

**RSPB Higham Marshes
Habitat Enhancement Project**



Water Vole (Rob Budgen, 2016)

**Ecological Site Assessment : Report to Inform an Assessment
Under the Habitats**

Regulations

Planning Application Proposal Supporting Documentation

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1. Introduction

1.1 Background

This report is a supporting document containing the relevant information for a Habitat Regulations Assessment and it has been prepared by the applicant, the Royal Society for the Protection of Birds (RSPB), as part of the DEFRA funded Green Recovery Challenge Fund in relation to a planning permission application being made to Medway Council.

The application is for engineering work to be undertaken with the aim of restoring and enhancing RSPB Higham Marshes. The application area is shown in Figure 1.

Higham Marshes is a 177.2 hectare area of predominantly, grassland, bisected (North to South) by an area of common land, and Environment Agency Main river (East to West). The northern boundary comprises the Thames and its associated flood defences and to the south the Village of Higham and agricultural land.

The land is used for the conservation of various species of conservation concern, with active habitat management carried out by the RSPB to ensure the habitats are in the right and best condition for them to thrive. The RSPB entered into a management agreement with the Landowner in 2013. Work was carried out to isolate the site from the surrounding drainage system in 2014. Various other small-scale habitat improvement works have been carried out in the following years. In 2019 the RSPB purchased the land from the landowner, excluding Higham Common.

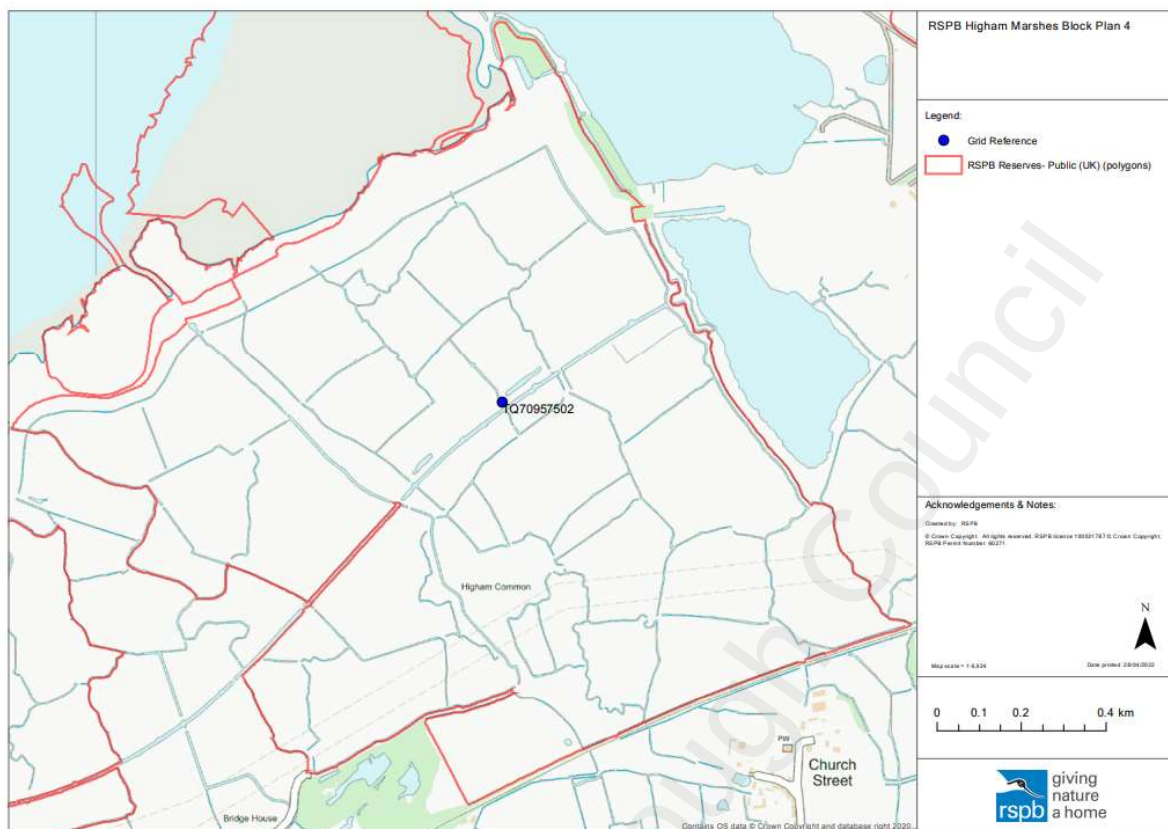


Figure 1: Higham Marshes Location

This project will deliver landscape-scale habitat restoration and innovative solutions for climate resilience in the Greater Thames Estuary. The RSPB working with partner organisations; Kent Wildlife Trust, Essex Wildlife Trust, Kent Wildfowling & Conservation Association and Elmley Nature Reserve Community Interest Company will restore and enhance 1,805 ha across 24 important Coastal and Floodplain Grazing Marsh (C&FGM) sites. This project seeks to make better use of freshwater across the landscape implementing 29 innovative smart solar pumps at 14 of the project sites, while also improving habitat

Across all 24 sites habitat conditions are failing to meet the needs of waders & other priority species. This project will work to address the below key issues facing the project sites:

- Surface pools dry out, depriving wader chicks of food and habitat for other species. Existing hydrological systems are inefficient and do not provide the volume of water required to maintain wet features throughout the spring and summer, this is getting worse through climate change;
- The lack of infrastructure to support grazing regimes which create the optimal grass sward structure that breeding waders need;
- Lack of nesting habitat for waders;

1.2 Habitats Regulations Assessment

This report aims to provide the relevant information to assess the potential for any likely significant effects of this project on European and Ramsar sites. The applicant will also suggest how any

potential negative impacts will be avoided or mitigated so that no likely significant effect on SPA and Ramsar sites can be concluded. Furthermore, this report will demonstrate where the project is 'directly connected with or necessary to the management of the site'.

Provision 63 of The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 states that:

'A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which—

a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and

b) is not directly connected with or necessary to the management of that site,

must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives.'

Paragraph 118 of the National Planning Policy Framework gives Ramsar sites the same protection as European sites (i.e. SPAs and SACs). This means that projects in, or in the vicinity of, Ramsar sites, as well as European sites, must be assessed under the Conservation of Habitats and Species Regulations 2010 (the Habitats Regulations).

The vast majority of Cooling Marsh and Cow Marsh is protected under the following designations

1. **The South Thames Estuary and Marshes Site of Special Scientific Protection (SSSI)**
 - a. Citation found in Higham_Marshes_SSSI_Citation
2. **The Thames Estuary and Marshes Special Protected Area (SPA)**
 - a. Citation found in Castle Higham_Marshes_SPA_Citation
3. **The Thames Estuary and Marshes Ramsar Site**
 - a. Citation found in Castle Higham_Marshes_Ramsar_Citation

Appendix 1 shows the map for SSSI, SPA and Ramsar.

1.3 Assessment of 'directly connected with or necessary to the management of the that site'

Provision 63 of the Habitats Regulations states that if a plan or project is 'directly connected with or necessary to the management of that site' then no further assessment is necessary.

Guidance from the European Commission¹ states that:

'for a plan or project to be 'directly connected with or necessary to the management of that site', the 'management' component must refer to management measures that are for conservation purposes, and the 'directly' element refers to measures that are solely conceived for the conservation management of a site and not direct or indirect consequences of other activities.'

1. To enhance Higham Marshes SSSI Favourable condition where applicable and, concurrently, to become high quality examples of these habitats. This will include delivering appropriate long-term management solutions i.e. grazing, as well as introducing new hydrological controls by undertaking groundworks and the installation of appropriate infrastructure to achieve the objective.

¹ https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf

As well as the national wildlife sites protected under the Wildlife and Countryside Act 1981. The engineering works planned to be undertaken within this project will allow the RSPB to control water levels and increase topographical variation.

In doing so, the RSPB will be recreating, enhancing and restoring wetland habitats which will improve the condition of the European sites and make them resilient to the effects of climate change. The hydrological management of Higham Marshes will add some flood storage capacity to benefit the surrounding locale, but this is secondary to the primary nature conservation purpose. Therefore, the plans are consistent with the guidelines on what constitutes a project 'directly connected with or necessary to the management of that site'.

2. The Project

2.1 Aims

This project aims to undertake engineering works to enhance the in-field topography and to repair hydrological bunds and culverts. This will allow the retention of surface water, being the foremost element of a wetland habitat restoration/enhancement, at the key times of the year – the breeding and wintering seasons. Since the early 1980s at Elmley Marshes on the Isle of Sheppey, this approach to converting wetland habitats has been tried and tested throughout the RSPB's tenure along the North Kent coast – and many other places in the UK. Other successful transformations have been delivered at Shorne Marshes, Northward Hill and Great Bells Farm where wetland fauna and flora now proliferate at levels not experienced previously or since the turn of the century – within an environment of widespread species declines.

2.2 Site

Currently Higham Marshes is a functioning wetland system after works carried out by the RSPB in conjunction with the land owner in 2013/14. Work was carried out to isolate the marsh from the surrounding landscape drainage system. A abstraction licence was gained from the Environment Agency.

The site does have wildlife value hence its designation as internationally important as part of The South Thames Estuary and Marshes SSSI and Thames Marshes and Estuary Ramsar. However, nature was in a very different state at the time of the original designation as a SSSI in 1981 and its review in 1991. Higham Marshes as a whole comprises a fraction of the SSSI, and as a consequence, necessitates that the habitat must be of the very highest quality to ensure that it has real value for all of the designated and undesignated features that should be utilising the reserve and maximising its potential.

The site is split by Higham Common, with the whole site being SSSI, with the eastern 'Side' being within the Thames Estuary and Marshes SPA and Ramsar.

For ease this Site Assessment will use quantify the whole site.

2.3 Description

This project seeks to improve the topography of the site to allow for better standing/surface water retention on site for the benefit of breeding waders.

The features listed above constitute the prime step in the hydrological strategy whilst another set of elements augments the strategy and constitute the enhancements that will bring the habitat up to the highest quality. These are:

Some of the hydrological control systems put in place during the initial restoration phase in 2013/14 have been damaged from use and now need replacing and upgrading. Drawings found in document Higham_Marshes_Design_Specification

NE4 – Install Culvert – **Drawing CUL2**
SE5 – Install Culvert – **Drawing CUL1**
NW – Repair bund – **Drawing BUN1 & BUN2**
NE – Repair bund – **Drawing BUN1 BUN2**

The features listed above constitute the hydrological strategy whilst another set of elements augments the strategy and constitute the enhancements that will bring the habitat up to the highest quality. These are:

- **Rills and scrapes** – shallow excavations that will provide increased topographical variation and resilience to maintain surface water as water draws down over the breeding season. Starting in November, water levels will be raised to reach the peak extent by January/February and, beginning in April, water levels will be lowered steadily under full control until July when no, or little, surface water will be present across the fields. Subject to rainfall, some water will remain in the base of the rills and scrapes, but this will not be actively managed. Good levels of water will remain in the ditch network within the hydrological units, but the field surface will remain dry, or predominantly so, until November when the cycle is repeated. Whilst extensive surface water is highly valuable, if it is too shallow, such as would be created if only the strategy element was delivered, the surface water will evaporate too early for breeding waders to complete reproductive cycles. This will become more pronounced according to climate change predictions. Therefore, the increased topographical variation will compensate for this and provide much improved feeding opportunities. Design principles for rills and scrapes include:
 - Crest height is -100mm - 200mm above the peak surface water level per hydrological unit.
 - Batters of the islands are either 1:10 or 1:20
- Using the natural topography of the site, from remnants of when the site saltmarsh/land drainage systems to expand the rills system. Field and length below including scape size. Using a tractor mounted spoil spreader to carry out the works.
- The rill system will mainly be made through the use of a tractor mounted soil spreader. Some rills will be created using a 22 tonne 360 to produce the spoil for the crossing points and plugs.
- Works have been broken down into Priority 1 and Priority 2.

Priority 1 works

- **NE1**
 - Rill length – 440 meters – soil spreader
 - Scrape size
- **NE4**
 - Rill length - 465 meters – soil spreader
 - Rill length – 100 meters – 360 – **Drawing RIL2**
 - Rotovate – 0.2 hectares

- **NE5**
 - Rill length – 581 meters – soil spreader
 - Scrape size – 0.4ha
- **NE6**
 - Rill length -450 meters – soil spreader
- **NE7**
 - Rill length – 330 meters soil - spreader
 - Scrape size
- **NE8**
 - Rill length - 148 meters soil spreader
 - Rotovate - 0.4 hectare
- **NE9**
 - Rill length – 150 meters – 360 - **Drawing RIL2**
 - Rotovate – 0.8 hectares
 - Islands – create 8 islands within scrape with site won material
- **NE10**
 - Rill length – 300 meters – soil spreader
 - Scrape size – 0.2 hectares
 - Rotovate – 0.4 hectares
- **NW1**
 - Rill length – 400 meters– soil spreader
 - Scrape size – 0.1 hectare
- **NW2**
 - Rill length – 500 meters– soil spreader
- **NW3**
 - Rill length - 380 meters– soil spreader
 - Scrape size – 0.12 hectares
- **NW4**
 - Rill length – 400 meters – soil spreader
 - Rill length – 65 meters – 360 - **Drawing RIL2**
 - Scrape size – 0.12 hectares
- **SE4**
 - Rill length – 900 meters
 - Scrape size – 1.2 hectares
- **SE8**
 - Rill length – 600 meters of new rills
 - Scrape size – 0.3 hectares

Priority 2

- **NE1**
 - Rill length – 4 meters – soil spreader
 - Scrape size – 0.12 ha
- **NE4**
 - Rill length - 250 meters – soil spreader
 - Scrape Size – 0.9 hectares
- **NE5**
 - Rill length –280 meters – soil spreader
 - Scrape size – 0.18ha
- **NE6**
 - Rill length -60 meters – soil spreader
 - Scrape Size – 0.15 ha
- **NE7**
 - Rill length – 360 meters soil - spreader
 - Scrape size – 0.06ha
- **NE8**
 - Rill length - 148 meters soil spreader
 - Rotovate - 0.4 hectare

- **NE10**
 - Rill length – 300 meters – soil spreader
 - Scrape size – 0.2 hectares
 - Rotovate – 0.4 hectares
- **NW2**
 - Rill length – 200 meters– soil spreader
 - Scrape size – 0.2 hectares
- **NW3**
 - Rill length - 630 meters– soil spreader
 - Scrape size – 0.15 hectares
- **NW4**
 - Rill length – 150 meters – soil spreader
- **SE4**
 - Rill length – 50 meters
 - Scrape size – 0.05 hectares
- **SE5**
 - Rill length – 970 meters
 - Scrape size – 0.25 ha
- **SE8**
 - Rill length – 200 meters of new rills
 - Scrape size – 0.05 hectares

3. European Site Qualifying Features

Below is a summary of the qualifying interest features that need to be assessed for any impacts that may or may not occur as a result of the delivery of the project.

The Thames Estuary and Marshes is designated as a SPA² because it qualifies under:

- Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive³:
 1. **Wintering:**
 - a. Avocet (*Recurvirostra avosetta*) – , 276 individuals representing at least 21.7% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)
 - b. Hen Harrier (*Circus cyaneus*) – , 7 individuals representing at least 0.9% of the wintering population in Great Britain (5 year mean 93/4-97/8).
- Article 4.2 of the Directive (79/409/EEC) by as it is used by 1% or more of the biogeographical populations of the following regularly occurring migratory species (other than those listed in Annex 1) in any one season: Population (5 yr peak mean 1993/94 - 1997/98)⁴;
 1. **Passage:**
 - a. Ringed Plover (*Charadrius hiaticula*) 1,324 birds representing 2.6% Europe /North Africa
 2. **Wintering:**
 - a. Grey Plover (*Pluvialis squatarola*) 2,593 birds 1.7% Eastern Atlantic
 - b. Dunlin (*Calidris alpina alpina*) 29,646 birds 2.1% Northern Siberia/Europe/West
 - c. Africa Knot (*Calidris canutus islandica*) 4,848 birds 1.4% North West Europe
 - d. Black-tailed Godwit (*Limosa limosa*) 1,699 birds 2.4% Iceland (breeding)
 - e. Redshank (*Tringa totanus totanus*) 3,251 birds 2.2% Eastern Atlantic
- Assemblage qualification: A wetland of international importance.

² Thames Estuary and Marshes SPA Review – 2001

³ <http://publications.naturalengland.org.uk/publication/3227002>

⁴ 6. Thames Estuary is regularly used by 1% or more of the biogeographical population of a regularly occurring species (other than those listed on annex 1) in any season (Cranswick et al., 1995).

1. The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl
2. Over winter, the area regularly supports 33,433 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: Redshank (*Tringa tetanus*), Black-tailed Godwit (*Limosa limosa islandica*), Dunlin (*Calidris alpina alpina*), Lapwing (*Vanellus vanellus*), Grey Plover (*Pluvialis squatarola*), Shoveler (*Anas clypeata*), Pintail (*Anas acuta*), Gadwall (*Anas strepera*), Shelduck (*Tadorna tadorna*), White-fronted Goose (*Anser albifrons albifrons*), Little Grebe (*Tachybaptus ruficollis*), Ringed Plover (*Charadrius hiaticula*), Avocet (*Recurvirostra avosetta*), Whimbrel (*Numenius phaeopus*).

The UK SPA review was published in 2001. However not all SPA citations have been updated with the revised qualifying bird populations. As such, this report considers all species considered across the various citation documents.

The Thames Estuary and Marshes is designated as a Ramsar wetland⁵ because it qualifies under:

Criterion 2 - The site supports 1 endangered plant species and at least 14 nationally scarce plants of wetland habitats. The site supports more than 20 British Red data book invertebrates:

- **Endangered plant species**
 - a. least lettuce *Lactuca saligna*
- **Nationally scarce plants**
 - a. bulbous foxtail *Alopecurus bulbosus*, slender hare's ear *Bupleurum tenuissimum*, divided sedge *Carex divisa*, saltmarsh goosefoot *Chenopodium chenopodioides*, sea barley *Hordeum marinum*, golden samphire *Inula crithmoides*, annual beard grass *Polypogon monspeliensis*, Borrer's saltmarsh-grass *Puccinellia fasciculata*, stiff saltmarsh-grass *P. rupestris*, one-flowered glasswort *Salicornia pusilla*, clustered clover *Trifolium glomeratum*, sea clover *T. squamosum*, narrow-leaved eelgrass *Zostera angustifolia* and dwarf eelgrass *Z. noltei*

The endangered species *Bagous longitarsis* occurs on the site. The following vulnerable species occur on the site: a groundbug *Henestaris halophilus*, a weevil *Bagous cylindrus*, a ground beetle *Polystichus connexus*, a crane fly *Erioptera bivittata*, a crane fly *Limnophila pictipennis*, a horse fly *Hybomitra expollicata*, a hoverfly *Lejops vittata*, a dancefly *Poecilobothrus ducalis*, a snail-killing fly *Pteromicra leucopeza*, a solitary wasp *Philanthus triangulum* and a damselfly *Lestes dryas*. The following rare species occur on the site: a ground beetle *Anisodactylus poeciloides*, the water beetles *Aulacochthebius exaratus*, *Berosus fulvus*, *Cercyon bifenestratus*, *Hydrochus elongatus*, *H. ignicollis*, *Ochthebius exaratus* and *Hydrophilus piceus*, a beetle *Malachius vulneratus*, a rove beetle *Philonthus punctus*, a fungus beetle *Telmatophilus brevicollis*, a fly *Campsicnemus magius*, a horsefly *Haematopota bigoti*, a soldier fly *Stratiomys longicornis* and a spider *Baryphyma duffeyi*.

Criterion 5 – Assemblages of international importance: Species with peak counts in winter: 45118 waterfowl (5 year peak mean 1998/99-2002/2003)

Ramsar criterion 6 – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation):

Species with peak counts in spring/autumn:

- **Ringed plover**, *Charadrius hiaticula*, Europe/Northwest Africa 595 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9- 2002/3)
- **Black-tailed godwit**, *Limosa limosa islandica*, Iceland/W Europe 1640 individuals, representing an average of 4.6% of the population (5 year peak mean 1998/9-2002/3)

Species with peak counts in winter:

- **Grey plover**, *Pluvialis squatarola*, E Atlantic/W Africa -wintering 1643 individuals, representing an average of 3.1% of the GB population (5 year peak mean 1998/9-2002/3)
- **Red knot**, *Calidris canutus islandica*, W & Southern Africa (wintering) 7279 individuals, representing an average of 1.6% of the population (5 year peak mean 1998/9-2002/3)
- **Dunlin**, *Calidris alpina alpina*, W Siberia/W Europe 15171 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9-2002/3)
- **Common redshank**, *Tringa totanus totanus*, 1178 individuals, representing an average of 1% of the GB population (5 year peak mean 1998/9- 2002/3)

Contemporary data and information on waterbird trends at this site and their regional (sub-national) and national contexts can be found in the Wetland Bird Survey report, which is updated annually. See www.bto.org/survey/webs/webs-alerts-index.htm. Details of bird species occurring at levels of National importance are given in Section 22

Ramsar criterion 6 – Species currently occurring at levels of national importance:

Species with peak counts in spring/autumn:

- **Little grebe**, (*Tachybaptus ruficollis ruficollis*), Europe to E Urals, NW Africa 251 individuals, representing an average of 3.2% of the GB population (5 year peak mean 1998/9-2002/3)
- **Little egret**, (*Egretta garzetta*), West Mediterranean 54 individuals, representing an average of 3.2% of the GB population (5 year peak mean 1998/9- 2002/3)
- **Ruff**, (*Philomachus pugnax*), Europe/W Africa 23 individuals, representing an average of 3.2% of the GB population (5 year peak mean 1998/9- 2002/3)
- **Common greenshank**, (*Tringa nebularia*), Europe/W Africa 38 individuals, representing an average of 6.3% of the GB population (5 year peak mean 1998/9- 2002/3)

Species with peak counts in winter:

- **Common shelduck**, (*Tadorna tadorna*), NW Europe 1238 individuals, representing an average of 1.5% of the GB population (5 year peak mean 1998/9- 2002/3)
- **Gadwall**, (*Anas strepera strepera*), NW Europe 359 individuals, representing an average of 2% of the GB population (5 year peak mean 1998/9- 2002/3)
- **Northern shoveler**, (*Anas clypeata*), NW & C Europe 288 individuals, representing an average of 1.9% of the GB population (5 year peak mean 1998/9- 2002/3)
- **Water rail**, (*Rallus aquaticus*), Europe 6 individuals, representing an average of 1.3% of the GB population (5 year peak mean 1998/9- 2002/3)
- **Pied avocet**, (*Recurvirostra avosetta*), Europe/Northwest Africa 607 individuals, representing an average of 17.8% of the GB population (5 year peak mean 1998/9- 2002/3)
- **Spotted redshank**, (*Tringa erythropus*), Europe/W Africa 6 individuals, representing an average of 4.4% of the GB population (5 year peak mean 1998/9- 2002/3)

4. Baseline Data

4.1 Higham Marshes Avian Data

The data provided in this section has been collected by the applicant as part of our management monitoring surveys for the reserve. Unfortunately, due to the Covid-19 pandemic, no surveys were undertaken in spring and summer 2020. However, it is reasonable to make a qualitative assessment as to whether a species was likely to be present during that period and this is indicated by a '1' for avian species and a '*' for non-avian species.

The following tables present peak count records for SPA and Ramsar species breeding, on passage and wintering for the **last eight** seasons across Higham Marshes. Breeding surveys were undertaken between April and June inclusive and followed the O'Brien and Smith (1992) method. Data compiled from annual RSPB breeding bird surveys undertaken, passage surveys were conducted during September and October following WeBS methodology with wintering surveys for the period between November and March also utilising the WeBS methodology.

- **Breeding Bird Species** – Presented in Higham_Marshes_Breeding_Birds
- **Wintering Birds counts** – presents in Higham_Marshes_WeBS

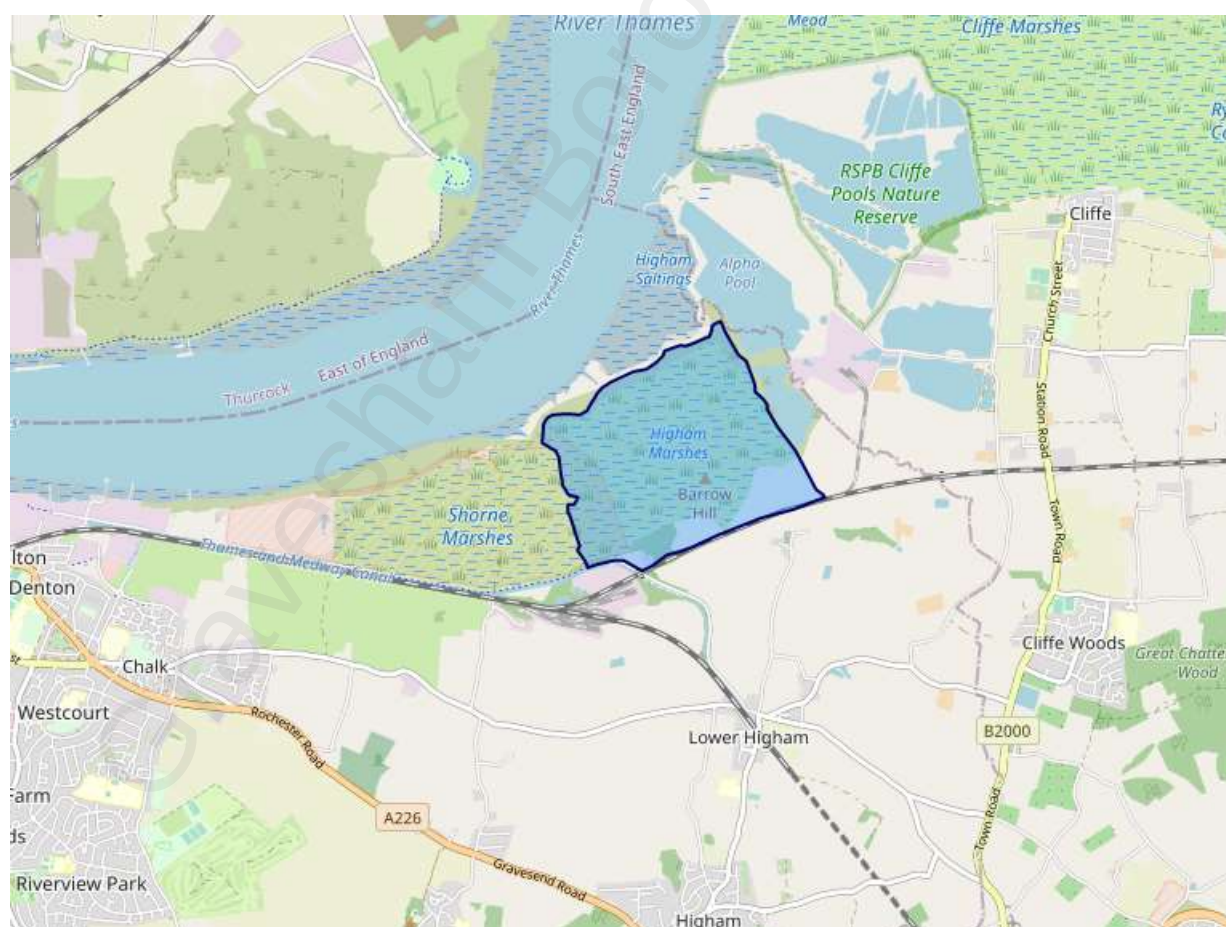


Figure 2: Higham Marshes WeBS sector

Higham Marshes – European Importance						
Wintering SPA species	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Avocet	0	0	0	0	0	0
Hen Harrier	0	0	0	0	0	0
Grey Plover	0	0	0	0	0	0
Dunlin	0	0	0	0	0	0
Knot	0	0	0	0	0	0
Black-tailed Godwit	0	0	0	0	0	0
Redshank	1	1	58	0	0	5
Higham Marshes – European Importance						
Passage SPA Species	2017	2018	2019	2020	2021	2022
Ringed Plover	0	0	0	0	0	0
Black-tailed Godwit	0	0	0	0	0	0

Table 1: Peak count records for Higham Marshes between 2016 and early 2022 for each of the SPA designated species present during that period. No records exist for cells shaded grey. SSSI species are presented in bold type.

Higham Marshes – International importance						
Passage Ramsar species	2017	2018	2019	2020	2021	2022
Ringed Plover	0	0	0	0	0	0
Black-tailed Godwit	0	0	0	0	0	0
Higham Marshes – International importance						
Wintering Ramsar species	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Grey plover	0	0	0	0	0	0
Knot	0	0	0	0	0	0
Dunlin	0	0	0	0	0	0
Redshank	1	1	58	0	0	5
Higham Marshes – National Importance						
Passage Ramsar species	2017	2018	2019	2020	2021	2022
Little Grebe	0	0	0	1	1	0
Little Egret	0	0	0	0	0	0
Ruff	0	0	0	0	0	0
Greenshank	0	0	0	0	0	0
Higham Marshes – National Importance						
Wintering Ramsar species	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Shelduck	0	70	39	47	17	14
Gadwall	0	2	31	0	0	14

Shoveler	0	10	52	0	13	54
Water Rail	0	0	0	0	0	0
Avocet	0	0	0	0	0	0
Spotted Redshank	0	0	0	0	0	0

Table 2: Peak count records for Higham Marshes between 2016 and early 2021 for each of the Ramsar designated species present during that period. No records exist for cells shaded grey. SSSI species are presented in bold type.

4.2 Non-Avian Ramsar species

The following tables present the records for the presence of non-avian Ramsar species across the Castle Stone in the scope of this report. Information was gathered from Kent and Medway Biological Records Centre (KMBRC), the ecological records centre for Kent, in February 2022, regarding the presence of nature conservation designations and protected and notable species with a 1km buffer of the boundary of the sites.

A water vole and vegetation survey were carried out in April 2022

Higher Plants	
Least lettuce <i>Lactuca saligna</i>	Not found on site since 1971 - 1980
Bulbous foxtail <i>Alopecurus bulbosus</i>	Not found on site since 1987 at TQ703751
Slender hare's ear <i>Bupleurum tenuissimum</i>	Not found on site since 2011 at TQ7175
Divided sedge <i>Carex divisa</i>	Abundant across the whole site.
Saltmarsh goosefoot <i>Chenopodium chenopodioides</i>	Found on site in at 2018 but outside of works area
Sea barley <i>Hordeum marinum</i>	Found on site in 2017 but not within the area or scope of proposed works. TQ7175
Golden samphire <i>Inula crithmoides</i>	Never recorded on site
Annual beard grass <i>Polypogon monspeliensis</i>	Found on site in 2012 but outside of works area. TQ6975
Borrer's saltmarsh-grass <i>Puccinellia fasciculata</i>	Not found on site
Stiff saltmarsh-grass <i>P. rupestris</i>	Not found on site since 1970-80. TQ77C
One-flowered glasswort <i>Salicornia pusilla</i>	Not found on site
Sea clover <i>T. squamosum</i>	Found just off site in 2010. TQ70207452
Clustered clover <i>Trifolium glomeratum</i>	No record
Narrow-leaved eelgrass <i>Zostera angustifolia</i>	No record
Dwarf eelgrass <i>Z. noltei</i>	No site Record.
Invertebrates -Engendered	
<i>Bagous longitarsis</i>	No record. Bagous limosus, Bagous subcarinatus and Bagous tempestivus. Recorded last in 1960s.
Invertebrates – vulnerable	
<i>Henestaris halophilus</i>	No record on site
<i>Bagous cylindrus</i>	No record on site
<i>Polystichus connexus</i>	No Record on site
<i>Erioptera bivittata</i>	No Record on site
<i>Limnophila pictipennis</i>	No Record on site
<i>Hybomitra expollicata</i>	No Record on site

<i>Lejops vittata</i>	No Record on site
<i>Poecilobothrus ducalis</i>	No Record on site
<i>Pteromicra leucopeza</i>	No Record on site
<i>Philanthus triangulum</i>	No Record on site
<i>Lestes dryas</i>	No record on site
Rare Species	
<i>Anisodactylus poeciloides</i>	No Record on site
<i>Aulacochthebius exaratus</i>	Not found on site since 1964
<i>Berosus fulvus</i>	Found on site, last record 1995, not within the area or scope of proposed works.
<i>Cercyon bifeneistratus</i>	No record on site
<i>Hydrochus elongatus</i>	No record since 1966
<i>H. ignicollis</i>	No Record on site
<i>Ochthebius exaratus</i>	Record outside of project area in 1965
<i>Hydrophilus piceus</i>	Not recorded on site since 1984
<i>Malachius vulneratus</i>	No Record on site
<i>Philonthus punctus</i>	No Record on site
<i>Telmatophilus brevicollis</i>	Not recorded on site since 1950 - 1955
<i>Campsicnemus magius</i>	Not recorded on site since 1980
<i>Haematopota bigoti</i>	No record on site
<i>Stratiomys longicornis</i>	No record on site
<i>Baryphyma duffeyi</i>	No record on site

5. Potential impacts and project design and delivery mitigation

5.1 Design

The design has been formulated to have a positive, long term impact on the European sites at Castle Stone farm. Whilst the design does propose a good level of intervention to unlock the reserve's latent potential, the design process has considered the appropriateness of the scale of intervention. For example, the topographical enhancements proposed – rills and scrapes. Whilst widespread, they are not considered to be excessive. The scale designed is considered the minimum required to be effective in enhancing the site for target and designated species. The aerial snapshot of Elmley NNR on the Isle of Sheppey at Figure 3 shows a large number of rills per field that will thoroughly maximise each field's value to breeding and wintering waders. Whilst dramatic when viewed from the air (less so on the ground), this approach is ecologically sound and would be considered a 'gold-standard' design. However, a 'gold-standard' design of this complexity significantly increases the complexities of delivery and brings with it an extended period of disruption where the habitat will take longer to 'settle'.

For this reason we have decided to carry out the management through the use of a 'soil spreader' and rotavator. These pieces of machinery allows for targeted management without causing damage to other parts of the site while also being able to work quickly and effectively. It should also be noted that whilst the cost of delivery for the design for the area in this project is far from cheap, a 'gold-standard' design would be prohibitively expensive in the current funding environment. A design that is gold standard on paper but can't be delivered due to not being able to source the funding is thoroughly useless to a habitat and the species that it seeks to transform and increase respectively.

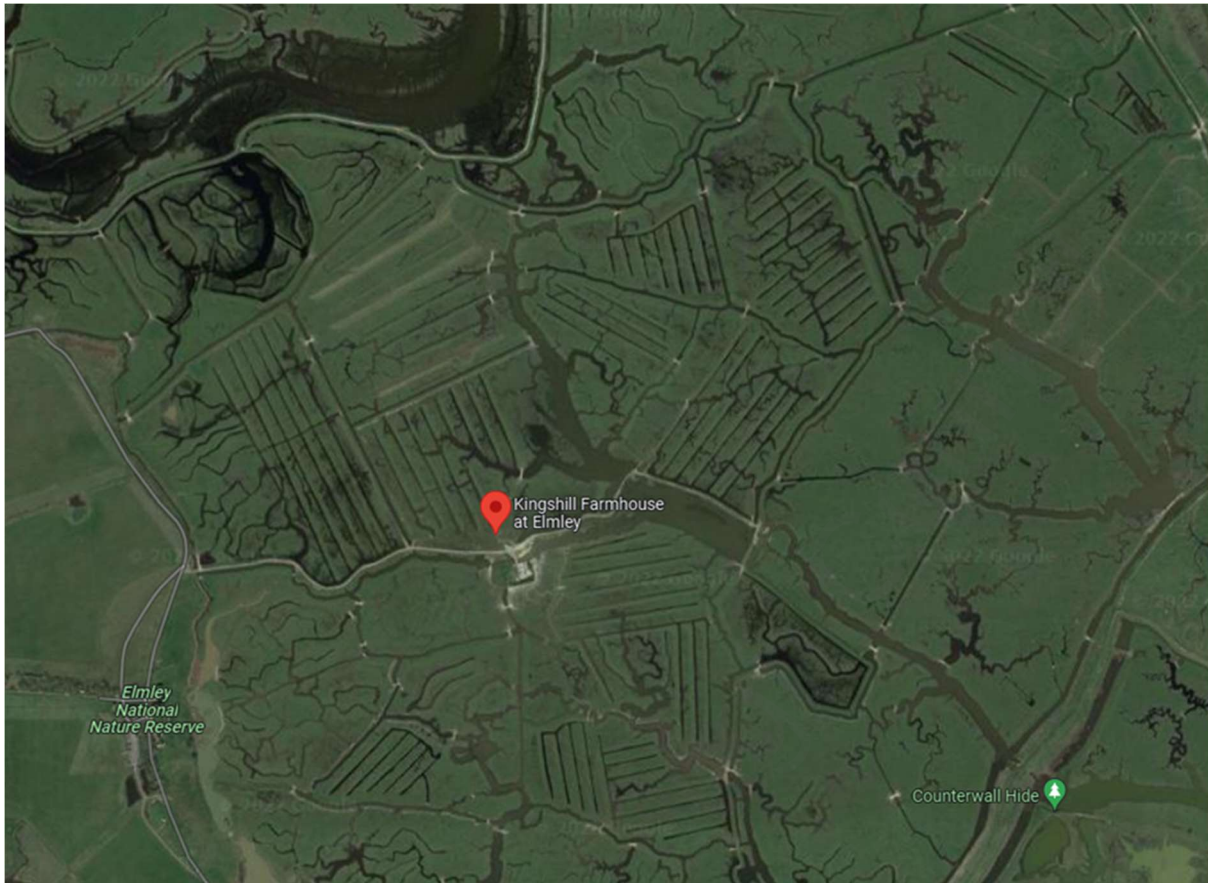


Figure 3: 'Gold-standard' rill creation at Elmley National Nature Reserve on the Isle of Sheppey.

In 2021, the entire project received funding from UK Government's Green Recovery Challenge Fund (GRCF). Being subject to the very short timescales for both application and delivery as defined by GRCF requirements has meant that the entire project has not been redesigned to be 'gold-standard' to take advantage of the potentially increased funding for a 'gold-standard' scheme but will be delivered as per the originally conceived rationale. A very good example of habitat transformation that has provided inspiration for the originally conceived scheme is Great Bells Farm, directly adjacent to Elmley NNR on the Isle of Sheppey, and shown in Figure 3 below.



Figure 4: Great Bells Farm Nature Reserve on the Isle of Sheppey. The image on the right shows the site before transformation and the image on the left shows the site immediately after transformation activities.

Finally, as defined by GRCF funding requirements, the entire project needs to be delivered before 31st March 2023. We are planning to deliver the works across the entire project area between July and December 2022 (inclusive) which coincides with the least active period in respect to birdlife although careful planning and phasing will still be required to accommodate non-avian receptors. However due to timescales involved in gaining the correct consents, it is possible this will overrun into, January 2023.

5.2 Groundworks Period

Whilst this report focusses on Higham Marshes, delivery will not be in isolation. Therefore, activities across the entire project area are taken into consideration. During the creation of the enhancements and associated structures it is envisaged that machinery movements and construction noise will cause the following impacts without appropriate mitigation:

- Disturbance to:
 - Breeding, passage and wintering birds.
 - Non-avian species.
- Injury to, killing/destruction of:
 - Nests/eggs/chicks of ground-nesting birds.
 - Non-avian species.
 -
- Degradation/loss of habitat.

5.2.1. Birds

To avoid impacts to breeding birds, the groundworks will be undertaken between August and February at the very latest.

Whilst the aim is to finish groundworks by the end of November 2022, events may require work into January and February to allow completion of the programme as defined by GRCF timescales. The works will be undertaken during the passage season. The nature and present quality of the habitat results in the lack of any significant birds using Castle Stone during this period.

The site receives extremely good coverage as part of the Wetland Bird Survey (WeBS), and therefore it can be taken with certainty that its importance as a wintering site for waders especially is limited to almost zero.

Two further defining factors will ensure that there is no potential pathway for interaction with any passage species in the proposal:

1. The passage period is currently dry across the application area and the majority of the entire project area. The site is unsuitable and unattractive to SPA/Ramsar passage species.
2. Higham Bight, to the north of the site is a large receptor of passage birds (such as Grey Plover and Curlew), as is Cliffe Pools to the East
3. On the extremely slight chance that SPA/Ramsar passage species might choose to utilise unenhanced areas of Higham Marshes during this period:
 - a. Even within each of the operational work areas, the activities are localised, meaning that any negative impacts are negligible at best and minimal at worst.
 - b. The two scenarios of delivery will have inherent mitigation:
 - i. All operational units worked on at the same time in one year. An unlikely scenario in all practicality but, if enacted, timescales for activity are fully expected to be condensed. The impact of this approach would be negligible at worst to passage SPA/Ramsar species.
 - ii. All operational units worked on in one year but only one, two or three at the same time. One, two or even three units can be enhanced while the remaining units remain as undisturbed refuge areas. Once the units being enhanced are completed, they become attractive refuge areas whilst the unenhanced units are being transformed.
 - iii. RSPB Cliffe Pools and the saline lagoons and Higham Bight are the main receptor site on the peninsula for passage birds and is located 2.5km south west of the site. A short distance as the 'crow flies.'

Where works extend into the wintering season, the scenario and impacts on wintering birds would be akin to point 2bii and 2biii above.

5.2.2. Non-avian species

Only Divided Sedge *Carex divisa* of non-avian species has been found on site in the last 2 years. The extent of which on site is large across all fields. A botanical survey was carried out in 2018 by an RSPB ecologist found,

*There were no scarce plants, but **Divided Sedge** was abundant.*

5.2.3. Degradation/loss of habitat

The habitat of Lowland Wet Grassland in the application area as designated under various synonyms in the SPA/Ramsar citations. The site suffers from poorly maintained hydrological controls and also a lack of topography within the application area. Therefore, the designated area will benefit practically from the restoration to the appropriate habitats and management.

Superficially, the cutting of new rills and scrapes could be construed as loss or degradation. However, this is not the case but an immediate enhancement – even without a green cover. They provide

immediate access to soil invertebrates for species that feed on these. In fact, established rills and scrapes can become choked with vegetation. At this point their value to waders reduces significantly (which can be seen in figure 2 and 3 in the planning statement). As such, the prescribed management technique is to soil spread and rotavate these features to control the vegetation and re-expose the soils.

Furthermore, there are two methods for rill creation where one is to remove all material completely and to use a spoil spreader. The former method will delay the re-vegetation process thereby increasing their longevity as effective foraging locations, however the speed of which the soil spreader can work and the detail at which it can work makes it preferable for this project.

The creation of the various lips will result in short term degradation, but this is mitigated by using locally won topsoil to cover the features which allows the vegetation to regenerate naturally. Whilst this strategy is a little slower than seeding with purchased seed, within a couple of seasons, these features look like they have always been there and uses the purest form of provenance – seed and root sources directly from the immediate vicinity.

The creation, repair and re-engineering of ‘plugs’, dam and culverts utilises the same principles as perimeter lips but are so isolated that even short-term degradation is negligible. However, the logistics of delivery could easily create unacceptable levels of short-term degradation to the habitat per se i.e. it is entirely inappropriate to have hordes of machinery tracking wherever they like and damaging field surfaces. As per the mitigation for damage to divided sedge, vehicle tracking via specified haul routes and stockpiling of materials and machinery will be kept to the minimum, and least sensitive, areas necessary.

5.3. Post-enhancement operational period

The project will result in seasonal habitat condition changes across the entire project area to a more dynamic wetland habitats. This will transform into the very definition of a Lowland Wet Grassland as designated under its various synonyms in the SPA/Ramsar citations. The long-term impacts are significantly positive for designated species that currently using both Higham Marsh and those that will colonise as a result of delivering this project. The impacts and, where required, mitigation for each designated species are presented in the following section.

6. Assessment of likely significant effects on ecological receptors

6.1 Predicting and characterising ecological impacts

Ecological Impact Assessment in the UK (IEEM 2006), when describing impacts, reference is made to the following, where applicable:

- **Confidence** in predictions (levels of certainty that an impact will occur as predicted), based on the following four-point scale:
 - o Certain/Near Certain ($\geq 95\%$ probability)
 - o Probable (50–95% probability)
 - o Unlikely (5–50% probability)
 - o Extremely Unlikely ($\leq 5\%$ probability)
- **Magnitude** – if an impact is deemed to be significant then its magnitude, in quantitative terms, should be assessed
- **Extent** – the area over which an impact occurs

- **Duration** – the time for which an impact is expected to last
- **Reversibility** – a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it; a temporary impact is one from which a spontaneous recovery is possible
- **Timing and frequency** – whether impacts occur during critical life-stages or seasons

6.2 Direct and indirect ecological impacts

Both direct and indirect impacts are considered within this assessment. A direct impact is directly attributable to a defined action such as the physical loss of a habitat or the immediate mortality of an individual of a particular species. Indirect impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or receptor. An example of an indirect effect would be the loss of an important prey species for a predator.

The following tables show that whilst some short term and negative and impacts will be experienced, they are both reversible and easily mitigated. The overriding impact of undertaking the habitat enhancements is significant, long term positive for SPA and Ramsar receptors.

6.3 Scoped out species and habitats.

Tables 3 and 4 summarise the designated SPA/Ramsar species and habitats that:

1. Will not be impacted negatively by the delivery of the project as they have not been recorded in the application area for a minimum of three years
2. Are likely to be impacted positively in the long-term over the post-enhancement operational period.
3. Will never be impacted positively or negatively as they are not found in a Lowland Wet Grassland habitat.

SPA species	Rationale for scope out	Other observations
Wintering Birds		
Avocet	No records in the last 6 years	Cliffe Pools and Higham Bight to the North are the main receptor sites for Avocet. The habitat enhancements will have a direct, long-term positive impact. It is expected that these species will start to utilise the application area in small numbers during passage with the following confidence levels: Certain/Near Certain
Hen Harrier	No records in the last 6 years	The habitat enhancements will have a direct, long-term positive impact. However, due to being a rare occurrence, it is expected that Hen harrier presence in the application area will remain Extremely Unlikely with a confidence level of Certain/Near Certain .
Grey Plover	No records in the last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected

		that this species will resume utilising the application area during winter with a confidence level of Unlikely .
Dunlin	No records in the last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Unlikely .
Knot	No records in the last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Unlikely .
Black-tailed Godwit	No records in last 3 years. 470 in 2018/19	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Redshank	1 record in 2022, none in previous 2 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
SPA Passage Species.		
Ringed Plover	No records in last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that Ringed plover will start to utilise the application area during passage with a confidence level of Probable .
Black-tailed Godwit	No records in last 6 years.	The habitat enhancements will have a direct, long-term positive impact. It is expected that Black-tailed Godwit will start to utilise the application area during passage with a confidence level of Certain/Near Certain .

Ramsar species, assemblage or habitat	Rationale for scope out	Other observations
Passage Birds		
Ringed Plover	No records in last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that Ringed plover will start to utilise the application area during passage with a confidence level of Probable .
Black-tailed Godwit	No records in last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that Black-tailed Godwit will start to utilise the application area during passage with a confidence level of Certain/Near Certain .
Wintering birds		
Grey plover	No records in last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Unlikely .
Knot	No records in last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Unlikely .
Dunlin	No records in last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Unlikely .
Redshank	1 record in 2022, none in previous 2 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Passage Ramsar species - National Importance		
Little Grebe	Small number of records with recording area.	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Little Egret	5 records in 2021, 0 in 2020	The habitat enhancements will have a direct, long-term positive impact. It is expected

		that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Ruff	No records in last 6 years	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Greenshank	No records in last 5 years, one in 2017	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Wintering Ramsar species – National Importance		
Shelduck	Regular occurrence on site	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Gadwall	Regular occurrence on site	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Shoveler	Regular occurrence on site.	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Water Rail	No record in last 6 years	The habitat enhancements will have no impact on this species due to the habitat available to them is not appropriate. It is expected that this species will not utilise the application area during winter with a confidence level of Certain/Near Certain .
Invertebrates		
<i>Lestes dryas</i>	No record on site, but present on nearby sites. Survey carried out by Project surveyor in August 2022 found no presence on site.	Whilst the habitat enhancements would definitely benefit these species with a confidence level of Certain/Near Certain , colonisation would be assessed as Probable
<i>Bagous longitarsis</i> <i>Henestaris halophilus</i> <i>Bagous cylindrus</i> <i>Polystichus connexus</i>	No records in last 2 years, many in last 40 years.	Whilst the habitat enhancements would

<i>Erioptera bivittata</i> <i>Limnophila pictipennis</i> <i>Hybomitra expollicata</i> <i>Lejops vittata</i> <i>Poecilobothrus ducalis</i> <i>Pteromicra leucopeza</i> <i>Philanthus triangulum</i> <i>Anisodactylus poeciloides</i> <i>Aulacochthebius exaratus</i> <i>Berosus fulvus</i> <i>Cercyon bifenestratus</i> <i>Hydrochus elongatus</i> <i>H. ignicollis</i> <i>Ochthebius exaratus</i> <i>Hydrophilus piceus</i> <i>Malachius vulneratus</i> <i>Philonthus punctus</i> <i>Telmatophilus brevicollis</i> <i>Campsicnemus magius</i> <i>Haematopota bigoti</i> <i>Stratiomys longicornis</i> <i>Baryphyma duffeyi</i>		definitely benefit these species with a confidence level of Certain/Near Certain , colonisation would be assessed as Extremely Unlikely
Higher Plants		
Divided sedge <i>Carex divisa</i>	Abundant and dominant across site. Before works in 2013, sparsely spread on site, now the most dominant plant species on site (see appendix 2)	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Saltmarsh goosefoot <i>Chenopodium chenopodioides</i>	Last record 2018- on Higham common, not within the application area	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Probable
Annual beard grass <i>Polypogon monspeliensis</i>	Last record 2012 (TQ6975) on Higham Bight (saltmarsh), not within the application areas	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Probable
Borrer's saltmarsh-grass <i>Puccinellia fasciculata</i>	Last record 2012 on Higham Bight (saltmarsh), not within application area. Records from 1980 within the application area.	The habitat enhancements will not have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Extremely Unlikely .
Bulbous foxtail <i>Alopecurus bulbosus</i>	Last record on site 2012 on Higham Bight (saltmarsh) – not within the application area	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Least lettuce <i>Lactuca saligna</i>	No record on site since 1980	The habitat enhancements will have a direct, long-term

		positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Probable
Slender hare's ear <i>Bupleurum tenuissimum</i>	No record since 2012 at TQ7175, within the application area but outside of work parameters	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Probable
Sea barley <i>Hordeum marinum</i>	No record since 2017 at TQ7175, within the application area but outside of work parameters	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain.
Stiff saltmarsh-grass <i>P. rupestris</i>	No record on site since 1980.	The habitat enhancements will not have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Extremely Unlikely.
One-flowered glasswort <i>Salicornia pusilla</i>	No record since 1968 on Higham Bight (saltmarsh)	The habitat enhancements will not have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Extremely Unlikely.
Sea clover <i>T. squamosum</i>	Record just off site at TQ70207452 in 2010	The habitat enhancements will not have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Extremely Unlikely.
Clustered clover <i>Trifolium glomeratum</i>	No record for the site	The habitat enhancements will not have a direct, long-term positive impact. It is expected that this species will resume utilising the application area during winter with a confidence level of Extremely Unlikely.
Golden samphire <i>Inula crithmoides</i>	No records within application area. Records for Higham bight saltmarsh in 2015.	Whilst the habitat enhancements would definitely benefit these species with a confidence level of Certain/Near Certain , colonisation would be assessed as Extremely Unlikely without a source population that is local to the reserve
Narrow-leaved eelgrass <i>Zostera angustifolia</i>	No site records	The habitat enhancements will have a direct, long-term positive impact. It is expected

• Dwarf eelgrass <i>Z. noltei</i> •		that this species will resume utilising the application area during winter with a confidence level of Certain/Near Certain .
Habitats		
Coastal Intertidal sediments (Including sandflat/mudflat) Estuary	Not present on application site	Certain/Near Certain for no change and no impacts positive or negative
Floodplain: Brakish and freshwater, including ditches.	Present on application site.	Whilst the habitat enhancements would benefit this habitat by creating a bigger and better capacity floodplain with a confidence level of Certain/Near Certain ,

6.4 Assessment of predicted likely effects of the delivery of the enhancements of The Thames Estuary and Marshes SPA ecological receptors currently present in the application area.

SPA species or assemblage	Activity/Source of impact	Nature of potential impacts on receptor	Significance of impact on receptor	Confidence level	Mitigation required	Residual significance	Confidence Level
Wintering Birds							
Avocet- No records in last 6 years. Hen Harrier- No records in last 6 years Grey Plover- No records in last 6 years Dunlin- No records in last 6 year Knot- No records in last 6 years	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased numbers of wintering birds including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None	n/a	n/a
Black-tailed Godwit- No records in last 6 Redshank - 1 of 5 birds in 2022, none in previous 2 years	Disturbance during habitat enhancement and engineering works in one intensive phase across all operational units	Direct Temporary negative	Not significant Numbers to date are very low and sparsely distributed across the application area and the rest of the WeBS sector data is taken from and similarly low and sparsely distributed for the extent of area available to wintering birds on the Hoo peninsular, due to the habitat not meeting their requirements	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation strategy will be enacted Groundworks period and in the separate CEMP(B)	None	Certain/ Near Certain
	Disturbance during habitat enhancement and engineering works in one year across all operational units but only one, two or three worked on at the same time	Direct Temporary negative	Not significant Numbers of wintering birds are expected to remain very low and sparsely distributed across the application area and similarly low and sparsely distributed in areas not enhanced due to the habitat not meeting their requirements	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation strategy will be enacted Groundworks period and in the separate CEMP(B) This scenario is considered highly unlikely and would only occur if significant delays	None	Certain/ Near Certain

					in starting are experienced.		
	Disturbance during habitat enhancement and engineering works during latter stages of the project if not completed by December 2023	Direct Temporary negative	Not significant Numbers of wintering birds are expected to remain very low and sparsely distributed across the application area and similarly low and sparsely distributed in areas not enhanced due to the habitat not meeting their requirements	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation strategy will be enacted Groundworks period and in the separate CEMP(B) This scenario is considered unlikely and would only occur if significant delays in the starting are experienced	None	Certain/ Near Certain
Waterbird Assemblage	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased numbers of wintering birds including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None	n/a	n/a
	Disturbance during habitat enhancement and engineering works during latter stages of the project if not completed by December 2023	Direct Temporary negative	Not significant Numbers of wintering birds are expected to remain very low and sparsely distributed across the application area and similarly low and sparsely distributed in areas not enhanced due to the habitat not meeting their requirements	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation strategy will be enacted Groundworks period and in the separate CEMP(B) This scenario is considered unlikely and would only occur if significant delays in the starting are experienced	None	Certain/ Near Certain

Passage Birds							
Ringed Plover - No records in last 6 years Black-tailed Godwit - No records in last 6 years.	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased numbers of spring passage birds including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None	n/a	n/a
	Disturbance to spring passage birds during habitat enhancement and engineering works	Direct Temporary negative	Significant negative	Certain/ Near Certain	Undertake works outside of the breeding season 2021 (Mar-Jun inclusive) as is planned. Works will be complete prior to the breeding season 2022	None	Certain/ Near Certain

6.5 Assessment of predicted likely effects of the delivery of the enhancements of The Thames Estuary and Marshes SPA ecological receptors currently present in application area

Ramsar species or assemblage	Activity/Source of impact	Nature of potential impacts on receptor	Significance of impact on receptor	Confidence level	Mitigation required	Residual significance	Confidence Level
Wintering Birds – International Importance							
Grey Plover - No records in last 6 years Dunlin - No records in last 6 years Knot - No records in last 6 years Redshank -1 of 5 birds record in 2022, none in previous 2 years	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased numbers of wintering birds including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None	n/a	n/a
	Disturbance during habitat enhancement and engineering works in one intensive phase across all operational units	Direct Temporary negative	Not significant Numbers to date are very low and sparsely distributed across the application area and the rest of the WeBS sector data is taken from and similarly low and sparsely distributed for the extent of area available to wintering birds on the Hoo peninsular, due to the habitat not meeting their requirements	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation strategy will be enacted Groundworks period and in the separate CEMP(B) This scenario is considered highly unlikely and would only occur if significant delays in starting are experienced.	None	Certain/ Near Certain
	Disturbance during habitat enhancement and engineering	Direct Temporary negative	Not significant Numbers of wintering birds are expected to remain very low and	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation	None	Certain/ Near Certain

	works in one year across all operational units but only one, two or three worked on at the same time		sparsely distributed across the application area and similarly low and sparsely distributed in areas not enhanced due to the habitat not meeting their requirements		strategy will be enacted which is set out in Groundworks period and in the separate CEMP(B)		
	Disturbance during habitat enhancement and engineering works during latter stages of the project if not completed by December 2022	Direct Temporary negative	Not significant Numbers of wintering birds are expected to remain very low and sparsely distributed across the application area and similarly low and sparsely distributed in areas not enhanced due to the habitat not meeting their requirements	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation strategy will be enacted which is set out in Section 5.2. Groundworks period and in the separate CEMP(B) This scenario is considered unlikely and would only occur if significant delays in the starting are experienced	None	Certain/ Near Certain
Passage Birds – International Importance							
Ringed Plover - No records in last 6 years Black-tailed Godwit - No records in last 6 years	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased numbers of spring passage birds including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None	n/a	n/a
	Disturbance to spring passage birds during habitat enhancement and engineering works	Direct Temporary negative	Significant negative	Certain/ Near Certain	Works undertaken outside of main passage season (September-December) as is planned. Works will be complete prior to	None	Certain/ Near Certain

					the spring passage season 2023		
Passage Ramsar species – National Importance							
Little Grebe – individual records in 2021 and 2020 Little Egret – no records in 6 years. Ruff - No records in 6 years Greenshank – no records in 6 years.	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased numbers of spring passage birds including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None	n/a	n/a
	Disturbance to spring passage birds during habitat enhancement and engineering works	Direct Temporary negative	Significant negative	Certain/ Near Certain	Works undertaken outside of main passage season (September-December) as is planned. Works will be complete prior to the spring passage season 2023	None	Certain/ Near Certain
Wintering Ramsar species – National Importance							
Shelduck – multiple records Gadwall – multiple records Shoveler – multiple records Water Rail – no records in last 6 years. Avocet – no records in last 6 years. Spotted Redshank - no records in last 6 years.	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased numbers of wintering birds including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None	n/a	n/a
	Disturbance during habitat enhancement and engineering works in one intensive phase	Direct Temporary negative	Not significant Numbers to date are very low and sparsely distributed across the application area and the rest of the WeBS sector data is taken	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation	None	Certain/ Near Certain

	across all operational units		from and similarly low and sparsely distributed for the extent of area available to wintering birds on the Hoo peninsular, due to the habitat not meeting their requirements. The habitat will be made sub-optimal before works to ensure these species are not present and also to ensure the site is dry enough for works to be carried out. No abstraction will be carried out and therefore not surface flooding on site, reducing habitat quality until the works are carried out.		strategy will be enacted Groundworks period separate CEMP(B) This scenario is considered highly unlikely and would only occur if significant delays in starting are experienced.		
	Disturbance during habitat enhancement and engineering works in one year across all operational units but only one, two or three worked on at the same time	Direct Temporary negative	Not significant Numbers of wintering birds are expected to remain very low and sparsely distributed across the application area and similarly low and sparsely distributed in areas not enhanced due to the habitat not meeting their requirements	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation strategy will be enacted Groundworks period and in the separate CEMP(B) This scenario is considered unlikely and would only occur if significant delays in the starting are experienced	None	Certain/ Near Certain
	Disturbance during habitat enhancement and engineering works during latter stages of the project if not completed by December 2022	Direct Temporary negative	Not significant Numbers of wintering birds are expected to remain very low and sparsely distributed across the application area and similarly low and sparsely distributed in areas not enhanced due to the habitat not meeting their requirements	Certain/ Near Certain	Whilst not directly required according to the assessment of significance, a mitigation strategy will be enacted Groundworks period and in the separate CEMP(B)	None	Certain/ Near Certain

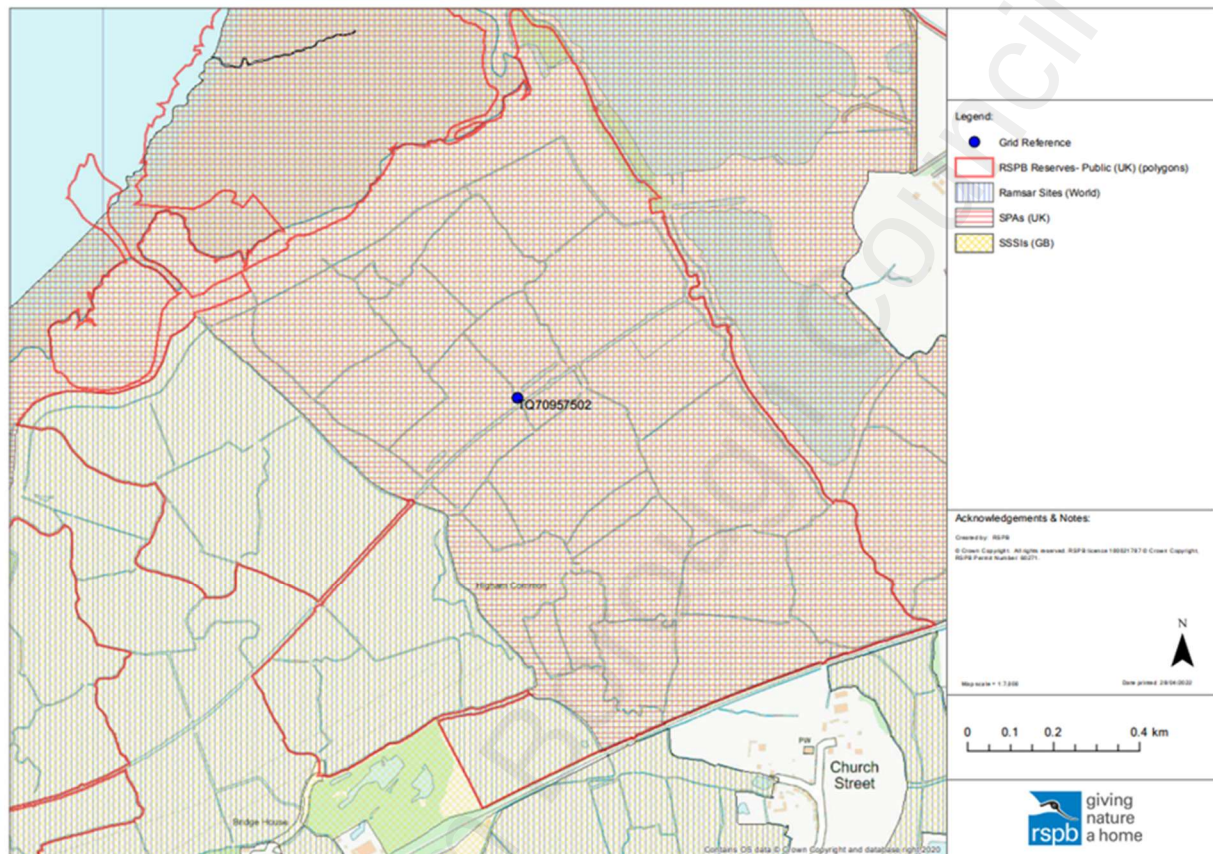
					This scenario is considered unlikely and would only occur if significant delays in the starting are experienced		
Higher plants							
Carex divisa	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased in abundance due to the site being wetter for long in the spring and summer.	Certain/ Near Certain			
	Disturbance/damage during habitat enhancement and engineering works in one intensive phase across all operational units	Direct Temporary negative	Not Significant Works carried out in winter, after the site has been grazed and the plant has died off. Movement around site will be restricted to perimeter of fields where drier and the species is not found.	Certain/ Near Certain			
	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased in abundance due to the site being wetter for long in the spring and summer.				
Habitats							
Coastal Floodplain: • Grazing Marsh:	Changes in habitat from a principally dry system to	Direct Long term positive	Significant positive The enhancements and ongoing management	Certain/ Near Certain	None	n/a	n/a

Brackish and Freshwater Ditches	functional and dynamic wetland habitats with appropriate ongoing management		will provide vastly superior habitat conditions resulting in increased numbers of spring passage birds including an increase in species appropriate to a functioning wet grassland habitat. Increase in breeding species associated with wet grassland such as Lapwing, redshank and wildfowl.				
	Degradation/loss of habitat during habitat enhancement and engineering works	Direct Short term negative Reversible	Moderate negative	Certain/ Near Certain	Keep vehicle tracking across site and work areas to the minimum area necessary i.e. use specified haul routes Make all possible efforts to programme the delivery of the works during dry/drier conditions Rotavate any significant rutting caused by vehicle movements Keep stockpiling of materials and machinery to the minimum area necessary Remove all unrequired materials immediately from	Not significant	Certain/ Near Certain

					areas as they are finished Allow vegetation to re-colonise naturally (from soil seed bank and surrounding vegetation) Undertake the enhanced surface water regime as soon as feasible to promote the re-vegetation process Undertake grazing and topping as soon as feasible to manage the short-term injurious weed (thistle) burden		
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Gravesham Borough Council

Appendix 1



**Appendix 2: Vegetation Survey Higham Marshes – carried out
RSPB Ecologist (Mark Gurney) in 2017**

Gravesham Borough Council

Higham Marsh

When we visited in May 2017, most of the grassland had few flowers and did not look promising botanically. There were no scarce plants, but **Divided Sedge** was abundant. This is uncommon in Britain, but frequent around the Thames Estuary. Bulbous Foxtail and other scarce species have been found here in the past. The scarce plants found in the past are associated with **lightly poached or disturbed slightly saline ground, often flooded in winter**. Most of them are more obvious later in the year, and **should be favoured by current conditions and management**. They are more likely to be found on the **sea wall** (in Higham Bight), around the edges of the wet features, or in lightly poached or disturbed ground.

The **wet features add more interest for plants and invertebrates**. The **wide shallow margins**, lightly poached in places, provide a good range of habitats, and could support scarce invertebrates. The ditch flora is typical of coastal marshes, with Frog-bit and Soft Hornwort as notable species. There is a **range of open, short vegetation and taller vegetation** around the margins of the features. This will be good for invertebrates, and **sections should be cleared on rotation** to provide a range of vegetation from bare ground to overgrown and tall.

There is Buttonweed around some of the margins, which is likely to spread invasively, but there is probably nothing we can do about it.



Much of the reserve is species-poor grassland, but it does contain the largest stands of Divided Sedge *Carex divisa* that I have seen.



The pools and ditches with wide, shallow margins are good for typical plants of seasonally wet mud and shallow margins. We found no rarities among the flora, but these margins could support good invertebrate communities.



Some of the ditches have Frog-bit and Soft Hornwort, uncommon plants typical of grazing marshes. This section has the invasive Buttonweed.