



RSPB Shorne Marshes Habitat Enhancement
Non-European Site Receptor Ecological Site Assessment: Planning Application
Proposal Supporting Documentation PP-12831173



RSPB Shorne Marshes (RSPB,2015)

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1. Introduction

1.1 Background

This report is a supporting document containing the assessment of impacts, both positive and negative, on the species and habitats, present or otherwise, in the Shorne Marshes project area as a result of delivering the habitat enhancements proposed within the project. The scope of this report refers to The South Thames Estuary and Marshes SSSI designated species and habitats as well as species categorised as being of conservation concern. Species and habitats that are designated as part of The Thames Estuary and Marshes Ramsar in addition to The South Thames Estuary and Marshes SSSI designation are assessed in the document 'Shorne_Marshes_Ecological_Site_Assessment'; Report to Inform an Assessment Under the Habitats Regulations' and are not within the scope of this document.

Shorne Marshes is a 133.8 hectare area of predominantly, grassland, bisected (North to South) by an World War II Concrete track, and an Environment Agency Main river (East to West). The northern boundary compromises the Thames and its associated flood defences and to the south the industrial land, the village of Chalk 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 Purchased the land in 2000. Work was carried out to isolate the site from the surrounding drainage system in and various other small-scale habitat improvement works have been carried out in the following years.

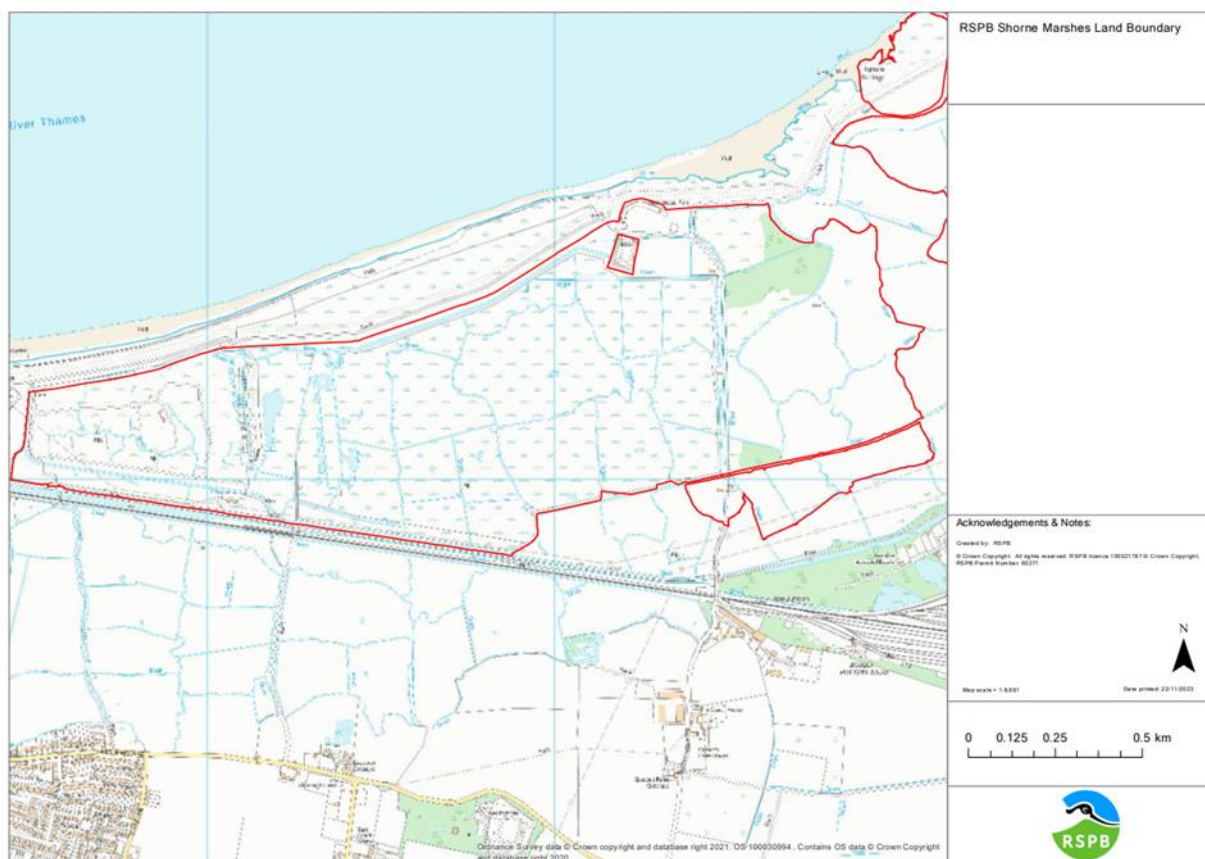


Figure 1: Shorne Marshes Location

This project will deliver landscape-scale habitat restoration and innovative solutions for climate resilience in the Greater Thames Estuary.

- 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 Identifying species and habitats of conservation concern

The sources of data have been used to identify species and habitats of conservation concern specific to Shorne Marshes

1. The South Thames Estuary and Marshes SSSI citation and presented in the document 'Shorne_Marshes_SSSI'
2. Breeding bird data gathered by surveys using Smith & O'Brian Shorne_Marshes_Breeding_Birds
3. BTO Wetland Bird Surveys – presented in the documents Shorne_Marshes_WeBS
4. Kent and Medway Biological Records Centre (KMBRC). A search of the entire Project Area with a 1km buffer. A number of datasets were obtained:
 - a. Habitats (general) and presented in the document Shorne_Marshes_Habitat Map
 - b. BAP Priority Habitats and presented in the document Shorne_Marshes_BAP Habitat Map
 - c. Protected Species Inventory (PSI) and presented in the document Shorne_Marshes_PSI
 - d. Conservation Concern Species Inventory (CCSI) and presented in the document Shorne_Marshes_CCS'.
 - e. Kent Rare & Scarce Species Inventory (KRSSI) and presented in the document Shorne_Marshes_KRSSI'.
 - f. Bat records from Kent Bat Group (KBG & KBGR), specifically for known bat roosts, and presented in the documents 'Shorne_Marshes_Bat Records and Shorne_Marshes_Bat_Roost Map
 - g. Historical Bird Data is presented in the document Shorne_Marshes_Bird Summary.

2. The Project

2.1 Aims

This project aims to undertake engineering works to enhance the in-field topography, to repair hydrological bunds and culverts and install a bund around a reedbed to allow for better water retention. 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 in North Kent at RSPB Cliffe Pools, RSPB Higham Marshes, RSPB Northward Hill and RSPB 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 Shorne Marshes is a functioning wetland system after works carried out by the RSPB in conjunction with the land owner in 2000. 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 is split in two by a Public Right of Way. The western side of the site has been actively managed for breeding waders and wintering waders and wildfowl. The eastern side has not sure to the need for groundworks and anti-predator fence.

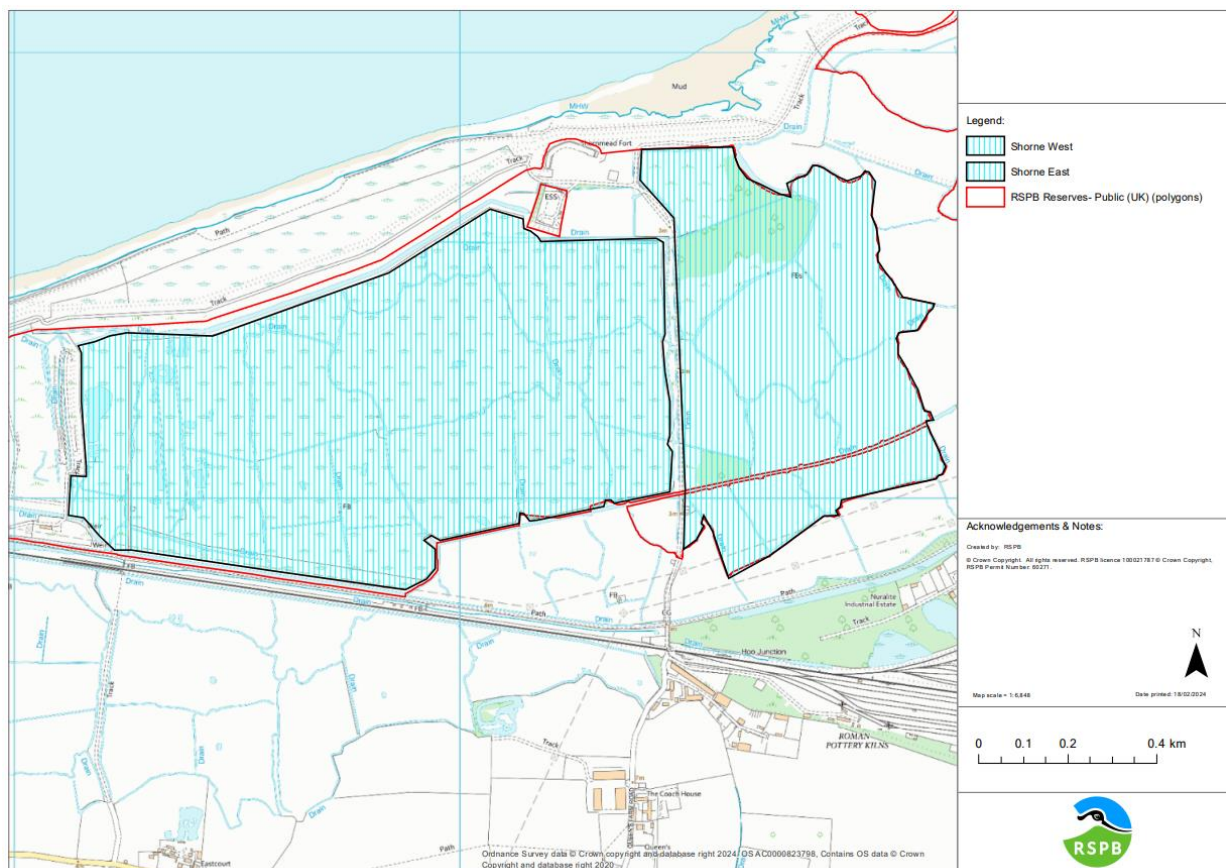


Figure 2: Shorne Marshes, showing Western and East split of the site.

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. However, Shorne Marshes 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.

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 below 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:

Drawings found in document *Shorne_Marshes_Design_Specifiication*

The features listed within this document 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:
 - 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.



Figure 3: Rills and scrapes installed at RSPB Cliffe Pools in 2023 (MC/22/1755), planning granted by Medway Council. *Image:RSPB*

- **Bunds** – long, low, earth bunds that also serve to improve site access around the perimeters of the hydrological units and compartments which, by extension, helps to minimise disturbance by keeping the majority of access to the periphery. Design principles for perimeter lips are:
 - Crest width 4-6m wide with the crest at a minimum 400mm higher than peak water levels. The crest will also have a very slight camber to minimise rainfall ‘puddling’, thereby assisting with structural integrity.
 - Batters are shallow and will be 1:4 or 1:8 either side and 1:4 or 1:10 at the ends. Shallow batters increase the structural integrity of the lips and make them safer whilst driving along if a vehicle happens to veer off the edge.
 - Created entirely from site-won earth/clay and to ensure that these features are hydrologically secure they are ‘keyed-in’. This involves excavating a 2m wide by 200-300mm deep soil strip along the length of the feature at the centre of its footprint. The topsoil is removed to expose the subsoil and the resulting void is filled with site-won non-porous clay arising from other on-site excavations i.e. rills, scrapes, ditching. More site-won non-porous clay from other excavations is then placed above this to a level not more than 100mm from the finished height of the feature. The structure can then be formed to completion with more site-won clay and porous topsoil.



Figure 4: Bund installed at RSPB Higham Marshes, adjacent to Shorne Marshes, in December 2022 planning granted by Gravesham Council. (20220575). *Image: RSPB*

LIST OF WORKS

3. Baseline Data

3.1 Avian species

Breeding bird data is available for Shorne Marshes from 2002, when the RSPB started the actively managing the site. Due to Covid, no data is present for 2020. Data is found in document *Shorne_Marshes_Breeding_Birds*

Breeding data however is irrelevant to this project as work will not be carried out during the breeding season. The whole intention of the project is to improve the area for the breeding birds listed within the SSSI citation, and priority wet grassland species such as Lapwing and Redshank.

- Garganey *Anas querquedula*,
- Pintail,
- Avocet
- Bearded tit *Panurus biarmicus*.
- Common tern

Data below has been taken from KMBRC data. WeBS data has been used to show the usage of the site by passage and wintering birds. The site over the last 6 years has had a good surveyor coverage and therefore bring the accuracy of the usage up.

Shorne Marshes (22813)

Grid Reference: TQ685742, Region: Thames Estuary - Hoo (Kent)

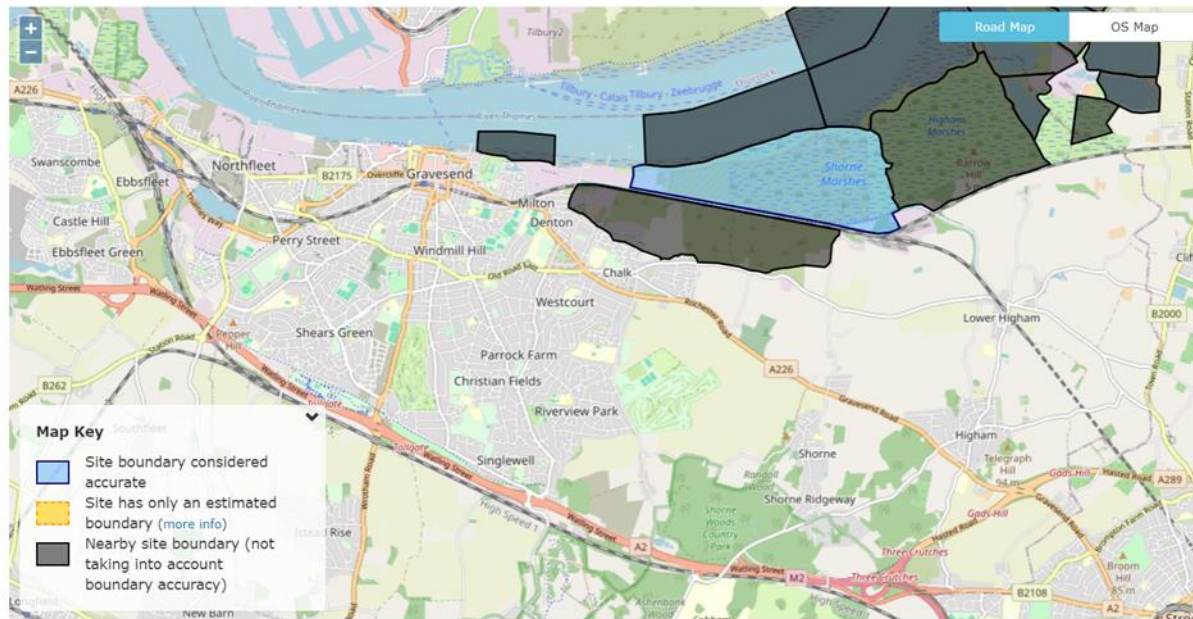


Figure 5: Shorne Marshes WebS sector

The following tables present peak count records for SSSI and species of conservation concern on passage and wintering for the last five and six seasons across the South Allhallows Marsh WebS sector, which is the area under consideration for this application. Where 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.

Shorne Marshes						
Passage SSSI species	2017	2018	2019	2020	2021	2022
Grey plover	0	0	0	0	0	0
Curlew	0	0	0	0	0	0
Black-tailed godwit	0	0	0	0	0	0
Redshank	0	0	0	0	0	0
Greenshank	0	0	0	0	0	0

Table 1: Peak count records for Shorne Marshes between 2017 and early 2022 for each of the SSSI/BoCC designated species during autumn passage (Redshank -Autumn and spring passage). SSSI species are presented in bold type.

Shorne Marshes						
Wintering SSSI species	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23
European white-fronted goose	0	0	0	0	0	0
Shelduck	20	30	18	30	5	0
Gadwall	5	10	0	0	29	0
Teal	14	11	3	312	0	0
Grey plover	0	0	0	0	0	0
Curlew	41	113	29	38	76	0
Black-tailed godwit	79	9	0	0	0	0

Table 2: Peak count records for Shorne Marshes between 2017 and early 2022 for each of the SSSI/BoCC designated species during winter (Redshank -Autumn and spring passage). SSSI species are presented in bold type.

Table 2: Peak count records for Shorne between 2017/18 and early 2022/23 for each of the SSSI designated species during autumn passage (Redshank -Autumn and spring passage). SSSI species are presented in bold type. Brackets represent non-core count.

3.2 Non Avian Species

Non Avian SSSI species across Shorne Marshes	
Higher Plants	
golden samphire <i>Inula crithmoides</i>	Found on site in 2012 but not within the area or scope of proposed works.
<i>Puccinellia fasciculata</i>	No site records
least lettuce <i>Lactuca saligna</i>	Not found on site. Closest Record Higham Marshes 1971-1980
saltmarsh grasses <i>Puccinellia</i> ,	<i>Puccinellia rupestris</i> not found on site.
the glassworts <i>Salicornia</i> ,	None found on site.
sea aster <i>Aster tripolium</i>	Not found on site
sea lavender <i>Limonium vulgare</i>	Not present on project site. To the east at TQ70207452
sea purslane <i>Halimione portulacoides</i> ,	Not present on site
divided sedge <i>Carex divisa</i>	Abundant and extensive across site
small goosefoot <i>Chenopodium botryodes</i>	Not present on site
golden dock <i>Rumex maritimus</i>	Not present on site

slender hare's ear <i>Bupleurum tenuissimum</i>	Last found on site 2018 but not within the area or scope of proposed works. At TQ6974
sea clover <i>Trifolium squamosum</i>	Found just off site in 2010. TQ70207452
Sea barley <i>Hordeum marinum</i>	Found on site in 2013 but not within the area or scope of proposed works.
bulbous foxtail grass <i>Alopecurus bulbosus</i>	No record on site
other foxtails <i>Alopecurus</i>	No other foxtails species present on project site
club-rush <i>Scirpus maritimus</i>	Present across project site
common reed <i>Phragmites australis</i>	Present across project site in ditches and as part of reed bed.
fennel pondweed <i>Potamogeton pectinatus</i>	No site records
brackish water-crowfoot <i>Ranunculus baudotii</i>	No site records
soft hornwort <i>Ceratophyllum submersum</i>	No site records
water soldier <i>Stratiotes aloides</i>	No site records
<i>Zostera angustifolia</i>	No site records
<i>Z. noltii</i>	No site records
Invertebrates	
scarce emerald damselfly' <i>Lestes dryas</i>	Present on site, but no records within works area.
<i>Lejops vittata</i>	No site records
<i>Saldula opacula</i>	No site records
dotted fan-foot moth <i>Macrochilo cribrumalis</i>	No site records
<i>Bagous</i> (aquatic weevils),	<i>Bagous tubulus</i> (2000) recorded on site, other <i>Bagous</i> species not found on site since 1980s
<i>Berosus</i>	No Site records
Great silver water beetle <i>Hydrophilus piceus</i>	Site records in 2008

Table 3: Non-avian SSSI species records. Records since the beginning of 2018 are presented in bold type

Non-avian conservation concern species across Shorne Marsh	
Mammals	
Bat species:	All recorded flying. No roosts sites on site except Shornemead Fort that is not within the scope of this project (see Shorne_Marshes_Bat Roost)
Water Vole	Present on site in reed bed see Arcadis Survey Results. None present in East Side of Shorne where works will be carried out. Due to cattle trampling and site being kept dry for <i>Crassula Helmsii</i> . See RSPB Survey. (Survey Results found in document RSPB_Shorne Marshes_Water_Vole
Reptiles	
Common Lizard	Last record on site 2000 at TQ77
Grass Snake	Present on site
Slow Worm	No records on project site since 1984
Adder	No records on project site
Amphibians	
Smooth newt	Present on site, but outside the works area
Great Crested newt	Present on site, but outside the works area
Fish	
Eel	Present in ditches.

Table 4: Non-avian SSSI species of conservation concern records.

Two separate water vole surveys were carried out in April 2022 covering the whole area where work will be undertaken in relation to this application. No signs (Burrows, Feeding stations or latrines) were found in the project area where works that would impact on water voles. Results of the surveys are found in the Appendix 2

3.3 Habitats

To ensure RSPB's assessments as to which habitats are present across the application area, data from KMBRC was used for analysis. The maps are presented in the documents Shorne_Marshes_Habitat Map and Shorne_Marshes_BAP Habitat Map

Habitats across Shorne Marshes	
BAP Habitats	
Neutral grassland Semi-improved Grazing marsh pasture	All compartments
Habitats	
Water: Open standing water, brackish	Present as ditch network across the application area and flight ponds

Table 5: BAP habitat present on Shorne Marshes.

4. Potential impacts and project design and delivery mitigation

4.1 Design

The design has been formulated to have a positive, long term impact on the European sites at Shorne Marshes. 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 6 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.

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.

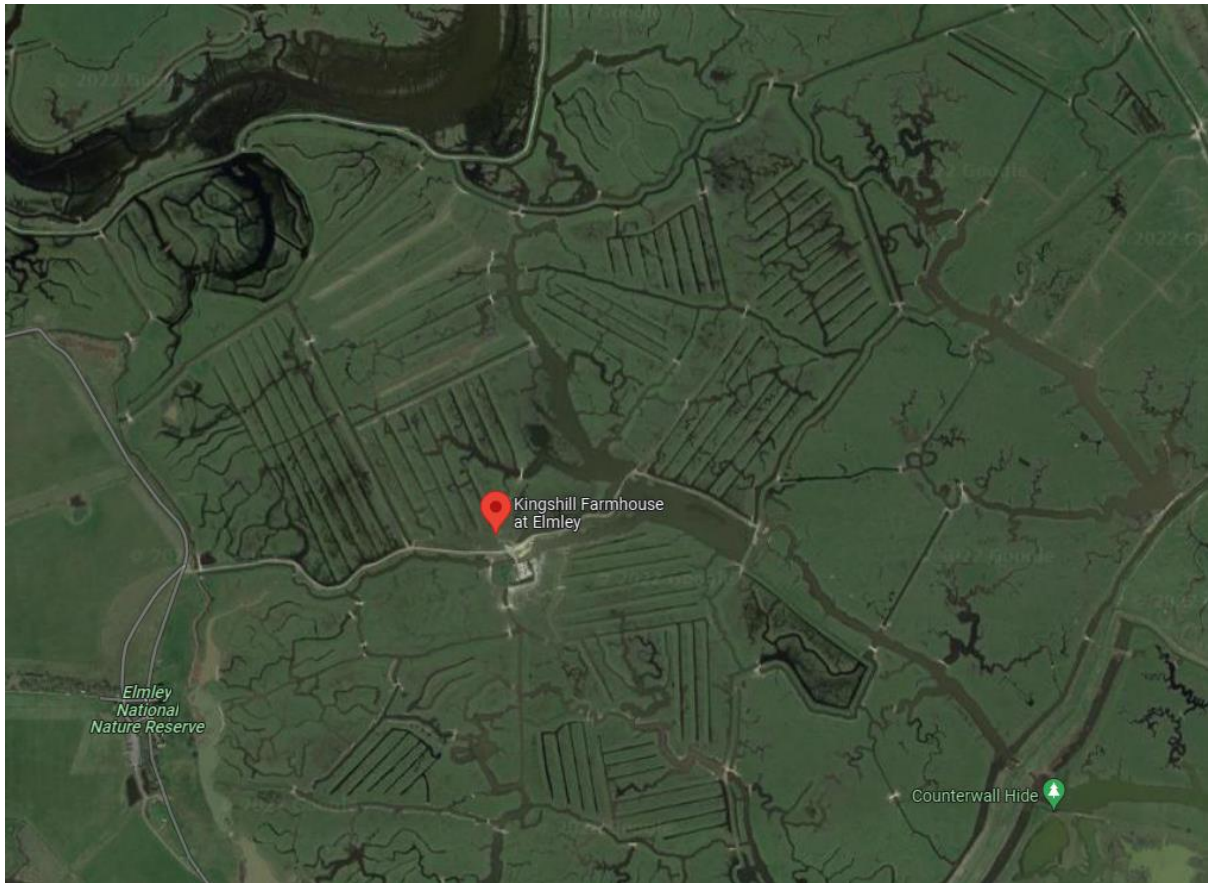


Figure 6: ‘Gold-standard’ rill creation at Elmley National Nature Reserve on the Isle of Sheppey¹.

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 7 below.

¹<https://www.google.com/maps/place/Kingshill+Farmhouse+at+Elmley/@51.382979,0.7927445,2204m/data=!3m1!1e3!4m16!1m7!3m6!1s0x47d92a60f453d695:0x5a6818ee2b6674a!2sElmley,+Sheerness+ME12+3RN!3b1!8m2!3d51.389223!4d0.775235!3m7!1s0x47d92afbfffffb:0x266196219d1eaa42!5m2!4m1!1i2!8m2!3d51.381041!4d0.794507>



Figure 7: 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.

In 2022, the RSPB received funding from UK Government's Green Recovery Challenge Fund (GRCF). Four large projects were carried out in North Kent similar to the one proposed here, with Planning for all for permitted through Medway Council and Gravesham Council.

- Cooling Marshes - MC/22/1029
- Cliffe Pools - MC/22/1755– see Figure 3
- Higham Marshes - 20220575– see Figure 4
- Castle Stone/Stoke Marshes. MC/22/1639

4.2 Groundworks Periods

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.

4.2.1. Birds

To avoid impacts to breeding birds, the groundworks will be undertaken in August and 2 weeks in January at the very latest. This is due to the Met Police firing range and restricted access. The site is only safe to use during these times each year.

Whilst the aim is to finish groundworks by the end of August, events may require work into January to allow completion of the programme as defined by the shooting range timings. 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 Shorne Marshes during this period.

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 SSSI passage species. We are actively keeping the application area dry to eradicate *Crassula Hemslsii* on site. This work has been consented by Natural England. See Document *RSPB_Shorne Marshes_SSSI_consent*.
2. On the extremely slight chance that SPA/Ramsar passage species might choose to utilise unenhanced areas of Shorne 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. Shorne Bight and RSPB Cliffe Pools and the saline lagoons is the main receptor site on the peninsula for passage birds and is located 2.5km west of the site.

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

4.2.2. Non-avian species

Several non-avian SSSI species are found on site. However, they are all away from the works location and therefore not impacted by destruction of or Degradation/loss of habitat.

Divided Sedge and Sea Club rush are two species that are present on site and are abundant and the dominant across all areas. Although the works may reduce their extent, due to their ecology of being rhizomatous, will recolonise the area in the following year.

Soft Hornwort is present on site, though there will be no impact due to no works occurring within the ditch systems, except at existing crossing points where culverts are being installed. These culverts will increase the ditch area on site positively impacting on this species.

However, and aside from necessary interactions to deliver the scheme, the standard operating procedure of keeping vehicle tracking and stockpiling of materials and machinery to the minimum, and least sensitive, areas necessary will minimise any additional negative effects.

4.2.3. Degradation/loss of habitat

The habitat of Lowland Wet Grassland in the application area as designated under various synonyms in the SPA/Ramsar and SSSI citations is present in name only. Both sites suffer from inappropriate water management for the habitat to be what it is supposed to be. Therefore, the designated area will benefit practically from the restoration to the appropriate habitats and management.

The creation of a reservoir to store water could be construed as a loss of habitat. However it is also the creation of habitat in itself, as well as being able to enhance and improve the existing habitat on the site. The reservoir will create open water habitat that will benefit wintering wildfowl such as dabbling/diving duck and grebes. The design will allow for emergent vegetation, replacing that lost through the building of it, which will benefit breeding birds such as reed bunting, reed warbler and breeding duck species.

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. As such, the prescribed management technique is to rotavate these features to control the vegetation and re-expose the soils. This work is consented by NE within the site management plan

The creation of the dams 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. 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.

4.3. Post-enhancement operational period

The project will result in seasonal habitat condition changes across the entire project area from predominately dry grassland to functional and dynamic wetland habitats. This will transform Shorne Marshes 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 the site 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.

5. Assessment of likely significant effects on ecological receptors.

5.1 Predicting and characterising ecological impacts

In accordance with the Institute of Ecology and Environmental Management (IEEM) Guidelines for 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

5.2 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 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 the SSSI and conservation concern receptors.

5.3 Scoped out species and habitats

Tables 7 and 8 summarise the designated SSSI 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.

SSSI species assemblage or habitat	Rationale for scope out	Other Observations
Breeding birds		

Garganey Pintail	Pairs present most years, no confirmed successful breeding. Works not being carried out in breeding season.	The habitat enhancements will have a direct, long-term positive impact. It is expected that these species will start to breed at the application area with the following confidence levels: • Garganey; Probably. • Pintail; Extremely Unlikely
Avocet Bearded tit Common tern	Have never been recorded breeding in the application area due to the site not meeting their requirements. Works not being carried out in breeding season.	The habitat enhancements will have a direct, long-term positive impact. It is expected that these species will start to breed at the application area with the following confidence levels: • Avocet; Probable. • Bearded Tit - Probable • Common Tern, Extremely Unlikely
Breeding Bird Assemblage	Current assemblage consists of good numbers of Lapwing, Yellow wagtail, Meadow pipit, skylark and Redshank. Works not being carried out in breeding season.	The habitat enhancements will have a direct, long-term positive impact. Certain/Near Certain
Wintering birds		
European white-fronted goose	Have never been recorded wintering in the application area due to the site not meeting their requirements. Work will also not be carried out in Winter	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will start to utilise the application area during winter in a range of numbers, small to large, with the following confidence levels: Unlikely.
Black-tailed godwit	Have been recorded as wintering on or near in the application area. Work will also not be carried out in Winter	The habitat enhancements will have a direct, long-term positive impact. It is expected that most of these species will start to utilise the application area during winter in a range of numbers, small to large, with the following confidence levels: Probable
Shelduck Gadwall Teal Curlew	Have been recorded in the works area. Work will also not be carried out in Winter	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will start to utilise the application area during winter in a range of numbers, small to large, with the following confidence levels: Certain

Grey plover	Have never been recorded wintering in the application area due to the site not meeting their requirements.	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will start to utilise the application area during winter in a range of numbers, small to large, with the following confidence levels: Grey Plover; Extremely Unlikely .
Passage birds		
Grey plover	Have never been recorded On autumn passage in the application area due to the site not meeting their requirements. The works area is being dried from January to November for the eradication of Crassula Helmsii	The habitat enhancements will have a direct, long-term positive impact. It is expected that most of these species will start to utilise the application area during winter in a range of numbers, small to large, with the following confidence levels: Extremely Unlikely
Curlew	Have never been recorded On autumn passage in the application area. application area due to the site not meeting their requirements The works area is being dried from January to November for the eradication of Crassula Helmsii	The habitat enhancements will have a direct, long-term positive impact. It is expected that this species will start to utilise the application area during winter in a range of numbers, small to large, with the following confidence levels: Probably
Black-tailed godwit	Have never been recorded On autumn passage in the application area. application area due to the site not meeting their requirements The works area is being dried from January to November for the eradication of Crassula Helmsii	The habitat enhancements will have a direct, long-term positive impact. It is expected that most of these species will start to utilise the application area during winter in a range of numbers, small to large, with the following confidence levels: Probable
Redshank	Have never been recorded On autumn passage in the application area. application area due to the site not meeting their requirements The works area is being dried from January to November for the eradication of Crassula Helmsii	The habitat enhancements will have a direct, long-term positive impact. It is expected that most of these species will start to utilise the application area during winter in a range of numbers, small to large, with the following confidence levels: Certain/Near Certain
Greenshank	Have never been recorded On autumn passage in the application area. application area due to the site not meeting their requirements	The habitat enhancements will have a direct, long-term positive impact. It is expected that most of these species will start to utilise the

	The works area is being dried from January to November for the eradication of <i>Crassula Helmsii</i>	application area during winter in a range of numbers, small to large, with the following confidence levels: Unlikely
Invertebrates		
scarce emerald damselfly <i>Lestes dryas</i>	Hasn't been recorded on the application area in last 3 years, however likely to be present	The habitat enhancements are designed to have a direct, long-term positive impact on this species with a confidence level of Certain/Near Certain . It is expected that this species may start to recolonise the application area with a confidence level: Certain
<i>Lejops vittatus</i>	Has never been recorded in the application area or surrounding area	The habitat enhancements are designed to have a direct, long-term positive impact on this species with a confidence level of Certain/Near Certain . It is expected that this species may start to recolonise the application area with a confidence range from Unlikely
<i>Saldula opacula</i>	Has never been recorded in the application area or surrounding area	The habitat enhancements are designed to have a direct, long-term positive impact on this species with a confidence level of Certain/Near Certain . It is expected that this species may start to recolonise the application area with a confidence range from Unlikely
dotted fan-foot moth <i>Macrochilo cribrumalis</i>	Has never been recorded in the application area or surrounding area	The habitat enhancements are designed to have a direct, long-term positive impact on this species with a confidence level of Certain/Near Certain . It is expected that this species may start to recolonise the application area with a confidence range from Unlikely
<i>Bagous</i> (aquatic weevils),	Hasn't been recorded on the application area in last 3 years	The habitat enhancements are designed to have a direct, long-term positive impact on this species with a confidence level of Certain/Near Certain . It is expected that this species may start to recolonise the application area with a confidence range from Unlikely
<i>Berosus</i>	Hasn't been recorded on the application area in last 3 years	The habitat enhancements are designed to have a direct, long-term positive impact on this species with a confidence

		level of Certain/Near Certain . It is expected that this species may start to recolonise the application area with a confidence range from Unlikely
Great silver water beetle <i>Hydrophilus piceus</i>	Hasn't been recorded on the application area in last 3 years	The habitat enhancements are designed to have a direct, long-term positive impact on this species with a confidence level of Certain/Near Certain . It is expected that this species may start to recolonise the application area with a confidence range from Likely
Higher Plants		
common reed <i>Phragmites australis</i> divided sedge <i>Carex divisa</i> club-rush <i>Scirpus maritimus</i>	Are present on site	The habitat enhancements are designed to have a direct, long-term positive impact on this species with a confidence level of Certain/Near Certain . It is expected that this species may start to recolonise the application area with a confidence range from Certain
Borrer's saltmarsh-grass <i>Puccinellia fasciculata</i> saltmarsh grasses <i>Puccinellia</i> , the glassworts <i>Salicornia</i> , <i>Zostera angustifolia</i> <i>Z. noltii</i> water soldier <i>Stratiotes aloides</i> golden dock <i>Rumex maritimus</i> sea clover <i>Trifolium squamosum</i> slender hare's ear <i>Bupleurum tenuissimum</i> least lettuce <i>Lactuca saligna</i> golden samphire <i>Inula crithmoides</i> sea barley <i>Hordeum marinum</i> small goosefoot <i>Chenopodium botryodes</i> fennel pondweed <i>Potamogeton pectinatus</i> sea aster <i>Aster tripolium</i> sea lavender <i>Limonium vulgare</i> sea purslane <i>Halimione portulacoides</i> brackish water-crowfoot <i>Ranunculus baudotii</i> soft hornwort <i>Ceratophyllum submersum</i> bulbous foxtail grass <i>Alopecurus bulbosus</i>	Have not been recorded present in the application area in the last 3 years.	Certain/Near Certain for no change and no impacts positive or negative.
Mammals		

Water Vole	Present on site – records from Lower Thames Crossing survey 2023. Scoped on Eastern application are out as not present in areas where work is happening on ditch edges, ditches have also been dried out for the attempt to eradicate Crassula Helmsii.	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements. The habitat enhancements are designed to have a direct, long-term positive impact on this species with a confidence level of Certain/Near Certain . It is expected that this species may start to recolonise the application area with a confidence range from Likely
Bat Species	No Roost/Maternity Sites within application area. But used for feeding.	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements. The habitat enhancements are expected to have a direct, long-term positive impact. Increased quantities of water held on site will lead to increased forage opportunities for Pipistrellus spp and Daubenton's bats with a confidence level of Certain/Near Certain .
Reptiles		
Grass Snake	Have not been recorded present in the application area in the last 3 years. But likely on site.	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements. The habitat enhancements are expected to have a direct, long-term positive impact on grass snakes.
Common Lizard Slow Worm Adder	Have never been recorded present in the application area, they have on nearby sites.	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements. The habitat enhancements are expected to no change and no impacts positive or negative.
Amphibians		
Smooth newt	Have not been recorded present in the application area in the last 3 years.	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements. The habitat enhancements are expected to have a direct, long-term positive impact on smooth newts.
Great Crested newt	Present on site in ponds to the north of the application area. Have never been recorded within the application area.	Whilst the habitat enhancements would definitely benefit these species with a confidence level of Certain/Near Certain , colonisation would be assessed as Extremely Unlikely

Fish		
Eel	Not recorded by likely to be present.	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements. The ditch cleaning and hydrological improvements are expected to have a direct, long-term positive impact on this species with a confidence level of Certain/Near Certain .
Habitats		
Mudflats	Not part of the site application area	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements.
Littoral sediments (mud and sand flats)	Not part of the site application area	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements.
Coastal saltmarsh	Not part of the site application area	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements.
Seagrass (<i>Zostera</i>) beds	Not part of the site application area	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements.
Coastal lagoons	Not part of the site application area	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements.
Vegetated shingle	Not part of the site application area	Certain/Near Certain for no impacts positive or negative during delivery of the enhancements.

Table 6: : Assessment of scoped out conservation concern ecological receptors

5.4 Assessment of predicted likely effect of the delivery of enhancements on the South Thames Estuary and Marshes SSSI ecological receptors currently present in the application area.

SSSI 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
Breeding birds							
Garganey – No records of breeding Pintail – No record of breeding	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 breeding birds including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None - works happening outside of breeding season	n/a	Certain/ Near Certain
	Disturbance to breeding birds and destruction of nests during habitat enhancement and engineering works	Direct Temporary negative	Significant negative	Certain/ Near Certain	None – works happening outside of breeding season	None	Certain/ Near Certain
Spring Passage							
Redshank – low records on spring passage	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate	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	Certain/ Near Certain	None - works happening outside of spring passage season	n/a	Certain/ Near Certain

	ongoing management		species appropriate to a functioning wet grassland habitat				
	Disturbance to spring passage birds during habitat enhancement and engineering works	Direct Long term positive	Significant negative	Certain/ Near Certain	None - works happening outside of spring passage season	None	Certain/ Near Certain
Autumn Passage							
Grey plover – no records Curlew – no records Black-tailed godwit – no records Redshank - low and sporadic records Greenshank – no records.	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate	Direct Long term positive	Significant positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased numbers of Autumn passage birds including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None	n/a	Certain/Near Certain
	Disturbance during habitat enhancement and engineering works in one intensive phase across all 8 operational units	Direct Temporary negative	Significant negative	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 Site will also be dried out as per Document <i>Shorne Marshes SSSI consent</i> to make to site unsuitable to passage birds.	None	Certain/ Near Certain

	Disturbance during habitat enhancement and engineering works in one year across all 8 operational units but only one, two or three worked on at the same time	Direct Temporary negative	Not significant Numbers of autumn passage birds are expected to remain low across the application area before works are completed and very 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 Site will also be dried out as per Document <i>Shorne_Marshes_SSSI_consent</i> to make to site unsuitable to passage birds.	None	Certain/ Near Certain
Wintering Birds							
Shelduck – records yearly in winter. Mainly on West side of site due to being wet Gadwall- multiple records. Mainly on West side of site due to being wet Teal – multiple records yearly. Mainly on West side of site due to being wet Curlew - multiple records yearly. Mainly on West side of site due to being wet	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	Certain/ Near Certain
	Disturbance during habitat enhancement and engineering works in one intensive phase across all 8 operational units	Direct Temporary negative	Not significant Numbers to date are very low and sparsely distributed across the application area and similarly low and sparsely distributed for the extent of area available to wintering birds at Shorne Marsh 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 This scenario is considered highly unlikely and would only occur if significant delays in starting are experienced	None	Certain/ Near Certain

Black-tailed godwit - multiple records yearly. Mainly on West side of site due to being wet	Disturbance during habitat enhancement and engineering works in one year across all 8 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 which is set out in Section 5.2	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 which is set out in Section 5.2 This scenario is considered highly unlikely and would only occur if significant delays in starting are experienced	None	Certain/ Near Certain
Invertebrates							
• Invertebrate assemblage; including SSSI assemblage and: Beetles Damselflies Dragonflies Flies	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 invertebrates including an increase in species appropriate to a functioning wet grassland habitat	Certain/ Near Certain	None	n/a	n/a
	Loss of invertebrates during habitat	Direct	Moderate negative	Certain/ Near Certain	Keep vehicle tracking across site and work areas to the	Not significant	Certain/ Near Certain

	enhancement and engineering works	Short term negative Reversible	Individuals lost through excavations and excessive vehicle tracking routes		minimum area necessary i.e. use specified haul routes Keep stockpiling of materials and machinery to the minimum, and least sensitive, area necessary Undertake the enhanced surface water regime as soon as feasible to promote the increase in species appropriate to a functioning wet grassland habitat. See document RSPB_Shorne_Marshes_CEMP		
Higher Plants							
SSSI Species Assemblage. Plants present on site, Common reed, divided sedge, sea club rush	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 across the application area will ensure that the area becomes functioning floodplain grazing marsh with significantly enhanced sub-environments	Certain/ Near Certain	None	n/a	n/a
	Degradation/loss of habitat during habitat enhancement and engineering works	Direct Short term negative Reversible	Moderate negative Stands of plants lost through excavations and excessive vehicle tracking routes Only sea club rush and divided sedge will be impacted through works and	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	Not significant	Certain/ Near Certain

			movement on site. Both species are abundant and prevalent across the site, and will recolonise the areas of works within a year.		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 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		
Reptiles							
Grass Snake – No record on site in last 3 years but probably present on site	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 ditch enhancements and ongoing management will provide vastly superior habitat conditions resulting in an increase of grass snake most especially if this species is present	Certain/ Near Certain	None	n/a	n/a
	Loss of species during habitat enhancement and engineering works	Direct Long term negative	Significant negative Individuals lost during creation or repair of dams, culverts and crossing points	Certain/ Near Certain	Cut vegetation where dams, lips, culverts and crossing points are to be created or repaired during the active period after the breeding season (July to September) as a precursor to undertaking groundworks	Not significant	Certain/ Near Certain

					If present, remove all potential refugia/hibernacula (stones/rocks, metalwork, wood) from the work locations. Place the removed items outside the area needed to conduct the works to maintain local presence of refugia/hibernacula Maintain vegetation as very low until features have been created, restored or repaired Allow vegetation to recolonise naturally from the seed bank and other on-site sources Undertake the enhanced surface water regime as soon as feasible to promote the increase in grass snake prey species appropriate to a functioning wet grassland habitat		
Fish							
Eel	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 ditch enhancements and ongoing management will provide vastly superior habitat conditions resulting in an increase of eels if this species is present	Certain/ Near Certain	None	n/a	Certain/ Near Certain
	Loss of eel during habitat	Direct	Significant negative	Certain/ Near Certain	None due to ditches already being dry.	Not significant	Certain/Near Certain

	enhancement and engineering works	Long term negative	Individuals lost during ditching works.				
Habitats							
Wet Grassland	Changes in habitat from a principally dry system to functional and dynamic wetland habitats with appropriate ongoing management	Long term Positive	Significant Positive The enhancements and ongoing management will provide vastly superior habitat conditions resulting in increased numbers of breeding/wintering/passage birds, as well as improved non avian assemblage, including an increase in species appropriate to a functioning wet grassland habitat.	Certain/Near Certain	None	n/a	Certain/ Near Certain
Ditches		Direct Positive	The ditch enhancements and ongoing management will provide vastly superior habitat conditions resulting in an improved water quality, habitat for ditch system assemblages (avian and non-avian) and	Certain/Near Certain	None	n/a	n/a

Table 8: Assessment of effects to extant conservation concern ecological receptors.

6. Conclusion

This report has demonstrated that the project has been designed in a way that no likely significant negative effect will occur to The South Thames Estuary and Marshes SSSI and other ecological receptors of conservation concern across the application area.

Furthermore, the designated interest of South Thames Estuary and Marshes SSSI will benefit from the delivery of this project with long term significant positive effects that will enhance the conservation value of The South Thames Estuary and Marshes SSSI and Shorne Marshes for other ecological receptors of conservation concern.

