NORTH FALLS

Offshore Wind Farm

ENVIRONMENTAL STATEMENT

Appendix 23.7 National Vegetation Classification Survey Report

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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.

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.

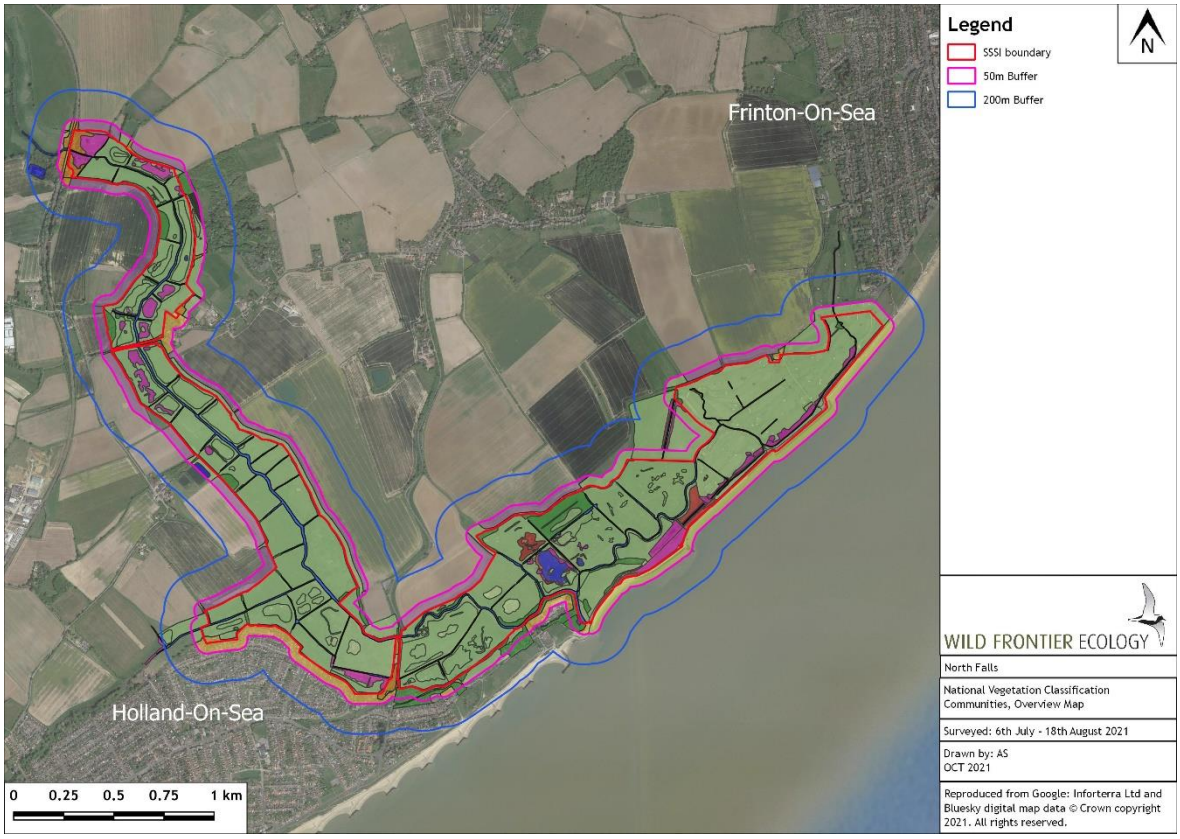
The project is proposed in response to The Crown Estate's (TCE) extension leasing round, launched in 2017, with TCE recognising that extensions to operational wind farms are proven to be a successful way of efficiently developing more offshore generating capacity. NFOW was awarded an Agreement for Lease (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

[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

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 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

[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.

[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).

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].

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. 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).

[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 [redacted]

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
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

[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)

[9] Essex Red Data List [redacted]

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
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
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

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
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
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

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
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
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

[10] SSSI Citation

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
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

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
Poa pratensis	Smooth meadow-grass	✓		Lower concern
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

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
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
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

Species – Scientific name	English name	2021 survey	SSSI Citation	Conservation Status[78]
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
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	**8.041**	**3.06**

Habitat Category	Area (ha)	Percentage of SSSI area
Communities		
SM12a	0.007	0.00
SM16b	4.243	1.61
SM23	1.056	0.40
SM24	2.735	1.04
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.

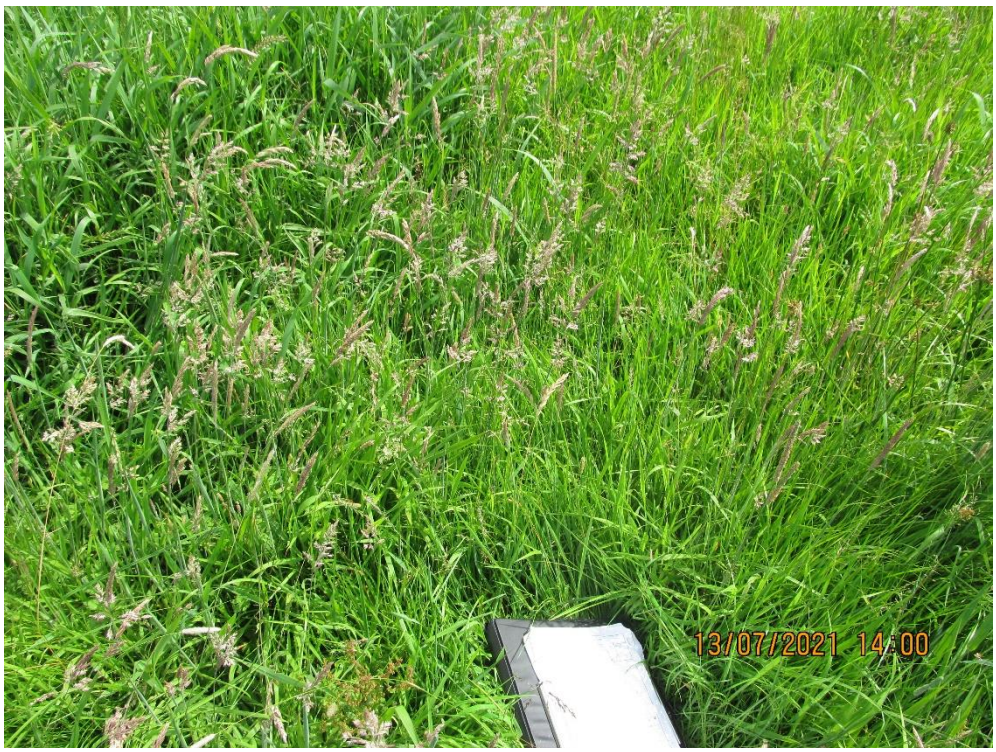
On the golf course, this community is still present, though it has been substantially altered because of the course landscaping and management. *Agrostis capillaris* all but replaces *Agrostis stolonifera* in the "rough" areas, but *Alopecurus pratensis*, *Hordeum secalinum* and *Lolium perenne* are 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.

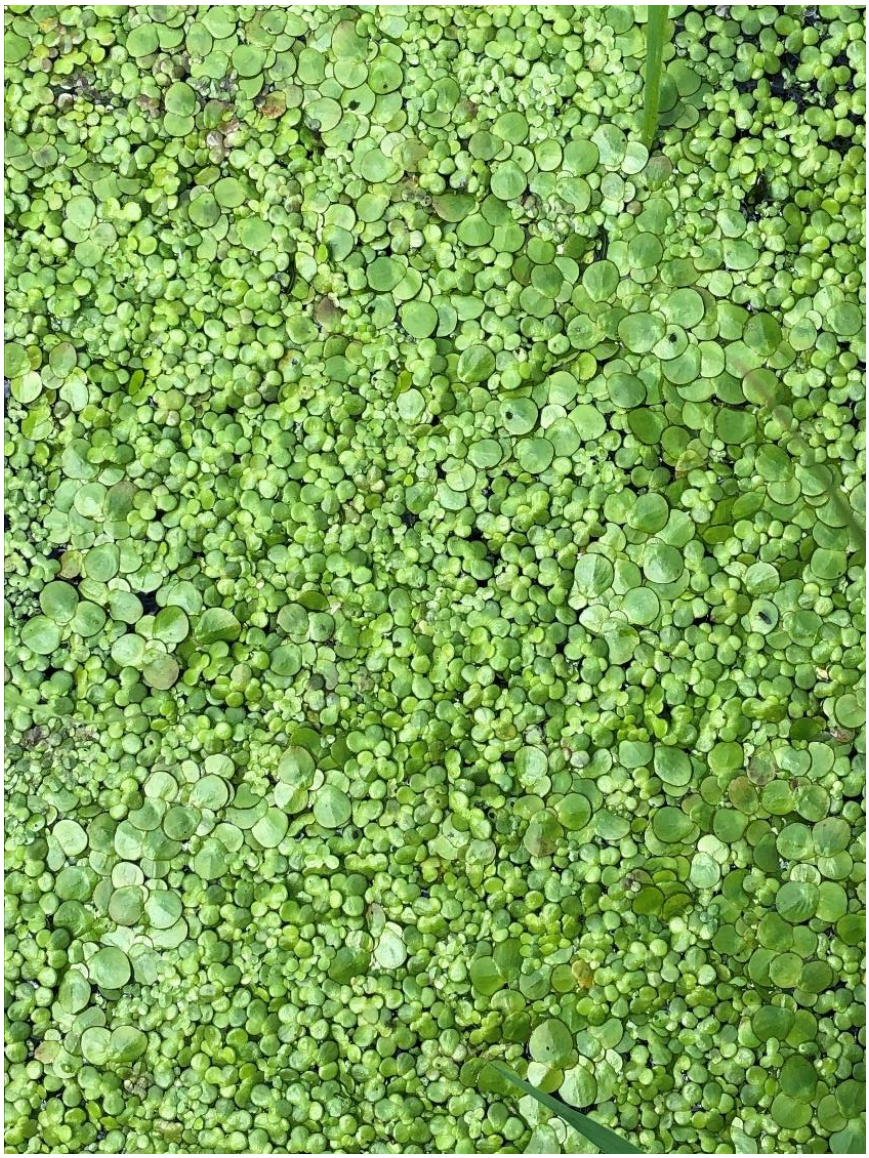
Typical appearance on site:

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 outside the SSSI boundary.

TM22341822 – 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.

TM23181899 – Ditches in the golf course northern section – generally 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 – 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 – Great Holland Brook. 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 – Grazing marsh ditch between SSSI and Great Holland Pits Nature Reserve. This small ditch, ending in a small pond, was dominated by *Sparganium erectum* (S14c), with frequent *Glyceria fluitans* and some *Alisma plantago-aquatica* and *Juncus effusus*.

6. Conclusions

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 (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.
- Mesotrophic grasslands MG5a, MG12a and MG13.
- Swamp community S19a.

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
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ECOLOGY

Holland Haven Marshes SSSI, Clacton, Essex

NVC Survey – Appendix 1 - Maps

October 2021

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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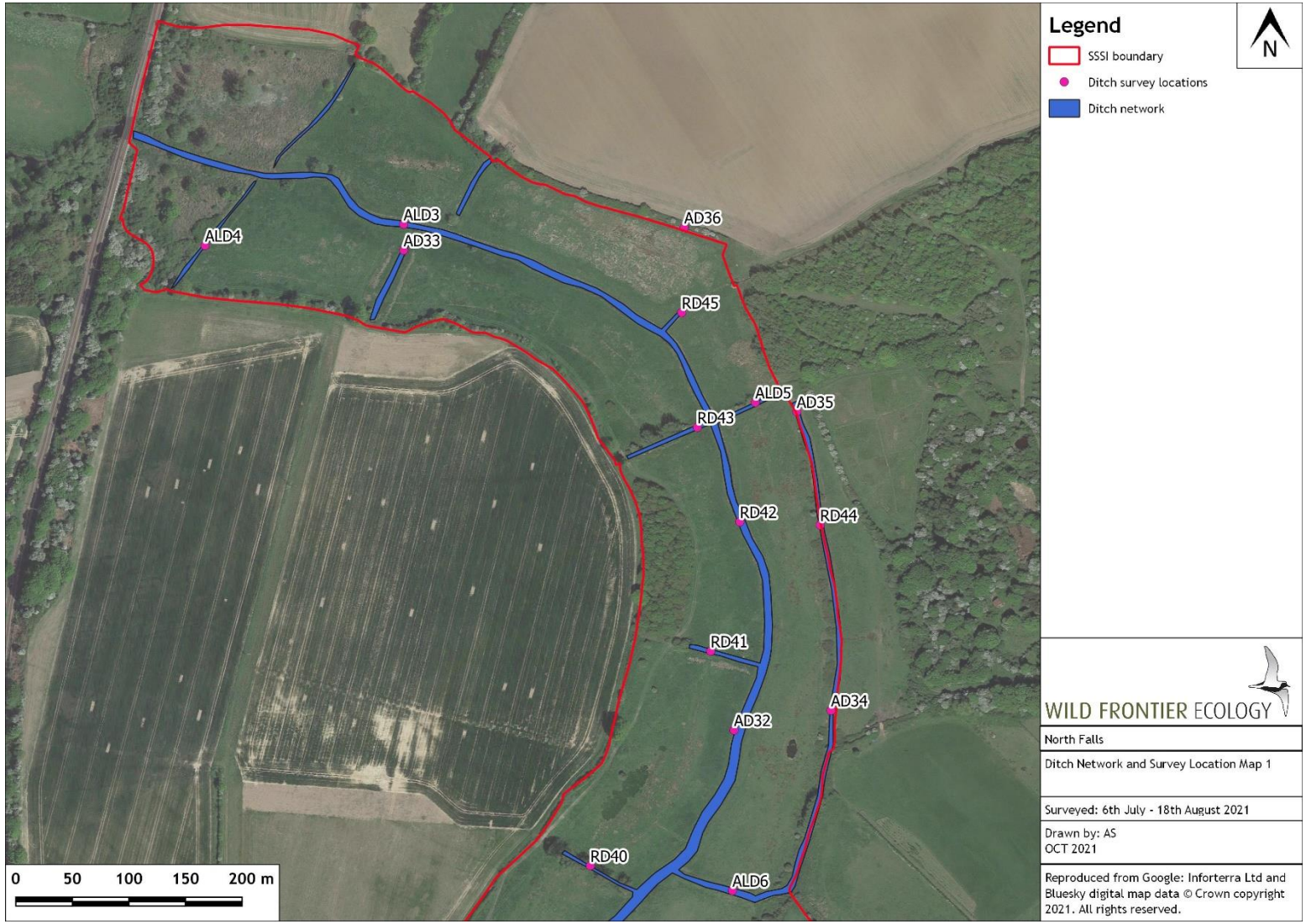
Director Robert Yaxley BSc (Hons) CEcol CEnv MCIEEM.

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.

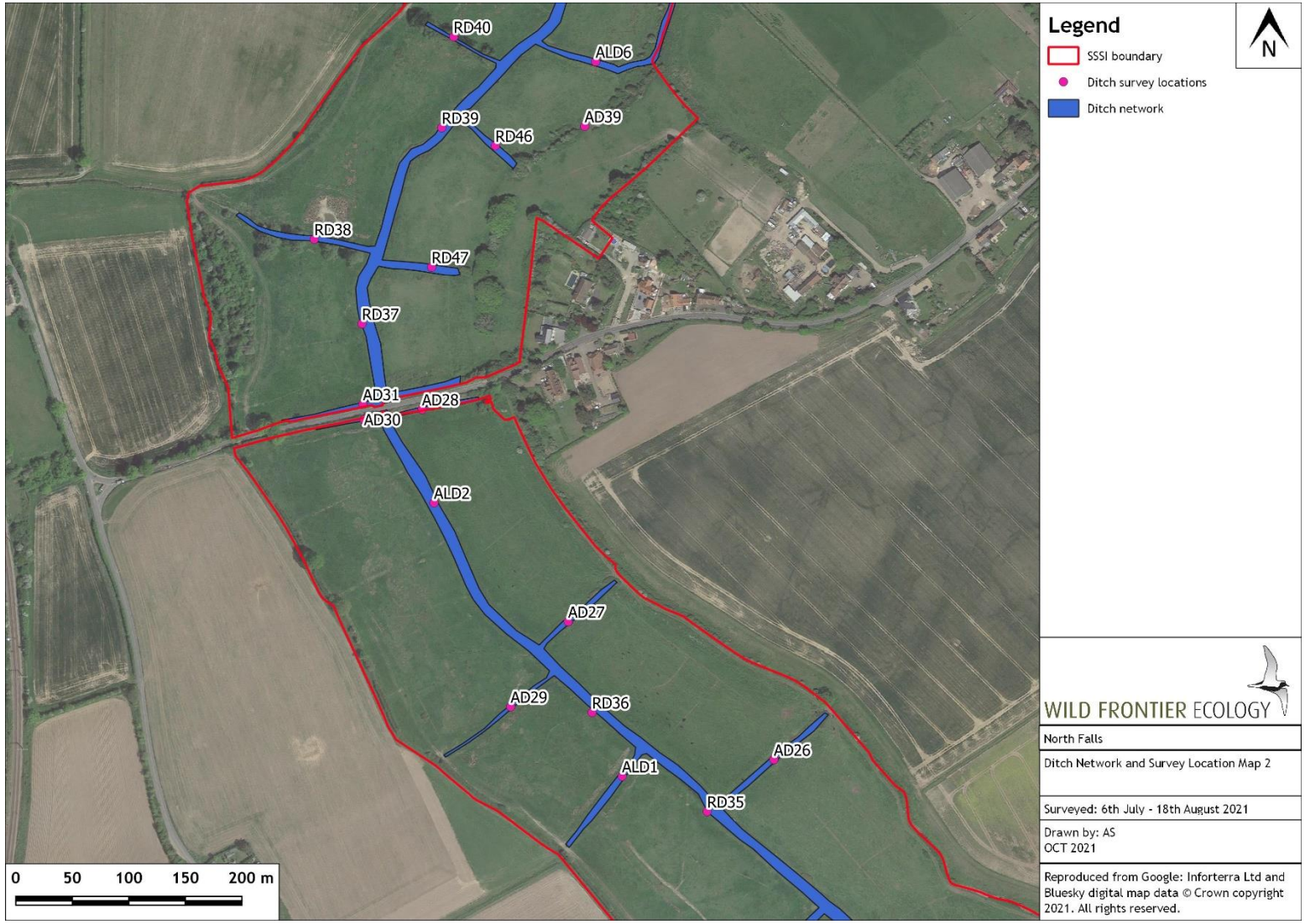
This report conforms to the British Standard 42020:2013 Biodiversity – Code of practice for planning and development.

Contents

Map 1a: Ditch Network and Survey Locations



Map 1b: Ditch Network and Survey Locations



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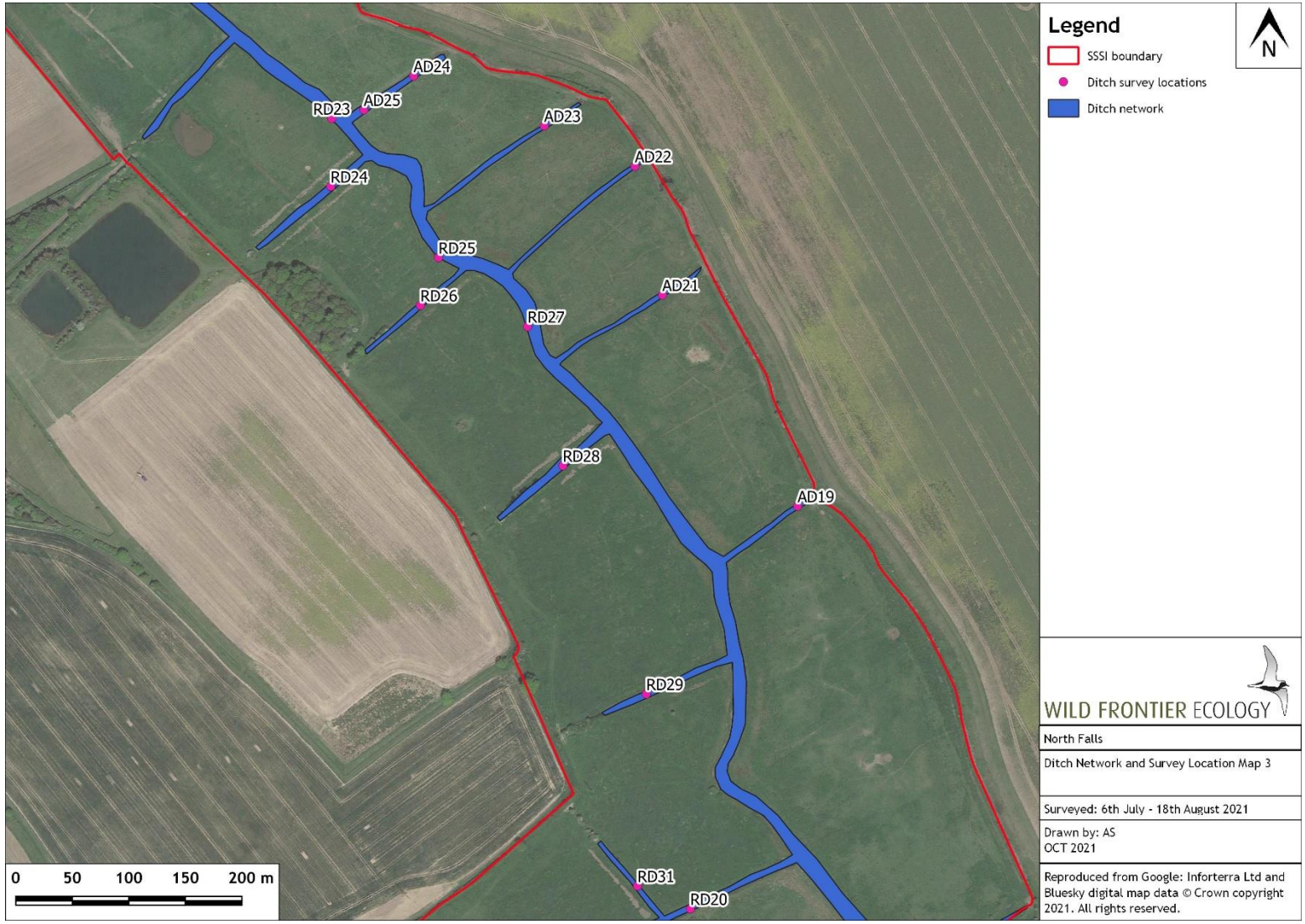

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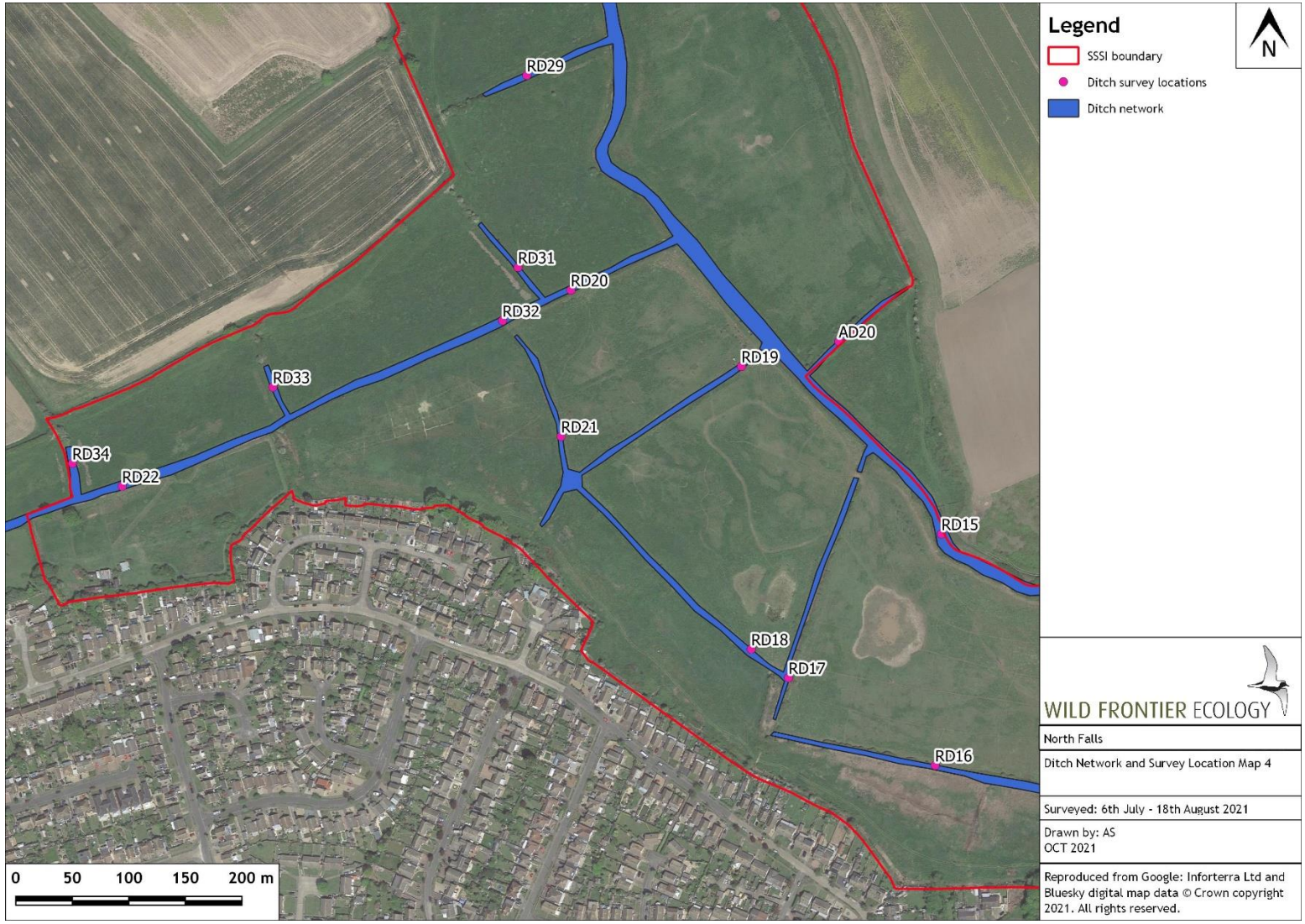
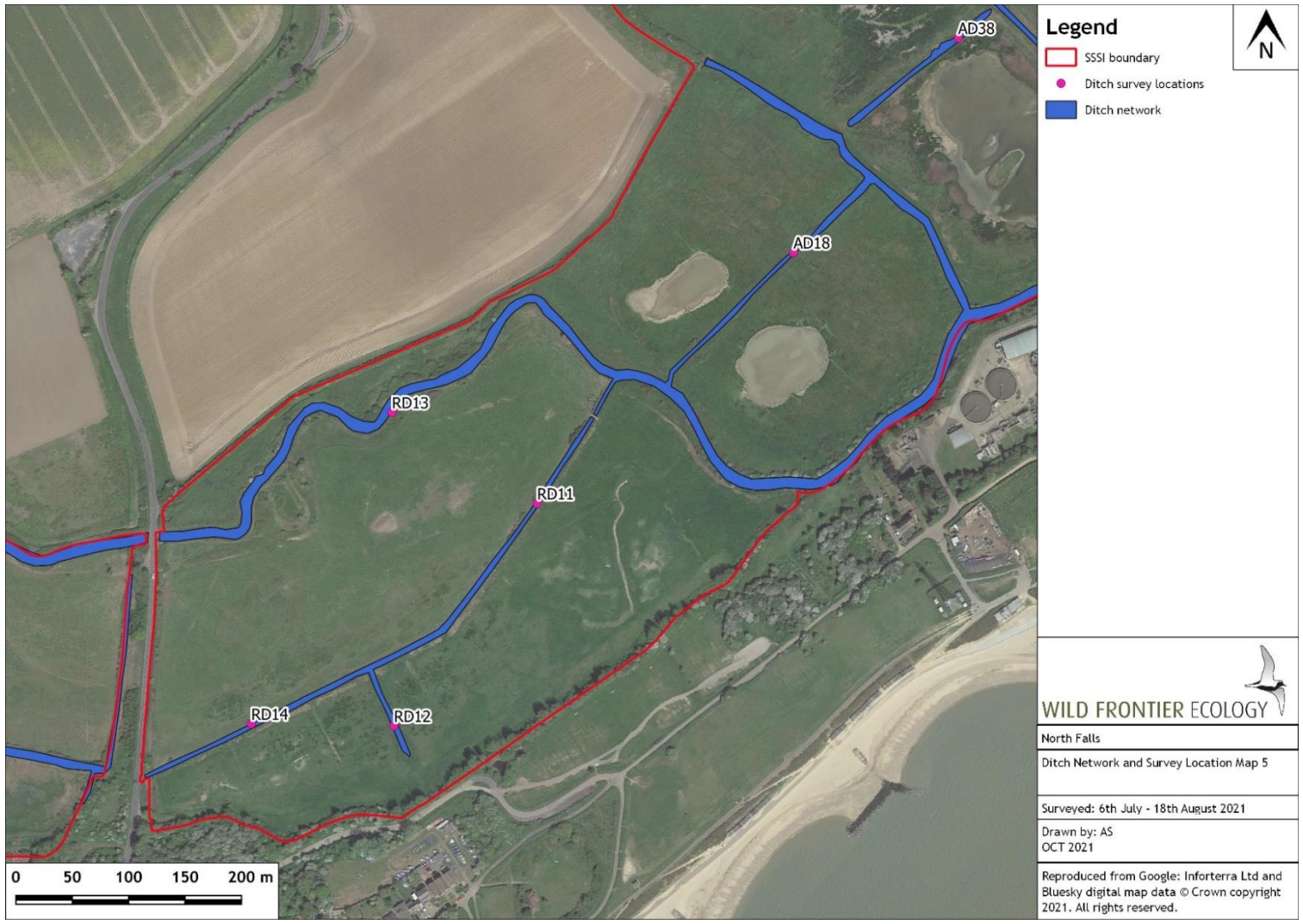
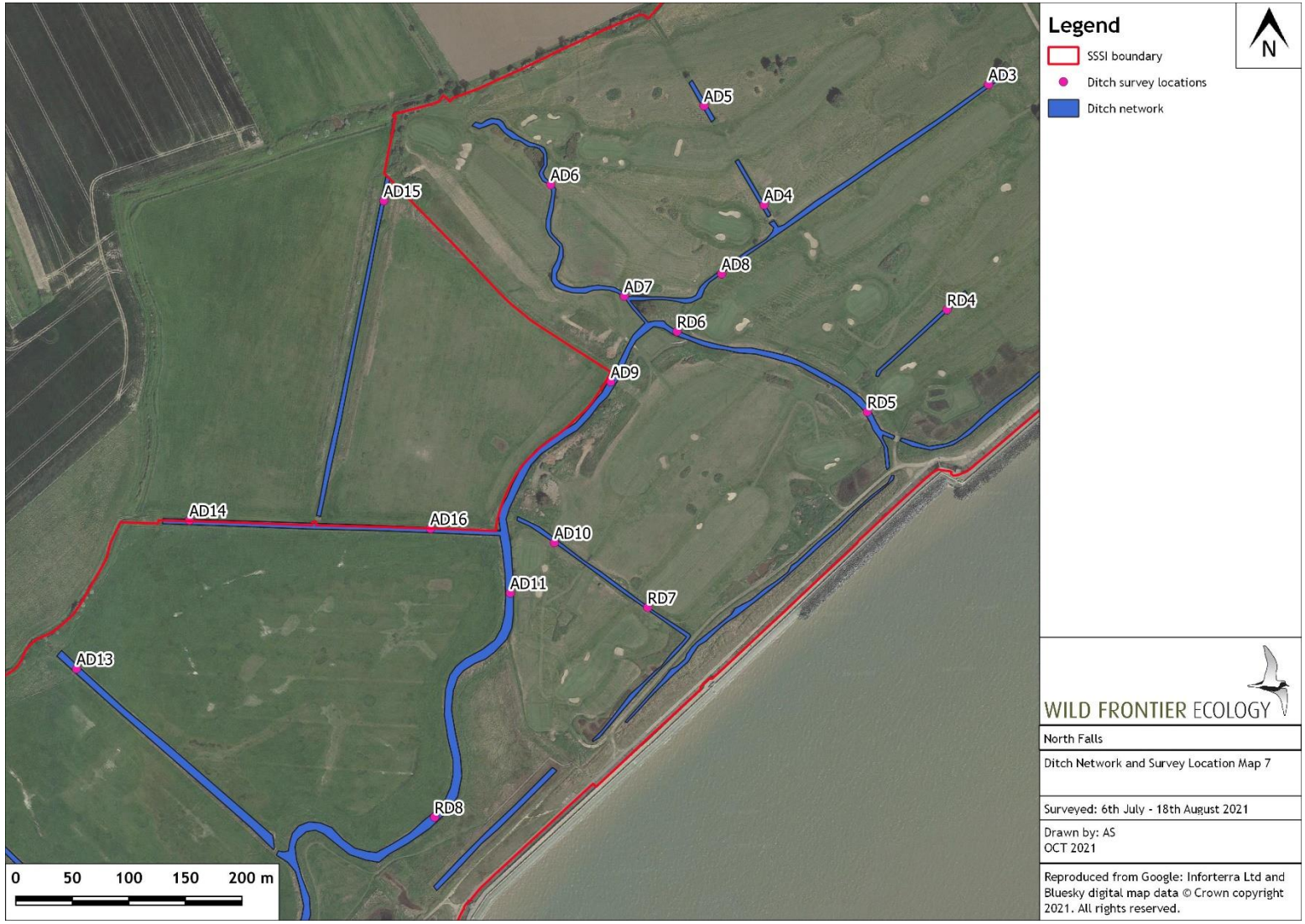


Map 1e: Ditch Network and Survey Locations



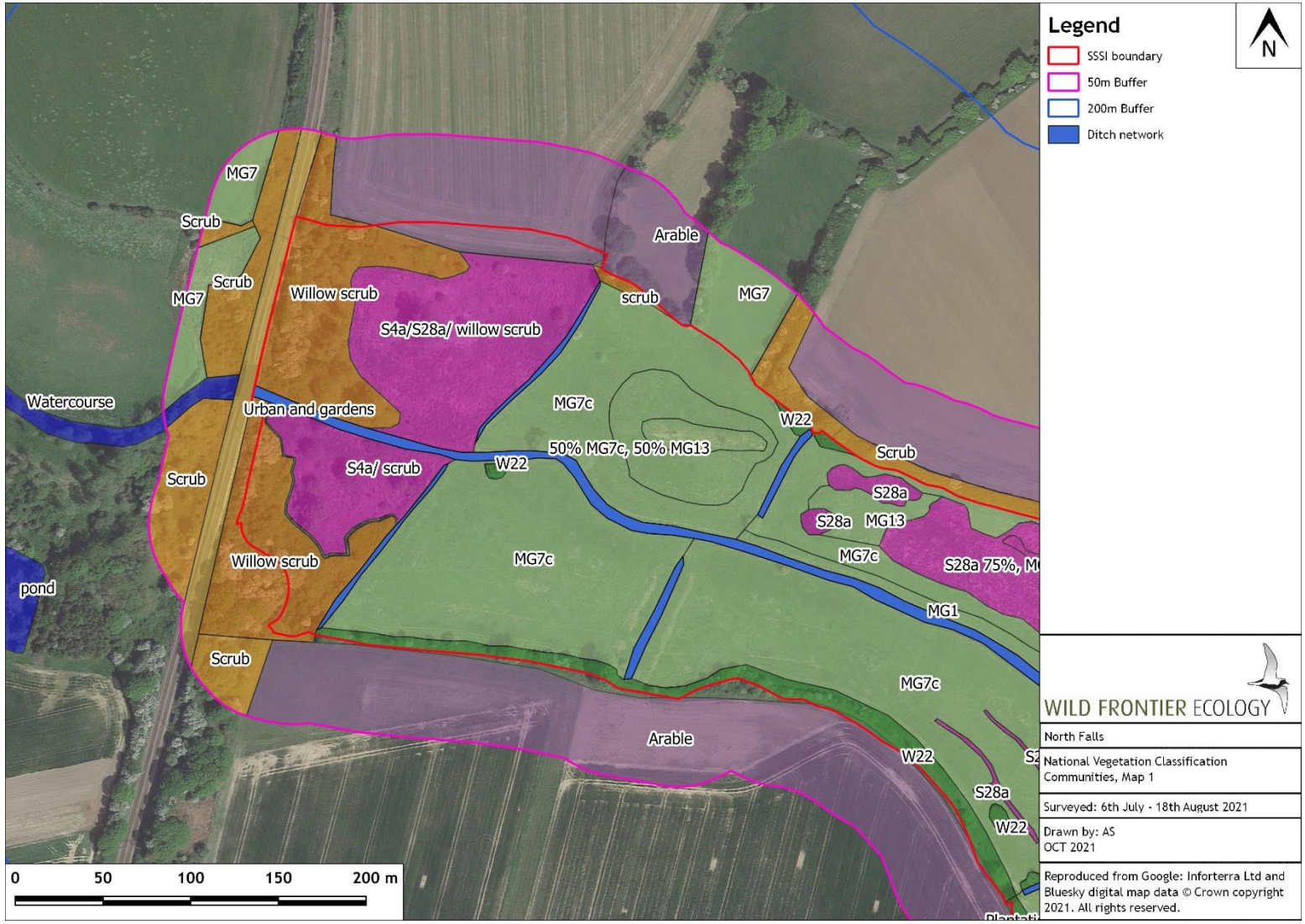
Map 1f: Ditch Network and Survey Locations

Map 1g: Ditch Network and Survey Locations

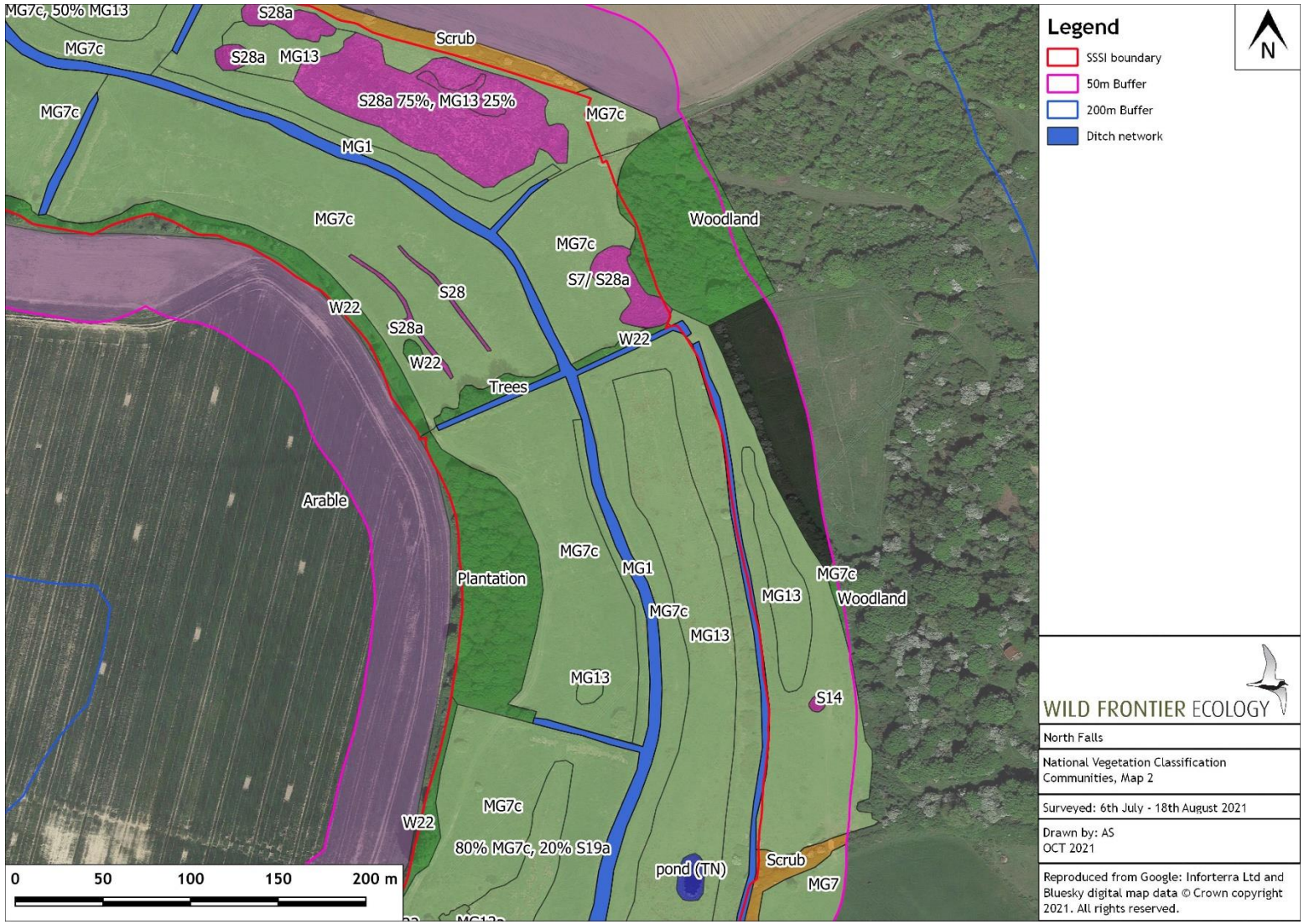


Map 1h: Ditch Network and Survey Locations

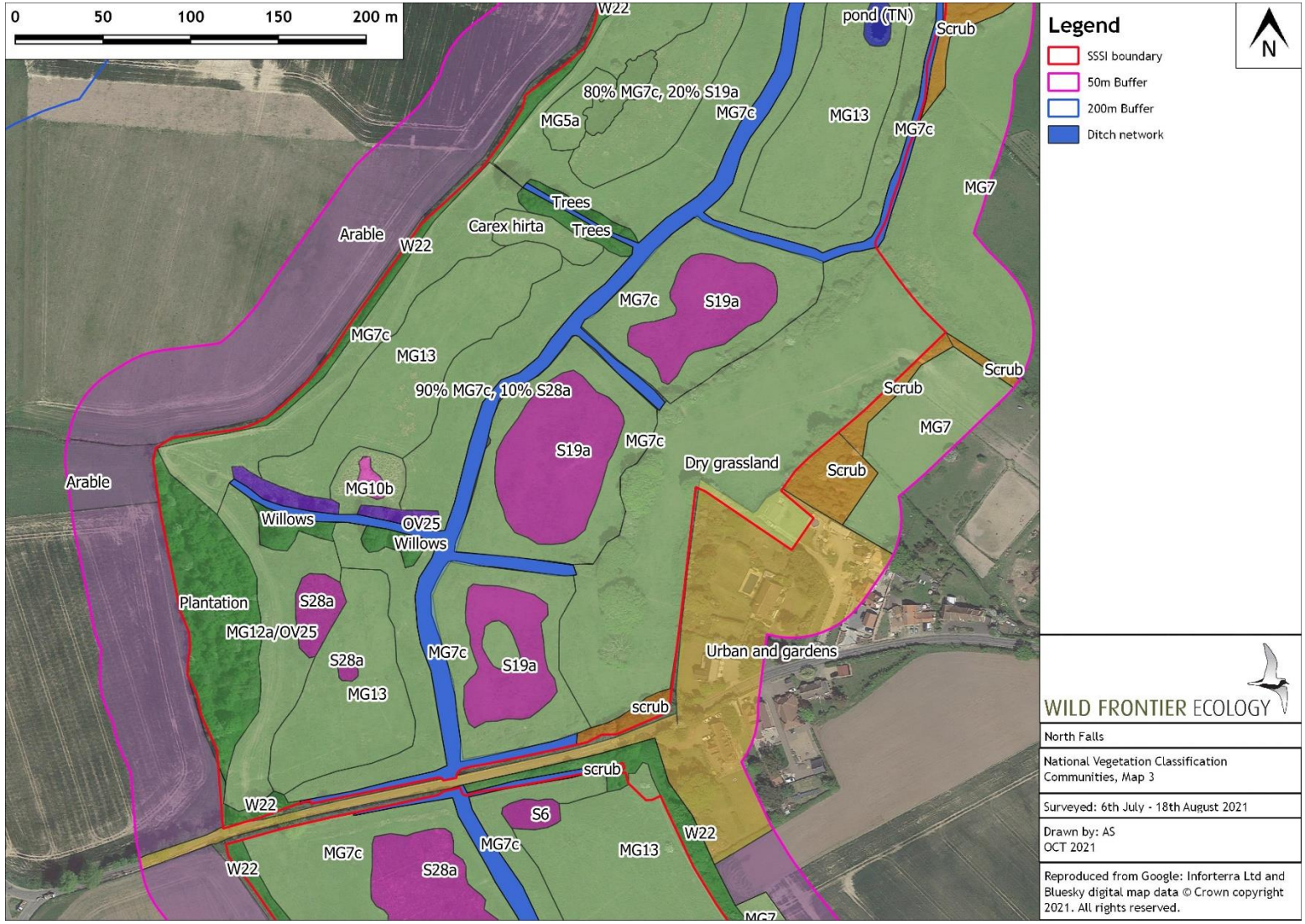
Map 2a: NVC Communities



Map 2b: NVC Communities



Map 2c: NVC Communities



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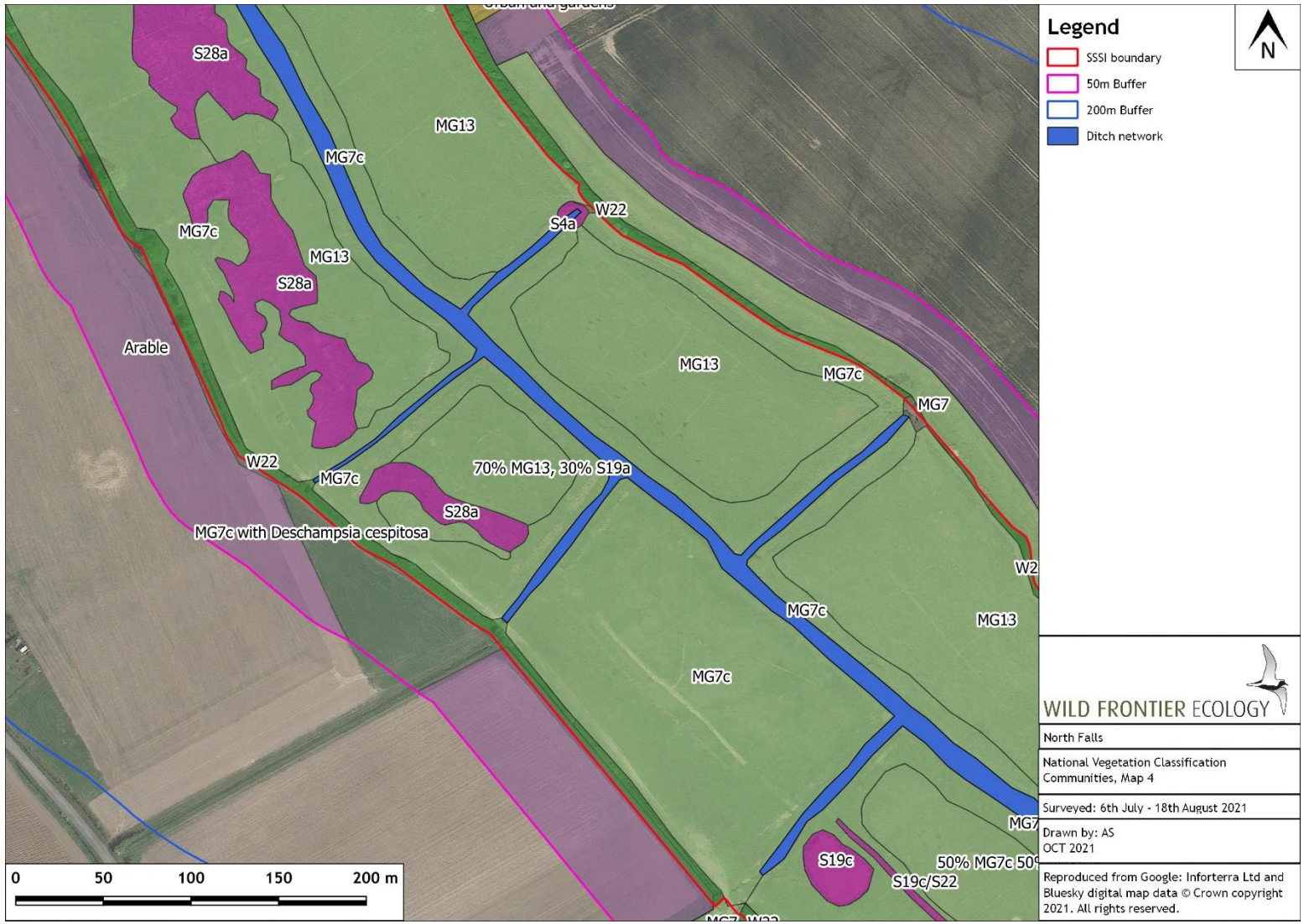

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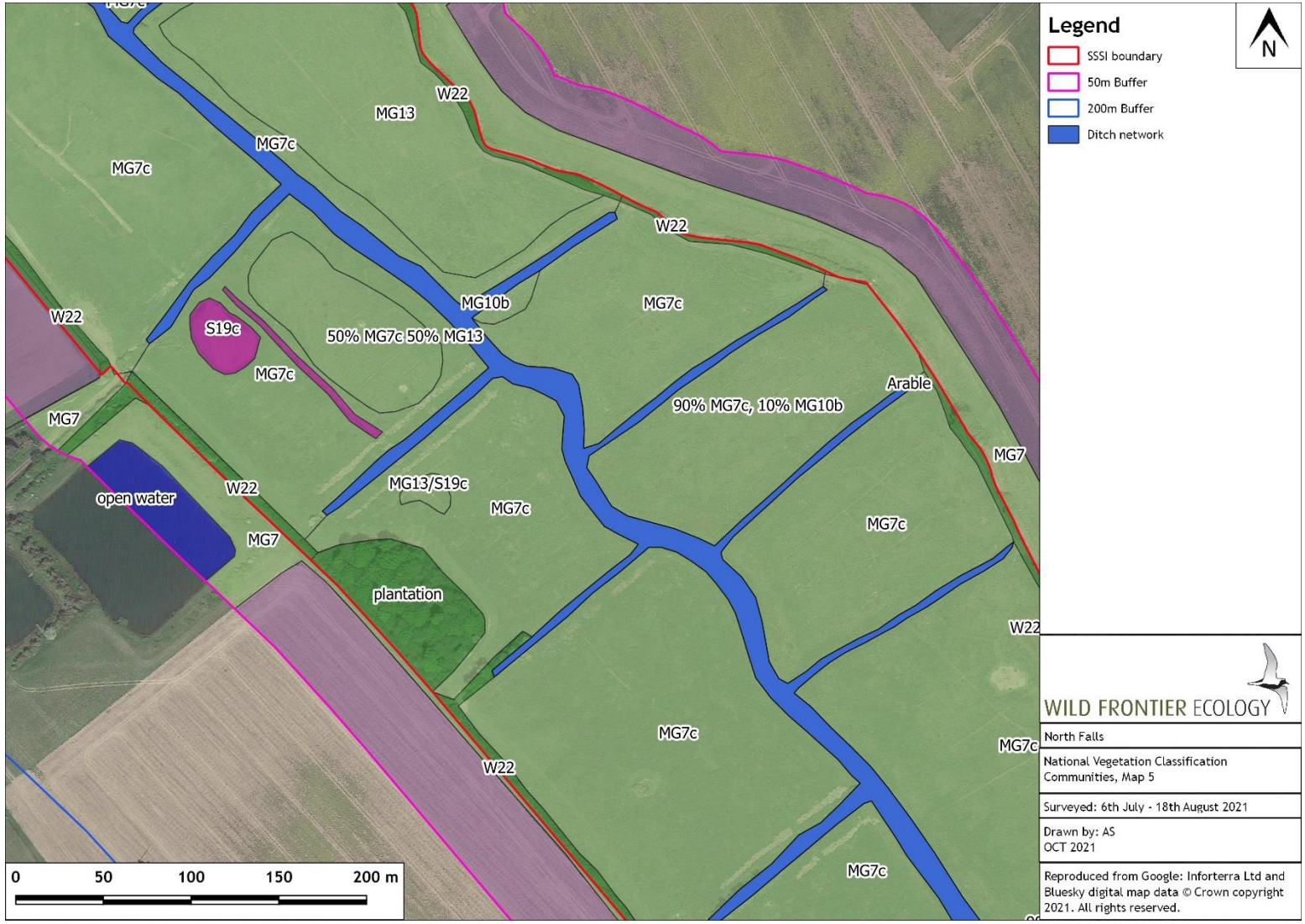
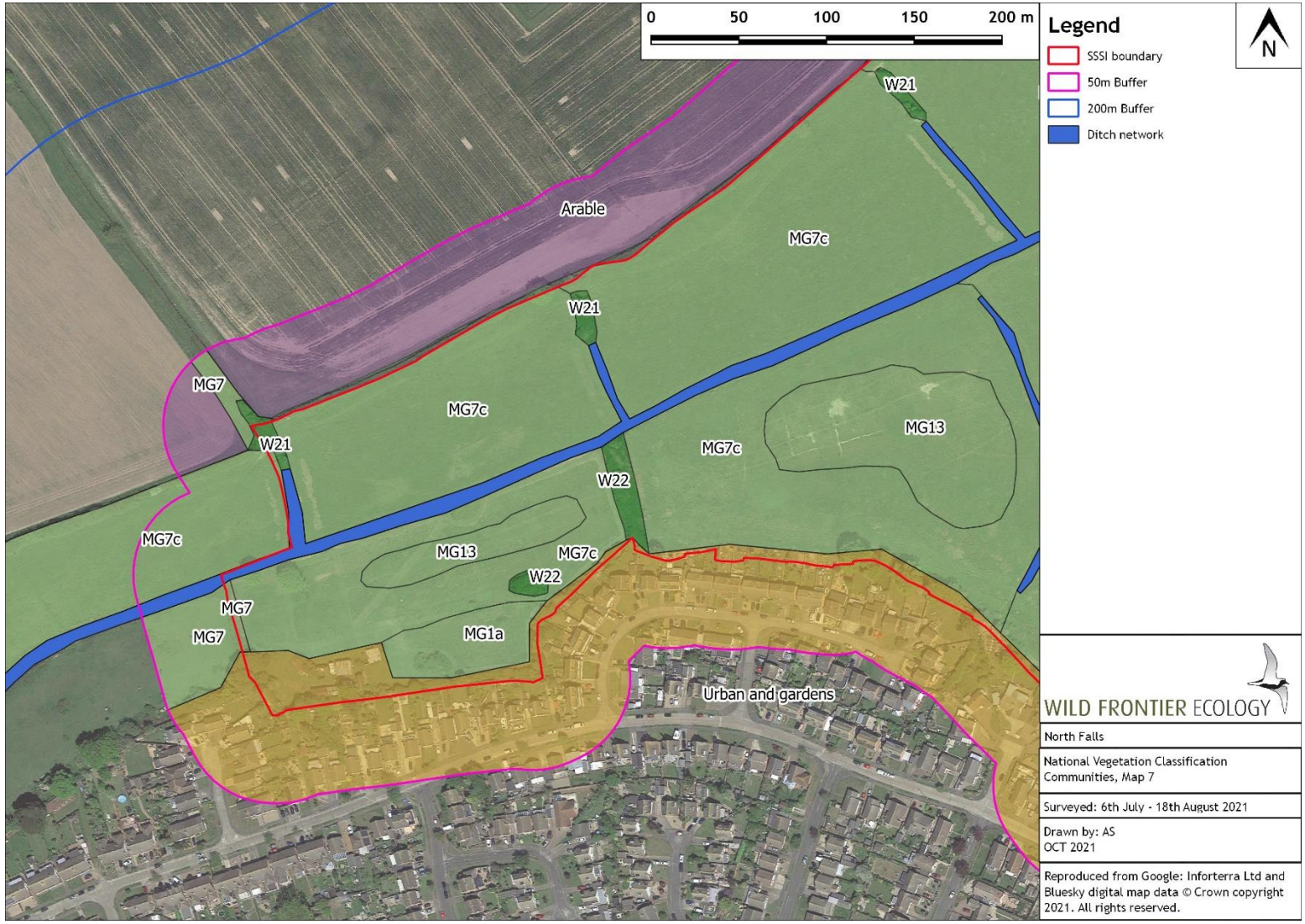


Map 2f: NVC Communities

Map 2g: NVC Communities



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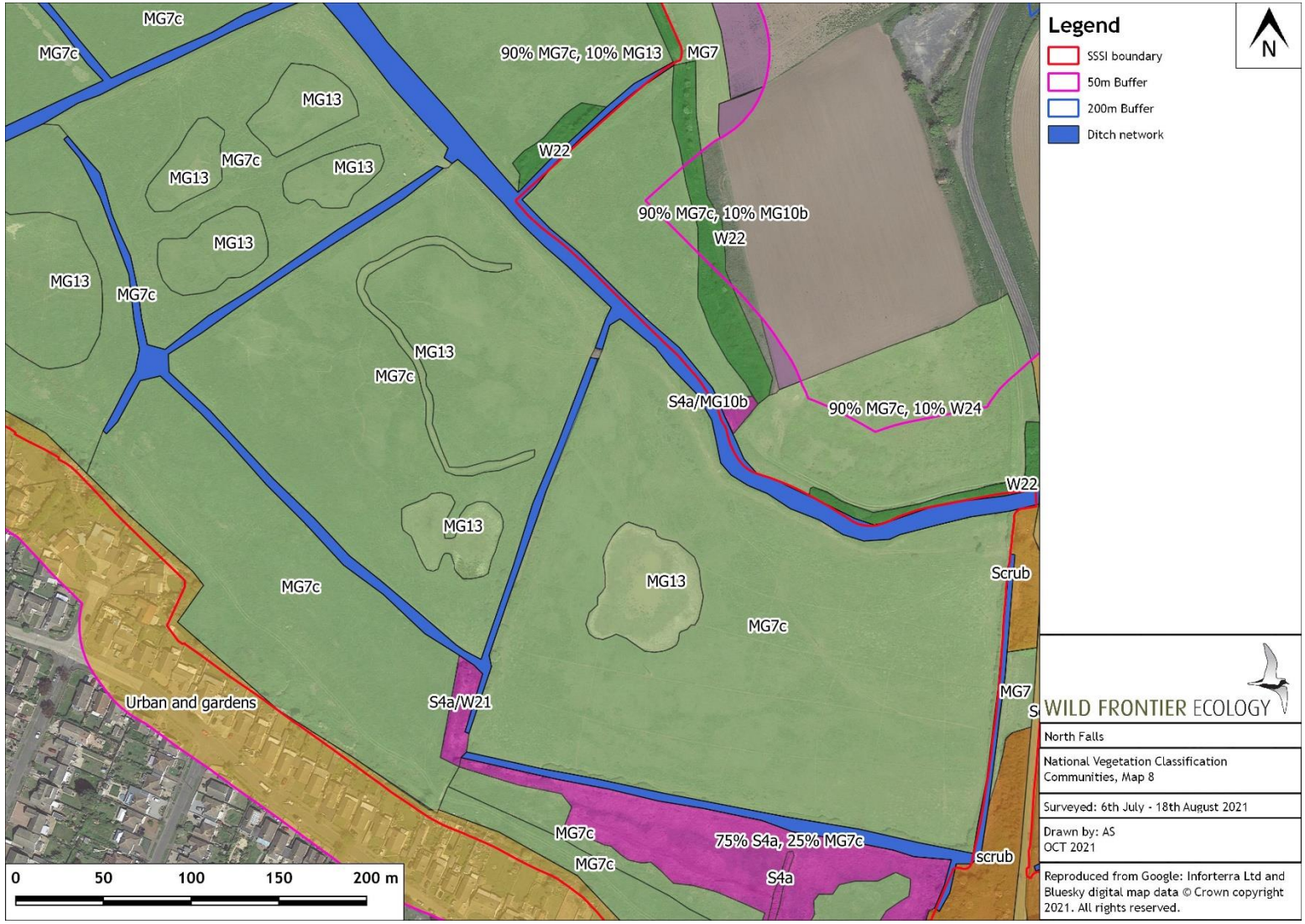
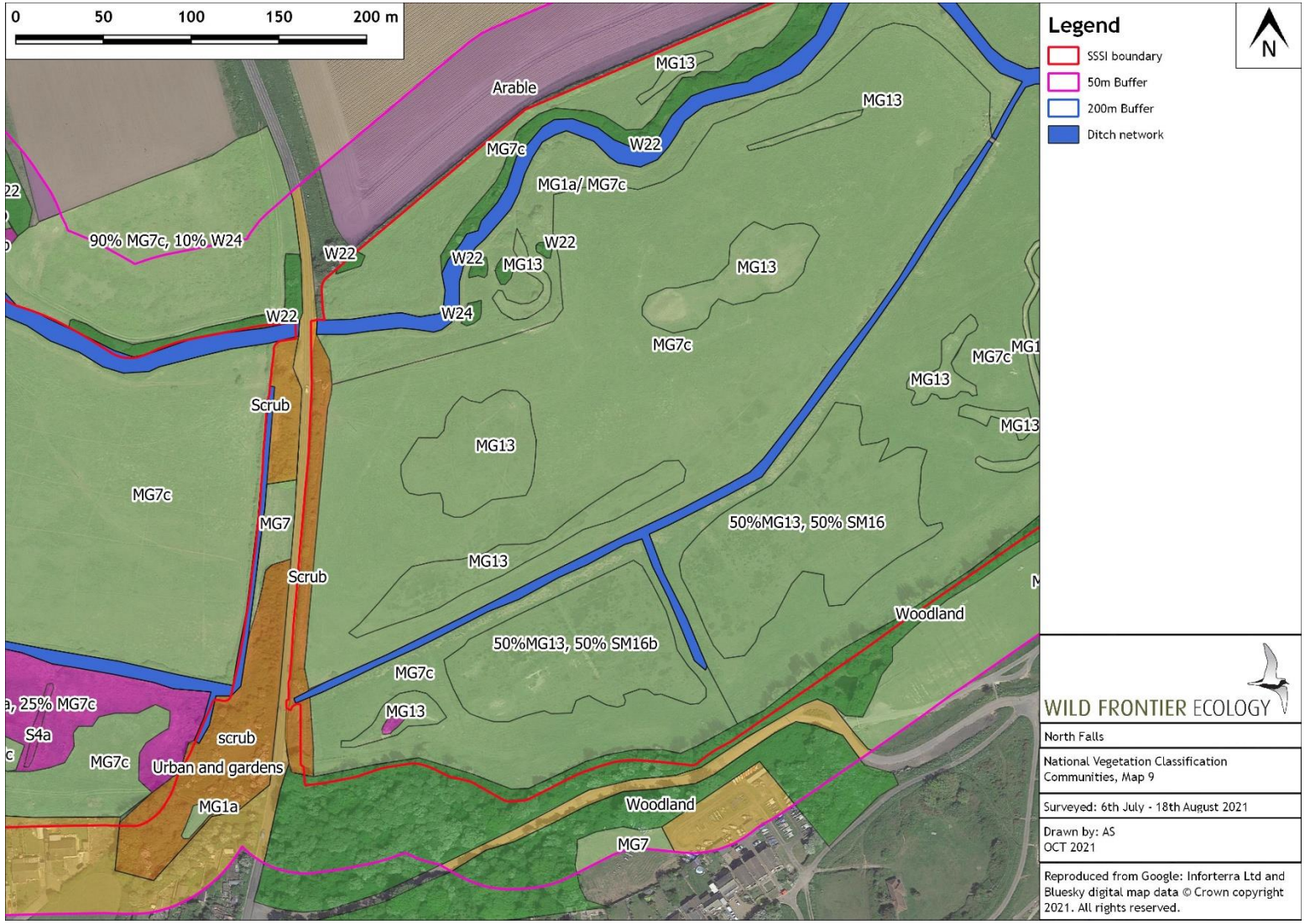


Map 2i: NVC Communities



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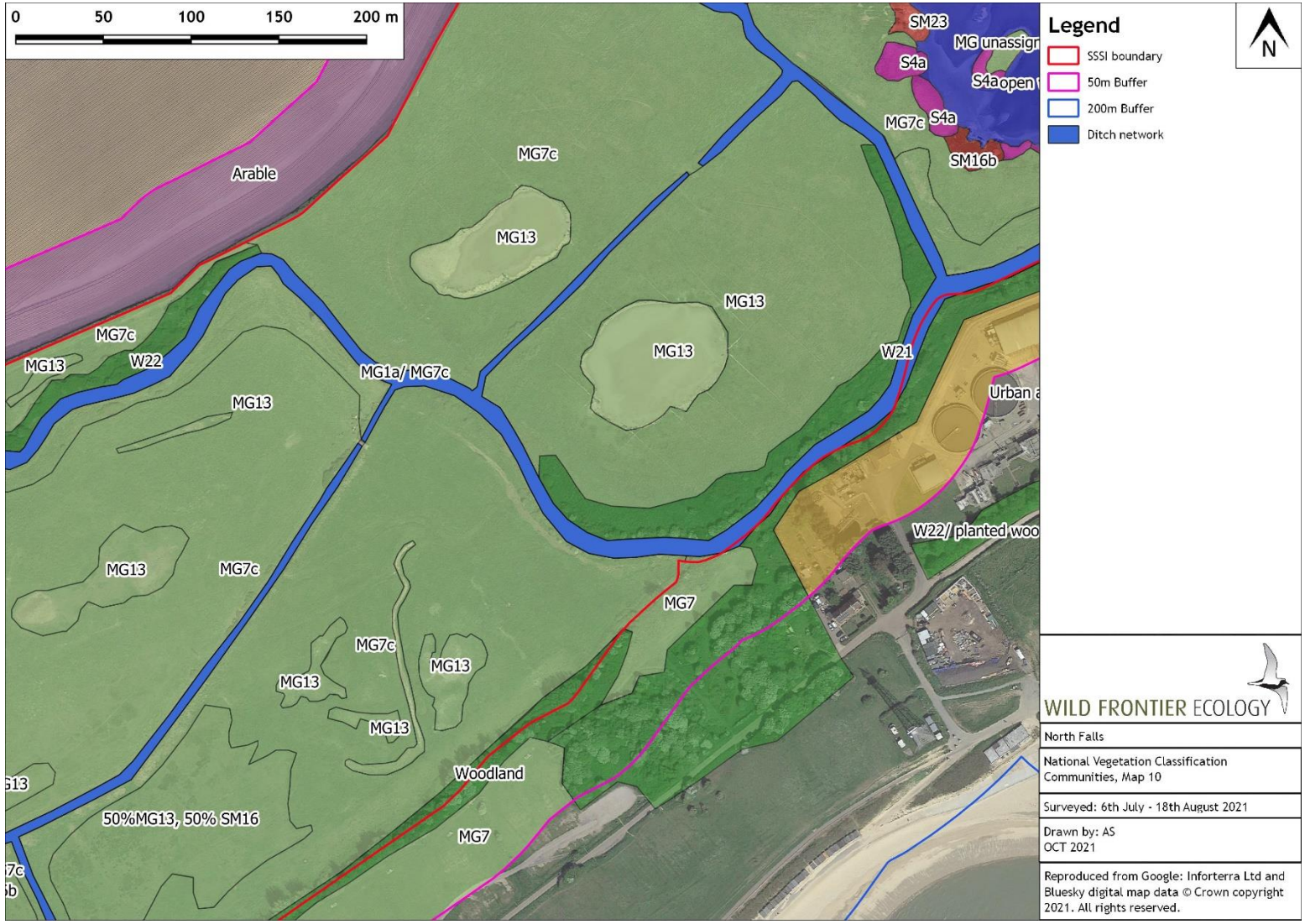

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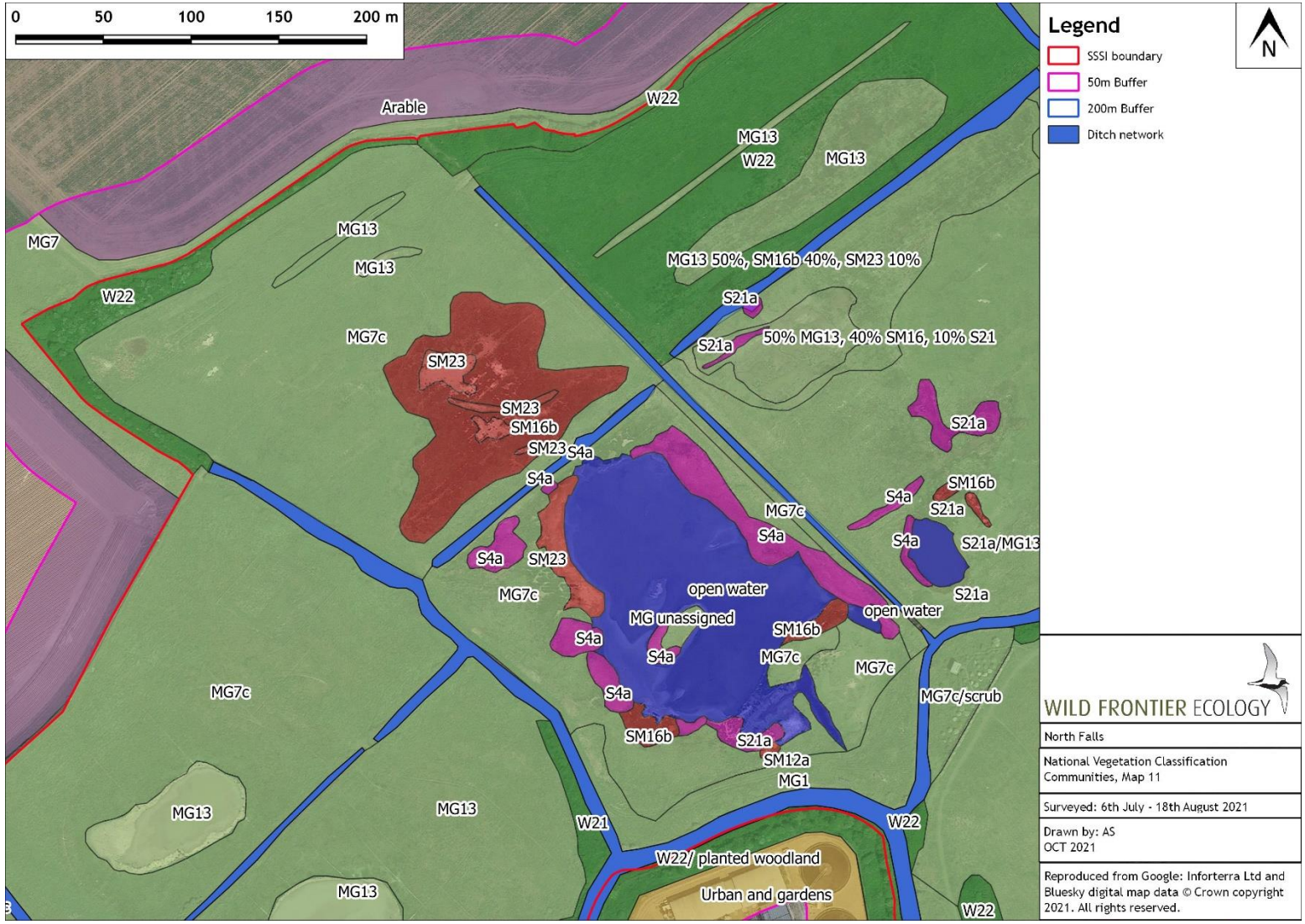

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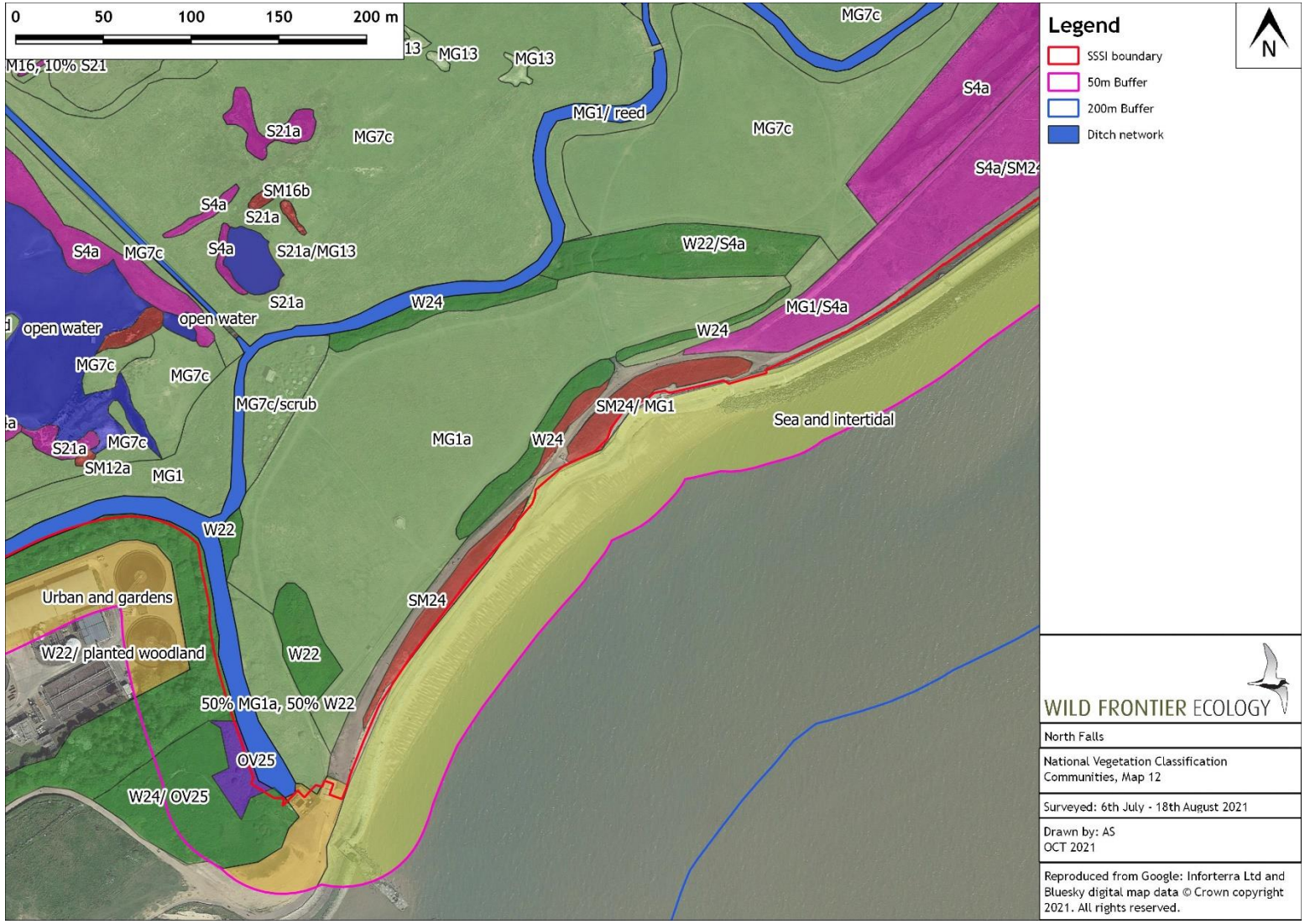

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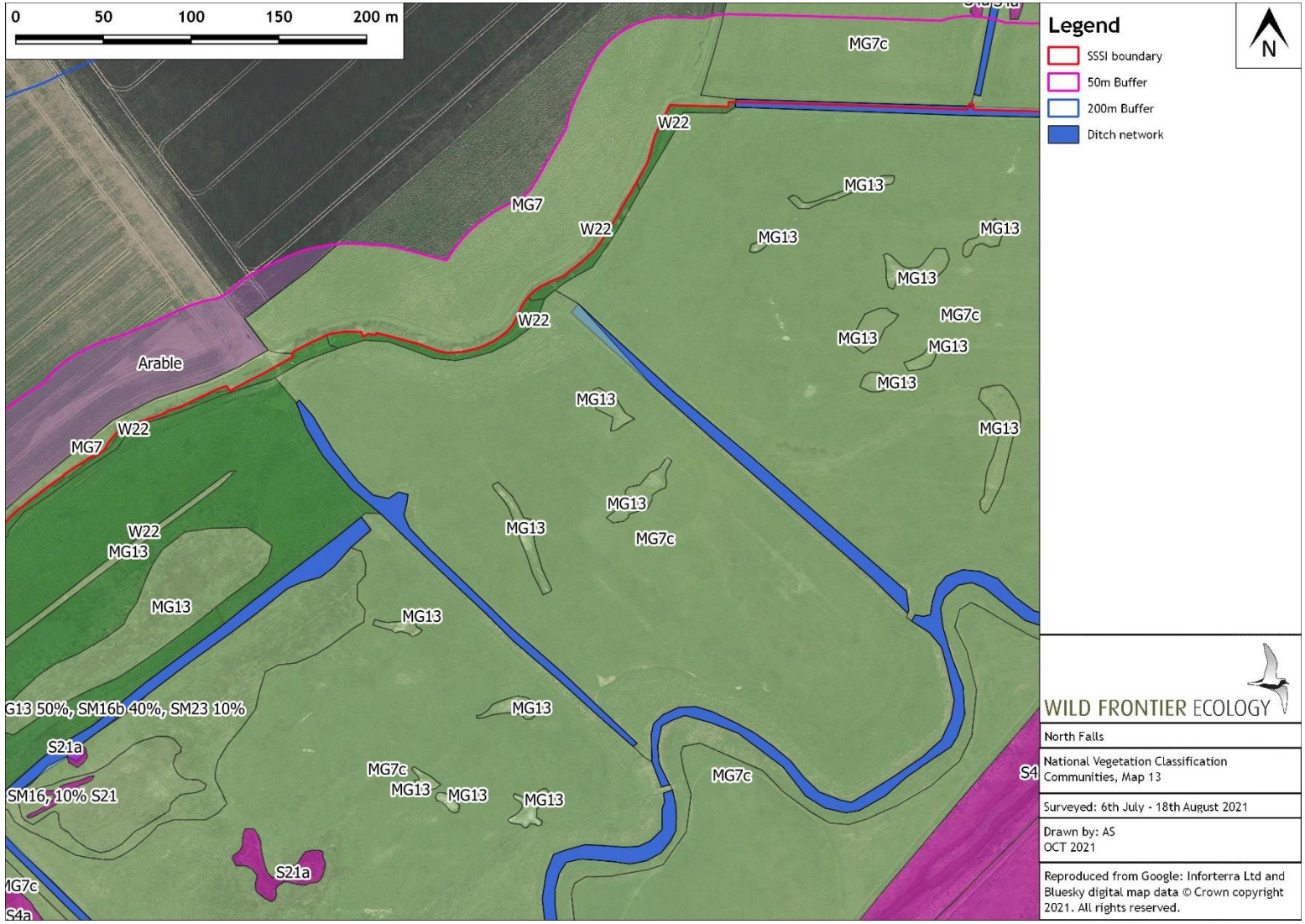

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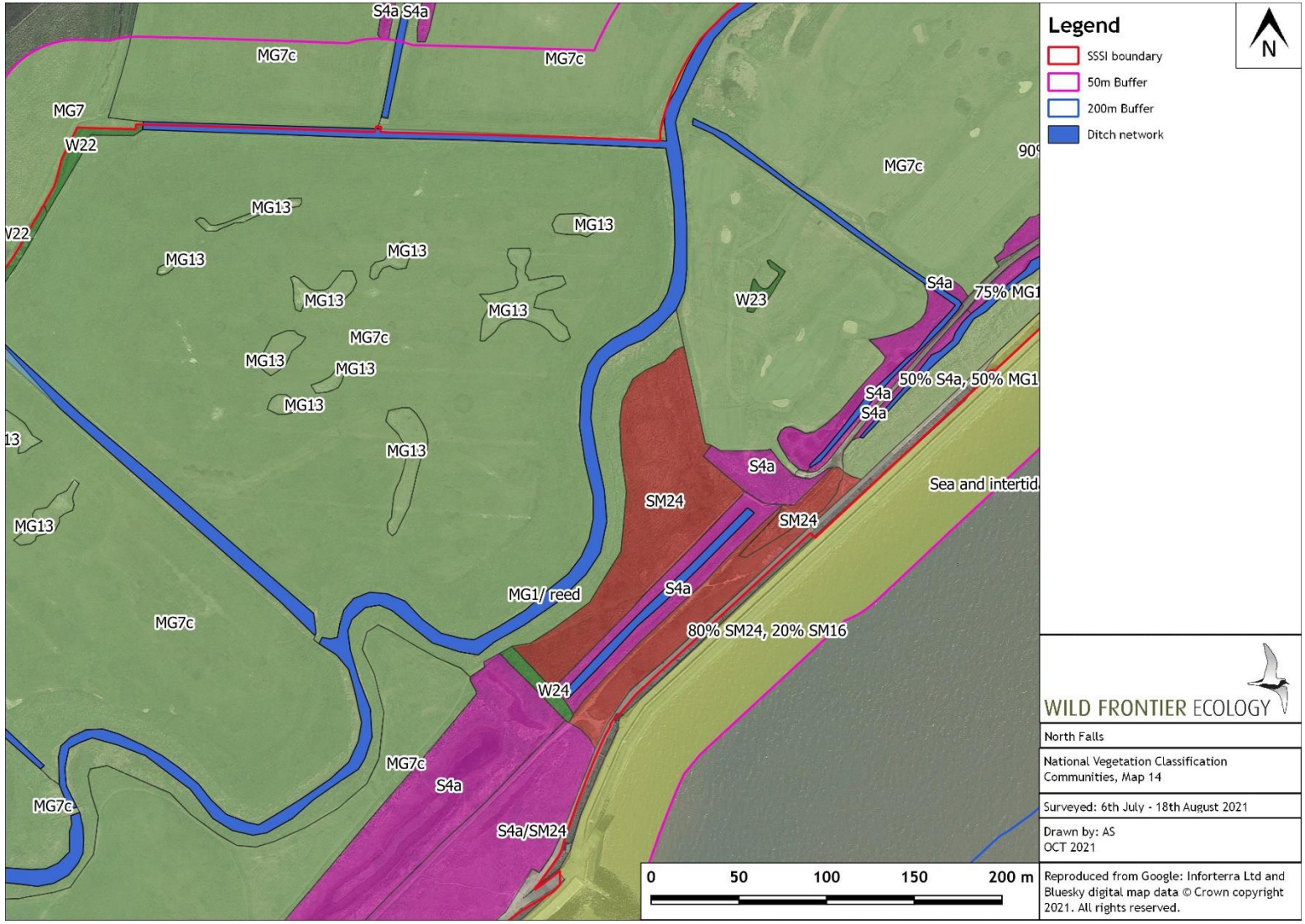

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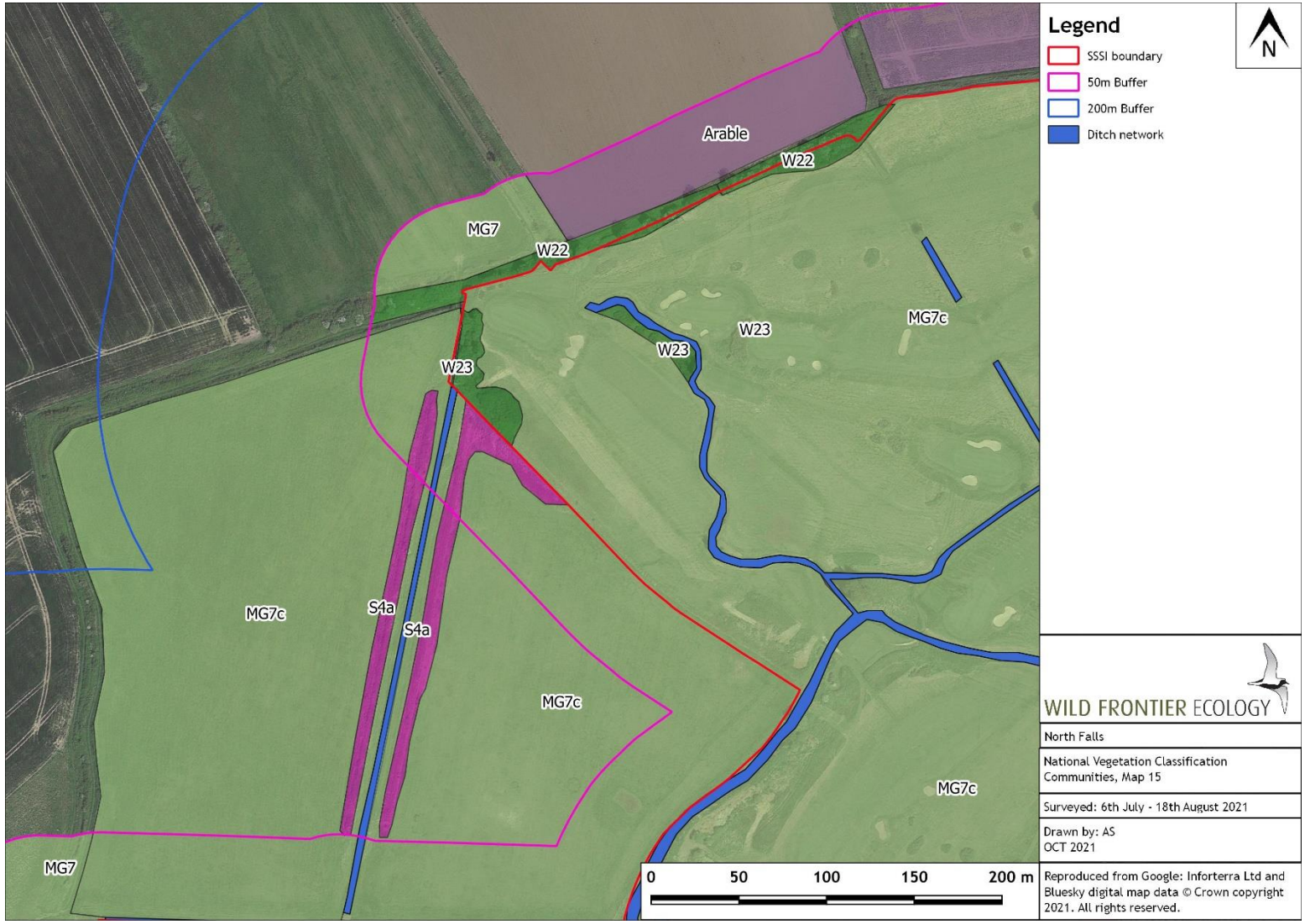

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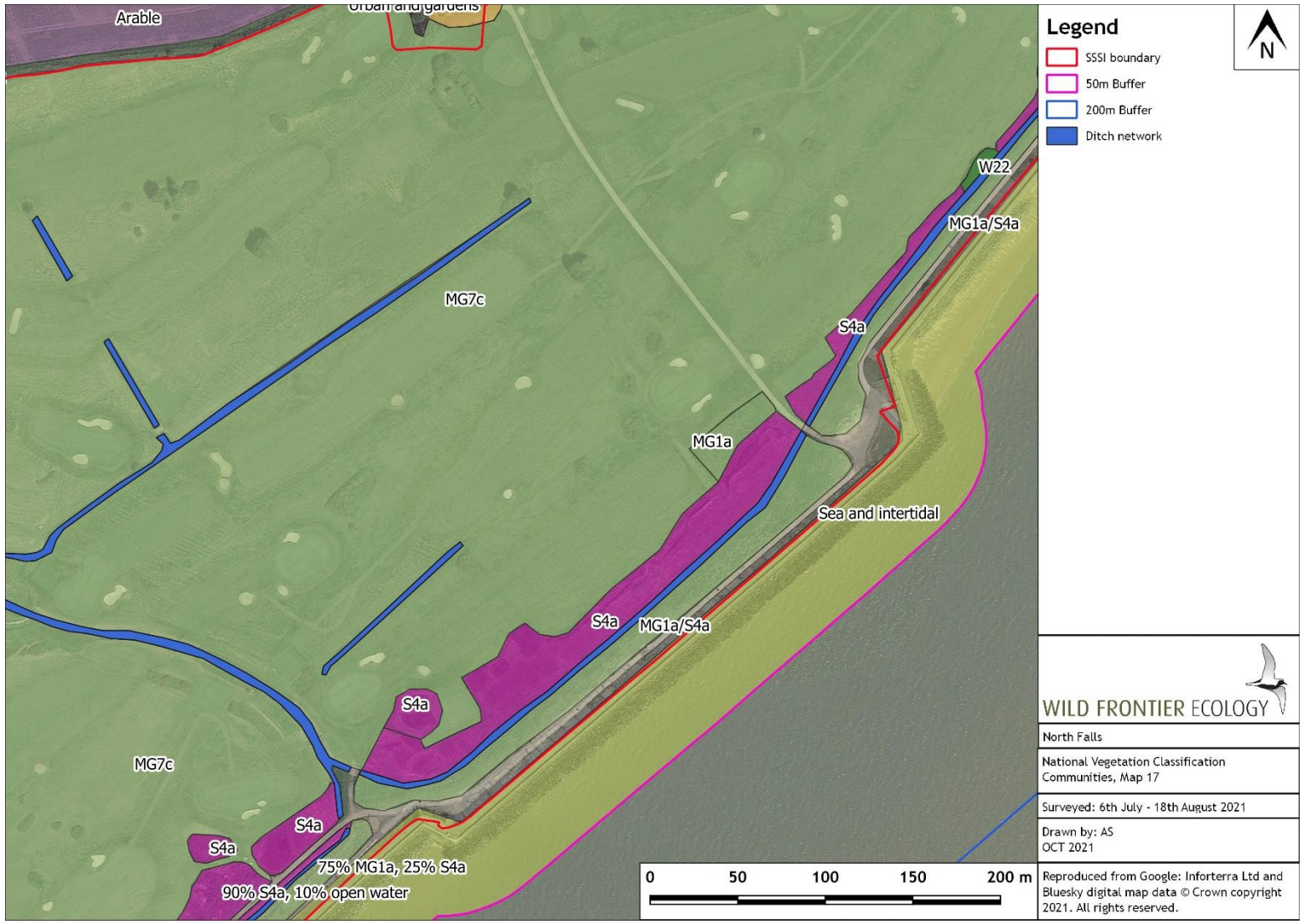
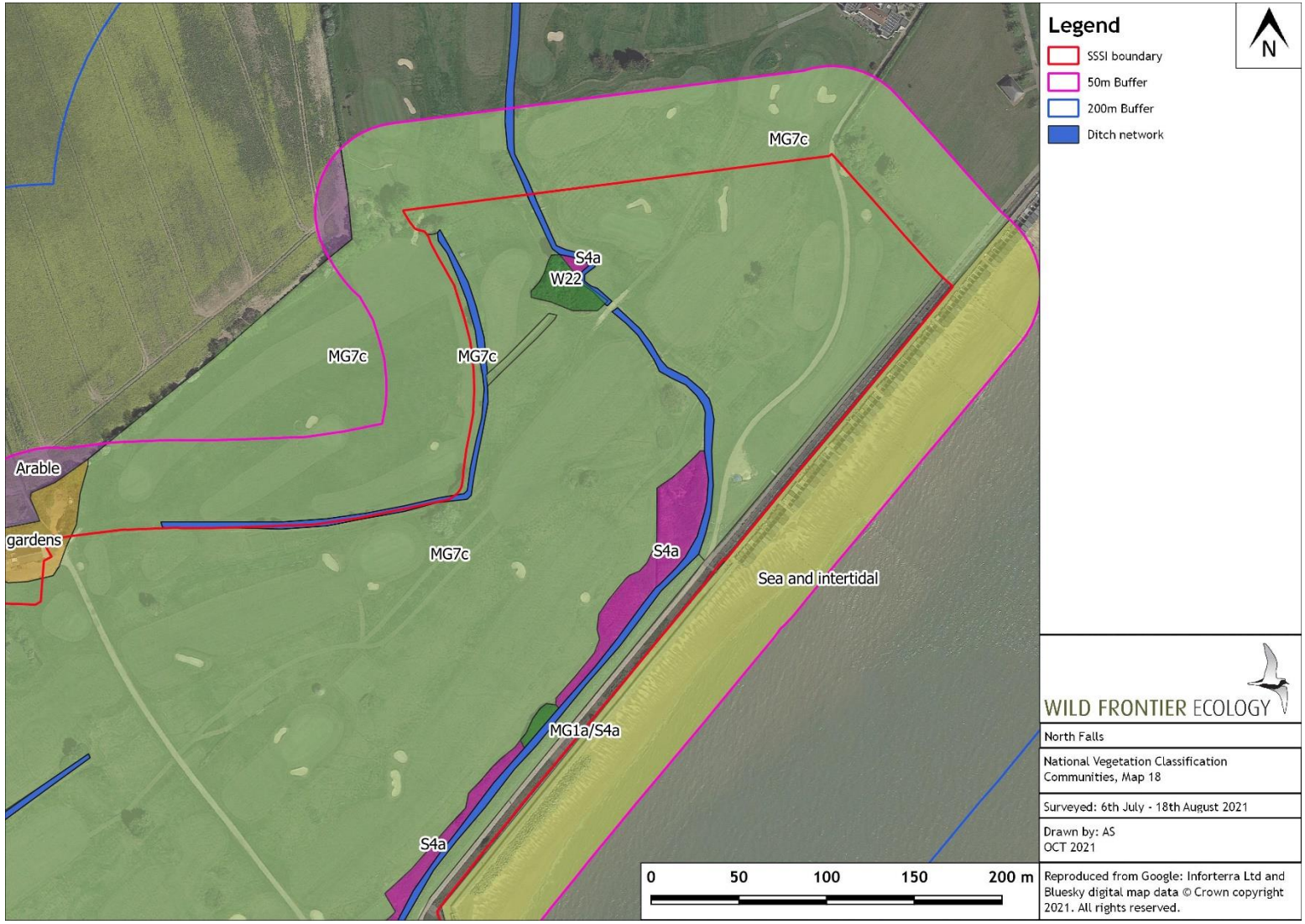
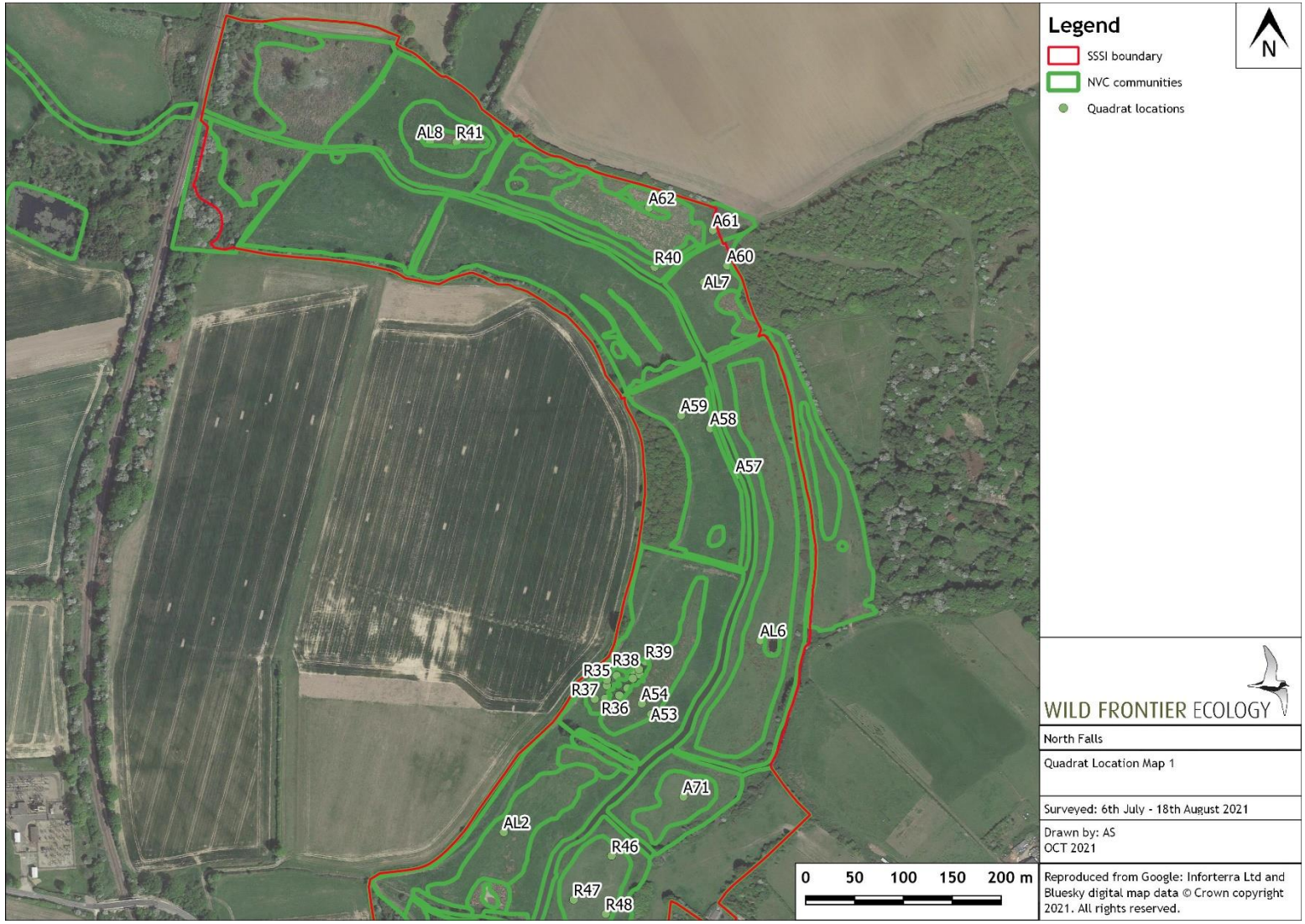


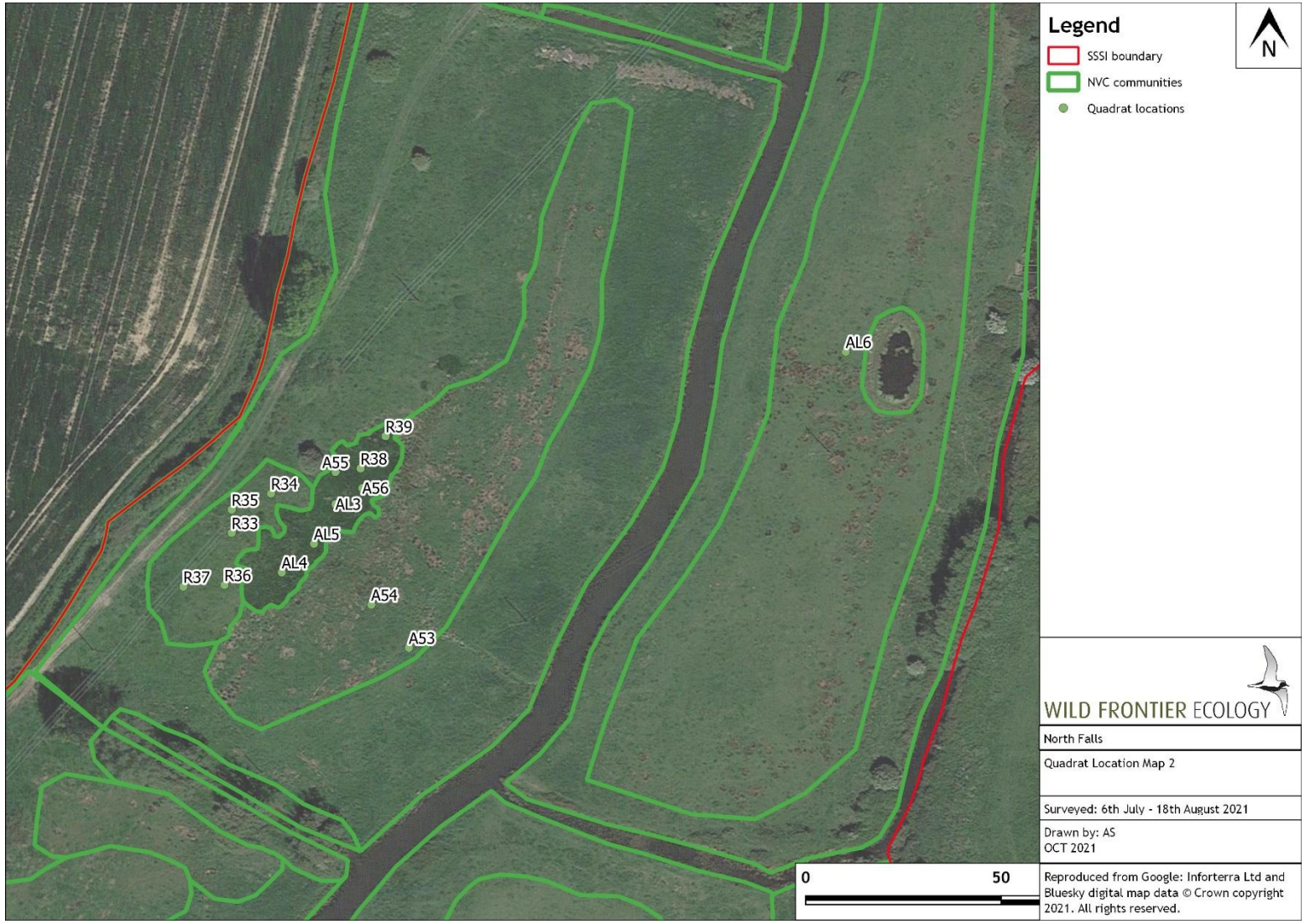
Map 2q: NVC Communities



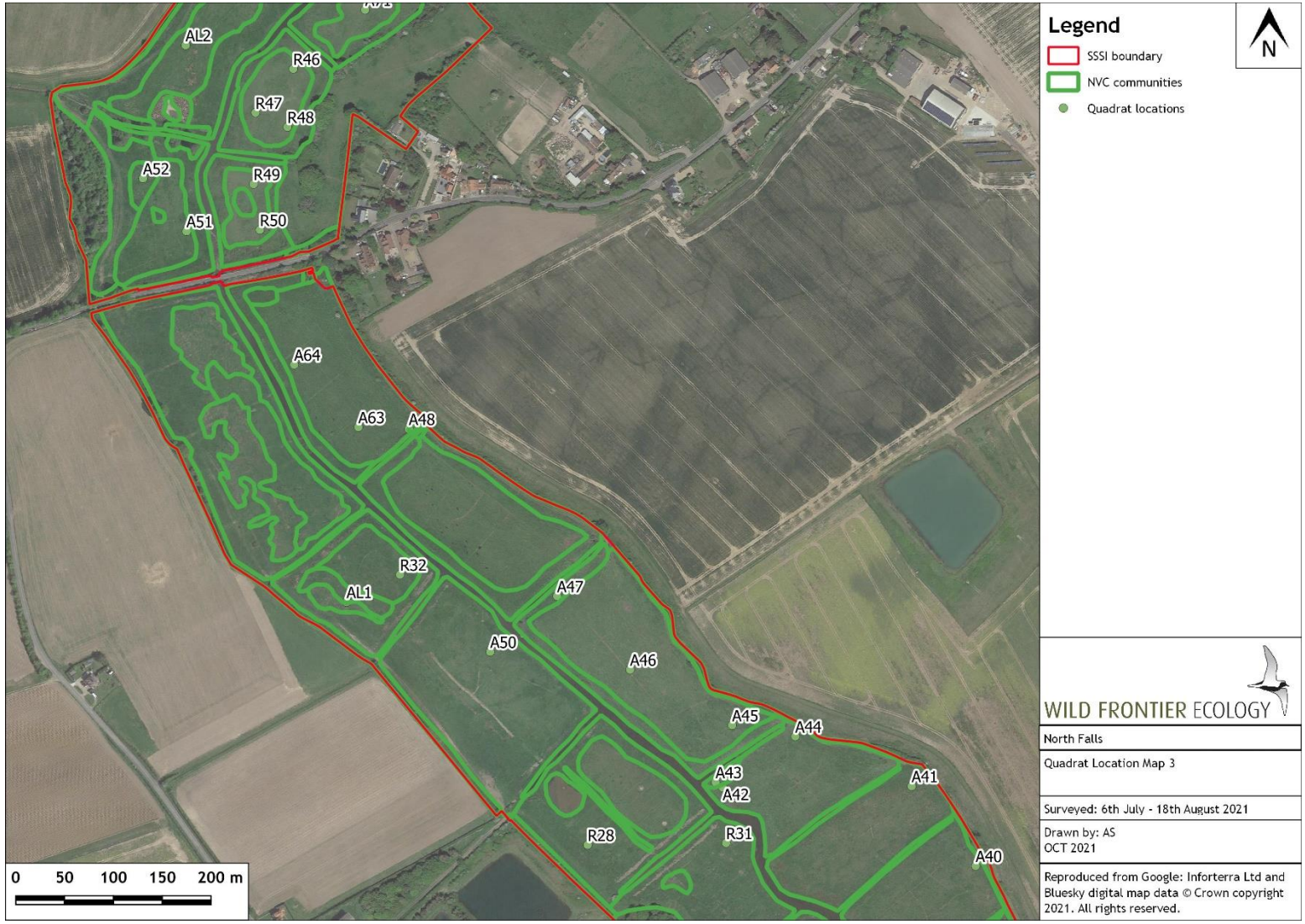
Map 3a: Quadrat locations



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

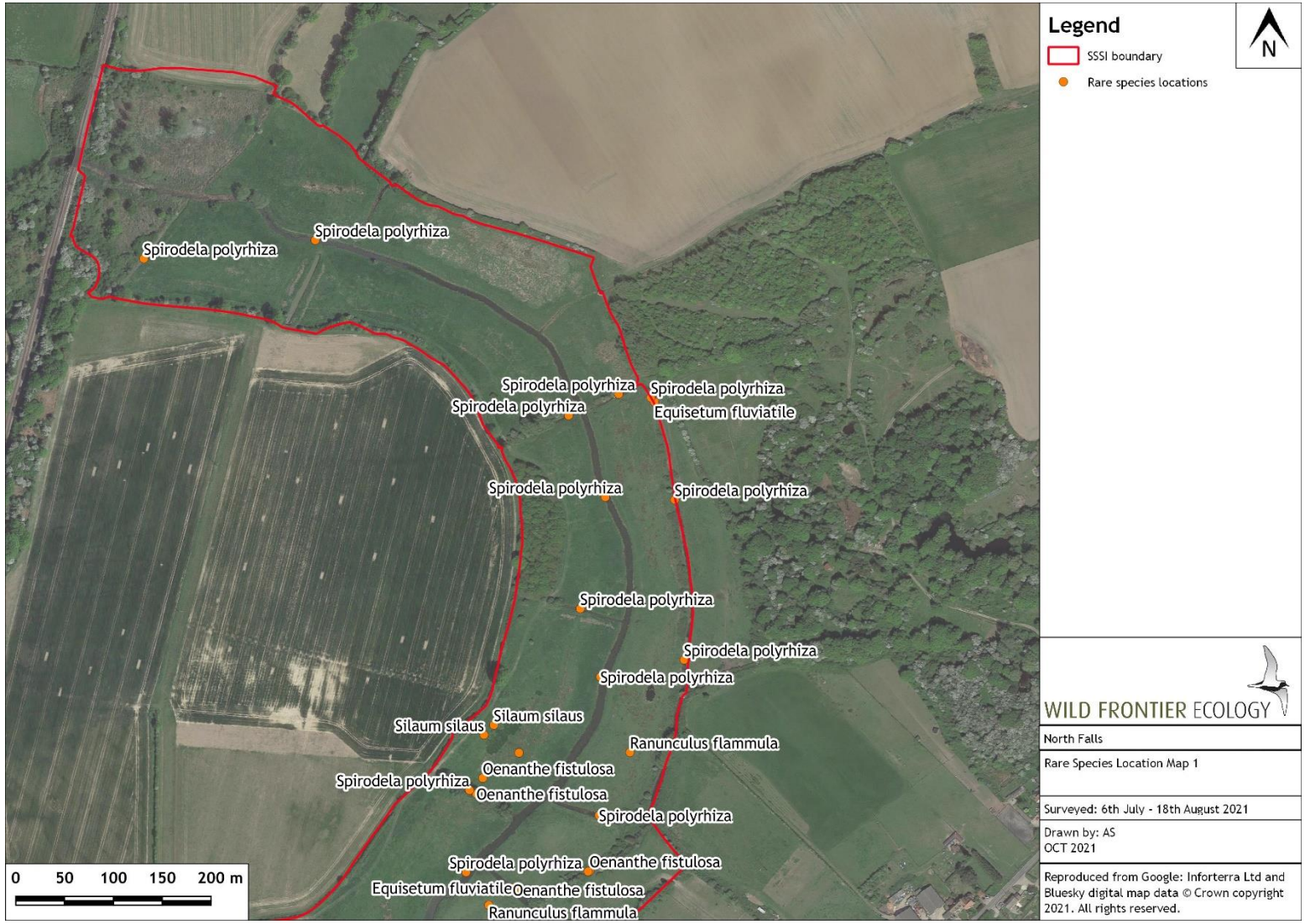
Surveyed: 6th July - 18th August 2021

Drawn by: AS
OCT 2021

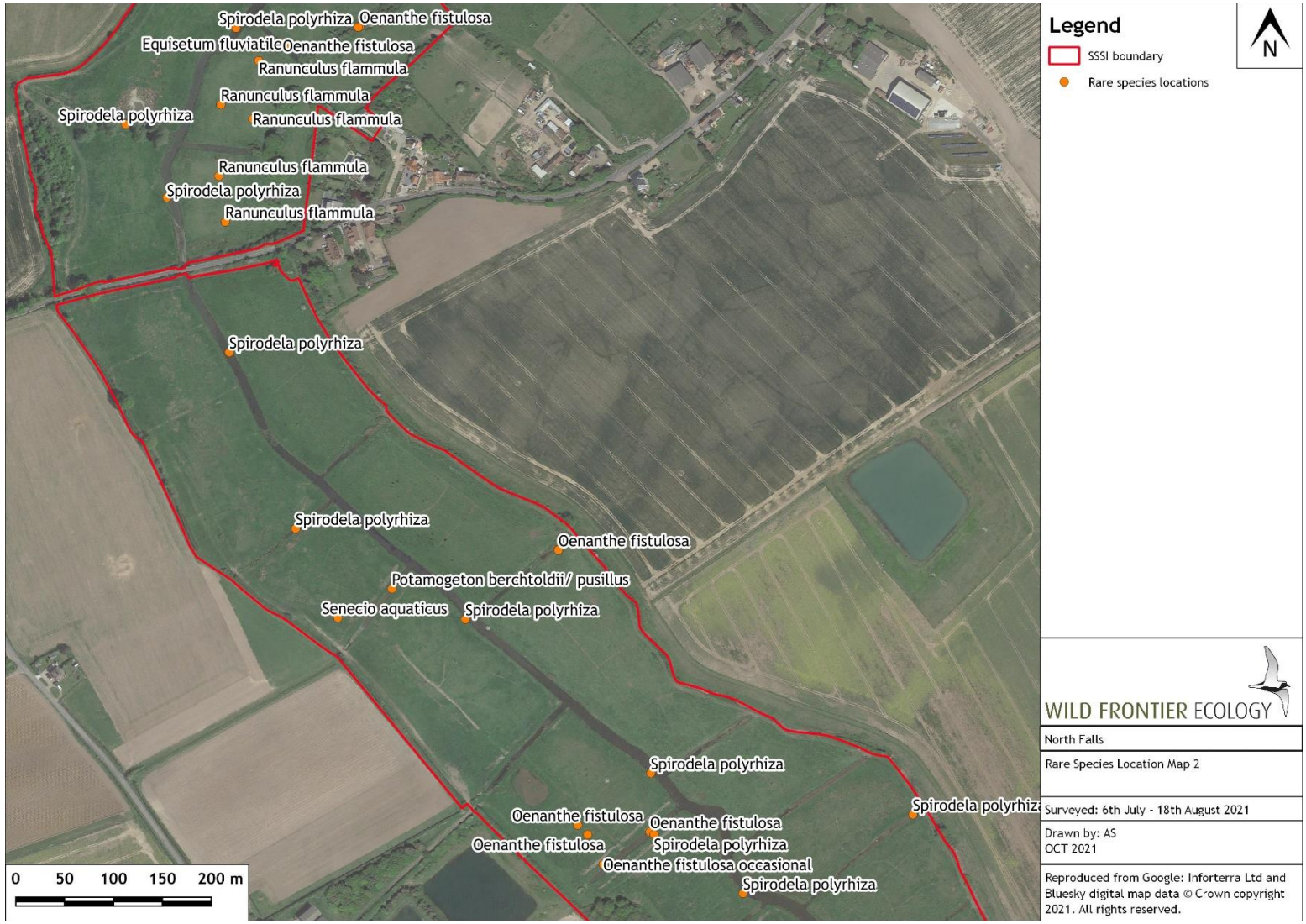
Map 3f: Quadrat locations

Map 3g: Quadrat locations

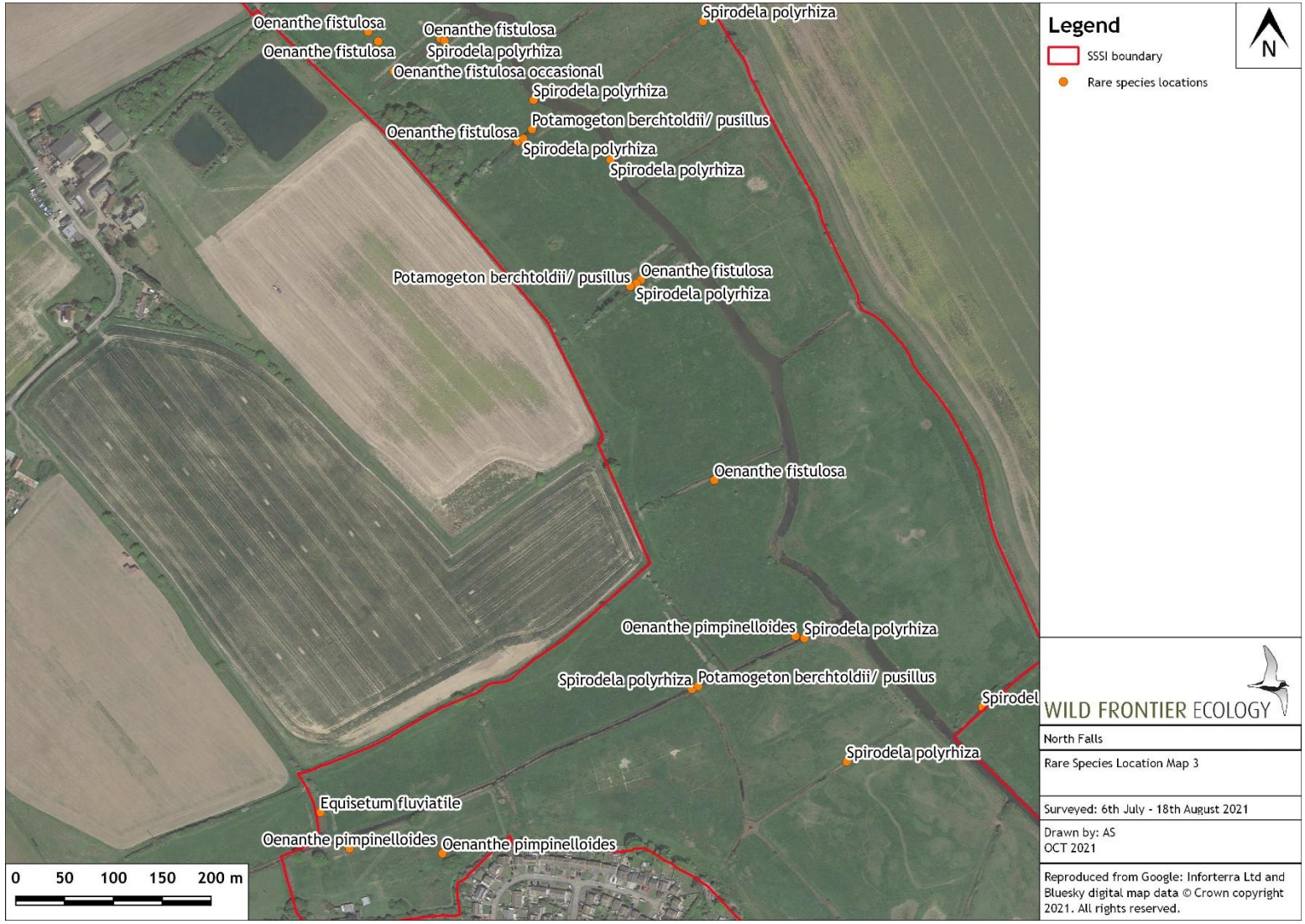
Map 4a: Rare and Valued Species Locations



Map 4b: Rare and Valued Species Locations



Map 4c: Rare and Valued Species Locations

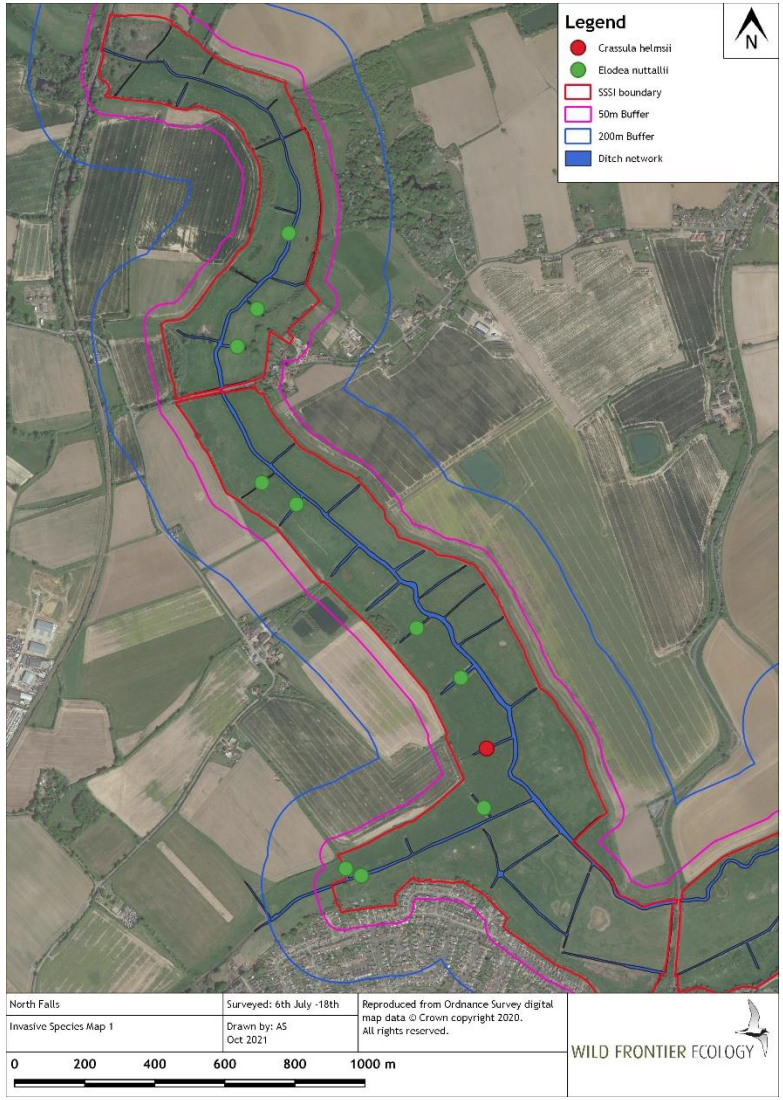


Map 4d: Rare and Valued Species Locations

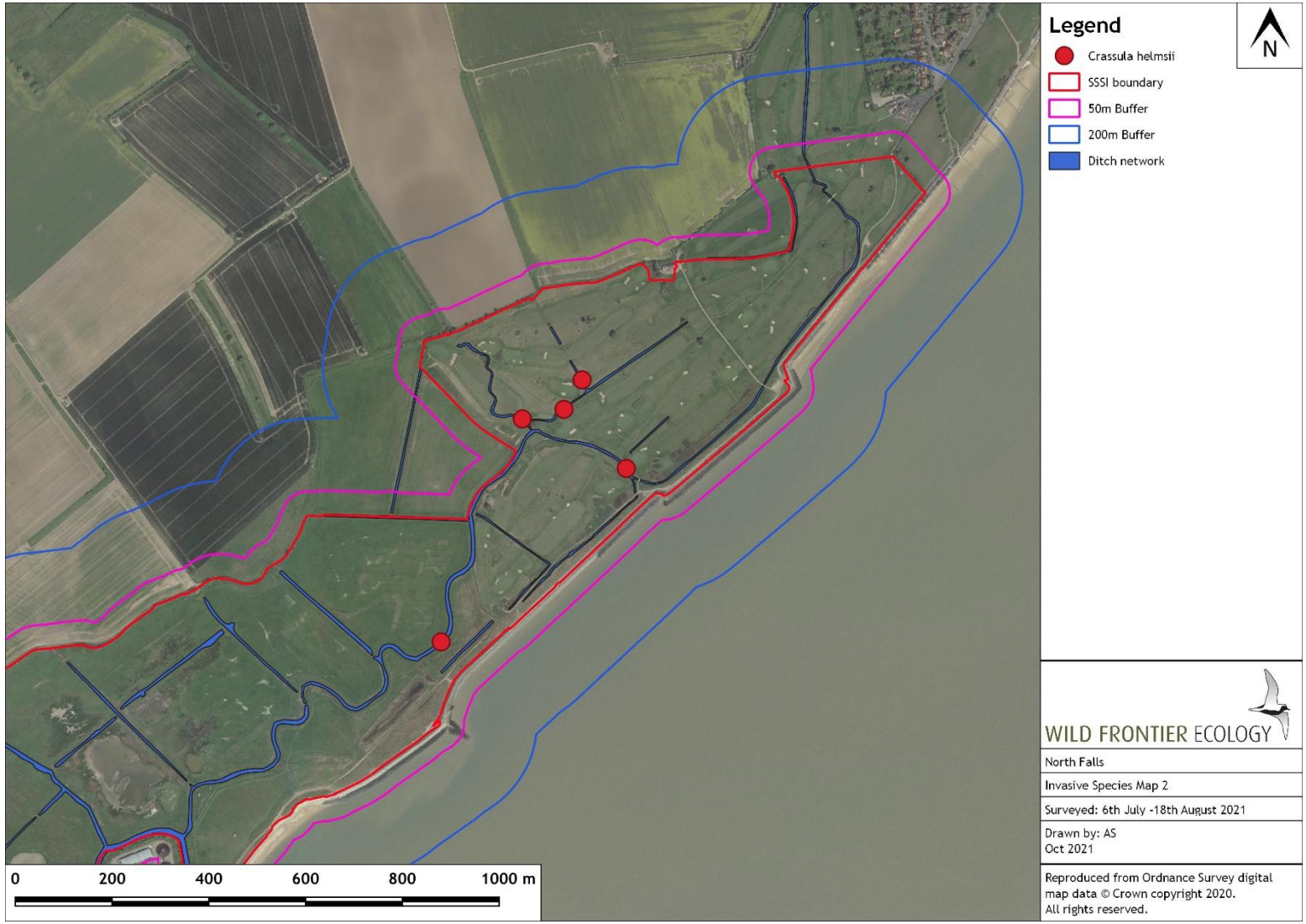
Map 4e: Rare and Valued Species Locations

Map 4f: Rare and Valued Species Locations

Map 5a: Non-native Invasive Species Locations



Map 5b: Non-native Invasive Species Locations



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

NORTH FALLS

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HARNESSING THE POWER OF NORTH SEA WIND

North Falls Offshore Wind Farm Limited

A joint venture company owned equally by SSE Renewables and RWE.

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