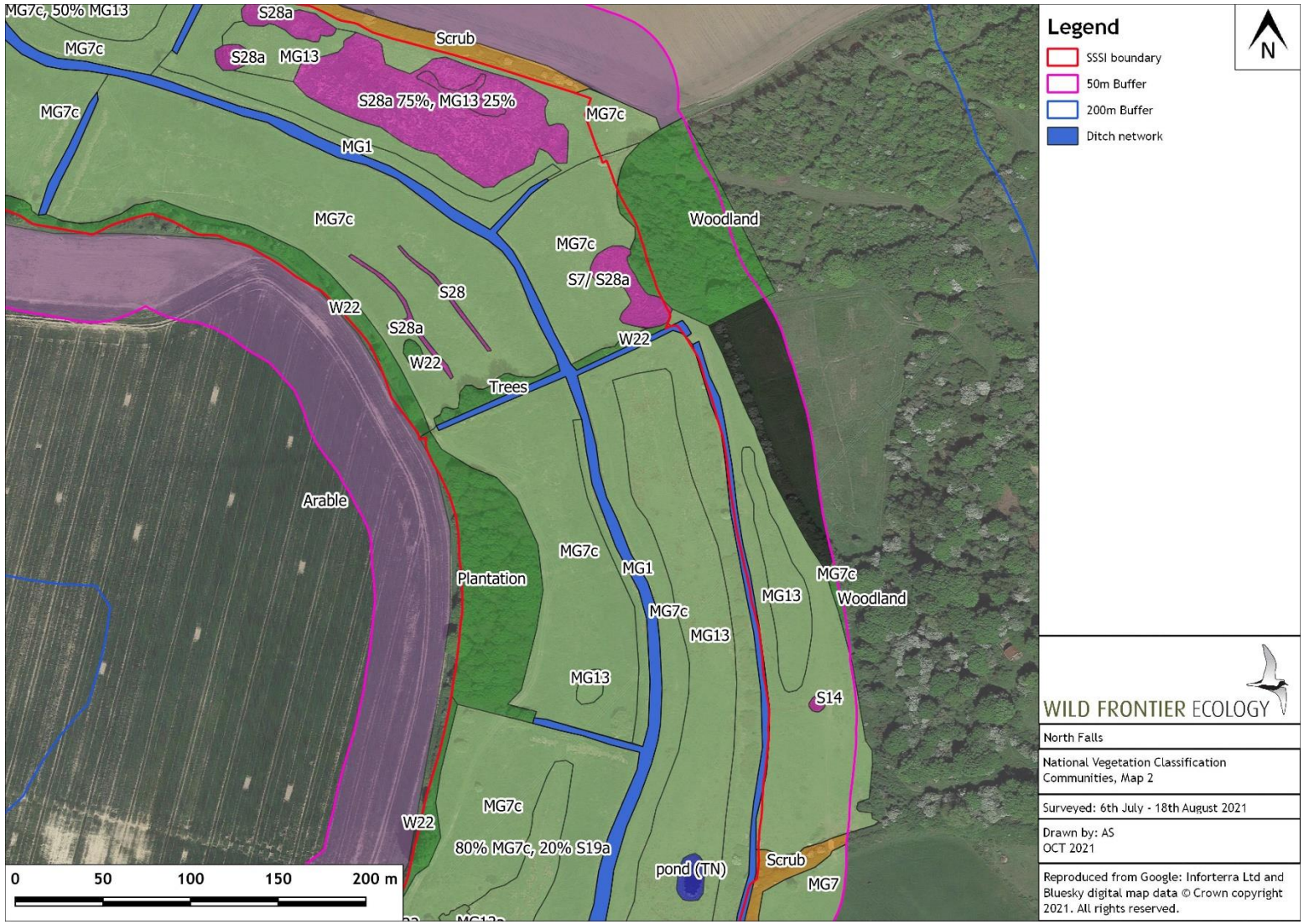


Map 1h: Ditch Network and Survey Locations

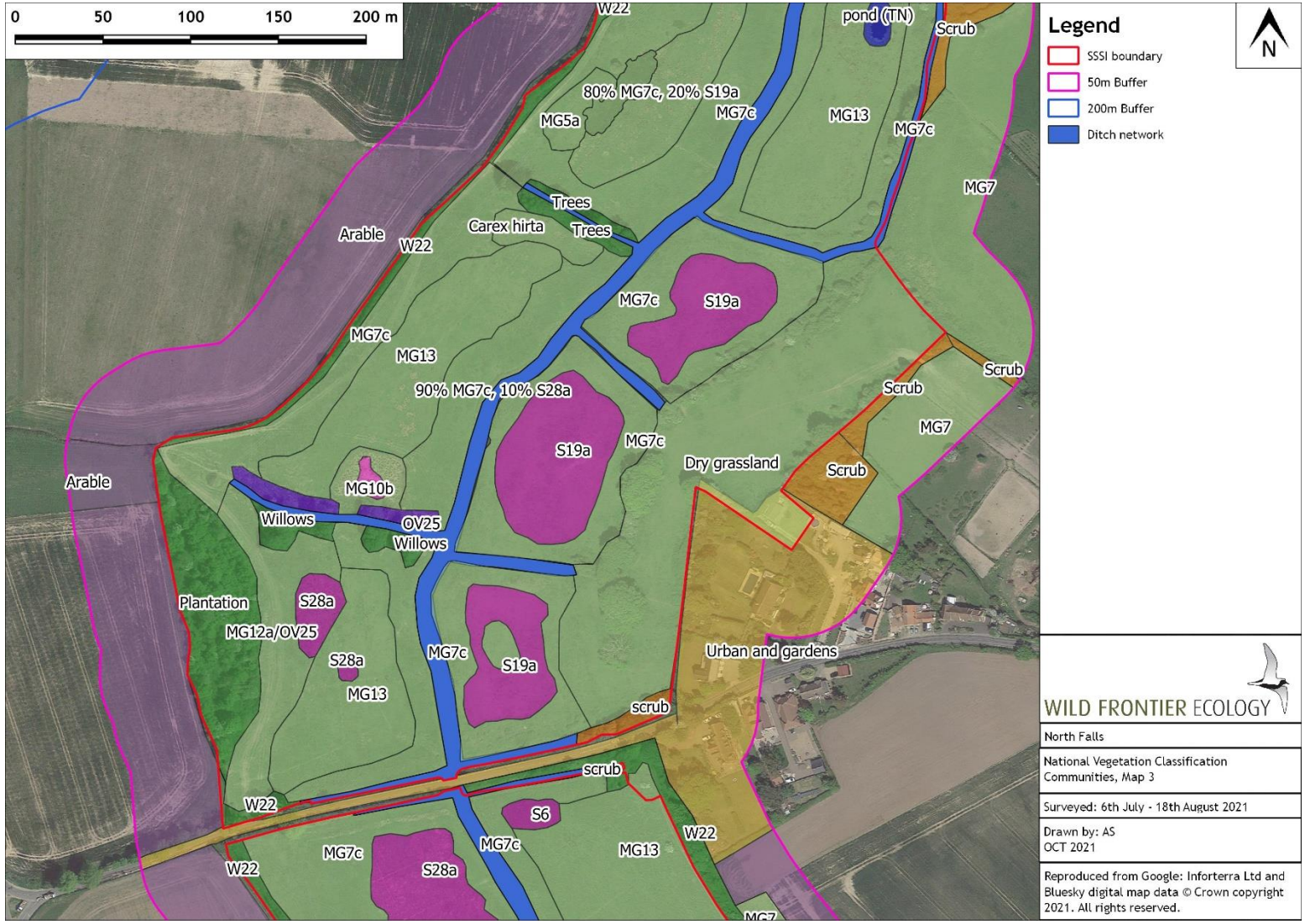
Map 2a: NVC Communities



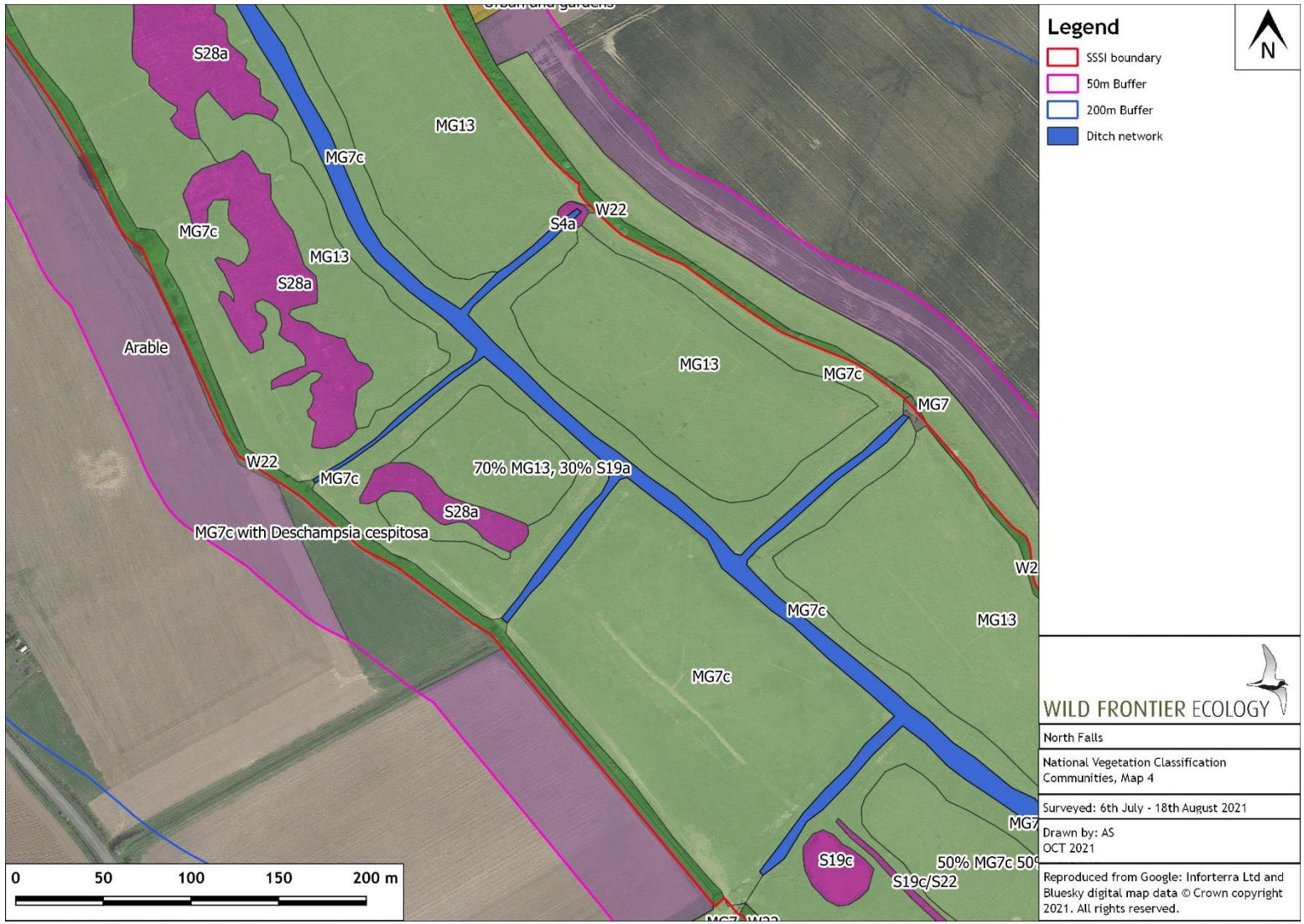
Map 2b: NVC Communities



Map 2c: NVC Communities



Map 2d: NVC Communities



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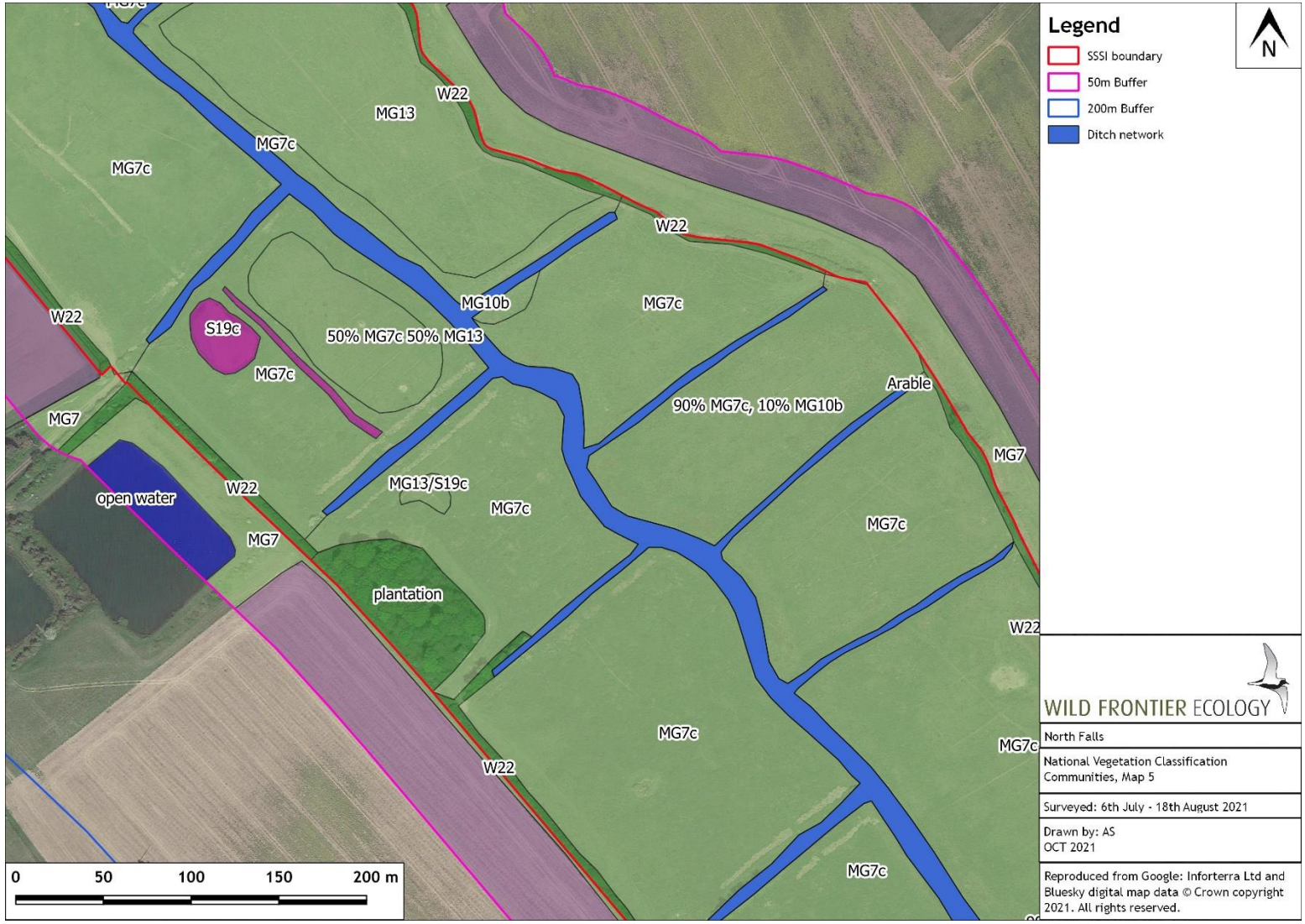
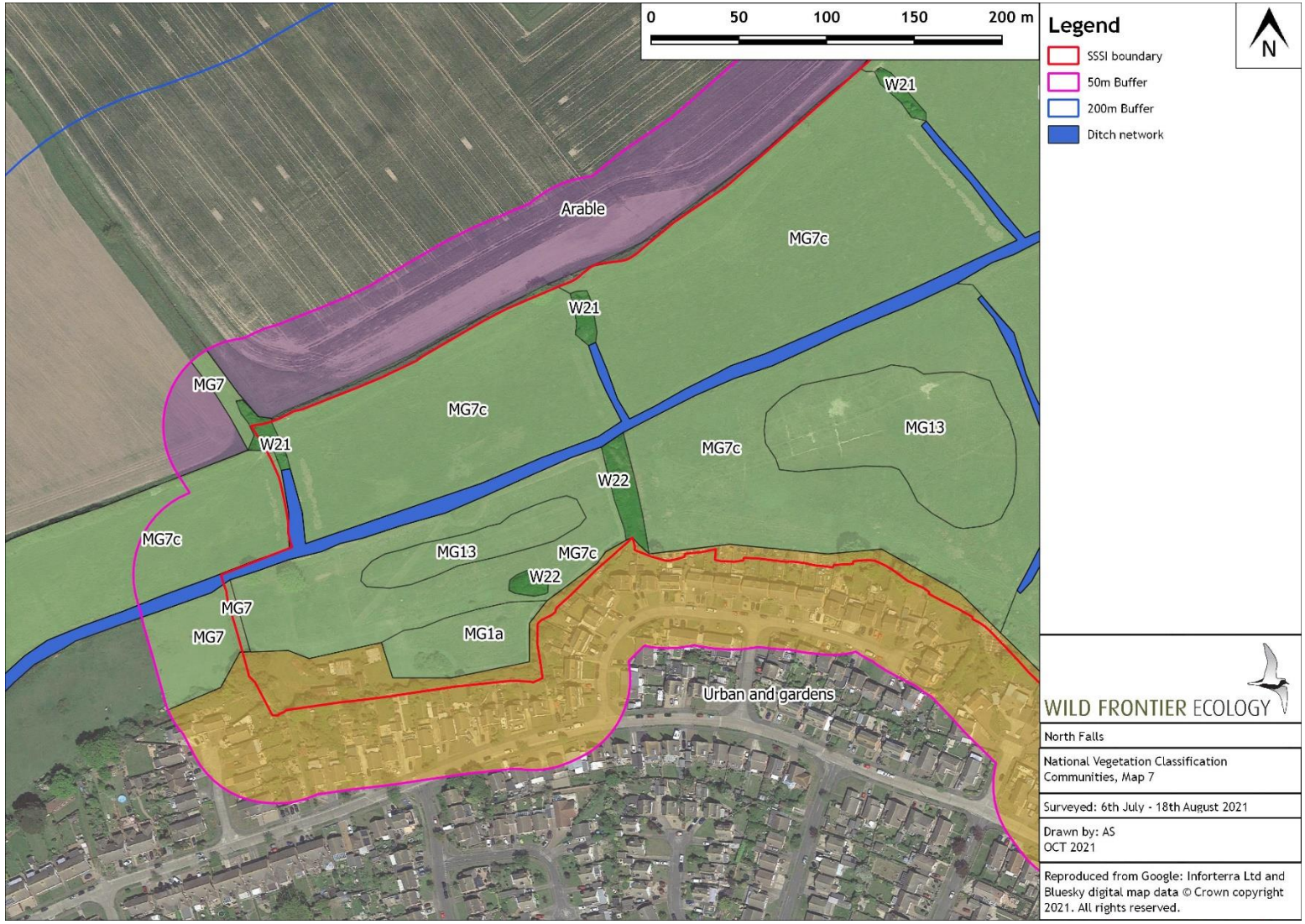
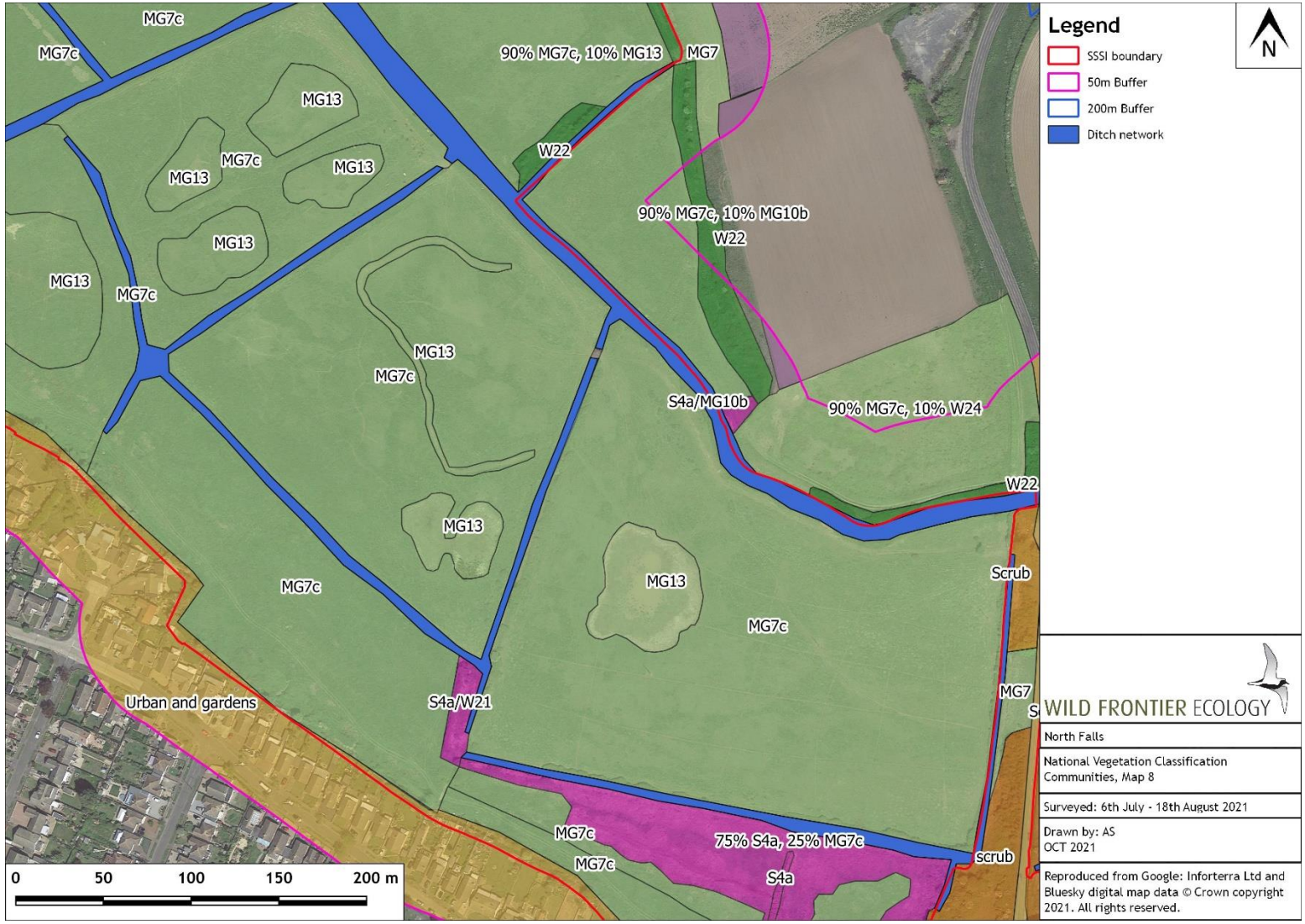


Map 2f: NVC Communities

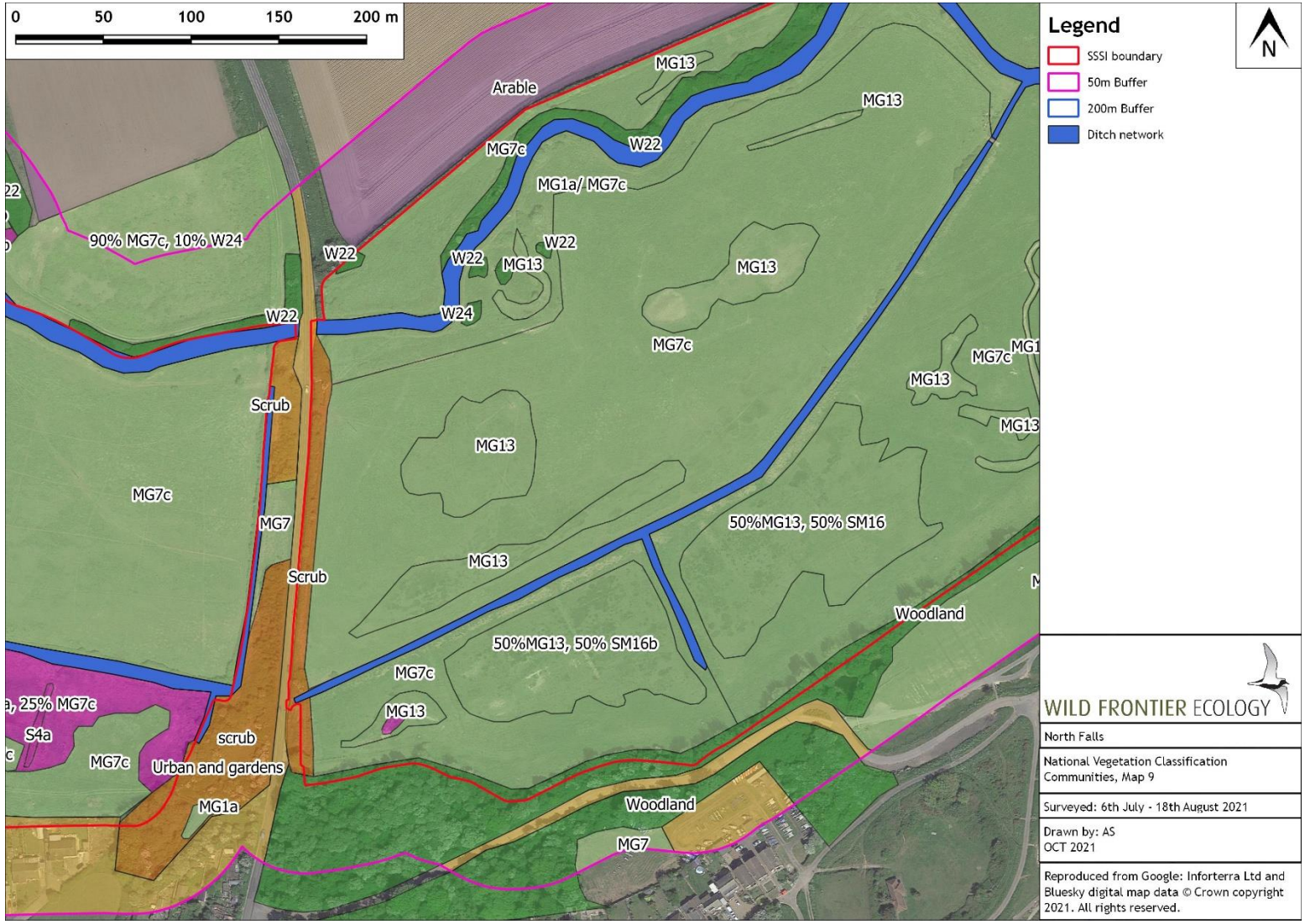
Map 2g: NVC Communities



Map 2h: NVC Communities



Map 2i: NVC Communities



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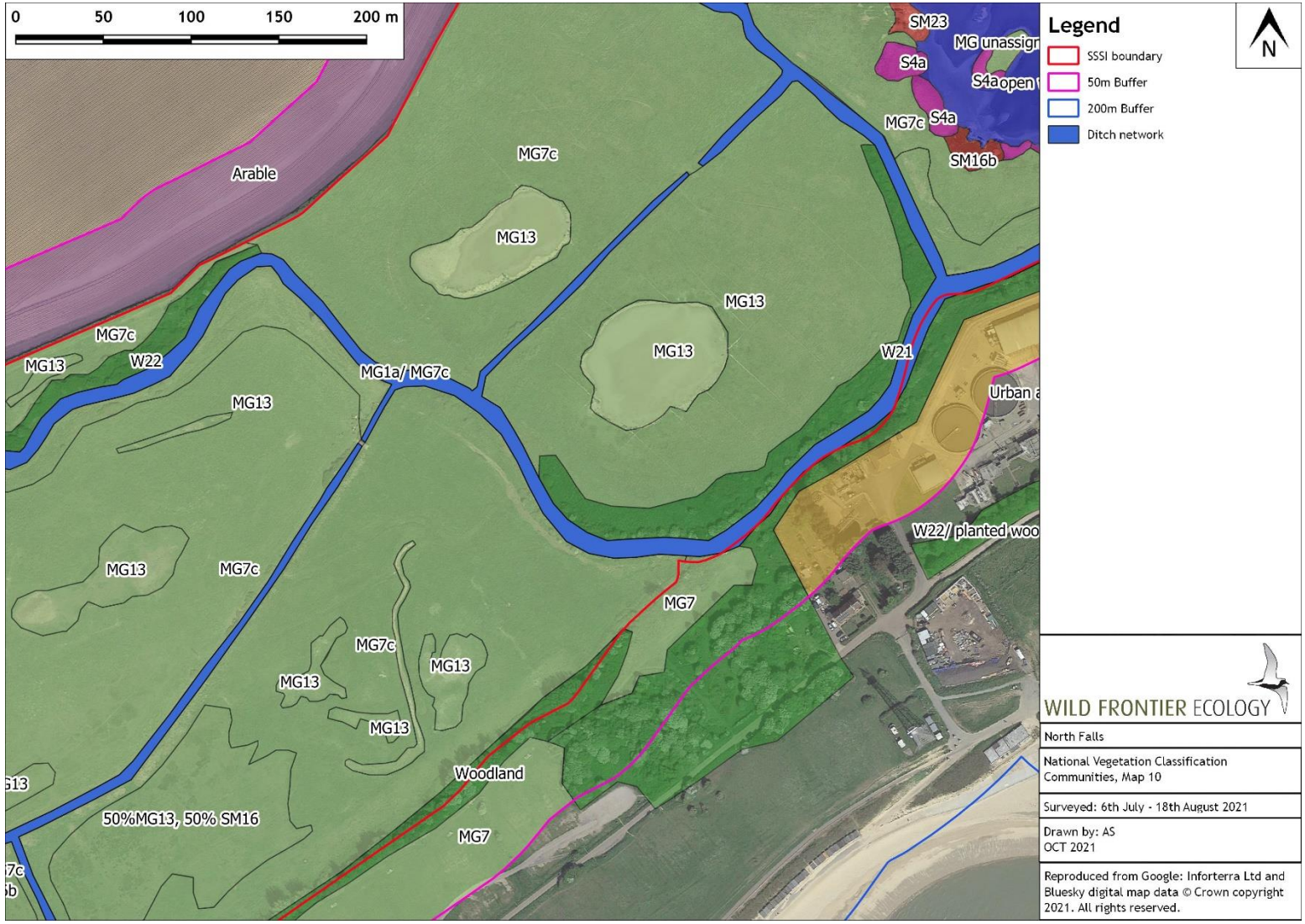

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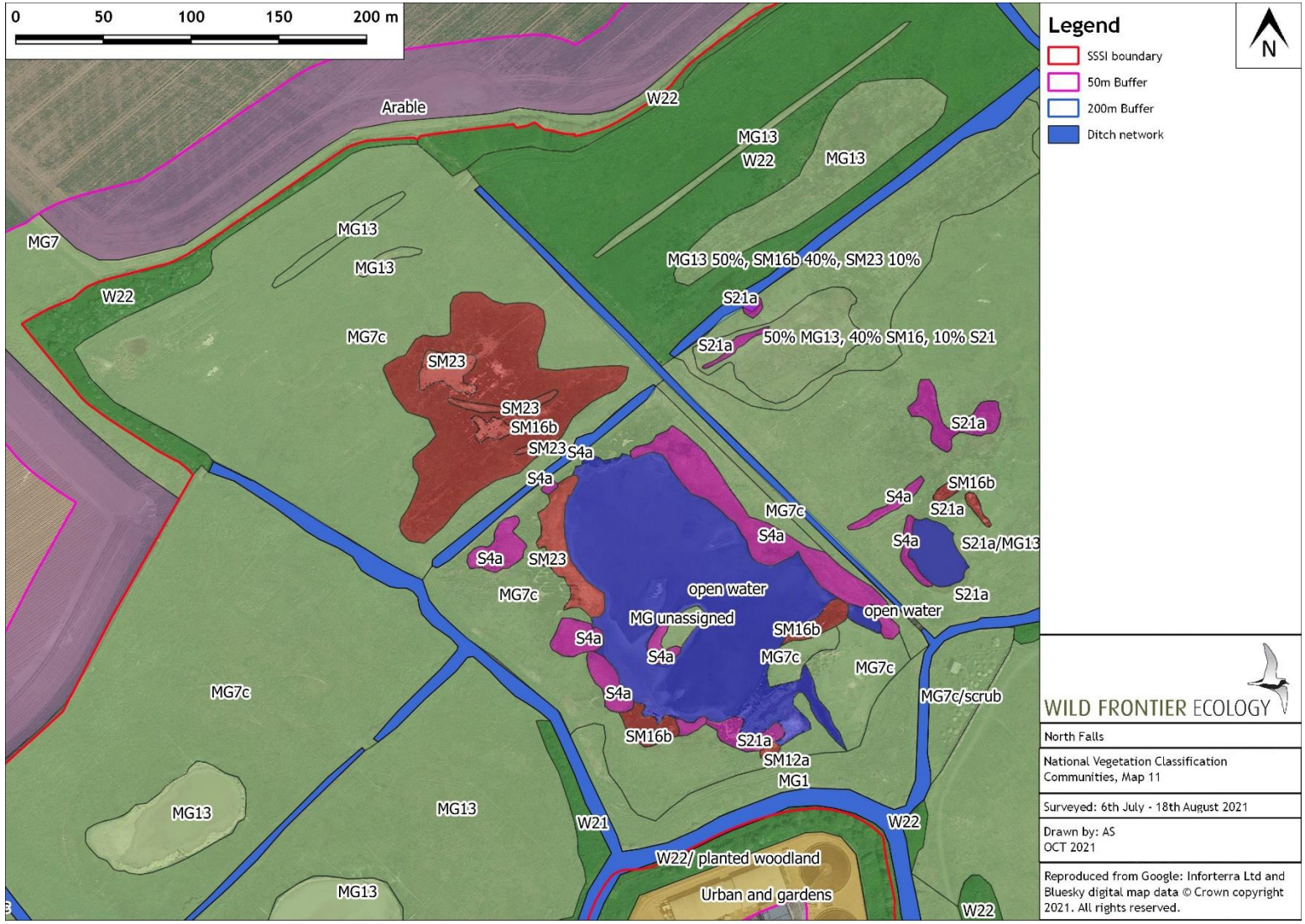
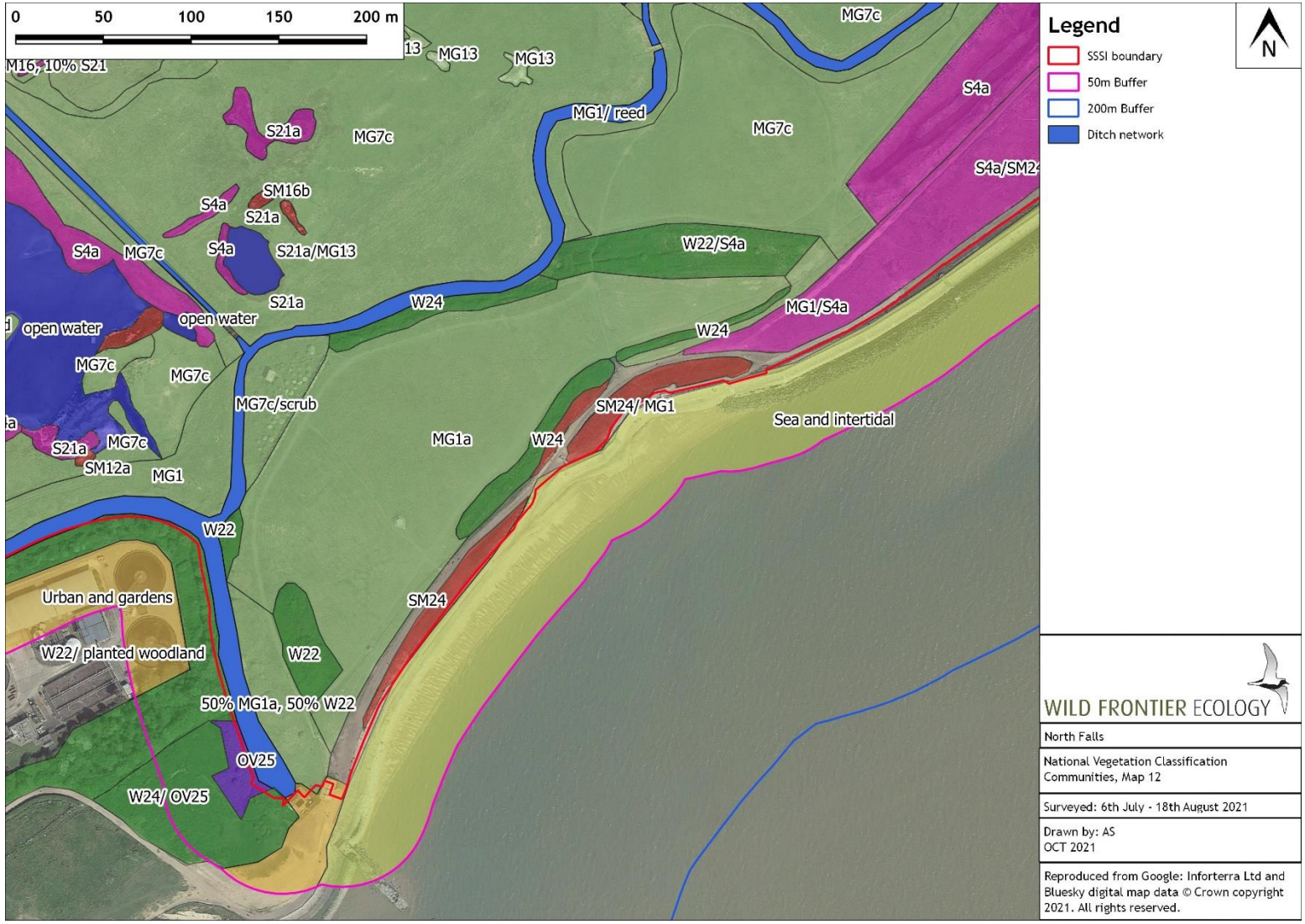


Map 2l: NVC Communities



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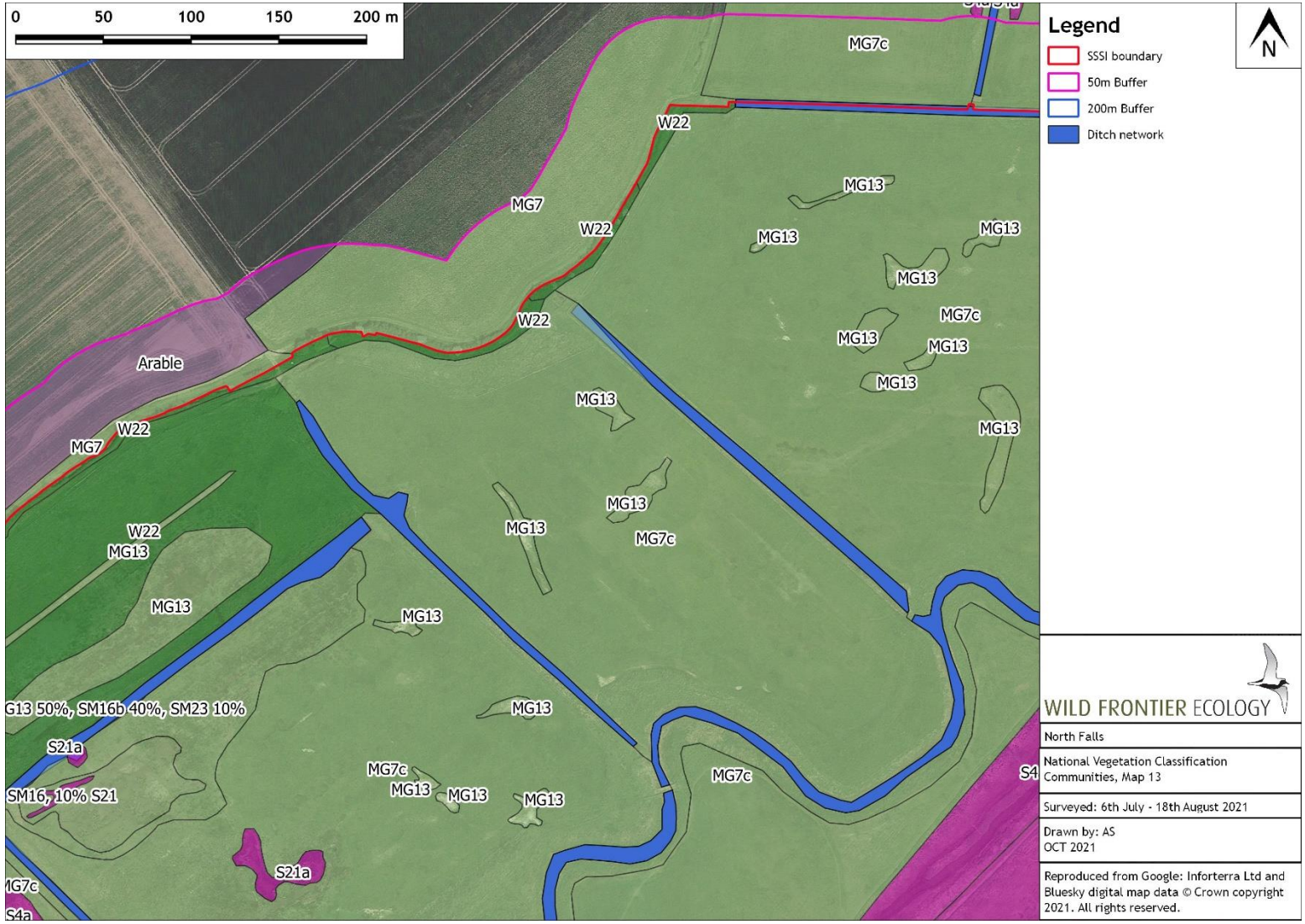

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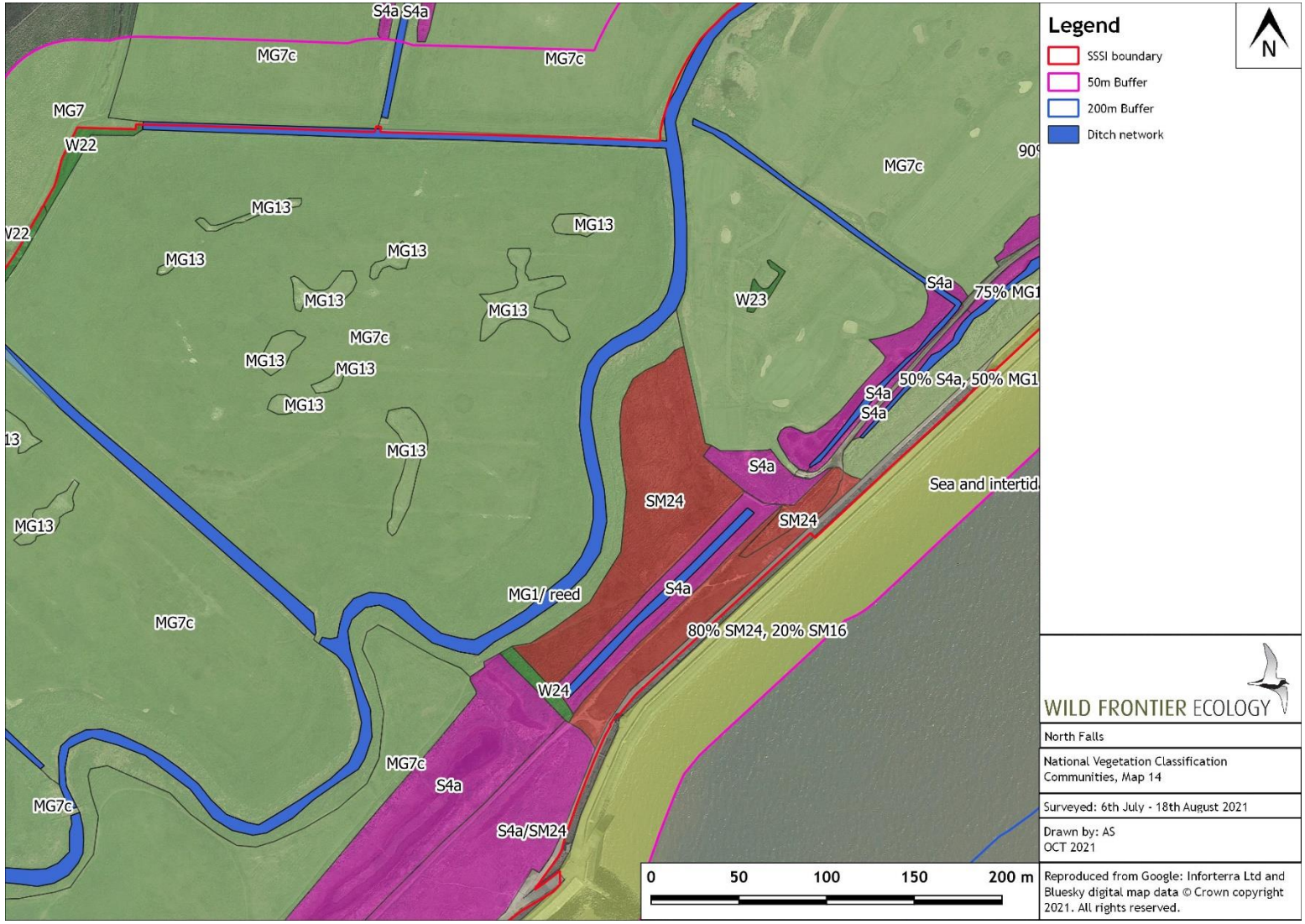
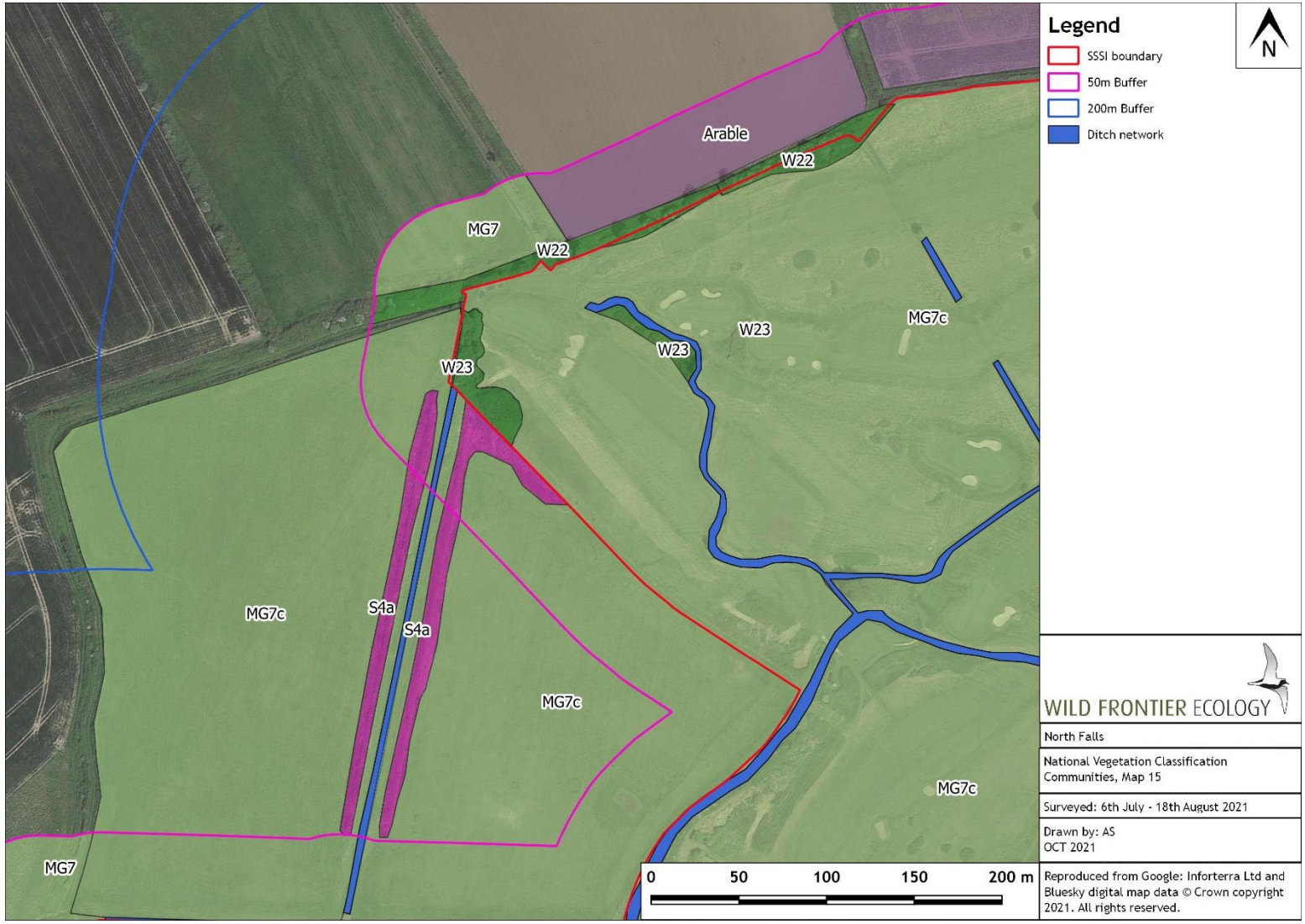
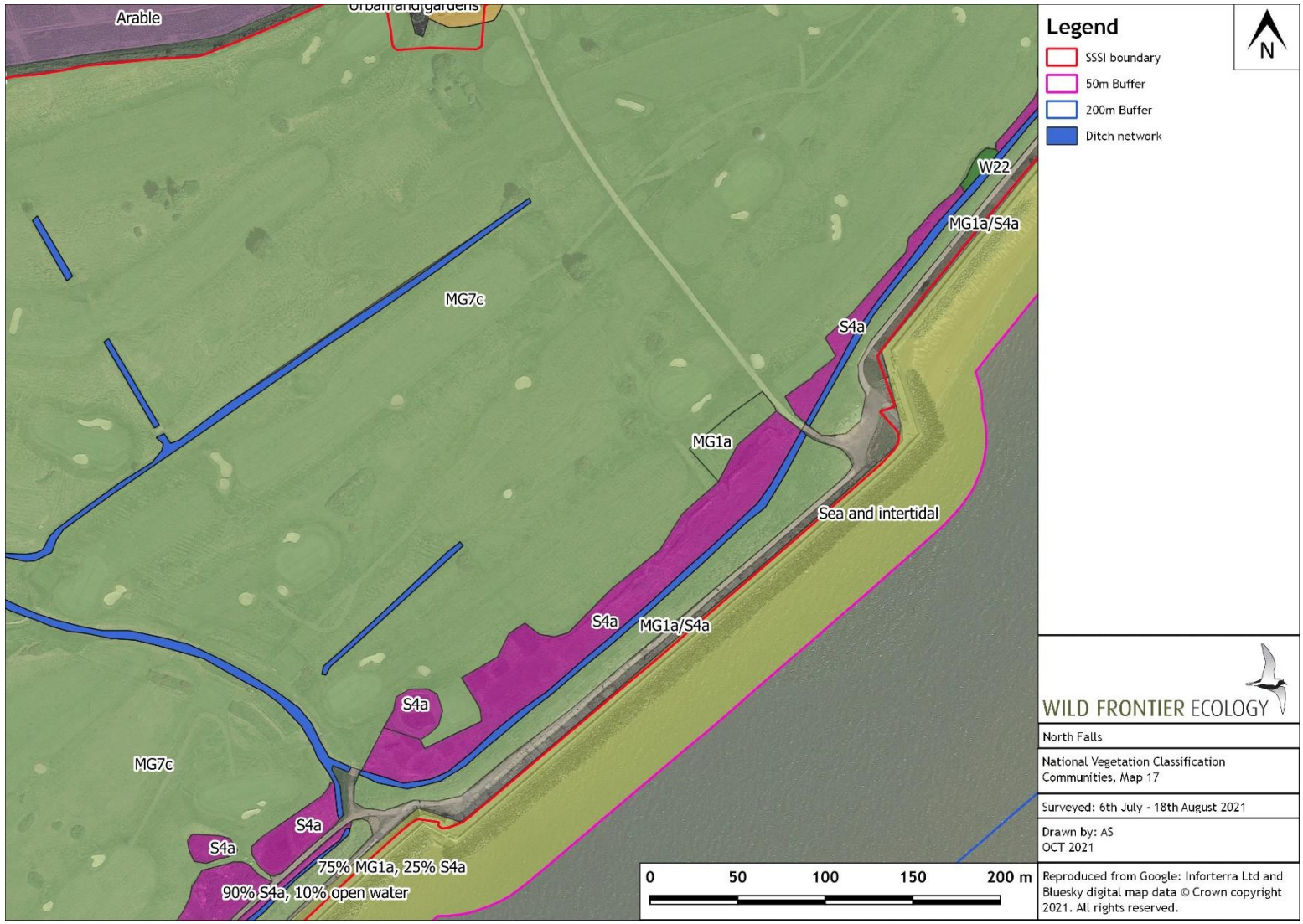


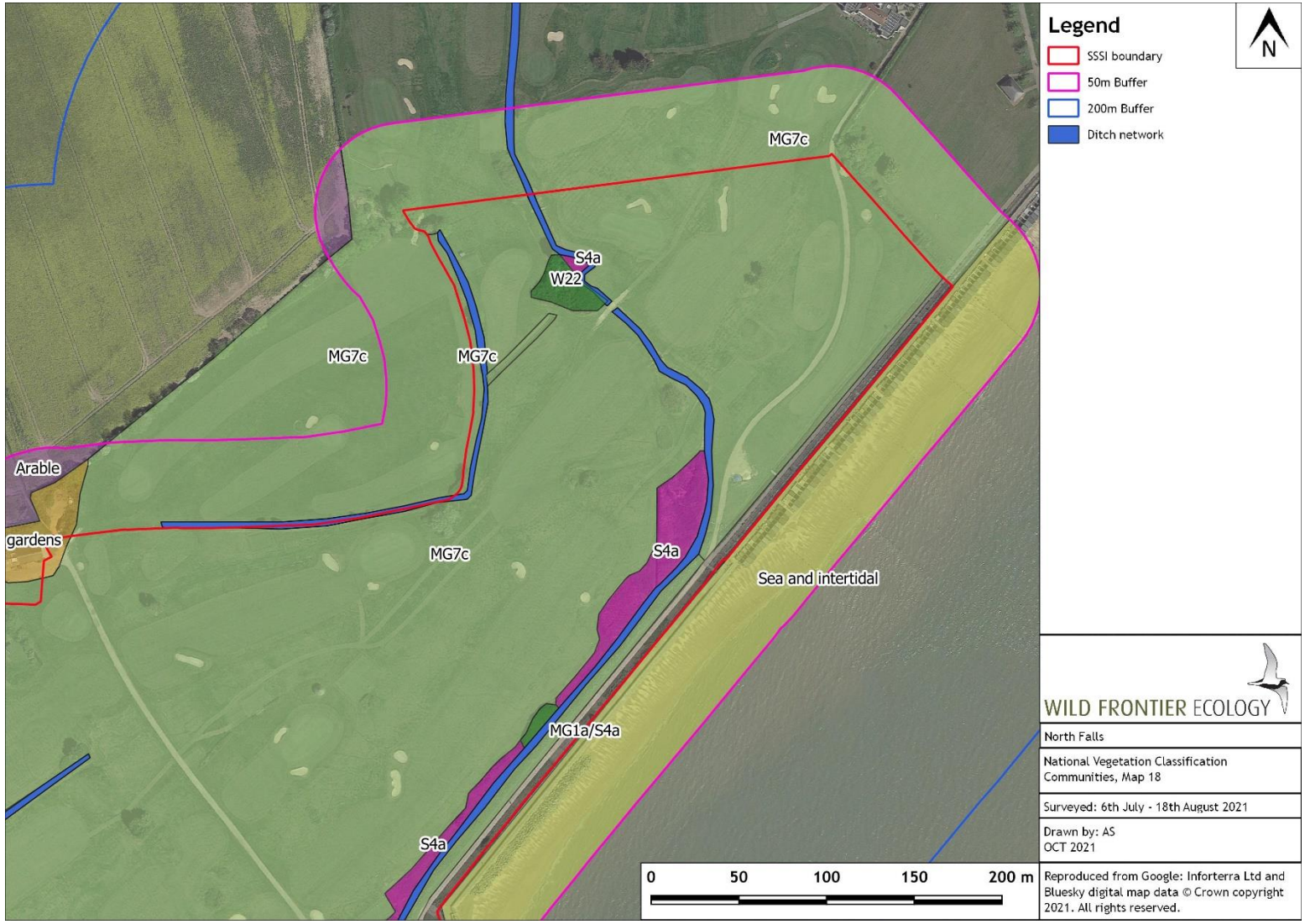
Map 2o: NVC Communities



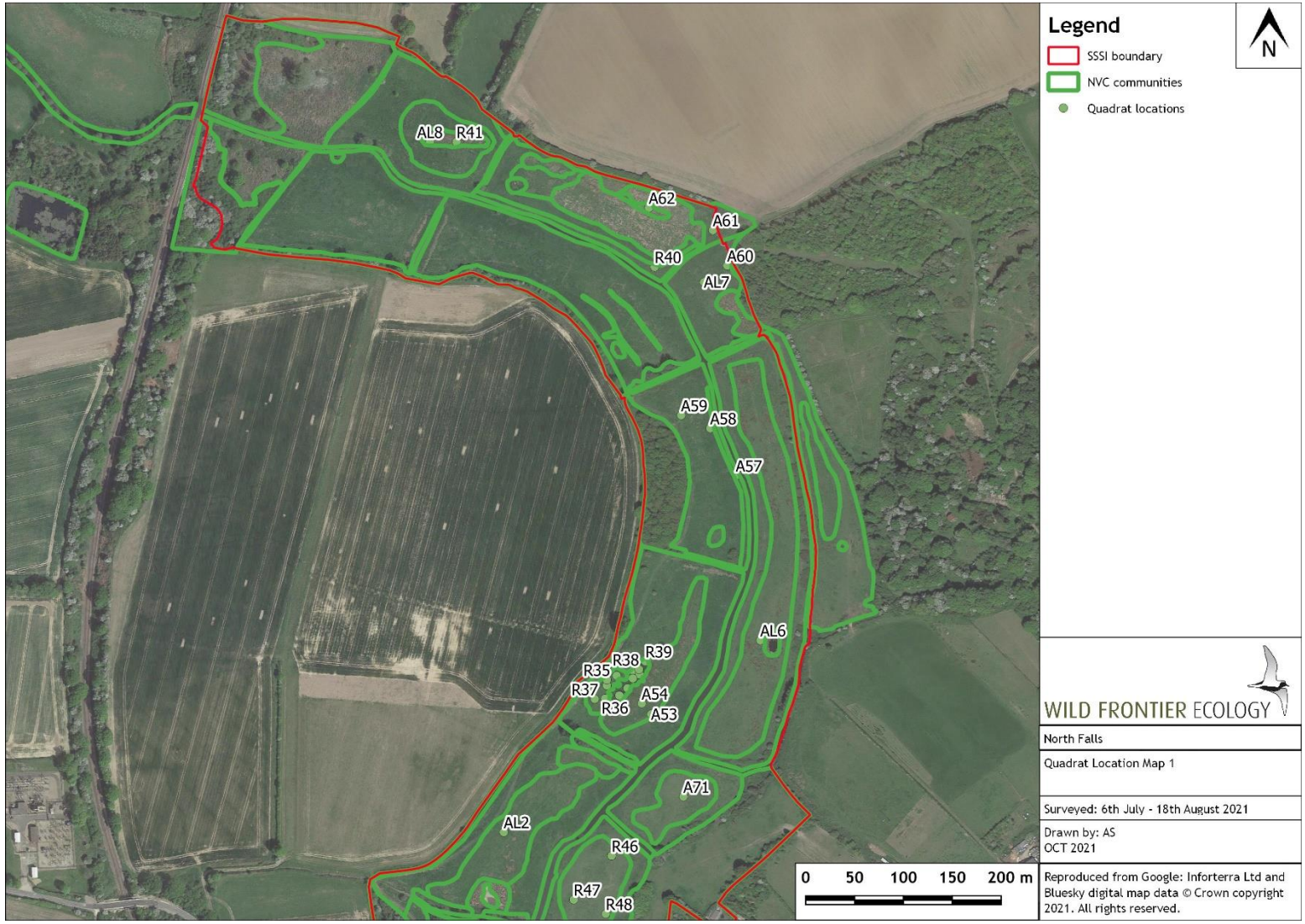
Map 2p: NVC Communities



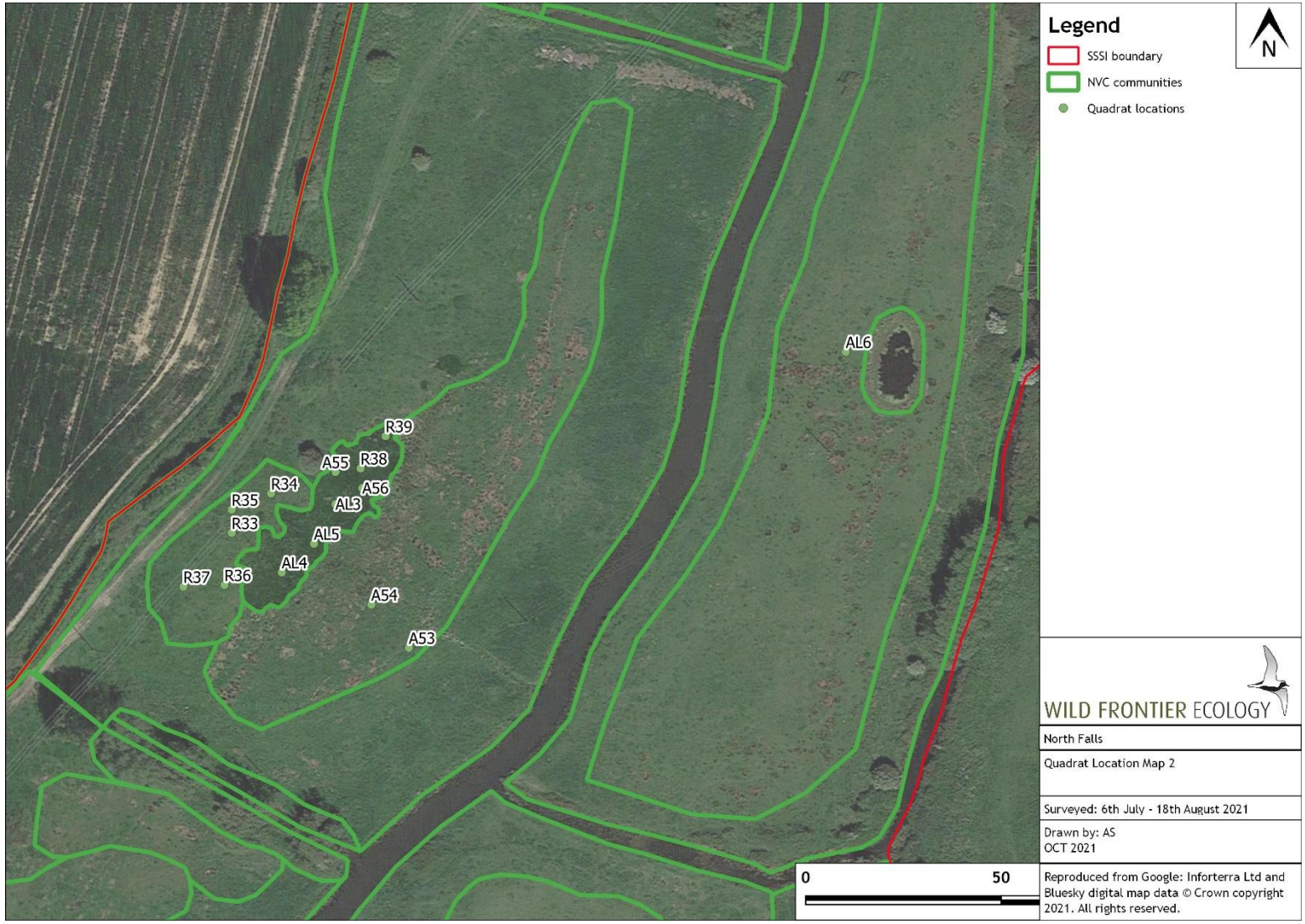
Map 2q: NVC Communities



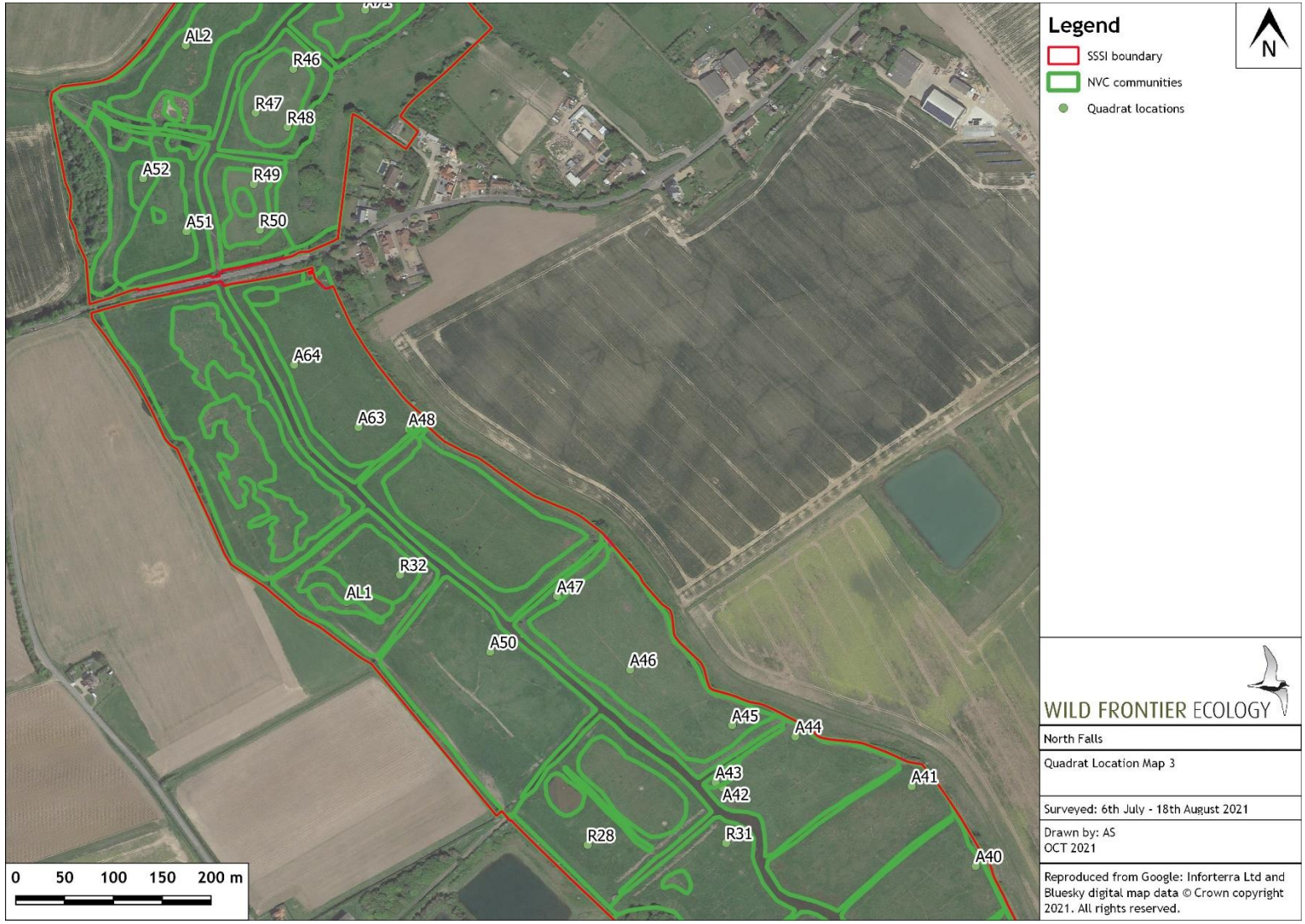
Map 3a: Quadrat locations



Map 3b: Quadrat locations



Map 3c: Quadrat locations



Map 3d: Quadrat locations

Map 3e: Quadrat locations

Legend

SSSI boundary

NVC communities

Quadrat locations

N

WILD FRONTIER ECOLOGY

North Falls

Quadrat Location Map 5

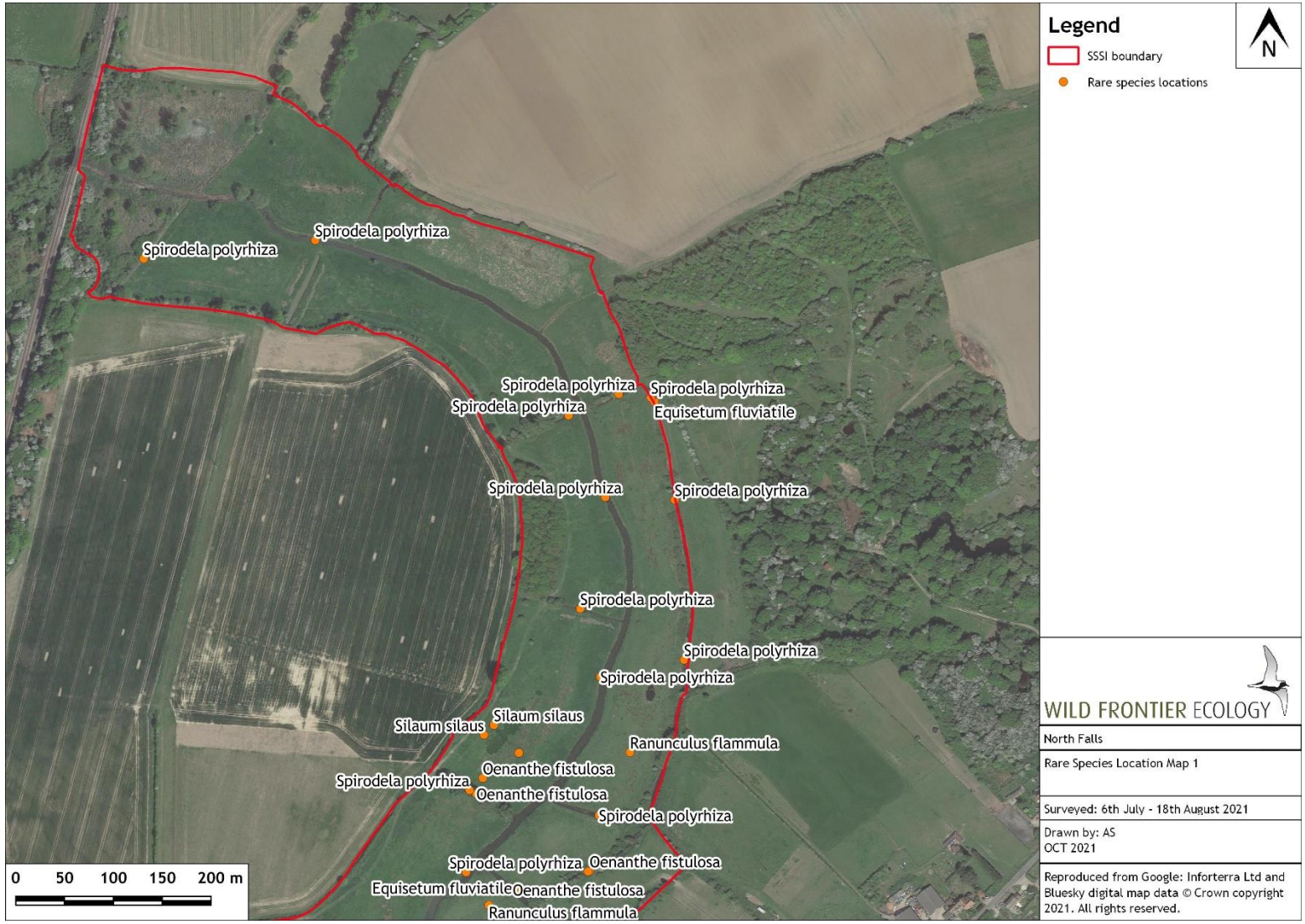
Surveyed: 6th July - 18th August 2021

Drawn by: AS
OCT 2021

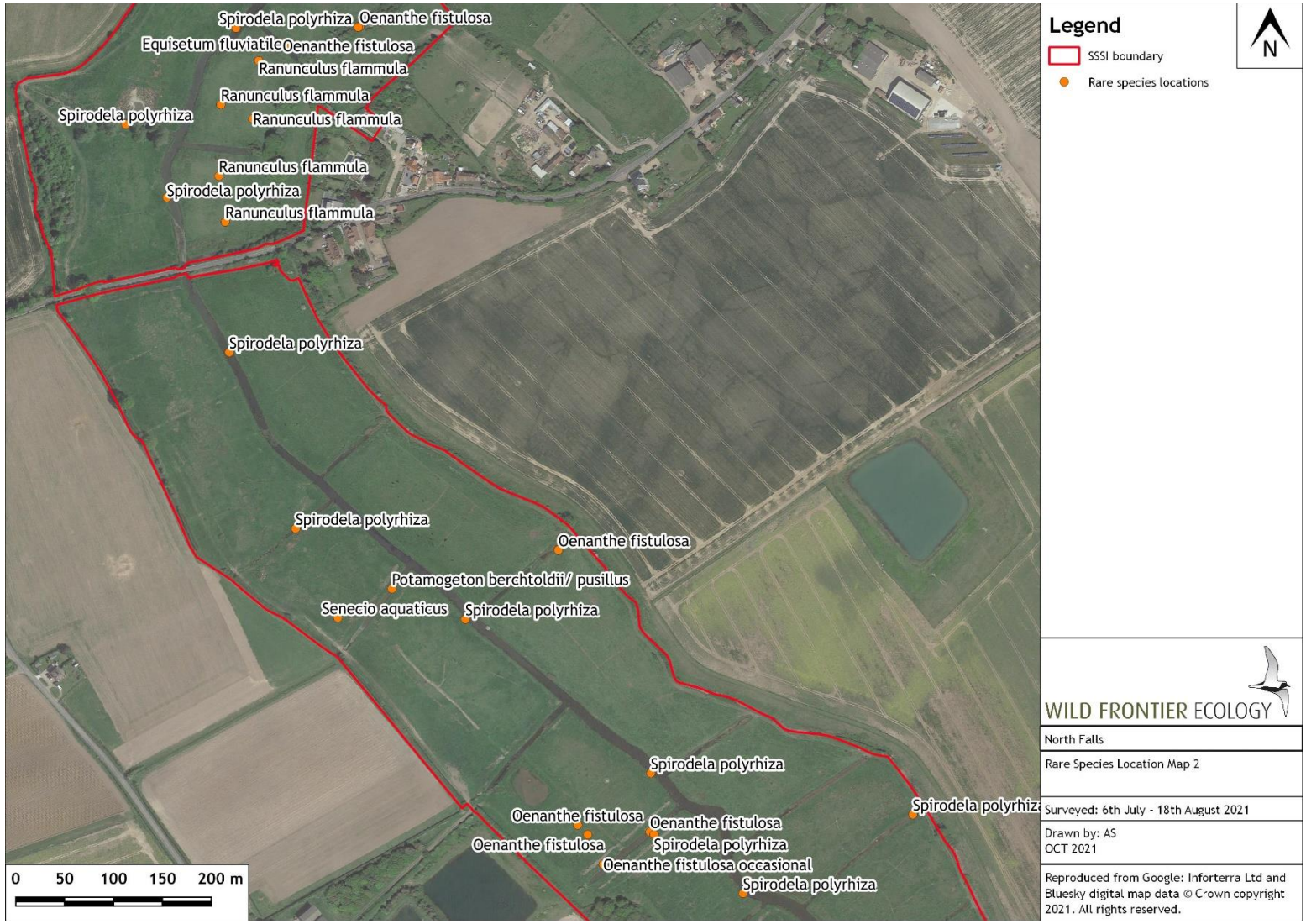
Map 3f: Quadrat locations

Map 3g: Quadrat locations

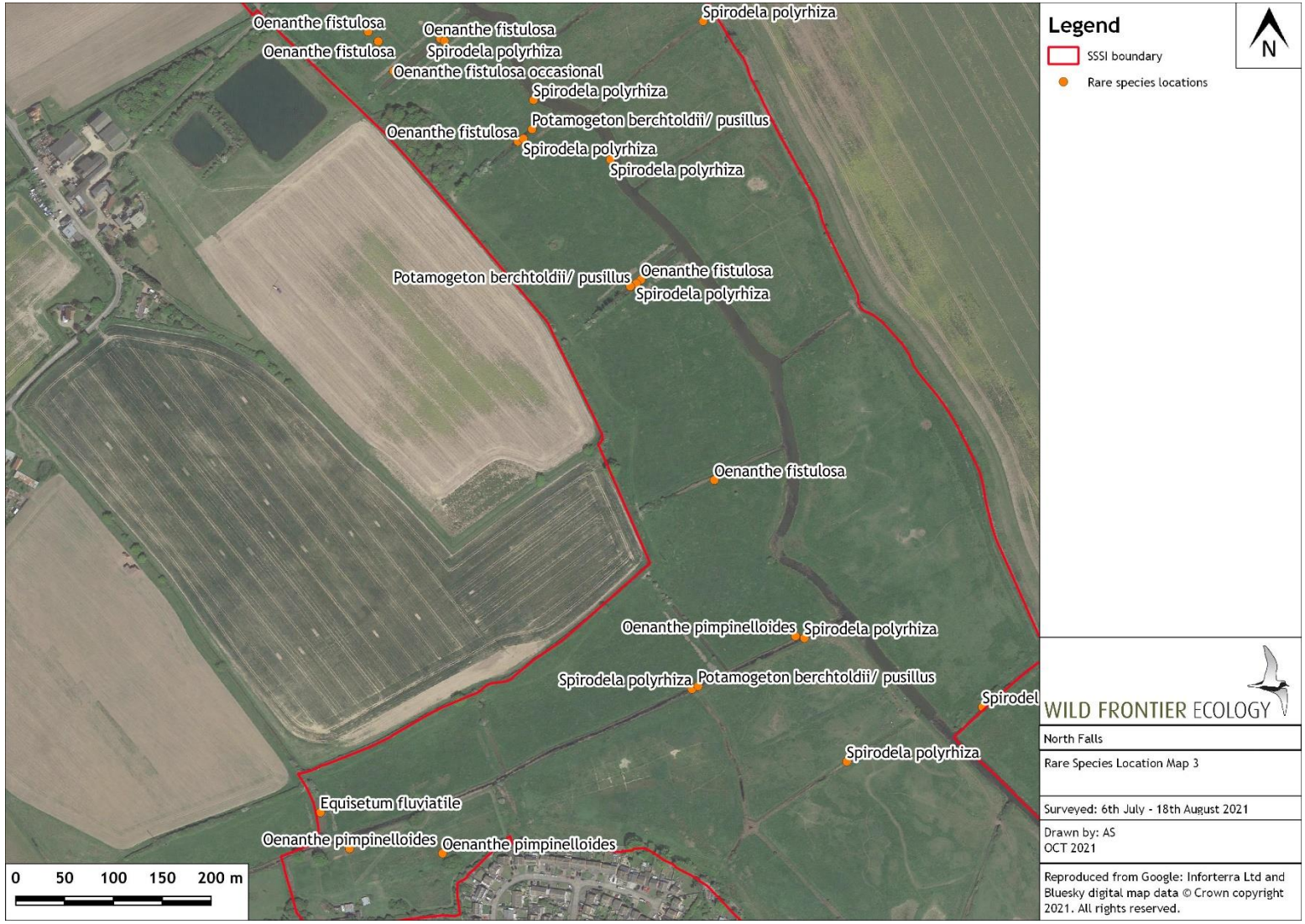
Map 4a: Rare and Valued Species Locations



Map 4b: Rare and Valued Species Locations



Map 4c: Rare and Valued Species Locations

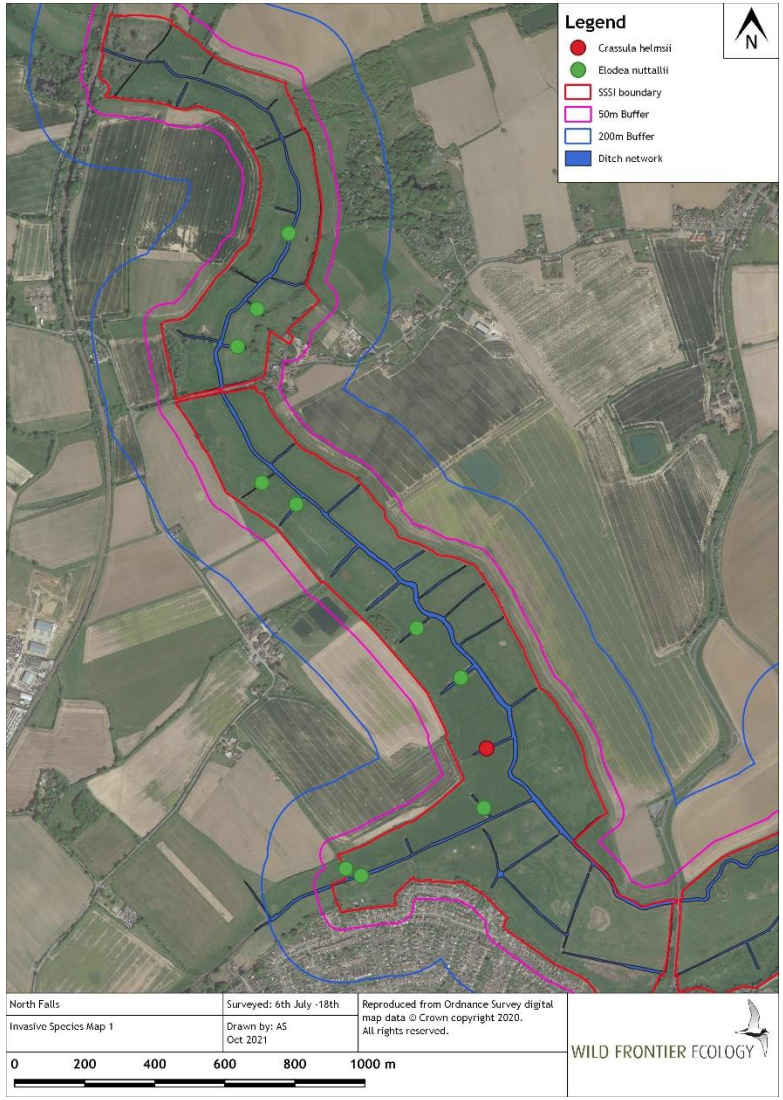


Map 4d: Rare and Valued Species Locations

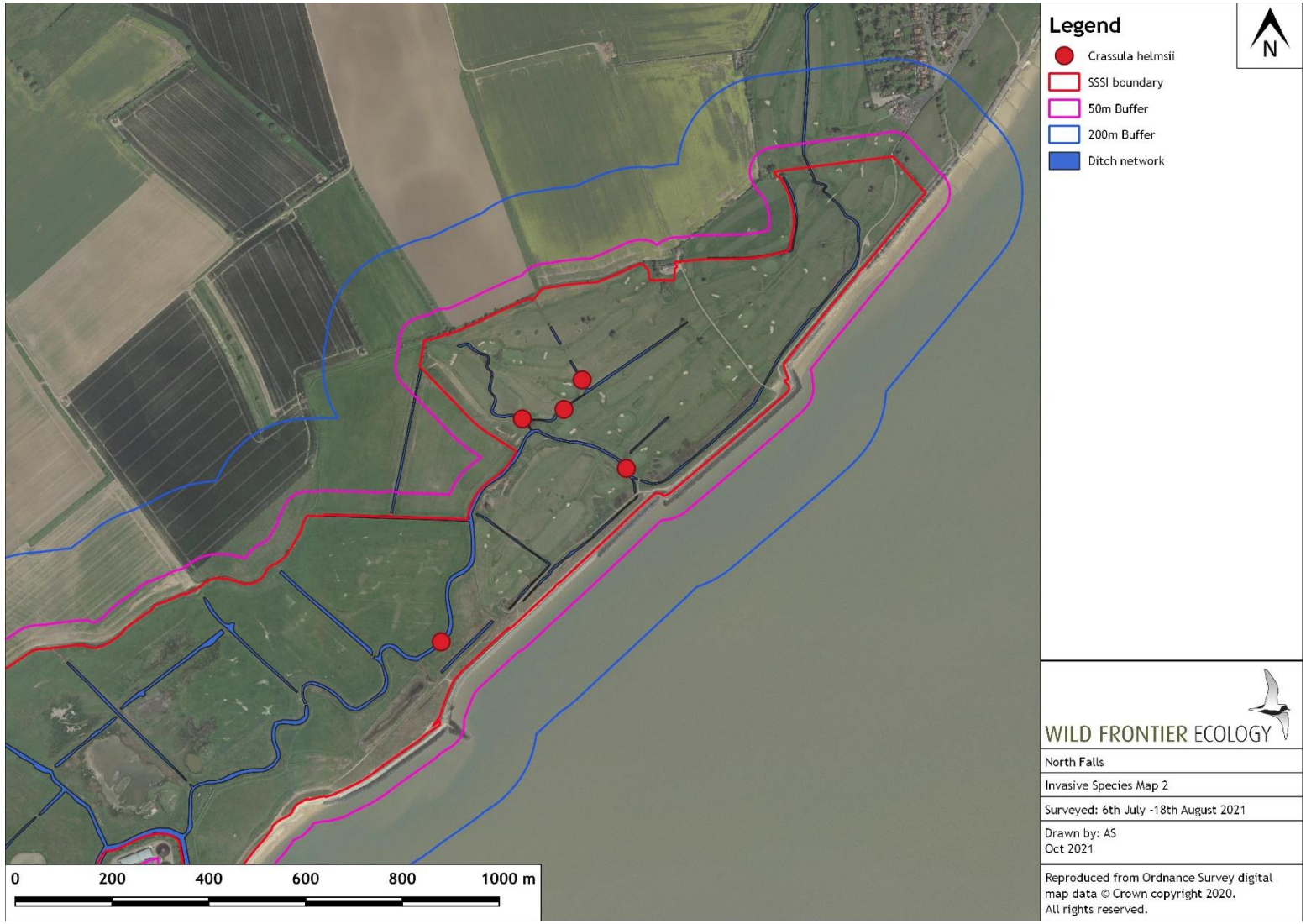
Map 4e: Rare and Valued Species Locations

Map 4f: Rare and Valued Species Locations

Map 5a: Non-native Invasive Species Locations



Map 5b: Non-native Invasive Species Locations



REPORT

North Falls Offshore Wind Farm - Extended Phase 1 Habitat Survey

Client: North Falls Offshore Wind Ltd

Reference: PB9244-RHD-ZZ-ON-RP-EC-0085

Status: S0/P01.03

Date: 21 December 2021

Royal HaskoningDHV

Enhancing Society Together

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Approved by: Gordon Campbell

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Classification
Project related

Royal HaskoningDHV

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1 Introduction

1.1 Project background

The North Falls Offshore Wind Farm project (herein 'the project') is a proposed extension to the Greater Gabbard offshore wind farm, which is located off the east coast of England in the Southern North Sea and was opened in 2013. The project is being developed by North Falls Offshore Wind Farm Ltd. (NFOW), a joint venture between SSE Renewables and RWE.

The project is proposed in response to The Crown Estate's (TCE) extension leasing round, launched in 2017, with TCE recognising that extensions to operational wind farms are proven to be a successful way of efficiently developing more offshore generating capacity. NFOW was awarded an Agreement for Lease (AfL) from TCE in September 2020. NFOW have begun the process of baseline data collection to inform an EIA for the project in support of a Development Consent Order (DCO) application proposed to be submitted to the Planning Inspectorate in 2023.

NFOW is currently awaiting a grid connection offer from National Grid, which will then inform the detailed site selection of the offshore cable corridor, landfall location, onshore cable route and onshore substation location. Whilst this process is ongoing, in order to ensure that adequate baseline data is collected to inform the project's EIA, NFOW have undertaken a suite of ecological surveys in 2021 so that baseline data for the project can be gathered.

In the first instance, for these 2021 ecological surveys NFOW has targeted an area immediately landward of the coast between the settlements of Clacton-on-Sea and Frinton (herein the 'cable landfall search area'). This area has been targeted as the most likely area in which cable will be brought ashore. Following receipt of preliminary information from National Grid in Summer 2021 regarding the location of potential grid connection points which will be offered to NFOW, NFOW has undertaken an initial site selection exercise to identify potential onshore cable corridor options. These initial onshore cable corridor options have then been used as the basis for identifying an footprint (herein the 'onshore project area', as shown in **Figure 1, Appendix A**) which is the subject of the surveys presented in this report.

Royal HaskoningDHV was commissioned to undertake an Extended Phase 1 Habitat Survey within and up to 50m from the onshore project area. This document has been produced to present information gathered during the Extended Phase 1 Habitat Survey, and to characterise the baseline environment and identify the requirement for Phase 2 species-specific surveys to inform and support the ecological impact assessment of the North Falls Preliminary Information Report (PEIR).

It is important to note that these surveys have been conducted on the widest possible onshore project area as understood at the time of survey, and as landfall and cable corridor options narrow down, the geographical extent of the Phase 2 species-specific surveys is likely to also reduce.

1.2 Purpose of this report

The purpose of this report is to:

- Present the results of the Extended Phase 1 Habitat Survey undertaken in April, July, September and October 2021;

- Provide an overall understanding of the existing ecological value of the environment within the onshore project area, in order to inform a future ecological impact assessment; and
- Inform the requirements and scope of Phase 2 species-specific surveys of the onshore project area.

In order to achieve this purpose, the Extended Phase 1 Habitat Survey consists of three components, which collectively enable a preliminary understanding of the ecological value of the habitats within and up to 50m from the onshore project area (hereafter the 'survey area'). These components include:

- A desk-based review that summarises information on existing protected species records and statutory and non-statutory nature conservation designations.
- A field survey, involving:
    - The recording of all habitats within the survey area.
    - An assessment of the likelihood of the survey area to support legally protected species or species of conservation concern.

This report has been prepared in accordance with the guidelines set out in the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines on Ecological Report Writing (CIEEM, 2017).

2 Legislation and Policy

Table 2.1 presents the relevant information regarding the legal protection afforded to the habitats and species mentioned in this report. However, it should be noted that this is for information only and is not intended to be exhaustive or to replace specialised legal advice.

Table 2.1 – Summary of key legislation and policy relevant to the Extended Phase 1 Habitat Survey area

Legislation	Relevance
Environment Act 2021	The Environment Act makes provisions about targets, plans and policies for improving the natural environment and environmental protection, including biodiversity and conservation covenants. The Environment Act also includes the provision for biodiversity net gain to be a condition of planning permission in England, which includes Nationally Significant Infrastructure Projects (NSIPs).
Wildlife and Countryside Act 1981 (as amended)	Codifies the European Union (EU) Directive 2009/147/EC (the Birds Directive) into UK law; provides legal protection for European designated sites (Special Protection Areas (SPA), Ramsar sites) and Sites of Special Scientific Interest (SSSI); outlines legal offences in relation to wild birds, animals, and invasive species; and provides lists of species which are protected under the Act.
The Conservation of Habitats and Species Regulations 2017 (as amended)	Codifies the EU Directive 92/43/EEC (The Habitats Directive) into UK law, and provides legal protection for European designated sites (Special Area of Conservation (SAC)). The Conservation of Habitats and Species Regulations (2017) were amended in 2019 with the EU Exit Regulations, which includes the provision that the protection of 'European' sites still apply following the UK's exit from the EU.
Natural Environment and Rural Communities Act 2006	Section 41 of the Act requires the relevant Secretary of State (SoS) to compile a list of habitats and species of principal

Legislation	Relevance
	importance for the conservation of biodiversity in England, which Local Authorities to consider in their daily operations.
Protection of Badgers Act 1992	Outlines legal offences in relation to badgers, including taking, injuring or killing badgers, and interfering with badger setts.
The Hedgerow Regulations 1997	Outlines the definition of 'important' hedgerows and legal offences in relation to their disturbance or removal.
UK Post-2010 Biodiversity Framework (JNCC 2012)	Supersedes the UK Biodiversity Action Plan (UK BAP), which fulfilled a legal obligation under the Convention on Biological Diversity to identify and produce action plans for priority habitats and species.

3 Methodology

3.1 Study area

3.1.1 Desk-based study area

The study area for the desk-based review comprised all land within, and within up to 2km of, the onshore project area (up to 5km for bat and bird species information).

3.1.2 Field survey area

The survey area included all habitats within the onshore project area plus an additional 50m buffer. A buffer of 250m was used when searching for potential breeding ponds for great crested newts.

3.2 Desk-based review

The Multi-Agency Geographic Information for the Countryside (MAGIC) website (Defra 2013, updated 2021) was reviewed in April and September 2021 for information on statutory designated nature conservation sites and notable habitats (e.g. ancient woodland) of nature conservation value, within the onshore project area and up to 5km from its boundaries.

A search for waterbodies using 1:25,000 Ordnance Survey (OS) maps was also undertaken to identify the potential aquatic habitats used by great crested newt *Triturus cristatus*. A 250m buffer is considered appropriate having considered the habitats within and around the survey area. Although great crested newt can use suitable terrestrial habitat up to 500m from a breeding pond (English Nature, 2001), research suggests that newts are likely to travel no more than 250m from ponds where suitable habitats for foraging and hibernation exist close to their breeding ponds (Cresswell and Whitworth, 2004).

Biological records data was obtained from the Essex Wildlife Trust biological records centre [1] and supplemented with additional data requested from the Essex Field Club. Information on non-statutory sites was not included within the data received, but has subsequently been requested. The report will be further updated once the data on non-statutory sites within the onshore project area has been received. Details of those species listed on the Essex Biodiversity Action Plan (BAP) are also noted.

[1] Initial biological records were obtained from Essex Wildlife Trust, however this facility was closed on 30th September 2021, therefore when updated records were required, to account for changes in the onshore project area, additional records were obtained in October 2021 from the Essex Field Club.

3.3 Field survey methodology

The Extended Phase 1 Habitat Survey was undertaken over the following dates:

- 20th – 30th April 2021;
- 10th – 11th July 2021; and
- 20th September – 10th October 2021.

The purpose of the Extended Phase 1 Habitat Survey was to record the habitats within the survey area and to assess the suitability of the habitats present for supporting legally protected and notable species, therefore providing an overall understanding of the existing ecological value of the environment within the onshore project area. For selected species (e.g. badgers), evidence of presence / likely absence was also recorded.

The Extended Phase 1 Habitat Survey was undertaken in accordance with the methodology set out in the Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment (IEMA 1995)). This method of survey enabled information on the habitats within the survey area to be provided and in turn enabled an assessment of the potential for legally protected species to be present within or adjacent to the survey area. Habitats have been recorded within the survey area using the system set out within the Joint Nature Conservation Committee (JNCC) *'Handbook for Phase 1 habitat survey: A technique for environmental audit'* (JNCC, 2010).

All of the habitats within the survey area that were accessible at the time of the survey have been mapped and Target Notes (TN) have been used to provide details of characteristic habitats, species composition and to highlight any features of ecological interest. All TN descriptions, with photographs where available, are presented in **Appendix B – Target Notes**. In addition, areas where landowner access had not been granted at the time of the survey have been digitised using aerial imagery and will be ground-truthed during a further survey effort once landowner access has been agreed.

An assessment of hedgerows within the survey area was also undertaken. The methodology of which followed that outlined in the Hedgerow Survey Handbook (Defra, 2007) and is in line with The Hedgerow Regulations 1997. All hedgerows were recorded in line with the JNCC habitat classifications (JNCC, 2010). The full hedgerow results are presented in **Appendix C – Hedgerow Results**.

In accordance with the Guidelines for Baseline Ecological Assessment (CIEEM, 2017), the Extended Phase 1 Habitat Survey was 'extended' to make preliminary investigations in respect to the following legally protected and/or notable species:

3.3.1 Birds

As part of the Extended Phase 1 Habitat Survey, a search of all habitats with suitability to support breeding and/or over-wintering birds was undertaken, with a focus on those habitats with the suitability to support birds listed in Annex I of the EU Birds Directive, Schedule 1 of the Wildlife & Countryside Act 1981, all nearby SPA and SSSI qualifying features and/or rare, Red-listed species in the Birds of Conservation Concern (BoCC) (Eaton et al., 2015). Such habitats include trees, hedgerows, waterbodies, grazing marsh and agricultural land.

Specific over-wintering and breeding bird surveys have been undertaken, the findings from which are reported separately and not repeated in this document.

3.3.2 Badgers

A search for signs of badgers *Meles meles* within the survey area was undertaken concurrently with the Extended Phase 1 Habitat Survey. Signs such as setts, tracks, hairs, bedding and spoil heaps, snuffle holes and latrines were checked for. The results of the badger survey are included within **Appendix D – Badger Survey Results (Confidential)**.

Where active setts were noted, they were classified using the following categories which follows the Scottish National Heritage (SNH) guidance on badger surveys (SNH, 2004):

- **Main sett** – several holes with large spoil heaps and obvious paths leading from and between sett entrances.
- **Annex sett** – normally less than 150m from a main sett, comprising several holes. These setts may not be in use all the time, even if main setts are very active.
- **Subsidiary sett** – these are usually at least 50m from a main sett with no obvious paths connecting to other setts. These may only be used intermittently.
- **Outlier sett** – little spoil outside holes, with no obvious paths connecting to other setts. These are only used sporadically and may also be used by foxes and/or rabbits.

3.3.3 Bats

All trees, buildings and structures (e.g. bridges and farm buildings) were assessed for their potential to support roosting bats from the ground and using binoculars. Each feature was assigned a classification of either ‘negligible’, ‘low’, ‘moderate’ or ‘high’ suitability for supporting roosting bats and in accordance with the guidelines set out in Table 4.1 of the Bat Conservation Trust’s (BCT) Bat Surveys for Professional Ecologists: Good Practice Guidelines (BCT, 2016).

All linear features (e.g. tree lines, waterbodies and hedgerows) were also assessed for their potential to provide commuting and foraging habitat for bats, in accordance with Table 4.1 the BCT guidelines (BCT, 2016).

3.3.4 Water vole and otter

All standing and running waterbodies within the survey area were assessed for their suitability to support water voles and otters. Assessments of a waterbody’s suitability to support water voles and/or otters was made in line with the Mammal Society guidance (Dean et al., 2016) and standing advice from Natural England (Natural England, 2015).

3.3.5 Great crested newts

All standing water bodies (i.e. ponds and ditches) within the survey area have been mapped and were subject to a Habitat Suitability Index (HSI) assessment for their suitability to support breeding populations for great crested newts (following Oldham et al., 2000).

3.3.6 Reptiles

Areas of potential reptile habitat were recorded during the Extended Phase 1 Habitat Survey. Such habitat includes habitat mosaics comprising suitable habitats for reptile hibernation, basking and/or foraging. These habitats also include habitat transitions (ecotones), rank grassland, piles of debris or bare ground (Edgar et al., 2010).

3.3.7 Invertebrates

High quality and diverse habitats considered to provide suitable opportunities for terrestrial invertebrates were recorded during the Extended Phase 1 Habitat Survey. These habitats include areas of previously developed or 'brownfield' land, areas of flower rich grassland, suitable ponds and damp areas, areas of scrub and woodland or hedgerows, and mature/veteran trees. Of particular importance are where these habitats exist as a mosaic with the ability to support significant invertebrate populations throughout their lifecycle (Buglife, 2019).

3.3.8 Hazel dormice

Areas of habitat suitable for hazel dormice *Muscardinus avellanarius* were recorded during the Extended Phase 1 Habitat Survey. These included woody habitats including hedgerows and areas of species rich scrub and grassland that are connected to woodland areas with high degree of species diversity within tree and shrub species (English Nature, 2006).

3.3.9 Invasive non-native species

Where present, the location and extent of invasive non-native species was recorded within the survey area. The Extended Phase 1 Habitat Survey focused on those species listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

3.4 Surveyors

The Extended Phase 1 Habitat was conducted by a team of four Royal HaskoningDHV ecologists. The survey was led by Charlotte Clements, BSc (Hons) who is an Associate Member of CIEEM with six years' of Extended Phase 1 Habitat surveying experience, and Claire Smith, MSc, BSc (Hons) who is a Full Member of CIEEM and has 12 years of experience. The survey team included:

- Ashleigh Holmes MSc, BSc (Hons).
- Lewis Ashton MSc, BSc (Hons).

3.5 Weather conditions

Table 3.1 summarises the weather conditions encountered during the Extended Phase 1 Habitat Survey.

Table 3.1 – Weather conditions during the Extended Phase 1 Habitat Survey

Survey Date	Weather conditions
20th April 2021	Dry, fine and moderate breeze. Approximately 15° Celsius
22nd April 2021	Dry, fine and moderate breeze. Approximately 18 ° Celsius
27th April 2021	Dry, fine and moderate breeze. Approximately 16 ° Celsius
28th April 2021	Dry, fine and moderate breeze. Approximately 15 ° Celsius
30th April 2021	Dry, fine and moderate breeze. Approximately 16 ° Celsius
10th July 2021	Dry, fine and moderate breeze. Approximately 22 ° Celsius
11th July 2021	Dry, fine and moderate breeze. Approximately 24 ° Celsius
20th September 2021	Dry, fine and moderate breeze. Approximately 16 ° Celsius
21st September 2021	Dry, fine and moderate breeze. Approximately 18 ° Celsius
22nd September 2021	Dry, fine and moderate breeze. Approximately 17 ° Celsius

Survey Date	Weather conditions
23rd September 2021	Dry, fine and moderate breeze. Approximately 20 ° Celsius
24th September 2021	Dry, fine and moderate breeze. Approximately 21 ° Celsius
27th September 2021	Dry, mild. clear, moderate wind (gusts). Approximately 16 ° Celsius
28th September 2021	Dry, mild. clear, moderate wind (gusts). Approximately 14 ° Celsius
1st October 2021	Intermittent rain, mild. moderate wind (gusts). Approximately 13 ° Celsius
8th October 2021	Dry, overcast, mild and moderate breeze. Approximately 14 ° Celsius
12th October 2021	Intermittent rain, overcast, mild and moderate breeze. Approximately 14 ° Celsius
13th October 2021	Dry, overcast, mild and moderate breeze. Approximately 13 ° Celsius
14th October 2021	Dry, overcast, mild and moderate breeze. Approximately 11 ° Celsius
15th October 2021	Dry, overcast, mild and moderate breeze. Approximately 13 ° Celsius

3.6 Survey limitations

The 2021 Extended Phase 1 Habitat Survey covered approximately 75% of the onshore project area (as defined the time of writing). The remaining 25% equates to an area that is currently unsurveyed due to no landowner access being granted at the time of the 2021 survey. In the absence of field survey data, the habitats present within the unsurveyed areas have been digitised using aerial mapping, and are these habitats are also shown on **Figure 3a** to **Figure 3q** in **Appendix A** using a separate colour scheme to those habitats which have been identified in the field.

Some areas of habitats could not be fully accessed during the 2021 survey due to the presence of physical barriers, such as (but not limited to) dense scrub, which prevented safe entry for the surveyors. However, such areas were small and discrete and were encountered infrequently. In the few locations where they were encountered, they were noted as potentially providing field signs which could not be confirmed during the 2021 survey.

The 2021 survey was undertaken in April, July, September and early-October, which are considered to be within the optimal surveying window for identifying ground flora species and habitat communities. Therefore, sufficient evidence of key indicator species was found which in turn has enabled the successful identification of habitat communities present within the survey area. Additionally, the majority of habitats encountered within the survey area is consistent with those expected of agricultural landscapes and colonised by identifiable species, for example scrub dominated by bramble and hawthorn. Therefore, it is considered that the survey (and its findings) are robust in being used to characterise the existing site conditions and in turn be used to inform and support the ecological impact assessment that will be presented in the PEIR.

Although the survey team made the utmost effort to cover every habitat and pick up all field signs present during the 2021 survey, on occasion some field signs can be missed. Despite this, the data presented in this report is considered to provide an accurate description of the habitats within the survey area.

4 Results

4.1 Desk study results

4.1.1 Designated sites

The following designated sites are located within a 2km buffer of the onshore project area:

- Statutory designated sites:
  - Hamford Water (Site of Special Scientific Interest (SSSI), Special Protection Area (SPA), Special Area of Conservation (SAC), Ramsar and National Nature Reserve (NNR);
  - Holland Haven Marshes SSSI;
  - Holland On-Sea Cliff SSSI;
  - Holland Haven Local Nature Reserve (LNR); and
  - Pickers Ditch Meadow LNR.
- Non-statutory designated sites:
  - Great Holland Pits Local Wildlife Site (LWS).

The location of these designated sites are shown on **Figure 1** in **Appendix A** and **Table 4.1** summarises the qualifying features/reasons for their notification. Note that Holland On-Sea Cliff is a geological SSSI only, is not considered further within this report. At the time of writing this report, we are yet to receive confirmation on any additional non-statutory sites from the Essex Field Club, the report will be updated once this data is received.

Table 4.1 – Designated sites for nature conservation of relevance to the onshore project area

Site Name	Designation	Distance from onshore project area	Qualifying features/reasons for notification
Holland Haven Marshes	SSSI	Within onshore project area	An area of reclaimed estuarine saltmarsh and freshwater marsh situated between Holland-on-Sea and Frinton-on-Sea. The site is bisected by Holland Brook and its tributaries, from which an extensive ditch system radiates. The ditch network represents an outstanding example of a freshwater to brackish water transition intimated by the aquatic plant communities, which include a number of nationally and locally scarce species. The adjoining grasslands are of botanical importance in their own right as well as acting as a buffer zone to the ditch system. Further interest is provided by the aquatic and terrestrial invertebrates and the birds which frequent the area, especially in winter.
Holland Haven	LNR	Within onshore project area	This site comprises mown amenity grassland, hawthorn scrub, rough grassland, wet grazing marsh, scrape area and ponds. This site is known to support invertebrates such as the ruddy darter dragonfly *Sympetrum sanguineum*, larger carder bee *Bombus muscorum*, Roesel's bush cricket *Metrioptera roeselii*. Plants include birds foot trefoil *Lotus corniculatus*, birds foot fenugreek *Trigonella foenum-graecum* and soft hornwort *Ceratophyllum submersum*. A large number of bird species have also been recorded on site including purple sandpiper *Calidris maritima*, avocet *Recurvirostra avosetta* and short eared owl *Asio flammeus*.
	SPA	50m	Qualifies under Article 4.1 of the EU Birds Directive by supporting:

Site Name	Designation	Distance from onshore project area	Qualifying features/reasons for notification
Hamford Water			*During the breeding season:* *Sterna albifrons* – breeding (Eastern Atlantic) - 2.3% of the UK breeding population. *Over winter:* *Recurvirostra avosetta* – breeding (Western Europe/Western Mediterranean) - 25% of the UK population. Qualifies under Article 4.2 of the EU Birds Directive by supporting over winter: *Anas crecca* (North-western Europe) - 2.7% of the population in UK 5 year peak mean 1991/92-1995/96; *Branta bernicla bernicla* (Western Siberia/Western Europe) - 2.3% of the population 5 year peak mean 1991/92-1995/96; *Charadrius hiaticula* (Europe/Northern Africa - wintering) - 1.1% of the population 5 year peak mean 1991/92-1995/96; *Limosa limosa islandica* (Iceland - breeding) - 1.7% of the population 5 year peak mean 1991/92-1995/96; *Pluvialis squatarola* (Eastern Atlantic - wintering) - 7.5% of the population in UK 5 year peak mean 1991/92-1995/96; *Tadorna tadorna* (North-western Europe) - 2.2% of the population in UK 5 year peak mean 1991/92-1995/96; and *Tringa totanus* (Eastern Atlantic - wintering) - 0.8% of the population 5 year peak mean 1991/92-1995/96.
	Ramsar	50m	Qualifies under Criterion 6 (A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird): *Species with peak counts in spring/autumn:* Ringed plover, *Charadrius hiaticula* (Europe/Northwest Africa) Common redshank, *Tringa totanus totanus* *Species with peak counts in winter:* Dark-bellied brent goose, *Branta bernicla bernicla,* Black-tailed godwit, *Limosa limosa islandica* (Iceland/W Europe) Grey plover, *Pluvialis squatarola* (E Atlantic/W Africa -wintering)[2]
	SAC	50m	Annex II species that are a primary reason for selection of the site: 4035 Fisher's estuarine moth *Gortyna borelii lunata*
	NNR	50m	Unlike many of the other Essex NNRs, Hamford Water is not an estuary as it does not have a major river running into it. Instead it is classified as a coastal embayment that has been formed due to a natural dip in the underlying geology of the area. The bird life that this variety of habitats attracts is outstanding, especially the waders and waterfowl that can be seen in winter. Main habitats: salt marsh, intertidal mud flats, coastal, grazing marsh, sands, shingle, small freshwater ponds and ditches

[2] *Species/populations identified subsequent to designation for possible future consideration under criterion 6.*

Site Name	Designation	Distance from onshore project area	Qualifying features/reasons for notification
	SSSI	50m	Hamford Water is a tidal inlet whose mouth is about three miles south of Harwich. It is a large and shallow estuarine basin comprising tidal creeks, intertidal mud and sand flats, saltmarshes, islands, beaches and marsh grasslands. The site is of international importance for breeding Little Terns and wintering Dark-bellied Brent Geese, wildfowl and waders, and of national importance for many other bird species. It also supports communities of coastal plants which are rare or extremely local in Britain, including Hog's Fennel *Peucedanum officinale* which is found elsewhere only in Kent.
Holland on Sea Cliff	SSSI	300m	Geological SSSI.
Pickers Ditch Meadow	LNR	500m	Meadow surrounding Pickers Ditch tributary, representing a valuable green space in the Great Clacton area. Hedge planting along the border helps screen the site, whilst tree planting in the adjacent area provides a copse area surrounding the existing footpath.
Great Holland Pits	LWS	Within onshore project area	Old gravel pit that now supports many flowering plants, open grassland and pasture with remnants of old woodland with ponds and wet depressions.

4.1.2 UK Habitats of Principal Importance

The following UK Habitats of Principal Importance are present within the survey area and are shown on **Figure 2**, **Appendix A**:

- Coastal and floodplain grazing marsh.
- Ancient woodland.
- Deciduous woodland.
- Semi-improved grassland.
- Hedgerows.
- Arable field margins.
- Lowland meadows.
- Reedbeds.
- Rivers.
- Ponds.

4.1.3 Protected species

This section summarises the records of all legally protected and notable species which have been obtained from the biological records search from the Essex Wildlife Trust and the Essex Field Club. Details of those species which are also Essex BAP species are all provided (whether or not they have been recorded locally).

4.1.3.1 Birds

The Essex Field Club hold records of 240 notable or protected bird species within 5km of the onshore project area, of which 41 are listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Two of the bird records are dated from 1985 with the remaining records are within the last 10 years (i.e. from 2011).

The following species are subject to the Essex Species BAP:

- Sky lark *Alauda arvensis*,
- Bittern *Botaurus stellaris*,
- Grey partridge *Perdix perdix*,
- Stone curlew *Burhinus oedicnemus*, and
- Song thrush *Turdus philomelos*.

4.1.3.2 Badgers

Records provided in relation to badgers are provided in **Appendix D**.

4.1.3.3 Bats

The Essex Field Club hold records of 15 species of bat within 5km of the onshore project area. Namely the western barbastelle *Barbastella barbastellus*, serotine *Eptesicus serotinus*, natterer's bat *Myotis nattereri*, lesser noctule *Nyctalus leisleri*, nathusius's pipistrelle *Pipistrellus nathusii*, common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus* and brown long-eared bat *Plecotus auritus*.

The following species are subject to the Essex Species BAP:

- Common Pipistrelle *Pipistrellus pipistrellus*.

4.1.3.4 Water Vole

The Essex Field Club holds 57 records for water vole within 2km of the survey area. Of the 57 records, three are within the last 10 years, these three records were shown within the Harwich Gateway retail park, the Dovercourt Dock river, and the River Colne, which are all outside of the onshore project area.

Consultation with Natural England through the project's Evidence Plan Process (Andrew Hartley, pers. comm., 13 January 2022) indicated that Holland Haven Marshes has historically supported populations of water voles.

Water voles are subject to the Essex Species BAP.

4.1.3.5 Otter

The Essex Field Club holds 14 records for otter within 2km of the survey area. Of the 14 records, five are within the last 10 years. These five records were shown within Holland Haven, Ardleigh reservoir, Alresford Creek, and Tenpenny Brook.

Otters are subject to the Essex Species BAP.

4.1.3.6 Great crested newts

The Essex Field Club holds 10 records of great-crested newt within 2km of the survey area. Of the 10 records, four are within the last 10 years. These records are shown within Weeley, Kirby Cross, and Ardleigh.

4.1.3.7 Reptiles

The Essex Field Club holds records of 24 adders *Vipera berus*, 68 common lizards *Zootoca vivipara*, 33 grass snakes *Natrix natrix* and 49 slow-worms *Anguis fragilis* throughout (and up to 2km from) the survey area.

4.1.3.8 White-clawed crayfish

The Essex Field Club holds no records for white-clawed crayfish within 2km of the survey area.

White-clawed crayfish are subject to the Essex Species BAP.

4.1.3.9 Invertebrates

The Essex Field Club holds 329 of invertebrates within 2km of the survey area, including notable bee, dragonfly, butterfly, moth, cricket and beetle species.

The following invertebrate species are subject to the Essex Species BAP:

- Bright wave moth *Idaea ochrat*,
- Desmoulin's whorl snail *Vertigo moulinsiana*,
- Fisher's estuarine moth *Gortyna borelii lunata*,
- Heath fritillary *Melitaea athalia*,
- Hornet's robber fly A*silus crabroniformis*,
- Shining ramshorn snail *Segmentina nitida*,
- Shrill carder bee *Bombus sylvarum*, and
- Stag beetle *Lucanus cervus*.

4.1.3.10 Invasive non-native species

The Essex Field Club holds 712 records of different invasive non-native species within 2km of the survey area.

Japanese knotweed has been recorded at 21 locations, including Clacton-Holland cliffs, Frating Green area, Frinton and Walton cliffs, Great Clacton, Stour Estuary, and Wivenhoe Marshes. In addition, American mink *Neovison vison*, butterfly bush *Buddleja davidii* have also been recorded.

4.1.3.11 Other species

The Essex Field Club holds 29 records of hazel dormouse *Muscardinus avellanarius* and 64 records of brown hare *Lepus europaeus* within 2km of the survey area.

Both the hazel dormouse and brown hare are subject to the Essex Species BAP.

Notable plant species, primarily associated with the Holland Haven Marshes SSSI and Holland Haven LNR, have also been recorded within the onshore survey area.

4.2 Field survey results

4.2.1 Habitats

Table 4.2 presents the key habitats that were recorded within the survey area during the field survey (as shown on **Figure 3a** to **Figure 3q** in **Appendix A**.

Table 4.2 – JNCC Phase 1 habitat areas recorded during the Extended Phase 1 Habitat Survey

JNCC Phase 1 Habitat Code	JNCC Phase 1 Habitat Survey Description	Area (ha)
A1.1.1	Broadleaved woodland - semi-natural	19.74
A1.1.2	Broadleaved woodland - plantation	2.96

JNCC Phase 1 Habitat Code	JNCC Phase 1 Habitat Survey Description	Area (ha)
A1.3.2	Mixed woodland - plantation	0.88
A2.1	Scrub - dense/continuous	29.47
A2.2	Scrub - scattered	0.83
A3.1	Broadleaved Parkland/scattered trees	3.74
A3.3	Mixed Parkland/scattered trees	1.49
B2.2	Neutral grassland - semi-improved	3.19
B4	Improved grassland	136.67
B5	Marsh/marshy grassland	10.97
B6	Poor semi-improved grassland	163.13
C3.1	Other tall herb and fern - ruderal	20.28
G1	Standing water	17.96
G2	Running water	6.86
H4	Boulders/rocks above high tide mark	0.47
H8.2	Soft cliff	0.74
J1.1	Cultivated/disturbed land - arable	1457.06
JNCC Phase 1 Habitat Code	**JNCC Phase 1 Habitat Survey Description**	**Length (m)**
G1	Standing water	5174.99
G2	Running water	788.74
J2.1.1	Intact hedge - native species-rich	1840.59
J2.1.2	Intact hedge - species-poor	22961.38
J2.2.1	Defunct hedge - native species-rich	458.38
J2.2.2	Defunct hedge - species-poor	9622.11
J2.3.1	Hedge with trees - native species-rich	10157.56
J2.3.2	Hedge with trees - species-poor	14681.18
J2.6	Dry ditch	12069.58
J2.8	Earth bank	190.64

In addition, the areas where no landowner access was agreed at the time of the Extended Phase 1 Habitat Survey have assigned habitats using a review of available aerial imagery, and the key habitats identified are summarised in **Table 4.3** below.

Table 4.3 – Habitats digitised using aerial mapping

JNCC Phase 1 Habitat Code	JNCC Phase 1 Habitat Survey Description	Area (ha)
A1	Woodland	18.15
B	Grassland	53.96
J1.1	Cultivated/disturbed land - arable	462.91
J3.6	Buildings	3.99

JNCC Phase 1 Habitat Code	JNCC Phase 1 Habitat Survey Description	Area (ha)
JNCC Phase 1 Habitat Code	**JNCC Phase 1 Habitat Survey Description**	**Length (m)**
G1/G2	Standing water/Running water	1596.76
J2	Hedge	13,538.50

4.2.1.1 Arable land

The largest habitat by area within the survey area is arable land (JNCC Phase 1 Habitat code J1.1). At the time of the 2021 survey, some of these fields were in crop and some were ploughed.

4.2.1.2 Boundary features

Field boundaries within the survey area comprised predominately of hedgerows, with some field margin drainage ditches (both dry and wet), scattered scrub and trees. The predominant type of hedgerow recorded was species-poor intact (J2.1.2) (total of 101 features), alongside species-poor hedges with trees (J2.3.2) (total of 50), species-poor defunct hedges (J2.2.2) (total of 45), species-rich hedges with trees (J2.3.1) (total of 31) species-rich intact hedges (J2.1.1) (total of 6) and species-rich defunct hedges (J2.2.1) (total of 5). Key species recorded in hedgerows throughout the survey area consisted of hawthorn *Craetagus monogyna* and blackthorn *Prunus spinosa*, with bramble *Rubus fruticosus*, dog rose *Rosa Canina*, oak *Quercus robur*, ash *Fraxinus excelsior* and hazel *Corylus avellana.*

An additional 50 hedgerows have been identified using aerial imagery, with specific details to be ground-truthed to identify species present and what hedgerow classification they are (e.g. species-rich/species-poor etc.)

4.2.1.3 Woodland

A total of 37 areas of woodland were recorded throughout the survey area and included semi-natural and plantation broad-leaved woodland as well as mixed plantation woodland. These areas ranged from larger areas of woodland to smaller roadside and field margin copses. A high number of woodland areas recorded contained game bird pens and feeding apparatus. Key species recorded included oak, ash, sweet chestnut *Castanea sativa*, hazel, sycamore *Acer pseudoplatanus*, birch *Betula spp.,* and pines.

An additional 33 areas of woodland have been identified using aerial imagery, with specific details to be ground-truthed to identify individual habitats and species present.

4.2.1.4 Scrub

A total of 63 areas of dense and scattered scrub were recorded within the survey area and key species comprised bramble, nettle, cow parsley and cleavers. These areas represented a range of habitat sub-types including transitional habitat associated with boundary features, field margins, woodland successional habitats and watercourse margins.

4.2.1.5 Improved grassland

A total of 51 areas of improved grassland was recorded across the survey area, mainly consisting of grazing pasture for sheep, cattle and horses. These grasslands were characterised by short sward perennial rye grass *Lolium perenne* with limited herbs consisting of ragwort *Jacobea vulgaris*, clover *Trifolium spp.,* and dandelion *Taraxacum officinale* with areas of scattered/dense shrubs and/or scrub.

4.2.1.6 Semi-improved grassland and Poor semi-improved grassland

81 areas of semi-improved and poor semi-improved grassland were recorded throughout the onshore project area. These areas comprised coarse ruderal grass and herb species such as cock's foot *Dactylis glomerata* and broadleaf dock *Rumex obtusifolius*.

4.2.1.7 Marshy grassland

A total of six areas of marshy grassland were recorded throughout the survey area, generally consisting of a mix of wet and dry areas with species such as hard rush *Juncus inflexus*, water forget-me-not *Myosotis scorpiodes*, lady's thumb *Persicaria maculosa*, creeping buttercup *Ranunculus repens* and bittercress *Cardamine hirsuta*.

4.2.1.8 Amenity grassland

41 areas of amenity grassland were recorded within the survey area, generally consisting of short sward perennial rye grass subject to frequent mowing.

In addition, a further 51 areas of grassland have been identified using aerial imagery, with specific details to be ground-truthed with regard to species present and habitat type.

4.2.1.9 Other tall herb and fern – ruderal

19 areas of ruderal herbs were recorded within the survey area, ranging from large areas through to field margins and set-aside areas within arable crops. Key species noted included, bristly ox-tongue *Helminthotheca echioides*, common and ribwort plantain *Plantago spp.*, fleabane *Pulicaria dysenterica*, common hogweed *Heracleum sphondylium*, nettle *Urtica dioica*, ox-eye daisy *Leucanthemum vulgare* and teasel *Dipsacus fullonum*.

4.2.1.10 Standing and running water

There are 80 watercourses (i.e. ditches and rivers, excluding ponds) within the survey area and these include both field margin/boundary ditches, standing water and running water such as rivers.

4.2.1.11 Other habitats

The following habitats were also recorded within the survey area (number of areas recorded in brackets):

- Caravan site (2);
- Buildings (251);
- Bare ground (50);
- Artificial sea wall (2); and
- Earth bank (1).

4.2.2 Protected species

This section should be read in conjunction with **Figure 3a** to **Figure 3q** in **Appendix A**.

4.2.2.1 Birds

All hedgerows, trees, grassland, scrub and woodland habitats that were recorded potentially provide suitable nesting habitat for protected, notable and common species of birds.

The following birds were also recorded utilising habitats within the survey area (all figures can be found in **Appendix A**):

- Oystercatcher *Haematopus ostralegus* (TN002, **Figure 3a**);
- Skylark *Alauda arvensis* (TN005, **Figure 3a**);
- Dunnock *Prunella modularis* (TN407, **Figure 3e**);
- Buzzard *Buteo buteo Falco tinnunculus* (TN472, **Figure 3j**; and
- Kestrel (TN411, **Figure 3f**).

In addition, several barn owl boxes (TN089 and TN110, **Figure 3a**; TN333, **Figure 3c**) and relic nests (e.g. old nests from previous breeding season(s)) (TN027 and TN102, **Figure 3b**; TN415, **Figure 3f** and TN478, **Figure 3m**) were also present within the survey area.

Additional findings from the separate over-wintering and breeding bird surveys are reported separately and have not been repeated in this document.

4.2.2.2 Badger

Field survey results relating to badger are provided separately in **Appendix D – Badger Survey Results (Confidential)**.

4.2.2.3 Bats

All features (e.g. trees and structures) recorded within the survey area were assessed from the ground level and using binoculars for cracks, crevices, splits, herein referred to as Potential Roost Features (PRFs). The presence of PRFs, or lack of, allows each feature to be categorised for their suitability to support roosting bats, in accordance with the BCT guidelines (BCT, 2016).

In total 331 features were assessed for their suitability to support roosting bats. Of these 86 were assessed as providing negligible suitability for roosting bats, 110 were assessed as providing low suitability, 122 as providing moderate suitability and 13 as having high suitability. The full details for each bat roost assessment is in **Appendix E – Bat Roost Assessment Results**, including a feature description, photograph and reference.

All linear features (e.g. watercourses, hedgerows) were also assessed for their potential suitability to support commuting and/or foraging bats, in accordance with the BCT guidelines (BCT, 2016).

In total, 215 features were assessed as for their suitability for commuting and foraging bats. Of these, 97 were assessed as providing negligible suitability, 15 features as providing low suitability, 100 as providing moderate suitability and three as having high suitability. Details regarding features assessed for their suitability for commuting and foraging bats are presented in **Appendix C** – **Hedgerow Results**

4.2.2.4 Water vole and otter

A total of 80 watercourses were recorded within the survey area which comprised of standing water, running water (e.g. rivers or ditches) and dry ditches. Of these 80 watercourses, 8 were assessed as being suitable to support water voles and 1 as being suitable to support otters.

The remaining 76 watercourses were assessed as sub-optimal for water voles and/or otters, primarily as they were field drains of insufficient size and depth to support either of these species, as well as being dry at the time of the survey. In addition, these watercourses were not functionally linked to the wider river/ditch network and therefore concluded unfavourable to these species.

4.2.2.5 Great crested newt

A total of 52 waterbodies (i.e. ponds and ditches) were subject to a HSI assessment during the 2021 survey, for which the full results are in **Appendix F – Full HSI Results**. All pond references are also included on **Figure 3a** to **Figure 3q** in **Appendix A**. A numerical score is derived from the ten suitability indices described in the Amphibian and Reptile Groups (ARG) of the United Kingdom Advice Note 5 (Oldham et al., 2000), which broadly considers habitat attributes (i.e. pond size, water quality, presence of fish or fowl etc.), that are considered to influence the suitability of a waterbody for breeding great crested newts. The approximate indication of habitat suitability is as follows:

- < 0.5 (poor quality habitat);
- 0.5 – 0.59 (below average quality habitat);
- 0.6 – 0.69 (average quality habitat);
- 0.7 – 0.79 (good quality habitat); and
- ≥ 0.8 (excellent quality habitat).

A summary of the HSI results undertaken during the Extended Phase 1 Habitat Survey is presented in **Table 4.4**.

Table 4.4 – Summary of HSI results of ponds assessed during the Extended Phase 1 Habitat Survey

HSI score	Number of waterbodies
< 0.5	7
0.5 – 0.59	13
0.6 – 0.69	14
0.7 – 0.79	13
≥ 0.8	5

4.2.2.6 Reptiles

A total of 15 areas of habitat potentially suitable for common reptile species was recorded within the survey area. These includes areas of rank grassland, debris piles, scrub, woodland edges and other ecotones. Of these 15 areas, a total of six have been identified as suitable habitat mosaics that could support large populations of common reptile species.

In addition, 8 locations that could potentially be used by hibernating reptile species was also recorded, consisting of log piles and deadwood/fallen logs.

4.2.2.7 Hazel dormice

A total of 13 areas of suitable habitat for dormice was recorded within the survey area primarily consisting of hazel rich hedgerows connected to woodland. These hedgerows were identified as suitable for dormice due to a rich species diversity as well as presence of hazel and connectivity to a wider woodland habitat. The locations of these habitats are as follows, the majority of which are hedgerows adjacent (and associated) with the Great Holland Pits LWS:

- TN401, H075, H076, H077, H078, H079 and H085, H087, H089 (**Figure 3e**);
- TN410 (**Figure 3d**)
- H127 and H136 (**Figure 3h**); and
- H149 (**Figure 3i**)

4.2.2.8 Invasive non-native species

One area of giant hogweed was recorded within the survey area (TN437, **Figure 3g**).

5 Recommendations

Section 4.2 identifies those habitats within the survey area that have been noted as having the potential to support legally protected or notable species, and also sightings/field signs for selected legally protected species. In light of these findings and in order to characterise the ecological baseline, further Phase 2 species-specific surveys have been identified are required to characterise the ecological baseline. Further details relating to these Phase 2 species specific surveys are provided in the following sections.

5.1 Phase 2 species specific surveys

5.1.1 Birds (over-wintering and breeding)

Over-wintering and breeding bird surveys have been undertaken (and are still ongoing) and the methodology and findings are reported separately so have not been repeated here.

5.1.2 Bat roost emergence/re-entry surveys

In accordance with the BCT guidance (BCT, 2016), all trees assessed as providing moderate or high suitability for supporting roosting bats will require additional surveys to be undertaken to confirm the likely presence and/or absence of a bat roost. In addition, any structures (i.e. buildings) that have been assessed as providing low, moderate or high suitability for roosting bats will also require a further survey effort.

All trees assessed as providing low suitability for supporting roosting bats will still be considered as potentially supporting opportunistic roosts in the future, but further surveys are not required to confirm presence or absence, following the guidelines set out by the BCT (BCT, 2016). Mitigation measures for trees assessed as providing low suitability for roosting bats will be required.

The Extended Phase 1 Habitat Survey identified the following numbers of features that will require a further survey effort:

- Low (structures only) – three;
- Moderate – 122; and
- High – 13.

Each emergence / re-entry surveys will be undertaken in accordance with the methodology outlined in the BCT guidelines (BCT 2016). For each building offering low suitability, one survey visit (i.e. one dusk emergence or one dawn re-entry) will be undertaken. For each building and/or tree offering moderate suitability, two survey visits (i.e. one dusk emergence survey and one dawn re-entry survey) will be undertaken. Each dusk emergence survey will commence 15 minutes before sunset and will stop 1.5-2 hours after sunset. The dawn re-entry surveys will commence 1.5-2 hours before sunrise and will stop 15 minutes after sunrise. All surveys will be undertaken at least two weeks apart and between May and September with one survey visit between May and August. For each building and/or tree offering high suitability, an additional dusk emergence or dawn re-entry survey will be undertaken, in line with the BCT guidelines.

Hand-held bat detectors (any type) and recording equipment to record any echolocation calls will be used for each survey. Laboratory sound-analysis will be used to identify the calls of any bat species picked up using the bat detectors. Species, timing, and activity will be noted for each bat picked up during the survey.

Weather conditions including temperature, wind speed and precipitation, will be recorded at the start and end of each survey visit. Surveys will not be carried out when the temperatures are below 10°C at sunset, or during heavy rain or strong wind unless justified by the surveying ecologist.

5.1.3 Bat activity transect and static detector surveys

Those linear habitats (i.e. hedgerows and watercourses) with the potential to support commuting and foraging bats will be subject to further survey effort to confirm the species assemblage utilising these habitats. In accordance with the BCT guidelines (BCT 2016), all habitats assessed as providing moderate or high suitability for supporting commuting and/or foraging bats will require further bat activity surveys in order to confirm the number of bats, whether they are used by foraging and/or commuting bats, and to identify the species which might be present.

All features assessed as providing low suitability for supporting commuting and/or foraging bats will still be considered as potentially supporting small numbers of commuting/foraging bats, but further surveys are not necessary to confirm presence or absence, as set out by the BCT guidelines (BCT 2016). Mitigation measures for features assessed as providing low suitability for commuting and/or foraging bats will be required.

The Extended Phase 1 Habitat Survey identified the following numbers of features that will require a further survey effort:

- Moderate – 100; and
- High – three.

Each monthly bat activity transect surveys will be undertaken in accordance with the guidelines (BCT 2016). Transect surveys will involve walking at a constant speed along each linear bat habitat recording observations such as number of bats, flight direction, flight height, behaviour, appearance and relative speed.

Static detector surveys will comprise the placement of a static detector at locations identified as suitable, such as within hedgerows or along woodland edges. Data from these surveys will be recorded and subject to laboratory sound-analysis to identify species and pass numbers following each survey.

Each habitat scoped into the survey, and assessed as providing moderate or high suitability for commuting or foraging bats will be subject to one transect survey visit per month between April and October (a total of seven visits), including one dusk and pre-dawn survey within a 24-hour period, and static bat detector surveys at up to three locations within each habitat collected on five consecutive nights per month, including one dusk and pre-dawn survey within a 24 hour period. Each transect survey will commence at sunset and stop 2-3 hours after sunset. The static detector surveys will commence 30 minutes before sunset and stop 15 minutes after sunrise.

The surveyors will use hand-held bat detectors (any type) and recording equipment to record any echolocation calls picked up during each survey. The same model of detector will be used for all surveys. Laboratory sound analysis will be used to identify the calls of any bat species picked up using the bat detectors.

Weather conditions including temperature, wind speed and precipitation, will be recorded at the start and end of each survey visit. Surveys will not be undertaken when the temperature is below 10°C at sunset, or during heavy rain or strong wind, unless justified by the surveying ecologist.

5.1.4 Water vole and otter

All eight waterbodies identified as providing optimal habitat for water vole and/or otter during the Extended Phase 1 Habitat Survey, plus all watercourse located within Holland Haven Marshes SSSI, will be subject to two separate survey visits.

The water vole surveys will be undertaken in accordance with the protocol for Environmental Assessment Surveys set out in the Water Vole Conservation Handbook (Strachan et al. 2011) and the Water Vole Mitigation Handbook (Dean et al., 2016). Surveys will be undertaken from the banks. Surveyors will search for field signs of water voles primarily within the marginal vegetation along the bank toe and along the length of the watercourse, including a buffer of 50m upstream and downstream, and up to 1m either side of this vegetation along one bank of the watercourse. All field signs of water vole will be recorded, including sightings, burrows, latrines, feeding stations, lawns, nests, footprints and runways. Field signs, habitat information, and weather conditions at the time of the survey will also be recorded alongside their location.

Otter surveys (comprising two separate visits) will be undertaken in accordance with the protocol set out by SNH (SNH, 2019). Surveys will be conducted on one bank for the full length of each optimal watercourse, plus an additional 250m upstream and 250m downstream. Each watercourse will be walked by an ecologist, and all field signs of otter will be recorded. This will include spraints, holts, couches, prints, feeding remains, anal jelly and sightings, as well as signs of mink. The field sign and its location will be recorded.

The water vole and/or otter survey will consist of two separate survey visits, one undertaken during the first half of the water vole breeding season (e.g. between April and June (inclusive)) and the second visit will be undertaken during the second half of the water vole breeding season (e.g. between July and September (inclusive)). Surveys for water vole and/or otter will not be undertaken following heavy rain.

Due to the potential overlap in survey methodology and in habitats, the otter survey may be undertaken concurrently with the water vole survey.

5.1.5 Great crested newt

All standing waterbodies (i.e. ponds and ditches) within and up to 250m of the onshore project area will be subject to an environmental DNA (eDNA) survey in accordance with the field sampling protocol set out in Biggs et al. (2014). The eDNA survey will be undertaken by licenced surveyors (Licence: CL08) at the appropriate time of year (e.g. between mid-March and the end of June (inclusive)). Water samples from each pond will be collected from around the accessible parts of each waterbody perimeter by a great crested newt licenced ecologist, including open water areas and areas with vegetation present. Each water body sampling will be completed with a fresh sampling pack to avoid cross contamination.

Each sample will then be sent to an approved laboratory for analysis for eDNA in accordance with approved field and laboratory protocols (Biggs et al., 2014). The presence or absence of great crested newt from each of the surveyed ponds will be determined based on the results of the eDNA analysis.

5.1.6 Reptiles

Areas of habitats suitable to support large numbers of common reptile species was recorded within the onshore project area. These habitat mosaics provide all the suitable habitat elements required by reptiles including hibernacula, basking and foraging areas.

Reptile presence/likely absence surveys will be undertaken in accordance with the protocol set out in the JNCC's Herpetofauna Worker's Manual (2003). The survey will involve the placement of artificial refugia (tiles/tins) within each suitable location and within area of optimal habitat. A total of seven separate visits will be undertaken and during each visit all refugia will be checked for the presence of reptiles. These visits will be undertaken during April, May and September. A minimum of 48hrs will be left between each survey visit.

Weather conditions will be recorded during each visit. Each survey visit will be undertaken during the morning and/or late afternoon, with the intention to coincide with the optimal temperature window (10-17 degrees Celsius).

5.1.7 Hazel dormice

Areas of suitable habitat for hazel dormice within the onshore project area will be subject to a dormouse presence/absence survey, using a combination of nest tubes and/or nest boxes. The survey will be undertaken in accordance with the methodology presented in the Dormouse Conservation Handbook (2nd Ed.) (English Nature, 2006). Nest tubes/nest boxes will be placed 15-20m apart within suitable habitat and checked every two months between April and October.

Weather conditions will be recorded during each visit and all surveys will be undertaken by an ecologist who holds a dormice survey and handling licence (Licence: CL10a).

5.1.8 Invertebrates

An invertebrate survey effort has been undertaken within the Holland Haven Marshes SSSI and the methodology and findings are reported separately and have not been repeated here.

5.1.9 National Vegetation Classification

A National Vegetation Classification (NVC) survey effort has been undertaken within the Holland Haven Marshes SSSI and the methodology and findings are reported separately and have not been repeated here.

5.2 Survey programme

Based on the results obtained from the 2021 survey, the provisional onshore ecology survey programme for 2022 is presented in **Table 5.1**.

Table 5.1 – Proposed onshore ecology survey programme

Survey	Proposed survey date
Over-wintering bird surveys	October 2020 – March 2021 (completed at cable landfall search area) October 2021 – March 2022
Functionally-linked land survey of ex situ SPA habitats	October 2021 – March 2022
Breeding bird surveys	April – July 2021 (completed at cable landfall search area)

Survey	Proposed survey date
Bat emergence/re-entry surveys	May – September 2022
Bat activity surveys	April – October 2022
Water vole surveys	Mid-April – June 2022 (1st survey visit) July – September 2022 (2nd survey visit)
Otter surveys	March – September 2022
Great crested newt surveys	Mid-April – June 2022
Reptile surveys	April – June, September 2022
Hazel dormice surveys	April – October 2022

5.3 Summary of Phase 2 survey requirements

Table 5.2 provides a summary of the Phase 2 species-specific surveys that have been identified based on the findings of the Extended Phase 1 Habitat Survey. Further information on the suite of Phase 2 surveys is provided in **Section 5.1** and an indicative survey programme is provided in **Section 5.2**.

Table 5.2 – Summary of Phase 2 survey requirements

Species	Phase 2 survey required (yes/no)
Birds	**Yes** – a suite of over-wintering and breeding bird surveys have been undertaken in 2020/2021, no further surveys beyond these are proposed.
Badgers	Information relating to badger is reported in **Appendix D**.
Bats	**Yes** – further surveys to confirm the presence of roosting bats (dusk/dawn emergence/re-entry survey) and commuting/foraging bats (monthly activity and static detector surveys) will be undertaken within all suitable habitat within the onshore project area.
Water vole and otter	**Yes** – presence/absence surveys will be undertaken of all waterbodies within the onshore project area.
Great crested newt	**Yes** – an eDNA survey to establish the presence or likely absence of great crested newts in ponds and ditches within and up to 250m of the onshore project area will be undertaken.
Reptiles	**Yes** – presence/absence surveys will be undertaken within all areas of suitable habitat that may support significant populations of common reptile species within the onshore project area.
Hazel dormice	**Yes** – presence/absence surveys will be undertaken within all areas of suitable habitat within the onshore project area.

6 Conclusion

An Extended Phase 1 Habitat Survey was undertaken in April, July, September and October 2021 to record the habitats within the onshore project area plus a 50m buffer and to identify suitability for these habitats to support legally protected and notable species.

The following designated sites are located within a 2km buffer of the onshore project area:

- Statutory designated sites:
  - Hamford Water (SSSI, SPA, SAC, Ramsar and NNR;

- Holland Haven Marshes SSSI;
- Holland On-Sea Cliff SSSI;
- Holland Haven LNR; and
- Pickers Ditch Meadow LNR.

- Non-statutory designated sites:
  - Great Holland Pits LWS.

At the time of writing this report, we are yet to receive confirmation on any additional non-statutory sites from the Essex Field Club, the report will be updated once this data is received.

The following UK Habitats of Principal Importance are present within the onshore project area:

- Coastal and floodplain grazing marsh;
- Ancient woodland;
- Deciduous woodland;
- Semi-improved grassland;
- Hedgerows;
- Arable field margins;
- Lowland meadows;
- Reedbeds;
- Rivers; and
- Ponds.

The onshore project area is dominated by arable fields interspersed with field margin drains, rivers and areas of scattered and dense scrub. Field boundaries are typically hedgerows (species-poor intact and/or defunct) and dominated by hawthorn and/or blackthorn. Other habitats are present which are considered to be of a higher ecological value such as semi-improved grassland, improved grassland, marshy grassland, woodland (broadleaved and mixed semi-natural and plantation) waterbodies, trees, tall ruderal, woodland/scrub successional habitats and areas of scrub.

Key features for protected and notable species have been recorded within the onshore project area and further surveys to the confirm their presence and/or likely absence has been identified. A summary of the features recorded during the Extended Phase 1 Habitat Survey is provided in **Table 6.1**.

Table 6.1 – Summary of features recorded during the Extended Phase 1 Habitat Survey

Species	Summary of key findings
Bat (roosting)	In total 331 features were assessed for their suitability to support roosting bats. Of these 86 were assessed as providing negligible suitability for roosting bats, 110 were assessed as providing low suitability, 122 as providing moderate suitability and 13 as having high suitability.
Bats (commuting/foraging)	In total, 215 features were assessed as for their suitability for commuting and foraging bats. Of these, 97 were assessed as providing negligible suitability, 15 features as providing low suitability, 100 as providing moderate suitability and three as having high suitability.
Water vole and otter	A total of 80 watercourses were recorded within the survey area which comprised of standing water, running water (e.g. rivers or ditches) and dry ditches. Of these 80 watercourses, 8 were assessed as being suitable to support water voles and 1 as being suitable to support otters.
Great crested newt	A total of 52 waterbodies (i.e. ponds and ditches) were subject to a HSI assessment during the Extended Phase 1 Habitat Survey.

Reptiles	A total of 15 areas of suitable reptile habitat was recorded within the survey area, of which six are potentially suitable for supporting large numbers of common reptiles.
Hazel dormice	A total of 13 areas of suitable habitat for dormice was recorded within the survey area primarily consisting of hazel rich hedgerows connected to woodland.
Invasive non-native species	One area of giant hogweed was recorded within the survey area.

7 References

Bat Conservation Trust's (BCT) (2012) Professional Training Standards for Ecological Consultants.

Bat Conservation Trust's (BCT) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed.).

Bibby, C.J., Burgess, N.D., Hill, D.A., Mustoe, S.H (2000). Bird Census Techniques, second edition. Ecoscope.

Biggs, J., Ewald, N., Valentini, A., Gaboriaund, C., Griffiths, R.A., Foster, J., Wilkinson, J., Arnett, A., Williams, P. & Dunn, F. (2014) Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA. Freshwater Habitats Trust, Oxford.

Buglife (2019). Good Planning Practice for Invertebrate Surveys.

Chartered Institute of Ecology and Environmental Management (CIEEM) (2016) Professional Code of Conduct, Revised June 2016.

Chartered Institute of Ecology and Environmental Management (CIEEM) (2017) Guidelines on Ecological Report Writing, 2nd Edition, December 2017)

The Conservation of Habitats and Species Regulations 2017 (as amended). Available at http://www.legislation.gov.uk/uksi/2017/1012/contents/made.

Cresswell, W., and Whitworth, R.., (2004) An assessment of the efficiency of capture techniques and the value of different habitats for the great crested newt Triturus cristatus. English Nature Research Reports.

Dean et al., (2016). The Water Vole Mitigation Handbook. The Mammal Society.

Defra (2007). Hedgerow Survey Handbook. A standard procedure for local surveys in the UK. Defra, London

Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746. Available at https://www.bto.org/sites/default/files/shared_documents/publications/birds-conservation-concern/birds-of-conservation-concern-4-leaflet.pdf

Edgar, P., Foster, J. and Baker, J. (2010). Reptile Habitat Management Handbook. Amphibian and Reptile Conservation, Bournemouth

English Nature (2001) Great Crested Newt Mitigation Guidelines

English Nature (2006) The Dormouse Conservation Handbook (2nd Edition)

The Hedgerow Regulations 1997. Available at http://www.legislation.gov.uk/uksi/1997/1160/contents/made.

Institute of Environmental Assessment (1995). Guidelines for Baseline Ecological Assessment.

IUCN (2019). The IUCN Red List of Threatened Species. Version 2019-1. Available at: http://www.iucnredlist.org.

Joint Nature Conservation Committee (JNCC) (2010) Handbook for Phase 1 habitat survey: A technique for environmental audit.

JNCC and Defra (on behalf of the Four Countries' Biodiversity Group). 2012. UK Post-2010 Biodiversity Framework. July 2012. Available from: http://jncc.defra.gov.uk/page-6189.

Natural England, Multi-Agency Geographic Information for the Countryside (MAGIC), Department for Environment, Food and Rural Affairs (Defra), May 2013. Available at www.magic.gov.uk.

Natural England (2015). Standing advice for local planning authorities who need to assess the impacts of development on water voles.

Natural Environmental and Rural Communities (NERC) Act 2006. Available at https://www.legislation.gov.uk/ukpga/2006/16/contents.

Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal 10 (4), 143-155.

Protection of Badgers Act 1992. Available at https://www.legislation.gov.uk/ukpga/1992/51/contents.

Scottish Natural Heritage (SNH) (2004) Best Practice Badger Survey Guidance Note

Scottish Natural Heritage (SNH) (2016) Standing advice for planning consultations – Otters

Strachan, R., Moorhouse, T., and Gelling, M. (2011) Water Vole Conservation Handbook 3rd Edition. Wildlife Conservation Unit, University of Oxford.

Wildlife and Countryside Act (WCA) 1981 (as amended). Available at https://www.legislation.gov.uk/ukpga/1981/69.

Site: Holland Haven Marshes Site of Special Scientific Interest

Item: Surveys and Assessment of Aquatic and Terrestrial Invertebrates

Client: Royal HaskoningDHV on behalf of North Falls Offshore Wind Limited

Author: Dr GW Hopkins FRES CEnv MCIEEM

Date: 18 November 2021

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CONTENTS

SUMMARY

The North Falls Offshore Wind Farm (herein 'the project') is a proposed extension to the operational Greater Gabbard Offshore Wind Farm, which is located off the east coast of England in the Southern North Sea. The project is currently awaiting a grid connection offer from National Grid. In the interim, an area immediately landward of the coast between the settlements of Clacton-on-Sea and Frinton is being targeted for ecological surveys in relation to the Holland Haven Marshes Site of Special Scientific Interest (SSSI) in order to inform the project's Environmental impact Assessment (EIA). The surveys and assessment presented here are intended to establish its baseline value for invertebrates, and to inform the assessment of impacts and suggest potential mitigation and enhancement measures.

The SSSI forms a tract of grazing marsh and associated habitat either side of the Holland Brook and includes a frontage to the sea with associated maritime grassland. Invertebrates are listed as a feature on the citation, although none of these are currently considered to be of conservation concern.

Terrestrial Species

Terrestrial surveys were undertaken at six sampling stations in each of June, July and August. These comprised stations with tall maritime grassland with varying extents of open short sward and disturbed ground conditions, and one with an improved agricultural grass sward with association to wet marginal vegetation including terrestrial bankside habitat.

A total of 121 species were recorded within the terrestrial samples, of which the specialist species are associated with: open short sward, bare sand and chalk, scrub edge, rich flower resource, and reed-fen and pools.

Of the terrestrial species in the SSSI citation, Roesel's bush cricket was recorded at two stations, but is likely to be more widespread in the maritime grassland. It was not recorded from improved agricultural grass swards.

Six species of conservation concern were identified, of which three are very likely to have their status 'downgraded' based on the descriptions of their current distributions within authoritative information sources. The three species of conservation concern are:

- one Nationally Scarce rove beetle,
- one butterfly (small heath) with Priority Species status while remaining widespread (albeit declining nationally), and
- one moth (cinnabar) with Priority Species status while remaining widespread (albeit declining nationally).

The standard classification scheme for determining the value of invertebrate assemblages, is based on the numbers of rare and scarce species.

- The dry maritime grassland and associated habitats are considered to be of District importance on the basis of the species recorded and also the likely presence of other species. It is probably unlikely, however, that the assemblages are of County value when compared to other coastal grassland sites in Essex.
- The wet or humid grassland including improved agricultural grass swards in association with other habitats, are likewise probably of District importance. It is unlikely that these would justify a higher rating.

The Fisher's estuarine moth is a protected species associated with maritime grassland in Essex and north Kent. Within the data search are a series of records from 2005-2019, associated with the maritime grassland. This is a species listed on Annex II of the Habitats Directive (and thereby protected in England under the Conservation of Habitats and Species Regulations 2017 (as amended)), and Hamford Water Special Area of Conservation (SAC) is designated for the moth. The SAC is located north along the coast ~5.7km from the survey area. The presence of the Fisher's estuarine moth is of at least National value, and if the population is important or otherwise of value in the context of the population at Hamford Water SAC then it would be of international importance.

Aquatic Species

Sixteen stations were surveyed for aquatic invertebrates in June and August, using the 'Buglife Ditch Manual method' (Palmer et al., 2013).

Most of the ditches are at a late seral stage, with substantial growth of emergent common reed, while more extensive areas of open water are present only in a small number of ditches that are at any earlier seral stage or are otherwise to wide and deep for emergent vegetation to develop.

A total of 48 species or 'morpho' species were collected across the 16 ditch stations and the two sampling periods. The beetles were the richest group, with 21 species collected.

Using standard metrics, the majority of species have low salinity tolerance, marsh fidelity and species quality scores, and are therefore considered to be freshwater species without particular habitat associations. Overall:

- Species that are tolerant of brackish conditions were recorded from two stations, and species dependent on mildly brackish conditions were recorded in the main channel of the Holland Brook. One water beetle is listed as being a species of brackish pools and ditches and saltmarsh.
- Species which are widespread or typical of grazing marsh assemblages were found in five stations (five species).
- Species scoring more than the minimum in terms of quality / status scores were found in 11 stations, with 12 species scoring either 2 or 3 on a scale from '1' to '5'.

The microhabitats to which the specialist species are associated are 'open water on disturbed mineral sediments', 'moss and tussock fen', and 'slow-flowing rivers'.

Of the two aquatic species listed on the SSSI citation, neither was recorded.

Three species of water beetle are of conservation concern and are listed as Nationally Scarce within the most recent review. All three are believed to be widespread on the Essex coastal marshes, and are associated with open water on disturbed mineral sediments, and moss and tussock fen, and slow-flowing rivers.

With reference to historic survey work, the Holland Haven Marshes were ranked in terms of species quality as the lowest scoring of the 29 Essex sites that are listed within a published national review of invertebrates in grazing marsh ditches. However, the presence of three Nationally Scarce species it is nevertheless of note as is the presence of water beetles from a range of conditions, and with reference to the standard classification scheme it is concluded that the aquatic assemblage is of District value.

1. INTRODUCTION

BACKGROUND

1.1 The North Falls Offshore Wind Farm (herein 'the project') is a proposed extension to the operational Greater Gabbard Offshore Wind Farm, which is located off the east coast of England in the Southern North Sea. The project is being developed by North Falls Offshore Wind Farm Ltd. (NFOW), a joint venture between SSE Renewables and RWE.

1.2 The project is proposed in response to The Crown Estate's (TCE) extension leasing round, launched in 2017, with TCE recognising that extensions to operational wind farms are proven to be a successful way of efficiently developing more offshore generating capacity. NFOW was awarded an Agreement for Lease (AfL) from TCE in September 2020. NFOW have begun the process of baseline data collection to inform an EIA for the project in support of a Development Consent Order (DCO) application proposed to be submitted to the Planning Inspectorate in 2023.

1.3 NFOW is currently awaiting a grid connection offer from National Grid, which will then inform the detailed site selection of the offshore cable corridor, landfall location, onshore cable route and onshore substation location. Whilst this process is ongoing, in order to ensure that adequate baseline data is collected to inform the project's EIA, NFOW have undertaken a suite of ecological surveys in 2021 so that baseline data for the project can be gathered.

1.4 In the first instance, NFOW is targeting an area immediately landward of the coast between the settlements of Clacton-on-Sea and Frinton (herein the 'cable landfall search area'). Due to the presence of the Holland Haven Marshes Site of Special Scientific Interest (SSSI) within the cable landfall search area, NFOW intends to undertake targeted Phase 2 ecology surveys of the SSSI during 2021 in order to inform earlier consultation with stakeholders regarding potential impacts of the project upon the SSSI.

1.5 The surveys and assessment presented here are intended to establish its baseline value for invertebrates present within the SSSI and its surrounding habitat, and to inform the assessment of impacts and suggest potential mitigation and enhancement measures.

SITE CONTEXT

1.6 The Holland Haven Marshes SSSI lies between Frinton and Clacton on the Essex coast, and forms a tract of grazing marsh and associated habitat either side of the Holland Brook. The SSSI includes a frontage to the sea with associated maritime grassland. The species listed on the citation comprise both aquatic species within ditches, and terrestrial species in the wider grazing marsh habitat. The total area of the SSSI is 208.8ha.

LEGISLATION AND PLANNING POLICY

1.7 The following key pieces of overlapping nature conservation legislation are relevant to invertebrates in a planning context (Hopkins and Thacker, 2016[1]):

- The Conservation of Habitats and Species Regulations 2017 (as amended)
- Natural Environment and Rural Communities Act 2006 (NERC 2006); and
- The Wildlife and Countryside Act 1981 (as amended) (WCA 1981).

[1] Hopkins, G. W., and Thacker, J. I. (2016). Protected species and development control: the merits of widespread invertebrate species in the European Habitats Directive and UK legislation. *Insect Conservation and Diversity*, *9*(4), 259-267.

1.8 The Conservation of Habitats and Species Regulations 2017 is of potential relevance here in relation to the Fisher's estuarine moth *Gortyna borelii lunata* (Lepidoptera: Noctuidae). This is listed on Annex II of the Habitats Directive and associated Regulations, with the requirement for Special Areas of Conservation (SACs) to be established for the species. SACs are afforded substantial protection, as do areas integral to their function. Hamford Water SAC is designated for the Fisher's estuarine moth and is located ~5.7km to the north.

1.9 Various invertebrates receive full or some form of partial protection under the WCA 1981, including the Fisher's estuarine moth. NERC 2006 identified a substantial number of invertebrates as Priority Species (or Species of Principal Importance within Section 41), and required local authorities to have regard for their conservation. The National Planning Policy Framework (NPPF) (DHCLG, 2021[2]) re-iterates the importance of these priority species and local planning authorities are required to promote the "*protection and recovery"* via planning and development control.

1.10 Although the NPPF has an overarching aim of minimising impacts to biodiversity, the majority of rare or scarce species are not specifically recognised by legislation or planning policy. The level of protection afforded to these is undefined and should be considered within the overall aim of minimising impacts on biodiversity.

1.11 Within this report 'species of conservation concern' is used as an umbrella term for any legally protected species, those identified as 'priority species', and other species that are considered to be rare or scarce. In broad terms these fall into the following categories:

- Annex II and IV species of the Habitats Directive and those covered by the Wildlife and Countryside Act, i.e. Fisher's estuarine moth.
- Priority Species that are rare or scarce.
- Priority Species that are widespread but declining, such as many moths.
- Other rare or scarce species that are not listed by name within legislation or policy, but which are part of the wider invertebrate biodiversity. A number of species listed on SSSI citations in general, and also relevant here, are no longer of conservation concern following revisions to their statuses since the citations were prepared. The level of protection afforded to these species is unclear and possibly open to interpretation, but they nevertheless form part of the special interest of the relevant SSSI, and it should be assumed that operations that damage their habitats would normally constitute an offence.

[2] DHCLG (2021). *National Planning Policy Framework for England*. Department for Communities and Local Government, London.

2. METHODS

PERSONNEL AND CONSENTS

2.1 All fieldwork and identifications were undertaken by Dr Graham Hopkins CEnv MCIEEM FRES and Dr Jonathan Thacker MCIEEM, both of whom hold PhDs in entomology and have extensive experience of undertaking surveys of macroinvertebrates in ditch and grazing marsh habitats.

2.2 The required consent for the sampling described below was granted by Natural England under Section 28E(3)(a) of the Wildlife and Countryside Act 1981 (as amended), dated 06 July 2021 (2605211648BL).

DATA SEARCH

2.3 A data search for a 2km radius from the SSSI boundary was commissioned from the Essex Field Club and provided by the client. Other sources of information in the published and grey literature were searched for using Google Scholar and Google Search, using various of relevant terms.

TERRESTRIAL SAMPLING

2.4 A visual appraisal was undertaken to appraise the quality of microhabitats and resources potentially relevant to invertebrates (based on the criteria and descriptions provided by Fry and Lonsdale, 1991[3]; Falk, 2007[4]; and Kirby 2011[5]) located within the survey area. This was undertaken on 17 and 18 May 2021, and used to inform the selection of sampling stations.

2.5 To standardise terminology for habitat descriptions and associations, reference is made to the classification of habitats, microhabitats and specialist species (Specific Assemblage Types) as contained within the Pantheon database (Webb et al., 2018[6]). The broad protocol for sampling follows those developed for the Invertebrate Species-habitat Information System (ISIS) (Webb and Lott, 2006[7]; Drake et al., 2007[8]).

2.6 Field sampling was undertaken at six sampling stations, comprising tall maritime grassland with varying extents of open short and disturbed ground conditions (stations 1, 2, 3, 5 and 6), and one with an improved agricultural grass sward in association to wet marginal vegetation including ditch-edge (station 4). These sampling stations covered the range of terrestrial habitats and also included the areas of habitat judged to be of the highest quality and most likely to support significant species and assemblages. Each station was sampled for 50-minutes, using a combination of hand searching and netting. The species-groups covered are

[3] Fry, R. and Lonsdale, D. (1991). *Habitat Conservation for Insects: A Neglected Green Issue.* Amateur Entomologists Society, Middlesex.

[4] Falk, S. J. (2007). Bees and wasps in the diversified coniferous woodland settings of British Centerparcs. *British Journal of Entomology and Natural History*, 20: 21-45.

[5] Kirby, P. (2001). *Habitat Management for Invertebrates: A Practical Handbook.* RSPB, Bedfordshire.

[6] Webb, J., Heaver, D., Lott, D., Dean, H.J., van Breda, J., Curson, J., Harvey, M.C., Gurney, M., Roy, D.B., van Breda, A., Drake, M., Alexander, K.N.A. and Foster, G. (2018). *Pantheon - database version 3.7.6.* Available from: https://www.brc.ac.uk/pantheon/

[7] Webb, J. R. and Lott, D. A. (2006). The development of ISIS: a habitat-based invertebrate assemblage classification system for assessing conservation interest in England. *Journal of Insect Conservation*, 10(2), 179-188.

[8] Drake C.M., Lott, D.A., Alexander, K.N.A. and Webb, J. (2007). *Surveying Terrestrial and Freshwater Invertebrates for Conservation Evaluation*. Natural England, Sheffield.

those relevant for ISIS in each habitat, and include the major insect orders and families as appropriate. The surveys were undertaken on 30 June, 20 and 21 July and 12 August 2021.

AQUATIC FIELD SURVEY

2.7 Survey methods follow the recommendations of Buglife (Palmer et al., 2013[9]). A brief summary follows; detailed information is to be found in Palmer et al.

2.8 Sixteen sampling stations were selected to provide a spatial spread of stations and to cover the range of ditch types present as far as possible, to include those from early- to late-successional stages, physical shape and also conductivity. The scoping of ditches was on 17 and 18 May 2021. Each sampling stations was based on a 50m length of ditch, where the plant and ditch characteristics were reasonably constant. Sampling used a standard benthic net to take samples each of for 1-3 minutes, followed by 7.5 minutes of sorting. Four such samples were taken from each length of ditch, and the resulting collection of invertebrates was pooled. Unambiguously-identifiable species are recorded and released; others are collected and stored in preservative, although time is not wasted collecting excessive numbers of abundant taxa. The surveys were undertaken on 28 and 29 June, and 10 and 11 August 2021.

2.9 Ditch characteristics (profile, depth, and vegetation cover) were recorded. Conductivity was measured using a handheld meter (Hanna HI-98311) on 17 and 18 May 2021.

2.10 Palmer et al. (loc. cit.) list the following important taxa: “adult water beetles, adult water bugs, the larvae of caddisflies, mayflies, stoneflies and dragonflies (with caveats on identification limitations), molluscs (Pisidium only if expertise is available), larger crustaceans, soldierflies, mosquitoes, dixids and water and raft spiders.” The assessment method does not take into account the abundance of taxa, only their presence.

2.11 Metrics of species attributes were taken from Palmer et al. as follows:

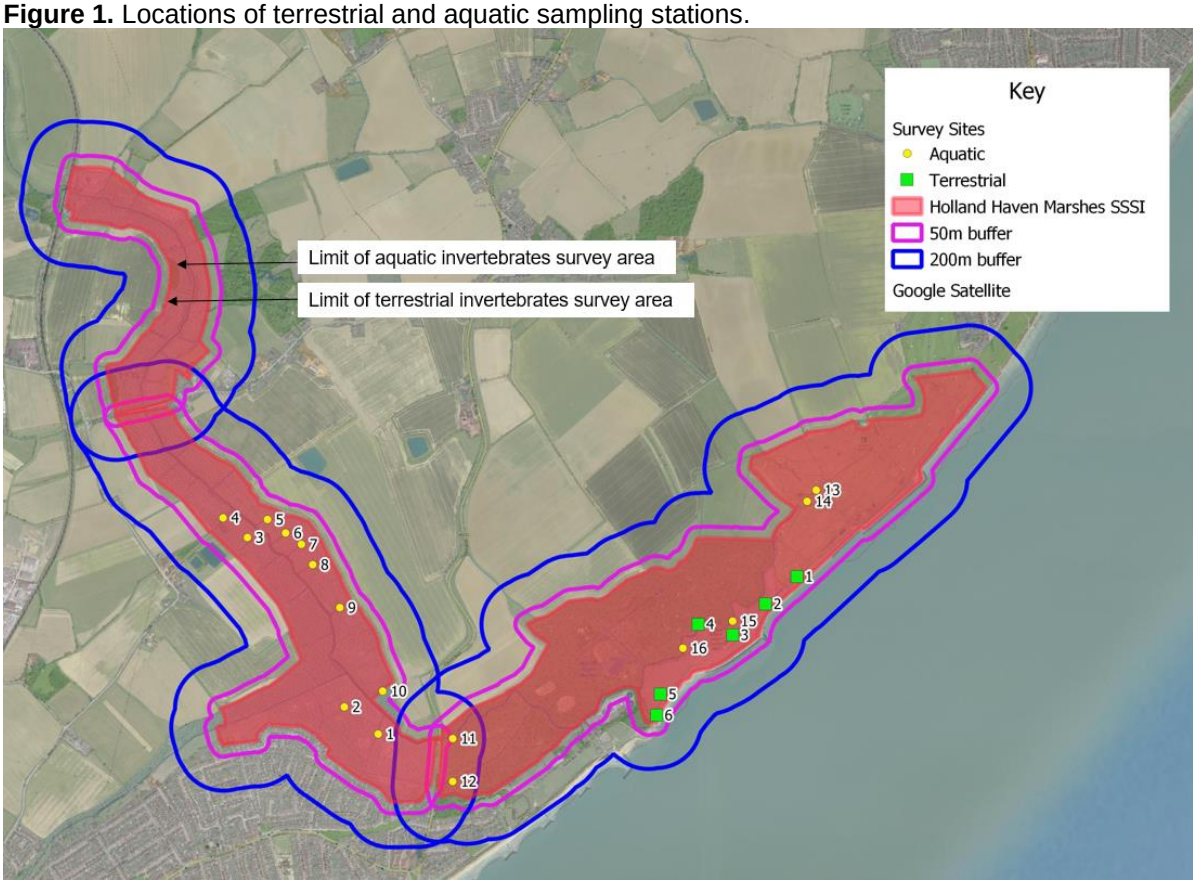
- Salinity scores for invertebrates range from 0 (not at all tolerant of salinity) to 2 (tolerant of high levels of salinity). The salinity index for invertebrates in Palmer et al. consists of the sum of salinity scores for all taxa present. Brackish ditches typically have lower invertebrate diversity than ditches with no saline influence, however, grazing marsh complexes with a range of salinity conditions may have species that are not present in sites with no saline influence.
- Marsh fidelity provides a measure for the extent to which species are restricted to grazing marsh. Thus, a score of 3 denotes species restricted to grazing marsh, 2 for species widespread in grazing marsh but with good populations in other wetland types, and 1 for species with no preference for grazing marsh.
- Habitat quality scores for invertebrates are not considered useful by Palmer et al. The scores on this metric (which measures the grazing marsh fidelity of invertebrates) were not found to provide additional discriminatory features over and above the species quality index (SQI), based on rarity (because invertebrates with high fidelity to grazing marshes also score highly on SQI.

SAMPLING STATIONS

2.12 The sampling stations are shown below (Figure 1) with grid references in Appendix 2.

[9] Palmer, M., Drake, N. and Steward, N. (2013). *A Manual for the Survey and Evaluation of the Aquatic Plant and Invertebrate Assemblages of Grazing Marsh Ditch Systems.* Buglife, Peterborough.

Figure 1. Locations of terrestrial and aquatic sampling stations.



EVALUATION

2.13 Both terrestrial and aquatic species were classified into broad biotope, habitat and Specific Assemblage Type associations within the Natural England's Pantheon package (Webb loc. cit.). This standardises the descriptions of species habitat and resource requirements and allows for the rapid identification of generalist and specialist species.

2.14 The formal evaluation of the survey area is based on the numbers of species of conservation concern as defined below. Thus, species of conservation concern are broadly defined as Red Data Book species (recorded in <30 tetrads on the national grid reference and in danger of extinction), Nationally Scarce species (recorded in between 30 and 100 tetrads), and priority species defined as those listed in Section 41 of the NERC Act 2006 (Table 1); and Local' species, are considered to be of restricted occurrence but do not justify listing in a category of greater rarity. Species that do not fall into these categories are 'common' or of 'least concern'.

2.15 Most of the conservation statuses listed below are not specifically identified or recognised within legislation or planning polices, the exceptions being Priority Species, protected species, and Habitats Directive: Annex II species. The other categories of conservation status are used to identify species of wider 'biodiversity value'.

Table 1. Definitions and criteria to classify the conservation statuses of invertebrates.

Conservation status	Definition
Red Data Book (RDB) (combined description for all categories)	Taxa in danger of extinction or with small populations in Great Britain.

Conservation status	Definition
Nationally Scarce / Notable	Species which are estimated to occur in 16 to 100 10 km squares in Great Britain. The subdividing of this category into Nationally Scarce A and Nationally Scarce B has not been attempted for some species because of either the degree of recording that has been carried out in the group to which the species belongs, or because there is some other reason why it is not sensible to be so exact.
Nationally Scarce / Notable A	Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain occur in 30 or fewer 10 km squares of the National Grid.
Nationally Scarce / Notable B	Taxa which do not fall within RDB categories but which are none-the-less uncommon in Great Britain and thought to occur in between 31 and 100 10 km squares of the National Grid.
Local	Not rigidly defined, loosely referring to species confined to a particular habitat type or species that are too widespread to warrant Nationally Scarce status but are nevertheless infrequently encountered.
Priority Species	Species listed as Species of Principal; Importance via their inclusion on Schedule 41 of the NERC Act. Many Priority Species also have RDB or Nationally Scarce status, but a substantial number are widespread but declining moths and do not otherwise have a conservation status. These moths are typically habitat generalists and at least a few species would be expected at most sites.
Protected species	Defined here as species with legal protection via • The Conservation of Habitats and Species Regulations 2017 (as amended), or • The Wildlife and Countryside Act 1981 (as amended).
Habitats Directive: Annex II species	These species for which Special rea of Conservation (SAC) are designated, although in most cases only a sub-set of sites with these species are designated as SACs.

2.16 Evaluation of the terrestrial fauna follows the criteria presented by Colin Plant Associates (2006)[10] to define the significance of invertebrate habitats with modifications to allow for the inclusion of Priority Species) (Table 2). A level of professional judgement is used in applying the criteria, taking into account the overall assemblages of species present and in particular whether individual habitats or resources support substantial numbers of species, as informed by the Pantheon output.

Table 2. The criteria used to define significance of invertebrate habitats.

Significance	Description	Minimum qualifying criteria
International / European (Habitats Directive)	European important site	Internationally important invertebrate populations present, defined as: Designated as an SAC for invertebrates or supporting part of a population for which an SAC is designated, or containing habitats that are threatened or rare at the European level (including, but not exclusively so, habitats listed on the EU Habitats & Species Directive)

[10] Colin Plant Associates (2006). *EcIA Guideline Comments*. Unpublished Report to the Institute of Ecology and Environmental Management. Available from: www.cieem.org.uk

Significance	Description	Minimum qualifying criteria
National	UK important site.	Achieving SSSI invertebrate criteria (Curzon et al., 2019[11]) or supporting sustainable populations of species that are listed as being RDB critically endangered, or supporting sustainable populations of species listed in Annex II of the Habitats Directive but not functionally linked to a population for which an SAC is designated, or supporting sustainable populations of species listed in and generally held to have RDB (endangered) status, or supporting sustainable populations of any species protected under the UK Wildlife and Countryside Act, as amended or containing important invertebrate habitats that are actively threatened nationally (Great Britain).
Regional	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in south-east England.	Habitat that is scarce or threatened in the region, or which is well-represented in the region but is rare or absent outside the region, and which has, or is reasonably expected to have, an assemblage of invertebrates that includes a combination of RDB and Nationally Scarce species amounting to at least ten such species in total or supporting sustainable populations of at least six Priority Species (excluding the widespread but declining moths).
County	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the county in question.	Habitat that is scarce or threatened in the county and contains or is reasonably expected to contain an assemblage of invertebrates including a combination of RDB or Nationally Scarce species, amounting at least five such species in total.
District	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the administrative District.	A rather vague definition of habitats falling below county significance level, but which may be of greater significance than merely Local. They include sites for which Nationally Scarce species in the range from 1 to 4 examples are reasonably expected, but not yet necessarily recorded, sites that have 1 to 4 Priority Species that also have RDB or Nationally Scarce status, and sites that have an outstanding assemblage of widespread but declining Priority Species moths.

[11] Curson J., Howe, M., Webb, J., Heaver D. and Tonhasca, A.(2019). *Guidelines for the Selection of Biological SSSIs Part 2: Detailed Guidelines for Habitats and Species Groups Chapter 20 Terrestrial and Freshwater Invertebrates.* Available from: https://data.jncc.gov.uk/data/747968a5-a8a7-4bd6-b12c-3329c3b5b6ca/SSSI-Guidelines-20-Invertebrates-2019.pdf

Significance	Description	Minimum qualifying criteria
Local	Site with populations of invertebrates or invertebrate habitats considered scarce or rare or threatened in the affected and neighbouring Parishes.	Habitats or species unique or of some other significance within the local area.
Low Significance	_	Although almost no area is completely without significance these are the areas with nothing more than expected “background” populations of common species and the occasional Nationally Scarce species.

LIMITATIONS

2.17 The principal limitations to the surveys were:

- Terrestrial invertebrates. The survey period for terrestrial invertebrates started in late-June, due to access and survey restriction; the weather was also overcast for the June and July surveys, which would have limited the numbers of active and flying insects.
- Aquatic surveys. Within Palmer et al., the survey period for ditches is described as follows: “Invertebrate fieldwork should start in the last week in April and ideally be completed by early June, although useful results can be obtained up to mid-October”. The Aquatic survey therefore started after the ‘ideal’ period, but include a mid-summer survey to record species that would appear later in the season, principally beetles.

2.18 Although the survey limitations have inevitably reduced the species recorded, the overall assessment of the value of habitats and assemblages is thought to be robust.

3. TERRESTRIAL INVERTEBRATES

DESK STUDY INFORMATION

Assemblages

3.1 In the review of the terrestrial habitats that are important for invertebrates along the Essex coast, Drake et al. (1996[12]) list grazing marsh as supporting nationally important assemblages, while the coastal grassland habitat is considered to be of local value for its assemblages (Table 3). The species highlighted for each habitat cover a range of species groups and with a range of ecological requirements.

Table 3. Relevant terrestrial habitats and their value within the Essex Marshes (taken from Drake et al., loc. cit.).

Habitat	Specific habitat features of value within the habitat	Value
Grazing marsh	Light grazing and trampling, some winter flooding, no summer flooding; associated pools; structurally diverse sward.	Nationally significant
Sea walls and other dry grassland associated with grazing marsh, including hedges	Herb-rich grassland with structural diversity; patches of dry ground on sunny side.	Local

3.2 The SSSI citation lists the Roesel's bush cricket *Metrioptera roeselii* (Orthoptera: Tettigoniidae), but this is no longer of conservation concern, having undergone a substantial climate-driven range expansion since the 1990s (Sutton, 2015[13]). Also listed is bee *Bombus muscorum* which is known from the survey area as reported below; this is a Priority Species and although not otherwise listed as being of conservation concern it is likely that it has undergone declines and would justify at least Nationally Scarce status[14].

3.3 The data search records returned records for only 28 species of conservation concern, which is a very low number of records and almost certainly reflects under-recording. Other than for the Fisher's estuarine moth (see below), the records are from the north of the search area, from the Great Holland Pits. These are associated with open grassland, tall sward and short sward, and also trees (Table 4). The two specialist species are the wall *Lasiommata megera* and small heath *Coenonympha pamphilus* butterflies (Lepidoptera: Nymphalidae).

3.4 A wider search of records with the published and grey literature has not revealed a substantial number of other records, and the only record of particular note is the presence of the moss carder bee *Bombus muscorum* (Hymenoptera: Apidae), which is an uncommon Priority Species associated with the flat grassy area between the landward toe of the raised embankment and the borrow dyke (also referred to as 'the folding') (Gardiner & Benton, 2011)[15].

[12] Drake, M., Clements, D., Eyre, M. Gibbs, D. and Kirby, P. (1998). *Invertebrates and their Habitats in Natural Areas. Volume 2 – Southern Areas.* English Nature, Peterborough.

[13] Sutton, P.G. (2015). *A Review of the Orthoptera (Grasshoppers and Crickets) and Allied Species of Great Britain. Natural England Commissioned Report NECR187.* Natural England, Sheffield.

[14] https://www.bwars.com/bee/apidae/bombus-muscorum

[15] Gardiner, T., & Benton, T. (2011). The *Importance of Sea Walls for the Moss Carder Bee Bom*bus muscorum *in Essex*. Hymettus Ltd., Midhurst.

Table 4. Habitat and association of the species reported by the data search (classified using Pantheon).

Biotope	No. of species	Habitat	No. of species	Specific Assemblage Type	No. of species
Open habitats	12	Tall sward & scrub	10	-	-
		Short sward & bare ground	2	Open short sward	2
Tree-associated	7	Arboreal	6	-	-
		Decaying wood	1	Heartwood decay	1

Fisher's Estuarine Moth

3.5 The Fisher's estuarine moth is a protected species associated with maritime grassland in Essex and north Kent, with legal protection under The Conservation of Habitats and Species Regulations 2017 (as amended) and the Wildlife and Countryside Act (as amended).Within the data search are a series of records from 2005-2019 described as being from 'Natural England monitoring', associated with the maritime grassland within the SSSI (see Section 5 for additional detail on its protected status).

FIELD SURVEYS

3.6 The field survey undertook sampling at six discrete stations and incidental recording elsewhere during field surveys. These stations were located along the coastal belt and comprise the highest quality habitat within the survey area and also stations that are considered representative of the wider habitats within the survey area (Table 5).

Table 5. Descriptions of terrestrial sampling stations.

Station	Description	Key features for invertebrates	
		Positive	Negative
1	Maritime grassland located in the 'folding' or the flat grassy area between the landward toe of the raised embankment and the borrow dyke. The vegetation was a moderately closed grass sward with a low abundance of flowering herbs.	Part of a relatively large block of similar habitat (as identified in Gardiner and Benton, loc. cit.), and with extensive areas of potential foraging habitat for bees in vicinity. High local habitat diversity in terms of sward height.	Little variation in topography. Little bare earth and exposed substrate. The nearby sea wall was concrete, thus without vegetation.
2	This area was a disturbed maritime grassland associated with an area of hardstanding and compacted gravel. The sward was varied in structure and included patches of open substrate and vegetation dominated by low-growing herbs such as bird's foot trefoil *Lotus corniculatus*.	Bare substrate present, although mostly compacted. Range of vegetation types within a restricted area, including low, opens swards. Extensive area of other habitat nearby.	Little variation in topography. The nearby sea wall was concrete, thus without vegetation.
3	This was an area of tall maritime grassland with some limited areas of open vegetation associated with a track and with tall reed *Phragmites australis* to the northern edge.	Bare substrate present, although mostly compacted. Range of vegetation types within a restricted area, including some open swards. Extensive areas of other habitat locally.	The nearby sea wall was concrete, thus without vegetation.

Station	Description	Key features for invertebrates	
		Positive	Negative
4	This area was part of a field of improved grass sward dominated by rye grass *Lolium* species and agricultural grasses. The herb component was low, and this habitat represented the vegetation of a large part of the SSSI, and was presumably under agricultural management.	Part of an extensive block of habitat and with other areas nearby.	Low habitat and botanical diversity.
5	This was a relatively open sward of bents and fescue grasses and presumably under agricultural management.	Extensive area of habitat, and other habitats nearby.	Relatively uniform sward conditions, without bare substrates or small-scale variations in topography. North-facing slope.
6	This was an area of disturbed grassland located adjacent to a busy track and with areas of heavy tramping by pedestrians grading into a longer grass sward.	High diversity of habitat and vegetation conditions within a restricted area. Extensive bare substrate with gradients in conditions from compacted substrate through to taller swards. Extensive areas of other habitats nearby.	Area of this habitat type was relatively small.

3.7 A total of 121 species were recorded within the terrestrial samples, and their ecological and habitat characteristics are shown below (Table 6). The key points are:

- The species of open habitats comprise the majority of species, associated with tall and open grasslands and with a number of specialist assemblages present (see below).
- Many of the wetland species recorded were hoverflies that are potential vagrants from further afield, but there were also a few species that are likely to be present as local populations, such as the soldierfly *Oplodontha viridula* (Diptera: Stratiomyidae).
- A small number of tree-associated species were recorded, presumably associated with the few areas of woody vegetation in the survey area but associated with blossom within sampling stations, or otherwise present as vagrants.
- The specialist species are associated with grassland, from open disturbed ground conditions through to scrub edge, with the rich flower resource also identified as being important for specialists (mainly bees).

Table 6. Habitat and assemblage associations of the species recorded during field surveys (classified using Pantheon).

Biotope	No of species	Habitat	No of species	Specific Assemblage Type	No of species
Open habitats	85	Tall sward & scrub	61	-	-
		Short sward & bare ground	23	Open short sward	3
		-	-	Bare sand and chalk	4
		-	-	Scrub edge	3
		-		Rich flower resource	12

Biotope	No of species	Habitat	No of species	Specific Assemblage Type	No of species
Wetland	14	Acid and sedge peats	9	Reed-fen & pools	1
		Running water	1	-	-
		Wet woodland	1	-	-
Tree-associated	11	Arboreal	5	-	-
		Decaying wood	4	Bark and sapwood decay	4
		Shaded woodland floor	2	-	-

3.8 Of the terrestrial species in the SSSI citation, Roesel's bush cricket was recorded at stations 1 and 3 but is likely to be more widespread. The other species listed on the citation, namely the moss carder bee *Bombus muscorum*, was not recorded but its presence was reported by Gardiner & Benton (loc. cit.) and the maritime grassland habitat remains in a suitable condition, thus the population is likely to be extant

SPECIES OF CONSERVATION CONCERN

3.9 Six species that are currently listed as being of conservation concern were recorded (of which once has RDB status and two are Nationally Scarce) which are classed as), but three of these are bees / wasps that would probably be classed as common or 'least concern' based on the current descriptions of their distribution and occurrences in authoritative reviews, namely *Megachile leachella*[16] and *Heriades truncorum*[17] (Hymenoptea: Magachilidae) and *Philanthus triangulum*[18] (Hymenoptera: Crabronidae).

3.10 The three species of conservation concern are therefore one Nationally Scarce rove beetle, and one butterfly and one moth with Priority Species status while remaining widespread albeit declining nationally (Table 7), namely the small heath butterfly and cinnabar moth.

Table 7. Species of conservation concern.

Species	Higher taxon	Status	Sampling station	Ecology	Reference
Tachyporus formosus	Coleoptera: Staphylinidae	Nationally Scarce	4	A predator found in wet meadows and similar habitats.	Zahn, et al. (2007)[19]; Lane, 2019[20]
Small heath *Coenonympha pamphilus*	Lepidoptera: Nymphalidae	Priority Species (a widespread but declining species.)	1 and 2	Associated with dry, open sward grassland, where the caterpillars feed on fine-leaved grasses.	Fox et al. (2010)[21]

[16] https://www.bwars.com/bee/megachilidae/megachile-dorsalis

[17] https://www.bwars.com/bee/megachilidae/heriades-truncorum

[18] https://www.bwars.com/wasp/crabronidae/philanthinae/philanthus-triangulum

[19] Zahn, A., Juen, A., Traugott, M., & Lang, A. (2007). Low density cattle grazing enhances arthropod diversity of abandoned wetland. *Applied Ecology and Environmental Research*, *5*, 73-86.

[20] Lane, S.A. (2019). *A Review of the Status of the Beetles of Great Britain – The Staphylinidae: Tachyporinae beetles. Natural England Commissioned Reports No. 265*. Natural England, Sheffield.

[21] Fox, R., Warren, M.S., and Brereton, T.M. (2010). *A New Red List of British Butterflies, Species Status 12.* Joint Nature Conservation Committee, Peterborough.

Species	Higher taxon	Status	Sampling station	Ecology	Reference
Cinnabar *Tyria jacobaeae*	Lepidoptera: Arctiidae	Priority Species (a widespread but declining species.)	3	Frequently found wherever the caterpillar foodplant of ragwort *Jacobaea vulgaris* is present, which is typically dry or moderately dry grassland and pasture with some disturbance.	Butterfly Conservation (2007)[22]

[22] Butterfly Conservation (2007). *Biodiversity Action Plan – Moths*. Available from: https://butterfly-conservation.org/our-work/reports-and-factsheets/biodiversity-action-plans

4. AQUATIC INVERTEBRATES

DESK STUDY INFORMATION

4.1 The grazing marshes in Essex are considered to be of national value for invertebrates, with the majority of the species provided as examples being flies and water beetles (Table 8).

Table 8. Relevant aquatic habitats and their value (taken from Drake et al., loc. cit.).

Habitat	Specific habitat features of value within the habitat	Value
Grazing marsh, ditches and pools	Light grazing and trampling; some winter flooding, no summer flooding; associated pools; structurally diverse sward; mainly old reed with dense litter layer; reed growing on gradient from dry ground to standing in shallow water.	Nationally important

4.2 Comparative data are provided for a large number of grazing marsh sites within Drake (2004)[23], with summary data for Holland Haven Marshes. The key points are:

- Overall value is considered to be of less than County value for freshwater invertebrates. Brackish and wetland groups are not rated, presumably due to the scarcity or absence.
- In terms of fidelity to grazing marsh, Drake had three categories of fidelity, of which none of the species were reported as having high fidelity (i.e. almost restricted) to grazing marsh; and five species were in the next category of '*form*(ing) *part of the characteristic fauna of grazing marsh',* while also being associated with other wetland types.
- The species quality index score for water beetles is the lowest for the 29 Essex sites that are listed.

4.3 Two dragonflies are listed within desk study sources, namely the ruddy darter *Sympetrum sanguineum* within the SSSI citation and the common darter *Sympetrum striolatum* (Odonata: Libellulidae (within the data search, but neither is considered to be of conservation concern (Daguet et al., 2008[24]). The soliderfly *Stratiomys singularior* is also listed on the SSSI citation, but is no longer of conservation concern, partly due to range expansion and greater survey effort revising its known distribution (Drake, 2017[25]).

FIELD SURVEYS

4.4 The field survey undertook sampling at 16 discrete stations. These stations were located through much of the survey area, to provide a good spatial spread and to provide as sample covering the main ditch types (Table 9). The majority of ditches across the survey area and within the SSSI are at a late seral stage with extensive growth of common reed, little open water and shallow depth. More extensive areas of open water are largely restricted to ditches with cattle poaching, greater width and depth or recent cleaning.

[23] Drake, C.M. (2004). *English Nature Research Reports Number 579 Grazing Marsh Assemblages and Site Classification Using Invertebrates*. English Nature, Peterborough.

[24] Daguet, C., French, G. and Taylor, P. (2008). *The Odonata Red Data List for Great Britain Species Status. 11.* JNCC, Peterborough.

[25] Drake, C.M. (2017). *A Review of the Status of the Larger Brachyceran Flies of Great Britain. Natural England Commissioned Report NECR192.* Natural England, Sheffield.

Table 9. Description of ditch sampling stations (brackish ditches have a conductivity of >2000µScm^{-1}).

Ditch	Width	Depth	Conductivity (µScm^{-1})	Description
1	4m	1m	290	Late seral phase ditch choked by common reed *Phragmites australis*. Heavily poached to the east by cattle; grazed on both sides. Emergents were restricted to reed 95% only. The small amount of open water was covered by floating macrophytes; common water starwort *Callitriche stagnalis* and *Lemna* spp. Smooth newts were present.
2	4m	1m	320	Late seral phase ditch, choked by common reed. Grazed on both eastern and western sides. Bankside vegetation with no wetland characteristics. Emergents comprised common reed 80%, brooklime *Veronica beccabunga* 10%, water forget-me-not *Myosotis scorpioides* 5% and water plantain Alisma plantago-aquatica 5%. Floating macrophytes comprised small quantities of *Lemna* species only.
3	3m	0.3m	335	Late seral phase ditch, mostly choked by common reed. Bankside vegetation included hard rush *Juncus inflexus*. The sole emergent was common reed, and aquatic macrophytes were absent except for *Lemna* species, which included fat duckweed *Lemna gibba*.
4	4m	0.3m	375	Late seral phase ditch, mostly choked by common reed. Bankside vegetation included hard rush *Juncus inflexus*. The sole emergent was common reed and macrophytes were absent except for *Lemna* spp, which included fat duckweed *Lemna gibba*.
5	4m	0.3m	320	Late seral phase ditch, mostly choked by common reed and greater pond sedge. Small amount of poaching by cattle; grazed on both sides, with little wetland component to wider vegetation. Emergents comprised common reed 50% and greater pond sedge *Carex riparia* 50%. Aquatic macrophytes were absent except for *Lemna* species, which included fat duckweed *Lemna gibba*.
6	3m	0.3m	345	Late seral phase ditch choked by common reed. Poaching by livestock and grazed to both sides. Bankside vegetation included hard rush *Juncus inflexus*. The sole emergent was common reed. Aquatic macrophytes were absent.
7	4m	0.3m (no water in places)	325	Late seral phase ditch choked by common reed. Poaching by livestock giving gentle slope to water. Sole emergent 100% common reed. The small amount of open water at the ditch's end included common water starwort and fool's water cress *Apium nodiflorum* as floating macrophytes at a low cover.
8	4m	0.3m	410	Late seral phase ditch, although without as much common reed as surrounding ditches (5-7; 9). Grazed on both sides. Emergents comprised common reed 40%, greater pond sedge 40%, reedmace 10%, bulrush *Scirpus* sp. 10%, water mint *Mentha aquatica* 20%, branched bur-reed *Sparganium erectum* 1% and water plantain 2%. The sole floating macrophyte was fool's water cress 20%.
9	4m	0.5m	460	Late seral phase ditch choked by common reed (10% open water). Grazed on both sides. Emergents comprised common reed 95% and greater pond sedge 5%. Submerged macrophytes comprised soft hornwort

Ditch	Width	Depth	Conductivity (μScm^{-1})	Description
				Ceratophyllum submersum at low abundance. *Lemna* spp. was the sole floating macrophyte (10%).
10	3m	0.5m	385	Mid-late seral phase ditch with 20% open water, dominated by common reed. Grazed on both sides. Surrounding vegetation comprised terrestrial with brambles and occasional shrubs. The sole emergent was common reed only (80% cover) and the sole floating macrophyte *Lemna* species.
11	10m	>1m	655	This was the main river channel of the Holland Brook, and consequently very wide with a very slow flow. Turbidity moderate. Grazed to the south, but with high levees on either side so not grazed to the water's edge. Emergents were restricted to a bankside fringe, of common reed, soft rush *Juncus effusus* 1% and gipsywort *Lycopus europaeus*. The sole aquatic macrophyte *Lemna* species at 5% cover.
12	2m	0.3m	575	Shallow late seral phase ditch choked by common reed, heavily poached to the north by cattle giving very gentle slope to water. Not grazed to the south. Very little open water. The sole emergent was common reed 100% and the sole submerged macrophyte was spiked water milfoil *Myriophyllum spicatum* at very low abundance (1%).
13	1.5m	0.4m	425	A shallow V-shaped ditch recently cut/scraped, so that the common reed was c. 1m tall. It was set within improved grassland surrounding a golf course. The sole emergent was common reed covering 50% of the water surface with *Lemna* spp. covering the remainder (50%).
14	4m	0.5m	450	A shallow U-shaped ditch dominated by common reed, but the reed appears to have been cut/scraped in the previous few years. The water depth was variable and apparently fluctuated with rainfall, as judged by stranded duckweed on the bank sides. Set within improved grassland (golf course). The sole emergent was common reed (80% cover) and water plantain 1%. The sole floating macrophyte was *Lemna* spp. with 20% cover.
15	2m	0.4m	520	Shallow and narrow ditch with no open water. Not grazed. The bankside vegetation comprised common reed with 50%, but the bankside reed had overtopped and flattened to cover the water's surface so that there was no open water. The sole floating macrophyte was *Lemna* spp. with 5% cover.
16	6m	>1m	485	Meandering, rather open ditch with 50% open water. The emergents were common reed and common reedmace *Typha latifolia*. The sole floating macrophyte was invasive New Zealand pigmyweed *Crassula helmsii* with ~10% cover with filamentous algae at 5% cover.

4.5 A total of 48 species or 'morpho' species were collected across the 16 ditch stations and the two sampling periods. The beetles were the richest group, with 21 species collected.

4.6 To assess these assemblages, reference is made to the various metrics provided within the Buglife Manual (Palmer et al., loc. cit.) for salinity tolerance, marsh fidelity and species quality. Pantheon is also used to describe the habitat associations of species.

4.7 Using the Buglife metrics, the majority of species have low salinity tolerance, marsh fidelity and species quality scores, and are therefore considered to be freshwater species without particular habitat associations (Table 10). Thus:

- Species that are tolerant of brackish conditions were recorded from two stations (3 and 4) and species dependent on mildly brackish conditions were recorded in one station (11, the main channel of the Holland Brook).
- Species which are widespread or typical of grazing marsh assemblages were found in five stations (five species).
- Species scoring more than the minimum in terms of quality / status scores were found in 11 stations, with 12 species scoring either 2 or 3 on a scale from '1' to '5'. (Species scoring 2 are equivalent to species considered to be of local occurrence and species scoring 3 were Nationally Scarce at the time the scoring developed [but see below]).

Table 10. Summary of ditch invertebrates, with species not in the lowest categories for salinity tolerance, marsh fidelity and quality scoring. The salinity scores >0 are as follows: 1: tolerant of mildly brackish; and 2: dependent on mildly or moderately brackish. The marsh fidelity scores are for: 2: widespread in grazing marsh and also other wetlands; and 3: confined to grazing marsh. Species quality scores from 2 to 5 are for species that are of local occurrence or rare.

Ref	No. of spp	Salinity scores >0		Marsh fidelity scores greater >1	Species status / quality scores of >1	
		1	2	2	2	3
1	16	-	-	*Rhantus grapii*	*Cymbiodyta marginellus* *Enochrus testaceus* *Aeshna mixta* *Hippeutis complanatus*	-
2	14	-	-			-
3	10	*Hygrotus parallellogrammus*	--	*Hygrotus parallellogrammus* *Berosus affinis*	*Berosus affinis*	*Hygrotus parallellogrammus*
4	12	*Sigara stagnalis,*	-	-	*Sigara stagnalis*	
5	13	-	-	-	-	-
6	16	-	-	*Ilybius ater*	*Enochrus testaceus*	-
7	9	-	-	-		-
8	13	-	-	-	*Liopterus haemorrhoidalis*	-
9	17	-	-	-	*Liopterus haemorrhoidalis*	-
10	14	-	-	-	-	*Hydaticus seminiger*
11	10	-	*Jaera* sp *Leptmoysis* sp	-	*Bithynia leachii* *Sigara stagnalis*	
12	18	-		*Peltodytes caesus*	*Sigara stagnalis*	*Peltodytes caesus*
13	2	-	-	-	-	-
14	8	-	-	-	*Enochrus testaceus*	-
15	6	-	-	-	-	-

Ref	No. of spp	Salinity scores >0		Marsh fidelity scores greater >1	Species status / quality scores of >1	
		1	2	2	2	3
16	19	-	-	*Peltodytes caesus*	*Sigara stagnalis*	*Peltodytes caesus*

4.8 Using the Pantheon classification (Table 11) the species mainly fall into the wetland habitats, with and three associated with wet woodland or shaded woodland flora, and two with coastal habitat. Of the species classified the specialists are associated with three Species Assemblage Types (Table 12).

Table 11. Habitat and assemblage associations of the species recorded during field surveys (as classified using Pantheon).

Biotope	No of species	Habitat	No of species	Specific Assemblage Type	No of species
Wetland	41	Marshland	33	Open water on disturbed mineral sediments	2
		Acid and sedge peats	6	Moss & tussock fen	2
		Wet woodland	3	-	-
		Lake	2	-	-
		Running water	2	Slow-flowing rivers	1
Tree-associated	3	Wet woodland	3		-
		Shaded woodland floor	3	-	-
Coastal	2	Brackish pools and ditches	2	-	-
		Saltmarsh	2	-	-

Table 12. Specialist species (as classified by Pantheon).

Specific Assemblage Type	No of species	Taxon	Status
Open water on disturbed mineral sediments	*Peltodytes caesus*	Coleoptera: Haliplidae	Nationally Scarce
	Plea minutissima	Heteroptera: Pleidae	-
Moss and tussock fen	*Hydaticus seminiger*	Coleoptera: Dytiscidae	Nationally Scarce
	Rhantus grapii	Coleoptera: Dytiscidae	-
Slow-flowing rivers	*Bithynia leachii*	Mollsuca: Bithyniidae	-

4.9 Of the aquatic species listed on the SSSI citation, the ruddy darter was not recorded but the habitat of the wider and more open ditches is considered suitable. The other aquatic species on the citation is the *Stratiomys singularior*, but it is unlikely that this was collected (a single soliderfly larva was collected from station 2, but it is unlikely that this was *S. singularior.*

SPECIES OF CONSERVATION CONCERN

4.10 Three species of water beetle are of conservation concern and are listed as Nationally Scarce within the most recent review, Foster 2010[26], and these are listed below (Table 13). All three are believed to be widespread on the Essex coastal marshes.

Table 13. Species of conservation concern.

Species	Status	Habitats within Pantheon		Habitat (from Friday, 1988[27])	Stations
		Habitat	Specific Assemblage Type		
Peltodytes caesus Coleoptera: Haliplidae	Nationally Scarce	Marshland	Open water on disturbed mineral sediments	Fenland drains and quarry ponds	12 and 16
Hydaticus seminiger Coleoptera: Dytiscidae	Nationally Scarce	Marshland	Moss & tussock fen	Pools, often shaded	10
Hygrotus parallelogrammus Coleoptera: Dytiscidae	Nationally Scarce	Brackish pools & ditches and saltmarsh	-	Brackish water	3

[26] Foster, G.N. (2010). *A Review of the Scarce and Threatened Coleoptera of Great Britain Part 3: Water Beetles of Great Britain. Species Status No. 1.* JNCC, Peterborough.

[27] Friday, L.E. (1988). A Key to the Adults of British Water Beetles. *Field Studies,* 7 (1988), 1-151

5. DISCUSSION

EVALUATION

Fisher's Estuarine Moth

5.1 The Fisher's estuarine moth is listed on Annex II and IV of the Habitats Directive and as such receives substantial legal protection via The Conservation of Habitats and Species Regulations 2017 (as amened) and also the Wildlife and Countryside Act 1981 (as amended) (Table 14).

Table 14. Summary of the protection afforded to the Fisher's estuarine moth.

Legislation	Schedule /annex	Protection
The Conservation of Habitats and Species Regulations 2017 (as amended)	Annex IIa	Designation of protected areas required within the natural range of the animal species listed. This is the basis for designating SACs for named species, although it is not required for all populations to be designated and the presence of the species outside the SAC is only relevant if there is a functional link to the SAC population.
	Annex IVa	Special protection required for the native animal species listed.
Wildlife and Countryside Act 1981 (as amended)	S. 9(4)(b)	Intentional disturbance of animal occupying such a structure or place.
	S. 9(4)(c)	Obstruction of access to any structure or place used for shelter or protection.
	S. 9(5)	Selling, offering for sale, possessing or transporting for the purpose of sale (live or dead animal, part or derivative); advertising for buying or selling live or dead animal, part or derivative.

5.2 As reported in Section 3, the Fisher's estuarine moth is known within the SSSI following monitoring by Natural England (Annex 3). A systematic search for the characteristic evidence of its presence was not attempted during the current surveys, but the sole foodplant, hog's fennel *Peucedanum officinale,* was recorded within the maritime grassland and it should be assumed that the moth continues to be present.

5.3 Its sole foodplant is hog's fennel*,* and the caterpillars feed in the stems, later boring into the roots, and it is likely that a single plant only supports a single larva to adult emergence. Hog's fennel is associated with maritime grassland and can be abundant along the edge of scrub*,* where it may benefit from reduced grazing, trampling and mowing. Studies on the ecology of the caterpillars showed that although hog's fennel was found to occur at a lower density in areas that supported a high abundance of tall, coarse grass species, plants in these situations were more likely to be used by the caterpillars (Ringwood et al., 2004[28]).

5.4 Within the United Kingdom there are two Special Areas of Conservation (SAC) designated for the Fisher's estuarine moth, one in north Kent and the second at Hamford Water SAC located north along the coast ~5.7km from the survey area. It is unlikely that there is suitable habitat between the survey area and the SAC, with the intervening habitat being farmland and Frinton itself lying on the coast between the two. There are apparently no data on the dispersal ecology of the Fisher's estuarine moth from the UK or elsewhere in Europe, and it does not

[28] Ringwood, Z., Hill, J., & Gibson, C. (2004). Conservation management of *Gortyna borelii lunata* (Lepidoptera: Noctuidae) in the United Kingdom. *Journal of Insect Conservation*, 8(2), 173-183.

appear to be reported from moth traps as a vagrant. It is likely therefore that the population within the survey area is effectively isolated from the SAC.

5.5 The likely presence of the Fisher's estuarine moth is of at least National value, and if the population is important or otherwise of value in the context of the population at Hamford Water SAC then it would be of International importance.

Terrestrial Assemblages

5.6 The terrestrial surveys covered the grassland and transition habitats from grassland, including maritime grasslands close to the sea wall and also improved swards under what is assumed to be more typical agricultural management.

5.7 Across the surveys three species of conservation concern were recorded, namely:

- The Nationally Scarce beetle *Tachyporus formosus* associated with damp or humid grassland. This was found in a station comprising improved grass sward under agricultural management.
- The small heath butterfly, which is a widespread but declining Priority Species. This was found in open sward grassland near the sea wall.
- The cinnabar moth, which is which is a widespread but declining Priority Species and is associated with ragwort in grassland of various types.

5.8 Within the literature the dry grassland associated with the sea wall at the survey area is known to support species such as the moss carder bee (Gardiner and Benton, loc. cit.), although none were recorded within the current surveys and the overall assemblage of dry grassland species was low. Nevertheless, it is likely that these grasslands support a larger assemblage of rare and scarce species than were recorded.

5.9 The agricultural grasslands generally lack many of the features with which high quality assemblages are associated. However, one Nationally Scarce species was recorded but it is likely that the agricultural grassland is of value where it is in association with other habitats or vegetation, such as ditches or scrub.

5.10 Using the Colin Plant Associates scheme (see Section 2), the presence of one to five scarce species would justify a site as being of District value. The following evaluations are therefore assigned to the invertebrate assemblages:

- Dry maritime grassland and associated habitats are considered to be of District importance on the basis of the species recorded and also the likely presence of other species. It is probably unlikely, however, that the assemblages are of County value when compared to other coastal grassland sites in Essex.
- Wet or humid grassland including agricultural swards in association with other habitats are likewise probably of District importance. It is unlikely that these would justify a higher rating.

Aquatic Assemblages

5.11 Three species of conservation concern were recorded by the aquatic surveys, namely three species of beetle that are Nationally Scarce. These are associated with a range of conditions, from relatively open water situations (*Peltodytes caesus*), to ditches that are at a later successional stage or certainly more vegetated (*Hydaticus seminiger*); one species is also associated with brackish conditions (*Hygrotus parallelogrammus*).

5.12 The direct conductivity measurements suggest the ditches are freshwater, and substantially below the threshold of >2000µScm^{-1} to be classed as brackish. However, there is clearly a level of brackish influence as judged by the presence of species that are either tolerant or dependent on mildly brackish conditions.

5.13 With reference to the survey work reported by Drake (loc. cit.), the Holland Haven Marshes were ranked in terms of species quality as the lowest scoring of the 29 Essex sites that are listed. However, with the presence of three Nationally Scarce species it is nevertheless of note as is the presence of water beetles from a range of conditions, and with reference to the Colin Plant Associates criteria it is concluded that the aquatic assemblage is of District value.

6. CONCLUSIONS

Terrestrial Species

6.1 A total of 121 species were recorded within the terrestrial samples, of which the specialist species are associated with open short sward, bare sand and chalk, scrub edge, rich flower resource, and reed-fen and pools.

6.2 The three species of conservation concern were recorded: one Nationally Scarce rove beetle, and one butterfly and one moth with Priority Species status while remaining widespread albeit declining nationally, namely the small heath butterfly and cinnabar moth.

6.3 The standard classification scheme for determining the value of invertebrate assemblages (based on the numbers of rare and scarce species) returned the following classifications:

- The dry maritime grassland and associated habitats are considered to be of District importance on the basis of the species recorded and also the likely presence of other species. It is probably unlikely, however, that the assemblages are of County value when compared to other coastal grassland sites in Essex.
- The wet or humid grassland including agricultural swards in association with other habitats are likewise probably of District importance. It is unlikely that these would justify a higher rating.

6.4 The Fisher's estuarine moth is known from the maritime grassland, and this is a species listed on Annex II of the Habitats Directive, with partial legal protection. The presence of the Fisher's estuarine moth is of at least National value, and if the population is important or otherwise of value in the context of the population at Hamford Water SAC then it would be of International importance.

Aquatic Species

6.5 Most of the ditches are at a late seral stage, with substantial growth of emergent common reed, while more open conditions (extensive open water) are in the recently cleaned ditches or wider ditches.

6.6 A total of 48 species or 'morpho' species were collected across the 16 ditch stations and the two sampling periods. The beetles were the richest group, with 21 species collected.

6.7 Using standard metrics, the majority of species have low salinity tolerance, marsh fidelity and species quality scores, and are therefore considered to be freshwater species without particular habitat associations. Thus:

- Species that are tolerant of brackish conditions were recorded from two stations, and species dependent on mildly brackish conditions were recorded in the main channel of the Holland Brook. One water beetle is listed as being a species of brackish pools and ditches and saltmarsh.
- Species which are widespread or typical of grazing marsh assemblages were found in five stations (five species).
- Species scoring more than the minimum in terms of quality / status scores were found in 11 stations, with 12 species scoring either 2 or 3 on a scale from '1' to '5'.

6.8 The specialist species are associated with open water on disturbed mineral sediments, moss and tussock fen, and slow-flowing rivers.

6.9 Three species of water beetle are of conservation concern and all three are believed to be widespread on the Essex coastal marshes, associated with open water on disturbed mineral sediments, and moss & tussock fen, and slow-flowing rivers.

6.10 With the presence of three Nationally Scarce species it is nevertheless of note, as is the presence of water beetles from a range of conditions, and with reference to the standard classification scheme it is concluded that the aquatic assemblage is of District value.

7. APPENDIX 1: PHOTOGRAPHS

Figure 2. Terrestrial station 1.

Figure 3. Terrestrial station 2.

Figure 4. Terrestrial station 3.

Figure 5. Terrestrial station 4.

Figure 6. Terrestrial station 5.

Figure 7. Terrestrial station 6.

Figure 8. Late seral stage ditches.

Figure 9. An example of the limited extent of open water within late seral stage ditches.

Figure 10. Holland Brook, station 11.

8. APPENDIX 2: SURVEY DATA

Locations of sampling stations.

Station	X	Y
Aquatic		
1	TM 20740	17230
2	TM 20590	17350
3	TM 20161	18100
4	TM 20053	18187
5	TM 20250	18180
6	TM 20330	18120
7	TM 20400	18070
8	TM 20450	17980
9	TM 20570	17790
10	TM 20760	17420
11	TM 21070	17210
12	TM 21070	17020
13	TM 22680	18310
14	TM 22640	18260
15	TM 22310	17730
16	TM 22090	17610
Terrestrial		
1	TM 22595	17927
2	TM 22455	17806
3	TM 22310	17669
4	TM 22157	17716
5	TM 21990	17407
6	TM 21973	17314

Terrestrial survey data.

Higher taxon	Family	Species	Sampling station					
			1	2	3	4	5	6
Araneae	Araneidae	*Araniella cucurbitina*				X		
Araneae	Araneidae	*Larinioides cornutus*					X	
Araneae	Dictynidae	*Dictyna uncinata*					X	
Araneae	Linyphiidae	*Erigone atra*				X		
Araneae	Linyphiidae	*Lepthyphantes tenuis*				X	X	
Araneae	Linyphiidae	*Neriene peltata*			X			
Araneae	Philodromidae	*Philodromus aureolus*		X				
Araneae	Tetragnathidae	*Metellina mengei*			X			
Araneae	Tetragnathidae	*Tetragnatha extensa*		X				
Araneae	Theridiidae	*Enoplognatha ovata*					X	
Coleoptera	Anthicidae	*Notoxus monoceros*					X	X
Coleoptera	Apionidae	*Ischnopterapion loti*					X	
Coleoptera	Apionidae	*Oxystoma pomonae*			X			
Coleoptera	Cantharidae	*Cantharis nigra*				X	X	
Coleoptera	Cantharidae	*Cantharis rufa*				X		
Coleoptera	Cantharidae	*Rhagonycha fulva*	X	X	X	X	X	X
Coleoptera	Carabidae	*Nebria brevicollis*	X					
Coleoptera	Carabidae	*Notiophilus biguttatus*			X			

Higher taxon	Family	Species	Sampling station					
			1	2	3	4	5	6
Coleoptera	Carabidae	*Pterostichus nigrita*			X			
Coleoptera	Cerambycidae	*Pseudovadonia livida*						X
Coleoptera	Chrysomelidae	*Cryptocephalus pusillus*						X
Coleoptera	Chrysomelidae	*Psylliodes chrysocephala*					X	
Coleoptera	Coccinellidae	*Coccinella septempunctata*				X		
Coleoptera	Coccinellidae	*Harmonia axyridis*	X					
Coleoptera	Coccinellidae	*Rhyzobius litura*						X
Coleoptera	Coccinellidae	*Subcoccinella vigintiquatuorpunctata*				X		
Coleoptera	Coccinellidae	*Tytthaspis sedecimpunctata*			X	X		
Coleoptera	Curculionidae	*Anthonomus rubi*						X
Coleoptera	Curculionidae	*Mecinus pascuorum*					X	
Coleoptera	Curculionidae	*Trichosirocalus troglodytes*					X	
Coleoptera	Malachiidae	*Malachius bipustulatus*	X	X	X	X	X	X
Coleoptera	Oedemeridae	*Oedemera nobilis*	X					
Coleoptera	Phalacridae	*Phalacrus championi*						X
Coleoptera	Staphylinidae	*Tachyporus chrysomelinus*					X	
Coleoptera	Staphylinidae	*Tachyporus formosus*				X		
Dermaptera	Forficulidae	*Forficula auricularia*		X				
Diptera	Asilidae	*Leptogaster cylindrica*	X	X		X	X	X
Diptera	Conopidae	*Sicus ferrugineus*		X				
Diptera	Rhagionidae	*Chrysopilus cristatus*					X	
Diptera	Sciomyzidae	*Coremacera marginata*	X	X				
Diptera	Sciomyzidae	*Limnia unguicornis*	X					
Diptera	Stratiomyidae	*Chloromyia formosa*				X		
Diptera	Syrphdiae	*Helophilus pendulus*		X	X			
Diptera	Syrphidae	*Cheilosia albitarsis*					X	
Diptera	Syrphidae	*Episyrphus balteatus*		X		X	X	X
Diptera	Syrphidae	*Eristalis arbustorum*				X		
Diptera	Syrphidae	*Eristalis nemorum*					X	
Diptera	Syrphidae	*Eristalis pertinax*						X
Diptera	Syrphidae	*Eristalis tenax*						X
Diptera	Syrphidae	*Melanostoma mellinum*			X			
Diptera	Syrphidae	*Pipizella viduata*	X					
Diptera	Syrphidae	*Platycheirus albimanus*				X		
Diptera	Syrphidae	*Platycheirus clypeatus*			X			
Diptera	Syrphidae	*Sphaerophoria scripta*			X	X	X	
Diptera	Syrphidae	*Syritta pipiens*			X		X	
Diptera	Syrphidae	*Syrphus ribesii*			X			
Heteroptera	Coreidae	*Coreus marginatus*		X				
Heteroptera	Coreidae	*Coriomeris denticulatus*						X
Heteroptera	Lygaeidae	*Ischnodemus sabuleti*			X			
Heteroptera	Miridae	*Closterotomus norwegicus*						X
Heteroptera	Miridae	*Leptopterna dolabrata*		X			X	
Heteroptera	Miridae	*Leptopterna ferrugata*		X				

Higher taxon	Family	Species	Sampling station					
			1	2	3	4	5	6
Heteroptera	Miridae	*Liocoris tripustulatus*		X	X			
Heteroptera	Miridae	*Lopus decolor*					X	
Heteroptera	Miridae	*Lygus cf. pratensis*	X					
Heteroptera	Miridae	*Megaloceroea recticornis*				X		
Heteroptera	Miridae	*Miridius quadrivirgatus*					X	X
Heteroptera	Miridae	*Notostira elongata*	X		X	X	X	
Heteroptera	Miridae	*Phytocoris varipes*				X		
Heteroptera	Miridae	*Plagiognathus chrysanthemi*	X					X
Heteroptera	Miridae	*Stenodema calcarata*	X		X	X		
Heteroptera	Miridae	*Stenodema laevigata*	X					X
Heteroptera	Miridae	*Stenodema trispinosa*	X				X	
Heteroptera	Nabidae	*Himacerus mirmicoides*	X		X			
Heteroptera	Nabidae	*Nabis limbatus*	X					
Heteroptera	Pentatomidae	*Aelia acuminata*			X			X
Heteroptera	Rhopalidae	*Chorosoma schillingi*			X	X		
Homoptera	Aphrophoridae	*Philaenus spumarius*					X	X
Homoptera	Cicadellidae	*Eupelix cuspidata*		X				X
Hymenoptera	Apidae	*Andrena nígroaenea*						X
Hymenoptera	Apidae	*Anthophora bimaculata*			X			
Hymenoptera	Apidae	*Bombus lapidarius*	X	X		X		
Hymenoptera	Apidae	*Bombus pascuorum*				X		
Hymenoptera	Apidae	*Bombus terrestris*	X					
Hymenoptera	Apidae	*Nomada flava*		X				X
Hymenoptera	Colletidae	*Hylaeus communis*	X					
Hymenoptera	Colletidae	*Hylaeus confusus*	X					
Hymenoptera	Colletidae	*Hylaeus dilatatus*	X					
Hymenoptera	Crabronidae	*Cerceris rybyensis*						X
Hymenoptera	Crabronidae	*Philanthus triangulum*						X
Hymenoptera	Formicidae	*Formica cunicularia*				X		
Hymenoptera	Formicidae	*Lasius flavus*	X					
Hymenoptera	Formicidae	*Lasius niger*				X		
Hymenoptera	Formicidae	*Myrmica sabuleti*			X			
Hymenoptera	Halictidae	*Sphecodes monilicornis*	X					
Hymenoptera	Megachilidae	*Heriades truncorum*						X
Hymenoptera	Megachilidae	*Megachile centuncularis*		X				
Hymenoptera	Megachilidae	*Megachile leachella*						X
Lepidoptera	Arctiidae	*Tyria jacobaeae*			X			
Lepidoptera	Hesperiidae	*Ochlodes faunus*				X		
Lepidoptera	Hesperiidae	*Thymelicus lineola*					X	
Lepidoptera	Hesperiidae	*Thymelicus sylvestris*	X		X	X	X	
Lepidoptera	Lepidoptera	*Aphantopus hyperantus*				X		
Lepidoptera	Lycaednidae	*Polyommatus icarus*	X					
Lepidoptera	Noctuidae	*Autographa gamma*			X			X
Lepidoptera	Nymphalidae	*Aglais urticae*						X

Higher taxon	Family	Species	Sampling station					
			1	2	3	4	5	6
Lepidoptera	Nymphalidae	*Inachis io*				X		
Lepidoptera	Satyridae	*Coenonympha pamphilus*	X	X				
Lepidoptera	Sesiidae	*Bembecia ichneumoniformis*		X			X	
Lepidoptera	Yponomeutidae	*Yponomeuta evonymella*	X					
Opiliones	Phalangiidae	*Rilaena triangularis*		X				
Orthoptera	Acrididae	*Chorthippus albomarginatus*	X				X	
Orthoptera	Acrididae	*Chorthippus brunneus*	X					
Orthoptera	Acrididae	*Chorthippus parallelus*	X		X			
Orthoptera	Acrididae	*Omocestus viridulus*		X				
Orthoptera	Tettigoniidae	*Conocephalus discolor*	X	X				
Orthoptera	Tettigoniidae	*Metrioptera roeselii*	X		X			
Orthoptera	Tettigoniidae	*Tettigonia viridissima*			X			
Stylommatophora	Helicidae	*Cepaea nemoralis*		X				
Diptera	Stratiomyidae	*Oplodontha viridula*						

Aquatic survey data.

Taxon	Species	Salinity tolerance	Marsh fidelity	Quality score	Station															
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Mollusca: Bithyniidae	*Bithynia leachii*	1	1	2											X					
Mollusca: Bithyniidae	*Bithynia tentaculata*	1	1	1	X	X	X		X	X	X		X							
Mollusca: Lymnaeidae	*Lymnaea palustris*	0	1	1	X	X	X	X	X	X	X	X	X	X	X		X	X		X
Mollusca: Lymnaeidae	*Lymnaea stagnalis*	0	1	1						X		X							X	X
Mollusca: Lymnaeidae	*Radix balthica*	0	1	1	X	X		X	X	X	X	X	X	X	X	X			X	X
Mollusca: Physidae	*Physa fontinalis*	0	1	1	X	X	X	X	X	X	X		X	X						
Mollusca: Planorbidae	*Anisus vortex*	0	1	1	X	X	X	X	X	X	X	X	X	X			X	X		
Mollusca: Planorbidae	*Hippeutis complanatus*	0	1	2	X															
Mollusca: Planorbidae	*Planorbis planorbis*	0	1	1	X	X	X	X	X	X	X	X	X	X				X		
Mollusca: Sphaeriidae	*Pisidium sp.*			1				X												
Hirudinea: Glossiphoniidae	*Helobdella stagnalis*	0	1	1		X				X										
Isopoda: Asellidae	*Asellus aquaticus*	0	1	1	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
Isopoda: Janiridae	*Jaera species*	2	1	1											X					
Mysidacea: Mycidae	*Leptomysis species*	2	1	1											X					
Coleoptera: Dytiscidae	*Agabus bipustulatus*	0	1	1							X	X	X			X				
Coleoptera: Dytiscidae	*Hydaticus seminiger*	0	1	3										X						
Coleoptera: Dytiscidae	*Hydroporus palustris*	0	1	1	X					X		X	X	X		X			X	
Coleoptera: Dytiscidae	*Hydroporus planus*	0	1	1	X					X		X								

Taxon	Species	Salinity tolerance	Marsh fidelity	Quality score	Station															
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Coleoptera: Dytiscidae	*Hygrotus inaequalis*	0	1	1				X								X		X		X
Coleoptera: Dytiscidae	*Hygrotus parallellogrammus*	1	2	3			X													
Coleoptera: Dytiscidae	*Hyphydrus ovatus*	0	1	1									X					X		X
Coleoptera: Dytiscidae	*Ilybius ater*	0	2	1						X										X
Coleoptera: Dytiscidae	*Liopterus haemorrhoidalis*	0	1	2								X	X							
Coleoptera: Dytiscidae	*Rhantus grapii*	0	2	2	X															
Coleoptera: Haliplidae	*Haliplus lineatocollis*	0	1	1									X			X				X
Coleoptera: Haliplidae	*Haliplus ruficollis*	0	1	1	X	X			X				X	X		X				X
Coleoptera: Haliplidae	*Peltodytes caesus*	0	3	3												X				X
Coleoptera: Helophoridae	*Helophorus aequalis*	0	1	1										X						
Coleoptera: Helophoridae	*Helophorus minutus*	0	1	1					X	X		X	X			X				X
Coleoptera: Hydrophilidae	*Anacaena limbata*	0	1	1	X	X			X	X		X	X	X						X
Coleoptera: Hydrophilidae	*Berosus affinis*	0	3	2			X													
Coleoptera: Hydrophilidae	*Cymbiodyta marginellus*	0	1	2	X															
Coleoptera: Hydrophilidae	*Enochrus testaceus*	0	1	2	X					X								X		
Coleoptera: Hydrophilidae	*Hydrobius fuscipes*	0	1	1					X		X		X							
Coleoptera: Noteridae	*Noterus clavicornis*	0	1	1			X	X	X	X		X	X	X		X	X			
Diptera: Stratiomyidae	Species 1	0	1	1		X														

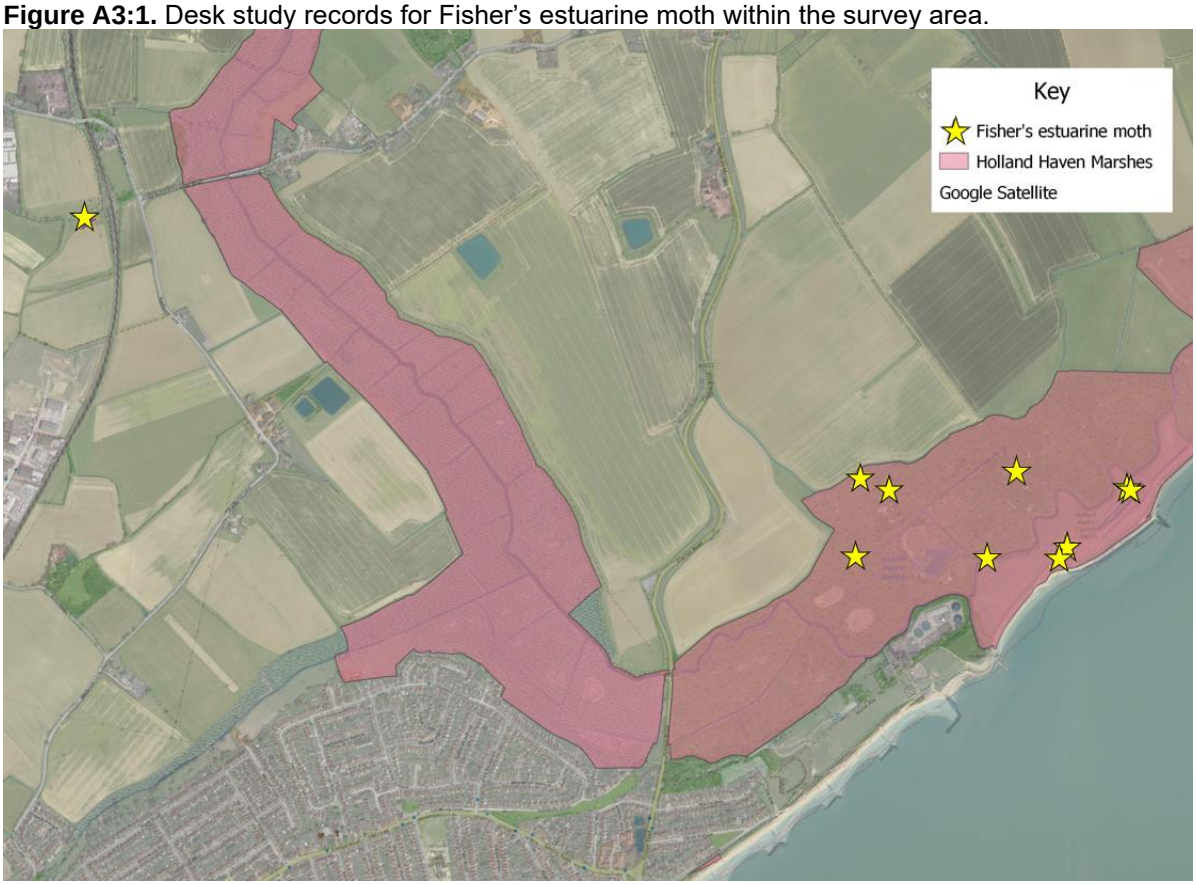
Taxon	Species	Salinity tolerance	Marsh fidelity	Quality score	Station															
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Heteroptera: Corixidae	*Hesperocorixa linnaei*	0	1	1			X	X								X				X
Heteroptera: Corixidae	*Hesperocorixa sahlbergi*	0	1	1														X		
Heteroptera: Corixidae	*Sigara nigrolineata*	0	1	1											X					
Heteroptera: Corixidae	*Sigara stagnalis*	1	1	2				X							X	X				X
Heteroptera: Gerridae	*Gerris lacustris*	0	1	1												X				X
Heteroptera: Naucoridae	*Ilyocoris cimicoides*	0	1	1		X									X	X			X	X
Heteroptera: Notonectidae	*Notonecta glauca*	0	1	1		X		X						X		X			X	X
Heteroptera: Pleidae	*Plea minutissima*	0	1	1												X				
Odonata: Aeshnidae	*Aeshna mixta*	0	1	2	X															
Odonata: Coenagrionidae	*Coenagrion puella*	0	1	1										X						
Odonata: Coenagrionidae	*Ischnura elegans*	0	1	1		X									X	X				X
Odonata: Libellulidae	*Sympetrum striolatum*	0	1	1											X	X				X

9. APPENDIX 3: FISHER'S ESTUARINE MOTH (CONFIDENTIAL)

The data search records include locations for the Fisher's estuarine moth with eight-figure grid references (equivalent to an accuracy of 10m by 10m). The records from within the survey area are shown in Figure A3:1.

These records are attributed to 'Natural England Fishers Estuarine moth monitoring' and include estimates of the percentage of plants at a locality with feeding signs. The records are dated 2005, and then 2011-19. It is not known if the records represent a systematic search for evidence of the moth or are based on visits to 'known' or 'pre-determined' locations.

Figure A3:1. Desk study records for Fisher's estuarine moth within the survey area.



North Falls Offshore Wind Farm

Onshore Landfall Area : 2020/21 Non-breeding Bird Surveys

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1 INTRODUCTION

A series of ornithological surveys were undertaken from October 2020 to March 2021, to determine the non-breeding bird assemblage present within the Potential Landfall Search Area (the 'Search Area') for the proposed North Falls Offshore Wind Farm (**Figure 1**), and identify at an early stage, potential sensitivities associated with construction phase of the landfall area and potential onshore cable routes.

Potential North Falls onshore cable routes within the Search Area have not yet been determined, as National Grid have yet to identify a grid connection point for North Falls Offshore Wind Farm. As such, the Search Area covers all potential land up to and around the existing Little Clacton substation.

2 METHODOLOGY

Survey work was undertaken during each month from October 2020 to March 2021, covering the main non-breeding bird season. This comprised a series of twice monthly transect walks (incorporating regularly-spaced vantage points) to record bird numbers, distribution and activity within the Search Area, and a minimum buffer of 300m (combined, the 'survey area', although in practice surveyors scanned further outwards from this where suitable habitat was found) to account for the spatial extent of any potential disturbance impacts to birds utilising any habitats of importance just outside of the Search Area (**Figure 1**).

The following impacts were identified as being of key concern to non-breeding birds:

- Disturbance to, or displacement of wintering and migrant species at roost sites; and
- Disturbance to, or displacement of wintering and migrant species at feeding sites.

The aims of surveys were therefore:

- To locate target species' roost and feeding sites within the survey area;
- To establish peak numbers of birds likely to utilise such areas; and
- To establish when, and how frequently, such locations are used.

The results of the surveys will be used to inform the final landfall and onshore cable route, subsequent Environmental Impact Assessment and Habitats Regulations Assessment if required.

2.1 Desk Study

A preliminary desk study identified the following likely key sensitivities, which were used to inform the scope of survey work:

- Holland Haven Marshes Site of Special Scientific Interest (SSSI) and Holland Haven Local Nature Reserve, located within the Search Area (**Figure 1**). This is an area of reclaimed saltmarsh and freshwater marsh which according to the Natural England SSSI citation[1], hosts during winter, a range of wader and wildfowl species, including passage migrants, as well as wintering raptors such as hen harrier and short-eared owl;

[1] https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1006349.pdf

- Hamford Water Special Protection Area (SPA), located 3.6km north of the Search Area. It supports numbers of European importance of two species listed in Annex I to the EU Birds Directive (breeding little tern and wintering avocet) and seven regularly occurring migratory species of waterbirds (dark-bellied brent goose, shelduck, teal, ringed plover, grey plover, black-tailed godwit and redshank). It is possible that connectivity with the SPA exists as SPA birds may use the Search Area on occasion.
- Colne Estuary SPA, located 8.2km southwest of the Search Area. This is designated for breeding pochard, ringed plover and little tern; and wintering dark-bellied brent goose, hen harrier and redshank as well as its wintering waterfowl assemblage. It is possible that SPA birds may use the Search Area on occasion.
- A review of the British Trust for Ornithology's (BTO) Wetland Bird Survey (WeBS) counts for the Holland Marshes count sector which shows that the location regularly hosts >1,000 brent geese during winter (with other species at lower numbers); and
- A review of aerial imagery which shows that the Search Area is a mixture of agricultural fields (mainly arable), marsh and marshy grassland, and amenity (golf course) habitats.

Based on this information, target species for winter surveys were therefore considered to be all wildfowl, wader and raptor species, although any other species of high conservation concern[2] were also recorded. Tally counts were also made of all other more common species.

A further desk study will be undertaken to compile all available historic data at the EIA stage. Monthly WeBS count data for the Holland Marshes area would be obtained from the BTO, which can potentially confirm whether the data collected in 2020/21 are representative of the long-term situation. Other records from local birdwatchers, the local wildlife trust or biological information records centres will be obtained if available.

2.2 Survey Methodology

Survey methodology was informed by the following guidance;

- The BTO WeBS Core Count methodology for waterbirds[3] which follows Bibby *et al.* (2000[4]); and Gilbert *et al.* (1998[5]); and
- Scottish Natural Heritage (2017[6]) guidance on bird survey methods for onshore wind farms, which includes a section on surveying wintering and migratory wildfowl.

A reconnaissance visit was made in September 2020, prior to the first survey to confirm walkover routes, suitable vantage point locations, access restrictions and health & safety issues.

Because the cable route or landfall area was not determined in sufficient detail during the survey period, landowner access was not arranged within the survey area. A series of walkover surveys following predetermined routes, combined with scans from a number of vantage points were

[2] Listed in Annex I of the EU Birds Directive, Schedule 1 of the Wildlife & Countryside Act 1981 or rare, Red-listed species in the Birds of Conservation Concern (Eaton *et al.* 2015).
[3] https://www.bto.org/sites/default/files/02_-_core_count_0.pdf
[4] Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S. 2000. Bird Census Techniques. 2nd edition. Academic Press, London.
[5] Gilbert, G., Gibbons, D.W. & Evans, J. 1998. Bird Monitoring Methods. RSPB, Sandy.
[6] SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms.

therefore conducted twice per month, utilising Public Rights of Way (PRoWs) and public roads within the survey area. The walkover routes and vantage point locations are shown on **Figure 1**.

Based on the desk study information and local surveyor knowledge, surveys were focussed on areas of suitable habitat (e.g., wetlands, waterbodies, marshy fields and suitable winter crop fields) likely to be utilised by target species.

Since groups of birds may be highly mobile during survey periods, distinct parts of the Search Area were compartmentalised into manageable areas largely visible at the same time, based on habitat type/field boundaries, so that peak counts per species, per survey could be made within each compartment, similar to a WeBS sector approach. This is shown as compartments A-E on **Figure 1**. Locations of target species were plotted onto a map to be able to identify key roost or feeding sites, whereas a tally of all non-target species within each compartment was made during each survey, to allow the surveyor to focus on target species.

The "look-see" methodology advised for WeBS core counts was followed, which determines that efforts should be made to ensure all suitable areas within the Search Area should be surveyed to within 500m. This means that counts can be made for example, from a suitable location outside of a field/compartment boundary, either along a footpath or from a public road. This method helped ensure that the risk of disturbance to birds is minimised, and also enabled the surveyor to record birds just outside of the Search Area, which may still be subject to disturbance.

In order to establish the location of key roost sites, surveys were timed to overlap with dawn or dusk periods, as well as continuing through the day to determine feeding sites. Effort was made to schedule surveys during suitable weather conditions, and to overlap with any foreseeable particularly cold periods, as the numbers of birds at a site may be augmented by influxes from the continent or from adjacent areas, and so the identification of potential cold-weather refuges was an important consideration.

The surveyor scanned each compartment from walkover routes and suitable vantage points for a suitable duration until it was confidently determined that all birds present were recorded.

The following information was recorded within each compartment during each survey:

- Peak count of each species;
- Location(s) of target species within compartment;
- Date and time of each count;
- Behaviour of birds (e.g., roosting, feeding);
- Directions of any movements to and from compartments and survey area; and
- Accuracy of counts should estimates be required, e.g., by access restrictions, continuous movements of birds.

Evidence of actual, and possible, disturbance sources to birds (e.g., dog walkers, bird scarers) were also noted during surveys, to help inform baseline disturbance levels within the Study Area.

3 RESULTS

3.1 Peak Counts

During the October to March survey period a total of 113 species were recorded within the survey area (refer to Annex A for species list). Of these, 52 were considered to be target species (wildfowl, waders, raptors and rare, BoCC Red-listed species).

A summary of peak counts recorded for each target species within compartments A-E is presented in **Table 1**. This represents the largest single count of a species during any survey within a particular compartment. It should be noted that it is possible that the same individuals were recorded in two or more compartments, and therefore population estimates for the whole survey area cannot be ascertained by summing peak counts within all compartments. Also shown are the 1% national and international thresholds for wildfowl and waders provided in the BTO's WeBS reports (Frost *et al.* 2020[7]), used to identify important sites. Where counts meet or exceed thresholds, this is highlighted.

Results show that Compartment D (Holland Marshes) held the greatest number of target species (44) and greatest number of birds. Compartment B (Holland Brook) held the next highest number of species (24), with comparatively lower diversity within the other compartments. For all wildfowl and wader species, only European white-fronted goose was recorded in numbers that exceed the national threshold of importance, with up to 101 individuals recorded in compartments A and C in late December 2020. The species was also present in compartments C and D during late December 2020 and early January 2021. Single great white egrets were recorded in compartments B and D which meets the current threshold for national importance.

Dark-bellied brent geese numbers peaked at 770 individuals in late December 2020 within Compartment E. Whilst this does not meet the 1% national threshold for the species, it represents around 14% of the cited populations given for both Hamford Water SPA (5,650 individuals, 1986/87 to 1990/91) and Colne Estuary SPA (5,315 individuals, 1987/88 to 1991/92). A number of other species were found in reasonably large numbers, including greylag goose, golden plover, lapwing, teal and wigeon.

Target raptor and owl species were recorded on occasion, including barn owl which is likely to be resident within the survey area, peregrine and marsh harrier which may also be present during the breeding season, and hen harrier, merlin and short-eared owl which are likely to be present during winter only.

Some rare BoCC Red-listed / Schedule 1 listed passerine species were also present, which may be reflective of possible breeding within the survey area. This includes bearded tit, corn bunting, Dartford warbler and yellow wagtail.

[7] Frost, T.M., Calbrade, N.A., Birtles, G.A., Mellan, H.J., Hall, C., Robinson, A.E., Wotton, S.R., Balmer, D.E. and Austin, G.E. 2020. Waterbirds in the UK 2018/19: The Wetland Bird Survey. BTO/RSPB/JNCC. Thetford.

Table 1 Target species peak counts (individuals) per compartment (Cpt)

Species	Cpt A Little Clacton	Cpt B Holland Brook	Cpt C Great Holland	Cpt D Holland Marshes	Cpt E Frinton Golf C.	GB Threshold	Inter-national Threshold
Avocet				42		87	940
Barn owl	2	1		1		-	-
Bearded tit				2		-	-
Black-tailed godwit (*islandica*)				5		390	1,110
Dark-bellied brent goose				110	770	980	2,100
Canada goose		34	1	28		-	-
Canada x greylag goose hybrid		1	7	7		-	-
Cetti's warbler	1	2	1	6	1	-	-
Coot	2	1				2,000	15,550
Cormorant		5	1	96	1	-	-
Corn bunting					5	-	-
Curlew				53	6	1,200	7,600
Dartford warbler				1		-	-
Dunlin				2		3,400	13,300
European W-f goose (*albifrons*)	101		101	50		21	12,000
Firecrest				1		-	-
Gadwall	4	7		4		310	1,200
Golden plover		1	100		27	4,000	9,300
Great crested grebe				2		170	6,300
Great white egret		1		1		1	780
Green sandpiper		1		1		3	20,000
Greylag goose	25	45	220	223	1	910	980
Kingfisher				1		-	-
Lapwing			252	137	250	6,200	20,000
Little egret				2		110	1,100
Little grebe	1	1		3		150	4,700
Little owl	1	1			2	-	-

Species	Cpt A Little Clacton	Cpt B Holland Brook	Cpt C Great Holland	Cpt D Holland Marshes	Cpt E Frinton Golf C.	GB Threshold	Inter-national Threshold
Mallard	15	13	1	19	16	6,700	20,000
Marsh harrier	1					-	-
Merlin				1		-	-
Moorhen	3	13	2	4	11	3,000	20,000
Mute swan	2	6	8	7		500	500
Oystercatcher	1	2		6	3	2,900	8,200
Peregrine	1			1	1	-	-
Pink-footed goose				2		5,100	5,400
Pintail	32	8		3		200	600
Purple sandpiper				7		97	110
Redshank				5		940	2,400
Ruff				1		9	20,000
Shag				1		1,100	2,000
Shelduck	8	11		19		470	2,500
Short-eared owl				1		-	-
Shoveler		3	4	38		190	650
Snipe		3		22		10000	20,000
Teal	45	305	30	216	76	4,300	5,000
Tufted duck	4					1,300	8,900
Tundra bean goose				2		3	5,500
Turnstone				7		400	1,400
Water rail			1	1		-	6,400
Wigeon	120	115	16	288	200	4,500	14,000
Woodcock	1				1	14,000	20,000
Yellow wagtail					1	-	-

The detailed results obtained from each survey, separated into each of the five compartments (A-E) are presented in tables in Annex B. For each target species, the peak count of individuals recorded during each survey is shown. A summary of results for each compartment is provided below.

3.2 Compartment A: Little Clacton

The Little Clacton compartment comprises mainly flat arable farmland to the west of Holland Haven Marshes SSSI and is bordered by commercial and residential areas to the south and west.

Table 3 in Annex B provides a detailed breakdown of peak counts per survey for each target species. In general, numbers of geese and waders were relatively low compared to those nearer to Holland Haven Marshes, although a peak count of 101 white-fronted geese was recorded in a field towards the north of the compartment in December 2020 (**Figure 2a**).

There were also notable counts of teal (45 individuals), pintail (32 individuals) and wigeon (120 individuals) made to the north of the compartment near the small reservoir, in mid-February 2021 (**Figure 3**).

Barn owls were also regularly recorded in this compartment and the species may breed in the vicinity. A Cetti's warbler (breeding species listed in Schedule 1 of the Wildlife & Countryside Act 1981) was heard within a damp wooded area at the northern site boundary in late February 2021 and so breeding may occur in this compartment.

3.3 Compartment B: Holland Brook

Compartment B is centred around Holland Brook which leads into Holland Haven Marshes and forms part of the SSSI. The marsh and wetland habitats of Holland Brook have an extensive ditch system and are surrounded by arable farmland with a few small agricultural reservoirs.

Results presented in **Table 4** and **Figure 3** show that the Compartment is regularly used by duck species including teal (peak count of 305 individuals) and wigeon (115), as well as pintail, gadwall, shelduck, shoveler and mallard in smaller numbers (**Figure 3**). Canada goose and greylag goose were also regularly recorded (**Figure 2b**).

The compartment was relatively unimportant for waders, with small numbers of golden plover and snipe occasionally present.

Cetti's warbler was consistently recorded from January 2021 and it is considered likely that the species breeds at Holland Brook. Barn owl and little owl were present and may also breed locally.

3.4 Compartment C: Great Holland

Compartment C comprises an extent of flat, intensively managed arable farmland of generally large field sizes. There are two agricultural reservoirs present within the site.

Species diversity was relatively low within this compartment, with a total of 14 species recorded across all surveys (**Table 5**). Notable records of geese were the count of 101 white-fronted geese in early December 2020 (the same flock that was recorded in Compartment A), and up to 220 greylag geese present.

Relatively large flocks of waders were occasionally recorded in stubble fields, with up to 252 lapwings in early January and 100 golden plovers in early December 2020 (**Figure 4**).

3.5 Compartment D: Holland Marshes

Compartment D forms the main part of the Holland Haven Marshes SSSI and comprises areas of reclaimed estuarine saltmarsh and freshwater marsh. The compartment is bisected by Holland Brook and contains a network of ditches, to produce a variety of suitable habitats for birds.

Brent geese were sometimes present (up to 110 birds), and flocks of white-fronted geese (up to 50 birds) were recorded on two occasions (**Table 6**, **Figure 2a**). Greylag geese were also regularly recorded in relatively large numbers (**Figure 2b**). Two tundra bean geese were recorded on one occasion.

Ducks were present in relatively large numbers within the compartment and just off the coast, with high counts of teal (up to 216 individuals), wigeon (288), shoveler (38) and shelduck (19) (**Figure 3**).

There was a notable wader assemblage, with avocet present from February 2021 onwards (up to 42 individuals), and curlew, snipe and lapwing present in good numbers throughout the winter. Purple sandpipers (up to seven individuals) were recorded beside the sea wall. Other wader species present in smaller numbers were black-tailed godwit, dunlin, green sandpiper, redshank, ruff and turnstone.

In late December 2020, due to the scrape being frozen over, wildfowl that normally frequent this area were recorded either on Holland Brook (teal) or on the sea (wigeon).

The marshes are occasionally used by barn owl, merlin, peregrine and short-eared owl.

Also notable were Schedule 1 species bearded tit, Cetti's warbler and Dartford warbler which may attempt to breed within the site during summer.

3.6 Compartment E: Frinton Golf Course

Compartment E contains part of the Holland Haven SSSI which extends northeast from Holland Haven Local Nature Reserve which is comprised of Frinton Golf Course and rough grassland and scrub close to the sea. To the north of the golf course is a series of large, intensively managed arable fields.

Although species diversity was relatively low in this area compared to adjacent Compartment D, there were some notable counts including a peak of 770 brent geese, and a peak of 250 lapwing using fields to the north of the SSSI on occasion. The area of SSSI within the golf course does however appear to be of relatively low importance for wintering birds compared to Holland Haven Marshes.

Other notable species observed were corn bunting and yellow wagtail utilising stubble fields, and Cetti's warbler was also present. These species may breed in the area.

4 BASELINE DISTURBANCE LEVELS

During surveys, observed and potential sources of disturbance to birds within the study area were noted. These may affect numbers and distributions of species in general, and at particular times of the day or year.

In general, there is widespread and frequent human activity across particular parts of the study area, including dog walkers, wildfowling, golfing, angling (at rocky jetties) and metal detecting.

The majority of the coastal strip (seawall to Kirby Brook) from Holland Haven to Frinton is used for recreational pursuits, so there is frequent potential disturbance to birds. During one survey in late

December 2020 for example, a total of 23 dog-walkers with 30 dogs (some off leash), 28 joggers, 21 golfers and 50-100 non-dog walkers were noted. Some PRoWs in other parts of the study area were also in heavy use by walkers.

Two gas gun scarers were stationed in Compartment C, and a further in Compartment A during winter months when geese are present. These are likely to affect the distribution and site usage of wildfowl in particular within the study area.

5 DISCUSSION

A reasonably large number of species were recorded within the survey area during the 2020-21 non-breeding season, although distribution was not even, with some areas more favoured by species, in particular within and around the wetland habitats within Holland Haven Marshes SSSI in Compartment D and to a lesser extent in Compartment B. These compartments are likely to form the areas of highest sensitivity to target species and are most likely to require specific mitigation/management to avoid/minimise impacts during the construction phase of the project, should the landfall and cable route be in proximity to sensitive locations.

Geese and waders also utilise arable fields within the other compartments, although the presence of gas gun scarers in Compartments A and C, as well as regular human presence throughout the Search Area means that birds, particularly geese, are likely to move frequently between locations in response to disturbance sources. Nevertheless, consideration of wildfowl, ducks and waders, particularly European white-fronted goose (which are on occasion present in nationally important numbers) and other species such as dark-bellied brent goose that are qualifying features of nearby SPAs may be required further in any mitigation strategy for the project.

ANNEX A. FULL SPECIES LIST

Table 2 Full species list and frequency of presence per compartment

Species	Number of Surveys Recorded				
	Cpt A Little Clacton	Cpt B Holland Brook	Cpt C Great Holland	Cpt D Holland Marshes	Cpt E Frinton Golf Course
Avocet				3	
Barn Owl	7	1		4	
Bearded Tit				2	
Black Redstart	1				
Blackbird	12	11	8	11	12
Black-headed Gull	12	10	11	12	12
Black-tailed Godwit (islandica)				4	
Blue Tit	12	11	4	12	10
Brambling				1	1
Brent Goose (bernicla)				4	5
Bullfinch	3			1	
Buzzard	10	10	5	4	
Canada Goose		5	4	7	
Canada x Greylag Goose hybrid		1	4	4	
Carrion Crow	12	12	11	12	12
Caspian Gull				1	
Cetti's Warbler	1	6	1	7	5
Chaffinch	11	7	1	12	11
Chiffchaff	4	1		2	
Coal Tit	1				1
Collared Dove	12	2	3	8	10
Common Gull	6	5	4	2	7
Coot	2	1			
Cormorant		2	1	8	1
Corn Bunting					3
Curlew				10	3
Dartford Warbler				1	
Dunlin				1	
Dunnock	12	11	7	10	11
European W-f Goose (albifrons)	1		1	2	
Feral Pigeon	2	3		10	12
Fieldfare	5	2		1	1
Firecrest				1	
Gadwall	1	1		3	
Goldcrest	6		1	3	
Golden Plover		2	2		1

	Number of Surveys Recorded				
Goldfinch	12	3	2	9	11
Great Black-backed Gull	1	1	2	6	2
Great Crested Grebe				1	
Great Spotted Woodpecker	5				2
Great Tit	10	6	3	7	8
Great White Egret		1		1	
Green Sandpiper		1		2	
Green Woodpecker	11	2		3	10
Greenfinch	7	3	1	5	5
Grey Heron	2	9	3	4	
Grey Wagtail	1		1	1	
Greylag Goose	2	9	6	9	1
Herring Gull	10	10	10	12	10
House Sparrow	12	4		6	9
Jackdaw	12	11	10	12	12
Jay	10	1		3	2
Kestrel	7	6	5	10	8
Kingfisher				4	
Lapwing			4	8	4
Lesser Black-backed Gull	2	6	1	7	
Lesser Redpoll				2	1
Linnet	1	5	1	5	11
Little Egret				5	
Little Grebe	1	3		1	
Little Owl	1	2			1
Long-tailed Tit	9	3		7	2
Magpie	12	10	10	12	11
Mallard	6	8	1	8	10
Marsh Harrier	1				
Meadow Pipit	9	4	3	9	7
Mediterranean Gull	1	2		2	2
Merlin				1	
Mistle Thrush	2	2			5
Moorhen	7	10	3	11	12
Mute Swan	5	5	11	6	
Oystercatcher	1	2		3	2
Peregrine	1			2	1
Pheasant	12	12	12	12	10
Pied Wagtail (yarrellii)	12	5	4	11	10
Pink-footed Goose				3	
Pintail	1	1		1	
Purple Sandpiper				8	
Red-legged Partridge	9	6	1		2

	Number of Surveys Recorded				
Redshank				4	
Redwing	7	1		2	1
Reed Bunting		1	2	10	6
Robin	12	12	11	12	12
Rock Pipit				5	1
Rook	11	12	4	3	7
Ruff				2	
Shag				1	
Shelduck	2	5		12	
Short-eared Owl				2	
Shoveler		1	1	8	
Siskin				2	2
Skylark	9	6	8	9	9
Snipe		1		4	
Song Thrush	9	2		2	
Sparrowhawk	3		1	2	1
Starling	5	12	8	12	10
Stock Dove	8	8	3	6	6
Stonechat				9	2
Swallow				3	1
Tawny Owl	1				
Teal	2	7	1	12	1
Treecreeper	1				
Tufted Duck	2				
Tundra Bean Goose				1	
Turnstone				6	
Twite					1
Water Rail			1	2	
Wigeon	1	1	1	10	2
Woodcock	2				1
Woodpigeon	12	12	12	12	12
Wren	12	12	7	12	11
Yellow Wagtail					1
Yellowhammer	3	1			1

ANNEX B. TARGET SPECIES PEAK COUNTS PER COMPARTMENT

Table 3 Target species peak counts per survey in Compartment A: Little Clacton

Species	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Barn Owl					2	2	2		2	2	2	2
Cetti's Warbler										1		
Coot											2	2
European W-f Goose (albifrons)					101							
Gadwall									4			
Greylag Goose									25		1	
Little Grebe											1	
Little Owl						1						
Mallard				6	3	15				3	5	5
Marsh Harrier								1				
Moorhen		2	1	1	2		1	3	1			
Mute Swan						2		2	2		2	2
Oystercatcher											1	
Peregrine					1							
Pintail									32			
Shelduck										1		8
Teal									45	4		
Tufted Duck											4	2
Wigeon									120			
Woodcock						1			1			

Table 4 Target species peak counts per survey in Compartment B: Holland Brook

Species	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Barn Owl									1			
Canada Goose							29		34	6	2	8
Canada x Greylag Goose hybrid											1	
Cetti's Warbler				1				2	1	2	1	1
Coot									1			
European W-f Goose (albifrons)												
Gadwall									7			
Golden Plover									1	1		
Great White Egret		1										
Green Sandpiper								1				
Greylag Goose	2	1		1			28	1	5	8	45	28
Little Grebe						1		1			1	
Little Owl					1			1				
Mallard	8	1		2				1	10	13	6	5
Moorhen	6		3	2	1		8	13	7	4	4	3
Mute Swan	2						2	6	4		2	
Oystercatcher											1	2
Pintail									8			
Shelduck					1			2	11		6	2
Shoveler									3			
Snipe									3			
Teal					1	4	6		305	1	12	2
Wigeon									115			

Table 5 Target species peak counts per survey in Compartment C: Great Holland

Species	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Canada Goose	1	1			1	1						
Canada x Greylag Goose hybrid	7	6			6	5						
Cetti's Warbler					1							
European W-f Goose (albifrons)					101							
Golden Plover						100				4		
Greylag Goose	133	220		120	162	73					6	
Lapwing	177				110		252		73			
Mallard	1											
Moorhen				1	2					1		
Mute Swan		4	6	7	6	8	5	8	6	6	2	2
Shoveler									4			
Teal									30			
Water Rail					1							
Wigeon									16			

Table 6 Target species peak counts per survey in Compartment D: Holland Marshes

Species	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Avocet										10	36	42
Barn Owl							1	1		1		1
Bearded Tit		1	2									
Black-tailed Godwit (islandica)						1				1	4	5
Brent Goose (bernicla)				31	110				11	38		
Canada Goose	1	1				1		28	5		6	2
Canada x Greylag Goose hybrid	7	6				5		6				
Cetti's Warbler	1	2	6	2				2			1	3
Curlew	3	8	5	6		5		3	9	24	31	53
Dartford Warbler			1									
Dunlin												2
European W-f Goose (albifrons)						50	26					
Firecrest											1	
Gadwall										4	2	2
Great Crested Grebe				2								
Great White Egret		1										
Green Sandpiper											1	1
Greylag Goose	126	223	128	146	53	151		149		3	16	
Kingfisher	1	1	1	1								
Lapwing	52	136	108	14	1					137	25	23
Little Egret	1	1			1	1						2
Little Grebe									3			
Mallard	2		2				1	8	10	19	9	7
Merlin								1				
Moorhen	2	3	4		2	1	2	3	3	1	4	2
Mute Swan	3	4	7		6	3	5					
Oystercatcher										2	5	6
Peregrine										1		1
Pink-footed Goose						1	2	2				
Pintail									3			
Purple Sandpiper	1		3	3	2		7	4	1	1		
Redshank		3								1	2	5

Species	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Ruff										1		1
Shag					1							
Shelduck	8	5	10	8	6	8	2	7	18	13	19	10
Short-eared Owl			1			1						
Shoveler		1	6				8	10	18	38	22	9
Snipe			22							14	22	12
Teal	142	8	85	7	76	2	36	216	178	167	90	75
Tundra Bean Goose						2						
Turnstone			6	6	3	3	6					7
Water Rail		1	1									
Wigeon	42		15		160	160	52	148	236	167	288	160

Table 7 Target species peak counts per survey in Compartment E: Frinton Golf Course

Species	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Brent Goose (bernicla)				9	110	770	55			252		
Cetti's Warbler	1	1	1	1				1				
Corn Bunting	5	1									1	
Curlew	3		6						2			
Golden Plover									27			
Greylag Goose					1							
Lapwing	2		14			12			250			
Little Owl									2			
Mallard		13	6	7	2	13	16	15	16		5	8
Moorhen	2	3	4	2	8	5	3	11	10	8	4	3
Oystercatcher			1							3		
Peregrine											1	
Teal					76							
Wigeon					160				200			
Woodcock									1			
Yellow Wagtail	1											

618000 619000 620000 621000 622000 623000

220000 219000 218000 217000 216000

A B C D E

Legend:

- Search Area
- Vantage Point (VP)
- 300m Survey Buffer
- Survey Compartments
- Survey Routes
- Holland Haven Marshes Site of Special Scientific Interest (SSSI)
- Holland Haven Local Nature Reserve (LNR)

Source: SSE, MacArthur Green

MacArthur Green

North Falls Onshore Landfall Search Area

Figure 1

Survey Area

0 250 500
Metres
MAP SCALE: 1:17,500 @ A3

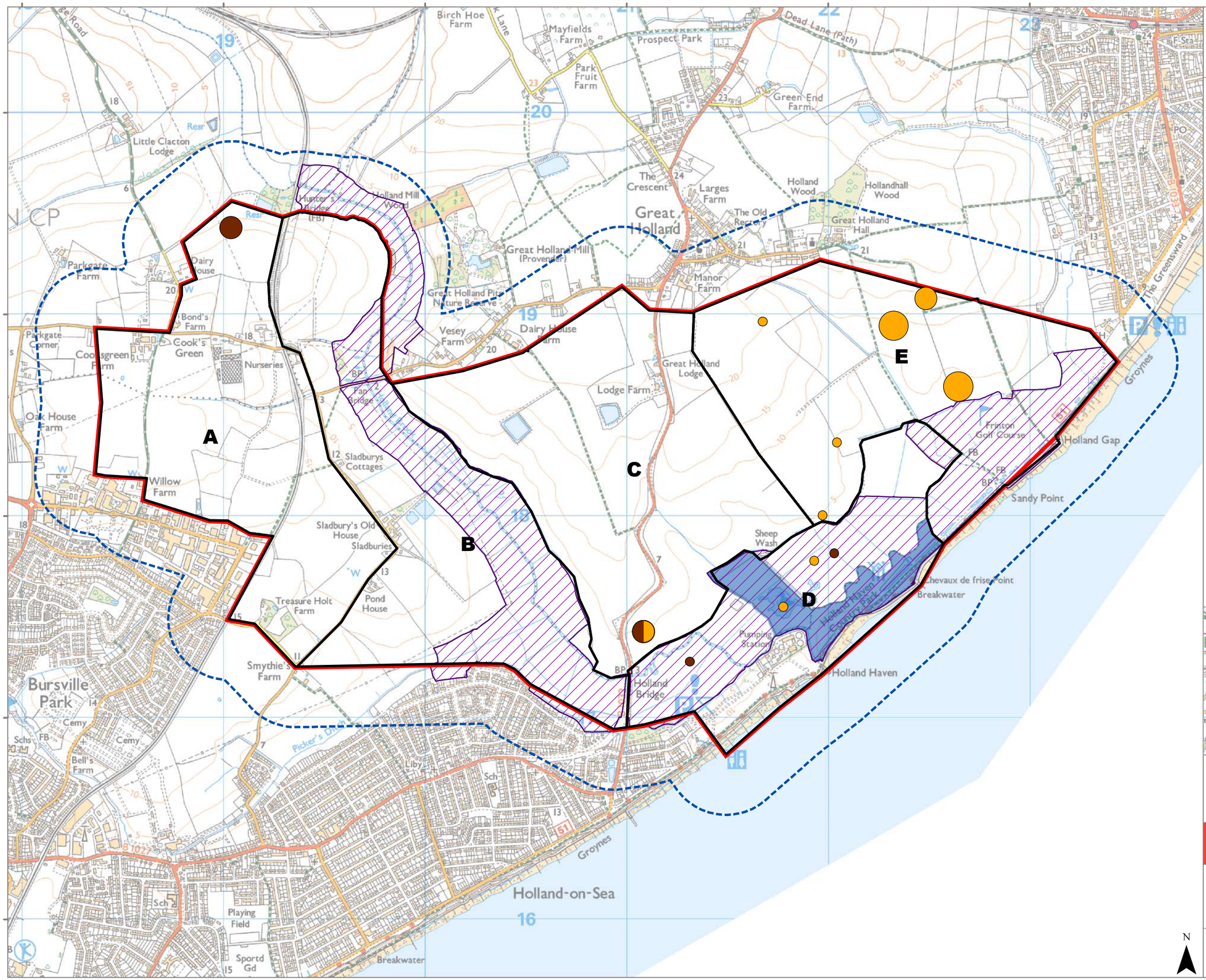
N

Map Author: LM Checked: LNF Approved: RD Status: Rev4

Document Path: S:\Projects\SSE\SSE 021 North Falls NFA\03_Data\O_CF_NE_Fig1_SurveyArea_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 26/05/2021



sse

Legend:

- Search Area
- 300m Survey Buffer
- Survey Compartments
- Holland Haven Marshes Site of Special Scientific Interest (SSSI)
- Holland Haven Local Nature Reserve (LNR)

Brent Goose Observations

- 2 - 50
- 101 - 250
- 251 - 770

White-fronted Goose Observations

- 2 - 50
- 101 - 250

Source: SSE, MacArthur Green, SPEC

MacArthur Green

North Falls Onshore Landfall Search Area

Figure 2a

White-fronted Geese and Brent Geese

0 250 500
Metres
MAP SCALE: 1:17,500 @ A3

N

Map Author: LM Checked: LNF Approved: RD Status: Rev4

Document Path: S:\Projects\SSE\SSE 021 North Falls NFA\03_Data\O_CF_NE_Fig2a_BG_WG_Geese_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 26/05/2021

618000 619000 620000 621000 622000 623000

220000 219000 218000 217000 216000

A B C D E

Legend:

- Search Area
- 300m Survey Buffer
- Survey Compartments
- Holland Haven Marshes Site of Special Scientific Interest (SSSI)
- Holland Haven Local Nature Reserve (LNR)

Other Goose Species Observations

- 1
- 2 - 50
- 51 - 100
- 101 - 250

Source: SSE, MacArthur Green, SPEC

MacArthur Green

North Falls Onshore Landfall Search Area

Figure 2b

Other Goose Species

0 250 500 Metres

MAP SCALE: 1:17,500 @ A3

N

Map Author: LM Checked: LNF Approved: RD Status: Rev4

Document Path: S:\Projects\SSE\SSE 021 North Falls NFA\03_Data\O_CF_NE_Fig2b_Other_Geese_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 26/05/2021

618000 619000 620000 621000 622000 623000

220000 219000 218000 217000 216000

A B C D E

Legend:

- Search Area
- 300m Survey Buffer
- Survey Compartments
- Holland Haven Marshes Site of Special Scientific Interest (SSSI)
- Holland Haven Local Nature Reserve (LNR)

Duck Species Observations

- 1
- 2 - 50
- 51 - 100
- 101 - 250

Source: SSE, MacArthur Green, SPEC

MacArthur Green

North Falls Onshore Landfall Search Area

Figure 3

Ducks

0 250 500
Metres
MAP SCALE: 1:17,500 @ A3

N

Datum: OSGB 1936, Projection: British National Grid

Date: 26/05/2021

Map Author: LM Checked: LNF Approved: RD Status: Rev4

Document Path: S:\Projects\SSE\SSE 021 North Falls NFA\03_Data\O_CF_NE_Fig3_Ducks_NFA.mxd

618000 619000 620000 621000 622000 623000

220000 219000 218000 217000 216000

A B C D E

Legend:

- Search Area
- 300m Survey Buffer
- Survey Compartments
- Holland Haven Marshes Site of Special Scientific Interest (SSSI)
- Holland Haven Local Nature Reserve (LNR)

Wader Species Observations

- 1
- 2 - 50
- 51 - 100
- 101 - 250
- 251 - 770

Source: SSE, MacArthur Green, SPEC

MacArthur Green

North Falls Onshore Landfall Search Area

Figure 4

Waders

0 250 500
Metres
MAP SCALE: 1:17,500 @ A3

N

Datum: OSGB 1936, Projection: British National Grid

Date: 26/05/2021

Map Author: LM Checked: LNF Approved: RD Status: Rev4

Document Path: S:\Projects\SSE\SSE 021 North Falls NFA\03_Data\O_CF_NE_Fig4_Waders_NFA.mxd

North Falls Offshore Wind Farm

Onshore Landfall Area : 2021/22 Non-breeding Bird Surveys

Date:	24 May 2022
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CONTENTS

LIST OF TABLES

1 INTRODUCTION

A series of ornithological surveys were undertaken from August 2021 to March 2022, to determine the non-breeding bird assemblage present within the proposed area for cable landfall (the 'cable landfall search area') for the proposed North Falls Offshore Wind Farm ('the project') (**Figure 1**), and identify at an early stage, potential sensitivities associated with construction phase of the project's landfall works and potential onshore cable routes. These surveys represent a second non-breeding season's worth of coverage, following on from those undertaken from October 2020 to March 2021 (see MacArthur Green, 2021a[1] for details), as well as breeding season surveys undertaken from April to July 2021 (MacArthur Green, 2021b[2]).

At the time of the Year 1 surveys, onshore cable routes within the cable landfall search area had not yet been determined, as National Grid had not identified a grid connection point for North Falls Offshore Wind Farm. As such, the cable landfall search area covers all potential land up to and around the existing Little Clacton substation. For consistency, the Year 2 surveys have covered the same survey area.

2 METHODOLOGY

Survey work was undertaken during each month from August 2021 to March 2022, covering the autumn post-breeding (August – September) and migratory (October – November) periods, and the main non-breeding bird season through to March 2022. This comprised a series of monthly transects in August and September, and twice monthly transect walks from October to March (incorporating regularly-spaced vantage points) to record bird numbers, distribution and activity within the cable landfall search area, and a minimum buffer of 400m in suitable habitat (combined, the 'survey area') to account for the spatial extent of any potential disturbance impacts to birds utilising any habitats of importance just outside of the cable landfall search area (**Figure 1**).

The aims of surveys were:

- To locate target species' roost and feeding sites within the survey area;
- To establish peak numbers of birds likely to utilise such areas; and
- To establish when, and how frequently, such locations are used.

The results of the surveys will be used to inform the final landfall and onshore cable route, subsequent Environmental Impact Assessment (EIA) and Habitats Regulations Assessment (HRA) if required.

2.1 Desk Study

A preliminary desk study was undertaken prior to commencement of surveys in Year 1, 2020-21, in order to identify likely key sensitivities, which were used to inform the scope of survey work (see MacArthur Green, 2021a for details).

[1] MacArthur Green (2021a). North Falls Offshore Wind Farm - Onshore Landfall Area : 2020/21 Non-breeding Bird Surveys.
[2] MacArthur Green (2021b). North Falls Offshore Wind Farm - Onshore Landfall Area: 2021 Breeding Bird Surveys.

Target species for winter surveys remain unchanged from Year 1, and are considered to be all wildfowl, wader and raptor species, although any other species of high conservation concern were also recorded. In some cases, seabirds were recorded from land, but these have not been considered as target species unless they were recorded utilising the survey area. Tally counts were made of these and all other more common species.

A further desk study will be undertaken to compile all available historic data at the EIA stage. Monthly WeBS count data for the Holland Marshes area will be obtained from the British Trust for Ornithology (BTO), which can potentially confirm whether the data collected in Years 1 and 2 are representative of the long-term situation. Other records from local birdwatchers, the local wildlife trust or biological information records centres will be obtained if available.

2.2 Survey Methodology

Survey methodology was informed by the following guidance;

- The BTO WeBS Core Count methodology for waterbirds[3] which follows Bibby *et al.* (2000[4]); and Gilbert *et al.* (1998[5]); and
- NatureScot (SNH, 2017[6]) guidance on bird survey methods for onshore wind farms, which includes a section on surveying wintering and migratory wildfowl.

A reconnaissance visit was made in September 2020, prior to the first survey to confirm walkover routes, suitable vantage point locations, access restrictions and health & safety issues.

A series of walkover surveys, following predetermined routes combined with scans from a number of vantage points was conducted twice per month, with landowner access being agreed beforehand. Where this was not possible, surveyors utilised Public Rights of Way (PRoWs) and public roads within the survey area. The walkover routes and vantage point locations are shown on **Figure 1**.

Based on the desk study information, local surveyor knowledge and results from Year 1, surveys were focussed on areas of suitable habitat (e.g., wetlands, waterbodies, marshy fields and suitable winter crop fields) likely to be utilised by target species.

Since groups of birds may be highly mobile during survey periods, distinct parts of the cable landfall search area were compartmentalised into manageable areas largely visible at the same time, based on habitat type/field boundaries, so that peak counts per species, per survey could be made within each compartment, similar to a WeBS sector approach. This is shown as compartments A-E on **Figure 1**. Locations of target species were plotted onto a map to be able to identify key roost or feeding sites, whereas a tally of all non-target species within each compartment was made during each survey, to allow the surveyor to focus on target species.

The "look-see" methodology advised for WeBS core counts was followed, which determines that efforts should be made to ensure all suitable areas within the cable landfall search area should be

[3] https://www.bto.org/sites/default/files/02_-_core_count_0.pdf
[4] Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S. 2000. Bird Census Techniques. Academic Press, London.
[5] Gilbert, G., Gibbons, D.W. & Evans, J. 1998. Bird Monitoring Methods. RSPB, Sandy.
[6] Scottish Natural Heritage (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms.

surveyed to within 500m. This means that counts can be made for example, from a suitable location outside of a field/compartment boundary, either along a footpath or from a public road. This method helped ensure that the risk of disturbance to birds is minimised, and also enabled the surveyor to record birds just outside of the cable landfall search area, which may still be subject to disturbance.

In order to establish the location of key roost sites, surveys were timed to overlap with dawn or dusk periods, as well as continuing through the day to determine feeding sites. Effort was made to schedule surveys during suitable weather conditions.

The surveyor scanned each compartment from walkover routes and suitable vantage points for a suitable duration until it was confidently determined that all birds present were recorded.

The following information was recorded within each compartment during each survey:

- Peak count of each species;
- Location(s) of target species within compartment;
- Date and time of each count;
- Behaviour of birds (e.g., roosting, feeding);
- Directions of any movements to and from compartments and survey area; and
- Accuracy of counts should estimates be required, e.g., by access restrictions, continuous movements of birds.

Evidence of actual, and possible, disturbance sources to birds (e.g., dog walkers, bird scarers) were also noted during surveys, to help inform baseline disturbance levels within the survey area.

3 RESULTS

3.1 Peak Counts

During the August 2021 to March 2022 survey period a total of 142 species were recorded within the survey area (refer to Annex A, **Table 2** for species list). This was an increase from 113 species recorded in October 2020 to March 2021. Of the species recorded in Year 2, 61 were considered to be target species (wildfowl, waders, raptors and rare BoCC Red-listed species), up from 52 in Year 1.

The distribution and flock sizes of target species and species groups across the whole search area are presented in **Figure 2** (brent goose and European white-fronted goose), **Figure 3** (other goose species), **Figure 4** (all duck species combined) and **Figure 5** (all wader species combined). In general, these species have been grouped based on similar habitat requirements and similar levels of conservation status.

A summary of peak counts recorded for each target species within compartments A-E in Year 1 and Year 2 is presented in **Table 1**. This represents the largest single count of a species during any survey within a particular compartment. It should be noted that it is possible that the same individuals were recorded in two or more compartments, and therefore population estimates for the whole survey area cannot be ascertained by summing peak counts within all compartments. Also shown

are the 1% national and international thresholds for wildfowl and waders provided in the BTO's WeBS reports (Frost *et al.* 2020[7]), used to identify important sites. Where counts exceed thresholds, this is highlighted. The detailed results obtained from each survey, separated into each of the five compartments (A-E) are presented in tables in Annex B. For each target species, the peak count of individuals recorded during each survey is shown. A summary of results for each compartment is provided below.

3.2 Compartment A: Little Clacton

The Little Clacton compartment comprises mainly flat arable farmland to the west of Holland Haven Marshes SSSI and is bordered by commercial and residential areas to the south and west.

Table 3 in Annex B provides a detailed breakdown of peak counts per survey for each target species in Year 2. Like Year 1, numbers of geese and waders were relatively low compared to those nearer to Holland Haven Marshes. There was a peak count of 20 curlew in late March, but otherwise peak counts for all species were fewer than ten individuals. Compared to Year 1, peak counts of wildfowl were lower, and species such as white-fronted goose and wigeon were absent.

Barn owls and little owls were regularly recorded in this compartment in Year 2. As recorded during the 2021 breeding bird surveys, barn owl breeds in this area, and it is likely that little owl also breeds within the compartment.

3.3 Compartment B: Holland Brook

Compartment B is centred around Holland Brook which leads into Holland Haven Marshes and forms part of the SSSI. The marsh and wetland habitats of Holland Brook have an extensive ditch system and are surrounded by arable farmland with a few small agricultural reservoirs.

Similar to the results from Year 1, the Compartment is favoured by duck species such as teal and wigeon, with peak counts of over 100 individuals in both cases. Other ducks present were gadwall, mallard, shelduck, shoveler and tufted duck, in smaller numbers. As in Year 1, Canada goose and greylag goose were also regularly recorded, with flocks of over 100 greylags through the winter.

In Year 2 more waders were recorded than the previous year, albeit sporadically, rather than consistently through the non-breeding season. Black-tailed godwit (peak of 16 individuals), curlew (39), golden plover (32), lapwing (66), oystercatcher (5) and snipe (2) were present.

Cetti's warbler was recorded from February 2022, and as recorded during breeding bird surveys, it is an abundant breeder within the Compartment (11 territories in 2021).

Unlike in Year 1, barn owl and little owl were absent, but marsh harrier and peregrine were recorded on occasion.

[7] Frost, T.M., Calbrade, N.A., Birtles, G.A., Mellan, H.J., Hall, C., Robinson, A.E., Wotton, S.R., Balmer, D.E. and Austin, G.E. 2020. Waterbirds in the UK 2018/19: The Wetland Bird Survey. BTO/RSPB/JNCC. Thetford.

Table 1 Target species peak counts (individuals) per compartment (Cpt). Where species counts exceeded GB threshold this has been highlighted amber.

Species	Cpt A Little Clacton		Cpt B Holland Brook		Cpt C Great Holland		Cpt D Holland Marshes		Cpt E Frinton Golf C.		GB Threshold	International Threshold
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2		
Avocet							42	37			87	940
Barn owl	2		1				1	1			-	-
Bearded tit							2				-	-
Bar-tailed godwit								1			500	1,500
Black-tailed godwit (*islandica*)				16			5	21			390	1,110
Dark-bellied brent goose						1,100	110	100	770	14	980	2,100
Canada goose			34	20	1	1	28	15		2	-	-
Canada x greylag goose hybrid			1	3	7	2	7	4			-	-
Cetti's warbler	1		2	1	1		6	2	1		-	-
Common sandpiper								11		5	1	12,000
Common tern								10			-	1,800
Coot	2		1	1							2,000	15,550
Cormorant		2	5	7	1	4	96	232	1	52	-	-
Corn bunting						20		1	5	12	-	-
Curlew		20		39			53	54	6	4	1,200	7,600
Dartford warbler							1	1		1	-	-
Dunlin							2	6		2	3,400	13,300
Egyptian goose				2								
European W-f goose (*albifrons*)	101				101	5	50	40		1	21	12,000

Species	Cpt A Little Clacton		Cpt B Holland Brook		Cpt C Great Holland		Cpt D Holland Marshes		Cpt E Frinton Golf C.		GB Threshold	International Threshold
Firecrest							1				-	-
Gadwall	4		7	18			4	7			310	1,200
Garganey						2					-	13,400
Golden plover			1	32	100	65			27		4,000	9,300
Great crested grebe							2	3			170	6,300
Great white egret			1				1				1	780
Green sandpiper			1				1	1			3	20,000
Grey plover								3		4	330	2,000
Greylag goose	25		45	107	220	201	223	238	1		910	980
Hen harrier								1			-	-
Hobby								1			-	-
Kingfisher							1	1			-	-
Knot								1			2,600	5,300
Lapwing				66	252	890	137	120	250	36	6,200	20,000
Little egret				1			2	2			110	1,100
Little grebe	1		1	4			3	1			150	4,700
Little owl	1	2	1						2		-	-
Little stint								1			1	3,000
Mallard	15	5	13	22	1	15	19	16	16	44	6,700	20,000
Marsh harrier	1			1				1			-	-
Merlin							1				-	-
Moorhen	3	3	13	25	2	2	4	8	11	11	3,000	20,000

Species	Cpt A Little Clacton		Cpt B Holland Brook		Cpt C Great Holland		Cpt D Holland Marshes		Cpt E Frinton Golf C.		GB Threshold	International Threshold
Mute swan	2	1	6	12	8	6	7	4		2	500	500
Oystercatcher	1		2	5			6	22	3	20	2,900	8,200
Pale-bellied Brent (hrota)						1					-	-
Peregrine	1			1			1	2	1	2	-	-
Pink-footed goose							2				5,100	5,400
Pintail	32		8				3	16		8	200	600
Purple sandpiper							7	12		4	97	110
Red kite						1					-	-
Redshank							5	3			940	2,400
Ruff							1	4			9	20,000
Sanderling								1		4	200	2,000
Sandwich tern								45		1	1	1,700
Shag							1				1,100	2,000
Shelduck	8	5	11	3		3	19	13			470	2,500
Short-eared owl							1	1		1	-	-
Shoveler		8	3	14	4		38	29			190	650
Snipe			3	2		5	22	18			10000	20,000
Teal	45	61	305	136	30		216	324	76	2	4,300	5,000
Tufted duck	4			7		3					1,300	8,900
Tundra bean goose							2				3	5,500
Turnstone							7	8		8	400	1,400
Water rail					1		1	1			-	6,400

Species	Cpt A Little Clacton		Cpt B Holland Brook		Cpt C Great Holland		Cpt D Holland Marshes		Cpt E Frinton Golf C.		GB Threshold	International Threshold
Whimbrel								2			1	6,700
Wigeon	120		115	120	16		288	370	200	30	4,500	14,000
Wood sandpiper								1			-	18,000
Woodcock	1								1	1	14,000	20,000
Yellow wagtail								1	1	3	-	-

3.4 Compartment C: Great Holland

Compartment C comprises an extent of flat, intensively managed arable farmland of generally large field sizes. There are two agricultural reservoirs present within the site. As in Year 1, species diversity was relatively low within this compartment, with a total of 17 species recorded across all surveys (**Table 5**).

Notable were the counts of over 1,000 brent geese in December, which exceeded the threshold for importance at a national level (**Table 1**). The flock was recorded on a winter wheat field at Dairy House Farm in mid-December, although the birds frequently took flight for short distances. On the following day the flock was also exceptionally mobile but spent parts of the day on the sea off Holland Haven as well as returning to Dairy House Farm occasionally. In late December the flock was again on winter wheat just north of Holland Haven. This flock was disturbed by a farm worker who fired firework rockets, and after taking flight the flock stayed within the bounds of Compartment C but was scattered.

White-fronted geese were present on only one occasion, with five individuals recorded in early January. A peak of over 200 greylag geese was recorded in November, but the species' presence was intermittent.

Relatively large numbers of lapwings were present in midwinter, with a peak flock size of 890 individuals recorded in early December. A flock of 65 golden plover was recorded on one occasion. Corn buntings were recorded occasionally in flocks, with a peak count of 20 individuals in October.

3.5 Compartment D: Holland Marshes

Compartment D forms the main part of the Holland Haven Marshes SSSI and comprises areas of reclaimed estuarine saltmarsh and freshwater marsh. The compartment is bisected by Holland Brook and contains a network of ditches, to produce a variety of suitable habitats for birds. The Compartment is the most species-rich within the survey area, with a total of 52 species recorded during the Year 2 non-breeding survey period.

As in Year 1, brent geese were sometimes present (up to 248 birds), and greylag geese were also regularly recorded in relatively large numbers, with a peak of 238 birds. Flocks of 40 white-fronted geese were recorded on two occasions, which as in Year 1, exceeds the threshold for national importance. Three other species were recorded in peak numbers on autumn passage which exceeded their national thresholds: common sandpiper (11 individuals), whimbrel (2 individuals) and Sandwich tern (45 individuals).

Ducks were again present in relatively large numbers within the compartment and just off the coast, with high counts of teal (up to 324 individuals), wigeon (370), shoveler (29) and shelduck (13), which are similar numbers to Year 1. Sixteen pintails were also recorded on one occasion.

The Compartment is notable for its diverse wader assemblage, with avocet present in most months apart from midwinter, with numbers peaking at 37 individuals in late March. Lapwing were regularly present although not in numbers as large as those flocks recorded in fields outside of Holland Marshes. No golden plovers were recorded within the Compartment.

Curlew and snipe were present in good numbers throughout the winter. Purple sandpipers (up to 12 individuals) were recorded beside the sea wall. Other wader species present in smaller numbers were black-tailed godwit, dunlin, green sandpiper, redshank, ruff and turnstone.

The marshes were occasionally used by barn owl, hen harrier, hobby, peregrine and short-eared owl. Also notable were Schedule 1 species Cetti's warbler and Dartford warbler, although bearded tit, recorded in Year 1, was absent.

3.6 Compartment E: Frinton Golf Course

Compartment E contains part of the Holland Haven SSSI which extends northeast from Holland Haven Local Nature Reserve which is comprised of Frinton Golf Course and rough grassland and scrub close to the sea. To the north of the golf course is a series of large, intensively managed arable fields. Species diversity was lower in this area compared to adjacent Compartment D, and peak counts of brent geese and lapwing did not reach those recorded in Year 1. Although a variety of species were recorded just off the coast, the area of SSSI within the golf course appears to be of relatively low importance for wintering birds compared to Holland Haven Marshes. A count of five common sandpipers on autumn passage did however exceed national significance level. Notable species observed were corn bunting and yellow wagtail utilising stubble fields. Both species were recorded breeding in the area in 2021.

4 DISCUSSION

Overall, the results of the Year 2 non-breeding season surveys within the cable landfall search area were largely consistent with those from Year 1. A reasonably large number of species were recorded within the survey area in both years. Spatial distribution within the survey area was however not even, although was consistent between years, with some areas more favoured by species, in particular within and around the wetland habitats within Holland Haven Marshes SSSI in Compartment D and to a lesser extent in Compartment B. These compartments are likely to form the areas of highest sensitivity to target species and are most likely to require specific mitigation/management to avoid/minimise impacts during the construction phase of the project, should the landfall and cable route be in proximity to sensitive locations.

Two geese species were recorded in numbers within the survey area that exceeded national thresholds: brent goose and European white-fronted goose. For the former, a large flock of over 1,000 birds was recorded in December on winter wheat within Compartment C, despite apparent deterrent attempts of local farmers. European white-fronted goose was recorded in nationally important numbers in both years, within Compartments A and C in Year 1, and Compartment C in Year 2. Compartment D also appears to be of some importance for birds on autumn passage, with nationally important numbers of Sandwich tern, common sandpiper and whimbrel recorded in 2021.

Geese and wader species utilise arable fields north of Holland Haven, although the presence of deterrents in Compartments A and C, as well as regular human presence throughout the cable landfall search area means that birds are likely to move frequently between locations in response to disturbance sources. Nevertheless, consideration of wildfowl, ducks and waders, particularly brent goose, European white-fronted goose and Red-listed wader species such as lapwing and curlew may be required further in any mitigation strategy for the project.

ANNEX A. FULL SPECIES LIST

Table 2 Full species list and frequency of presence per compartment (Aug 2021 to Mar 2022)

Species	Frequency of Occurrence (Number of Surveys Recorded On – max = 14)				
	Cpt A Little Clacton	Cpt B Holland Brook	Cpt C Great Holland	Cpt D Holland Marshes	Cpt E Frinton Golf Course
Arctic Skua				1	
Avocet				9	
Barn Owl	7			1	
Bar-tailed Godwit				1	
Blackbird	13	13	10	14	10
Blackcap		2		1	1
Black-headed Gull	14	13	13	13	13
Black-tailed Godwit (islandica)		2		10	
Blue Tit	14	13	6	14	10
Brambling					1
Brent Goose (bernicla)			2	6	2
Bullfinch	1			1	
Buzzard	11	13	11	13	11
Canada Goose		7	2	7	1
Canada x Greylag Goose hybrid		1	1	3	
Carrion Crow	13	13	13	13	11
Cetti's Warbler		3		6	
Chaffinch	8	11	1	6	9
Chiffchaff	3	2	1	2	1
Coal Tit		1			
Collared Dove	14	6	6	9	3
Common Gull	5	5	5	7	6
Common Sandpiper				1	1
Common Tern				1	
Coot		3			
Cormorant	3	11	7	14	9
Corn Bunting			3	1	7
Curlew	1	5		9	2
Dartford Warbler				2	1
Dunlin				4	1
Dunnock	13	8	13	10	9
Egyptian Goose		1			
Eider					1
European W-f Goose (albifrons)			1	3	1
Feral Pigeon	7	9	13	7	14
Fieldfare	2	1		1	1
Gadwall		2		2	
Gannet				4	4
Garganey			1		

	Frequency of Occurrence (Number of Surveys Recorded On – max = 14)				
Goldcrest				1	
Golden Plover		1	1		
Goldfinch	2	8	4	6	8
Great Black-backed Gull		1	3	11	9
Great Crested Grebe				2	
Great Northern Diver				2	1
Great Skua				2	
Great Spotted Woodpecker	5	2	1	1	1
Great Tit	14	13	5	7	7
Green Sandpiper				1	
Green Woodpecker	7	9		6	9
Greenfinch	2	4	1	4	
Grey Heron	5	14	3	11	3
Grey Plover				1	1
Grey Wagtail		1		1	
Greylag Goose		10	5	9	
Guillemot				1	1
Hen Harrier				1	
Herring Gull	12	14	14	13	13
Hobby				2	
House Martin	1	1		3	1
House Sparrow	11	3	2		4
Jackdaw	14	14	6	12	10
Jay	8	10	2	4	4
Kestrel	10	12	10	10	13
Kingfisher				1	
Kittiwake					1
Knot				1	
Lapwing		6	5	11	1
Lesser Black-backed Gull	6	9	9	7	3
Lesser Redpoll		1			
Lesser Whitethroat				2	
Linnet		4	6	5	12
Little Egret		2		4	
Little Grebe		9		1	
Little Gull				1	
Little Owl	8				
Little Stint				2	
Long-tailed Tit	2	4	1	4	1
Magpie	14	12	8	14	12
Mallard	6	11	4	9	11
Manx Shearwater				1	
Marsh Harrier		2		5	
Meadow Pipit	1	8	9	9	9

	Frequency of Occurrence (Number of Surveys Recorded On – max = 14)				
Mediterranean Gull	2	1		7	3
Mistle Thrush	1	1	1		
Moorhen	7	14	2	12	11
Mute Swan	2	12	4	1	1
Oystercatcher		2		4	1
Pale-bellied Brent (hrota)			1		1
Peregrine		1		3	3
Pheasant	11	12	10	13	7
Pied Wagtail (yarrellii)	10	3	10	11	9
Pintail				1	1
Pomarine Skua					1
Purple Sandpiper				5	2
Razorbill				1	
Red Kite			1		
Red-legged Partridge	4	4	6		7
Red-necked Grebe				1	1
Redshank				2	
Red-throated Diver				9	6
Redwing	1				
Reed Bunting		7	5	8	5
Reed Warbler		1		1	
Robin	14	13	7	12	9
Rock Pipit				5	2
Rook	14	13	9	5	10
Ruff				2	
Sand Martin				1	2
Sanderling				2	1
Sandwich Tern				3	1
Shelduck	1	6	1	11	
Short-eared Owl				2	1
Shoveler	3	6		13	
Siskin				1	
Skylark		7	10	6	12
Snipe		5	2	8	
Song Thrush	3	7	2		4
Sparrowhawk	4	4	1	8	4
Starling	5	12	8	14	10
Stock Dove	11	11	6	9	12
Stonechat		2	3	8	7
Swallow	2	3	2	3	2
Swift				1	1
Teal	3	11		14	1
Tree Sparrow				1	
Tufted Duck		3	1		

	Frequency of Occurrence (Number of Surveys Recorded On – max = 14)				
Turnstone				10	1
Water Pipit				1	
Water Rail				3	
Wheatear			2	1	2
Whimbrel				1	
White Wagtail	1				
Whitethroat		1		1	1
Wigeon		6		13	1
Willow Warbler				1	
Wood Sandpiper				1	
Woodcock					1
Woodpigeon	12	13	13	12	11
Wren	10	7	1	4	3
Yellow Wagtail				2	1
Yellowhammer	3				1

ANNEX B. TARGET SPECIES PEAK COUNTS PER COMPARTMENT

Table 3 Target species peak counts per survey in Compartment A: Little Clacton

Species	Aug	Sep	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Barn Owl						2	1	2			2	2	2	2
Cormorant		1				2		1						
Curlew														20
Little Owl				1			1	1		1	2	2	2	1
Mallard			5			5	2	5	2					1
Moorhen	2	1				3	1		2			2	2	
Mute Swan									1		1			
Shelduck														5
Shoveler										8		4		7
Teal								61				2		1

Table 4 Target species peak counts per survey in Compartment B: Holland Brook

Species	Aug	Sep	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Black-tailed Godwit (islandica)												16	15	
Canada Goose						8			18	18	12	17	20	2
Canada x Greylag Goose hybrid										3				
Cetti's Warbler					1							1	1	
Coot							1			1			1	
Cormorant	2		4	5	1	3	6	1		7		5	3	1
Curlew						1		1				36	39	11
Egyptian Goose											2			

Species	Aug	Sep	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Gadwall													18	3
Golden Plover							32							
Greylag Goose	1		107	97	22				3	105	81	41	99	40
Lapwing			65		10			45	3				66	2
Little Egret	1							1						
Little Grebe					2	2	1	1	1	4	2		1	1
Mallard	7		19	4	2			2	5	13	2	12	12	22
Marsh Harrier			1	1										
Moorhen	6	2	2	2	3	12	5	2	14	25	15	14	13	13
Mute Swan			12	8	7	6	6	8	4	7	4	5	8	2
Oystercatcher													3	5
Peregrine							1							
Shelduck							2	3			2	3	2	2
Shoveler						3	3		1	1		2	14	
Snipe		1	1									1	2	1
Teal			1	2	8	22		136	27	94	37	82	29	17
Tufted Duck											1	7	6	
Wigeon				47		77				22	120	12	1	

Table 5 Target species peak counts per survey in Compartment C: Great Holland

Species	Aug	Sep	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Brent Goose (bernicla)								1000	1100					
Canada Goose											1			1
Canada x Greylag Goose hybrid											2			
Cormorant	1	1		1			4		1	1	3			
Corn Bunting			20									2	14	
European W-f Goose (albifrons)									5					
Garganey														2
Golden Plover						65								
Greylag Goose					201	24	12				105			7
Lapwing					16	326	55	890	44					
Mallard			7	15								3		3
Moorhen			1	2										
Mute Swan											6	3	5	4
Pale-bellied Brent (hrota)							1							
Red Kite					1									
Shelduck														3
Snipe		1					5							
Tufted Duck										3				

Table 6 Target species peak counts per survey in Compartment D: Holland Marshes

Species	Aug	Sep	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Avocet	25	7	5					3	2		2	21	7	37
Barn Owl	1													
Bar-tailed Godwit		1												
Black-tailed Godwit (islandica)	11	21	1		7	1			1	11	11		1	9
Brent Goose (bernicla)			248		20	2			1	1				
Canada Goose	15					8	8	8		7			6	4
Canada x Greylag Goose hybrid							2	2	4					
Cetti's Warbler	2	2		1								1	1	1
Common Sandpiper	11													
Common Tern	10													
Cormorant	10	7	9	11	4	232	10	7	69	14	9	18	14	2
Corn Bunting										1				
Curlew	1	5					5		20	40	54	14	1	9
Dartford Warbler							1		1					
Dunlin	2		6					1					1	
European W-f Goose (albifrons)								4		40	40			
Gadwall	1													7
Great Crested Grebe					1		3							
Green Sandpiper									1					
Grey Plover	3													
Greylag Goose		3	1	192	72	238	103	228	200	143				
Hen Harrier			1											
Hobby			2											
Kingfisher	1													
Knot			1											

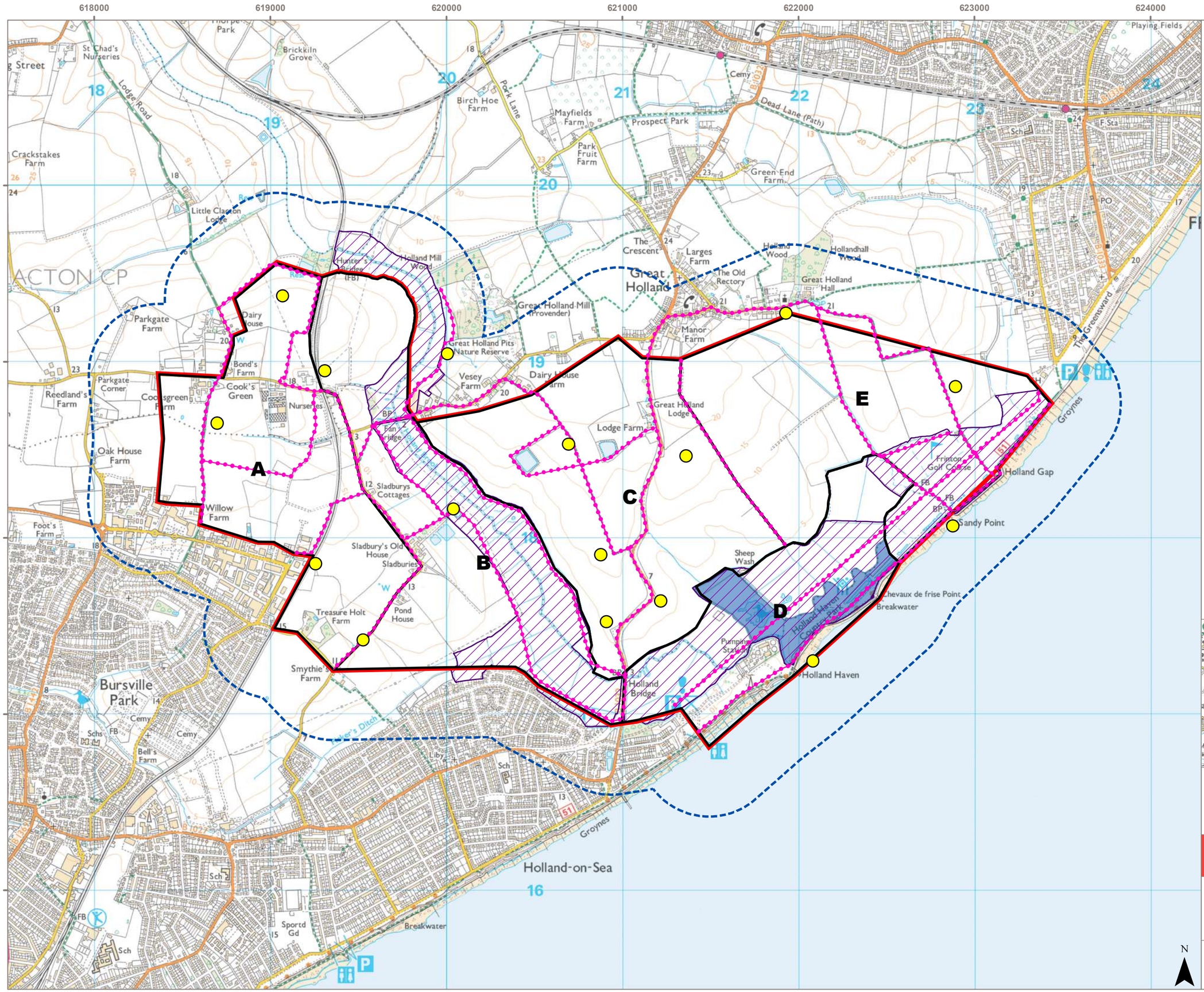
Species	Aug	Sep	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Lapwing	9	120	13	42	70				62	107	2	44	39	12
Little Egret			2		1	1				1				
Little Grebe							1							
Little Stint	1	1												
Mallard	14	7	16						5	2	8	4	9	5
Marsh Harrier	1			1					1	1				1
Moorhen	7	5	5	3	3	5		6	7		3	6	8	6
Mute Swan				4										
Oystercatcher	22											4	6	4
Peregrine				1			1			2				
Pintail								16						
Purple Sandpiper				2		12	7			1				3
Red-necked Grebe					1									
Redshank	2													3
Ruff	3	4												
Sanderling			1			1								
Sandwich Tern	45	2	24											
Shelduck	5	1			8	4		3	4	3	5	9	6	13
Short-eared Owl			2											
Shoveler	4		9	8	26	12	25	29	11	13	1	20	21	21
Snipe	10	17	2	18				13	6		2			4
Teal	57	30	241	56	84	89	225	324	177	79	54	106	97	38
Turnstone		4	8	5	2	2		5	1	8	8	1		
Water Rail	1	1			1									
Whimbrel	2													
Wigeon		50	370	53	84	65	170	152	142	186	124	219	157	177

Species	Aug	Sep	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Wood Sandpiper	1													
Yellow Wagtail	1		1											

Table 7 Target species peak counts per survey in Compartment E: Frinton Golf Course

Species	Aug	Sep	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Brent Goose (bernicla)					14	6								
Canada Goose												2		
Common Sandpiper	5													
Cormorant		1			6	52	14	5	2	1			4	2
Corn Bunting					7		2	12	4		2		1	3
Curlew				1				4						
Dartford Warbler											1			
Dunlin	2													
European W-f Goose (albifrons)								1						
Grey Plover	4													
Lapwing								36						
Mallard	4	6			12		38	34	25	18	17	44	9	5
Moorhen		7			7	11	4	5	5	8	6	11	8	4
Mute Swan													2	
Oystercatcher	20													
Pale-bellied Brent (hrota)								1						
Peregrine						1			1				2	
Pintail		8												
Purple Sandpiper											2	4		

Species	Aug	Sep	Oct 1	Oct 2	Nov 1	Nov 2	Dec 1	Dec 2	Jan 1	Jan 2	Feb 1	Feb 2	Mar 1	Mar 2
Red-necked Grebe					1									
Sanderling	4													
Sandwich Tern		1												
Short-eared Owl				1										
Teal								2						
Turnstone	8													
Wigeon		30												
Woodcock					1									
Yellow Wagtail	3													



Legend:

- □ Search Area
- □ Survey Compartment
- - - - 400m Survey Area
- ▨ Holland Haven Marshes Site of Special Scientific Interest (SSSI)
- 🟦 Holland Haven Local Nature Reserve (LNR)
- ⋯ Non-breeding Bird Survey Transect Route
- ● Vantage Point

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Landfall

Figure 1

Landfall Search Area: Survey Area

0 0.5 1
km
MAP SCALE: 1:20,000 @ A3

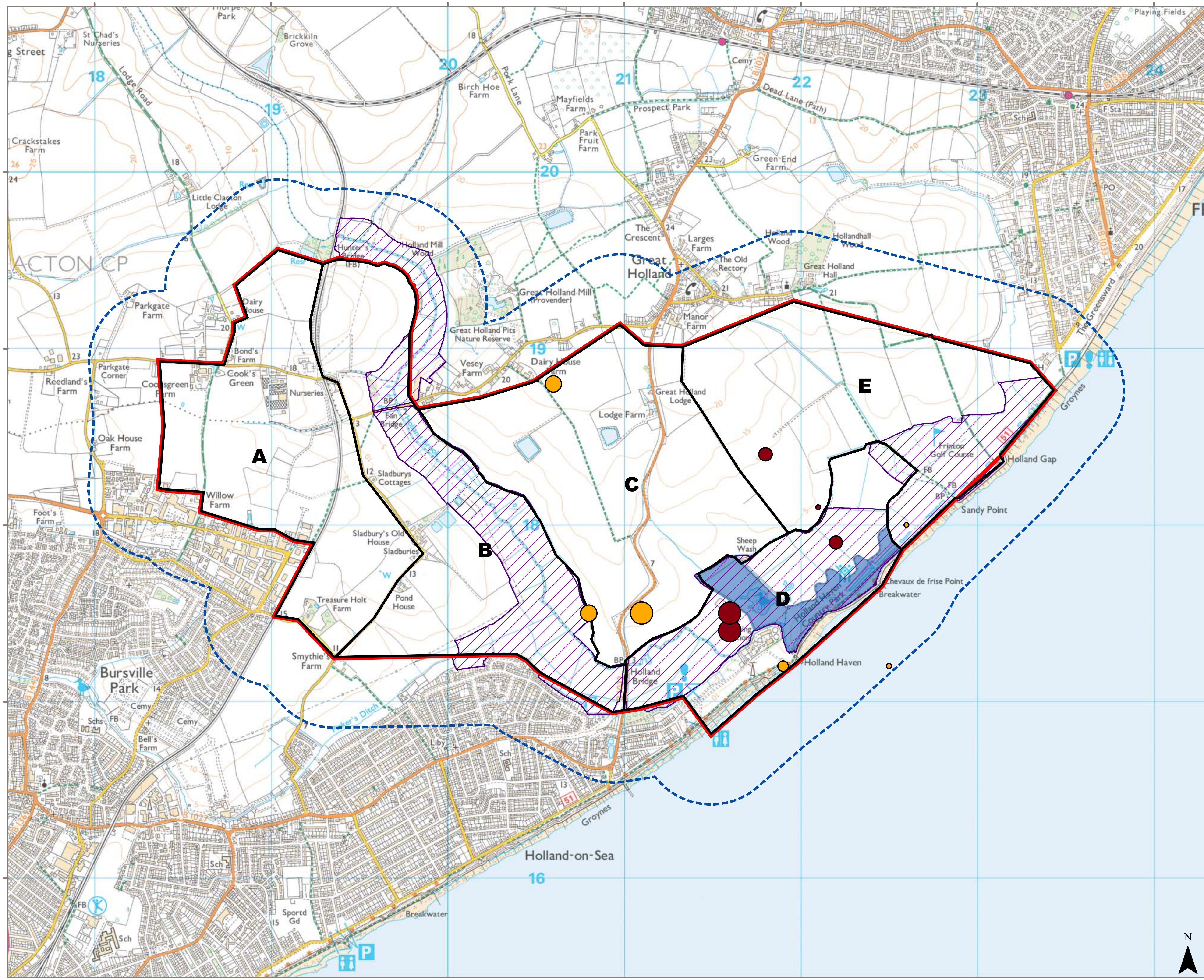
N

Map Author: LM Checked: LNF Approved: RD Status: Rev0

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_Landfall_Fig1_SvA_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 24/05/2022



Legend:

Search Area

Survey Compartment

400m Survey Area

Holland Haven Marshes Site of Special Scientific Interest (SSSI)

Holland Haven Local Nature Reserve (LNR)

Brent Goose Observations

1

2 - 250

251 - 1000

1001 - 1100

European White-fronted Goose Observations

1

2 - 5

6 - 40

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Landfall

Figure 2

Brent Geese and White-fronted Geese

0 0.5 1
km
MAP SCALE: 1:20,000 @ A3

N

Map Author: LM Checked: LNF Approved: RD Status: Rev0

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_Landfall_Fig2_BG_WG_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 24/05/2022

618000 619000 620000 621000 622000 623000 624000

220000 219000 218000 217000 216000

A B C D E

ACTON CP

Great Holland

Holland-on-Sea

Holland Haven

Bursville Park

Legend:

- Search Area
- Survey Compartment
- 400m Survey Area
- Holland Haven Marshes Site of Special Scientific Interest (SSSI)
- Holland Haven Local Nature Reserve (LNR)

Other Goose Species Observations

- 1
- 2 - 5
- 6 - 50
- 51 - 100
- 101 - 228

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Landfall

Figure 3

Other Goose Species

0 0.5 1 km

MAP SCALE: 1:20,000 @ A3

N

Datum: OSGB 1936, Projection: British National Grid

Date: 24/05/2022

Map Author: LM Checked: LNF Approved: RD Status: Rev0

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_Landfall_Fig3_OtherGooseSp_NFA.mxd

618000 619000 620000 621000 622000 623000 624000

220000 219000 218000 217000 216000

A B C D E

ACTON CP

Great Holland

Holland-on-Sea

Holland Haven

Legend:

- Search Area
- Survey Compartment
- 400m Survey Area
- Holland Haven Marshes Site of Special Scientific Interest (SSSI)
- Holland Haven Local Nature Reserve (LNR)

Duck Species Observations

- 1
- 2 - 5
- 6 - 50
- 51 - 150
- 151 - 282

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Landfall

Figure 4

Duck Species

0 0.5 1 km

MAP SCALE: 1:20,000 @ A3

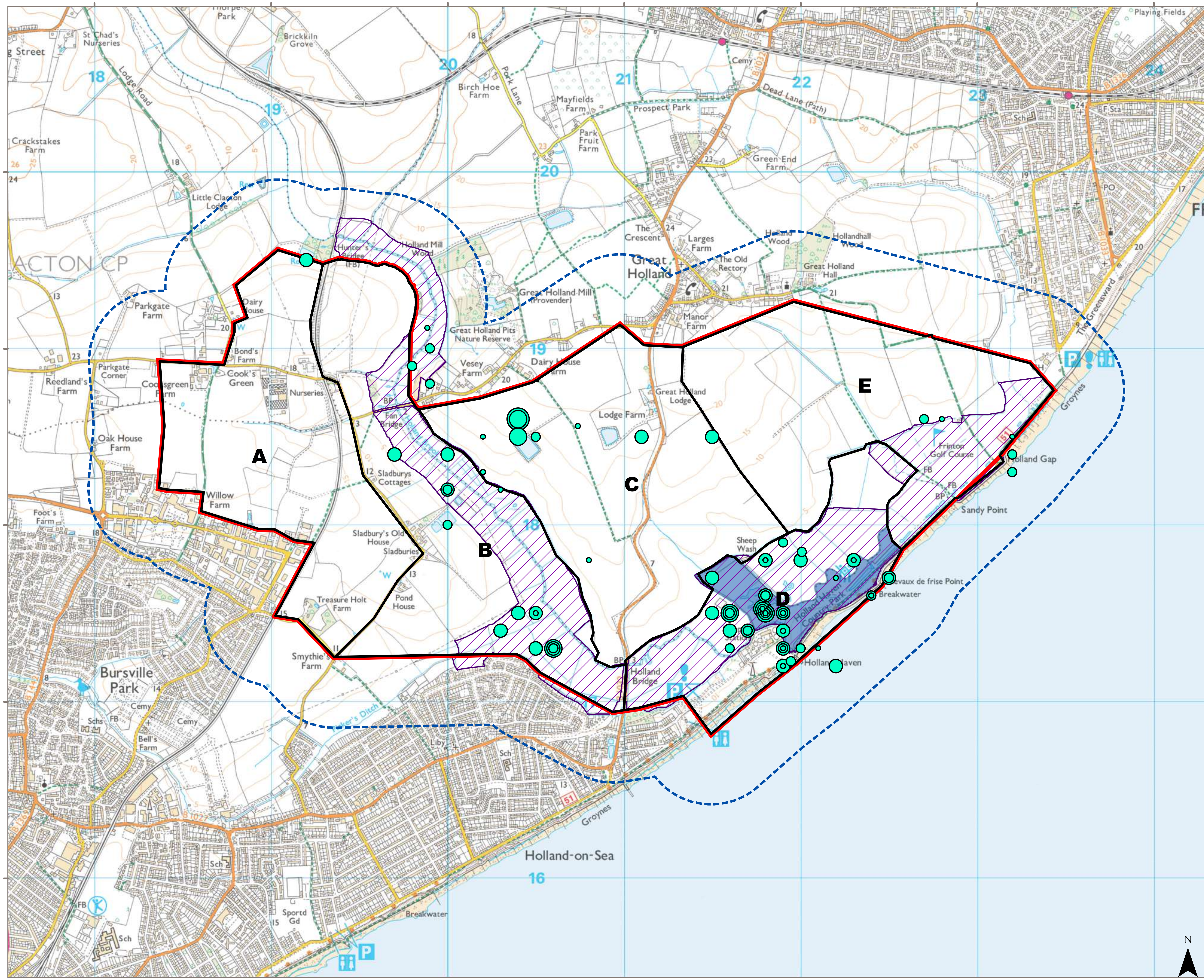
N

Datum: OSGB 1936, Projection: British National Grid

Date: 24/05/2022

Map Author: LM Checked: LNF Approved: RD Status: Rev0

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_Landfall_Fig4_DuckSp_NFA.mxd



MacArthur Green

North Falls Landfall

Figure 5

Wader Species

MAP SCALE: 1:20,000 @ A3

Map Author: LM Checked: LNF Approved: RD Status: Rev0

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_Landfall_Fig5_WaderSp_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 24/05/2022

North Falls Offshore Wind Farm

Onshore Cable Route Non-breeding Bird Surveys 2021-22

Date:	28 June 2022
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1.1	Updated	R. Dewar	28/06/2022

CONTENTS

1 INTRODUCTION

A series of surveys (herein the 'non-breeding season bird surveys') were undertaken from October 2021 to March 2022 to determine the non-breeding bird assemblage present within the search areas for the onshore transmission infrastructure of the proposed North Falls Offshore Wind Farm ('the project') (**Figure 1**), and to identify at an early stage, potential sensitivities associated with construction phase of the project's onshore cable routes and potential onshore substation locations (herein the 'onshore project area'). The potential grid connections for the projects, yet to be finalised, may be up to 21km inland, towards the village of Ardleigh within the Tendring peninsula (**Figure 1**).

These surveys compliment the non-breeding season surveys undertaken in 2020-21 and 2021-22 within the cable landfall search area directly to the south, the results of which are reported on separately (MacArthur Green, 2021[1]; 2022[2]).

This report presents details of the survey methodology and results, which will be used to inform the layout and Environmental Impact Assessment (EIA) for the project.

2 METHODOLOGY

2.1 Determination of Target Species

The non-breeding season bird surveys were designed to cover functionally-linked land for ornithological qualifying features of surrounding designated sites, as well as habitats suitable for other identified target species, within an appropriate survey area (see section 2.2).

The following designated sites[3] with ornithological interests are within what is most likely to be potential connectivity range (c.10km) of the onshore project area:

- Holland Haven Marshes Site of Special Scientific Interest (SSSI) and Holland Haven Local Nature Reserve located within the cable landfall search area to the south of the onshore project area (**Figure 1**). This is an area of reclaimed saltmarsh and freshwater marsh which according to the Natural England SSSI citation[4], hosts during winter, a range of wader and wildfowl species, including passage migrants, as well as wintering raptors such as hen harrier and short-eared owl.
- Hamford Water Special Protection Area (SPA) and associated Ramsar site and Site of Special Scientific Interest (SSSI) located c.500m northeast of the onshore project area. The SPA supports numbers of European importance of two species listed in Annex I to the EU Birds Directive (breeding little tern and wintering avocet) and seven regularly occurring migratory species of waterbirds (dark-bellied brent goose, shelduck, teal, ringed plover, grey plover, black-tailed godwit and redshank).

[1] MacArthur Green (2021). North Falls Offshore Wind Farm - Onshore Landfall Area : 2020/21 Non-breeding Bird Surveys.
[2] MacArthur Green (2022). North Falls Offshore Wind Farm - Onshore Landfall Area : 2021/22 Non-breeding Bird Surveys.
[3] https://designatedsites.naturalengland.org.uk
[4] https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1006349.pdf

- Stour and Orwell Estuaries SPA with associated Stour and Orwell Estuaries Ramsar site and SSSI, and Cattawade Marshes SSSI, located 1.6km north of the onshore project area. The SPA supports breeding avocet in summer, and during winter supports dark-bellied brent goose, redshank, pintail, grey plover, knot, dunlin and black-tailed godwit, as well as a waterbird assemblage.
- Colne Estuary SPA and associated Ramsar site and SSSI, located c.5.5km southwest of the onshore project area. The SPA is designated for breeding pochard, ringed plover and little tern; and wintering dark-bellied brent goose, hen harrier and redshank as well as its wintering waterfowl assemblage.

The landscape where the onshore project area will be located is predominantly intensively managed agricultural land and based on cable landfall surveys undertaken since 2020, and locations of designated sites, the main impacts are considered most likely to be construction disturbance or displacement to wintering wildfowl and waders utilising the area for feeding or roosting. The target species most likely to be present within the onshore project area during the non-breeding season were therefore considered to be:

- Geese: particularly dark-bellied brent goose associated with designated sites in the wider area, and European white-fronted goose which was found in nationally important numbers during cable landfall surveys in 2020/2021; and
- Waders: particularly any that are qualifying features of nearby designated sites, but also those that are Red-listed Birds of Conservation Concern[5] that are known to utilise inland habitats in winter: primarily lapwing, curlew, and Annex I[6] listed golden plover.

Any other Annex I, Schedule 1 or rare Red-listed species were also considered as target species and recorded during surveys. A tally of all lower conservation value non-target species was also made on each survey, to allow the surveyor to focus on locating target species.

2.2 Scope and Aims

Natural England was consulted with on the scope and aims of the survey (27 September 2021), and comments were received (letter dated 8 October 2021). Natural England supported the approach, albeit it was noted that they did not have sight of the survey area at the time of commenting.

Following an initial site reconnaissance visit in September 2021, surveys were undertaken twice each month from October 2021 to March 2022, covering the main ornithology non-breeding season. Surveys were designed to recorded bird numbers, distribution and activity within the onshore project area and a buffer of up to 400m (the 'survey area') to account for the spatial extent of any potential disturbance impacts to birds utilising any habitats of importance just outside of the onshore project area. The surveys followed a similar methodology to that

[5] M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747.

[6] EU Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.

undertaken by MacArthur Green at the cable landfall search area in 2020/2021[7], previously discussed with Natural England.

The aims of surveys were:

- To record the distribution of target species and the locations of potentially important areas for roosting and feeding within the survey area;
- To establish peak numbers of birds likely to utilise particular areas; and
- To establish when, and how frequently, such locations are used.

The survey area was split into discrete labelled mapping areas (see **Figure 1** which shows those used from late November onwards) in order to avoid surveyor overlap as well as to aid determination of the distribution of non-target species within different parts of the survey area, with separate tally counts made in each mapping area.

During the early stages of the non-breeding season, refinements to the onshore project area meant that there were some differences from the survey area used from late November onwards, with changes made before the surveys in early November, and again before surveys in late November (mapping areas were therefore also slightly different as a result). These amendments were relatively minor in extent, but it is possible that some small parts of the final survey area were not covered during the early November visit. It is also possible that there may be slight over or underestimates of tally counts of non-target species in these visits due to differences in survey area. Again, these are likely to be minor.

2.3 Survey Methodology

Survey methodology was informed by the following sources:

- The British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS) Core Count methodology for waterbirds[8] which follows Bibby *et al.* (2000[9]); and Gilbert *et al.* (1998[10]); and
- Scottish Natural Heritage (2017[11]) guidance on bird survey methods for onshore wind farms, which includes a section on surveying wintering and migratory wildfowl.

A reconnaissance visit was made in September 2021 to gather the following information, in addition to recording birds:

- Suitable survey routes, including land access, Public Right of Ways (PRoWs), parking locations and health & safety issues;
- Location of suitable vantage points to cover larger areas of land more efficiently and record movements of birds within the survey area and across the wider area; and

[7] MacArthur Green (2020). North Falls Offshore Wind Farm: Onshore Cable Route: Ornithology Survey Methodology, Winter 2020/21.
[8] https://www.bto.org/sites/default/files/02_-_core_count_0.pdf
[9] Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S. 2000. Bird Census Techniques. 2nd edition. Academic Press, London.
[10] Gilbert, G., Gibbons, D.W. & Evans, J. 1998. Bird Monitoring Methods. RSPB, Sandy.
[11] SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms.

- Land use and broad habitat types within the survey area.

Based on the results of the reconnaissance visit, as well as desk study information and local surveyor knowledge, surveys from October onwards focussed on areas of suitable habitat for target species, including:

- Any grassland habitat with short sward (e.g. <5cm), including golf course/amenity land;
- Any arable land comprising oilseed rape, winter cereals, maize stubble or bare till;
- Any coastal, wetland or marsh habitat; and
- Any waterbodies which may be used by geese, waders or ducks.

The visit also determined any areas, generally small in extent, that could be reasonably excluded from further surveys due to low suitability, e.g. settlements, woodland.

The "look-see" methodology advised for WeBS core counts was followed during all surveys, which determines that efforts should be made to ensure all suitable areas should be surveyed to within 500m. This means that counts can be made for example, from a suitable location outside of a field boundary, either along a footpath or from a public road. This method helps ensure that the risk of disturbance to birds is minimised, and also enables the surveyor to record birds just outside of the survey area, which may still be subject to disturbance.

Surveyors scanned the survey area from a combination of walkovers and vehicles, from suitable vantage points for a suitable duration until it could be confidently determined that all birds present have been recorded.

The following information was recorded during each survey for target species:

- Counts of each species (including non-target species);
- Location(s) of target species;
- Date and time of each count;
- Behaviour of birds (e.g. roosting, feeding);
- Directions of any movements within or outside of the survey area; and
- Accuracy of counts should estimates be required, e.g. by access restrictions, continuous movements of birds

In some cases when bird activity was high, tally counts of abundant non-target species such as woodpigeon or corvids were suspended to allow the surveyor to concentrate on recording target species. As such, these species may be under-recorded on some surveys.

For each survey, total counts per mapping area have been summed in order to give a total count within the whole survey area. Whilst this is likely to be a reasonable estimate of species populations at the time of survey, because each visit took place across four or five days, it is possible that some individuals were recorded in more than one mapping area, leading to overestimates of abundance. Nevertheless, the total counts are useful in providing comparisons of relative numbers through the non-breeding season.

3 RESULTS

3.1 Summary of Results

Overall, the survey area hosts a relatively wide range of wader, wildfowl and raptor species during the non-breeding season. A total of 111 species was recorded during the surveys, and a full species list and breakdown of peak tally counts per mapping area, and peak total survey count is presented in Annex A. Of these species, a total of 51 were considered to be target species. Table 3-1 below summarises the total counts per survey, and peak count for these target species.

Species diversity is reasonably consistent across the survey area, with a range of 76-96 species recorded within a particular mapping area during a survey (excluding areas H and I which were only surveyed in October under a previous survey area). Mapping area A (northwest around Little Bromley) and E (nearest to Hamford Water SPA) hosted the most species, at 95 and 96 respectively.

The only wildfowl or wader species that was present in sufficient numbers to exceed the BTO WeBS Report[12] threshold for national importance was green sandpiper, when counts of up to eight individuals within the survey area exceeded the Great British threshold (3 individuals) on four surveys. Notable numbers of some species were however recorded, and may be of importance at a regional level. These include a flock of 124 brent geese, reasonably high peak counts of golden plover, lapwing and curlew, and a healthy population of wintering corn bunting.

The sections below describe the temporal and spatial distribution, and abundance of the target species recorded during surveys.

3.2 Geese

Brent geese were largely absent from the survey area during the non-breeding season. Only one flock was recorded in November (124 individuals, including 17 juveniles), feeding in a field just south of Lawford, at the northern boundary of the survey area (**Figure 2**). No European white-fronted geese were recorded during surveys, despite some presence observed within the cable landfall search area to the south during the winter (see MacArthur Green, 2022).

Greylag geese, and non-native Canada and Egyptian geese were more commonly recorded. A peak count of 400 greylag geese was recorded in late October (max flock size of 381 individuals within mapping area F in the southwest) and the species was present throughout the non-breeding season. Up to 352 and 99 individuals of Canada goose and Egyptian goose respectively were recorded during any one survey.

The fields around Stacie's Farm within the northern part of the survey area appear to be relatively important for geese, and the waterbodies present in this area are likely to be used by birds. Away from this area the site usage is more sporadic with no real concentrations of activity, although the agricultural land near Hamford Water SPA may be more frequently used.

[12] https://app.bto.org/webs-reporting/numbers.jsp

Table 3-1 Total Counts of Target Species per Survey within Survey Area.

Species	Sep*	Early Oct	Late Oct	Early Nov	Late Nov	Early Dec	Late Dec	Early Jan	Late Jan	Early Feb	Late Feb	Early Mar	Late Mar	Peak Count
Avocet					1									1
Barn Owl			1	2	1			1	1					2
Black-tailed Godwit (islandica)						1								1
Brent Goose (bernicla)				124										124
Canada Goose			3	352		32	49	5	6	10	4	2	8	352
Cetti's Warbler		1												1
Coot	1	98	24	8	14	10	26	27	15	32	25	16	22	98
Cormorant	1	16	41	4	9	25	13	7	6	9	16	9	2	41
Corn Bunting	1		12	74	37	83	86	59	51	43	15	22	43	86
Curlew			6	30	84	82	13	10	11	45	24	5	14	84
Egyptian Goose		2	61	77	53	93	99	26	92	17		2	10	99
Gadwall		8	2		8		44	19	3	25	20	9	2	44
Garganey													3	3
Golden Plover	4	1			39	30	48	484	87	5				484
Great Crested Grebe	1	6	4								1	2	1	6
Great Egret					1	1	1	1		1	1			1
Green Sandpiper				2	4	1	8	1	5	1	3	1	6	8
Grey Heron		2	5	4	4	4	2	3	2	3	3		2	5
Grey Partridge									3	5			7	7
Grey Plover					2				1	5				5

Species	Sep*	Early Oct	Late Oct	Early Nov	Late Nov	Early Dec	Late Dec	Early Jan	Late Jan	Early Feb	Late Feb	Early Mar	Late Mar	Peak Count
Greylag goose	95	220	400	10	10	12	62	16	280	25	6	29	12	400
Hen harrier						1								1
Kestrel	4	6	16	10	12	12	13	16	15	18	14	7	15	18
Kingfisher			1	3	1	1		1		1				3
Lapwing			17	6	282	155	1044	1628	102	212	11	12	10	1628
Little Egret		2	2	5	3	6	2	4	2	2	1	1	1	6
Little Grebe	1	2	8	2	4	3	4	3	6	8	4	7	7	8
Little Owl	1	1	1		2		2			2		1	4	4
Mallard	12	30	59	59	55	74	103	86	73	42	46	25	55	103
Mandarin Duck							1							1
Marsh Harrier	1	2	2	1		1				6	2			6
Merlin						2	1			1				2
Moorhen	1	1	10	8	13	10	23	18	17	28	12	16	19	28
Mute Swan		2	7	7	8		5	7	14	19	6	3	10	19
Oystercatcher									1			2	1	2
Peregrine Falcon		1	4	1	1	2	2	2	2	2			1	4
Pochard							3				2			3
Red Kite										5	1	1		5
Redshank		2		4	5	10	4		5	5	3	2	3	10
Ruff						1	3							3
Shelduck							17	2				15	7	17

Species	Sep*	Early Oct	Late Oct	Early Nov	Late Nov	Early Dec	Late Dec	Early Jan	Late Jan	Early Feb	Late Feb	Early Mar	Late Mar	Peak Count
Shoveler		4	6		2		24	3	8	11	3	4	4	24
Snipe					2	3	2	1	3		1			3
Spoonbill		1												1
Tawny Owl						1			1	-1	1		1	1
Teal	1	6	12	15	64	22	83	46	137	84	40	20	23	137
Tufted Duck		22	2	14	2		11	8	3	29	28	18	35	35
Water Rail						1								1
Wigeon	1	57	53				36	11			25			57
Woodcock				2		1		2	1	2		1	3	3
Woodlark			2											2

* September survey was reconnaissance visit and so some species may be under-recorded.

3.3 Lapwing

Lapwings were present within the survey area from late October onwards, although there was a clear peak in numbers in midwinter, with total counts of over 1,000 individuals in late December and early January. The largest flocks, and highest frequency of observations, were recorded near Hamford Water SPA around Quay Farm, Beaumont Hall and Barker's Farm (**Figure 3**) with the largest flock of 1,250 individuals being an overspill from a flock of approximately 2,300 individuals in a field outside of the survey area to the north.

Other areas frequented by smaller numbers of lapwing were in the north just south of Lawford, and in the south near the cable landfall search area. Birds were recorded within winter wheat, stubble fields, and on two occasions roosting in ploughed fields in the north of the survey area. There were also a number of incidences where surveyors noted that lapwings were disturbed by walkers, a gas gun, and shooting.

3.4 Golden Plover

Like lapwing, golden plover numbers had a midwinter peak in early January, albeit in smaller numbers (survey peak of 484 individuals). The peak flock size recorded was 375 individuals which was combined with the aforementioned lapwing flock at Quay Farm near Hamford Water SPA (**Figure 3**), and was also an overspill, from a larger flock of 1,880 individuals, to the north of the survey area.

Golden plovers were generally found in similar areas to lapwing, close to Hamford Water SPA, or within the northern part of the survey area. Birds were recorded feeding in winter wheat and stubble fields, and in the north, roosting in stubble and grass fields.

3.5 Curlew

Curlew numbers were smaller than lapwing and golden plover, and present from late October onwards, with a peak of 84 and 82 individuals within the survey area in late November and early December respectively. Birds were most commonly recorded feeding in stubble fields relatively near Hamford Water SPA in the centre of the survey area, and towards the cable landfall search area in the south, but were notably absent in the north of the survey area (**Figure 3**).

3.6 Other Waders

Records of other wader species were mainly made in the area around Beaumont Quay, adjacent to Hamford Water SPA to the east of the central part of the survey area (**Figure 4**). These birds, which are likely to form part of the assemblage of the SPA, included relatively small numbers of a variety of species such as redshank, green sandpiper, avocet, black-tailed godwit, ruff and snipe.

There was also a small concentration of waders found in the north, particularly around Stacie's Farm, including regular records of up to three green sandpipers (meeting the BTO WeBS threshold for national importance) feeding around the edges of a waterbodies. Observations of two and four green sandpipers were also made by reservoirs to the northeast of Thorpe-le-Soken.

3.7 Ducks

The main concentrations of duck species were found in similar locations to waders, namely at the edge of Hamford Water SPA and on waterbodies around Stacie's Farm in the north, but they were also associated with waterbodies throughout the rest of the survey area, including those northeast of Thorpe-le-Soken, near Tendring, and on Holland Brook in the south (**Figure 5**).

Species found in largest numbers were mallard, teal and wigeon, although the latter was recorded only sporadically through the winter. Other species recorded included shelduck, close to Hamford Water SPA, shoveler mainly in the north, and gadwall across the survey area.

3.8 Raptors and Owls

Raptor and owl species were frequently recorded during surveys, mainly flying over or hunting within the survey area (**Figure 6**). Marsh harrier and peregrine falcon were regularly recorded, with up to six and four observations respectively within the survey area during one survey. Barn owls and little owls were recorded near farms in the northern half of the survey area, and both species are likely to breed there. Other species such as merlin and hen harrier were infrequently recorded.

3.9 Corn Bunting

Red-listed corn bunting was regularly recorded, in flocks of up to 41 individuals throughout the winter period, with a peak single survey count of 86 individuals across the survey area in late December. Birds were recorded feeding in ploughed, weedy or stubble fields and maize strips. Flocks were recorded mainly in two parts of the survey area: in the north around Little Bromley and New Hall, and in the south near Great Holland (**Figure 6**). The species is likely to breed within the survey area.

3.10 Other Species

Other notable species include a number of grey partridge records in the northwest corner of the survey area (up to seven individuals), woodlark near Thorpe-le-Soken, and kingfishers associated with waterbodies throughout the survey area. It is possible that these species breed within the survey area.

4 DISCUSSION

Although a wide range of target species were recorded across the survey area, it is evident that there are particular parts that are of relatively greater importance for most species. These are (i) the central part of the survey area in closest proximity to Hamford Water SPA; and (ii) the northern part of the survey area around Little Bromley where the grid connection and onshore substation would be located.

Waders and geese that may feed and roost within the central part of the survey area are likely to be part of the Hamford Water SPA assemblage, and so although not recorded in nationally important numbers (except for green sandpiper), may form an important part of the SPA population. It will therefore be important to seek to carefully consider the location of onshore cable route and construction programme in this area to avoid or minimise impacts on these species.

In the north of the survey area, the key location for wildfowl and waders is the fields and waterbodies around Stacie's farm which is used for feeding and roosting, including nationally important (albeit still small) numbers of green sandpiper. This area is likely to be used by geese and waders that form part of the assemblage of Stour and Orwell Estuaries SPA to the north, and possibly Hamford Water SPA. In addition, it is possible that Red-listed species such as corn bunting and grey partridge, and Schedule 1 barn owl may breed in this area, and so careful consideration will be required for the placement of the onshore cable route and onshore substation, as well as potential mitigation measures, to minimise potential effects.

ANNEX A. SURVEY RESULTS

Table 4-1 Non-breeding season survey results showing peak counts per species per mapping area, and per survey.

* Mapping areas H and I were only surveyed in October 2021 under a previous survey area.

Species	A	B	C	D	E	F	G	H*	I*	Peak Survey Count
Avocet					1					1
Barn Owl	1		1	1	1					2
Black Redstart	1									1
Blackbird	45	30	40	45	70	67	30	5	6	195
Blackcap	1			3						4
Black-headed Gull	1200	1200	350	295	280	575	725	180	350	2695
Black-tailed Godwit (islandica)					1					1
Blue Tit	30	45	45	58	45	21	42	8	15	203
Brambling	26	2		1	3	1	2		2	28
Brent Goose (bernicla)	124									124
Bullfinch	1	2	2	6	9	1	1			12
Buzzard	12	6	10	22	18	9	11	1	3	58
Canada Goose	39	350		4	8	3				352
Carrion Crow	125	115	70	125	80	45	49	55	22	435
Cetti's Warbler							1			1
Chaffinch	70	25	55	60	125	24	33	5	12	254
Chiffchaff	12	3	4	35	9	4	3		2	63
Coal Tit	2	2	3	12	10					27
Collared Dove	4	6	6	5	6	8	5		2	22
Common Gull	320	350	180	230	130	39	42	2	5	900
Coot	8	2		2	28	98	14			98

Species	A	B	C	D	E	F	G	H*	I*	Peak Survey Count
Cormorant	18	3	4	6	3	17	9		24	41
Corn Bunting	79	30	6	2	4	22	35			86
Corvid sp.	100	100	100	100	100		200	100	100	700
Curlew		1		31	51	14	84		6	84
Dunnock	22	12	30	32	38	10	14	3	6	113
Egyptian Goose	95	72		5	2	16	2			99
Feral Pigeon	280	125	75	3	25	5	35		5	297
Fieldfare	325	55	40	430	85	19	125			895
Gadwall	1			14	44	8	2			44
Garganey	3									3
Goldcrest	3		1	5	3	22	5		2	24
Golden Plover	109	56	4	34	375	30	1			484
Goldfinch	45	28	48	50	45	40	42	5	15	186
Great Black-backed Gull	1	2		1	3	1	8	1	1	9
Great Crested Grebe				3	2	6	1			6
Great Egret				1						1
Great Spotted woodpecker	4	4	3	6	4	2	5		1	13
Great Tit	30	19	35	42	40	20	23	2	5	135
Green Sandpiper	4	4	1		7		1			8
Green woodpecker	5	4	6	6	9	2	6	2	3	31
Greenfinch	7	4	6	5	5	5	34	2		35
Grey Heron	1	2	1	2	2	4	2		1	5
Grey Partridge	7		1							7
Grey Plover		5			2					5

Species	A	B	C	D	E	F	G	H*	I*	Peak Survey Count
Grey Wagtail	1		1	1	1		1			2
Greylag goose	110	7	6	187	23	381	6		19	400
Hen harrier						1				1
Herring Gull	47	28	35	45	60	49	60	3	5	208
House Martin	2	1	40							40
House Sparrow	24	8	15	12	8	30	57		3	57
Jackdaw	90	100	35	100	125	213	190	45	155	585
Jay	12	3	6	3	8	6	20	6	12	38
Kestrel	6	3	6	6	5	8	5	2	1	18
Kingfisher	2			1	1	1				3
Lapwing	313	78	2	2	1315	230	73			1628
Lesser Black-backed Gull	25	15	25	25	25	6	9		1	108
Lesser Redpoll	1			3	1					3
Linnet	170	65	260	125	255	18	50	5	16	585
Little Egret	3	2		1	6	3	2			6
Little Grebe	1			2	7	5	7			8
Little Owl	1			1	3		1			4
Long-tailed Tit	25	15	12	25	30	20	30		6	120
Magpie	20	7	15	15	20	17	21	8	5	52
Mallard	59	46	7	48	32	43	12	12	25	103
Mandarin Duck						1				1
Marsh Harrier	1	1		5	1	1	2			6
Meadow Pipit	35	43	40	60	35	317	44	3	3	319
Mediterranean Gull	4	2	1	4	3	12				14

Species	A	B	C	D	E	F	G	H*	I*	Peak Survey Count
Merlin	1	1			1					2
Mistle Thrush	4	5	4	14	7	9	6		1	16
Moorhen	10	3	2	13	6	2	8	3	6	28
Mute Swan	7	12	3	6	3	7	2			19
Oystercatcher			1		1					2
Peregrine Falcon	1	1	1	1	1	1	2			4
Pheasant	18	130	50	65	10	40	60	30	20	285
Pied Wagtail (yarrellii)	32	7	22	31	25	35	50	6	4	102
Pochard	3				2					3
Raven	4	2	1	2						4
Red Kite	1			5		1				5
Red-legged Partridge	16	25	30	45	40	102	58	5	30	134
Redshank	1				10	4	2			10
Redwing	225	13	5	40	140	130	250	75	80	303
Reed Bunting	2			5	11					14
Robin	32	45	20	40	50	18	18	10	7	167
Rock Pipit					8		1			8
Rook	325	245	220	305	220	250	280	60	125	1270
Ruff					3					3
Shelduck					17	2				17
Shoveler	24	3			2	6	4			24
Siskin	4	2	5	54	8	22	11	4		60
Skylark	190	540	125	220	120	35	130	27	20	890
Snipe	1	2		1	2	1	1			3

Species	A	B	C	D	E	F	G	H*	I*	Peak Survey Count
Song Thrush	10	3	3	5	17	5	3	12	6	20
Sparrowhawk	3	1	1	2	2	1	1	1	1	6
Spoonbill							1			1
Starling	450	330	800	200	300	325	140	40	65	1133
Stock Dove	250	130	80	125	450	40	250	25	8	795
Stonechat	1									1
Swallow	2		40							42
Tawny Owl				1	1					1
Teal	79	12		14	65	15	11			137
Treecreeper	2	1	1	5	3		1	1		7
Tufted Duck	5	2			29	22	2			35
Water Rail					1					1
Wheatear					2					2
Wigeon	5				25	57				57
Woodcock	2	1	1	2	1					3
Woodlark	1						1			2
Woodpigeon	3000	6000	1000	2000	2200	1764	370	225	300	9100
Wren	45	20	30	45	70	8	12	2	4	150
Yellowhammer	12	13	12	16	17	7	3			49
Number of Species	**95**	**76**	**68**	**84**	**96**	**78**	**79**	**38**	**49**	**112 (inc. 'corvid sp')**

605000 610000 615000 620000

230000

225000

220000

Stour and Orwell Estuaries (SPA)

Hamford Water (SPA)

Colne Estuary (Mid-Essex Coast Phase 2) (SPA)

Holland Haven (LNR)

Holland Haven Marshes (SSSI)

a b c d e f g

TENDRING DISTRICT

Legend:

- Landfall Search Area

Ornithological Designated Sites

Source: Natural England

- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)
- Survey Tile Extent
- Survey Area

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Onshore Cable Route

Figure 1

Onshore Cable Route: Survey Area

0 1 2 km

MAP SCALE: 1:60,000 @A3

N

Map Author: LM Checked: LNF Approved: RD Status: Rev1

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_OnshoreCableRoute_Fig1_SvA_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 28/06/2022

605000 610000 615000 620000

230000

225000

220000

Stour and Orwell Estuaries (SPA)

Hamford Water (SPA)

Colne Estuary (Mid-Essex Coast Phase 2) (SPA)

Holland Haven (LNR)

Holland Haven Marshes (SSSI)

TENDRING DISTRICT

Legend:

- Landfall Search Area

Ornithological Designated Sites

Source: Natural England

- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)
- Survey Area

Brent Goose Observations

- 124

Canada Goose Observations

- 1
- 2 - 5
- 6 - 10
- 11 - 50
- 51 - 225

Egyptian Goose Observations

- 1
- 2 - 5
- 6 - 10
- 11 - 50
- 51 - 75

Greylag Goose Observations

- 1
- 2 - 5
- 6 - 50
- 51 - 100
- 101 - 175

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Onshore Cable Route

Figure 2

Geese

N

0 1 2 km

MAP SCALE: 1:60,000 @A3

Map Author: LM Checked: LNF Approved: RD Status: Rev1

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_OnshoreCableRoute_Fig2_Geese_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 28/06/2022

605000 610000 615000 620000

230000

225000

220000

Stour and Orwell Estuaries (SPA)

Hamford Water (SPA)

Colne Estuary (Mid-Essex Coast Phase 2) (SPA)

Holland Haven (LNR)

Holland Haven Marshes (SSSI)

TENDRING DISTRICT

Legend:

Landfall Search Area

Ornithological Designated Sites

Source: Natural England

Special Protection Area (SPA)

Site of Special Scientific Interest (SSSI)

Local Nature Reserve (LNR)

Survey Area

Curlew Observations

1

2 - 5

6 - 10

11 - 50

51 - 84

Golden Plover Observations

1

2 - 5

6 - 50

51 - 100

101 - 375

Lapwing Observations

1

2 - 50

51 - 100

101 - 250

251 - 1250

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Onshore Cable Route

Figure 3

Lapwing, Curlew and Golden Plover

0 1 2 km

MAP SCALE: 1:60,000 @A3

N

Map Author: LM Checked: LNF Approved: RD Status: Rev1

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_OnshoreCableRoute_Fig3_L_CU_GP_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 28/06/2022

605000 610000 615000 620000

230000

225000

220000

Stour and Orwell Estuaries (SPA)

Hamford Water (SPA)

Colne Estuary (Mid-Essex Coast Phase 2) (SPA)

Holland Haven (LNR)

Holland Haven Marshes (SSSI)

TENDRING DISTRICT

Legend:

Landfall Search Area

Ornithological Designated Sites

Source: Natural England

Special Protection Area (SPA)

Site of Special Scientific Interest (SSSI)

Local Nature Reserve (LNR)

Survey Area

Other Wader Species Observations

1

2

3 - 4

5 - 10

Source: MacArthur Green, RHDHV

Sudbury
Felixstowe
Harwich
Colchester
Manningtree
Wivenhoe
The Naze
Brightlingsea
Frinton-on-Sea
Clacton-on-Sea
Kelvedon
West Mersea
Maldon
Southminster

MacArthur Green

North Falls Onshore Cable Route

Figure 4

Other Waders

N

0 1 2
km

MAP SCALE: 1:60,000 @A3

Map Author: LM Checked: LNF Approved: RD Status: Rev1

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_OnshoreCableRoute_Fig4_OtherWaders_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 28/06/2022

605000 610000 615000 620000

230000 225000 220000

Stour and Orwell Estuaries (SPA)

Hamford Water (SPA)

Colne Estuary (Mid-Essex Coast Phase 2) (SPA)

Holland Haven (LNR)

Holland Haven Marshes (SSSI)

TENDRING DISTRICT

Legend:

Landfall Search Area

Ornithological Designated Sites

Source: Natural England

Special Protection Area (SPA)

Site of Special Scientific Interest (SSSI)

Local Nature Reserve (LNR)

Survey Area

Duck Species Observations

1

2 - 5

6 - 20

21 - 50

51 - 79

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Onshore Cable Route

Figure 5

Ducks

0 1 2 km

MAP SCALE: 1:60,000 @ A3

N

Map Author: LM Checked: LNF Approved: RD Status: Rev1

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_OnshoreCableRoute_Fig5_Ducks_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 28/06/2022

605000 610000 615000 620000

230000

225000

220000

Stour and Orwell Estuaries (SPA)

Hamford Water (SPA)

Colne Estuary (Mid-Essex Coast Phase 2) (SPA)

Holland Haven (LNR)

Holland Haven Marshes (SSSI)

TENDRING DISTRICT

Legend:

- Landfall Search Area

Ornithological Designated Sites

Source: Natural England

- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)
- Survey Area

Raptor and Owl Species Observations

- Barn Owl
- Hen Harrier
- Kestrel
- Little Owl
- Marsh Harrier
- Merlin
- Peregrine Falcon
- Red Kite
- Sparrowhawk
- Tawny Owl

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Onshore Cable Route

Figure 6

Raptors and Owls

0 1 2 km

MAP SCALE: 1:60,000 @A3

N

Map Author: LM Checked: LNF Approved: RD Status: Rev1

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_OnshoreCableRoute_Fig6_Raptors_Owls_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 28/06/2022

605000 610000 615000 620000

230000

225000

220000

Stour and Orwell Estuaries (SPA)

Hamford Water (SPA)

Colne Estuary (Mid-Essex Coast Phase 2) (SPA)

Holland Haven (LNR)

Holland Haven Marshes (SSSI)

TENDRING DISTRICT

Legend:

Landfall Search Area

Ornithological Designated Sites

Source: Natural England

Special Protection Area (SPA)

Site of Special Scientific Interest (SSSI)

Local Nature Reserve (LNR)

Survey Area

Corn Bunting Observations

1

2 - 5

6 - 10

11 - 20

21 - 41

Source: MacArthur Green, RHDHV

MacArthur Green

North Falls Onshore Cable Route

Figure 7

Corn Bunting

N

0 1 2 km

MAP SCALE: 1:60,000 @A3

Map Author: LM Checked: LNF Approved: RD Status: Rev1

Document Path: S:\Projects\RHDHV\North Falls_NFA\03_Data\O_R_Annual_OnshoreCableRoute_Fig7_CorBunting_NFA.mxd

Datum: OSGB 1936, Projection: British National Grid

Date: 28/06/2022

North Falls Offshore Wind Farm

Onshore Landfall Area: 2021 Breeding Bird Surveys

Date:	07 September 2021
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1.1	Updated	R. Dewar	07/09/2021

CONTENTS

1 INTRODUCTION

A series of breeding bird surveys was undertaken from April to July 2021, to determine the assemblage present within the Potential Landfall Search Area (the 'Search Area') for the proposed North Falls Offshore Wind Farm (**Figure 1**) and identify at an early stage any potential sensitivities associated with construction phase of the landfall area and potential onshore cable routes.

Onshore cable routes within the Search Area have not yet been determined, as National Grid have yet to identify a grid connection point for North Falls Offshore Wind Farm. As such, the Search Area covers all potential land up to and around the existing Little Clacton substation.

2 METHODOLOGY

The survey programme covered the main breeding season from April to July 2021. Surveys comprised a series of twice monthly transect walks, incorporating regularly-spaced vantage points, in April to June, and a final visit in July, to record bird numbers, distribution and activity within the Search Area, with a buffer of up to 400m in suitable habitat (combined, the 'survey area') to account for the spatial extent of any potential disturbance impacts to birds utilising any habitats of importance just outside of the Search Area. The survey area is shown in **Figure 1**.

The aims of surveys were:

- To determine the range of species present during the breeding season;
- To locate target species' nest sites or territories within the survey area;
- To establish abundance and distribution of target species' territories/pairs within the survey area; and
- To establish any areas of particular importance for birds.

The results of the surveys will be used to inform the final landfall and onshore cable route, and subsequent Environmental Impact Assessment and Habitats Regulations Assessment if required.

2.1 Desk Study

A preliminary desk study identified the following information, which was used to inform the scope of survey work:

- Site visits and results from non-breeding season surveys carried out within the survey area in 2020/2021[1], which provided an indication of which resident species may be breeding on site during summer months, as well as the knowledge of potentially suitable habitat for target species to be sufficiently covered during breeding bird surveys.
- Holland Haven Marshes Site of Special Scientific Interest (SSSI) and Holland Haven Local Nature Reserve is located within the Search Area (**Figure 1**). This is an area of reclaimed saltmarsh and freshwater marsh which according to the Natural England SSSI citation[2],

[1] MacArthur Green (2021). North Falls Offshore Wind Farm. Onshore Landfall Area: 2020/21 Non-breeding Bird Surveys.
[2] https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1006349.pdf

hosts during the breeding season species such as "*skylark, meadow pipit and yellow wagtail, with reed warblers in the dykes and ringed plover behind the sea wall.*";

- Hamford Water Special Protection Area (SPA), located 3.6km north of the Search Area. It supports numbers of European importance of two species listed in Annex I to the EU Birds Directive (breeding little tern and wintering avocet) and seven regularly occurring migratory species of waterbirds (dark-bellied brent goose, shelduck, teal, ringed plover, grey plover, black-tailed godwit and redshank).
- Colne Estuary SPA, located 8.2km southwest of the Search Area. This is designated for breeding pochard, ringed plover and little tern; and wintering dark-bellied brent goose, hen harrier and redshank as well as its wintering waterfowl assemblage.
- A review of aerial imagery which shows that the Search Area is a mixture of agricultural fields (mainly arable), marsh and marshy grassland, and amenity (golf course) habitats.

Based on this information, target species for breeding bird surveys were all those listed in Annex I of the EU Birds Directive, Schedule 1 of the Wildlife & Countryside Act 1981, all nearby SPA and SSSI qualifying features and/or rare, Red-listed species in the Birds of Conservation Concern (BoCC, Eaton *et al*. 2015[3]). Tally counts were also made of all other more common species.

A further desk study will be undertaken to compile all available historic data at the EIA stage, including any available records from local birdwatchers, the local wildlife trust or biological information records centres.

2.2 Survey Methodology

Survey methodology was informed by the following guidance;

- The British Trust for Ornithology's (BTO's) Breeding Bird Survey[4] and Common Birds Census[5] guidance;
- Bibby *et al.* (2000[6]); and
- Gilbert *et al.* (1998[7]).

Non-breeding season survey visits in 2020/2021 were used to determine the optimal walkover routes, suitable vantage point locations, and any access restrictions and health & safety issues. The walkover routes and vantage point locations are shown on **Figure 1**.

Based on the desk study information and local surveyor knowledge, surveys focussed on areas of suitable habitat (e.g., wetlands, marshy fields, field margins, scrub) likely to be utilised by target species.

[3] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746.
[4] https://www.bto.org/our-science/projects/bbs/taking-part/survey-methods
[5] https://www.bto.org/sites/default/files/u31/downloads/details/CBC-instructions-g100.pdf
[6] Bibby, C.J., Burgess, N.D., Hill, D.A. & Mustoe, S. 2000. Bird Census Techniques. 2nd edition. Academic Press, London.
[7] Gilbert, G., Gibbons, D.W. & Evans, J. 1998. Bird Monitoring Methods. RSPB, Sandy.

Since birds may be mobile during survey periods, distinct parts of the Search Area were compartmentalised into manageable areas largely visible at the same time, based on habitat type/field boundaries, so that peak counts per species, per survey could be made within each compartment. This is shown as compartments A-E on **Figure 1**. Grid references of target species were obtained using a GPS to be able to identify nest locations or territory centres, whereas a tally of all non-target species individuals observed within each compartment was made during each survey, to allow the surveyor to focus on target species. The breeding status of all birds encountered was noted, using standard BTO codes (**Annex A**).

The surveyor scanned each compartment from walkover routes and suitable vantage points for a suitable duration until it was confidently determined that all birds present were recorded.

2.3 Compartments

The survey area was demarcated into five compartments for ease of surveying, based on similar habitat types and physical features. A brief description of these compartments, as shown on **Figure 1**, is provided below.

- Compartment A, Little Clacton comprises mainly flat arable farmland to the west of Holland Haven Marshes SSSI and is bordered by commercial and residential areas to the south and west.
- Compartment B is centred around Holland Brook which leads into Holland Haven Marshes and forms part of the SSSI. The marsh and wetland habitats of Holland Brook have an extensive ditch system and are surrounded by arable farmland with a few small agricultural reservoirs.
- Compartment C comprises an extent of flat, intensively managed arable farmland of generally large field sizes. There are two agricultural reservoirs present within the site.
- Compartment D forms the main part of the Holland Haven Marshes SSSI and comprises areas of reclaimed estuarine saltmarsh and freshwater marsh. The compartment is bisected by Holland Brook and contains a network of ditches, to produce a variety of suitable habitats for birds.
- Compartment E contains part of the Holland Haven SSSI which extends northeast from Holland Haven Local Nature Reserve which is comprised of Frinton Golf Course and rough grassland and scrub close to the sea. To the north of the golf course is a series of large, intensively managed arable fields.

2.4 Survey Limitations

The first breeding bird survey was undertaken on 8th and 9th April 2021, and it is possible that early breeding activity associated with some target species may have commenced prior to this date. However, any breeding activity observed during non-breeding season surveys in February and March 2021 was recorded accordingly and is included in the Results, Section 3. Although outside of the main breeding season for target species present, post-breeding surveys in August will record any evidence of late breeding attempts or use of the survey area by fledged birds.

In general, spatial coverage of the survey area was considered to be good, with largely unrestricted access agreed beforehand with landowners. Where some access restrictions were in place, or

features such as large arable fields prevented exhaustive coverage on foot, vantage points generally offered sufficient coverage of these areas so that breeding attempts of any target species are unlikely to have been missed.

3 RESULTS

A total of 102 species were recorded during the breeding bird surveys in 2021. A full species list is presented in **Annex B**, showing the maximum count of all individuals per compartment during any survey. Breeding attempts were confirmed for a number of target species, [redacted] and discussed in the sections below. The summary tables for each target species provide a location of these breeding attempts and an indication of when breeding activity occurred, and when birds are present within the survey area during the breeding season. These include any evidence of early breeding activity recorded during non-breeding season surveys in February and March 2021.

3.1 Avocet

Avocet is a Schedule 1 breeding species and Amber-listed on the BoCC. The species is present within Compartment D (Holland Marshes SSSI) throughout the winter and birds were confirmed as breeding on the lagoon [redacted] Up to 39 individuals were present during any count in the Holland Marshes area, which are all likely to comprise breeding birds. Fledged young were recorded from the early June visit onwards.

Table 1: Confirmed records of breeding avocet

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
TM2176917570	D	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

3.2 Barn Owl

Barn owl is a Schedule 1 breeding species and is resident within the survey area. [redacted] Barn owls are likely to forage within farmland in the western half of the survey area, in particular along areas of field margins, rough grassland or marshy grassland.

Table 2: Confirmed records of breeding barn owl

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
[redacted]	A	✓	✓	✓	✓	✓	✓	✓			
	B									✓	✓
	D										✓

3.3 Cetti's Warbler

Cetti's warbler (Schedule 1 species) was a common breeder across the survey area in 2021, with a total of 26 territories recorded through the survey period. Breeding activity began early, in February at some of the sites. [redacted]

[redacted]

Table 3: Confirmed records of breeding Cetti's warbler

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
[redacted]	B	✓									
	B							✓			
	B	✓	✓	✓	✓	✓					
	B					✓		✓	✓		✓
	B									✓	✓
	B					✓		✓	✓		
	B					✓		✓		✓	
	B						✓				
	B							✓	✓		
	B							✓			
	B	✓				✓		✓			
	C							✓	✓	✓	
	C					✓	✓		✓	✓	
	C					✓	✓	✓			
	D								✓		
	D		✓	✓							
	D					✓	✓	✓		✓	
	D			✓	✓	✓				✓	
	D									✓	✓
	D			✓		✓					
	E					✓			✓		
	E					✓		✓			
	E							✓			
	E							✓			
	E					✓					
	E							✓			

3.4 Corn Bunting

A total of 11 corn bunting (Red-listed species with large national decline) territories were recorded, with the majority in arable habitat within Compartment E. Single territories were also recorded in Compartments C and D. Although birds were recorded on site from early March, breeding activity was only observed from late April onwards. Nests are likely to be found within cereal fields, rough grassland or field margins.

Table 4: Confirmed records of breeding corn bunting

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
TM2056318579	C							✓			
TM2205717550	D								✓		
TM2240117799	D						✓	✓			

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
TM2209418895	E								✓	✓	
TM2210119232	E							✓	✓		
TM2214917938	E									✓	
TM2220418956	E								✓		
TM2226518765	E									✓	
TM2237719256	E					✓	✓	✓	✓	✓	
TM2248018979	E									✓	✓
TM2260218858	E										✓

3.5 Grey Partridge

Grey partridge is a Red-listed breeding species which has suffered a large national decline in numbers. No birds were recorded during breeding bird surveys but an incidental record of an apparent breeding attempt within Compartment A was provided by a local landowner. Birds are likely to nest among tall vegetation found along field margins or other suitable farmland habitats.

Table 5: Confirmed records of breeding grey partridge

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
TM1929418531	A						✓				

3.6 Lapwing

Lapwing is Red-listed due to large national declines in breeding numbers. The species is present within the survey area throughout the year, although breeding birds were recorded in Compartments B, C and D, and post-fledging flocks of up to 12 birds were recorded in July in Compartment B, as well as in lower numbers in C and D. Lapwings nest on bare or sparsely vegetated open ground, and within the survey area were recorded within wet grassland in the SSSI, and arable land.

Table 6: Confirmed records of breeding lapwing

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
TM1985418125	B							✓	✓		✓
TM2105917734	C							✓	✓	✓	✓
TM2193617749	D	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

3.7 Marsh Harrier

Marsh harrier is a Schedule 1 breeding species and BoCC Amber-listed. A single adult female was observed within a particular area of arable land [redacted] Although breeding was not confirmed, it is possible that this represents a breeding territory.

Table 7: Confirmed records of breeding marsh harrier

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
[redacted]	C								✓		✓

3.8 Redshank

Redshank is Amber-listed on the BoCC. Birds are present within Holland Haven Marshes SSSI all year round and were found to be breeding in small numbers there in 2021. A total of up to six individuals were present on any one survey, with breeding confirmed at one area in Compartment D, at Holland Haven Marshes.

Table 8: Confirmed records of breeding redshank

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
TM2176917570	D	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

3.9 Yellow Wagtail

Yellow wagtail is Red-listed on the BoCC. A small number of breeding attempts were likely within the survey area, with breeding behaviour recorded in arable farmland in Compartments A, C and E. Birds tend to prefer nesting in large fields away from tall vegetation and field margins.

Table 9: Confirmed records of breeding yellow wagtail

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
TM1899619358	A								✓		
TM2046118517	C							✓			
TM2087618462	C								✓		
TM2197119224	E							✓			
TM2243119156	E								✓		

3.10 Yellowhammer

Yellowhammer is Red-listed on the BoCC. Breeding was recorded in Compartments A, B and E along field margins in arable land, with a non-breeding individual also recorded in Compartment D (not shown). Birds generally nest on or close to the ground in ditch vegetation or at the base of short, thick hedgerows and scrub.

Table 10: Confirmed records of breeding yellowhammer

Grid Ref	Compartment	24-Feb	17-Mar	25-Mar	08-Apr	20-Apr	05-May	20-May	02-Jun	15-Jun	07-Jul
TM1889819447	A		✓	✓	✓						
TM1924518522	A								✓		
TM1938118579	B										✓
TM1929918254	A									✓	
TM1944818873	B			✓							
TM1959818667	B							✓			
TM1963718155	B								✓		
TM2197119224	E				✓						
TM2209418895	E								✓		

3.11 Other SSSI Species

Although not a primary reason for designation, the Holland Haven Marshes SSSI citation does refer to the presence of breeding passerine species, including skylark, meadow pipit and reed warbler. These species were not considered to be target species during the breeding bird surveys, as they are not inherently rare, and likely to be less sensitive to disturbance than non-passerines. Tally counts per compartment were however made during each survey (see Annex B).

Skylarks were recorded on each survey visit and, in every compartment, with up to six territories located within Holland Haven Marshes (Compartment D) and up to 27 territories in Compartment E recorded on any survey. A maximum of 56 territories was recorded across the whole survey area on any survey.

Meadow pipits were present in lower numbers, and territories were mainly located within Holland Haven Marshes, with a peak survey count of eight territories.

Reed warblers were recorded within every compartment, with compartments D and E holding the highest numbers of breeding territories, with up to nine and ten territories respectively on any survey. A peak total of 21 territories across the whole survey area was recorded in May and June.

The Holland Haven Marshes SSSI citation also mentions that ringed plovers may breed there, but the species was not recorded during surveys.

3.12 Migratory and Non-breeding Birds

A number of other higher conservation status species were recorded during surveys, but these were either non-breeders, or no breeding activity could be confirmed. A summary of their presence follows:

- Small numbers of migratory waders including black-tailed godwit, curlew, golden plover, little ringed plover, greenshank, ruff, turnstone, wood sandpiper and purple sandpiper were recorded within wetland areas at Holland Haven Marshes (mainly Compartment D) in April and May in particular. These were non-breeding individuals.
- A count of 63 migratory whimbrel was recorded within Compartment E in early May.

- Non-breeding teal and shoveler were also present in Compartments B and D in April and early May.
- Mediterranean gull: small numbers of summering non-breeding birds were recorded within all compartments, with a peak of seven birds in Compartment B in April.
- Very small numbers of Sandwich tern were recorded in Holland Haven Marshes in April and June, but no breeding evidence.
- Shelducks were distributed widely across the survey area, but particularly within wetland areas in Compartments B and D. A peak count of 42 birds was recorded on any survey. No breeding locations were confirmed but fledged young were observed in Compartment D in July.
- A pair of gadwall was present within Holland Marshes in April and May, but no signs of breeding.

4 DISCUSSION

The 2021 breeding bird surveys recorded a relatively diverse assemblage of birds within the survey area, reflective of the variety of mainly wetland and farmland habitats found there. The richest species assemblages were found within Compartments B and D (see **Annex B**) which corresponds with the extent of the Holland Haven Marshes SSSI. Predominantly arable and other agricultural land within Compartments A, C and E had relatively fewer species although did host some Schedule 1 and/or Red-listed species such as marsh harrier, corn bunting, yellow wagtail and Cetti's warbler.

Holland Haven Marshes continues to play some importance for non-breeding waders during spring migration and is likely to be used as a stopover for breeding birds during this period and the autumn migration.

ANNEX A. BTO BREEDING STATUS CODES

Non-breeding

F	**F**lying over
M	Species observed but suspected to be still on **M**igration
U	Species observed but suspected to be s**U**mmering non-breeder

Possible breeder

H	Species observed in breeding season in suitable nesting **H**abitat
S	**S**inging male present (or breeding calls heard) in breeding season in suitable breeding habitat

Probable breeding

P	**P**air observed in suitable nesting habitat in breeding season
T	Permanent **T**erritory presumed through registration of territorial behaviour (song, etc.) on at least two different days a week or more apart at the same place or many individuals on one day
D	Courtship and **D**isplay (judged to be in or near potential breeding habitat
N	Visiting probable **N**est site
A	**A**gitated behaviour or anxiety calls from adults, suggesting probable presence of nest or young nearby
B	Nest **B**uilding or excavating nest-hole

Confirmed breeding

UN	**U**sed **N**est or eggshells found (occupied or laid within period of survey)
FL	Recently **FL**edged young (nidicolous species) or downy young (nidifugous species). Careful consideration should be given to the likely provenance of any fledged juvenile capable of significant geographical movement. Evidence of dependency on adults (e.g. feeding) is helpful. Be cautious, even if the record comes from suitable habitat.
ON	Adults entering or leaving nest-site in circumstances indicating **O**ccupied **N**est (including high nests or nest holes, the contents of which cannot be seen) or adults seen incubating
FF	Adult carrying **F**aecal sac or **F**ood for young
NE	**N**est containing **E**ggs
NY	**N**est with **Y**oung seen or heard

ANNEX B. SPECIES LIST

Table A1 shows the maximum count of individuals within each compartment during any survey. Totals include all individuals present and do not necessarily relate to breeding birds or numbers of territories.

Table A1: Summary of Maximum Individual Count per Species per Compartment

Species	Conservation Status	A	B	C	D	E
Avocet	Annex 1, Schedule 1, BoCC Amber				39	
Barn Owl	Schedule 1, BoCC Green	2	1		1	
Blackbird	BoCC Green	23	14	9	12	11
Blackcap	BoCC Green	19	7	3	7	1
Black-headed Gull	BoCC Amber	25	81	23	45	47
Black-tailed Godwit (*islandica*)	Schedule 1, BoCC Red				3	
Blue Tit	BoCC Green	17	8	4	4	5
Bullfinch	BoCC Amber		1			
Buzzard	BoCC Green	4	5	2	1	3
Canada Goose	No status		11	2	10	
Canada x Greylag Goose hybrid	No status		1			
Carrion Crow	BoCC Green	8	12	6	6	9
Cetti's Warbler	Schedule 1, BoCC Green		9	1	3	4
Chaffinch	BoCC Green	8	4	2	4	9
Chiffchaff	BoCC Green	13	5		7	1
Collared Dove	BoCC Green	12	5	4	5	4
Common Gull	BoCC Amber		8	8	2	2
Common Sandpiper	BoCC Amber				1	3
Coot	BoCC Green	2	2			
Cormorant	BoCC Green	1	3	2	6	1
Corn Bunting	BoCC Red			1	1	6
Cuckoo	BoCC Red	1	2		1	1

Species	Conservation Status	A	B	C	D	E
Curlew	BoCC Red	3	22		7	
Dunnock	BoCC Amber	10	7	5	10	4
Egyptian Goose	No status		2			
Feral Pigeon	BoCC Amber	2	9	2	11	63
Fieldfare	Schedule 1, BoCC Red			1	1	
Fulmar	BoCC Amber				1	
Gadwall	BoCC Amber				2	
Goldcrest	BoCC Green	1			1	
Golden Plover	Annex 1, BoCC Green					1
Goldfinch	BoCC Green	22	8	25	4	6
Great Black-backed Gull	BoCC Amber		1		1	
Great Spotted Woodpecker	BoCC Green	5	1		1	1
Great Tit	BoCC Green	19	9	5	3	2
Green Woodpecker	BoCC Green	5	3		1	3
Greenfinch	BoCC Green	9	3	4	8	5
Greenshank	Schedule 1, BoCC Amber				1	
Grey Heron	BoCC Green	1	4	1	4	1
Greylag Goose	BoCC Amber	4	37	2	2	2
Herring Gull	BoCC Red	15	246	60	147	36
House Martin	BoCC Amber	14	12	11	3	
House Sparrow	BoCC Red	57	14	11	8	24
Indian Peafowl	BoCC Amber					1
Jackdaw	BoCC Green	47	63	12	11	61
Jay	BoCC Green	6	2		2	1
Kestrel	BoCC Amber	3	3	3	2	1
Lapwing	BoCC Red		12	6	8	
Lesser Black-backed Gull	BoCC Amber	2	18	6	4	5

Species	Conservation Status	A	B	C	D	E
Lesser Whitethroat	BoCC Green	2	1	1	1	2
Linnet	BoCC Red	7	21	38	70	50
Little Egret	Annex 1, BoCC Green				1	
Little Grebe	BoCC Green		1	1		
Little Owl	Schedule 1, BoCC Green	2	1			
Little Ringed Plover	Schedule 1, BoCC Green				1	
Long-tailed Tit	BoCC Green	1	3	2		2
Magpie	BoCC Green	5	2	1	15	8
Mallard	BoCC Amber	9	21	9	12	15
Marsh Harrier	Annex 1, Schedule 1, BoCC Amber			1		
Meadow Pipit	BoCC Amber		1	1	8	3
Mediterranean Gull	Annex 1, Schedule 1, BoCC Amber	6	7	2	3	1
Mistle Thrush	BoCC Red	2	1	1		2
Moorhen	BoCC Green	2	10	2	5	6
Mute Swan	BoCC Amber	2	5	2	2	
Oystercatcher	BoCC Amber		9	2	5	8
Pheasant	No status	22	22	15	14	28
Pied Wagtail (*yarrellii*)	BoCC Green	3	4	4	3	2
Purple Sandpiper	Schedule 1, BoCC Amber				1	3
Red-legged Partridge	BoCC Green	2	1	2	1	2
Redshank	BoCC Amber				6	
Reed Bunting	BoCC Amber	2	3	3	7	9
Reed Warbler	BoCC Green	2	4	4	9	10
Robin	BoCC Green	17	6	5	8	7
Rook	BoCC Green	32	134	18	14	25
Ruff	Annex 1, Schedule 1, BoCC Red				1	
Sandwich Tern	Annex 1, BoCC Amber				2	

Species	Conservation Status	A	B	C	D	E
Sedge Warbler	BoCC Green		2		10	3
Shelduck	BoCC Amber	5	19	15	20	4
Shoveler	BoCC Amber				10	
Siskin	BoCC Green				1	
Skylark	BoCC Red	14	11	10	6	27
Snipe	BoCC Amber		13	1	11	
Song Thrush	BoCC Red	2	3		1	4
Sparrowhawk	BoCC Green	1	1		1	
Starling	BoCC Red	8	25	70	183	69
Stock Dove	BoCC Amber	10	8	4	5	10
Stonechat	BoCC Green				2	
Swallow	BoCC Green	8	11	31	8	14
Swift	BoCC Amber	2		16	415	2
Teal	BoCC Amber		23	2	37	
Tufted Duck	BoCC Green		3	1		
Turnstone	BoCC Amber				9	
Water Pipit	BoCC Amber				1	
Wheatear	BoCC Green	1			2	9
Whimbrel	Schedule 1, BoCC Red		1		7	63
Whitethroat	Annex 1, Schedule 1, BoCC Red	8	17	11	11	17
Wigeon	BoCC Amber				8	
Wood Sandpiper	Annex 1, Schedule 1, BoCC Amber				2	
Woodpigeon	BoCC Green	435	134	119	176	127
Wren	BoCC Green	20	13	5	14	8
Yellow Wagtail	BoCC Red	1		2	1	5
Yellowhammer	BoCC Red	1	1			1
TOTAL SPECIES COUNT		**62**	**74**	**61**	**89**	**65**

618000 619000 620000 621000 622000 623000

220000 219000 218000 217000 216000

A B C D E

Legend:

- Search Area
- Survey Area
- Survey Compartment
- Holland Haven Marshes Site of Special Scientific Interest (SSSI)
- Holland Haven Local Nature Reserve
- Breeding Bird Survey (BBS) Transect Route
- Vantage Point (VP)

Source: RHDHV, MacArthur Green

MacArthur Green

North Falls Onshore

Figure 1

Landfall Search Area: Survey Area

0 250 500
Metres
MAP SCALE: 1:17,500 @A3

N

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Datum: OSGB 1936, Projection: British National Grid

Date: 26/08/2021

Map Author: LNF Checked: RD Approved: RD Status: Rev0

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