Gateway Energy Centre

HIGH VOLTAGE ELECTRICAL CONNECTION

ENVIRONMENTAL REPORT

ECOLOGICAL SURVEYS VOLUME

Prepared by

PARSONS BRINCKERHOFF

125 YEARS

November 2012

CONTENTS

OVERVIEW

A range of ecological surveys have been carried out within the Survey Area, each intended to help inform the surveys area's value for flora and fauna.

The initial Phase 1 Habitat Survey confirmed which habitats types are present and thus which Protected and Notable Species are likely to be present.

Subsequently, Phase 2 Protected Species Surveys were carried out for:

- Badgers;
- Water Voles;
- Reptiles;
- Great Crested Newts; and,
- Terrestrial Invertebrates.

These Phase 2 Protected Species Surveys confirmed the presence / absence and / or population abundance of the species groups.

The Phase 1 Survey Report and the Phase 2 Survey Reports for each of these species / species groups (excluding Badgers) are presented in this Ecological Surveys Volume.

EXTENDED PHASE 1 HABITAT SURVEY

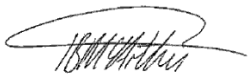
Extended Phase 1 Habitat Survey: Gateway Energy Centre Grid Connection

InterGen

November 2012

PARSONS BRINCKERHOFF

PB 125 YEARS

Report Title	**:**	**Extended Phase 1 Habitat Survey: Gateway Energy Centre Grid Connection**
Report Status	**:**	**Final**
Job No	**:**	**63958 A**
Date	**:**	**November 2012**
Prepared by	**:**	**Tom McArthur** 
Checked by	**:**	**Vicky Cheung** 
Approved by	**:**	**Emily Agus.....**

Document History and Status

Report Issue	Date of Issue	Prepared By:	Checked By:	Approved By:
A	May 2012	Tom McArthur	Vicky Cheung	Emily Agus
B	November 2012	Tom McArthur	Vicky Cheung	Emily Agus
C	November 2012	Tom McArthur	Vicky Cheung	Emily Agus

PARSONS BRINCKERHOFF

CONTENTS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Parsons Brinckerhoff Limited (PB) was commissioned by InterGen to undertake an Extended Phase 1 Habitat Survey of the proposed route of the HV Electrical Connection associated with the Gateway Energy Centre Combined Cycle Gas Turbine (CCGT) Power Station (GEC), east of Stanford-le-Hope, Essex.

The purpose was to document the baseline ecological conditions by carrying out an Extended Phase 1 Habitat Survey to record and map broad habitat types present, identifying any Designated Sites and confirming the presence or potential presence of Protected and / or Notable Species that would require further Phase 2 Surveys.

Within the Search Area, one Statutory and two Non-Statutory Designated Sites were identified. The Statutory Designated Site is Fobbing Marshes Site of Special Scientific Interest (SSSI) located approximately 900 m to the north. The two Non-Statutory Designated Sites are Corringham Marshes SINC (located approximately 100 m north) and Vange and Fobbing Marshes SINC (located approximately 900 m north). It should be noted that part of the Corringham Marshes SINC is also managed as part of the DP World's Northern Triangle Receptor site.

The proposed HV Electrical Connection will not directly impact the Statutory Designated Sites and Non-Statutory Designated Site located approximately 900 m away (Fobbing Marshes SSSI / Vange and Fobbing Marshes SINC) due to the envisaged temporary and relatively localised impacts associated with the construction works. However, the proposed HV Electrical Connection may directly impact the Non-Statutory Designated Site located approximately 100 m away (Corringham Marshes SINC).

The Survey Area supports a mosaic of several interconnected habitats including: improved and semi-improved grassland; continuous and scattered scrub; broad-leaved scattered trees; wet and dry ditches; inundation vegetation; bare ground; and, broad-leaved semi-natural woodland. In isolation these habitats are widespread and relatively common place within the local landscape and as such are found to be primarily of negligible or low conservation value when viewed alone. However, with reference to the Eastern Section (Section 3), the habitats together form a potentially valuable green corridor through an otherwise largely industrial area.

During the Extended Phase 1 Habitat Survey, evidence was recorded of: badgers; nesting birds; and, water voles. In addition, the mosaic of habitats has the potential to also support: bats; GCN; common reptile species; and, terrestrial invertebrates. Based on the construction methods to be employed, the following specific Phase 2 Protected Species Surveys have been recommended in respect of: badgers; GCN; reptiles; terrestrial invertebrates; and, water vole.

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Overview

1.1.1 Parsons Brinckerhoff Limited (PB) was commissioned by InterGen to undertake an Extended Phase 1 Habitat Survey of the proposed route of the HV Electrical Connection associated with the Gateway Energy Centre Combined Cycle Gas Turbine (CCGT) Power Station (GEC).

1.1.2 The purpose was to document the baseline ecological conditions by carrying out an Extended Phase 1 Habitat Survey to record and map broad habitat types present, identifying any Designated Sites and confirming the presence or potential presence of Protected and / or Notable Species that would require further Phase 2 Surveys.

1.1.3 Further Phase 2 Surveys would be required for any species or habitat which might comprise an ecological constraint to the proposed development of the HV Electrical Connection.

1.2 Survey Area Context

1.2.1 GEC will be located on land within the London Gateway Development (LG Development). The LG Development, being promoted by DP World, is currently in the early stages of construction.

1.2.2 A HV Electrical Connection is required to connect the GEC into the National Grid National Electricity Transmission System.

1.2.3 The HV Electrical Connection route runs between the proposed GEC and the existing National Grid Coryton South Substation, and would:

- Leave the GEC Substation within the GEC site, and exit the GEC site to the east, and then turn northwards following the route of the agreed easement with DP World;
- Likely require a Horizontal Directional Drill (HDD) under the A1014 (The Manorway);
- Turn eastwards towards the existing CECL Power Station;
- Likely require a second HDD back under the A1014 (The Manorway); and
- Continue south-eastwards towards the Coryton South Substation at the existing CECL Power Station.

1.2.4 Within this HV Electrical Connection route, two Options are considered. These are referred to as the 'Preferred Option' and the 'Manorway Fleet / Northern Triangle Option'.

1.2.5 The exact route has yet to be determined. The exact route will be determined after the appointment of the Construction Contractor / HDD Specialist who will take into consideration the potential locations of the HDD drilling pits and agreements with land owners.

1.2.6 Under the Preferred Option, to the north of the A1014 (The Manorway), the HV Electrical Connection would be installed under the cycle path. In terms of HDD, it has been assumed that this would be used for the two crossings of the A1014 (The Manorway) and the crossing of the railway.

1.2.7 The Manorway Fleet / Northern Triangle Option would be employed in the event that it is not practicable to install the HV Electrical Connection under the cycle path. Under the Manorway Fleet / Northern Triangle Option it may be necessary to extend the working corridor northwards into the Manorway Fleet and the Northern Triangle. In terms of HDD, it has been assumed that (in addition to the two crossings of the A1014

(The Manorway) and the crossing of the railway) this would be used for the crossing of the Northern Triangle.

1.2.8 Accordingly, under either Option, the cables associated with the HV Electrical Connection will likely be laid using a combination of two construction methods. These are:

- Direct Buried (at a depth of approximately 1.5 m inside a working width (working corridor) of up to 30 m wide); and,
- HDD (which comprises a trenchless technique for installing underground cables along a pre-prescribed path by using a surface launched drilling rig).

1.2.9 Given the length of the HV Electrical Connection route and the diversity of habitats it bisects, the Survey Area has been divided into three distinct 'Sections', each comprising broadly similar habitat types. The three distinct Sections are shown in Figure 1. The three Sections are:

- ***Section 1:***

  The Western Section (running north from GEC to the A1014 (The Manorway)), which is located within the operational DP World / LG Development Construction Site.

- ***Section 2:***

  The Northern Section (running eastwards alongside the A1014 (The Manorway)), which encompasses: the A1014 (The Manorway), a Cycle Path, the Manorway Fleet, and part of the Northern Triangle (DP World / LG Development Receptor Site).

- ***Section 3:***

  The Eastern Section (running south-east from the A1014 (The Manorway) to the existing National Grid Coryton South Substation), which passes in close proximity to the existing Coryton Power Station Overhead 400 kV Electrical Transmission Lines.

1.2.10 The Survey Area cross a series of different habitats and incorporates land owned (mainly) by DP World, Shell and Petroplus.

1.3 Legislation and Planning Context

1.3.1 Articles of Wildlife and Countryside Legislation, Planning Policy Guidance and references to both Local and National Biodiversity Action Plans (including their context and applicability) is explained as appropriate in the relevant Sections of this Report.

1.3.2 A summary of Legislation and Guidance for Protected and Notable Species and Habitats in the UK is presented in Appendix A.

1.3.3 The key articles of relevance are:

- The Conservation of Habitats and Species Regulations 2010 (Habitats Regulations) (as amended);
- The Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Countryside and Rights of Way Act 2000 (CRoW);
- The Natural Environment and Rural Communities Act 2006 (NERC);
- The Protection of Badgers Act 1992;
- National Planning Policy Framework 2012;

- The UK Biodiversity Action Plan (UKBAP);
- The Local Biodiversity Action Plan (LBAP) for Essex and Thurrock;
- The East of England Plan;
- Thurrock Borough Core Strategy; and,
- Thurrock Borough Local Plan.

SECTION 2

METHODOLOGY

2 METHODOLOGY

2.1 Desk Study

2.1.1 Due to the existence of a number of recent Ecological Studies and Reports produced to inform the Consent applications for GEC, the GEC Underground Gas Pipeline and Associated AGI and the LG Development, no new data search was considered necessary.

2.1.2 Instead a review of the existing data was undertaken. In the first instance, data from the GEC Underground Gas Pipeline and Associated AGI Ecological Scoping Report (2010 Ecological Scoping Report) was reviewed.

2.1.3 This data is less than three years old and is directly relevant to the proposed route of the HV Electrical Connection. Therefore, it is considered to be accurate and still relevant.

2.1.4 The 2010 Ecological Scoping Report included a thorough and detailed Desk Study of a "Search Area" within 1 km of the proposed route of the Underground Gas Pipeline and Associated AGI.

2.1.5 In line with this, a "Search Area" comprising a width of up to 1 km from the proposed route of the HV Electrical Connection Route is used for all Statutory and Non-Statutory Designated Sites. These included:

- Special Areas of Conservation (SAC);
- Special Protection Areas (SPA);
- Ramsar Sites;
- Sites of Special Scientific Interest (SSSI);
- National Nature Reserves (NNR);
- Local Nature Reserves (LNR);
- Sites of Importance for Nature Conservation (SINC); and
- Local Wildlife Sites (LWS);

2.1.6 A further "Search Area" comprising a width of up to 2 km from the proposed route of the HV Electrical Connection Route was used for all Protected and Notable Species / Habitats.

2.1.7 In addition to the above, the Phase 2 Protected Species Reports produced for the GEC Underground Gas Pipeline and Associated AGI (and the initial, now superseded, Grid Connection Route) were reviewed. These Phase 2 Protected Species Reports included the following:

- Phase 2 Bat Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes (PB, 2010);
- Phase 2 Breeding Bird Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes (PB, 2010);
- Phase 2 Great Crested Newt Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes (PB, 2010);
- Phase 2 Reptile Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes (PB, 2010);
- Phase 2 Water Vole Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes (PB, 2010); and,

- Phase 2 Bat Report: Grid Connection Electricity Cabling Routes (PB, 2011).

2.1.8 These Phase 2 Reports contained (where relevant) reference to other Reports / Surveys / Data which have been undertaken in the area (i.e. those undertaken and being undertaken for the LG Development).

2.1.9 In addition, several statutory and non-statutory Consultees were consulted to inform this assessment. These included:

- Natural England;
- Essex Bat Group;
- Essex Small Mammal and Bat County Recorder;
- Essex Freshwater Invertebrate County Recorder*;
- Essex Terrestrial Invertebrate County Recorder*;
- Essex Bird County Recorder*;
- Essex Wildlife Trust;
- Essex Badger Protection Group; and,
- Essex Flora County Recorder*.

** No data was available for the search area or was not provided.*

2.1.10 The following web-based databases also were consulted:

- National Biodiversity Network (NBN) Gateway – Accessed 26 April 2012*;*
- Multi Agency Geographic Information for the Countryside (MAGIC) – Accessed 26 April 2012; and,
- Nature on the Map – Accessed 26 April 2012.

2.2 Walkover Survey

2.2.1 A Walkover Survey was undertaken by PB Ecologists on 5 April 2012. This assessed the ecological value of the route of the HV Electrical Connection and recorded any Protected Habitats and evidence of / potential for any Protected or Notable Species on site or within the relevant surrounding area.

2.2.2 The Walkover Survey followed standard survey methodology published by the Joint Nature Conservation Committee (JNCC)[1]. This standard survey methodology comprises a technique for rapidly obtaining baseline ecological information over a large area of land. All habitat types present on site were recorded on Phase 1 Maps and dominant plant species recorded in accordance with standard nomenclature[2].

2.2.3 In accordance with Best Practice, the standard survey methodology was extended to consider and include all protected and notable fauna and habitats suitable to support them[3]. Any incidental records or evidence of species were target noted on a separate map and each habitat evaluated for its potential to support protected or notable species.

---

1 *Joint Nature Conservation Committee (2007) Handbook for Phase 1 Habitat Survey - A Technique for Environmental Audit, Joint Nature Conservation Committee, Peterborough.*

2 *Stace, C. (1997) New Flora of the British Isles; Second Edition. Cambridge University Press, Cambridge.*

3 *Institute of Ecology and Environmental Management (2006). Guidelines for Ecological Impact Assessment in the United Kingdom (version 7 July 2006). http://www.ieem.org.uk/ecia/index.html*

2.3 Walkover Survey Limitations

2.3.1 The Walkover Survey took place on a single day in April 2012. As such, seasonal variations cannot be observed and potentially only a selection of all species that occur within the Survey Area will have been noted. Therefore, the Walkover Survey provides a general assessment of potential nature conservation value. However, it is considered that the combination of historic records from the Desk Study and the Walkover Survey provides an accurate representation of the various species and habitat types present or potentially present within the Survey Area.

2.3.2 Several Sections of the Survey Area were not accessed. In particular, access was not gained to Section 1. However, this limitation is not considered significant as the majority of Section 1 comprises an active construction site which has been confirmed to be devoid of vegetation (see Appendix B).

SECTION 3

RESULTS

3 RESULTS

3.1 Desk Study

Designated Sites

Statutory Designated Sites

3.1.1 There is one Statutory Designated Site located within 1 km of the proposed route of the HV Electrical Connection. This is Vange and Fobbing Marshes Site of Special Scientific Interest (SSSI).

3.1.2 Details are provided in Table 3.1 and its location in Figure 2.

TABLE 3.1: STATUTORY DESIGNATED SITES FOUND WITH THE SEARCH AREA

Designated Site	Size (Ha)	Distance	Description
Vange and Fobbing Marshes SSSI	167.3	900 m north	Unimproved grassland and associated wet ditches and creeks which support a diversity of nationally uncommon or rare plant and invertebrate species.

3.1.3 Holehaven Creek SSSI, a wetland site important for its nationally and internationally important numbers of wintering black-tailed godwit (*Limosa limosa islandica*) is located along the eastern boundary of, but outside of, the search area.

Non-Statutory Designated Sites

3.1.4 There are two Non-Statutory Designated Sites located within 1 km of the proposed route of the HV Electrical Connection. These sites are afforded a level of protection through the planning process and represent a tier of nature conservation interest below that of the Statutory Designated Sites.

3.1.5 Details are provided in table 3.2 and their locations are shown in Figure 3.

TABLE 3.2: NON-STATUTORY DESIGNATED SITES FOUND WITHIN THE SEARCH AREA

Designated Site	Size (Ha)	Distance	Description
Corringham Marshes SINC	247.7	Within 100 m	A large extent of grassland and grazing marshes bisected by wet ditches. The area of the SINC which the route will pass close to is also a receptor site for protected great crested newts, reptiles and water voles which have recently been translocated from the adjacent DP World Park Development site. The site is managed under a Natural England European Protected Species development licence.

Designated Site	Size (Ha)	Distance	Description
Vange and Fobbing Marshes SINC	130.3	900 m north	Unimproved coastal grassland and associated wet ditches and creeks which support a diversity of nationally uncommon or rare plant and invertebrate species.

Protected Species and / or Species of Conservation Importance

3.1.6 The scope of species included within this sub-Section has been informed by and is underpinned by legislative and policy requirements. Details of which are presented in Appendix A.

Badger

3.1.7 There are records of active badgers (*Meles meles*) throughout the Search Area.

3.1.8 Two outlier badger setts have been previously recorded within Corringham Marshes SINC to the west.

Otter

3.1.9 The Desk Study did not identify any records of otter (*Lutra lutra*) within the 2 km Search Area.

3.1.10 Otters are a UK BAP priority species.

Water Vole

3.1.11 There is a large population of water voles (*Arvicola amphibius*) within the area. They are present extensively throughout the wet ditches, particularly within the Northern Triangle receptor site, located immediately to the north.

3.1.12 Water voles are a UK and Thurrock BAP priority species.

Dormice

3.1.13 No records of dormice (*Muscardinus avellanarius*) were identified during the formal Desk Study.

3.1.14 However, the Essex BAP indicated the presence of dormouse approximately 10 km north-east of the Search Area within Belfair's Local Nature Reserve within the past ten years.

3.1.15 Dormice are a UK and Essex BAP priority species.

Bats

3.1.16 Various records of bats have been identified within the 2 km Search Area. These include: pipistrelle (*Pipistrellus spp.*); noctule (*Nyctalus noctula*); serotine (*Eptesicus serotinus*) Leisler's (*Nyctalus leisleri*); and, brown long-eared (*Plecotus auritus*).

3.1.17 The majority of records were located within and around the LG Development where extensive surveys have been recently undertaken. There were several recordings along the A1014 (The Manorway). However, Corringham Marshes SINC was largely devoid of any noteworthy records.

3.1.18 Despite a wide distribution across the Survey Area, the abundance of bats is considered to be low.

3.1.19 The majority of the recordings comprise sporadic single passes with only a few occasions where bats were recorded foraging in an area for a sustained period of time or in groups of two or more bats.

3.1.20 Several bat species are listed on the UK, Essex and Thurrock BAPs.

Birds

3.1.21 Breeding bird surveys undertaken as part of the LG Development indicated the presence of three Schedule 1 Species. These are: barn owl (*Tyto alba*); black redstart (*Phoenicurus ochruros*); and, bearded tit (*Panurus biarmicus*).

3.1.22 Subsequent surveys for the GEC Underground Gas Pipeline and Associated AGI helped confirm the presence of 12 UK BAP / Red list Species within the Search Area, including: grey partridge (*Perdix perdix*); lapwing (*Vanellus vanellus*); skylark (*Alauda arvensis*); song thrush (*Turdus philomelos*); spotted flycatcher (*Muscicapa striata*); starling (*Sturnus vulgaris*); house sparrow (*Passer domesticus*); linnet (*Carduelis cannabina*); yellowhammer (*Emberiza citrinella*); reed bunting (*Emberiza shoeniclus*); Cetti's warbler (*Cettia cetti*); and, corn bunting (*Miliaria calandra*).

Amphibians

3.1.23 A large meta-population of Great Crested Newts (GCN) (*Triturus cristatus*) has been identified within the 2 km Search Area. Of the 320 water bodies located within the LG Development survey area, GCN were present within 44 of them. It was estimated that they comprised 39 small populations and five medium populations.

3.1.24 The GCN were translocated from the LG Development site to one of two neighbouring Receptor sites. The GCN from the LG Port site were moved to the Northern Triangle Receptor site, located immediately north of the proposed route of the HV Electrical Connection and the GCN from the LG Logistics and Business Park site were moved into the Boundary Corridor Receptor site, located approximately 150 m west of the proposed route of the HV Electrical Connection.

3.1.25 GCN are listed as a UK, Essex and Thurrock BAP species.

3.1.26 Smooth newts (*Triturus vulgaris*) and palmate newts (*Triturus helveticus*) were also recorded within the Search Area and anecdotal evidence suggested common toads (*Bufo bufo*) may also be present.

Reptiles

3.1.27 There are records of all four common reptile species within the 2 km Search Area. These are: grass snake (*Natrix natrix*); adder (*Vipera berus*); slow worm (*Anguis fragilis*); and, common lizard (*Zootoca vivipara*).

3.1.28 There is thought to be a large population of each species when viewed across the whole Search Area, particularly within the two nearby receptor sites: the Northern Triangle; and, the Boundary Corridor.

3.1.29 All four reptile species are listed on the UK BAP priority list, and grass snake and adder on the Thurrock BAP.

White-Clawed Crayfish

3.1.30 The Desk Study revealed no records of this species within the Survey Area.

3.1.31 White-clawed Crayfish are listed on the Essex BAP.

Other Aquatic Invertebrates

3.1.32 The surveys undertaken for the LG Development identified 30 different invertebrate families. One identified species (the scarce emerald damselfly (*Lestes dryas*)) is listed as vulnerable in the UK red data book. Additionally four vulnerable, three endangered, 16 rare and 77 nationally scarce species (as well as many species of local importance) were also recorded.

3.1.33 Many aquatic invertebrates species are listed on the UK BAP, several of which are also listed on the Essex and Thurrock BAP priority species lists.

Terrestrial Invertebrates

3.1.34 The surveys undertaken as part of the LG Development, comprising predominantly brown field land, confirmed the presence of approximately 470 species of terrestrial invertebrate, including two UK BAP species. These were: the brown carder bee (*Bombus humilis*); and, the shrill carder bee (*Bombus syvarum*). Two nationally vulnerable species, four nationally rare species and 34 nationally notable species were also recorded within the LG Logistics and Business Park.

3.1.35 The 'All of a Buzz' Project, run by Buglife in the Thames Gateway Area evaluates habitats, including brownfield sites for their potential to support invertebrates. There are six key brownfield sites within the wider area which have been identified as being of particular importance to invertebrates.

3.1.36 Many terrestrial invertebrates species are listed on the UK BAP, several of which are also listed on the Essex and Thurrock BAPs.

Flora

3.1.37 No records of protected flora have been identified within the search area.

3.1.38 Five nationally scarce species were identified within the 2 km search area. These are: divided sedge (*Carex divisa*); broad-leaved spurge (*Euphoria platyphyllos*); dittander (*Lepidium latifolium*); annual beard grass (*Polypogon monspeliensis*); and, stiff salt marsh-grass (*Puccinellia rupestris*). Divided sedge, dittander and stiff salt marsh-grass, though nationally scarce, are relatively common within southern Essex.

3.1.39 A further 22 species of local importance have also been recorded.

Other Notable Species

3.1.40 Historical records indicate the presence of brown hare (*Lepus europaeus*) throughout the Search Area. Brown hares are also a UK, Essex and Thurrock BAP species.

3.1.41 Evidence of mink (*Mustela vison*) has been recorded within the Search Area. Mink are acknowledged to be one of the key reasons for the recent dramatic decline in the national water vole population. Mink are listed on Schedule 9 of the Wildlife and Countryside Act 1981, as amended, making it illegal to release this species into the wild.

3.2 Walkover Survey

3.2.1 The Survey Area is divided into three Sections as illustrated in Figure 1.

3.2.2 Details of the habitats and species included within this section and a justification for their inclusion is provided in Appendix A.

General Habitat Types

3.2.3 The Survey Area supported a number of habitat types as defined by the JNCC standard methodology for Phase 1 Habitat Survey.

3.2.4 The geographical distribution of the habitats is illustrated in Figure 4 with details of the associated Target Notes in Appendix C.

Section 1

3.2.5 This Section is located within the LG Development construction site. This currently comprises a temporary haul road which provides access to the construction sites and is subsequently dominated by bare open ground and hardstanding. No vegetation of significance is present (see Appendix B).

3.2.6 A disused railway line which supports dense continuous scrub is located immediately to the east of the temporary haul road and forms the boundary to the LG Development site. The dominant scrub species are buddleia (*Buddleia davidii*),

bramble (*Rubus fruticosus agg.*), and silver birch (*Betula pendula*), with various grasses dominating the ground flora. This area of scrub widens at the northern end where it abuts Section 2.

Section 2

3.2.7 The A1014 (the Manorway) traverses east to west through the centre of this Section. The area comprises hardstanding, amenity grassland, semi-improved grassland, inundation vegetation, dense scrub and semi-natural broad-leaved woodland.

3.2.8 The A1014 (the Manorway) itself is dominated by hardstanding and is flanked by a combination of grassland and scrub and small isolated patches of semi-mature broad-leaved woodland. One wet and one dry ditch are also present, to the north and south of the road but are somewhat hidden within the thick scrub.

3.2.9 The land to the south of A1014 (the Manorway) (adjacent to Section 1) comprises a large area of dense scrub habitat and a parking area associated with the LG Development. The scrub habitat was dominated by buddleia, bramble and silver birch. The land to the south of A1014 (the Manorway) (adjacent to Section 3) is dominated by the disused railway corridor. The tracks are still visible with the ballast maintaining a thin linear strip of bare ground but the bramble and buddleia has encroached elsewhere to form thick areas of dense scrub.

3.2.10 The land to the north of A1014 (the Manorway) is dominated by the Manorway Fleet, a deep water course which supports a significant coverage of reeds (*Phragmites sp.*). The semi-improved grassland of the Northern Triangle Receptor site is located further north of the Manorway Fleet.

3.2.11 Open standing water, broad-leaved woodland and marsh and / or swamp are UK BAP habitats. Wetlands including grazing marsh and reedbeds and woodlands are Essex BAP habitats and roadside verges and reedbeds are also Thurrock BAP habitats.

Section 3

3.2.12 This Section is the most biologically diverse. It is formed of two large unmanaged grassland fields divided by an access road running east to west towards the Shell Aviation Oil Depot. Together, the fields form a strip of grassland and scrub sandwiched between various industrial complexes.

3.2.13 The northern field comprises rank semi-improved grassland to the north-east, intermittently scattered with scrubland species such as hawthorn (*Cragaegus monogyna*) and blackthorn (*Prunus spinosa*). This scrub becomes thicker and dominates the south-western corner of the field. Patches of immature silver birch were situated amongst the scrub. The open grassland and dense scrub are divided by a chain link fence and a narrow wet ditch forms the northern boundary with Section 2.

3.2.14 The southern-most field is larger and dominated by rank semi-improved grassland. A one meter wide wet ditch runs from east to west through the middle of the site. A small pond is located approximately 10 m to the north of the ditch. Areas of scattered scrub, hardstanding and tall ruderal vegetation are located infrequently throughout the area.

3.2.15 Ponds are listed as an Essex BAP habitat and brownfield wildlife land is listed as a Thurrock BAP habitat.

Protected Species and / or Species of Conservation Importance

Badger

3.2.16 No badger setts were recorded within the Survey Area.

3.2.17 However, a fresh latrine (see target note 14 in Appendix C and Figure 4) and other likely evidence of badgers (such as snuffle holes and mammal paths) were noted. The Shell Employees confirmed there was an active badger sett under one of the oil storage tanks on their land, approximately 100 m to the east of Section 1.

Otter

3.2.18 No evidence of otters was recorded within the Survey Area.

3.2.19 The site supports three wet un-connected ditches, each approximately 1 m wide. Many more ditches were recorded within the wider area but none were considered suitable to support otters.

3.2.20 This species is therefore not considered further.

Water Vole

3.2.21 Likely evidence of water voles was recorded within the Survey Area.

3.2.22 A small patch of cut reeds, consistent with a water vole feeding station, was recorded along the southern bank of the wet ditch which runs through the centre of Section 3 (see Target Note 11 in Appendix C and on Figure 4).

Dormice

3.2.23 The Survey Area contains limited habitat for dormice.

3.2.24 The patches of dense scrub and woodland could potentially support this species but they are largely isolated and fragmented from other, more suitable habitats. As such, it is highly unlikely that this species is present.

3.2.25 This species is therefore not considered further.

Bats

3.2.26 No bats or evidence of bats was recorded within the Survey Area.

3.2.27 There are no built structures suitable to support roosting bats, but a row of eleven mature willow (*Salix sp*.) and poplar (*Populus sp.*) trees located along the north-eastern boundary of Section 3 did support a series of cracks, holes and crevices which could potentially be used by this species.

3.2.28 The network of scrubland and woodland interspersed by wet ditches, ponds and connected by the railway corridor and the A1014 (the Manorway) is considered suitable to support commuting and foraging bat species.

Birds

3.2.29 The Survey Area contains various habitats suitable to support nesting birds; these comprise open grassland, mature trees and scrub. However, only widespread and common place species were recorded incidentally during the Walkover Survey. These included: wood pigeon (*Columba palumus*); chaffinch (*Fringilla coelebs*); and, blackbird (*Turdus merula*).

Reptiles

3.2.30 No reptiles were recorded during within the Survey Area.

3.2.31 However, the Survey Area does contain habitats which are deemed suitable to support common reptile species, particularly the rank grassland of Section 3 which is interspersed with scrub habitat and piles of old vegetative matter and patches of bare ground.

3.2.32 In addition, a number of grass and ruderal vegetated banks are present within Section 3, providing suitable basking habitat for reptiles.

Great Crested Newts

3.2.33 No GCN were recorded within the Survey Area.

3.2.34 However, the combination of rank grassland and water bodies within Section 3 were considered suitable to support this species. The unmanaged grassland and scattered scrub with small piles of cut logs and / or vegetative debris is considered to be optimal terrestrial foraging and hibernating habitat for all newt species. The ditches were considered suitable but their tendency to fill quickly or flow in times of high rain fall indicates that they weren't of optimal suitability for great crested newts. The pond although considered semi-permanent was very shallow and dominated by grassland species rather than submerged aquatic vegetation. As such, the water bodies offered moderate opportunities to support GCN.

Other Amphibians

3.2.35 For the same reasons described above for GCN, the site is considered suitable to support other amphibian species.

White-Clawed Crayfish

3.2.36 The Survey Area does not support habitats considered suitable to support this species.

3.2.37 The Manorway Fleet is the only suitably large water body in the area but is understood to support still or very slow moving water. It is also located some 20 to 30 m north of the proposed alignment of the Grid Connection Route and will not be directly affected.

3.2.38 As such, this species is not considered further.

Other Aquatic Invertebrates

3.2.39 The three wet ditches and single pond have the potential to support other aquatic species but are very widespread and common place through the wider landscape.

Terrestrial Invertebrates

3.2.40 The Survey Area consists of a mosaic of different habitats which present some potential for terrestrial invertebrates. The unmanaged semi-improved grassland and its proximity to scrubland and water bodies is considered suitable for a variety of protected and notable invertebrate species.

Flora

3.2.41 The habitats present in the Survey Area are common and widely represented in the wider area and it is considered likely that the flora is limited to common and widespread species.

SECTION 4

DISCUSSION AND RECOMMENDATIONS

4 DISCUSSION AND RECOMMENDATIONS

4.1 Overview

4.1.1 A HV Electrical Connection is required to connect GEC into the National Grid Electricity National Transmission System.

4.1.2 The HV Electrical Connection route runs between the proposed GEC and the existing National Grid Coryton South Substation, and would:

- Leave the GEC Substation within the GEC site, and exit the GEC site to the east, and then turn northwards following the route of the agreed easement with DP World;
- Likely require a Horizontal Directional Drill (HDD) under the A1014 (The Manorway);
- Turn eastwards towards the existing CECL Power Station;
- Likely require a second HDD back under the A1014 (The Manorway); and
- Continue south-eastwards towards the Coryton South Substation at the existing CECL Power Station.

4.1.3 Within this HV Electrical Connection route, two Options are considered. These are referred to as the 'Preferred Option' and the 'Manorway Fleet / Northern Triangle Option'.

4.1.4 The exact route has yet to be determined. The exact route will be determined after the appointment of the Construction Contractor / HDD Specialist who will take into consideration the potential locations of the HDD drilling pits and agreements with land owners.

4.1.5 Under either Option, the cables associated with the HV Electrical Connection will likely be laid using a combination of two construction methods. These are:

- Direct Buried (at a depth of approximately 1.5 m inside a working width (working corridor) of up to 30 m wide); and,
- HDD (which comprises a trenchless technique for installing underground cables along a pre-prescribed path by using a surface launched drilling rig). .

4.1.6 Given the length of the HV Electrical Connection route and the diversity of habitats it bisects, the Survey Area has been divided into three distinct 'Sections', each comprising broadly similar habitat types.

4.1.7 It is likely that the construction works would be undertaken in phases. As such, the construction works will be temporary and are therefore likely to only affect each area intermittently and for a few days at a time.

4.1.8 The following assessment summarises the envisaged impacts on nature conservation for each of the three Sections. A summary of any additional Phase 2 Protect Species Survey recommendations is also provided.

4.2 Designated Sites

4.2.1 One Statutory and two Non-Statutory Designated Sites were identified. The Statutory Designated Site is Fobbing Marshes SSSI, located approximately 900 m to the north. The two Non-Statutory Designated Sites are Corringham Marshes SINC (located approximately 100 m north) and Vange and Fobbing Marshes SINC (located approximately 900 m north). It should be noted that part of the Corringham Marshes SINC is also managed as part of the DP World's Northern Triangle Receptor site.

4.2.2 The proposed HV Electrical Connection will not directly impact the Statutory Designated Sites and Non-Statutory Designated Site located approximately 900 m away (Fobbing Marshes SSSI / Vange and Fobbing Marshes SINC) due to the envisaged temporary and relatively localised impacts associated with the construction works. However, the proposed HV Electrical Connection may directly impact the Non-Statutory Designated Site located approximately 100 m away (Corringham Marshes SINC).

4.2.3 Regardless, no further site specific assessments (such as a Habitat Regulations Assessment) are considered necessary.

4.3 Section 1

4.3.1 This Section is located within the LG Development construction site.

4.3.2 This Section is devoid of all vegetation / nature conservation interest (see Appendix B).

4.3.3 No further survey or assessment is considered necessary.

4.3.4 However, as the exact route of the HV Electrical Connection has yet to be determined it is not known how close the route will be to the adjacent railway corridor. Although, the scrub habitat of the railway corridor could support nesting birds and reptiles it is not likely to be directly affected. However, it is considered best practice for the railway corridor to be searched for any active badger setts, as these could be adversely affected if works are undertaken within 30 m of their entrance or any network of tunnels[4].

4.4 Section 2

4.4.1 If the Preferred Option is employed, the majority of the route of the HV Electrical Connection will be confined to the alignment of the existing Cycle Path. Although the Cycle Path has a negligible nature conservation value, the working width may be wider than the Cycle Path itself so the adjacent habitats may also likely to be directly affected. The mosaic of scrub and grassland, which will be directly affected, and their proximity to a ditch and small area of woodland cumulatively provide habitat suitable to support protected and / or notable species (in particular GCN, reptiles and water voles).

4.4.2 If the Manorway Fleet / Northern Triangle Option is employed, the route of the HV Electrical Connection will pass through the Northern Triangle Receptor site which is known to support large numbers of translocated GCN, reptiles and water voles.

4.4.3 Accordingly, a review of recent Survey Reports[5] and / or further Phase 2 Surveys for these species should be undertaken. The results will be used to inform the formal impact assessment and any potentially required avoidance or mitigation measures.

4.4.4 The construction works could also affect nesting birds which use the adjacent scrub habitat. This habitat is not considered suitable to support any specially protected Schedule 1 Species. Additional survey effort will only be required pre-vegetation clearance if works are due to be undertaken during the nesting season. No further bird surveys are therefore considered necessary at present.

4.5 Section 3

4.5.1 The route of the HV Electrical Connection through the northern half of this Section will traverse through an area of rank semi-improved grassland and scattered scrub.

---

[4] *Natural England (2009). Protection of Badgers Act 1992 (as amended): Interpretation of 'Disturbance' in relation to badgers occupying a sett, Guidance Note.*

[5] DP World continue to monitor the protected species within the receptor sites as part of the Natural England European Protected Species Licences.

4.5.2 Once the route of the HV Electrical Connection has crossed the access road to the Shell Aviation Oil Depot, the construction works will be restricted to the side of the existing main road. The route of the HV Electrical Connection through the southern half of this Section will therefore predominantly affect amenity grassland and potentially a thin strip of semi-improved grassland only. Given the proximity of the route of the HV Electrical Connection to the wet ditch, it is likely that this will also be directly affected.

4.5.3 The rank grassland throughout this Section has the potential to support badgers, bats, GCN (throughout their terrestrial phases), common reptile species, terrestrial invertebrates and nesting birds. The possible disturbance of the wet ditch could adversely affect GCN (throughout their aquatic phases) and / or water voles.

4.5.4 However:

- In terms of bats, the only roosting opportunities present on site comprise the mature willow and poplar trees present within the north-eastern corner. These trees are located approximately 40 m from the alignment of the route of the HV Electrical Connection and are therefore unlikely to be adversely affected either directly or indirectly. Should the alignment of the route of the HV Electrical Connection change, further tree roost surveys may be required. The works are also highly unlikely to adversely affect the foraging potential of the area. No further bat surveys are therefore considered necessary at present.
- In terms of nesting birds (as with Section 2), surveys will only be required pre-vegetation clearance if works are due to be undertaken during the nesting season. No further bird surveys are therefore considered necessary at present.

4.5.5 Further Phase 2 Survey are therefore recommended for badgers, GCN, reptiles, terrestrial invertebrates and water voles.

4.6 Recommendations Summary

4.6.1 The following Phase 2 Protected Species are recommended:

- Badgers;
- Great Crested Newts;
- Reptiles;
- Water Voles; and
- Terrestrial Invertebrates*.

** Three invertebrate samples will be collected from the site during suitable weather conditions in May, June and July to inform the mitigation requirements of the proposed works. A full invertebrate survey is not deemed necessary.*

4.6.2 Nesting Birds Surveys will only be required pre-vegetation clearance if works are due to be undertaken during the nesting season. No species specific bird surveys are considered necessary to inform the provision of consent.

4.6.3 The Phase 2 Protected Species Surveys recommended above should be undertaken to inform the baseline and impact assessment of the application for Planning Permission. Where necessary, mitigation and / or compensation measures should be identified following the findings of the Surveys and in consideration of the final proposed design for the route of the HV Electrical Connection.

SECTION 5

CONCLUSIONS

5 CONCLUSIONS

5.1.1 An Extended Phase 1 Habitat Survey of the proposed HV Electrical Connection route has been completed.

5.1.2 The purpose was to document the baseline ecological conditions by carrying out an Extended Phase 1 Habitat Survey to record and map broad habitat types present, identifying any Designated Sites and confirming the presence or potential presence of Protected and / or Notable Species that would require further Phase 2 Surveys.

5.1.3 Within the Search Area, one Statutory and two Non-Statutory Designated Sites were identified. The Statutory Designated Site is Fobbing Marshes Site of Special Scientific Interest (SSSI) located approximately 900 m to the north. The two Non-Statutory Designated Sites are Corringham Marshes SINC (located approximately 100 m north) and Vange and Fobbing Marshes SINC (located approximately 900 m north). It should be noted that part of the Corringham Marshes SINC is also managed as part of the DP World's Northern Triangle Receptor site.

5.1.4 The proposed HV Electrical Connection will not directly impact the Statutory Designated Sites and Non-Statutory Designated Site located approximately 900 m away (Fobbing Marshes SSSI / Vange and Fobbing Marshes SINC) due to the envisaged temporary and relatively localised impacts associated with the construction works. However, the proposed HV Electrical Connection may directly impact the Non-Statutory Designated Site located approximately 100 m away (Corringham Marshes SINC).

5.1.5 The Survey Area supports a mosaic of several interconnected habitats including: improved and semi-improved grassland; continuous and scattered scrub; broad-leaved scattered trees; wet and dry ditches; inundation vegetation; bare ground; and, broad-leaved semi-natural woodland. In isolation these habitats are widespread and relatively common place within the local landscape and as such are found to be primarily of negligible or low conservation value when viewed alone. However, with reference to the Eastern Section (Section 3), the habitats together form a potentially valuable green corridor through an otherwise largely industrial area.

5.1.6 During the Extended Phase 1 Habitat Survey, evidence was recorded of: badgers; nesting birds; and, water voles. In addition, the mosaic of habitats has the potential to also support: bats; GCN; common reptile species; and, terrestrial invertebrates. These species or groups of species could all comprise some degree of constraint to the development of the HV Electrical Connection.

5.1.7 Based on the construction methods to be employed, the following specific Phase 2 Protected Species Surveys have been recommended in respect of: badgers; GCN; reptiles; terrestrial invertebrates; and, water vole.

FIGURES

N

Notes

Indicative route A

50m Study area

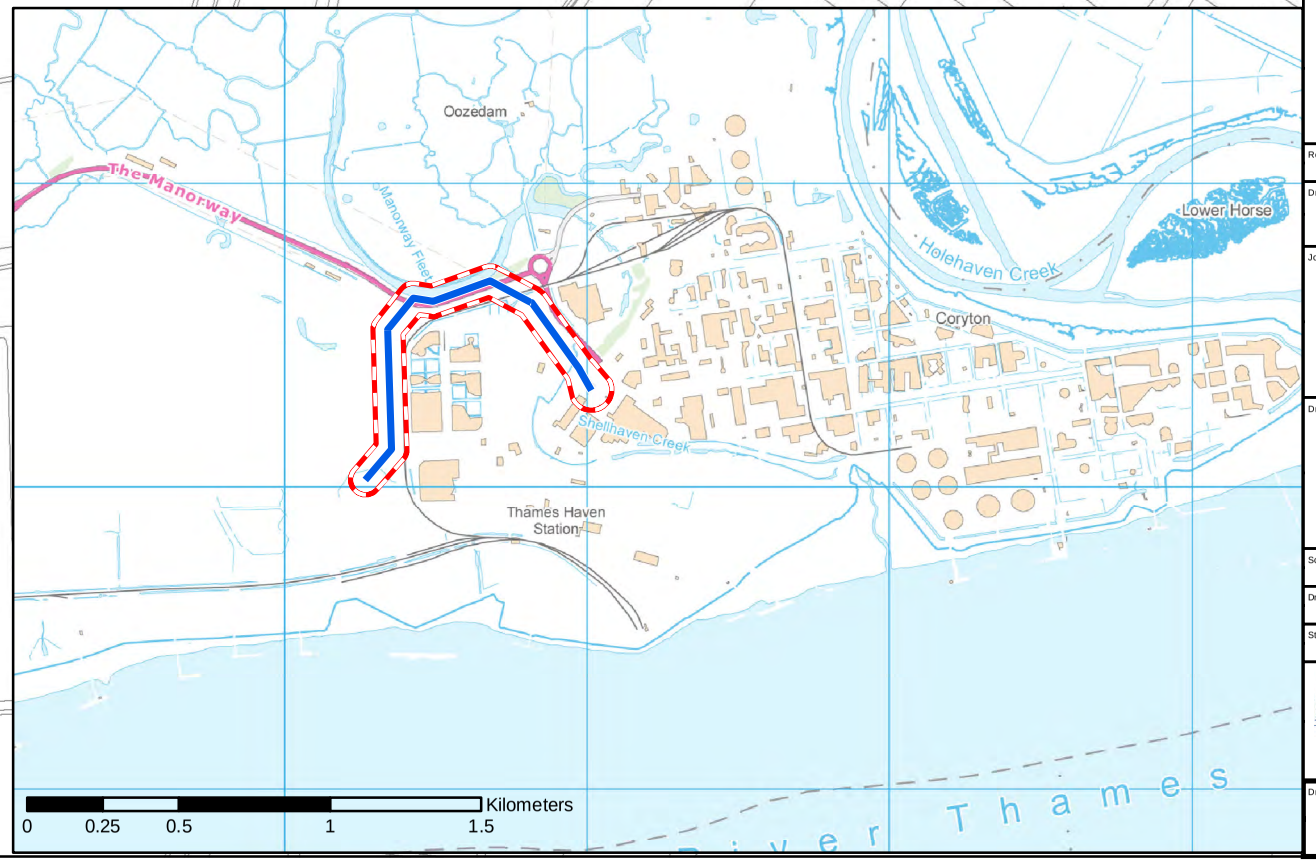
Section

1

2

3

0 20 40 60 80 100
Metres



Revision Details	By / Check	Date	Suffix

Drawing Status: DRAFT

Job Title: Thames Haven

Drawing Title: Figute 1: Proposed Route Site Location

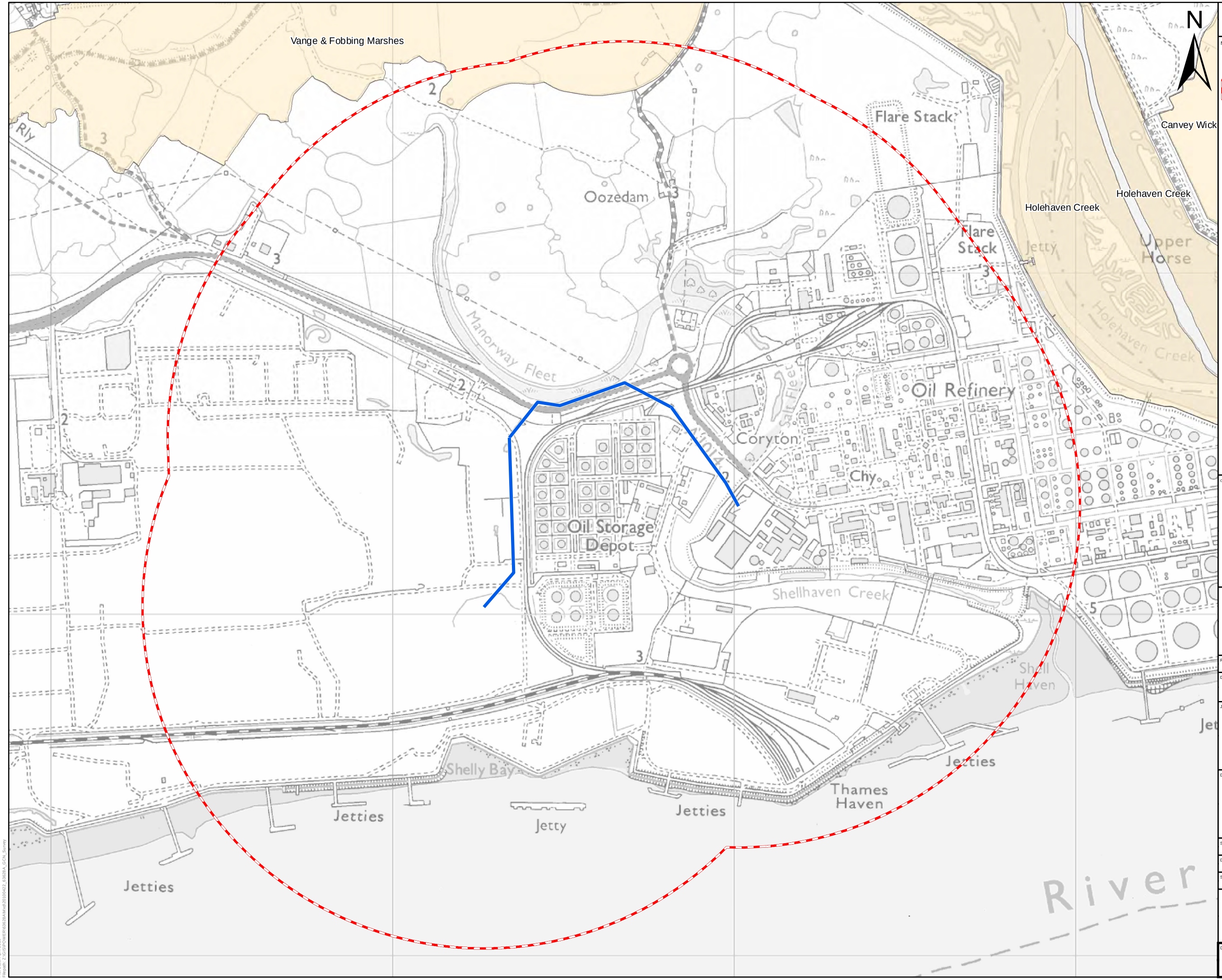
Scale at A3: 1:3,000

Drawn	Approved		
KF	TM		
Stage 1 check: JL	Stage 2 check: TM	Originated: KF	Date: 20/05/2010

PB PARSONS BRINCKERHOFF
100 YEARS
6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number: **63958A_site_location_sections** Rev

Plot Date: April 2010
Filepath: Z:\GIS\POWER\63828A\Mxd\20100422_63828A_GCN_Survey



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

Notes

- Indicative route A
- 1km Study area
- Site of Special Scientific Interest

0 50 100 150 200 250
Metres

Revision Details	By / Check	Date	Suffix

Drawing Status: DRAFT

Job Title: Thames Haven

Drawing Title: Figure 2: Statutory Designated Sites

Scale at A3: 1:10,000

Drawn	Approved
KF	TM

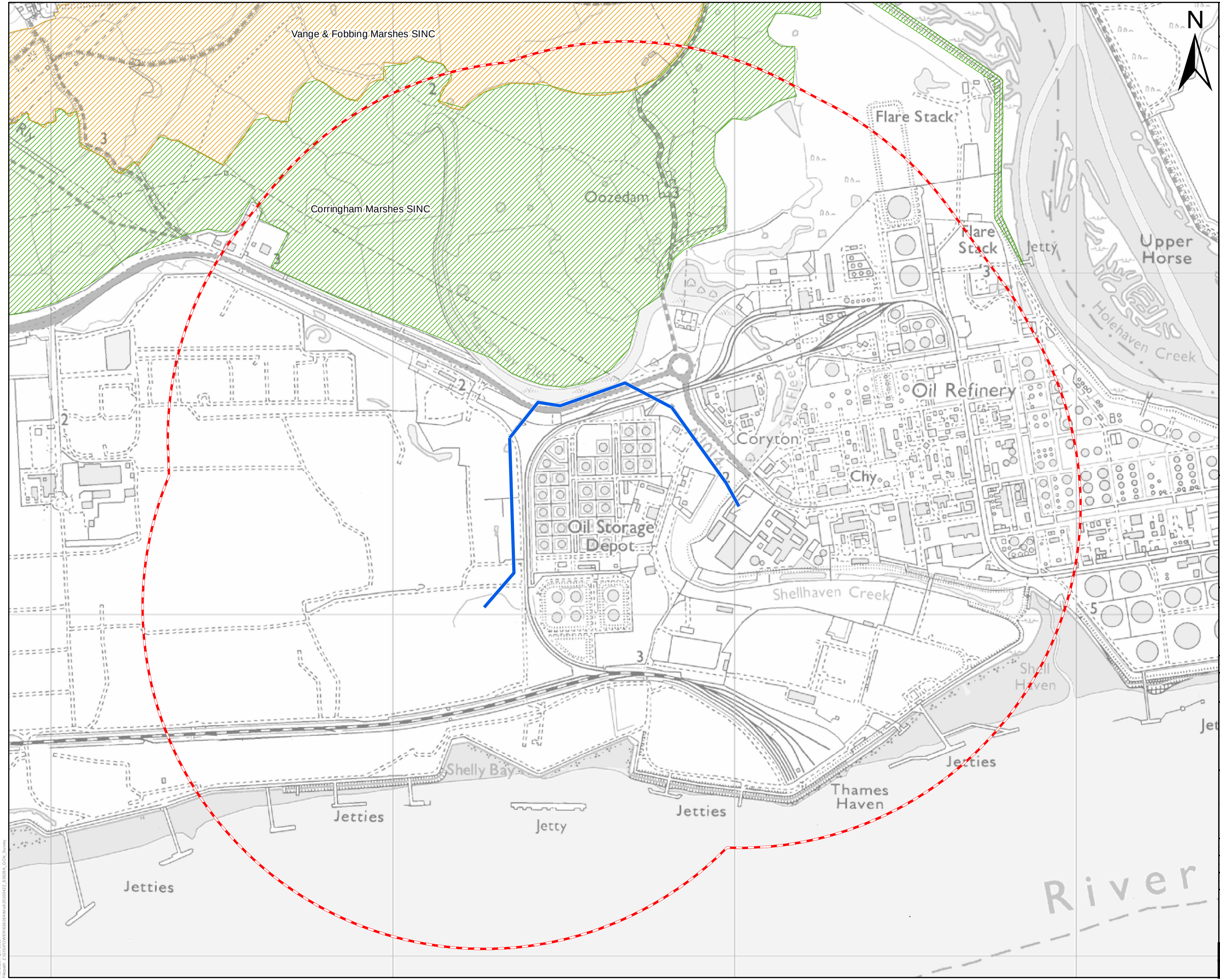
Stage 1 check	Stage 2 check	Originated	Date
JL	TM	KF	20/05/2010

PB PARSONS BRINCKERHOFF
100 YEARS
6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number: 63958A_Stat_RevA

Rev

Plot Date: April 2010
Filepath: Z:\GIS\POWER\63628A\Mxd\20100422_63628A_GCN_Survey



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

Notes

- Indicative route A
- 1km Study area
- Corringham Marshes SINC
- Vange & Fobbing Marshes SINC

0 50 100 150 200 250
Metres

Revision Details	By / Check	Date	Suffix

Drawing Status: DRAFT

Job Title: Thames Haven

Drawing Title: Figure 3: Non-Statutory Designated Sites

Scale at A3: 1:10,000

Drawn	Approved
KF	TM

Stage 1 check	Stage 2 check	Originated	Date
JL	TM	KF	20/05/2010

PB PARSONS BRINCKERHOFF
100 YEARS
6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number: 63958A_Non_Stat_RevA

Rev

Plot Date: April 2010
Filepath: Z:\GIS\POWER\63628A\Mxd\20100422_63628A_GCN_Survey

THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

Notes

- 50m Study area
- Indicative route A
- Scrub - scattered
- Broadleaved parkland/scattered trees
- Dry ditch
- Earth bank
- Fence
- Broadleaved woodland - semi-natural
- Scrub - dense/continuous
- SI Neutral grassland - semi-improved
- Other tall herb and fern - ruderal
- Marginal and inundation - inundation vegetation
- Standing Water
- A Cultivated/disturbed land - amenity grassland
- Cultivated/disturbed land - ephemeral/short perennial
- Buildings
- Bare ground
- Hard standing

0 20 40 60 80 100
Metres

Revision Details	By / Check	Date	Suffix

Drawing Status: DRAFT

Job Title: Thames Haven

Drawing Title: Figure 4: Phase I Habitat Map

Scale at A3: 1:3,000

Drawn	Approved
KF	TM

Stage 1 check	Stage 2 check	Originated	Date
JL	TM	KF	20/05/2010

PARSONS BRINCKERHOFF
6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number: 63958A_Phase_1_RevA

Rev

Plot Date: April 2010
Filepath: Z:\GIS\POWER\63628A\Mxd\20100422_63628A_GCN_Survey

APPENDIX A

SUMMARY OF LEGISLATION AND GUIDANCE FOR PROTECTED AND NOTABLE SPECIES AND HABITATS IN THE UK

SUMMARY OF LEGISLATION AND GUIDANCE FOR PROTECTED AND NOTABLE SPECIES AND HABITATS IN THE UK

The following Appendix sets out details of Legislation and Guidance within the UK and how this Legislation and Guidance applies to particular species groups.

The key pieces of International and National Legislation are described, after which specific Legislation pertaining to Species or Species Groups are described in turn.

International and National Legislation

EC Habitats Directive

In 1992, the European Community adopted Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, known as the Habitats Directive. The main aim of the Habitats Directive is to promote the maintenance of biodiversity by requiring Member States to introduce protection for these habitats and species of European importance.

The mechanism for protection is through designation of Special Areas of Conservation (SACs), both for habitats and for certain species listed within Annex II. There are a number of species listed within Annex II of the Habitats Directive that are present within the UK. These include: four lower plant species; nine higher plant species; six species of molluscs; six species of arthropods; eight species of fish; two species of amphibian; and, nine species of mammal.

The Bern Convention

The Convention on the Conservation of European Wildlife and Natural Habitats (the Bern Convention) came into force in 1982. The principal aims of the Convention are to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix 3. To this end the Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1000 wild animal species.

Bonn Convention

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention or CMS) was adopted in Bonn, Germany in 1979 and came into force in 1985. Contracting Parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix 1 of the Convention), concluding multilateral agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix 2 of the Convention), and by undertaking co-operative research activities.

Convention on Biological Diversity

The Convention on Biological Diversity (Biodiversity Convention or CBD) was adopted at the Earth Summit in Rio de Janeiro, and entered into force in December 1993. It was the first treaty to provide a legal framework for biodiversity conservation. Contracting Parties are required to create and enforce national strategies and action plans to conserve, protect and enhance biological diversity.

Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act 1981 (as amended) is the principle mechanism for the legislative protection of wildlife in Great Britain. However it does not extend to Northern Ireland, the Channel

Islands or the Isle of Man. This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') and the European Union Directives on the Conservation of Wild Birds (79/409/EEC) and Natural Habitats and Wild Fauna and Flora (92/43/FFC) are implemented in Great Britain.

Conservation of Habitats and Species Regulations 2010

In the UK the Council Directive 92/43/EEC has been transposed into national laws by means of the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended), and the Regulations (Northern Ireland) 1995 (as amended). The Regulations came into force on 30 October 1994, and have been amended several times. Subsequently the Conservation of Habitats and Species Regulations 2010 was created which consolidates all the various amendments made to the 1994 Regulations in respect of England and Wales and is commonly known as the 'the Habitats Regulations'. In Scotland the Habitats Directive is transposed through a combination of the Habitats Regulations 2010 (in relation to reserved matters) and the 1994 Regulations. The Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended) transpose the Habitats Directive in relation to Northern Ireland.

The Regulations contain five Parts and four Schedules, and provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.

Other Legislation

Deer Act 1991

The Deer Act 1991protects deer from poaching, taking or killing of certain deer in close season, taking or killing deer at night, and the use of prohibited weapons for the trapping or killing of deer.

Wild Mammals (Protection) Act 1996

The Act protects wild mammals from malicious or intentional harm.

Species and Habitat Specific Legislation

Plants

Wild plants are protected under Section 13 of the Wildlife and Countryside Act 1981 (as amended). It prohibits the unauthorised intentional uprooting of any wild plant species and forbids any picking, uprooting or destruction of plants listed on Schedule 8 of which there are over 150.

The Conservation of Habitats and Species Regulations 2010 have nine plants listed within Annex IV these are; shore dock, (*Rumex rupestris*), killamey fern (*Trichomanes speciosum*), early gentian (*Gentianella anglica*), lady's slipper (*Cypripedium calceolus*), creeping marshwort (*Apium repens*), slender naiad (*Najas flexilis*), fen orchid (*Liparis loeselii*), floating-leaved water plantain (*Luronium natans*), and yellow marsh saxifrage (*Saxifraga hirculus*). It is an offence to deliberately pick, collect cut, uproot or destroy any protected plant, or keep, transport, sell, or exchange, any live or dead such plant species, this applies to all stages of its life cycle.

Invasive Species

Schedule 9, Section 14 of the Wildlife and Countryside Act (1981, as amended) prohibits the introduction into the wild of any species that is not ordinarily resident in and is not a regular visitor to Great Britain in a wild state, or any species of the 39 plants listed on Schedule 9.

The frequently encountered invasive species within proposed development sites include Japanese knotweed (*Fallopia japonica*); Giant hogweed (*Heracleum mantegazzianum*); Himalayan balsam (*Impatiens glandulifera*); Floating pennywort (*Hydrocotyle ranunculoides*); New Zealand pygmyweed (*Crassula helmsii*); Rhododendron (*Rhododendron ponticum*); and certain hybrids of the above, some species may be native yet are listed for conservation purposes.

Plant or soil material contaminated by Japanese knotweed that is to be discarded is considered to be a 'controlled waste' under the Environmental Protection Act 1990 (EPA 1990). It is an offence to deposit, treat, keep, or dispose of controlled waste without a licence. Furthermore knotweed that has been cut down and removed must be received by an authorised person to be disposed of correctly. A licence can be obtained from the Environment Agency (EA). The release or planting of a listed species in the wild can be permitted under a licence granted by the relevant statutory body.

Fungi

There are five species of fungi protected under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended). These include the sandy stilt puffball (*Battarrea phalloides*), royal bolete (*Boletus regius*), and the hedgehog fungus (*Hericium erinaceus*). It is an offence to pick, uproot, trade in, or possess for the purpose of trade, any species listed under schedule 8.

Invertebrates

A number of invertebrates such as stag beetles (*Lucanus cervus*), silver studded blue butterfly (*Plebejus argus*) or white letter hairstreak (*Stymondia w-album*) are fully protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended). This legislation makes it illegal to intentionally kill, injure, or take a protected invertebrate, or to damage, destroy, or obstruct access to any structure or place used for shelter or protection by such a species; and disturb any protected species occupying such a structure or place**.**

Three invertebrates are listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2010, the large blue butterfly (*Maculinea arion*), fisher's estuarine moth (*Gortyna borelii lunata*), and lesser whirlpool ram's-horn snail (*Anisus vorticulus*). It is an offence deliberately to kill, capture, or disturb a listed species, or to damage or destroy the breeding site or resting place of such an animal.

White-clawed Crayfish

White-clawed crayfish (*Austropotamobius pallipes*) are Britain's only native freshwater crayfish. The white clawed crayfish is listed under Annex II and V of the Habitats Directive and therefore member states are required to designate Special Areas of Conservation to protect important populations of this species. White-clawed crayfish are protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended). It is illegal to take the animals from the wild or to sell them.

All surveys for white clawed crayfish must be carried out by, or under the supervision of, an experienced licence holder, and all licence conditions must be complied with. In England and Wales trapping also requires the approval of the Environment Agency, with application for a licence to use traps within the watercourse being surveyed. Licences to permit taking (for example during relocation exercises) are not available in respect of development activities and usually need to be covered under a conservation licence which is issued by the relevant statutory body subject to approval of a method statement.

Amphibians

There are four common species amphibian species, common frog (*Rana temporaria*), common toad (*Bufo bufo*), palmate newt (*Triturus helveticus*), and smooth newt (*Triturus vulgaris*). All of the four

common species are protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) against deliberate and/or intentional killing, injuring and trade.

Great Crested Newts and Natterjack Toads

Great crested newts (*Triturus cristatus*) (GCN) and natterjack toads (*Bufo calamita)* are fully protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) and the Conservation of Habitats and Species Regulations 2010. It is illegal to posses a protected species (alive or dead), deliberately capture, injure or kill, to intentionally or recklessly disturb, or to deliberately take or destroy the eggs of these protected species. It is also illegal to damage, destroy or intentionally or recklessly obstruct access to a breeding or resting place used by these protected species. All life stages of great crested newts and natterjack toads are afforded the same level of protection.

In order to undertake any activity which would otherwise result in any of the above offences being committed, it may be necessary to obtain a European Protected Species (EPS) licence from the relevant statutory body (Natural England (NE), Countryside Council for Wales (CCW) or Scottish natural Heritage (SNH)). It is possible to undertake surveys which would otherwise involve unlawful acts, such as disturbance, by obtaining a survey license which provides authorisation for scientific and educational purposes

Reptiles

The four common reptile species, adder (*Vipera berus*), grass snake (*Natrix natrix*), common lizard (*Zootoca vivipara*) and slow worm (*Anguis fragilis*), are protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) against deliberate and/or intentional killing, injuring and trade.

If common reptile species are found to be present or considered potentially present within a proposed development site. To ensure that no subsequent offence will be committed a precautionary method of working (written by a suitably qualified ecologist) and submitted to the relevant authority may be required to enable works to proceed with limited risks of offences being caused.

Smooth Snakes and Sand Lizards

Smooth snakes (*Coronella austriaca*) and sand lizards (*Zootoca agilis*) are fully protected under the Wildlife and Countryside Act (1981, as amended) and the Conservation of Habitats and Species Regulations 2010. This additional protection means it is an offence to posses, intentionally kill, capture or injure these species; deliberately, intentionally or recklessly disturb these species; damage, destroy or obstruct a breeding site, resting place or other place used for shelter and protection; take or destroy eggs and to sell or trade in these species.

In order to undertake any activity which would otherwise result in any of the above offences being committed in respect of smooth snakes, it may be necessary to obtain a licence from the relevant statutory body (NE, CCW or SNH).

Birds

All birds, their nests and eggs are protected by the Wildlife and Countryside Act (1981, as amended). It is an offence to intentionally kill, injure, or take any wild bird, or take or destroy an egg of any wild bird. It is also an offence to damage or destroy the nest of any wild bird (whilst being built, or in use). Therefore, clearance of vegetation within the site boundary, or immediately adjacent to the site during the nesting season could result in an offence occurring under the Act. The bird breeding season can be taken to run between the 1 February and 31 August and is subject to geographical and seasonal factors. There are 79 species of birds listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). I t is an offence to intentionally or recklessly disturb any wild bird listed on

Schedule 1 while it is nest building, or at a nest containing eggs or young, or disturb the dependent young of such a bird.

Barn Owls

Barn owls (*Tyto alba*) are listed as 'Amber' status under the Birds of Conservation Concern (BoCC) and are categorised as a species of European Conservation Concern. The Barn Owl is given the highest level of legal protection possible under Schedule 1 of the Wildlife and Countryside Act 1981. It is therefore illegal to kill, injure or take a barn owl, or to take or destroy its eggs. It is also illegal to intentionally or recklessly take, damage, or destroy the nest of any wild bird while it is in use or being built, release or allow the escape of a barn owl into the wild or posses any bird (dead or alive) or part of bird without a licence which is obtainable through the country agencies (EN, SNH, and CCW).

Mammals

All wild mammals are protected under the Wild Mammals (Protection) Act 1996 from certain cruel acts; and for connected purposes. It is an offence to mutilate, kick, beat, nail, or otherwise inflict unnecessary suffering on any wild mammal.

Badgers

Badgers (*Meles meles*) are protected under the Protection of Badgers Act (1992) and the Wildlife and Countryside Act (1981, as amended). As such it is an offence to wilfully take, kill, injure or ill-treat a badger, or posses a dead badger or any part of a badger. Under the Act their setts are also protected against obstruction, destruction, or damage in any part.

Sett interference includes damaging or destroying a sett, obstructing access to a sett, and disturbing a badger whilst it is occupying a sett. The Act defines a badger sett as 'any structure or place, which displays signs indicating the current use by a badger' and Natural England takes this definition to include seasonally used setts.

Work that may disturb badgers or their setts is illegal without a development licence from the relevant statutory body (NE, CCW, SNH). As a precautionary principle, a buffer distance between a badger sett and the works will be determined, based upon guidance from an appropriately experienced ecologist. This buffer distance should be based upon the size and activity levels at the sett, the topography between the sett and the works and the nature of the works.

Bats

All native UK bat species are fully protected by UK law under Schedule 5 and 6 of the Wildlife and Countryside Act (1981, as amended), and under Schedule 2 of the Conservation of Habitats and Species Regulations 2010. It is illegal to deliberately capture, injure or kill a bat or to intentionally or recklessly disturb bats. It is also illegal to damage, destroy or intentionally or recklessly obstruct access to a breeding or resting place used by a bat.

Any activity that would result in a contravention of the above legislation would likely require an EPS licence from the relevant statutory body (NE, CCW or SNH). Works or mitigation activities involving interference with bats or bat shelters must be carried out by a licensed bat worker.

Dormice

Dormice (*Muscardinus avellanarius*) are protected under the Wildlife and Countryside Act (1981, as amended) and are listed in Schedule 2 of the Conservation of Habitats and Species Regulations 2010. Under the current legislation it is illegal to intentionally or deliberately kill, injure or capture

dormice, deliberately disturb dormice (whether in a nest or not); or to damage, or destroy dormouse breeding sites or resting places.

Any activity that would result in a contravention of the above legislation would likely require an EPS licence from the relevant statutory body (NE, CCW or SNH).

Otters

The otter (*Lutra lutra*) is fully protected under Schedule 5 of the Wildlife and Countryside Act (1981, as amended) and are listed under Schedule 2 of the Conservation of Habitats and Species Regulations 2010. It is therefore illegal to deliberately capture, injure or kill an otter, posses an otter (dead or alive), or any other part of an otter, or intentionally or recklessly disturb otters. It is also illegal to damage, destroy or intentionally or recklessly obstruct access to a holt or other resting place used by an otter.

Any activity that would result in a contravention of the above legislation would likely require an EPS licence from the relevant statutory body (NE, CCW or SNH).

Water Voles

Water voles (*Arvicola amphibius*) are protected under the Wildlife and Countryside Act (1981, as amended). It is an offence to possess, control or sell water voles or to intentionally kill, injure or take water voles. It is also an offence to intentionally or recklessly damage, destroy or obstruct access to a place that water voles use for shelter or protection or disturb water voles whilst using such a place.

A licence is required for catching/handling water voles, or for field surveys that are intrusive or disturbing where the surveyor suspects' water voles are present. A licence can be obtained by applying to the relevant statutory body (NE, SNH, and CCW,)

Hedgerows

The Hedgerows Regulations (1997) make provision for the protection of important hedgerows in England and Wales. The regulations affect hedgerows which are 20m or more in length, or connected at both ends to another hedgerow of any length.

They relate to hedgerows which are on, or adjoining land used for the following purposes: agriculture or forestry; the breeding or keeping of horses, ponies or donkeys; common land; village greens; Sites of Special Scientific Interest (which include all terrestrial SACs, NNRs, and SPAs) and Local Nature Reserves. They do not include hedges that is attached to, or marking the boundaries of a private house.

It is an offence to intentionally or recklessly remove or cause or permit another person to remove a hedgerow or intentionally or recklessly remove, or cause or permit another person to remove, a hedgerow which is the subject of a hedgerow retention notice.

Tree Preservation Order (TPO)

Part VIII of the Town and Country Planning Act (1990) and the Town and Country Planning (Trees) Regulations (1999) allows tree preservation orders (TPO) to be made by a Local Planning Authority in respect of trees or woodlands. This prohibits the cutting down, uprooting, topping, lopping, wilful damage, or wilful destruction of a preserved tree. Any tree is eligible for protection, regardless of age, species or size, no trees are automatically protected.

Tree Felling

Up to 5m³ of standing timber can be felled per quarter without requirement for a felling licence provided that no more than 2m³ is sold. There are a number of exemptions, refer to the Forestry Authority Website.

General Guidance on European Protected Species Licence Applications

Should a European Protected Species (EPS) be found on a development site, and where best practice guidance either cannot be followed or is not applicable an EPS licence will be required. The licence permits operations that fall outside the Good Practice Guidance an application for such a licence should be made to the relevant statutory body (NE, CCW or SNH) before any works can proceed. It is also possible to obtain a general licence that may cover an area rather than applying in each individual case for a separate specific/individual licence

Should the survey information be considered insufficient or the statutory body is not satisfied with the application, the licence application may be refused. This could potentially result in significant delays to a project, if not considered in time; however, early consideration of the potential presence of EPS on a site and an assessment of suitable mitigation measures to derogate such possibilities early in a project will negate this potential delay.

APPENDIX B

CONFIRMATION DOCUMENTATION THAT SECTION A IS DEVOID OF ALL VEGETATION AND ANY SENSITIVE ECOLOGICAL RECEPTORS

AECOM
9th & 10th Floors
Sunley House
4 Bedford Park
Croydon CR0 2AP
United Kingdom
www.aecom.com

+44 (0)208 639 3500 tel
+44 (0)208 639 3599 fax

14 August 2011

FAO Marcus Pearson
DP World London Gateway

Our Ref: 60154898/ARG/L7472

To Whom It May Concern

Subject: DP World London Gateway Ecological Park Clearance - Confirmation of Work Completed by AECOM

AECOM were involved with the ecological clearance of a 190.5ha area of the DP World London Gateway site, known as the Rest of Park (RoP), and the design and supervision of the creation of the Northern Landscape Receptor Site (NLRS) (30.5ha), in 2010. This involved the translocation of great crested newt (*Triturus cristatus*) and water vole (*Arvicola amphibius*), both under licence, and common reptiles (which do not require a licence) from the site.

Please note that AECOM commended on the 23rd March and completed their ecological works on site on 1st October 2010, at which time Thomson Ecology took over responsibilities for the completion of ecological clearance of the RoP.

All relevant ecology works by AECOM were conducted under licence (where applicable) and in accordance with best practice, as detailed below.

Great Crested Newts

In order to comply with United Kingdom (UK) legislation and European Union (EU) directives on nature conservation and a number of planning conditions AECOM obtained the Natural England Great Crested Newt Licence for the RoP translocation works (EPSM2010-1983A), granted on the 28th May 2010. AECOM subsequently obtained the revised licence (EPSM2010-1983B) on the 10th September 2010, following the inclusion of a number of project amendments.

AECOM conducted the RoP great crested newt translocation works, including preparatory works and fencing in accordance with the licence method statement, between the 28th May 2010 and the 1st October 2010.

Under licence from Natural England, 3326 great crested newts were captured from the RoP by AECOM, using pitfall traps, carpet tiles and night searches, between 1st July 2010 and 1st October 2010. Capture and release locations were recorded using handheld geographical information (GIS) and global positioning systems (GPS) for accuracy and future reference.

The receptor site for great crested newts, the NLRS was designed by AECOM and constructed by a principal contractor adjacent to the RoP and all great crested newts captured were released to it. The receptor site is wholly owned by DP World.

On the 1st October 2010, the responsibility, as ecological consultant, for the revised Natural England Great Crested Newt Licence for the RoP translocation works (EPSM2010-1983B) was transferred to Thomson Ecology to complete the clearance of great crested newts for the RoP.

Water Voles

In order to comply with UK legislation on nature conservation and a number of planning conditions, translocation of the water vole population was required from the RoP prior to site clearance, land raise and construction works.

Derek Gow Consultancy Ltd (DGC) was contracted by AECOM to conduct the RoP water vole translocation works.

The water vole conservation license for London Gateway RoP site (License number 20101256) was granted by Natural England on 22nd March 2010 and was valid until the 31st May 2011 inclusive.

Under licence from Natural England, 276 water voles were captured from the RoP by the DGC, using bespoke traps, between 23rd March and 1st October 2010.

In coordination with Thomson Ecology and Essex Wildlife Trust the main population of water voles was released at sites along the River Colne, near Colchester Essex, which is subject to a mink (*Mustela vison*) control programme. Locations of each water vole capture and release were recorded for future reference and monitoring.

A small population of water voles was retained from the RoP site for captive breeding to allow for future reinforcement of the initial release.

Reptiles

In order to comply with UK nature conservation legislation and a number of planning conditions, translocation of adder (*Vipera berus*), grass snake (*Natrix natrix*), common lizard (*Zootoca vivipara*) and slow worm (*Anguis fragilis*) populations were required from the RoP prior to site clearance, land raise and construction works.

Reptiles are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and are consequently protected from intentional killing or injury. However, no licensing is required for the translocation of common reptiles.

Reptile refugia, laid at a density of 139.5/ha, were used as tools to capture reptiles in order to translocate them. The majority of refugia were laid across the site in March 2010. Trapping commenced on the 6th April 2010 and continued to 30th September 2010. Refugia, reptile capture and release locations were all recorded using handheld GIS / GPS devices for future reference and monitoring.

Weather data including temperature, precipitation and wind speed was automatically logged by weather stations, providing current information about the site weather during, and the night before, trapping rounds. This information was used to adjust, and refine, the trapping effort.

A total of 17,616 common reptiles were translocated from the RoP site by AECOM, comprising 12,754 common lizards, 4,041 slow worms, 468 adders and 353 grass snakes.

The reptiles were translocated to several sites: NLRS, northern triangle receptor sites and Stanford Wharf owned by DP World, the West Canvey Marsh nature reserve owned and managed by the Royal Society for the Protection of Birds (RSPB) and three further sites provided by The Environment Bank.

General

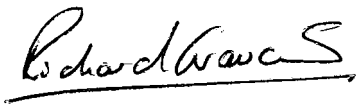
Completion reports were provided for amphibians, water voles and reptiles. Receptor site were selected and assessed as suitable, in accordance with the appropriate best practice and scientific advice. The assessment reports were subject to review by third parties where appropriate. Where required habitat enhancements were designed by AECOM and implemented prior to translocations. Suitable monitoring arrangements and agreements for the newly established populations are proposed for all sites.

All ecological clearance and associated fencing and trapping was conducted and supervised by AECOM ecologists who were suitably qualified and experienced. All AECOM ecologists work in accordance with the Institute of Ecology and Environmental Management's (IEEM) code of professional conduct. All works were undertaken in accordance with AECOM's own quality, environmental management and health and safety procedures.

AECOM are satisfied that ecological works undertaken by us, on behalf of DP World during 2010, complied with or exceeded, all the requirements of nature conservation law and ecological best practice as it is currently understood.

Any further information with regards to AECOMs work at the RoP can be provided, or queries addressed through requests to our client for the works: DP World London Gateway Park Ltd.

Yours faithfully,



A.R. Graves BSc MSc Dip CEnv MIEEM
Director of Ecology
D +44 (0)20 8639 3554
M +44 (0)7879 488524
richard.graves@aecom.com

APPENDIX C:

THE TARGET NOTES RELEVANT TO THE PHASE 1 HABITAT SURVEY

Target Number	*Target Description*
1	Mammal run underneath the fence line.
2	Semi-improved grassland with bramble, hawthorn and blackthorn with some intermittent elder.
3	Area of former hard-standing with ephemeral / short perennial vegetation and encroaching scrub around fenced perimeter.
4	Area of grassland and scrub with three mature willow and two mature poplar trees along the road-side.
5	Mammal run alongside and underneath the fence line.
6	Bund with grass and tall ruderal vegetation and patches of rubble. Potential hibernacula for reptiles and / or great crested newts.
7	Wet ditch lined with dense reeds. The ditch is approximately 1 m wide and between 10 – 20 inches deep.
8	Numerous mammal runs within this area.
9	Numerous mammal runs within this area. The wet ditch widens and becomes more open to the south-west. It also supports fewer reeds. Algae was recorded floating on the water's surface.
10	Pond measuring approximately 15 m by 5 m. Very shallow, between 5 inches and 15 inches at its deepest point. Densely covered with reeds and emergent grass species.
11	Very clear mammal path across the ditch(very likely to be made by badgers). Small pile of cut reeds indicative of a water vole feeding station.
12	Bank present at edge of car park area. The bank consisted grass and ruderal vegetation. It supports a high potential for reptiles. Numerous mammal paths were also recorded within this area.
13	Wet ditch present with dense reed coverage.
14	Fresh badger latrine.
15	Area of trees, a thin strip of which had recently been cleared.
16	Cycle Path alongside the A1014 (The Manorway) with grassy verges and intermittent patches of scrub. More dense scrub and trees bordering the northern triangle which opens to become an area of semi-improved grassland.

PHASE 2 WATER VOLE SURVEY

Water Vole Phase 2 Survey Report: Gateway Energy Centre Grid Connection

InterGen

November 2012

PARSONS BRINCKERHOFF

Report Title	**:**	Water Vole Phase 2 Survey Report: Gateway Energy Centre Grid Connection
Report Status	**:**	Final
Job No	**:**	63958A
Date	**:**	November 2012
Prepared by	**:**	Marianne Curtis 
Checked by	**:**	Vicky Cheung 
Approved by	**:**	Emily Agus

Document History and Status

Report Issue	Date of Issue	Prepared By:	Checked By:	Approved By:
A	August 2012	Marianne Curtis	Vicky Cheung	Emily Agus
B	November 2012	Marianne Curtis	Vicky Cheung	Emily Agus
C	November 2012	Marianne Curtis	Vicky Cheung	Emily Agus

PARSONS BRINCKERHOFF

CONTENTS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Parsons Brinckerhoff Limited (PB) was commissioned by InterGen to undertake a Phase 2 Water Vole (*Arvicola amphibius*) Survey to inform the application for planning permission for the proposed HV Electrical Connection associated with the Gateway Energy Centre (GEC) Combined Cycle Gas Turbine (CCGT) Power Plant (GEC).

GEC will be located on land within the London Gateway Development (LG Development). The LG Development, being promoted by DP World, is currently in the early stages of construction.

A HV Electrical Connection is required to connect the GEC into the National Grid National Electricity Transmission System.

The HV Electrical Connection route runs between the proposed GEC and the existing National Grid Coryton South Substation, and would:

- Leave the GEC Substation within the GEC site, and exit the GEC site to the east, and then turn northwards following the route of the agreed easement with DP World;
- Likely require a Horizontal Directional Drill (HDD) under the A1014 (The Manorway);
- Turn eastwards towards the existing CECL Power Station;
- Likely require a second HDD back under the A1014 (The Manorway); and
- Continue south-eastwards towards the Coryton South Substation at the existing CECL Power Station.

Within this HV Electrical Connection, two Options are considered. These are referred to as the 'Preferred Option' and the 'Manorway Fleet / Northern Triangle Option'. The exact route has yet to be determined. The exact route will be determined after the appointment of the Construction Contractor / HDD Specialist who will take into consideration the potential locations of the HDD drilling pits an, agreements with land owners.

For the purposes of the ecology surveys and reporting, the route of the HV Electrical Connection has been divided into three distinct 'Sections'. These are:

- Section 1 running north from GEC to the A1014 (The Manorway);
- Section 2 running eastwards alongside the A1014 (The Manorway); and,
- Section 3 running south-east from the A1014 (The Manorway) to the existing National Grid Coryton South Substation.

Section 1 is not considered suitable to support water voles (and no presence / absence surveys were undertaken).

Within Section 2 (north of the Manorway Fleet and within the Northern Triangle), a large population of water voles is known to be present. However, in line with consultation with Natural England, no presence / absence surveys were undertaken.

Within Section 2 (south of the Manorway Fleet / Northern Triangle), no evidence of water voles was recorded. However, due to the close proximity of the North Triangle Receptor Site and the presence of the Manorway Fleet (water voles are known to be present within these areas) it is considered that water voles are likely to be present within water body 1 (which is connected to the Manorway Fleet). Furthermore, it is likely that, due to the connectivity of the surrounding habitat, water voles may be present in any wet ditches.

Within Section 3, Evidence of water voles was recorded within one of the water bodies (water body 5). This evidence included: mammal runs; feeding stations; and, two latrines within the 250 m stretch of the water body which was surveyed. In addition, water body 5 is considered to be connected to the wider network of suitable wet ditches within the surrounding area as it is fed via a culvert to water bodies 4 and 6. These are, in turn, connected to the other wider network of ditches. Water voles are

therefore also assumed to use the surrounding ditches for commuting purposes.

Based on the two Options which could be implemented, it is recommended that all of the construction works are undertaken under an overarching Construction Environment Management Plan, within which a specific Water Vole Method Statement should be included. The Water Vole Method Statement should include precautionary measures to be undertaken when working within proximity to, or directly bisecting, any water bodies.

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Overview

1.1.1 Parsons Brinckerhoff Limited (PB) was commissioned by InterGen to undertake a Phase 2 Water Vole (*Arvicola amphibius*) Survey to inform the application for planning permission for the proposed HV Electrical Connection associated with the Gateway Energy Centre (GEC) Combined Cycle Gas Turbine (CCGT) Power Plant (GEC).

1.1.2 It was identified within the Extended Phase 1 Habitat Survey: Gateway Energy Centre Grid Connection Report[1] that a Phase 2 Water Vole Survey should be undertaken on water bodies within and immediately surrounding the proposed working width / working corridor[2].

1.1.3 The Phase 2 Water Vole Survey was recommended to identify the presence or likely absence of (and, if relevant, the distribution and abundance of) water voles and ensure compliance with the legislation protecting this species group.

1.2 Survey Area Context

1.2.1 GEC will be located on land within the London Gateway Development (LG Development). The LG Development, being promoted by DP World, is currently in the early stages of construction.

1.2.2 A HV Electrical Connection is required to connect the GEC into the National Grid National Electricity Transmission System.

1.2.3 The HV Electrical Connection route runs between the proposed GEC and the existing National Grid Coryton South Substation, and would:

- Leave the GEC Substation within the GEC site, and exit the GEC site to the east, and then turn northwards following the route of the agreed easement with DP World;
- Likely require a Horizontal Directional Drill (HDD) under the A1014 (The Manorway);
- Turn eastwards towards the existing CECL Power Station;
- Likely require a second HDD back under the A1014 (The Manorway); and
- Continue south-eastwards towards the Coryton South Substation at the existing CECL Power Station.

1.2.4 Within this HV Electrical Connection route, two Options are considered. These are referred to as the 'Preferred Option' and the 'Manorway Fleet / Northern Triangle Option'.

1.2.5 The exact route has yet to be determined. The exact route will be determined after the appointment of the Construction Contractor / HDD Specialist who will take into consideration the potential locations of the HDD drilling pits and agreements with land owners.

1.2.6 Under the Preferred Option, to the north of the A1014 (The Manorway), the HV Electrical Connection would be installed under the cycle path. In terms of HDD, it has been assumed that this would be used for the two crossings of the A1014 (The Manorway) and the crossing of the railway.

[1] *Parsons Brinckerhoff (2012) Extended Phase I Habitat Survey: Gateway Energy Centre Grid Connection Report for InterGen*
[2] *In line with consultation with Natural England, the Phase 2 Presence / Absence Survey was not undertaken within the Northern Triangle.*

1.2.7 The Manorway Fleet / Northern Triangle Option would be employed in the event that it is not practicable to install the HV Electrical Connection under the cycle path. Under the Manorway Fleet / Northern Triangle Option it may be necessary to extend the working corridor northwards into the Manorway Fleet and the Northern Triangle. In terms of HDD, it has been assumed that (in addition to the two crossings of the A1014 (The Manorway) and the crossing of the railway) this would be used for the crossing of the Northern Triangle.

1.2.8 Accordingly, under either Option, the cables associated with the HV Electrical Connection will likely be laid using a combination of two construction methods. These are:

- Direct Buried (at a depth of approximately 1.5 m inside a working width (working corridor) of up to 30 m wide); and,
- HDD (which comprises a trenchless technique for installing underground cables along a pre-prescribed path by using a surface launched drilling rig).

1.2.9 Given the length of the HV Electrical Connection route and the diversity of habitats it bisects, the Survey Area has been divided into three distinct 'Sections', each comprising broadly similar habitat types. The three distinct Sections are shown in Figure 1. The three Sections are:

- ***Section 1:***

  The Western Section (running north from GEC to the A1014 (The Manorway)), which is located within the operational DP World / LG Development Construction Site.

- ***Section 2:***

  The Northern Section (running eastwards alongside the A1014 (The Manorway)), which encompasses: the A1014 (The Manorway), a Cycle Path, the Manorway Fleet, and part of the Northern Triangle (DP World / LG Development Receptor Site).

- ***Section 3:***

  The Eastern Section (running south-east from the A1014 (The Manorway) to the existing National Grid Coryton South Substation), which passes in close proximity to the existing Coryton Power Station Overhead 400 kV Electrical Transmission Lines.

1.3 Legislation and Planning Context

1.3.1 Water voles are protected under the Wildlife and Countryside Act 1981 (as amended).

1.3.2 Under this legislation, it is an offence to possess, control or sell water voles or to intentionally kill, injure or take water voles. It is also an offence to intentionally or recklessly damage, destroy or obstruct access to a place that water voles use for shelter or protection or to disturb water voles whilst using such a place.

1.3.3 All Planning Authorities must have regard for the conservation of water voles as required by Section 40 of the Natural Environmental and Rural Communities (NERC) Act 2006.

1.3.4 Water voles are listed on both the United Kingdom Biodiversity Action Plan (UKBAP) and Thurrock Biodiversity Action Plan (BAP). This makes them a priority species for conservation.

SECTION 2

METHODOLOGY

2 METHODOLOGY

2.1 Desk Study

2.1.1 The Extended Phase 1 Habitat Survey[3] contained a full Desk Study for the proposed Survey Area. To collate any data within a 2 km Search Area of the proposed alignment of the HV Electrical Connection, the Desk Study included consultation with the following websites and groups:

- National Biodiversity Network (NBN) Gateway – accessed 26 April 2012;
- Multi Agency Geographic Information for the Countryside (MAGIC) – accessed 26 April 2012;
- Essex Wildlife Trust;
- Essex Field Club; and
- DP World Ecology Surveys and Reports for the LG Development.

2.1.2 In addition to the above, the Phase 2 Water Vole Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes[4] produced for the GEC Underground Gas Pipeline and Associated AGI (and the initial, now superseded, Grid Connection Route) was reviewed.

2.2 Presence / Absence Survey

2.2.1 The survey followed Best Practice Guidance set out in Strachan and Moorhouse[5]. The suitability of the water bodies to support water voles was assessed prior to the survey. A suitability ranking of low, medium or high was allocated to each water body based on: the condition of the water body; presence of suitable food sources; and, professional judgement.

2.2.2 The water vole survey was undertaken on 24 May 2012 by PB Ecologists. The water bodies along or in the vicinity of the alignment of the HV Electrical Connection route surveyed are shown in Figure 2. During the water vole survey, Surveyors walked along the margins of the water bodies and wet ditches within the survey area, looking for signs indicating the presence of water voles. These field signs included:

- Positive sightings of water voles;
- Latrines;
- Burrows (including those both above and below water level);
- Footprints;
- Small mammal runs and pathways within the vegetation;
- Feeding remains;
- Distinctive ‘plop’ sound of water voles entering the water; and,
- Feeding ‘lawns’ around tunnel entrances.

2.2.3 All field signs were recorded and mapped.

[3] Parsons Brinckerhoff (2012) *Extended Phase I Habitat Survey: Gateway Energy Centre Grid Connection Report* for InterGen
[4] *Parsons Brinckerhoff (2010), Phase II Water Vole Report: Gateway Energy Centre Gas Pipeline & Electricity Cabling Routes*
[5] *Strachan and Moorhouse (2006), Water Vole Conservation Handbook Second Edition, Wildlife Conservation Research Unit, Oxon.*

2.3 Survey Limitations

2.3.1 Water body 1 was not surveyed, as access was not possible due to the presence of impenetrable dense scrub. This is not considered likely to affect the validity of the results.

2.3.2 The survey was undertaken during the summer. As such, vegetation alongside water bodies can become dense and can limit visibility. Any excessively dense sections of vegetation were surveyed as accurately as possible with spot checks undertaken at least every 10 m.

2.3.3 The above limitations are not considered to have significantly affected the outcome of the assessment / this Report. The survey results, in addition to the results of the Desk Study, are considered sufficient to have provided an accurate representation of the water vole population present within the immediate area and any potential effects of the proposed construction of the HV Electrical Connection.

SECTION 3

RESULTS

3 RESULTS

3.1 Overview

3.1.1 Section 1 does not contain any water bodies and thus is not considered suitable to support water voles (and no presence / absence surveys were undertaken).

3.1.2 To prevent unnecessary disturbance, Section 2 (north of the Manorway Fleet and within the Northern Triangle) was not surveyed. This was discussed and agreed in advance with Natural England. In this regard, the results of the Desk Study, and previous Ecological Survey Reports, are considered sufficient to cover this area and are discussed in sub-Section 3.2.

3.1.3 Section 2 (south of the Manorway Fleet / Northern Triangle) and Section 3 were surveyed. The results of the presence / absence survey are discussed in sub-Section 3.3.

3.2 Desk Study

3.2.1 The Desk Study[6,7], and other previous Ecological Survey Reports which the Desk Study referenced, identified that there are water voles present throughout the extensive connected network of drains, wet ditches and water bodies north of the A1014 (The Manorway) and west of the LG Development. The Northern Triangle Receptor Site has also been used as a receptor site for water voles translocated from the LG Development site[8].

3.2.2 Accordingly, within Section 2 (north of the Manorway Fleet and within the Northern Triangle), a large population of water voles is known to be present.

3.2.3 In addition, records of American mink (*Mustela vison*) have been recorded within the local area[7]. The American mink is an introduced species that successfully colonised the British countryside. The American mink is a predator of water vole and has considerably impacted the national water vole population.

3.3 Presence / Absence Survey

3.3.1 The results of the presence / absence survey are shown Figure 2. These results are also summarised in Table 3.1.

[6] *Thomson Ecology (2008), London Gateway Ecological Action Plan – Water Vole*
[7] *Parsons Brinckerhoff (2010), Phase II Water Vole Report: Gateway Energy Centre Gas Pipeline & Electricity Cabling Routes*
[8] *Thomson Ecology (2008), London Gateway (Site A) Natural England Water Vole Trapping and Translocation Licence Method Statement*

TABLE 3.1: SUMMARY OF PHASE 2 WATER VOLE SURVEY

Water Body	*Description of Water Body*	*Description of Water Vole Field Signs Found*
1	Small wet ditch connecting to the Manorway Fleet, which runs along the north of the A1014 (The Manorway). Water body 1 was inaccessible due to dense impenetrable scrub. Water was observed within the ditch and the Manorway Fleet when viewed from a vantage point. The ditch was heavily shaded by common reed and dense scrub. The ditch was considered to have a **High Suitability** to support water voles.	N / A However, water voles are known to occur within the Manorway Fleet and thus likely to be present within water body 1.
2	Wet ditch running along the south of the A1014 (The Manorway). The ditch was dry at the time of survey and was **Not Considered Suitable** to support water voles.	N / A
3	Wet ditch approximately 2 m wide. Emergent vegetation is comprised mainly of common reed (*Phragmites australis*). The banks were shallow, being dominated by scrub. The ditch was considered to have a **Low Potential** to support water voles.	No conclusive signs of water voles were recorded. No latrines, burrows, or feeding stations were observed.
4	This wet ditch runs alongside the Coryton South Substation Access Road into a large pond. The ditch was approximately 1 m wide with shallow banks. There were patches of common reed (*Phragmites australis*) along the ditch. The banks were dominated by grass and bramble scrub (*Rubus fruticosus* agg.). The water appeared polluted and the ditch contained a large amount of rubbish. The ditch was considered to have a **Low Potential** to support water voles.	No conclusive signs of water voles were recorded. No latrines, burrows, or feeding stations were observed. Small mammal paths were identified.

Water Body	*Description of Water Body*	*Description of Water Vole Field Signs Found*
5	This wet ditch directly bisects the proposed V Electrical Connection route alignment. The ditch was approximately 2 m wide with steep banks. The emergent vegetation was dominated by common reed (*Phragmites australis*) and bulrush (*Typha latifolia*). The banks were dominated by grass, bramble scrub (*Rubus fruticosus* agg.) and tall ruderal vegetation. The ditch is connected to water bodies 4 and 6 by a culvert that runs underneath the Coryton South Substation Access Road. The ditch was considered to have a **High Potential** to support water voles.	Two water vole latrines, five mammal burrows, a number of mammal paths and five piles of feeding remains were observed. **Water voles were confirmed to be present.**
6	A large pond approximately 9 x 15 m, fed by water bodies (ditches) 4 and 5. The pond was surrounded by common reed (*Phragmites australis*). The ditch was considered to have a **High Potential** to support water voles.	No conclusive signs of water voles were recorded. Small mammal paths were identified.

Summary

3.3.2 A total of six water bodies were identified within the Survey Area. Of these six water bodies, five of them were considered suitable for water voles. However, only one water body contained evidence of water vole.

3.3.3 No evidence of American mink (*Mustela vison*) was recorded during the survey.

SECTION 4

DISSCUSSION AND RECOMMENDATIONS

4 DISCUSSION AND RECOMMENDATIONS

4.1 Overview / Discussion

4.1.1 A Phase 2 Water Vole (*Arvicola amphibius*) Survey was undertaken to inform the application for planning permission for the proposed HV Electrical Connection associated with GEC.

4.1.2 Given the length of the HV Electrical Connection route and the diversity of habitats it bisects, the Survey Area has been divided into three distinct 'Sections', each comprising broadly similar habitat types.

Section 1

4.1.3 Section 1 is not considered suitable to support water voles and thus no presence / absence surveys were undertaken.

4.1.4 Water voles are absent from this Section.

Section 2 – North of the Manorway Fleet and within the Northern Triangle

4.1.5 To prevent unnecessary disturbance, no presence / absence surveys were undertaken. This was discussed and agreed in advance with Natural England. The results of the Desk Study, and previous Ecological Survey Reports, are considered sufficient to cover this area. Accordingly, within Section 2 (north of the Manorway Fleet and within the Northern Triangle), a large population of water voles is known to be present.

Section 2 – South of the Manorway Fleet / Northern Triangle

4.1.6 No evidence of water voles was recorded.

4.1.7 However, due to the close proximity of the North Triangle Receptor Site and the presence of the Manorway Fleet (water voles are known to be present within these areas) it is considered that water voles are likely to be present within water body 1 (which is connected to the Manorway Fleet). Furthermore, it is likely that, due to the connectivity of the surrounding habitat, water voles may be present in any wet ditches.

Section 3

4.1.8 Evidence of water voles was recorded within one of the water bodies (water body 5). This evidence included: mammal runs; feeding stations; and, two latrines within the 250 m stretch of the water body which was surveyed.

4.1.9 In addition, water body 5 is considered to be connected to the wider network of suitable wet ditches within the surrounding area as it is fed via a culvert to water bodies 4 and 6. These are, in turn, connected to the other wider network of ditches. Water voles are therefore also assumed to use the surrounding ditches for commuting purposes.

4.2 Recommendations

4.2.1 Based on the two potential Options which could be implemented, it is recommended that all of the construction works are undertaken under an overarching Construction Environment Management Plan (CEMP), within which a specific Water Vole Method Statement should be included. The Water Vole Method Statement should include precautionary measures to be undertaken when working within proximity to, or directly bisecting, any water bodies.

4.2.2 The Water Vole Method Statement should include (but not be limited to) the following recommendations:

- A Toolbox Talk should be presented to all construction personnel / employees highlighting the legal obligations, identification and the ecology of this species.
- Works that may impact individual water voles or their burrows should be undertaken under the supervision of a qualified Ecologist to ensure that all works are undertaken professionally and in accordance with the CEMP.
- Working hours should be restricted to daylight hours to minimise any excessive disturbance to water voles.
- Water voles should be displaced from the working width (working corridor) using habitat displacement / habitat manipulation methods[9] to avoid injury or mortality. Vegetation along the water body that falls within the working width (working corridor) should be cleared in a directional way. This should occur at the beginning of the breeding season (from mid-February, but before April as per Standard Guidelines).
- Before any clearance of vegetation, all burrows within the area will need to be identified, checked and marked. Burrows will need to remain open to enable animals to escape.
- Cleared areas may need to be left for up to seven days, to allow time for water voles to leave the area naturally. Regular checks of burrows should be made by a water vole specialist throughout this period and the re-cutting of vegetation may be required.
- Burrows found within the working area will have to be excavated by hand following the vegetation removal and time allowed for water voles to have leftthe area naturally.
- Buffer zones[10] of approximately 10 m should be implemented by the installation of appropriate hazard fencing around the water bodies in order to minimise direct and indirect impacts on water voles. These buffer zones should prevent construction personnel / employees from entry into such water body areas. The use of buffer zones would also preclude the storage of materials and heavy plant machinery within these areas.
- Following the completion of construction works, habitat should be replanted or allowed to naturally re-colonise to ensure there is no net or permanent loss of water vole habitat across the area.

4.2.3 In addition, due to the presence of water voles within the wider surrounding area, any other water bodies that will be directly impacted should be subject to the above mitigation as a precaution.

4.2.4 If the Preferred Option is pursued, it is not considered necessary to consult further with Natural England. However, in the event that water voles are recorded during any stage of the construction, all construction works will cease and an experienced Ecologist will be contacted immediately. Further consultation with Natural England will be required.

4.2.5 If the Manorway Fleet / Northern Triangle Option is pursued (and water vole habitat cannot be avoided), then it will be necessary to agree the specific mitigation measures and content of the Water Vole Method Statement with Natural England.

[9] *It should be noted that habitat displacement / habitat manipulation methods rely on the area being maintained as unsuitable for water voles throughout the construction works. However, they are also subject to the mitigation requirements of other protected species.*

[10] *English Nature (2001) Water Vole Mitigation Techniques: A Questionnaire Research Project. No. 415 – English Nature Research Reports.*

FIGURES

N

Notes

Indicative route A

50m Study area

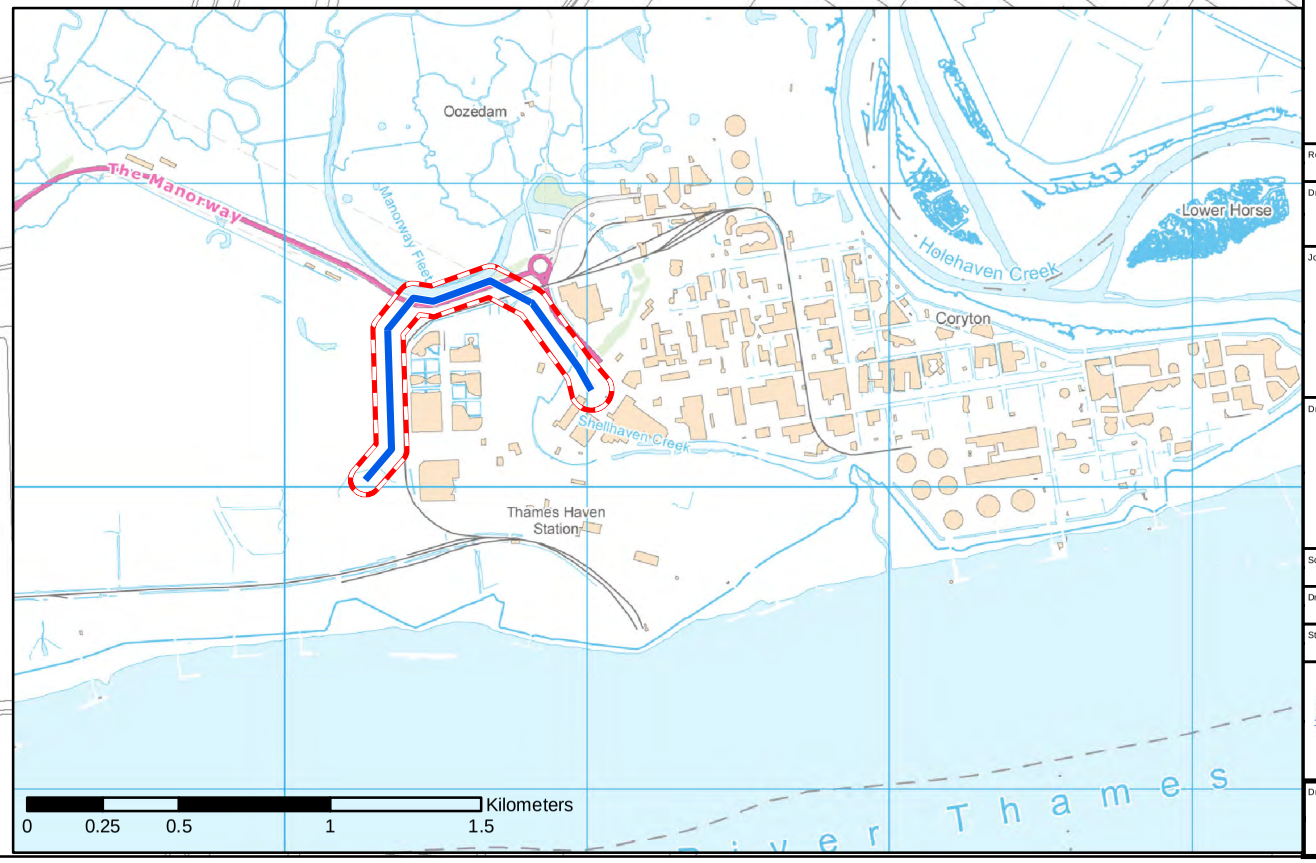
Section

1

2

3

0 20 40 60 80 100
Metres



Revision Details	By / Check	Date	Suffix

Drawing Status: DRAFT

Job Title: Thames Haven

Drawing Title: Figute 1: Proposed Route Site Location

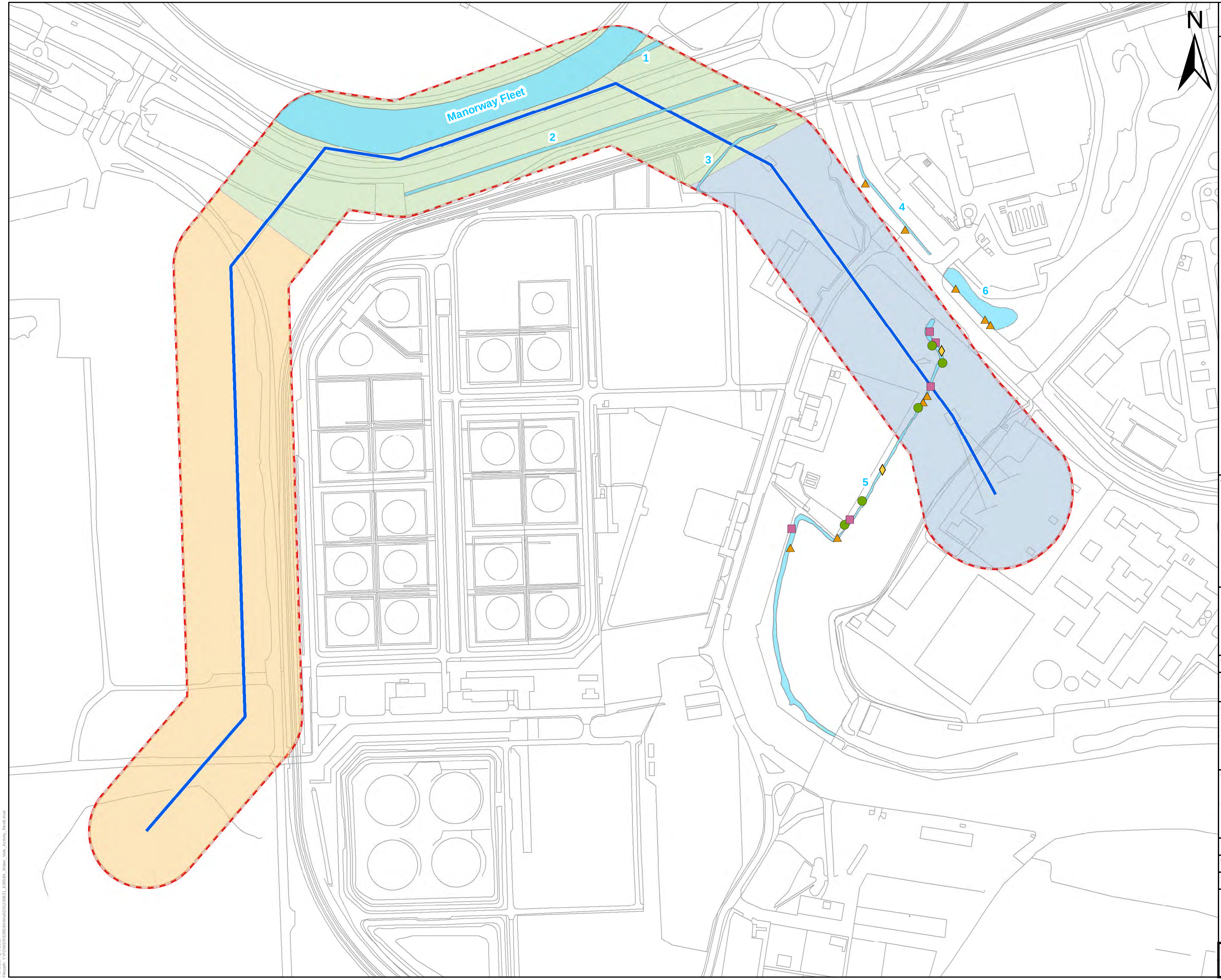
Scale at A3: 1:3,000

Drawn	Approved		
KF	TM		
Stage 1 check: JL	Stage 2 check: TM	Originated: KF	Date: 20/05/2010

PB PARSONS BRINCKERHOFF
100 YEARS
6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number: **63958A_site_location_sections** Rev

Plot Date: April 2010
Filepath: Z:\GIS\POWER\63828A\Mxd\20100422_63828A_GCN_Survey



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

Notes

50m Study Area

Indicative Route A

Section

1

2

3

Water Bodies

Mammal Path

Water Vole Burrow

Water Vole Feeding Remains

Water Vole Latrine

0 20 40 60 80 100

Metres

Revision Details	By / Check	Date	Suffix

Drawing Status

DRAFT

Job Title

Thames Haven
Grid Connection

Drawing Title

Figure 2:
Water Vole Activity Map

Scale at A3

1:3,000

Drawn	Approved
KF	TM

Stage 1 check	Stage 2 check	Originated	Date
JL	TM	KF	20/05/2010

PARSONS BRINCKERHOFF

6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number Rev

63958A_Water_Vole_Activity_RevB

Plot Date: April 2010
Filepath: Y:\PO\WE\63958A\Mxd\20120821_63958A_Water_Vole_Activity_RevB.mxd

PHASE 2 REPTILE SURVEY

Reptile Phase 2 Survey Report: Gateway Energy Centre Grid Connection

InterGen

November 2012

PARSONS BRINCKERHOFF

Report Title	**:**	Reptile Phase 2 Survey Report: Gateway Energy Centre Grid Connection
Report Status	**:**	Final
Job No	**:**	63958A
Date	**:**	November 2012
Prepared by	**:**	Marianne Curtis 
Checked by	**:**	Vicky Cheung 
Approved by	**:**	Emily Agus

Document History and Status

Report Issue	Date of Issue	Prepared By:	Checked By:	Approved By:
A	August 2012	Marianne Curtis	Vicky Cheung	Emily Agus
B	November 2012	Marianne Curtis	Vicky Cheung	Emily Agus
C	November 2012	Marianne Curtis	Vicky Cheung	Emily Agus

PARSONS BRINCKERHOFF

CONTENTS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Parsons Brinckerhoff Limited (PB) was commissioned by InterGen to undertake a Phase 2 Reptile Presence / Absence Survey to inform the application for planning permission for the proposed HV Electrical Connection associated with the Gateway Energy Centre (GEC) Combined Cycle Gas Turbine (CCGT) Power Plant (GEC).

GEC will be located on land within the London Gateway Development (LG Development). The LG Development, being promoted by DP World, is currently in the early stages of construction.

A HV Electrical Connection is required to connect GEC into the National Grid National Electricity Transmission System.

The HV Electrical Connection route runs between the proposed GEC and the existing National Grid Coryton South Substation, and would:

- Leave the GEC Substation within the GEC site, and exit the GEC site to the east, and then turn northwards following the route of the agreed easement with DP World;
- Likely require a Horizontal Directional Drill (HDD) under the A1014 (The Manorway);
- Turn eastwards towards the existing CECL Power Station;
- Likely require a second HDD back under the A1014 (The Manorway); and
- Continue south-eastwards towards the Coryton South Substation at the existing CECL Power Station.

Within this HV Electrical Connection, two Options are considered. These are referred to as the 'Preferred Option' and the 'Manorway Fleet / Northern Triangle Option'. The exact route has yet to be determined. The exact route will be determined after the appointment of the Construction Contractor / HDD Specialist who will take into consideration the potential locations of the HDD drilling pits an, agreements with land owners.

For the purposes of the ecology surveys and reporting, the route of the HV Electrical Connection has been divided into three distinct 'Sections'. These are:

- Section 1 running north from GEC to the A1014 (The Manorway);
- Section 2 running eastwards alongside the A1014 (The Manorway); and,
- Section 3 running south-east from the A1014 (The Manorway) to the existing National Grid Coryton South Substation.

Section 1 is not considered suitable to support reptiles (and no presence / absence surveys were undertaken).

Within Section 2, all four common species of reptile are known to be present within the Northern Triangle Receptor Site. As such, it has been assumed that reptiles are present within all suitable habitat within this Section.

Within Section 3, the visits / surveys have confirmed the presence of three of the four common species of reptile. These are: adder; common lizard; and, slow worm. In addition, it is likely that grass snakes are also present within Section 3 as they are known to occur within the surrounding area.

Based on the two Options which could be implemented, it is recommended that all of the construction works are undertaken under an overarching Construction Environment Management Plan, within which a specific Reptile Method Statement should be included. The Reptile Method Statement should include precautionary measures to be undertaken at all times.

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Background

1.1.1 Parsons Brinckerhoff Limited (PB) was commissioned by InterGen to undertake a Phase 2 Reptile Presence / Absence Survey to inform the application for planning permission for the proposed HV Electrical Connection associated with the Gateway Energy Centre (GEC) Combined Cycle Gas Turbine (CCGT) Power Plant (GEC).

1.1.2 It was identified within the Extended Phase 1 Habitat Survey: Gateway Energy Centre Grid Connection Report[1] that a Phase 2 Reptile Presence / Absence Survey should be undertaken along the alignment of the HV Electrical Connection route within all suitable habitats that could potentially support reptiles and which could be affected by the proposed HV Electrical Connection construction works[2].

1.1.3 The Phase 2 Reptile Survey was recommended to identify the presence or likely absence of (and, if relevant, the distribution and abundance of) reptiles and ensure compliance with the legislation protecting this species group.

1.2 Survey Area Context

1.2.1 GEC will be located on land within the London Gateway Development (LG Development). The LG Development, being promoted by DP World, is currently in the early stages of construction.

1.2.2 A HV Electrical Connection is required to connect the GEC into the National Grid National Electricity Transmission System.

1.2.3 The HV Electrical Connection route runs between the proposed GEC and the existing National Grid Coryton South Substation, and would:

- Leave the GEC Substation within the GEC site, and exit the GEC site to the east, and then turn northwards following the route of the agreed easement with DP World;
- Likely require a Horizontal Directional Drill (HDD) under the A1014 (The Manorway);
- Turn eastwards towards the existing CECL Power Station;
- Likely require a second HDD back under the A1014 (The Manorway); and
- Continue south-eastwards towards the Coryton South Substation at the existing CECL Power Station.

1.2.4 Within this HV Electrical Connection route, two Options are considered. These are referred to as the 'Preferred Option' and the 'Manorway Fleet / Northern Triangle Option'.

1.2.5 The exact route has yet to be determined. The exact route will be determined after the appointment of the Construction Contractor / HDD Specialist who will take into consideration the potential locations of the HDD drilling pits and agreements with land owners.

1.2.6 Under the Preferred Option, to the north of the A1014 (The Manorway), the HV Electrical Connection would be installed under the cycle path. In terms of HDD, it has been assumed that this would be used for the two crossings of the A1014 (The Manorway) and the crossing of the railway.

---

1 Parsons Brinckerhoff (2012) Extended Phase 1 Habitat Survey: Gateway Energy Centre Grid Connection Report for InterGen

2 In line with consultation with Natural England, the Phase 2 Presence / Absence Survey was not undertaken within the Northern Triangle.

1.2.7 The Manorway Fleet / Northern Triangle Option would be employed in the event that it is not practicable to install the HV Electrical Connection under the cycle path. Under the Manorway Fleet / Northern Triangle Option it may be necessary to extend the working corridor northwards into the Manorway Fleet and the Northern Triangle. In terms of HDD, it has been assumed that (in addition to the two crossings of the A1014 (The Manorway) and the crossing of the railway) this would be used for the crossing of the Northern Triangle.

1.2.8 Accordingly, under either Option, the cables associated with the HV Electrical Connection will likely be laid using a combination of two construction methods. These are:

- Direct Buried (at a depth of approximately 1.5 m inside a working width (working corridor) of up to 30 m wide); and,
- HDD (which comprises a trenchless technique for installing underground cables along a pre-prescribed path by using a surface launched drilling rig).

1.2.9 Given the length of the HV Electrical Connection route and the diversity of habitats it bisects, the Survey Area has been divided into three distinct 'Sections', each comprising broadly similar habitat types. The three distinct Sections are shown in Figure 1. The three Sections are:

- ***Section 1:***

  The Western Section (running north from GEC to the A1014 (The Manorway)), which is located within the operational DP World / LG Development Construction Site.

- ***Section 2:***

  The Northern Section (running eastwards alongside the A1014 (The Manorway)), which encompasses: the A1014 (The Manorway), a Cycle Path, the Manorway Fleet, and part of the Northern Triangle (DP World / LG Development Receptor Site).

- ***Section 3:***

  The Eastern Section (running south-east from the A1014 (The Manorway) to the existing National Grid Coryton South Substation), which passes in close proximity to the existing Coryton Power Station Overhead 400 kV Electrical Transmission Lines.

1.3 Legislation and Planning Context

1.3.1 The four common UK reptile species (adder (*Vipera berus*), grass snake (*Natrix natrix*), common lizard (*Zootoca vivipara*) and slow worm (*Anguis fragilis*)) are protected under Schedule 5 of the Wildlife and Countryside Act, 1981 (as amended) against deliberate and / or intentional killing, injuring and trade.

1.3.2 The smooth snake (*Coronella austriaca*) and sand lizard (*Lacerta agilis*) are afforded higher levels of protection under the Wildlife and Countryside Act, 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010 (Habitat Regulations 2010). However the survey area does not fall within the known distribution for either of these species. Therefore, they will not be considered further within this Report.

1.3.3 All six UK reptile species are United Kingdom Biodiversity Action Plan (UKBAP) species. The adder and grass snake are Thurrock Biodiversity Action Plan (BAP) species.

SECTION 2

METHODOLOGY

2 METHODOLOGY

2.1 Desk Study

2.1.1 The Extended Phase 1 Habitat Survey[3] contained a full Desk Study for the proposed Survey Area. To collate any data within a 2 km Search Area of the proposed alignment of the HV Electrical Connection, the Desk Study included consultation with the following websites and groups:

- National Biodiversity Network (NBN) Gateway – accessed 26 April 2012;
- Multi Agency Geographic Information for the Countryside (MAGIC) – accessed 26 April 2012;
- Essex Wildlife Trust;
- Essex Field Club; and
- DP World Ecology Surveys and Reports for the LG Development.

2.1.2 In addition to the above, the Phase 2 Reptile Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes[4] produced for the GEC Underground Gas Pipeline and Associated AGI (and the initial, now superseded, Grid Connection Route) was reviewed.

2.2 Presence / Absence Survey

2.2.1 All presence / absence surveys undertaken in 2012 were carried out using Standard Best Practice Methodologies as recommended in the Herptofauna Workers' Manual[5] and the Herptofauna Groups of Britain and Ireland Maintaining Best Practice[6]. The survey methodologies also took into consideration 'Froglife Advice Sheet 10[7]'.

2.2.2 A total of 69 numbered artificial refugia (tins) comprising a mixture of bitumen roofing felt (~50 x 40 cm) and corrugated bitumen and plastic roofing sheets (~100 x 60 cm) were placed at a density of approximately 30 per hectare of suitable habitat. The locations of the artificial refugia are shown in Figure 2. The tins were set out by PB Ecologists on 3 May 2012.

2.2.3 The tins were only placed in habitat considered suitable or optimal for reptiles. The tins were numbered and mapped to ensure no mats would be missed during the subsequent surveys. The tins were left 'in-situ' for a minimum of two weeks prior to the first visit to allow them to 'bed in' and for reptiles within the area to locate and become familiar with them.

2.2.4 In line with the Herptofauna Groups of Britain and Ireland Maintaining Best Practice, a total of seven visits / surveys were undertaken between 24 May and 23 July 2012 by PB Ecologists. All visits were undertaken during suitable weather conditions for basking reptiles (generally when the air temperature was between 10 to 20°C, and there was no rain and intermittent sunshine). During each visit, a visual survey of the area and each tin was carried out first, whereby any naturally basking reptiles were noted before the area was surveyed and potentially disturbed. The tins were then surveyed for any reptiles sheltering underneath.

---

3 *Parsons Brinckerhoff (2012) Extended Phase I Habitat Survey: Gateway Energy Centre Grid Connection Report for InterGen*

4 *Parsons Brinckerhoff (2010) Phase II Reptile Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes*

5 *Joint Nature Conservation Committee (1998) 'Herpetofauna Workers Manual' Gent, A. & Gibson, S. (Eds). JNCC, Peterborough.*

6 *Herpetofauna Groups of Britain and Ireland (1998). Evaluating Local Mitigation / Translocation Programmes: Maintaining Best Practice and Lawful Standards.*

7 *Froglife (1999) Advice Sheet 10: Reptile Survey – An Introduction to Planning, Conducting and Interpreting Surveys for Snake and Lizard Conservation. Froglife, Peterborough.*

2.2.5 During each visit / survey, the species, number of individuals, age class, refuge number and (where possible) sex were recorded. The weather conditions and temperature during the visits were also noted.

2.2.6 In line with the Herptofauna Groups of Britain and Ireland Maintaining Best Practice, the peak count of each species obtained by a survey under 'good' survey conditions was used to calculate reptile population size class estimations (see Table 2.1). This precautionary approach has been developed because of the complex relationship between numbers of animals detected during surveys and the actual population size, and allows for an estimation of likely population sizes only.

TABLE 2.1: CRITERIA FOR POPULATION SIZE CLASS ESTIMATIONS

Species	*Low Population*	*Good Population*	*Exceptional Population*
Adder	<5	5 - 10	>10
Grass Snake	<5	5 – 10	>10
Common Lizard	<5	5 – 20	>20
Slow-worm	<5	5 – 20	>20

2.3 Survey Limitations

2.3.1 Due to poor weather conditions throughout June, the final three surveys were undertaken during the early part of July. July is considered suitable although sub-optimal to survey for reptiles, as they generally spend less time basking due to the high temperatures and longer periods of dry weather. However, with the early part of the 2012 summer being particularly cool and wet, and with the weather conditions during these surveys being optimal at the time of survey, this was not considered to be a significant limitation to the survey results.

SECTION 3

RESULTS

3 RESULTS

3.1 Overview

3.1.1 Section 1 is not considered suitable to support reptiles (and no presence / absence surveys were undertaken). Indeed, a large scale translocation programme has removed all reptiles from the area. Following the translocation programme, Section 1 has been levelled, with all suitable vegetation and natural refugia removed.

3.1.2 To prevent unnecessary disturbance, Section 2 (north of the Manorway Fleet and within the Northern Triangle) was not surveyed. This was discussed and agreed in advance with Natural England. In this regard, the results of the Desk Study, and previous Ecological Survey Reports, are considered sufficient to cover this area and are discussed in sub-Section 3.2.

3.1.3 Section 2 (south of the Manorway Fleet / Northern Triangle) was not surveyed. This is not considered to be limiting as the habitat between the Manorway Fleet and Cycle Path is considered to be sub-optimal as it is highly managed and well used. Furthermore, with the known populations of all four species of reptiles within the Northern Triangle Receptor Site, reptiles are assumed to occur. In this regard, the results of the Desk Study are considered sufficient to cover this area and are discussed in sub-Section 3.2.

3.1.4 Section 3 was surveyed. The results of the presence / absence survey are discussed in sub-Section 3.3.

3.2 Desk Study

3.2.1 The Desk Study[8,9], and other previous Ecological Survey Reports which the Desk Study referenced, identified that there are records of all four common reptile species within the 2 km Search Area. These are: adder (*Vipera berus*); grass snake (*Natrix natrix*); common lizard (*Zootoca vivipara*); and, slow worm (*Anguis fragilis*).

3.2.2 There is thought to be a medium-large population of each species when viewed across the whole Search Area. Within the Northern Triangle Receptor Site, all four species were known to occur[10].

3.2.3 Accordingly, within Section 2 medium-large populations of reptiles are thought to be present.

3.3 Presence / Absence Survey

3.3.1 Table 3.1 summarises the weather conditions on each visit / survey. Table 3.2 summarises the reptile survey results, with the peak count of reptiles highlighted in bold.

[8] *Parsons Brinckerhoff (2012) Extended Phase I Habitat Survey: Gateway Energy Centre Grid Connection Report for InterGen*

[9] *Parsons Brinckerhoff (2010) Phase II Reptile Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes*

[10] *DP World (2008), London Gateway, Ecological Action Plan (Part 2) Reptiles*

TABLE 3.1: SUMMARY OF THE WEATHER CONDITIONS FOR EACH OF THE VISITS / SURVEYS WITHIN 2012

Visit	*Date*	*Weather*
1	24 May	15°C, no rain, 0/8 cloud cover, light breeze
2	29 May	17°C, no rain, 0/8 cloud cover, gentle breeze
3	6 June	15°C, rain early in day, 5/8 cloud cover, light breeze
4	21 June	17.5°C, rain early in day, 7/8 cloud cover, calm
5	17 July	18°C, rain early in day, 6/8 cloud cover, moderate wind
6	18 July	16°C, no rain, 7/8 cloud cover, moderate wind
7	23 July	20°C, rain early in day, 0/8 cloud cover, moderate wind

TABLE 3.2: RESULTS OF REPTILE SURVEY

Visit	*Date*	*Adder*	*Grass Snake*	*Common Lizard*	*Slow Worm*
1	24 May	-	-	2	1
2	29 May	-	-	4	2
3	6 June	-	-	6	1
4	**21 June**	**3**	**-**	**8**	2
5	**17 July**	1	-	3	**6**
6	18 July	1	-	3	5
7	23 July	-	-	-	2

3.3.2 The results of the presence / absence survey are shown in Figure 3.

Summary

3.3.3 The survey area consists of habitats suitable to support reptiles. These include areas of rough grassland, field boundaries, and scrub.

3.3.4 Low numbers of adders, common lizards and slow worms were recorded during the visits / surveys. This is shown in Figure 3. These reptiles were generally evenly distributed throughout the Survey Area, suggesting that these reptiles are using all suitable habitats within the Survey Area. It is considered that all populations present within the area are breeding populations as sub-adults and juveniles were recorded for each species.

3.3.5 Grass snakes were not recorded during any of the visits / surveys.

SECTION 4

DISCUSSIONS & RECOMMENDATIONS

4 DISCUSSIONS AND RECOMMENDATIONS

4.1 Overview / Discussion

4.1.1 A Phase 2 Reptile Presence / Absence Survey was undertaken to inform the application for planning permission for the proposed HV Electrical Connection associated with GEC.

4.1.2 Given the length of the HV Electrical Connection route and the diversity of habitats it bisects, the Survey Area has been divided into three distinct 'Sections', each comprising broadly similar habitat types.

Section 1

4.1.3 Section 1 is not considered suitable to support reptiles and thus no presence / absence surveys were undertaken.

4.1.4 However, it is noted that within this Section there is a small area which retains the potential to support reptiles. This is the disused railway corridor located outside of the LG Development site. However, the disused railway corridor has reptile fencing running along the western boundary, thus effectively excluding reptiles from the area.

4.1.5 Reptiles are absent from this Section.

Section 2

4.1.6 It is understood that all four common species of reptile are present within the Northern Triangle Receptor Site. As such, it has been assumed that reptiles are present within all suitable habitat within this Section.

Section 3

4.1.7 The visits / surveys have confirmed the presence of three of the four common species of reptile. These are: adder; common lizard; and, slow worm. The peak count for each species equates into a 'low population class' for the species present within the area.

4.1.8 In addition, it is likely that grass snakes are also present within Section 3 as they are known to occur within the surrounding area. Therefore, as a precaution, they should be considered present.

4.2 Recommendations

4.2.1 Based on the two potential Options which could be implemented, it is recommended that all of the construction works are undertaken under an overarching Construction Environmental Management Plan (CEMP), within which a specific reptile method statement should be included. The Reptile Method Statement should include precautionary measures to be undertaken at all times.

4.2.2 The Reptile Method Statement should include (but not be limited to) the following recommendations:

- A Toolbox Talk should be presented to all construction personnel / employees highlighting the legal obligations, identification and the ecology of this species.
- Works should be undertaken under the supervision of a qualified Ecologist to ensure that all works are undertaken professionally and in accordance with the CEMP.
- Reptiles should be displaced from the working width (working corridor) using habitat manipulation methods[11] to avoid injury or mortality. This should occur

[11] *Habitat manipulation should be undertaken with consideration / in accordance with other Protected Species mitigation, such as for badgers.*

during the reptiles most active months (generally agreed to be between April and June and during September). The displacement should be undertaken using habitat manipulation in a staged approach over a number of days, to allow reptiles to naturally move out of the area. The cutting regime should be directional towards suitable habitat to encourage reptiles to move into the adjoining habitat. In addition, the working width / working corridor must be maintained devoid of vegetation throughout the period of construction works.

- If works are undertaken during / extend over the winter months, targeted vegetation clearance would be necessary. This should include the removal of vegetation (which will also be required as part of the measures to avoid directly impacting GCN) and is aimed to render the working width / working corridor unsuitable for this species. In addition, the working width / working corridor must be maintained devoid of vegetation throughout the period of construction works. However, any suitable hibernacula must be left in situ throughout the winter months and dismantled by hand under the supervision of an Ecologist once the hibernation period is over.
- Any hibernacula (piles of wood, stones or dead vegetation) should be taken apart by hand by an experienced Ecologist and any reptiles found moved to a safe location off site.
- Following completion of the construction works, habitat should be reinstated to ensure there is no net or permanent loss of reptile habitat across the area.

4.2.3 In the event that reptiles are recorded during any stage of the construction, all construction works should cease, and the reptile should be given time to move out of the working width / working area naturally, and an experienced ecologist should be contacted immediately.

4.2.4 Due to the localised and temporary nature of the works, reptile fencing or translocation of reptiles from the working width / working area is not considered necessary.

FIGURES

N

Notes

Indicative route A

50m Study area

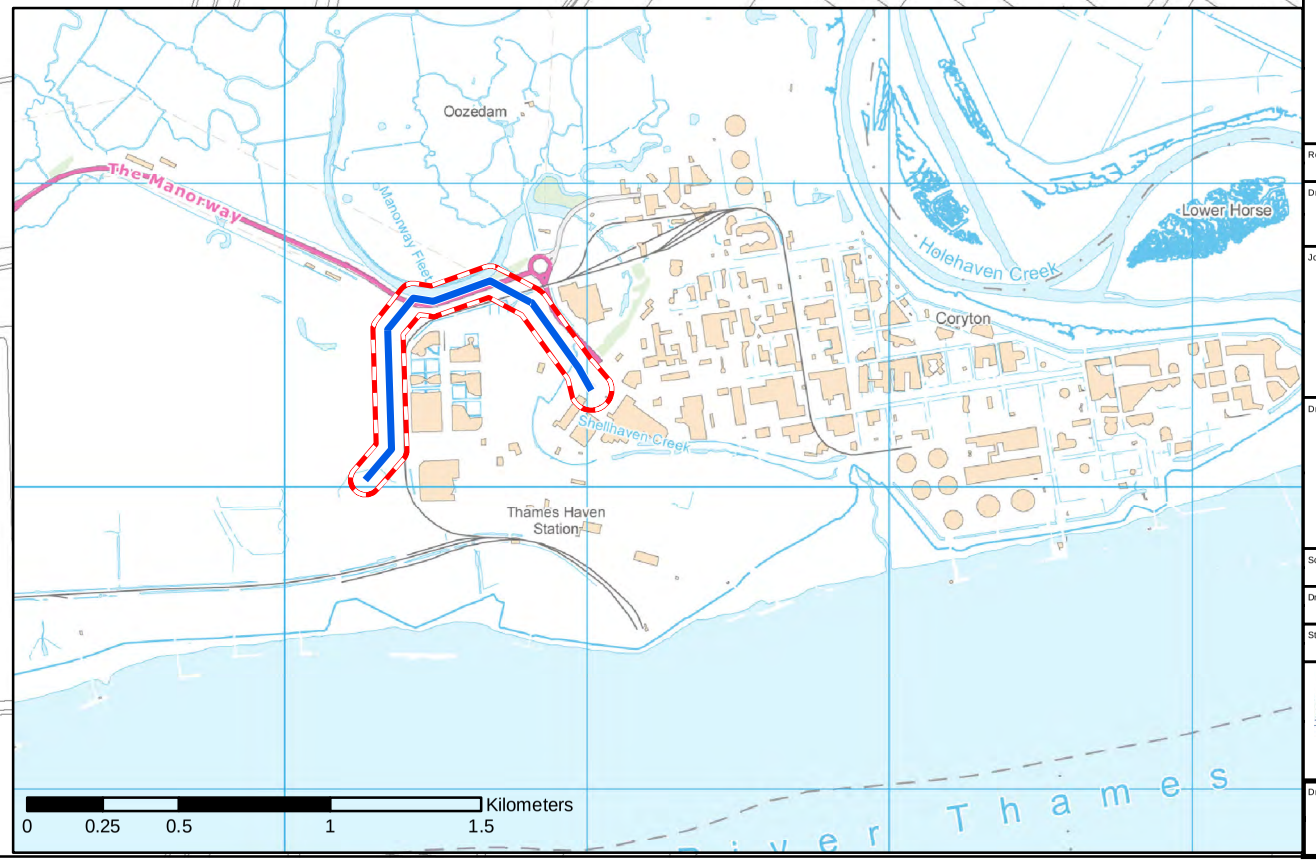
Section

1

2

3

0 20 40 60 80 100
Metres



Revision Details	By / Check	Date	Suffix

Drawing Status: DRAFT

Job Title: Thames Haven

Drawing Title: Figute 1: Proposed Route Site Location

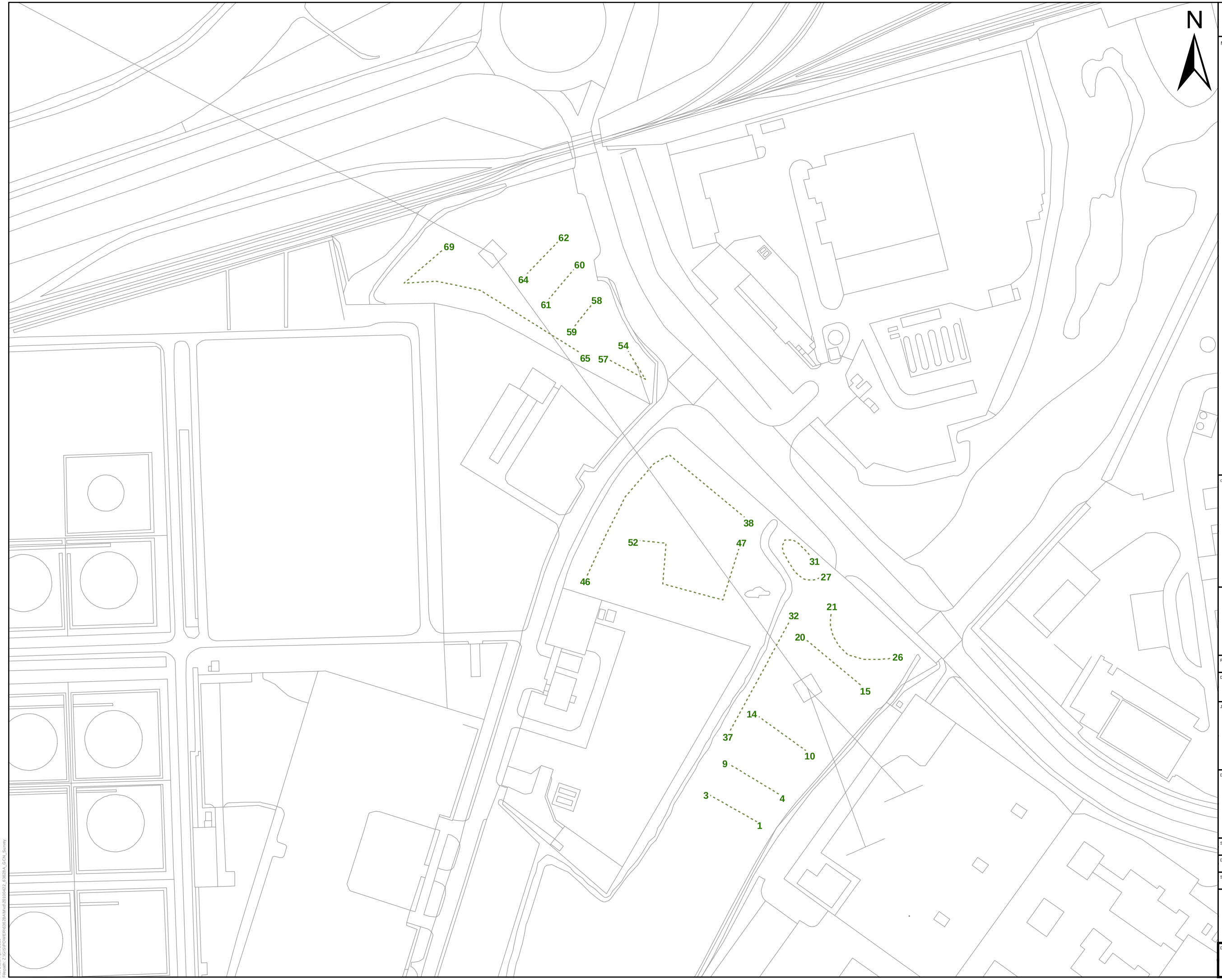
Scale at A3: 1:3,000

Drawn	Approved		
KF	TM		
Stage 1 check: JL	Stage 2 check: TM	Originated: KF	Date: 20/05/2010

PB PARSONS BRINCKERHOFF
100 YEARS
6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number: **63958A_site_location_sections** Rev

Plot Date: April 2010
Filepath: Z:\GIS\POWER\63828A\Mxd\20100422_63828A_GCN_Survey



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

Notes

15 Refugia Number

Refugia Transect

0 10 20 30 40 50
Metres

Revision Details	By / Check	Date	Suffix

Drawing Status: DRAFT

Job Title: Thames Haven Grid Connection

Drawing Title: Figure 2: Artificial Refugia Locations

Scale at A3: 1:1,750

Drawn	Approved
KF	VC

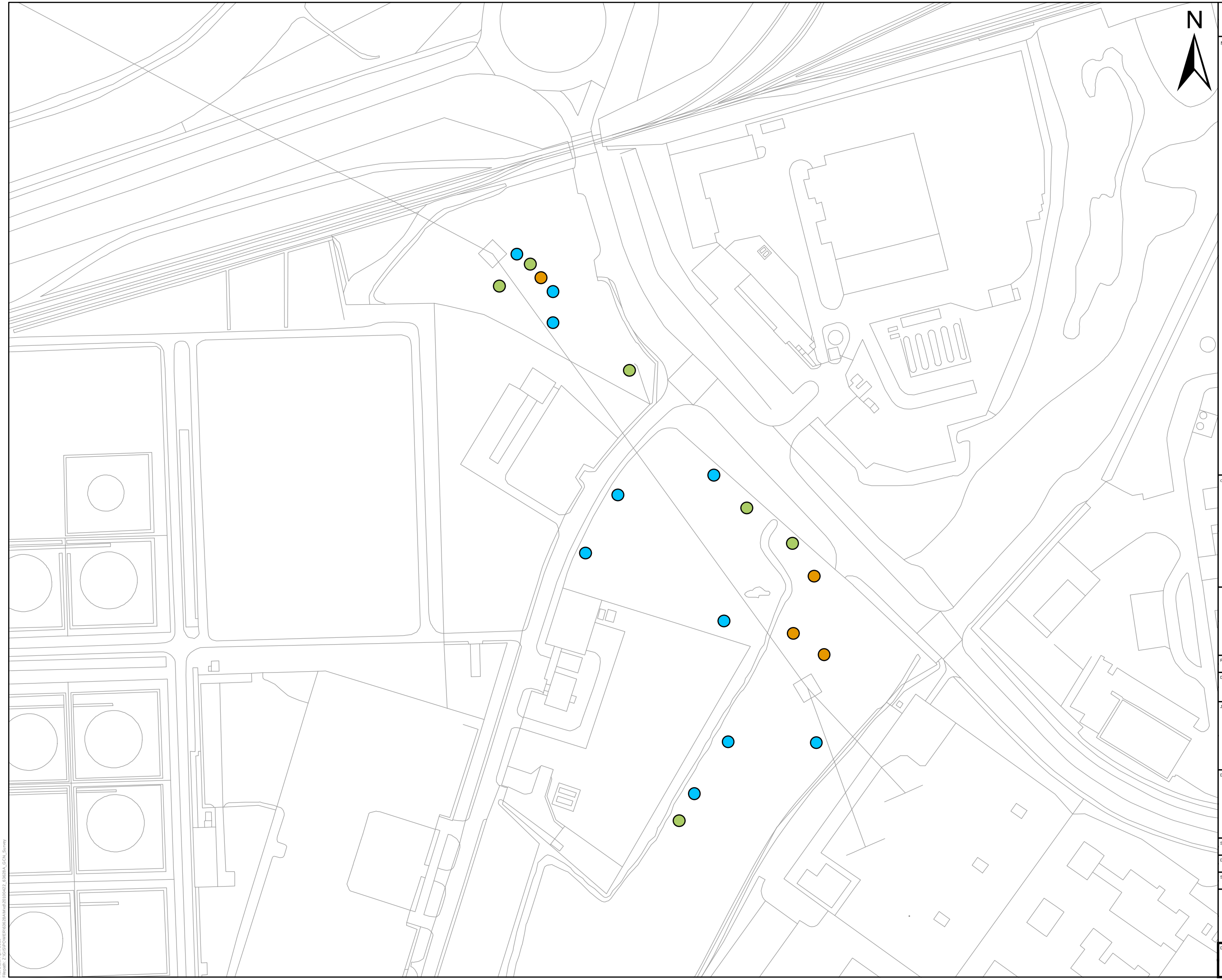
Stage 1 check	Stage 2 check	Originated	Date
JL	MC	KF	20/05/2010

PARSONS BRINCKERHOFF
100 YEARS
6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number: 63958A_Reptile_Survey_A

Rev

Plot Date: April 2010
Filepath: Z:\GIS\POWER\63628A\Mxd\20100422_63628A_GCN_Survey



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

Notes

Reptile Species

- Adder
- Common Lizard
- Slow Worm

0 10 20 30 40 50
Metres

Revision Details	By / Check	Date	Suffix

Drawing Status: DRAFT

Job Title: Thames Haven Grid Connection

Drawing Title: Figure 3: Reptile Distribution Map

Scale at A3	1:1,750		
Drawn: KF		Approved: VC	
Stage 1 check: JL	Stage 2 check: MC	Originated: KF	Date: 20/05/2010

PARSONS BRINCKERHOFF
100 YEARS
6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number: **63958A_Reptile_Survey_RevA** Rev

Plot Date: April 2010
Filepath: Z:\GIS\POWER\63628A\Mxd\20100422_63628A_GCN_Survey

PHASE 2 GREAT CRESTED NEWT SURVEY

Great Crested Newt Phase 2 Survey Report: Gateway Energy Centre Grid Connection

InterGen

November 2012

PARSONS BRINCKERHOFF

PB 125 YEARS

Report Title	**:**	Great Crested Newt Phase 2 Survey Report: Gateway Energy Centre Grid Connection
Report Status	**:**	Final
Job No	**:**	63958A
Date	**:**	November 2012
Prepared by	**:**	Jason Brown 
Checked by	**:**	Vicky Cheung 
Approved by	**:**	Emily Agus

Document History and Status

Report Issue	Date of Issue	Prepared By:	Checked By:	Approved By:
A	August 2012	Jason Brown	Vicky Cheung	Emily Agus
B	November 2012	Jason Brown	Vicky Cheung	Emily Agus
C	November 2012	Jason Brown	Vicky Cheung	Emily Agus

PARSONS BRINCKERHOFF

CONTENTS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Parsons Brinckerhoff Limited (PB) was commissioned by InterGen to undertake a Phase 2 Great Crested Newt (GCN) Presence / Absence Survey to inform the application for planning permission for the proposed HV Electrical Connection associated with the Gateway Energy Centre (GEC) Combined Cycle Gas Turbine (CCGT) Power Plant (GEC).

GEC will be located on land within the London Gateway Development (LG Development). The LG Development, being promoted by DP World, is currently in the early stages of construction.

A HV Electrical Connection is required to connect GEC into the National Grid National Electricity Transmission System.

The HV Electrical Connection route runs between the proposed GEC and the existing National Grid Coryton South Substation, and would:

- Leave the GEC Substation within the GEC site, and exit the GEC site to the east, and then turn northwards following the route of the agreed easement with DP World;
- Likely require a Horizontal Directional Drill (HDD) under the A1014 (The Manorway);
- Turn eastwards towards the existing CECL Power Station;
- Likely require a second HDD back under the A1014 (The Manorway); and
- Continue south-eastwards towards the Coryton South Substation at the existing CECL Power Station.

Within this HV Electrical Connection, two Options are considered. These are referred to as the 'Preferred Option' and the 'Manorway Fleet / Northern Triangle Option'. The exact route has yet to be determined. The exact route will be determined after the appointment of the Construction Contractor / HDD Specialist who will take into consideration the potential locations of the HDD drilling pits an, agreements with land owners.

For the purposes of the ecology surveys and reporting, the route of the HV Electrical Connection has been divided into three distinct 'Sections'. These are:

- Section 1 running north from GEC to the A1014 (The Manorway);
- Section 2 running eastwards alongside the A1014 (The Manorway); and,
- Section 3 running south-east from the A1014 (The Manorway) to the existing National Grid Coryton South Substation.

Section 1 is not considered suitable to support GCN (and no presence / absence surveys were undertaken).

Within Section 2 (north of the Manorway Fleet and within the Northern Triangle), a large meta-population of GCNs is known to be present. However, in line with consultation with Natural England, no presence / absence surveys were undertaken.

Within Section 2 (south of the Manorway Fleet / Northern Triangle) and Section 3, a total of four presence / absence surveys were undertaken on six water bodies located along or in the vicinity of the alignment of the HV Electrical Connection route. The four presence / absence survey visits confirmed that GCN are absent from Section 2 (south of the Manorway Fleet / Northern Triangle) and Section 3.

Based on the two Options which could be implemented, it is recommended that all of the construction works are undertaken under an overarching Construction Environment Management Plan, within which a specific GCN Method Statement should be included. The GCN Method Statement should include precautionary measures to be undertaken at all times.

If the Preferred Option is pursued, it is not considered necessary to obtain a Natural England

Development Licence. In the event that GCN are recorded during any stage of the construction, all construction works will cease and an experienced ecologist and / or Natural England will be contacted immediately. In this instance, it is likely that a Development Licence maybe subsequently required. If the Manorway Fleet / Northern Triangle Option is pursued, it will be necessary to obtain a Natural England Licence and Development Licence in order for the construction works to proceed.

SECTION 1

INTRODUCTION

1 INTRODUCTION

1.1 Background

1.1.1 Parsons Brinckerhoff Limited (PB) was commissioned by InterGen to undertake a Phase 2 Great Crested Newt (GCN) (*Triturus cristatus*) Presence / Absence Survey to inform the application for planning permission for the proposed HV Electrical Connection associated with the Gateway Energy Centre (GEC) Combined Cycle Gas Turbine (CCGT) Power Plant (GEC).

1.1.2 It was identified within the Extended Phase 1 Habitat Survey: Gateway Energy Centre Grid Connection Report[1] that a Phase 2 GCN Survey should be undertaken on six water bodies within and adjacent to the proposed alignment of the HV Electrical Connection route due to the potential suitability of these, and the terrestrial habitat within the alignment, to support this species[2].

1.1.3 The Phase 2 GCN Survey was recommended to identify the presence or likely absence of (and, if relevant, the distribution and abundance of) GCN and ensure compliance with the legislation protecting this species group.

1.2 Survey Area Context

1.2.1 GEC will be located on land within the London Gateway Development (LG Development). The LG Development, being promoted by DP World, is currently in the early stages of construction.

1.2.2 A HV Electrical Connection is required to connect the GEC into the National Grid National Electricity Transmission System.

1.2.3 The HV Electrical Connection route runs between the proposed GEC and the existing National Grid Coryton South Substation, and would:

- Leave the GEC Substation within the GEC site, and exit the GEC site to the east, and then turn northwards following the route of the agreed easement with DP World;
- Likely require a Horizontal Directional Drill (HDD) under the A1014 (The Manorway);
- Turn eastwards towards the existing CECL Power Station;
- Likely require a second HDD back under the A1014 (The Manorway); and
- Continue south-eastwards towards the Coryton South Substation at the existing CECL Power Station.

1.2.4 Within this HV Electrical Connection route, two Options are considered. These are referred to as the 'Preferred Option' and the 'Manorway Fleet / Northern Triangle Option'.

1.2.5 The exact route has yet to be determined. The exact route will be determined after the appointment of the Construction Contractor / HDD Specialist who will take into consideration the potential locations of the HDD drilling pits and agreements with land owners.

1.2.6 Under the Preferred Option, to the north of the A1014 (The Manorway), the HV Electrical Connection would be installed under the cycle path. In terms of HDD, it has

[1] *Parsons Brinckerhoff (2012) Extended Phase 1 Habitat Survey: Gateway Energy Centre Grid Connection Report for InterGen*

[2] *In line with consultation with Natural England, the Phase 2 Presence / Absence Survey was not undertaken within the Northern Triangle.*

been assumed that this would be used for the two crossings of the A1014 (The Manorway) and the crossing of the railway.

1.2.7 The Manorway Fleet / Northern Triangle Option would be employed in the event that it is not practicable to install the HV Electrical Connection under the cycle path. Under the Manorway Fleet / Northern Triangle Option it may be necessary to extend the working corridor northwards into the Manorway Fleet and the Northern Triangle. In terms of HDD, it has been assumed that (in addition to the two crossings of the A1014 (The Manorway) and the crossing of the railway) this would be used for the crossing of the Northern Triangle.

1.2.8 Accordingly, under either Option, the cables associated with the HV Electrical Connection will likely be laid using a combination of two construction methods. These are:

- Direct Buried (at a depth of approximately 1.5 m inside a working width (working corridor) of up to 30 m wide); and,
- HDD (which comprises a trenchless technique for installing underground cables along a pre-prescribed path by using a surface launched drilling rig).

1.2.9 Given the length of the HV Electrical Connection route and the diversity of habitats it bisects, the Survey Area has been divided into three distinct 'Sections', each comprising broadly similar habitat types. The three distinct Sections are shown in Figure 1. The three Sections are:

- ***Section 1:***

  The Western Section (running north from GEC to the A1014 (The Manorway)), which is located within the operational DP World / LG Development Construction Site.

- ***Section 2:***

  The Northern Section (running eastwards alongside the A1014 (The Manorway)), which encompasses: the A1014 (The Manorway), a Cycle Path, the Manorway Fleet, and part of the Northern Triangle (DP World / LG Development Receptor Site).

- ***Section 3:***

  The Eastern Section (running south-east from the A1014 (The Manorway) to the existing National Grid Coryton South Substation), which passes in close proximity to the existing Coryton Power Station Overhead 400 kV Electrical Transmission Lines.

1.3 Legislation and Planning Context

1.3.1 GCN are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010 (Habitat Regulations 2010).

1.3.2 Under this legislation, it is illegal to: possess a protected species (alive or dead); deliberately capture, injure or kill this protected species; to intentionally or recklessly disturb this protected species; or, deliberately take or destroy the eggs of this protected species. It is also illegal to damage, destroy or intentionally or recklessly obstruct access to a breeding or resting place used by these protected species.

1.3.3 All life stages of GCN are afforded the same level of protection.

1.3.4 The other native newt species within the UK, palmate newts (*Lissotriton helveticus*) and smooth newts (*Lissotriton vulgaris*), are only protected against trade (buying and selling) under the current legislation.

1.3.5 GCN are additionally listed as a priority species on the United Kingdom Biodiversity Action Plan (UKBAP), and Essex and Thurrock Biodiversity Action Plans (BAP).

1.3.6 Further details regarding legislation requirements are provided in Appendix A.

SECTION 2

METHODOLOGY

2 METHODOLOGY

2.1 Desk Study

2.1.1 The Extended Phase 1 Habitat Survey[3] contained a full Desk Study for the proposed Survey Area.

2.1.2 To collate any amphibian data within a 2 km Search Area of the proposed alignment of the HV Electrical Connection, the Desk Study included consultation with the following websites and groups:

- National Biodiversity Network (NBN) Gateway – accessed 26 April 2012;
- Multi Agency Geographic Information for the Countryside (MAGIC) – accessed 26 April 2012;
- Essex Field Club; and
- Thomson Ecology (2010) Great Crested Newt Trapping Report 2010 for DP World London Gateway Port Ltd.

2.1.3 In addition to the above, the Phase 2 Great Crested Newt Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes[4] produced for the GEC Underground Gas Pipeline and Associated AGI (and the initial, now superseded, Grid Connection Route) was reviewed.

2.2 Presence / Absence Survey

Initial Habitat Suitability Index

2.2.1 Habitat Suitability Index (HSI)[5] Assessments of all water bodies were undertaken. The six water bodies along or in the vicinity of the alignment of the HV Electrical Connection route surveyed are shown in Figure 1.

2.2.2 A HSI Assessment is a tool which is used to assess the likelihood of whether a water body will support GCN or not. It incorporates ten Suitability Indices (SI) which are factors thought to affect GCN (such as the quality of the water and the presence / absence of different predators (particularly fish and waterfowl)).

2.2.3 Each SI is assessed separately and then mathematically combined to provide a numerical index, between 0 and 1, which is the final HSI Assessment score. The following equation is used to calculate the final HSI Score:

$$HSI\ Score = (SI_1 \times SI_2 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/10}$$

2.2.4 The categorisation of HSI Assessment scores is shown in Table 2.2.

TABLE 2.2: CATEGORISATION OF HSI ASSESSMENT SCORES

HSI Assessment Score	*Pond Suitability*
< 0.5	Poor
0.5 - 0.59	Below Average
0.6 - 0.69	Average
0.7 - 0.79	Good
> 0.8	Excellent

[3] *Parsons Brinckerhoff (2012) Extended Phase I Habitat Survey: Gateway Energy Centre Grid Connection Report for InterGen*

[4] *Parsons Brinckerhoff (2010) Phase 2 Great Crested Newt Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes for InterGen*

[5] *Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000) Evaluating the Suitability of Habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal 10(4), 143-155*

Presence / Absence Surveys

2.2.5 The presence / absence surveys of the water bodies were undertaken using standard methodologies in accordance with the Best Practice Guidelines[6]. The presence / absence surveys were undertaken by Natural England Licensed PB Ecologists.

2.2.6 In accordance with the Best Practice Guidelines, a total of four presence / absence surveys were undertaken on all six water bodies. Best Practice Guidelines dictate that four visits during suitable weather conditions should be undertaken between mid-March and mid-June, with at least half of the survey effort (two visits) between mid-April and mid-May. In addition, three survey methods per presence / absence survey visit should be used wherever possible. Ideally these should be: torch surveys; bottle trapping; and, egg searching. Further detail of these survey methods is provided below.

2.2.7 If GCN presence is confirmed an additional two survey visits are required in order to allow population size class assessments to be made. The survey methods to be used per population size class assessment survey are: torch surveys; and, bottle trapping. These two visits must be undertaken within the timescales stated above for presence / absence surveys, hence one additional visit would be required between mid-April and mid-May.

Torching

2.2.8 This survey method involves searching for GCN at night by shinning a high powered torch (>500,000 to <1,000,000 candlepower) over the water bodies. All accessible margins are surveyed during each visit to ensure as much of the water body surface area is searched as possible.

2.2.9 At least 15 minutes of torching should be conducted per 50 m of shoreline, up to a maximum of 30 minutes per water body.

Bottle Trapping

2.2.10 Bottle trapping involves the submersion of bottle traps around the margins of the water body. The bottle traps are made from inverted and manipulated water bottles and created to a specified design. The bottle traps are set at dusk and left in the water bodies overnight.

2.2.11 GCN (and potentially other wildlife) enter into the bottle traps as they move around the water body.

2.2.12 The following morning, all the bottle traps are checked, and any species caught are recorded and released back into the water. The bottle traps are removed.

2.2.13 Following the Best Practice Guidelines, a density of one bottle trap per two metres of shoreline should be employed for each water body surveyed.

Egg Searches

2.2.14 Egg searches involve searching all safely accessible submerged plant matter for GCN eggs. Confirming identification of GCN eggs involves un-wrapping the eggs from the leaves / plant matter on which they are laid.

2.2.15 Once a GCN egg is identified at a water body, no further searching is undertaken.

Netting

2.2.16 GCN can be captured by sampling the water body using a long-handled dip net. The perimeter of the water body is walked, with at least 15 minutes of netting conducted per 50 m of shoreline, up to a maximum of 30 minutes per water body.

[6] *English Nature (2001) Great Crested Newt Mitigation Guidelines. English Nature, Peterborough.*

2.2.17 Effort is concentrated in areas where GCN are most likely to be found.

2.2.18 This method is often used to supplement torching, bottle trapping and egg searching. Alternatively, it may be used where one or more of these other methods are not possible.

2.3 Survey Limitations

2.3.1 Access to water body 1 (a ditch) was limited. The ditch contained only a few areas of clear water suitable for GCN. The ditch's banks were heavily vegetated with dense bramble and reeds. The dense bramble and reeds made torching, bottle trapping, egg searching and netting difficult. The water depth along the ditch was shallow (approximately 4 inches deep) and the surface was covered in duck weed. During the initial survey it was possible to survey a length of the ditch approximately 4 m long. However, during subsequent surveys the ditch conditions deteriorated and no further survey was possible.

2.3.2 Access to water body 2 (an ephemeral pond) was ideal. However, the water levels varied over the survey visits. This ephemeral pond was dominated by terrestrial grassland species. For the initial survey, the water was too shallow for bottle traps. Netting was used instead, ensuring three suitable survey methods were used and Best Practice Guidelines maintained. During the final three surveys, bottle trapping was used.

2.3.3 Access to water bodies 4 and 5 was limited in parts. The banks of both water bodies were steep and heavily vegetated with reeds. Their western banks were also restricted by the proximity of a security fence abutting the top of the bank.

2.3.4 Water body 6 was dry during the first two surveys. Thick vegetation both within the ditch and along the banks restricted access to its eastern reaches during the final two surveys visits.

2.3.5 Although the surveys were therefore somewhat limited in parts, the physical conditions restricting access in particular to water bodies 1, 4, 5 and 6 is also likely to reduce their suitability for GCNs.

SECTION 3

RESULTS

3 RESULTS

3.1 Overview

3.1.1 Section 1 is not considered suitable to support GCN (and no presence / absence surveys were undertaken). Indeed, a large scale translocation programme has removed all GCN from the area. Following the translocation programme, Section 1 has been levelled, with all suitable terrestrial or aquatic habitat removed.

3.1.2 To prevent unnecessary disturbance, Section 2 (north of the Manorway Fleet and within the Northern Triangle) was not surveyed. This was discussed and agreed in advance with Natural England. In this regard, the results of the Desk Study, and previous Ecological Survey Reports, are considered sufficient to cover this area and are discussed in sub-Section 3.2.

3.1.3 Section 2 (south of the Manorway Fleet / Northern Triangle) and Section 3 were surveyed. The results of the presence / absence survey are discussed in sub-Section 3.3.

3.2 Desk Study

3.2.1 The Desk Study[7,8], and other previous Ecological Survey Reports which the Desk Study referenced, identified a large meta-population of GCNs within the 2 km Search Area.

3.2.2 In particular, of the 320 water bodies which were once located within the LG Development site survey area, GCNs were present within 44 of them. It was estimated that they comprised 39 small populations and 5 medium populations.

3.2.3 These GCN were subsequently translocated from the LG Development site, prior to the commencement of the site clearance works, to one of two neighbouring Receptor Sites. The GCNs from the LG Port site were moved to the Northern Triangle Receptor Site and the GCNs from the LG Logistics and Business Park site were moved into the Boundary Corridor Receptor site, located approximately 150 m west of the proposed HV Electrical Connection route (at its closest point). In addition, a total of 4036 GCNs were translocated from the 'Rest of Park Development' to the Northern Triangle Receptor Site in 2010[9].

3.2.4 Small populations of GCN have also been recorded within water bodies located 2 km to the west of the Survey Area. These GCN are considered likely to be part of the same larger meta-population previously present within the LG Development site.

3.2.5 Accordingly, within Section 2 (north of the Manorway Fleet and within the Northern Triangle), a large meta-population of GCNs is known to be present.

3.3 Presence / Absence Survey

Habitat Suitability Index

3.3.1 Full detail of the HSI Assessment scores is provided in Appendix B. A summary is provided here.

3.3.2 Within Section 2 (south of the Manorway Fleet / Northern Triangle) and Section 3, a total of six water bodies were identified within 250 m of the indicative alignment of the HV Electrical Connection route alignment. These are shown in Figure 1. The unmanaged grassland and scattered scrub with small piles of cut logs and vegetative

[7] *Parsons Brinckerhoff (2012) Extended Phase I Habitat Survey: Gateway Energy Centre Grid Connection Report for InterGen*

[8] *Parsons Brinckerhoff (2010) Phase 2 Great Crested Newt Report: Gateway Energy Centre Gas Pipeline and Electricity Cabling Routes for InterGen*

[9] *Thomson Ecology (April 2011) London Gateway Rest of Park Development: Great Crested Newt Trapping Report 2010. For DP World (London Gateway Port Ltd).*

debris is considered to be optimal terrestrial foraging and hibernating habitat for all newt species.

Water Body 1

3.3.3 Water body 1 is a one metre wide wet ditch that runs from east to west through the eastern half of Section 2.

3.3.4 The banks of the ditch are heavily vegetated with dense bramble (*Rubus fruticosa* agg.). Dense reeds (*Phragmites* sp.) cover the surface of the ditch and only allow very few areas of clear water.

3.3.5 Water body 1 received an HSI Assessment Score of 0.686.

3.3.6 As such it is considered to be of average suitability for GCN, and was surveyed on a precautionary basis.

Water Body 2

3.3.7 Water body 2 is a pond within Section 3.

3.3.8 It is considered to be semi-permanent, very shallow and dominated by terrestrial grassland species rather than submerged aquatic vegetation. The pond was largely shallow and silted up with small areas of deep (approximately 30 to 40 cm) water.

3.3.9 The water level increased midway through the survey following a few nights of high rainfall but later fell significantly.

3.3.10 Water body 2 received an HSI Assessment score of 0.639.

3.3.11 As such it is considered to be of average suitability for GCN, and was surveyed on a precautionary basis.

Water Body 3

3.3.12 Water body 3 is a long ditch within Section 3.

3.3.13 It is very steeply sided and heavily vegetated with reeds. The bank on the southern side is heavily vegetated with bramble. The ditch was observed to contain fish (sticklebacks, (*Gasterosteidae* sp.)) and great diving beetles (*Dytiscus marginalis*).

3.3.14 Water body 3 received an HSI Assessment score of 0.691.

3.3.15 As such it is considered to be of average suitability for GCN, and was surveyed on a precautionary basis.

Water Body 4

3.3.16 Water body 4 is a pond situated alongside the road to the immediate north-east of Section 3.

3.3.17 The banks of the pond were heavily vegetated with bramble, reeds and nettle (*Urtica dioica*).

3.3.18 Water body 4 received an HSI Assessment score of 0.306.

3.3.19 This HSI Assessment score indicated that it is considered to be of poor suitability to support GCN. However, due to its proximity to other water bodies that could potentially support GCN, the pond was included in this survey as a precaution.

Water Body 5

3.3.20 Water body 5 is a pond that is situated between the road and an earth bund to the north-east of Section 3.

3.3.21 The pond is vegetated with grass, pennywort (*Umbilicus rupestris*) and yellow flag iris (*Iris pseudacorus*), with the banks also heavily vegetated with reeds.

3.3.22 Water body 5 received an HSI Assessment score of 0.297.

3.3.23 This HSI Assessment score indicated that it is considered to be of poor suitability to support GCN. However, due to its proximity to other water bodies that could potentially support GCN, the pond was included in this survey as a precaution.

Water Body 6

3.3.24 Water body 6 is a ditch running north-east to south-west at the boundary between Sections 2 and 3. This water body was dry during the first two surveys.

3.3.25 Water body 6 received an HSI Assessment score of 0.610.

3.3.26 As such it is considered to be of average suitability for GCN, and was surveyed on a precautionary basis.

Summary

3.3.27 All water bodies were therefore either considered be potentially suitable to support GCN, or were located in proximity to other water bodies that could potentially support GCN.

3.3.28 Accordingly, further surveys to determine presence / absence were therefore undertaken.

Presence / Absence Survey Results

3.3.29 No GCN were recorded during the surveys.

3.3.30 Small numbers of smooth newts were recorded on occasional evenings.

3.3.31 The presence / absence surveys were completed in optimal weather conditions between April and May 2012, in accordance with Best Practice Guidelines.

3.3.32 Table 3.1 provides a summary of each presence / absence survey. Full details are provided in Appendix B.

TABLE 3.1: SUMMARY OF PRESENCE / ABSENCE SURVEYS

Date	Weather Conditions	Water Body	Survey Method	Results
24.04.12	Overcast No wind 10°C	1	Torching / Egg Search / Netting	No Amphibians Recorded
		2	Torching / Egg Search / Netting	No Amphibians Recorded
		3	Torching / Bottle Trap / Egg Search / Netting	One Smooth Newt Recorded
		4	Torching / Bottle Trap	Smooth Newt Egg Recorded
		5	Torching / Bottle Trap / Egg Search	Four Smooth Newts Recorded
		6	No Survey	N / A
04.05.12	Light Cloud Slight Breeze 12°C	1	Egg Search	No Amphibians Recorded
		2	Torching / Bottle Trap / Egg Search	No Amphibians Recorded
		3	Torching / Bottle Trap / Egg Search / Netting	11 Smooth Newts Recorded
		4	Torching / Bottle Trap	No Amphibians Recorded
		5	Torching / Bottle Trap / Egg Search / Netting	Five Smooth Newts and One Unknown Smooth / Palmate Newt Recorded
		6	No Survey	N / A
10.05.12	Bright and Sunny Light breeze 14°C	1	No Survey	N / A
		2	Torching / Bottle Trap	No Amphibians Recorded
		3	Torching / Bottle Trap	11 Smooth Newts Recorded
		4	Torching / Bottle Trap	No Amphibians Recorded
		5	Torching / Bottle Trap	Four Smooth Newts Recorded
		6	Torching / Bottle Trap	No Amphibians Recorded
28.05.12	Clear No wind 11°C	1	No Survey	N / A
		2	Torching / Bottle Trap	No Amphibians Recorded
		3	Torching / Bottle Trap	Two Smooth Newts Recorded
		4	Torching / Bottle Trap	No Amphibians Recorded
		5	Torching / Bottle Trap	No Amphibians Recorded
		6	Torching	No Amphibians Recorded

SECTION 4

DISCUSSIONS & RECOMMENDATIONS

4 DISCUSSION & RECOMMENDATIONS

4.1 Overview / Discussion

4.1.1 A Phase 2 GCN Presence / Absence Survey was undertaken to inform the application for planning permission for the proposed HV Electrical Connection associated with GEC.

4.1.2 Given the length of the HV Electrical Connection route and the diversity of habitats it bisects, the Survey Area has been divided into three distinct 'Sections', each comprising broadly similar habitat types.

Section 1

4.1.3 Section 1 is not considered suitable to support GCN and thus no presence / absence surveys were undertaken.

4.1.4 However, it is noted that within this Section there is a small area which retains the potential to support GCN. This is the disused railway corridor located outside of the LG Development site. However, the disused railway corridor has GCN fencing running along the western boundary, thus effectively excluding GCN from the area.

4.1.5 GCN are absent from this Section.

Section 2 – North of the Manorway Fleet and within the Northern Triangle

4.1.6 To prevent unnecessary disturbance, no presence / absence surveys were undertaken. This was discussed and agreed in advance with Natural England. The results of the Desk Study, and previous Ecological Survey Reports, are considered sufficient to cover this area. Accordingly, within Section 2 (north of the Manorway Fleet and within the Northern Triangle), a large meta-population of GCNs is known to be present.

Section 2 – South of the Manorway Fleet / Northern Triangle

4.1.7 The presence / absence survey visits have confirmed that GCN are absent.

Section 3

4.1.8 The presence / absence survey visits have confirmed that GCN are absent.

4.2 Recommendations

4.2.1 Based on the two potential Options which could be implemented, it is recommended that all of the construction works are undertaken under an overarching Construction Environment Management Plan (CEMP), within which a specific GCN Method Statement should be included. The GCN Method Stated should include precautionary measures to be undertaken at all times.

4.2.2 The GCN Method Statement should include (but not be limited to) the following recommendations:

- A Toolbox Talk should be presented to all construction personnel / employees highlighting the legal obligations, identification and the ecology of this species.
- GCNs should be displaced from the "working width" using habitat manipulation methods[10] to avoid injury or mortality. This should occur during the GCN active season (generally between March / April and September / October). The displacement should be undertaken using habitat manipulation in a staged approach over a number of days, to allow GCNs to naturally move out of the area. The cutting regime should be directional towards suitable habitat to encourage GCNs to move into the adjoining habitat. In addition, the working

[10] *Habitat manipulation should be undertaken with consideration / in accordance with other Protected Species mitigation.*

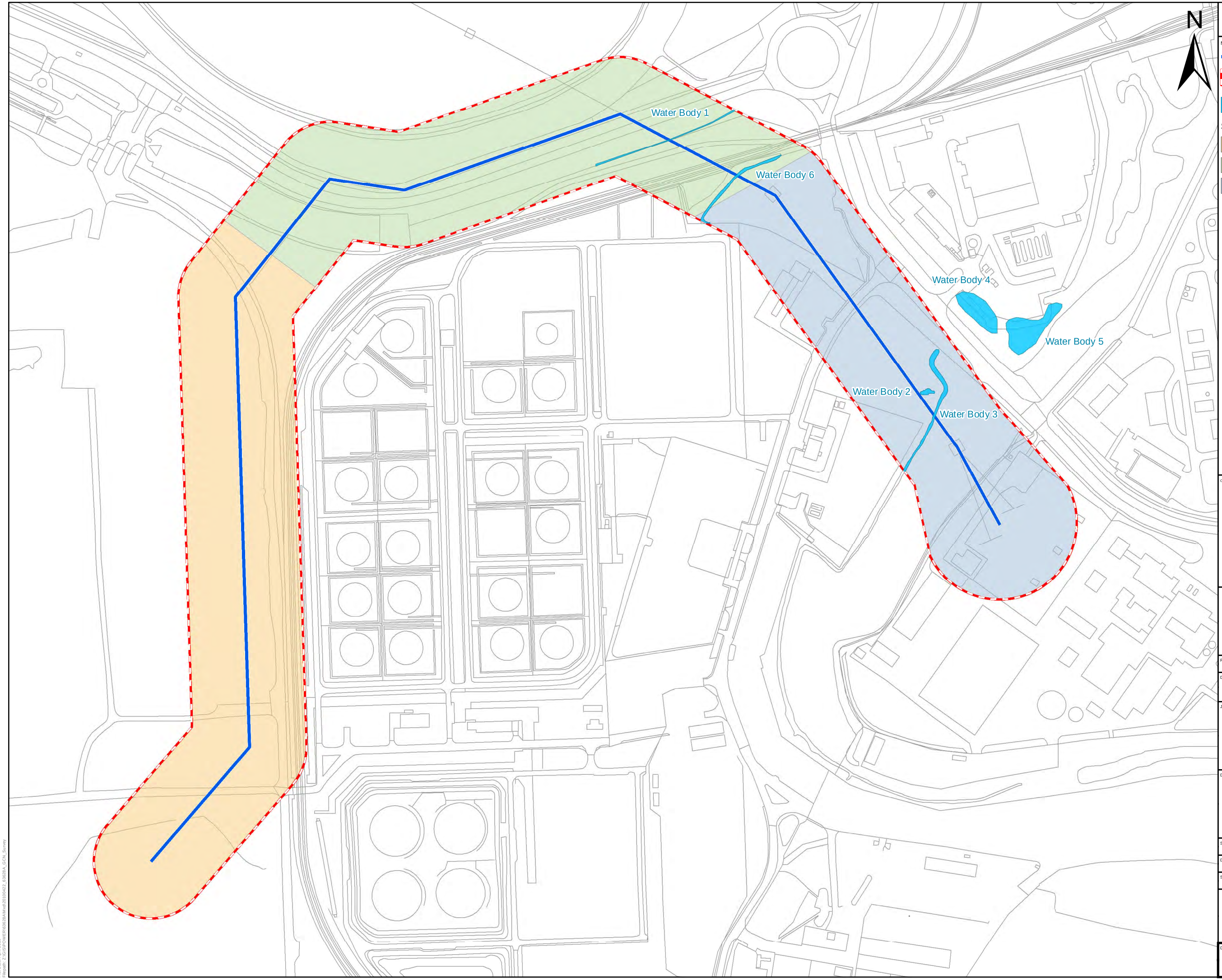
width / working corridor must be maintained devoid of vegetation throughout the period of construction works. This habitat displacement technique will be required for both GCN and reptiles as described above.

- Any hibernacula (piles of wood, stones or dead vegetation) should be taken apart by hand by an experienced Ecologist and any reptiles found moved to a safe location off site.
- If works are undertaken during / extend over the winter months, targeted vegetation clearance would be necessary. This should include the removal of vegetation (which will also be required as part of the measures to avoid directly impacting reptiles) and is aimed to render the working width / working corridor unsuitable for this species. In addition, the working width / working corridor must be maintained devoid of vegetation throughout the period of construction works. However, any suitable hibernacula must be left *in situ* throughout the winter months and dismantled by hand under the supervision of an Ecologist once the hibernation period is over.
- Works should be undertaken under the supervision of a qualified Ecologist to ensure that all works are undertaken professionally and in accordance with the CEMP.
- As a measure of best practice, if any smooth newts, common frogs or common toads are found during the construction works they should be removed carefully by hand to areas away from the working width / working corridor.
- Following completion of the construction works, habitat should be reinstated.

4.2.3 If the Preferred Option is pursued, it is not considered necessary to obtain a Natural England Development Licence. In the event that GCN are recorded during any stage of the construction, all construction works will cease and an experienced ecologist and / or Natural England will be contacted immediately. In this instance, it is likely that a Development Licence maybe subsequently required.

4.2.4 If the Manorway Fleet / Northern Triangle Option is pursued, it will be necessary to obtain a Natural England Licence and Development Licence in order for the construction works to proceed.

FIGURES



THIS DRAWING MAY BE USED ONLY FOR THE PURPOSE INTENDED AND ONLY WRITTEN DIMENSIONS SHALL BE USED

Notes

- Indicative route A
- 50m Study Area
- Waterbodies Surveyed for Great Crested Newts

Section

- 1
- 2
- 3

0 20 40 60 80 100
Metres

Revision Details	By / Check	Date	Suffix

Drawing Status: DRAFT

Job Title: Thames Haven Grid Connection

Drawing Title: Phase 2 Great Crested Newt Survey: Water Body Location Plan

Scale at A3: 1:3,000

Drawn	Approved
KF	TM

Stage 1 check	Stage 2 check	Originated	Date
JL	TM	KF	20/05/2010

PARSONS BRINCKERHOFF
6 Devonshire Square,
London, EC2M 4YE
Tel: 020 7337 1700 Fax: 020 7337 1701

Drawing Number: 63958A_GCN_Water_Bodies

Rev

Plot Date: April 2010
Filepath: Z:\GIS\PCPOWER\63928A\Mxd\20100422_63928A_GCN_Survey

APPENDIX A

SUMMARY OF LEGISLATION & GUIDANCE FOR GREAT CRESTED NEWTS IN THE UK

SUMMARY OF LEGISLATION AND GUIDANCE FOR AMPHIBIANS IN THE UK

The following Appendix sets out details of Legislation within the UK, and how this applies to amphibians.

International and National Legislation

Conservation of Habitats and Species Regulations 2010

In the UK the Council Directive 92/43/EEC (the Habitats Directive) has been transposed into national law by means of the Conservation (Natural Habitats, & c.) Regulations 1994 (as amended). The Regulations came into force on 30 October 1994, and have been amended several times.

Subsequently the Conservation of Habitats and Species Regulations 2010 was created which consolidates all the various amendments made to the 1994 Regulations in respect of England and Wales and is commonly known as the 'the Habitats Regulations'. The Regulations contain five Parts and four Schedules, and provide for the designation and protection of 'European Sites', the protection of 'European Protected Species', and the adaptation of planning and other controls for the protection of European Sites.

In Scotland the Habitats Directive is transposed through a combination of the Habitats Regulations 2010 (in relation to reserved matters) and the 1994 Regulations.

In Northern Ireland the Habitats Directive is transposed through the Conservation (Natural Habitats, &c) Regulations (Northern Ireland) 1995 (as amended).

Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act 1981 (as amended) is the principle mechanism for the legislative protection of wildlife in Great Britain. However it does not extend to Northern Ireland, the Channel Islands or the Isle of Man.

This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') and the European Union Directives on the Conservation of Wild Birds (79/409/EEC) and Natural Habitats and Wild Fauna and Flora (92/43/FFC) are implemented in Great Britain.

Great Crested Newts and Natterjack Toads

Great crested newts (*Triturus cristatus*) (GCN) and natterjack toads (*Bufo calamita*) are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010.

Under this legislation, it is illegal to: possess a protected species (alive or dead); deliberately capture, injure or kill these protected species; to intentionally or recklessly disturb these protected species; or, deliberately take or destroy the eggs of these protected species. It is also illegal to damage, destroy or intentionally or recklessly obstruct access to a breeding or resting place used by these protected species.

All life stages are afforded the same level of protection.

In order to undertake any activity which would otherwise result in any of the above offences being committed, it may be necessary to obtain a European Protected Species (EPS) Development Licence from the relevant Statutory Authority (i.e. Natural England (NE) / Countryside Council for Wales (CCW) / Scottish Natural Heritage (SNH)).

It is possible to undertake surveys which would otherwise involve unlawful acts (such as disturbance) by obtaining a Survey Licence. This provides authorisation for scientific and educational purposes.

Amphibians

There are four common amphibian species, common frog (*Rana temporaria*), common toad (*Bufo bufo*), palmate newt (*Lissotriton helveticus*), and smooth newt (*Lissotriton vulgaris*). All of the four

common species are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) against trade only.

PARSONS BRINCKERHOFF

APPENDIX B

RAW DATA HSI AND SURVEY RESULTS FOR GCN SURVEYS 2012

RAW DATA 1A: GREAT CRESTED NEWT HABITAT SUITABILITY INDICES

Sustainability Index Number	*Sustainability Index Description*	*Water Body (See Figure 1)*					
		1	***2***	***3***	***4***	***5***	***6***
1	**Map Location** Optimal (1) / Marginal (0.5) / Unsuitable (0.01)	1	1	1	1	1	1
2	**Estimate of Pond Area (m^2)**	480 m^2 0.9	40 m^2 0.05	>2000 m^2 N / A	424 m^2 0.81	315 m^2 0.6	400 m^2 0.8
3	**Number of Years in 10 Water Body Dries Up** Never (0.9) / Rarely (1) / Sometimes (0.5) / Annually (0.1)	1	0.5	0.9	0.9	0.9	1
4	**Water Quality** Bad (0.01) / Poor (0.33) / Moderate (0.67) / Good (1)	0.67	0.67	0.67	0.67	0.67	0.67
5	**Percentage Perimeters Shaded (to at least 1 m from the Shore)**	1	1	0.4	1	1	1
6	**Waterfowl Impact** Major (0.01) / Minor (0.67) / Absent (1)	1	1	1	1	1	1
7	**Fish Presence** Major (0.01) / Minor (0.33) / Possible (0.67) / Absent (1)	1	1	0.33	0.01	0.01	1
8	**Number of Ponds within 1 km (1:25,000 Maps) not Separated by Barriers to dispersal**	0.75	0.75	0.75	0.75	0.75	0.75
9	**Terrestrial Habitat** None (0.01) / Poor (0.33) / Moderate (0.67) / Good (1)	0.67	1	1	0.33	0.33	0.67
10	**Percentage of Pond Surface occupied by Marginal Vegetation (March to May)**	0.8	0.9	0.9	1	1	0.8

RAW DATA 1B: GREAT CRESTED NEWT HABITAT SUITABILITY INDEX ASSESSMENT RESULTS

Water Body (see Figure 1)	HSI Assessment Score	Suitability	Suitable for Breeding GCN
1	0.686	Average	Possible
2	0.639	Average	Possible
3	0.691	Average	Possible
4	0.306	Poor	No
5	0.297	Poor	No
6	0.610	Average	Possible

RAW DATA 2: GREAT CRESTED NEWT SURVEY RESULTS

Date of Survey	Water Body	Survey Method Used				Results						Comments [It should be noted that it is difficult to distinguish between smooth and palmate newts during torch surveys]
		Torch	Bottle Trap	Net	Egg	GCN		Smooth		Palmate		
						M	F	M	F	M	F	
Survey Visit 1												
24 / 25 April 2012	1	✓	-	✓	✓	-	-	-	-	-	-	Very limited access to banks which are heavily vegetated with dense bramble. Ditch heavily vegetated with reeds. Water was shallow at approximately 4 inches deep, although was deeper further west. Duck weed covered much of the ditch. A length of approximately 4 m of the ditch was accessible for survey.
	2	✓	-	✓	✓	-	-	-	-	-	-	Very shallow ephemeral pond
	3	✓	✓	✓	✓	-	-	-	1	-	-	Long ditch most of which is very steeply sided and heavily vegetated with reeds. The bank on the southern side is heavily vegetated with bramble and overall very limited access to banks.
	4	✓	✓	-	-	-	-	-	-	-	-	Pond situated alongside the road. The banks of the pond are heavily vegetated with bramble, reeds and nettle and overall access to banks was limited. Pond contained stickleback **Smooth Newt Egg Found**
	5	✓	✓	-	✓	-	-	3	1	-	-	Over 30 / 40 cm depth in places. Margins shallower. **Smooth Newt Eggs Found / 6 unidentified Smooth Newts Observed during Torching**
	6	-	-	-	-	-	-	-	-	-	-	Dry during Survey Visit 1.

Date of Survey	Water Body	Survey Method Used				Results						Comments [It should be noted that it is difficult to distinguish between smooth and palmate newts during torch surveys]
		Torch	Bottle Trap	Net	Egg	GCN		Smooth		Palmate		
						M	F	M	F	M	F	
Survey Visit 2:												
4 / 5 May 2012	1	-	-	-	✓	-	-	-	-	-	-	Not surveyed as pond has become inaccessible with very little water present for survey. Egg searches were conducted where accessed allowed.
	2	✓	✓	-	✓	-	-	-	-	-	-	
	3	✓	✓	✓	✓	-	-	3	8	-	-	Sticklebacks were observed.
	4	✓	✓	-	-	-	-	-	-	-	-	Visibility is poor due to blanket coverage of duck weed. Pond could only be accessed from 4 points. Pond contained a large number of fish.
	5	✓	✓	✓	✓	-	-	2	3	-	-	One unknown smooth / palmate newt was observed during torch survey.
	6	-	-	-	-	-	-	-	-	-	-	Dry during Survey Visit 2.

Date of Survey	Water Body	Survey Method Used				Results						Comments [It should be noted that it is difficult to distinguish between smooth and palmate newts during torch surveys]
		Torch	Bottle Trap	Net	Egg	GCN		Smooth		Palmate		
						M	F	M	F	M	F	
Survey Visit 3												
10 / 11 May 2012	1	-	-	-	-	-	-	-	-	-	-	Not surveyed as pond has become inaccessible with very little water present for survey.
	2	✓	✓	-	-	-	-	-	-	-	-	
	3	✓	✓	-	-	-	-	7	4	-	-	Sticklebacks were observed.
	4	✓	✓	-	-	-	-	-	-	-	-	Pond contained a large number of fish.
	5	✓	✓	-	-	-	-	4	-	-	-	Pond contained a number of fish.
	6	✓	✓	-	-	-	-	-	-	-	-	Ditch now contains water after high rain event.

Date of Survey	Water Body	Survey Method Used				Results						Comments [It should be noted that it is difficult to distinguish between smooth and palmate newts during torch surveys]
		Torch	Bottle Trap	Net	Egg	GCN		Smooth		Palmate		
						M	F	M	F	M	F	
Survey Visit 4												
28 / 29 May 2012	1	-	-	-	-	-	-	-	-	-	-	Not surveyed as pond has become inaccessible with very little water present for survey.
	2	✓	✓	-	-	-	-	-	-	-	-	Pond largely dry with only few small areas of water left.
	3	✓	✓	-	-	-	-	2	-	-	-	
	4	✓	✓	-	-	-	-	-	-	-	-	
	5	✓	✓	-	-	-	-	-	-	-	-	
	6	✓	-	-	-	-	-	-	-	-	-	Ditch was relatively overgrown limiting survey methods.

PHASE 2 TERRSTRIAL INVERTEBRATE SURVEY

Commissioned by
Parsons Brinckerhoff
6 Devonshire Square
London
EC2M 4YE

THAMES HAVEN
400 kV CABLE ROUTE

INVERTEBRATE SURVEY REPORT

Report number BS/2723/12

August 2012

Prepared by

Colin Plant Associates (UK)
Consultant Entomologists
14 West Road
Bishops Stortford
Hertfordshire
CM23 3QP

01279-507697
cpauk1@ntlworld.com

1 INTRODUCTION AND METHODOLOGY

1.1 Introduction

1.1.1 **Colin Plant Associates (UK)** were commissioned by **Parsons Brinckerhoff**, to undertake an appraisal of invertebrate habitats and their importance along the proposed route of an underground electric cable at a site known as Thames Haven, in South Essex. An initial walkover survey of the site was undertaken on 25th May 2012.

1.1.2 The site is positioned in an area of Essex that supports a number of sites of known high conservation importance and it was noted during the walkover survey that the broad habitat type represented at Thames Haven was reflected in some of these important sites. Consequently, it was agreed that a limited invertebrate species sampling exercise was necessary to better define their current ecological value.

1.1.3 Invertebrate sampling visits were thus made, on 13th June and 25th July 2012. Three surveyors, each with a different area of taxonomic expertise, undertook the sampling visits.

1.2 Survey Constraints

1.2.1 As a direct consequence of the widely documented southwards shift of the jet stream, an air current in the upper atmosphere, from its normal path north of Scotland to flow across central France, a continuous series of atmospheric depressions brought rain to all of Britain on a daily basis during the period from 24th April to 20th July. Apart from a short spell from 23rd to 29th May, rain fell at least once on every day, often heavily and sometimes torrentially so, with much, well-publicised flooding across the country.

1.2.2 We were able to make the sampling visits on some of the few non-rainy days in the year, but the generally poor weather conditions did nevertheless impact on invertebrate survey – and seemingly on invertebrates. Throughout the summer, many normally common and widespread species were not encountered using active sampling – both here and at many other sites. This factor needs to be considered in interpreting the relatively short species inventory obtained. Numbers of individuals within almost all species were also severely depressed.

1.3 Methodology

1.3.1 Site visits were made on 21st May, 13th June and 25th July 2012. Within the constraints discussed above, sampling was undertaken by direct observation and by the following active sampling methods:

Sweep-netting. A stout hand-held net is moved vigorously through vegetation to dislodge resting insects. The technique may be used semi-quantitatively by timing the number of sweeps through vegetation of a similar type and counting selected groups of species. This technique is effective for many invertebrates, including several beetle families, most plant bug groups and large number of other insects that live in vegetation of this type.

Beating trees and bushes. A cloth tray, held on a folding frame, is positioned below branches of trees or bushes and these are sharply tapped with a stick to dislodge insects. Black or white trays are used depending upon which group of invertebrates has been targetted for search. Insects are collected from the tray using a pooter. This technique is effective in obtaining records of most arboreal species, including many beetle groups, bugs, caterpillars of Lepidoptera, spiders and others.

Suction Sampling consists of using a converted leaf blower to collect samples from grass and other longer ground vegetation. The sample is then everted into a net bag and the invertebrates removed with a pooter. The advantage of suction sampling is that it catches species, which do not fly readily or which live in deep vegetation. It is particularly productive for Coleoptera, some Diptera and Arachnida.

1.3.2 The exposed (to view) nature of the site contra-indicated the use of a Malaise trap, which might have generated a longer list of invertebrate species than that obtained by active survey. We determined that pitfall and pan trapping was also inappropriate because of both the prevailing weather conditions and the time of year available for the survey (pitfall traps catch species that are most active in April/May and September/October in most years).

2 INVERTEBRATE HABITATS ENCOUNTERED

2.1 Summary of Invertebrate Habitats Encountered

2.1.1 A short section of the proposed route follows the northern edge of the A1014 road just west of the Coryton Roundabout and falling beneath the point where the overhead power lines cross the existing road. This is **recording compartment A** in the species list and following discussion.

2.1.2 We were not asked to survey the southwards running part of the route to the west of this section.

2.1.3 At its eastern end, it veers abruptly south-east, first running under the A1014 road before re-surfacing to run through a vegetated area. This latter area is **recording compartment B** and is divided into two sections by an north-east to south-west aligned access road.

2.2 Compartment A

2.2.1 Treating this section from the road kerb northwards, there is first a level, kerbside grassland strip, approximately 1.5 metres wide that is probably mown occasionally; this is followed next by a slightly raised and possibly non-mown zone of similar width that appears to be more flower-rich. Next runs a tarmac footpath, at a slightly lower level, then a hedge separating the Highways area from a reed-choked drainage ditch on the grazing marsh to the rear.

2.2.2 At the point directly below the overhead power lines, this hedge is comprised of young Blackthorn (*Prunus spinosa*). To the immediate east of this are three standing dead trees and to the immediate west two more.

2.2.3 Further west of this hedge section, the hedge itself becomes gappy and is more or less absent, the land instead dominated by rank grass, though the flowery-roadside grassland strip continues on the south side of the tarmac footpath.

2.2.4 To the east of the section crossed by the overhead power lines the hedge is of a much better physical structure and in addition to having a slightly higher intrinsic value for invertebrates it may also play a role in controlling microclimate along the drainage ditch immediately to its north.

2.3 Compartment B

2.3.1 North-west of the access road that bisects compartment B the line of the proposed cable route is separated from the road by a mown grass verge and a line of planted trees whilst in the west a fence prevents access to a secure area of bare and sparsely-vegetated ground.

2.3.2 Between the road and the fence, tall and fairly rank, species-poor grassland dominates the area beneath the overhead power lines, but at the northern end of this, more or less around the northern pylon, the grass is shorter and there is greater floral diversity. In this area some mature or semi-mature trees have been felled; the piles of sawdust suggest this was a fairly recent activity. In the north-east portion some semi-mature trees remain on the inside of the grassy road verge. At the extreme north-west corner the ground is permanently wet and supports marshland vegetation, notably Common Reed.

2.3.3 The south-eastern sector, across the access road, is dominated largely by made areas; these were judged likely to be of minimal invertebrate interest and were not examined during the subsequent sampling visits in June and July. A narrow, vegetated strip against the road more or less coincides with the run of overhead power lines and comprises open, tall grassland similar to the species poor section in the northern part. As this habitat unit meets the car parking area in the south a small area dominated by reeds is evident.

3 INVERTEBRATE SPECIES

3.1 Summary

3.1.1 Appendix 1 reports the complete list of insect taxa encountered during the survey; a total of 222 species was recorded. The list is also annotated with formal National Status codes where these are better than "nationally common" and these status codes are explained in Appendix 2.

3.2 Species of Conservation Interest

3.2.1 Several categories of invertebrates are of raised significance in an ecological assessment. These categories are explained in Appendix 2 and the corresponding species are now examined.

Legally Protected Species

3.2.2 No invertebrate species that are afforded direct legal protection under any UK or European legislation were encountered during the survey; none are likely to have been overlooked.

UK Biodiversity Action Plan Priority Species

3.2.3 One UK BAP Priority Species was recorded during the survey.

The Brown-banded Carder Bee (*Bombus humilis*) is a national BAP species on the basis of major declines across Britain. The East Thames Corridor and parts of South Wales support the most important remaining metapopulations in the UK. Populations appear to operate at a landscape scale and in the East Thames Corridor this implies dependency upon the entire remaining meta-habitat of post-industrial sites.

The availability of suitable forage (nectar and pollen) sources throughout the whole season from May to September is crucial. The queens require nectar early in the season to replenish diminished energy resources following hibernation. They then need pollen for stocking cells in newly established nests to enable the first workers to develop. Workers then require both nectar and pollen both for their own sustenance and to stock the developing nest. These resources need to be provided by an abundance of specific key plants all of which, significantly, have very long flowering seasons as well as long corolla tubes which correspond to the long tongues of the bumblebees. Important plant species used in early summer by queens include Fodder Vetch, Red Clover *Trifolium pratense* and Broad-leaved Everlasting-pea *Lathyrus latifolius*. Workers forage on the flowers of species such as bird's-foot trefoils *Lotus* spp., clovers, Black Horehound *Ballota nigra*, Lucerne *Medicago sativa* and Red Bartsia *Odontites verna*. Observations suggest that a small number of large patches of flowers are used more frequently and are much more important than a larger number of small patches.

3.2.4 The list of UK Biodiversity Action Plan Priority Species *of moths* is divided into two sections. In the first, a total of 81 species are afforded the status of UK BAP Priority Species; none of these is recorded in the surveyed area nor is any likely to be present.

3.2.5 The second section is a list of 69 species that have declined in population strength by a significant amount in the past 25 years. These are not yet rare and are flagged as UK BAP species "**for research only**". They were inadvertently included in the overall BAP list by non-specialists.

3.2.6 This has resulted a confusing situation; these species were not intended to be affected by the requirements of *Planning Policy Statement 9: Biodiversity and Geological Conservation*, published by the Office of the Deputy Prime Minister during 2005, which requires Local Authorities to take measures to protect the habitats of UK BAP species from further decline through policies in local development documents. They were merely flagged for special attention.

3.2.7 During the present survey, we have recorded one such "Research Only" moth species; several others are confidently predicted to be present.

The Cinnabar Moth (*Tyria jacobaeae*) has distinctive black and yellow-striped caterpillars which feed in the flower-heads of ragwort plants and are familiar to most people. The species is widespread and abundant across southern Britain.

Red Data Book Species

3.2.8 No species listed in the British Red Data Books (Shirt, 1987; Bratton, 1991) or which has been elevated to the status of Critically Endangered, Endangered, Nationally Vulnerable or Near Threatened (formerly Nationally Rare) by subsequent formal reviews are so far recorded in the present survey.

3.2.9 However, one species is provisionally placed in the "unknown" category, RDBK.

The picture-winged fly *Tephritis divisa* is a recent arrival in Britain (2004) and may be spreading in the south-east. The larvae feed in the flower-heads of *Picris echioides*.

Nationally Scarce Species

3.2.10 Three of the species so far recorded feature in the Nationally Scarce (formerly Nationally Notable - Na) category (see Appendix 2).

The Wasp Spider (*Argiope bruennichi*) was first recorded in Britain in 1922 at Rye, East Sussex and for many years seemed to be restricted to a few areas close to the south coast in Sussex, Kent, Hampshire and Dorset. Since the 1970s, evidence suggests that the spider has been increasing its range, probably due to longer warmer summers and autumns. However, although now widely recorded as far north as Lincolnshire, the species currently still warrants its formal status as it remains very localised. The large orb webs are slung low down in the vegetation and the adult spider is easily hidden by the surrounding herbage. Grasshoppers form the main food item. The large urn shaped egg cocoon is positioned in the higher levels of vegetation and the eggs over-winter, hatching out in the following spring. Both sexes mature in the late summer, the females perhaps living on until October, but the much smaller males living for only a short time.

The blue and red leaf beetle *Podagrica fuscipes* feeds as a grub in the flowers and seeds of mallow (*Malva* species). The plant has become a common feature of verges, hedgerows and other sites and the distinctive beetle has become quite frequent in the past few years. A very similar species, called *Podagrica fuscicornis*, is also frequent and is in the Nationally Notable B category (see below).

The Hornet Moth *Sesia apiformis* feeds, as a caterpillar, under the bark at the base of Black Poplar and Hybrid Black Poplar trees; it is far more common than older records suggest. The mature larva excavates an emergence hole which it then caps with chewed bark before passing winter in the tree ready to emerge in the following year. Adults are rarely found unless one is present as they emerge from the hole, mate, then immediately walk up the trunk to the canopy.

3.2.11 Four species recorded feature in the Nationally Scarce (formerly Nationally Notable - Nb) category (see Appendix 2).

Lasioglossum malachurum is a solitary bee that occurs in southern England, originally on the coast and inland in Essex and Kent, but currently much more widespread throughout the south-east. It constructs its nest chamber in the ground, apparently preferring substrates with a clay content. Adult pollen requirements are un-recorded in Britain, but flower visits are reported from a variety of species, including various yellow composites (Asteraceae). In recent years it has become a widespread and common species in the south-east of Britain and an as yet unpublished review of status removes it from the list of Nationally Scarce species.

Roesel's Bush-cricket *Metrioptera roeselii* has, in recent years, undergone a very large expansion of range that is almost certainly climate-driven. In most years the insects develop without the ability to fly, but in favourable (hot) summers the females develop winged forms that are able to disperse after mating and establish populations in new areas. In the south-east of England, this cricket is present in considerable abundance in grassland habitats, including set-a-side, field margins, road verges and lightly grazed pastures where there is plenty of vegetation cover. The Nationally Notable status is, perhaps, no longer warranted.

The blue and red leaf beetle *Podagrica fuscicornis* feeds as a grub in the flowers and seeds of mallow (*Malva* species). The plant has become a common feature of verges, hedgerows and other sites and the distinctive beetle has become quite frequent in the past few years.

The pyralid moth *Synaphe punctalis* is most often found in the seaboard counties of southern England where it is associated with sheltered hollows in sandy or chalk-based grassland areas and saltmarshes. The caterpillar feeds on ground-covering mosses, particularly *Hypnum cupressiforme*, living within silk tubes from which piles of frass are ejected betraying its presence.

3.2.12 Twenty-three of the recorded species are listed formally as Nationally Local (see Appendix 2). These are:

Species	Ecological Associations	Where Found	
Agapanthia villosoviridescens	larvae feed internally in plant stems, including in thistles	A	
Anthocomus rufus	fens and marshes - a false soldier beetle	A	
Anthophora bimaculata	excavates nest burrow in relatively hard vertical faces		B
Aphthona euphorbiae	widely polyphagous		B
Chaetorellia jaceae	larvae feed in the seed heads of Centaurea species		B
Conocephalus dorsalis	formerly at damp coastal sites it is now found in a variety of inland habitats		B
Cordylepherus viridis	a common grassland species	A	
Cryptocephalus fulvus	possibly on sheep's-sorrel, but adults are found on a variety of flowers		B
Formica cunicularia	under stones, dry turf on banks etc on various soil types, but shade-intolerant		B
Graphocraerus ventralis	a grassland species of southern distribution	A	B
Hoplitis spinulosa	breeds in empty snail shells		B
Lygocoris lucorum	low plants		B
Melanargia galathea	tall calcareous grassland	A	B
Nemotelus uliginosus	reed beds and saltmarshes		B
Oedemera lurida	a common grassland species	A	
Oncotylus viridiflavus	widespread in grassland habitats, usually on flowering heads of knapweed		B
Oplodontha viridula	marshes and pond margins		B
Pipiza fenestrata	Edge habitats		B
Pipizella virens	probably associated with root aphids of Umbelliferae		B
Rhopalus subrufus	St John's Wort (Hypericum perforatum)	A	
Tettigonia viridissima	coarse herbage on banks etc in dry, sunny situations		B
Trypeta zoë	larva mines leaves of mugwort		B
Xanthogramma pedisequum s.str.	larvae feed in ants nests		B

4 DISCUSSION AND RECOMMENDATIONS

4.1 The species list is very short in relation to the survey effort that was put in to obtaining it, though this might be as much a consequence of the quite unusual weather patterns of the year 2012 as a reflection of actual site quality.

4.2 Surveys undertaken by us for other parties at other sites within ten kilometres of Thames Haven, during the same period of 2012, have generated equally poor inventories. This may be a function of the weather, at least in part, however, the number of taxa that are of some level of conservation interest at this site is depressed in comparison with the lists from other sites in the local area. This suggests that the Thames Haven site may not support a high proportion of rare or otherwise important species. As such, the poor weather was not a significant influencing factor and the limited species list obtained is likely to reflect the nature of the fauna moderately well.

4.3 Within compartment A we do not consider that there will be any significant loss of features of value to invertebrate ecology as a consequence of the proposed works.

4.4 Nevertheless, it would be appropriate to retain the section of Blackthorn hedge if practical. Seasonal constraints prevented us from determining whether or not the Sloe Carpet moth is present here, but if it is, a likelihood that we regard as being high, it will thrive on established Blackthorn plants. Complete removal would inevitably destroy individuals; replacement replanting would not be adequate to attract fresh individuals to re-colonise.

4.5 Not withstanding this, if the hedge is retained it ought to be reinforced with new planting of locally native genetic strains of Blackthorn so that an improved habitat is created for the future. If it is to be lost, replacement planting, also using locally native genetic strains of Blackthorn, may provide for long-term loss mitigation.

4.6 Compartment B has generated a poor species list that is low in species of interest or conservation value and overall this habitat does not support an outstanding assemblage of invertebrates.

4.7 Mention must, however, be made of the Brown-banded Carder Bee (*Bombus humilis*) which although expected in this coastal part of South Essex is nevertheless both rare and threatened nationally and is a Priority Species within the UK Biodiversity Action Plan. We recorded worker bees in the grassland area of compartment B, but are at a loss to discover any suitable plants at which these might forage. We conclude that the bees were “passing through” and the value of the present site to this species lies, therefore, in its contribution to the maintenance of a large area of open “green” habitat that is crucial for this rare insect. The site itself is therefore not considered significant for this bee species.

4.8 Remaining species of formal conservation interest, mentioned in Part 3 of this report are, by-and-large, insects that have become more numerous and/or extended their geographical distribution in the years since designation. In 2012 they are no longer of high conservation significance in this region of South Essex.

4.9 It is an inevitable conclusion that no significant losses to the overall invertebrate ecology of Thames Haven is at all likely to result from the proposed works, assuming that the route indicated to us is adhered to.

4.10 Indeed, the proposed works are more likely to provide an opportunity for an overall improvement of invertebrate interest, since there is considerable scope for diversification of the herbaceous flora within this currently rather uninteresting strip of rank, improved grassland. Detailed proposals ought to be prepared for this; these should emphatically not include the planting of trees, nor the use of seed mixes that contain Perennial Rye Grass or similar competitive grasses.

5 REFERENCES REFERRED TO IN THE PREPARATION OF THIS REPORT AND ITS APPENDICES

Bratton, J. H.	1991	*British Red Data Books: 3. Invertebrates other than insects*. NCC
Falk, S.	1991a	*A review of the scarce and threatened bees, wasps and ants of Great Britain (part 1).* Research & Survey in Nature Conservation, number **35**. NCC.
Falk, S.	1991b	*A review of the scarce and threatened flies of Great Britain (part 1).*Research & Survey in Nature Conservation, number **39**. NCC.
Hill, L., Randle, A., Fox, R. & Parsons, M.	2010	*Provisional Atlas of the UK's Larger Moths.* Butterfly Conservation.
Hyman, P.S. & Parsons, M.S.	1992	*A review of the scarce and threatened Coleoptera of Great Britain Part 1.* UK Nature Conservation, number **3**. JNCC.
Hyman, P.S. & Parsons, M.S.	1994	*A review of the scarce and threatened Coleoptera of Great Britain Part 2.* UK Nature Conservation, number **12**. JNCC.
Kirby, P.	1992a	*A review of the scarce and threatened Hemiptera of Great Britain* UK Nature Conservation, number **2**. JNCC.
Shirt, D. B. (ed.)	1987	*British Red Data Books: 2. Insects.* NCC
UK Biodiversity Group	1999	*Tranche 2 action plans. Volume iv – invertebrates*. English Nature.

APPENDICES

APPENDIX 1: INVERTEBRATE SPECIES RECORDED

National Status Codes are explained in Appendix 2.

Group / Species	English Name if Available	National Status	Ecological Associations	Where Found	
				A	B
ARACHNIDA	**SPIDERS**				
Araneidae					
Araneus diadematus	the garden spider		ubiquitous	A	B
Argiope bruennichi	Wasp Spider	NS(Na)	tall grassland - a species that is extending its range		B
Larinioides cornutus			long grasses by water in wetland habitats	A	
Philodromidae					
Tibellus oblongus			prefers taller herbage, in either wet or dry habitats	A	B
Pisauridae					
Pisaura mirabilis			more or less ubiquitous, but likes tall vegetation	A	
Tetragnathidae					
Tetragnatha extensa			amongst grasses and other low vegetation preferring waterside areas	A	
COLEOPTERA	**BEETLES**				
Apionidae					
Ceratapion gibbirostre			thistles - in the stems. Was called carduorum in older texts.		B
Malvapion malvae			Malvaceae - especially Malva sylvestris	A	
Protapion assimile			clover, especially red clover; widespread and common	A	
Protapion fulvipes			various clovers	A	
Protapion nigritarse			feeds on a wide variety of low plants and bushes		B
Bruchidae					
Bruchus rufimanus			larva on Viccia (vetches); adults at flowers		B
Byturidae					
Byturus tomentosus			Brambles and raspberries		B
Cantharidae					
Cantharis cryptica			tall vegetation, especially at the woodland/grassland interface		B
Rhagonycha fulva			tall, rank vegetation in lowland areas	A	B
Carabidae					
Amara (Zezea) aenea			Phytophagous species of gardens and other open, dry and sunny habitats		B
Amara (Zezea) ovata			most open and moderately dry ground		B
Bembidion lampros			open, sunny sites, often amongst tussocks		
Dromius (Paradromius) linearis			dry tussocky grassland and coastal dunes		B
Harpalus affinis (= aeneus)			a species typically of dry grasslands		B
Microlestes minutulus			known from scattered localities in south-east Britain		B
Syntomus foveatus			prefers sparsely-vegetated sandy	A	

Group / Species	English Name if Available	National Status	Ecological Associations	Where Found	
				A	B
			soils (heaths & coastal dunes)		
Cerambycidae					
Agapanthia villosoviridescens		Local	larvae feed internally in plant stems, including in thistles	A	
Leptura (Rutpela) maculata	Harlequin beetle		larvae feed in decaying tree stumps; adults wander and are found at flowers	A	B
Chrysomelidae					
Altica lythri			Associated with various willowherbs (Onagraceae)	A	B
Aphthona euphorbiae		Local	widely polyphagous		B
Cassida rubiginosa			various thistles, burdock and other Asteraceae		B
Crepidodera aurea			poplars - occasionally on willows		B
Crepidodera fulvicornis			Salix species		B
Cryptocephalus fulvus		Local	possibly on sheeps-sorrel, but adults are found on a variety of flowers		B
Lochmaea crataegi			Hawthorn - larvae mine the berries. Occasionally on Blackthorn or Rowan		B
Neocrepidodera ferruginea			polyphagous		B
Phyllotreta nigripes			various Brassicaceae		B
Podagrica fuscicornis		NS(Nb)	mallow (Malva species)	A	
Podagrica fuscipes		NS(Na)	larvae feed on mallows, especially Malva sylvestris	A	
Sphaeroderma testaceum			mainly on thistles		B
Coccinellidae					
Adalia bipunctata	2-spot ladybird		predatory on other insects	A	B
Anisostica novemdecimpunctata	19-spot ladybird		wetland habitats		B
Coccidula rufa	Spotless ladybird		reed beds and other marshy places		B
Coccinella septempunctata	7-spot ladybird		predatory on other insects	A	B
Harmonia axyridis	Harlequin ladybird		a recent colonist in Britain		B
Propylea quattuordecimpunctata	14-spot ladybird		predatory on other insects		B
Psyllobora vigintidoupunctata	22-spot ladybird		feeds on mildews		B
Rhyzobius litura			predatory on other insects		B
Subcoccinella vigintiquattuorpunctata	24-spot ladybird		predatory on other insects	A	B
Curculionidae					
Anthonomus rubi			flowers of brambles and raspberries		B
Ceutorhynchus typhae			on seeds of Brassicaceae. Formerly called Ceutorhynchus floralis		B
Mecinus pascuorum			feeds on flowers of Plantago lanceolata (Ribwort Plantain)		B
Nedyus quadrimaculatus			nettles - feeding on the flowers		B
Parethelcus pollinarius			Nettles		B
Phyllobius pyri			Larvae develop in the ground an adults feed on a variety of herbage and tree leaves		B
Polydrusus cervinus			trees and shrubs - feeding on the leaves	A	B
Rhinusa antirrhini			feeds in the flowers of toadflax		B
Sitona lineatus			various legumes	A	

Group / Species	English Name if Available	National Status	Ecological Associations	Where Found	
				A	B
Elateridae					
Agriotes lineatus			larvae feed on grass roots		B
Kateretidae					
Brachypterus glaber			Nettles		B
Malachiidae					
Anthocomus rufus		Local	fens and marshes - a false soldier beetle	A	
Cordylepherus viridis		Local	a common grassland species	A	
Malachius bipustulatus	a malachite beetle		grasslands	A	
Mordellidae					
Mordellistena acuticollis			widespread in the south-east, on Artemisia vulgaris		B
Nitidulidae					
Meligethes aeneus			various flowers	A	B
Oedemeridae					
Oedemera lurida		Local	a common grassland species	A	
Oedemera nobilis			a common grassland species	A	
Phalacridae					
Olibrus aeneus	a smut beetle		flowers of various Compositae, especially Matricaria, Artemisia and Tanacetum		B
Olibrus affinis			associated with the capitula of various Compositae		B
Staphylinidae					
Philonthus carbonarius (= varius)			ubiquitous - in moss, litter, carrion, dung etc		B
Tachyporus hypnorum			leaf litter, grass tussocks and similar micro-habitats		B
Xantholinus linearis			leaf litter, grass tussocks and similar micro-habitats		B
DERMAPTERA	**EARWIGS**				
Forficulidae					
Forficula auricularia	common earwig		generalist species	A	B
DIPTERA	**TRUE FLIES**				
Agromyzidae					
Agromyza graminicola			larvae feed in the leaves of reeds, Phragmites		B
Calycomyza artemisiae			larva mines leaves of Mugwort		B
Chromatomyia horticola			mines the leaves of many plant species		B
Asilidae					
Leptogaster cylindrica			grassland predator	A	B
Stratiomyidae	**Soldierflies**				
Beris chalybata			associated with the scrub/grassland interface		B
Beris vallata			saprophagous larvae		B
Chloromyia formosa			ubiquitous	A	B
Nemotelus uliginosus		Local	reed beds and saltmarshes		B
Oplodontha viridula		Local	marshes and pond margins		B
Pachygaster atra			woodland edge & scrubland species - larvae under dead bark of trees	A	B
Pachygaster leachii			woodland edge & scrubland species - larvae under dead bark of trees	A	B
Syrphidae	**Hoverflies**				
Chrysotoxum bicinctum			grassland species -associated with		B

Group / Species	English Name if Available	National Status	Ecological Associations	Where Found	
				A	B
			ants' nests		
Episyrphus balteatus			ubiquitous species, partly immigrant, and a predator of aphids	A	B
Eristalis arbustorum			Larvae require damp habitats but adults are more or less ubiquitous		B
Eristalis pertinax			Larvae require damp habitats but adults are more or less ubiquitous		B
Helophilus pendulus			Larvae require damp habitats but adults are more or less ubiquitous	A	
Melanostoma mellinum			Grassland		B
Melanostoma scalare			Grassland	A	
Neoascia podagrica			edge-habitat species		B
Neoascia tenur			reeds and similar emergent vegetation	A	
Paragus haemorrhous			bare or sparsely vegetated, dry sandy ground		B
Pipiza fenestrata		Local	Edge habitats		B
Pipizella viduata			Larvae feed on root aphids on Umbelliferae		B
Pipizella virens		Local	probably associated with root aphids of Umbelliferae		B
Platycheirus albimanus			ubiquitous - larvae prey on aphids	A	B
Platycheirus clypeatus			Damp habitats	A	B
Platycheirus peltatus s. str.			aphid predator		B
Sphaerophoria rueppellii			coastal grasslands		B
Sphaerophoria scripta			Grassland - larvae prey on aphids	A	B
Syritta pipiens			larvae in decaying vegetation; adults at flowers		B
Syrphus vitripennis			larvae are aphid predators on trees and bushes	A	B
Xanthogramma pedisequum s.str.		Local	larvae feed in ants nests		B
Tabanidae					
Haematopota pluvialis			damp habitats - adult females are blood sucking horseflies		B
Tachinidae					
Eriothrix rufomaculata			larva parasitises moth larvae		B
Tephritidae	**picture-winged flies**				
Chaetorellia jaceae		Local	larvae feed in the seed heads of Centaurea species		B
Euleia heraclei			larvae feed in the seed heads of white-flowering Umbelliferae		B
Tephritis divisa		RDB K	a recent arrival (2004) - larvae develop in flowerheads of Picris echioides		B
Trypeta zoë		Local	larva mines leaves of mugwort		B
Urophora cardui			larvae gall the flowers of thistles		B
Xyphosia miliaria			larvae gall the flowers of thistles - ubiquitous		B
HETEROPTERA	**PLANT BUGS**				
Anthocoridae					
Anthocoris nemorum			low vegetation		B
Cimicidae					
Orius vicina			predatory amongst low growing vegetation	A	
Coreidae					

Group / Species	English Name if Available	National Status	Ecological Associations	Where Found	
				A	B
Coreus marginatus			Develops on a variety of Polygonaceae in open habitats	A	B
Lygaeidae					
Chilacis typhae			Reedmace - in the flower heads	A	B
Ischnodemus sabuleti			reed beds	A	B
Orsillus depressus			a recent colonist, now spreading - associated with Lawson's Cypress	A	
Miridae					
Adelphocoris lineolatus			leguminous plants	A	
Atractotomus mali			hawthorn, apple and other trees, restricted to the south-east		B
Capsus ater			Grassland		B
Charagochilus gyllenhali			in open habitats where there are bedstraws (Galium sp.)		B
Deraeocoris ruber			nettles, brambles and similar rough vegetation		B
Heterotoma planicornis			edge habitats - especially in association with nettles	A	B
Leptoterna dolabrata			found in a wide range of grassland habitats		B
Liocoris tripustulatus			stinging nettle	A	
Lygocoris lucorum		Local	low plants		B
Lygocoris pabulinus			Polyphagous amongst low vegetation		B
Lygocoris spinolai			Polyphagous amongst low vegetation	A	
Lygus maritimus			Chenopodiaceae - in coastal sites and inland ruderal sites	A	
Megaloceraea recticornis			grass feeding plant bug of a wide range of habitats		B
Notostira elongata			grasslands	A	B
Oncotylus viridiflavus		Local	widespread in grassland habitats, usually on flowering heads of knapweed		B
Pinalitus cervinus			associated with trees - especially lime but also hazel, ash and ivy		B
Plagiognathus arbustorum			polyphagous, but usually associated with stinging nettles	A	B
Plagiognathus chrysanthemi			polyphagous	A	
Stenodema calcaratum			grasslands	A	B
Stenodema laevigatum			grasslands	A	
Nabidae					
Nabis limbatus	marsh damsel bug		marshy places		B
Pentatomidae					
Aelia acuminata			Thistles	A	
Eurydema oleracea			feeds on cruciferous plants	A	
Palomena prasina			trees and shrubs	A	B
Rhopalidae					
Rhopalus subrufus		Local	St John's Wort (Hypericum perforatum)	A	
Tingidae					
Tingis ampliata			creeping thistle	A	B
HOMOPTERA	**PLANT HOPPERS**				
Cercopidae					
Neophilaenus campestris			dry, open grassland	A	

Group / Species	English Name if Available	National Status	Ecological Associations	Where Found	
				A	B
Neophilaenus lineatus			grasslands	A	B
Philaenus spumarius	spittle-bug/Cuckoo-spit bug		larvae feed under froth on a wide range of herbaceous plants	A	B
Cicadellidae					
Aguriahana stellulata			on a variety of trees, including lime, cherry and plum	A	
Aphrodes makarovi			grasslands	A	B
Eupteryx urticae			Usually on nettles		B
Euscelis incisus			grasses	A	
Graphocraerus ventralis		Local	a grassland species of southern distribution	A	B
Idiocerus vitreus			Black and Lombardy Poplars		B
Macropsis scotti			feeds on brambles	A	
Populicerus (=Idiocerus) nitidissimus			black poplar		B
Zyginidia scutellaris			grasses	A	
Delphacidae					
Javesella pellucida			grasses in a range of habitats	A	
HYMENOPTERA: ACULEATA	**BEES, WASPS & ANTS**				
Apidae					
Anthophora bimaculata		Local	excavates nest burrow in relatively hard vertical faces		B
Apis mellifera	honey bee		flowers in general	A	B
Bombus humilis	Brown-banded Carder Bee	BAP	costal grasslands and similar	A	B
Bombus lapidarius	red-tailed bumble bee		ubiquitous	A	
Bombus pascuorum	common carder bee		ubiquitous		B
Bombus pratorum	a bumble bee		ubiquitous		B
Bombus terrestris	buff-tailed bumble bee		ubiquitous	A	B
Hoplitis claviventris			nests in hollow plant stems, especially bramble		B
Hoplitis spinulosa		Local	breeds in empty snail shells		B
Lasioglossum calceatum			nests in burrows on steep sandy banks		B
Lasioglossum malachurum	a mining bee	NS(Nb)	ground nesting species - prefers soils with a clay component		B
Lasioglossum smeathmanellum			excavates nest burrows in level ground		B
Nomada fabriciana	a nomad bee		nest parasite of Andrena bees - especially Andrena bicolor		B
Nomada flava			nest parasite of Andrena scotica	A	
Formicidae					
Formica cunicularia		Local	under stones, dry turf on banks etc on various soil types, but shade-intolerant		B
Lasius flavus	yellow ant		grassland. A high nest density indicates long term grassland continuity		B
Lasius niger s. str.	common black ant		generalist species	A	
Myrmica rubra	a red ant		ubiquitous		B
Sphecidae					
Passaloecus singularis			nests in hollow plant stems, dividing individual egg chambers with mud walls		B
Vespidae					

Group / Species	English Name if Available	National Status	Ecological Associations	Where Found	
				A	B
Vespula germanica	a common social wasp		ubiquitous		B
HYMENOPTERA: SYMPHYTA	**SAWFLIES**				
Cephidae					
Calameuta filiformis			larvae mine the stems of grasses in damp habitats		B
Calameuta pallipes			a grassland sawfly		B
Cephus cultratus			larvae mine the stems of grasses		B
LEPIDOPTERA	**BUTTERFLIES**				
Hesperiidae					
Thymelicus sylvestris	Small skipper		grassland	A	B
Nymphalidae					
Aphantopus hyperantus	Ringlet		woodland edge and clearings, hedges and other edge habitats		B
Maniola jurtina	Meadow brown		grassland species		B
Melanargia galathea	Marbled White	Local	tall calcareous grassland	A	B
Pararge aegeria	Speckled wood		grasses in light woodland or scrub		B
Pyronia tithonus	Gatekeeper		larvae feed on coarse grasses	A	
Pieridae					
Pieris brassicae	Large white		various Cruciferae	A	
LEPIDOPTERA	**MOTHS**				
Arctiidae					
Phragmatobia fuliginosa	Ruby Tiger		herbaceous plants		B
Tyria jacobaeae	Cinnabar	BAP(R)	Ragwort		B
Bucculatricidae					
Bucculatrix thoracella			lime		B
Choreutidae					
Anthophila fabriciana	Nettle-tap		nettles	A	
Coleophoridae					
Coleophora artemisicolella			mugwort - on the seeds		B
Glyphipterigidae					
Glyphipterix simpliciella			caterpillar feeds on the seeds of Dactylis and Festuca species of grasses		B
Gracillariidae					
Cameraria ohridella			larva mines the leaves of Horse Chestnut - a recent colonist in Britain, from Europe	A	
Leucospilapteryx omisella			mines lower leaves of mugwort turning them purple	A	
Phyllonorycter corylifoliella			mines leaves of hawthorn and other rosaceous shrubs, rarely on birch		B
Hepialidae					
Hepialus lupulinus	Common Swift		roots of grasses and herbaceous plants		B
Nepticulidae					
Stigmella aurella agg.			mines leaves of bramble		B
Stigmella plagicolella			mines leaves of blackthorn	A	
Pyralidae					
Agriphila straminella			grasses		B
Agriphila tristella			grasses		B
Chrysoteuchia culmella			grasses	A	B
Crambus lathoniellus			grasses	A	B
Crambus pascuella			grasses		B

Group / Species	English Name if Available	National Status	Ecological Associations	Where Found	
				A	B
Synaphe punctalis		NS(Nb)	mosses, especially Hypnum cupressiforme	A	
Sesiidae					
Sesia apiformis	Hornet Moth	NS(Na)	larvae feed under the bark at the base of poplar trees		B
Tortricidae					
Agapeta hamana			thistles - in the roots		B
Cochylis atricapitana			ragwort		B
Hedya pruniana			Prunus, especially blackthorn	A	
Yponomeutidae					
Argyresthia spinosella			in the flowering shoot of blackthorn		B
Scythropia crataegella			hawthorn - sometimes blackthorn	A	B
NEU					
Chrysopidae					
Chrysopa perla			aphid predator amongst herbage		B
Chrysoperla carnea			aphid predator of trees and bushes	A	B
Cunctochrysa albolineata			predatory on aphids in tree foliage		B
Hemerobiidae					
Hemerobius lutescens			trees and bushes, hedges, etc	A	
ODONATA	**DRAGONFLIES & DAMSELFLIES**				
Coenagriidae					
Ischnura elegans	Blue-tailed damselfly		found in most permanent water bodies, the adults flying from May to August		B
Libellulidae					
Sympetrum striolatum	Common Darter dragonfly		water-bodies with emergent vegetation, flying mid June to October and often wandering	A	B
ORTHOPTERA	**GRASSHOPPERS & CRICKETS**				
Acrididae					
Chorthippus brunneus	Field grasshopper		grassland	A	
Chorthippus parallelus	Meadow grasshopper		grassland	A	B
Tettigoniidae					
Conocephalus dorsalis	Short-winged Cone-head	Local	formerly at damp coastal sites it is now found in a variety of inland habitats		B
Metrioptera roeselii	Roesel's Bush-cricket	NS(Nb)	long grassland	A	B
Tettigonia viridissima	Great Green Bush-cricket	Local	coarse herbage on banks etc in dry, sunny situations		B

APPENDIX 2: INVERTEBRATE STATUS CODES

Earlier published reviews of scarce and threatened invertebrates employed the Red Data Book criteria used in the British Insect Red Data Book (Shirt 1987) with the addition of the category RDBK (Insufficiently Known) after in 1983. In addition, the status category Nationally Notable (now termed Nationally Scarce) was used from 1991. The original criteria of the International Union for the Conservation of Nature (IUCN – now called the World Conservation Union) for assigning threat status used in these publications had the categories *Endangered*, *Vulnerable*, and *Rare*, which were defined rather loosely and without quantitative parameters. The application of these categories was largely a matter of subjective judgment, and it was not easy to apply them consistently within a taxonomic group or to make comparisons between groups of different organisms. The deficiencies of the old system were recognised internationally, and in the mid-1980s proposals were made to replace it with a new approach which could be more objectively and consistently applied. In 1989, the lUCN's Species Survival Commission Steering Committee requested that a new set of criteria be developed to provide an objective framework for the classification of species according to their extinction risk. The first, provisional, outline of the new system was published in 1991. This was followed by a series of revisions, and the final version adopted as the global standard by the IUCN Council in December 1994. The guidelines were recommended for use also at the national level. In 1995, the Joint Nature Conservation Committee (JNCC) endorsed their use as the new national standard for Great Britain, and subsequent British Red Data Books have used these revised IUCN criteria. These criteria are used in this present report and are as follows:

EXTINCT (EX) A species is *Extinct* when there is no reasonable doubt that the last individual has died.

EXTINCT IN THE WILD A species is *Extinct* in the wild when it is known to survive only in cultivation, in captivity or as a naturalised population (or populations) well outside the past range.

CRITICALLY ENDANGERED
A species is *Critically Endangered* when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the following criteria:

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 80%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 100 Km^2 or areas of occupancy estimated to be less than 10 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at only a single location.
2. Continuing decline, observed, inferred or projected, in any of the following: a. extent of occurrence b. area of occupancy c. area, extent and/or quality of habitat d. number of locations or sub-populations e. number of mature individuals
3. Extreme fluctuations in extent of occurrence, area of occupancy, number of locations or sub-populations or number of mature individuals.

C. Population estimated to number less than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within 3 years or one generation, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 50 mature individuals) or all individuals are in a single sub-population

D. British population estimated to number less than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild of at least 50% within 10 years or 3 generations, whichever is the longer.

ENDANGERED (Formerly RDB category 1)

A species is Endangered when it is not *Critically Endangered* but is facing a very high risk of extinction in the wild in the near future, as defined by any of the following criteria:

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 50%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 5,000 Km^2 or areas of occupancy estimated to be less than 10 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at no more than five locations.
2. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or sub-populations or the number of mature individuals.

C. Population estimated to number less than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within 5 years or 2 generations, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 250 mature individuals) or all individuals are in a single sub-population

D. British population estimated to number less than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild of at least 20% within 20 years or 5 generations, whichever is the longer..

VULNERABLE (Formerly RDB category 2)
A species is *Vulnerable* when it is not *Critically Endangered or Endangered but* is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the following criteria (A to E):

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 20%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 20,000 Km^2 or areas of occupancy estimated to be less than 20,000 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at no more than ten locations. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or sub-populations or the number of mature individuals.
2. Extreme fluctuations in extent of occurrence, area of occupancy, number of locations or sub-populations or number of mature individuals.

C. Population estimated to number less than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or 3 generations, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 1000 mature individuals) or all individuals are in a single sub-population

D. Population very small or restricted in the form of either of the following:

1. Population estimated to number less than 1,000 mature individuals.
2. Population is characterised by an acute restriction in its area of occupancy (typically less than 100 km) or in the number of locations (typically less than 5). Such a species would thus be prone to the effects of human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming *Critically Endangered* or even *Extinct* in a very short period.

E. Quantitative analysis showing the probability of extinction in the wild of at least 10% within 100 years.

LOWER RISK (Formerly RDB category 3)

A species is Lower Risk when it has been evaluated but does not satisfy the criteria for any of the categories *Critically Endangered, Endangered* or *Vulnerable.* Species included in the Lower Risk category can be separated into three sub-categories:

• **Conservation Dependent** species which are the focus of a continuing species -specific or habitat-specific conservation program targeted towards the species in question, the cessation of which would result in the species qualifying for one of the threatened categories above within a period of five years.

• **Near Threatened** Species which do not qualify for *Lower Risk (Conservation Dependent),* but which are close to qualifying for *Vulnerable.*

• **Least Concern**
Species which do not qualify for *Lower Risk (Conservation Dependent)* or *Lower Risk (Near Threatened).*

DATA DEFICIENT A species is *Data Deficient* when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. A species in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. *Data Deficient* is therefore not a category of threat or Lower Risk.

LOWER RISK (NATIONALLY SCARCE – FORMERLY NATIONALLY NOTABLE)

Species which are not included within the IUCN threat categories and are estimated to occur less than 100 hectads of the Ordnance Survey national grid in Great Britain. It should be noted that Lower Risk (Nationally Scarce) is not a threat category, but rather an estimate of the extent of distribution of these species. Lower Risk species are subdivided as follows:

Na species estimated to occur within the range of 16 to 30 10-kilometre squares of the National Grid System.

Nb species estimated to occur within the range 31 to 100 10-kilometre squares of the National Grid System.

N Diptera (flies) not separated, falling into either category Na or Nb.

NATIONALLY LOCAL (L)

Species which, whilst fairly common, are evidently less widespread than truly common species, but also not qualifying as Nationally Notable having been recorded from over one hundred, but less than three hundred, ten-kilometre squares of the UK National Grid.

ASSOCIATED DEFINITIONS

Extent of occurrence

Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a species, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of species (e.g. large areas of obviously unsuitable habitat) (but see 'area of occupancy'). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

Area of occupancy

Area of occupancy is defined as the area within its 'extent of occurrence' (see definition) which is occupied by a species, excluding cases of vagrancy. The measure reflects the fact that a species will not usually occur throughout the area of its extent of occurrence, which may, for example, contain unsuitable habitats. The area of occupancy is the smallest area essential at any stage to the survival of existing populations of a species *(e.g.* colonial nesting sites, feeding sites for migratory species). The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the species. The criteria include values in km^2, and thus to avoid errors in classification, the area of occupancy should be measured on grid squares (or equivalents) which are sufficiently small.