WYG Environment
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MSER Shoeburyness Phase 2

Nature Conservation Assessment and Ecological Mitigation Package

WYG PROJECT NO: A021830-34

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WYG PROJECT NO: A021830-34

Reference: A021830-34 QQ MSER2 - ecology				
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APPENDICES

0.0 INTRODUCTION

0.1 Background to project

The Ministry of Defence facility on Foulness Island near Shoeburyness holds a range of Battery sites, which comprise explosives firing and testing areas and associated buildings. All buildings being used for explosive operations must comply with HSE licensing regulations (Manufacture and Storage of Explosives Regulations 2005) and must be suitable for purpose. The MoD/QinetiQ operates a number of sites across the Shoeburyness area that all are affected by HSE licensing. Issues that may result in the refusal to grant a license include inadequate safety distances between explosive stores, the standard of buildings, inadequate messing facilities, electrical installations and security.

0.2 Development proposals and timing

The current application (MSER 2) comprises the construction of a number of safety features, including earth traverses, pipelines and pendine walls at the following Battery locations:

- Q Battery
- K Battery
- DAT Battery
- Rugwood Battery
- Churchend Battery
- Shelford Battery
- Sappers Area
- Nasewick Battery
- R Battery
- Eastwick Battery
- Environmental Test Centre (ETC) Buildings
- Avocet
- X3 Battery
- White City

The main development activity at all Battery sites is the construction of a series of earth traverses or bunds in which to store munitions. The traverses are 2.4m high with a base of 8.2m wide and are U-shaped with sides of approximately 25m in length. For fire safety reasons the earth traverses will be seeded with a grass seed mix and managed intensively thereafter by grass cutting on a regular basis. All construction and related storage activities will be confined to a fenced construction compound within the Licenced working area. Access to the compound will be facilitated via existing hard standing roads.

At Churchend and Rugwood Batteries short sections of drainage ditch will be affected by the proposed works, namely the construction of road crossings and the culverting of the water course.

0.3 Aims of this Assessment and Mitigation Package

This report aims to evaluate and assess the significance of the proposed work at each Battery site in terms of the impact on the biodiversity and protected sites on Foulness Island, and sets out a mitigation package to enable the work to commence. The primary aim of this work is to avoid any impact on the protected sites and species found in the area, to minimize impacts if avoidance is not possible and to put in place appropriate mitigation measures.

Extensive discussions have taken place between QinetiQ, the MoD, Defence Estates and WYG Management Services (Project Managers) to explore opportunities to avoid and minimise the ecological impact of the proposed works. This report is the end product of these discussions and draws upon the experience of site managers, as well as the ecological surveyors from WYG, who have developed background knowledge of the sites in question. A consultation period, including site visits by the Defence Estates Environmental Support Team and Natural England, has also enabled further refinements of the mitigation package.

0.4 Evaluation and Assessment

0.4.1 Methodology

The methodology utilised as a guideline for this assessment is based on the Institute for Ecology and Environmental Management (IEEM) guidelines approved and published in 2006 - Guidelines for Ecological Impact Assessment in the United Kingdom (IEEM, 2006). The evaluation approach is also informed by the standard nature conservation methodology set out in A Nature Conservation Review (Ratcliffe. 1977) and Guidelines for the selection of biological SSSIs (Nature Conservancy Council, 1989, revised 1998).

The IEEM guidelines recommend that the process of identifying the characteristics of the impacts should be made explicit by considering the following when describing impacts: confidence in predictions, positive or negative, magnitude, extent, duration, reversibility, timing and frequency, and cumulative effects.

The recommendations for predicting and characterising ecological impacts contained in the IEEM guidelines have been followed in broad terms. The assessment method utilises a process of assigning values to the identified ecological features and resources, predicting and characterising ecological impacts and, through this process, determining significance of potential impacts on ecological receptors.

The value of ecological receptors has been assigned following a standard geographic frame of reference. An ecological resource or feature is considered to be valuable (or have potential value) at the following scales:

- International;
- UK;
- National;
- Regional;
- County;
- District (or Unitary Authority, City or Borough);

- Local or Parish; and/or
- Within zone of influence only (which might be the project site or a larger area).

0.4.2 Significance of impact:

The assessment of the significance of impacts follows the guidance set out below and in this assessment is applied to the significance of the impact of the proposed works on invertebrates and vascular plants.

Sensitivity of Receptor	**Magnitude of Impact**			
	Substantial	***Moderate***	***Slight***	***Negligible***
High	Major	Major-moderate	Moderate	Neutral
Medium	Major-Moderate	Moderate	Minor	Neutral
Low	Moderate	Minor	Minor-neutral	Neutral

1.0 BASELINE INFORMATION

1.1 Previous surveys and biodiversity information

This package draws on a range of information sources:

- A Phase 1 ecological scoping study undertaken at each Battery site in March 2009 and updated during May and June 2009. This work evaluated the ecological and nature conservation interests of each Battery site and recommended a range of further surveys;
- Phase 2 type surveys of selected species groups as recommended in the Phase 1 survey undertaken during May and June 2009;
- A data search by Essex Wildlife Trust;
- Biodiversity information supplied by the Defence Estates Conservation Team.

This information is collated and reported in the Phase 1 and 2 survey reports produced by WYG Environment in June 2009, but is not duplicated in this report.

1.2 Designated sites

The Batteries are located within and close to the following statutory nature conservation sites:

- Foulness (Mid-Essex Coast Phase 5) Special Protection Area (SPA)
- Foulnesss Wetland of International Importance (Ramsar site)
- Foulness Site of Special Scientific Interest (SSSI)
- Essex Coast Environmentally Sensitive Area (ESA)

Other nature conservation and land management designations within the site boundary:

- Mid Essex Important Bird Areas
- Lowland Grazing Marsh UKBAP priority habitat type

Other nature conservation and land management designations within one kilometre of the site boundary:

- Essex Estuaries SAC
- Environmental Stewardship Agreements

Qualifying features of the Foulness SPA/Ramsar and SSSI

Foulness (Mid-Essex Coast Phase 5) SPA

Details of the qualifying features of the SPA are given in Appendix A and summarised below.

Foulness is located on the coast of Essex, on the east coast of England north of the mouth of the Thames estuary. The site is part of an open coast estuarine system comprising grazing marsh, saltmarsh, intertidal mud-flats, cockle-shell banks and sand-flats. It includes one of the three largest continuous sand-silt flats in the UK. The diversity of high quality coastal habitats at present support important populations of breeding, migratory and wintering waterbirds, notable very important concentrations of Dark-bellied Brent Goose *Branta bernicla bernicla*. Foulness is an integral component of the phased Mid-Essex Coast SPA.

Information on the ecological requirements of key bird species noted above is given in Appendix A

Foulnesss Wetland of International Importance (Ramsar site)

Details of the qualifying features of the Ramsar site are given in Appendix A and summarised below.

Foulness is part of an open coast estuarine system comprising grazing marsh, saltmarsh, intertidal mudflats and sandflats which support nationally rare and nationally scarce plants, and nationally and internationally important populations of breeding, migratory and wintering waterfowl.

Foulness Site of Special Scientific Interest (SSSI)

Details of the qualifying features of the SSSI are given in Appendix A and summarised below.

Foulness is a key site in 'A Nature Conservation Review' edited by D A Ratcliffe (Pub: Cambridge University Press, 1977). It supports representative habitats and species characteristic of the Essex Coastal zone and ss such, the safeguarding of this site is regarded as an essential element in the success of nature conservation in Britain. It is also proposed as part of the mid-Essex Coast Special Protection Area, under the EEC Directive on the Conservation of Wild Birds (Directive 79/409/EEC), and as a Wetland of International Importance (Ramsar).

1.3 The presence of SPA/Ramsar/SSSI Qualifying features and Notable and Protected species at the Battery sites

The Consultation, data search and Phase 1and 2 surveys and have shown that the Battery sites have potential to support a range of SPA/Ramsar/SSSI features and notable species. Table 1 below summarises these findings.

Table 1. Potential of Battery sites to support SPA/Ramsar/SSSI qualifying features and protected species.

Battery location	SPA/Ramsar/SSSI and Notable/Protected species interests											Notes
	SPA qualifying features	Ramsar qualifying features	SSSI features	Water Voles	Bats	Badgers	Birds	Amphibian, e.g. Great Crested Newts	Reptiles	Invertebrate interests	Vascular plants	
Q	✓	✓	✓	✓	×	✓	✓	✓	✓	✓	✓	Characteristic SPA habitats are found here, but the individual habitat patches are considered to be borderline UKBAP priority habitats. Large are is effected by the proposals and this comprises a mosaic of habitat in a topographically diverse location. High levels of water vole evidence in borrowdyke and Moderate levels of water vole evidence in ditches located approx. 60 m from site. Inactive badger sett located near access track > 30m distance from site. General breeding bird interest in scrub and moderate potential avocet nesting site approx. 60 m distance from site. Reptile interest in rank grassland of construction site. Amphibian interest in seasonal water body near boundary of construction site. Unlikely to support notable vascular plant and invertebrates and initial scoping survey suggests minimal significance.
K	✓	×	✓	✓	×	✓	✓	✓	✓	×	?	Characteristic SPA habitats are found here, but these do not qualify as UKBAP priority habitats due to the small size concerned. Moderate levels of water vole evidence along the borrowdyke approx. 30 metres from the borrowdyke. General breeding bird interest in scrub. Reptile interest along railway sidings and in rough marshy grassland behind the proposed development. Initial scoping survey suggests minimal invertebrate significance. Species rich

Battery location	SPA/Ramsar/SSSI and Notable/Protected species interests											Notes
	SPA qualifying features	Ramsar qualifying features	SSSI features	Water Voles	Bats	Badgers	Birds	Amphibian, e.g. Great Crested Newts	Reptiles	Invertebrate interests	Vascular plants	
K contd.												grassland behind proposed development comprising a relatively rich sward with orchids present, however this area is not affected by the proposed development.
DAT	✓	✓	✓	✓	×	✓	×	×	✓	×	×	Reptile interest at DAT. DAT holds a good population of common lizards. Old water vole feeding signs and latrine was observed in the ditch. This ditch lies adjacent to the proposed development of site construction welfare facility unit but the location of this unit is proposed to be relocated. High density of snuffle marks were observed from badger foraging and a latrine noted adjacent to northern development area, and a sett was reported on DAT battery. Areas of scrub were cleared however no setts were identified.
Eastwick	×	×	×	×	×	×	×	×	×	×	×	Old water voles signs are present in the drainage ditches and Moderate levels of current water vole evidence noted in the borrowdyke. These waterbodies border the site and appropriate mitigation is required to fence these ditches to protect water voles from the proposed developments. A low population of common lizards are present surrounding the Atlantic wall area and ditch to the north of the site.
Rugwood	✓	✓	✓	✓	×	×	×	×	✓	×	×	The presences of water voles have been confirmed along the ditches that surround the site and these ditches are proposed to be culverted for the proposed development
X3	×	×	×	✓	×	✓	×	×	✓	×	×	The site is a burning area and comprises large areas of hardstanding. Badger setts are present along the north western ditch. The ditch is approximately 18 metres from the proposed development. Badgers were using the setts in March 2009 but in May 2009 the setts were overgrown and not used. Oyster

Battery location	SPA/Ramsar/SSSI and Notable/Protected species interests											Notes
	SPA qualifying features	Ramsar qualifying features	SSSI features	Water Voles	Bats	Badgers	Birds	Amphibian, e.g. Great Crested Newts	Reptiles	Invertebrate interests	Vascular plants	
X3 contd.												catchers are nesting on the site but due to the nature of the activity on site these are not breeding successfully. A good population of common lizards are present at the site within the rough grassland habitat and tall ruderal vegetation on and surrounding the site. High levels of water vole evidence in borrowdyke located on the bank opposite the development (no activity on the bank adjacent to development) and Low levels of water vole evidence in the borrowdyke bank nearest to the development and in the ditches located approx. 18 m from site.
Sappers	✓	✓	×	✓	×	×	×	×	×	×	×	Low levels of water vole interest in the drainage ditches to the south west of the site, therefore the appropriate mitigation is required. Sappers has a good population of common lizards within the rough grassland throughout the site and adjacent to the drainage ditches. There is ground nesting bird interest throughout the rough grassland habitat.
R	×	×	×	×	×	✓	×	×	✓	×	×	Badger foraging interest and a latrine noted within the rough grassland habitat surrounding the site. The drainage ditch that lies to the south west of the development was not surveyed for water voles as the development does not impinge on this area however it is recommended fencing is erected to protect water voles from the development. Bird interest within the scrub habitat surrounding the site.
Avocet	×	×	×	×	×	×	×	×	×	×	×	Badger commuting habitat throughout the site. Low water vole interest in the eastern ditch immediately adjacent to the proposed development.
Shelford	✓	✓	✓	✓	×	×	×	×	✓	×	×	A small area of species-poor coastal grazing marsh is affected by the proposed works. A ditch system lies beyond the development footprint. Low population

Battery location	SPA/Ramsar/SSSI and Notable/Protected species interests											Notes
	SPA qualifying features	Ramsar qualifying features	SSSI features	Water Voles	Bats	Badgers	Birds	Amphibian, e.g. Great Crested Newts	Reptiles	Invertebrate interests	Vascular plants	
Shelford contd.												of common lizards present within rough grassland habitat adjacent to the ditch. Low presence of water voles signs along the drainage ditch to the south west of the proposed development
Churchend	✓	✓	✓	✓	×	✓	×	×	✓	×	×	A number of excavations are present within the banks of the ditch to the west of the site, thought to be once used by badgers but are inactive now. Reptile interest within rough grassland habitat either site of the ditch. Potential bird breeding habitat within scrub alongside the ditch. Moderate water vole interest present within the ditch to the west of the proposed development and new plans indicate that the southern ditch (not surveyed for water vole presence/absence) will now be culverted and an access road built upon it.
Nasewick	×	×	×	×	×	×	×	×	×	×	×	Areas of rough grassland of reptile interest but not affected by development.
ETC	×	×	×	×	×	×	×	×	×	×	×	The buildings at ETC are of bird nesting interest.
White City	×	×	×	×	×	×	×	×	×	×	×	

1.4 UK BAP Priority Habitat types

Table 2 lists the UK BAP Habitat types are found within or in close proximity to the Battery sites in question:

Table 2. UK BAP priority habitat types found within or in close proximity to the Battery Sites.

UK BAP Priority Habitat types	Battery site	Comments
Cereal Field margins	Rugwood?, Nasewick?	The field headlands at these Battery sites have potential to support rare arable plants and meet the criteria for the UK BAP type.
Lowland meadows/neutral unimproved grassland	Q, K and DAT Batteries	Elements of the habitat mosaic at Q Battery includes lowland meadows, areas adjacent to K, DAT and Shelford qualify as UK BAP lowland meadows
Coastal and Floodplain Grazing marsh	Q, K, DAT, Sappers and Shelford Batteries	Elements of the habitat mosaic at these sites support the characteristic UK BAP type, but none are grazed.
Reedbed	Q	Small area at Q Battery, but does not fulfil the UK BAP.
Saline lagoon	Q	Situated close to Q Battery site. A drying trend is evident.
Eutrophic Standing waters	Most Battery sites, inc. Q, K DAT and Nasewick	Most sites are close to or support standing, saline or brackish water ditches. Most are considered to be borderline UK BAP type.

2.0 LEGISLATIVE CONSIDERATIONS AND CONSTRAINTS

2.1 Introduction

The ecological impact assessment has been undertaken with reference to the following relevant legislation, planning guidance and policies.

2.2 European legislation and policies

The Conservation (Natural Habitats &c) Regulations 1994 (known as the Habitats Regulations) require 'Competent Authorities' (including the MoD and Natural England) to consider the impacts of plans and projects on sites designated as Special Protection Areas (SPA), Special Areas of Conservation (SAC) or Ramsar Sites. The process involves an assessment as to whether the proposals will have a significant effect on the features for which the site is designated. If, following consultation with Natural England, it is concluded that the integrity of a site would be adversely affected; the Authority must take appropriate action to remove the potential for harm. For example, planning obligations restricting the use of land or modification or revocation of the permission might be sought. European Protected Species

The Habitats Regulations also make it an offence to deliberately kill, capture, or disturb a European protected species, or to damage or destroy the breeding site or resting place of such an animal. European protected species include the Great Crested Newt (*Triturus cristatus),* otter (*Lutra lutra*) and all species of bats. In order to carry out any activities relating to development that may result in any of the offences above, it is necessary to obtain a licence from the Natural England (formerly issued by the Department for Environment, Food and Rural Affairs). In order for the licence to be granted the following conditions must be satisfied:

- The proposal must be necessary 'to preserve public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment';

- There is no satisfactory alternative';

- The proposals 'will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range'.

2.3 UK legislation and policy

Statutory nature conservation planning legislation

SSSIs are statutory UK sites which are notified under Section 28 of the Wildlife and Countryside Act 1981 (as amended) (WCA) for their biological, geological or physiographical interest, and to which reinforced protection is now given under the Countryside and Rights of Way Act (CRoW) Act 2000. SSSIs are representative samples of the best wildlife habitats and geological sites within the UK which are afforded protection against loss or damage to ensure that the diversity of plant and animal species, habitat s and representative geological samples in the UK is maintained.

The CROW Act, introduced in England and Wales in 2000, amends and stengthens existing wildlife legislation detailed in the WCA. It places a duty on government departments and the National Assembly for Wales to have regard for biodiversity, and provides increased powers for the protection and maintenance of SSSIs. The Act also contains lists of habitats and species (Section 74) for which conservation measures should be promoted, in accordance with the recommendations of the Convention on Biological Diversity (Rio Earth Summit) 1992.

The Natural Environment and Rural Communities (NERC) Act 2006 Section 40 places a duty upon all local authorities and public bodies in England and Wales to promote and enhance biodiversity in all of their functions. Sections 40 (England) list habitats and species of principal importance to the conservation of biodiversity and supersedes Section 74 of the CRoW Act. These species and habitats are a material consideration in the planning process.

The United Kingdom Biodiversity Action Plan (UKBAP), first published in 1994 and updated in 2007, is a government initiative designed to implement the requirements of the Convention of Biological Diversity to conserve and enhance species and habitats. The UKBAP contains a list of priority habitats and species of conservation

concern in the UK, and outlines biodiversity initiatives designed to enhance their conservation status. Lists and Broad and Local habitats are also included. The priority habitats and species correlate with those listed on Section 74 of the CRoW Act and Section 40 of the NERC Act.

The UK BAP list has recently been revised (2007) and as such the list is more extensive and includes many species which are not legally protected in the UK. All UK BAP priority species and habitats will be material considerations in any planning application where they are present.

UK BAP priority habitat types are defined by a set of standard descriptors which set out the criteria for UK BAP habitat qualification (Maddock, 2008).

UK Protected Species

The Wildlife & Countryside Act 1981 (as amended) is also the principal mechanism for the legislative protection of wildlife in Great Britain. The parts of this act likely to be most relevant to developments such as this one include:

- The protection of animals listed in Schedule 5 of the Act (which includes water voles and all species of reptiles and bats) which prohibits the intentional killing, injuring or taking, as well as possession and trade. In addition: places used for shelter and protection are safeguarded against intentional or reckless damage, destruction and obstruction and disturbance to animals occupying those places;

- The protection of wild birds which prohibits the intentional killing, injuring or taking of any wild bird and the taking, damaging or destroying of the nest (whilst being built or in use) or eggs;

- The protection of plants listed in Schedule 8 of the Act;

Badgers receive protection under the Protection of Badgers Act 1992 which prohibits, amongst other things, the killing, injuring or taking of badgers and interfering with badger setts. Development activities that may cause disturbance (classed as interference) to badger setts may require a licence issued by Natural England.

Planning Policy Guidance

In addition to the primary legislation, there are a number of national and local planning guidance and policies relating to biodiversity and nature conservation. This includes Planning Policy Statement 9 (PPS9). PPS9 sets out the key principles for local planning authorities assessing biodiversity and geological conservation in development control decisions. PPS9 also suggests that good design will incorporate opportunities beneficial for biodiversity and geological features.

Paragraph 1(ii) of PPS 9 states that: "...planning decisions should aim to maintain, and enhance, restore or add to biodiversity and geological conservation interests. In taking decisions, local planning authorities should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; and to biodiversity and geological interests within the wider environment."

Paragraph 1 goes on to state in part (vi) that "local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place".

3.0 EVALUATION AND ASSESSMENT

3.1 Designated statutory nature conservation sites

The Battery sites where the proposed works are planned are all either located within the Foulness (Mid-Essex Coast Phase 5) Special Protection Area (SPA), Ramsar Site and SSSI or situated within 400 metres of the boundary of this protected area.

The Batteries which are located wholly or partially within the SPA/Ramsar/SSSI boundary are:

- Q Battery;
- K Battery;
- DAT Battery;
- Sappers Battery;
- R Battery;
- Shelford Battery;

The Batteries which are located outside the SPA/Ramsar/SSSI boundary, but within 400 metres of the boundary of the protected area are:

- Nasewick Battery;
- Eastwick Battery;
- Rugwood Battery;
- Churchend Battery;
- X3 Battery;
- Avocet Battery;
- ETC;
- White City.

3.1.1 Evaluation and Assessment

Introduction

Following initial assessment through the Phase 1 scoping exercise, Phase 2 species surveys and in consultation with the Defence Estates Environmental Support Team a number of Battery Sites are considered to warrant assessment in relation to the impact of the proposed

works on the SPA/Ramsar and SSSI qualifying features. It is also acknowledged that the proposed works on all Battery sites will have some impact on the biodiversity of the area, particularly in relation to notable and protected species.

The ecological impact at each Battery site have been assessed in terms of both the construction and operational stages of the proposed development.

SPA/Ramsar and SSSI qualifying features

Q, K, DAT, Sappers, R Battery and Shelford Batteries support SPA/Ramsar and SSSI qualifying features and hence are the focus for this assessment.

Construction Phase

Habitat loss

Q, K, DAT, Sappers, R and Shelford Batteries have been highlighted in recent surveys to support characteristic coastal habitats, including grazing marsh, reedbed, lowland meadow/grassland and both standing and running brackish and saline, open water bodies. The construction of earth traverses and access roads on these sites will lead to a permanent loss of habitat.

These habitats are well represented on the SPA/Ramsar and SSSI and the areas in question form an integral element of the overall mosaic of habitats on Foulness Island. Collectively and across the whole area this habitat mosaic is fundamental in ensuring the future nature conservation status of the SPA/Ramsar and SSSI. It provides essential overwintering birds feeding and roosting ground and migratory and resident bird breeding sites. Any loss of habitat in this respect will impact on the integrity of the habitat mosaic as a whole and the network of bird feeding, roosting and nesting areas generally. As an important principal any loss of habitat within the SPA/Ramsar/SSSI should be avoided, but if this is not possible the replacement of habitats should ensure a net gain in biodiversity interest at this site.

The individual parcels of characteristic habitat types affected by the development proposals tend to be relatively small at each of these Batteries. The total area of the coastal grazing marsh UK BAP priority habitat type affected is approximately 1.5 hectares (Q, K, DAT, R, Sappers and Shelford Batteries). At Q and K Batteries where the largest land take will be

experienced approximately 0.72 ha and 0.1 ha respectively of coastal grazing marsh will be lost. The remaining sites will loss small areas which are adjacent to hardstanding and the existing active Battery footprint.

Individually, few of these habitat parcels strictly meet the definitions for the identification of a UKBAP priority habitat type and most represent low quality, botanically species-poor grassland and/or mid - late successional wetland areas (Maddock, 2008). Most of the semi-natural areas at these Battery sites are unmanaged, apart from the immediate surrounds of the Batteries, and are maintained by the prevailing coastal climatical conditions. The main interest therefore lies in their geographical position on Foulness Island, their value as part of the habitat mosaic and their contribution towards the important feeding, roosting and breeding bird habitat on the Island (SPA criteria).

In relation specifically to the SPA/Ramsar/SSSI qualifying features the semi-natural habitats found at Q, K, DAT, Sappers, R and Shelford Batteries are considered to be valuable in nature conservation terms at the ***Within the zone of influence only*** to a ***Local*** level.

Impact on bird fauna

At Q, K, DAT, Sappers, R and Shelford Batteries the qualifying features of the SPA, the over wintering and breeding birds, are unlikely to extensively utilise these sites for feeding and/or breeding purposes. The relatively small areas concerned, their proximity to man made structures and the regular activity at each Battery site renders these sites unfavourable for nesting purposes.

At Q Battery the local 'effective field size' is reduced from approximately 4 ha to 1.5 ha, reducing the attractiveness of this area to feeding and roosting overwintering birds. Birds may be discouraged from using the reedbed, wet grassland areas and small open water body to the east of the proposed works as a result. However, the small open water area is a saline/brackish lagoon which has low to moderate potential as an avocet nesting location (not currently used by this species for this purpose). This wetland sits approximately 50m from the proposed construction area and will not be affected by the development activities. Similarly, the site is not considered to be a significant feeding area for over wintering birds. In addition it is considered that predation would be excessive in this area.

At K Battery the size of the habitat affected is also small at approximately 0.1ha and is unlikely to be used by the qualifying features of the SPA. This is also the case at DAT, Sappers, R and Shelford Batteries, the latter because of its proximity to the main spine road of the Island.

These Battery sites are considered to be of value ***Within the zone of influence*** only for bird nesting, feeding and roosting purposes.

The proposed construction areas are located close to and within busy Battery firing facilities and whilst there may be some small increase in noise and disturbance levels as a result of the construction this is not expected to be significant to the bird fauna at these sites. The bird population in the vicinity of these facilities are considered to be habituated to the noise and disturbance at these sites and therefore any small increase in noise levels will be insignificant for over wintering and feeding birds.

The construction of the large earth traverses in open areas adjacent to existing buildings may create a visual barrier to sight lines for birds feeding, nesting and roosting in the vicinity of the Battery sites. This may leave birds exposed to predation pressure and reduce nesting potential and success in these areas. At Q Battery the earth traverses will be located within 40 m of a shallow scrape and approximately 70 m from the delph/borrowdyke, both have been recognised as having moderate potential as avocet nesting and feeding areas. This is considered to be a significant impact and will require need to mitigated

The 'in combination' or cumulative effects of disturbance should also be considered particularly as the construction phase will last from October 2009 until March 2010. The impact on the critical overwintering period for the SPA/Ramsar bird qualifying features is the key issue. It is considered however that the impact will be of minor significance given the phasing of construction activities, the current level of disturbance at each site due to the Battery operation and the presence of extensive alternative roosting and feeding areas on Foulness Island. Overwintering birds move around the network of feeding and roosting areas on a daily basis and during the months they remain on the Island. It is the presence and integrity of the network of potential overwintering bird roosting and feeding areas which is important to protect and temporary disturbance as a result of construction will be of limited significance.

Impact on invertebrates and vascular plants

There are two other qualifying features related to the Ramsar and SSSI designation which are important on Foulness Island – a short list of notable invertebrates and vascular plants. A screening procedure and impact assessment has been carried out on the list of species concerned and this is given in Tables 3a and 3b in Appendix C.

The impact of the proposed works is considered to be of minor significance for the listed notable vascular plants. It is considered therefore that the habitats at Q, K, DAT, Sappers, R and Shelford Batteries, which will be lost, could potentially be valuable for selected notable vascular plant species at the level of ***Within the zone of influence*** only. However, it is important that mitigation takes into account the loss of potential habitat for these species. The construction of the earth traverses offers an opportunity to create a 'sea wall-type' habitat favoured by several of the notable vascular plant species.

For several invertebrates species the impact is judged to be of moderate significance. These are the scarce emerald damselfly *(Lestes dryas) and* the hoverflies *Lejops vittata and Paragus albifrons*. The records and surveys have not located these species on the Battery sites, yet the habitats present are favourable and there is potential to support these species on or close to the areas in question.

Few records exist for the two hoverfly species in Essex, but the scarce emerald damselfly is recorded widely in the Thames estuary and inland in Norfolk and the south Midlands. The habitats in the proposed works area of each Battery site are considered to be sub-optimal for these species, apart from Q Battery. Here the dense vegetation is favourable especially for the hoverfly *Paragus albifrons*, which has been founding in low-lying grass marshes and ditches adjacent to drier grassy banks and shell beaches with sparse vegetation (Stubbs and Falk, 1996). The latter is the habitat where the Essex record was located. The preferred habitats for the scarce emerald damselfly and the hoverfly *Lejops vittata* are located in the area but outside the proposed work areas at each Battery site.

It is considered therefore that the habitat at Q Battery, which will be lost is valuable for these invertebrate species at the level of ***Within the zone of influence*** only. However, it is important that mitigation takes into account the loss of potential habitat for these species.

Rugwood and Churchend Batteries are affected by specific ditch works, but no ditch habitat will be lost as a result and these sites sit outside the SPA/Ramsar/SSSI boundary. However, it can not be discounted that these ditches may support SPA/Ramsar/SSSI qualifying features and therefore should be protected as much as possible. Approximately 40 metres of ditch habitat at Rugwood and Churchend Batteries will be directly affected by the proposals. Small sections will be culverted and hence a small area of habitat there will be lost, but the remaining stretches will be reinstated and enhanced. Put in context this is approximately 0.03% of the total length of this habitat type across Foulness Island as a whole (approx. 150km).

Operational Phase

During the operational phase at the Batteries within the SPA/Ramsar/SSSI boundary the impact of the new structures on the SPA qualifying features will be similar to the existing situation. These busy Battery facilities will continue to operate at sensitive times of the day, e.g. high tide feeding and roosting, and the year, e.g. winter feeding and roosting, and the avocet breeding period. It is considered that the resident and migratory bird fauna quickly habituates to the current noise and activity levels and the operational phase of the Battery sites post-construction works provides limited additional disturbance.

3.2 Protected (WaCA, 1981) and notable (UKBAP) species

3.2.1 Evaluation

The following table summarises the value of each Battery site for protected (WaCA, 1981) and notable (UKBAP priority) species and does not duplicate the assessment undertaken for the SPA/Ramsar/SSSI qualifying features above.

3.2.2 Water voles

Table 4. Water vole evaluation

Battery location	Evaluation Notes
Q	Water vole evidence in ditch and borrowdyke approx. 60 m from site. Probable high population in borrowdyke, but less so in the drainage ditches near construction area. *Local* value.
K	Probable high population in borrowdyke; three ditches adjacent to the construction areas inaccessible due to H&S issues, but unfavourable habitat for water voles. *Local* value.
DAT	Old feeding evidence of water voles, but probably present in the ditches adjacent to the construction area. *Within the zone of influence* value only.
Eastwick	Old feeding evidence of water voles, but probably present in the borrowdyke and ditches adjacent to the construction area. *Local* value.
Rugwood	Borrowdyke some distance from the construction area inaccessible due to H&S issues, but in surrounding ditches evidence of medium population of water voles. *Within the zone of influence* value only.
X3	Probable high population in borrowdyke; fresh signs along drainage ditches bordering site, but less frequent. *Local* value.
Sappers	Probable medium sized population in ditches adjacent to the site. *Within the zone of influence* value only.
R	No survey undertaken due to initial plans suggesting no impact on ditches. Plans have now changed and it is assumed a water vole presence at this site. *Local* value.
Avocet	Old feeding evidence of water voles, but probably present in the ditches adjacent to the construction area. *Local* value.
Shelford	Probable medium sized population in ditches adjacent to the site. *Within the zone of influence* value only.
Churchend	Probable medium sized population in ditches adjacent to the site. *Within the zone of influence* value only.
Nasewick	No survey undertaken due to initial plans suggesting no impact on ditches, but assuming water vole presence. *Local* value.
ETC	No survey undertaken due to initial plans suggesting no impact on ditches. *Negligible* value
White City	Small ditch present but not affected by construction activity and surrounded by improved short grassland. *Negligible* value

3.2.3 Bats

Table 5. Bats evaluation

Battery location	Evaluation Notes
Q	N/a. No structures or trees available as roost sites.
K	N/a. No structures or trees available as roost sites.
DAT	N/a. No structures or trees available as roost sites.
Eastwick	N/a. No structures or trees available as roost sites.

Rugwood	N/a. No structures or trees available as roost sites.
X3	N/a. No structures or trees available as roost sites.
Sappers	N/a. No structures or trees available as roost sites.
R	N/a. No structures or trees available as roost sites.
Avocet	N/a. No structures or trees available as roost sites.
Shelford	N/a. No structures or trees available as roost sites.
Churchend	N/a. No structures or trees available as roost sites.
Nasewick	A bat roost potential assessment was undertaken, but *Negligible* value.
ETC	N/a. No structures or trees available as roost sites.
White City	N/a. No structures or trees available as roost sites.

3.2.4 Badgers

Table 6. Badgers evaluation

Battery location	Evaluation Notes
Q	Inactive badger sett in an old access track in scrub. > 30 m from construction area. *Within the zone of influence only* value.
K	No evidence.
DAT	Records of badger sett on the construction site from 1993. No current evidence, but substantial foraging and territorial activity. *Local value* as a foraging area.
Eastwick	No evidence.
Rugwood	No evidence.
X3	An active badger sett in March 2009 found in the ditchside along the north west boundary of construction site. This is probably an 'Outlier' sett and is not a main sett. Approx. 18m distance from construction area. *Local value* due to the active sett.
Sappers	No evidence.
R	Foraging signs around site, no setts, but territorial activity over 30m from construction area. *Within the zone of influence only* value as a foraging area.
Avocet	Territorial activity near eastern boundary of site, no setts. *Within the zone of influence only* value as a foraging area.
Shelford	No evidence.
Churchend	Probable badger excavations along ditch to the west of the construction area, some foraging signs. *Local value*
Nasewick	Badger sett approx. 1050m from construction area. *Negligible value.*
ETC	No evidence.
White City	No evidence.

3.2.5 Common nesting birds, e.g. passerines.

Table 7 Common birds evaluation

Battery location	Evaluation Notes
Q	Scrub and wet grassland/reedbed areas suitable as nesting and feeding sites. *Local value.*
K	Scrub and wet grassland/sedge and borrowdyke areas suitable as nesting and

	feeding sites. *Local value.*
DAT	Scrub areas suitable as nesting and feeding sites. *Within the zone of influence only* value.
Eastwick	Atlantic Wall area as nesting and feeding sites. *Within the zone of influence only* value.
Rugwood	Small areas of scrub along the ditch suitable as nesting and feeding sites. *Within the zone of influence only* value.
X3	Ground nesting potential, but due to activity at this site *Negligible* value.
Sappers	Ground nesting potential, but intensively managed. *Within the zone of influence only* value.
R	Small areas of scrub as nesting and feeding sites. *Within the zone of influence only* value.
Avocet	*Negligible* value.
Shelford	*Negligible* value.
Churchend	Small areas of scrub along the ditch suitable as nesting and feeding sites, but arable land within construction area. *Negligible* value.
Nasewick	*Negligible* value.
ETC	Foraging potential for over wintering birds and ditches as nesting areas. Buildings hold potential for nesting birds. *Within the zone of influence only value.*
White City	Buildings hold potential for nesting birds. *Within the zone of influence only value.*

3.2.6 Reptiles

Table 8 Reptiles evaluation

Battery location	Evaluation Notes
Q	Good population of common lizard and slow worm, low population of grass snake. *Local* value.
K	Good population of common lizard and slow worm. *Local* value
DAT	Good population of common lizard only. *Within the zone of influence only value.*
Eastwick	Low population of common lizard only. *Within the zone of influence only value.*
Rugwood	No surveys as ditches were being cut and managed intensively. Considered to be present. *Within the zone of influence only value.*
X3	Good population of common lizard only. *Within the zone of influence only value.*
Sappers	Good population of common lizard only. *Within the zone of influence only value.*
R	Low population of common lizard and slow worm. *Within the zone of influence only value.*
Avocet	N/a
Shelford	Very low population of common lizard only. *Within the zone of influence only value.*
Churchend	Low population of common lizard only. *Within the zone of influence only value.*
Nasewick	N/a
ETC	N/a
White City	N/a

3.2.7 Amphibians

Table 9 Amphibians evaluation

Battery location	Evaluation Notes
Q	A small smooth newt population located in drainage ditch adjacent to construction area. *Within the zone of influence only value.*
K	N/a
DAT	N/a
Eastwick	N/a
Rugwood	N/a
X3	N/a
Sappers	N/a
R	N/a
Avocet	N/a
Shelford	N/a
Churchend	N/a
Nasewick	N/a
ETC	N/a
White City	N/a

3.2.8 Invertebrates

Table 10. Invertebrates evaluation

Battery location	Evaluation Notes
Q	Supports characteristic coastal grazing marsh habitats within the construction area, which have moderate potential to support notable invertebrates. *Within the zone of influence only value.*
K	Supports characteristic coastal grazing marsh habitats which have moderate potential to support notable invertebrates. All adjacent to construction area. *Within the zone of influence only value.*
DAT	Supports characteristic coastal grazing marsh habitats which have moderate potential to support notable invertebrates. All adjacent to construction area. *Within the zone of influence only value.*
Eastwick	N/a
Rugwood	N/a
X3	N/a
Sappers	Supports low quality coastal grazing marsh habitat which has low potential to support notable invertebrates. All adjacent to construction area. *Within the zone of influence only value.*
R	N/a
Avocet	N/a
Shelford	Supports characteristic coastal grazing marsh habitats which have moderate potential to support notable invertebrates. All adjacent to construction area. *Within the zone of influence only value.*

Churchend	N/a
Nasewick	Supports low quality coastal grazing marsh habitat which has low potential to support notable invertebrates. All adjacent to construction area. *Within the zone of influence only value.*
ETC	N/a
White City	N/a

3.2.9 Vascular plants

Table 11. Vascular plants evaluation

Battery location	Evaluation Notes
Q	Construction site adjacent to borrowdyke which has records of notable vascular plants. *Within the zone of influence only* value.
K	Areas of characteristic species-rich neutral grassland adjacent to site, but not impinging on construction area. *Within the zone of influence only value.*
DAT	Areas of characteristic coastal grazing marsh adjacent to site, but not impinging on construction area. *Within the zone of influence only value.*
Eastwick	N/a
Rugwood	Areas of arable fields may hold rare arable plants. *Within the zone of influence only* value
X3	Tall ruderal with moderate species-richness. *Within the zone of influence only* value
Sappers	Supports low quality coastal grazing marsh habitat which has low potential to support notable vascular plants. All adjacent to construction area. *Within the zone of influence only value.*
R	N/a
Avocet	N/a
Shelford	Areas of characteristic coastal grazing marsh adjacent to site, but not impinging on construction area. *Within the zone of influence only value.*
Churchend	N/a
Nasewick	Areas of arable fields may hold rare arable plants. *Within the zone of influence only* value
ETC	N/a
White City	N/a

3.3 Assessment

3.3.1 Construction Phase

Table 12 below summaries the evaluation procedure and indicates where the impacts of the proposed works are considered to be significant.

Table 12. Significant negative impacts during the construction phase

Battery location	Negative impacts regarded as significant therefore requiring mitigation measures									Notes
	SPA/Ramsar/ SSSI qualifying features	Water Voles	Bats	Badgers	Birds	Amphibian, e.g. Great Crested Newts	Reptiles	Invertebrate interests	Vascular plants	
Q	✓	×	×	×	✓	×	✓	✓	✓	A large area of characteristic SPA habitat will be lost as a result of the construction activity and appropriate mitigation measures are required. Reptile interest in rank grassland on construction site will be lost and appropriate mitigation measures are required.
K	✓	×	×	×	×	×	✓	×	×	Small area of characteristic SPA habitat will be lost and appropriate mitigation measures are required. Reptile mitigation measures required.
DAT	✓	×	×	×	×	×	✓	×	×	Small area of characteristic SPA habitat will be lost and appropriate mitigation measures are required. Reptile mitigation measures required.
Eastwick	×	×	×	×	×	×	✓	×	×	Reptile mitigation measures required.
Rugwood	×	✓	×	×	×	×	✓	×	×	Reptile and water vole mitigation measures required.

Battery location	Negative impacts regarded as significant therefore requiring mitigation measures									Notes
	SPA/Ramsar/ SSSI qualifying features	Water Voles	Bats	Badgers	Birds	Amphibian, e.g. Great Crested Newts	Reptiles	Invertebrate interests	Vascular plants	
X3	×	×	×	✓	×	×	✓	×	×	Badger and reptile mitigation measures required. Non licensable badger protection required.
Sappers	✓	×	×	×	×	×	✓	×	×	Small area of low quality SPA habitat will be lost and appropriate mitigation measures are required. Reptile mitigation measures required.
R	✓	×	×	×	×	×	✓	×	×	Small area of low quality SPA habitat will be lost and appropriate mitigation measures are required. Reptile mitigation measures required.
Avocet	×	×	×	×	×	×	×	×	×	No further work required other than general precautionary approach.
Shelford	✓	×	×	×	×	×	✓	×	×	Coastal grazing marsh area lost and appropriate mitigation measures are required. Reptile mitigation measures required.
Churchend	×	✓	×	×	×	×	✓	×	×	Reptile and water vole mitigation measures required.
Nasewick	×	×	×	×	×	×	×	×	×	No further work required other than general precautionary approach.
ETC	×	×	×	×	×	×	×	×	×	No further work required other than general precautionary approach.
White City	×	×	×	×	×	×	×	×	×	No further work required other than general precautionary approach.

3.3.2 Operational Phase

It is expected that post construction the species groups noted above will return to the vicinity of the construction area and continue to inhabit the busy Battery facility sites. A precautionary approach should be adopted for the ongoing management of the Battery sites and every opportunity should be taken, given the limitations of the necessary Health and Safety works, to relax the management input, for example, the grass cutting regimes around the Earth Traverses in non–essential fire risk areas.

4.0 MITIGATION PLAN

4.1 SPA/SSSI mitigation guidance

Primary mitigation works

The cumulative loss of characteristic SPA/Ramsar/SSSI habitat at Q, K, DAT and Shelford Batteries is considered to be significant and therefore it is important to investigate the options for replacement and creation of similar coastal grassland and wetland habitats on Foulness Island.

A number of basic principles apply to the mitigation work required for the replacement of characteristic SPA/Ramsar/SSSI habitats, these are:

- The replacement of lost habitats should result in a net gain in the biodiversity interest on Foulness Island and not necessarily on a 1:1 or 1:2 loss to replacement ratio;
- The created and/or restored habitats should contribute to the conservation of the integrity of the network of important bird feeding nesting and roosting sites across Foulness Island;
- The created and/or restored habitats should also take into account the ecological requirements of the other Ramsar/SSSI notable invertebrate and vascular plant species;
- The mitigation work associated with the MSER 2 project should also contribute towards bringing the specific SSSI Units on Foulness Island back into favourable condition;
- The latter should be achieved by the development of an overarching ecological management plan for SSSI Unit 4 (Wakering Stairs) and other SSSI Units as necessary.

Recent discussion and consultation with the MoD, Defence Estates, QinetiQ and Natural England have resulted in a number of possible locations for this work. The mitigation areas require detailed planning, design and working methods statement. There will be further requirement for further consultations with the Environment

Agency, due to the flood defence and land drainage consent implications, Natural England and RSPB. It is essential to ensure that these mitigation schemes align and are fully integrated with all existing flood defence plans, e.g. the Flood Management Unit No. 10 proposed upgrade to the sea wall, The RSPB have extensive experience in creating and restoring similar habitats and as such it is important that key personnel are involved in the planning and design stage of these mitigation works.

The short listed locations for the mitigation schemes are given below with a broad description of the work involved.

- **Ware Corner, near Courts End** on the Crouch River Estuary– widen and extend ditches to create a predator-free island for bird nesting purposes, especially avocets, and re-profiling of ditches to enhance for characteristic invertebrates and vascular plants;

- **Between N and P Butts and Q Battery** – create shallow wet scrapes and a ditch system in open, low-quality grazing marsh areas, the latter to enable control of water levels and for predator control purposes. The borrowdyke/ delph ditch system will also be linked to the new ditch network. Reduce scrub cover and create open coastal grazing marsh providing continuity with Q Battery site through to N Butts of characteristic open grazing marsh habitat;

- **Q Battery** – reprofile existing shallow scrape to east of construction area to create a deeper central area and shallow 'fingers'. This will enhance the site as bird nesting area and assist in predator control;

- **N Butts** – introduce scrub management regime to enhance site for nesting birds and reptiles, the latter as a receptor area for the translocated reptiles from the various Battery sites. The area is already an important reptile site and the above work will bolster the existing habitat and enhance the area generally for reptiles and nesting birds.

Other SPA/Ramsar/SSSI mitigation works

Wetland and drainage ditch protection

During construction works it is important to ensure that ditches and water bodies are protected from encroachment and storage of materials etc. Where ditches are found close to the construction area protective fencing should be erected. Apart from Rugwood and Churchend Batteries, which lie beyond the SPA/Ramsar/SSSI boundary, most ditches are found outside the construction areas, but in some locations the ditches are vulnerable to disturbance. This work is also required to protect water vole habitat and as such is specified in Sections 4.2 and 4.3 below.

Earth traverse construction landscaping

A habitat creation opportunity is presented in the construction of the earth traverses.

The soil on these large structures will need to be stabilised at an early stage after construction. This is usually achieved by sowing a grass seed mix. Given time, appropriate management and if sown with a suitable grass/wildflower seed mix, the traverses could support characteristic Foulness Island sea wall plant communities and provide a favourable habitat for several notable vascular plants. There are limitations however in achieving this aim, the primary factor being the intensity of the grass cutting regime and the requirement to keep the grass short for fire hazard reasons.

The following recommendations are given:

- the traverses should be constructed or formed with infertile subsoil material of a known and uncontaminated source;
- seed collected locally from the sea wall or coastal grazing marsh area should be sown at an appropriate rate;
- if seed cannot be collected, then hay cut material from the coastal grazing marsh can be spread over the traverse to stabilise the soil and seeds will naturally establish from this source;

- The first year of establishment will require frequent cutting of the traverses to reduce the vigour of competitive grasses and enable perennial herbs to establish. Thereafter in subsequent years, the cutting regime should be relaxed, with just one cut during April/early May and then several cuts during late summer early autumn to reduce dead and fire hazard material (nb. young green growth of grass is not usually a fire hazard, so the priority should be to clear old growth/dead stalks from end of July onwards);
- All arisings or cuttings should be removed from site;
- The emerging plant communities on the earth traverses should be monitored to inform any changes in the management/cutting regime.

4.2 Generic protected species (WaCA, 1981) mitigation guidance

General mitigation guidelines which apply generally to a number of Battery sites are noted below.

4.2.1 Water voles

Water vole mitigation will entail a 'displacement' approach rather than capture and translocation, since on the relatively small of operation such an approach is likely to be considerably less stressful for animals than trapping and forced relocation.

The following procedure will be adopted at Rugwood and Churchend batteries:

- vegetation cutting of both ditch banks in August/September, including emergent plants and repeated on a regular basis (at least once a week). Cut to bare soil;
- where possible draw-down the water in the ditch, in conjunction with vegetation removal, for a period of at least two weeks (this may not be necessary as some ditches are dry); and
- ensure that the presence/provision of suitable alternative habitat for animals is maintained within proximity of the works corridor.

There is generally there should be no requirement for exclusion fencing. Associated contractor briefing and monitoring work is also important, the latter indicates the progress and success of the mitigation approach. This work should include:

- a 'Tool Box' Talk for the contractor;
- monitoring of signs of water vole presence before, during and after mitigation works.

In order to ensure no long term impact upon water vole populations, re-instatement of good quality habitat is an important aspect of the post construction phase. The cutting of vegetation along and within the ditches should be relaxed to pre-mitigation levels, water returned to ditches, and where necessary appropriate vegetation turves should be transferred to disturbed areas for rapid revegetation.

All other construction works at the other Battery sites close to ditches (within 5 m of a ditch/delph/borrowdyke) should take account of possible water vole activity. In this respect it is proposed that exclusion fencing be placed in strategically to ensure no encroachment of works or materials into the ditch zone (see mitigation plans for details where this is necessary).

All works should be supervised by a suitably qualified and experienced ecologist.

4.2.2 Badgers

The potential disturbance to a badger sett

All badger setts are protected under the Protection of Badgers Act 1992. It is an offence to disturb or destroy a badger sett or to disturb badgers in their setts whether intentionally or recklessly. This includes working close to a sett without taking positive steps to avoid damage and or undertaking such work without an appropriate licence. There should be a presumption that all setts will be protected in situ. Disturbance in the vicinity of any sett where breeding is confirmed or expected should be avoided during the period 1st December to 30th June inclusive. Work close

to a badger sett, e.g. less than 30 metres as a guideline, during the breeding period is normally not acceptable and a licence application will not be approved. This does not apply to most Battery sites apart from X3. See specific mitigation measures for X3 Battery below.

General interaction between badgers and the construction site on the other Batteries.

The construction phase of the development activities may pose a temporary threat to badgers or disturb them whilst they are in their sett. The latter is unlikely given the distance of most setts from these areas, but a precautionary approach should be adopted given the prolific population of badgers on Foulness Island. This applies to the following sites:

- Q Battery
- Dat Battery
- X3 Battery
- Avocet Battery
- Churchend Battery
- Nasewick Battery

The following guidelines should be adopted:

- Badger activity should be monitored on the construction area throughout the works phase and due diligence taken to protect badgers from the construction works;

- The use of noisy plant and machinery in the vicinity of a badger sett should cease at least two hours before sunset;

- Security lighting should be directed away from setts;

- Chemicals should be stored as far away from the setts and badger paths as possible;

- Trenches must be covered at the end of each working day, or include a means of escape for any animal falling in. (Badgers will continue to use established paths across a site even when construction work has started);

- Any temporarily exposed open pipe system should be capped in such a way as to prevent badgers gaining access as may happen when contractors are off site;

- Water sources (for badgers) should always be safeguarded;

4.2.3 Common nesting birds

There are generally no specific bird related constraints on the Battery sites in question, apart from those indirectly associated with the SPA, see above. However, general guidelines are necessary for the following sites which have some potential as nesting areas and where birds may begin nesting from mid February/early March:

- Q Battery
- K Battery
- DAT Battery
- Rugwood Battery
- Churchend Battery
- Sappers Area
- R Battery
- Eastwick Battery
- Environmental Test Centre (ETC) Buildings
- X3 Battery
- White City

If the works are likely to affect the existing bird nesting habitats, e.g. buildings, scrub, etc. in the latter part of the working period, i.e. mid February to March, it is important that these areas are not disturbed. If nesting habitat is removed during the breeding bird season (unlikely), a nesting bird survey will be required prior to vegetation/building removal. It should be noted here that birds will sometimes nest

outside these months and the relevant legislation will still apply to any nesting birds are found.

4.2.4 Reptiles

Reptile populations are found at a number of Battery sites, these are:

- Q Battery
- K Battery
- DAT Battery
- Rugwood Battery
- Churchend Battery
- Shelford Battery
- Sappers Area
- R Battery
- Eastwick Battery
- X3 Battery

These sites will be treated generally similar in terms of the mitigation required. The aim of mitigation will be to avoid harm to reptiles and to enable the client to comply with the relevant species protection legislation. Reptiles will be initially encouraged to move from the construction area by manipulation of the habitat and then if required captured and moved from the construction area. There may not be a necessity to construct reptile fencing in all areas.

There are Health and Safety aspects related to the work required in the reptile translocation project and the methodology has been adapted accordingly. For example, because of the possibility of unexploded ordnance a traditional destructive search (stripping of the top layers of soils) will not be undertaken and reptile fencing should be minimised, since the erection of such usually entails excavation of a shallow trench.

The general methodology will be:

Managed exclusion:

The initial phase of the translocation project will comprise excluding and clearing reptiles from the construction working area in August and September 2009. The managed exclusion approach will be as follows:

- Hand search the area and capture any reptiles found placing in a suitable habitat in the area well outside of the construction area;
- Under WYG ecological supervision cut/strim the vegetation using hand held machinery;
- Implement an intensive capture effort (two visits per day in suitable weather conditions) by placing suitable artificial refuges across the site at a density above the recommended standard (10 per ha) at approximately 20 per 0.1ha;
- Undertake a further hand search and then a further cut/strim on the footprint of the earth traverses. This 'hard' strim should be taken to the bare soil;
- Continue the capture of reptiles until the project ecologist confirms the site is clear of reptiles;
- A judgment on the conclusion of the capture stage of the translocation will be made by the Ecologist Project Manager in consultation with Natural England/Defence Estates, but is usually accepted after five consecutive visits to a site without encountering any animals;

Record keeping and reporting

Throughout the translocation project records of all activities will be made and stored in electronic format. All animals captured will have the following information recorded:

- Species
- Sex
- Activity level (Active, resting, torpid, breeding condition etc)
- Stage (Adult female, adult male, Immature male/female, juvenile etc)

Information will also be recorded on the source of the translocated animals, e.g. mat/tin number and the location of these artificial refuges will be digitally mapped by GIS. The relocation destination will also be recorded, mapped and cross-referenced to the source information.

A range of environmental information will also be collected at the time of capture and relocation, including, air and ground temperature, weather conditions etc.

The receptor areas

The enhancement of reptile habitat, as an element of the mitigation project, at N Butts noted in Section 4.1 above will provide an important receptor area for most Battery site translocations. However, it is always preferable to move animals to a suitable area as close to the donor site as possible. In some Battery sites there is substantial capacity to do this, but where this is not the case then the N Butts receptor site will be utilised.

Monitoring of the translocated reptile population

Generally there is a requirement to monitor translocated populations to assess survival rates. However, given the presence of extensive favourable reptile habitat across Foulness Island it is considered unnecessary to undertake this activity on this occasion. It is important however to ensure that animals are moved into favourable habitat where there is substantial space to coexist with the resident reptile populations.

Translocation Work Programme

All translocation and managed exclusion work should be completed by mid to late October 2009.

4.3 Specific Battery site protected species mitigation guidance

The following section provides site specific guidance where a variation from the generic guidance given above is required.

4.3.1 Q Battery (see plan A02180/QBatt in Appendix C)

SPA/SSSI

All specific SPA–related mitigation requirements are discussed in Section 4.1 and noted in Section 5.1 above.

Protected species mitigation measures

Reptiles

The two construction areas will require vegetation clearance and translocation in the large area of marshy grassland, small strip of ditch, some scrub in the centre of the site and the area of railway line.

The generic methodology will be followed as detailed above with the following addition:

- As well as cutting/strimming of grass, small areas of scrub will also need to be cleared in the construction area (outside the bird breeding period and during September 2009).

Preferably reptile fencing is required on this site to ensure no ingress of reptiles back onto the site. However, this action is limited due to significant Health and Safety issues and therefore a managed exclusion approach is adopted.

Water voles

This species is found in the ditches around the site. The ditch close to the construction area will need to be protected, but no displacement work is required. The generic methodology will be followed as detailed above and with the addition of the following work:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone;
- The fence to be erected under supervision of the Project Ecologist.

4.3.2 K Battery (see plan A02180/KBat in Appendix C)

SPA/SSSI

All specific SPA–related mitigation requirements are discussed in Section 4.1 and noted in Section 5.1 above.

Protected species mitigation measures

Reptiles

The generic methodology will be followed as detailed above with the following addition:

- As well as cutting/strimming of grass, large areas of scrub will also need to be cleared in the construction area (outside the bird breeding period and during September 2009).

Preferably reptile fencing is required on this site to ensure no ingress of reptiles back onto the site. However, this action is limited due to significant Health and Safety issues and therefore a managed exclusion approach is adopted.

4.3.3 R Battery (see plan A02180/RBat in Appendix C)

Protected species mitigation measures

Reptiles

The generic methodology will be followed as detailed above with the following addition:

- As well as cutting/strimming of grass, a small area of scrub will also need to be cleared in the construction area (outside the bird breeding period and during September 2009).

Preferably reptile fencing is required on this site to ensure no ingress of reptiles back onto the site. However, this action is limited due to significant Health and Safety issues and therefore a managed exclusion approach is adopted.

Water voles

This species is probably found in the ditches around the site. The ditch close to the construction area will need to be protected, but no displacement work is required. The generic methodology will be followed as detailed above and with the addition of the following work:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone;
- The fence to be erected under supervision of the Project Ecologist.

4.3.4 X3 (see plan A02180/X3 in Appendix C)

Protected species mitigation measures

Reptiles

The generic methodology will be followed as detailed above.

Water voles

The ditch in the northern boundary of the site will potentially be subject to disturbance due to the close proximity of construction traffic. The generic methodology will be followed as detailed above and with the addition of the following work:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone;

- The fence to be erected under supervision of the Project Ecologist.

Badgers

The badger sett at X3 Battery is likely to be disturbed during the construction works due to the close proximity of the earth traverse (within approx. 18m), but this is considered to be within acceptable limits if the work is undertaken outside the breeding period (1st December to June 31st inclusive).

However, when the details of the construction activity at X3 are finalised then this judgement may need to be reviewed. Any work at X3 nearer than 18 m to the sett and within the breeding period will require a licence from Natural England. It should be noted that normally licences are not approved for work near setts in the breeding period. It is recommended therefore that the work to construct the earth traverse along the northern boundary of X3 should be undertaken before mid November 2009.

4.3.5 Shelford (see plan A02180/Shel in Appendix C)

Protected species mitigation measures

Reptiles

The generic methodology will be followed as detailed above.

Water voles

The ditch in the eastern boundary of the site will potentially be subject to disturbance due to the close proximity of construction traffic. The generic methodology will be followed as detailed above and with the addition of the following work:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone;
- The fence to be erected under supervision of the Project Ecologist.

4.3.6 Sappers (see plan A02180/Sap in Appendix C)

Protected species mitigation measures

Reptiles

The generic methodology will be followed as detailed above.

Water voles

The ditch in the eastern boundary of the site will potentially be subject to disturbance due to the close proximity of construction traffic. The generic methodology will be followed as detailed above and with the addition of the following work:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone on the eastern bank;
- The fence to be erected under supervision of the Project Ecologist.

4.3.7 Churchend (see plan A02180/Chur in Appendix C)

Protected species mitigation measures

Reptiles

The generic methodology will be followed as detailed above.

Water voles

The ditch on the south eastern boundary of the site will be subject to disturbance due to the close proximity of construction traffic and the necessity to construct a culvert. The generic methodology will be followed as detailed above and with the addition of the following work:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone on the eastern bank;
- The fence to be erected under supervision of the Project Ecologist;
- Consider options for culvert design, which provide free flow of water at times of flood and movement of riparian mammals along the ditch system.

A culvert will be constructed to enable road access to the site across the ditch on the south eastern boundary. It is important to retain the integrity of the ditch network at this location and minimise severance. It is recommended that a minimum 600mm diameter pipe be used under the crossing, but a larger dimension is preferred which would provide more headroom above water as the watercourse floods.

4.3.8 Rugwood (see plan A02180/Rug in Appendix C)

Protected species mitigation measures

Reptiles

The generic methodology will be followed as detailed above.

Water voles

The ditch on the north eastern boundary of the site will be subject to disturbance due to the close proximity of construction traffic and the necessity to construct a culvert. The generic methodology will be followed as detailed above and with the addition of the following work:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone on the eastern bank;
- The fence to be erected under supervision of the Project Ecologist;
- Consider options for culvert design, which provide free flow of water at times of flood and movement of riparian mammals along the ditch system.

A culvert will be constructed to enable road access to the site across the ditch on the north eastern boundary. It is important to retain the integrity of the ditch network at this location and minimise severance. It is recommended that a minimum 600mm diameter pipe be used under the crossing, but a larger dimension is preferred which would provide more headroom above water as the watercourse floods.

4.3.9 DAT (see plan A02180/Dat in Appendix C)

Protected species mitigation measures

Reptiles

The generic methodology will be followed as detailed above with the following addition:

- As well as cutting/strimming of grass, a small area of scrub will also need to be cleared in the construction area (outside the bird breeding period and during September 2009).

Preferably reptile fencing is required on this site to ensure no ingress of reptiles back onto the site. However, this action is limited due to significant Health and Safety issues and therefore a managed exclusion approach is adopted.

Water voles

The ditch near the western boundary of the site will potentially be subject to disturbance due to the close proximity of construction traffic. The generic methodology will be followed as detailed above and with the addition of the following work:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone;
- The fence to be erected under supervision of the Project Ecologist.

4.3.10 Eastwick (see plan A02180/East in Appendix C)

Protected species mitigation measures

Reptiles

The generic methodology will be followed as detailed above with the following additions:

- As well as cutting/strimming of grass, a small area of scrub will also need to be cleared in the construction area (outside the bird breeding period and during September 2009);
- Erect a reptile fence in the area as marked on Plan A02180/Eas to exclude reptiles from the construction area after Safety clearance of the site by MoD;
- Reptile fencing to be supervised by the Project Ecologist.

Water voles

The ditch system either side of the access route into the construction area supports water voles. Diligence is required here to ensure that there is no encroachment and storage of materials on the ditch sides. It is recommended that security fencing (high visibility plastic fence and metal stakes) be placed along the edges of the track to ensure no damage to the ditch. This is a precaution rather than a necessity.

The borrowdyke to the south of the construction will require protection with the following work:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone;
- The fence to be erected under supervision of the Project Ecologist.

4.3.11 Avocet (see plan A02180/Avo in Appendix C

Protected species mitigation measures

Reptiles

No mitigation work should be required for this site, but a watching brief is necessary if the site has not been routinely cut. If not, then strimming will be required as detailed in the generic guidance above.

Water voles

The ditch near the south eastern boundary of the site will potentially be subject to disturbance due to the close proximity of the pipe line construction work. This is generally low impact work, but as a precaution it is recommended that the following additional work take place:

- Protective fencing (temporary high visibility site fencing) will be required to protect from encroachment of vehicles and materials into the ditch zone;
- The fence to be erected under supervision of the Project Ecologist.

4.3.12 White City

No mitigation measures are required for this site.

4.3.13 ETC

No specific ecological mitigation measures are required for this site, but given the site is dissected by ditches it is important to ensure that runoff of contaminated and sediment laden water from the construction areas is controlled.

4.3.14 Nasewick

Reptiles

No mitigation work should be required for this site, but a watching brief is necessary if the site has not been routinely cut. If not, then strimming will be required as detailed in the generic guidance above.

4.4 Summary of mitigation requirement at each Battery site

Table 13 below summarises the mitigation requirement at each Battery site.

Table 13 Mitigation summary

Battery location	Mitigation measures required as specified in the text											
	SPA/Ramsar/SSSI habitat mitigation works	Water vole displacement/ habitat management	Large culvert required (600mm)	Ditch reinstatement works	Protective fence around sensitive ditch	Reptile fencing	Reptile translocation	Reptile displacement/ strimming of construction area	Reptile displacement/ hard strimming of earth traverse footprint	Scrub clearance	Badger mitigation and general protective measures	Bird mitigation – ensure work outside breeding period
Q	✓	✓	×	×	✓	×	✓	✓	✓	✓	✓	✓
K	✓	×	×	×	✓	×	✓	✓	✓	✓	×	✓
DAT	✓	✓	×	×	✓	×	✓	✓	✓	✓	✓	✓
Eastwick	×	×	×	×	✓	✓	✓	✓	✓	✓	×	✓
Rugwood	×	✓	✓	✓	✓	×	✓	✓	✓	✓	×	✓
X3	×	×	×	×	✓	×	✓	✓	✓	✓	✓	✓
Sappers	×	×	×	×	✓	×	✓	✓	✓	×	×	✓
R	×	×	×	×	✓	×	✓	✓	✓	✓	×	✓
Avocet	×	✓	×	×	✓	×	×	×	×	×	✓	✓
Shelford	✓	×	×	×	✓	×	✓	✓	✓	×	×	✓
Churchend	×	✓	✓	✓	✓	×	✓	✓	✓	×	✓	✓
Nasewick	×	×	×	×	×	×	×	×	×	×	✓	✓
ETC	×	×	×	×	×	×	×	×	×	×	×	✓
White City	×	×	×	×	×	×	×	×	×	×	×	✓

5.0 CONCLUSION AND SUMMARY

This report details the mitigation measures required to avoid and minimise the impact of the proposed works on the biodiversity interests at the important nature conservation site of Foulness Island. The nature conservation and ecological interests at each of the fourteen Battery sites is evaluated and assessed and the significance of impact is described. Specific measures are proposed for the potential impacts on the Foulness Island SPA/Ramsar/SSSI and for the protected and notable species and habitats known to be present at each of the Battery sites.

These mitigation measures will now provide a basis for the next stage of this work, approval of the application for planning permission, and the work in the field to enable construction to commence. It is considered that when all the mitigation measures, as specified in this report, are implemented in full the proposed works to each of the Battery sites should proceed with minimal impact on the important ecological features of this site.

6.0 DOCUMENTS CONSULTED

IEEM (2006) Guidelines for Ecological Impact Assessment in the United Kingdom.

Ratcliffe, D.A (1977) Nature Conservation Review

Nature Conservancy Council (1989, revised 1998) Guidelines for the selection of biological SSSIs Nature Conservancy Council,

Article 4.1 of the Directive (79/409/EEC) 1 http://www.jncc.gov.uk/default.aspx?page=2021

UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008. http://www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsfinalAllhabitats20081022.pdf

Stubbs, A.E. and Falk, S.J. (1983) British Hoverflies BENHS pub. Revised and reprinted in 1996

Appendices

Appendix A – Legislative status of Foulness Island

Appendix B– Screening and impact assessment of notable Ramsar and SSSI species

Appendix C – Battery specific mitigation plans (Drawings)

Appendix D – Report conditions

Appendix A

Legislative status of Foulness Island

STATUTORY AND MOD POLICY OBLIGATIONS

MOD Natural Environment Policy

MOD policy on Nature Conservation is detailed in the Defence Lands Handbook (JSP 362) Chapter 5 – Natural Environment (Conservation), revised October 2004. This includes the Declaration of Intent between MOD and English Nature and Memorandum of Understanding with Defra *et al.*

It is MOD policy to ensure that natural environment issues are fully integrated with operational
And training requirements and safety issues. All military and estate management activities must comply with all current conservation legislation.

It is MOD policy to maintain the conservation interest on all SSSIs for which it has management responsibility. In compliance with section 28G of the Wildlife and Countryside Act 1981, MOD must

"*take reasonable steps, consistent with the proper exercise of 'MOD' functions, to further the conservation and enhancement of flora and fauna or geological or physiological features by reason of which the site is of special scientific interest*".

MOD policy on sustainable development and environmental aspects, such as, pollution, waste, water etc. are detailed in the MOD Sustainable Development and Environment Manual (JSP 418), revised April 2005.

The MOD Sustainability and Environmental Appraisal Tools Handbook ('the Handbook') is the single point of reference for the suite of appraisal tools used on MOD estate-related plans, programmes, projects and activities. Section 5 of the Handbook provides practical guidance for undertaking Appropriate Assessment (AA). Hard copies of all the above are available from Defence Estates Property Directorate, DE Sutton Coldfield or through the DE Natural Environment Adviser.

Natural Environment Legislation

MOD has statutory duties to protect and where appropriate enhance European and Internationally protected sites and species for which it has management responsibility. The main UK statutory obligations for nature conservation are detailed as follows:

Wildlife and Countryside Act (WCA) 1981

The Act covers protection of wildlife (birds, and some animals and plants), the countryside, National Parks, and provides for the establishment and management of a network of nationally important protected sites – SSSIs. The WCA makes it an offence to deliberately capture, kill, disturb or trade in the species listed as protected or to pick, collect, cut, uproot, destroy or trade in protected plants. The legislation includes provisions for licenses and exceptions.

Conservation of Habitats (&c.) Regulations 1994 – 'Habitats Regulations'

The Habitats Regulations provide for the designation and protection of a network of 'European sites' (Special Areas of Conservation (SACs) and Special Protection Areas (SPA)) known as the Natura 2000 network, The Regulations also provide for the protection of 'European protected species' (EPS).

Ramsar sites are wetlands of international importance designated under the UN Convention on Wetlands of International Importance, 1979. Ramsar sites often overlay with SACs and SPAs and the UK planning policy determines that they should be accorded the same importance and protection.

Natural Environment and Rural Communities Act (NERC) 2006

Section 40 under the NERC Act states that *"every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity".*

Protected Species

European Protected Species

The Habitats Regulations make it an offence to deliberately capture, kill, disturb, or trade in the animal listed in Schedule 2, or pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 4. However, these actions can be made lawful through the granting of licenses by the appropriate authorities.

Nationally Protected Species

In addition to the European Protected Species as listed under the Habitats Regulations, the protection for species of national importance is provided for primarily in the WCA.

Birds – the WCA makes it an offence (with exception to species listed in Schedule 2) to intentionally kill, injure, or take any wild bird or their eggs or nests. There are special penalties for offences related to birds listed on Schedule 1, for which there are additional offences of disturbing these birds at their nests, or their dependent young.

Animals – it is an offence (subject to exceptions) to intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. The Act also prohibits certain methods of killing, injuring, or taking wild animals.

Plants – it is an offence (subject to exceptions) to pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional uprooting of such plants.

Certain actions can be made lawful through the granting of licenses under Section 16 of the Act by the appropriate authorities. Section 4 below identifies the protected species that occur at Foulness.

Essex Estuaries SAC Description

Habitats that are a primary reason for selection of this site:

Estuaries

This is a large estuarine site in south-east England, and is a typical, undeveloped, coastal plain estuarine system with associated open coast mudflats and sandbanks. This site comprises the major estuaries of the Colne, Blackwater, Crouch and Road rivers and is important as an extensive area of contiguous estuarine habitat. Essex Estuaries contains a very wide range of characteristic marine and estuarine sediment communities and some diverse and unusual marine communities in the lower reaches, including rich sponge communities on mixed, tide-swept substrates. Sublittoral areas have a very rich invertebrate fauna, including the reef-building work *Sabellaria spinulosa*, the brittlestar *Ophiothrix fragilis*, crustaceans and ascidians. The site also has large areas of saltmarsh and other important coastal habitats.

Mudflats and sandflats not covered by seawater at low tide

Essex Estuaries represents the range of variation of this habitat type found in south-east England and includes the extensive intertidal mudflats and sandflats of the Colne, Blackwater, Roach and Crouch estuaries, Dengie Flats and Maplin Sands. The area includes a wide range of sediment flat communities, from estuarine muds, sands and muddy sands to fully saline, sandy mudflats with extensive growths of eelgrass *Zostera* spp. on the open coast. The open coast areas of Maplin Sands and Dengie Flats have very extensive mudflats and an unusually undisturbed nature. Maplin Sands is particularly important for its large, nationally-important beds of dwarf eelgrass *Zostera noltei* and associated animal communities.

***Salicornia* and other annuals colonising mud and sand**

Glasswort *Salicornia* spp. saltmarsh in the Essex estuaries on the east coast of England forms an integral part of the transition from the extensive and varied intertidal mud and

sandflats through to upper saltmeadows. Although the saltmarshes in this area are generally eroding, secondary pioneer communities appear as a precursor to erosion on the seaward edge of degraded mid-marsh communities. The area of pioneer marsh includes gradation into extensive cord-grass *Spartina* spp. swards.

***Spartina* swards (*Spartinion maritimae*)**

The most extensive remaining stand of the native small cord-grass *Spartina maritime* in the UK and possibly in Europe is found in the Essex Estuaries. The stand is located at Foulness Point and covers approximately 0.17ha. Other smaller stands are found elsewhere in the estuary complex, notable in the Colne estuary, where it forms a major component of the upper marsh areas.

Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

Although the saltmarshes in this area are generally eroding, extensive salt meadows remain and Essex Estuaries represents Atlantic salt meadows in south-east England, with floristic features typical of this part of the UK. Golden samphire *Inula crithmoides* is a characteristic species of these marshes, occurring both on the lower marsh and on the drift-line. It represents a community of south-east England also found to the south in mainland Europe.

Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)

In this complex of estuarine marshes on the east coast of England the occurrence of Mediterranean and thermo-Atlantic halophilous scrubs is currently artificially restricted by sea-walls. It now occurs principally as a strandline community or at the foot of sea-walls. Recent managed retreat schemes offer the prospect of future expansion of the habitat type. The local variant of this vegetation, which features sea-lavenders *Limonium* spp. and sea-heath *Frankenia laevis*, occurs at one location, Colne Point.

Habitats present as a qualifying feature, but not a primary reason for selection of this site:

Sandbanks which are slightly covered by sea water all the time.

Foulness (Mid-Essex Coast Phase 5) SPA Description1

Foulness is located on the coast of Essex, on the east coast of England north of the mouth of the Thames estuary. The site is part of an open coast estuarine system comprising grazing marsh, saltmarsh, intertidal mud-flats, cockle-shell banks and sand-flats. It includes one of the three largest continuous sand-silt flats in the UK. The diversity of high quality coastal habitats at present support important populations of breeding, migratory and wintering waterbirds, notable very important concentrations of Dark-bellied Brent Goose *Branta bernicla bernicla*. Foulness is an integral component of the phased Mid-Essex Coast SPA.

Qualifying Species

This site 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 Directive:

1 http://www.jncc.gov.uk/default.aspx?page=2021

During the breeding season:

- Avocet *Recurvirostra avosetta*, 46 pairs representing at least 7.8% of the breeding population in Great Britain (RBBP 1996)
- Common Tern *Sterna hirundo*, 220 pairs representing at least 1.8% of the breeding population in Great Britain (Count, as at 1996)
- Little Tern *Sterna albifrons*, 24 pairs representing at least 1.0% of the breeding population in Great Britain (5 year mean, 1992-1996)
- Sandwich Tern *Sterna sandvicensis*, 320 pairs representing at least 2.3% of the breeding population in Great Britain (5 year mean, 1992-1996)
- Ringed plover *Charadrius hiaticula*, upt to 1.6% of the population in Great Britain (5 year peak mean 1991/2 – 1995/6)

Over winter:

- Avocet *Recurvirostra avosetta*, 100 individuals representing at least 7.9% of the wintering
  population in Great Britain (5 year peak mean 1991/2 - 1995/6)
- Bar-tailed Godwit *Limosa lapponica*, 7,639 individuals representing at least 14.4% of the
  wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)
- Golden Plover *Pluvialis apricaria*, 3,359 individuals representing at least 1.3% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)
- Hen Harrier *Circus cyaneus*, 6 individuals representing at least 0.8% of the wintering population in Great Britain (3 year mean 1994/5-1996/7)

This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

On passage

- Redshank *Tring tetanus*, 2,144 individuals representing at least 1.2% of the Eastern Atlantic – wintering population (5 year peak mean 1991/2 – 1995/6)

Over winter

- Dark-bellied Brent Goose *Branta bernicla bernicla*, 13,075 individuals representing at least 4.4% of the wintering Western Siberia/Western Europe population (5 year peak mean 1991/2 - 1995/6)
- Grey Plover *Pluvialis squatarola*, 4,209 individuals representing at least 2.8% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)
- Knot *Calidris canutus*, 40,429 individuals representing at least 11.6% of the wintering
  Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)
- Oystercatcher Haematopus ostralegus, 11,756 individuals representing at least 1.3% of the wintering Europe & Northern/Western Africa population (5 year peak mean 1991/2 - 1995/6)

Assemblage qualification: A wetland of international importance

The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 107,468 individual waterfowl (5 year peal mean 1991/2- 1995/6 including: Redshank *Tringa totanus*, Curlew *Numenius arquata*, Black-tailed Godwit *Limosa limosa islandica*, Dunlin *Calidris alpina alpina*, Lapwing *Vanellus vanellus*, Wigeon *Anas penelope*, Shelduck *Tadorna tadorna*, Little Grebe *Tachybaptus ruficollis*, Knot *Calidris canutus*, Grey Plover *Pluvialis squatarola*, Oystercatcher *Haematopus ostralegus*, Dark-bellied Brent Goose *Branta bernicla bernicla*, Bar-tailed Godwit *Limosa lapponica*, Golden Plover *Pluvialis apricaria*, Avocet *Recurvirostra avosetta*.

Foulness (Mid Essex Coast Phase 5) Ramsar Site

Designated: 4th October 1996

Overview

Foulness is part of an open coast estuarine system comprising grazing marsh, saltmarsh, intertidal mudflats and sandflats which support nationally rare and nationally scarce plants, and nationally and internationally important populations of breeding, migratory and wintering waterfowl.

Ramsar Criterion 1 - This site qualifies by virtue of the extent and diversity of saltmarsh habitat present. This and four other sites in the Mid-Essex Coast Ramsar site complex, include a total of 3,237 ha, that represent 70% of the saltmarsh habitat in Essex and 7% of the total area of saltmarsh in Britain.

Ramsar criterion 2 - The site supports a number of nationally-rare and nationally-scarce plant species, and British Red Data Book invertebrates.

Ramsar criterion 3 - The site contains extensive saltmarsh habitat, with areas supporting full and representative sequences of saltmarsh plant communities covering the range of variation in Britain.

Ramsar criterion 5 - Assemblages of international importance: Species with peak counts in winter: 82148 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:

- Common redshank , Tringa totanus totanus, 2586 individuals, representing an average of 1% of the population (5 year peak mean 1998/9- 2002/3)

Species with peak counts in winter:

- Dark-bellied brent goose, Branta bernicla bernicla, 6475 individuals, representing an average of 3% of the population (5 year peak mean 1998/9-2002/3)
- Eurasian oystercatcher , Haematopus ostralegus ostralegus, Europe & NW Africa – wintering 14674 individuals, representing an average of 1.4% of the population (5 year peak mean 1998/9-2002/3)
- Grey plover , Pluvialis squatarola, E Atlantic/W Africa –wintering 4343 individuals, representing an average of 1.7% of the population (5 year peak mean 1998/9-2002/3)
- Red knot , Calidris canutus islandica, W & Southern Africa (wintering) 22439 individuals, representing an average of 4.9% of the population (5 year peak mean 1998/9-2002/3)
- Bar-tailed godwit , Limosa lapponica lapponica, W Palearctic 4095 individuals, representing an average of 3.4% of the population (5 year peak mean 1998/9-2002/3)

Physical features of the site

- Soil & geology shingle, sand, mud, clay, nutrient-rich, sedimentary, gravel
- Geomorphology and landscape lowland, coastal, floodplain, subtidal sediments (including sandbank/mudbank), intertidal sediments (including sandflat/mudflat), open coast (including bay), estuary
- Nutrient status eutrophic
- pH circumneutral
- Salinity brackish / mixosaline, fresh, saline / euhaline
- Soil mainly organic
- Water permanence usually permanent

Summary of main climatic features Annual averages (Lowestoft, 1971–2000)

- Max. daily temperature: 13.0° C
- Min. daily temperature: 7.0° C
- Days of air frost: 27.8
- Rainfall: 576.3 mm
- Hrs. of sunshine: 1535.5

General description of the Physical Features

Foulness is part of an open coast estuarine system comprising grazing marsh, saltmarsh, intertidal mudflats, cockle-shell banks and sandflats. It includes one of the three largest continuous sand-silt flats in the UK.

Physical features of the catchment area

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type). Foulness is part of an open coast estuarine system comprising grazing marsh, saltmarsh, intertidal mudflats, cockle-shell banks and sandflats. It includes one of the three largest continuous sand-silt flats in the UK.

Hydrological values

Shoreline stabilisation and dissipation of erosive forces, sediment trapping.

Wetland types

Human-made wetland, Marine/coastal wetland

Code Name % Area

B Marine beds (e.g. sea grass beds) 2.7
E Sand / shingle shores (including dune systems) 0.1
G Tidal flats 89.5
H Salt marshes 2.1
Q Saline / brackish lakes: permanent 0.5
Ts Freshwater marshes / pools: seasonal / intermittent 3.7
Other 1.4

General ecological features

The main habitat types of this site are: mudflats, sandflats, saltmarsh, brackish-water lagoon, freshwater, grazing marsh. Pioneer saltmarsh communities with *Spartina maritima*, *Sarcocornia perennis* and *Suaeda vera*; mature saltmarsh communities with *Atriplex pedunculata*. Species-rich perennial saltmarsh and driftlike communities with *Suaeda vera*, eelgrass *Zostera* beds. Brackishwater vegetation dominated by *Bolboschoenus maritimus*. Grazing marsh with *Alopecurus geniculatus*, *Hordeum secalinum* and fescues *Festuca* spp.

Noteworthy flora

Atriplex pedunculata, Cynodon dactylon, Bupleurum tenuissimum, Carex divisa, Hordeum marinum, Inula crithmoides, Limonium humile, Parapholis incurva, Poa bulbosa, Polypogon monspeliensis, Puccinellia fasciculata, Puccinellia rupestris, Ruppia cirrhosa, Salicornia pusilla, Spartina maritima, Suaeda vera, Trifolium squamosum, Trifolium suffocatum, Vulpia fasciculata, Zostera angustifolia, Zostera noltei.

Noteworthy Birds

Species regularly supported during the breeding season

- Sandwich tern, Sterna (Thalasseus) sandvicensis sandvicensis, W Europe 320 pairs, representing an average of 3% of the GB population (5 year mean 1992-1996)
- Common tern, Sterna hirundo hirundo, N & E Europe 134 apparently occupied nests, representing an average of 1.3% of the GB population (Seabird 2000 Census)
- Little tern, Sterna albifrons albifrons, W Europe 24 pairs, representing an average of 1.2% of the GB population (5 year mean 1992-1996).

Species with peak counts in spring/autumn

- Little egret, Egretta garzetta, West Mediterranean 55 individuals, representing an average of 3.3% of the GB population (5 year peak mean 1998/9- 2002/3)
- Ringed plover, Charadrius hiaticula, Europe/Northwest Africa 547 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3)
- Sanderling, Calidris alba, Eastern Atlantic 432 individuals, representing an average of 2.1% of the GB population (5 year peak mean 1998/9- 2002/3)
- Ruff, Philomachus pugnax, Europe/W Africa 20 individuals, representing an average of 2.8% of the GB population (5 year peak mean 1998/9- 2002/3)
- Whimbrel, Numenius phaeopus, Europe/Western Africa 34 individuals, representing an average of 1.1% of the GB population (5 year peak mean 1998/9-2002/3)
- Eurasian curlew, Numenius arquata arquata, N. arquata Europe (breeding) 2948 individuals, representing an average of 2% of the GB population (5 year peak mean 1998/9- 2002/3)
- Common greenshank, Tringa nebularia, Europe/W Africa 139 individuals, representing an average of 23.2% of the GB population (5 year peak mean 1998/9-2002/3).

Species with peak counts in winter

- Little grebe, Tachybaptus ruficollis ruficollis, Europe to E Urals, NW Africa 97 individuals, representing an average of 1.2% of the GB population (5 year peak mean 1998/9- 2002/3)
- Common shelduck, Tadorna tadorna, NW Europe 1305 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9- 2002/3)
- Hen harrier, Circus cyaneus, Europe <19 individuals, representing an average of 2.5% of the GB population (5 year mean 1987/8- 1991/2)
- Pied avocet, Recurvirostra avosetta, Europe/Northwest Africa 255 individuals, representing an average of 7.5% of the GB population (5 year peak mean 1998/9- 2002/3)
- European golden plover, Pluvialis apricaria apricaria, P. a. altifrons Iceland & Faroes/E Atlantic 4066 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9- 2002/3)
- Dunlin, Calidris alpina alpina, W Siberia/W Europe 9905 individuals, representing an average of 1.7% of the GB population (5 year peak mean 1998/9- 2002/3)
- Spotted redshank, Tringa erythropus, Europe/W Africa 5 individuals, representing an average of 3.6% of the GB population (5 year peak mean 1998/9- 2002/3).

Nationally important Invertebrate species occurring on the site

Lestes dryas, Aethes margarotana, Malacosoma castrensis, Hybomitra expollicata, Lejops vittata,Poecilobothrus ducalis, Stratiomys longicornis, Parydroptera discomyzina, Paragus albifrons, Tachys scutellaris, Berosus spinosus, Gammarus insensibilis.

Social and cultural values

Aesthetic

Archaeological/historical site

Fisheries production

Livestock grazing

Sport hunting

Land tenure/ownership

Ownership category On-site Off-site

NGO + +

Local authority, municipality etc. + +

National/Crown Estate + +

Private +

Current land (including water) use

Activity On-site Off-site

Nature conservation + +

Tourism +

Recreation +

Current scientific research +

Fishing: commercial + +

Fishing: recreational/sport +

Bait collection +

Arable agriculture (unspecified) + +

Grazing (unspecified) + +

Hunting: recreational/sport + +

Flood control + +

Mineral exploration (excl. hydrocarbons) +

Transport route + +

Non-urbanised settlements + +

Urban development +

Military activities +

Factors adversely affecting the site's ecological character, including changes in land (including water) use and development projects

Erosion - The Essex Coast and Estuaries Coastal Habitat Management Plan (CHaMP) (Anon. 2002) covers the site and it is expected to inform the shoreline management plan as well as

local plan policies. The MOD is responsible for the site and there are discussions underway as to the possibility of managed realignment.

Is the site subject to adverse ecological change? YES

Key Habitat Attributes for Foulness SPA and Ramsar site Birds – using information from English Nature Research Report 359, 2000 "Key Habitat Attributes for Birds and Bird Assemblages in England"

SPA / Ramsar Site Species	Breeding / overwintering	Habitat	Landform[1]	Vegetation Characteristics	Hydrology	Food availability
Avocet	Annex 1 Breeding and Overwintering+ assemblage	Breeding: coastal lagoons pools or freshwater marsh; Wintering: Estuaries, deltas and sheltered coasts	Shallow sloping bare or open ground adjacent to standing open water for feeding and breeding	Roosting: Frequent patches of sparsely vegetated or bare ground	Extensive shallow fresh or low-salinity water 3-5cm with stable water levels through nesting <2cm fluctuation at breeding areas	Abundance of shallow water invertebrates
Common Tern	Breeding Annex 1 Species	Breeds on coastal beaches, offshore islands	Mix of short <3cm vegetation / bare ground and longer vegetation	Feeding open water. Roosting & nesting bare ground / <3cm sparse vegetation	Frequent connected, undisturbed, low, shallow-sloping islands affording maximum protection against flooding for nesting. Very close to the sea	Abundance of marine fish and crustaceans or freshwater fish
Little Tern	Breeding Annex 1 Species	Breeds on coastal beaches, lagoons and islands / rafts in some inland waters	Predominately open grounds	Feeding open water. Roosting & nesting bare ground / <3cm sparse vegetation	Frequent connected, undisturbed, low, shallow-sloping islands affording maximum protection against flooding for nesting. Very close to the sea	Abundance of marine fish, crustaceans worms and molluscs

[1] NB Notes on roosting 'unrestricted views' and 'minimum effective field size' need to be treated with some caution, as most of the birds at Shoeburyness roost on the saltmarsh edge at high tide, and feed in the creeks adjacent to high banks, at least during the day. Behaviour might differ at night due to risk of predation.

SPA / Ramsar Site Species	Breeding / overwintering	Habitat	Landform[1]	Vegetation Characteristics	Hydrology	Food availability
Sandwich Tern	Breeding Annex 1 Species	Breeds on coastal beaches, sand dunes and small islands offshore	Open ground with >90% bare surfaces	Sparse vegetation <10%		Abundance of marine fish
Ringed plover	Breeding Species	Breeds on coastal beaches, and stony areas within estuaries, rivers, inland wetlands, grasslands, agricultural and industrial land	Open ground predominantly short vegetation and frequent bare patches for nesting and feeding, unrestricted views > 200m, > 10ha field size	Breeding: Sparse vegetation <5cm, 10-20% bare ground Roosting: open short vegetation or bare ground vegetation<10cm		Abundance surface and near surface invertebrates
Bar-tailed Godwit	Annex 1 overwintering+ assemblage	Wintering Estuaries and sandy beaches	Open terrain free of obstructions, unrestricted views > 200m for feeding & roosting	Open short <10cm vegetation or bare ground predominating in roosting habitat		Intertidal abundance of marine worms and molluscs
Golden Plover	Annex 1 overwintering+ assemblage	Winters on mixed agricultural land, flooded wetlands and intertidal areas	Large open areas with unrestricted views >200m, field size >10ha	Feeding short grasslands swards < 10cm . Roosting: open short grass or bare ground areas for roosting		Abundance of soil and ground surface invertebrates
Hen Harrier	Annex 1 overwintering	Winters on a variety of open habitats				Abundance of live mammals and birds

[1] NB Notes on roosting 'unrestricted views' and 'minimum effective field size' need to be treated with some caution, as most of the birds at Shoeburyness roost on the saltmarsh edge at high tide, and feed in the creeks adjacent to high banks, at least during the day. Behaviour might differ at night due to risk of predation.

SPA / Ramsar Site Species	Breeding / overwintering	Habitat	Landform[1]	Vegetation Characteristics	Hydrology	Food availability
Redshank	overwintering+ assemblage	Winters on estuaries, open beaches and rocky shores	Large open areas with unrestricted views >200m, field size >10ha	Feeding intertidal, marshes and wet grassland. Roosting<10cm short grassland swards	Extensive shallow water 1-6cm for feeding, wet fields with many surface pools, ditches or channels for feeding	Intertidal abundance of surface and subsurface invertebrates, abundance of soil invertebrates on marshy grassland
Dark-bellied Brent Goose	overwintering + assemblage	Winters in estuaries, saltmarsh, improved grassland and arable	Large open areas with unrestricted views >500m, field size >5ha	Feeding intertidal, feeding and roosting<10cm short grassland swards		Improved grassland or cereal crops, abundance of soft-leaved plants on saltmarsh or mudflats.
Grey Plover	overwintering + assemblage	Winters on estuaries and sheltered coasts	Large open areas with unrestricted views >200m, field size >10ha	Feeding: Intertidal Roosting: open short grass or bare ground areas		Intertidal abundance of marine worms, molluscs and crustaceans
Knot	overwintering + assemblage	Winters on estuaries, open beaches and rocky shores	Open terrain, relatively free of obstructions, unobstructed views > 200m, field size > 10ha	Feeding intertidal. Roosting: Open short vegetation <10cm		Intertidal abundance of surface and subsurface invertebrates
Oystercatcher	overwintering + assemblage	Winters on estuaries, open beaches and rocky shores	Large open areas with unrestricted views >200m, field size >10ha	Open short vegetation or bare ground for roosting, <10cm sward	Wet fields with many surface pools ditches or channels for feeding	Intertidal or terrestrial abundance of surface and subsurface invertebrates
Black-tailed Godwit	Overwintering assemblage	Winters in estuaries, inland lakes and marsh	Intertidal for feeding large open areas, including fields for roosting, unrestricted views over >200m	Feeding intertidal. Roosting: Open short vegetation <10cm		Intertidal abundance of marine molluscs and worms

[1] NB Notes on roosting 'unrestricted views' and 'minimum effective field size' need to be treated with some caution, as most of the birds at Shoeburyness roost on the saltmarsh edge at high tide, and feed in the creeks adjacent to high banks, at least during the day. Behaviour might differ at night due to risk of predation.

SPA / Ramsar Site Species	Breeding / overwintering	Habitat	Landform[1]	Vegetation Characteristics	Hydrology	Food availability
Curlew	Overwintering assemblage	Winters in pasture, arable, estuaries, saltmarsh, grazing marsh	Open terrain, relatively free of obstructions, unobstructed views > 200m, field size > 10ha	Feeding intertidal. Roosting: open short vegetation or bare ground predominating		Intertidal abundance of surface and subsurface invertebrates
Dunlin	Overwintering assemblage	Winters in estuaries, coastal beaches	Open terrain, relatively free of obstructions, unobstructed views > 200m, field size > 10ha	Feeding: intertidal. Roosting: open short vegetation or bare ground predominating		Intertidal abundance of surface and subsurface invertebrates
Lapwing	Overwintering assemblage	Winters on mixed agricultural land, flooded wetlands and intertidal areas	Roosts on Large open areas with unrestricted views >500m, field size >15ha	Feeding: short grasslands <15cm. Roosting: open short vegetation or bare ground predominating	Marshy grassland with frequent shallow flooded areas for feeding	Abundance of grassland surface and near surface invertebrates
Little Grebe	Overwintering assemblage	Winters on still or flowing freshwaters, estuaries and sheltered coastal bays			One or more extensive >1ha areas of shallow 0.5-1m water for feeding	Abundance of fish, amphibians, and aquatic invertebrates
Shelduck	Overwintering assemblage	Winters in estuaries, coastal beaches			Extensive shallow water <40cm cm for feeding. Dropping water levels providing a succession of surface water areas for feeding	Intertidal abundance of surface and subsurface invertebrates. Standing water abundance of macroinvertebrates

[1] NB Notes on roosting 'unrestricted views' and 'minimum effective field size' need to be treated with some caution, as most of the birds at Shoeburyness roost on the saltmarsh edge at high tide, and feed in the creeks adjacent to high banks, at least during the day. Behaviour might differ at night due to risk of predation.

SPA / Ramsar Site Species	Breeding / overwintering	Habitat	Landform[1]	Vegetation Characteristics	Hydrology	Food availability
Wigeon	Overwintering assemblage	Winters in estuaries, saltmarsh and inland lakes	Feeds on large open areas with unrestricted views >500m, field size >5ha. Feeds on pastures adjacent to open water. Roosts on open water	Short sward <5cm		Abundance of soft leaved plants on pasture, intertidal and saltmarsh

[1] NB Notes on roosting 'unrestricted views' and 'minimum effective field size' need to be treated with some caution, as most of the birds at Shoeburyness roost on the saltmarsh edge at high tide, and feed in the creeks adjacent to high banks, at least during the day. Behaviour might differ at night due to risk of predation.

Foulness SSSI

Citation

SITE NAME: FOULNESS

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981. Gunners Park is a Local Nature Reserve (LNR) declared under Section 21 of the National Parks and Access to the Countryside Act 1949.

National Grid Reference: TR 030905 Area: 10,702 (ha.) 26,433.9 (ac.)
Date Notified (Under 1949 Act): 1956 Date of Last Revision: 1974 and 1980
Date Notified (Under 1981 Act): 1993 Date of Last Revision: –

Foulness is a key site in 'A Nature Conservation Review' edited by D A Ratcliffe (Pub: Cambridge University Press, 1977). As such, the safeguarding of this site is regarded as an essential element in the success of nature conservation in Britain. It is also proposed as part of the mid-Essex Coast Special Protection Area, under the EEC Directive on the Conservation of Wild Birds (Directive 79/409/EEC), and as a Wetland of International

Importance under the Ramsar Convention.

The majority of the site is owned and managed by the Ministry of Defence. A Local Nature Reserve (LNR) at Shoeburyness is managed by the Essex Wildlife Trust. The boundary of the site has been modified at this renotification to include a small area of grazing marsh at Little Wakering and coastal habitats of saltmarsh, mudflats and sea wall at Little Wakering Creek. Land which has lost its special interest, since the last notification, has been excluded.

Description and Reasons for Notification:

Foulness lies on the north shore of the Thames Estuary between Southend in the south and the Rivers Roach and Crouch in the north. It comprises extensive intertidal sand-silt flats, saltmarsh, beaches, grazing marshes, rough grass and scrubland. The flats are of national and international importance as winter feeding grounds for nine species of wildfowl and

wader, with the islands, creeks and grazing land forming an integral part as sheltered feeding and roosting sites. The shell banks support nationally important breeding colonies of Little Terns, Common Terns and Sandwich Terns.

The complex matrix of habitats also supports nationally important numbers of breeding Avocets along with plants and invertebrates. Numerous species are locally restricted in their distribution and nationally uncommon or rare.

During the winter months Foulness is a refuge for tens of thousands of waders and wildfowl, which migrate from breeding grounds to overwintering sites. These include over 13,000 dark-bellied brent geese (14.7% of the British population and 7.8% of the world population). This is a reflection of the abundance of their favoured food plant, the rare dwarf eelgrass *Zostera noltii*, which unlike the more common eelgrass *Z. marina*, does not lose its leaves in autumn before the brent arrive from their breeding grounds in Siberia. The uncommon narrow-leaved eelgrass *Z. angustifolia* is also present. Once this food source is exhausted by the brent geese, alternative feeding is provided by the adjacent fields on New England and Foulness Islands. The site also supports nationally important numbers of Shelduck (on average 826, 1.1% of the British population). Of the waders, Curlew and Dunlin occur in nationally important numbers, whilst five species, bar-tailed godwit, grey plover, knot, redshank and oystercatcher, occur in internationally important numbers. This is due to the rich invertebrate food supply in the mudflats, such as *Hydrobia* snails on the surface of the mud which are favoured by dunlin. Mudhopper crustaceans, *Corophium*, inhabit the upper surface layers and are preferred by redshank, whilst knot and grey plover take the small bivalve mollusc, *Macoma*, and deeper in the mud, ragworm (*Neris* and *Nepthys*) provide food for the curlew. On sandier areas, the lugworm *Arenicola* supports the bartailed godwit, and oystercatchers feed on cockles *Cerastoderma edule.* Empty cockle shells are washed up at Foulness Point to form the most extensive shell beach in Britain. Additionally, during work associated with proposals to create an airport on the Maplin Flats in the 1970s an artificial island was created towards the south west of the site.

Together these areas support nationally important breeding colonies of little, common and sandwich terns. Breeding pairs of little tern fluctuate from a high of 87 in 1987 to none in 1990, with an average in excess of 26 pairs between 1987 and 1991. Sandwich terns have

increased steadily and now over 500 pairs breed on the artificial island created (over 3% of the total British population).

Large numbers of ringed plover also breed across the site. In recent years the Island has become a favoured breeding ground for avocets. Presently there are four sites with an average of about 30 breeding pairs. At present this represents almost 6% of the British breeding population. The beach at Foulness Point also forms an important high tide roost for waders and wildfowl, not only from Foulness but also from the neighbouring Crouch Estuary and the Dengie Flats. The beach flora at Foulness Point includes yellow horned-poppy *Glaucium flavum*, sea rocket *Cakile maritima* and prickly saltwort *Salsola kali* subsp. *kali*. Further south, along the beach of Pig's Bay, typical colonisers include abundant sea holly *Erynigium maritimum* together with sea rocket, sand sedge *Carex arenaria*, sea sandwort *Honkenya peploides* and sea bindweed *Calystegia soldanella*. The low natural cliff-line has a strong colony of the rare Bermuda-grass *Cynodon dactylon*.

The saltmarsh and hinterland also provides high tide roosting sites for the birds. The dominant saltmarsh plants include common saltmarsh-grass *Puccinellia maritima*, sea purslane *Halimione portulacoides* and common sea-lavender *Limonium vulgare*, with sea aster *Aster tripolium* and annual sea-blite *Suaeda maritima* at the lower levels. There are a number of uncommon plants associated with the saltmarshes, including borrer's saltmarsh-grass *Puccinellia fasciculata* and stiff saltmarshgrass *P. rupestris*, laxflowered sea-lavender *L. humile* and annual beard-grass *Polypogon monspeliensis*. On the upper saltings, uncommon plants include two glassworts *Salicornia perennis* and *S. pusilla*, together with golden samphire *Inula crithmoides* and shrubby sea-blite *Suaeda vera*; the latter two particularly favour the drift-line at the foot of the seawall.

The seawalls are generally dominated by coarse grasses, especially sea couch *Elymus pycnanthus*. However, they also provide suitable conditions for a number of plants with a restricted distribution, for example, slender hare's-ear *Bupleurum tenuissimum*, sea barley *Hordeum marinum*, upright chickweed *Moenchia erecta* and sea clover *Trifolium squamosum*. The accompanying borrowdykes and island ditches also support a distinctive flora. Sea club-rush *Scirpus maritimus* and common reed *Phragmites australis* are generally dominant, whilst nationally uncommon plants include soft hornwort *Ceratophyllum submersum* and spiral tasselwood *Ruppia cirrhosa*. In 1987 a plant previously considered

extinct in Britain was discovered. Foulness is now the only known locality for annual sea purslane *Halimione pedunculata.*

At Gunners Park, unimproved grassland has developed over relict sand dunes and in consequence supports a flora which is unique in Essex. There are large stands dominated by grass and sedge communities, with rushes in damp hollows, together with low-growing vegetation maintained by rabbit grazing. The tall grassland is dominated by false oat-grass *Arrhenatherum elatius*, cock's-foot *Dactylis glomerata*, red fescue *Festuca rubra* and Yorkshire-fog *Holcus lanatus*, amongst which are found the locally uncommon distant sedge *Carex distans* and divided sedge *C. divisa*. The shorter turf is unusually rich in lichens, with the more compacted areas also supporting suffocated clover *Trifolium suffocatum*, curved hard-grass *Parapholis incurva* and stiff saltmarsh-grass *Puccinellia rupestris*, all three of local distribution in Britain. On loose sand, particularly near rabbit burrows, dune fescue *Vulpia membranacea* and bulbous meadow-grass *Poa bulbosa* grow alongside more frequent dune species such as sea fern-grass *Desmazeria marina*, sand cat's-tail *Phleum arenarium* and sand sedge.

Marram *Ammophilia arenaria*, sea bindweed and yellow horned-poppy provide further evidence of the sand dune origin of the area. Foulness, in addition to its bird and plant interest, is also of prime importance for its invertebrates. The combination of saltmarsh, ditches, long grass on the seawalls, lightly-grazed marshes, and scrub such as found at Wakering Stairs, provides habitats for numerous species. There are no less than 71 listed as of notable occurrence or nationally rare, including such Red Data Book species as the scarce emerald damselfly Lestes dryas, the beetles *Tachys scutellaris* and *Berosus spinosus* and the flies *Stratiomys longicornis* and *Paragus albifrons.*

Foulness SSSI – Operations likely to damage the special interest

Site Name: Foulness, Essex

OLD1002984

1 Cultivation, including ploughing, rotovating, harrowing, and re-seeding;

2 Grazing and changes in the grazing regime (including type of stock or intensity or seasonal pattern of grazing);

3 Stock feeding and changes in stock feeding practice;

4 Mowing or other methods of cutting vegetation and changes in the mowing or cutting regime (including hay making to silage and cessation);

5 Application of manure, fertilisers and lime;

6 Application of pesticides, including herbicides (weedkillers);

7 Dumping, spreading or discharge of any materials;

8 Burning;

9 The release into the site of any wild, feral or domestic animal*, plant or seed;

10 The killing or removal of any wild animal*, including pest control;

11 The destruction, displacement, removal or cutting of any plant or plant remains, including tree, scrub, herb, hedge, dead or decaying wood, moss, lichen, fungus, leaf-mould or turf;

12 Tree and/or woodland management+ and changes in tree and/or woodland management+;

13a Drainage (including the use of mole, tile, tunnel or artificial drains);

13b Modification of the structure of watercourses (e.g. rivers, streams, springs, ditches, dykes, drains);

13c Management of aquatic and bank vegetation for drainage purposes;

14 The changing of water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and through boreholes);

15 Infilling of ditches, dykes, drains, ponds, pool, marshes or pits;

16a The introduction of freshwater fishery production and/or management and changes in freshwater fishery production and/or management, including sporting fishing and angling;

16b Coastal fishing or fisheries management and seafood or marine life collection and

changes in coastal fishing practice or fisheries management and seafood or marine life collection, including the use of traps or fish cages;

17 Reclamation of land from sea, estuary or marsh;

18 Bait digging in intertidal areas;

19 Erection of sea defences or coast protection works, including cliff or landslip drainage or stabilisation measures;

20 Extraction of minerals, including peat, shingle, sand and gravel, topsoil, subsoil, shells and spoil.

* 'animal' includes any mammal, reptile, amphibian, bird, fish or invertebrate

+ including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand or underwood, changes in species composition, cessation of management.

Appendix B

Screening and impact assessment of notable Ramsar and SSSI species

Table 3a. Initial screening of potential likely effect on invertebrates and vascular plants

Scientific name	Common name	Taxon	Habitat preference	Status	Grazing Marsh Sward	Grazing Marsh Ditches
Invertebrates						
Lestes dryas	Scarce Emerald Damselfly	Damselfly	The coastal sites used in south-east England are typically freshwater or brackish ditches with dense emergent vegetation in areas of grazing marsh. Inland small, sometimes shaded pools with thick vegetation.	Nationally scarce, but expanding range, locally abundant	No	Possible
Aethes margarotana,	n/a	Moth	Frequents coastal sandhills and shingle, where the larval foodplant *Eryngium maritimum (sea holly)* grows. Very local, restricted to Kent, Essex and Suffolk.	RDB2	No	No
Malacosoma castrensis	Ground Lackey	Moth	Inhabits coastal and estuarine salt-marshes, the larva feeding on *Limonium vulgare*, *Artemisia maritima* and other salt-marsh plants. Very local in south-east England confined to Kent, Essex and Suffolk.	IUCN (pre 1994) - Rare, Biodiversity Lists - Long List	No	No
Hybomitra expollicata	n/a	Horserfly	Brackish coastal levels with ditches; possibly saltmarsh at Studland and some Essex sites. The larvae probably develop in damp soil and the marginal zones of saline ponds and ditches.	IUCN (pre 1994) - Endangered	Possible	Possible

Lejops vittata	n/a	Hoverfly	Mainly coastal grazing marshes, associated with mildly brackish ditches (especially those with sea club-rush Scirpus maritimus intermixed with freshwater plants). Some sites are several miles from the coast where sea club-rush survies from earlier times of more saline conditions. The larvae are unknown but are predictably of the rat-tailed maggot type adapted to aquatic conditions.	Species Action Plan. Red Data Book. Biodiversity Lists - Long List, IUCN (pre 1994) - Vulnerable	No	Possible
Poecilobothrus ducalis	n/a	Small dancefly	larvae probably semi-aquatic carnivore in mud beside saline pools and ditches. Adults recorded from July to September. All modern records are from the North kent Marshes, though there are also old records from Hants and Somerset.	Biodiversity Lists - Long List, IUCN (pre 1994) - Vulnerable	No	Unlikely
Stratiomys longicornis	n/a	Soldier fly	It is almost certainly strongly associated with saline pools in saltmarshes and brackish pools and ditches on coastal levels.	IUCN (pre 1994) - Vulnerable	No	Possible
Parydroptera discomyzina	n/a	Shore fly	Recorded from four sites on the coast of southern England from Suffolk to Sussex, where it has been noted from saltmarshes and coastal levels. Biology unknown, though larvae are probably carnivore in damp, saline mud.	IUCN (pre 1994) - Vulnerable	No	No
Paragus albifrons	n/a	Hoverfly	Preferences unclear. Known sites include a grassy flood embankment adjacent to coastal levels and a shell beach with sparse vegetation.	IUCN (pre 1994) - Rare, RDB	Possible	Possible

Tachys scutellaris	n/a	Ground beetle	Saltmarshes, also wetland near the coast. A species associated with saline or brackish water. Predatory. Occurs on sandy silts and mud. Adults have been recorded from May to September.	IUCN (pre 1994) - Rare	No	No
Berosus spinosus	Water scavenger beetle	Water beetle	Aquatic, Typically found in the intertidal zone at the water's edge	IUCN (pre 1994) - Rare	No	No
Gammarus insensibilis	Lagoon sand shrimp	Crustacean	The sites in Great Britain are waters of reduced salinity, either landlocked or with only a restricted connection with the sea, but in all cases showing no more than a small tidal range, allowing the development of beds of attached and free-floating plants. In the Mediterranean this species is also found in fully marine habitats at depths from 0 to 15 metres (Stock 1967), and in Lough Hyne the salinity differs little from full strength sea water (Kitching 1987). A major food source in the British south coast lagoons is the alga *Chaetomorpha linum* Kutzing, and *G. insensibilis* typically forms part of a weed-associated fauna	IUCN (pre 1994) - Rare, Priotiy species BAP Priority	No	No
Vascular Plants						
Atriplex pedunculata	Annual sea purslane		Drier saltmarshes, belived extinct refound in Essex 1987	Critically Endangered in Great Britain and fully protected by Schedule 8 of the Wildlife and Countryside Act, 1981	No	No
Cynodon dactylon	Bermuda grass		Bare, often sandy ground near the sea	IUCN Vulnerable	No	No

Bupleurum tenuissimum	Slender hare's-ear		Sea-walls, upper saltmarshes, other grassy, brackish places by the sea. Thinly vegetated or disturbed coastal sites, including coastal banks, sea walls, drained estuarine marshes and the margins of brackish ditches.	IUCN Vulnerable, BAP Priority	Possible	Possible
Carex divisa	Divided sedge		Brackish ditches, dune-slacks and damp grasslands near the sea. It avoids areas of standing water. Reasons for decline: Coastal development, conversion of grazing marshes to arable	BAP Priority, locally abundant	Possible	Possible
Hordeum marinum	Sea barley		Bare and waste ground, and grassy places by the sea. Sea walls.	BAP Priority	Possible	No
Inula crithmoides	Golden saphire		Bare ground by the sea, especially cliffs and drier saltmarshes	BSBI Scarce	No	No
Limonium humile	Lax-flowered sea-lavender		Saltmarshes	Local, coastal, tends to hybridize, decreasing	No	No
Parapholis incurva	Curved hard-grass		Bare and grassy places by the sea.	rare, scattered, coastal habitats	Possible	No
Poa bulbosa	Bulbous meadow-grass		Bare sandy places usually by the sea	Coastal, probably overlooked	Possible	No
Polypogon monspeliensis	Annual beard-grass		Bare and sparsely grassy places, especially near the sea, casual elsewhere	Very local coastal marshes, increasing ?	Possible	No
Puccinellia fasciculata	Borrer's saltmarsh grass		Drier places. Bare places by the sea, in grazing marshes around cattle-poached pools and depressions, on earthen sea walls, vehicle tracks and the mud dredged from ditches. Threatened by Infilling of pools and ditches, upgrading of sea walls, conversion of coastal grazing marshes to arable.	BAP Priority widespread coastal in Essex	Possible	No

Puccinellia rupestris	Stiff saltmarsh grass		Bare damp places by the sea.	Very scattered, coastal in Essex, only a small number of sites but can be abundant	Possible	No
Ruppia cirrhosa	Spiral tassle weed		In deeper water, mainly south eastern. Borrowdykes	Local	No	No
Salicornia pusilla	One-flowered glasswort		Drier saltmarshes	Local, upper saltmarsh	No	No
Spartina maritima	Small cord-grass		Saltmarshes on drier mud. Tidal mud-flats, in saltmarsh creeks and pans, and on bare ground behind sea walls. Reasons for decline: Successional changes, coastal erosion, land-claim	BAP Priority	No	No
Suaeda vera	Shrubby seablite		Coastal shingle and sand	Widespread shoreline & sea walls in NE of Essex	No	No
Trifolium squamosum	Sea clover		Short turf by the sea	Coastal, locally very abundant, disappears by the end of June	Possible	No
Trifolium suffocatum	Suffocated clover		Short turf or bare sandy or gravelly ground, mainly near the sea	Single site on the Shoebury ranges	Possible	No
Vulpia fasciculata	Dune fescue		Mainly coastal dunes	Very rare, scattered, coastal sands	No	No
Zostera angustifolia	Narrow-leaved eelgrass		Muddy tidal flats, mainly from half to low tide mark,widespread	Very local, declining	No	No
Zostera noltei	Dwarf eelgrass		Muddy tidal flats, from half-tide to low-tide mark, but not below it, scattered	Very local	No	No

Table 3b. Impact Assessment of invertebrates and vascular plants

Scientific name	Loss of Grazing Marsh habitat	Loss of Grazing Marsh ditches	Change in hydrological regime/water table draw down	Ground disturbance/ compaction	Contaminated runoff during construction	Operational impacts, e.g. Battery operation	Cumulative magnitude of impact	Sensitivity of receptor	Significance	Comments
Invertebrates										
Lestes dryas	Loss of LCGM at Q Battery will reduce roosting habitat for this species.	No ditches to be lost in proposed works, but substantial disturbance at Rugwood and Churchend likely.	Unlikely impact at all Battery sites given the nature of works	Unlikely to impact on this species given the distance of suitable wetland areas from the proposed works	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	High	Moderate significance	Small length of disturbance to ditches at Rugwood and Churchend, which have low potential for this species. The loss of habitat at Q Battery will not impact on ditches and open water bodies used by this species for breeding and larval stages.
Hybomitra expollicata	Loss of LCGM at Q Battery will reduce roosting habitat for this species, but generally unfavourable as a breeding and	No ditches to be lost in proposed works, but substantial disturbance at Rugwood and	Unlikely impact at all Battery sites given the nature of works	Unlikely to impact on this species given the distance of suitable wetland areas from the proposed	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Negligible	High	Neutral significance	This species is unlikely to be found at these Battery sites given the lack of grazing management

	feeding area, due to lack of grazing animals.	Churchend likely. Lack of substantial sea club rush vegetation in these ditches.		works						and suitable habitat.
Lejops vittata	Loss of LCGM at Q Battery will reduce roosting habitat for this species, but generally unfavourable as a breeding area. Adjacent areas to site have more potential as breeding sites, inc. ditches with sea club rush and open water bodies.	No ditches to be lost in proposed works, but substantial disturbance at Rugwood and Churchend likely.	Unlikely impact at all Battery sites given the nature of works	Unlikely to impact on this species given the distance of suitable wetland areas from the proposed works	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	High	Moderate significance	This species is unlikely to be found at the majority of Battery Sites, but the saline and brackish lagoons adjacent to saltmarsh formations are the favoured habitat.
Stratiomys longicornis	Loss of LCGM does not include saline and brackish pools, therefore unlikely to impact on this species	No ditches to be lost in proposed works, but substantial disturbance at Rugwood and Churchend likely. These ditches are unfavourable for this species	Unlikely impact at all Battery sites given the nature of works	Unlikely to impact on this species given the distance of suitable wetland areas from the proposed works	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Negligible	High	Neutral significance	This species is unlikely to be found at the majority of Battery Sites, but the wetland and ditch habitats nearby support favourable habitat.

Paragus albifrons	The loss of the well vegetated and elevated drier areas at Q battery may be significant for this species.	The low lying ditches adjacent to the drier vegetated areas at Q are probable favoured habitats for this species. But ditches will be unaffected by the proposed works	Unlikely impact at all Battery sites given the nature of works	Unlikely to impact on this species given the distance of suitable wetland areas from the proposed works	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	High	Moderate significance	A large area of habitat which may be favourable to this species will be lost at Q Battery.
Vascular plants										
Bupleurum tenuissimum	Unlikely to be found on the Battery sites in question apart from the thinly vegetated margins. Surveys have not located this species on the Battery sites.	No ditches to be lost in proposed works, but substantial disturbance at Rugwood and Churchend likely.	Unlikely impact at all Battery sites given the nature of works	Excessive disturbance and compaction on the periphery of the proposed works area may be a significant impact	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	Medium	Minor significance	Unlikely to be a major issue for this species at the Battery sites
Carex divisa	Not observed during surveys, but its presence can not be discounted at Q and K Batteries. The wet ditches and lagoon edges will not be affected by	No ditches to be lost in proposed works, but substantial disturbance at Rugwood and Churchend likely.	Unlikely impact at all Battery sites given the nature of works	Unlikely to impact on this species given the distance of suitable wetland areas from the proposed works	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	Medium	Minor significance	Unlikely to be a major issue for this species at the Battery sites

	the proposed works.									
Hordeum marinum	Unlikely to be found on the Battery sites apart from the open vegetated margins near the Battery working areas. Substantial suitable habitat exists on the adjacent sea walls.	N/a	N/a	Excessive disturbance and compaction on the periphery of the proposed works area may be a significant impact	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Negligible	Medium	Neutral significance	Unlikely to be a major issue for this species at the Battery sites
Parapholis incurva	The well vegetated habitats at Q Battery are unlikely to support this species, but there is potential at K Battery. Not noted during surveys.	N/a	N/a	Excessive disturbance and compaction on the periphery of the proposed works area may be a significant impact	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	Medium	Minor significance	Unlikely to be a major issue for this species at the Battery sites

Poa bulbosa	The well vegetated habitats at Q Battery are unlikely to support this species, but there is potential at K Battery. Not noted during surveys.	N/a	N/a	Excessive disturbance and compaction on the periphery of the proposed works area may be a significant impact	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	Medium	Minor significance	Unlikely to be a major issue for this species at the Battery sites
Polypogon monspeliensis	The well vegetated habitats at Q Battery are unlikely to support this species, but there is potential at K Battery. Not noted during surveys.	N/a	N/a	Excessive disturbance and compaction on the periphery of the proposed works area may be a significant impact	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	Medium	Minor significance	Unlikely to be a major issue for this species at the Battery sites
Puccinellia fasciculata	There is a lack of suitable habitat for this species, lack of poaching and well vegetated area render the Battery sites generally unfavourable for this species.	No ditches to be lost in proposed works, but substantial disturbance at Rugwood and Churchend likely.	Unlikely impact at all Battery sites given the nature of works	The lack of disturbance is a major factor in restricting the distribution of this specie across Foulness Island.	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Negligible	High	Neutral significance	Unlikely to be a major issue for this species at the Battery sites

Puccinellia rupestris	There is a lack of suitable habitat for this species, lack of poaching and well vegetated area render the Battery sites generally unfavourable for this species.	No ditches to be lost in proposed works, but substantial disturbance at Rugwood and Churchend likely.	Unlikely impact at all Battery sites given the nature of works	N/a	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Negligible	High	Neutral significance	Unlikely to be a major issue for this species at the Battery sites
Trifolium squamosum	The well vegetated habitats at Q Battery are unlikely to support this species, but there is potential at K Battery. Not noted during surveys.	N/a	N/a	Excessive disturbance and compaction on the periphery of the proposed works area may be a significant impact	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	Medium	Minor significance	Unlikely to be a major issue for this species at the Battery sites
Trifolium suffocatum	The well vegetated habitats at Q Battery are unlikely to support this species, but there is potential at K Battery. Not noted during surveys.	N/a	N/a	Excessive disturbance and compaction on the periphery of the proposed works area may be a significant impact	Unlikely to be a significant impact given the nature works involved	Unlikely to be a significant impact	Slight	Medium	Minor significance	Unlikely to be a major issue for this species at the Battery sites

APPENDIX C

Battery specific mitigation plans (Drawings)

See separate documents

Appendix D

Report Conditions

WYG ENVIRONMENT

REPORT CONDITIONS

QQ MSER 2

Ecological Mitigation Package

This report is produced solely for the benefit of QinetiQ and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYGE. In time improved practices, fresh information or amended legislation may necessitate a re-assessment. Opinions and information provided in this report are on the basis of WYGE using due skill and care in the preparation of the report.

This report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

This report is limited to those aspects reported on, within the scope and limits agreed with the client under our appointment. It is necessarily restricted and no liability is accepted for any other aspect. It is based on the information sources indicated in the report. Some of the opinions are based on unconfirmed data and information and are presented as the best obtained within the scope for this report.

Reliance has been placed on the documents and information supplied to WYGE by others but no independent verification of these has been made and no warranty is given on them. No liability is accepted or warranty given in relation to the performance, reliability, standing etc of any products, services, organisations or companies referred to in this report.

Whilst skill and care have been used, no investigative method can eliminate the possibility of obtaining partially imprecise, incomplete or not fully representative information. Any monitoring or survey work undertaken as part of the commission will have been subject to limitations, including for example timescale, seasonal and weather related conditions.

Although care is taken to select monitoring and survey periods that are typical of the environmental conditions being measured, within the overall reporting programme constraints, measured conditions may not be fully representative of the actual conditions. Any predictive or modelling work, undertaken as part of the commission will be subject to limitations including the representativeness of data used by the model and the assumptions inherent within the approach used. Actual environmental conditions are typically more complex and variable than the investigative, predictive and modelling approaches indicate in practice, and the output of such approaches cannot be relied upon as a comprehensive or accurate indicator of future conditions.

The potential influence of our assessment and report on other aspects of any development or future planning requires evaluation by other involved parties.

The performance of environmental protection measures and of buildings and other structures in relation to acoustics, vibration, noise mitigation and other environmental issues is influenced to a large extent by the degree to which the relevant environmental considerations are incorporated into the final design and specifications and the quality of workmanship and compliance with the specifications on site during construction. WYGE accepts no liability for issues with performance arising from such factors.

WYG Environment Planning Transport Ltd.