

Hornsea Project Three  
Offshore Wind Farm



## Hornsea Project Three Offshore Wind Farm

Environmental Statement:  
Volume 6, Annex 3.13 – Red Squirrel, Hazel Dormouse and Freshwater Pearl Mussel Desk Study

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Date: May 2018

**Environmental Impact Assessment**

**Environmental Statement**

**Volume 6**

**Annex 3.13 – Red Squirrel, Hazel Dormouse and Freshwater Pearl Mussel Desk Study**

**Liability**

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## Glossary

Term	Definition
Phase 1 Habitat Survey	A field survey technique which provides a relatively rapid system to record and map semi-natural vegetation and other wildlife habitats.
Preliminary Ecological Appraisal	The first stage in any site ecological assessment. It has two main elements; an ecological desk study and an extended Phase 1 habitat survey.
Herpetofauna	Reptile and amphibian life.
Arboreal	Living in trees.
Omnivorous	Feed on food of both plant and animal origin.
Nocturnal	Active mostly at night.
Oligotrophic	Containing very low levels of nutrients.

## Acronyms

Unit	Description
DCO	Development Consent Order
EIA	Environmental Impact Assessment
HVAC	High Voltage Alternating Current.
HVDC	High Voltage Direct Current
NBIS	Norfolk Biodiversity Information Service
PEA	Preliminary Ecological Appraisal
PEIR	Preliminary Environmental Information Report

## Units

Unit	Description
GW	Gigawatt (power)
ha	Hectare (area)
m	Metre (distance)
km	Kilometre (distance)

## 1. Introduction

### 1.1 Development background

- 1.1.1.1 Ørsted is promoting an application for a development consent order ('DCO') for the Hornsea Project Three Offshore Wind Farm (hereafter referred to as 'Hornsea Three') a proposed offshore wind farm located in the southern North Sea. The onshore components of the Hornsea Three development include an onshore cable corridor, substations (HVDC Converter/HVAC substation, HVAC booster station), storage areas, grid connection and construction compounds. The application for Hornsea Three includes the approximately 55 km onshore cable corridor which runs from Weybourne on the north Norfolk coast south to the National Grid Sub-station, Swardeston, south-west of Norwich.
- 1.1.1.2 At the time of ecological survey scoping in December 2016, a 200 m wide cable corridor search area had been identified by Ørsted. The 200 m wide search area included the locations of the proposed onshore components (as listed above) and was the focus of the Preliminary Environmental Information Report (PEIR) published in July 2017. This search area is hereafter referred to as the 'PEIR onshore cable corridor search area'. Following this, some alternate route considerations were added. Ecological survey area boundaries were therefore based on the PEIR onshore cable corridor search area and alternate routes considered, with an appropriate survey buffer added for some survey types where necessary. The ecological desk study search area applicable to this report comprises the PEIR onshore cable corridor search area plus a 2 km buffer, subsequently referred to as the search area.
- 1.1.1.3 Subsequently, a route refinement process has been undertaken to refine the Hornsea Three onshore cable corridor to an approximately 80 m wide corridor (hereafter referred to as the 'onshore cable corridor') as well as identify locations of compounds, access roads and storage areas. The location of permanent and temporary land take associated with the HVDC converter/HVAC substation and HVAC booster station has also been refined. This process is described in more detail in volume 1, chapter 4: Site Selection and Alternatives of the Environmental Statement. The search area applicable to this report covers all areas within the Hornsea Three onshore cable corridor with the exception of the main construction compound located to the east of the cable corridor.
- 1.1.1.4 A full description of Hornsea Three is provided in volume 1, chapter 3: Project Description.

### 1.2 Ecology background

- 1.2.1.1 A Preliminary Ecological Appraisal (PEA) of the onshore components of the Hornsea Three project was undertaken in 2016 (RPS, 2016). This included a 500 m wide Phase 1 survey area (including the PEIR onshore cable corridor search area) and a desk study, whereby data from the local biological records centre was purchased and reviewed.

- 1.2.1.2 The data requested included records of protected species within the desk study search area (including freshwater pearl mussel (*Margaritifera margaritifera*) and hazel dormouse (*Muscardinus avellanarius*) in response to a scoping response received from the Environmental Agency for the Hornsea Three project in November 2016.

- 1.2.1.3 The desk study results did not include any records for freshwater pearl mussel or hazel dormouse. A single record was returned for red squirrel (*Sciurus vulgaris*) which is a species of conservation concern in England.

- 1.2.1.4 Although the desk study did not return any records for freshwater pearl mussel or hazel dormouse and only a single record for red squirrel, the Phase 1 habitat survey (RPS, 2016) recorded suitable habitat to be present for these species within the Hornsea Three onshore cable corridor. Therefore as a precautionary approach, it was recommended that the scope of the desk study was extended to assess the likelihood of these species occurring within the onshore cable corridor and determine if there was a requirement to undertake field survey for these species.

### 1.3 The brief and objectives

- 1.3.1.1 Based on the above, the brief of this desk study was to:

- Obtain biological records of the three target species within the search area from the local biological records centre, or other third-party sources;
- Evaluate the suitability of the onshore cable corridor to support the target species using the habitat descriptions from the extended Phase 1 habitat survey and aerial photography; and
- Make an assessment of the likelihood of the target species being present within the Hornsea Three onshore cable corridor.

- 1.3.1.2 The objective of the survey was to determine the likelihood of the target species being present within the Hornsea Three onshore cable corridor to determine if field survey was necessary in respect to red squirrel, hazel dormouse and freshwater pearl mussel to inform the impact assessment presented within volume 3, chapter 3: Ecology and Nature Conservation.

## 2. Methodology

- 2.1.1.1 The desk study search area was defined as the PEIR onshore cable corridor search area plus a 2 km buffer in accordance with best practice guidance (CIEEM, 2013). The desk study did not include the main construction compound to the east of the Hornsea Three onshore cable corridor. However, given that this compound comprises existing hard standing with negligible ecological importance, it is considered that a detailed survey of baseline conditions were not required. All other aspects of the onshore cable corridor route are covered in this desk study.
- 2.1.1.2 The desk study comprised a review of biological records purchased during the original PEA (RPS, 2016) as well as publically available research papers. Consideration was given to the geographical distribution of the species within England and the habitat descriptions from the extended Phase 1 habitat survey to determine their potential to support the three protected species (red squirrel, hazel dormouse and freshwater pearl mussel).
- 2.1.1.3 Additional sources of information that were reviewed included:
- The Multi-Agency Geographical Information for the Countryside (MAGIC);
  - The National Biodiversity Network (NBN) Gateway; and
  - Norfolk Biodiversity Information Service (NBIS).



## 3. Results

### 3.1 Red squirrel

#### 3.1.1 Background

3.1.1.1 The red squirrel is an arboreal, omnivorous rodent, widespread across most of Europe. It is most abundant in large tracts of coniferous forest, preferring Scots pine (*Pinus sylvestris*), and Norway spruce (*Picea abies*). Small populations also occur in deciduous woodland, mixed forest, parks, gardens, and small stands of conifers. Its diet is mainly vegetarian, consisting of seeds, acorns, fungus, bark, and sapwood, but may also include animal prey such as young birds and eggs.

3.1.1.2 Red squirrel is protected under Schedule 5 and 6 of the Wildlife and Countryside Act 1981, as amended. This makes it an offence to intentionally kill or injure a red squirrel or intentionally or recklessly damage or destroy any structure or place a red squirrel uses for shelter or protection, or disturb a red squirrel while it occupies such a place.

3.1.1.3 Although described as common throughout most of its European range, there have been well-documented population declines and range contractions in the United Kingdom, Ireland and Italy. Population densities vary geographically and show large annual fluctuations in response to tree seed crop availability (Lurz *et al.*, 2000). Local extinctions are associated with the introduction of the invasive eastern grey squirrel (*Sciurus carolinensis*) from North America.

3.1.1.4 Red squirrels in the UK are now mainly present only on the Isle of Wight, in north England, south and central Scotland, Wales and Northern Ireland (Gurnell and Pepper, 1991). The distribution of the species is presented in Figure 3.1. Only records from the last 20 years have been presented.

3.1.1.5 Semi-natural broadleaved woodland with some patches of remnant broadleaved woodland and plantation pine woodland occur within the Hornsea Three onshore cable corridor, providing suitable habitat for the species. Thetford Forest, located 35 km south-west of the search area, was previously a stronghold for the species (Natural England, 1997). A small population may remain within this area, although there is no significant connectivity between this and the onshore cable corridor making it unlikely that any individuals present in Thetford Forest could utilise the habitats present within the onshore cable corridor.

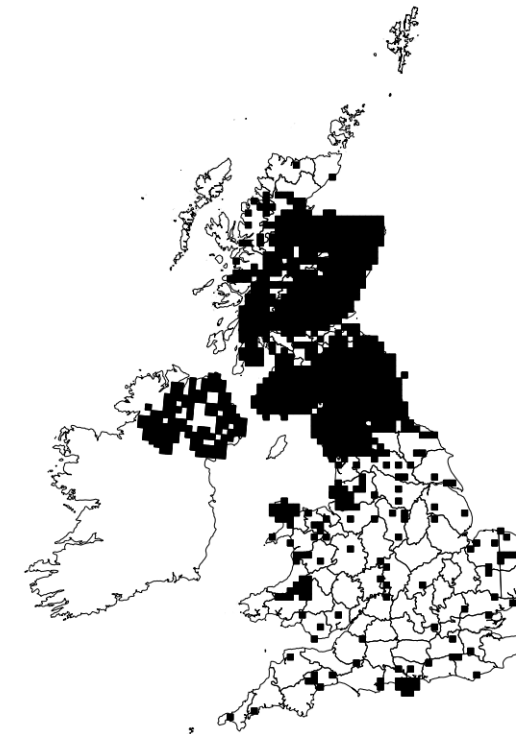


Figure 3.1: Distribution of Red Squirrel from 1997 to 2017. Source NBN Gateway (data.nbn.org.uk) accessed 2 March 2017

3.1.1.6 As part of a national conservation initiative, there are currently 15 enclosures in Norfolk and Suffolk taking part in a captive breeding programme for red squirrels. Young have been released in the north of England and Wales to augment established colonies. As with the potential population in Thetford Forest, it is unlikely that individuals from these populations would use the habitats within the Hornsea Three onshore cable corridor.

#### 3.1.2 Survey-area specific

3.1.2.1 Sixteen records exist within the Norfolk area, dating between 1997 and 2016.

3.1.2.2 A single record of red squirrel at Swardeston (500 m east and west of the PEIR onshore cable corridor search area) dating from 2006 was returned during the desk study (RPS, 2016). The sighting was recorded in a residential garden, habitat unsuitable for a wild red squirrel population. The note accompanying this record states that the animal was partially tame and was assumed to be an escaped or released animal which was not expected to survive. As such this record is not considered to be a wild red squirrel.

3.1.2.3 Based on the habitats present, and current distribution of the species, it is considered unlikely that a red squirrel population is present in the search area or within the onshore cable corridor. Further surveys are therefore not recommended.

## 3.2 Hazel dormouse

### 3.2.1 Background

3.2.1.1 Whilst they are traditionally associated with hazel (*Corylus avellana*), hazel dormouse occurs in a wide variety of woody habitats from semi-natural woodlands to hedgerows and areas of species-rich scrub. Hazel dormouse is a mostly arboreal and nocturnal animal that feeds amongst the branches of trees and shrubs on a variety of food sources including flowers, fruits, nuts and some insects. Hazel dormouse rarely descends to the ground, except for hibernation.

3.2.1.2 Hazel dormouse is protected under Schedule 2 of the Conservation of Habitats and Species Regulations 2010, as amended, and Schedule 5 and 6 of the Wildlife and Countryside Act 1981, as amended. Hazel dormouse is also afforded some protection under the Countryside and Rights of Way Act 2000 and is a Species of Principal Importance under the Natural Environment and Rural Communities Act 2006. Taken together, these make it an offence to deliberately capture, kill or disturb a hazel dormouse or to intentionally or recklessly damage, destroy or obstruct access to a breeding site or resting place of a hazel dormouse.

3.2.1.3 The hazel dormouse has declined both in terms of population and distribution during the 20<sup>th</sup> century, largely due to loss and fragmentation of woodland habitat as a result of forestry, urbanisation and agriculture. The UK population was estimated to be 45,000 individuals in 2005, and is still thought to be declining (Battersby, 2005). The distribution of the hazel dormouse is now primarily in southern England and Wales and is confirmed as being absent in Scotland.

3.2.1.4 The National Biodiversity Network (NBN) distribution map, presented in Figure 3.2 indicates that the species is largely absent from the Norfolk region. This distribution map is based on data collected by local biological record groups.

### 3.2.2 Survey-area specific

3.2.2.1 Within Norfolk, Bright and Morris (1996) demonstrated the species was likely to be extinct, although they were known to be present in Norfolk in the late 19<sup>th</sup> century.

3.2.2.2 Three records of hazel dormouse exist within Norfolk, however these are dated 1959 and 1998. Based on the records purchased from the local biological records centre, no records of hazel dormouse within the last 10 years exist in the search area (RPS, 2016).

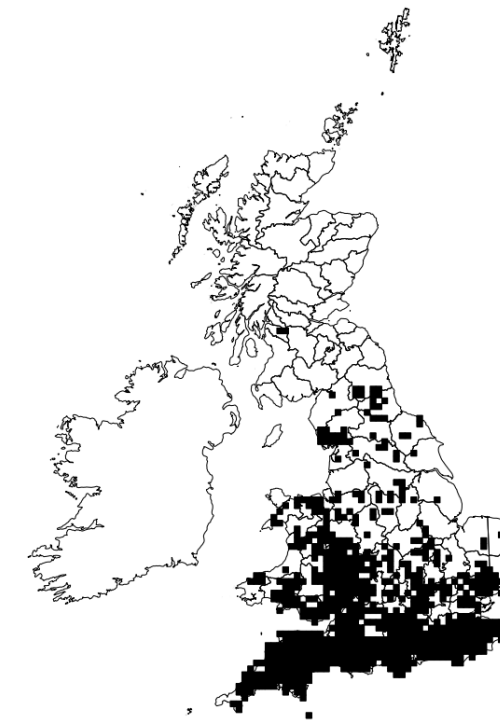


Figure 3.2: Distribution of Hazel Dormouse. Source NBN Gateway ([data.nbn.org.uk/](http://data.nbn.org.uk/)) accessed 2 March 2017

3.2.2.3 Suitable habitat for hazel dormouse does exist in the search area in the form of semi-natural broadleaved woodland, dense scrub and species-rich hedgerow. In some areas, these habitats are relatively isolated, being surrounded by intensively managed farmland. Despite suitable habitat being present, the known distribution of the species indicates that it is unlikely for hazel dormouse to be present in the search area, including the Hornsea Three onshore cable corridor, and as such no further surveys are recommended.



### 3.3 Freshwater pearl mussel

#### 3.3.1 Background

3.3.1.1 Freshwater pearl mussel is an invertebrate that can live up to 100 years (Bauer, 1992). They live buried or partially buried in sandy substrates or between boulders and pebbles, in fast-flowing, oligotrophic and unpolluted rivers and streams. As larvae the mussels attach themselves to the gills of salmonid fish species (Skinner *et al.*, 2003).

3.3.1.2 Freshwater pearl mussel receives protection under Schedule 5 of the Wildlife and Countryside Act (1981), as amended, and is also listed on Annexes II and V of the EU Habitats and Species Directive, and Appendix III of the Bern Convention.

3.3.1.3 The freshwater pearl mussel is distributed from the Arctic and temperate regions of western Russia through Europe to the north-eastern seaboard of North America. Within the UK the species was once widely distributed and abundant. However surveys carried out in England and Wales have found most former populations to be extinct or with very little active recruitment (presence of juveniles) (Chesney & Oliver, 1998). In Scotland, freshwater pearl mussel is now confined to a limited number of Highland rivers (Cosgrove *et al.*, 2000). Sixty-six populations of freshwater pearl mussel remain in the UK (JNCC 2013). Their location is presented in Figure 3.3.

#### 3.3.2 Survey-specific

3.3.2.1 Despite the presence of suitable habitat within the search area and the onshore cable corridor, the species' known distribution and life history make it highly unlikely to be present. Purchased local data also returned no current records. Therefore, no further surveys are recommended.

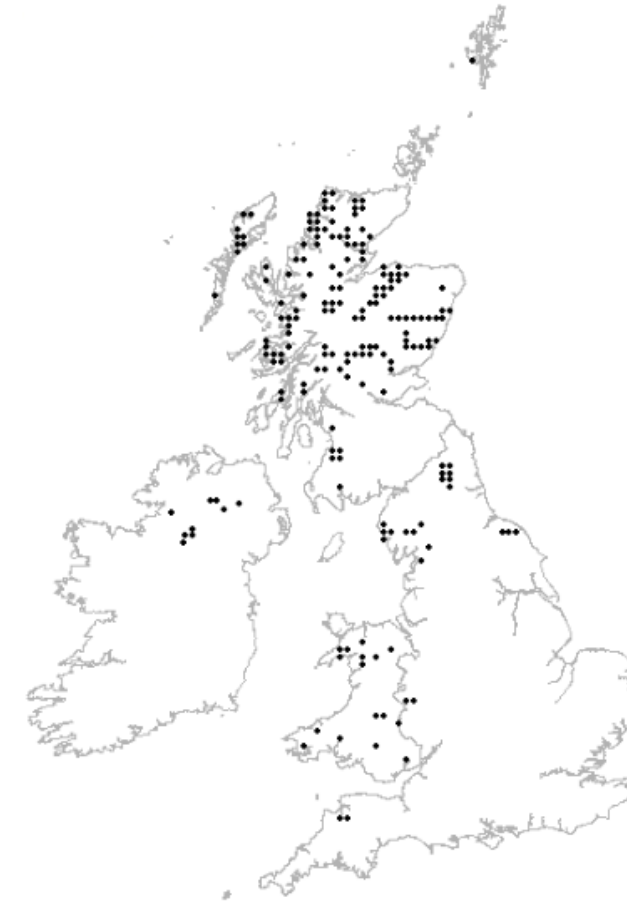


Figure 3.3: Distribution of Freshwater Pearl Mussel. Source JNCC (2013)

## 4. Conclusion

- 4.1.1.1 The desk study results, presented in the PEA (RPS, 2016), indicated an absence of red squirrel, hazel dormouse and freshwater pearl mussel records within the search area and consequently within the onshore cable corridor.
- 4.1.1.2 The findings of this desk study support these findings. The species' distribution and known populations within the UK suggest none of these species is present in Norfolk. Although suitable habitat occurs in the search area, the lack of existing records within the region and absence of known populations indicate it is unlikely that red squirrel, hazel dormouse and freshwater pearl mussel occurs within the search area or Hornsea Three onshore cable corridor. As such no further surveys are recommended.

## 5. References

- Battersby, J. (2005) UK Mammals: Species Status and Population Trends. First Report by the Tracking Mammals Partnership. JNCC, Peterborough.
- Bauer, G. (1992) Variation in the life span and size of the freshwater pearl mussel. *Journal of Animal Ecology* 61, 425–436.
- Bright, P. & Morris, P. (1996) Why are dormice rare? A case study in conservation biology. *Mammal Review* 26: 157 – 187
- Bright, P., Morris, P. and Mitchell-Jones, A. (2006) Dormouse Conservation Handbook 2nd Edition. English Nature, Peterborough.
- Chesney, H. & Oliver, P. (1998) Conservation issues for Margaritiferidae in the British Isles and Western Europe. In: Killeen I and Holmes AM (eds). *Molluscan Conservation. A strategy for the 21st Century*. *Journal of Conchology Special Publication* 2, 231–242.
- Chartered Institute of Ecology and Environmental Management (CIEEM) (2013) Guidelines for Preliminary Ecological Appraisal.
- Cosgrove, P., Young, M., Hastie, L., Gaywood, M. and Boon, P. (2000) The status of the freshwater pearl mussel *Margaritifera margaritifera* L. in Scotland. *Aquatic Conservation: Marine and Freshwater Ecosystems* 10, 3, 197–208.
- Gurnell, J. & Pepper, H. (1991) Conserving the red squirrel. Great Britain, Forestry Commission, Research Division.
- JNCC (2013) European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora S1029 - Freshwater pearl mussel. (*Margaritifera margaritifera*).
- Lurz, P., Garson, P. & Wauters, L. (2000) Effects of temporal and spatial variations in food supply on the space and habitat use of red squirrels (*Sciurus vulgaris* L.). *Journal of Zoology*, 251(2), 167-178.
- Natural England (1997) Conserving the Red Squirrel in Thetford Forest, Natural England, Peterborough
- Skinner, A., Young, M., & Hastie, L. (2003) Ecology of the Freshwater Pearl Mussel. Conserving Natura 2000 Rivers Ecology Series No. 2 English Nature, Peterborough.
- RPS (2016) Hornsea Three Preliminary Ecological Appraisal. Report prepared for DONG Energy