The London Resort

Appendix 12.1: Ecology Baseline Report

Prepared by:
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On behalf of:
London Resort Company Holdings Limited

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Non-technical Summary

S1 This Ecology Baseline Report has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of London Resort Company Holdings Limited. It provides the baseline ecological conditions and identified important ecological features (IEFs) relevant to the Proposed Development of land on the Swanscombe Peninsula, and the Ebbsfleet Valley, on the south side of the River Thames (referred to as 'the Kent Project Site'), and land to the east of the A1089 Ferry Road and the Tilbury Ferry Terminal (referred to as 'the Essex Project Site'). Collectively these two parts of the entire Development Consent Order (DCO) boundary are referred to as 'the Project Site'. It comprises approximately 523.1 hectares (ha) of land with a range of habitat types.

S2 The baseline ecological investigations that have been, or are currently being undertaken as part of this baseline condition assessment include a desk study, Extended Phase 1 Habitat Survey, River Corridor Survey and River Habitat Survey, and detailed (Phase 2) surveys including a botanical survey and others relating to birds, bats, dormouse (*Muscardus avellanarius*), badgers (*Meles meles*), otters (*Lutra lutra*), water voles (*Arvicola amphibious*), harvest mice (*Micromys minutus*), great crested newts (*Triturus cristatus*) and reptiles.

S3 No part of the Project Site is covered by any statutory designations designated for ecological reasons however Bakers Hole Site of Special Scienitific Interest (SSSI) designated for geological reasons is situated within the Kent Project Site. There are four international statutory designations within 15km of the Project Site; two of which are considered likely to be impacted by the proposed development (Thames Estuary and Marshes Special Protection Area (SPA)/Ramsar and Medway Estuary and Marshes SPA/Ramsar/SSSI.

S4 There are seven statutory designations of national importance within 5km of the Project Site and two more at a greater distance but considered to be within the Zone of Influence due to ecological connectivity. Four of these national designations have potential to be impacted by the Proposed Development and therefore considered as IEFs in the Ecological Impact Assessment (EcIA), including Darenth Woods SSSI, Inner Thames Marshes SSSI, South Thames Estuary and Marshes SSSI and West Thurrock and MArshes SSSI.

S5 There are 19 non-statutory designations within 2km of the Project Site including Botany Marshes Local Wildlife Site (LWS) within the Kent Project Site and three further LWSs adjacent to the Kent Project Site; these four LWSs are considered likely to be impacted by the proposed development.

S6 The Essex Project Site comprises predominantly hardstanding with small linear areas of poor semi-improved grassland and scrub, adjacent to seasonally wet ditches.

S7 The Kent Project Site supports a range of habitats including intertidal sediment, saltmarsh, wetlands, including running water (the Ebbsfleet), open water (ponds),

reedbed/swamp and ditch networks, a range of grasslands and open mosaic habitats, arable, scrub, woodland, chalk cliffs/exposures, buildings and bare ground. The extensive semi improved grassland and scrub mosaic, broadleaved semi-natural woodland, poor semi-improved grassland and the River Ebbsfleet corridor are of value at the Local level. The open mosaic on previously developed land, coastal/floodplain grazing marsh, waterbodies (primarily the ditch network), and areas of higher quality grassland are all considered of district level importance. The swamp (reedbed) is considered of County level importance. There are also populations of a number of nationally scarce plant species which are of National importance.

S8 Species surveys were undertaken in 2012 and 2016 for the Kent Project Site and currently being updated in 2020. Surveys have confirmed that the Project Site supports a wintering wading bird assemblage of International value, a wintering terrestrial bird assemblage of County value, a breeding bird assemblage of at least County value, a bat assemblage of at least Local value, a dormouse population of Local value, a (considered likely to be breeding) population of water vole of Local to District value, an amphibian assemblage of Local to District value, a terrestrial invertebrate assemblage of National value and an aquatic invertebrate assemblage of County to regional value. The Kent Project Site also potentially supports otter and a population of harvest mouse; a precautionary valuation is given to these features subject to the findings of further targeted surveys.

S9 The IEF that are pertinent to an EcIA in respect of the Proposed Development are those considered to be of Local value or higher and likely to be impacted by the Proposed Development. They are listed in **Table EDP S1**. Some features are included based on the likelihood of presence with presence and value yet to be determined.

Table EDP S1: IEFs to be taken Forward for the EcIA, based on Survey Work Completed to Date

Important Ecological Feature	Key Attributes	Nature Conservation Value
Designations		
Thames Estuary and Marshes SPA/Ramsar	Extensive intertidal mudflats with saltmarsh and channel systems. Internationally importance of assemblage of birds and wintering populations of many wader species.	International
Medway Estuary and Marshes SPA/Ramsar/SSSI	Single tidal system with the Swale and joins the southern part of the Thames Estuary between the Isle of Grain and Sheerness. Internationally importance of assemblage of birds and wintering populations of many wader species.	International
Darenth Woods SSSI	Some of the most valuable areas of ancient semi-natural woodland in north-west Kent with rare woodland types.	National
Inner Thames Marshes SSSI	Largest remaining expanse of wetland bordering the upper reaches of the Thames Estuary. Diverse bird interest especially the variety of breeding birds and the numbers of wintering wildfowl, waders, finches and birds of prey.	National

Important Ecological Feature	Key Attributes	Nature Conservation Value
South Thames Estuary and Marshes SSSI	Extensive mosaic of grazing marsh, saltmarsh, mudflats and shingle characteristic of the estuarine habitats of the north Kent marshes. Freshwater pools and some areas of woodland provide additional variety and complement the estuarine habitats. Supports outstanding numbers of waterfowl, total counts regularly over 20,000.	National
West Thurrock Lagoon and Marshes SSSI	One of the most important sites for wintering waders and wildfowl on the Inner Thames Estuary. Extensive intertidal mudflats together with a large and secure high tide roost, attracts waders in nationally important numbers, with significant populations of other bird species. The adjacent Stone Ness saltmarsh is noted for the size and character of its high marsh plant community.	National
Botany Marshes LWS	Reedbed and potential for ditch & grazing marsh restoration. Reedbed and grazing marsh are of principal importance in England. Also supports three species of reptile, water vole, otter and is of value to birds.	County
Ebbsfleet Marshes, Northfleet LWS	Range of habitats including reedbed, calcareous stream, lake, scrub, woodland, calcareous and neutral grassland. Protected species have been recorded including reptiles and great crested newts.	County
Alkerden Lane Pit LWS	Contains nationally scarce plants and Kent's largest population of green-flowered helleborine (*Epipactis phyllanthes*). Also contains round leaved wintergreen (*Pyrola rotundifolia*) and several species of nationally rare and scarce invertebrates.	County
Tilbury Marshes LWS	Diverse saltmarsh flora. Good grazing-marsh flora. An important invertebrate habitat destroyed by development, but some of the key species may survive on these remaining fragments.	County
Habitats/Flora		
Rare plants	Populations of 13 nationally scarce species were found in 2016. Eight were refound in 2020	National
Broad leaved Semi Natural Woodland	Woodland with good canopy species and ground flora species diversity. Connects to other woodlands in wider area.	Local
Scrub	Extensive mature and colonising scrub forming a corridor of woody habitats between the A2 and the River Thames.	Local
Semi-improved grassland	Including areas of species-poor semi-improved grassland and areas of semi-improved neutral, and calacareous grassland (with relict areas of more species-rich grassland of NVC MG1d and CG2 but not extensive or fine examples).	Local to District
Coastal/Floodplain Grazing Marsh	Botany Marsh West - Priority Habitat[1] coastal/floodplain grazing marsh.	District

[1] UK Biodiversity Action Plan Priority Habitat Descriptions Coastal and Floodplain Grazing Marsh From: UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008

Important Ecological Feature	Key Attributes	Nature Conservation Value
Open mosaic on previously developed land	Discrete areas within the Kent Project Site that fulfil the Priority Habitat description.	District
Waterbodies (ponds, standing water and ditches)	Extensive ditch network around the peninsula with associated ponds. Ditch network forms part of a large marsh area including Botany Marshes LWS and adjacent grazing marsh and is considered of district level. Some ponds, within Broadness Grassland particularly, are contaminated by leachate from the nearby cement production facility and are of negligible ecological value.	District
Swamp (reedbed)	Three main areas in Black Duck Marsh, CTRL Wetland and Botany Marsh, the latter of which is partially designated as a LWS.	County
River Ebbsfleet	Acts as a wildlife corridor and is linked to reed bed and woodland habitats. Moderate water quality.	Local
Species		
Wintering Wading Bird Assemblage	Supports many of the species associated with the nearby SPA/Ramsars.	International
Wintering terrestrial bird assemblage	28 species of conservation concern recorded by in low to moderate numbers.	County
Breeding Bird Assemblage	91 species recorded so far of which 28 were listed on either the Amber list of Birds of Conservation Concern and 16 on the Red list.	County
Bat Assemblage	Assemblage of at least nine species, including one Kent BAP species. However, the activity is predominantly of common pipistrelle (*Pipistrellus pipistrellus*) bats. One tree roost confirmed and a further three possible tree roosts found in 2016. 2020 data in progress.	Local
Dormouse	Confirmed presence within the Kent Project Site. Considered to be using the Kent Project Site for dispersal, foraging and breeding. Likely to be a meta population with that close to the Bluewater shopping centre.	District
Otter	Assumed present in low numbers within the ditch network and on the River Ebbsfleet due to suitable habitat.	Local
Water Vole	Latrines and feeding sign found in Botany Marsh East and West – likely breeding and therefore qualifies as LWS.	Local to District
Harvest Mouse	Considered likely to be present and so would qualify the Project Site as a LWS.	Local
Amphibian assemblage	Likely to support four species and meet criteria for LWS selection.	Local to District
Reptile assemblage	Three species supported. Likely to be exceptional populations of common lizard (*Zootoca vivipara*) and slow-worm (*Anguis fragilis)*. Meets criteria for LWS selection.	District
Terrestrial Invertebrates	Current data in process, but 22 species of conservation concern so far recorded and a total of 262 species. Considered likely to remain of National importance.	National

Important Ecological Feature	Key Attributes	Nature Conservation Value
Aquatic Invertebrates	Current data in process but previous data suggests an assemblage of County to Regional importance	County to Regional

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Section 1
Introduction

1.1 This Ecology Baseline Report has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of London Resort Company Holdings Limited. It provides the baseline ecological conditions relevant to the proposed development on land on the Swanscombe Peninsula, and the Ebbsfleet Valley, on the south side of the River Thames (referred to as 'the Kent Project Site', and land to the east of the A1089 Ferry Road and the Tilbury Ferry Terminal (referred to as 'the Essex Project Site'). Collectively these two parts of the Development Consent Order (DCO) boundary are referred to as 'the Project Site'.

1.2 The land within the Project Site will be subject to a DCO application for a world class destination theme park in partnership with Paramount Studios with associated infrastructure, staff accommodation, A2 upgrade, public amenity space and habitat creation. The application will be supported by an Environmental Impact Assessment (EIA), with this report provided as a technical appendix to inform the baseline section of the 'Terrestrial and Freshwater Ecology and Biodiversity' chapter of the Environmental Statement (ES). Aquatic features in the Thames Estuary intertidal and subtidal environment are dealt with separately in Chapter 12.

1.3 EDP is an independent environmental planning consultancy with offices in Cirencester, Shrewsbury, Cardiff and Cheltenham. The company provides advice to private and public-sector clients throughout the UK in the fields of landscape, ecology, archaeology, cultural heritage, arboriculture, rights of way and masterplanning. Details can be obtained at our website (www.edp-uk.co.uk).

Project Site Context

1.4 The Project Site location is shown on **Plan EDP 1**. It comprises two parts as described above: the 'Kent Project Site', which is centred approximately at Ordnance Survey Grid Reference (OSGR) TQ 606 758, and the 'Essex Project Site', which is centred approximately at OSGR TQ 643 752. The Project Site lies partly within three local planning authority areas; Dartford Borough and Gravesham Borough for the Kent Project Site, and Thurrock Council for the Essex Project Site.

1.5 The Project Site measures approximately 523.1ha and comprises a range of habitat types including woodland and scrub, grasslands of varying quality, salt marsh, intertidal zones, brownfield areas, running and standing water, chalk exposures and developed land.

1.6 The principal ecological features within the Project Site (based on the results of the Extended Phase 1 Survey) are described, along with illustrative site photographs, in **Annex EDP 1**.

Scope of Baseline Report

1.7 This report describes the update ecological assessment undertaken in 2019/2020, comprising both desk- and field-based investigations, and summarises these findings in the context of baseline investigations undertaken by Chris Blandfod Associates at the Kent Project Site in 2012 and 2015-2016. The report has been written in accordance with the latest Chartered Institute of Ecology and Environmental Management (CIEEM) guidance on report writing and EcIA[2,3]. The remainder of the report is structured as follows:

- **Section 2** summarises the methodology employed in determining the ecological baseline within and around the Project Site (with further details provided within annexes and plans where appropriate at the end of this report);

- **Section 3** summarises the baseline ecological conditions (with further details also provided within annexes and on plans where appropriate) and identifies and evaluates any pertinent ecological features/receptors; and

- **Section 4** summarises the IEFs that are relevant to the Project Site, to be taken forward for further assessment in the EcIA.

[2] CIEEM (2017) *Guidelines on Ecological Report Writing*. Chartered Institute of Ecology and Environmental Management, Winchester.
[3] CIEEM (2018) *Guidelines for Ecological Impact Assessment in the UK and Ireland.* Chartered Institute of Ecology and Environmental Management, Winchester.

Section 2
Methodology (Baseline Investigations)

2.1 This section summarises the methodologies employed in determining the baseline ecological conditions within and around the Project Site in 2019 and 2020. The investigations have been undertaken by suitably experienced and licensed ecologists, using relevant best practice methodologies, wherever possible. Full details of the techniques and process adopted are, where appropriate, provided within annexes and plans to the rear of this report. Throughout this section parts of the Project Site are referred to using commonly used names, as shown on **Plan EDP 1**.

Desk Study and Consultation

2.2 The desk study is an important element of a wider ecological assessment of a site, enabling the initial collation and review of contextual information such as designations together with known records of protected and priority species.

2.3 The desk study involved collating information from the following sources:

- Kent and Medway Biological Records Centre (KMBRC);
- Essex Wildlife Trust and Biological Records Centre;
- Essex Field Club;
- Multi-Agency Geographic Information for the Countryside (MAGIC) website[4]; and
- National Biodiversity Network (NBN) Atlas website[5].

2.4 The desk study was undertaken during April 2020 and involved obtaining the following information (search radii from the DCO boundary of the Project Site are also provided):

- International statutory designations (15km);
- National statutory designations (5km);
- Non-statutory local sites (2km);
- Annex II bat species[6] records (6km); and

[4] www.magic.gov.uk
[5] www.nbnatlas.org
[6] Bat species listed in Annex II of the *EC Habitats Directive*, namely Greater horseshoe, Lesser horseshoe, Barbastelle and Bechstein's bats

- All other protected/notable species records (2km).

2.5 These search areas are considered sufficient to cover the potential Zone of Influence (ZoI)[7] of the Proposed Development in relation to designations, habitats and species.

2.6 The potential ZoI of the Project Site along with those statutory designations that occur within it are illustrated on **Plan EDP 2**, with non-statutory designations illustrated on **Plan EDP 3**.

Extended Phase 1 Habitat Survey

2.7 The survey technique adopted for the initial habitat assessment was at a level intermediate between a standard Phase 1 survey[8], based on habitat mapping and description, and Phase 2 surveys, based on detailed habitat and species surveys. The survey technique is commonly known as an Extended Phase 1 Habitat survey and involves identifying and mapping the principal habitat types and identifying the dominant plant species present in each principal habitat type. In addition, any actual or potential protected species or species of principal importance are identified and scoped.

2.8 An Extended Phase 1 Habitat survey of the Project Site was undertaken by a suitably experienced surveyor in May 2020. May is within the recommended April to mid-October period as per current guidance (Joint Nature Conservation Committee; JNCC, 2010) and is therefore not considered to be constrained by any seasonal factors.

2.9 A detailed botanical survey was then undertaken of certain areas within the Kent Project Site identified during the Extended Phase 1 Habitat survey, as detailed below. This included a search for the rare plants previously recorded at the Project Site. The botanical survey was completed by an experienced botanist with 30+ years experience. During this survey, the results of the Extended Phase 1 Habitat survey were verified.

2.10 Habitats recorded during the course of the Extended Phase 1 Habitat survey are described in **Annex EDP 1** and illustrated on **Plan EDP 4**. The rare plant populations recorded are shown on **Plan EDP 5**.

River Corridor/River Habitat Survey

2.11 To establish a detailed baseline for the River Ebbsfleet and associated riparian habitats, an approximate 2km stretch from its upstream extent at Springhead Garden Centre (OSGR TQ 617 727) to its downstream extent north of Ebbsfleet International Station (OSGR TQ 614 744), was surveyed in accordance with standard River Corridor Survey (RCS) methodology. The RCS was undertaken by a suitably qualified ecologist on 18 May 2020. To aid an assessment of the watercourse, the extent of the River Ebbsfleet

[7] Zone of Influence - the areas and resources that may be affected by the proposed development
[8] Joint Nature Conservation Council (2010) *Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit*

within the Kent Project Site, was subdivided into three sections, each circa 500 metres long and each broadly representative of the different habitat types across the catchment. The survey sections are illustrated in **Plan EDP 6**.

2.12 A River Habitat Survey of the River Ebbsfleet was also undertaken in tandem with the RCS on 18 May 2020, in accordance with methodologies established by the Environment Agency. As dense vegetation and expansive areas of wetland/reedbeds limited access to several sections of the River Ebbsfleet, the River Habitat Survey was confined to two 500m sections of the watercourse as illustrated on **Plan EDP 7**.

2.13 Full details of the RCS and River Habitat Survey can be found in **Annex EDP 2**.

Detailed (Phase 2) Surveys

2.14 The scope of Phase 2 Surveys undertaken within the Project Site was defined following completion of the 2020 desk study, a review of the previous ecology surveys undertaken on the Kent Project Site and review of the Extended Phase 1 Habitat survey information. Surveys that have been, or will be, undertaken in 2019 and 2020 include:

- Botanical survey;
- Wintering bird surveys;
- Breeding bird surveys;
- Passage bird surveys;
- Bat surveys;
- Dormouse surveys;
- Badger survey;
- Otter and water vole surveys;
- Harvest mouse surveys;
- Great crested newt survey;
- Reptile surveys;
- Terrestrial invertebrate surveys; and
- Aquatic invertebrate surveys.

2.15 The methodologies used for these surveys are described in further detail below.

Botanical Survey

2.16 The Extended Phase 1 Habitat survey identified several areas of grassland of botanical interest within the Kent Project Site. Furthermore, following review of previous habitat/ plant surveys on the Kent Project Site, a range of nationally rare plant species are known to be present. Therefore, a detailed botanical survey was undertaken by a botanist with over 30 years of UK botanical experience, to record plant species within areas of higher botanical interest throughout the Swanscombe Peninsula on the Kent Project Site. The survey used Dominant, Abundant, Frequent, Occasional and Rare (DAFOR) grades. Homogenous stands of National Vegetation Classification (NVC) types were determined in the field and supported by sampling of representative quadrats to establish their ecological value where deemed appropriate. Details of the results of the botanical survey have been included within **Annex EDP 1**, with habitats displayed on **Plan EDP 4** and rare plant populations illustrated on **Plan EDP 5**.

Ornithological Surveys

2.17 Ornithological surveys at the Kent Project Site have been completed in November 2019 to March 2020 (wintering birds), April to June 2020 (breeding birds), and a passage bird survey at high and low tide in April 2020. Further breeding bird surveys are being undertaken in July, along with passage bird surveys in August and September.

2.18 No ornithological surveys are proposed at the Essex Project Site due to lack of suitable habitat.

Wintering Bird Surveys

2.19 Owing to the proximity of the Thames Estuary and Marshes SPA and Ramsar (c.3.4km east of the Essex Project Site, and c.7km east of the Kent Project Site); and the Medway Estuary and Marshes SPA/Ramsar (c.13.4km south-east of the Essex Project Site, and c. 15.7km east of the Kent Project Site), which are both internationally designated for their wintering wetland bird assemblages, and the presence of suitable habitat for species from this assemblage within the Kent Project Site, wintering birds survey were conducted on the Kent Project Site during the winter 2019/2020.

2.20 The scope and methodology employed during the wintering bird surveys is described in full in the 'Wintering Bird Baseline Report', available as **Annex EDP 3** to this report.

Breeding Bird Surveys

2.21 As well as designations for wintering birds, the Thames Estuary and Marshes SPA/Ramsar and Medway Estuary and Marshes SPA/Ramsar are also designated for breeding populations of certain species. The Kent Project Site supports suitable breeding habitat for a range of bird species including those recorded on these SPA/Ramsar sites. The

Essex Project Site does not support suitable breeding habitat to support these bird species.

2.22 Therefore, full breeding bird surveys comprising four survey visits across the Kent Project Site are being undertaken to record bird activity and ascertain breeding status of any species/individuals identified. The surveys are based on a hybrid methodology, referring to Common Bird Census (CBC) 'territory mapping' methodology[9], and black redstart (*Phoenicurus ochruros*)[10] and breeding wader survey methodology[11].

Passage Bird Surveys

2.23 Passage bird surveys will take place along the estuary front only, at the Kent Project Site, and will take place during the daytime in April, September and October. Passage surveys comprise two surveys per month: one focussed on High Tide; and the other focussed on Low Tide. The exact timings and dates are dependent on tide times, which are not generally available or accurate more than a few weeks in advance of the survey. However, each visit will consist of core counts for one hour before peak tide to one hour after.

Spotted Crake Surveys

2.24 Species specific surveys for spotted crake (*Porzana porzana*) were also undertaken after an individual of this species was incidentally recorded within the Kent Project Site during another survey on 02 June 2020. A targeted nocturnal survey was subsequently undertaken between 23:00 19 June 2020 and 03:00 on 20 June 2020 by two surveyors and involved a targeted survey of wetland habitat using sound recording equipment.

2.25 Full details of the breeding bird, passage bird and spotted crake surveys can be found in **Annex EDP 4** and on **Plans EDP 8** to **10**.

Bat Surveys

2.26 Full details of bat surveys being undertaken across the Project Site are provided in **Annex EDP 5**, and on **Plans EDP 11** to **15**. A summary of the survey effort is provided below.

Bat Roosting – Trees

Preliminary Roost Assessment

2.27 The Kent Project Site supports a small number of trees that were identified as being potentially suitable for roosting bats. As such, to determine the potential impacts of the Proposed Development on bats potentially roosting within trees, all trees across the Kent Project Site were subject to a preliminary ground-level visual assessment in June 2020 by a suitably experienced ecologist. These are shown on **Plan EDP 11**. The Essex

[9] British Trust for Ornithology. Common Bird Census. www.bto.org.
[10] Morgan, R. A. and Glue, D. E. (1981) Breeding survey of black redstarts in Britain, 1977. Bird study 28: 163-168
[11] Brown, A. F. and Shepherd, K. B. (1993) A method for censusing upland breeding waders. Bird Study, 40, pp. 189-195.

Project Site does not support any trees that will be affected by the Proposed Development.

Presence/Absence surveys

2.28 Upon completion of the preliminary tree roost assessment, a total of 15 trees were considered to have high potential to support roosting bats, two were considered to have medium potential and two considered to have low potential as shown on **Plan EDP 11**. Once the development layout is fixed, if any of the high/medium potential trees are to be affected, they will be subject to aerial tree surveys to confirm the presence/likely absence of roosting bats.

2.29 In accordance with the Good Practice Guidelines[12], the following survey effort will be applied:

- Low potential = no further surveys;
- Medium potential = two survey visits, May to September with at least one survey between May and August; and
- High potential = three survey visits, May to September with at least two surveys between May and August.

Bat Roosting – Buildings/Structures

Preliminary Roost Assessment

2.30 There are also a number of buildings within the Project Site potentially suitable to support roosting bats. A preliminary external roost assessment of buildings across the Manor Way Industrial Estate was undertaken on 01 May 2020, with further site visits conducted on 07 July 2020, 15 July 2020 and 17 July 2020, and informed the level of further survey effort to be undertaken. These buildings are shown on **Plan EDP 12**.

2.31 Subject to landowner permission and assuming internal inspections can be undertaken without contravening Government guidance in relation to social distancing due to the COVID-19 pandemic, internal inspections will take place of all buildings to be demolished or otherwise affected by the Proposed Development.

2.32 In light of the 'lockdown' and social distancing measures imposed as a result of the COVID-19 virus global pandemic, it is unlikely that internal access to buildings will be possible. In this instance, a precautionary approach to the assessment of bat roost potential will be followed based on the nature/fabric/use/location of the building using the professional judgement of a bat licenced Ecologist.

[12] Collins, J (ed) (2016) Bat Surveys for professional ecologists: Good Practice Guidelines. (3rd edn) Bat Conservation Trust, London.

Hibernation Survey

2.33 A wintertime hibernation survey was completed of the tunnel within the south-west corner of Craylands Pit (see **Plan EDP 12**) on 24 February 2020 by a bat licenced ecologist to check for the presence of, or potential to support, hibernating bats. These tunnels are shown on **Plan EDP 13**.

Presence/Absence surveys

2.34 Upon completion of the external preliminary roost assessment, two buildings were considered to have high potential for roosting bats, nine to have moderate potential and 14 to have low potential. An additional 60 buildings are 'requiring further assessment' as access limitations prevented a full visual inspection, as illustrated on **Plan EDP 12**.

2.35 Subject to landowner permission, detailed emergence/re-entry surveys to confirm the presence/likely absence of roosting bats within those buildings identified as high, medium or low potential will be undertaken.

2.36 The scope of emergence/re-entry surveys will be informed by industry-standard best practice guidance, namely the Bat Conservation Trust's Bat Surveys for Professional Ecologists, Good Practice Guidelines, 3rd edition[13]. In accordance with these guidelines the following survey effort will be applied where possible:

- Low potential = one survey visit, May to August;
- Medium potential = two survey visits, May to September with at least one survey between May and August; and
- High potential = three survey visits, May to September with at least two surveys between May and August.

Activity Surveys

2.37 Bat activity surveys will be undertaken at the Kent Project Site, comprising a combination of manual transect surveys and automated detector surveys between May and September 2020 as shown on **Plan EDP 13**. No activity surveys will be conducted at the Essex Project Site which supports predominantly hardstanding and built development of negligible value to foraging/ commuting bats.

2.38 Bat activity transect surveys were completed in May and June 2020 (as shown on **Plans EDP 14** and **15**), and further surveys will be undertaken during July, August and September 2020 to determine the usage of the Kent Project Site by bats. Surveys were/will be undertaken with reference to the Bat Conservation Trust Guidelines[14] for a site with '*moderate suitability habitat for bats*' and include seven walked transects which

[13] Collins, J (ed) (2016) Bat Surveys for professional ecologists: Good Practice Guidelines. (3rd edn) Bat Conservation Trust, London.

cover all suitable bat foraging habitat. In addition, 16 static, automated bat detectors were also/will also be deployed across the Kent Project Site to record for a period of five nights in each of the survey months.

Dormouse Survey

2.39 Records of dormouse were returned during the updated 2020 Desk Study and during the previous desk study conducted in 2015, as shown on **Plan EDP 16**. Therefore, owing to the suitability of the continuous scrub and woodland habitat within the Kent Project Site, a sample of these habitats will be surveyed, which will include much of the edge habitat along the Ebbsfleet Valley and Swanscombe Peninsula, including Station Quarter North and South, the former landfill adjacent to Ebbsfleet International, Bamber Pit, the Sportsground and Botany Marsh as shown on **Plan EDP 16**. The survey methodology is a nest tube survey to determine the presence/likely absence of dormouse.

2.40 No dormouse surveys are proposed at the Essex Project Site due to lack of suitable habitat.

2.41 Full details of the dormouse survey are provided in **Annex EDP 6** and on **Plans EDP 16** and **17**.

Badger Survey

2.42 The Kent Project Site offers suitable foraging and sett building opportunities for badger. A detailed badger walkover survey was undertaken in conjunction with the Extended Phase 1 Survey by a suitably experienced surveyor to determine the presence and distribution of badgers and their setts across the Kent Project Site, and the current (breeding) status of any setts present.

2.43 During the detailed survey, any signs of badger activity were recorded, including the following:

(i) Setts, the number of entrances and any evidence of current use;

(ii) Tracks that are confirmed as badger pathways (i.e. there is a clear link to a sett or there is additional evidence of badger activity nearby such as latrines, hairs, footprints or feeding signs); and

(iii) The presence of discarded bedding, hairs, footprints, latrines and feeding signs.

Otter and Water Vole Survey

2.44 There are a number of ditches in the marsh areas and the River Ebbsfleet within the Kent Project Site that support suitable habitat for water vole and otter.

2.45 A water vole survey was/will be carried out on these ditches during June and August 2020 to determine presence or absence. Due to health and safety constraints, and difficulty in

accessing the banks due to dense vegetation, the standard survey methodology which involves searching the banks of each ditch for evidence of water voles was not possible. Therefore, as per best practice guidelines in these situations[15], Styrofoam rafts were deployed to act as artificial latrine sites. A total of 193 Styrofoam rafts were deployed on 02 and 10 June 2020 within the most suitable and accessible ditches, and in the River Ebbsfleet, as shown on **Plan EDP 18**.

2.46 A visual inspection of the watercourses for characteristic signs of otters, such as prints, tracks, spraints, feeding remains and resting sites/holts was also undertaken where possible. Features considered to have the potential to be used as holts were also documented during the survey.

2.47 Full details of the water vole and otter survey can be found at **Annex EDP 7**.

2.48 No water vole or otter surveys will be conducted at the Essex Project Site due to lack of suitable habitat.

Harvest Mouse Survey

2.49 Harvest mouse evidence was found on the Kent Project Site during the 2015 surveys. Therefore, to determine if harvest mice remain present on the Kent Project Site, a hand search of tall grassland/ruderal/scrub vegetation for the presence of harvest mouse nests will be undertaken.

2.50 The survey will require a team of surveyors systematically hand searching through grassland to search for abandoned summer nests. The survey will need to be completed in the winter prior to December, to try and avoid nests being destroyed through stormy weather. The survey area will be confined to Swanscombe Peninsula and suitable habitat within Station Quarter and surveys are anticipated to take place between 27 and 29 October 2020, subject to prevailing weather conditions at the time.

Great Crested Newt Survey

2.51 There are several ponds and ditches on both the Kent Project Site and the Essex Project Site and within 250m of the Project Site boundary at the time of surveying. For the purposes of this report, the ponds have been numbered as **P1** to **P33** and ditches as **D1** to **D43** and their locations are shown on **Plan EDP 19**.

2.52 A total of 8 ponds and 21 ditches were tested for great crested newt (GCN) environemtal DNA (eDNA) during the 2020 breeding season. Full details are provided in **Annex EDP 8**.

Reptile Survey

2.53 Many records of all four common and widespread British reptile species were returned during the desk study and populations of grass snake (*Natrix natrix*), slow worm and

[15] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)

common lizard were found on the Kent Project Site during the 2015 surveys as shown on **Plan EDP 20**.

2.54 Therefore, an artificial refugia survey across a sample of suitable habitats within the Kent Project Site is being conducted. This includes representative parts of the Kent Project Site apart from the central grazed areas of Botany Marsh West (the track and ditch banks immediately to the west will be surveyed) and the industrial estate. Edge habitats will be surveyed around the former landfill site. No reptile surveys are proposed at the Essex Project Site due to lack of suitable habitat.

2.55 The location of reptile refugia are shown on **Plan EDP 20** and full details of the reptile survey are provided in **Annex EDP 9** and **Plan EDP 21**.

Invertebrate Surveys

Invertebrate Scoping Study

2.56 An invertebrate habitat scoping study to highlight which areas of the Project Site should be prioritised for further survey, was conducted during two periods; 14 to 16 April 2020, and 20 to 22 April 2020.

2.57 The Project Site was walked and both terrestrial and aquatic habitats and habitat features with potential to support significant invertebrate assemblages/key species, target-noted, mapped and geo-referenced. Habitat was assessed in terms of topography, substrate and general vegetation composition and structure.

Terrestrial Invertebrate Surveys

2.58 Terrestrial invertebrate fieldwork will be undertaken over four separate sampling events; in Mid-May, June, July and late August 2020.

2.59 Sampling will be undertaken using a combination of standard capture methods enabling subsequent analysis using Pantheon. Where possible, sampling will be undertaken during periods of dry, sunny and relatively windless weather.

2.60 Although the precise approach to sampling varies according to habitat, it is expected that a combination of two or more of the following sampling methods would be used:

- Sweep-net;
- Vacuum Sampling;
- Direct Searching;
- Spot Sampling;
- Beating Tray;

- Pitfall Trapping;
- Water Traps; and
- Flight Interception Traps.

2.61 Specimens not identified in the field will be identified using a binocular microscope and appropriate taxonomic keys as required. If necessary, specialist verification of rare or uncommon species will be sought from the appropriate county recorder or expert in the relevant species group, also samples may be subcontracted to suitably qualified and experienced third parties for identification if required.

2.62 Full details of the terrestrial invertebrate survey methodology are provided in **Annex EDP 10**.

Aquatic Invertebrate Surveys

Standing Waterbodies

2.63 Aquatic invertebrate samples will be undertaken over two, discrete sampling events. The first sampling period took place during May 2020 alongside terrestrial sampling, with additional sampling in July, and further sampling will be conducted alongside the corresponding August terrestrial sampling event.

Sample Site Selection and Collection of Macroinvertebrate Samples

2.64 Where a number of waterbodies occur on a single survey area, samples will be taken from a sufficient range of waterbodies to represent the area as a whole and sampling would be prioritised in waterbodies exhibiting habitat characteristics of highest potential to support macroinvertebrate assemblages of higher conservation value. The locations where samples have been collected from are shown on **Plan EDP 22**.

2.65 Each aquatic invertebrate sample will be collected by a three-minute sweep method from a sufficient range of representative meso-habitats to adequately cover the main invertebrate niches of the waterbody.

2.66 Each sample will be either sorted in-situ or preserved and transported to the laboratory for washing sorting and identification.

Washing, Sorting and Identification of Samples

2.67 If not sorted in situ, each sample will be thoroughly washed and graded by rinsing through a series of different sized meshes.

2.68 Samples will then be identified to family level, enabling (if required) Biological Monitoring Working Party (BMWP) and Average Score Per Taxon (ASPT) scores to be calculated for

the sample, and where appropriate to species level, for the requirements of Pantheon analysis alongside terrestrial data. Full details can be found in **Annex EDP 11**.

River Ebbsfleet

2.69 To assess current biological water quality of the River Ebbsfleet and establish a baseline against any future monitoring scheme required to ensure future compliance of development with the objectives of the Water Framework Directive (WFD) (2000/60/EC) the aquatic invertebrate community was sampled at four locations along the length of the Rivers Ebbsfleet as illustrated in **Plan EDP 23**.

2.70 Sampling of the watercourse was undertaken on 26 May 2020 by a suitably qualified ecologist. Further sampling is proposed for completion during autumn (September/October) 2020.

2.71 At each location a single three-minute kick/sweep sample was collected. Additionally, a further one-minute hand search of submerged stones, woody debris, plants and tree roots was undertaken to capture any animals that might have evaded the kick/sweep sample. Each sample was then transferred to a sealed plastic sample pot and preserved in 90% Industrial Methylated Spirit for future washing, sorting and identification.

Washing, Sorting and Identification of Samples

2.72 Samples will be washed using a 500µm sieve to separate preservative and fine silt from the retained sample fraction. Specimens will be identified to species level (or as far as possible) with the aid of dichotomous keys.

2.73 From the taxonomic data, a suite of standards biotics indices will be calculated including BWMP, ASPT and N-Taxa (Number of Scoring Taxa) which together provide a standard measure of biological quality and indicate background levels of organic pollution. The Community Conservation Index (CCI) Score will be assigned to each taxon to evaluate the conservation value of the invertebrate community. Further details can be found in **Annex EDP 11**.

Previous Ecology Assessments

2.74 The Kent Project Site has previously been subject to a suite of ecological baseline surveys as set out in the following reports prepared in 2012/2013 and 2015/2016:

- 2012 Desk Study and Phase 1 Habitat Survey Report (CBA, 2012) (**Annex EDP 12**)
- 2012 Botanical Survey Report (CBA, 2012) (**Annex EDP 13**)
- Phase 1 and Botanical Survey Report (CBA February 2016) (**Annex EDP 14**)
- 2012/13 Wintering Birds Survey Report (CBA, 2013) (**Annex EDP 15**)

- Wintering Bird Survey Report (Corylus Ecology April 2016) (**Annex EDP 16**)
- 2012 Breeding Birds Survey Report (CBA, 2012) (**Annex EDP 17**)
- Common Bird Survey Report (Corylus Ecology April 2016) (**Annex EDP 18**)
- Bat Activity Report 2015 (Corylus Ecology June 2016) (**Annex EDP 19**)
- Dormouse Report (Corylus Ecology February 2016) (**Annex EDP 20**)
- 2015 Badger Survey Report (CBA February 2016) (**Annex EDP 21**)
- 2015 Water Vole Survey Report (CBA February 2016) (**Annex EDP 22**)
- 2015 Harvest Mouse Survey Report (CBA February 2016) (**Annex EDP 23**)
- 2012 Amphibian Survey Report (CBA, 2012) (**Annex EDP 24**)
- 2015 Amphibian Survey Report (CBA February 2016) (**Annex EDP 25**)
- 2015 & 2016 Reptile Survey Report (CBA August 2016) (**Annex EDP 26**)
- 2012 Terrestrial Invertebrate Survey Report (CBA, 2012) (**Annex EDP 27**)
- Invertebrate Survey and Assessment of the London Paramount Entertainment Resort 2015 (Edwards Ecological Services, 2015) (**Annex EDP 28**)
- 2012 Terrestrial Invertebrate Survey Supplementary Report (Spiders [Araneae] and related groups) (CBA, 2012) (**Annex EDP 29**)
- An ecological survey of the waterbodies and wetlands on and around the Swanscombe Peninsula, Kent (Aseda, 2016) (**Annex EDP 30**)
- A targeted ecological survey of selected waterbodies and wetlands on the Swanscombe peninsula, Kent (Aseda, 2016) (**Annex EDP 31**)
- Fish survey of Swanscombe Marshes (Colclough and Coates, 2015) (**Annex EDP 32**)
- Fish survey of the Ebbsfleet Stream (Colclough and Coates, 2015) (**Annex EDP 33**)

2.75 The findings of the 2019/2020 surveys are discussed in relation to the previous surveys in **Section 3** of this report.

Surveys Scoped Out

2.76 Based on survey information gathered in 2015 (as summarised in **Annex EDP 32** and **Annex EDP 33**), which recorded very few fish species within the Thames Estuary, Swanscombe Marshes, and the Ebbsfleet Stream, it is considered that any effects of the Proposed Development on fish populations potentially present are unlikely to be significant, in EIA terms. Effects on this receptor have therefore been scoped out of the assessment.

2.77 Although effects on fish populations are unlikely to be significant, a scoping exercise has also considered the survey and assessment of a local fish population as an indicator of water quality within the River Ebbsfleet. However, survey effort undertaken during 2015 identified a limited fish assemblage constrained by the highly modified nature of the River Ebbsfleet and barriers to migration with subsequent with poor availability of suitable habitat. Populations are thus constrained by the availability of suitable habitat rather than water quality and are unlikely to provide a robust indicator of water quality within the River Ebbsfleet. As such, no further fish surveys are to be undertaken.

Section 3
Results (Baseline Conditions)

3.1 This section summarises the baseline ecological conditions determined through the course of the desk-based and field-based investigations described in **Section 2**. In particular, this section identifies and evaluates those ecological features that lie within the Project Site and its potential ZoI. Where appropriate, further technical details are provided within annexes and on plans to the rear of this report. Throughout this section parts of the Project Site are referred to using commonly used names, as shown on **Plan EDP 1**.

3.2 In 2013, the *UK Biodiversity Action Plan* (UKBAP) Priority Habitats and Priority Species, and the Section 41 Species and Habitats of Principal Importance for Conservation under the *Natural Environment and Rural Communities* (NERC) *Act* 2006, were rationalised. This rationalisation occurred under the *Post-2010 Biodiversity Framework*. As a result, a new list of Priority Species and Priority Habitats is now in operation at the UK level. These new lists supersede the former UKBAP; they are the new 'Biodiversity Indicators' that are used to monitor the status of biodiversity at the UK level. Each of the four devolved countries of the UK also has a similar list. Within England, the new rationalised lists of 24 Priority Habitats and 213 Priority Species are provided in *Biodiversity 2020,* which is the national biodiversity policy for England.

3.3 Within this Ecology Baseline report, where relevant, these species and habitats of national nature conservation priority will therefore be referred to as 'Priority Species' and 'Priority Habitats'[16].

3.4 The guidelines recommend that the value or potential value of an ecological resource or feature should be determined within a defined geographical context, and the guidelines provide a geographical range ('frame of reference') that can be adapted. The geographical frame of reference used in this assessment, based upon the CIEEM guidelines, is as follows:

- International value (SACs, SPAs, Ramsar sites);
- National value (within England), e.g. SSSIs and NNRs;
- Regional value (within south-east England);

[16] Priority habitats and species include those habitats and species which are 'of principal importance for the purpose of conserving biodiversity' under Section 41 of the Natural Environment and Rural Communities Act, 2006, and are therefore a focus for conservation action in England
See the following for more detail:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/382483/2a._priority_habitats2a_2014_final.pdf;
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/382951/Technical_Background_Priority_Species__abundance__2014.pdf;
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/382487/4a_Status_of_Priority_Species_2014_final.pdf

- County value (within Kent or Essex), e.g. Local Nature Reserves, Local Wildlife Sites, ancient woodlands, atypical and diverse species assemblages with good population sizes;

- District value (within the Borough of Dartford, Borough of Gravesend or Thurrock Council), e.g. where species rich/extensive/atypical examples are present – moderate population sizes or species assemblages with moderate to high diversity;

- Local value (within Swanscombe and Greenhithe Civil Parish, Bean Civil Parish, or Southfleet Civil Parish, or the towns of Northfleet, Gravesend or Tilbury), e.g. priority habitats or priority species, and/or common and widespread species with relatively moderate populations and relatively limited diversity;

- Site value (the Project Site and immediate environs), e.g. small areas of common habitats such as species-poor grassland and scrub (common and widespread species with small populations and limited diversity); and

- Negligible value (typically applied to areas of bare open ground/built development/areas of hardstanding).

Designated Sites

3.5 Information regarding designated sites was obtained during the ecological desk study in 2020 and previously in 2012 (as shown in **Annex EDP 12**). Statutory designations (those receiving legal protection) and non-statutory designations (those receiving planning policy protection only) are discussed in turn below.

Statutory Designations

3.6 Statutory designations represent the most significant ecological receptors, being of recognised importance at an international and/or national level. International designations include Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites[17]. National designations include Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs).

International Designations (SPAs/SACs/Ramsar)

3.7 No part of the Project Site is covered by any statutory designations of international importance. However, there are four statutory designations of international importance within 15km of the Project Site. Full details on these designations is provided in **Tables EDP 3.1** and **3.2** and they are displayed on **Plan EDP 2**.

[17] Sites designated under the Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1971.

Table EDP 3.1: International Statutory Designations (SPA/Ramsars) within the Project Site's Potential ZoI

Site Name	Distance and Direction from the Project Site	Site Description	ARTICLE 4.1 QUALIFICATION (79/409/EEC)	ARTICLE 4.2 QUALIFICATION (79/409/EEC)	Ramsar Criterion
Thames Estuary & Marshes SPA/Ramsar	c.3.4km east of the Essex Project Site, and c.7km east of the Kent Project Site	Extensive intertidal mudflats that are visible at low tide. Additionally, there is saltmarsh and complex channel systems.	**Over winter the area regularly supports**: *Circus cyaneus* 1% of the population in GB *Recurvirostra avosetta* (Western Europe/Western Mediterranean - breeding) 28.3% of the population in GB	**Over winter the area regularly supports**: *Calidris alpina* alpine (Northern Siberia/Europe/Western Africa) 2.1% of the population *Calidris canutus* (North-eastern Canada/ Greenland/Iceland/ North-western Europe) 1.4% of the population *Limosa limosa islandica* (Iceland - breeding) 2.4% of the population *Pluvialis squatarola* (Eastern Atlantic - wintering) 1.7% of the population *Tringa tetanus* (Eastern Atlantic - wintering) 2.2% of the population **On passage the area regularly supports**: *Charadrius hiaticula* (Europe/Northern Africa - wintering) 2.6% of the population **AN INTERNATIONALLY IMPORTANT ASSEMBLAGE OF BIRDS** Over winter the area regularly supports: 75,019 waterfowl	**Crierion 2** The site supports more than 20 British Red Data Book invertebrates and populations of the GB Red Book endangered least lettuce (*Lactuca saligna*), as well as the vulnerable slender hare's-ear (*Bupleurum tenuissimum*), divided sedge (*Carex divisa*), sea barley (*Hordeum marinum*), Borrer's saltmarsh-grass (*Puccinellia fasciculata*), and dwarf eelgrass (*Zostera noltei*). **Ramsar criterion 5** Assemblages of international importance: Species with peak counts in winter: 45,118 waterfowl (5 year peak mean 1998/99-2002/2003) **Ramsar criterion 6** Species/populations occurring at levels of international importance. **Species with peak counts in spring/autumn**: **Black-tailed godwit** (*Limosa limosa islandica*) Iceland/Western Europe 1,640 individuals, an average of

Site Name	Distance and Direction from the Project Site	Site Description	ARTICLE 4.1 QUALIFICATION (79/409/EEC)	ARTICLE 4.2 QUALIFICATION (79/409/EEC)	Ramsar Criterion
					4.5% of the population (5 year peak mean 1998/9-2002/3) **Species with peak counts in winter**: **Dunlin** (*Calidris alpina alpine*), Western Siberia/Western Europe 15,171 individuals, an average of 1.1% of the population (5 year peak mean (1998/9-2002/3). **Red knot** (*Calidris canutus islandica*), Western & Southern Africa(wintering) 7,279 individuals, an average of 1.6% of the population (5 year peak mean 1998/9-2002/3).
Medway Estuary and Marshes SPA/Ramsar	13.4km south-east of the Essex Project Site, and c.15.7km east of the Kent Project Site.	The estuary forms a single tidal system with the Swale and joins the southern part of the Thames Estuary between the Isle of Grain and Sheerness.	**During the breeding season the area regularly supports**: *Recurvirostra avosetta* (Western Europe/Western Mediterranean - breeding) 6.2% of the GB breeding population *Sterna albifrons* (Eastern Atlantic - breeding) 1.2% of the GB breeding population *Sterna hirundo*	**Over winter the area regularly supports**: *Anas acuta* (North-western Europe) 1.2% of the population *Anas clypeata* (North-western/Central Europe) 0.8% of the population in GB *Anas crecca* (North-western Europe) 1.3% of the population in GB *Anas penelope* (Western Siberia/North-western/North-eastern Europe) 1.6% of the population in GB *Arenaria interpres* (Western Palearctic -	**Criterion 2a** Site supports a nuber of species of rare plants and animals including sea barley, curved hard grass, annual beard grass, Borrer's saltmarsh grass, slender hare's ear, sea clover, small ghoosefoot, golden samphire, perennial glasswort and one flowered glasswort. At least 12 Red Data book species of wetland invertebrates occur and a

Site Name	Distance and Direction from the Project Site	Site Description	ARTICLE 4.1 QUALIFICATION (79/409/EEC)	ARTICLE 4.2 QUALIFICATION (79/409/EEC)	Ramsar Criterion
			(Northern/Eastern Europe - breeding) 0.6% of the GB breeding population **Over winter the area regularly supports**: *Cygnus columbianus bewickii* (Western Siberia/North-eastern & North-western Europe) 0.2% of the GB population *Recurvirostra avosetta* (Western Europe/Western Mediterranean - breeding) 24.7% of the GB population	wintering) 0.9% of the population in GB *Branta bernicla bernicla* (Western Siberia/Western Europe) 1.1% of the population *Calidris alpina alpina* (Northern Siberia/Europe/Western Africa) 1.9% of the population *Calidris canutus* (North-eastern Canada/Greenland/Iceland/North-western Europe) 0.2% of the population *Charadrius hiaticula* (Europe/Northern Africa - wintering) 1.6% of the population *Haematopus ostralegus* (Europe & Northern/Western Africa) 1% of the population in GB *Limosa limosa islandica* (Iceland - breeding) 12.9% of the population in GB *Numenius arquata* (Europe - breeding) 1.7% of the population in GB *Pluvialis squatarola* (Eastern Atlantic - wintering) 2% of the population *Tadorna tadorna* (North-western Europe) 1.5% of the population	significant number of non wetland Red data book specoes occur. **Criterion 3a** Internationally important wildfowl assemblage (greater than 20,000 birds). **Criterion 3c** Over winter the site regularly supports internationally important populations of dark bellied brent goose, Dunlin, grey plover, knot, pintail, redshank, ringed plover and shelduck.

Site Name	Distance and Direction from the Project Site	Site Description	ARTICLE 4.1 QUALIFICATION (79/409/EEC)	ARTICLE 4.2 QUALIFICATION (79/409/EEC)	Ramsar Criterion
				Tringa nebularia (Europe/Western Africa) 2.6% of the population in GB *Tringa totanus* (Eastern Atlantic - wintering) 2.1% of the population.	

Table EDP 3.2: International Statutory Designations (SACs) within the Project Site's Potential ZoI

Site Name	Distance from Project Site	Description
North Downs SAC	8km south-east of Kent Project Site	Annex I habitats that are a primary reason for selection: • 9130 Asperulo-Fagetum beech forests; and • 91J0 Taxus baccata woods of the British Isles * Priority feature.
Peters Pit SAC	13km south-east of Kent Project Site	Annex II species that are a primary reason for selection of this site: • Great crested Newt for which this is considered to be one of the best areas in the United Kingdom.

National Designations (SSSIs)

3.8 Within the Kent Project Site lies Bakers Hole SSSI, designated for its geological interest. Additionally, within the potential ZoI of the Project Site lie Swanscombe Skull Site SSSI, Lion Pit SSSI, Globe Pit SSSI and Purfleet Chalk pit SSSI which are also designated for geological reasons. These SSSI's will be scoped out of the EcIA as the reasons for designation are not related to ecology.

3.9 In addition, within the potential ZoI of the Project Site, there lies a further seven statutory designations of national importance within 5km of the Project Site plus a further two which lie beyond 5km but are considered based on potential ecological connectivity to the Project Site. Details are provided in **Table EDP 3.3** and sites are shown on **Plan EDP 2**.

Table EDP 3.3: National statutory Designations Within the Potential ZoI of the Project Site

Designation	Distance and Direction from the Closest Project Site	Site Description
Darenth Woods SSSI	Adjacent to the south-west corner of the Kent Project Site	This site comprises some of the most valuable areas of ancient seminatural woodland in north-west Kent and includes several rare woodland types.
West Thurrock Lagoon and Marshes SSSI	1km west of Kent Project site	One of the most important sites for wintering waders and wildfowl on the Inner Thames Estuary. The combination of extensive intertidal mudflats together with a large and secure high tide roost, attracts waders in nationally important numbers, with significant populations of other bird species. The adjacent Stone Ness saltmarsh is noted for the size and character of its high marsh plant community.
Grays Thurrock Chalk Pit SSSI	2km north of Kent Project Site	Natural colonisation of the pit bottom has created a range of woodland, scrub and calcareous grassland habitats that are important for the assemblage of invertebrate fauna they support.

Designation	Distance and Direction from the Closest Project Site	Site Description
Hangmans Wood and Denholes	2.6km north of Essex Project Site	Hangman's Wood deneholes, the remains of medieval chalk mines, provide the most important underground hibernation site for bats in Essex. Three species have been recorded; Brown longeared bat (*Plecotus auritus*), Natterer's bat (*Myotis nattereri*) and Daubenton's bat (*Myotis daubentonii*). A total of 62 were recorded early in 1991.
South Thames Estuary and Marshes SSSI (within Thames Estuary and Marshes SPA)	3km east of Essex Project Site	Forms a major component of the Greater Thames Estuary. An extensive mosaic of grazing marsh, saltmarsh, mudflats and shingle characteristic of the estuarine habitats of the north Kent marshes. Freshwater pools and some areas of woodland provide additional variety and complement the estuarine habitats. Supports outstanding numbers of waterfowl, total counts regularly over 20,000.
Mucking Flats and Marshes SSSI (within Thames Estuary and Marshes SPA)	4km east of Essex Project Site	Comprise an extensive stretch of Thames mudflats and saltmarsh with sea wall grassland. Wintering wildfowl and waders reach nationally and internationally important numbers on the mudflats, roosting and feeding on saltmarsh and silt lagoons.
Shorne and Ashenbank Woods SSSI	5km south-east of both Project Sites	A complex of ancient and plantation woodland and includes a variety of stand-types associated with Tertiary gravels, clays and sands. The site supports an important and diverse invertebrate fauna, especially its Coleoptera (beetles), Hemiptera (true bugs), and Odonata (dragonflies).
Inner Thames Marshes SSSI	5.9km north-west of Kent Project Site	Form the largest remaining expanse of wetland bordering the upper reaches of the Thames Estuary. The site is of particular note for its diverse bird interest and especially for the variety of breeding birds and the numbers of wintering wildfowl, waders, finches and birds of prey.
Medway Estuary and Marshes SSSI	14.5km east of both Project Sites	Form the largest area of intertidal habitats that have been identified as of value for nature conservation in Kent, and are representative of the estuarine habitats found on the North Kent coast. A complex of mudflats and saltmarsh is present with in places grazing marsh behind the sea walls, which is intersected by dykes and fleets.

3.10 In their response to the 2014 Scoping report (Natural England ref: 137264, dated 04 December 2014), Natural England identified that the Proposed Development, which at the time did not include land within the Essex Project Site, has potential to indirectly impact on:

- Darenth Woods SSSI;
- Medway Estuary and Marshes SSSI, SPA and Ramsar Site;
- Rainham Marshes SSSI;
- South Thames Estuary and Marshes SSSI;
- Thames Estuary and Marshes Special Protection Area and Ramsar Site;
- Swanscombe Skull Site SSSI and National Nature Reserve; and
- West Thurrock Lagoon and Marshes SSSI.

3.11 As described above, Swanscombe Skull Site SSSI and NNR, which comprises a landscaped area over deposits rich in fossils, is designated for its geological interest. Owing to its' reason for designation, it is considered that effects upon Swanscombe Skull Site SSSI and NNR are best addressed within the heritage/archaeological chapter.

3.12 It is understood that the reference to Rainham Marshes SSSI in Natural England's comments actually relates to Inner Thames Marshes SSSI, as the Rainham Marshes SSSI does not exist.

3.13 Following review of the SSSIs located within the potential ZoI of the Essex Project Site, as illustrated in **Plan EDP 2**, it is not considered that any of these designations would experience a potential adverse risk due to their geographical separation or lack of effect-receptor pathways.

3.14 Therefore, the following statutory designations will be included within the EcIA as IEFs:

- Thames Estuary and Marshes SPA and Ramsar Site;
- Medway Estuary and Marshes SPA, Ramsar Site and SSSI;
- Darenth Woods SSSI;
- Inner Thames Marshes SSSI;
- South Thames Estuary and Marshes SSSI; and
- West Thurrock Lagoon and Marshes SSSI.

Non-statutory Designations

3.15 Non-statutory designations are also commonly referred to in planning policies as 'local sites', although these designations are typically considered to be important at a county level. In Kent, and Essex, such designations are referred to as Local Wildlife Sites (LWSs).

3.16 Additional designations which should be considered at this level include Local Nature Reserves (LNRs) and Ancient Semi-natural Woodland (ASNW) where these are not covered by other designations.

3.17 Within the Kent Project Site, there lies the Botany Marshes LWS. This LWS, along with 18 other LWSs that occur within a 2km radius (potential ZoI) of the Project Site, are described in **Table EDP 3.4** and shown in **Plan EDP 3**.

Table EDP 3.4: Local Wildlife Sites Within the Potential ZoI of the Kent Project Site

Site Name and Reference (Plan EDP 3)	Location	Reason for Designation
Botany Marshes (GR19)	Within the Kent Project Site	Important owing to the presence of reedbed and the potential for ditch & grazing marsh restoration. Reedbed and grazing marsh are of principal importance in England. Also supports three species of reptile, water vole, otter and is of value to birds.
Ebbsfleet Marshes, Northfleet (GR05)	Southern part in the Kent Project Site	Designated for its range of habitats including reedbed, calcareous stream, lake, scrub, woodland, calcareous and neutral grassland. Protected species have been recorded including reptiles and great crested newts.
Alkereden Lane Pit (DA13)	Adjacent to the NW of the Kent Project Site	Contains nationally scarce plants and Kent's largest population of *Epipactis phyllanthes*. Also contains *Pyrola rotundifolia* and several species of nationally rare and scarce invertebrates.
Bluewater Quarry (DA1)	Adjacent to the W edge of Kent Project Site	Geological interest.
Disused Hospital Grounds, Mabledon (DA12)	1.45km SW of Kent Project Site	Designated for its chalk habitats including chalk grassland. The designation contains mixed scrub. The habitats within the designation support reptiles and lepidoptera.
Green Street Common (DA01)	1.5km SW of Kent Project Site	Designated for its acid grassland, which supports four plant species that are of county or national importance. The designation also supports a range of lepidoptera species.

Site Name and Reference (Plan EDP 3)	Location	Reason for Designation
Th37. Tilbury Marshes (39.8ha)	Immediately to the E of the Essex Project Site	Relict grazing-marsh, brackish ditches and the outer moats and grasslands of Tilbury Fort. Supports a diverse saltmarsh flora, with species such as *Juncus gerardii, Salicornia spp.*, *Aster tripolium*, *Suaeda maritima* and the nationally scarce *Puccinellia rupestris* and *Hordeum marinum*. Grazing land supports a good grazing-marsh flora, with many Nationally Scarce plants such as *Carex divisa. Bupleurum tenuissimum*, with some *Ranunculus sardous, Galium verum. Lotus glaber [tenuis*]. *Parapholis sp.* and *Spergularia spp*. The north-western section lies adjacent to the now-lost "Ferry Fields" grassland, an important invertebrate habitat destroyed by development, but some of the key species may survive on these remaining fragments.
Th39. Lytag Brownfield (12.4ha)	c.650m NE of Essex Project Site	Populations of all four Essex reptiles *Vipra beris, Natrix natrix. Zootoca vivipara* and *Anguis fragilis*, making this one of the more important reptile sites in the borough. Extensive developing acid grassland, which falls within the remit of the Essex heathland BAP project. Such brownfield sites are also likely to be of interest for their invertebrate populations, but no data is currently available. However, given the presence of UK BAP invertebrates on similar habitats around Th40, it is likely that an important fauna will be present here.
Th40. Tilbury Centre (2.8ha)	c.900m E of Essex Project Site	Comprises the grounds surrounding the Tilbury Energy and Environment centre. A complex mosaic of grassland, flower-rich early successional/pioneer vegetation, ditches, a small reedbed and a pond, notable for its colony of *Chara sp*. and the nationally rare (Red Data Book) *Hydrophilus piceus*. The pioneer vegetation includes abundant *Lotus corniculatus*, on which the national BAP bumblebees *(Bombus humilis*) forages. Other important invertebrates have been recorded.
Th15. West Thurrock Reedbed (2.8ha)	2km NW of Kent Project Site	Reedbed that forms a significant habitat extension to the bordering LWS (Th18) and the West Thurrock Lagoons and Marshes SSSI. Both Reed and Sedge Warbler have been recorded. One of the largest continuous blocks of reedbed habitat left in Thurrock.

Site Name and Reference (Plan EDP 3)	Location	Reason for Designation
Th18. West Thurrock Lagoon (20.5ha)	1.5km NW of Kent Project Site	Former pulverised fuel ash dump that has developed a complex vegetation mosaic and supports an exceptionally diverse and important invertebrate fauna. Peripheral ditches support bands of reedbed, complementing the West Thurrock Reedbed Site. Flora includes plants normally associated with chalk grassland, such as *Blackstonia perfoliata* and *Inula conyzae*, and a suite of saltmarsh species, such as *Aster tripolium, Scirpus maritimus*, *Puccinellia* spp. and *Spergularia marina.* The remaining areas of dry grassland are species-rich and provide foraging for the invertebrates. At least 59 Essex Red Data List species have been recorded.
Th22. Grenville Road Grasslands (1.3ha)	2km NW of Kent Project Site	The western boundary of the old Mill Wood Pit, an important invertebrate site that has been all but lost to the housing development. Small chalk bank and part of the associated railway line cutting still supports an interesting flora and an insect assemblage that includes *Myrmeleotettix maculatus*. This is rare in Essex and this is its only known location in Thurrock and only third known in south Essex. Site supports at least eight other Essex Red Data List species.
Th23. Anchor Field (3.3ha)	1.8km NW of Kent Project Site	Principal value is the invertebrate interest, which includes possibly the largest British population of the national BAP fly *Dorycera graminum*. Includes many nationally rare and scarce species and over 40 Essex Red Data List species. Also supports adder (*Vipera berus*), common izard and slow-worm.
Th24. Mill Wood and Cliff (3.5ha)	2km NW of Kent Project Site	Thought to be an ancient woodland fragment. Ancient woodland ground flora plants are rather sparse but *Conopodium majus* and Euphorbia *amygdaloides* occur sparingly. The southern fringe supports a rather trampled acid grassland flora, characterised by *Centaurium erythraea*, *Pilosella officinarum*, *Odontites vernus*, *Trifolium arvense* and *Trifolium campestre*. Lower slopes towards the cliff support two chalk grassland species: *Inula conyzae* and *Anthyllis vulneraria*. The cliff is a small remnant of the once vast and regionally, if not nationally, important Mill Wood Pit. This supported an exceptional invertebrate fauna. The cliff here supports many Essex Red Data List invertebrates.
Th28. Lion Gorge (7.4ha)	1.7km NW of Kent Project Site	Comprises steep, wooded chalk cliffs (from quarrying) capped with sand and gravel deposits with relic grassland and scrub, forming an unusual habitat assemblage. *Daphne mezereum*, though possibly introduced, has been recorded. Old quarry tunnels at the back of the Gorge are important for bats. The invertebrate fauna includes five nationally rare (Red Data Book) species, including two UK BAP species.

Site Name and Reference (Plan EDP 3)	Location	Reason for Designation
Th31. Grays Pit Extensions (5.9ha)	1.9km N of Kent Project Site	The core of the Grays Chalk Pit nature reserve is a SSSI and excluded from the LWS network. The eastern section is an area of grassland lying on the chalk at the edge of the old quarry, whilst the main section to the west is more akin to brownfield land, being re-landscaped and disturbed ground. Provides an important ecological corridor to other LWS to the west, most notably Lion Gorge and Warren Gorge.
Th38. Broom Hill (11.3ha)	1.9km N of Essex Project Site	Hilltop site of interest for its ancient acid-grassland flora, particularly *Scilla autumnalis* along with *Saxifraga granulata*, *Potentilla argentea* and many legumes. Such acid grasslands fall within the remit of the Essex Heathland BAP. Invertebrate populations are of exceptional importance, this being one of the key Thames Terrace grassland sites in Thurrock. The invertebrates include seven nationally rare (Red Data Book) species, 39 Nationally Scarce species and over 120 Local species.
Th49. Goshems Farm (74.0ha)	1.9km E of Essex Project Site	Old landfill area that supports two important species: the Red Data Book plant *Chenopodium vulvaria* and the national BAP Hornet Robberfly (*Asilus crabroniformis*). Other plants on the Essex Red Data List, are *Chenopodium chenopodioides* and *Marrubium vulgare*.

Note: N = north, S = south, E = east, W = west

3.18 Also considered at this level is the Greater Thames Marshes Nature Improvement Area (NIA). NIAs seek to protect and enhance certain habitat types within a target area, in this case wetland habitats in particular. The Greater Thames Marshes NIA takes in the majority of the north Kent and South Essex coastlines and aims to provide additional coastal/floodplain grazing marsh within this area through targeted enhancement of improved grassland.

3.19 Of those non-statutory designations described within **Table EDP 3.4**, it is considered that only those occurring within the DCO boundary or within its immediate surroundings will be at potential risk from the Proposed Development. On this basis, the following LWSs will be scoped into the EcIA as IEFs requiring further consideration:

- Botany Marshes LWS;
- Ebbsfleet Marshes, Northfleet LWS;
- Alkerden Lane Pit LWS; and
- Tilbury Marshes LWS.

3.20 The remaining non-statutory designations are not considered to be affected by the Proposed Development and have been scoped out of the EcIA as an IEF owing to their

spatial separation and/or lack of ecological connections with the Project Site. Bluewater Quarry LWS is scoped out of the EcIA as its reasons for designation is due to its geological rather than ecological interest.

Habitats/Flora

3.21 The distribution of the different habitat types within and adjacent to the Project Site, confirmed through the 2020 Extended Phase 1 Habitat survey and detailed botanical survey, are illustrated on **Plan EDP 4** and **Plan EDP 5**. In addition, detailed descriptions of these habitat types, together with illustrative photographs, are provided in **Annex EDP 1**. A summary and qualitative assessment of these habitats is provided in **Table EDP 3.5**.

Table EDP 3.5: Summary of Habitats within the Project Site

Habitat/Flora	Distribution within the Project Site	Intrinsic Ecological Importance
Rare plants	Populations of 13 nationally scarce species were found on Swamscombe Peninsula in the Kent Project Site in 2016[18]. Eight were refound in 2020.	**National**, nationally scarce.
Broad-leaved semi-natural woodland	Mainly in the South along the A2 corridor, some along the eastern boundary.	**Local**, owing to connectivity, good canopy species diversity, ground flora diversity and status as a Priority Habitat.
Broad-leaved plantation woodland	Many areas throughout the Project Site.	**Site**, as small in extent and immature planting.
Scrub	Many areas throughout the Project Site.	**Local**, despite being a common habitat, due to extent and structure.
Tall ruderal	Small extent in station quarter south.	**Site**, owing to small extent and low species diversity.
Arable	Small areas in A2 corridor.	**Negligible**, owing to low species diversity and high levels of disturbance and management.
Improved grassland	Small area in A2 corridor.	**Site**, owing to low species diversity.
Poor semi-improved grassland	Botany marsh east, Broadness grasslands and former landfill.	**Local**, species diversity is low across most of extent, but forms large area of continuous habitat.
Semi-improved neutral and calcareous grassland	Neutral grassland in Broadness Grassland area and to the west of Black Duck Marsh, calcareous grassland in Craylands Pit, Black Duck Marsh and north of Tiltman Lane.	**Local to District**, some areas of lower botanical diversity but supports nationally scarce plant species. One small area of MG1d grassland in Broadness Grassland with increased value.

[18] **Annex EDP 14**

Habitat/Flora	Distribution within the Project Site	Intrinsic Ecological Importance
Coastal/Floodplain Grazing Marsh	Botany Marsh West.	**District**, a large area of Priority Habitat[19] coastal/floodplain grazing marsh.
Open mosaic on previously developed land	Bamber Pit and along main access track (including tunnel storage area).	**District**. Priority Habitat[20] forming a reasonable area just to the north of Manor Way Industrial Estate. The areas are not floristically diverse but have the potential to support important invertebrate assemblages.
Amenity grassland and shrub	Small area concentrated around Northfleet and road- and trackside verges.	**Negligible**, owing to low species diversity, intensive management.
Marshy grassland	Small area in station quarter south.	**Site** owing to small extent and limited species diversity.
Waterbodies (ponds, standing water and ditches)	Scattered throughout the Project Site, ditches forming two main networks at Black Duck and Botany Marshes.	**District** –many ponds are leachate treatment lagoons or contaminated by leachate. The remaining ponds and ditches support little vegetation other than reeds. Ditch network forms part of a large marsh area including Botany Marshes LWS and adjacent grazing marsh and is considered of district level.
Swamp (reedbed)	Black duck Marsh and CTRL Wetland form extensive reedbed, smaller areas exist within Botany Marsh East and along ditch network.	**County** - Priority Habitat forming a large area of the Project Site in close proximity to the River Thames.
Bare ground	Mostly around Manor Way industrial Estate.	**Negligible**, no species diversity and surrounded by buildings.
Hardstanding and buildings	Mostly around Manor Way industrial Estate, station quarter and the Essex Project Site	**Negligible**, man-made structures.
River Ebbsfleet	Along the Eastern boundary of the Kent Project Site.	**Local**, as this river corridor and its associated riparian habitat provide a green corridor.

3.22 As shown on **Plan EDP 4**, the Essex Project Site comprises predominantly hardstanding, being occupied by a large area used for vehicle storage, and buildings associated with Tilbury Ferry Terminal. There are small linear areas of poor semi-improved grassland and scrub adjacent to seasonally wet ditches along the A1089, which traverses the western part of the Essex Project Site.

[19] UK Biodiversity Action Plan Priority Habitat Descriptions Coastal and Floodplain Grazing Marsh From: UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008

[20] UK Biodiversity Action Plan Priority Habitat Descriptions Open Mosaic Habitats on Previously Developed Land (Updated July 2010) From: UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008

3.23 The Kent Project Site supports a range of habitats including, intertidal sediment, saltmarsh, wetlands, including running water (the River Ebbsfleet), open water (ponds), reedbed/swamp and ditch networks, a range of grasslands and open mosaic habitats, arable, scrub, woodland, chalk cliffs/exposures, buildings and bare ground. The saltmarsh and intertidal habitat are described and valued in Chapter 12 of the Preliminary Environmental Impact Report (PEIR). It also supports populations of several rare plant species as shown on **Plan EDP 5**.

3.24 The following habitats, being of Local value or higher, will be taken forward for further consideration in the EcIA as IEFs:

- Rare plants;
- Reedbed/swamp;
- Coastal/floodplain grazing marsh;
- Open mosaic habitats on previously developed land;
- Semi-improved grassland (including areas of poor semi-improved grassland, and semi-improved neutral and calcareous grassland);
- Scrub;
- Broadleaved semi-natural woodland; and
- The River Ebbsfleet.

3.25 These habitats, together with a number of the habitats or other features present within the Project Site, also require consideration in relation to their importance in maintaining populations of protected and/or notable species, as discussed further below.

Protected and/or Notable Species

3.26 The likelihood or confirmed presence of protected/and or notable wildlife species within the Project Site is summarised below with reference to previous survey work, updated desk study records, habitat suitability and detailed surveys where relevant. Further details are made available within annexes and plans where referenced.

3.27 Where a particular species or taxonomic group has been confirmed to be present, or presence is inferred based on habitat suitability, the ecological value or significance of the population or assemblage is assessed on the geographical scale in paragraph 3.4.

3.28 A summary of previous survey findings and the updated 2020 record centre returns can be found at the beginning of each species section.

Birds

Wintering Birds

Previous Surveys

3.29 In 2015, the total number of wetland species (including birds of prey) recorded over the two wintering bird survey periods of 2012/13 and 2014/15 was 42 with additional wetland bird species incidentally or by London Bird Club. Six birds of prey species were recorded during the wintering bird and marine mammal surveys and three Kent RDB3[21] species were recorded over the two survey periods and from records from the London Bird Club, none have been recorded as regularly occurring species. The wintering bird assemblage was "*considered to be of County Importance*"[22].

2019/2020 Update Surveys

3.30 A combined total of up to 44 species were recorded during 2012/13, 2014/15 and 2019/20 intertidal and high tide surveys. Of the 30 Ramsar/SPA/SSSI qualifying species mentioned in the designation citations, a total of 22 have been recorded either low or high tide. Of the 22 Ramsar/SPA qualifying species which have stated peak population counts, EDP recorded an overall total of 12 over the course of the 2019/20 high and low tide surveys, with the numbers recorded during surveys at either low or high tide between 0.07% and 8.66% of the peak population counts stated in the citations.

3.31 In 2019/2020 it was concluded that the Project Site itself is not regarded to have value at the International level. However, the wintering wader/wildfowl assemblage present within inland areas of the Kent Project Site (namely Botany Marsh West and Blackduck Marsh), given their status as 'functionally linked' to the estuary assemblage, must be valued at the International level for nature conservation value. Botany Marsh West and Black Duck Marsh are considered locally important areas at dawn (rest)/ high tide (refuge) for small numbers of several target species.

3.32 Additionally, 28 other terrestrial species (non-wader, non-wildfowl species) of conservation concern were also recorded in generally low to moderate numbers, typically relating to individuals or small flocks of each species recorded on one or two survey visits, but also including a high diversity and reasonable numbers of Schedule 1 Birds[23] and Birds of Conservation Concern. Therefore, the terrestrial wintering bird assemblage present within the Kent Project Site should be considered separately and is of County Importance. Full details can be found in **Annex EDP 3**.

[21] RDB3 = Kent Red Data Book 3 - Rare Species that have been recorded in 6-10 tetrads
[22] **Annex EDP 16** using data from **Annex EDP 15**
[23] Species listed on Schedule 1 of the Wildlife & Countryside Act (WCA) 1981 (as amended)

Breeding Birds

Previous Surveys

3.33 In 2012, 36 bird species were recorded breeding within the Kent Project Site with a further six species considered likely to be breeding although this could not be confirmed. Of these 42 species, there was only one Schedule 1 species (Cetti's warbler (*Cettia cetti*)) and six Red List species including song thrush (*Turdus philomelos*), cuckoo (*Cuculus canorus*), starling (*Sturnus vulgaris*), dunnock (*Prunella modularis*), linnet (*Linaria cannabina*), lapwing (*Vanellus vanellus*), skylark (*Alauda arvensis*) and reed bunting (*Emberiza schoeniclus*)[24].

3.34 In 2016, it was found that the breeding bird assemblage within the Swanscombe Peninsula fulfilled the Kent Wildlife Trust criteria to be considered of County Importance[25]. However, based on the range of species of conservation importance recorded it was considered that the Swanscombe Peninsula should be considered as being of at least Regional Importance for its breeding birds, as it supported:

- At least three WCA Schedule 1 species breeding in 2015;
- 11 Birds of Concervation Concern (BoCC) Red List species and Priority Species; and
- Seven species monitored by the Rare Breeding Bird Panel.

3.35 The three other survey areas, Bamber Pit, Northfleet Landfill and Station Quarter South supported fewer bird species and fewer of the species of conservation importance. The evaluations of these areas is set out below:

- Botany Marshes – Local Importance
- Station Quarter South – Local Importance
- Northfleet Landfill – Neighbourhood Importance.

2020 Surveys

3.36 KMBRC returned numerous bird records for the Kent Project Site, 89 of which have been confirmed to have bred on at least one occasion. Of those 89, 37 are considered to be BoCC[26] with 21 (24%) within the Red List[27] and 16 (18%) within the Amber List[28]. The

[24] **Annex EDP 17**

[25] Based on Fuller, R.J., A method for assessing the ornithological interest of sites for conservation. Biological Conservation Volume 17, Issue 3, April 1980, Pages 229-239 and Local Wildlife Sites in Kent, Criteria for Selection and Delineation Version 1.5, Kent Wildlife Trust, August 2015. Report found in Annex EDP 18

[26] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708–746.

[27] Red list criteria includes:
Species is globally threatened.
Historical population decline in UK during 1800–1995.

remaining 52 species are not considered to be of conservation concern. The majority of those Red and Amber list species records relate to terrestrial species; however, several wildfowl and waders have also been confirmed to have bred including, redshank (*Tringa tetanus*), mute swan (*Cygnus olor*), greylag goose (*Anser anser*), shelduck (*Tadorna tadorna*), mallard (*Anas platyrhynchos*), shoveler (*Spatula clypeata*) and oystercatcher (*Haematopus ostralegus*).

3.37 Essex Field Club (EFC) returned records of 187 bird species, 72 of which were breeding records. There were no different species recorded. The record resolution was too low to ascertain a distance from either Project Site.

3.38 Although surveys have not yet been completed, a diverse assemblage has been recorded within the Kent Project Site due to the presence of a range of wetland, grassland and scrub habitats. A summary of these species has been included within **Annex EDP 3**, and plans showing all registrations as **Plans EDP 8, 9** and **10** along with estimated numbers of pairs. As noted previously, it is not possible before the results of the fourth surveys have been collated to confirm breeding or more precise pair numbers. These estimates are, therefore, subject to change.

3.39 Overall, bird abundance was very high across the Project Site. Green listed species were present in large numbers across all areas. The most commonly recorded green listed species were wren (*Troglodytes troglodytes*), with a peak count of 90 individuals, whitethroat (*Sylvia communis*) with 101 individuals, reed warbler (*Acrocephalus scirpaceus*) with 69 individuals, robin (*Erithacus rubecula*) with 56 individuals, blackcap (*Sylvia atricapilla*) with 66 individuals, blackbird (*Turdus merula*) with 62 individuals, chiffchaff (*Phylloscopus collybita*) with 49 individuals, and most notably Cetti's warbler, a Schedule 1 species[29], with 57 individuals. It is considered very likely that these species are breeding within the Kent Project Site. Peregrine falcon (*Falco peregrinus*), another Schedule 1 species, was also recorded hunting within the Kent Project Site.

3.40 The total number of species recorded was 93, of which 29 were listed on either the Amber list of Birds of Conservation Concern and 17 on the Red list. Most notable was a range of

Severe (at least 50%) decline in UK breeding population over last 25 years, or longer-term period (the entire period used for assessments since the first BoCC review, starting in 1969).
Severe (at least 50%) contraction of UK breeding range over last 25 years, or the longer-term period.

[28] Birds in the amber list will be subject to at least one of the relevant factors listed below:
Species with unfavourable conservation status in Europe (SPEC = Species of European Conservation Concern).
Historical population decline during 1800–1995, but recovering; population size has more than doubled over last 25 years.
Moderate (25-50%) decline in UK breeding population over last 25 years, or the longer-term period.
Moderate (25-50%) contraction of UK breeding range over last 25 years, or the longer-term period.
Moderate (25-50%) decline in UK non-breeding population over last 25 years, or the longer-term period.
Rare breeder; 1–300 breeding pairs in UK.
Rare non-breeders; less than 900 individuals.
Localised; at least 50% of UK breeding or non-breeding population in 10 or fewer sites, but not applied to rare breeders or non-breeders.
Internationally important; at least 20% of European breeding or non-breeding population in UK (NW European and East Atlantic Flyway populations used for non-breeding wildfowl and waders respectively).

[29] Species on Schedule 1 - Part I of the Wildlife And Countyside Act 1981 (as amended). Birds and their young, for which it is an offence to intentionally or recklessly disturb at, on or near an 'active' nest:

wetland species present within Botany Marsh, the CTRL Wetland and Black Duck Marsh. In Botany Marsh West, greylag geese, shelduck, lapwing, gadwall (*Mareca Strepera*), mallard, greenshank (*Tringa nebularia*), teal (*Anas crecca*), shoveler and tufted duck (*Aythya fuligula*) were all recorded. Black Duck Marsh supports a pair of marsh harriers (*Circus aeruginosus*) and a small heronry, and there are a small number of pairs of bearded tit (*Panurus biarmicus*) spread between the CTRL Wetland and Black Duck Marsh. A single spotted crake (*Porzana porzana*) was also recorded crossing a track near Black Duck Marsh in early June.

3.41 A number of Schedule 1 species were recorded within the Kent Project Site, including the aforementioned peregrine, spotted crake, bearded tit, marsh harrier and Cetti's warbler. Other Schedule 1 species recorded were Mediterranean gull (*Larus melanocephalus*), greenshank (*Tringa nebularia*), redwing (*Turdus iliacus*) and kingfisher (*Alcedo atthis*).

3.42 The scrubland across the peninsula, and to a lesser extent the chalk pits to the south, supports a range of scrubland specialists, including grasshopper warbler (*Locustella naevia*), nightingale (*Luscinia megarhynchos*), cuckoo, as well as the aforementioned whitethroats and other more common species. Dunnock are particularly abundant, with a peak count of 45 singing individuals recorded.

3.43 Overall, the breeding bird assemblage found within the Kent Project Site is considered to be of County level significance as it still fulfils the criteria listed above in paragraph 3.33.

Spotted Crake

3.44 During the targeted surveys following the initial sighting of the spotted crake on the track by pond **P8** in early June, no further evidence of their presence or breeding status was found. They are considered to be possibly breeding having been recorded within suitable habitat during the breeding season.

Passage Birds Survey

3.45 The results of the April passage bird surveys are included in **Annex EDP 3**. A single ringed plover (*Charadrius hiaticula*), the only species listed as a qualifying feature of the Thames Estuary and Marshes SPA during passage, was recorded during the high tide survey. Abundance and diversity was significantly reduced from that found along the estuary front throughout winter, with the most abundant birds being black-headed gulls and mallard. Full results of the passage bird surveys will be provided once the autumn surveys have been completed.

Bats

Previous Surveys

3.46 In 2015, a total of nine species were recorded within the Kent Project Site. Unidentified *Myotis* bats were recorded in all areas but at Station Quarter South, two species were confirmed: Natterer's (*Myotis natterii*) and Daubenton's (*Myotis daubentonii*), bats. A tree roost was identified in the Station Quarter South survey area and two further likely tree roosts were also determined[30].

3.47 The results of the bat surveys revealed a bat assemblage in the Peninsula, Craylands Pit, Bamber Pit and Station Quarter South of at least 'Local Importance', and within Northfleet Landfill of 'Neighbourhood Importance'.

2020 Desk Study Records

3.48 In 2020, Kent bat group returned 390 records of bats of which 169 related to roosting; Daubenton's bat (57), Natterer's bat (37) and brown long eared (*Plecotus auritus*) (36). Other species roosting were serotine (*Eptesicus serotinus*), Brandt's (*Myotis brandtii*), Leisler's (*Nyctalus leisleri*), noctule (*Nyctalus noctule*), common pipistrelle and soprano pipistrelle (*Pipistrellus pygmaeus*). Only Nathusius pipistrelle (*Pipistrellus nathusii*) had been recorded without any roosts. No roost records came from within the Project Site.

3.49 EFC returned records of nine species, five of which were recorded as hibernating or roosting; Daubenton's, natterers bat, *Myotis sp*., pipistrelle species and brown long eared bat. Hibernation records are from Chafford Tunnels, Grays Tunnels and bunkers and a maternity roost was found in Stifford St Mary's church. No roost or hibernation records are from within the Project Site.

Bat Roosting – Trees

3.50 During the visual assessment for roosting bats on 04 June 2020, no bats or evidence of bats was found from ground level. However, a total of 19 trees were identified as offering potential to support roosting bats. Fifteen trees were identified as having high potential, two with moderate potential and two as low potential. Details are provided in **Annex EDP 5** and the locations of these trees are illustrated on **Plan EDP 11**.

Bat Roosting – Buildings

3.51 There are a total of 150 buildings within the DCO boundary. Of these, 101 buildings were assessed as having negligible potential to support roosting bats due to their construction or are no longer present. These buildings were therefore not subject to any further level of survey.

3.52 A total of 24 buildings were found to have potential to support roosting bats during the assessment, with 10 assessed as having Low potential, 10 assessed as having Moderate

[30] **Annex EDP19**

potential and four assessed as having High potential. There are 25 buildings that could not be adequately assessed at the present time due to access reastrictions. Locations and gradings of the buildings is shown on **Plan EDP 12**.

Bat Roosting – Tunnels

3.53 The *Bat Activity Report 2015* produced by Corylus Ecology (see **Annex EDP 19**) evaluated the potential for tunnels within Craylands Pit to support hibernating bats, and concluded that:

"The temperature and humidity monitoring in tunnel 007 found that the temperature inside the tunnel fluctuates greatly along with the external temperature. Humidity levels fell to approximately 70% relative humidity at the mid-point of the tunnel, which is relatively dry and not in the preferred humidity range for hibernating bats. It can be inferred from the data gathered during the survey that tunnel 007 is not suitable as a hibernation roost due to relatively large humidity and temperature fluctuations. The tunnel does not provide a stable environment for hibernating bats and it is considered that, with a hard ground frost, the internal temperature is likely to be close to 0°C. The tunnel is open at the south-western end where a metal grill prevents human access. There is therefore potential for significant air flow through the tunnel, which affects the stability of both the internal temperature and humidity. It may be that the tunnel could be used as an occasional temporary shelter or night roost, but is not likely to be used as a permanent winter roost."

3.54 The hibernation survey undertaken by EDP within the same tunnel in February 2020 found no evidence to confirm the presence of hibernating bats.

Bat Foraging/Commuting Activity

3.55 Based on the surveys undertaken to date, a bat assemblage of at least nine species has been recorded within the Kent Project Site. This assemblage includes two nationally rare bats; barbastelle (*Barbastella barbastellus*) and Nathusius' pipistrelle and three Kent Red Data Book species; noctule, Leisler's and Serotine (the latter also being a Kent BAP species), however, recordings from these species are few with 84-89.2% of activity resulting from common pipistrelle. Results from the bat activity surveys are detailed in **Annex EDP 5** and on **Plans EDP 13** to **15**.

3.56 Based on the findings summarised above, the bat assemblage is considered to be of at least Local level importance, subject to the findings of further bat surveys to be conducted.

Dormouse

Previous Surveys

3.57 Despite the records close to the Kent Project Site, the previous survey work in 2015 concluded that "*It is considered highly unlikely that dormice will occur within the Springhead Site (Station Quarter South)*" and no further surveys were undertaken[31].

2020 Surveys

3.58 In 2020, 12 records of dormouse were returned by KMBRC. Three of the records dated from 2017 from near the Bluewater Shopping Centre. The closest of these was 250m west of the Kent Project Site. Another record from 2011 originated from a similar area between the Bluewater Shopping Centre and the A296. The other records were all over ten years old, none of which originated within the Project Site. EFC returned one 2009 record from Tilbury Marshes. Records returned from KMBRC and those extracted from previous survey work are displayed on **Plan EDP 16**.

3.59 During the deployment of the tubes in April 2020, three individual dormice were found in old tubes that had remained on the Kent Project Site from previous surveys.

3.60 Following this, during the May visit, a total of six individual dormice were found in addition to five nests. The locations of these dormice sightings can be found in **Plan EDP 17**.

3.61 This species is considered likely to be using the woodland and scrub habitats within the Kent Project Site for foraging, refuge and dispersal. Evidence thus far would suggest that the Kent Project Site supports a population that likely forms a metapopulation with the population from which records are returned near the Bluewater shopping centre. Kent is considered a 'good' county for dormice, but numbers are declining, largely due to loss and fragmentation of habitat[32]. Therefore, the population within the Kent Project Site that survives in sub-optimal habitat (in scrub rather than good quality hedgerows and ancient woodland) is considered currently, subject to further survey findings, to be of local level importance and will be taken forward as an IEF.

Badger

Previous Surveys

3.62 In 2015, no signs of badgers were found within or adjacent to most of the Proposed Development Area[33].

[31] **Annex EDP 20**
[32] https://www.kentmammalgroup.org.uk/index.php?option=com_content&view=article&id=118:a-future-for-dormice-in-kent&catid=43:atlases-a-surveys&Itemid=73
[33] **Annex EDP 21**

2020 Surveys

3.63 In 2020, KMBRC and EFC returned many records of badger. None of the records originate from within the Project Site.

3.64 No evidence of badger has been found during the Extended Phase 1 survey or any other survey visits so far in 2020. It is not considered likely that badgers are using the Project Site and they will not be taken forward as an IEF.

Otter and Water Vole

Previous Surveys

3.65 In 2015 it was concluded that despite previous records of water voles on Swanscombe Peninsula and along the Ebbsfleet, current survey evidence strongly suggested that water voles are absent from the Kent Project Site[34].

2020 Surveys

3.66 In 2020, KMBRC returned 25 records for water vole, the most recent record originates from 2016 for a location 5.0km east of the Kent Project Site. The other records all predate 2005 with the majority originating from within the marshes in the north of the Kent Project Site. EFC returned six records of water vole with the most recent from 2009 from Thurrock Park. No otter records were returned.

3.67 Following the first water vole survey, latrines and feeding remains were found in Botany Marsh East and West as shown on **Plan EDP 18**. This would imply that there is a breeding population present in this area. A breeding population of water vole would meet the criteria for designation as an LWS in Kent[35]. However, the small amount of evidence gathered suggests that the population is of no greater value than at the local to district level, subject to the findings of further survey work.

3.68 No sign of otter has yet been found although the habitat within the reedbeds and River Ebbsfleet is suitable. Therefore, otter are considered likely to be present, and, on a precautionary basis, the population is considered to be of at least Local value.

Harvest Mouse

Previous Surveys

3.69 In 2015 it was concluded that harvest mice were present on Swanscombe Peninsula, especially Broadness, but also among grassland and scrub to the south east of Black Duck Marsh. There have also been records of harvest mouse nests from Botany Marsh

[34] **Annex EDP 22**

[35] Local Wildlife Sites in Kent (Formerly called Sites of Nature Conservation Interest) Criteria for Selection and Delineation Version 1.5, August 2015, Kent Wildlife Trust on Behalf of the Kent Nature Partnership

East in 2010. Outside Swanscombe Peninsula no harvest mouse nests were found in Station Quarter South[36].

2020 Surveys

3.70 In 2020, one record was returned by KMBRC dating from 1963 located within the peninsula on the Kent Project Site. Three records were returned from EFC records with only one from the last 10 years and none from the Project Site.

3.71 It is considered likely that a small population of harvest mouse is present on the Swanscombe peninsula and that, on a precautionary basis at this stage, this population will be of at least Local level value. Harvest mouse will therefore be taken forward as an IEF, subject to the findings of surveys to take place in 2020.

Other Mammals

3.72 No previous survey work has been undertaken on other mammals.

3.73 KMBRC returned 62 records for hedgehog (*Erinaceus europaeus*) of which ten records dated from within the last decade and EFC returned seven records with only three from the last decade. None originated from within the Project Site.

3.74 Ten records for common shrew (*Sorex araneus*) were returned by KMBRC with the majority originating from within the Project Site. Three old records were returned from EFC not from within the Project Site. Six records for pygmy shrew (*Sorex minutus*) were returned by KMBRC of these one originated from within the Project Site dating from 1975.

3.75 Four records of stoat (*Mustela erminea*) and five records of weasel (*Mustela nivalis*) were returned by KMBRC. Three of the weasel records originate from within the Project Site on the Swanscombe Peninsula. EFC retuned a single weasel record from Tilbury.

3.76 Two records of brown hare (*Lepus europaeus*) were returned by KMBRC, and one from EFC. All originated from locations outside of the Project Site and the records were old. Whilst all of the above species could potentially be supported by the Kent Project Site, populations are considered likely to be of less than local importance. None of these species are likely to be supported by the Essex Project Site. Other mammals will not be taken forward as an IEF.

Great Crested Newt

Previous Surveys

3.77 From the 2012 and 2015 surveys, it was concluded that no waterbodies within the Proposed Development Area are used for breeding by great crested newts. However, it is possible that populations recorded nearby may use terrestrial habitat within the Proposed

[36] **Annex EDP 23**

Development Area, although the risk is considered to be low due to the presence of barriers to dispersal[37].

2020 Surveys

3.78 KMBRC returned 29 records of great crested newts of which only one was from within the last decade. EFC returned seven records with only two from the last decade. That record dated from 2012 and was from 800m south of the Kent Project Site, to the south of the village of Bean. No records were returned from within the Project Site.

3.79 All eDNA results were returned negative. Therefore, great crested newts are considered unlikely to be present and breeding within the Project Site and will not be taken forward as an IEF. Full details are provided on **Plan EDP 19** and in **Annex EDP 8**.

Other Amphibian Assemblage

3.80 In 2020, KMBRC and EFC returned many amphibian records: for palmate newts (*Lissotriton helveticus*), smooth newt (*Lissotriton vulgaris*) common toad (*Bufo bufo*), marsh frog (*Pelophylax ridibundus*) and common frog (*Rana temporaria*). Only one smooth newt record was from the Project Site however, there were incidental records of smooth newt and marsh frog from the Swanscombe Peninsula, smooth newt from Botany Marsh East and smooth newt and common toad from Bamber Pit during the 2015 surveys.

3.81 The extent of the wetland habitat and waterbodies within the Kent Project Site has the potential to support large numbers of amphibians and records suggest that smooth and palmate newt, common toad and common frog are present. Even with low populations of these species, if all four were present, this would mean Swanscombe peninsula could be designated as a LWS on grounds of its amphibian assemblage[38]. Large numbers of marsh frog have been heard/seen throughout the Peninsula during the course of ecological surveys.

3.82 Collectively, the amphibian assemblage considered likely to be present across the Kent Project Site is valued at local to district level.

Reptiles

Previous Surveys

3.83 In 2015, common lizard, slow worm and grass snake were recorded during the surveys, of which common lizard was the most widespread and abundant, being recorded in all survey areas and with an exceptional population on Swanscombe Peninsula[39].

[37] Annexes EDP 24 and 25
[38] Local Wildlife Sites in Kent (Formerly called Sites of Nature Conservation Interest) Criteria for Selection and Delineation Version 1.5, August 2015, Kent Wildlife Trust on Behalf of the Kent Nature Partnership
[39] Annex EDP 26

3.84 It was also found that Swanscombe Peninsula, Craylands Lane Pit/West Quarry, Bamber Pit and Station Quarter South qualify as Key Reptile Sites and would be eligible for designation as Local Wildlife Sites based on their reptile populations/assemblages. They are therefore considered to be of County Importance for reptiles. All other areas are considered to be of Local Importance.

2020 Surveys

3.85 In 2020, KMBRC returned many reptile records. The majority of records were from the Old Malbeon Hospital which is located 1.5km west of the Kent Project Site. There were 189 records for common lizard (nine of which were from within the Kent Project Site), 104 records of slow worm (two from within the Kent Project Site) and 22 records of grass snake (three from within the Kent Project Site) returned.

3.86 KMBRC returned 53 records of adder but none of these were from the Project Site. EFC returned less records of all four species, none of which were from the Project Site.

3.87 So far, two reptile refugia checks have taken place. During the May check counts of 10 common lizard, 15 slow worm and two grass snake were recorded. During the June check counts of 42 common lizard, 10 grass snake and 42 slow worm were recorded.

3.88 Based on the presence of three reptile species and the relative size of the populations, the Kent Project Site meets the criteria for selection as a LWS[40]. Subject to the findings of the remaining surveys, the reptile population is considered likely to be of at least district value and will be taken forward as an IEF. Reptiles are not considered to be present on the Essex Project Site due to the paucity of suitable habitat.

Invertebrates

Terrestrial Invertebrates

Previous Surveys

3.89 The 2012 surveys recorded a total of 479 species, 80 of which were of local or national significance[41].

3.90 The 2015 survey work[42] concluded that the entire site should be considered as two different ecological systems:

a) A dry, well-drained habitat, predominately grassland with a scrub element and patches of intermittent disturbance (substantially present both north and south of Manor Way); and

[40] Kent Wildlife Trust (2015) '*Local Wildlife Sites in Kent. Criteria for Selection and Delineation*', Version 1.5 August 2015.
[41] **Annex EDP 27**
[42] **Annex EDP 28**

b) A wetland habitat, with varying water flow through individual areas. Mostly north of Manor Way, although there are small examples to the south.

3.91 Both these systems are of high (National) ecological importance. This means that the entire site is of high (National) ecological importance. It is also of high importance when considered among local sites for which there is information.

2020 Surveys

3.92 In 2020, KMBRC returned records of the following species within 2km of the Project Site: 61 lepidoptera records (4 butterfly, 51 moth); 10 Hymenoptera; 2 diptera; and 3 coleptera. EFC returned records of 215 different beetle species, 10 butterfly species, four dragonfly species, 154 Hymenoptera species, 125 moth species, six orthoptera species, 48 hemiptera species and 485 diptera species. None were from the Essex Project Site.

Spiders

3.93 In 2012, it was concluded that the site was of most importance for its thermophilic spider fauna. Based on the presence of most of the species of conservation concern, two or three sparsely vegetated areas were considered to be of National Importance for their spider fauna. There may be other areas of similar quality not surveyed. Three other areas were surveyed but all supported a limited spider fauna and were considered to be of Negligible or Local Importance[43].

3.94 In 2020, the desk study returned one record of the elusive distinguished jumping spider (*Sitticus distinguendus*) from Swanscombe Marshes.

3.95 The 2020 survey data is still being gathered and processed but so far 22 species of conservation concern have been recorded and 262 species in total. No records of the distinguished jumping spider have been found to date. It is considered likely that the Project Site will remain of National importance for terrestrial invertebrates.

Aquatic Invertebrates

Previous Surveys

3.96 In 2015, a total of 199 species of aquatic macroinvertebrate were recorded amongst approximately 70,000 individuals. Amongst these, several species of conservation concern were recorded; one Vulnerable, three Near Threatened, 11 Nationally Scarce and 51 with a Local distribution within the UK. Of the wetland and aquatic plants recorded in and around the waterbodies eight had a Local distribution. A total of five ponds, of the seven surveyed, were of the quality necessary for Priority Habitat Pond status.

[43] **Annex EDP 29**

3.97 Both Botany and Swanscombe Marshes combined could tentatively be categorised as being at least of County value, if not Regional[44].

2020 Surveys

3.98 Aquatic invertebrates recorded on the River Ebbsfleet in isolation are considered to be of less than Local importance as they represent only moderate water quality and a heavily modified water course. Full details can be found in **Annex EDP 11**.

3.99 The 2020 survey data for other aquatic habitats within the Project Site is still being gathered and processed but it is considered likely that the Project Site will remain of County to Regional importance for aquatic invertebrates.

[44] **Annex EDP 30** and **31**

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Section 4
Summary of Findings

4.1 Based on the baseline investigations described above, the IEFs pertinent to an EcIA in respect of the proposed development at the Project Site are listed in **Table EDP 4.1**.

Table EDP 4.1: Important Ecological Features to be Considered Within the EcIA

Important Ecological Feature	Key Attributes	Nature Conservation Value
Designations		
Thames Estuary and Marshes SPA/Ramsar	Extensive intertidal mudflats with saltmarsh and channel systems. Internationally importance of assemblage of birds and wintering populations of many wader species.	International
Medway Estuary and Marshes SPA/Ramsar/ SSSI	Single tidal system with the Swale and joins the southern part of the Thames Estuary between the Isle of Grain and Sheerness. Internationally importance of assemblage of birds and wintering populations of many wader species.	International
Darenth Woods SSSI	Some of the most valuable areas of ancient semi-natural woodland in north-west Kent with rare woodland types.	National
Inner Thames Marshes SSSI	Largest remaining expanse of wetland bordering the upper reaches of the Thames Estuary. Diverse bird interest especially the variety of breeding birds and the numbers of wintering wildfowl, waders, finches and birds of prey.	National
South Thames Estuary and Marshes SSSI	Extensive mosaic of grazing marsh, saltmarsh, mudflats and shingle characteristic of the estuarine habitats of the north Kent marshes. Freshwater pools and some areas of woodland provide additional variety and complement the estuarine habitats. Supports outstanding numbers of waterfowl, total counts regularly over 20,000.	National
West Thurrock Lagoon and Marshes SSSI	One of the most important sites for wintering waders and wildfowl on the Inner Thames Estuary. Extensive intertidal mudflats together with a large and secure high tide roost, attracts waders in nationally important numbers, with significant populations of other bird species. The adjacent Stone Ness saltmarsh is noted for the size and character of its high marsh plant community.	National
Botany Marshes LWS	Reedbed and potential for ditch & grazing marsh restoration. Reedbed and grazing marsh are of principal importance in England. Also supports three species of reptile, water vole, otter and is of value to birds.	County
Ebbsfleet Marshes, Northfleet LWS	Range of habitats including reedbed, calcareous stream, lake, scrub, woodland, calcareous and neutral grassland. Protected species have been recorded including reptiles and great crested newts.	County

Important Ecological Feature	Key Attributes	Nature Conservation Value
Alkerden Lane Pit LWS	Contains nationally scarce plants and Kent's largest population of green-flowered helleborine (*Epipactis phyllanthes*). Also contains round leaved wintergreen (*Pyrola rotundifolia*) and several species of nationally rare and scarce invertebrates.	County
Tilbury Marshes LWS	Diverse saltmarsh flora. Good grazing-marsh flora. An important invertebrate habitat destroyed by development, but some of the key species may survive on these remaining fragments.	County
Habitats/Flora		
Rare plants	Populations of 13 nationally scarce species were found in 2016. Eight were refound in 2020.	National
Broad leaved Semi Natural Woodland	Woodland with good canopy species and ground flora species diversity. Connects to other woodlands in wider area.	Local
Scrub	Extensive mature and colonising scrub forming a corridor of woody habitats between the A2 and the River Thames.	Local
Semi-improved grassland	Including areas of species-poor semi-improved grassland and areas of semi-improved neutral, and calacareous grassland (with relict areas of more species-rich grassland of NVC MG1d and CG2 but not extensive or fine examples).	Local to District
Coastal/Floodplain Grazing Marsh	Botany Marsh West - Priority Habitat[45] coastal/floodplain grazing marsh.	District
Open mosaic on previously developed land	Discrete areas within the Kent Project Site that fulfil the Priority Habitat description.	District
Waterbodies (ponds, standing water and ditches)	Extensive ditch network around the peninsula with associated ponds. Ditch network forms part of a large marsh area including Botany Marshes LWS and adjacent grazing marsh and is considered of district level. Some ponds, within Broadness Grassland particularly, are contaminated by leachate from the nearby cement production facility and are of negligible ecological value.	District
Swamp (reedbed)	Three main areas in Black Duck Marsh, CTRL Wetland and Botany Marsh, the latter of which is partially designated as a LWS. Priority habitat.	County
River Ebbsfleet	Acts as a wildlife corridor and is linked to reed bed and woodland habitats. Moderate water quality.	Local
Species		
Wintering Wading Bird Assemblage	Supports many of the species associated with the nearby SPA/Ramsars.	International
Wintering terrestrial bird assemblage	28 species of conservation concern recorded by in low to moderate numbers.	County

[45] UK Biodiversity Action Plan Priority Habitat Descriptions Coastal and Floodplain Grazing Marsh From: UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008

Important Ecological Feature	Key Attributes	Nature Conservation Value
Breeding Bird Assemblage	91 species recorded so far of which 28 were listed on either the Amber list of Birds of Conservation Concern and 16 on the Red list.	County
Bat Assemblage	Assemblage of at least nine species, including one Kent BAP species. However, the activity is predominantly of common pipistrelle bats. One tree Roost confirmed and a further three possible tree roosts found in 2016. 2020 data in progress.	Local
Dormouse	Confirmed presence within the Kent Project Site. Considered to be using the Kent Project Site for dispersal, foraging and breeding. Likely to be a meta population with that close to the Bluewater shopping centre.	Local
Otter	Assumed present in low numbers within the ditch network and on the River Ebbsfleet due to suitable habitat.	Local
Water Vole	Latrines and feeding sign found in Botany Marsh East and West – likely breeding and therefore qualifies as LWS.	Local to District
Harvest Mouse	Considered likely to be present and so would qualify the Project Site as a LWS.	Local
Amphibian assemblage	Likely to support four species and meet criteria for LWS selection.	Local to District
Reptile assemblage	Three species supported. Likely to be exceptional populations of common lizard and slow worm. Meets criteria for LWS selection.	District
Terrestrial Invertebrates	Current data in process but 22 species of conservation concern so far recorded and a total of 262 species. Considered likely to remain of National importance.	National
Aquatic Invertebrates	Current data in process but previous data suggests an assemblage of County to Regional importance.	County to Regional

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Annex EDP 1
Habitat Descriptions and Illustrative Photographs

A1.1 This annex describes the habitats within the Project Site by area. The areas referred to are shown on **Plan EDP 1** and the broad habitat distributions across the Project Site is shown on **Plan EDP 4**.

A1.2 The Extended Phase 1 Habitat Survey was undertaken by an ecologist experienced with this type of survey in May 2020, then verified by an independent specialist botanist with over 30 years of experience of botanical survey in the UK in June 2020.

A1.3 Following the Phase 1 survey, eight distinct areas of the Kent Project Site were identified as having the potential to support plant communities of botanical value. These areas were initially proposed for NVC survey but when subject to detailed botanical assessment most were found to be of low botanical diversity and thus no NVC was conducted over them. Three of the eight areas were found to be of sufficient botanical value to warrant NVC survey; the remaining five areas were subject to DAFOR survey only.

A1.4 The NVC methodology was that described within British Plant Communities Volume 3: Grasslands and montane communities Ed J.S.Rodwell 1992 (1998 edition). Homogenous stands of vegetation were sought and 2m square quadrats thrown within those stands. All vascular plant species within the quadrats were recorded according to the NVC methodology where the relative abundance of each species is allotted a score on the Domin scale between 1-10 where 1 equals very few individuals and 10 equals 91-100% of the vegetation. The quadrat data was then compared to the keys within British Plant Communities Volume 2 to determine the best approximation to the NVC community/sub-community.

A1.5 With the DAFOR methodology each plant species was accorded a code relative to its frequency within the site:

D = Dominant;

A= Abundant;

F = Frequent;

O = Occasional; and

R = Rare.

A1.6 Where a plant species has a localised distribution within a stand which differs from its overall distribution in that stand the letter L is used to identify this localised variance. For example, a plant which is rare (R) in the wider stand being recorded but has a localised occurrence as Frequent in one or more areas of that stand it is recorded as R/LF.

Nationally Scarce Plant Species Survey

A1.7 The CBA 2016 report detailed the Nationally Scarce plant species recorded over the survey site during their survey as well as existing from recent records prior to their survey, and provided clear maps identifying the locations where those species were found.

A1.8 The Nationally scarce species recorded by CBA are as follows:

- Yellow vetchling (*Lathyrus aphaca*);
- Bithynian vetch (*Vicia bithynica*);
- Man orchid (*Orchis anthropophora*);
- Divided sedge (*Carex divisa*);
- Hairy vetchling (*Lathyrus hirsutus*);
- Brackish water-crowfoot (*Ranunculus baudotii*);
- Sickle clover (*Medicago sativa* ssp. *falcata*);
- Borrers saltmarsh grass (*Puccinellia fasciculate*);
- Stiff saltmarsh grass (*Puccinellia rupestris*);
- Round-leaved wintergreen (*Pyrola rotundifolia* ssp. *Maritima*); and
- Slender Hare's-ear (*Bupleurum tenuissimum*).

A1.9 Eight of the thirteen nationally scarce species recorded over the terrestrial habitats on this site were relocated during the 2020 NVC survey. Of these, most displayed some variance in their 2020 distributions compared with their distributions recorded in the 2016 CBA report[46].

Yellow Vetchling

A1.10 Yellow vetchling was recorded over very considerable areas in the northern half of the site in 2016, predominantly adjacent to tracks. It was also recorded as small localised populations elsewhere on the site at that date.

A1.11 In 2020 it was found that yellow vetchling populations on the sea banks; in a large area to the east of the derelict jetty; along a track running parallel to the shoreline up to the creek; and in the northern centre of the site either could not be re-found or comprised only small numbers of individual plants. It would thus appear that those populations have

[46] **Annex EDP 14**

either experienced a very considerable decline or are within a period of scarcity as part of a wider cycle of abundance and scarcity – a process which is not uncommon amongst some species of plant and often caused by climatic factors, predation by invertebrates, or pathogens. It is possible that relatively frequent cutting of vegetation on the sea banks since 2016 may have caused this species to be lost from that location.

A1.12 New populations of this plant were identified in the north-east of the Kent Project Site where it was locally frequent and widely distributed, and along the main north-south access track running through the centre of the site. In addition, this species was found to be present in small number where scrub clearance work had taken place in the Botany Marsh East Nature Reserve and to the north of the linear waterbody in the centre of the site.

Bithynian Vetch

A1.13 Bithynian vetch in part demonstrated little change with regard to its distribution between 2016 and 2020 as it is still abundant on the easternmost of the sea banks. However, in 2016 it was also recorded extensively over an area in the north-east of the Kent Project Site, and as a small population in the northern centre of the Kent Project Site. It was not recorded in either of those locations in 2020, now anywhere else on the Kent Project Site.

Man Orchid

A1.14 Man orchid could not be relocated in 2020 despite a sustained survey effort.

Divided Sedge

A1.15 Divided sedge was recorded as locally abundant in the part of Botany Marsh East Nature Reserve known as the Playing Field in 2016. However, its distribution appeared to have contracted significantly since 2016 (assuming that the 2016 distribution map accurately represented its area at the time). The contraction in area appeared to be as a result of tall fescue (*Festuca arundinacea*) expanding over parts of the Playing Field.

A1.16 In 2016 this species was also recorded as a small population on the eastern side of the easternmost sea bank; it was not relocated there in 2020.

Hairy Vetchling

A1.17 Hairy vetchling in 2016 was recorded only in the north-eastern centre of the Kent Project Site, where it appears to have been extensive, and along the main path through the Botany Marsh East Nature Reserve. In 2020 it was found to be present in relatively large numbers in the north-east of the Kent Project Site (an area where it was not previously recorded) and in an area immediately to the south-west of where its core population was recorded in 2016. However, in 2020 it was present only at very low frequency in that former core area. This species is still present, albeit sporadically, along the main path through the Botany Marsh East Nature Reserve.

Brackish Water-crowfoot

A1.18 Brackish water-crowfoot was not recorded in 2020. Two of the areas where it was recorded in 2016 were both inaccessible for survey in 2020: Botany Marsh West supported populations in the field ditches in 2016 but access permission to this area was not granted in 2020; in addition extensive populations in the south-eastern centre of the Kent Project Site were not verifiable in 2020 due to that area having become an extensive reedbed with a relatively high water table and as such offered hazardous survey conditions.

A1.19 The third area where this species was recorded in 2016 was extensively along the eastern boundary ditch of the Botany Marsh East Nature Reserve. In 2020 this ditch was for the most part full of common reed (*Phragmites australis*) and thus offered poor conditions for brackish water-crowfoot which requires open water with little shading. A section of this ditch had been subject to some mechanical clearance and re-profiling immediately prior to the 2020 survey but the clearance works had been too recent for this species to have had an opportunity to germinate.

A1.20 A fourth, small population was recorded in the centre of an open area in the north-western centre of the Kent Project Site in 2016 however this population was not relocated in 2020.

Sickle Clover

A1.21 Sickle clover was recorded as only one plant in 2020 – to the immediate south of the old jetty area on the north-western edge of the Kent Project Site. This is a sub-species of the plant which is most commonly recorded as lucerne (*Medicago sativa sativa*) and the two sub-species frequently hybridise to produce another sub-species (*Medicago sativa falcata*). In 2016 sickle clover was recorded along the sea banks and along tracks to the north-east and east of the sea banks; it was in this area (north of the sea banks) where sickle clover was recorded in 2020.

A1.22 It is possible that pure sickle clover has been mostly lost from the Kent Project Site through hybridisation with Lucerne. However, it is to be noted that sickle clover can most reliably be identified from its seedpods and that at the time of the 2020 survey very few plants of Medicago sativa had seed pods which were sufficiently mature enough to allow for accurate identification. It is to be noted however that sickle medick also typically has yellow flowers and yellow-flowered *Medicago sativa* were very rare here in 2020.

Borrer's Saltmarsh Grass

A1.23 Borrer's saltmarsh grass was recorded in 2020 in several locations along the track which runs along the eastern edge of the creek in the north of the Kent Project Site. This was where it was recorded in the 2016 CBA report. This is typically a saltmarsh species and may well be present in other coastal parts of the Kent Project Site. A separate NVC survey of the saltmarsh is included within the Marine Ecology and Biodiversity Chapter of the Environmental Statement (Chapter 12).

Stiff Saltmarsh Grass

A1.24 Stiff saltmarsh grass was recorded in one location in the 2016 CBA report – the same general location as the Borrer's saltmarsh-grass. The continued presence of this species in that location was confirmed in 2020.

Round-leaved Wintergreen

A1.25 In 2020, round-leaved wintergreen was found to be present as a single population on the bank of an old tramway/railway leading to the disused jetty. This population is found within light silver birch (*Betula pendula*)/bramble (*Rubus fruticosus* agg.) woodland and covers an area of approximately three square metres.

Slender Hare's-ear

A1.26 Slender Hare's-ear was recorded in the CBA 2016 report from two locations: the northern edge of Botany Marsh and an adjacent area along the banks of the adjacent stream. These two adjacent areas have upper saltmarsh vegetation and slender hare's-ear is a species largely associated with that habitat. Slender hare'-ear is a cryptic grass-like herb which is very hard to identify when it is not in fruit; it fruits in late summer and autumn when the fruits make the plant slightly less cryptic. Although a search was made for it in 2020 this plant was not recorded, however, this is to be expected and it is possible that a survey in these two small areas of saltmarsh between mid-August and early October would be more productive.

Additional Species Not Previously Recorded

A1.27 In addition, a further two nationally scarce species have been recorded from the survey site but in locations which lie outside this survey's boundaries (golden samphire *Inula crithmoides* and annual beard-grass *Polypogon monspiliensis*).

Evaluation

A1.28 Collectively, these populations of nationally scarce plant species are considered to be of National importance and are shown on **Plan EDP 5**.

Habitat Descriptions

Essex Project Site

Port of Tilbury

A1.29 The majority of the Essex Project Site is hard standing. However, the road verges, ditches and green areas surrounding the hard-standing hold some ecological value.

A1.30 The hard standing shows some signs of deterioration, with patches of ephemeral vegetation and plants typical of rough and disturbed ground growing around its peripheries, including hoary mustard (*Hirschfeldia incana*), buddleia (*Buddleja davidii*), smooth hawk's-beard (*Crepis capillaris*), wall barley (*Hordeum murinum*), ribwort plantain (*Plantago lanceolate*), scentless chamomile (*Tripleurospermum inodorum*), herb Robert (*Geranium robertianum*), black medick (*Medicago lupulina*), Oxford ragwort (*Senecio squalidus),* mugwort (*Artemisia vulgaris*), greater burdock (*Arctium lappa*), annual mercury (*Mercurialis annua*) and common mallow (*Malva neglecta*).

A1.31 The two areas running parallel to the A1089 running south along the western edge of the Essex Project Site are dominated by scrub. The roadside ditch is mostly dry and edged by bramble (*Rubus fruticosus*) but contains some branched bur-reed (*Sparganium erectum*) and is also surrounded by false-oat, nettle (*Urtica dioica*) and curled dock (*Rumex crispus*) in places. The eastern strip of scrub is mature and includes a number of woody species, such as apple (*Malus domestica*), blackthorn (*Prunus spinosa*), buddleia, ash (Fraxinus excelsior), sycamore (*Acer pseudoplanatus*), dog rose (*Rosa canina*), elder (*Sambucus nigra*) and hawthorn (*Crataegus monogyna*). It is edged by rough grass with small numbers of forb species. Species include cock's-foot (*Dactylis glomerata*), false oat, oxford ragwort, ribwort plantain, ivy (*Hedera helix*), red valerian (*Centranthus ruber*) and purple toadflax (*Linaria purpurea*). The northern end of this scrub band has been cleared to facilitate roadworks.

A1.32 The road verges, which loop round the northern edge of the A1089 and Fort Road, are characterised by well, but infrequently, managed grass with occasional shrubs and some species of rough ground. Species recorded include red fescue (*Festica rubra*), cock's-foot, perennial rye (*Lolium perenne*), barren brome (*Bromus sterilis*), soft brome (*Bromus hordeaceus*), creeping cinquefoil (*Potentilla reptans*), yarrow (*Achillea millefolium*), goat's-beard (*Aruncus dioicus*), ribwort plantain, rough hawkbit (*Leontodon hispidus*), red campion (*Silene dioica*), common mouse-ear (*Cerastium fontanum*), hoary mustard, common mallow, dove's-foot cranesbill (*Geranium mole*), white valerian (*Valeriana officinalis* L.), smooth sow-thistle (*Sonchus oleraceus*), bulbous buttercup (*Ranunculus bulbosus*) and beaked hawk's-beard (*Crepis vesicaria*).

A1.33 The sea-wall supports a small range of additional species, including ox-eye daisy (*Leucanthemum vulgare*), tufted vetch (*Vicia cracca*) and bird's-foot trefoil (*Lotus corniculatus*) and occasional woody scrub including hazel (*Corylus avellana*), hawthorn, field maple (*Acer campestre*), willow (*Salix sp.*) and elder.

A1.34 The habitats around the Asda roundabout were dominated by species of disturbed ground, including mugwort, cleavers (*Gallium aparine*), nettle, hedge bindweed (*Calystegia sepium*), greater burdock, white valerian, hoary mustard, hemlock (*Conium maculatum*) and false-oat. The centre of the roundabout is mowed regularly and lawn daisy (*Bellis perennis*) are common within the lawns, which are surrounded by ornamental and native trees and shrubs, including silver birch (*Betula pendula*), willow and cherry (*Prunus avium*). The area between the two A1089 carriageways leading north contains a small amount of more species-rich grassland, which has species including

lesser trefoil (*Trifolium dubium*), ox-eye daisy, common vetch (*Vicia sativa*), bulbous buttercup, white and red clover (*Trifolium repens* and *T. pratense*), meadow vetchling (*Lathyrus pratensis*) and bird's-foot trefoil.

A1.35 All of the grassland and scrub habitats in the Essex Project Site are considered to be of Site level value only due to their limited extent, relatively low species diversity, and isolation.

Kent Project Site

Swanscombe Peninsula

A1.36 The peninsula is dominated by scrub and rough grassland habitats (**Image EDP A1.1**), although some nationally rare and scarce species have been identified, as described above.



Image EDP A1.1: Typical scrub/rough grassland mosaic on Swanscombe Peninsula

A1.37 Although forb diversity within any one area is relatively low, some species groups are well represented, with various species of legume being particularly prominent, including everlasting sweet-pea (*Lathyrus latifolius*), sand Lucerne (*Medicago sativa nothossp*), hop trefoil (*Trifolium campestre*), bird's-foot trefoil, narrow-leaved bird's-foot trefoil (*Lotustenuis*), smooth tare (*Vicia tetrasperma*), grass vetchling (*Lathyrus nissolia*), hairy vetch (*Vicia villosa*) and yellow vetchling (*Lathyrus aphaca*).

A1.38 A thin band of saltmarsh edges the peninsula, most prevalent in the south-west and around the creek on Broadness Point. Small lengths of saltmarsh are also present inland: between the sea banks in the south-west and along the northern edge of Botany Marsh leading onto the banks of the Ebbsfleet. This is described in Chapter 12 of the PEIR, which detail intertidal and marine habitat and species interest.

Broadness Grassland (formerly Broadness Salt Marsh)

A1.39 Broadness Grassland is a largely unmanaged area of rough, poor semi-improved grassland and scrub which has colonised following the deposition of large amounts of industrial and landfill waste across former saltmarsh. The habitat in this area is a matrix of more open, rough grasslands through to dense scrub. The grassland is dominated by false oat grass (*Arrhenatherum elatius*), common (*Elymus repens*) and sea couch grass (*Elytrigia atherica*), with other maritime species present including sea beet (*Beta vulgaris subsp. Maritima*) and abundant sand lucerne along the managed pathways. Other species are fairly limited in the north of the area but include nettle.

A1.40 The southern half of Broadness Point is slightly more diverse, although it appears that in the intervening eight years since the Phase 1 and botanical survey undertaken by CBA, the grassland has built up significant thatch and some more forb-rich areas have been lost to coarse grasses and scrub encroachment. Some pyramidal orchids (*Anacamptis pyramidalis*) were recorded along the tracks crossing the peninsula and man orchid (*Orchis anthropophora*), bee orchid (*Ophrys apifera*) and common spotted orchid (*Dactylorhiza fuchsia*) have previously been recorded here but were not recorded in 2020.

A1.41 A small area in the south of Broadness grasslands was subject to a NVC survey as shown as **TN3** on **Plan EDP 4** and pictured in **Image EDP A1.2**. This grassland is notable for the large number of leguminous species recorded including the largest and most extensive populations of the nationally scarce yellow vetchling and hairy vetchling (*Lathyrus hirsutus*) recorded during this survey. Dominated by false oat-grass this is an **MG1d** *Arrhenatherum elatius* grassland *Pastinaca sativa* sub-community.



Image EDP A1.2: NVC survey area in the south-east of the Broadness Grassland survey area

A1.42 A number of man-made ponds are present in this Broadness Grassland area, some of which are used as leachate treatment lagoons for the nearby cement works and have a pH of up to 13. As such, they have little to no ecological value.

A1.43 The species-poor, semi-improved grassland/scrub mosaic is considered to be of Local value due to the habitat's extent and structure, but lack of botanical diversity. The area marked as **TN3** on **Plan EDP 4** is considered to be of District importance due to its populations of Nationally Scarce species and its increased botanical diversity.

Botany Marsh East

A1.44 Botany Marsh east is former grazing marsh, which was ungrazed for a number of years. It is currently managed as a nature reserve by the landowner following the advice of the Kent Wildlife Trust. The management regime includes rotational scrub and reed cutting, alongside rotational dredging of ditches.

A1.45 This management regime has resulted in a mosaic of reedbed, dry grassland, dense scrub and wet ditches. The publicly accessible grassland in the centre of the reserve appears to be former amenity grassland established over an area of relict grazing marsh.

A1.46 This small area of unmanaged grassland has two distinct plant communities and is shown as **TN4** on **Plan EDP 4** and pictured in **Image EDP A1.3**: a community dominated by tall fescue (*Festuca arundinacea)* in the north and south-west, and a finer grassland in the remainder of the field where creeping bent (*Agrostis stolonifera*) is dominant, and meadow barley (*Hordeum secalinum*), Yorkshire fog (*Holcus lanatus*), red fescue, and smooth meadow grass (*Poa pratensis*) frequent and occasionally locally abundant. Grass vetchling is locally common but otherwise this field is herb-poor although small numbers of hairy buttercup (*Ranunculus sardous*) (a species strongly associated with floodplain coastal grazing marsh) were recorded. However, of greatest interest here is a very large population of divided sedge (*Carex divisa*) – a nationally scarce species largely restricted to unimproved coastal grazing marshes. It is apparent that in the parts of the field where tall fescue is abundant there is no divided sedge and thus it is likely that as tall fescue expands across this field (although native it is an aggressive invasive species) it has caused the localised extinction of divided sedge.



Image EDP A1.3: Former amenity grassland established over grazing marsh, now supporting substantial populations of divided sedge

A1.47 Areas of grassland across the rest of the reserve are richer and include a range of seasonally inundated patches and dry banks. Species recorded include ox-eye daisy, red campion, ragged robin (*Lychnis flos-cuculi*), yellow rattle (*Rhinanthus minor*), common knapweed (*Centaurea nigra*), common vetch (*Vicia sativa*), tall fescue, bird's-foot trefoil, red clover, bulbous buttercup and perforate St. John's wort (*Hypericum perforatum*). Scrub is dominated by hawthorn but also includes willow and broom (*Sarothamnus scoparius*).

A1.48 In the south-east of the Botany Marsh East Nature reserve there are relict areas of grassland amongst scrub which are dominated by common grass species such as red fescue, creeping bent, false oat-grass, cocksfoot, and smooth meadow-grass along with some tall fescue and meadow barley. This area is shown as **TN5** on **Plan EDP 4**.

A1.49 Herbs are generally uncommon here but amongst others include ox-eye daisy, wild carrot, perforate St John's-wort, bird's-foot trefoil and a small quantity of ragged robin (*Silene flos-cuculi*).

A1.50 The reedbed in this area is considered to be of County value due to its status as a Priority Habitat and Kent BAP habitat.

A1.51 The scrub is considered to be of Local level value only, due to a lack of diversity in structure and species.

A1.52 The ditch and pond network are considered to be of County value due to their ability to support protected species and their connection with the wider landscape, including the grazing marsh to the west.

A1.53 The former sports field grassland is considered to be of District value due to the presence of large numbers of nationally scarce species.

Botany Marsh West

A1.54 Botany Marsh west is still under management as a grazing marsh and comprises a large open expanse of grass, divided by wet ditches and containing scattered scrapes and ephemeral ponds. Access to this area was not granted for the Phase 1 survey, but grass species recorded included common reed (*Phragmites australis*) and perennial rye. It is likely that this area qualifies as the priority habitat 'coastal/floodplain grazing marsh'. On the northern edge or botany marsh west, leading upwards along the stream is saltmarsh vegetation. Slender hare's-ear (*Bupleurum tenuissimum*), a species with a strong association with upper saltmarsh habitat was recorded, and sea club-rush (*Bolboschoenus maritimus*) is plentiful, along with sea couch (*Elytrigia atherica*) along the banks of the stream forming the eastern boundary of the NE Tip.

A1.55 This area has been valued as of District importance as a precaution, due to its likelihood of qualifying as a Priority Habitat, and its ability to support protected species.

Black Duck Marsh

A1.56 Black Duck Marsh forms a large area of reedbed in the south-west of the peninsula (**Image EDP A1.4**). It is surrounded by deep, wet ditches and is shielded from the remainder of the peninsula by bands of scrub/immature woodland. The northern half of the marsh appears to be drier and contains scattered scrub. The southern half contains a large body of open water.

A1.57 The sea wall running along the marsh's north-western edge is moderately species-rich, although it is mown regularly so its value is reduced. Species recorded include hedge bedstraw (*Galium mollugo*), bird's-foot trefoil, red clover, yellow vetchling, grass vetchling, ribwort plantain, marjoram (*Origanum majorana*), ox-eye daisy and meadow vetchling.

A1.58 A small area of salt marsh exists between the two existing sea walls (**Image EDP A1.5**), although this area is no longer regularly inundated due to the presence of the outer wall and is managed for amenity value at its southern extent. Slender hare's-ear (*Bupleurum tenuissimum*), a species with a strong association with upper saltmarsh habitat was recorded here.



Image EDP A1.4: The large reedbed at Black Duck Marsh with open water in the centre – looking north-east



Image EDP A1.5: Saltmarsh adjacent to Black Duck Marsh – looking south-west

A1.59 In the northern tip of the Black Duck Marsh targeted survey area is a small area of unmanaged calcareous grassland dominated by red fescue (*Festuca rubra*) with large but localised populations of ox-eye daisy (*Leucanthemum vulgare*) and kidney vetch (*Anthylis vulneraria*); glaucous sedge (*Carex flacca*) is also locally common. This calcareous grassland was too small and lacking in heterogeneity to conduct an NVC survey. This is shown as **TN6** on **Plan EDP 4**.

A1.60 There is a small area of shallow, open water in the south-eastern corner of the marsh. This area was formerly recorded as marshy grassland but was wet well into June 2020 after a very dry Spring, suggesting that the water table has risen in the past eight years.

The area currently forms a series of ponds dominated by rushes, with narrow scrubby banks running through the centre.

A1.61 Immediately west of Black duck marsh is a thin strip of saltmarsh vegetation along the interface with the estuary.

A1.62 The reedbed is considered to be of County level importance due to its status as a Priority Habitat and Kent BAP habitat, its extent and its position along the Thames Estuary.

A1.63 The calcareous grassland and sea-wall grassland are considered to be of Local value only due to their limited extent and unfavourable management.

Main Access Track, Tunnel Section Storage and Adjacent Ephemeral Habitat

A1.64 The track runs to the east of Black Duck Marsh north to the edge of Broadness Grassland. The verges of the track are rough grassland and scattered scrub with poor species diversity although yellow vetchling is occasionally recorded here. As the track passes the central ridge, the track passes a large area of former hard standing. This area, along with the area directly to the east of the security hut on Manor Way currently being used as storage for sections of tunnel, is slowly being colonised by vegetation and could currently be described as the priority habitat "*open mosaic habitats on previously developed land*". Some more florally diverse areas exist, particularly along the banks surrounding the former hard standing. Species found here include hoary ragwort (*Jacobaea erucifolia*), bulbous buttercup, wild carrot (*Daucus carota*), yellow vetchling, ox-eye daisy, red valerian, hairy vetch and red clover.

A1.65 These areas fulfil the criteria set out in the Priority Habitat descriptions for habitats of this type[47], and are therefore considered to be of District level value.

NE Tip

A1.66 The NE Tip is one of the most open areas of the peninsula, with just a small amount of scattered scrub around its northern edge. The tip is a disused landfill site and therefore forms a small hill, which is a high point within the peninsula. It is surrounded by reed-filled, wet ditches to the north, east and west and by reedbed associated with the former sewage works to the south.

A1.67 The poor semi-improved grassland is dominated by common couch and false-oat grass, with occasional ox-eye daisy, mugwort, teasel (*Dipsacus fullonum*), colt's-foot (*Tussilago farfara*), sand lucerne, bird's-foot trefoil and tufted vetch. Yellow vetchling is present along the track ringing the 'pit'.

A1.68 A colony of giant hogweed (*Heracleum mantegazzianum*) is present within scrub along the north-eastern edge of the Tip.

[47] UK Biodiversity Action Plan Priority Habitat Descriptions Open Mosaic Habitats on Previously Developed Land From: UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008.

A1.69 A small area of salt-marsh was also identified during the botanical survey, which recorded the presence of plentiful sea club-rush (*Bolboschoenus maritimus)* and sea couch (*Elytrigia atherica*).

A1.70 The poor semi-improved grassland/scrub mosaic here is considered to be of Local level value only.

Channel Tunnel Rail Link (CTRL) Wetland and Former Sewage Works

A1.71 A large area of relatively dry reedbed with willow scrub and areas of open water, the area surrounds the HS1 tunnel portal under the Thames and encompasses the entirety of the former sewage works located just to its north. The reebed is a Priority Habitat and Kent BAP habitat and is therefore considered to be valuable at the County level.

Land to the North of Tiltman Avenue

A1.72 The southern half of this area is rough, calcareous semi-improved grassland with scattered scrub. Further north, this turns to dense scrub and eventually immature woodland. The grassland community on the verge appears to have been deliberately sown as it is not only dominated by an unusual variety of red fescue (*Festuca rubra*) but it also has a predominance of unusually vigorous varieties of salad burnet (*Sanguisorba minor*) and common bird's-foot trefoil (*Lotus corniculatus*) such as are frequently encountered in swards established by sowing a "wild seed mix". Wild seed mixes, especially where not designed specifically for nature conservation works, often contain varieties of native plants of continental European origin or from parent stock cultivated in plant nurseries and typically displaying greater vigour than wild stock.

A1.73 This sward was subject to a detailed NVC survey[48] but did not key out as any recognisable NVC community and thus gives additional weight to the suspicion that this is a sown wild-flower mix with cheap commercial grass varieties predominating. The area under NVC survey is shown as **TN1** on **Plan EDP 4** and is considered to be of Local level only value due to its establishment through the sowing of a seed mix.

SW Tip

A1.74 The central ridge is dominated by hawthorn, rose and dogwood scrub, with some more open false-oat, poor semi-improved grassland present across the top of the ridge.

A1.75 The main drain runs adjacent to the ridge, along its eastern edge. The drain is slow moving and flanked by common reeds, willow scrub, gypsywort (*Lycopus europaeus*), bittersweet (*Solanum dulcamara*) and great willowherb (*Epilobium hirsutum*). It drains in its north into a leachate contaminated pond. The pond does not have appear to have much aquatic vegetation apart from a line of reeds along its eastern edge.

A1.76 The aquatic habitats within this area are considered to be of Local value only due to their contamination and therefore poor water quality.

[48] British Plant Communities Volume 3: Grasslands and montane communities Ed J.S.Rodwell 1992 (1998 edition)

A1.77 The scrub and grassland mosaic is considered to be of Local level value only due to lack of species diversity but as part of a large habitat network.

Manor Way Industrial Estate

A1.78 The industrial estate is mostly hard standing, with intact and derelict buildings surrounded by industrial yards and chalk cliffs to the south. Some areas of dense scrub exist along the edges of the estate, and buddleia is abundant along Manor Way itself. The habitats in this area are considered to be of Site level value.

Craylands Pit

A1.79 Craylands pit is a disused chalk pit, which has partly been left to be colonised by vegetation. Its western end slopes downwards to the gateway onto Craylands Lane. At the top of the slope is a band of bramble, rose (*Rosa sp.*), hawthorn, dogwood (*Cornus sp.*), buddleia and sycamore scrub with some wildflowers at its base, including ox-eye daisy, bird's-foot trefoil, kidney vetch (*Anthyllis vulneraria*), red clover, everlasting sweet-pea, wild carrot, red valerian and perforate St. John's wort. Immediately to the east of this is a depression leading to a gated tunnel through the chalk ridge. This depression contains dense scrub and rough grassland.

A1.80 The main body of the pit is characterised by a matrix of sparsely vegetated chalk substrate, more mature rough grassland and scattered scrub on an unimproved soil. The more open areas are botanically richer, including colt's-foot, salad burnet, red clover, ox-eye daisy, ribwort plantain, marjoram, wild carrot, sainfoin and abundant kidney vetch. Small amounts of knapweed and yellow rattle are also present. The dominant grass species are false-oat and red fescue.

A1.81 The floor of Craylands Pit was subject to a detailed NVC survey as shown as **TN2** on **Plan EDP 4** and pictured in **Image EDP A1.6**. There are two distinct communities here: NVC2a is found around the edges of the pit and is what appears to be a self-sown semi-natural grassland demonstrating a mild calcareous affinity whilst NVC2b comprises numerous narrow bands of an apparently sown calcareous sward. The bands within NVC2b were clearly made by agricultural or horticultural equipment and are small shallow furrows or drill lines supporting a skeletal soil and a species-poor calcareous sward dominated by common bird's-foot trefoil, wild carrot (*Daucus carota*), and locally by kidney vetch (*Anthyllis vulneraria*). It is possible that the area now covered by NVC2b may have had a species-poor self-sown sward, which was cleared to allow for a herb-dominated mix to be sown; alternatively it may have been a compacted mineral surface with very little natural regeneration thus necessitating the clearance, drilling and sowing. Given that the edge of NVC2b is often very sharply demarcated, it is possible that the former option is most likely and that a self-sown turf was stripped.



Image EDP A1.6: Craylands Pit NVC2b community – sown grassland in furrows

A1.82 The best approximation of NVC2a is to the **MG1d** *Arrhenatherum elatius* grassland *Pastinaca sativa* sub-community although wild parsnip (*Pastinaca sativa*) is lacking here. Whilst this grassland community is a criteria for SSSI selection[49], it must exceed 5ha or be of exceptionally high quality to be of National Importance.

A1.83 NVC2b has no satisfactory association with any NVC community or sub-community but bears some resemblance to a highly modified and grass-poor **CG2** *Festuca ovina-Avenula pratensis* grassland.

A1.84 Scrub habitat is most prevalent around the edges of the pit, both at the top and base of the chalk cliffs. Species include willow, hawthorn, poplar (*Populus sp.*) and buddleia.

A1.85 A track leads to a second tunnel through the northern cliff. The slopes leading down to this tunnel have a higher forb coverage, with mostly the same species being present, with the addition of yarrow, great knapweed (*Centaurea scabiosa*) and meadow buttercup (*Ranunculus acris*).

A1.86 Whilst the pit contains two grassland communities that fit the Priority Habitat description for lowland calcareous grassland (CG2)[50] and lowland meadows (MG1d)[51], they are not particularly fine examples. The MG1d grassland is considered to be valued at the District level value due to its limited extent, and the other grassland and scrub communities are considered to be of Local value only.

[49] Guidelines for the Selection of Biological SSSIs Part 2: Detailed Guidelines for Habitats and Species Groups Chapter 3 Lowland Grasslands Authors Jefferson, R.G., Smith, S.L.N. & MacKintosh, E.J., JNCC 2019

[50] UK Biodiversity Action Plan Priority Habitat Descriptions Lowland Calcareous Grassland From: UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008.

[51] UK Biodiversity Action Plan Priority Habitat Descriptions Lowland Meadows From: UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008.

Bamber Pit

A1.87 The northern half of Bamber Pit has been used historically as landfill, and as a result is at a much higher elevation than the rest of the pit. Apart from maintained pathways, this area is impenetrable due to dense hawthorn, dogwood, elder and buddleia scrub. The area around the gate is more open and contains wall barley, barren brome, nettle, curled dock, false oat, soft brome, cock's-foot and fat-hen (*Chenopodium album*). Small amounts of pink sorrel (*Oxalis articulate*) and comfrey (*Symphytum officinale*) were recorded further along the track.

A1.88 The remainder of the pit is at a significantly lower elevation and comprises a matrix of ephemeral vegetation, scattered scrub and small pockets of poor semi-improved grassland. The slope leading to the south-eastern corner of the pit contains an area of grassland with species including white valerian, teasel, creeping cinquefoil, knapweed, common ragwort, ribwort plantain, common vetch, marjoram, perforate St. John's wort, cut-leaved cranesbill (*Geranium dissectum*), forget-me-not (*Myosotis sp.*), ox-eye daisy and common mallow, although dominated by false-oat grass.

A1.89 A large pond/small lake exists at the base of the pit (**Image EDP A1.7**), which is surrounded by dense scrub and populated by large carp. The lake is used recreationally by members of the public who have broken into the area, and as a result is heavily polluted by litter. The only aquatic species noted during the Phase 1 was white water lily (*Nymphaea alba*).



Image EDP A1.7: The lake at Bamber Pit

A1.90 Two areas of grassland were subject to a detailed botanical survey. The northernmost area (**TN7** on **Plan EDP 4**) covers a small area and is notably species-poor; intensive grazing by rabbits (*Oryctolagus cuniculus*) keeps the sward short and is likely to influence species composition as unpalatable species will dominate. Creeping cinquefoil (*Potentilla reptans*) is dominant here but false oat-grass, cocksfoot (*Dactylis glomerata*), and annual meadow-grass (*Poa annua*) are frequent.

A1.91 The southernmost of the two small grassland areas (**TN8** on **Plan EDP 4**) is larger and slightly more species-rich although no species of any note were recorded. False oat-grass, cocksfoot, annual meadow-grass and creeping cinquefoil are again the most common species recorded.

A1.92 The grassland and scrub habitats in Bamber Pit are considered to be of Local level value only.

A1.93 The pond is considered to be of Local level value due to its Status as a Priority Habitat, but despite its heavy pollution and the presence of non-native fish (carp (*Cyprinus carpio)*).

Sportsground

A1.94 This area is another former chalk pit, although at a later successional stage than Craylands Pit. The eastern end of the pit is adjacent to the HS1 railway and is an open, scattered hawthorn scrub/rough false-oat and cock's-foot poor semi-improved grassland mosaic. False oat-grass is dominant here but common couch (*Elytrigia repens*), cocksfoot, creeping cinquefoil, and field bindweed (*Convolvulus arvensis*) are all frequent. Grass vetchling (*Lathyus nissolia*) is locally abundant and ribwort (*Plantago lanceolata*) common. The western end and much of the southern boundary of the pit is wooded as shown in **Image EDP A1.8**, and between is an area of dense bramble scrub, which has engulfed a small building.



Image EDP A1.8: The Western end and much of the southern boundary of Craylands Pit is Wooded

A1.95 The woodland is considered to be of Local level value due its status as a Priority Habitat, but limited extent, structure and diversity.

A1.96 The scrub and grassland mosaic are considered to be of no more than Local level value.

Former Northfleet Landfill

A1.97 The main body of the landfill is managed, open, poor semi-improved grassland (**Image EDP A1.9**). This is fairly rough in character, although contains higher forb diversity in some areas. This grassland includes species such as cock's-foot, soft brome, Yorkshire fog, rough meadow-grass, rough chervil (*Chaerophyllum temulum*), wild carrot, bristly ox-tongue (*Helminthotheca echioides*), smooth sow-thistle, creeping thistle, ribwort plantain, creeping cinquefoil and bird's-foot trefoil. Higher diversity areas also include common vetch, red clover, yarrow, yellow toadflax, goat's-beard, white valerian and hedgerow cranesbill (*Geranium pyrenaicum*). Some pyramidal and bee orchids were present around the southern edge of the landfill.

A1.98 Two areas of scrub are present in the east of the area, these are ringed by ditches and contain a mix of hawthorn, crab-apple (*Malus Sylvestris*), blackthorn, dog rose, dogwood, gorse (*Ulex europaeus*), broom, bramble and buddleia. Further scrub is present along the eastern boundary, thickening into the north-eastern corner, where a small section of the original pit is present (Bamber Pit south). This area is unmanaged and dominated by false-oat grass and scrub, but also contains hairy vetch and other forb species, plus some ox-eye daisy and teasel.

A1.99 The western edge of the landfill is bordered by a band of off-site woodland and bramble scrub. The scrub and grassland habitats within this area are considered to be of no more than Local level value.



Image EDP A1.9: Open poor semi improved grassland on the former landfill

Station Quarter South and River Ebbsfleet

A1.100 The River Ebbsfleet, which is described in **Annex EDP 11** forms the eastern edge of the area. The river corridor is flanked by alder (*Alnus glutinosa*) and willow dominated wet woodland to the west, which then gives way to dense, then scattered scrub and finally, open false-oat grassland. Teasel is abundant in this area, and bramble scrub is the

dominant habitat in the south and east. Three ponds are present in the north, one natural and one drainage feature and an inline pool associated with the river.

A1.101 The scrub is made up of willow, hawthorn and dog rose, with occasional cherry, hazel, dogwood, field maple, silver birch, oak (*Quercus sp.*) and elder.

A1.102 The poor semi-improved grassland is varied in length due to grazing by rabbits, although none is species-rich. Species present include hemlock (*Conium maculatum*), teasel, crown vetch (*Securigera varia*), creeping thistle, spear thistle, dove's-foot cranesbill, weld (*Reseda luteola*), meadow buttercup, broad-leaved dock (*Rumex obtusifolius*), curled dock, cut-leaved cranesbill, creeping cinquefoil, yellow-wort (*Blackstonia perfoliate*), hoary cress (*Lepidium draba*), colt's-foot, white campion, ground ivy (*Glechoma hederacea*), black medick, common vetch, great willowherb, nettle and field forget-me-not (*Myosotis arvensis*). The grassland/scrub mosaic habitats here are considered to be of Local value due to their structural diversity and extent, despite their relatively low floral diversity.

Station Quarter North

A1.103 Most of the area of Station Quarter North is taken by car parking and associated landscape planting (in the form of dense, immature tree planting along the roadside). The remaining semi-natural vegetation to the south of the car park is open to the east and scrubby to the west (**Image EDP A1.10**). The eastern, semi-improved grassland includes species such as tall fescue, red fescue, soft brome, barren brome, Yorkshire fog, mugwort, perforate St. John's Wort, crown vetch, creeping thistle, ox-eye daisy, bladder campion (*Silene vulgaris*), ragwort, yellow vetchling, grass vetchling, rough hawk's-beard, red clover and hogweed (*Heracleum sphondylium*). The scrub comprises a mix of blackthorn, dogwood, grey poplar (*Populus x canescens*), hawthorn, rose, cherry, buddleia, grey willow (*Salix cinerea*), broom, oak, hazel, alder, field maple and silver birch. The grassland and scrub habitats here are considered to be of Site value only due to their limited extent.



Image EDP A1.10: Scrub in Station Quarter

Land along Thames Way and A2260, Northfleet

A1.104 This land follows the route of the River Ebbsfleet and the adjacent Thames Way road, which links Ebbsfleet International station with Northfleet. It is formed of four distinct parcels, three of which, to the east of the road are dominated by reedbed and willow woodland. A small area of Japanese knotweed (*Fallopia japonica*) is present along the public right of way to the north of Sawyer's Lake.

A1.105 The area between the A2260 and International Way is rough semi-improved grassland, dominated by false-oat grass, with barren brome, Yorkshire fog, ox-eye daisy, crown vetch and white valerian. There is some scattered dog rose and hawthorn.

A1.106 The road verges along Thames Way are scrubby with some finer patches of grassland with species including ox-eye daisy, crown vetch, common vetch, red fescue, false-oat and rough hawk's-beard.

A1.107 The area west of Thames Way, north of the railway, is dominated by buddleia scrub, with willow scrub and reedbed along the river channel. To the north of this is a more open area with ruderal and scrub species, including wild raspberry (*Rubus occidentalis*), hemlock, bramble, white valerian, creeping thistle and areas of almost exclusively creeping cinquefoil.

A1.108 The scrub and grassland habitats in these areas are considered to be of Local value, and the reedbed of County value due to its status as a Priority Habitat and Kent BAP habitat.

A2 Corridor

A1.109 The A2 corridor comprises a small strip of poor semi-improved grassland along the side of the A2 dual carriageway, with a band of woodland to the north. The grassland contains many species of rough/disturbed land and is dominated by false-oat and barren brome. Amongst the other species present are hawk's-beard spp., ox-eye daisy, goat's-beard, wild carrot, common mallow, wall barley, rough hawkbit, crown vetch, yarrow, ragwort and teasel. To the north is a steep drop into a former quarry, which is presently being developed for housing. The woodland along the slope is diverse in woody species, including dogwood, hawthorn, ash, guelder rose (*Viburnum opulus*), field maple, hazel, birch, elm (*Ulmus* sp.), holly, hornbeam (*Carpinus* sp.), wild cherry, apple, sweet chestnut (*Castanea sativa*), Norway maple (*Acer platanoides*), white poplar (*Populus alba*), dog rose, rowan (*Sorbus aucuparia*), turkey oak (*Quercus cerris*), honeysuckle (*Lonicera* sp.), alder, old man's beard and oak.

A1.110 Further to the west, the woodland rises, widens and becomes more natural in character, dominated by oak, with occasional sweet chestnut, gorse, field maple, birch and honeysuckle. Here the ground flora is reasonably diverse and includes wood sage (*Teucrium scorodonia*), wood spurge (*Euphorbia amygdaloides*), St. John's wort, bramble, dog mercury (*Mercurialis perennis*), wood-rush (*Luzula sylvatica*), wood false-brome (*Brachypodium sylvaticum*), wood avens (*Geum urbanum*), false-fox sedge (*Carex otrubae*) and wood speedwell (*Veronica montana*). The habitats in this area are

considered to be of less than local value with the exception of the natural woodland to the west which is considered to be of Local value due to its connectivity with other woodland, its status as a Priority Habitat and Kent BAP habitat, and the presence of dormouse.

NVC Tables for Locations within Targeted Survey Areas

Northern Verge of Tiltman Avenue (Shown as TN1 on Plan EDP 5)

Table EDP A1.1: NVC1 - Does not key out to any satisfactory NVC community (most probably a recently sown commercial wildflower seed mix)

Common Name	Scientific Name	NVC Quadrat				DOMIN
		1	2	3	4	
Yarrow	*Achillea millefolium*		3		1	II (1-3)
False oat-grass	*Arrhenatherum elatius*		1	2	1	III (1-2)
Barren brome	*Bromopsis sterilis*	4	5	5	5	IV (4-5)
Black knapweed	*Centaurea nigra*	1		3		II (1-3)
Common mouse-ear	*Cerastium fontanum*			1	3	II (1-3)
Creeping thistle	*Cirsium arvense*	2				I (2)
Wild carrot	*Daucus carota*	4	4	4		III (4)
Sea couch	*Elytrigia aetherica*		2	3	2	III (2-3)
Red fescue	*Festuca rubra*	8	8	6	7	IV (6-8)
Fennel	*Foeniculum vulgare*				1	I (1)
Hedge bedstraw	*Galium mollugo*	3	5	7	6	IV (3-7)
Lady's bedstraw	*Galium verum*	5		6	5	III (5-6)
Hogweed	*Heracleum sphondylium*			1		I (1)
Hoary mustard	*Hirschfeldia incana*	2	1			II (1-2)
Yorkshire fog	*Holcus lanatus*	6	3	6	7	IV (3-7)
Perforate St John's-wort	*Hypericum perforatum*			2	2	II (2)
Grass vetchling	*Lathyrus nissolia*		1	4		II (1-4)
Ox-eye daisy	*Leucanthemum vulgare*		4		1	II (1-4)
Bird's-foot trefoil	*Lotus corniculatus*	5	7	3	5	IV (3-7)
Black medick	*Medicago lupulina*	2	6	3		III (2-6)
Lucerne	*Medicago sativa ssp. sativa*	1	1		1	III (1)
Lemon balm	*Melissa officinalis*		1			I (1)
Sainfoin	*Onobrychis viciifolia*			1	1	II (1)
Timothy	*Phelum pratense*				2	I (2)
Hawkweed ox-tongue	*Picris hieracioides*	4			3	II (3-4)
Ribwort	*Plantago lanceolata*	1	5	5	3	IV (1-5)
Flattened meadow-grass	*Poa compressa*			4		I (4)
Creeping cinquefoil	*Potentilla reptans*	6	4	6	5	IV (4-6)
Greek dock	*Rumex cristatus*		2			I (2)
Salad burnet	*Sanguisorba minor*	5	3	5	5	IV (3-5)
Common ragwort	*Senecio jacobaea*	2				I (2)
Goatsbeard	*Tragopogon pratense*			2		I (2)

Common Name	Scientific Name	NVC Quadrat				DOMIN
		1	2	3	4	
Squirreltail fescue	*Vulpia bromoides*			3	5	II (3-5)

Craylands Pit Natural Grassland (Shown as TN2 on Plan EDP 4)

Table EDP A1.2: NVC2a - **MG1d** *Arrhenatherum elatius* grassland *Pastinaca sativa* sub-community

Common Name	Scientific Name	NVC Quadrats					DOMIN
		1	2	3	4	5	
Yarrow	*Achillea millefolium*		3	2	2		III (2-3)
Common bent	*Agrostis capillaris*	5	2	6		3	IV (2-6)
Pyramidal orchid	*Anacamptis pyramidalis*				2		I (2)
Kidney vetch	*Anthyllis vulneraria*		3			7	II (3-7)
False oat-grass	*Arrhenatherum elatius*	5	7	7	6	6	V (5-7)
Silver birch seedlings	*Betula pendula*	1	3	1		1	IV (1-3)
Yellow-wort	*Blackstonia perfoliata*	1					I (1)
Smooth brome	*Bromus hordaceus*			3		4	II (3-4)
Buddleia seedling	*Buddleia davidii*	1	1	1			III (1)
Common mouse-ear	*Cerastium fontanum*	2	2		2		III (2)
Wild clematis	*Clematis vitalba*		4				I (4)
Hawthorn seedling	*Crataegus monogyna*				2		I (2)
Beaked hawksbeard	*Crepis vesicaria*			3		1	II (1-3)
Cocksfoot	*Dactylis glomerata*	1	4	2	3		IV (1-4)
Wild carrot	*Daucus carota*	3		2		3	III (2-3)
Tall fescue	*Festuca arundinacea*		4				I (4)
Red fescue	*Festuca rubra*	5	7	2	6	6	V (2-7)
(Commercial fescue variety)	*Festuca sp.*			6			I (6)
Hedge bedstraw	*Galium mollugo*	3					I (3)
Perforate St John's-wort	*Hypericum perforatum*	2	1				II (1-2)
Ox-eye daisy	*Leucanthemum vulgare*		5	5	3	3	IV (3-5)
Perennial rye-grass	*Lolium perenne*	3			3	4	III (3-4)
Bird's-foot trefoil	*Lotus corniculatus*			6	1	1	III (1-6)
Narrow-leaved bird's-foot trefoil	*Lotus glaber*	2				3	II (2-3)
Black medick	*Medicago lupulina*		1	1			II (1)
Melilot species	*Melilotus sp.*	3			2		II (1-3)
Sainfoin	*Onobrychis viciifolia*		1	1			II (1)
Wild marjoram	*Origanum vulgare*			2			I (2)
Hawkweed ox-tongue	*Picris hieracioides*	2	2	1			III (1-2)
Ribwort	*Plantago lanceolata*	1	4			2	III (1-4)
Creeping cinquefoil	*Potentilla reptans*			6	5		II (5-6)
Self-heal	*Prunella vulgaris*	4				1	II (1-4)
Willow seedlings	*Salix spp.*		4	3			II (3-4)
Salad burnet	*Sanguisorba minor*				2		I (2)
Hop trefoil	*Trifolium campestre*		3	1	2		III (1-3)
Red clover	*Trifolium pratense*	5	2	4			III (2-5)
Yellow oat-grass	*Trisetum flavescens*				2	2	II (2)
Coltsfoot	*Tussilago farfara*					3	I (3)

Common Name	Scientific Name	NVC Quadrats					DOMIN
Common vetch	*Vicia sativa*			2		3	II (2-3)

Craylands Pit – Possibly Seeded Area (Shown as TN2 on Plan EDP 4)

Table EDP A1.3: NVC2b - No satisfactory association with any NVC community or sub-community but bears some resemblance to a highly modified and grass-poor **CG2** *Festuca ovina- Avenula pratensis* grassland

Common Name	Scientific Name	NVC Quadrats					DOMIN
		1	2	3	4	5	
Common bent	*Agrostis capillaris*				1	3	II (1-3)
Kidney vetch	*Anthyllis vulneraria*	5		3	5	8	IV (3-8)
False oat-grass	*Arrhenatherum elatius*	2			1	1	III (1-2)
Yellow-wort	*Blackstonia perfoliata*		3			2	II (2-3)
Smooth brome	*Bromus hordaceus*			1		1	II (1)
Black knapweed	*Centaurea nigra*	2					I (2)
Common centaury	*Centaurium erythrea*			2			I (2)
Beaked hawksbeard	*Crepis vesicaria*	1	1				II (1)
Cocksfoot	*Dactylis glomerata*		2	2		1	III (1-2)
Common spotted orchid	*Dactylorhiza fuchsii*		3		1		II (1-3)
Wild carrot	*Daucus carota*	3	6	5	5	7	V (3-7)
Red fescue	*Festuca rubra*		1		2		II (1-2)
Perforate St John's-wort	*Hypericum perforatum*				4	1	II (1-4)
Ox-eye daisy	*Leucanthemum vulgare*	4		2	1	5	IV (1-5)
Bird's-foot trefoil	*Lotus corniculatus*	7		6	6	7	IV (6-7)
Narrow-leaved bird's-foot trefoil	*Lotus glaber*		3				I (3)
Black medick	*Medicago lupulina*		2	4			II (2-4)
Melilot species	*Melilotus sp.*	5	5			3	III (3-5)
Mouse-ear hawkweed	*Pilosella officinarum*				6		I (6)
Ribwort	*Plantago lanceolata*	3	6	2	4	2	V (2-6)
Salad burnet	*Sanguisorba minor*		2		3	2	III (2-3)
Red clover	*Trifolium pratense*	4					I (4)
Coltsfoot	*Tussilago farfara*				5		I (5)
Bare ground		6	6	3	6	5	V (3-6)

Area in the South-east of Broadness Grassland (shown as TN3 on Plan EDP 4)

Table EDP A1.4: NVC3 - **MG1d** *Arrhenatherum elatius* grassland *Pastinaca sativa* sub-community

Common Name	Scientific Name	NVC Quadrats					DOMIN
		1	2	3	4	5	
Yarrow	*Achillea millefolium*			1	2		II (1-2)
Pyramidal orchid	*Anacamptis pyramidalis*		1				I (1)
False oat-grass	*Arrhenatherum elatius*	8	8	9	7	9	V (7-9)
Yellow-wort	*Blackstonia perfoliata*	1			1		II (1)
Common mouse-ear	*Cerastium fontanum*	1	2			1	III (1-2)
Creeping thistle	*Cirsium arvense*	4		4	1	2	IV (1-4)

Common Name	Scientific Name	NVC Quadrats					DOMIN
Hemlock	*Conium maculatum*				1		I (1)
Dogwood	*Cornus sanguineus*		1	1			II (1)
Beaked hawksbeard	*Crepis vesicaria*	2			2		II (2)
Cocksfoot	*Dactylis glomerata*	3	1		3	1	IV (1-3)
Wild carrot	*Daucus carota*		4	3	1	1	IV (1-4)
Perennial wall-rocket	*Diplotaxis tenuis*	1					I (1)
Common teasel	*Dipsacus fullonum*		1			2	II (1-2)
Sea couch	*Elytrigia aetherica*	6	5	7	5	3	V (3-7)
Goosegrass	*Galium aparine*	2			3	2	III (2-3)
Hogweed	*Heracleum sphondylium*				1	2	II (1-2)
Perforate St John's-wort	*Hypericum perforatum*				3		I (3)
Ploughman's spikenard	*Inula conyzae*	2				1	II (1-2)
Prickly lettuce	*Lactuca seriola*		1			3	II (1-3)
Great lettuce	*Lactuca virosa*			1			I (1)
Yellow vetchlingling	*Lathyrus aphaca*	4	5	4		4	IV (4-5)
Hairy vetch ling	*Lathyrus hirsutus*	3	3	3	4	1	V (1-4)
Broad-leaved everlasting-pea	*Lathyrus latifolius*				3		I (3)
Grass vetchling	*Lathyrus nissolia*	4	1		6		III (1-6)
Hoary cress	*Lepidium draba*			2			I (2)
Ox-eye daisy	*Leucanthemum vulgare*		2		2	2	III (2)
Common toadflax	*Linaria vulgaris*				1		I (1)
Bird's-foot trefoil	*Lotus corniculatus*				3		I (3)
Narrow-leaved bird's-foot trefoil	*Lotus glaber*	4					I (4)
Common mallow	*Malva sylvestris*			3	1	1	III (1-3)
Black medick	*Medicago lupulina*	6	5	5			III (5-6)
Wild parsnip	*Pastinaca sativa*				3	4	II (3-4)
Hawkweed ox-tongue	*Picris hieracioides*			6	3	3	III (3-6)
Ribwort	*Plantago lanceolata*	4				2	II (2-4)
Smooth meadow-grass	Poa palustris	2	4	3	1	3	V (1-4)
Bastard cabbage	Rapistrum rugosum			2			I (2)
Bramble	Rubus fruticosus ag..				2	1	II (1-2)
Curled dock	Rumex crispus	1	1				II (1)
Greek dock	Rumex cristatus	1					I (1)
Hoary ragwort	Senecio erucifolius		2				I (2)
Oxford ragwort	Senecio squalidus	2	2			3	III (2-3)
White campion	Silene latifolia				1		I (1)
Stone parsley	Sison amomum			2			I (2)
Alexanders	Smyrnium olusatrum					2	I (2)
Goatsbeard	Tragopogon pratense			2			I (2)
Hop trefoil	Trifolium campestre				3	3	II (3)
Yellow oat-grass	Trisetum flavescens			2			I I(2)
Nettle	Urtica dioica		4				I (4)
Tufted vetch	Vicia cracca	1		1	3		III (1-3)
Smooth tare	Vicia tetrasperma	3			5	4	III (3-5)

DAFOR Tables (For Locations Within Targeted Survey Areas Not Suitable for NVC Survey)

Table EDPA1.5: Disused Chalk Pits (Shown as **TN7** and **TN8** on **Plan EDP 4**)

Common Name	Scientific Name	Pit Name and DAFOR		
		Sports Ground	Bamber Pit 1 (TN7)	Bamber Pit 2 (TN8)
Yarrow	*Achillea millefolium*	O		O
Pyramidal orchid	*Anacamptis pyramidalis*	R		
False oat-grass	*Arrhenatherum elatius*	D	F	F/LA
Mugwort	*Artemesia vulgaris*	R		
Black horehound	*Ballota nigra*	R		
Barren brome	*Bromopsis sterilis*	R		
Black knapweed	*Centaurea nigra*			O
Creeping thistle	*Cirsium arvense*	O		
Field bindweed	*Convolvulus arvensis*	F		
Beaked hawksbeard	*Crepis vesicaria*	O/LF		
Cocksfoot	*Dactylis glomerata*	F	F	F/LA
Wild carrot	*Daucus carota*	O/LF		
Perennial wall-rocket	*Diplotaxis tenuifolia*			O/LF
Common teasel	*Dipsacus fullonum*	R	F	O
Sea couch	*Elytrigia atherica*	R/LO		
Common couch	*Elytrigia repens*	F		
Red fescue	*Festuca rubra*			O/LF
Fennel	*Foeniculum vulgare*	R		
Hedge bedstraw	*Galium mollugo*	O		
Cut-leaved cranesbill	*Geranium dissectum*	O		O/LF
Dovesfoot cranesbill	*Geranium molle*			R
Hogweed	*Heracleum sphondylium*	R		
Hoary mustard	*Hirschfeldia incana*		O	O/LF
Yorkshire fog	*Holcus lanatus*		R	O
Perforate St John's-wort	*Hypericum perforatum*	R	R	F
Ploughman's spikenard	*Inula conyzae*			R
Meadow vetchling	*Lathtyrus pratensis*	R		
Grass vetchling	*Lathyrus nissolia*	O/LA		
Hoary cress	*Lepidium draba*	R		O/LF
Ox-eye daisy	*Leucanthemum vulgare*	R/LO		
Common toadflax	*Linaria vulgaris*	R/LF		
Common bird's-foot trefoil	*Lotus corniculatus*			O
Common mallow	*Malva sylvestris*	R	R	O
Lucerne	*Medicago sativa sp. sativa*	R		
Marjoram	*Origanum vulgare*			R
Hawkweed oxtongue	*Picris hieracioides*	R		
Ribwort	*Plantago lanceolata*	O/LF	O	O
Annual meadow-grass	*Poa annua*		F	F
Smooth meadow-grass	*Poa pratensis*	F	R	
Creeping cinquefoil	*Potentilla reptans*	F/LA	D	F/LA

Common Name	Scientific Name	Pit Name and DAFOR		
		Sports Ground	Bamber Pit 1 (TN7)	Bamber Pit 2 (TN8)
Celery-leaved buttercup	*Ranunculus scleratus*	R		
Dog rose	*Rosa arvensis agg.*			R
Bramble	*Rubus fruticosus agg.*			R
Greek dock	*Rumex cristatus*	R	R	
Hoary ragwort	*Senecio erucifolia*	R		
White campion	*Silene latifolia*			R
Prickly sow-thistle	*Sonchus asper*			R
Dandelion	*Taraxacum officinale agg.*	R		
Goatsbeard	*Tragopogon pratense*	O		
Red clover	*Trifolium pratense*	R		
Germander speedwell	*Veronica chamaedrys*			R
Tufted vetch	*Vicia cracca*	O		
Common vetch	*Vicia sativa*			R
Smooth tare	*Vicia tetrapserma*	O		

Table EDPA1.6: Calcareous Grassland at the Northern Tip of Black Duck Marsh (Shown as **TN6** on **Plan EDP 4**)

Common Name	Scientific Name	DAFOR
Kidney vetch	*Anthyllis vulneraria*	F/LD
False oat-grass	*Arrhenatherum elatius*	O
Silver birch whip	*Betula pendula*	R
Yellow-wort	*Blackstonia perfoliate*	R
Glaucous sedge	*Carex flacca*	O/LF
Black knapweed	*Centaurea nigra*	R
Hawthorn whip	*Crataegus monogyna*	R
Beaked hawksbeard	*Crepis vesicaria*	R
Cocksfoot	*Dactylis glomerata*	O
Wild carrot	*Daucus carota*	O
Sea couch	*Elytrigia atherica*	F
Common couch	*Elytrigia repens*	R
Meadow fescue	*Festuca pratensis*	R
Red fescue	*Festuca rubra*	A
Cut-leaved cranesbill	*Geranium dissectum*	R
Yorkshire fog	*Holcus lanatus*	O
Perforate St John's-wort	*Hypericum perforatum*	R
Ox-eye daisy	*Leucanthemum vulgare*	O
Common bird's-foot trefoil	*Lotus corniculatus*	O
Narrow-leaved bird's-foot trefoil	*Lotus glaber*	F
Black medick	*Medicago lupulina*	O
Lucerne	*Medicago sativa sp. sativa*	O/LA
Marjoram	*Origanum vulgare*	R
Hawkweed oxtongue	*Picris hieracioides*	R
Ribwort	*Plantago lanceolata*	R
Annual meadow-grass	*Poa annua*	O

Common Name	Scientific Name	DAFOR
Smooth meadow-grass	*Poa pratensis*	R
Creeping cinquefoil	*Potentilla reptans*	O
Meadow buttercup	*Ranunculus acris*	R
Willow whip	*Salix spp*	R
Red clover	*Trifolium pratense*	O
Common vetch	*Vicia sativa*	R
Smooth tare	*Vicia tetrapserma*	R

Table EDPA1.7: Playing Field in Botany Marsh East (Shown as **TN4** on **Plan EDP 4**)

Common name	Scientific name	DAFOR
Creeping bent	*Agrostis stolonifera*	A/LD
Meadow foxtail	*Alopecurus pratensis*	O
False oat-grass	*Arrhenatherum elatius*	R
Divided sedge	*Carex divisa*	F/LA
Black knapweed	*Centaurea nigra*	R
Crested dog's-tail	*Cynosurus cristatus*	O
Cocksfoot	*Dactylis glomerata*	R
Sea couch	*Elytrigia atherica*	O/LF
Common couch	*Elytrigia repens*	O
Tall fescue	*Festuca arundinacea*	A/LD
Red fescue	*Festuca rubra*	O/LF
Hogweed	*Heracleum sphondylium*	R
Yorkshire fog	*Holcus lanatus*	F
Meadow barley	*Hordeum secalinum*	F/LA
Hairy vetchling	*Lathyrus hirsuta*	O
Grass vetchling	*Lathyrus nissolia*	O
Perennial rye-grass	*Loilum perenne*	O/LF
Common bird's-foot trefoil	*Lotus corniculatus*	R
Hawkweed oxtongue	*Picris hieracioides*	O/LF
Ribwort	*Plantago lanceolata*	R
Annual meadow-grass	*Poa annua*	R
Smooth meadow-grass	*Poa pratensis*	F
Creeping cinquefoil	*Potentilla reptans*	O
Hairy buttercup	*Ranunculus sardous*	R
Celery-leaved buttercup	*Ranunculus scleratus*	R
Hoary ragwort	*Senecio erucifolia*	R
Oxford ragwort	*Snecio squalidus*	R
Red clover	*Trifolium pratense*	O
White clover	*Trifolium repens*	R
Common vetch	*Vicia sativa*	R
Smooth tare	*Vicia tetrapserma*	R

Table EDPA1.8: Relict Grassland in South-east of Botany Marsh East (Shown as **TN5** on **Plan EDP 4**)

Common Name	Scientific Name	DAFOR
Yarrow	*Achillea millefolium*	R
Creeping bent	*Agrostis stolonifera*	F
False oat-grass	*Arrhenatherum elatius*	A
Mugwort	*Artemesia vulgaris*	R

Common Name	Scientific Name	DAFOR
Black knapweed	*Centaurea nigra*	O
Creeping thistle	*Cirsium arvense*	O
Beaked hawksbeard	*Crepis vesicaria*	O
Cocksfoot	*Dactylis glomerata*	F
Wild carrot	*Daucus carota*	F
Perennial wall-rocket	*Diplotaxis tenuifolia*	R
Common teasel	*Dipsacus fullonum*	R/LO
Sea couch	*Elytrigia atherica*	O
Common couch	*Elytrigia repens*	O
Tall fescue	*Festuca arundinacea*	F
Red fescue	*Festuca rubra*	R/LO
Hedge bedstraw	*Galium mollugo*	R
Cut-leaved cranesbill	*Geranium dissectum*	R
Dovesfoot cranesbill	*Geranium molle*	R
Yorkshire fog	*Holcus lanatus*	A
Meadow barley	*Hordeum secalinum*	O/LF
Perforate St John's-wort	*Hypericum perforatum*	O
Meadow vetchling	*Lathtyrus pratensis*	R
Yellow vetchling	*Lathyrus aphaca*	R
Grass vetchling	*Lathyrus nissolia*	R
Ox-eye daisy	*Leucanthemum vulgare*	O
Common toadflax	*Linaria vulgaris*	R
Common bird's-foot trefoil	*Lotus corniculatus*	F
Lucerne	*Medicago sativa sp. sativa*	R
Hawkweed oxtongue	*Picris hieracioides*	O
Ribwort	*Plantago lanceolata*	F
Annual meadow-grass	*Poa annua*	F
Smooth meadow-grass	*Poa pratensis*	F
Creeping cinquefoil	*Potentilla reptans*	F/LA
Yellow rattle	*Rhinanthus minor*	R/LO
Dog rose	*Rosa arvensis agg.*	R
Bramble	*Rubus fruticosus agg.*	O/LF
Hoary ragwort	*Senecio erucifolia*	R
Red campion	*Silene dioica*	R/LO
Ragged robin	*Silene flos-cuculi*	R
Dandelion	*Taraxacum officinale agg.*	R
Red clover	*Trifolium pratense*	F
White clover	*Trifolium repens*	O
Common vetch	*Vicia sativa*	O
Tufted vetch	*Vicia cracca*	R/LO

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Annex EDP 2
River Ebbsfleet Surveys
River Corridor Survey and River Habitat Survey

A2.1 The River Ebbsfleet flows south to north from the southern boundary of the Kent Project Site, downstream of the A2 dual carriageway and continues north of Ebbsfleet International Station where it is culverted under existing development at Northfleet before discharging into the tidal River Thames. In respect of the nature and extent of Proposed Development and impacts to water quality potentially arising, detailed surveys have been undertaken to establish the baseline for the river corridor, particularly with respect to aquatic biological communities and water quality. The current reported status of the waterbody in the context of the Water Framework Directive (WFD) (2000/60/EC) has further been considered and informed by a desk-based assessment.

Methodology

Desk Study

A2.2 A request was submitted to the Environment Agency (EA) for any aquatic survey data for the River Ebbsfleet within the Project Site. This was in addition to a review of online data sets held by the Environment Agency including archived water quality data[52]; and a review of existing ecological survey reports for the River Ebbsfleet where available.

River Corridor Survey

A2.3 To establish a detailed baseline for the Rivers Ebbsfleet watercourse and associated riparian habitats, an approximate 2km stretch from its upstream extent at Springhead Garden Centre (OS Grid Reference TQ 617 727) to its downstream extent north of Ebbsfleet International Station (OS Grid Reference TQ 614 744), was surveyed in accordance with standard River Corridor Survey (RSC) methodology[53]. Upstream and downstream of these locations, the River Ebbsfleet is culverted under existing development.

A2.4 The River Corridor Survey is a standardised approach to characterising the physical and ecological features of a watercourse. Originally developed as a conservation tool, it has previously been used to classify the conservation resource of aquatic habitats, to highlight important features requiring protection and to identify opportunities to rehabilitate damaged habitats.

[52] https://environment.data.gov.uk/water-quality/view/explore?search=&area=10-38&samplingPointType.group=&samplingPointStatus%5B%5D=open&loc=561064%2C174349&_limit=500

[53] National Rivers Authority (1992). *River Corridor* Surveys. *Conservation Technical Handbook Number 1*. NRA, Bristol.

A2.5 The River Corridor Survey was undertaken by a suitably qualified EDP ecologist on 18 May 2020 during which the weather was 20°C and dry with no recent rainfall in the past seven days.

A2.6 To aid an assessment of the watercourse, the River Ebbsfleet, within the Kent Project Site, was subdivided into three survey sections, each circa 500 metres in length with each section broadly representative of different habitat types across the catchment, as illustrated at **Plan EDP 6**. For each survey section, the River Corridor Survey included an assessment of four definable zones, with mapping of key features and habitats:

- Aquatic zone - plant communities, flow and current features, substrate and physical features;
- Marginal zone - plant communities, substrate and physical features;
- Bank zone - tree species, other plant communities, physical features; and
- Adjacent land zone - habitat types, land use.

A2.7 During the survey, at least 1 representative cross section was drawn for each 500 metre stretch to indicate:

- Width of the water filled channel;
- Depth of water;
- Bank height, slope and width;
- Flood bank height and width where appropriate;
- Water level relative to the top of the bank; and
- Land use to a minimum of 50 metres either side of the river.

A2.8 An assessment of land use within 50 metres of the river corridor was undertaken in accordance with Phase I Habitat Survey Guidelines. Phase 1 Habitat Survey (JNCC, 2010) is a standard technique for obtaining baseline ecological information for large areas of land in which the main vegetation types present within the survey area are mapped using a standard set of habitat categories.

Limitations

A2.9 Dense vegetation and expansive areas of wetland/reedbeds limited access to several sections of the River Ebbsfleet such that a thorough inspection of the watercourse and associated marginal and bankside habitats was not possible. Given the uniformity of the watercourse and habitats surveyed, however, this is not considered to affect the outcome

of an assessment and survey data collected has allowed a suitable assessment of aquatic and riparian habitats across the survey area.

River Habitat Survey

A2.10 A River Habitat Survey[54] of the River Ebbsfleet was also undertaken in tandem with the RCS on 18 May 2020, in accordance with methodologies established by the Environment Agency, to provide further contextual information. The survey was undertaken by an ecologist with prior experience in undertaking RHS. As dense vegetation and expansive areas of wetland/reedbeds limited access to several sections of the River Ebbsfleet, a River Habitat Survey was confined to two 500m sections of the watercourse as illustrated within **Plan EDP 7**. Observations of the physical characteristics of the watercourse were made at ten equally spaced spot-checks along each stretch, and information on valley form and land-use in the river corridor are noted.

A2.11 The survey data was then inputted into Rapid 3.0 software[55] which calculates Habitat Modification Scores (HMS) and Habitat Quality Assessment (HQA) for each surveyed section. The HMS score provides a measure of the diversity and 'naturalness' of the physical habitat structure (1 - near natural; 5 = severely modified) and IS thus an indicator of artificial modification to river channel morphology. HQA scores are, in contrast, determined by the presence and extent of habitat features of interest to wildlife recorded during the survey.

Results

Desk Study

A2.12 There are no Environment Agency monitoring stations along the River Ebbsfleet and no historical data with respect to chemical and biological water quality data. This is with the exception of a single fish survey undertaken by the Environment Agency during 2007 (adjacent to Ebbsfleet International Station) during which no fish were captured.

A2.13 A fish survey of the River Ebbsfleet was initially undertaken by Coclough and Coates Aquatic Consultants in 2015 to inform development proposals (see **Annex EDP 33**). The River Ebbsfleet from Springhead Nurseries downstream to the crossing point of the North Kent railway line at Northfleet was subject to a visual survey whilst electrofishing and fyke nets were deployed at two locations close to the A226 Thames Way/A2260 junction.

A2.14 Modest populations of mature roach (*Rutilus rutilus*) and perch (*Purca fluviatilis*) were captured during electrofishing and fyke netting operations. There was no evidence of active recruitment to either of these populations. Three-spined stickleback (*Gasterosteus*

[54] C. M. Drake, D. A. Lott, K. N. A Alexander & J. Webb (2007) *Surveying terrestrial and freshwater invertebrates for conservation evaluation*. Natural England Research Report NERR005.

[55] Davy-Bowker, J., Davies, C.E., Dean, H.J. and Murphy, J.F. (2017) RAPID 3.0 © Data Entry System Right/Copyright NERC - Centre for Ecology Hydrology. All rights reserved.

aculestus) were common or abundant at all sites fished and were observed at a number not fished. Nine-spine sticklebacks (*Pungitius pungitius*) were also found in both electrofishing and fyke netting operations.

Background to River Ebbsfleet WFD Classification

A2.15 The Water Framework Directive (WFD) was adopted and came into force in December 2000. The WFD establishes a legislative framework for the protection of surface waters (including rivers, lakes, transitional waters, and coastal waters) and groundwater throughout the EU. The Water Framework Directive requires all natural waterbodies to achieve good 'status' by 2027; the status of a waterbody being a function of its chemical, ecological and physical (hydromorphological) condition based on a number of 'supporting elements'. These are reported within River Basin Management Plans (RBMP) specific to each river basin district, alongside the current status of each watercourse, the predicted status for 2021, and the overall status objective to be achieved by 2027.

A2.16 The River Ebbsfleet is located within the Thames River basin district, the first cycle River Basin Management Plan56 (RMBP) for which identifies the objectives and measures required to improve the status of surface and ground waterbodies within the catchment.

A2.17 The River Ebbsfleet (WFD Waterbody GB106040024190) was previously identified as a Heavily Modified Waterbody (HMWB) under the WFD until 2015. At this time, the River Ebbsfleet was considerate to be at 'moderate ecological' potential based with an objective to reach good potential by 2027. The waterbody's chemical status did not require assessment whilst supporting conditions for quantity and dynamics of flow supports 'good' status. Ecological potential is instead defined by the following mitigation measures:

- Retain marginal aquatic and riparian habitats; and
- Increase in-channel morphological diversity.

A2.18 Justification for not for achieving 'good' potential by 2015 is, however, attributed to being disproportionately expensive and technically unfeasible.

A2.19 Following progression of the second cycle River Basin Management Plans, however, the River Ebbsfleet has been 'de-classified' and no longer subject to assessment or management under the WFD with no subsequent classification of its current ecological potential.

[56] https://www.gov.uk/government/collections/river-basin-management-plans-2015#thames-river-basin-district-rbmp:-2015

River Corridor Survey

A2.20 Key features identified during the course of the River Corridor Survey illustrated at **Plan EDP 6**. In addition, detailed descriptions of the survey length, together with illustrative photographs, are provided below.

Section 1 (TQ 617 727 to TQ 616 732)

A2.21 Section 1 (**Image EDP A2.1**) encompasses a circa 500 metre stretch of the River Ebbsfleet the upstream extent of which is located at Springhead Garden Centre. Upstream of this location the River Ebbsfleet is culverted under existing development. Here, the watercourse is characterised by a straightened/realigned and uniform channel approximately 2m wide with average water depth circa 0.4m.



Image EDP A2.1: Section 1, adjacent to Springhead Nurseries looking upstream.

A2.22 The channel exhibits a relatively smooth flow throughout the survey section, although a pool was noted at its upstream extent (downstream of the culvert) whilst ponded areas were recorded at its downstream extent. Here, the watercourse spills out across areas of wet woodland dominated by goat willow. During the course of the survey, however, water flow at the upstream extent would increase sporadically indicating presence of an outfall discharging into the watercourse beneath the culvert.

A2.23 The channel substrate is largely dominated by gravels/pebbles with pockets of accumulated silt and sand although cobbles account for circa 40% at its upstream extent. In the upper sections, submerged floating sweet grass was frequently recorded in addition

to pockets of fool's water cress within the margins. Further downstream, emergent macrophytes become more dominant and largely obscure the channel substrate. The downstream section, however, flows through wet woodland and, therefore, is subject to heavy shading. Access to the watercourse was limited here such that a detailed survey of the watercourse was not undertaken. However, where visible and coinciding with breaks in the woodland canopy, a macrophyte community appeared limited to marginal stands of reed canary grass and greater willowherb with submerged water starwort.

A2.24 The banks of the watercourse, particularly adjacent to Springhead Nurseries, are typically steeply sloping and circa 3-4m high. Sections of the left-hand bank, immediately adjacent to Springhead Nurseries have been reinforced at the toe whilst concrete abutments are associated with the culvert and road bridge recorded within this section. Bank side and bank top vegetation is dominated by a tall ruderal and grassland community. Common nettle is dominant whilst wild angelica is particularly abundant. False oat-grass, barren brome, cleaver, hogweed and elder and willow saplings were also present. Further downstream, the banks of the watercourse become shallower and less distinguished from the surrounding bank top habitat, dominated by common nettle with occurrences of dense bramble scrub.

A2.25 With respect to habitats within 50m of the watercourse, a linear belt of woodland is present within 50m of the right bank, contiguous with boundaries of a public footpath and railway line further east. Land adjacent to the left-hand bank is, in contrast, dominated by buildings and hardstanding associated with Springhead Nurseries although the watercourse does flow through semi-natural habitats comprising dense scrub, tall ruderal vegetation and woodland further downstream.

Section 2 (TQ 616 7322 to TQ 617 737)

A2.26 There was limited access to Section 2 (**Image EDP A2.2**) due to prevalence of dense scrub and wetland habitats combined with presence of an active construction site along part of the survey stretch such that the results of a survey are based on discrete locations along the watercourse.

A2.27 The upstream extent of the survey area is characterised by a relatively deep pool, circa 10m wide and up to 1m deep located immediately upstream of a railway bridge. The channel substrate is again dominated by gravel/pebbles with occasional cobbles, although a layer of overlying silt has settled across the substrate. This silt is up to circa 20cm deep, due to the absence of any water flow with sub-layer notably deoxygenated. The right-hand bank top is contiguous with the water's edge and likely the watercourse tops its banks during periods of heavy rainfall. Beneath the water's surface the right-hand bank gently slopes away from a public footpath into deeper water at the centre of the pool. The bank here is reinforced with steel mesh netting. A submerged macrophyte community appears to be limited to water starwort which is present in some abundance. Marginal vegetation, meanwhile, is represented by reed canary grass with occurrences of greater willowherb along the left-hand bank but is largely absent along the right-hand bank where overhanging scrub comprising bramble, willow and hawthorn is more proliferate.

A2.28 A presumably man-made ponded area is similarly present downstream of the railway bridge, with steep sided banks circa 6m high bordering a public footpath. An outfall was recorded along the left-hand bank at this location but was closed with no discharge recorded at the time of the survey. Here, there is limited open water with the majority of the channel dominated by reed canary-grass and occasional yellow iris.



Image EDP A2.2: Section 2, downstream of railway bridge.

A2.29 Further downstream the watercourse widens significantly (circa 25m wide) and encompasses areas of swamp dominated by reed canary grass. The channel of the River Ebbsfleet here is indistinguishable from the swamp and areas of open water. At the time of survey, construction works were ongoing in the area limiting access to this section of the watercourse and comprised the construction of a bridge spanning across the watercourse (**Image EDP A2.3**), further modifying and reinforcing this section of the River Ebbsfleet and its banks. Indeed, the apparent widening of the channel and large expanses of open area appear to be a result of removal of associated wetland habitat to facilitate construction. Land adjacent to the left-hand bank comprises the footprint of a new residential estate and associated vegetation and flood defences whilst the right-hand bank borders a railway line, and main, single carriageway road. As such sections of the right-hand bank are artificial in nature.



Image EDP A2.3: Section 2 - New construction spanning across River Ebsfleet and associated wetland habitat.

A2.30 Further downstream the open water channel narrows to a 3m wide watercourse flowing through vegetated swamp dominated by reed canary grass and border by scrub and woodland.

Section 3

A2.31 The upper extent of Section 3 (**Image EDP A2.4**) of the River Ebbsfleet is culverted under Thames Way, a busy, single carriageway road and again under a single vehicular track leading to Blue Lake. Immediately upstream and downstream of the watercourse, the watercourse deepens into a pool, with no water flow and heavily shaded by adjacent woodland dominated by willow. As such, channel substrate is obscured by a layer of silt and detritus, the latter comprising leaf litter from overhanging trees. In channel vegetation is limited to patches of fool's water cress and water starwort whilst the bankside margins are dominated by reed canary grass. Further downstream, the watercourse is again representative of a re-aligned stream circa 4m wide and 0.6m deep with a channel substrate dominated by pebbles/gravel with a deep silt layer. The channel is overgrown with bur-reed with occasional yellow iris and water plantain. Bank top vegetation comprises a line of trees associated with wet willow woodland. As such, several fallen logs and young trees were recorded spanning across the channel. Sections of the bank toe are reinforced within stone. An area swamp lies to the north whilst a native hedgerow, which marks the boundary between the woodland and Thames Way, is located to the south to the south.



Image EDP A2.4: Section 3 flowing parallel to Thames Way.

A2.32 Further north, the watercourse flows beneath a railway bridge before culverted under Thames Way. Here, the bank top and bankside vegetation is less proliferate whilst the watercourse only supports scattered pockets of vegetation with much litter recorded in the channel.

A2.33 The lower section of the River Ebbsfleet (**Image EDP A2.5**) flows east to west through an area of scrub and wet willow woodland between Thames Way and Ebsfleet International Station, before entering a culvert which travels under Northfleet town towards the River Thames. Access here was very limited due to dense scrub and woodland cover. Open sections of the watercourse were however characterised by a 2m wide and 0.4m deep channel with vertical earth banks dominated by sedge with occasional reed canary grass, bulrush and bramble scrub.



Image EDP A2.5: Section 3 adjacent to Ebbsfleet International Station.

River Habitat Survey

A2.34 The results are shown in **Table EDP 2.1**. The River Ebbsfleet is a realigned/straightened and heavily modified watercourse, relatively uniform in appearance and structure with limited in channel diversity, as evidenced by the findings of survey effort. Following completion of the River Habitat Survey and analysis of data using Rapid 3.0 software[57], Section 1 has an HMS of 1624 which puts it in HMS Class 5, representative of severely modified watercourses. Section 2 has an HMA of 880 (HMS class 4) representative of a significantly modified watercourse.

A2.35 The HQA scores for section 1 and section 2 are 45 and 42 respectively and thus are broadly comparable in terms of score and habitat features including bankside vegetation, presence of in channel vegetation, and overhanging trees.

Table EDP A2.1: River Habitat Survey Results.

Survey Reach	HMS Score	HMS Class	HQA Score
Section 1	1625	5	45
Section 2	880	4	42

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Annex EDP 3
Wintering Bird Surveys
(edp5988_r003b)

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Annex EDP 4
Breeding and Passage Bird Surveys

Methodology

A4.1 The breeding bird survey (BBS) was undertaken with reference to standard methodology, entailing a modified Common Bird Census (CBC) 'territory mapping' approach[58]. Due to the complexity of habitats within the Kent Project Site and the variety of potential species supported, this involved one survey visit per month to each area of the Kent Project Site between April and July (i.e. at the height of the breeding bird season for lowland Britain).

A4.2 The Kent Project Site was split into five sections and surveyed by a single, experienced surveyor. The sections were designed to limit double counting by incorporating adjacent similar habitats within single sections where possible.

A4.3 Following best practice, the survey visits were timed to start around first light, to coincide with the period of peak activity for birds, most particularly passerine songbird species. Survey visits involving the Manor Way industrial estate began an hour before sunrise in order to record black redstart (*Phoenicurus ochruros*), potentially present. Surveys were also undertaken during suitable weather conditions, i.e. days/periods with strong winds and heavy or persistent rain were generally avoided. It is therefore considered that the results are not significantly limited by seasonal or climatic factors.

A4.4 Species specific surveys for spotted crake were also undertaken after an individual of this species was recorded during another survey. This survey was undertaken at night between 23:00 and 03:00 on 19 June 2020 by two surveyors and involved a targeted survey of wetland habitat using sound recording equipment.

A4.5 The dates and timings of the survey visits and the weather conditions encountered are summarised in **Table EDP A4.1**.

Table EDP A4.1: Date, Timing and Weather Conditions during the Breeding Bird Survey Visits

Survey	Date	Start/Finish Time	Precipitation	Wind (kph)	Visibility
1	14.04.20	04:50-09:26	None	Up to 11	Excellent
	16.04.20	04:38-09:41	None	Up to 5	Very good
	19.04.20	04:32-09:31	None	None	Excellent
	30.04.20	03:55-08:40	None	Up to 20	Excellent
2	06.05.20	04:10-08:39	None	Up to 15	Excellent
	08.05.20	03:52-09:02	None	None	Excellent
	20.05.20	03:34-07:42	None	None	Excellent
	27.05.20	03:23-08:43	None	None	Excellent

[58] British Trust for Ornithology, Common Bird Census. www.bto.org.

Survey	Date	Start/Finish Time	Precipitation	Wind (kph)	Visibility
3	05.06.20	03:01-08:22	Rain for 5 min	Up to 20	Very good
	09.06.20	03:27-08:28	None	None	Excellent
	11.06.20	03:14-07:48	None	Up to 13	Excellent
	26.06.20	03:28-07:35	Rain for 1 hour	Light	Excellent
4	Survey to be completed				
Spotted Crake	19.06.2020	22:41-03:09	None	Light	Good

A4.6 The survey methodology involved walking to within c.50m of all parts of the Kent Project Site, where possible, and recording all birds listed within the Birds of Conservation Concern (BoCC) report[59] and their activity status, with a particular emphasis placed upon those elements considered to relate to, or be indicative of, breeding. This ensured that the survey identified all birds using the margins of the Kent Project Site, as well as those in the interior. Following the completion of the survey, the breeding status of each bird species identified will be determined according to the nature and frequency of the behavioural elements recorded, as set out overleaf in **Table EDP A4.2**.

Table EDP A4.2: Summary of Field Evidence Used to Determine Breeding Bird Status

Status	European Bird Census Council (EBCC) Criteria for Categorisation of Breeding Status
Confirmed	• Distraction-display or injury feigning; • Used nest or eggshells found (occupied or laid within period of survey); • Recently fledged young (nidicolous *species*) or downy young (nidifugous species); • Adults entering or leaving nest-site in circumstances indicating occupied nest (including high nest or nest-holes, the contents of which cannot be seen) or adult seen incubating; • Adult carrying faecal sac or food for young; • Nest containing eggs; or • Nest with young seen or heard.
Probable	• Pair observed in suitable nesting habitat in breeding season; • Permanent territory presumed through registration of territorial behaviour (song, etc.) on at least two different days a week or more apart at the same place; • Courtship and display; • Visiting a probable nest site; • Agitated behaviour or anxiety calls from adults; • Brood patch on adult examined in the hand; or • Nest building or excavating nest-hole.
Possible	• Species observed in breeding season in possible nesting habitat; or • Singing male(s) present (or breeding calls heard) in breeding season.

[59] Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D.A. and Gregory, R.D. (2015). *Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man*. British Birds, Vol. 108, 708-746.

Status	European Bird Census Council (EBCC) Criteria for Categorisation of Breeding Status
Non-breeder	• Feeding birds only; • Birds flying over only; or • Lack of suitable breeding habitat.

A4.7 To provide further detail with regard to the total assemblage of bird species present within the Kent Project Site, a list of all other bird species recorded (i.e. those that are not considered to be of conservation concern) was made for each survey visit.

A4.8 The BBS was carried out by experienced ornithologists, at an appropriate time of year for the locality, and in suitable weather conditions. It is therefore considered that the results provide a representative overview of the breeding bird interest at the Kent Project Site.

A4.9 An assessment of the individual bird species recorded, as well as the overall assemblage, was subsequently made with reference to the national and local conservation status of the different breeding species recorded according to the Birds of Conservation Concern report.

Results

A4.10 KMBRC returned numerous bird records for the Kent Project Site, 89 of which have been confirmed to have bred on at least one occasion. Of those 89, 37 are considered to be BoCC[60] with 21 (24%) within the Red List[61] and 16 (18%) within the Amber List[62]. The remaining 52 species are not considered to be of conservation concern. The majority of those Red and Amber list species records relate to terrestrial species; however, several wildfowl and waders have also been confirmed to have bred including, redshank (*Tringa tetanus*), mute swan (*Cygnus olor*), greylag goose (*Anser anser*), shelduck (*Tadorna tadorna*), mallard (*Anas platyrhynchos*), shoveler (*Spatula clypeata*) and oystercatcher (*Haematopus ostralegus*).

60 Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746.

61 Red list criteria includes:
Species is globally threatened.
Historical population decline in UK during 1800–1995.
Severe (at least 50%) decline in UK breeding population over last 25 years, or longer-term period (the entire period used for assessments since the first BoCC review, starting in 1969).
Severe (at least 50%) contraction of UK breeding range over last 25 years, or the longer-term period.

62 Birds in the amber list will be subject to at least one of the relevant factors listed below:
Species with unfavourable conservation status in Europe (SPEC = Species of European Conservation Concern).
Historical population decline during 1800–1995, but recovering; population size has more than doubled over last 25 years.
Moderate (25-50%) decline in UK breeding population over last 25 years, or the longer-term period.
Moderate (25-50%) contraction of UK breeding range over last 25 years, or the longer-term period.
Moderate (25-50%) decline in UK non-breeding population over last 25 years, or the longer-term period.
Rare breeder; 1–300 breeding pairs in UK.
Rare non-breeders; less than 900 individuals.
Localised; at least 50% of UK breeding or non-breeding population in 10 or fewer sites, but not applied to rare breeders or non-breeders.
Internationally important; at least 20% of European breeding or non-breeding population in UK (NW European and East Atlantic Flyway populations used for non-breeding wildfowl and waders respectively).

A4.11 Essex Field Club (EFC) returned records of 187 bird species, 72 of which were breeding records. There were no different species recorded. The record resolution was too low to ascertain a distance from either Project Site

A4.12 Full results of the BBS will be provided once surveys are completed and analysed. However, **Table EDP A4.3**, gives a summary of all species of conservation concern recorded across the Kent Project Site and illustrated on **Plans EDP 8, 9** and **10** during April, May and June. It is not possible to provide definitive assessments for each species until survey work is completed, however an estimated number of breeding pairs is given based on the results of April, May and June's surveys.

A4.13 **Table EDP A4.4** provides a full list of those species recorded so far that are not considered to be of conservation concern.

Table Table EDP A4.3: A Summary of the Bird Species of Conservation Concern Recorded during the Breeding Bird Survey – Schedule 1 species are highlighted in bold

Species	**Protection/- UK Status/- Country Status**	**Area of Kent Project Site Recorded**	**Estimated Population within the Kent Project Site in April/May**
Bearded tit (*Panurus biarmicus*)	Amber List/Sch.1	Black Duck Marsh, CTRL Wetland	3-5 pairs
Black-headed gull (*Chroicocephalus ridibundus*)	Amber List	Estuary, Ebbsfleet Valley, Botany Marsh West	0 pairs (peak count of 89)
Black redstart (*Phoenicurus ochruros*)	Red List/Sch.1	Cemex (off-site)	1 pair
Bullfinch (*Pyrrhula pyrrhula*)	Amber List/S.41	Bamber Pit, Sportsground, Ebbsfleet Valley, Botany Marsh East, Main Access Track	c.4 pairs
Common gull (*Larus canus*)	Amber List	Estuary	0 pairs (peak count of 2)
Common tern (*Sterna hirundo*)	Amber List	Estuary (Broadness)	0 pairs (peak count of 1)
Cuckoo (*Cuculus canorus*)	Red List/S.41	Peninsula, Ebbsfleet Valley, Former Northfleet Landfill	Up to 9 (peak count of 9)
Dunnock (*Prunella modularis*)	Amber List/S.41	All areas	40-45 pairs
Gadwall (*Anas strepera*)	Amber List	CTRL Wetland, Black Duck Marsh, Botany Marsh West, Estuary	4-6 pairs (peak count of 12)
Grasshopper warbler (*Locustella naevia*)	Red List/S.41	Broadness, NE Tip, SW Tip	5-11 pairs
Great black-backed gull (*Larus marinus*)	Amber List	Estuary	0 pairs (peak count of 7)
Greenshank (*Tringa nebularia*)	Amber List	Botany Marsh West	1 pair (peak count 1)
Greylag goose (*Anser anser*)	Amber List	Botany Marsh West, Estuary, Black Duck Marsh	Up to 12 pairs (peak count of 27 including juveniles)
Grey wagtail (*Motacilla cinerea*)	Red List	West of Manor Way Industrial Estate	1 pair
Herring gull (*Larus argentatus*)	Red List/S.41	Estuary	0 pairs (peak count of 13)
House martin (*Delichon urbicum*)	Amber List	Black Duck Marsh	0 pairs (peak count of 5)
House sparrow (*Passer domesticus*)	Red List/S.41	Northfleet Industrial Estate, Stanhope Road (off-site)	4-5 pairs
Kestrel (*Falco tinnunculus*)	Amber List	Ebbsfleet Valley, Peninsula	c.2 pairs
Kingfisher (*Alcedo atthis*)	Amber List/Sch.1	R. Ebbsfleet (west of Sawyer's Lake)	1 pair (peak count of 3)
Lapwing (*Vanellus vanellus*)	Red List/S.41	Botany Marsh West	1 pair (peak count of 2)

Species	Protection/- UK Status/- Country Status	Area of Kent Project Site Recorded	Estimated Population within the Kent Project Site in April/May
Lesser black-backed gull (*Larus fuscus*)	Amber List	Botany Marsh West	0 pairs (peak count of 1)
Linnet (*Linaria cannabina*)	Red List/S.41	All areas	12-16 pairs (peak count of 33)
Mallard (*Anas platyrhynchos*)	Amber List/S.41	Estuary, Black Duck Marsh, CTRL Wetland, River Ebbsfleet, main drain, Botany Marsh West	12-16 pairs
Marsh harrier (*Circus aeruginosus*)	Amber List/Sch.1	Black Duck Marsh	1 pair
Marsh tit (*Poecile palustris*)	Red List/S.41	River Ebbsfleet	1 pair (peak count of 1)
Mistle thrush (*Turdus viscivorus*)	Red List	Manor Way, Stanhope Road, Station Quarter, Botany Marsh	c.4 pairs
Mediterranean gull (*Larus melanocephalus*)	Amber List/Sch.1	Black Duck Marsh, Bamber Pit, Botany Marsh West	0 pairs (peak count of 9)
Mute swan (*Cygnus olor*)	Amber List	Black Duck Marsh	1 pair
Nightingale (*Luscinia megarhynchos*)	Red List	Broadness, Botany Marsh East, Bamber Pit	3-4 pairs
Oystercatcher (*Haemotopus ostralegus*)	Amber List	Estuary	2 (peak count of 4)
Pochard (*Aythya ferina*)	Red List	Black Duck Marsh, Pond P3	4-7 pairs
Redwing (*Turdus iliacus*)	Red List/Sch.1	Ebbsfleet Valley	0 pairs (peak count of 1 –in passage)
Reed bunting (*Emberiza schoeniclus*)	Amber List/S.41	Peninsula	3-9 pairs
Shelduck (*Tadorna tadorna*)	Amber List	Botany Marsh West, Estuary	5-10 pairs (peak count of 21)
Shoveler (*Anas clypeata*)	Amber List	Black Duck Marsh, Botany Marsh West	2 pairs
Skylark (*Alauda arvensis*)	Red List/S.41	Former Northfleet Landfill, NE Tip, Station Quarter	7-8 pairs
Song thrush (*Turdus philomelos*)	Red List/S.41	All areas	36-44 pairs
Spotted crake (*Porzana porzana*)	Amber List/ Sch.1	Black Duck Marsh	Up to 1 pair
Starling (*Sturnus vulgaris*)	Red List/S.41	Black Duck Marsh, Ebbsfleet Valley, Botany Marsh East	Up to 12 pairs (peak count of 251 in June over estuary)
Stock dove (*Columba oenas*)	Amber List	Bamber Pit, Craylands Pit, Sportsground	c.5 pairs
Swift (*Apus apus*)	Amber List	Black Duck Marsh, Craylands Pit, Bamber Pit	Up to 15 pairs (poss in Industrial Estates)

Species	Protection/-UK Status/-Country Status	Area of Kent Project Site Recorded	Estimated Population within the Kent Project Site in April/May
Teal (*Anas crecca*)	Amber List	Botany Marsh West	0 (peak count of 1)
Tufted duck (*Aythya fuligula*)	Amber List	Black Duck Marsh, Pond P7	Up to 8 pairs
Willow warbler (*Phylloscopus trochilus*)	Amber List	Botany Marsh East	1 pair
Yellow-legged gull (*Larus michahellis*)	Amber List	Estuary	0 (peak count of 1)
Yellow wagtail (*Motacilla flava*)	Red List	Estuary	1 pair

Table EDP A4.4: Summary of Bird Species Recorded Which Are Not Considered to Be of Conservation Concern (Eaton *et al*., 2015) – Schedule 1 Species are Highlighted in Bold

Species
Blackbird (*Turdus merula*)
Blackcap (*Sylvia atricapilla*)
Blue tit (*Cyanistes caeruleus*)
Buzzard (*Buteo buteo*)
Canada goose (*Branta canadensis*)
Carrion crow (*Corvus corone*)
Chaffinch (*Fringilla coelebs*)
Chiffchaff (*Phylloscopus collybita*)
Collared dove (*Streptopelia decaocto*)
Coot (*Fulica atra*)
Cormorant (*Phalacrocorax carbo*)
Cetti's warbler (*Cettia cettia*)
Little egret (*Egretta garzetta*)
Little grebe (*Tachybaptus ruficollis*)
Long-eared owl (*Asio otus*)
Feral pigeon (*Columba livia domestica*)
Garden warbler (*Sylvia borin*)
Green Woodpecker (*Picus viridis*)
Goldfinch (*Carduelis carduelis*)
Great spotted woodpecker (*Dendrocopos major*)
Great tit (*Parus major*)
Greenfinch (*Chloris chloris*)
Grey heron (*Ardea cinerea*)
Jackdaw (*Corvus monedula*)
Jay (*Garrulus glandarius*)
Lesser whitethroat (*Sylvia curruca)*
Long-tailed tit (*Aegithalos caudatus*)
Magpie (*Pica pica*)
Moorhen (*Gallinula chloropus*)
Peregrine falcon (*Falco peregrinus*)
Pheasant (*Phasianus colchicus*)
Pied wagtail (*Motacilla alba*)
Raven (*Corvus corax*)
Red-legged partridge (*Alectoris rufa*)
Reed warbler (*Acrocephalus scirpaceus*)
Ring-necked parakeet (*Psittacula krameri*)
Robin (*Erithacus rubecula*)
Rook (*Corvus frugilegus*)
Sand martin (*Riparia riparia*)
Sedge warbler (*Acrocephalus schoenobaenus)*
Sparrowhawk (*Accipiter nisus)*
Swallow (*Hirundo rustica*)
Water rail (*Rallus aquaticus*)
Wheatear (*Oenanthe oenanthe*)
Whitethroat (*Sylvia communis*)
Woodpigeon (*Columba palumbus*)

Species
Wren (*Troglodytes troglodytes*)

Passage Bird Surveys

3.100 The results of the April passage bird surveys are included in **Tables EDP A4.5** and **A4.6** below. A single ringed plover (*Charadrius hiaticula*), the only species listed as a qualifying feature of the Thames Estuary and Marshes SPA during passage, was recorded during the high tide survey. Abundance and diversity was significantly reduced from that found along the estuary front throughout winter, with the most abundant birds being black-headed gulls and mallard. Full results of the passage bird surveys will be provided once the autumn surveys have been completed.

Low Tide Survey

Table EDP 4.5: Survey Results – 15 April 2020

Species	Sector Peak									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total**
Black-headed gull	7	11	6	9	9	1	5	9	3	**60**
Carrion crow	2	-	-	-	-	-	-	-	-	**2**
Common gull	-	1	-	-	-	-	-	-	-	**1**
Common sandpiper	-	-	-	-	-	1	-	-	-	**1**
Cormorant	-	-	1	2	1	5	-	-	-	**9**
Curlew	-	-	-	-	-	1	-	-	-	**1**
Peregrine	-	-	-	3	-	-	-	-	-	**3**
Great black-backed gull	1	-	-	-	-	3	1	-	-	**5**
Goldeneye	-	-	-	-	-	1	-	-	-	**1**
Herring gull	-	1	1	-	-	-	1	-	-	**3**
House martin	2	-	-	-	-	-	-	-	-	**2**
Lesser black-backed gull	-	-	1	-	-	-	-	-	-	**1**
Mallard	-	4	1	2	1	1	-	-	19	**28**
Mediterranean gull	3	2	7	-	4	-	-	-	-	**16**
Oystercatcher	-	4	-	-	3	-	2	-	-	**9**
Pheasant	-	-	-	-	-	-	1	-	-	**1**
Shelduck	-	-	-	2	1	10	-	-	-	**13**
Yellow-legged gull	-	-	-	-	-	-	-	-	1	**1**

High Tide Survey

Table EDP A4.6: Survey Results – 21 April 2020

Species	Sector Peak									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total**
Black-headed gull	36	38	13		47	5	11	13	16	**179**
Canada goose	2	1	-	-	-	-	-	-	-	**3**
Common gull	-	-	-	-	-	3	-	1	-	**4**
Common sandpiper	-	-	-	-	3	-	-	-	-	**3**
Common tern	-	-	-	-	1	-	–	-	-	**1**
Cormorant	-	-	-	-	-	3	1	-	1	**5**
Dunlin	1	-	-	-	-	-	-	-	-	**1**
Gadwall	-	-	-	-	-	2	-	-	-	**2**
Great black-backed gull	1	2	-	1	-	-	1	-	-	**5**
Greylag goose	-	1	-	-	1	-	-	-	-	**2**
Herring gull	1	-	1	-	1	-	-	1	-	**4**
Little egret	-	-	-	-	1	-	-	-	-	**1**
Mallard	2	-	-	4	38	2	2	-	-	**48**
Mediterranean Gull	1	-	-	-	-	1	1	-	-	**3**
Oystercatcher	-	-	-	-	-	2	-	-	1	**3**
Ringed plover	-	-	-	-	1	-	-	-	-	**1**
Shelduck	-	-	-	4	1	-	-	-	2	**7**
Swallow	-	1	-	-	-	-	-	-	-	**1**

Annex EDP 5
Bat Surveys

Methodology

A5.1 During the Extended Phase 1 survey, areas of woodland, scrub, grassland and aquatic habitats were identified as having the potential to support foraging and commuting bats. In addition, a number of mature trees and a variety of buildings present within the Kent Project Site were considered to have the potential to support roosting bat species.

A5.2 The following surveys for bats were therefore undertaken, with reference to national best practice guidelines[63], including investigations of:

1. Bat Roosting:
    (a) Daytime inspections of trees for bat roosting potential;
    (b) Daytime inspections of buildings/strructures for bat roosting potential; and
    (c) Dusk and dawn emergence and re-entry surveys of buildings – to be completed.
2. Bat foraging/commuting activity:
    (a) Manual transect surveys; and
    (b) Automated detector surveys.

Preliminary Ground-level Roost Assessment – Trees

A5.3 To determine the potential impacts of the proposed development on bats potentially roosting within trees across the Kent Project Site, all suitable trees were subject to a visual assessment with reference to current best practice guidance.

A5.4 The survey involved a visual assessment of all trees for the presence of, or potential to support, roosting bats. The survey was undertaken on 04 June 2020 by a Natural England (NE) bat licensed ecologist. The trees were searched as thoroughly as possible from ground level, with all elevations covered where accessibility allowed.

A5.5 Suitable features for roosting bats searched for during the assessment included:

- Loss/peeling/fissured bark;
- Natural holes e.g. rot holes and holes from fallen limbs;

[63] Collins, J (ed) (2016) *Bat Surveys for professional ecologists: Good Practice Guidelines*. (3rd edn) Bat Conservation Trust, London

- Woodpecker holes;
- Cracks/splits or hollow tree trunks/limbs; and
- Thick-stemmed ivy.

A5.6 Signs of roosting bats searched for included:

- Bat/s roosting *in situ*;
- Bat droppings within or beneath a feature;
- Staining around or beneath a feature;
- Oily marks (staining) around roost access points;
- Audible squeaking from the roost;
- Large/regularly used roosts or regularly used sites may produce an odour; and
- Flies around the roost, attracted by the smell of guano.

A5.7 Based upon the results of the visual assessment and features/evidence identified, the following ratings for trees were used during the assessment:

- Known or confirmed roost – European Protected Species (EPS) licence required for works to tree to be completed lawfully;
- High potential – Tree supports one or more features that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time;
- Moderate potential – Tree supports one or more features that could be used by bats but are unlikely to support a roost type of high conservation status;
- Low potential – Tree supports one or more features that could be used by individual bats opportunistically, or is of sufficient size and age to contain such features; and
- Negligible potential – Negligible features likely to support roosting bats.

Limitations

A5.8 It should be noted that this type of assessment is based on features visible from ground level and is not considered to be a definitive bat roosting survey. Additional survey work may therefore be required to establish if any bats are roosting within the trees that have

potential and are to be subject to felling/tree surgery, and, if present, to establish the species, number and roost type/status.

A5.9 The western end of woodland **W16** (**Plan EDP 11**) was difficult to access due to the presence of thick scrub, marshland and fencing surrounding, with uneven ground throughout the woodland parcel to the east. Therefore, there are a small number of trees at the western end of woodland **W16** for which a ground-level assessment was not possible. Trees within the western end of woodland **W16** appear to be semi-mature and therefore less likely to have features suitable to support roosting bats, although this cannot be ruled out. Removal of trees within this western half of the woodland would need to be supervised by a licenced bat worker, who will be able to check for the presence of trees with potential roosting features at the same time as vegetation is cleared, making access possible.

Preliminary Roost Assessment - Buildings

Rapid Assessment

A5.10 A high-level "rapid assessment" of all buildings within the Kent Project Site, where access was possible, was undertaken on 01 May 2020. The purpose of this survey was to determine whether any buildings could be ruled out as having negligible potential to support roosting bats, in order to focus the efforts of the external and internal inspections described below. The assessment was undertaken by two Natural England licensed bat workers. The locations of buildings surveyed is illustrated on **Plan EDP 12**.

External and Internal Inspections

A5.11 Further external assessments of buildings which were not ruled out during the rapid assessment were undertaken on 07 July 2020, 15 July 2020 and 17 July 2020. The assessment was undertaken by two experienced ecologists and Natural England licensed bat workers.

A5.12 All external features considered potentially suitable for bats were assessed, using a high-powered torch, from all aspects, where accessibility allowed. Suitable roost features in buildings include:

- Cracks/crevices in stone/brickwork/timber;
- Missing/broken/raised roof/ridge/hanging tiles;
- Loose/lifted lead flashing/bitumen felt;
- Loft voids (particularly if relatively undisturbed, potential bat access points present, clear flight space with simple truss formation, roof lining and insulation present);
- Gaps in soffits, barge boards or fascias; and

- Cavity walls with potential bat access.

A5.13 Signs of bat activity searched for include:

- Bats present (live, dead or skeletons);
- Droppings;
- Feeding remains, such as clusters of moth/butterfly wings and beetle wingcases;
- Urine staining below a potential access point/feature;
- Oily marks (staining) around potential roost access point/feature;
- Audible squeaking from behind roofing felt or timber boarding (particularly on a warm summer afternoon); and
- Large/regularly used roosts may produce an odour.

A5.14 On this basis, the buildings assessed will be assigned a rating of potential suitability for roosting bats, from negligible to confirmed roost, as follows:

- Known or confirmed roost – where evidence of bats found;
- High potential – Multiple highly suitable features capable of supporting larger roosts;
- Medium potential – Definite bat roosting potential with fewer suitable features than high potential;
- Low potential – The building supports features that have limited potential for roosting bats; and
- Negligible potential – No potential features to support roosting bats.

Limitations

A5.15 Access permission has not been granted to all buildings thus far for a preliminary roost assessment for bats, and some are inaccessible due to dense scrub. Discussions with landowners to agree access permission is ongoing. In light of the current 'lockdown' and social distancing measures imposed as a result of the COVID-19 virus global pandemic, it is unlikely that internal access to buildings will be possible. In this instance, a precautionary approach to the assessment of bat roost potential will be followed based on the nature/ fabric/ use/ location of the building using professional judgement of a bat licenced ecologist.

Hibernation Surveys

A5.16 A wintertime hibernation survey was completed of the tunnel within the south-west corner of Craylands Pit on 24 February 2020 by a bat licenced ecologist to check for the presence of, or potential to support, hibernating bats. These tunnels are shown on **Plan EDP 13**.

Emergence/Re-entry Surveys

A5.17 Those building considered to have low moderate or higher bat roosting potential were then subject to emergence/re-entry surveys. In accordance with best practice guidelines, surveys were spread over the course of the active bat season and completed within the optimal survey months of April to September inclusive and the level of survey was thus:

- Low potential = one survey visit, May to August;
- Medium potential = two survey visits, May to September with at least one survey between May and August; and
- High potential = three survey visits, May to September with at least two surveys between May and August.

A5.18 Emergence/re-entry surveys will be completed by experienced bat surveyors around the buildings considered to have bat roost potential following the internal inspections.

A5.19 For emergence surveys, the building aspects with the most access points will be watched from 15 minutes before sunset to catch early emerging species such as common pipistrelle until two hours after sun set to ensure emergence times for all bat species were covered. For re-entry surveys, the same aspect of the building was watched from two hours before sunrise until sunrise. All bats will be recorded with emphasis on those observed emerging and re-entering. Time and location on the building of the emergence/re-entry as well as species and number of bats from that location will be recorded.

A5.20 Emergence-re-entry surveys will be conducted using Elekon batlogger M with a built in GPS unit. Bats will identified on the basis of their characteristic echolocation calls, which were recorded and analysed using computer sonogram analysis (BatSound) to confirm species identification. Species of myotid bat and long-eared bat are difficult to tell apart solely from their echolocation calls and were therefore grouped as such.

Limitations

A5.21 Any limitations to these surveys will be recorded here when they have taken place.

Investigations of Bat Foraging/Commuting Activity

Manual Transect Surveys

A5.22 Manual transect surveys were undertaken across the Kent Project Site to identify areas of bat foraging activity and commuting routes used by bats. Surveys were spread over the course of the active bat season and completed each month from May to September,

A5.23 Full details including the survey type, date, timing, and weather conditions during each of the transect surveys undertaken is given in **Table EDP A5.1**.

Table EDP A5.1: Date, timing and weather conditions of bat activity transect surveys.

Survey Date	**Dusk/-Dawn**	**Survey Time**	**Sunrise/-Sunset Time**	**Weather Conditions**			
				Temp (ºC)	**Cloud (%)**	**Rain**	**Wind (Beaufort scale)**
18.05.20	Dusk	20:49-22:56	20:49	18-20	40-50	Nil	1-3
23.06.20	Dusk	21:20-23:20	21:20	19-21	5-10	Nil	1-2
07.20	Surveys have yet to take place						
08.20							
09.20							

A5.24 Manual transect surveys were completed by experienced bat surveyors across six transect survey routes in May. Transect 2 walked during May was subsequently divided into transect 2 and 7 from June onwards as illustrated on **Plan EDP 13**. Transect routes were designed to cover all potential foraging or commuting habitat on the Kent Project Site. Transect routes were walked at a slow pace with 'pacing points' to ensure an even speed throughout the transect. All bats were recorded and their behaviour marked on survey maps characterise the value of the Kent Project Site and its component habitats to foraging and commuting bats.

A5.25 Activity surveys were conducted using Elekon batlogger M with a built in GPS unit. Observations of the time, location, and activity of all bats seen or heard were noted. Bats were identified on the basis of their characteristic echolocation calls, which were recorded and analysed using computer sonogram analysis (BatSound) to confirm species identification. Species of myotid bat and long-eared bat are difficult to tell apart solely from their echolocation calls and were therefore grouped as such.

Limitations

A5.26 Weather conditions on each visit so far were optimum for bat surveys, being relatively warm with light to medium winds and no rain. The surveys are therefore not considered to be seasonally or climatically constrained.

A5.27 The bat detector used on Transect 4 in May did not record any bats. However, the surveyor only reported a single bat pass (detected visually) throughout the survey and so it is not thought that this equipment failure has any significant impact of the results.

Automatic Detector Surveys

A5.28 To supplement the bat transect survey data, bat activity within the Kent Project Site was also sampled using static bat detectors which automatically trigger and record bat echolocation calls. This survey method has been used during the months of May and June and will be continued during July, August and September 2020 on the following dates:

- 19.05.2020-26.05.2020;
- 23.06.2020-29.06.2020;
- 21.07.2020-27.07.2020 (TBC);
- 17.08.2020-24.08.2020 (TBC); and
- 16.09.2020-21.09.2020 (TBC).

A5.29 Anabat Express Bat Detectors were deployed in 12 different locations over the Kent Project Site in May, (1, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13 and 14) as shown on **Plan EDP 13**. The Anabats were fixed in secure locations, with an external microphone attached 1.5m above ground, and directed away from the tree, approximately 45° to the hedgerow, to maximise detection sensitivity. With addition of a seventh transect route in June, the Anabat locations were increased accordingly, and additional detectors were deployed to ensure full coverage of the Kent Project Site. From June onwards, Anabats were deployed in 16 locations (with the addition of 9, 11, 15 and 16). **Table EDP 5.2** lists the position number from **Plan EDP 13** and the corresponding Kent Project Site areas from **Plan EDP 1**.

Table EDP 5.2: Anabat position numbers and Project Site locations

Position Number (Plan EDP 13)	**Project Site Area (Plan EDP 1)**
1	Peninsula (north)
2	Peninsula (north)
3	Peninsula (north)
4	NE Tip
5	Botany Marshes

Position Number (Plan EDP 13)	Project Site Area (Plan EDP 1)
6	Botany marshes
7	Edge of Black Duck Marsh
8	North of Tiltman Avenue
9	Craylands Pit
10	Bamber Pit
11	Bamber Pit
12	Former landfill
13	Station Quarter north
14	Station Quarter south
15	A2 corridor
16	A2 Corridor

A5.30 The echolocation calls recorded by the Anabats were filtered for noise files (i.e. sound files created when noise triggers the Anabat to record) and then specifically for each of the UK's bat species using Analook software filter function. The parameters for the noise filter are based on that proposed by Chris Corben and Kim Livengood[64] and are provided in **Table EDP A5.3**. All files passing the various filters were checked manually using sonogram analysis (AnalookW) in accordance with published parameters[65] to confirm the species identification of each bat call.

Table EDP A5.3: Filtration values used by Analook software to remove noise files.

Filter	Smoothness	Frequency (Fc (kHz))		Duration (ms)	
		Min	Max	Min	Max
Noise filter	50	15	120	2	50

Limitations

A5.31 None of the automatic detector surveys so far are considered to have been constrained by unseasonably cold conditions.

A5.32 In addition, the identification of calls and species using Analook software is dependent upon the quality of the recording made which can be influenced by the following factors, which may limit levels of activity and species recorded:

- Weather conditions – rainfall and wind;
- Distance of bat from Anabat;
- Presence of obstructions through which the noise must pass, i.e. trees; and
- Proximity of other noise sources such as roads.

64 Taken from Making an Antinoise Filter presentation from 2010 Annual Bat Conference
65 Russ (2012). *British Bat Calls, a guide to species identification*. Pelagic Publishing, Exeter

A5.33 In relation to this, the Anabat at location 10 during May recorded a large amount of noise files. This was likely due to its proximity to the railway line. This may have resulted in some bat calls being missed in May at this location. It was moved for subsequent recording periods. Due to the number of other Anabat locations and months of recording, this one location on one month is unlikely to impact the overall conclusions.

Results

Bat Roost Assessment – Trees

Preliminary ground-level roost assessment

A5.34 During the visual assessment for roosting bats on 04 June 2020, no bats or evidence of bats was found from ground level. However, a total of 19 trees were identified as offering potential to support roosting bats. Fifteen trees were identified as having high potential, two with moderate potential and two as low potential. Details are provided in **Table EDP A5.4** and the locations of these trees are illustrated on **Plan EDP 11**.

Table EDP A5.4: Results of Preliminary Roost Assessment of Trees

Tree ID	Species	Features Identified	Bat Roost Potential
W16a	Sycamore	Multiple limb cavities on north aspect of semi-mature tree in poor condition	High
W16b	Ash	Woodpecker hole on north aspect at 8m	High
W16c	Beech	Dead tree with woodpecker hole on south aspect at 5m	High
G120a	Cherry	Hollow stem with multiple cavities, woodpecker holes and flaking bark on north aspect	High
G120b	Cherry	Multi-stemmed tree with woodpecker holes on various aspects	High
G120c	Cherry	Multi-stemmed tree with woodpecker holes on west aspect	High
G120d	Willow	Hazard beam on vertical limb at 2m	Low
G120e	Willow	Woodpecker hole on west aspect at 2m	High
G120f	Willow	Woodpecker hole on west aspect at 3m	High
G120g	Willow	Woodpecker holes on various aspects	High
G120h	Oak	Woodpecker holes on various aspects	High
G120i	Oak	Woodpecker holes on various aspects	High
G120j	Oak	Hollow trunk with cavity leading in at 1m on west aspect	Moderate
G120k	Ash	Semi-mature tree in poor condition, with hollow stem at 0.5m, and split limbs with flaking bark on multiple aspects	Moderate
G120l	Beech	Fallen tree with split in stem	Low

Tree ID	Species	Features Identified	Bat Roost Potential
G120m	Blackthorn	Three woodpecker holes on west aspect at varying heights	High
G121a	Silver birch	Hollow stem with multiple cavities on various aspects	High
G121b	Goat willow	Woodpecker hole on west aspect at 5m	High
G121c	Poplar	Two woodpecker holes on west aspect at 3m and 4m	High

Bat Roost Assessment - Buildings

Rapid Assessment

A5.35 A total of 150 buildings are present within the DCO boundary. Of these, 101 buildings were assessed as having negligible potential to support roosting bats due to their construction or are no longer present. These buildings were therefore not subject to any further level of survey.

A5.36 A total of 24 buildings were found to have potential to support roosting bats during the assessment, with 10 assessed as having Low potential, 10 assessed as having Moderate potential and four assessed as having High potential. There are 25 buildings that could not be adequately assessed at the present time due to access restrictions. Locations and gradings of the buildings is shown on **Plan EDP 12**.

Emergence-re-entry Surveys

A5.37 Results are to follow once surveys are completed.

Roost Assesment - Tunnels

A5.38 The *Bat Activity Report 2015* produced by Corylus Ecology (see **Annex EDP 19**) evaluated the potential for tunnels within Craylands Pit to support hibernating bats, and concluded that:

"The temperature and humidity monitoring in tunnel 007 found that the temperature inside the tunnel fluctuates greatly along with the external temperature. Humidity levels fell to approximately 70% relative humidity at the mid-point of the tunnel, which is relatively dry and not in the preferred humidity range for hibernating bats. It can be inferred from the data gathered during the survey that tunnel 007 is not suitable as a hibernation roost due to relatively large humidity and temperature fluctuations. The tunnel does not provide a stable environment for hibernating bats and it is considered that, with a hard ground frost, the internal temperature is likely to be close to 0°C. The tunnel is open at the south-western end where a metal grill prevents human access. There is therefore potential for significant air flow through the tunnel, which affects the stability of both the internal temperature and humidity. It may be that the tunnel could be used as an occasional temporary shelter or night roost, but is not likely to be used as a permanent winter roost."

A5.39 The hibernation survey undertaken by EDP within the same tunnel in February 2020 found no evidence to confirm the presence of hibernating bats.

Investigations of Bat Foraging/Commuting Activity

Manual Transect Surveys

A5.40 During the May transects, bat activity detected was low and predominantly of common pipistrelle (**Plan EDP 14**). Low levels of noctule, serotine and Leiseler's bat activity were detected in May and this was concentrated along the River Ebbsfleet corridor and along the A2 corridor close to the woodland in the west. There was some soprano pipistrelle activity, largely within the Broadness Grassland area of the peninsula. The first bats detected on each transect were between 21:19 and 22:08, 30 and 79 minutes after sunset, respectively. Indicating that there are unlikely to be any roosts nearby.

A5.41 During the June transects (**Plan EDP 15**), activity was low and predominantly of common pipistrelle with limited soprano pipistrelle and noctule passes. The first bats detected were between 21:42 and 22:20, 22 and 60 minutes aftersunset, respectively. Activity was greatest around botany marshes.

A5.42 **Plan EDP 13** illustrates the transect routes, and **Plans EDP 14** and **15** illustrates the results of the May and June transect surveys, respectively. A summary table of activity on each survey can be found in **Table EDP A5.5**.

Table EDP A5.5: Bat activity recorded on the manual transect surveys

Transect Number	Time	Species	Notes
18/05/20 - Dusk			
1	21:28	C.pip	First bat
	Most activity along the river corridor. Predominantly C.pip with some Leisler and serotine		
2 (2 + 7)	21:46	C.pip	First bat
	Very low activity levels. Predominantly C.pip with some S.pip		

Transect Number	Time	Species	Notes
3	21:27	Noctule	First bat
	Low levels of foraging and some commuting, predominantly C.pip		
4	No data mapped as detector failed		
	21:37	C.pip	Only bat seen - Foraging
5	21:24	C.pip	First bat
	22:08	C.pip	Last bat
	Only foraging activity along path detected. Low levels of activity		
6	21:19	S.pip	First bat
	Low levels of foraging activity of predominantly C.pip. Species diversity increase further west to the woodland where noctule, Leisler and serotine were recorded		
23/6/20 - Dusk			
1	21:42	C.pip	First bat
	Very low levels of C.pip activity		
2	21:46	S.pip	First bat
	Some pipistrelle activity in Bamber pit and noctule activity around the sports ground		
3	21:45	C.pip	First bat
	Low levels of C.pip activity		
4	21:55	C.pip	First bat
	Very low levels of C.pip activity		
5	22:09	C.pip	First bat
	Low levels of C.pip activity		
6	21:43	C.pip	First bat
	Low levels of C.pip activity		
7	22:20	C.pip	First bat
	Very low levels of C.pip activity		

Automated Detector Surveys

A5.43 The automated detectors have recorded activity from at least nine bat species in May and June. Activity was predominantly (89.2% and 84%) by common pipistrelle with the next highest species activity from noctule at 6.6% and 11% in May and Juine, respectively.

A5.44 Activity was highest at positions 4 to 8 in May, the Anabats located around the two marsh areas; Black Duck Marsh and Botany Marsh. This is not surprising as vegetated aquatic corridors provide high quality bat foraging habitat. In June, activity was highest at position 2 and 4 to 6. This is broadly similar to the results from May with activity highest within or close to the marsh areas.

A5.45 Activity was lowest around Station Quarter in both May and June. This is also not surprising as these areas are very built up and provide little foraging habitat. Activity was also found to be very low at the additional positions along the A2 corridor in June.

A5.46 The numbers of bat passes recorded overall was not considered to be high.

A5.47 The results of the automated detector surveys for May and June are given in **Tables EDP A5.6** and **A5.7**, respectively. The Anabat locations are illustrated on

Plan EDP 13. A Kent Project Site-wide monthly summary of bat activity is given in **Table EDP A5.8**.

Table EDP A5.6: Detailed Results from the May Anabat Recording Period

Position	Bat Species	Number of Bat Registrations Recorded per Night								Total
		18.05	19.05	20.05	21.05	22.05	23.05	24.05	25.05	
1	Common pipistrelle	95	63	239	191	7		117	261	973
	Myotis sp.	1						1	2	4
	Noctule		9	2	1				1	13
	Soprano pipistrelle	2	7		4			5	14	32
	Total	**98**	**79**	**241**	**196**	**7**	**0**	**123**	**278**	**1022**
2	Common pipistrelle	198	81	186	261	13	3	71	167	980
	Long eared bat								1	1
	Leisler		1		3					4
	Myotis sp.	4	1						1	6
	Nathusius pipistrelle				1					1
	Noctule	1	11	6	1	2		6	5	32
	Soprano pipistrelle	4	6	11	9			2	6	38
	Serotine			1						1
	Grand Total	**207**	**100**	**204**	**275**	**15**	**3**	**79**	**180**	**1063**
3	Common pipistrelle	320	177	383	344	81	12	122	354	1793
	Leisler		1						1	2
	Myotis sp.		1		3				5	9
	Noctule	7	6		2				2	17
	Soprano pipistrelle	1	1	5	5			3	3	18
	Grand Total	**328**	**186**	**388**	**354**	**81**	**12**	**125**	**365**	**1839**
4	Common pipistrelle	429	223	431	590	664	626	107	385	3455
	Leisler	2	88		2			1		93
	Myotis sp.	11	7	10	4	3	1	3	7	46
	Nathusius pipistrelle		2		1					3
	Noctule	2	9	3	1	1		24	17	57
	Soprano pipistrelle	25	24	27	27	20	8	3	11	145
	Serotine	1	4	1	2					8
	Grand Total	**470**	**357**	**472**	**627**	**688**	**635**	**138**	**420**	**3807**

Position	Bat Species	Number of Bat Registrations Recorded per Night								Total
		18.05	19.05	20.05	21.05	22.05	23.05	24.05	25.05	
5	Common pipistrelle	227	105	262	230	112		95	522	1553
	Leisler	1	1		1			2		5
	Myotis sp.	2						1	3	6
	Nathusius pipistrelle		1							1
	Noctule	12	11	4	5			4	5	41
	Soprano pipistrelle	4	5	8	2	2		1	7	29
	Grand Total	**246**	**123**	**274**	**238**	**114**	**0**	**103**	**537**	**1635**
6	Common pipistrelle	502	474	378	272	255	327	267	370	2845
	Myotis sp.	1					1			2
	Nathusius pipistrelle	1	2							3
	Noctule	1	73	2	3				2	81
	Soprano pipistrelle	4	1	2	7	2	1		3	20
	Grand Total	**509**	**550**	**382**	**282**	**257**	**329**	**267**	**375**	**2951**
7	Common pipistrelle	1110	114	160	180	1130	624	173	303	3794
	Long eared bat							1		1
	Myotis sp.	3	1	2	1	2			1	10
	Noctule	43	50	33	85	91	96	82	81	561
	Soprano pipistrelle	19	1	2	1	11	130	7	11	182
	Grand Total	**1175**	**166**	**197**	**267**	**1234**	**850**	**263**	**396**	**4548**
8	Barbastelle		1		1		2	2		6
	Common pipistrelle	347	169	227	335	58	35	170	204	1545
	Long eared Bat	6	1	5	1	7	1	2	5	28
	Myotis sp.	10	9	22	26	17	15	17	18	134
	Nathusius pipistrelle	2	2		1					5
	Noctule	107	101	54	38	12	5	88	61	466
	Soprano pipistrelle	9	12	8	14	5	5	11	20	84
	Grand Total	**481**	**295**	**316**	**416**	**99**	**63**	**290**	**308**	**2268**

Position	Bat Species	Number of Bat Registrations Recorded per Night								Total
		18.05	19.05	20.05	21.05	22.05	23.05	24.05	25.05	
10	Common pipistrelle	17	315	44	80	86	29	25	76	672
	Long eared bat								1	1
	Nathusius pipistrelle		18		3					21
	Noctule	5	21	4	18	5		2	6	61
	Soprano pipistrelle								1	1
	Grand Total	**22**	**354**	**48**	**101**	**91**	**29**	**27**	**84**	**756**
12	Common pipistrelle	166	114	110	205	57	64	96	111	923
	Myotis sp.			1						1
	Noctule	1	4	5	6			2	3	21
	Soprano pipistrelle					1				1
	Grand Total	**167**	**118**	**116**	**211**	**58**	**64**	**98**	**114**	**946**
13	Common pipistrelle	13	32	19	9	6		8	32	119
	Leisler		1	1						2
	Nathusius pipistrelle		1	1						2
	Noctule	9	20	8	6	2	2	3	5	55
	Soprano pipistrelle	1			1			1		3
	Serotine		1	1						2
	Grand Total	**23**	**55**	**30**	**16**	**8**	**2**	**12**	**37**	**183**
14	Common pipistrelle	6	5	3	81	13	1	3	24	136
	Leisler							2		2
	Myotis sp.	1			3				1	5
	Noctule	2	8	10	9	1	2	4	15	51
	Soprano pipistrelle		1							1
	Grand Total	**9**	**14**	**13**	**93**	**14**	**3**	**9**	**40**	**195**

Table EDP A5.7: Detailed Results from the June Anabat Recording Period

Position	Bat Species	Number of Bat Registrations Recorded per Night						Total
		23.06	24.06	25.06	26.06	27.06	28.06	
1	Common pipistrelle	38	105	265	32	1	0	441
	Myotis sp.	1	1	0	0	0	0	2
	Noctule	1	2	0	2	0	1	6
	Soprano pipistrelle	5	13	9	1	0	0	28
	Grand Total	**45**	**121**	**274**	**35**	**1**	**1**	**477**
2	Barbastelle	1	0	0	0	0	0	1
	Common pipistrelle	357	183	146	331	88	156	1261
	Long eared bat	1	0	0	0	0	0	1
	Myotis sp.	1	0	0	0	0	0	1
	Noctule	1	0	0	0	0	1	2
	Soprano pipistrelle	10	10	4	8	1	1	34
	Serotine	0	0	0	0	1	0	1
	Grand Total	**371**	**193**	**150**	**339**	**90**	**158**	**1301**
3	Common pipistrelle	33	22	22	9	0	3	89
	Noctule	0	1	2	0	0	0	3
	Soprano pipistrelle	0	1	0	0	0	0	1
	Total	**33**	**24**	**24**	**9**	**0**	**3**	**93**
4	Common pipistrelle	26	34	48	254	406	335	1103
	Long eared bat	0	0	0	2	2	0	4
	Myotis sp.	0	1	2	3	5	3	14
	Noctule	4	3	6	25	5	2	45
	Soprano pipistrelle	12	5	9	26	93	17	162
	Serotine	0	0	0	0	0	1	1
	Grand Total	**42**	**43**	**65**	**310**	**511**	**358**	**1329**
5	Common pipistrelle	777	737	642	84	33	8	2281
	Myotis sp.	1	1	1	1	0	0	4
	Noctule	2	5	4	2	0	2	15
	Soprano pipistrelle	89	16	26	1	0	0	132
	Grand Total	**869**	**759**	**673**	**88**	**33**	**10**	**2432**

Position	Bat Species	Number of Bat Registrations Recorded per Night						Total
		23.06	24.06	25.06	26.06	27.06	28.06	
6	Common pipistrelle	371	324	190	211	258	320	1674
	Long eared bat	1	0	0	0	0	0	1
	Myotis sp.	17	4	0	01	0	2	24
	Nathusius pipistrelle	1	0	0	0	0	0	1
	Noctule	2	3	4	1	0	0	10
	Soprano pipistrelle	3	0	9	1	4	1	18
	Grand Total	**395**	**331**	**203**	**214**	**262**	**323**	**1728**
7	Common pipistrelle	79	41	17	27	72	498	734
	Noctule	0	1	0	0	3	2	6
	Soprano pipistrelle	1	0	1	1	5	6	14
	Grand Total	**80**	**42**	**18**	**28**	**80**	**506**	**754**
8	**Anabat fault**							
9	Common pipistrelle	17	14	17	29	7	24	108
	Long eared bat	0	1	0	0	0	1	2
	Leisler	0	0	0	0	1	0	1
	Myotis sp.	2	5	5	3	3	1	19
	Noctule	61	94	77	147	21	14	414
	Soprano pipistrelle	0	0	0	2	0	0	2
	Serotine	0	1	1	2	0	1	5
	Grand Total	**80**	**115**	**100**	**183**	**32**	**41**	**551**
10	Common pipistrelle	6	1	2	19	20	4	52
	Myotis sp.	1	0	0	0	0	0	1
	Noctule	47	39	66	124	91	42	409
	Soprano pipistrelle	0	0	0	1	0	0	1
	Serotine	0	1	0	1	0	1	3
	Grand Total	**54**	**41**	**68**	**145**	**111**	**47**	**466**

Position	Bat Species	Number of Bat Registrations Recorded per Night						Total
		23.06	24.06	25.06	26.06	27.06	28.06	
11	Common pipistrelle	12	11	5	23	7	17	75
	Leisler	1	0	0	1	0	0	2
	Myotis sp.	0	2	0	0	0	0	2
	Noctule	10	7	46	94	17	6	180
	Serotine	0	1	0	0	0	0	1
	Grand Total	**23**	**21**	**51**	**118**	**24**	**23**	**260**
12	Common pipistrelle	5	8	10	37	1	0	61
	Myotis sp.	0	0	0	3	0	0	3
	Noctule	1	3	1	3	0	1	9
	Grand Total	**6**	**11**	**11**	**43**	**1**	**1**	**73**
13	Barbastelle	0	0	1	1	1	0	3
	Common pipistrelle	22	8	14	69	1	8	122
	Myotis sp.	0	0	1	1	0	0	2
	Soprano pipistrelle	2	0	1	3	0	0	6
	Serotine	0	0	0	1	0	1	2
	Grand Total	**24**	**8**	**17**	**75**	**2**	**9**	**135**
14	Common pipistrelle	67	50	38	60	3	1	219
	Nathusius pipistrelle	1	0	0	0	0	0	1
	Noctule	2	0	5	2	0	0	9
	Soprano pipistrelle	0	2	0	1	0	0	3
	Serotine	0	0	1	0	0	0	1
	Grand Total	**70**	**52**	**44**	**63**	**3**	**1**	**233**
15	Common pipistrelle	123	219	148	23	9	32	554
	Myotis sp.	0	1	0	0	0	1	2
	Noctule	2	5	4	4	3	5	23
	Soprano pipistrelle	1	1	3	0	0	0	5
	Serotine	0	0	0	0	1	0	1
	Grand Total	**126**	**226**	**155**	**27**	**13**	**38**	**585**

Position	Bat Species	Number of Bat Registrations Recorded per Night						Total
		23.06	24.06	25.06	26.06	27.06	28.06	
16	Common pipistrelle	8	6	6	10	0	0	30
	Leisler	0	0	0	1	0	1	2
	Myotis sp.	2	0	0	0	0	0	2
	Noctule	3	4	1	7	1	2	18
	Soprano pipistrelle	0	1	0	2	0	1	4
	Serotine	2	0	0	0	0	0	2
	Grand Total	**15**	**11**	**7**	**20**	**1**	**4**	**58**

Table EDP A5.8: Monthly Summary of Automated Detector Surveys

Survey Month	Species	No. Registrations Recorded	% Of Total
May	Barbastelle	6	0.0
	Common pipistrelle	18788	89.2
	Long eared Bat	31	0.1
	Myotis sp.	223	1.1
	Nathusius pipistrelle	36	0.2
	Noctule	1395	6.6
	Soprano pipistrelle	554	2.6
	Serotine	11	0.1
	Leisler	15	0.1
	Total	**21059**	**100**
June	Barbastelle	4	0.0
	Common pipistrelle	8804	84.0 0.0
	Long eared Bat	8	0.1
	Myotis sp.	76	0.7
	Nathusius pipistrelle	2	0.0
	Noctule	1149	11.0
	Soprano pipistrelle	410	3.9
	Serotine	17	0.2
	Leisler	5	0.0
	Total	**10475**	**100**

Summary of Bat Activity

A5.48 Bat foraging and commuting activity recorded during the course of both transect and automated detector surveys undertaken in May and June 2020 is summarised below and illustrated on **Plans EDP 14** and **15**. Results for July, August and September are to follow.

Species Diversity and Abundance

A5.49 So far, species diversity recorded at the Project Site is moderate, with at least nine bat species/species groups (*Myotis* and long-eared bats were not identified to species level) confirmed to be present foraging and/or commuting, although many species were found in very low numbers. During the automated detector surveys, the majority of bat activity (89.2% of all Anabat recordings) related to common pipistrelle bats.

A5.50 Despite the prevalence of common pipistrelle, soprano pipistrelle and noctule were frequently recorded making up 2.6% and 6.6% of all Anabat recordings respectively.

A5.51 Notably, barbastelle and Nathusius pipistrelle, considered rare in the UK, were recorded but only accounted for <0.1% and 0.2% of activity, respectively.

A5.52 Four Kent Red Data Book species were also recorded: serotine, noctule, brown long eared and Leisler's bat which are classed as rare, vulnerable, vulnerable and endangered, respectively. Serotine is also a Kent BAP species. Activity of serotine was low, accounting for only 0.1% activity so far and only found in three locations.

A5.53 The range and proportion of species/species groups recorded during the manual transect surveys was broadly similar to that described above with regards to the automated surveys but with no detection of barbastelle, long eared bats, Nathusius pipistrelle or Myotis species. This is not surprising though as activity of these species across the Kent Project Site was low.

Evaluation of Overall Bat Assemblage

A5.54 The abundance and diversity of bat species recorded at the Project Site is considered to be fairly typical of an urban edge site in south-esast England with common and widespread generalist species such as common pipistrelle bats accounting for the vast majority of foraging and commuting activity. However, a number of rarer bat species were recorded using the Project in low numbers including barbastelle and Nathusius' pipistrelle. Serotine bats are also recorded, which are considered rare the Kent.

A5.55 The overall bat assemblage, taking into consideration the presence of rare and uncommon species (albeit only present in low numbers), is considered to be of Local level value.

Annex EDP 6
Dormouse Survey

Methodology

A6.1 An assessment of habitat suitability and local records concluded that the likelihood of dormice being present within the Kent Project Site was high. Therefore, to determine the presence within the Kent Project Site a presence/absence survey was undertaken.

A6.2 A presence/absence survey for dormice was carried out using dormouse nest tubes in accordance with the current industry standard survey guidance[66]. These tubes are made from black plastic sheet, 5×5cm in cross section and 25cm long, sealed at one end, with a plywood tray inside. They are then suspended under horizontal limbs to resemble a hollow branch. The tubes are then inspected for the presence of dormice and also for signs of recently constructed dormouse nests.

A6.3 A total of 284 nest tubes were deployed within the woodland and scrub habitats with the most potential across the Kent Project site on 08 April 2020, the locations of which are displayed on **Plan EDP 16**. The tubes will then be checked four times between May and October. The provisional dates of the completed and planned checks are displayed in **Table EDP A6.1**.

Table EDP A6.1: Anticipated dates of dormouse checks

Check Number	Date
1	19.05.20
2	20.08.20
3	24.09.20
4	22.10.20

A6.4 In accordance with best practice guidance[67], whereby the index of proability in detecting dormice presence within nest tubes is calculated according to set scores given for each of the different months in which tubes are deployed (during which a minimum of fifty nest tubes are deployed), the total surey effort employed on the Kent Project Site is considered to be sufficient to determine presence or absence. As illustrated in **Table EDP A6.2**, the combined survey effort score calculated to be 130.64 far exceeds the minimum survey effort score of 20 recommended by Chanin and Woods (2003) for a thorough dormouse survey through which absence may be assumed if no evidence of dormice is found.

[66] Bright, P., Morris, P. and Mitchell-Jones, T. (2006). *The Dormouse Conservation Handbook: 2nd Edition*. English Nature, Peterborough.

[67] Bright, P., Morris, P. and Mitchell-Jones, T. (2006). *The Dormouse Conservation Handbook: 2nd Edition*. English Nature, Peterborough.

Table EDP A6.2: Dormouse Survey Effort Scores

Month	Index of Probability for 50 tubes	Index of probability Weighted for Number of Tubes in Survey Area
April	1	5.68
May	4	22.72
June	2	11.36
July	2	11.36
August	5	28.4
September	7	39.76
October	2	11.36
November	2	11.36
Total Survey Effort Score		**130.64**

To date, a check on 19 May 2020 has been completed. Further checks are planned for August, September and October.

Limitations

A6.5 All dormouse checks have been, or are planned to be, conducted within the optimum recognised survey period.

Results

A6.6 During the deployment of the tubes in April 2020, three individual dormice were found in old tubes that had remained on the Kent Project Site from previous surveys.

A6.7 Following this, during the May visit, a total of six individual dormice were found in addition to five nests. The locations of these dormice sightings can be found in **Plan EDP 17**.

Annex EDP 7
Water Vole Survey

Methodology

A7.1 There are a number of ditches within the Kent Project Site and the River Ebbsfleet that hold suitable habitat for water vole (*Arvicola amphibius*).

A7.2 Suitable Habitat for water voles includes:

- Water more than 50cm deep and relatively stable;
- Muddy bottom;
- Static or slow flowing water;
- Earth banks of >45° (for burrowing);
- Dense vegetation cover on the banks of a good mix of grasses and herbs for summer food and cover and some berry bearing bushes, tubers and trees for autumn and winter food;
- Emergent, in-channel vegetation; and
- 1-2m wide.

A7.3 A water vole survey was carried out on these ditches during June and August 2020 to determine presence or absence. Due to health and safety constraints, the standard survey methodology, which involves searching the banks of each ditch for evidence of water voles, was not possible. Therefore, as per best practice guidelines[68] in these situations, 193 Styrofoam mats were deployed on 02 and 10 June 2020 within the most suitable and accessible ditches and in the River Ebbsfleet to act as artificial latrine sites.

A7.4 These 'rafts' are constructed from a buoyant material approximately 60x30 cm. They are situated within vegetation at the toe of the bank at a density of approximately one every 10m and tethered in place. The most obvious field sign for water vole is their latrines (piles of droppings) which are used by individuals to mark territories and thus 'obvious' and open places (such as artificial rafts) are often chosen as latrine sites. The locations of the rafts deployed in the Kent Project Site can be found on **Plan EDP 18**.

A7.5 Other evidence for the presence of water voles includes:

- Feeding signs (neat piles of short pieces of vegetation cut at a 45° angle);

[68] Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016), Water Vole Mitigation Handbook (Mammal Society Mitigation Guidance Series). Eds Fiona Matthews and Paul Channin. Mammal Society, London.

- Burrows;
- Footprints and pathways; and
- Actual sightings.

Limitations

A7.6 The optimal period for water vole survey is during the breeding season (Mid-April to end of September) so the surveys undertaken at the Kent Project Site are not considered to be limited by season.

A7.7 A significant number of rafts have been deployed and will remain in place throughout the water vole breeding season so it is thought that the likelihood of detecting water vole on the Project Site (if present) is high. There are no seasonal constraints on the survey.

A7.8 It was not possible to survey all of the ditches in Botany Marsh East due to dredging work taking place over the course of the summer. This meant that many ditches were unsuitable already due to the scraped sides, or will be by the next survey.

A7.9 Furthermore, at the current time of writing no access to Botany Marsh East, which supports grazing marsh interescted by ditches, has been granted by the landowner. Therefore, no water vole or otter surveys have been completed from the internal ditch network inside Botany Marsh West.

A7.10 Deployment of rafts was not possible across the majority of the reedbed habitat due to the presence of Schedule 1 nesting birds limiting access. Water vole have been recorded using reedbeds, and it therefore must be assumed that they are present in reedbeds within the Kent Project Site.

A7.11 Access and visibility constraints mean that field signs could also be missed.

Results

A7.12 Water vole latrines and feeding signs have been found in Botany Marsh east and west as shown on **Plan EDP 18**. This would indicate that Botany Marsh has a breeding population.

A7.13 An otter was sighted in Black Duck Marsh during the March winter bird survey.

Annex EDP 8
Great Crested Newt Survey

Methodology

A8.1 There are several ponds and ditches present on both the Kent Project Site and the Essex Project Site and within 250 m of both Project Sites. For the purposes of this report, the ponds have been numbered as **P1** to **P33** and ditches as **D1** to **D43** and their locations are shown on **Plan EDP 19**.

Environmental DNA (eDNA) Sampling

A8.2 A total of eight ponds and 21 ditches were tested for GCN eDNA. Environmental DNA (eDNA) testing was formally approved by Natural England in spring 2014 and can remove the need for the time-consuming standard survey procedures if the results are returned negative.

A8.3 The ponds and ditches were subject to eDNA testing during the 2020 breeding season in accordance with the Technical Advice Note for field and laboratory sampling of GCN eDNA (WC1067)[69]. Using sampling kits supplied by SureScreen, this technique involved the collection of 20 No. 40ml water samples from locations spread around the perimeter of the pond/ditch, which are then combined and decanted into six sample tubes and forwarded to the SureScreen laboratory to be analysed.

Limitations

A8.4 Many ponds and ditches could not be surveyed for reasons explained in **Table EDP A8.1**. Despite the lack of survey on some water bodies, the complete set of negative results from the other waterbodies and the results from the previous surveys conducted on the Kent Project Site in 2012 and 2015, mean it is not considered likely that a survey of these water bodies would have resulted in a different conclusion.

Results

A8.5 A total of 36 records of GCN were returned during the desk study. Of these, only 3 were recent (last 10 years) and none of these were from within the Project Site. No GCN were recorded on the Kent Project Site in the 2012 and 2015 surveys.

[69] Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA. Freshwater Habitats Trust, Oxford.

eDNA Surveys

A8.6 The eDNA results from all surveyed waterbodies were returned negative. No further surveys were considered necessary. Great Crested Newt are not considered to be present within the Project Site.

Table EDP A8.1: Great Crested Newt Survey Schedule

On/Off-site	Location	Pond No.	Surveyed?	Reasons for Scoping Out	eDNA Result
On-site	Black duck marsh	D1	N	Inaccessible due to scrub cover. Unsuitable for GCN (v. shallow water, 100% shade, no aquatic veg). Schedule 1 birds in marsh	
On-site	Central peninsula	D10	Y		**Negative**
On-site	Central peninsula	D11	Y		**Negative**
On-site	Central peninsula	D12	Y		**Negative**
On-site	Central peninsula	D13	N	Dry	
On-site	Broadness grasslands	D14	N	Dry	
On-site	Central peninsula	D15	N	Dry	
On-site	Broadness grasslands	D16	N	No Access - fenced	
On-site	Botany Marshes Nature Reserve	D17	Y		**Negative**
On-site	Botany Marsh	D18	Y		**Negative**
On-site	Botany Marsh	D19	Y		**Negative**
On-site	Black duck marsh	D2	N	Inaccessible due to steep banks and scrub cover. (limited suitability for GCN where seen - shallow water, no aquatic veg). Schedule 1 birds in marsh	
On-site	Botany Marsh	D20	Y		**Negative**
On-site	Botany Marsh	D21	Y		**Negative**
On-site	Botany Marshes Nature Reserve	D22	Y		**Negative**
On-site	Botany Marsh	D23	Y		**Negative**
On-site	Botany Marsh	D24	Y		**Negative**
On-site	Botany Marshes Nature Reserve	D25	Y		**Negative**
On-site	Botany Marshes Nature Reserve	D26	Y		**Negative**
On-site	Botany Marshes Nature Reserve	D27	N	No longer exists - large reedbed in place with no obvious waterbody	
On-site	Botany Marshes Nature Reserve	D28	Y		**Negative**
On-site	Botany Marshes Nature Reserve	D29	Y		**Negative**
On-site	Black duck marsh	D3	N	Inaccessible due to scrub cover and adjacent marsh. Schedule 1 birds in marsh	
On-site	Botany Marshes Nature Reserve	D30	Y		**Negative**
On-site	Botany Marshes Nature Reserve	D31	Y		**Negative**
Off-site	Industrial estate to east	D32	N	Lead contamination	

On/Off-site	Location	Pond No.	Surveyed?	Reasons for Scoping Out	eDNA Result
Offsite	Land around Thames Way	D33	N	Part of river Ebbsfleet. Flowing water. GCN highly unlikely to be present	
Offsite	Land around Thames Way	D34	N	Part of R. Ebbsfleet. Separated from main development by B255. Potential for highway improvement works to result in habitat loss, subject to extent of works.	
On-site	Station Quarter South	D35	N	Part of R. Ebbsfleet. Flowing water. GCN highly unlikely to be present	
On-site	A2 Corridor	D36	N	Unaffected by development proposals, subject to nature/ extent of highway improvement works	
On-site	A2 Corridor	D37	N	GCN considered unlikey to be present. Isolated field drain on the edge of intensive arable field. Nearest pond with no barriers 700m SE.	
On-site	A2 Corridor	D38	N	GCN considered unlikey to be present. Ditch isolated by HS1 and New Barn Lane	
On-site	Essex Project Site	D39	N	Ditch no longer exists	
On-site	Black duck marsh	D4	N	Inaccessible due to D5 and surrounding marsh. Schedule 1 birds in marsh	
On-site	Essex Project Site	D40	Y		**Negative**
On-site	Essex Project Site	D41	N	Ditch inaccessible due to H&S	
Off-site	Adjacent to Essex Project Site	D42	Y		**Negative**
		D43	N	Ditch dry	
On-site	Black duck marsh	D5	Y		**Negative**
On-site	Black duck marsh	D6	N	Inaccessible due to D5 and surrounding marsh	
On-site	Black duck marsh	D7	N	Inaccessible due to D5 and surrounding marsh	
On-site	Black duck marsh	D8	N	Inaccessible due to D5 and surrounding marsh	
On-site	Black duck marsh	D9	Y		**Negative**
On-site	Broadness grasslands	P1	N	Leachate treatment lagoon. Highly aklaine due to leachate contamination	
On-site	Central peninsula	P10	N	Inaccessible, possibly dry, within reedbed	
Off-site	Industrial estate to east	P11	N	Lead contamination	
On-site	Central peninsula	P12	N	No water accessible within reedbed and scrub	
On-site	Botany Marsh	P13	N	Inaccessible	

On/Off-site	Location	Pond No.	Surveyed?	Reasons for Scoping Out	eDNA Result
On-site	Bamber Pit	P14 (former quarry lake)	N	Inaccessible. Very deep water and steep sides. <5% of shoreline accessible. Large shoals of fish observed in lake. GCN highly unlikely to be present in significant numbers due to fish predation.	
Offsite	Land around Thames Way	P15	Y		**Negative**
Offsite	Land around Thames Way	P16 (Sawyers Lake)	N	Heavily stocked with fish for commercial fishing. GCN highly unlikely to be present	
On-site	Station Quarter South	P17	Y		**Negative**
On-site	Station Quarter South	P18	N	Could not access through fence	
Offsite	Future Redrow development land	P19	Y		**Negative**
On-site	Broadness grasslands	P2	N	Leachate treatment lagoon. Highly aklaine due to leachate contamination	
On-site	A2 Corridor (south)	P20	N	A2 Corridor (not affected by proposals)	
On-site	A2 Corridor (south)	P21	N	A2 Corridor (not affected by proposals)	
On-site	A2 Corridor (south)	P22	N	Isolated pond in intensive arable field. Pond not affected by proposals, and c. 230m from site boundary.	
Offsite	Ebbsfleet Garden City	P23	N	A2 Corridor (not affected by proposals)	
On-site	Ebbsfleet Garden City	P24	N	A2 Corridor (not affected by proposals)	
Offsite	Ebbsfleet Garden City	P25	N	A2 Corridor (not affected by proposals)	
Offsite	Ebbsfleet Garden City	P26	N	A2 Corridor (not affected by proposals)	
Offsite	Ebbsfleet Garden City	P27	N	A2 Corridor (not affected by proposals)	
On-site	A2 Corridor (north)	P28	N	A2 Corridor (not affected by proposals)	
On-site	Bluewater shopping centre	P29	N	Unaffected by development proposals, subject to nature/ extent of highway improvement works	
On-site	Central peninsula	P3	Y		**Negative**
On-site	A2 Corridor (north)	P30	N	A2 Corridor (not affected by proposals)	
On-site	A2 Corridor (south)	P31	N	Isolated pond set in intensive arable landscape, with low/negligible quality habitat connecting it to site boundary	
On-site	Castle Hill Garden City Park	P32	Y		**Negative**

On/Off-site	Location	Pond No.	Surveyed?	Reasons for Scoping Out	eDNA Result
On-site	Castle Hill Garden City Park	P33	Y		**Negative**
On-site	Central peninsula	P4	N	Leachate treatment lagoon. Highly aklaine due to leachate contamination	
Offsite	Industrial estate to east	P5	Y		**Negative**
On-site	Central peninsula	P6	N	Dry	
Offsite	Industrial estate to east	P7	N	Lead contamination	
On-site	Black duck marsh	P8	Y		**Negative**
On-site	Central peninsula	P9	N	No water accessible within reedbed	

Annex EDP 9
Reptile Survey

Methodology

A9.1 In order to confirm the presence of reptiles from within the Kent Project Site, a reptile survey, following best practice guidance[70], was undertaken. The Kent Project Site supports suitable habitat for a range of common and widespread British reptile species; marsh habitat, reed bed, woodland, scrub, brownfield habitat and various grassland types including calcareous grassland. The total area of suitable habitat amounts to approximately 173 hectares. However, approximately 35 hectares of this is reed bed that could not be surveyed for health and safety reasons and due to the presence of Schedule 1 nesting birds, so the surveyed area amounted to approximately 139 hectares. A total of 1142 artificial refugia were used, resulting in a density of 8.2 refugia/hectare, which is within the minimum requirements cited in Froglife guidance as 'between five and ten refuges per hectare'.

A9.2 The refugia comprised 50cm^2 sheets of roofing felt. They were placed across the Kent Project Site on 14 and 29 April 2020 as illustrated on **Plan EDP 20**. These refugia were left undisturbed *in situ* for over ten days prior to the commencement of seven survey visits. Some refugia were deployed on 12 June 2020 to replace those destroyed during maintenance of the Kent Project Site. Additional refugia were deployed around the northern and western edge of Botany Marsh, and within Botany Marsh East.

A9.3 To date, a single survey visit has taken place on 26 May 2020. The remaining six visits are planned between June and September 2020.

A9.4 During each survey visit, artificial refugia will be individually checked by experienced Ecologists with any reptiles observed recorded, along with notes on their life stage (adult/juvenile) and sex where possible. A peak count of the total number of individuals of a particular species was recorded. Peak counts were then used to estimate approximate population size for each reptile species recorded. Estimates of population size followed the approach given in the withdrawn draft reptile mitigation guidelines[71]; and are summarised in **Table EDP A9.1**.

Table EDP A9.1: Population size class estimates

Species	Population Size Class Category		
	Small	Medium	Large
Slow worm	<10	10–40	>40
Common lizard	<5	5–20	>20
Grass snake	<5	5–10	>10

[70] Froglife (1999) Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10, Froglife, Halesworth; DMRB (2005) *Nature conservation advice in relation to reptiles and roads. Volume 10, Section 4, Part 7, HA/116/05.* DMRB

[71] Natural England (2011) *Natural England Technical Information Note TIN102 Reptile Mitigation Guidelines.* WITHDRAWN

Species	Population Size Class Category		
	Small	Medium	Large
Adder	<5	5–10	>10

A9.5 Detailed weather conditions recorded during each survey visit are summarised in **Table EDP A9.2**.

Table EDP A9.2: Date, Timing and Weather Conditions of Reptile Survey Visits

Visit Date	Start Time	Air Temp Range (°C)	Wind Speed (Beaufort)	Cloud Cover (%)	Rain
26/05/20	08:30	18-22	1-3	10-25	Nil
29/06/20	09:20	16-17	4-6	80-90	Nil
07/07/20	Surveys yet to commence				
04/08/20					
03/09/20					
14/09/20					
22/09/20					

Limitations

A9.6 The surveys so far have not been constrained by weather and took place in suitable conditions. All surveys are planned within the optimal surveying period.

A9.7 Several of the refugia within the top of the Peninsula were damaged or lost through vegetation management meaning a full refugia check in this area could not be completed in May. These refugia were replaced in June 2020.

Results

A9.8 So far, two reptile refugia checks have taken place. During the May check counts of 10 common lizard, 15 slow-worm and two grass snake were recorded.

A9.9 During the June check counts of 42 common lizard, 10 grass snake and 42 slow-worm were recorded.

A9.10 The locations of these can be found on **Plan EDP 21**.

Annex EDP 10
Terrestrial Invertebrate Survey

Methodology

Invertebrate Scoping Study

A10.1 An invertebrate habitat scoping study to highlight which areas of the Project Site should be prioritised for further survey was conducted during two periods; 14 to 16 April 2020, and 20 to 22 April 2020.

A10.2 The Project Site was walked and both terrestrial and aquatic habitats and habitat features with potential to support significant invertebrate assemblages/key species, target-noted, mapped and geo-referenced. Habitat was assessed in terms of topography, substrate and general vegetation composition and structure.

Detailed Invertebrate Surveys

Terrestrial Invertebrate Sampling

A10.3 It is anticipated that terrestrial invertebrate fieldwork will be undertaken over four separate sampling events. In order to correspond with peak flight periods, the first of these was undertaken 18-20 May 2020, the second 15-17 June 2020, the third survey is scheduled for July, and the fourth for mid to late August 2020.

A10.4 For the sampling, the Project Site was split into compartments as shown in **Figure EDP A10.1** overleaf. Compartment 1a was added to the survey in June and therefore not sampled in May.

A10.5 In accordance with Drake et al (2007)[72] sampling will be undertaken using a combination of standard capture methods enabling subsequent analysis using Pantheon. Where possible, sampling would be undertaken during periods of dry, sunny and relatively windless weather.

A10.6 Standard sampling methods used during the survey will be expected to include timed sweep sampling, timed vacuum sampling, direct searching, spot sampling and beating (see descriptions below). In addition, indirect methods such as pitfall trapping and water trapping would be used to ensure coverage of species not easily obtainable by direct capture methods.

A10.7 The survey will be expected to cover taxa from all of the larger (and most of the smaller) taxonomic insect orders, as well as other arthropods such as spiders (Araneae), harvestmen (Opiliones), woodlice (Isopoda), centipedes (Chilopoda) and pseudoscorpions (Pseudoscorpiones). For certain large groups, target taxa recognised within Pantheon only

[72] C. M. Drake, D. A. Lott, K. N. A Alexander & J. Webb (2007) Surveying terrestrial and freshwater invertebrates for conservation evaluation. Natural England Research Report NERR005.

will be identified (e.g. parasitic hymenoptera such as Ichneumonoidea, and some two-winged fly (Diptera) families are not supported within Pantheon and such groups are generally excluded from standard invertebrate surveys as are terrestrial molluscs.

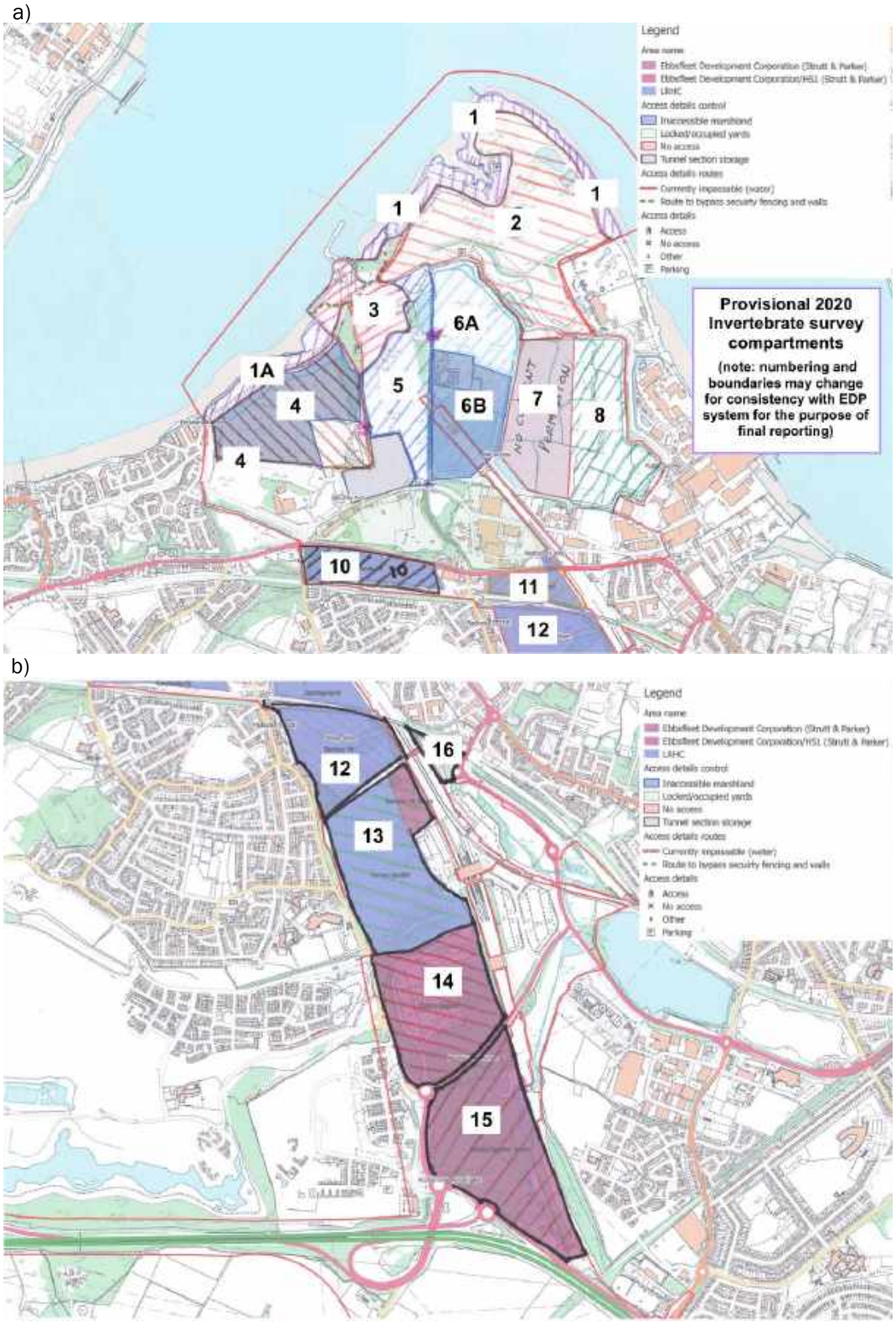


Figure EDP A10.1: Compartment Numbers on the Kent Project Site for the Terrestrial Invertebrate Survey

A10.8 The precise approach to sampling varies according to habitat, it is expected that a combination of two or more of the following sampling methods would be used:

- Sweep-net – a standard sweep net is used to collect specimens from grassland and scrub habitat. Timed sweeps would be undertaken in representative habitat in accordance with Drake et al (2007);

- Vacuum Sampling – a vacuum sampler is used to collect ground-dwelling specimens not easily retrieved by other sampling methods. Vacuum sampling can be timed, enabling repeatable surveying to be undertaken as specified in Drake et al (2007);

- Direct Searching – direct searching beneath refugia such as rocks, under bark and in the crevices of standing and fallen trees;

- Spot Sampling – direct catching of species not easily caught using other methods (e.g. bees, solitary wasps, large hoverflies, etc.);

- Beating Tray – a beating tray is used to collect specimens from trees and scrub habitat. Timed samples collected in accordance with Drake et al (2007);

- Pitfall Trapping – pitfall trapping would follow methods described in Drake et al (2007). Traps comprising 7.5 cm diameter x 10cm deep plastic cups are sunk into holes cut into the soil using a bulb cutter, or similar device such as an auger or trowel. At each sample location, nine traps, spaced two metres apart would be set along a transect. The traps would contain ethylene glycol (antifreeze) as a preservative, with a few drops of detergent to break the surface tension. When not in use, covers are put over traps to minimise the risk of inadvertent capture of small mammals and herptiles;

- Water Traps – water traps comprise shallow bowls of water (usually white) with added ethylene glycol (antifreeze) and a few drops of detergent to break the surface tension. Water traps are particularly effective for sampling flying insects including two-winged flies (Diptera) and Bees and wasps (Hymenoptera); and

- Flight Interception Traps – flight interception traps are effective in capturing flying insects such as social and solitary bees, wasps (Aculeate Hymenoptera), true flies (Diptera) and other aerial taxa.

A10.9 Specimens not identified in the field will be identified using a binocular microscope and appropriate taxonomic keys as required. If necessary, specialist verification of rare or uncommon species will be sought from the appropriate county recorder or expert in the relevant species group, also samples may be subcontracted to suitably qualified and experienced third parties for identification if required.

Results

Desk Study

A10.10 In 2020, KMBRC returned records of the following species within 2km of the Project Site: 61 lepidoptera records (4 butterfly, 51 moth); 10 Hymenoptera; 2 diptera; and 3 coleptera. EFC returned records of 215 different beetle species, 10 butterfly species, four dragonfly species, 154 Hymenoptera species, 125 moth species, six orthoptera species, 48 hemiptera species and 485 diptera species. None were from the Essex Project Site.

Surveys

A10.11 So far, two of the four sampling periods have been completed however, identification is not complete for these two periods. The species so far recorded are mainly incidental and easily identified, and total 262. Twenty-two species of conservation status have been recorded so far including Brown-banded Carder Bee (*Bombus humilis*) and Phoenix Fly (*Dorycera graminea*), both flagship species of Open mosaic habitat on previously developed land and remnant herb-rich grassland. These are listed in **Table EDP A10.1**. The current complete list can be found in **Table EDP A10.2**.

Table EDP A10.1: Species of Recognised UK Conservation Value So Far Recorded During the Terrestrial Invertebrate Surveys

Common Name	Scientific Name	Order	UK Status	Compartment
A jumping spider	*Ballus chalybeius*	Araneae	Nationally Scarce	6, 10, 11, 12, 14
A jumping spider	*Sibianor aurocinctus*	Araneae	Nationally Scarce	11, 13
An anthicid beetle	*Cyclodinus constrictus*	Coleoptera	Nationally Scarce	6a
Ground-ivy Jewel Beetle	*Trachys scrobiculatus*	Coleoptera	Nationally Scarce	15
A pirate spider	*Ero aphana*	Coleoptera	Nationally Scarce	15
A tortoise beetle	*Cassida prasina*	Coleoptera	Nationally Scarce	19
A leaf beetle	*Cryptocephalus hypochaeridis*	Coleoptera	Nationally Scarce	1a, 2, 5, 10, 11, 12
A weevil	*Larinus planus*	Coleoptera	Nationally Scarce	8
Hop-garden Earwig	*Apterygida media*	Dermaptera	Nationally Scarce	13
Lesne's Earwig	*Forficula lesnei*	Dermaptera	Nationally Scarce	15
Phoenix Fly	*Dorycera graminum*	Diptera	S41; Near Threatened (Post-2001 IUCN criteria); RDB3 'rare' pre-1994.	11, 16
A stilt bug	*Berytinus hirticornis*	Hemiptera	Nationally Scarce	15

Common Name	Scientific Name	Order	UK Status	Compartment
Slender-horned Leatherbug	*Ceraleptus lividus*	Hemiptera	Nationally Scarce	2, 10
A planthopper	*Asiraca clavicornis*	Hemiptera	Nationally Scarce	6a, 11, 12, 13, 16
Sandrunner Shieldbug	*Sciocoris cursitans*	Hemiptera	Nationally Scarce	5
Four-banded Flower Bee	*Anthophora quadrimaculata*	Hymenoptera	Nationally Scarce	4
Brown-banded Carder Bee	*Bombus humilis*	Hymenoptera	S41	2, 10, 11, 12, 13
Blue Carpenter Bee	*Ceratina cyanea*	Hymenoptera	RDB3 pre-1994 criteria	3, 5, 8, 11, 13
Buff Ermine	*Spilosoma lutea*	Lepidoptera	S41 research only	12
Cinnabar	*Tyria jacobaeae*	Lepidoptera	S41 research only	6, 10, 11, 12, 13, 15, 16
Small Blue	*Cupido minimus*	Lepidoptera	S41; Near Threatened (Post-2001 IUCN criteria)	10
Small Heath	*Coenonympha pamphilus*	Lepidoptera	S41; Near Threatened (Post-2001 IUCN criteria)	2, 3, 10, 11, 13

Table EDP A10.2: Complete Terrestrial Invertebrate Species List Recorded So Far

Common Name	*Scientific Name*	Order	UK Status	Compartment Number																	
				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
Labyrinth Spider	*Agelena labyrinthica*	Araneae	Widespread			x	x															
An anyphaenid spider	*Anyphaena accentuata*	Araneae	Widespread			x							x				x	x				
An orb-web spider	*Agalenatea redii*	Araneae	Local	x					x										x			
Garden Spider	*Araneus diadematus*	Araneae	Widespread	x																		
A cucumber spider	*Araniella cucurbitina*	Araneae	Widespread			x							x					x	x			
A cucumber spider	*Araniella opisthographa*	Araneae	Widespread							x												
An orb-web spider	*Gibbaranea gibbosa*	Araneae	Widespread															x				
An orb-web spider	*Larinioides cornutus*	Araneae	Widespread	x		x														x		
An orb-web spider	*Mangora acalypha*	Araneae	Local	x		x	x				x		x		x	x	x	x	x	x		x
A clubionid spider	*Clubiona comta*	Araneae	Widespread														x	x	x	x	x	x
Diving Bell Spider	*Argyroneta aquatica*	Araneae	Local								x											
A thomisid spider	*Xysticus audax*	Araneae	Local			x	x	x	x	x	x	x	x									
A lycosid spider	*Alopecosa pulverulenta*	Araneae	Widespread												x							
A lycosid spider	*Pardosa nigriceps*	Araneae	Widespread												x							
A lycosid spider	*Pardosa pullata*	Araneae	Widespread														x				x	
A running crab spider	*Philodromus albidus*	Araneae	Local															x				
A philodromid spider	*Tibellus oblongus*	Araneae	Widespread																		x	
Nursery-web Spider	*Pisaura mirabilis*	Araneae	Widespread			x				x					x	x	x			x		
A jumping spider	*Ballus chalybeius*	Araneae	Nationally Scarce				x			x			x		x	x	x	x	x			
A jumping spider	*Heliophanus cupreus*	Araneae	Widespread							x					x			x	x		x	

Common Name	*Scientific Name*	Order	UK Status	Compartment Number																		
				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
A jumping spider	*Heliophanus flavipes*	Araneae	Widespread			x	x	x	x	x		x	x	x	x							x
A jumping spider	*Sibianor aurocinctus*	Araneae	Nationally Scarce													x		x				
A tetragnathid spider	*Tetragnatha montana*	Araneae	Widespread					x														
A thomisid spider	*Diaea dorsata*	Araneae	Local						x	x												
A crab spider	*Misumena vatia*	Araneae	Widespread				x		x	x							x		x			
A thomisid spider	*Xysticus cristatus*	Araneae	Widespread			x										x		x	x	x	x	
A thomisid spider	*Xysticus kochi*	Araneae	Local															x			x	
Fan-bearing Wood-borer	*Ptilinus pectinicornis*	Coleoptera	Widespread						x													
An anthicid beetle	*Cyclodinus constrictus*	Coleoptera	Nationally Scarce					x														
An apionid weevil	*Oxystoma pomonae*	Coleoptera	Widespread			x	x						x		x			x				
Ground-ivy Jewel Beetle	*Trachys scrobiculatus*	Coleoptera	Nationally Scarce																	x		
Raspberry Beetle	*Byturus tomentosus*	Coleoptera	Widespread														x			x		
A soldier beetle	*Cantharis decipiens*	Coleoptera	Widespread			x	x	x	x	x		x	x									
A soldier beetle	*Cantharis rustica*	Coleoptera	Widespread		x															x		
A soldier beetle	*Rhagonycha fulva*	Coleoptera	Widespread										x									
Green Tiger Beetle	*Cicindela campestris*	Coleoptera	Widespread			x									x							
A ground beetle	*Microlestes minutulus*	Coleoptera	Local						x													
A ground beetle	*Paradromius linearis*	Coleoptera	Widespread	x		x	x			x						x	x	x	x	x		
A ground beetle	*Philorhizus melanocephalus*	Coleoptera	Widespread																	x		
A ground beetle	*Platyderus depressus*	Coleoptera	Local				x															

Common Name	*Scientific Name*	Order	UK Status	Compartment Number																	
				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
A ground beetle	*Pterostichus madidus*	Coleoptera	Widespread																	x		
A ground beetle	*Syntomus foveatus*	Coleoptera	Widespread				x		x													
Golden-bloomed Grey Longhorn Beetle	*Agapanthia villosoviridescens*	Coleoptera	Widespread			x							x									
Wasp Beetle	*Clytus arietis*	Coleoptera	Widespread						x	x				x								
A pirate spider	*Ero aphana*	Coleoptera	Nationally Scarce																	x		
Common Grammoptera	*Grammoptera ruficornis*	Coleoptera	Widespread										x				x	x				
Plum Longhorn Beetle	*Tetrops praeustus*	Coleoptera	Local			x	x	x	x	x		x	x	x	x							
A tortoise beetle	*Cassida prasina*	Coleoptera	Nationally Scarce																			x
A tortoise beetle	*Cassida rubiginosa*	Coleoptera	Widespread			x																
A leaf beetle	*Cryptocephalus aureolus*	Coleoptera	Local												x	x		x		x		
A leaf beetle	*Cryptocephalus hypochaeridis*	Coleoptera	Nationally Scarce		x	x			x							x	x					
A leaf beetle	*Galeruca tanaceti*	Coleoptera	Local			x																
Two-spot Ladybird	*Adalia bipunctata*	Coleoptera	Widespread		x																	
A ladybird beetle	*Coccidula scutellata*	Coleoptera	Local																			x
Seven-spot Ladybird	*Coccinella septempunctata*	Coleoptera	Widespread	x		x	x						x		x	x		x				x
A ladybird beetle	*Nephus redtenbacheri*	Coleoptera	Widespread			x												x				
A ladybird beetle	*Platynaspis luteorubra*	Coleoptera	Nationally Scarce													x						

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				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
14-spot Ladybird	*Propylea quattuordecimpunctata*	Coleoptera	Widespread								x											
22-spot Ladybird	*Psyllobora vigintiduopunctata*	Coleoptera	Widespread			x			x									x				
A ladybird beetle	*Rhyzobius litura*	Coleoptera	Widespread				x									x	x	x	x	x		
24-spot Ladybird	*Subcoccinella 24-punctata*	Coleoptera	Widespread		x	x									x	x						
16-spot Ladybird	*Tytthaspis sedecimpunctata*	Coleoptera	Widespread			x	x			x			x		x	x		x				
Strawberry-blossom weevil	*Anthonomus rubi*	Coleoptera	Widespread														x	x		x	x	x
A broad-nosed weevil	*Exomias pellucidus*	Coleoptera	Widespread							x												
A weevil	*Larinus planus*	Coleoptera	Nationally Scarce										x									
A dasytid beetle	*Dasytes aeratus*	Coleoptera	Widespread				x													x		
A drilid beetle	*Drilus flavescens*	Coleoptera	Local				x		x													
A click beetle	*Agrypnus murinus*	Coleoptera	Widespread			x	x		x	x						x			x	x		
A malachite beetle	*Cordylepherus viridis*	Coleoptera	Local	x							x		x		x	x	x	x	x	x	x	x
A malachite beetle	*Malachius bipustulatus*	Coleoptera	Widespread				x		x							x	x	x	x		x	
Wharf Borer	*Nacerdes melanura*	Coleoptera	Local			x																
Lurid Flower Beetle	*Oedemera lurida*	Coleoptera	Widespread		x	x	x	x	x	x	x		x		x	x		x	x	x	x	x
Thick-kneed Flower Beetle	*Oedemera nobilis*	Coleoptera	Widespread	x	x	x	x	x	x	x	x		x		x	x		x	x	x	x	x
Red-headed Cardinal Beetle	*Pyrochroa serraticornis*	Coleoptera	Widespread														x					

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				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
Apple Fruit Rhynchites	*Neocoenorrhinus aequatus*	Coleoptera	Widespread			x				x			x			x	x	x		x		x
The Welsh Chafer	*Hoplia philanthus*	Coleoptera	Local						x							x						
A scirtid beetle	*Cyphon coarctatus*	Coleoptera	Widespread				x	x														
A scraptiid beetle	*Anaspis maculata*	Coleoptera	Widespread			x							x			x	x	x	x	x		
A silphid beetle	*Silpha laevigata*	Coleoptera	Local												x							
A silphid beetle	*Silpha tristis*	Coleoptera	Local												x							
A rove beetle	*Bledius spectabilis*	Coleoptera	Local								x											
A rove beetle	*Drusilla canaliculata*	Coleoptera	Widespread													x				x		
A rove beetle	*Metopsia clypeata*	Coleoptera	Widespread			x				x					x	x				x		
A darkling beetle	*Isomira murina*	Coleoptera	Local			x		x														
Hop-garden Earwig	*Apterygida media*	Dermaptera	Nationally Scarce															x				
Common Earwig	*Forficula auricularia*	Dermaptera	Widespread	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Lesne's Earwig	*Forficula lesnei*	Dermaptera	Nationally Scarce																	x		
Violet Black-legged Robberfly	*Dioctria atricapilla*	Diptera	Widespread	x		x																
Dark-edged Beefly	*Bombylius major*	Diptera	Widespread				x	x	x								x					
A hoverfly	*Chrysotoxum bicinctus*	Diptera	Widespread				x													x		
Marmalade Hoverfly	*Episyrphus balteatus*	Diptera	Widespread																			x
A hoverfly	*Helophilus pendulus*	Diptera	Widespread			x	x															
A hoverfly	*Helophilus trivittatus*	Diptera	Widespread				x															
A hoverfly	*Myathropa florea*	Diptera	Widespread													x						
A hoverfly	*Volucella bombylans*	Diptera	Widespread														x					

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Orange-belted Hoverfly	*Xylota segnis*	Diptera	Widespread			x																
A tiger cranefly	*Nephrotoma flavescens*	Diptera	Widespread				x															
Phoenix Fly	*Dorycera graminum*	Diptera	S41; Near Threatened (Post-2001 IUCN criteria); RDB3 'rare' pre-1994.													x					x	
Birch Shieldbug	*Elasmostethus interstinctus*	Hemiptera	Widespread						x													
Common Flower Bug	*Anthocoris nemorum*	Hemiptera	Widespread																	x		
A flower bug	*Cardiastethus fasciiventris*	Hemiptera	Local																	x		
A flower bug	*Orius niger*	Hemiptera														x						
Common Froghopper	*Philaenus spumarius*	Hemiptera	Widespread				x															
A stilt bug	*Berytinus hirticornis*	Hemiptera	Nationally Scarce																	x		
A leafhopper	*Agallia consobrina*	Hemiptera															x					
A leafhopper	*Agallia sp*	Hemiptera													x					x		
A leafhopper	*Athysanus argentarius*	Hemiptera	Local										x									
A leafhopper	*Eupelix cuspidata*	Hemiptera	Local			x									x	x						
A leafhopper	*Eupteryx notata*	Hemiptera																		x		
A leafhopper	*Euscelis incisus*	Hemiptera														x						x

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				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
A leafhopper	*Macustus grisescens*	Hemiptera														x						
A leafhopper	*Metidiocerus rutilans*	Hemiptera													x							
A leafhopper	*Mocydia crocea*	Hemiptera		x		x											x		x	x		
A leafhopper	*Oncopsis flavicollis*	Hemiptera						x														
A leafhopper	*Psammotettix confinis*	Hemiptera									x								x			
A leafhopper	*Psammotettix helvolus*	Hemiptera																			x	x
A leafhopper	*Zyginidia scutellaris*	Hemiptera									x								x			
A lacehopper	*Tachycixius pilosus*	Hemiptera	Widespread			x				x			x	x	x							
Slender-horned Leatherbug	*Ceraleptus lividus*	Hemiptera	Nationally Scarce			x									x			x				
Dock Bug	*Coreus marginatus*	Hemiptera	Widespread			x									x				x	x		
Denticulate Leatherbug	*Coriomeris denticulatus*	Hemiptera	Widespread				x							x				x		x	x	x
Rambur's Pied Shieldbug	*Tritomegas sexmaculatus*	Hemiptera	Recent UK colonist										x			x						
A planthopper	*Asiraca clavicornis*	Hemiptera	Nationally Scarce		x				x	x			x			x	x	x			x	
A planthopper	*Criomorphus albomarginatus*	Hemiptera													x					x		
A planthopper	*Dicranotropis hamata*	Hemiptera																		x		x
A planthopper	*Eurybregma nigrolineata*	Hemiptera											x			x			x	x		
A planthopper	*Eurysa lineata*	Hemiptera				x										x		x				
A planthopper	*Hyledelphax elegantulus*	Hemiptera													x					x		

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				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
A planthopper	*Javesella dubia*	Hemiptera															x					
A planthopper	*Javesella pellucida*	Hemiptera																	x			
A planthopper	*Stenocranus minutus*	Hemiptera														x						
A planthopper	*Issus coleoptratus*	Hemiptera	Widespread															x				
A ground bug	*Cymus glandicolor*	Hemiptera	Widespread										x									
A ground bug	*Cymus melanocephalus*	Hemiptera	Widespread				x															
Nettle Ground Bug	*Heterogaster urticae*	Hemiptera	Widespread				x						x				x					
European Clinchbug	*Ischnodemus sabuleti*	Hemiptera	Widespread	x		x	x		x	x			x			x		x				
Birch Catkin Bug	*Kleidocerys resedae*	Hemiptera	Widespread			x	x	x	x	x		x	x									
A ground bug	*Megalonotus emarginatus*	Hemiptera																				x
A ground bug	*Metapoplax ditomoides*	Hemiptera	Recent UK colonist			x													x		x	x
A ground bug	*Peritrechus geniculatus*	Hemiptera											x		x							
A ground bug	*Scolopostethus affinis*	Hemiptera	Widespread	x													x					
A ground bug	*Taphropeltus contractus*	Hemiptera					x															
A mirid bug	*Capsus ater*	Hemiptera	Widespread		x					x			x				x			x		
A plant bug	*Deraeocoris lutescens*	Hemiptera							x													
A plant bug	*Dryophilocoris flavoquadrimaculatus*	Hemiptera																			x	
A plant bug	*Grypocoris stysi*	Hemiptera															x					

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				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
A grass bug	*Notostira elongata*	Hemiptera	Widespread			x																
A mirid bug	*Pithanus maerkeli*	Hemiptera	Widespread			x																
A plant bug	*Psallus assimilis*	Hemiptera																				x
A plant bug	*Psallus sp*	Hemiptera															x					
A grass bug	*Stenodema calcarata*	Hemiptera	Widespread			x	x	x	x	x		x	x									
A grass bug	*Stenodema laevigata*	Hemiptera	Widespread	x		x							x		x	x					x	x
Tree Damselbug	*Himacerus apterus*	Hemiptera	Widespread													x						
Ant Damselbug	*Himacerus mirmicoides*	Hemiptera	Widespread			x				x						x		x	x			x
A damsel bug	*Himacerus mirmicoides*	Hemiptera																x				
A damsel bug	*Nabis rugosus*	Hemiptera															x	x	x			
Bishop's Mitre Shieldbug	*Aelia acuminata*	Hemiptera	Widespread	x		x	x		x				x		x	x		x	x			x
Hairy Shieldbug	*Dolycoris baccarum*	Hemiptera	Widespread													x					x	
Brassica Bug	*Eurydema oleracea*	Hemiptera	Widespread	x		x			x													
Woundwort Shieldbug	*Eysarcoris venustissimus*	Hemiptera	Local											x								
Common Green Shieldbug	*Palomena prasina*	Hemiptera	Widespread													x						
Gorse Shieldbug	*Piezodorus lituratus*	Hemiptera	Widespread		x																	
Turtle Shieldbug	*Podops inuncta*	Hemiptera	Local												x			x		x		
A shieldbug	*Sciocoris cursitans*	Hemiptera	Nationally Scarce NS						x													
A beet bug	*Parapiesma quadratum*	Hemiptera	Local	x																		
A rhopalid bug	*Rhopalus subrufus*	Hemiptera	Widespread													x					x	

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				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
A lace bug	*Tingis ampliata*	Hemiptera											x									
Tawny Mining Bee	*Andrena fulva*	Hymenoptera	Widespread														x					
Hairy-footed Flower Bee	*Anthophora plumipes*	Hymenoptera	Widespread														x					
Four-banded Flower Bee	*Anthophora quadrimaculata*	Hymenoptera	Nationally Scarce					x														
Honey Bee	*Apis mellifera*	Hymenoptera	Widespread										x		x	x		x		x		
Brown-banded Carder Bee	*Bombus humilis*	Hymenoptera	S41			x									x	x	x	x				
Tree Bumblebee	*Bombus hypnorum*	Hymenoptera	Widespread														x					
Large Red-tailed Bumblebee	*Bombus lapidarius*	Hymenoptera	Widespread	x	x	x	x		x						x	x	x	x	x	x	x	
Common Carder Bee	*Bombus pascuorum*	Hymenoptera	Widespread			x	x		x	x			x		x	x	x	x		x	x	
Buff-tailed Bumblebee	*Bombus terrestris (agg.)*	Hymenoptera	Widespread	x	x	x	x	x	x	x			x		x	x	x	x	x	x	x	
Vestal Cuckoo Bee	*Bombus vestalis*	Hymenoptera	Widespread						x													
Blue Carpenter Bee	*Ceratina cyanea*	Hymenoptera	RDB3 pre-1994 criteria				x		x				x			x		x				
A ruby-tailed wasp	*Pseudospiniola neglecta*	Hymenoptera	Local																	x		
A crabronid wasp	*Trypoxylon attenuatum*	Hymenoptera	Widespread			x			x													
A formicine ant	*Formica cunicularia*	Hymenoptera	Local			x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	
A formicine ant	*Formica fusca*	Hymenoptera	Widespread	x			x		x	x					x	x		x	x	x		
A formicine ant	*Lasius niger*	Hymenoptera	Widespread				x	x	x	x	x		x	x	x	x	x	x	x	x	x	x
Black Ant	*Lasius niger*	Hymenoptera	Widespread				x		x		x					x			x	x	x	
A myrmicine ant	*Myrmica sabuleti*	Hymenoptera	Widespread				x															

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A myrmicine ant	*Myrmica scabrinodis*	Hymenoptera	Widespread						x	x												
A myrmicine ant	*Tetramorium caespitum*	Hymenoptera	Local		x																	
Orange-legged Furrow Bee	*Halictus rubicundus*	Hymenoptera	Widespread				x															
Sand Digger Wasp	*Ammophila sabulosa*	Hymenoptera	Widespread				x															
A social wasp	*Dolichovespula media*	Hymenoptera	Widespread															x				
Common Wasp	*Paravespula vulgaris*	Hymenoptera	Widespread						x				x									
Common Pill Woodlouse	*Armadillidium vulgare*	Isopoda	Widespread				x									x		x		x		
Common Striped Woodlouse	*Philoscia muscorum*	Isopoda	Widespread	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Dark Elm Case-bearer	*Coleophora limosipennella*	Lepidoptera	Local					x														
Scarce Footman	*Eilema complana*	Lepidoptera	Local												x							
Burnet Companion	*Euclidia glyphica*	Lepidoptera	Widespread		x										x			x				
Buff Ermine	*Spilosoma lutea*	Lepidoptera	S41 research only														x					
Cinnabar	*Tyria jacobaeae*	Lepidoptera	S41 research only							x			x		x		x	x		x	x	
Treble Bar	*Aplocera plagiata*	Lepidoptera	Widespread				x															
Large Skipper	*Ochlodes sylvanus*	Lepidoptera	Widespread		x			x		x					x	x		x		x		
Essex Skipper	*Thymelicus flavus*	Lepidoptera	Widespread							x												
Small Skipper	*Thymelicus sylvestris*	Lepidoptera	Widespread				x		x				x		x	x	x	x	x	x		
Brown Argus	*Aricia agestis*	Lepidoptera	Widespread				x			x								x				

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Green Hairstreak	*Callophrys rubi*	Lepidoptera	Widespread																x			
Holly Blue	*Celastrina argiolus*	Lepidoptera	Widespread					x							x	x	x	x				
Small Blue	*Cupido minimus*	Lepidoptera	S41												x							
Small Copper	*Lycaena phlaeas*	Lepidoptera	Widespread												x			x				
Common Blue	*Polyommatus icarus*	Lepidoptera	Widespread				x		x	x					x	x		x	x	x	x	
Silver Y	*Autographa gamma*	Lepidoptera	Regular migrant												x	x						
Mother Shipton	*Calystegi mi*	Lepidoptera	Widespread												x			x				
Large Yellow Underwing	*Noctua pronuba*	Lepidoptera	Widespread						x													
Small Tortoiseshell	*Aglais urticae*	Lepidoptera	Widespread	x	x	x							x				x		x		x	
Ringlet	*Aphantopus hyperantus*	Lepidoptera	Widespread												x	x	x					
Small Heath	*Coenonympha pamphilus*	Lepidoptera	S41	x			x								x	x		x		x		
Peacock	*Inachis io*	Lepidoptera	Widespread			x		x		x			x				x					
Meadow Brown	*Maniola jurtina*	Lepidoptera	Widespread		x		x								x	x	x	x		x		
Marbled White	*Melanargia galathea*	Lepidoptera	Widespread													x				x		
Speckled Wood	*Pararge aegeria*	Lepidoptera	Widespread					x					x									
Comma	*Polygonia c-album*	Lepidoptera	Widespread			x											x					
Red Admiral	*Vanessa atalanta*	Lepidoptera	Widespread / partial migrant			x																
Painted Lady	*Vanessa cardui*	Lepidoptera	Regular migrant				x															

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				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
Orange Tip	*Anthocharis cardamines*	Lepidoptera	Widespread										x			x	x	x		x		
Brimstone	*Gonepteryx rhamni*	Lepidoptera	Widespread				x	x	x				x		x					x		
Large White	*Pieris brassicae*	Lepidoptera	Widespread					x	x	x			x		x	x	x	x		x		
Green-veined White	*Pieris napi*	Lepidoptera	Widespread			x																
Small White	*Pieris rapae*	Lepidoptera	Widespread	x	x	x			x	x			x		x					x		
A bagworm moth	*Psyche casta*	Lepidoptera	Widespread															x				
Twin-barred Knot-horn	*Homoeosoma sinuella*	Lepidoptera	Widespread							x												
Six-belted Clearwing	*Bembecia ichneumoniformis*	Lepidoptera	Local			x	x															
Bramble Shoot Moth	*Notocelia uddmanniana*	Lepidoptera	Widespread					x														
Southern Hawker	*Aeshna cyanea*	Odonata	Widespread	x				x														
Emperor Dragonfly	*Anax imperator*	Odonata	Widespread	x						x						x						
Azure Damselfly	*Coenagrion puella*	Odonata	Widespread					x		x	x						x			x		
Common Blue Damselfly	*Enallagma cyathigerum*	Odonata	Widespread				x	x		x	x						x					
Common Blue-tailed Damselfly	*Ischnura elegans*	Odonata	Widespread					x											x			
Broad-bodied Chaser	*Libellula depressa*	Odonata	Widespread					x												x		
Four-spotted Chaser	*Libellula quadrimaculata*	Odonata	Widespread																	x		
Black-tailed Skimmer	*Orthetrum cancellatum*	Odonata	Widespread							x	x		x		x							
Red-veined Darter	*Sympetrum fonscolombii*	Odonata	Recent UK colonist					x														

Common Name	*Scientific Name*	Order	UK Status	Compartment Number																	
				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
Common Darter	*Sympetrum striolatum*	Odonata	Widespread							x	x				x							
Lesser Marsh Grasshopper	*Chorthippus albomarginatus*	Orthoptera	Widespread		x	x							x									
Field Grasshopper	*Chorthippus brunneus*	Orthoptera	Widespread		x	x	x		x				x		x	x	x	x		x	x	
Meadow Grasshopper	*Chorthippus parallelus*	Orthoptera	Widespread		x					x	x				x	x	x	x	x	x	x	
Mottled Grasshopper	*Myrmeleotettix maculatus*	Orthoptera	Widespread				x															
Common Green Grasshopper	*Omocestus viridulus*	Orthoptera	Widespread		x																	
A leaf beetle	*Chrysolina banksi*	Orthoptera	Widespread				x															
Long-winged Conehead	*Conocephalus fuscus*	Orthoptera	Widespread		x	x				x					x	x	x		x	x		
Southern Oak Bush-cricket	*Meconema meridionale*	Orthoptera	Recent UK colonist													x						
Oak Bush-cricket	*Meconema thalassinum*	Orthoptera	Widespread													x						
Speckled Bush Cricket	*Leptophyes punctatissima*	Orthoptera	Widespread			x	x									x	x					
Slender Groundhopper	*Tetrix subulata*	Orthoptera	Widespread							x										x		
Common Groundhopper	*Tetrix undulata*	Orthoptera	Widespread	x																		
Roesel's Bush-cricket	*Metrioptera roeselii*	Orthoptera	Widespread		x	x	x								x	x		x	x	x		
Dark Bush Cricket	*Pholidoptera griseoaptera*	Orthoptera	Widespread				x	x									x					

Common Name	*Scientific Name*	Order	UK Status	Compartment Number																		
				1	1a	2	3	4	5	6a	6b	7	8	9	10	11	12	13	14	15	16	19
Great Green Bush-cricket	*Tettigonia viridissima*	Orthoptera	Local													x	x					
A psocid	*Graphosocus cruciatus*	Pscocoptera	Widespread			x							x									
Copse Snail	*Arianta arbustorum*	Stylommatophora	Widespread						x													
Wrinkled Snail	*Candidula intersecta*	Stylommatophora	Widespread				x															
White-lipped Snail	*Cepaea hortensis*	Stylommatophora	Widespread						x													
Striped Snail	*Cernuella virgata*	Stylommatophora	Widespread						x													
Common Garden Snail	*Cornu aspersum*	Stylommatophora	Widespread				x															
Kentish Snail	*Monacha cantiana*	Stylommatophora	Widespread			x	x															

A10.12 Following completion of the existing and forthcoming sample identification, the number of species is likely to increase rapidly, and it is anticipated that the overall number of species of recognised conservation value recorded will increase proportionately throughout the project. It is considered likely that the terrestrial invertebrate assemblage within the Project Site will remain of National Importance.

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Annex EDP 11
Aquatic Invertebrate Surveys

Methodology

Invertebrate Scoping Study

A11.1 An invertebrate habitat scoping study to highlight which areas of the Project Site should be prioritised for further survey was conducted during two periods; 14 to 16 April 2020, and 20 to 22 April 2020.

A11.2 The Project Site was walked and both terrestrial and aquatic habitats and habitat features with potential to support significant invertebrate assemblages/key species, target-noted, mapped and geo-referenced. Habitat was assessed in terms of topography, substrate and general vegetation composition and structure.

Detailed Invertebrate Surveys

Standing Waterbodies

A11.3 Aquatic invertebrate samples will be undertaken over two, discrete sampling events. Timing of sampling for aquatic invertebrates will occur prior to peak emergence times of target winged species with aquatic larvae such as dragonflies and damselflies (Odonata), mayflies (Ephemeroptera), etc., whilst corresponding with peak times for aquatic beetles (Coleoptera) and bugs (Hemiptera). The first sampling period took place during the May survey window alongside terrestrial sampling for collecting the first samples, with further amples from the interior of Blackduck Marsh and the CTRL mitigation ponds in July 2020, and additional sampling will be conducted alongside the corresponding August terrestrial sampling event.

Sample Site Selection and Collection of Aquatic Macroinvertebrate Samples

A11.4 The selection of sampling sites would aim to reasonably represent the heterogeneity of habitat and therefore, the aquatic macroinvertebrate fauna of the Project Site as a whole. The sample locations from standing waterbodies are shown on **Plan EDP 22**.

A11.5 Where a number of waterbodies occur on a single survey area, samples will be taken from a sufficient range of waterbodies to reasonably represent the survey area as a whole and sampling would be prioritised in waterbodies exhibiting habitat characteristics of highest potential to support aquatic macroinvertebrate assemblages of higher conservation value.

A11.6 Each aquatic invertebrate sample will be collected in accordance with Murray Bligh (1999)[73] three-minute sweep method (as used by the Environment Agency). Each sample will be collected from a sufficient range of representative meso-habitats to adequately cover the main invertebrate niches of the waterbody in question. Each sample will be timed for three minutes, the sampling time divided between representative meso-habitats and the watch stopped after each sweeping to enable the contents of the net to be deposited in the sample tray.

A11.7 Each sample will be either sorted to taxonomic order level in situ, or transferred to a sealed plastic sample pot, preserved and transported to the laboratory for washing sorting and identification.

Washing, Sorting and Identification of Samples

A11.8 If not already sorted in situ, each sample will be thoroughly washed and graded by rinsing through a series of different sized meshes[74]. Samples will then be sorted into a plastic sorting square (as standardly used by the Environment Agency).

A11.9 Samples would then be identified to family level, enabling (if required) Biological Monitoring Working Party (BMWP) and Average Score Per Taxon (ASPT) scores to be calculated for the sample, and where appropriate to species level, for the requirements of Pantheon analysis alongside terrestrial data. Where necessary, specimens will be identified using appropriate, up to date taxonomic keys, such as volumes produced by the Freshwater Biological Association and Field Studies Council (FSC). Analysis using Site Analysis for Freshwater Invertebrate Surveys (SAFIS), may also be considered if required.

Aquatic Invertebrate Sampling - River Ebbsfleet

A11.10 To assess the current biological water quality of the River Ebbsfleet, the aquatic macroinvertebrate community was sampled at four locations along the length of the Rivers Ebbsfleet, deemed to be representative of the watercourse, as illustrated at **Plan EDP 23**.

A11.11 The locations of aquatic macroinvertebrate sampling points were initially established during the River Corridor Survey. Sampling of the watercourse was undertaken on 26 May 2020 by a suitably qualified ecologist.

A11.12 At each sampling location a single three-minute kick/sweep sample was collected following the standard protocol detailed in the Environment Agency's handbook, BT00175 and in the procedure for collecting and analysing aquatic macroinvertebrate

[73] Murray-Bligh, J.A.D., Furse, M.T., Jones, F.H., Gunn, R.J.M, Dines, R.A. and Wright, J.F. (1997) Procedure for collecting and analysing macroinvertebrate samples for RIVPACS. Joint publication by the Institute of Freshwater Ecology and the Environment Agency, 162 pp.

[74] Endecotts laboratory test sieves as used by the EA used.

[75] Environment Agency (1999) *Procedures for Collecting and Analysis Macroinvertebrate Samples* (issue 2.0), Environment Agency BT001.

samples for RIVPACS[76]. Each kick/sweep sample encompassed all the in-stream habitats present at the sampling location in proportion to their occurrence over the three-minutes sampling time. Additionally, a further one-minute hand search of submerged stones, woody debris, plants and tree roots was undertaken to capture any animals that might have evaded the kick/sweep sample. Each sample was then transferred to a sealed plastic sample pot and preserved in 99% Industrial Methylated Spirit for future washing, sorting and identification.

A11.13 At each sample location, a suite of environmental parameters was recorded to in further inform an assessment including:

- Estimated surface current velocity (m/sec);
- Wetted width (m);
- Water depth (cm);
- Substratum composition (% boulders, cobbles, pebbles/gravel, sand and silt/clay across the sample location;
- Channel vegetation (% cover); and
- Flow type (riffle, runs, glides, pools, slacks) – measured across the whole sampling area.

Washing, Sorting and Identification of Samples

A11.14 Samples were washed using a 500µm sieve to separate preservative and fine silt from the retained sample fraction. Samples were then sorted into a plastic sorting square with specimens picked out from the remaining sediment. Specimens were identified to species level (or as far as possible if damaged/too small) with the aid of dichotomous keys.

A11.15 From the taxonomic data, a suite of standards biotics indices were calculated including BWMP Biological Working Monitoring Party), ASPT (Average Score per Taxon) and N-Taxa (Number of Scoring Taxa) which together provide a standard measure of biological quality and indicate background levels of organic pollution and are calculated as follows:

- BWMP relates to the pollution tolerance of an aquatic macroinvertebrate assemblage. This assigns a numerical score (from 1 to 10) to a range of aquatic macroinvertebrate families, depending on their tolerance/intolerance to organic pollution. Pollution sensitive families score more highly than pollution tolerant ones. The cumulative score of these assigned values, therefore, provides a good indication of biological water quality;

[76] Murray-Bligh, J.A.D., Furse, M.T., Jones, F.H., Gunn, R.J.M, Dines, R.A. and Wright, J.F. (1997) *Procedure for collecting and analysing macroinvertebrate samples for RIVPACS*. Joint publication by the Institute of Freshwater Ecology and the Environment Agency, 162 pp.

- Average core Per Taxon is obtained by dividing the BMWP score by the number of scoring families. The product is, therefore, independent of the taxon richness. Usually, the higher the ASPT, the more sensitive the population is to pollution. Usually, a low ASPT indicates the site is suffering from pollution; and

- Taxon richness is defined as the number of taxa (such as a given species, genus or family) recorded and provides a measure of biodiversity.

A11.16 In general, BWMP scores may be interpreted as stated within **Table EDP A11.1**.

Table EDP A11.1: Biological Water Quality Categories

BMWP Score	Category	Interpretation
0-10	Very poor	Heavily polluted
11-40	Poor	Polluted or impacted
41-70	Moderate	Moderately impacted
71-100	Good	Clean, but slightly impacted
>100	Very good	Unpolluted, unimpacted

A11.17 In addition, the Community Conservation Index (CCI) Score was then assigned to each taxon identified to evaluate the conservation value of the aquatic macroinvertebrate community (with reference to the Red Data Book (RBD) register of threatened wildlife) Identified taxa are scored from 1-10 (1 being 'very common' and 10 being endangered) as indicated within **Table EDP A11.2**.

Table EDP A11.2: Conservation Scores for Freshwater Invertebrates in Great Britain[77]

CCI Score	Definition
10	RDB1 (Endangered)
9	RDB2 (Vulnerable)
8	RDB3 (Rare)
7	Notable
6	Regionally Notable
5	Local
4	Occasional (species not in categories 10-5, which occur in up to 10% of all samples from similar habitats)
3	Frequent (species not in categories 10-5, which occur in greater than 10-25% of all samples from similar habitats)
2	Common (species not in categories 10-5, which occur in greater than 25-50% of all samples from similar habitats)
1	Very Common (species not in categories 10-5, which occur in greater than 50-100% of all samples from similar habitats)

A11.18 Following assignment of CCI scores to each appropriate species, the sum of the CSs is calculated and divided by the number of contributing species to give a mean measure of

[77] Chadd, R. and Extence, C. 2004. The conservation of freshwater macroinvertebrate populations: a community-based classification scheme. *Aquatic Conservation: Marine and Freshwater Ecosystems* 14: 597–624.

conservation value. This is then multiplied by a Community Score to give the final CCI. In general, the resultant CCI can be interpreted as within **Table EDP A11.3**.

Table A11.3: CCI Categories[78]

CCI Score	Description	Interpretation
0.0 - 5.0	Sites supporting only common species and/or community of low taxon richness	Low conservation value
>5.0-10.0	Sites supporting at least 1 species of restricted distribution and/or a community of moderate taxon richness	Moderate conservation value
>10.0-15.0	Sites supporting several uncommon species, at least one of which may be national rare and/or a community of high taxon richness	High conservation value
>20.0	Sites supporting several rarities, or at least one extreme rarity and/or a community of very high taxon richness	Very high conservation value

Results

Standing Waterbodies

A11.19 The results of the standing water body aquatic invertebrate surveys are still in progress.

River Ebbsfleet

A11.20 A summary of the biotic scores calculated for each sample location is displayed in **Table EDP A11.4** below whilst **Tables EDP A11.5** to **A11.8** present the full aquatic macroinvertebrate species lists and the resulting biotic scores for the four sites sampled during May 2020.

Table EDP A11.4: Summary Biotic Scores - May 2020.

Sample Site	BMWP	ASPT	N-Taxa	CCI Score
Site 1	47	4.7	10	1
Site 2	66	4.4	15	8.2-12.6
Site 3	56	4.67	12	4.3
Site 4	65	4.3	15	7.9

Site 1: River Ebbsfleet at Springhead Garden Centre

A11.21 The River Ebbsfleet at Section 1 is straightened, uniform section characterised by steeply sloping banks circa 3-4m with a channel substrate dominated by gravel and pebbles with occasional cobbles. In-channel vegetation is limited to patches of floating sweet grass and marginal fool's water cress. The sampling point is located downstream of a major

[78] Chadd, R. and Extence, C. 2004. The conservation of freshwater macroinvertebrate populations: a community-based classification scheme. *Aquatic Conservation: Marine and Freshwater Ecosystems* 14: 597–624.

culvert. At the time of survey water flow would sporadically increase indicating a discharge into the watercourse upstream of the sample site

A11.22 Biotic scores recorded at this site are indicative of moderate (BWMP, 47; APT 4.7) biological quality with relatively low taxon richness. Samples were largely dominated by pollution tolerant taxa, in particular water hog-louse (*Asellus aquaticus*) and non-biting midge larvae (Chironomidae), indicators of nutrient enrichment, whilst pollution sensitive species were largely absent.

A11.23 This sample site is located within an urban environment downstream of a major culvert which travels beneath the A2 dual carriageway and thus is likely to receive a number of urban discharges which may impact the biological quality of the stream. A macroinvertebrate community is, furthermore, likely to be suppressed by the limited diversity of micro-habitats and morphological features.

Site 2: River Ebbsfleet Upstream of Rail Bridge

A11.24 The watercourse at this site is circa 10m wide with limited flow, contiguous with a ponded area fringed by reed canary grass. The survey site is characterised by shallow bank sides reinforced and stablished with wire mesh. Water depth at the centre of the watercourse is circa 1.5m deep. The watercourse immediately downstream of the sample site flows beneath a rail bridge and thus is heavily shaded. Marginal vegetation is, therefore, limited although submerged water starwort is particularly abundant.

A11.25 Biotic scores at this site are indicative of moderate biological quality with a slightly greater taxon diversity recorded when compared to Site 1. ASPT is, however, relatively comparable. Samples are again dominated by pollution tolerant taxa including non-biting midge larvae. However, the pollution sensitive cased caddisfly (*Athripsodes atterimus*) was identified within the sample. The absence of in-channel diversity at this location also may limit a diverse aquatic macroinvertebrate assemblage although some species may be unrepresented due to limitations to survey effort associated with deep water.

Site 3: River Ebbsfleet at Thames Way

A11.26 The watercourse at this site is circa 4m wide and 0.4m deep with some limited. The survey site is characterised by steep bank sides circa 0.4m high. The channel substrate is dominated by gravel/pebbles with a deep layer of silt within the centre of the channel where some vegetation has established. Immediately upstream of the site the River Ebbsfleet flows through an area of woodland. Here, branched bur-reed is dominate both within the channel and also the channel margins. At the sample location, vegetation is less prolific whilst the banksides are largely bare, with no vegetation present forming a boundary between the watercourse and adjacent footpath and road.

A11.27 Biotic scores at this site are indicative of moderate biological quality and consistent with those recorded at other sample sites. The aquatic macroinvertebrate community here is similarly comparable. The cased caddisfly Limnephilus lunatus, is particularly abundant; this species is widespread and common within the British Isles and typically found in

association with slower flowing water where there is an abundance of plant material and particulate organic matter.

Site 4: River Ebbsfleet at Ebbsfleet International Station

A11.28 The watercourse at this site flows through an area of wet woodland and scrub land and as such is predominantly heavily shaded. The Site was, however, located within an open section of the watercourse and as such the banks sides are dominated by dense sedge. The channel here is circa 2m wide and 0.4 deep but with a deep sediment layer lying across the channel. This sediment is dominated by silt with a high abundance of dead gastropods and bivalves.

A11.29 Biotic scores recorded at this site are again indicative of moderate (BWMP, 47; APT 4.7) biological quality and together with Site 2 are representative of the highest BWMP score recorded within the survey area with comparably taxon richness. Although the pollution tolerant hog-louse is still relatively abundant the aquatic macroinvertebrates community is dominated by the cased caddisfly (*Limnephilus lunatus*). A relatively more diverse gastropod community was also recorded ere alongside the pollution sensitive *Athripsodes atterimus* and *Mystacides longicornis*, both relatively common and widespread species typically found in slow water waters.

Community Conservation Index

A11.30 The majority of the species recorded within the survey had a CS of one and thus clases are classed as being very common. The beetle *Ilybius quadriguttas* and lesser water boatman (*Sigara concinna*) each have a CCI score of 5 (Local). Both species have a scattered distribution across the UK although records for London and south east England are frequent.
Summary

A11.31 Overall, biotic scores recorded for the Rivers Ebbsfleet are representative of moderate water quality and subject to background pollution levels arising from surface water runoff and urban discharges from surrounding development. The watercourse is, however, heavily modified and characterised by a straightened/realigned channel with limited morphological and hydromorphological diversity, which is further likely to suppress a diverse aquatic macroinvertebrate community.

Table EDP A11.5: Sample Site 1 Aquatic Invertebrate Species List

Scientific Name	Common Name	Abundance	BMWP Score	CCI
Agabus sp.	A beetle	1	5	-
Agapetus fuscipes	A cased caddisfly	7	7	1
Agapetus sp.	A cased caddisfly	1	-	-
Asellus aquaticus	Hoglouse	140	3	1
Baetis rhodani	A mayfly	59	4	1
Ceratopogonidae	Biting midge larvae	7	-	-
Chironomidae	Non-biting midge larvae	41	2	-
Crangonyx pseudogracilis	A freshwater shrimp	13	6	1

Scientific Name	Common Name	Abundance	BMWP Score	CCI
Dytiscidae	A beetle	10	-	-
Elmis aenea	Riffle beetle	9	5	1
Glossosomatidae	Cased caddisfly	3	-	-
Limnephilidae	Cased caddisfly	1	7	-
Limnephilus lunatus	Cased caddisfly	5	-	1
Lymnaea peregra	Pond snail	1	3	1
Psychoda sp.	A fly	1	-	-
Tipula sp.	A cranefly	5	5	-

Table EDP A11.6: Sample Site 2 Aquatic Invertebrate Species List

Scientific Name	Common Name	Abundance	BMWP Score	CCI
Asellus aquaticus	Hoglouse	60	3	1
Athripsodes atterimus	Cased caddisfly	1	10	1
Baetidae	A mayfly	4	4	-
Ceratopogonidae	Biting midge larvae	1	-	-
Chironomidae	Non-biting midge larvae	550	2	-
Cloeon dipterum	A mayfly	10	-	1
Corixidae	Lesser water boatman	3	5	-
Crangonyx pseudogracilis	A freshwater shrimp	13	6	1
Daphnia sp.	Water flea	1	-	-
Dytiscidae	Great diving beetle	8	5	-
Gyraulus alba	White ramshorn snail	3	3	1
Haliplus lineatocollis	A beetle	3	5	4
Haliplus sp.	A beetle	1	-	
Hydracarina	Water mite	6	-	-
Limnephilus lunatus	Cased caddisfly	2	7	1
Lymnaea peregra	Pond snail	1	3	1
Ostracoda	Seed shrimp	1		-
Pisidium sp.	A bivalve	1	3	-
Potamopyrgus	Jenkin's spire shell	33	3	1
Sialis lutaria	An alderfly	10	4	1
Sigara dorsalis/striata	Lesser water boatman	1	-	1/7
Sigara concinna	Lesser water boatman	1	-	5
Stictotarsus	A beetle	1	-	2
Valvata cristata	A gastropod	1	3	2

Table EDP A11.7: Sample Site 3 Aquatic Invertebrate Species List

Scientific Name	Common Name	Abundance	BMWP Score	CCI
Asellus aquaticus	Hoglouse	67	3	1
Athripsodes atterimus	Cased caddisfly	3	10	1
Chironomidae	Non-biting midge larvae	370	2	-
Crangonyx pseudogracilis	A freshwater shrimp	3	6	1
Donaclinae	A beetle	3	-	
Gyrinus sp.	Whirligig beetle	1	5	
Limnphilidae	Cased caddisfly	27	7	
Limnephilus lunatus	Cased caddisfly	12	-	1
Lymnaea peregra	Pond snail	5	3	1

Scientific Name	Common Name	Abundance	BMWP Score	CCI
Notonectidae	Greater water boatman	1	5	
Pisidium sp.	A bivalve	10	3	-
Planorbis corneus	Ramshorn corneus	1	3	4
Scirtidae	A beetle	1	-	-
Sialis lutaria	An alderfly	1	4	1
Simuliidae	Blackfly	37	5	-

Table EDP A11.8: Sample Site 4 Aquatic Invertebrate Species List

Scientific Name	Common Name	Abundance	BMWP Score	CCI
Asellus aquaticus	Hoglouse	64	3	1
Athripsodes atterimus	Cased caddisfly	5	10	1
Ceratopogonidae	Biting midge larvae	1	-	-
Chironomidae	Non-biting midge larvae	46	2	-
Crangonyx pseudogracilis	A freshwater shrimp	7	6	1
Helobdella stagnalis	A leech	1	3	1
Hydropsyche siltalai	A caseless caddisfly	2	5	1
Ilybius quadriguttas	A beetle	1	5	5
Limnphilidae	A cased caddisfly	79	7	-
Limnephilus lunatus	A cased caddisfly	44	-	1
Lymnaea peregra	Pond snail	1	3	1
Limoniidae	A cranefly	1	5	-
Mystacides longicornis	A cased caddisfly	1	-	1
Physella acuta group	A gastropod	2	3	1
Pisidium sp.	A bivalve	4	3	-
Planorbis corneus	Ramshorn corneus	1	3	4
Potamopyrgus antipodarum	Jenkin's spire shell	1	3	1
Sialis lutaria	An alderfly	1	4	1
Stagnicola palustris	A gastropod	4	-	2
Succineidae	A gastropod	3	-	-

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Annex EDP 12
2012 Desk Study and Phase 1 Habitat Survey Report (CBA, 2012)

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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Desk Study and Phase I Habitat Survey Report

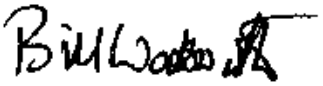
July 2012

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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Desk Study and Phase I Habitat Survey Report

Approved	 Bill Wadsworth
Position	Senior Associate (Ecology)
Date	31st July 2012
Revision	Final

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1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings (LRCH) Ltd. to undertake a series of ecological surveys to inform the design and assessment of the proposed London Paramount development at Swanscombe, North Kent.

1.1.2 This report details the results of the desk-top study undertaken in April 2012 and the Phase 1 habitat survey undertaken in May 2012.

1.2 Scope

1.2.1 The scope of the desk-top study was to identify the presence of any statutory and non-statutory designated sites and records of species of nature conservation concern (including species protected by law), both within the survey area and in the area surrounding it.

1.2.2 The scope of the Phase 1 habitat survey was to identify the habitats present within the proposed development area, to map their extent and distribution, and to identify key areas or habitats likely to be of broad nature conservation interest. Additionally, the survey also identifies the presence, or potential presence, of species protected by law or considered to be of nature conservation value through their inclusion in Biodiversity Action Plans and/or Red Data Listings.

Survey Limitations

1.2.3 Access was limited in a number of locations either due to landownership restrictions or due to health and safety considerations. The locations where access was restricted is discussed in detail in Section 4.1.

1.3 Key Findings

1.3.1 Three statutorily designated sites were identified: Baker's Hole Site of Special Scientific Interest (SSSI) and the Swanscombe Skull Site National Nature Reserve (NNR) and SSSI, both of which are designated for their geological interest. North of the River Thames, the West Thurrock Lagoon and Marshes SSSI is designated for its important assemblages of overwintering waders and wildfowl. The non-statutorily designated Alkerden Pit and Swanscombe Heritage Park Local Wildlife Site (LWS) and Ebbsfleet Marshes LWS are also present within 2km of the proposed development area.

1.3.2 A number of protected species and species of nature conservation importance have been recorded within the boundaries of the proposed development area including water vole, great crested newt, common pipistrelle, daubenton's and noctule bats. Species recorded within a 2km radius of the proposed development area include badger, soprano pipistrelle, brown-long eared and serotine bats.

1.3.3 The Phase 1 habitat survey revealed a range of different habitats within the proposed development area including woodland, scrub, grassland, swamp, open water, mudflat, saltmarsh, inland cliff and hedgerow. The dominant vegetation type was species-poor grassland with scattered scrub. This range of habitats has the potential to support notable plant species, notable invertebrate species, bats, birds, great crested newts, water voles and reptiles and it is recommended that further survey work is carried in respect of these groups.

1.3.4 Overall the most valuable habitats in the survey area from a nature conservation perspective are considered to be the more species-rich grasslands, reedbeds, mudflats, saltmarsh and open mosaic habitats on previously developed land. However, other habitats and features such as the woodland, scrub and standing water will also have value, including for example their potential to support protected species such as water voles.

1.3.5 Although it would otherwise be of relatively low value, some of the less species-rich grassland also has the potential to support a range of notable species. For example, areas of coarse grassland, especially where present with ruderal and scrub, are likely to be of value to reptiles.

2.0 METHODOLOGY

2.1 Desk-top Study

2.1.1 The desk-top study was carried out using data acquired from the Kent and Medway Biological Records Centre (KMBRC) in April 2012. Further information on designated sites and habitats was retrieved from the following websites:

- MAGIC (Multi-Agency Geographic Information for the Countryside)
- JNCC (Joint Nature Conservation Committee)
- Natural England
- K-LIS (Kent Landscape Information System)
- Kent BAP (Biodiversity Action Plan)

2.1.2 Habitat data and all species records (except bats) were received for evaluation within a 2km radius of the proposed development area. The data was filtered so that only recent records made since 1981 were considered. This made the data more relevant i.e. species recorded within the search area are more likely to still be present. The choice of year to cut the data is not arbitrary- it marks the implementation of the Wildlife and Countryside Act 1981, the main source of legal protection for animals and plants in the UK.

2.1.3 All bat records were received for evaluation within a 5km radius of the proposed development area. Again data was filtered so that only recent records made since 1981 were considered.

2.2 Phase 1 Habitat Survey

2.2.1 The proposed development area was surveyed over the course of four days on the 4th, 8th, 9th and 14th May 2012. The survey was undertaken during the optimal period for conducting Phase 1 habitat surveys (April-September). Weather conditions during the survey were good and posed no constraints to the results.

2.2.2 The survey was carried out using the methodology outlined in the 'Handbook for Phase 1 habitat survey - a technique for environmental audit'[1] to identify, map and describe the main habitats present along with their associated species. Target notes were taken on features of ecological interest and lists compiled of species of flora and fauna observed during the survey. An assessment was also made of the presence or likely presence of statutory protected species.

2.2.3 Where access was not possible in certain areas, observations were made on the surrounding habitats from public rights of way.

[1] JNCC (2010) *Handbook for Phase 1 habitat survey - a technique for environmental audit*. ISBN 0 86139 636 7

2.2.4 The results of single ecological surveys should be regarded as a summary of the site at a particular point in time. Surveys are often limited by the seasonal presence of many species, their mobility and difficulties associated with detection. Additional surveys have been recommended where the likelihood of protected species and species of conservation importance occurring is considered to be high.

3.0 RESULTS

3.1 Desk-top Study

Designated Sites and Habitats

Sites of Special Scientific Interest (SSSI)

3.1.1 Sites of Special Scientific Interest (SSSIs) are notified under the Wildlife and Countryside Act 1981 as being of "special interest for nature conservation". They receive statutory protection and it is an offence for anyone to intentionally or recklessly damage, or destroy, the flora, fauna, physiological or geological features of a SSSI.

3.1.2 Bakers Hole SSSI (TQ 612741) is a 6.5ha key Pleistocene site exposing various periglacial and temperate climate deposits. As a geological or earth science SSSI, it has been chosen for its research value. The site is located close to Ebbsfleet International Rail Station.

3.1.3 Located approximately 0.6km south-west of the proposed development area is another geological SSSI, Swanscombe Skull Site (TQ 597743). This 3.9ha site is nationally important as the only site to yield Lower Palaeolithic human remains. For this reason it is also designated a National Nature Reserve (NNR). NNRs are statutory reserves established under the Wildlife and Countryside Act 1981.

3.1.4 On the opposite side of the River Thames in Essex, approximately 1.2km north-west of the proposed development area is West Thurrock lagoon and marshes (TQ 585766). This 66.98ha site is a biological SSSI important for wintering wildfowl and waders. It features extensive intertidal mudflats and large areas of reedbed.

Local Wildlife Sites (LWS)

3.1.5 Local Wildlife Sites (LWSs) are considered important for the conservation of wildlife at a county level but have no statutory protection. They may support habitats or species considered to be of nature conservation value within a local context.

3.1.6 Ebbsfleet Marshes LWS (TQ 619738) is located close to Ebbsfleet International Rail Station. Habitats include grassland, marsh, scrub, the River Ebbsfleet and a large flooded quarry to the north east known as 'blue lake'. This site was first notified in 1985 and since then the Channel Tunnel Rail Link (CTRL) has been constructed with associated car parking, causing severe fragmentation and development of the site. This is likely to have decreased its value and some of the habitats and species quoted in the original citation may no longer be present.

3.1.7 Another LWS, Alkerden Pit (TQ 597745), is located immediately south of the proposed development area below the railway line, A226 and Swanscombe Marshes. Habitats include grassland, scrub, woodland and an inland cliff. The site was mainly designated for supporting nationally and county scarce plant species including narrow-leaved everlasting pea *Lathyrus sylvestris,* a relict population of yellow vetchling *Lathyrus aphaca* and the county's largest population of green-flowered helleborine *Epipactis phyllanthes*. An area of former landfill on the site is also known to support a rare assemblage of invertebrates including at least one UK Biodiversity Action Plan (BAP) species.

Country Parks

3.1.8 Alkerden Pit and Swanscombe Skull Site also overlap with Swanscombe Heritage Park. Country parks are recognised as providing a wide range of opportunities for education, health and recreation and improving the quality of life for local communities.

UK Biodiversity Action Plan (BAP) Priority Habitats

3.1.9 The following UK Biodiversity Action Plan (BAP) priority habitats occur within the proposed development area:

- Coastal saltmarsh – provides habitat for wintering and passage waterfowl and waders and nationally important for specialist invertebrates;
- Grazing marsh – provides habitat for wintering wildfowl and waders. It can support a range of invertebrates and plants and is also of particular importance for the water vole *Arvicola amphibious;*
- Inland rock – provides habitat for specialist invertebrates, mosses, lichens and liverworts;
- Mudflats – provides habitat for waders and wildfowl;
- Reedbeds – associated with a range of breeding bird species;
- Hedgerows – provide linkages within the wider landscape and support species dispersal and foraging activity; and,
- Open mosaic habitats on previously developed land - a new priority habitat recognised for its unusual plant assemblage and species-rich invertebrate fauna. It is also important for certain species of bird such as the skylark *Alauda arvensis* and grey partridge *Perdix perdix*. This habitat is defined by its known history of disturbance, early successional vegetation, bare substrate and spatial variation.

Species

Botany

3.1.10 A number of scarce or rare plant, lichen and fungi species were revealed within a 2km radius of the proposed development area. Their status, legal protection, and the number of records with a date range for each species is summarised in **Table 1.**

Table 1 Notable Plant Species within a 2km Radius (including lower plants, lichens and fungi)
UK BAP = UK Biodiversity Action Plan priority species; **NERC** = Natural Environment and Rural Communities Act 2006 (Section 41: Species of Principal Importance in England); **RDB(1/2/3)** = National Red Data Book species (Endangered/Vulnerable/Rare); **NR** = Nationally Rare; **NS** = Nationally Scarce; **KRDB(1/2/3)** = Kent Red Data Book species (Endangered/Vulnerable/Rare); **HD (V)** = Habitats Directive (Annex V); **WCA (8)** = Wildlife and Countryside Act 1981 (Schedule 8); **CROW** = Countryside and Rights of Way Act 2000; **CITES** = Convention on International Trade in Endangered Species of Wild Flora and Fauna

Common Name	Scientific Name	Status	Legal Protection	Number of records
Annual knawel	*Scleranthus annuus*	UK BAP; NERC; RDB1		1 (1997)
Bird's-nest	*Monotropa hypopitys*	UK BAP; NERC; RDB1		1 (1994)
Bitter webcap	*Cortinarius infractus*	RDB2; KRDB3		1 (2010)
Bluebell	*Hyacinthoides non-scripta*		WCA (8)	5 (1999-2010)
Borrer's saltmarsh-grass	*Puccinellia fasciculata*	UK BAP; NERC; RDB2; NS		7 (1992-2001)
Box	*Buxus sempervirens*	NR; KRDB2		2 (1985-2002)
Bryophyte	*Herzogiella seligeri*	NS; KRDB1		1 (1986)
Bryophyte	*Seligeria calcarea*	KRDB2		1 (2001)
Butcher's-broom	*Ruscus aculeatus*		HD (V)	6 (1996-2010)
Cornflower	*Centaurea cyanus*	UK BAP; NERC; KRDB1		6 (1982-1999)
Cypress spurge	*Euphorbia cyparissias*	KRDB2		1 (2000)
Divided sedge	*Carex divisa*	UK BAP; NERC; RDB2; NS		6 (1992-2011)
Eyebright	*Euphrasia anglica x micrantha*	UK BAP; NERC; RDB1		1 (1996)
Fungi	*Coriolopsis gallica*	KRDB3		1 (2007)
Fungi	*Cortinarius aureoturbinatus*	KRDB1		1 (2000)
Fungi	*Cortinarius osmophorus*	RDB2; KRDB1		2 (2010)
Fungi	*Cortinarius rufo-olivaceus*	RDB2; KRDB2		2 (2000-2010)
Fungi	*Cortinarius sodagnitus*	RDB2; KRDB1		1 (2000)
Fungi	*Lactarius mairei*	KRDB1		1 (2000)
Fungi	*Lactarius zonarius*	KRDB1		1 (2010)
Fungi	*Mycena*	KRDB1		1 (2010)

Common Name	Scientific Name	Status	Legal Protection	Number of records
	corynephora			
Fungi	*Mycena pseudocorticola*	KRDB1		1 (2010)
Fungi	*Sarcoscypha austriaca*	KRDB3		1 (2007)
Fungi	*Sowerbyella radiculata*	RDB3; KRDB2		1 (2000)
Giant funnel-cap	*Leucopaxillus giganteus*	KRDB2		1 (2000)
Gilded bolete	*Aureoboletus gentilis*	KRDB1		1 (2010)
Gilded brittlegill	*Russula aurea*	RDB2; KRDB1		3 (2000-2010)
Golden dock	*Rumex maritimus*	KRDB3		1 (2000)
Golden gilled bolete	*Phylloporus rhodoxanthus*	KRDB2		2 (2000-2010)
Green-flowered helleborine	*Epipactis phyllanthes*	NS; KRDB1	CITES	8 (1999-2010)
Heath dog-violet	*Viola canina subsp. canina*	KRDB1		1 (1987)
Hemisphaeric liverwort	*Reboulia hemisphaerica*	KRDB2		1 (1986)
Hoary cinquefoil	*Potentilla argentea*	KRDB3		1 (1997)
Italian catchfly	*Silene italica*	RDB2; KRDB1		3 (1994-2011)
Knapweed broomrape	*Orobanche elatior*	KRDB3		2 (2001)
Large White-moss	*Leucobryum glaucum*		HD (V)	1 (1986)
Lichen	*Peltigera rufescens*	KRDB1		1 (2003)
Lichen	*Pleurosticta acetabulum*	KRDB3		1 (2000)
Man orchid	*Orchis anthropophora*	UK BAP; NERC; RDB1; NS	CITES	5 (1998-2001)
Marsh helleborine	*Epipactis palustris*	KRDB2	CITES	1 (1999)
Mat-grass fescue	*Vulpia unilateralis*	NS; KRDB3		3 (1999-2001)
Pale St.John's-wort	*Hypericum montanum*	KRDB2		2 (1983-1984)
Pennyroyal	*Mentha pulegium*	UK BAP; NERC; RDB1; NS	WCA(8); CROW	1 (1999)
Petty whin	*Genista anglica*	KRDB1		2 (1981-1991)
Round-leaved wintergreen	*Pyrola rotundifolia*	NS; KRDB3		11 (1996-2010)
Sea barley	*Hordeum marinum*	UK BAP; NERC; RDB2; NS		1 (2004)
Slender hare's-ear	*Bupleurum tenuissimum*	UK BAP; NERC; RDB2; NS		2 (1995-1999)
Splendid webcap	*Cortinarius splendens*	RDB2; KRDB1		1 (2000)
Tiered tooth	*Hericium cirrhatum*	RDB2; KRDB1		1 (2000)
Townsend's	*Spartina maritima x*	UK BAP; NS;		1 (2001)

Common Name	Scientific Name	Status	Legal Protection	Number of records
cord-grass	*alterniflora = S. x townsendii*	KRDB1		
Verdigris navel	*Arrhenia chlorocyanea*	RDB3; KRDB1		1 (1998)
Wintergreen	*Pyrola rotundifolia subsp. maritima*	NS; KRDB3		5 (1984-2003)

Mammals

3.1.11 3 records of badger *Meles meles* were received within a 2km radius of the proposed development area. The most recent record made in 2008 is located approximately 1.4km south-east of the proposed development area. Although not rare, the badger has historically suffered from persecution and is therefore protected under the Bern Convention (Appendix III) and the Protection of Badgers Act 1992. Under the act it is an offence to kill, injure or take a badger or interfere with a sett which includes damaging it, destroying it or obstructing an entrance.

3.1.12 11 records of water vole (1996-2002) were received within the search area. Most of these were made in Swanscombe Marshes which mainly fall outside the boundaries of the proposed development area. This species has suffered severe declines in recent years due to a loss of habitat and predation by the American mink *Mustela vison*. For these reasons it is listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006) protected under the Wildlife and Countryside Act 1981 (Schedule 5) and the Countryside and Rights of Way Act 2000. It is also a UK BAP and Kent Red Data Book species.

3.1.13 Three records of hedgehog *Erinaceus europaeus* were received within the search area, the most recent made in 2000 is located approximately 0.8km south-east of the site. Due to population declines the hedgehog is listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006) and a UK BAP species.

3.1.14 Nine species of bat have been recorded within a 5km radius of the proposed development area; Serotine, Daubenton's, Whiskered, Natterer's, Leisler's, Noctule, 45kHz Pipistrelle, 55kHz Pipistrelle and Brown long-eared. Their status and the number of records for each species is summarised in **Table 2**. The distance to the nearest record and its date are also given.

All species of bat and their roosts are protected under the Wildlife and Countryside Act 1981 (Schedule 5), the Habitats Directive (Annex IV), the Bern Convention (Annex II) and the Bonn Convention (Annex II).

Table 2 Bat Species within a 5km Radius

KRDB(1/2/3) = Kent Red Data Book Species (Endangered/Vulnerable/Rare); **NERC** = Natural Environment and Rural Communities Act 2006 (Section 41: Species of Principal Importance in England); **UK BAP** = UK Biodiversity Action Plan Priority Species

Common Name	Scientific Name	Status	Number of records		Distance to nearest record
			Non-roost	Roost	
Common Pipistrelle (45kHz)	*Pipistrellus pipistrellus*		16	4	Within proposed development area (2002)
Soprano Pipistrelle (55kHz)	*Pipistrellus pygmaeus*	NERC;UK BAP	7	0	0.2km (1999)
Brown long-eared	*Plecotus auritus*	KRDB2;NERC; UK BAP	2	19	0.2km (2000)
Daubenton's	*Myotis daubentonii*		3	38	Within proposed development area (2002)
Leisler's	*Nyctalus leisleri*	KRDB1	1	0	3.9km (2008)
Natterer's	*Myotis nattereri*	KRDB2	1	22	2.5km (1984)
Noctule	*Nyctalus noctula*	KRDB2;NERC; UK BAP	5	1	Within proposed development area (2011)
Serotine	*Eptesicus serotinus*	KRDB3	2	0	0.2km (1999)
Whiskered	*Myotis mystacinus*	KRDB1	0	3	3.6km (1986)

Herptiles

3.1.15 12 records of great crested newt *Triturus cristatus* were received within a 2km radius of the proposed development area. Four of these are located within the boundaries, mainly to the south and east in Ebbsfleet Valley and Bamber Pit. Records made outside the proposed development area are located further south and east of the site. The most recent of these was in 2001 however the majority of the records were made in the 1980s. The great crested newt is afforded full legal protection under the Wildlife and Countryside Act 1981 (Schedule 5), the Bern Convention (Appendix II), the Habitats Directive (Annex II) and the Countryside and Rights of Way Act 2000. It is also listed as a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006) and a UK BAP species. Britain is a stronghold for populations of the great crested newt and has a special responsibility for its conservation.

3.1.16 Four other species of amphibian have been recorded within the search area; palmate newt *Lissotriton helveticus,* smooth newt *Lissotriton vulgaris,* common toad *Bufo bufo* and common frog *Rana temporaria*. All of these species are protected under the Wildlife and Countryside Act 1981 (Schedule 5) with respect to sale only and the Bern Convention (Appendix III). In addition

the common toad is a Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006) and a UK BAP species. The number of records for each species and the date range is listed below:

- Palmate newt 8 (1984-2003)
- Smooth newt 15 (1984-2007)
- Common toad 4 (1993-2009)
- Common frog 4 (1991-2007)

Of these species, only the smooth newt and common toad have been recorded within the boundaries of the proposed development area.

3.1.17 Three species of reptile were recorded in the search area; slow-worm *Anguis fragilis,* common lizard *Zootoca vivipara* and grass snake *Natrix natrix*. All of these species are protected under the Wildlife and Countryside Act 1981 (Schedule 5) and the Bern Convention (Appendix III) against intentional killing or injury. Due to substantial declines they are also listed as Species of Principal Importance in England (Section 41: Natural Environment and Rural Communities Act 2006) and UK BAP species. The number of records for each species and the date range is listed below:

- Slow-worm 6 (1986-2002)
- Common lizard 55 (1985-2009)
- Grass snake 10 (1984-2008)

All three of these species have been recorded within the boundaries of the proposed development area.

Birds

3.1.18 All British bird species, their eggs and nests are protected under the Wildlife and Countryside Act 1981. However there is some additional protection for species considered rare or important in Britain, particularly those listed on schedule 1 of the Wildlife and Countryside Act 1981 which are protected by species penalties. A number of notable bird species were recorded within a 2km radius of the proposed development area. Their status, additional legal protection, and the number of records (with the date of the most recent record) for each species is summarised in **Table 3**. Further details on the criteria for assigning birds to the different status categories are provided in **Appendix D**.

Table 3 Notable Bird Species within a 2km Radius

Red/Amber List = Birds of Conservation Concern – Red/Amber List Species; **NERC** = Natural Environment and Rural Communities Act 2006 (Section 41: Species of Principal Importance in England); **UK BAP** = UK Biodiversity Action Plan Priority Species; **KRDB(1/2/3)** = Kent Red Data Book Species (Endangered/Vulnerable/Rare); **Bern (II)** = Bern Convention (Annex II); a; **WCA (I)** = Wildlife and Countryside Act 1981 (Schedule 1 Species)

Common Name	Scientific Name	Status	Legal Protection[2]	Number of records
Arctic tern	*Sterna paradisaea*	Amber list	Bern(II); BD(I)	8 (2008)
Avocet	*Recurvirostra avosetta*	Amber list; KRDB3	Bern(II); BD(I); WCA(I)	5 (2004)
Barn owl	*Tyto alba*	Amber list	Bern(II); WCA(I)	3 (2005)
Bar-tailed godwit	*Limosa lapponica*	Amber list	BD(I)	2 (1995)
Bearded tit	*Panurus biarmicus*	Amber list; KRDB3	Bern(II); WCA(I)	14 (2010)
Black redstart	*Phoenicurus ochruros*	Amber list; KRDB1	Bern(II); WCA(I)	1 (2010)
Black tern	*Chlidonias niger*	Amber list	Bern(II); BD(I); WCA(I)	10 (2008)
Black-tailed godwit	*Limosa limosa*	UK BAP; Red list; NERC; KRDB1	WCA(I)	47 (2010)
Brambling	*Fringilla montifringilla*		WCA(I)	3 (2008)
Cetti's warbler	*Cettia cetti*	KRDB1	Bern(II); WCA(I)	76 (2011)
Common crossbill	*Loxia curvirostra*		Bern(II); WCA(I)	2 (2008)
Common scoter	*Melanitta nigra*	UK BAP; Red list; NERC	WCA(I)	3 (2003)
Common tern	*Sterna hirundo*	Amber list	Bern(II); BD(I)	34 (2009)
Dartford warbler	*Sylvia undata*	Amber list	Bern(II); BD(I); WCA(I)	7 (2008)
Dunlin	*Calidris alpina*	Red list	Bern (II); BD(I)	53 (2010)
Fieldfare	*Turdus pilaris*	Red list	WCA(I)	35 (2009)
Firecrest	*Regulus ignicapillus*	Amber list; KRDB1	Bern(II); WCA(I)	1 (2008)
Garganey	*Anas querquedula*	Amber list; KRDB1	WCA(I)	3 (1995)
Goldeneye	*Bucephala clangula*	Amber list	WCA(I)	5 (2004)
Great northern diver	*Gavia immer*	Amber list	Bern(II); BD(I); WCA(I)	2 (1985)
Green sandpiper	*Tringa ochropus*	Amber list	Bern(II); WCA(I)	110 (2010)
Greenshank	*Tringa nebularia*		WCA(I)	4 (2009)
Hen harrier	*Circus cyaneus*	Red list; NERC	BD(I); WCA(I)	2 (1997)
Hobby	*Falco subbuteo*	KRDB3	Bern(II); WCA(I)	20 (2009)
Kingfisher	*Alcedo atthis*	Amber list	Bern(II); BD(I); WCA(I)	50 (2010)
Leach's petrel	*Oceanodroma leucorhoa*	Amber list	Bern(II); BD(I); WCA(I)	3 (2003)
Little egret	*Egretta garzetta*	Amber list	Bern(II); BD(I)	50 (2010)

[2] The provisions of the Birds Directive are implemented in the UK through the Conservation of Habitats and Species Regulations 2010 and the Wildlife and Countryside Act 1981.

Common Name	Scientific Name	Status	Legal Protection[2]	Number of records
Little gull	*Larus minutus*	Amber list	Bern(II); BD(I); WCA(I)	27 (2007)
Little ringed plover	*Charadrius dubius*	KRDB1	Bern(II); WCA(I)	26 (2010)
Marsh harrier	*Circus aeruginosus*	Amber list; KRDB1	BD(I); WCA(I)	5 (2010)
Mediterranean gull	*Larus melanocephalus*	Amber list; KRDB1	Bern(II); BD(I); WCA(I)	15 (2010)
Merlin	*Falco columbarius*	Amber list	Bern(II); BD(I); WCA(I)	2 (2003)
Peregrine	*Falco peregrinus*	KRDB1	Bern(II); BD(I); WCA(I)	27 (2010)
Pintail	*Anas acuta*	Amber list; KRDB3	WCA(I)	8 (2001)
Quail	*Coturnix coturnix*	Amber list; KRDB1	WCA(I)	2 (1992)
Red kite	*Milvus milvus*	Amber list	BD(I); WCA(I)	5 (2010)
Red-throated diver	*Gavia stellata*	Amber list; KRDB3	Bern(II); BD(I); WCA(I)	3 (2002)
Redwing	*Turdus iliacus*	Red list	WCA(I)	20 (2010)
Ruddy Shelduck	*Tadorna ferruginea*		Bern(II); BD(I);	3 (1997)
Ruff	*Philomachus pugnax*	Red list	BD(I); WCA(I)	4 (2000)
Sandwich tern	*Sterna sandvicensis*	Amber list; KRDB3	Bern(II); BD(I)	16 (2008)
Scaup	*Aythya marila*	UK BAP; Red list; NERC	WCA(I)	19 (2001)
Short-eared owl	*Asio flammeus*	Amber list; KRDB1	Bern(II); BD(I)	6 (2003)
Slavonian grebe	*Podiceps auritus*	Amber list	Bern(II); BD(I); WCA(I)	1 (2004)
Smew	*Mergus albellus*	Amber list	Bern(II); BD(I)	2 (2010)
Snow bunting	*Plectrophenax nivalis*	Amber list	Bern(II); WCA(I)	1 (2002)
Whimbrel	*Numenius phaeopus*	Red list	WCA(I)	20 (2009)

3.1.19 In addition to the birds listed above there were a further 57 listed solely under the Bern Convention, Appendix II. The convention places a particular emphasis on migratory species and listed fauna are required to be protected from disturbance, killing, capture, damage or destruction of nesting sites, taking of eggs and trading.

Invertebrates

3.1.20 Approximately 30 species of rare or scarce invertebrate have been described within a 2km radius of the proposed development area. The number of species within each of the relevant status categories is given below. Further details on the criteria for assigning invertebrate species to the different status categories are provided in **Appendix C**.

- National Red Data Book 1 – Endangered 2
- National Red Data Book 3 – Rare 11
- National Red Data Book K – Insufficiently known 2
- National Red Data Book X – Believed extinct 1[3]

- Nationally Notable 1

- Nationally Notable B 1

- Kent Red Data Book 1 – Endangered 5
- Kent Red Data Book 2 – Vulnerable 7
- Kent Red Data Book 3 – Rare 5
- Kent Red Data Book 4 (flies only) 1

- UK BAP 29

It should be noted that many of the above categories overlap, for example a National Red Data book species might also be a Kent Red Data Book species and be a UK Biodiversity Action Plan priority species too.

Invasive Species

3.1.21 Outlined in **Table 4** are a number of invasive alien species that have been recorded within a 2km radius of the proposed development area. Their name, status and number of records with the date of the most recent record are given. These are non-native species which pose a threat to the UK's native fauna and flora. Legal frameworks and policies such as the Convention on the Conservation of European Wildlife and Natural Habitats (1979) require that contracting parties shall prevent the introduction of non-native species, control or eradicate them where appropriate. Section 14 of the Wildlife and Countryside Act (1981) makes it illegal to release into the wild, allow to escape or grow any non-native species of animal or plant listed in schedule 9 (parts 1 and 2).

[3] A parasitic fly *Litophasia hyalipennis* recorded from Sussex in 1887 was believed extinct until rediscovered at Northfleet, Kent in 1987. Essex Field Club (2012) *Species Account for Litophasia hyalipennis*. Available at <www.essexfieldclub.org.uk> Accessed 28 May 2012

Table 4 Invasive Species within a 2km Radius

WCA(9) = Wildlife and Countryside Act 1981 (Schedule 9 species)

Common Name	Scientific Name	Status	Number of records
Plants			
Canadian waterweed	*Elodea canadensis*	WCA(9)	1 (1999)
Curly waterweed	*Lagarosiphon major*	WCA(9)	2 (1998)
Dutch rose	*Rosa 'hollandica'*		1 (1997)
False acacia	*Robinia pseudoacacia*	WCA(9)	1 (1999)
False Virginia-creeper	*Parthenocissus inserta*	WCA(9)	1 (2011)
Himalayan cotoneaster	*Cotoneaster simonsii*	WCA(9)	4 (2010)
Hollyberry cotoneaster	*Cotoneaster bullatus*	WCA(9)	1 (1994)
Indian balsam	*Impatiens glandulifera*	WCA(9)	1 (1999)
Japanese knotweed	*Fallopia japonica*	WCA(9)	8 (2011)
Japanese rose	*Rosa rugosa*	WCA(9)	2 (2011)
New Zealand pigmyweed	*Crassula helmsii*	WCA(9)	1 (1996)
Nuttall's waterweed	*Elodea nuttallii*	WCA(9)	1 (2009)
Red valerian	*Centranthus ruber*		13 (2011)
Small-leaved cotoneaster	*Cotoneaster integrifolius*	WCA(9)	1 (1999)
Wall cotoneaster	*Cotoneaster horizontalis*	WCA(9)	3 (2011)
Winter heliotrope	*Petasites fragrans*		1 (1999)
Invertebrates			
Lily beetle	*Lilioceris lilii*		2 (2004)

3.2 Phase 1 Habitat Survey

3.2.1 The Phase I Habitat Survey Maps (**Figures 1a-f**) illustrate the distribution and extent of habitats present within the survey area and shows the locations of Target Notes (TNs), which highlight features of ecological interest, or provide further information on the habitats or species present. Details of the Target Notes are listed in **Table 5**.

Habitats

3.2.2 The following habitats and features were identified in the survey area and are discussed in more detail below:

- Broadleaved semi-natural woodland – A1.1.1
- Broadleaved plantation woodland – A.1.1.2
- Dense scrub – A2.1
- Scattered scrub – A2.2
- Semi-improved neutral grassland – B2.2
- Marshy grassland – B5
- Poor semi-improved grassland – B6
- Tall ruderal – C3.1
- Swamp – F1
- Standing water – G1
- Intertidal mudflat – H1.1
- Saltmarsh – H2
- Inland cliff (basic) – I1.1.2
- Ephemeral/short perennial – J1.3
- Defunct species-poor hedgerow – J2.2.2
- Dry ditch – J2.6
- Bare ground – J4

Woodland and Trees

Semi-natural broadleaved woodland (A1.1.1)

3.2.3 Overall the amount of woodland in the proposed development area is very small. All is likely to have arisen as a result of natural succession from scrub caused by a lack of active management. The only appreciable area of woodland is located along the southern boundary of Black Duck marsh at **TN1**. This area is approximately 2 ha in size and has developed on a strip of land with steep and uneven topography. The canopy is dominated by sycamore *Acer pseudoplatanus* with a dense and more varied shrub layer consisting of dogwood *Cornus sanguinea*, privet *Ligustrum vulgare*, ash *Fraxinus excelsior* and hawthorn *Crataegus monogyna*. The ground flora is covered almost uniformly with ivy *Hedera helix* with occasional cleavers *Galium aparine* and limited other forbs.

3.2.4 An old badger hole was found in the woodland (**TN36**) but it appears to have been abandoned for a long time and there were no other signs of badgers being present. Some of the trees have bat roost potential with dense ivy and woodpecker holes.

3.2.5 There is a small area of woodland located in a former quarry pit at **TN43** that has recently succeeded from scrub and has a different character from the other woodland in the proposed development area**.** The canopy is dominated by even-aged stands of silver birch *Betula pendula* rather than the sycamore which characterises the other woodland areas.

Broadleaved Plantation woodland (A1.1.2)

3.2.6 Several small strips of land on the peninsula have been planted with broadleaved trees for amenity or shelter. They are all less than 30 years old and do not exceed 20m in width. Most of the woodland strips are composed of a limited number of species with frequent sycamore, field maple *Acer campestre* and Norway maple *Acer platanoides*. At the north end of the survey area there is a line of planted trees where many have died and are being replaced by a naturally colonised scrub understory. The dominant species include hawthorn, dogwood and gorse *Ulex europaeus*.

Scrub

Dense scrub (A2.1)

3.2.7 Dense scrub represents the final stage in the succession to broadleaved woodland and occurs in areas where scrub has invaded open ground and formed a closed canopy. It is found frequently across the whole survey area due to a lack of habitat management.

3.2.8 The main areas of dense scrub include:

- to the east of Swanscombe marshes where a large area of scrub has enclosed two drainage ditches;
- to the east of Botany marshes featuring in a large area of semi-improved grassland with scattered scrub;
- within the former quarry pit at **TN43** forming a gradient between the woodland and semi-improved grassland with scattered scrub;
- to the south of the former quarry at **TN42,** lining the top of the inland cliff that has been created;
- to the south of the Ebbsfleet International car parks enclosing a small area of swamp.

3.2.9 Hawthorn, dog rose *Rosa canina*, birch and willow *Salix spp.* are the most numerous species. Willow tends to occur in the damper areas such as dense scrub that surrounds areas of swamp.

3.2.10 This habitat provides a valuable nesting and foraging site for many species of warbler including nightingale *Luscinia megarhynchos*, cetti's warbler, whitethroat *Sylvia communis*, chiffchaff *Phylloscopus collybita* and blackcap *Sylvia atricapilla*.

Scattered scrub (A2.2)

3.2.11 Scattered scrub is ubiquitous throughout the proposed development area, often present in a close mosaic with grassland and ruderal vegetation and forming a successional stage between open ground and woodland. The most frequent components are hawthorn, dog rose and bramble *Rubus fruticosus*. Buddleia *Buddleia davidii* colonises bare areas of hard standing and willow is abundant on damper areas of the site such as on Black Duck marshes.

3.2.12 Scattered scrub in combination with grassland is a valuable habitat for breeding birds, reptiles and invertebrates. Common lizard *Zootoca vivipara* are likely to thrive in the proposed development area and several individuals were seen during the habitat survey in the areas of grassland with scattered scrub.

Grassland

3.2.13 Grassland is the most dominant habitat type in the survey area, the majority of which has developed naturally on bare ground as a result of lack of management. All of the grassland has been classed as semi-improved, as it neither shows signs of improvement (such as fertiliser application, re-seeding and drainage) nor has the high species diversity of unimproved grassland.

3.2.14 The underlying geology of the peninsula is Seaford and Newhaven chalk formation but this is overlain by alluvial clay deposits and none of the sward shows the plant assemblage characterising rich calcareous grassland. However there are some species present indicative of slightly chalky soils such as wild marjoram *Origanum vulgare*, hoary ragwort *Senecio erucifolius*, wild carrot *Daucus carota* and red clover *Trifolium pratense*.

Marshy Grassland (B5)

3.2.15 The area of land immediately south of the CTRL (**TN40**) exhibited some traits of marshy grassland. An area of standing water inter-mixed with both hard and soft rush *Juncus inflexus* and *Juncus effuses*, false fox sedge *Carex otrubae*, great willowherb *Epilobium hirsutum* and common fleabane *Pulicaria dysenterica*.

Poor semi-improved grassland (B6)

3.2.16 The majority of grassland in the survey area was classified as species-poor. The sward is tall, rank and dominated by a few competitive grasses indicative of a lack of grazing and mowing including cock's foot *Dactylis glomerata*, couch grass *Elytrigia repens*, red fescue *Festuca rubra* and false oat grass *Arrhenatherum elatius*. Most of the grassland also contains scattered scrub. Such areas have a low diversity of forbs, mainly restricted to those species able to compete with tall grasses such as tall melilot *Melilotus altissimus*, common vetch *Vicia sativa* and ribwort plantain *Plantago lanceolata*.

Semi-improved neutral grassland (B2.2)

3.2.17 On less fertile, free-draining land such as on banks or on grassland at an early stage of succession the dominance of tall competitive grasses is reduced, enabling a higher diversity of flowering plants. The resulting sward is moderately species-rich and has been classified as neutral semi-improved grassland. Across the survey area there are small patches of this grassland and much of it was too limited in extent to map accurately. The two main areas with a moderately species-rich sward occur on the flood banks of the River Thames at **TN13** and in a small strip to the north of the site at **TN18**.

3.2.18 The flood bank grassland (**TN13**) has a short (<20cm) sward comprising red fescue and a variety of forbs including bird's-foot trefoil *Lotus corniculatus*, red clover, common vetch, meadow vetchling *Lathyris pratensis*, yellow vetchling *Lathyrus aphaca*, rough hawkbit *Leontodon hispidus* and ox-eye daisy *Leucanthemum vulgare*. It appears to be managed by mowing.

3.2.19 The small area of grassland at **TN18** also features red fescue as the dominant grass with a wide range of forbs (some indicative of slightly calcareous soil) in common with the grassland on the flood banks. In addition wild marjoram, hoary ragwort, common knapweed *Centaurea nigra*, tufted vetch *Vicia cracca* and wild carrot are also present. The mosaic of short and tall swards and the scattered scrub could support a wide range of invertebrates.

3.2.20 Botany Marshes is an area consisting of several wet grassland fields which are grazed by cattle. These were not able to be accessed for survey and were target noted from the surrounding paths. Provisionally these fields have been classified as neutral semi-improved grassland but further survey work will be required to determine the species-richness and composition of the sward once access to the land has been granted.

Tall ruderal (C3.1)

3.2.21 Small areas of tall ruderal vegetation are present in the survey area, especially in areas with fertile and disturbed soils such as where spoil has been tipped or on the roadsides. The tall ruderal vegetation at **TN40** has developed on recently burnt ground, south of where the Channel Tunnel Rail Link emerges above ground. The dominant species include creeping thistle *Cirsium arvense*, broad-leaved dock *Rumex obtusifolius*, common nettle *Urtica dioica*, fennel *Foeniculum vulgare* and common ragwort *Senecio jacobaea*.

Swamp (F1)

3.2.22 Swamp is tall emergent vegetation which occurs in areas where the water table is at or just above ground level. In the survey area, this vegetation is dominated by uniform stands of common reed *Phragmites australis*. There are two very large reedbeds within the survey area: on Black Duck Marsh (**TN9)** and around the old sewage treatment works (**TN34**). Other small scattered areas of reedbed occur throughout, around the edges of water bodies and along ditch margins. With the exception of occasional patches of rush *Juncus spp.*, sedge *Carex spp.* and damp forbs such as common fleabane *Pulicaria dysenterica* and great willowherb *Epilobium hirsutum*, very few other plants are able to grow within the dense thatch created by the reeds. In some areas, the reedbed is gradually drying out and willow scrub invading.

3.2.23 Reedbeds are a BAP Priority Habitat and are especially important as nesting sites for reed bunting *Emberiza schoeniclus*, sedge warbler *Acrocephalus schoenobaenus* and cetti's warbler on the site.

Standing water (G1)

3.2.24 Areas of standing water have developed as a legacy of quarrying and the creation of large steep-sided depressions in the landscape. There are four main waterbodies located north of the A226 on the peninsula at **TN4**, **TN16**, **TN32** and **TN34**. Two large waterbodies occur in the bases of old quarries south of the A226 at **TN43** and **TN46**. The majority of the waterbodies are deep with steep-sided banks covered with scrub and with little marginal or emergent aquatic vegetation present. Fish were observed in some of the sites and this fact, combined with their physical characteristics, is likely to make them sub-optimal breeding habitat for the majority of amphibians.

3.2.25 There are numerous drainage ditches present in the survey area. These occur in a network across Black Duck Marshes, along the edges of the two landfills and on Botany Marshes. The average ditch profile has a width of 4-6m and a maximum depth of c.1m. The majority have emergent and marginal stands of common reed, to a lesser extent bulrush and with occasional

hard rush *Juncus inflexus*. There are several sections of dry ditch which have not been managed for some time and have become choked by common reed.

3.2.26 Most of the water bodies and ditches north of the A226 on the peninsula appeared to have been polluted by leachate from the landfill. The water is discoloured red/brown in places with an unpleasant smell. There are very few aquatic invertebrates to be observed which also raises suspicions over the water quality.

3.2.27 Evidence of water voles was discovered in Swanscombe marshes along the lengths of the drainage ditches. Signs included droppings, chopped vegetation (feeding remains) and old burrows. Little evidence was found which suggests at this early stage of survey that the population is small.

Intertidal mud (H1.1)

3.2.28 Narrow ribbons of mudflat occur along the margins of the River Thames (northern boundary of the proposed development area) which are exposed at high tide and represent an important feeding habitat for wading birds. On the upper sections of mudflat saltmarsh vegetation has colonised.

Saltmarsh (H2)

3.2.29 Narrow strips of saltmarsh have colonised the mudflats on the outer margins of the River Thames. These contain large stands of sea plantain *Plantago maritima*, sea arrow grass *Triglochin maritima*, saltmarsh grass *Puccinellia maritima* and, on the upper sections close to the bank, sea purslane *Halimione portulacoides* and sea couch grass *Agropyron junceiforme*. Between the outer and inner flood banks at **TN14** a brackish depression has formed and this area has been colonised by saltmarsh vegetation including sea plantain and sea arrow grass.

Inland cliff (I1.1.2)

3.2.30 Quarrying of the underlying bedrock on southern sections of the site has created depressions in the ground and exposed steep chalk embankments around their edges. The tops of these inland cliff faces represent the natural ground level.

Ephemeral/Short Perennial (J1.3)

3.2.31 This is a diffuse category composed of plant communities occurring on early successional swards with free-draining ground and areas of bare earth. The sward is short (<10cm) and

ephemeral in nature, quickly becoming established with grassland and scattered scrub. The main areas of ephemeral/short perennial vegetation occur at **TN6, TN11** and an area of former quarrying at **TN42**. Species occurring in such areas are typical of brownfield sites and include coltsfoot *Tussilago farfara*, ragwort, sheep's fescue *Festuca ovina*, bird's foot trefoil and rough hawkbit.

Defunct species-poor hedge (J2.2.2)

3.2.32 Only one hedgerow was recorded during the survey along the track leading from Lower Road to Botany Marshes (**TN31**). It is tall (c.4-5m), unmanaged with hawthorn, hazel *Corylus avellana* and elder *Sambucus nigra*. The ground flora is dominated by ivy and nettles.

Protected Species

Badger

3.2.33 No evidence was found during the survey that suggested badgers were currently present. A mammal burrow was found in the woodland at **TN36** that may have been the entrance to an old badger sett. There were no paths leading to and from this hole and no evidence of tracks or other field signs. The whole area is overgrown with ivy and if there are any other entrances these are obscured and not in use.

Water vole

3.2.34 The survey area features a range of wetland habitats such as reedbeds, grazing marsh and drainage ditches that have the potential to support water voles. Evidence of this species was discovered along the ditches of Swanscombe marshes (**TN49**) however it did not appear to be present in large numbers.

Bats

3.2.35 Areas of woodland, wetland and grassland within the survey area are potential foraging habitats for bats. It might also be expected that linear features such as the drainage ditches and secondary woodland strips are used for dispersal between roosts and foraging grounds. The area of mature woodland at **TN1**, known as 'Lord's Wood' featured potential roosting opportunities in the form of trees with woodpeckers holes and densely covered with ivy.

Dormice

3.2.36 No evidence of dormice was found during the survey however this species is nocturnal, secretive and can be hard to detect. Dormice prefer ancient woodland habitats with hazel coppice or mature hedgerows linked to suitable woodland, neither of which were found within the survey area. The isolated areas of scrub and secondary woodland are deemed sub-optimal habitats and overall it is unlikely that dormice are present.

Great Crested Newts

3.2.37 There are a limited number of water bodies within the survey area with the potential to support great crested newts. In the main body of the proposed development area (Swanscombe Peninsula) most of the drainage ditches are too heavily choked with vegetation and are deemed unsuitable as they provide little or no open water for the newts to display. The water bodies at **TN16** and **23** provide large areas of open water but feature little or no aquatic vegetation and the biological quality is questionable. There were other water bodies that couldn't be accessed and will require further investigation but in the first instance most of them appeared unsuitable due to the presence of fish (**TN43**), waterfowl (**TN34**) or other factors.

Reptiles

3.2.38 There are extensive areas of habitat in the survey area deemed suitable for reptiles. The mosaic of long grass and scattered scrub covering the landfills is likely to be a key habitat, especially around the margins where it is interspersed with short grass or grades into areas that were recently cleared and now feature ruderal or ephemeral/short perennial vegetation. An example of this is the landfill central to the Swanscombe Peninsula (**TN12**) that features short grass to the north and recently cleared areas further north and to the south (**TN11**, **37**). There are a number of tracks and public footpaths running through the peninsula with short grass on their margins that provided opportunities to spot common lizard basking so this species alone is confirmed as present. It is highly possible that grass snakes and slow-worms will also be found in the proposed development area.

Breeding Birds

3.2.39 Areas of woodland, scrub and reedbed in the survey area are prime habitats providing nesting and foraging sites for birds. The mudflats, saltmarsh and grazing marsh are likely to be important for wintering and migrating wildfowl and waders, particularly as foraging areas but potentially nesting sites too.

Other Species

Invertebrates

3.2.40 Brownfield sites in the Thames Gateway are renowned for their important invertebrate assemblages and support populations of several UK BAP species, so the proposed development area should also be noted for its potential in this area. In particular the recently cleared areas at **TN11** and **TN37** feature patches of bare sandy soil that are suitable for burrowing wasps and bees and the flood banks of the River Thames (**TN13**) are quite forb rich, providing foraging opportunities for a range of adult insects. Lord's Wood was limited in the amount of dead wood it provided so the potential for saproxylic species is small but the saltmarsh and grazing marsh on the peninsula may support its own specialist invertebrate assemblage. The water bodies in the survey area have the potential to support various aquatic invertebrates but due to the poor water quality are unlikely to be rich in sensitive species such as caddisflies, dragonflies and damselflies.

Table 5 Phase 1 Habitat Survey Target Notes (see **Figure 1** for location of Target Notes).

Target Note (TN)	Habitat/feature	Comments
1	Broad-leaved semi-natural woodland	Secondary woodland strip running in east-west direction to the south of Black Duck Marsh. The area has a steep, uneven topography and is c.500m in length with an average width of 100m. Canopy dominated by sycamore with a dense and more varied shrub layer with dogwood, privet, ash and hawthorn. The ground flora is covered with ivy. An old badger hole was found in the wood and some of the trees have bat roost potential with dense ivy and woodpecker holes.
2	Poor semi-improved grassland with scattered scrub	Open area between the woodland at TN1 and the A226. Large areas of bare earth and rubbly ground but a developing grassland sward with abundant sheep's fescue, bird's foot-trefoil, ribwort plantain and melilot. There is scattered willow, hawthorn and buddleia scrub throughout.
3	Tall ruderals	Recently cleared ground to the southwest of the abandoned warehouse buildings with a tall ruderal sward consisting of creeping thistle, common nettle and colt's foot.
4	Standing water	A lake with standing water has developed in the excavation quarry immediately north of the A226. It is surrounded by very steep sides and was inaccessible to survey. There was little apparent aquatic vegetation except occasional clumps of hard rush. The banks are covered by woodland to the south and willow scrub to the north.

Target Note (TN)	Habitat/feature	Comments
5	Semi-improved neutral grassland with scattered scrub	Grassland with scattered hawthorn scrub between the A226 and the old warehouse buildings. The sward is tall with coarse grasses dominated by couch grass and frequent cock's foot. Forbs include common vetch, creeping cinquefoil and ribwort plantain.
6 (see TN 37)	Ephemeral/short perennial with scattered scrub	Patchy short vegetation colonising area of hard standing Buddleia and birch scrub are scattered throughout the area.
7	Dense scrub/semi-improved neutral grassland	Area of mature willow, birch and hawthorn scrub with closed canopy and small open areas with couch grass, false oat grass, spotted meddick, creeping cinquefoil, ribwort plantain and bird's foot-trefoil.
8	Semi-improved neutral grassland with scattered scrub	Former compound area surrounded by coal spoil banks. The ground is flat and the soil clayey. There is abundant willow scrub and the ground flora consists of similar species to TN5 but with additional plants associated with recently disturbed, well-drained waste ground such as teasel, bristly ox-tongue and mouse-ear hawkweed.
9	Swamp with standing water (ditches) and scattered scrub	An extensive reedbed has developed on an area of former quarrying known as Black Duck Marshes or Swanscombe Marshes. The area extends from the woodland at TN1 to the banks of the River Thames. It is bisected by several ditches and there are small areas of standing water. However, the majority of the wetland appears to have dried out and consists almost exclusively of common reed.
10	Standing water (ditch)	A typical ditch on Black Duck Marsh. The channel is c.6m wide with a variable depth of water to c.1m. Common reed dominates the bank and channel vegetation. There is little other vegetation besides *Phragmites* with only occasional patches of bulrush.
11	Ephemeral/short perennial	Large expanse of recently-colonised bare ground with low sward of brownfield and ruderal species including ragwort, colt's foot and patches of grassland with extensive bird's foot-trefoil. Shelducks use the area for loafing.
12	Poor semi-improved grassland with scattered scrub	Gently sloping area, a former landfill with Channel Tunnel rail link passing underground. The majority of the sward consists of tall rank grasses and is species-poor. There are extensive patches of bramble and hawthorn scrub which support breeding warblers.
13	Semi-improved neutral grassland	The flood banks above the River Thames have a short (<20cm) mown grassland sward with a higher diversity of forbs than the majority of the grassland on site. There is abundant red fescue with bird's foot trefoil, red clover, common vetch, meadow vetchling, yellow vetchling and ox-eye daisy.

Target Note (TN)	Habitat/feature	Comments
14	Scattered saltmarsh plants	Brackish depression formed by borrow pit excavation between the outer and inner river banks. The area has developed saltmarsh type vegetation including sea plantain and sea arrow grass.
15	Saltmarsh	Narrow strips of saltmarsh have colonised the mudflats on the outer margins of the River Thames. These contain large areas of sea plantain, sea arrow grass, saltmarsh grass and, on the upper sections, sea purslane and sea couch.
16	Standing water	Medium-sized waterbody in between two former landfill sites. There was no aquatic vegetation visible and the water appeared to be polluted with landfill leachate. There are narrow strips of marginal common reed and a planted belt of broadleaved woodland on the western banks.
17	Standing water (ditch)	A ditch draining the landfill appears to have been recently dredged. Common reed and bulrush within the channel.
18	Semi-improved neutral grassland	Small area of comparatively species-rich grassland lies to the north of the landfill bordering the planted woodland strip at TN19. Red fescue is the dominant grass with a wide range of forbs (some indicative of slightly calcareous soil) including wild marjoram, hoary ragwort, red clover, ox-eye daisy, common knapweed, tufted vetch, meadow vetchling, yellow vetchling and wild carrot. The mosaic of short and tall swards and the scattered scrub could support a wide range of invertebrates.
19	Broad-leaved scattered trees/dense scrub	Narrow planted shelterbelt consisting predominantly of sycamore with understory of dense hawthorn, dogwood and gorse scrub. Many of the planted trees have died and are standing dead wood.
20	Poor semi-improved grassland	The grassland on the north-east corner of Broadness Marsh has an open and flat topography with a uniform and species-poor sward dominated by common couch and plants indicative of a fertile soil including common nettle, creeping thistle and cleavers. Several pairs of skylarks were heard singing.
21	Bare ground	An area of active workings (off-site and not able to be accessed) with extensive earth mounds and spoil tips. There is little vegetation excepting recently colonised ruderal species.
22	Poor semi-improved grassland with scattered scrub	The area of the former CKD landfill is covered by a species-poor grassland sward with scattered scrub with a similar plant assemblage to other areas of tall grassland on site.
23	Standing water	Recently created lagoon with steep bare soil banks. The water quality appears to be poor (and possibly contaminated with landfill leachate) and there was little aquatic vegetation or observable invertebrates.

Target Note (TN)	Habitat/feature	Comments
24	Poor semi-improved grassland with standing water	The area known as Botany Marshes consists of several fenced and cattle-grazed pasture fields. The area could not be accessed for survey and was observed from adjacent paths. The sward is short (<20cm), disturbed by poaching and enriched with frequent thistles and nettles. There are several narrow reed-fringed ditches dividing the field and small areas of standing water. Displaying lapwing were observed and it is likely that they use the field for breeding.
25	Poor semi-improved grassland	Strips of mown and well-trodden grassland along the path consisting of a short sward with plants tolerant of trampling and close mowing such as daisy, dandelion, plantain and yarrow.
26	Standing water (ditch)	Drainage ditch with some areas of open water (to 50cm depth), long stretches of which are densely vegetated with common reed.
27	Planted grass banks	The steep banks on the western boundary of the industrial units north of Botany Marshes have been planted with lyme grass to stabilise the soil.
28	Scraped soil	Area of recent scraping bordering the ditch along the northern boundary of Botany Marshes where stands of young common reed are colonising. Many planted trees in the land to the south have recently died (possibly due to the brackish conditions or pollution).
29	Dense scrub	An area of mature dense scrub thicket between Manor Way and Botany Marshes. Singing nightingales were heard.
30	Poor semi-improved grassland with scattered scrub	The majority of the land (possibly scrubbed-over former grazing fields) between Manor Way and Botany Marshes comprises naturally-colonised mature hawthorn scrub with small areas of semi-improved grassland. The area was not accessible for survey but numerous singing warblers were heard including nightingale, whitethroat, chiffchaff and blackcap.
31	Species-poor defunct hedge	Mature hedgerow along the northern edge of the track running from Lower Road to Botany Marshes. It is tall (c.4-5m), unmanaged with hawthorn, hazel and elder. The ground flora is dominated by ivy and nettles.
32	Standing water	Medium-sized waterbody to the north of the A226 surrounded by industrial development and ruderal vegetation.
33	Swamp	Area of shallow water which is rapidly vegetating over with common reed and bulrush. It grades into marshy grassland on the north-western side with creeping bent, great willowherb and hard rush.
34	Standing water and swamp	Large area of recently created water to the south of the old sewage treatment works. The whole area is surrounded by a very large swamp dominated by common reed. Several species of waterfowl were noted on the water.

Target Note (TN)	Habitat/feature	Comments
35	Poor semi-improved grassland	Early successional short (5-10cm) grassland on recently disturbed area on southern edge of landfill with extensive colt's foot, red fescue and bird's foot trefoil.
36	Badger hole	Single entrance hole made by badger on northern boundary of woodland at TN1 to the south of Black Duck Marshes. The hole appeared to be disused with no signs of recent occupation and no other setts in the surrounding area.
37 (see TN6)	Ephemeral/short perennial/poor semi-improved grassland with scattered scrub	Patchy short vegetation communities colonising area of hard standing on land bordering Manor Way. A close matrix of bare ground and ephemeral/short perennials with areas of developing grassland sward at a later stage of succession. Scattered birch, buddleia and willow scrub throughout.
38	Standing water (ditch)	Ditch on western side of track running between Manor Way and old sewage works. It is broad (c. 6m bank-width) with standing water in channel to at least 50cm, emergent bulrush and banks with tall grass and ruderal vegetation.
39	Standing water (ditch)	Ditch on eastern side of track running between Manor Way and old sewage works with standing water and dense stands of *Phragmites* and occasional great willowherb.
40	Marshy grassland with scattered scrub/standing water/swamp/tall ruderals	Area of recently disturbed (and burnt) ground with a wide range of different habitats. Areas of shallow open water fringed by reed and bulrush swamp grading into marshy grassland (consisting of hard rush, soft rush, false fox sedge, great willowherb and common fleabane).
41	Semi-improved neutral grassland with scattered scrub	Bank of semi-improved grassland with bulbous buttercup, wild marjoram, yarrow, ox-eye daisy, cowslips and bird's-foot trefoil. Scattered hawthorn and buddleia scrub.
42	Ephemeral/short perennial	Area of former quarrying to the south of the A226 bordering the railway. Short patchy vegetation sward has developed and there are still extensive remaining areas of bare ground. Not accessible for survey.

Target Note (TN)	Habitat/feature	Comments
43	Tall ruderals and semi-improved neutral grassland with scattered scrub/dense scrub/broadleaved woodland/standing water	Very extensive area to the east of Swanscombe High Street extending to the HS1 Railway line. Possibly a former quarry pit with steep uneven topography and a lake at the base. The area is a complex mosaic of land at various stages of succession: short rabbit-grazed and taller grassland swards, scattered scrub and small areas of developing birch woodland. The taller grassland has low plant diversity and contains abundant false oat grass with very extensive creeping cinquefoil. The shorter turf on the quarry slopes has a higher diversity of flowering plants including common knapweed, ox-eye daisy and perforate st-john's-wort. The area to the north of the lake, possibly a former landfill site, is dominated by ruderal species such as hoary mustard, teasel and common ragwort.
44	Poor semi-improved grassland	Area to the south of TN3 and possibly a former landfill site with a domed profile and sloping topography. The area has a tall rank grassland sward consisting of competitive grasses such as false oat grass, cock's foot, couch grass and barren brome. Forbs present include large quantities of melilot, common vetch, ribwort plantain, white clover and bristly ox-tongue.
45	Swamp	Dry reedbed bordering the railway surrounded by willow scrub.
46	Standing water	Large water body known as' blue lake' in area of former quarrying located between the A226 and Northfleet. The site is surrounded by steep chalk escarpments and was not accessible for survey.
47	Quarry pit	Large area of former quarrying to the north of TN46 occupied by patchy ephemeral/short perennial vegetation with spoil heaps and areas of bare earth. Not accessible for survey.
48	Tall ruderals with scattered scrub	Abandoned area of land between Hive Lane and Factory Road is occupied by mature scattered scrub and tall ruderals. Not accessible for survey.
49	Evidence of water voles	Some old burrows, droppings and chopped vegetation indicate the presence of water voles along the lengths of the drainage ditches in Swanscombe marshes.
50	Steep sided valley	A valley with steep sided banks dominated by buddleia, occasional willow and sycamore. Ground covered with creeping ivy and brambles. There is a pond at the bottom of the valley that is inaccessible but appears to have little/no marginal or emergent vegetation. There is much litter strewn down the valley sides and in the pond.

4.0 EVALUATION

4.1 Constraints to the survey

4.1.1 The main constraint to carrying out the Phase 1 Habitat Survey was unsafe/restricted access to certain parts of the proposed development area. Binoculars were used to help identify the broad habitat types or dominant species present where possible. The following areas had limited/no access:

- The lake at **TN4** has very limited access. It was surveyed only along its southern and western perimeter;
- The lagoon at **TN23** is currently operational with no permitted public access. The lagoon was surveyed through a mesh fence that runs around its entire perimeter;
- No access was available to Botany Marshes (**TN24, 28, 29, 30**). The area was surveyed from various locations and vantage points around its perimeter;
- No access was available to the pond at **TN32.** It was surveyed through the mesh fence on the northern boundary;
- The area of swamp and open water at **TN34** was surveyed from the adjacent paths running along the eastern and western boundaries;
- No safe access to the chalk pit at **TN42** was found. The area was surveyed from its north-western boundary;
- No safe access to the lake at **TN46** was found. The area was surveyed from a raised path located on the north-western boundary;
- No safe access to the chalk pit at **TN47** was found. The area was surveyed from its western boundary; and,
- The pond at **TN50** is in a very steep sided depression, with no safe access to its margins. It was surveyed from the top of the wooded valley.

4.1.2 Due to these restrictions it was not possible to provide detailed information on the species present in these areas; however an assessment could be made on the species likely to be present and the broad scope of the Phase 1 habitat survey was still able to be carried out.

4.2 Designated Sites

4.2.1 Statutorily designated sites in the vicinity of the proposed development area include the Baker's Hole SSSI and the Swanscombe Skull Site SSSI, both of which are designated for their geological value. The non-statutorily designated Ebbsfleet Marshes LWS has been fragmented since its original designation in 1985, by the construction of the Channel Tunnel Rail Link and Ebbsfleet International Rail Station. As a result, further detailed surveys may be required to determine its current ecological value.

4.2.2 The Swanscombe Peninsula may play a role in supporting overwintering and migrant waders and waterflowl associated with West Thurrock Lagoon and Marshes SSSI (located ~1.2km north-west of Swanscombe peninsula, on the northern bank of the River Thames). Detailed winter bird surveys will help to determine whether there is a relationship between the two sites.

4.3 Habitats and Species

Woodland and Scrub

4.3.1 Overall the woodland in the survey area is considered to have low intrinsic value, being mainly comprised of non-native (sycamore), common and widespread species (silver birch, ash). However it is recognised for its potential to provide foraging and roosting habitat for bats and breeding birds.

4.3.2 The scrub within the survey area consists of non-native (buddleia), common and widespread species such as hawthorn, bramble and willow, therefore its intrinsic value is considered to be low. However where present as a mosaic habitat with grassland and ruderal vegetation, scrub represents an important habitat for breeding birds, reptiles and invertebrates.

Grassland

4.3.3 The majority of grassland within the survey area was classified as neutral species-poor, having low diversity and ecological value. Coarse grasses such as false oat grass and couch grass dominated much of the landscape. This habitat may be of limited value to invertebrates, birds, bats and reptiles.

4.3.4 The areas of grassland with a slight calcareous influence, shorter sward and richer species assemblage have a higher intrinsic value and the potential to support rare or protected plant species.

Swamp

4.3.5 Reedbeds are a BAP priority habitat and highly valuable for supporting populations of water voles and breeding birds. Overall this habitat has high intrinsic value.

Standing Water

4.3.6 In the past the drainage ditches and open water bodies on site north of the A226 would likely have been prime habitat for water voles, breeding amphibians and aquatic invertebrates. In recent years, however, due to apparent changes in hydrological conditions, limited management and possible discharges of leachate, these habitats have deteriorated in condition and are now of limited ecological value for aquatic invertebrates and amphibians. However they do still have the potential to support populations of water vole and breeding birds.

4.3.7 The two large water bodies south of the A226 are stocked with fish and therefore of limited value in terms of providing habitat for protected species such as the great crested newt.

Mudflat and Saltmarsh

4.3.8 The areas of mudflat and saltmarsh on site have high intrinsic value, being UK BAP priority habitats. They may also be important habitats for supporting wintering and migrant birds, including those moving between recognised sites such as the West Thurrock Lagoon and Marshes SSSI. Additionally, mudflats and saltmarshes are known to play an important role in managing flood risk and coastal erosion control.

Open Mosaic Habitats on Previously Developed Land

4.3.9 Some of the ephemeral/short perennial habitat on site can be classified as the new UK BAP priority habitat 'open mosaic habitat on previously developed land'. Botanically these areas were not very interesting, being comprised of common and widespread species typical of brownfield sites such as ragwort and colt's foot. However it is recognised as a potentially rich habitat for invertebrates, particularly the burrowing wasps and bees, and an important resource for bird species such as the skylark (red list; UK BAP).

4.4 Recommendations for Further Work

4.4.1 It is recommended that further survey work is carried out in the proposed development area to assess the status of species and habitats of interest highlighted in this report.

4.4.2 A botanical survey should be carried out and specifically directed towards the saltmarshes and more species-rich grasslands where rare species could have been overlooked during the initial Phase 1 habitat survey. Saltmarshes are a declining habitat colonised by specialist and rare plant species so it is important in the case of such habitats to have a botanical expert examine the area. Botanical surveys can be carried out all year round but are optimal between April and October depending on the habitat in question.

4.4.3 It is also recommended that surveys are used to establish whether bats are using the woodland strips and water bodies on site for foraging or roosting. Summer roost emergence and activity surveys should be conducted between April and October (with an optimal period of May-September). Hibernation roosts can be inspected during the winter.

4.4.4 A suite of bird surveys is also recommended; a breeding bird survey to be undertaken between March and July and a wintering bird survey to be conducted between September and March.

The proposed development area may provide a staging post for migrant species, as well as providing suitable foraging and roosting grounds for breeding and/or wintering species.

4.4.5 A survey for great crested newts should be undertaken due to the presence of several water bodies with potential to support this species (as well as other amphibians) on site. Surveys for adult newts should be undertaken between March and June and will result in incidental records for any other amphibians present in the ditches, ponds and lakes.

4.4.6 The presence of water voles and common lizards has already been confirmed in the survey area and this should be followed up with a dedicated surveys targeted towards each of these species. Water vole surveys are best carried out between March and October (optimally during March to May, before increased vegetation growth obscures the ditch banksides) and optimal survey periods for reptiles are April to May and/or September.

4.4.7 Despite the lack of desk-top study records within a 2km radius of the site and the apparent isolation of sub-optimal habitats present on site, a dormouse survey is recommended in line with the guidance outlined in Natural England's Interim Advice Note. The advice note states '*Dormouse surveys to inform mitigation licence applications should not be limited to perceived 'optimal' habitat. Where projects that will significantly affect woody habitat occur within known dormouse range, surveys should be completed, even if the habitat appears fragmented*[4]'. Nest tube surveys should be undertaken in scrub and woodland habitats between April and November, and nut searches are best undertaken between September and December.

4.4.8 No evidence was found during the survey to suggest badgers were currently present, however they do appear to have been present on site in the past and suitable supporting habitat is still present. It is therefore recommended that the areas of woodland, scrub and hedgerows on site are surveyed thoroughly for evidence of badgers. This can be undertaken all year round, but optimally between February and April or September and November.

4.4.9 Lastly a terrestrial and aquatic invertebrate survey is recommended due to the location of the proposed development area in the Thames Gateway and the variety of habitats available that have the potential to support a diverse and rare invertebrate assemblage. Terrestrial invertebrate surveys should be conducted between March and October (bearing in mind many species are only on the wing for a few short weeks during this time) and aquatic invertebrate surveys can be carried out all year round with an optimal periods of either April to May and/or September to October.

[4] Natural England *Interim Natural England Advice Note – Dormouse Surveys for Mitigation Licensing – Best Practice and Common Misconceptions*. WML – G37 (12/11)

5.0 CONCLUSIONS

5.1.1 Three statutorily designated sites were identified: Baker's Hole Site of Special Scientific Interest (SSSI) and the Swanscombe Skull Site National Nature Reserve (NNR) and SSSI, both of which are designated for their geological interest. North of the River Thames, the West Thurrock Lagoon and Marshes SSSI is designated for its important assemblages of overwintering waders and wildfowl. The non-statutorily designated Alkerden Pit and Swanscombe Heritage Park Local Wildlife Site (LWS) and Ebbsfleet Marshes LWS are also present within 2km of the proposed development area.

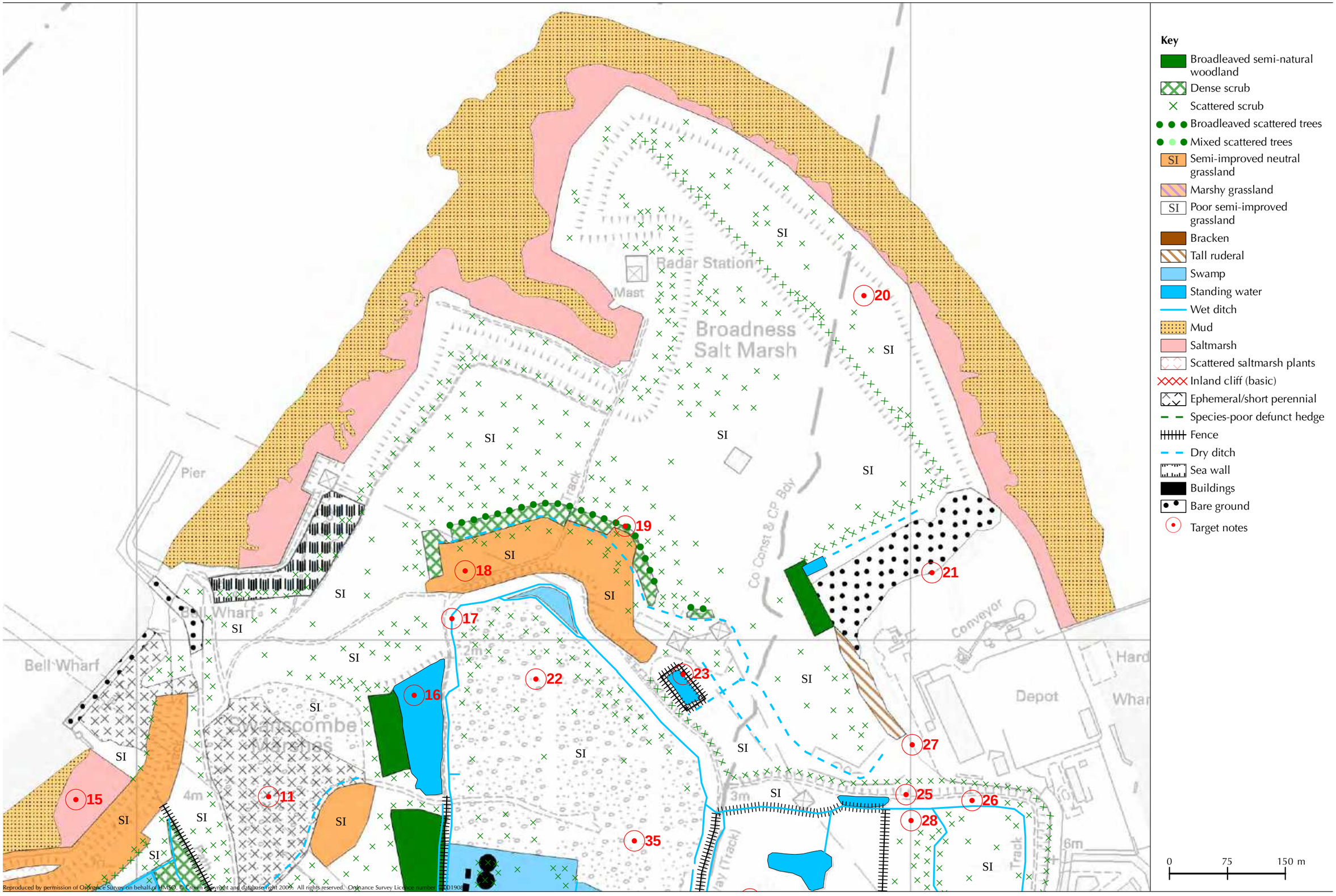
5.1.2 A number of protected species and species of nature conservation importance have been recorded within the boundaries of the proposed development area including water vole, great crested newt, common pipistrelle, daubenton's and noctule bats. Species recorded within a 2km radius of the proposed development area include badger, soprano pipistrelle, brown-long eared and serotine bats.

5.1.3 The Phase 1 habitat survey revealed a range of different habitats within the proposed development area including woodland, scrub, grassland, swamp, open water, mudflat, saltmarsh, inland cliff and hedgerow. The dominant vegetation type was species-poor grassland with scattered scrub. This range of habitats has the potential to support notable plant species, notable invertebrate species, bats, birds, great crested newts, water voles and reptiles and it is recommended that further survey work is carried in respect of these groups.

5.1.4 Overall the most valuable habitats in the survey area from a nature conservation perspective are considered to be the more species-rich grasslands, reedbeds, mudflats, saltmarsh and open mosaic habitats on previously developed land. However, other habitats and features such as the woodland, scrub and standing water will also have value, including for example their potential to support protected species such as water voles.

5.1.5 Although it would otherwise be of relatively low value, some of the less species-rich grassland also has the potential to support a range of notable species. For example, areas of coarse grassland, especially where present with ruderal and scrub, are likely to be of value to reptiles.

FIGURES

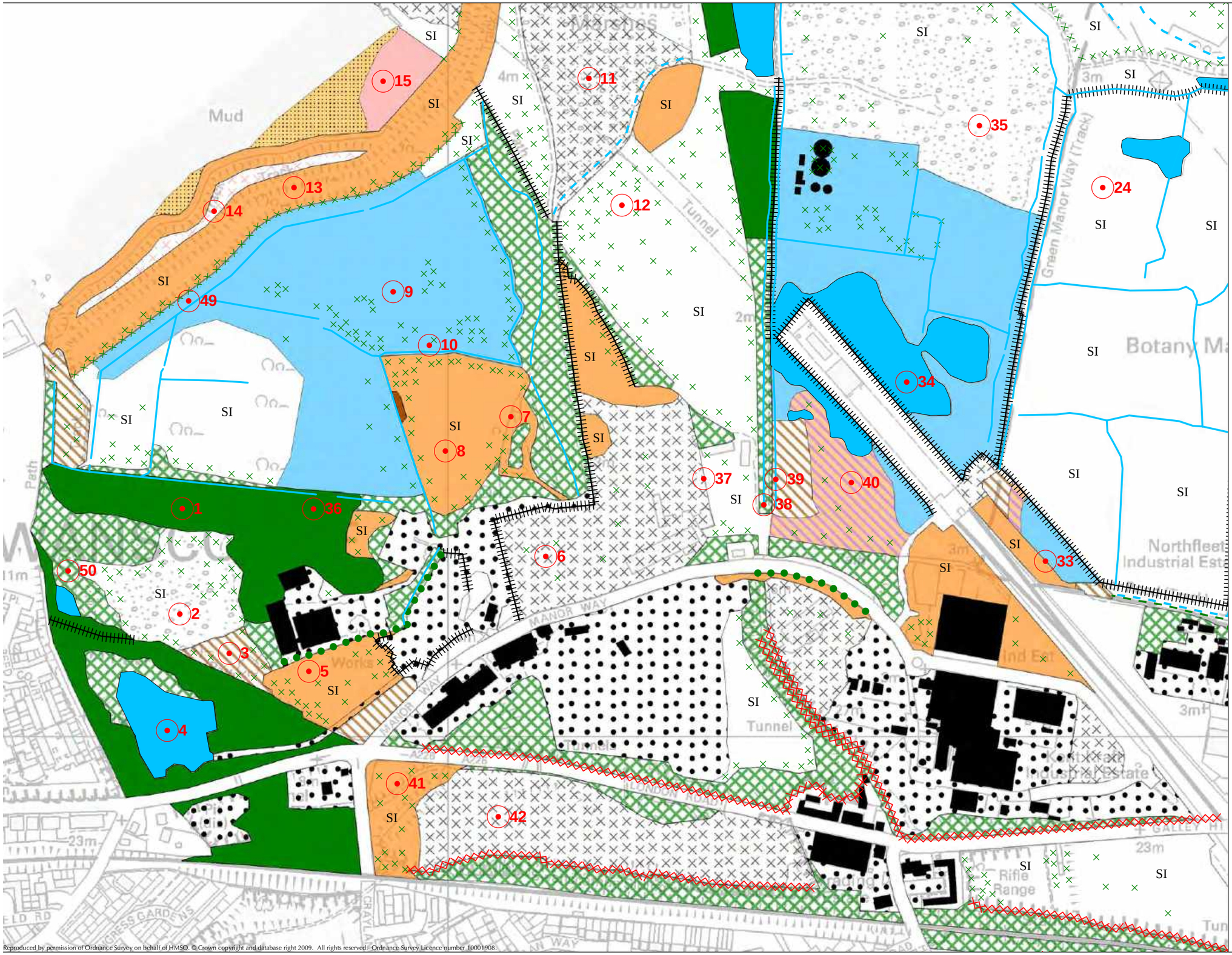


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LONDON PARAMOUNT
Phase 1 Habitat Survey

FIGURE 1a
Phase 1 Habitat Map

MAY 2012



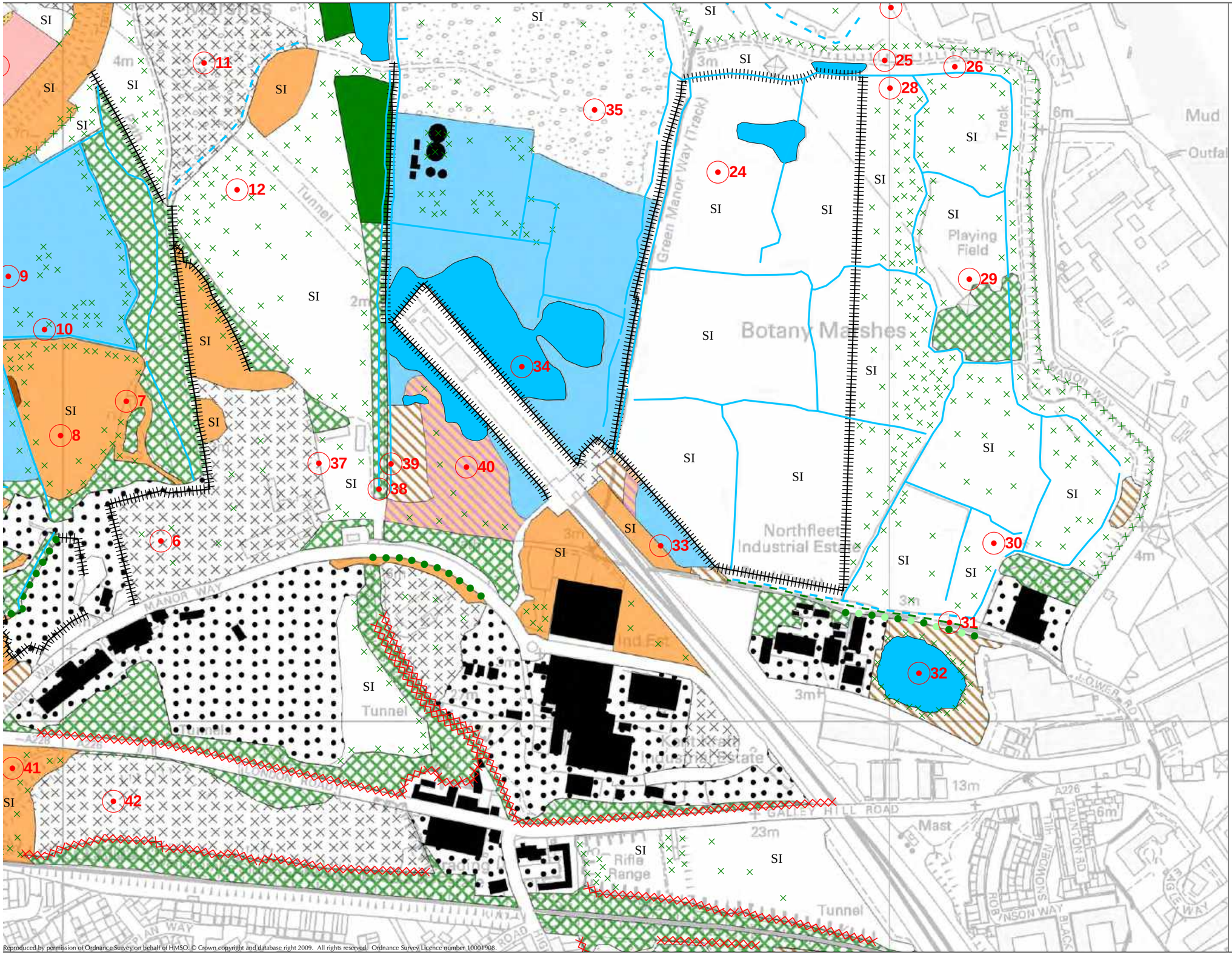
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LONDON PARAMOUNT
Phase 1 Habitat Survey

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FIGURE 1b
Phase 1 Habitat Map



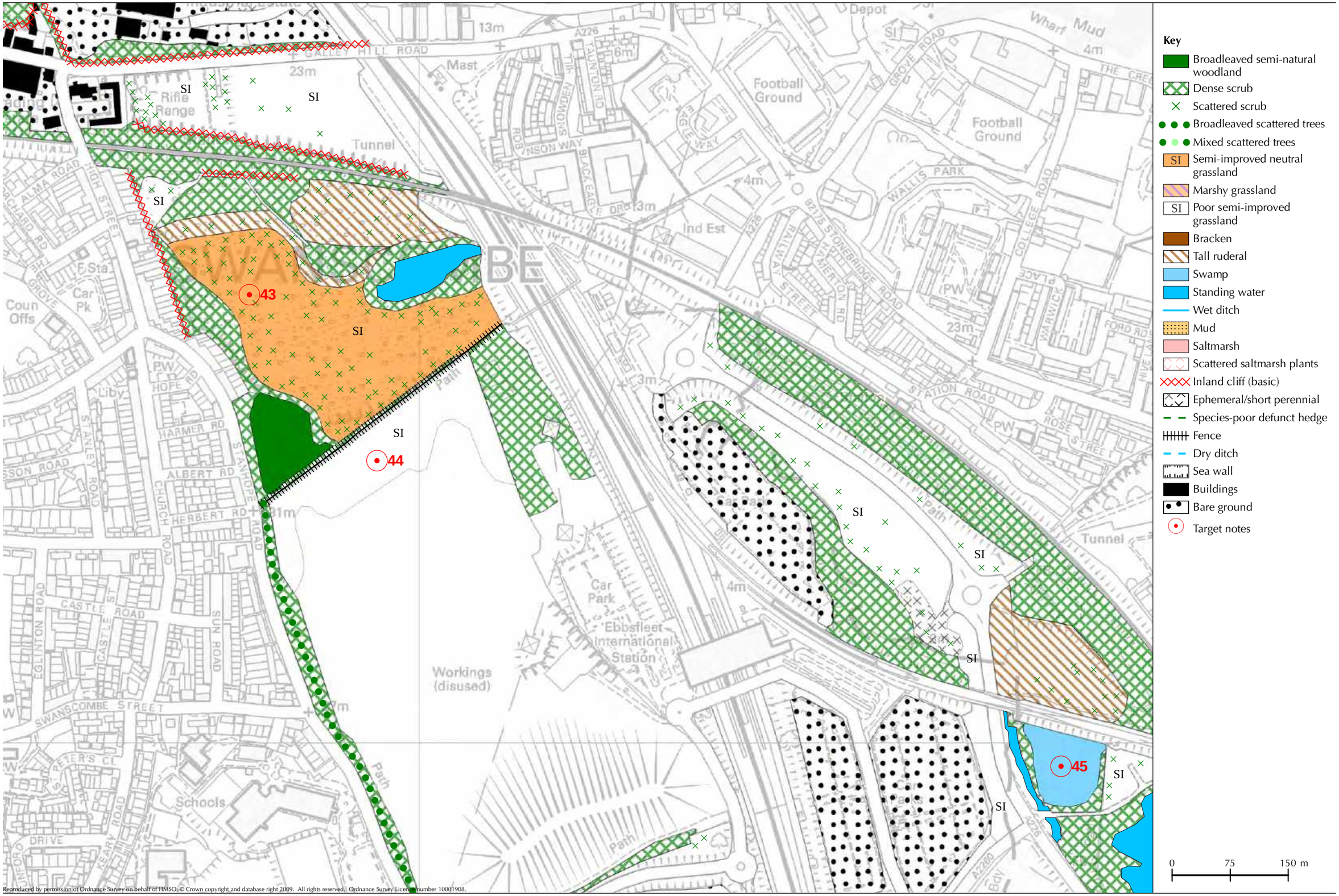
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Phase 1 Habitat Survey

FIGURE 1c
Phase 1 Habitat Map

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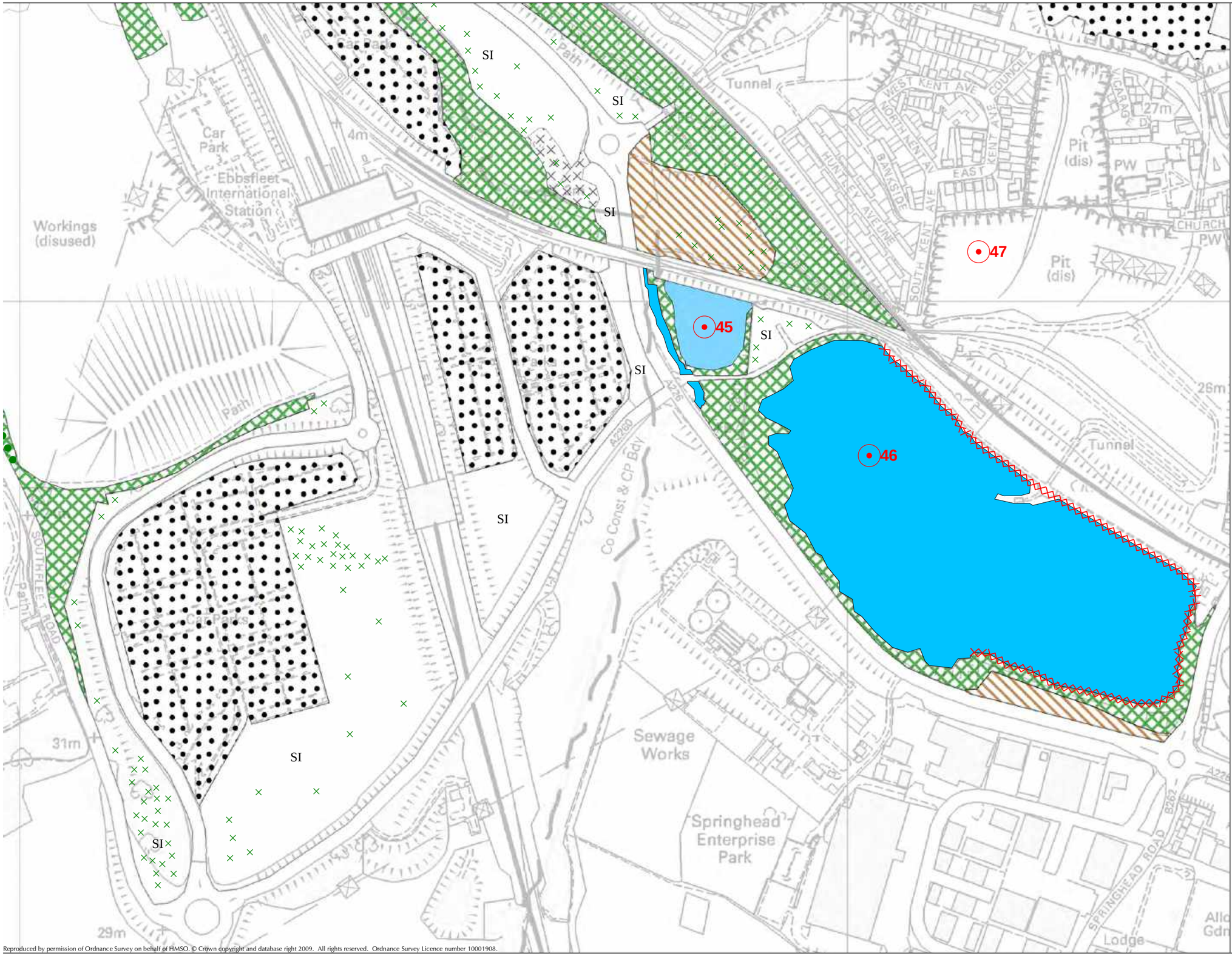
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Phase 1 Habitat Survey

FIGURE 1d
Phase 1 Habitat Map



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LONDON PARAMOUNT
Phase 1 Habitat Survey

FIGURE 1e
Phase 1 Habitat Map

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Key

- Broadleaved semi-natural woodland
- Dense scrub
- Scattered scrub
- Broadleaved scattered trees
- Mixed scattered trees
- SI — Semi-improved neutral grassland
- Marshy grassland
- SI — Poor semi-improved grassland
- Bracken
- Tall ruderal
- Swamp
- Standing water
- Wet ditch
- Mud
- Saltmarsh
- Scattered saltmarsh plants
- Inland cliff (basic)
- Ephemeral/short perennial
- Species-poor defunct hedge
- Fence
- Dry ditch
- Sea wall
- Buildings
- Bare ground
- Target notes

0 75 150 m

N

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LONDON PARAMOUNT
Phase 1 Habitat Survey

FIGURE 1f
Phase 1 Habitat Map

APPENDICES

APPENDIX A
Site Photographs



Figure A1 Lake at **TN4** with surrounding willow scrub and steep-sided woodland covered banks



Figure A2 Typical species-poor grassland with scattered scrub found at **TN5** and ubiquitously on site



Figure A3 An area of ephemeral/short perennial vegetation and scattered scrub at **TN6** & **TN37** that has developed on hard standing



Figure A4 The reedbed at Swanscombe marshes with broadleaved woodland in the distance and a ditch in the foreground



Figure A5 A typical ditch on Swanscombe marshes – 5m wide channel dominated by common reed on the banks and occasional bulrush



Figure A6 A large area of ephemeral/short perennial vegetation at **TN11** with typical brownfield and ruderal species and areas of bare ground



Figure A7 Saltmarsh vegetation (mainly sea plantain) developing in a brackish depression between the outer and inner flood banks at **TN14**



Figure A8 Mudflats with saltmarsh on the upper levels - found in short sections round the coast of the peninsula



Figure A9 The lake at **TN16** fringed with common reed. The water is discoloured red/brown in places



Figure A10 The planted woodland belt at **TN19** with a dense understory of scrub



Figure A11 An area of active workings at **TN21** with extensive areas of bare ground



Figure A12 The lagoon at **TN23** with steep-sided bare soil banks. The water is discoloured red/brown- possibly due to leachate contamination



Figure A13 A reed fringed ditch north of Botany Marshes. The water is discoloured red/brown- possibly due to leachate contamination



Figure A14 A large area of mature dense scrub between Manor Way and Botany Marshes at **TN29**



Figure A15 Large areas of open water and swamp dominated by common reed at **TN34**



Figure A16 Species-poor grassland on the landfill at **TN35** with a short, early successional sward



Figure A17 Area of marshy grassland at **TN40** with the HS1 railway in the background



Figure A18 A poached field drain in the cattle-grazed fields of Botany Marshes



Figure A19 A ditch north of Botany marshes- many water bodies on site exhibit this water coloration

APPENDIX B

Total Species List Recorded during Site Visits

Common name	Scientific name
Alexanders	*Smyrnium olusatrum*
Annual meadow grass	*Poa annua*
Ash	*Fraxinus excelsior*
Barren brome	*Bromus sterilis*
Bithynian vetch	*Vicia bithynica*
Black meddick	*Medicago lupulina*
Blackthorn	*Prunus spinosa*
Bracken	*Pteridium aquilinum*
Bramble	*Rubus fruticosus agg.*
Branched bur-reed	*Sparganium erectum*
Bristly ox-tongue	*Picris echioides*
Broad-leaved dock	*Rumex obtusifolius*
Buck's-horn plantain	*Plantago coronopus*
Buddleia	*Buddleia davidii*
Bulbous buttercup	*Ranunculus bulbosus*
Charlock	*Sinapis arvensis*
Cherry	*Prunus sp.*
Cleavers	*Galium aparine*
Cock's-foot	*Dactylis glomerata*
Colt's-foot	*Tussilago farfara*
Common bird's-foot trefoil	*Lotus corniculatus*
Common broom	*Cytisus scoparius*
Common centaury	*Centaurium erythraea*
Common chickweed	*Stellaria media*
Common field speedwell	*Veronica persica*
Common figwort	*Scrophularia nodosa*
Common fleabane	*Pulicaria dysenterica*
Common gorse	*Ulex europaeus*
Common knapweed	*Centaurea nigra*
Common mallow	*Malva sylvestris*
Common nettle	*Urtica dioica*
Common orache	*Atriplex patula*
Common ragwort	*Senecio jacobaea*
Common reed	*Phragmites australis*
Common saltmarsh-grass	*Puccinellia maritima*
Common vetch	*Vicia sativa*
Cotoneaster	*Cotoneaster sp.*
Couch grass	*Elytrigia repens*
Cow parsley	*Anthriscus sylvestris*
Cowslip	*Primula veris*
Crab apple	*Malus sylvestris*
Creeping bent	*Agrostis stolonifera*

Common name	Scientific name
Creeping buttercup	*Ranunculus repens*
Creeping cinquefoil	*Potentilla reptans*
Creeping thistle	*Cirsium arvense*
Curled dock	*Rumex crispus*
Cut-leaved crane's-bill	*Geranium dissectum*
Daisy	*Bellis perennis*
Dandelion	*Taraxacum officinale*
Dog rose	*Rosa canina*
Dogwood	*Cornus sanguinea*
Dove's foot crane's-bill	*Geranium molle*
Elder	*Sambucus nigra*
Elm	*Ulmus sp.*
English scurvy grass	*Cochlearia anglica*
English yew	*Taxus baccata*
Evergreen oak	*Quercus ilex*
False fox sedge	*Carex otrubae*
False oat grass	*Arrhenatherum elatius*
Fennel	*Foeniculum vulgare*
Fennel leaved pondweed	*Potamogeton pectinatus*
Field bindweed	*Convolvulus arvensis*
Field forget-me-not	*Myosotis arvensis*
Field maple	*Acer campestre*
Fool's water-cress	*Apium nodiflorum*
Germander speedwell	*Veronica chamaedrys*
Giant hogweed	*Heracleum mantegazzianum*
Gipsywort	*Lycopus europaeus*
Goat willow	*Salix caprea*
Grass vetchling	*Lathyrus nissolia*
Great mullein	*Verbascum thapsus*
Great willowherb	*Epilobium hirsutum*
Greater bird's-foot trefoil	*Lotus pedunculatus*
Greater knapweed	*Centaurea scabiosa*
Greater plantain	*Plantago major*
Grey poplar	*Populus × canescens*
Grey willow	*Salix cinerea*
Groundsel	*Senecio vulgaris*
Hard rush	*Juncus inflexus*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Heath speedwell	*Veronica officinalis*
Hedge bedstraw	*Galium mollugo*
Hedge woundwort	*Stachys sylvatica*
Hemlock	*Conium maculatum*

Common name	Scientific name
Hemp agrimony	*Eupatorium cannabinum*
Hoary ragwort	*Senecio erucifolius*
Hogweed	*Heracleum sphondylium*
Holly	*Ilex aquifolium*
Hornbeam	*Carpinus betulus*
Horse chestnut	*Aesculus hippocastanum*
Hybrid black poplar	*Populus x canadensis*
Ivy	*Hedera helix*
Japanese knotweed	*Fallopia japonica*
Laburnum	*Laburnum anagyroides*
Lesser burdock	*Arctium minus*
Lesser pond sedge	*Carex acutiformis*
Leyland cypress	*Cupressocyparis x leylandii*
Lombardy poplar	*Populus nigra 'italica'*
Lyme grass	*Leymus arenarius*
Meadow buttercup	*Ranunculus acris*
Meadow vetchling	*Lathyrus pratensis*
Melilot sp.	*Melilotus sp.*
Mouse-ear hawkweed	*Hieracium pilosella*
Mugwort	*Artemisia vulgaris*
Norway maple	*Acer platanoides*
Oil seed rape	*Brassica napus*
Ox-eye daisy	*Leucanthemum vulgare*
Oxford ragwort	*Senecio squalidus*
Perforate St-John's-wort	*Hypericum perforatum*
Pineapple mayweed	*Matricaria matricarioides*
Poppy	*Papaver sp.*
Red bartsia	*Odontites vernus*
Red clover	*Trifolium pratense*
Red dead-nettle	*Lamium purpureum*
Red fescue	*Festuca rubra*
Red valerian	*Centranthus ruber*
Reedmace	*Typha latifolia*
Ribwort plantain	*Plantago lanceolata*
Rough hawkbit	*Leontodon hispidus*
Saltmarsh rush	*Juncus gerardii*
Scots pine	*Pinus sylvestris*
Sea arrow-grass	*Triglochin maritima*
Sea aster	*Aster tripolium*
Sea beet	*Beta vulgaris*
Sea couch grass	*Elytrigia atherica*
Sea plantain	*Plantago maritima*
Sea purslane	*Halimione portulacoides*

Common name	Scientific name
Sea-buckthorn	*Hippophae rhamnoides*
Sheep's fescue	*Festuca ovina*
Silver birch	*Betula pendula*
Soft brome	*Bromus hordeaceus*
Soft rush	*Juncus effusus*
Spanish bluebell	*Hyacinthoides hispanica*
Spear thistle	*Cirsium vulgare*
Spotted meddick	*Medicago arabica*
Square-stalked St John's-wort	*Hypericum tetrapterum*
Sycamore	*Acer pseudoplatanus*
Tamarisk	*Tamarix gallica*
Teasel	*Dipsacus fullonum*
Toadflax	*Linaria vulgaris*
Tufted vetch	*Vicia cracca*
Water crowfoot sp.	*Ranunculus sp.*
Water dock	*Rumex hydrolapathum*
Water starwort sp.	*Callitriche sp.*
Wayfaring tree	*Viburnum lantana*
Weld	*Reseda luteola*
White campion	*Silene alba*
White clover	*Trifolium repens*
White comfrey	*Symphytum orientale*
White dead-nettle	*Lamium album*
White helleborine	*Cephalanthera damasonium*
White mignonette	*Reseda alba*
Wild carrot	*Daucus carota*
Wild marjoram	*Origanum majorana*
Wild privet	*Ligustrum vulgare*
Wild strawberry	*Fragaria vesca*
Wood false brome	*Brachypodium sylvaticum*
Yarrow	*Achillea millefolium*
Yellow vetchling	*Lathyrus aphaca*
Yellow-wort	*Blackstonia perfoliata*

APPENDIX C
Conservation Status Categories for Invertebrates

Red Data Book (RDB) Categories

RDB categories are based upon the most modern work, usually one of the English Nature Research and Survey in Nature Conservation reviews. Where these do not exist the category given in Shirt, D.B., 1987 The British Red Data Books: 2 is given. These categories may require revision in the light of new information but a new Red Data Book has yet to be compiled. Such revisions are indicated as provisional. The new Red Data Book categories will be based on threat, of which distribution is only one part. This is likely to lead to a far more meaningful conservation assessment, as the number of squares recorded for any one species is highly susceptible to recorder effort, especially as data accumulates over time.

RDB 1. Endangered. Species currently (post 1970) known to exist in five or fewer ten-kilometre squares.

RDB 2. Vulnerable. Species in severely declining or vulnerable habitats, or of low known populations. Known to exist (post 1970) in ten, or fewer, ten-kilometre squares.

RDB 3. Rare. Species with small populations, not at present Endangered or Vulnerable, but which are felt to be at risk. Species currently known to exist (post 1970) in fifteen, or fewer, ten-kilometre squares.

RDB K. Species of undoubted RDB rank, but with insufficient information for accurate placement; includes possible recent arrivals.

RDB X. Species believed to be extinct.

Nationally Scarce. Species currently (post 1970) known to exist in one hundred, or fewer, ten-kilometre squares.

In some groups these are further sub-divided into:-

Nationally Scarce a. Species currently (post 1970) known to exist in thirty, or fewer, ten-kilometre squares.

Nationally Scarce b. Species currently known to exist in thirty-one to one hundred ten-kilometre squares.

Kent Red Data Book (RDB) Categories

KRDB was compiled by Natural England, Kent County Council, Kent Wildlife Trust, Maidstone Museum and local specialist recorders. Species on the inventory include all those located in Kent and listed on the EC Habitats Directive, EC Birds Directive, Bern Convention, Bonn Convention, UK Biodiversity Action Plan, national Red Data lists, nationally 'Notable' and 'Scarce' species or are considered a local rarity. Categorisation of species is determined by the number of 2km by 2km National Grid squares (tetrads) in which they occur in the county. Other factors are taken into account such as the dependence of a species on a threatened habitat or the rate of decline/spread.

KRDB 1. Endangered. Species that have been recorded in 1-2 tetrads.

KRDB2. Vulnerable. Species that have been recorded in 3-5 tetrads, or are considered to be undergoing a significant decline.

KRDB3. Rare. Species that have been recorded in 6-10 tetrads.

KRDB4. (Flies only) Species categorised as RDB1, 2, 3 or K nationally and have been recorded in over 10 discrete sites in Kent.

APPENDIX D
Conservation Status Categories for Birds

Birds of Conservation Concern 3 (BoCC3) Categories

BoCC3 is a quantitative review of the population status of British birds, produced in 2009 by the UK's leading bird conservation organisations.[1] Species on the Green list are considered of low conservation concern whereas those on the Amber and Red lists are considered of medium and high conservation concern respectively. Species are categorised using the following criteria;

Red list.

- Globally threatened according to IUCN criteria
- Historical population decline in UK during 1800-1995
- Severe (≥50%) decline in UK breeding population over last 25 years or since 1969
- Severe (≥50%) decline in UK non-breeding population over last 25 years or since 1969
- Severe (≥50%) contraction of UK breeding range over last 25 years or since 1969

Amber list.

- Species of European Conservation Concern (SPEC)
- Historical population decline during 1800-1995, but recovering; population size has more than doubled over last 25 years
- Moderate (25≥p<50%) decline in UK breeding population over last 25 years or since 1969
- Moderate (25≥p<50%) decline in UK non-breeding population over last 25 years or since 1969
- Moderate (25≥p<50%) contraction in UK breeding range over last 25 years or since 1969
- UK breeding population of <300 pairs or non-breeding population or <900 individuals
- ≥50% of UK breeding or non-breeding population found on ≤10 sites
- ≥20% of European breeding or non-breeding population found in the UK

Kent Red Data Book (KRDB) Categories

KRDB is a list of rare or threatened species in Kent, or those for which Kent holds a significant proportion of the British population. Due to their ecology the standard criteria for categorising KRDB species was deemed unsuitable for birds. The list was written with the Kent Ornithological Society and the following criteria used;

KRDB 1. Endangered. Breeding species with 25 pairs or fewer in Kent.

KRDB 2. Vulnerable. Breeding species with over 25 pairs in Kent but featuring on the national **Red List** for their breeding decline.

KRDB 3. Rare;

- species for which Kent holds >15% of the British population
- species that breed in 20 or fewer 2km tetrads in Kent
- nationally rare species (<1000 breeding pairs in Britain)
- nationally localised species (breeding in <15% of 10km x 10km squares in Britain)
- BTO high alert species

[1] Eaton MA, Brown AF, Noble DG, Musgrove AJ, Hearn R, Aebischer NJ, Gibbons DW, Evans A and Gregory RD (2009) Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds* 102, pp296–341.



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Annex EDP 13
2012 Botanical Survey Report (CBA, 2012)

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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Botanical Survey Report

December 2012

CHRIS BLANDFORD ASSOCIATES
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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Botanical Survey Report

Approved	Bill Wadsworth
Position	Senior Associate (Ecology)
Date	15th December 2012
Revision	Final

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A: Total Species Lists with Relative Frequency and Abundance

1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings (LRCH) Ltd. to undertake a series of ecological surveys to inform the Environmental Impact Assessment for the proposed London Paramount development at Swanscombe, North Kent.

1.1.2 This report details the results of the botanical survey that was carried out during May and June 2012, of land in and around Swanscombe Marsh and the adjoining peninsula, and at Bamber Pit near Swanscombe (herein referred to as 'the Site').

1.2 Scope

1.2.1 The scope of the survey was to identify and evaluate the plant species and communities present that could be affected by the proposed development.

Survey Limitations

1.2.2 Some areas within the proposed development area were excluded due to access restrictions, however, beyond this, there were no limitations to the survey.

2.0 METHODOLOGY

2.1 Scope of Survey

2.1.1 The requirement to undertake a botanical survey for the Site results from the possibility of there being rare and/or important plant species and communities present, identified during the desk-top study and Phase 1 habitat survey carried out by CBA in April-May 2012.

2.1.2 The desk-top study identified 52 notable species of vascular plant, lichen or fungi within a 2km radius of the proposed development area. The species records which were supplied by Kent and Medway Biological Records Centre (KMBRC) with an accurate grid reference of at least 6 figures (100m precision) have been shown in **Figure 1**. Species previously found on the Swanscombe Peninsula and in Bamber Pit include Townsend's cord-grass *Spartina x townsendii,* Borrer's saltmarsh-grass *Puccinellia fasciculata,* slender hare's-ear *Bupleurum tenuissimum,* divided sedge *Carex divisa* and round-leaved wintergreen *Pyrola rotundifolia*.

2.1.3 The results of the Phase 1 habitat survey suggested that the most botanically interesting habitats on Site were likely to be the areas of saltmarsh, open mosaic habitats on previously developed land and grassland with a slight calcareous influence and shorter sward height. During the botanical survey, effort was targeted at these habitat types.

2.2 Survey Methodology

2.2.1 Botanical surveys were carried out during May and June 2012 by professional ecologists working for CBA, and the methodologies used are described below. The locations of surveyed areas and habitats are illustrated in **Figure 2**.

2.2.2 Nomenclature for plant species follows Stace[1].

Habitats

2.2.3 Habitats were divided into grassland and early successional/ruderal, scrub and woodland, wetland (open water, reedbed and ditches) and salt-marsh. In each area surveyed all species identified were recorded and a broad indication of their frequency and abundance was given using the DAFOR scale (Dominant, Abundant, Frequent, Occasional and Rare). Notes were also taken of the general features of the different habitats and areas, their appearance and

[1] Stace C., 2010. New Flora of the British Isles, third edition. Cambridge University Press.

structure. Where possible and appropriate, the plant communities present have been referred to the most relevant National Vegetation Classification community[2].

Rare and Scarce Species

2.2.4 The location and extent of rare and scarce plant species, as represented by species included in the Kent Red Data List (which includes both Nationally and Kent rare and scarce species), was recorded, as was a broad indication of population size.

2.3 Evaluation Methodology

2.3.1 Habitats and species were evaluated using a range of criteria and plans, such as those outlined by Ratcliffe[3], including size, diversity, naturalness, rarity, geographical position and fragility, the potential for substituting the habitat, criteria for the selection of sites for SSSI designation[4] and for Local Wildlife Sites in Kent[5], Kent Priority Habitat and Species Action Plans[6], the UK Red Data List for vascular plant species[7], Scarce Plants in Britain[8] and Kent Red Data Book[9]. In all cases evaluations were based only on the flora of the surveyed areas and did not include evaluation for other characteristics.

[2] Rodwell, J.S. (ed) et al, 1991-2000. British Plant Communities Volumes 1-5. Cambridge University Press.
[3] Ratcliffe, D., 1977. A Nature Conservation Review, Volume 1. Cambridge University Press.
[4] Nature Conservancy Council , 1989. Guidelines for selection of biological SSSIs. Nature Conservancy Council.
[5] Kent Wildlife Trust on behalf of the Kent Biodiversity Partnership, 2006. Local Wildlife Sites in Kent (Sites of Nature Conservation Interest) Criteria for Selection and Delineation Version 1.3.
[6] http://www.kentbap.org.uk/habitats-and-species/ accessed 25-10-2012
[7] Cheffings, C.M. and Farrel, L. (eds.), 2005. The Vascular Plants Red Data List for Great Britain. JNCC.
[8] Stewart, A., Pearman, D.A. and Preston, C.D, 1994. Scarce Plants in Britain. JNCC.
[9] Kent Wildlife Trust, 1999. Provisional Red Data Book for Kent.

3.0 RESULTS

3.1 Swanscombe Marsh and Peninsula

3.1.1 The areas and habitats surveyed are shown in **Figure 2** and the location of **Nationally Scarce** species recorded during the survey are shown in **Figure 3**. Specific reference to a given area (e.g. **G1** or **Grassland 1**) is mentioned in the text and also shown in **Figure 2. Appendix A** lists the full results of the botanical survey for grassland and early successional/ruderal, woodland, and saltmarsh habitats respectively.

Habitats

Grassland and early successional/ruderal

3.1.2 These habitats share many species but are variable in structure and appearance, from sparsely vegetated areas to dense, coarse swards. With the exception of parts of the seawall/embankment, much of this vegetation appears to be unmanaged or to receive very low levels of management. Parts of the Site have clearly been subject to substantial disturbance and material appears to have been imported into the Site, creating a range of different growing conditions. On the whole therefore the variable structure of the vegetation appears likely to be attributable in large part to differences in disturbance regime, including the period of time following significant disturbance, as well as differences in growing conditions, including productivity. Within the communities there are elements characteristic of maritime or coastal locations, as well as of calcareous soils. Scrub (see below), of varying density is scattered throughout many of the grassland areas.

Grassland

3.1.3 Much of the Site, including the northern part of the peninsula, the area to the west of Swanscombe Marsh and the sides of the landfill area comprise a coarse sward dominated by Common couch *Elytrigia repens*, Sea couch *Elytrigia athericus* and/or False oat-grass *Arrhenatherum elatius* (**G1**). Cocksfoot *Dactylis glomerata* and Yorkshire fog *Holcus lanatus* are also widespread and locally abundant. Much of this is very species poor with a limited number of forbs such as Hawkweed oxtongue *Picris hieracioides*, Wild carrot *Daucus carota* and hogweed *Heracleum sphondyllium*. However, some areas of this grassland do support significant quantities of the **Nationally Scarce** Yellow vetchling *Lathyrus aphaca*, as well as smaller quantities of the **Nationally Scarce** Bithynian vetch *Vicia bithynica*. Most of this grassland can be attributed to NVC MG1 *Arrhenatherum elatius* – False oat grass grassland, a

grassland characteristic of low levels of management (cutting or grazing) with, in some areas, affinities to SM24 *Elymus pycnanthus* (*Elytrigia athericus*) saltmarsh.

3.1.4 Among this coarse grassland, particularly in the northern part of the site, there are pockets of less coarse and more species rich grassland, These support a range of grassland species characteristic of neutral to alkaline soils, such as Birds-foot trefoil *Lotus corniculatus*, Narrow-leaved birds-foot trefoil *Lotus tenuis*, hop trefroil *Trifolium campestre*, wild carrot, ox eye daisy *Leucanthemum vulgare*, Hawkweed oxtongue, Smooth tare *Vicia tetrasperma* and Yellow-wort *Blackstonia perfoliata*. Such areas also support a number of orchid species, of which the most frequent and numerous is Bee orchid *Ophrys apifera*, but Pyramidal *Anacamptis pyramidalis* and Common spotted *Dactylorrhiza fuchsia* are also present. A small group of 10-12 flowering spikes of the **Nationally Scarce** Man orchid *Orchis anthropophora* was also recorded in one area of such grassland.

3.1.5 Also located within this grassland in the northern part of the peninsula there are some small areas which exhibit a saline influence, with dominant Reflexed saltmarsh grass *Puccinellia distans* and frequent Lesser sea spurrey *Spergularia marina* (NVC SM23 *Spergularia marina-Puccinellia distans* lesser sea spurrey-reflexed salt-marsh grass saltmarsh community). Sea beet *Beta vulgaris* is also occasional in this area.

3.1.6 A large stand of the invasive non-native Giant hogweed *Heracleum mantegazzianum* is present on the eastern side of the landfill area.

3.1.7 In addition to the small pockets of more species rich grassland described above there are some larger areas of moderately species-rich grassland (**G2**, **G3**, **G4** and **G5**) in which forb cover is relatively high (50% and above), including a range of typical grassland species such as Red and White clover *Trifolium pratense* and *repens*, Black medick *Medicago lupulina*, Meadow vetchling *Lathyrus pratensis*, Bird's-foot and Narrow-leaved bird's foot trefoils, Ox-eye daisy, Hedge bedstraw *Galium mollugo*, Perforate St John's wort *Hypericum perforatum*, Ribwort plantain *Plantago lanceolata*, Wild marjoram *Origanum vulgare* and Red bartsia *Odontites verna*. These areas are described briefly below. With the possible exception of G6 and G7 these grasslands have affinities with the NVC MG5 *Cynosorus cristatus-Centaurea nigra* Crested dog's-tail-Common knapweed grassland, a characteristically forb-rich grassland developed on neutral soils. The coarser areas are attributable to MG1 *Arrhenatherum elatius* – False oat grass grassland.

3.1.8 **G2 -** This is located on a section of the seawall/embankment. It includes frequent grass vetchling Lathyrus nissiola and populations of the Nationally Scarce Yellow vetchling and

Bithynian vetch. This area was mown during the course of the survey and periodic mowing probably contributes to the maintenance of species diversity in this area. However, mowing of the Nationally Scarce species prior to seed set is likely to negatively impact their populations, especially as both are annual species and reliant on annual seed set and recruitment for population survival.

3.1.9 **G3 -** This has a variable sward, including both short and coarser parts. A feature of the shorter areas is abundant Hop trefoil and the grassland also supports the Nationally Scarce Yellow vetchling and Bithynian vetch.

3.1.10 **G4 -** This has high forb cover, with over 80% in parts. Wild marjoram is notably abundant here and there is a small population of the Nationally Scarce Bithynian vetch. There are some areas of very short sward with characteristic species such as Mouse-ear hawkweed *Pilosella officinarum*, Thyme-leaved sandwort *Arenaria serpyllifolia* and Eyebright *Euphrasia* sp.

3.1.11 **G5 -** This area has a moderately tall to coarse sward in which Wild marjoram and Common knapweed *Centarea nigra* are both notably abundant, the latter more so than elsewhere in the Site.

3.1.12 **G6 -** This area has a relatively fine sward with much red fescue. Forb cover is quite high and generally greater than 50%. However, on the whole the sward is less species rich than the last four areas described with the forb element generally dominated by a relatively small number of species, especially Black medick and Plantains. There are groups of bee and pyramidal orchids.

3.1.13 **G7 -** This comprises the top of the landfill area. It supports a distinctive sward dominated by abundant narrow-leaved bird's-foot trefoil with red and white clover, false oat grass, squirrel-tail fescue *Vulpia bromoides* and common couch.

Early successional/ruderal

3.1.14 A ruderal element is present throughout much of the grassland. However, through the central part of the Site there are a number of areas where the vegetation is sparse and open to varying degrees (**G8**), probably as result of disturbance and/or where the substrate is of inherently low fertility, for example on aggregates such as sands, gravels and concrete waste. The sward varies from very open, with much bare ground, to an almost closed sward. In the southernmost of these areas the vegetation is largely confined to gaps between areas of concrete.

3.1.15 Many of the species present are shared with the adjoining grasslands. However, the ruderal element is generally more prominent in such areas, conspicuous amongst which, for example, are hoary mustard *Hirschfeldia incana*, bastard cabbage *Rapiastrum rugosum*, perennial wall rocket *Diplotaxis tenuifolia*, Oxford ragwort *Senecio squalidus*, Canadian fleabane *Conyza canadensis* and melilot species *Melilotus* spp. The invasive non-native butterfly bush is frequent and locally abundant in these areas.

3.1.16 There are some small depressions within these areas which hold water during at least part of the year and these support small stands of common reed *Phragmites australis*, as well as a small number of other wetland species.

3.1.17 In addition, some areas of cleared or felled scrub and woodland also support ruderal vegetation, largely comprising common and widespread ruderal species such as nettle *Urtica dioica*, thistles *Cirsium* species, willowherbs *Epilobium* species and cleavers *Galium aparine*. These include a section of the woodland described below (**W1**), and an area in the west of the Site. A track in this area supports a small population of the **Nationally Scarce** divided sedge *Carex divisa*. It is possible that this species may be present elsewhere in the site, for example in the grassland to the east (towards Swanscombe Marsh) although it was not observed during the survey and the grassland in this area is generally very coarse.

3.1.18 The grassland and ruderal areas as a whole support a number of non-native legume species, including fodder vetch *Vicia villosa*, sand lucerne *Medicago sativa* ssp. *sativa*, goats rue *Galega officinalis*, broad-leaved everlasting pea *Lathyrus latifolius* and white melilot *Melilotus albus*.

Waterbodies

3.1.19 There are two main waterbodies in the site. The central one has stands of common reed of variable width (up to approx. 10m) on its perimeter. These support a limited number of marginal species such as woody nightshade *Solanum dulcamara*, hemlock water dropwort *Oenanthe crocata*, hemp agrimony *Agrimonia eupatoria* and great willowherb *Epilobium hirsutum*.

3.1.20 The waterbody in the south western corner of the site has very limited emergent and marginal vegetation, including small stands of common reed and reedmace *Typha latifolia*, occasional clumps of hard rush *Juncus inflexus* and jointed rush *Juncus articulatus* and some great willowherb.

3.1.21 There is a smaller pond to the north of this, set at the bottom of steep wooded banks. Observed from the top of one the banks it appeared to support little or no aquatic, emergent or marginal vegetation.

Reedbed

3.1.22 There are two larger areas of reedbed, Swanscombe Marsh and the site of the old sewage works together with an area immediately to its east. These areas were viewed from their edges but they appear to be overwhelmingly dominated by common reed with scattered willows *Salix* species. On the northern edge of the Swanscombe Marsh reedbed there are also some stands of sea club-rush *Bolboschoenus maritimus*.

3.1.23 There is a smaller area of common reed and ruderal vegetation, including thistles and willowherbs, to the south of the HS1 exit which was viewed from its south western corner.

Ditches

3.1.24 There is a network of ditches throughout the site. Apart from the wide ditch in the western part of the site (**D1**), which supports abundant fennel pondweed *Potomogeton pectinatus* little or no aquatic vegetation was observed. However, many of the ditches support extensive stands of common reed and/or reedmace, although locally there are also stands of branched bur-reed *Sparganium erectum*. The vegetation of the ditch edges includes a small number of common marginal species such as woody nightshade, hemlock water dropwort, hemp agrimony and great willowherb.

Scrub

3.1.25 Scattered and dense scrub is widespread throughout the site. This includes a range of species typical of neutral to calcareous soils, including especially Bramble *Rubus fruticosus*, Hawthorn *Crataegus monogyna*, Dog rose *Rosa canina*, Dogwood *Cornus sanguinea* and Wild privet *Ligustrum vulgare*. The field layer largely comprises species typical of the adjoining grasslands or ivy and bramble, although there is also much bare ground in the denser areas scrub. This is attributable to the NVC W21 *Crataegus monogyna-Hedera helix* Hawthorn-Ivy scrub community. The invasive non-native butterfly bush *Buddleia davidii* is also frequent and locally abundant among the scrub, especially in the southern part of the Site. In some areas the scrub is developing into woodland, with Ash *Fraxinus excelsior*, Sycamore *Acer pseudoplatanus* and Silver birch *Betula pendula* and very locally Alder *Alnus glutinosa*. In wetter areas, including some of the areas of reedbed and wet grassland, there are willows, including Grey *Salix*

cinerea, Goat *Salix caprea*, White *Salix alba*, Crack *Salix fragilis* and Osier *Salix viminilis* willows.

Woodland

3.1.26 In the south western part of the site there is an area of more mature woodland (W1). This appears to be characteristically species poor secondary woodland of recent development. The canopy is dominated by sycamore, with occasional ash and silver birch. The shrub layer includes frequent and locally abundant ash and sycamore regeneration as well as frequent dogwood and wild privet, locally abundant butterfly bush and occasional hawthorn and elder *Sambucus nigra*. The field layer is species poor and dominated by ivy *Hedera helix*, with bramble, nettle *Urtica dioica* and herb Robert *Geranium robertianum*. This comprises a species poor form of the NVC W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* Ash-Field maple-Dog's mercury woodland community, and specifically of the *Hedera helix* Ivy sub-community.

Salt-marsh

3.1.27 A narrow strip of salt-marsh (up to approx. 40m at its widest) is present around the edge of most of the peninsula (S1). Much of the lower part of this is dominated by common salt-marsh grass *Puccinellia maritima* (NVC SM13 *Puccinellia maritima* salt-marsh community), although sea purslane *Atriplex portulacoides* and sea club-rush are also locally dominant. There are also some small areas of cord grass *Spartina anglica*. In addition to the dominant species, a range of other saltmarsh species are present and these can be frequent and locally abundant, including sea aster *Aster tripolium*, sea arrowgrass *Triglochin maritimum*, sea plantain *Plantago maritima*, lesser sea spurrey, sea milkwort *Glaux maritima*, English skurvygrass *Cochleria anglica*, sea rush *Juncus maritimus*, sea-beet *Beta maritima*, spear-leaved orache *Atriplex prostrata*. Some of these are locally abundant. Reflexed salt-marsh grass is locally abundant in some parts of the saltmarsh with lesser sea spurrey, including a number of wet depressions or pans (NVC SM23 *Spergularia marina- Puccinellia distans* lesser sea spurrey-reflexed salt-marsh grass salt-marsh community). Upper parts of the marsh, where they merge into the adjoining grassland, are mostly strongly dominated by sea couch *Elytrigia atherica* (NVC SM23 *Elymus pycnanthus* (*Elytrigia atherica*) Sea couch salt-marsh community) with mostly occasional other species, such as sea beet and spear-leaved orache. A small number of plants of the **Nationally Scarce** golden samphire *Inula crithmoides* are present in the saltmarsh and on the adjoining seawall.

3.1.28 There is a further area of upper salt-marsh vegetation (S2) between the two embankments in the north western part of the site. This includes saltmarsh rush *Juncus gerardii*, sea couch, sea aster,

sea plantain, sea arrowgrass and lesser sea spurrey. There is an area of standing water at its western end with common reed and sea club-rush.

Notable Species

Nationally Scarce species

3.1.29 As noted above five Nationally Scarce species were recorded from the site (described above). They are listed in **Table 1** below with habitat/location and an indication of population size.

Table 1 Nationally Scarce Species recorded during the 2012 Survey

Common Name	Scientific Name	Habitat	Population size
Yellow vetchling	*Lathyrus aphaca*	Grassland (G1, G2, G3, including coarse)	Large - thousands
Bithynian vetch	*Vicia bithynica*	Grassland (G1, G2, G3, G4, though rare or absent in coarsest)	Medium-large – at least hundreds
Man orchid	*Orchis anthropophora*	Grassland (G1)	Small – 10 spikes in small area
Divided sedge	*Carex divisa*	Grassland/ruderal (G1/ruderal, on track – possibly present elsewhere)	Small – small number of plants along track
Golden samphire	*Inula crithmoides*	Saltmarsh/seawall (S1)	Small – few plants

3.2 Bamber Pit

3.2.1 The areas and habitats surveyed are shown in **Figure 2. Appendix A** lists the full results of the botanical survey for grassland and ruderal, scrub and woodland respectively.

Habitats

Grassland and ruderal

3.2.2 The southern part of the pit supports a species poor to (locally) moderately species rich grassland. Much of this is dominated by false oat grass and cocksfoot (NVC MG1 *Arrhenatherum elatius* – False oat grass grassland), although there are some shorter and more open areas with creeping bent *Agrostis stolonifera* and red fescue *Festuca rubra*. Other frequent or abundant species include hawkweed oxtongue, perforate St John's wort, black medick, red bartsia, narrow-leaved birds foot trefoil and cinquefoil *Potentilla reptans*. In the southernmost part of the pit there are some areas of a very short, heavily rabbit grazed grassland with thyme-

leaved sandwort and procumbent pearlwort *Sagina procumbens*. Parts of the bottom of the pit also have a short and sparse, heavily rabbit grazed sward, with scattered field forget-me-not *Myosotis arvensis*, vipers bugloss *Echium vulgare* and centaury *Centaurium erythraea*.

3.2.3 Much of the northern part of the pit appears to have been used for landfill and supports ruderal vegetation dominated by hoary mustard, with hemlock *Conium maculatum*, common mallow *Malva sylvestris* and teasel *Dipsacus fullonum*.

Water body

3.2.4 A water body located in the eastern part of the pit supports a few patches of white water-lily *Nymphaea alba* at its western end but no other aquatic vegetation was observed. Due to the steepness of the banks there is little emergent or marginal vegetation, although a few small patches of water mint *Mentha aquatica*, woody nightshade, great willowherb and hemp agrimony are present.

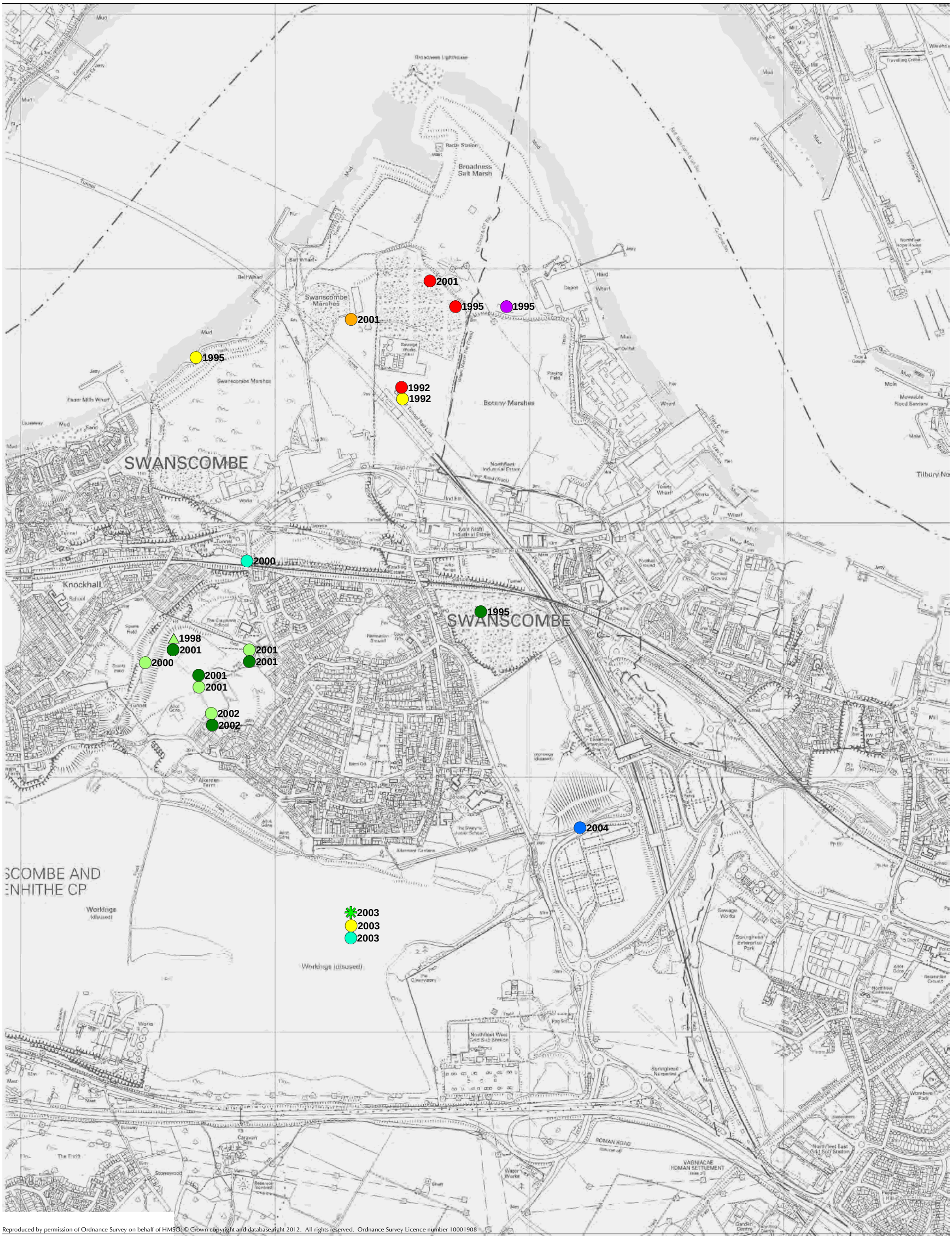
Scrub and woodland

3.2.5 There is scattered and dense scrub throughout the grassland and ruderal vegetation, including bramble, hawthorn, dog rose, dogwood, wild privet and elder. The invasive non-native butterfly bush is also frequent and locally abundant and a number of other non-native trees and shrubs are scattered throughout the pit. In some areas the scrub is developing into woodland, for example in the south western corner, where there is locally abundant silver birch. The field layer here is species poor and strongly dominated by ivy. The invasive non-native wall Cotoneaster *Cotoneaster horizontalis* is present in and around this area of developing woodland. On the banks adjoining the water body grey and goat willow are locally abundant.

Cliff faces

3.2.6 The chalk cliff faces on the western and northern sides of the pit support ivy, red valerian *Centranthus ruber*, perennial wall rocket and the invasive non-natives butterfly bush and wall cotoneaster.

FIGURES



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KEY

Vascular Plant Species

- Divided Sedge
- Slender Hare's-Ear
- Townsend's Cord-Grass
- Borrer's Saltmarsh-Grass
- Sea Barley
- Green-flowered Helleborine
- Round-leaved Wintergreen
- Wintergreen

Lichen and Fungi Species

- *Peltigera rufescens*
- Verdigris Navel

2003 Date of Record

It should be noted that species locations are approximate - based on at least 6 figure grid references with an accuracy of 100m

0 250 500 m

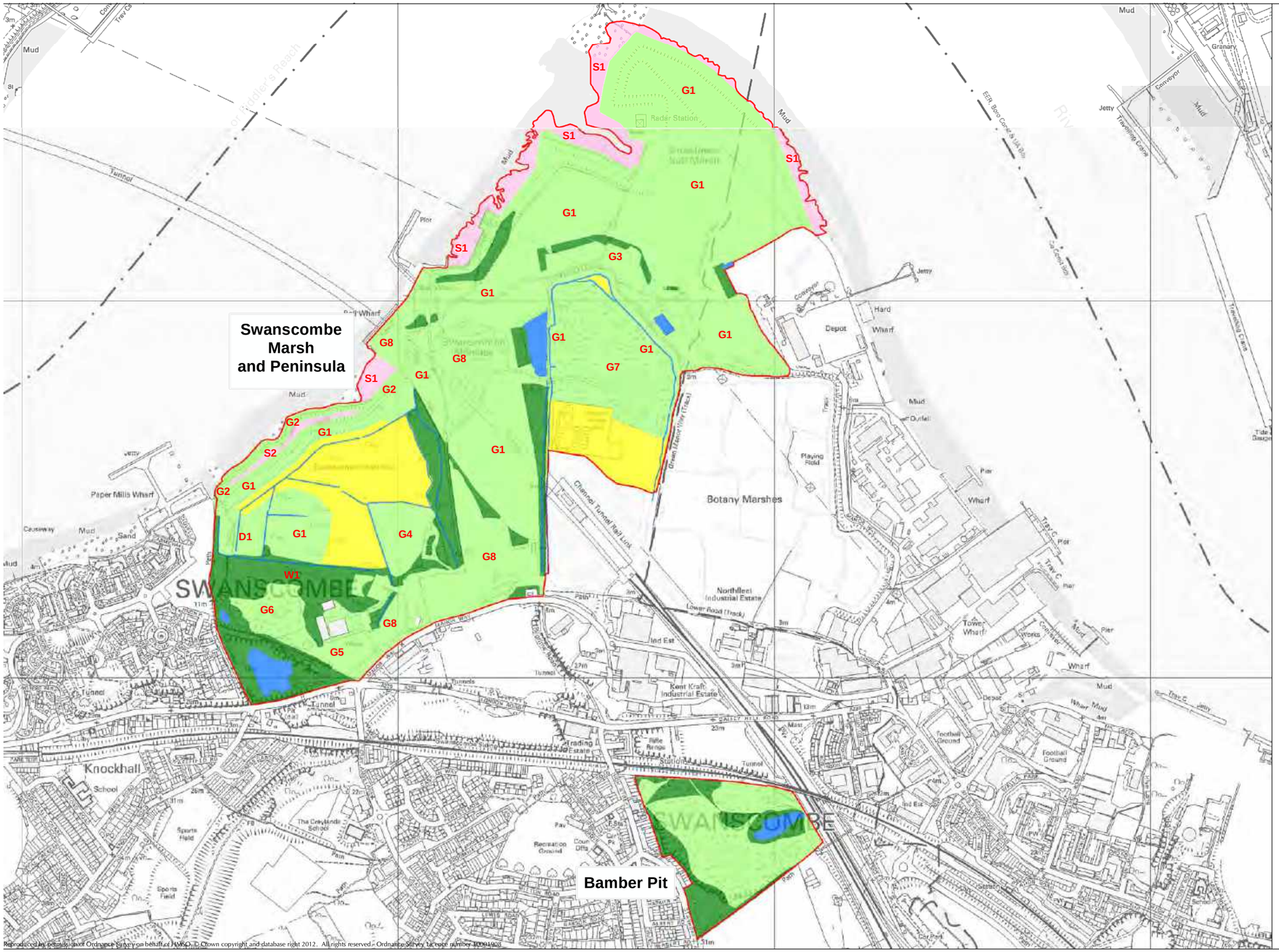
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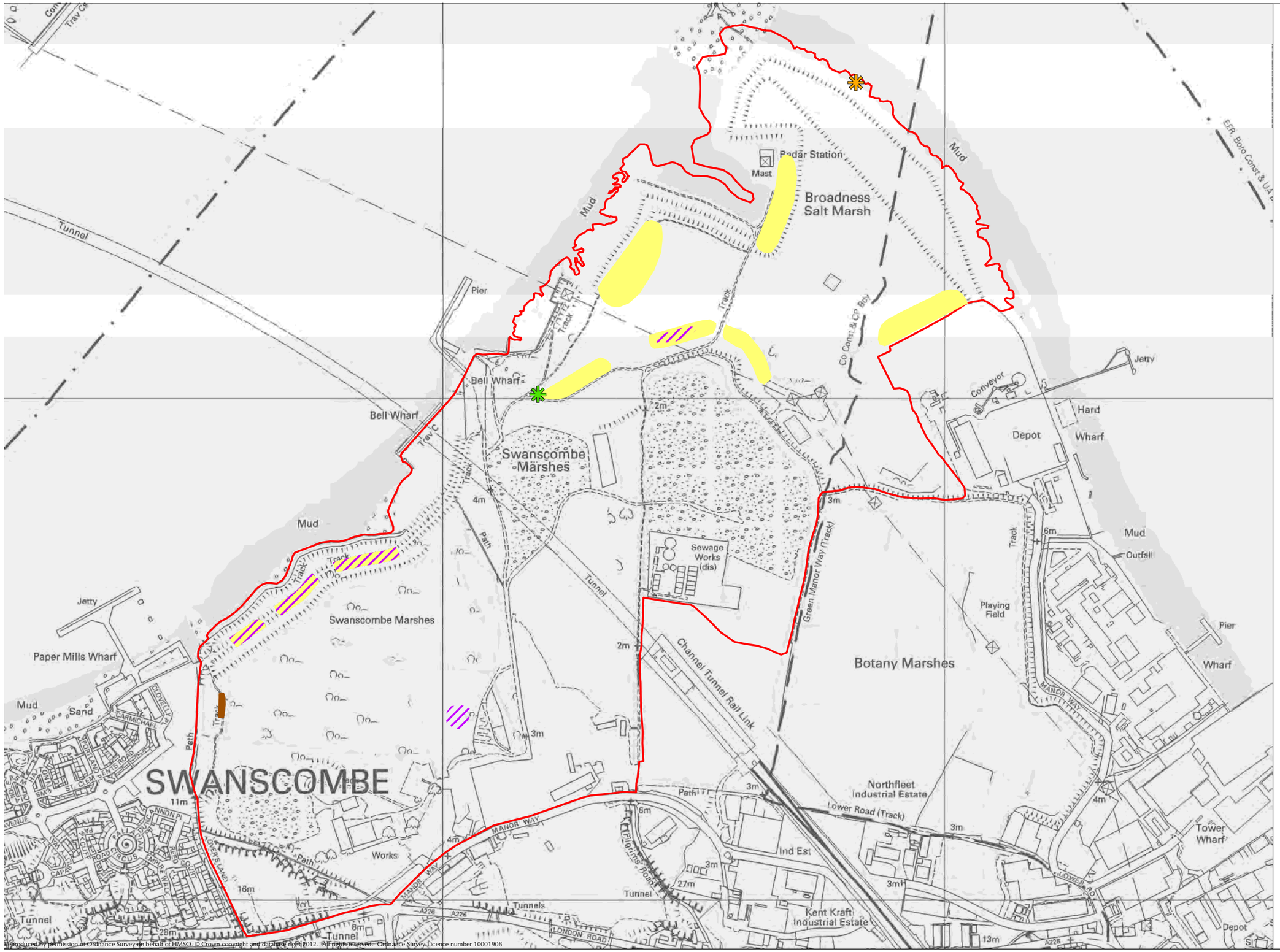
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FIGURE 1
Notable Plant, Lichen and Fungi Records (based on desk-top study data provided by KMBRC)

JUNE 2012



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FIGURE 3
Location of Nationally Scarce Plant Species (recorded during the 2012 survey)

APPENDICES

APPENDIX A

Total Species Lists with Relative Frequency and Abundance

Swanscombe Marsh and Peninsula

DAFOR Scale = Dominant, **A**bundant, **F**requent, **O**ccasional, **R**are (L = Locally or Patchily)

Habitat : Grassland and Early Successional/Ruderal

Scientific Name	Common Name	G1	G2	G3	G4	G5	G7	G8
Agrostis stolonifera	Creeping bent					O		O
Anisantha sterilis	Barren brome	O/LA	R					R
Arrhenatherum elatius	False oat-grass	F/LA or D	F/LA	O	F/LA	A	F/LA	F
Brachypodium sylvaticum	Wood false-brome		LA					
Bromus hordaceous	Soft brome	O	F	R	R			F
Catapodium rigidum	Fern grass		R		R			O
Dactylis glomerata	Cocksfoot	F/LA	F/LA	F/LA				O
Elytrigia pycnanthus	Sea couch	F/LA or D	O/LF	F/LA				O
Elytrigia repens	Common couch	F/LA or D	F/LA	O/LA		F/LA	O/LA	
Schedonorus arundinaceus	Tall fescue	O/LF	O					O
Festuca rubra	Red fescue	O/LA	F/LA	A	F/LA	F/LA		F
Holcus lanatus	Yorkshire fog	F			O	O	O	F
Lolium perenne	Perennial rye-grass				R		O	
Phleum bertolonii	Small cat's-tail	O/LA						
Phragmites australis	Common reed							R
Poa pratensis	Smooth meadow-grass	O	O	O	R			O
Poa trivialis	Rough meadow-grass	O	O		R			R
Puccinellia distans	Reflexed saltmarsh grass	O/LA						
Vulpia bromoides	Squirrel-tail fescue				F		F	O/LF
Carex flacca	False fox sedge							R
Carex otrubae	Glaucus sedge		R					
Juncus inflexus	Hard rush	R						

Scientific Name	Common Name	G1	G2	G3	G4	G5	G7	G8
Aceras anthropophorum	Man orchid	R						
Achillea millefolium	Yarrow	O	O			O		
Agrimonia eupatoria	Common agrimony					R		
Anacamptis pyramidalis	Pyramidal orchid	R						
Anthyllis vulneraria	Kidney vetch	R	R					
Arctium sp.	Burdock	R						
Arenaria serpyllifolium	Thyme-leaved sandwort				O			
Artemisia vulgaris	Mugwort	O					R	O
Ballota nigra	Black horehound	R						
Bellis perennis	Daisy		O/LF					
Beta vulgaris	Sea beet	O						
Blackstonia perfoliata	Yellowort	O	R	O	O			O
Centaurea nigra	Common knapweed	R		LA		F/LA		
Centaurium erythraea	Common centaury							O
Centrantus rubra	Red valerian		R					O
Cerastium fontanum	Comon mouse-ear		O					O
Chenopodium rubrum	Red goosefoot	R						
Cirsium arvense	Creeping thistle	O/LF	O				R	
Cirsium vulgare	Spear thistle	R						
Conyza canadensis	Canadian fleabane							O/LF
Crepis vesicaria	Beaked hawksbeard	O/LF	O/LF		R	R		F
Dactylorrhiza fuchsii	Common spotted orchid	R			R			
Daucus carota	Wild carrot	F	F	F/LA	F	F		F
Diplotaxis tenuifolia	Perennial wall rocket	O	O					F
Dipsacus fullonum	Teasel	R						
Euphrasia nemerosa	Common eyebright				O			
Galega officinalis	Goat's rue							R
Galium aparine	Cleavers	R						
Galium album	Hedge bedstraw					F		
Geranium dissectum	Cut-leaved cranesbill	R		F				
Geranium molle	Dove's-foot cranesbill		R					
Heracleum mantegazzianum	Giant hogweed	LA						

Scientific Name	Common Name	G1	G2	G3	G4	G5	G7	G8
Heracleum sphodyllium	Hogweed		R					
Hieracium sp.	Hawkweed				R			
Hirschfeldia incana	Hoary mustard		R					F
Hypericum perforatum	Perforate St. John's-wort	R			F	F		O
Inula conyzae	Shepherd's spikenard					R		
Lactuca serriola	Prickly lettuce					O		R
Lathyrus aphaca	Yellow vetchling	O/LA	O/LA	O				
Lathyrus latifolius	Broad-leaved everlasting pea	R						
Lathyrus nissiola	Grass vetchling		O/LF					
Lathyrus pratensis	Meadow vetchling		F/LA			LA		
Lathyrus sylvestris	Narrow-leaved everlasting pea	R						
Leontodon hispidus	Rough hawkbit					R		
Leucanthemum vulgare	Ox-eye daisy	O	F	O				O
Linaria purpurea	Purple toadflax	R						R
Linaria vulgaris	Common toadflax	R			R			R
Lotus corniculatus	Bird's-foot trefoil	R	F	R	R			O
Lotus tenuis	Narrow-leaved bird's foot trefoil	O	F/LA	O	F/LA		A	F/LA
Malva sylvestris	Common mallow	R						R
Medicago arabica	Spotted medick		O					R
Medicago lupulina	Black medick		F	R	F/LA	F/LA		O
Medicago sativa ssp. varia	Sand lucerne	O/LF	O/LF		O		F/LA	F
Melilotus albus	White melilot	O	R		O			F
Melilotus altissimus	Tall melilot	O	R		O			F
Odontites verna	Red bartsia		O	O	O			
Ophrys apifera	Bee orchid	R		R				
Origanum vulgare	Wild marjoram	O/LF	R	O	O/LF	F/LA		O
Orobanche minor	Common broomrape		R					
Papaver rhoeas	Common poppy		R					R
Picris echioides	Bristly oxtongue	O		O		R		
Picris hieracioides	Hawkweed oxtongue	F	F	O	F	O		F/LA
Pilosella officinarum	Mouse-ear hawkweed							

Scientific Name	Common Name	G1	G2	G3	G4	G5	G7	G8
Plantago coronopus	Bucks-horn plantain							R
Plantago lanceolata	Ribwort plantain		F/LA	R	F			F
Potentilla reptans	Cinquefoil	O/LA				O/LA		O
Ranunculus acris	Meadow buttercup	R						
Ranunculus bulbosus	Bulbous buttercup		O					
Ranunculus flammula	Lesser spearwort							R
Ranunculus repens	Creeping buttercup	R						
Rapiastrum rugosum	Bastard mustard							LF
Reseda lutea	Mignonette							R
Rumex obtusifolius	Broad-leaved dock	R	R					O
Senecio erucifolius	Hoary ragwort	O	F	O	O	F		O
Senecio jacobaea	Common ragwort	O	O/LF		O	O		O
Senecio squalidus	Oxford ragwort							F
Senecio vulgaris	Groundsel							O
Silene latifolia	White campion		R					
Silene vulgaris	Bladder campion		R					
Smyrnium olusatrum	Alexanders	R						
Sonchus arvensis	Perennial sowthistle	R						
Sonchus asper	Prickly sowthistle		R	R				
Sonchus olraceous	Smooth sowthistle							
Spergularia marina	Lesser sea spurrey	LF						
Taraxacum officinale agg.	Dandelion	O	O					F
Torilis japonica	Upright hedge parsley					O		
Trifolium arvense	Hare's-foot clover				R			
Trifolium campestre	Hop trefoil	O/LA	R	F/LA	F			O
Trifolium dubium	Lesser hop trefoil	R	R	R				
Trifolium pratense	Red clover	O	F/LA		F	F/LA	F/LA	O
Trifolium repens	White clover	O/LF	O/LF		O	O	F/LA	O
Tussilago farfara	Coltsfoot		O				R	
Urtica dioica	Nettle	O						
Veronica arvensis	Wall speedwell		R					
Veronica catenata	Pink water speedwell							R

Scientific Name	Common Name	G1	G2	G3	G4	G5	G7	G8
Veronica chamaedrys	Germander speedwell		R					
Vicia bithyinica	Bithynian vetch	R	O/LA	O	LA			
Vicia hirsuta	Hairy tare		O					
Vicia sativa	Common vetch	O	F			O		O
Vicia tetrasperma	Smooth tare	O	O					
Vicia villosa	Fodder vetch		R	O	O		O	R

Nationally Scarce species

Invasive non-native species - listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended)

Habitat: Woodland

Scientific Name	Common Name	W1
Canopy		
Acer pseudoplatanus	Sycamore	A
Betula pendula	Silver birch	O
Fraxinus excelsior	Ash	O
Populus tremula	Aspen	R
Shrub		
Acer pseudoplatanus	Sycamore	F/LA
Buddleia davidii	Butterfly bush	O/LA
Cornus sanguinea	Dogwood	F
Crataegus monogyna	Hawthorn	O
Fraxinus excelsior	Ash	F/LA
Ligustrum vulgare	Wild privet	F
Quercus ilex	Holm oak	R
Sambucus nigra	Elder	O
Viburnum lantana	Wayfaring tree	R
Field		
Brachypodium sylvaticum	Wood false-brome	O
Geranium robertianum	Herb robert	O/LF
Hedera helix	Ivy	A/LD
Lamium album	White deadnettle	R
Rubus fruticosus	Bramble	F/LA
Stachys sylvatica	Hedge woundwort	R
Urtica dioica	Nettle	O

Habitat: Saltmarsh

Scientific Name	Common Name	S1	S2
Aster tripolum	Sea aster	F/LA	O/LF
Atriplex portulacoides	Sea purslane	O	
Atriplex prostrata	Spear-leaved orache	O/LF	
Beta vulgaris	Sea beet	O	
Bolboeschoenus maritimus	Sea club-rush	LD	
Cochleria anglica	English scurvygrass	O	
Elytrigia pycnanthus	Sea couch	LD	O/LA
Festuca rubra	Red fescue	R	O/LF
Glaux maritima	Sea milkwort	O	
Inula crithmoides	Golden samphire	R	
Juncus gerardii	Saltmarsh rush	LF	F/LA
Juncus maritimus	Sea rush	R	
Phragmites australis	Common reed		F/LA
Plantago maritima	Sea plantain	F/LA	A
Puccinellia distans	Reflexed saltmarsh-grass	LA	
Puccinellia maritima	Common saltmarsh-grass	A/LD	
Spartina anglica	Cord grass	O	
Spergularia marina	Lesser sea spurrey	O/LF	O/LF
Triglochon maritima	Sea arrowgrass	F/LA	F/LA

Nationally Scarce species

Bamber Pit

DAFOR Scale = Dominant, **A**bundant, **F**requent, **O**ccasional, **R**are (L = Locally or Patchily)

Habitat: Grassland and Ruderal

Scientific Name	Common Name	Grassland	Ruderal
Agrostis stolonifera	Creeping bent	F/LA	O
Anisantha sterilis	Barren brome	R	R
Arrhenatherum elatius	False oat-grass	F/LA	O/LA
Bromus hordaceous	Soft brome	R	R
Dactylis glomerata	Cocksfoot	F/LA	O
Elytrigia repens	Common couch	R	
Festuca rubra	Red fescue	O/LA	
Holcus lanatus	Yorkshire fog	F/LA	R
Hordeum murinum	Meadow barley	R	
Lolium perenne	Perennial rye-grass	O	R
Phragmites australis	Common reed		R
Poa annua	Annual meadow grass	O/LA	O
Poa pratensis	Smooth meadow-grass	R	
Poa trivialis	Rough meadow-grass	R	
Vulpia bromoides	Squirrel-tail fescue	R	
Achillea millefolium	Yarrow	O	
Agrimonia eupatoria	Common agrimony	O	
Anacamptis pyramidalis	Pyramidal orchid	R	
Arctium sp.	Burdock	O	
Armoracia rusticana	Horse radish	R	
Arenaria serpyllifolium	Thyme-leaved sandwort	O/LA	
Artemisia vulgaris	Mugwort	O	
Ballota nigra	Black horehound	O	
Calystegia sepium	Hedge bindweed	O/LA	
Centaurea nigra	Common knapweed	O/LA	
Centaurium erythraea	Common centaury	O	
Cerastium fontanum	Comon mouse-ear	O	
Cirsium arvense	Creeping thistle	O/LA	
Conium maculatum	Hemlock	O	O/LA
Crepis vesicaria	Beaked hawksbeard	O	
Daucus carota	Wild carrot	O	
Diplotaxis tenuifolia	Perennial wall rocket	F	
Dipsacus fullonum	Teasel	F/LA	F/LA
Echium vulgare	Viper's bugloss	O/LF	
Euphrasia nemerosa	Common eyebright	R	
Foeniculum vulgare	Fennel	R	
Galega officinalis	Goat's rue	O/LA	O/LA
Galium mollugo	Hedge bedstraw	O	
Geranium dissectum	Cut-leaved cranesbill	O	
Geranium molle	Dove's-foot cranesbill	O	
Glechoma hederacea	Ground ivy	O/LA	LA
Hirschfeldia incana	Hoary mustard	O/LA	A/LD
Hypericum perforatum	Perforate St. John's-wort	F/LA	O/LA

Scientific Name	Common Name	Grassland	Ruderal
Iris pseudoacorus	Yellow Iris	R	
Lathyrus latifolius	Broad-leaved everlasting pea	R	
Lathyrus pratensis	Meadow vetchling	O	
Lathyrus sylvestris	Narrow-leaved everlasting pea	R	
Lepidium draba	Hoary cress	O/LA	O/LA
Leucanthemum vulgare	Ox-eye daisy	O	
Linaria vulgaris	Common toadflax	R	
Lotus corniculatus	Bird's-foot trefoil	R	
Lotus tenuis	Narrow-leaved bird's foot trefoil	O/LA	
Malva sylvestris	Common mallow	F	O/LF
Medicago arabica	Spotted medick	O/LA	
Medicago lupulina	Black medick	F/LA	F/LA
Medicago sativa ssp. varia	Sand lucerne	R	
Melilotus altissimus	Tall melilot	R	
Myosotis arvensis	Field forget-me-not	LF	
Odontites verna	Red bartsia	F/LA	O
Ononis repens	Restharrow	R	
Ophrys apifera	Bee orchid	R	
Origanum vulgare	Wild marjoram	R	
Papaver rhoeas	Common poppy	R	
Pastinaca sativa	Wild parsnip	R	
Picris echioides	Bristly oxtongue		O
Picris hieracioides	Hawkweed oxtongue	F/LA	O
Plantago lanceolata	Ribwort plantain	F/LA	
Potentilla reptans	Cinquefoil	O/LA	O/LA
Prunella vulgaris	Self-heal	O	
Ranunculus repens	Creeping buttercup	O	
Rumex obtusifolius	Broad-leaved dock	O/LA	
Sagina procumbens	Procumbent pearlwort	O/LA	
Senecio jacobaea	Common ragwort	F/LA	
Silene latifolia	White campion	O	
Sonchus asper	Prickly sowthistle	R	O
Torilis japonica	Upright hedge parsley		R
Trifolium campestre	Hop trefoil	O	
Trifolium pratense	Red clover	R	
Trifolium repens	White clover	O/LA	
Tussilago farfara	Coltsfoot	R	
Urtica dioica	Nettle	O/LA	O/LA
Verbascum thapsus	Great mullein	O	
Veronica arvensis	Wall speedwell	R	
Veronica chamaedrys	Germander speedwell	R	
Vicia tetrasperma	Smooth tare	R	

Habitat: Scrub and Woodland

Scientific Name	Common Name	Abundance
Acer pseudoplatanus	Sycamore	O
Betula pendula	Silver birch	O/LA
Buddleia davidii	Butterfly bush	F/LA
Castanea sativa	Sweet chestnut	R
Cornus sanguinea	Dogwood	F/LA
Cotoneaster horizontalis	Wall cotoneaster	O
Crataegus monogyna	Hawthorn	F
Fraxinus excelsior	Ash	O
Laburnum sp.	Laburnum	R
Ligustrum vulgare	Wild privet	O
Malus sp.	Apple	R
Populus tremula	Aspen	LA
Prunus spinosa	Blackthorn	O/LA
Quercus ilex	Holm oak	R
Quercus robur	Pedunculate oak	R
Rhamnus catharticus	Buckthorn	R
Robinia pseudoacacia	False acacia	R
Rosa canina	Dog rose	F
Salix caprea	Goat willow	O
Salix cinerea	Grey willow	O/LA
Sambucus nigra	Elder	F
Syringa vulgaris	Lilac	R
Tamarix sp.	Tamarisk	R
Tillia x europaea	Common lime	R
Viburnum lantana	Wayfaring tree	O
Yucca sp.	Yucca	R

Invasive non-native species – listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended)



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Annex EDP 14
Phase 1 and Botanical Survey Report (CBA February 2016)

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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

Phase I and Botanical Survey Report

DRAFT

February 2016

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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

Phase I and Botanical Survey Report

Approved	D. Watkins
	Dominic Watkins
Position	Director
Date	15th February 2016
Revision	Draft

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1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.1.2 The Phase 1 habitat and botanical survey was undertaken by CBA. This report details the methodology, results and evaluation of the survey undertaken between May and June 2015.

1.2 Scope of Survey

1.2.1 The scope of the survey encompassed identifying:

- the habitats present within the Proposed Development Area and mapping their extent and distribution;
- key areas or habitats likely to be of broad nature conservation interest;
- the plant species and communities present; and
- notable plant species and communities.

1.3 Survey Limitations

1.3.1 There were some small limitations in terms of access to parts of the Proposed Development area and where relevant these are noted in the text of the report.

1.4 Key Findings

Phase 1 Habitats

1.4.1 The Proposed Development area supports a range of habitats including, intertidal sediment, saltmarsh, wetlands, including running water (the Ebbsfleet), open water (ponds), reedbed/swamp and ditch networks, a range of grasslands and early successional, arable, scrub, woodland and cliffs/exposures.

1.4.2 The most valuable habitats and areas in terms of their broad nature conservation value are:

- intertidal sediment;
- saltmarsh;
- reedbed and associated ditches;

- open water and ponds;
- more species and/or forb rich grasslands;
- early successional areas;
- coastal grazing marsh and associated ditches;
- marshy grassland;
- grassland, early successional and scrub mosaic;
- exposures; and,
- the Ebbsfleet Corridor (including the river and associated wetland/riparian habitat).

1.4.3 Other habitats such as other grassland, tall ruderal, scrub, woodland and ditches also have value and may be of particular importance for some species or species groups.

1.4.4 The habitats and features present have the potential to support a range of notable species and species protected by law.

Flora

1.4.5 Nine Nationally Scarce plant species were identified during the survey and an additional four Nationally Scarce species have been recorded by the Kent Botanical Recording Group since 2012, making a total of 13 **Nationally Scarce** species. The areas supporting the greatest concentration and largest populations of these species on the Swanscombe Peninsula are considered to be of County Importance for their plant species. In addition to the Nationally Scarce species seven other species listed in the Kent Rare Plant Register were recorded.

1.4.6 The saltmarsh, reedbed and ponds P3, P4 and P5 are considered to be of County Importance. The more species and forb rich areas of grassland and early successional vegetation, including those supporting Nationally Scarce and Kent Rare Plant Register species, are considered to be of Local Importance. Most other habitats are considered to be of Parish Importance.

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Desk-top study data, including details of designated sites, habitats (Biodiversity Action Plan (BAP) Habitats, Kent Habitat Survey 2012 and Ancient Woodland) and protected and notable species records, was obtained from Kent and Medway Biological Records Centre (KMBRC) in January 2015. Recent plant records, which were not included in the desk-top study data from KMBRC, were obtained from the Kent Botanical Recording Group (KBRG) in November 2015. Protected and notable species records (excluding birds as these are not available) were obtained from Essex Field Club in January 2015 and information on Local Wildlife Sites in Essex was obtained from the Essex Wildlife Trust's Biological Records Centre in November 2015. Further information on designated sites was also obtained from the following web-sites;

- Magic Map[1];
- Natural England[2]; and
- JNCC[3].

2.1.2 Details on designated sites, habitats and plant species records are summarised in this report. Accounts of desk-top data records for other species are included in the relevant survey reports for each species or species group.

2.2 Phase 1 Habitat and Botanical Survey

2.2.1 Most of the Site was surveyed during May and June 2015. The survey was undertaken during the optimal period for conducting Phase 1 habitat surveys (April-September). Weather conditions during the survey were good and posed no constraints to the results.

2.2.2 The survey was carried out using the methodology outlined in the 'Handbook for Phase 1 habitat survey - a technique for environmental audit'[4] to identify, map and describe the main habitats present along with their associated species. Target notes have been used to identify and provide a greater detail regarding features of ecological interest.

2.2.3 In many areas or habitats a list was made of all plant species and their abundance and frequency were recorded using the DAFOR scale. The distribution and abundance of notable plant species was also noted and plotted. Where appropriate the different vegetation types

[1] http://www.magic.gov.uk/
[2] https://designatedsites.naturalengland.org.uk/
[3] http://jncc.defra.gov.uk/page-4
[4] JNCC (2010) *Handbook for Phase 1 habitat survey - a technique for environmental audit.*

surveyed are discussed in relation to relevant National Vegetation Classification (NVC) plant communities[5].

2.2.4 Part of the Site along the A2 corridor was surveyed by the Halcrow Hyder Joint Venture (JV), working on behalf of Highways England, during May 2015. The results of this survey were made available to the project through a data sharing agreement and are summarised in this report.

Previous Surveys

2.2.5 Phase 1 habitat and botanical surveys were carried out of part of the Site (particularly Swanscombe Peninsula) in 2012. However, all relevant areas have been revisited and resurveyed as appropriate.

Access

2.2.6 Where access was not possible to certain areas, observations were made from adjoining publically accessible locations and where relevant this is noted in the text of the results section of the report.

2.3 Evaluation

2.3.1 A broad-based evaluation of the nature conservation importance of the habitats and features present was made, based on the relative significance of the habitats and features present and the species they are considered to have the potential to support.

2.3.2 The plant species and communities present were evaluated using a range of criteria and plans, such as those outlined by Ratcliffe[6], including size, diversity, naturalness, rarity, geographical position and fragility, criteria for the selection of sites as SSSIs[7] and Local Wildlife Sites in Kent[8], Kent Priority Habitat and Species Action Plans[9], the Great Britain and England Red Data Lists for vascular plant species[10], Scarce Plants in Britain[11], Kent Red Data Book[12] and Kent Rare Plant Register (KRPR)[13] as well as the potential for replacing the species population or

[5] Rodwell, J.S. (ed.), (1991-2000). *British Plant Communities Vol. 1-5*.Cambridge University Press
[6] Ratcliffe, D., 1977. A Nature Conservation Review, Volume 1. Cambridge University Press
[7] Nature Conservancy Council , 1989. Guidelines for selection of biological SSSIs. Nature Conservancy Council
[8] Kent Wildlife Trust on behalf of the Kent Nature Partnership, 2015. Local Wildlife Sites in Kent - Criteria for Selection and Delineation Version 1.5
[9] http://www.kentbap.org.uk/habitats-and-species/ accessed 31-07-2015
[10] Cheffings, C.M. and Farrel, L. (eds.), 2005. The Vascular Plants Red Data List for Great Britain. JNCC and Stroh, P.A., Leach, S.J., August, T.A., Walker, K.J., Pearman, D.A., Rumsey, F.J., Harrower, C.A., Fay, M.F., Martin, J.P., Pankhurst, T., Preston, C.D., and Taylor, I., 2014. A Vascular Plant Red List for England. The Botanical Society of Britain and Ireland
[11] Stewart, A., Pearman, D.A. and Preston, C.D, 1994. Scarce Plants in Britain. JNCC
[12] Kent Wildlife Trust for Kent County Council, 1999. Kent Red Data Book
[13] Kitchener, G. and Kent Botanical Recording Group, 2015. Kent Rare Plant Register (Draft)

community. In this case the evaluations were based only on the flora of the surveyed areas and did not include evaluation of other characteristics.

3.0 RESULTS

3.1 Desk Study

Designated Sites

3.1.1 The location of designated sites is illustrated in **Figure 1**

Statutory Sites

International Sites

3.1.2 There are no internationally designated sites within 2km of the Proposed Development Area. The Thames Estuary and Marshes Special Protection Area (SPA) and RAMSAR site is approximately 5.5-6km to the east. The site is designated largely for the wader and waterfowl as well as marsh harrier populations it supports, particularly over winter.

National Sites - SSSIs

Kent

3.1.3 **Bakers Hole Site of Special Scientific Interest SSSI** is located within the Proposed Development Area close to Ebbsfleet International Rail Station. This 6.5ha geological SSSI is a key Pleistocene site exposing various periglacial and temperate climate deposits, including evidence of palaeolithic industries.

3.1.4 **Swanscombe Skull Site SSSI** and **National Nature Reserve** (**NNR**) is located approximately 0.5km west of the Proposed Development Area is another geological SSSI,. This 3.9ha geological SSSI is nationally important as the only site to yield Lower Palaeolithic human remains. It is also of great importance for stratigraphy, palaeontology and Palaeolithic archaeology

3.1.5 **Darenth Wood SSSI** lies immediately to the west of the Proposed Development Area along the A2. This 121.79ha biological SSSI comprises some of the most valuable areas of ancient semi-natural woodland in north-west Kent and includes several rare woodland types. The invertebrate fauna has been well studied and includes many rarities. The site also includes a small area of chalk grassland supporting Nationally Rare and Scarce plant species.

Essex

3.1.1 **West Thurrock Lagoon and Marshes SSSI** is located approximately 1km north-west of the Proposed Development Area along the northern bank of the Thames. This 66.98ha biological SSSI is important for wintering wildfowl and waders. For the Inner Thames Estuary it features relatively extensive intertidal mudflat, saltmarsh and areas of reedbed.

3.1.2 **Grays Thurrock Chalk Pit SSSI** is located approximately 1.6km to the north of the Proposed Development Area. This 17.27 ha disused chalk quarry has developed a mosaic of vegetation and habitats which support the largest populations of man orchid *Orchis anthropophora* and round-leaved wintergreen *Pyrola rotundifolia* in Essex as well as the greatest concentration and diversity of invertebrates associated with calcareous substrates in Essex. It forms a part of the Essex Wildlife Trusts Trust's Chafford Gorges nature reserve.

3.1.3 **Lion Pit SSSI** is located approximately 1.1km north of the Proposed Development Area. This 2.5 ha geological site exhibits a sequence of Pleistocene Thames deposits overlying chalk, representing the northern edge of the river's floodplain at the time of deposition.

Non-statutory

County Sites - Kent

3.1.4 **Ebbsfleet Marshes, Northfleet Local Wildlife Site** (**LWS**) (51.49ha) lies within the south eastern part of the Proposed Development Area. The site includes the Ebbsfleet River itself plus associated wetland and riparian habitats such as wet woodland and reedbed, as well as grassland and scrub.

3.1.5 **Alkerden Lane Pit LWS** (26ha) lies within 100m to the south west of Crayland's Lane Pit of the Proposed Development Area. Grassland and scrub in this disused pit supports a range of Nationally Scarce and county scarce plant species, including the county's largest population of green-flowered helleborine *Epipactis phyllanthes* and a large population of round leaved wintergreen. It is also important for invertebrates.

3.1.6 **Beacon Wood Country Park LWS** (27.52ha) lies approximately 0.5km to the south of the Proposed Development Area close to the Bean junction on the A2. Much of this site was excavated for clay and now forms a pit. It includes a large area of open water and remnant woodland with a range of characteristic species and is of county importance for its fungi.

3.1.7 **Disused Hospital Grounds, Mabledon LWS** (7.38ha) lies approximately 1.4km to the west of the Proposed Development Area along the A2. This site was formerly the grounds of Mabledon Hospital. It is now a mosaic of disturbed ground, scrub and chalk grassland with a range of characteristic species including the Nationally Scarce man orchid Orchis anthropophora.

3.1.8 **Green Street Green Common LWS** (11.2ha) lies approximately 1.7km to the south of the Proposed Development Area south of the Bean junction on the A2. This site supports high quality acid grassland and includes a number of associated species of county and/or national importance including a range of small clover and other leguminous species.

3.1.9 **Mounts Road, Greenhithe Roadside Nature Reserve** (**RNR**) lies approximately 1km to the west of the Proposed Development Area south of the A226 in Greenhithe. This site supports the last known population of Italian catchfly *Silene italica* in Britain. This is considered likely to have been introduced but has been recorded nearby for over a hundred years.

County Sites – Essex

3.1.10 **West Thurrock Lagoon LWS** (20.5ha) is approximately 1.5km to the north west of the Proposed Development Area. This is a former PFA (pulverised fuel ash) dump which has developed a complex vegetation mosaic and supports an exceptionally diverse and important invertebrate fauna.

3.1.11 **Grenville Road Grasslands LWS** (1.3ha) lies approximately 1.7km to the north west of the Proposed Development Area. It comprises grassland on a bank supporting a range of characteristic chalk grassland plant species as well as a significant assemblage of invertebrates.

3.1.12 **Anchor Field LWS** (3.3ha) is located approximately 1.6km to the north west of the Proposed Development Area. This ex-arable field supports a significant assemblage of invertebrates as well as three reptile species.

3.1.13 **Mill Wood and Cliff LWS** (3.5ha) lies approximately 1.8km to the north west of the Proposed Development Area. It includes both Mill Wood, which is thought to be an Ancient Woodland fragment, as well as an ex-quarry cliff supporting a significant assemblage of invertebrates and a landscaped mound. It forms a part of the Essex Wildlife Trusts Trust's Chafford Gorges nature reserve.

3.1.14 **Warren Lane Grasslands LWS** (1.4ha) is approximately 1.8km to the north of the Proposed Development Area. The site supports grassland early successional habitat with a significant assemblage of invertebrates.

3.1.15 **Lion Gorge LWS** (7.4ha) is located approximately 1.5km to the north of the Proposed Development Area. This site comprises steep, wooded chalk cliffs topped with sand and gravel deposits with relic grassland and scrub. It supports a significant assemblage of invertebrates and tunnels are important for bats. It forms a part of the Essex Wildlife Trusts Trust's Chafford Gorges nature reserve.

3.1.16 **Clockhouse Cliff LWS** (1.3ha) is approximately 1.8km to the north of the Proposed Development Area. It is a narrow strip of flower-rich cliff-top grassland which supports a significant assemblage of invertebrates. It forms a part of the Essex Wildlife Trusts Trust's Chafford Gorges nature reserve.

3.1.17 **Grays Pit Extensions LWS** (5.9ha) lies approximately 1.7km to the north of the Proposed Development Area. The site comprises areas of grassland and disturbed brownfield land adjoining Grays Thurrock Chalk Pit SSSI. It forms a part of the Essex Wildlife Trusts Trust's Chafford Gorges nature reserve.

Habitats

BAP Priority Habitats/Habitats of Principal Importance

3.1.18 The following BAP Priority Habitats/Habitats of Principal Importance were recorded from within or immediately adjoining the Proposed Development Area in the desk-study data;

- Intertidal rock and sediment (Swanscombe Peninsula);
- Saltmarsh (Swanscombe Peninsula);
- Open mosaic habitats on previously developed land (Swanscombe Peninsula and parts of: Bamber Pit, Craylands La. Pit/West Quarry and North of Springhead nursery);
- Reedbeds (Swanscombe Peninsula and Ebbsfleet Corridor);
- Wet woodland (Ebbsfleet Corridor); and
- Lowland calcareous grassland (Bamber Pit).

Ancient Woodland

3.1.19 Two small areas of Ancient Woodland lie within the Proposed Development Area just east of the Bean junction of the A2. Two larger Ancient Woodlands lie immediately to the south of the Proposed Development Area between the Bean and Ebbsfleet junctions of the A2. Darenth Wood Ancient Woodland and SSSI (3.1.5) is immediately to the west of the Proposed Development Area, west of Bean junction.

Plant Species

3.1.20 A large number of notable plant species or species of conservation concern have been recorded. The most relevant, based on the location and date of records and available habitat in the Proposed Development Area, are listed below (species in bold recorded from within the Proposed Development Area). They are largely species of grassland, open or ruderal habitats or coastal/saltmarsh species.

Kent

Nettle-leaved Goosefoot	*Chenopodium murale*
Prickly Saltwort	*Salsola kali subsp. Kali*
Pyrola rotundifolia	***Round-leaved Wintergreen***
White Mullein	*Verbascum lychnitis*
Cat-mint	***Nepeta cataria***
Basil Thyme	*Clinopodium acinos*
Lesser Calamint	*Clinopodium calamintha*
Knapweed Broomrape	*Orobanche elatior*
Greater Broomrape	*Orobanche rapum-genistae*
Rock Stonecrop	*Sedum forsterianum*
Whorled Water-milfoil	*Myriophyllum verticillatum*
Gold-of-pleasure	*Camelina sativa*
Dittander	*Lepidium latifolium*
White Helleborine	*Cephalanthera damasonium*
Narrow-lipped Helleborine	*Epipactis leptochila*
Marsh Helleborine	*Epipactis palustris*
Bird's-nest Orchid	*Neottia nidus-avis*
Man Orchid	*Orchis anthropophorum*
Prickly Poppy	*Papaver argemone*
Stinking Hellebore	*Helleborus foetidus*
Sainfoin	*Onobrychis viciifolia*
Bithynian Vetch	*Vicia bithynica*
Yellow-vetch	*Vicia lutea*
Yellow Vetchling	***Lathyrus aphaca***
Hairy Vetchling	***Lathyrus hirsutus***
Bur Medick	*Medicago minima*
Toothed Medick	*Medicago polymorpha*
Sickle Medick	***Medicago sativa subsp. falcata***
Sea Clover	***Trifolium squamosum***

Dwarf Spurge	*Euphorbia exigua*
Wild Pansy	*Viola tricolor*
Marsh-mallow	*Althaea officinalis*
Henbane	*Hyoscyamus niger*
Greater Water-parsnip	*Sium latifolium*
Common Cudweed	*Filago vulgaris*
Slender Hare's-ear	***Bupleurum tenuissimum***
Spreading Hedge-parsley	***Torilis arvensis***
Divided Sedge	***Carex divisa***
Blue Fescue	*Festuca longifolia*
Purple Fescue	*Vulpia ciliata subsp. ambigua*
Mat-grass Fescue	*Vulpia unilateralis*
Borrer's Saltmarsh-grass	***Puccinellia fasciculata***
Stiff Saltmarsh-grass	***Puccinellia rupestris***
Bulbous Meadow-grass	*Poa bulbosa*
Curved Hard-grass	*Parapholis incurva*
Rye Brome	*Bromus secalinus*
Sea Barley	***Hordeum marinum***
Annual Beard-grass	***Polypogon monspeliensis***

Essex (excluding spp. listed for Kent)

Saltmarsh Goosefoot	*Chenopodium chenopodioides*
Oak-leaved Goosefoot	*Chenopodium glaucum*
Marsh Dock	*Rumex palustris*

3.2 Figures and Tables

3.2.1 The Phase I habitat survey maps (**Figure 2**) illustrate the distribution and extent of habitats present within the survey area and shows the locations of Target Notes (TNs), which highlight features of ecological interest, or provide further information on the habitats or species present. Details of the Target Notes are listed in **Table 1**.

3.2.2 **Figure 3** identifies the location of areas and habitats referred to in the text and **Figure 4** illustrates the distribution of Nationally Scarce plant species recorded during the survey.

3.2.3 **Tables 2-6** list the plant species recorded in the saltmarsh, grassland and early successional/ruderal (Swanscombe Peninsula and non-Peninsula), wetland and woodland habitats within the Proposed Development Area and identifies their abundance and frequency using the DAFOR scale.

3.3 Site Background and Context

Swanscombe Peninsula

3.3.1 The Site includes a large part of the Swanscombe Peninsula (the Peninsula), which projects northwards into the River Thames or Inner Thames Estuary, and includes intertidal saltmarsh and sediment. Historically the northern part of the Peninsula, known as Broadness, was saltmarsh and between this and the chalk to the south much of the land comprised coastal grazing marsh. However, the peninsula has been heavily modified by industrial activity, especially associated with the large-scale cement production based at the southern end of the Peninsula from the 19th century onwards. Parts of the Peninsula were used for tipping waste material, including dredgings from the Thames and especially cement kiln dust (CKD), for example on Broadness and the NE and SW Tips (**Figure 2**).

3.3.2 Part of the southern part of the Peninsula in and around the CTRL Wetland and Botany Marsh West were disturbed by the construction of the Channel Tunnel Rail Link (CTRL) where it emerges from the tunnel beneath the Thames. Wetland habitat, including open water and reedbed was created in the area around the railhead as mitigation for the impacts of its construction.

3.3.3 The Peninsula is bordered to the north by the Thames. Most of the northern bank of the Thames opposite the Site is heavily developed, including Tilbury Docks to the north east. However, areas of intertidal habitat and other habitat of nature conservation importance are present, for example at and adjacent to West Thurrock Lagoon and Marshes Site of Special Scientific Interest (SSSI) to the north-west. The Peninsula is bordered to the west largely by residential development and to the east by industrial and commercial development, which for example separates Botany Marshes from the River Thames.

3.3.4 The Peninsula and its habitats form one of a small number of sites supporting intertidal and wetland habitats (such as reedbed and grazing marsh) in the Inner Thames Estuary west of Gravesend, the main sites being (from east to west) Swanscombe Peninsula, West Thurrock (including the SSSI), Dartford and Crayford Marshes and Rainham Marshes (including the Inner Thames Marshes SSSI and Rainham Marshes RSPB reserve)

South of the Peninsula

Chalk Pits

3.3.5 To the south of the Peninsula the Proposed Development Area lies over chalk forming the northern part of the dip slope of the North Downs. This has been extensively quarried in the past to form a series of pits, such as Craylands Lane Pit/West Quarry, Sport's Field/East Quarry and Bamber Pit. Subsequently some of these areas have been used for landfill, such as the northern part of Bamber Pit, Northfleet Landfill and part of the land North of Springhead Nursery.

3.3.6 Immediately south of the Peninsula, beside Manor Way, some of the old pit areas are occupied by industrial or commercial estates. South of this the Proposed Development Area is criss-crossed by a number of transport routes including both the A226 and the local railway line and Swanscombe High Street, which occupy chalk spines between the pits. Between the local railway line and the A2 the Site forms a corridor of greenspace between Swanscombe to the west and Northfleet to the east. CTRL runs north to south through the eastern part of this area with Ebbsfleet International Station and associated car parking within or immediately adjacent to the Site.

The Ebbsfleet

3.3.7 The Ebbsfleet is a stream or small river which rises from a spring beside Springhead Nursery just north of the A2 and flows broadly northwards towards the Thames. Both the course and flow of the river have been modified in the past. The river enters a culvert at it northernmost point within the Site before emerging shortly before discharging into the Thames at Northfleet. The section of the Ebbsfleet within the Site and its associated wetland and riparian habitats is included within the Ebbsfleet Marshes, Northfleet Local Wildlife Site (LWS), a non-statutory designation.

A2 Corridor

3.3.8 The southernmost part of the Site comprises the A2 corridor and an area immediately to its south beside the Ebbsfleet Junction. To the west of the Ebbsfleet junction parts of this are adjoined by areas of Ancient Woodland, including Darenth Wood SSSI to the west, and to the south, near Bean. To the north of the section between the Bean and Ebbsfleet junctions is Eastern Quarry, a large, disused chalk quarry in the process of development. To the south of

the A2 is the gently undulating landscape of the North Downs dip slope with arable, grassland and scattered hedges, scrub and woodland.

3.4 Habitats

Swanscombe Peninsula

3.4.1 Swanscombe Peninsula comprises a mosaic of habitats including Intertidal sediments and saltmarsh beside or within the Thames, extensive areas of grassland and ephemeral/short perennial (early successional) vegetation of variable character, dense and scattered scrub, several small areas of broadleaved plantation and wetland, including reedbed and open water.

Intertidal Sediments

3.4.2 A strip of intertidal sediment of variable width (approx. 80m at its widest) is present around the edge of the Peninsula. Much of this is mud, notably up the western side of the Peninsula where the sediments are at their widest. However, locally there is much shingle and cobble sized material with the mud, for example in the south-western section and in the north towards Broadness Point, and on the eastern side of the Peninsula the sediment contains a much higher proportion of sand. Parts of the sediments, and especially the rocky material, support marine algae species and communities which are locally abundant. The intertidal sediments and the species they support are described in more detail in the Intertidal Survey report[14].

3.4.3 There is woody material with the appearance of tree roots among the sediment on the north western side of the peninsula. It is possible this may be similar in origin to the submerged or drowned forest remains at other locations along the Thames in the local area, such as Purfleet and Erith.

Saltmarsh

3.4.4 A strip of salt-marsh (up to approx. 60m at its widest) is present around the edge of most of the peninsula (**S1**). This comprises a mosaic of communities in which a number of different species or combinations of such species are locally dominant. In the lowest areas of the marsh, for example in and around the inlet in the north west of Broadness (TN 2), there are large stands of sea club-rush *Bolboschoenus maritimus,* as well as smaller stands of cord grass *Spartina anglica* (NVC SM6 *Spartina anglica* cord grass salt-marsh community).

[14] Smith, P., 2015. Intertidal Surveys at Swanscombe, 21-22nd April 2015.

3.4.5 Above this around much of the north western and eastern side of Broadness is a 'shelf' of saltmarsh, north of the old jetty marked by an erosion cliff of approximately one to three meters in height on the riverward side and by a bank of approximately two to three meters up to the adjoining habitats on Broadness on the landward side. Much of this is dominated by common salt-marsh grass *Puccinellia maritima* (NVC SM13 *Puccinellia maritima* common saltmarsh grass salt-marsh community) with frequent or abundant sea aster *Aster tripolium*, sea arrowgrass *Triglochin maritimum*, sea plantain *Plantago maritima* and spear-leaved orache *Atriplex prostrate*. Sea club rush and saltmarsh rush *Juncus gerardii* are also widespread and locally abundant or dominant. Lesser sea spurrey, sea milkwort *Glaux maritima* and English scurvygrass *Cochleria anglica* are frequent, especially on the riverward edge at the top of the erosion cliff, and in a similar position on the eastern side of the Peninsula there are in the region of 50 plants of the **Nationally Scarce** golden samphire *Inula crithmoides*. Common sea lavender *Limonium vulgare* was also recorded by the Kent Botanical Recording Group on the western side of the peninsula in Aug 2015. Common reed *Phragmites australis* is also very locally abundant near to the jetty.

3.4.6 The upper parts of the marsh, for example along the base of the bank, are often strongly dominated by sea couch *Elytrigia atherica* (NVC SM23 *Elymus pycnanthus* (*Elytrigia atherica*) sea couch salt-marsh community). A number of other species are present within this where it is not overwhelmingly dominant, including spear-leaved orache, grass-leaved orache *Atriplex littloralis* and sea beet *Beta vulgaris* ssp. *maritima*. This is also the most common community on much of 'shelf' on the eastern side of the peninsula, within which sea purslane *Atriplex portulacoides* is frequent or locally abundant.

3.4.7 Leachate from the landward bank appears to cause localised scorching of the vegetation and there is also a pronounced strandline of variable abundance, both of which have strong local effects on the vegetation. In the areas affected by the leachate, where the ground is not bare, common saltmarsh grass is locally abundant or dominant. Other species associated with both these areas include locally abundant annual seablite *Suaeda maritima* (NVC SM9 *Suaeda maritima* annual seablite salt-marsh community) spear-leaved orache, grass-leaved orache and sea beet.

3.4.8 Reflexed salt-marsh grass is locally abundant in some parts of the saltmarsh with lesser sea spurrey, including a number of depressions or pans (NVC SM23 *Spergularia marina- Puccinellia distans* lesser sea spurrey-reflexed salt-marsh grass salt-marsh community). Annual seablite and very small amounts of glasswort *Salicornia* sp. are also present in some of these areas.

3.4.9 An area of upper saltmarsh vegetation (**S2**) is also present between the two embankments on the western side of the Peninsula. Various mixtures of sea club-rush, saltmarsh rush, sea couch,

common reed and sea plantain form the bulk of the vegetation but sea aster, sea arrowgrass, lesser sea spurrey and hard grass *Parapholis strigosa* are also present.

3.4.10 Saltmarsh species, of which the most frequent and abundant are sea plantain and sea aster, are also present among the rock armouring of the seawall on the western side of the Peninsula (**S3**).

Other Saline (Halophytic) Vegetation

3.4.11 Species characteristic of salty or brackish condition are present in a number of locations in and around Broadness, for example beside the lagoon associated with the leachate treatment facility on its northern edge (TN1), near the lagoon in its south eastern corner (TN9) and on the northern edge of Botany Marsh West (TN11). The more open areas support species such as lesser sea spurrey *Spergularia marina*, reflexed and common saltmarsh grass, saltmarsh rush, sea club-rush, annual seablite, spear-leaved and grass-leaved orache, red goosefoot *Chenopodium rubrum*, fig-leaved goosefoot *Chenopodium ficifolium* and sea beet. These areas are often adjoined by more extensive stands dominated by sea couch (NVC SM23 *Elymus pycnanthus* (*Elytrigia atherica*) sea couch salt-marsh community) in which few other species are present, though there are occasional stands of sea club-rush and scattered spear-leaved and grass-leaved orache.

3.4.12 The presence of such plants may reflect saline or brackish conditions, but a number of such species, such as reflexed saltmarsh grass, also exhibit tolerance to high alkalinity/elevated pH levels, and their presence may therefore also reflect this, due to the presence of tipped CKD. It is perhaps not a coincidence that there are concentrations of these species in areas in and around lagoons associated with the capture and treatment of leachate from the tipped CKD, where salt and alkalinity levels are most likely to be high due to collection and concentration (by evaporation) of leachate.

Grassland and Early Successional (Ephemeral/short perennial)

3.4.13 These habitats share many species but are variable in structure and appearance, from sparsely vegetated areas to dense, coarse swards. With the exception of parts of the seawall/embankment and along the access tracks that cross the Peninsula, much of this vegetation appears to be unmanaged or to receive very little management. As noted above, related to its previous industrial use, parts of the Site have been subject to substantial disturbance and a range of materials, especially those related to cement production, have been tipped or otherwise brought into the Site, creating a variety of different substrates. This, together with variations in topography and hydrology, has created a range of different growing conditions. On the whole therefore the variable structure and composition of this vegetation is

considered to be attributable to differences in disturbance regime, including the period of time following significant disturbance, as well as differences in growing conditions, including productivity. Within the communities there are elements characteristic of maritime or coastal locations, as well as of neutral and calcareous grasslands. Legume (Fabacae) species, both native and non-native, form a significant component and scrub (see below), of varying density is scattered throughout most areas.

Grassland

3.4.14 Much of the grassland on the Peninsula, including most of Broadness and the SW and NE Tip areas comprise a coarse sward dominated by common couch *Elytrigia repens*, sea couch *Elytrigia athericus*, false oat-grass *Arrhenatherum elatius* or more locally tall fescue *Schedonorus arundinacea* (**G1**). Cocksfoot *Dactylis glomerata* and Yorkshire fog *Holcus lanatus* are also widespread and locally abundant, as is creeping bent *Agrostis stolonifera* in damp areas. Species richness and forb content is somewhat variable but are often low, in some areas very low. Generally the most frequent forbs are –

Wild carrot	*Daucus carota*
Hogweed	*Heracleum sphondyllium*
Red clover	*Trifolium pratense*
Narrow-leaved bird's-foot trefoil	*Lotus tenuis*
Sand lucerne	*Medicago sativa* ssp. *varia*
Common vetch	*Vicia sativa*
Fodder vetch	*Vicia villosa*
Ribwort plantain	*Plantago lanceolata*
Ox-eye daisy	*Leucanthemum vulgare*
Hawkweed oxtongue	*Picris hieracioides*
Beaked hawk's-beard	*Crepis vesicaria*

3.4.15 Both the non-native broad and native narrow-leaved everlasting peas *Lathyrus latifolia* and *sylvestris* are also locally prominent in the sward.

3.4.16 Some areas of similar grassland, such as **G2** and **G3**, but also many smaller areas within **G1**, are somewhat less coarse, have higher forb content and are rather more species-rich. Many of the species listed above occur at greater frequency or abundance and a number of other species are present, or assume greater prominence, such as –

Hop trefoil	*Trifolium campestre*
Smooth tare	*Vicia tetrasperma*
Grass vetchling	*Lathyrus nissiola*

Meadow vetchling	*Lathyrus pratensis*
Black medick	*Medicago lupulina*
Hedge bedstraw	*Galium mollugo*
Perforate St John's wort	*Hypericum perforatum*
Wild marjoram	*Origanum vulgare*
Red bartsia	*Odontites verna*
Yellow-wort	*Blackstonia perfoliata*
Pyramidal orchid	*Anacamptis pyramidalis*
Common spotted orchid	*Dactylorrhiza fuchsia*
Bee orchid	*Ophrys apifera*

3.4.17 Most of this grassland can be attributed to NVC MG1 *Arrhenatherum elatius* – False oat grass grassland, a grassland characteristic of low levels of management (cutting or grazing) with, in areas in which sea couch is abundant, affinities to SM24 *Elymus pycnanthus* (*Elytrigia athericus*) saltmarsh.

3.4.18 Although often rather species poor this grassland, especially on Broadness, supports a number of **Nationally Scarce** plant species. There is a large population of the Yellow vetchling *Lathyrus aphaca*, as well as rather smaller populations of Bithynian vetch *Vicia* bithynica and hairy vetchling *Lathyrus hirsutus*. All three species are annual and are most frequent and abundant in areas that receive some management in the form of annual mowing, for example along the access tracks and **G3** (Figs. 2 and 3), although the timing of this, for example in June in the case of the access tracks and part of **G3**, is not ideal. A small population of the Man orchid *Orchis anthropophora*, comprising approximately 80-90 flowering spikes plus non-flowering rosettes is present either side of the main east-west track crossing the Peninsula along the southern edge of Broadness. The sickle medick is frequent and locally abundant in parts of the grassland, especially alongside the main east-west track across the Peninsula. A small patch of divided sedge *Carex divisa* is also present in such grassland at the bottom of a bank on the northern edge of Black Duck marsh (**Figure 3**).

3.4.19 A relatively large stand of the invasive non-native giant hogweed *Heracleum mategazzianum* is present among such grassland on the NE Tip (TN8).

3.4.20 **G6** is a moderately species rich, meadow-like grassland located on the new, landward seawall/embankment. Forb content varies from approx. 20 to 70%, with approx. 50% overall. Red clover, narrow-leaved bird's-foot trefoil, black medick, grass vetchling, meadow vetchling, ox-eye daisy and wild carrot are frequent and the **Nationally Scarce** yellow vetchling and Bithynian vetch are locally frequent or abundant. In both 2012 and 2015 this area was mown

during June and periodic mowing probably contributes to the maintenance of species diversity, although the timing is not ideal in terms of nature conservation.

3.4.21 **G7** is a small moderately species-rich area at the north east corner of Black Duck marsh in which red fescue *Festuca rubra* is the most abundant grass species and there is frequent kidney vetch *Anthyllis vulneraria*, eyebright *Euphrasia* sp. and glaucus sedge *Carex flacca*, species characteristic of calcareous grassland. Forb cover ranges from approx. 30 to 70%, with approx. 50% overall.

3.4.22 **G8** comprises a triangular area to the south east of Black Duck Marsh. Much of it is flat but there are banks and a spoil heap around the edges and adjoining tracks. The flat areas are quite wet, with patchy standing water during winter and spring. Creeping bent is abundant with Yorkshire fog, false oat-grass and sea couch. There is also locally frequent hard rush, as well as small amounts of greater reedmace, common spike-rush *Eleocharis palustris* and sea club-rush *Bolboschoenus maritimus*. However, narrow-leaved bird's-foot trefoil and cinquefoil *Potentilla reptans*, for example, are frequent and locally abundant and overall the forb content is approx. 50%. There is also a small population of the **Nationally Scarce** Bithynian vetch. Recently stooled willow Salix spp. as well as other scrub and trees is scattered throughout much of this area.

The banks are drier, with a shorter and more species rich sward with many of the species present elsewhere but also, for example, locally abundant mouse-ear hawkweed *Pilosella officinarum* and eyebright *Euphrasia* sp.. Forb cover ranges from 40% to 80%.

3.4.23 **G10** lies between the woodland south of Black Duck Marsh and the new road which is being constructed between Manor Way and Ingress Park. It has in parts a relatively fine sward with much red fescue and forb cover overall is around 40%. Otherwise it supports species typical of the grasslands elsewhere on the Peninsula. Parts of the southern edge of this area appear to have been recently disturbed, probably in relation to the construction of the new road, and have a relatively large proportion of bare ground with an early successional type flora similar to that described below.

3.4.24 **Botany Marsh West** is an area of relic coastal grazing marsh which is still managed by traditional grazing. The grassland is species poor and dominated by creeping bent, common reed and rough meadow grass *Poa trivialis*, although Yorkshire fog is also frequent and sea and common couch *Elytrigia athericus* and *repens* are locally abundant. Sea club-rush is widespread as is hairy buttercup *Ranunculus sardous*, a characteristic species of coastal grazing marsh. Generally forbs are only occasional and of low cover.

3.4.25 A narrow section in the east appears to be drier and supports a rather different sward with frequent false oat-grass, grass vetchling, smooth tare and hoary ragwort *Senecio erucifolius*.

3.4.26 From historic aerial photographs Botany Marsh West appears to have been under arable cultivation in the past (e.g. around 1990) and this may well account for the fact that characteristic species of coastal grazing marsh, such as divided sedge, were not found, despite extensive searching. This species is however present in a part of Botany Marsh East (see below), which was not subject to cultivation.

3.4.27 There are a number of shallow depressions (some of which have been excavated) which hold water from autumn to spring, although they were dry at the time of survey. These support a distinctive flora which varies somewhat in vegetation cover and species composition but comprises largely of hairy buttercup, spear-leaved and grass-leaved orache, red, fig-leaved and many-seeded goosefoot *Chenopodium rubrum*, *ficifolium* and *polyspermum*, broad-leaved, curled and clustered dock *Rumex obtusifolius*, *crispus* and *conglomeratus*, greater plantain *Plantago major* ssp. *intermedia* (KRPR), hairy buttercup and redshank *Persicaria maculata*,, less frequently knotgrass *Persicaria aviculare*, pink water speedwell *Veronica catenata*, celery-leaved buttercup *Ranunculus sceleratus* and swine-cress *Lepidium coronopus*, as well as sea club rush, creeping bent, common reed and marsh foxtail *Alopecurus geniculatus*.

3.4.28 **Botany Marsh East** was also historically coastal grazing marsh but was left largely unmanaged for many years, with much of the area now supporting reedbed or scrub. However, a number of areas of grassland do remain, especially in the south. These are species poor and dominated by a number of tall, course grasses, including false oat grass and cocksfoot along with a small number of bulky forbs or ruderals. A small population of the **Nationally Scarce** hairy vetchling is present in grassland/ruderal alongside the northern section of the path running north-south through the middle of this area.

3.4.29 In the northern half there is an area that has been managed as amenity grassland, although it appears now to be less frequently cut. This is species poor but supports the **Nationally Scarce** divided sedge, a species characteristic of coastal grazing marsh, more or less throughout as well as hairy buttercup and frequent grass vetchling along the edges.

Early Successional and Ruderal

3.4.30 Through the central part of the Site, from the old jetty south to Manor Way there are several areas (**G4**, **G5** and **G9**) where the vegetation is sparse and open to varying degrees as result of disturbance and/or where the soil or substrate is skeletal and/or of inherently low fertility. Many of these areas appear to be summer-parched. The sward varies from very open, with much bare

ground, to an almost closed sward and in many areas merge into closed grasslands of the types described above. These areas would be considered to be Open Mosaic Habitat on Previously Developed Land, a Habitat of Principal Importance.

3.4.31 Many of the species present are shared with the adjoining grasslands. However, a number of species are characteristic or distinctive of these areas, because they occur only in these areas or are most frequent or abundant in them, including soft brome *Bromus hordaceous*, squirrel-tail fescue *Vulpia bromoides* (especially **G9**), fern grass *Catapodium rigidum*, flattened meadow-grass *Poa compressa* (**G9** only) yellow-wort, centaury *Centaurium erythraea*, stag's-horn plantain *Plantago coronopus*, common whitlowgrass *Erophila verna*, and rarely common storksbill *Erodium cicutarium* (**G4** only).

3.4.32 The ruderal element is also generally more prominent in these areas, conspicuous amongst which, for example, are hoary mustard *Hirschfeldia incana*, bastard cabbage *Rapiastrum rugosum*, perennial wall rocket *Diplotaxis tenuifolia*, Oxford ragwort *Senecio squalidus*, narrow-leaved ragwort *Senecio inaequidens*, red valerian *Centrantus ruber* and melilot species *Melilotus* spp. The invasive non-native butterfly bush is frequent and locally abundant in parts.

3.4.33 There are some small depressions within these areas which hold water during winter and spring and these support small amounts of common reed *Phragmites australis*, greater reedmace, common spike-rush, false fox sedge *Carex otrubae* (especially **G9**), and a number species tolerant of saline or brackish conditions including the **Nationally Scarce** brackish water-crowfoot *Ranunculus baudotii*, saltmarsh rush, sea rush *Juncus maritimus* and sea aster (**G5**). However, as noted above (3.4.12), the presence of some of these species may also reflect tolerance to elevated alkalinity associated with the presence of CKD, as well as to salt.

3.4.34 Parts of the NE Tip were disturbed by works during the previous winter and spring and these support quite open vegetation comprising a range of grassland and ruderal species typical of the Peninsula.

3.4.35 On the edge of a disturbed area on the boundary between Black Duck Marsh and the Ingress Park development site there are a small number of plants of the **Nationally Scarce** annual beard grass *Polypogon monspeliensis*.

3.4.36 There are stands of tall ruderal vegetation, including for example nettle *Urtica dioica*, thistles *Cirsium* spp and goat's rue *Galega officinalis* scattered across the Peninsula.

Wetland

Waterbodies

3.4.37 There are several waterbodies within the peninsula.

3.4.38 **P1** comprises a lagoon forming part of the leachate capture and treatment facilities and is located on the southern edge of Broadness. This appears not to support any aquatic, emergent or marginal vegetation.

3.4.39 **P2** is a large pond in the centre of the Peninsula. There appears to be significant quantities of what appears to be CKD or similar material as sediment in the bottom, especially at the southern end. There appears to be no aquatic vegetation but there are stands of common reed of variable width (up to approx. 10m) on its perimeter. These support a limited number of marginal species such as woody nightshade *Solanum dulcamara*, hemlock water dropwort *Oenanthe crocata*, hemp agrimony *Agrimonia eupatoria* and great willowherb *Epilobium hirsutum*.

3.4.40 **P3**, **4** and **5** form a group of waterbodies adjoining the CTRL compound in the south of the peninsula, and form part of wider habitat that was created as mitigation for the impact of the construction of the CTRL. All are set among wider areas of reedbed with scattered willow scrub (see below).

3.4.41 **P3** is a roughly circular pond set within common reed with a fringe of sea club-rush. It is approximately 30-40m diameter and up to approx. 20cm in depth. There is abundant least pondweed *Potamogeton pusillus* (KRPR) and frequent common stonewort *Chara vulgaris*.

3.4.42 **P4** is a large long pond approx. 20m by 200m with water at least 20cm deep. There was abundant small pondweed *Potamogeton berchtoldii*, frequent and locally abundant water starwort *Callitriche* sp. and occasional but locally abundant **Nationally Scarce** brackish water-crowfoot. Much of the pond was fringed by stands of common reed, as well as greater and lesser reedmace *Typha latifolia* and *angustifolia*. On the northern shore, which was rocky at least in parts the fringing vegetation was more varied and also included hard and jointed rush *Juncus inflexus* and *articulatus*, common spike-rush, grey club-rush *Schoenoplectus tabernaemontani*, sea club-rush, false fox sedge, water plantain *Alisma plantago-aquatica* and pink water-speedwell.

3.4.43 **P5** is a small pond approx. 20m diameter and up to more than 20cm deep. It is fringed by common reed and reedmace *Typha* spp. as well as some hard rush and with least pondweed (KRPR) and common stonewort.

3.4.44 **P6** is a new small pond that has been recently created on the eastern side of Botany Marsh East. Much of it and the adjoining banks are bare of vegetation although there are small stands of common reed and reedmace and some **Nationally Scarce** brackish water-crowfoot.

3.4.45 The western end of Black Duck marsh includes a relatively large area of open water set within the larger reedbed (see below). This supports little aquatic vegetation apart from scattered common duckweed *Lemna minor* and a small patch of horned pondweed *Zanichellia palustris* on the western end. The water appears to be at least partly seasonal, with levels water dropping during the summer months from the west to leave bare mud studded with stands of common reed and rushes, patchy remnants of the previous grassland, including creeping bent and cinquefoil as well as goosefoots *Chenopodium* spp. oraches *Atriplex* spp. and docks *Rumex* spp..

Reedbed

3.4.46 There are three relatively large areas of reedbed, a Habitat of Principal Importance, Black Duck Marsh, the CTRL wetland, including the site of the old wastewater treatment works in its north western corner, and Botany Marsh East.

3.4.47 The reedbed in Black Duck Marsh is wet with water up to over a meter deep in spring 2015, though the water level did drop during the summer months. There has been a significant increase in water levels in the Marsh since the area was surveyed in 2012, when for example the western part supported grassland. This is now inundated from autumn to at least early summer and the grassland has disappeared and been replaced by a mosaic of open water and reedbed, which has extended in area since 2012. The Marsh is edged and bisected by a network of ditches which are open.

3.4.48 Common reed is overwhelmingly dominant, although there are large stands of sea club rush on the northern edge and willow scrub *Salix* spp. is scattered throughout, especially in the centre and on the western edge. However, much of the scrub appears in poor condition, probably as a result of the raised water level.

3.4.49 The CTRL Wetland has developed in an area surrounding the CTRL compound as well as in and around the old water treatment works to the north west. As noted above this forms a part of habitat created as mitigation for the impact of the construction of the CTRL. On the whole the reedbed is drier than that in Black Duck Marsh, with at least parts dry even in winter, although there is standing water in parts.

3.4.50 In the northern part common reed is still overwhelmingly dominant although in some areas there are stands of nettle, great willowherb, hemp agrimony and hemlock water dropwort *Oenanthe crocata*, for example among the old water treatment works. The southern part, either side of the CTRL compound, is more varied. In addition to the waterbodies described above a range of other species are present, including hemp agrimony *Eupatoria cannabina*, great willowherb, cleavers *Galium aparine*, hedge bindweed *Calystegia sepium*, woody nightshade *Solanum dulcamara*, gypsywort *Lycopus europaeus* and false fox sedge. There is a small area of damp grassland in the south east corner with false fox sedge, fleabane *Pulicaria dysenterica* and marsh woundwort *Stachys palustris*. Scattered (mostly willow) scrub is present, especially among the old water treatment works and around the CTRL compound.

3.4.51 There are areas of common reed in Botany Marsh East. Most of this dry, expect where there are ditches (see below) and appears to have arisen as a result of a lack of management of historic coastal grazing marsh (Botany Marsh West is still managed as such). Common reed is dominant, but due to the relative dryness of the reed a range of ruderal and grassland species as well as scattered scrub is also present in many areas.

Ditches

3.4.52 There are ditch networks across the Peninsula, in and adjoining Black Duck Marsh, around the edges of the CTRL Wetland and NE Tip and in and around Botany Marshes.

3.4.53 The ditches in Black Duck marsh are several meters wide with open water. In the main body of the Marsh they are fringed with common reed, or sea club-rush. However, there is dense and scattered scrub on the eastern edge of the marsh and some sections of the ditches that run through these areas are heavily shaded. The ditches support relatively little aquatic vegetation apart from scattered or patchy common duckweed and ivy-leaved duckweed *Lemna triscula*. Small pondweed is present in a ditch in the west of the Marsh.

3.4.54 The ditches around the edges of the CTRL Wetland and NE Tip (incl. ditches **D1** and **D2**, **Table 5**) support extensive and often dense stands of common reed, but also locally reedmace and in the northern section sea club-rush. In the south west there are also some small stands of branched bur-reed *Sparganium erectum*. Much of this ditch network is filled with vegetation, although the most westerly ditch is largely open along much of its length. The banks of the western section support a range of common marginal species including hemp agrimony, great willowherb, woody nightshade, celery-leaved buttercup *Ranunculus sceleratus* and false fox sedge.

3.4.55 The ditches of Botany Marsh comprise a single continuous network. However, the differing management of the two halves means that they have different characters and settings. Botany Marsh West is an area of remnant coastal grazing marsh which is still managed traditionally with grazing by cattle. The ditches largely support dense common reed, but also reedmace and sea club-rush. There are some small open sections with water plantain, **Nationally Scarce** brackish water-crowfoot, celery-leaved buttercup, brooklime *Veronica beccabunga* and and pink water speedwell. Many of the ditches, or ditch sections appear to dry out in the summer.

3.4.56 Many of the ditches in Botany Marsh East also support dense common reed, although some, where they have been shaded by dense scrub support relatively little vegetation. However, the ditch running up the eastern side supports somewhat more varied vegetation with, in addition to common reed, stands of reedmace, and **Nationally Scarce** brackish water-crowfoot. Some the ditches or ditch sections appear to have been slubbed-out over the last winter.

Scrub

3.4.57 Scattered and dense scrub is widespread throughout the Peninsula. Larger areas are present, for example around the woodland to the south of Black Duck Marsh, on the eastern side of Black Duck Marsh, on the SW Tip, in parts of Broadness and in Botany Marsh East. This includes a range of species typical of neutral to calcareous soils, including especially bramble *Rubus fruticosus*, hawthorn *Crataegus monogyna*, dog rose *Rosa canina*, dogwood *Cornus sanguinea* and wild privet *Ligustrum vulgare*. There are also small amounts of buckthorn *Rhamnus cathartica* and on the eastern edge of Black Duck Marsh, for example, there is frequent elm *Ulmus* sp., much of which is dead. The field layer largely comprises species typical of the adjoining grasslands or ivy and bramble, although there is also much bare ground in the denser areas. However, a patch of the **Nationally Scarce** round-leaved wintergreen *Pyrola rotundifolia* is present among ivy beneath scrub on an embankment forming part of the old track to the jetty.

3.4.58 The scrub is attributable to the NVC W21 *Crataegus monogyna-Hedera helix* Hawthorn-Ivy scrub community. The invasive non-native butterfly bush *Buddleia davidii* is also frequent and locally abundant among the scrub, especially in the southern-central part of the Peninsula. A number of other non-native shrub species, such as Spanish broom *Spartium junceum* and Bladder-senna *Colutea arborescens* are also present in small amounts.

3.4.59 In some areas the scrub is developing into woodland, with Ash *Fraxinus excelsior*, Sycamore *Acer pseudoplatanus* and Silver birch *Betula pendula* and very locally Alder *Alnus glutinosa*.

3.4.60 In wetter areas, including some of the reedbeds and wet grassland there are scattered and dense willows, including grey *Salix cinerea*, goat *Salix caprea*, white *Salix alba*, crack *Salix fragilis* and osier *Salix viminilis*.

Woodland and Plantation

3.4.61 The only significant area of woodland is in the south western part of the Peninsula, immediately to the south of Black Duck Marsh (**W1**). This appears to be characteristically species poor secondary woodland of recent development. The canopy is dominated by sycamore, with occasional ash and silver birch. The shrub layer includes frequent and locally abundant ash and sycamore regeneration as well as frequent dogwood and wild privet, locally abundant butterfly bush and occasional hawthorn and elder *Sambucus nigra*. The field layer is species poor and dominated by ivy *Hedera helix*, with bramble, nettle and herb Robert *Geranium robertianum*. This comprises a species poor form of the NVC W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* Ash-Field maple-Dog's mercury woodland community, and specifically of the *Hedera helix* Ivy sub-community.

3.4.62 There are a number of small mature broadleaved plantations, for example to the west and south west of **P2** and east of **G3**. These comprise a mix of native with some non-native species.

Outside Swanscombe Peninsula

Manor Way

3.4.63 This comprises three areas adjoining Manor Way

3.4.64 Manor Way 1 comprises a mosaic of early successional, grassland, tall ruderal and dense and scattered scrub. The chalk spine that carries the PRoW supports mostly dense scrub with a narrow strip of rather species poor coarse grassland. The scrub extends in narrow strips to the east and west along the tops of the cliffs. To the east is an of stony ground area supporting early successional vegetation (ephemeral/short perennial) with a range of species typical of similar vegetation on the peninsula and scattered to dense scrub comprising largely of butterfly bush. Dense scrub, including large stands of bramble dominate the easternmost part, although there are some small areas of species poor grassland.

3.4.65 Manor Way 2 and 3 were surveyed from the adjoining roads and are small areas of grassland with a range of species typical of the area. Manor Way 3 supports populations of the **Nationally Scarce** yellow vetchling and Bithynian vetch on its eastern side.

3.4.66 The invasive non-native species Japanese knotweed Fallopia japonica is present along Manor Way (TN18).

Craylands Lane Pit / West Quarry

3.4.67 This disused quarry has chalk cliffs along its southern, eastern and northern edges with an exposure of a sandy layer above the chalk at the top of the cliffs. Dense scrub dominates the top of the cliff on the southern side with scattered scrub, species poor grassland and ruderal along the eastern and northern sides. Much of the cliffs themselves are bare chalk but in parts there is abundant ivy. Elsewhere plants are scattered, except where ledges retain more soil. Species include wallflower *Erysimum cheiri*, red valerian, mignonette *Reseda lutea*, perennial wall rocket and barren brome *Anisantha sterilis*.

3.4.68 Within the Pit dense scrub, including much butterfly bush, has been recently cleared from the base of the northern cliff and in parts of the western end of the Pit, leaving much bare ground and ruderal vegetation.

3.4.69 The grassland in the base of the Pit is variable. At least part of it appears to have been sown (drill or cultivation lines are still visible in places) with a mixture containing red fescue and a number of characteristic of calcareous grasslands, including kidney vetch (which may be the non-native ssp. *polyphylla*) and sanfoin *Onobrychis vicifolia*. Parts of this are quite sparse with much bare, chalky ground. Elsewhere there is common knapweed *Centaurea nigra*, salad burnet *Poterium sanguisorba*, common centaury and common spotted orchid *Dactylorrhiza fuchsia*. Other species include frequent bird's-foot trefoil, wild carrot and ox-eye daisy. Some areas support a coarser sward with much false-oat grass, Yorkshire fog and cocksfoot. Forb content is variable, from approx. 20% to over 90%, but is approx. 50% overall.

3.4.70 The banks beside the entrance track into the Pit support coarse grassland with ruderal and dense and scattered scrub. The invasive non-native species Japanese knotweed is present close to the second set of gates into the Pit (TN21).

Sport's Field / East Quarry

3.4.71 The eastern two thirds of this disused pit comprise rather species poor coarse false oat-grass dominated grassland with stands of tall ruderal and scattered scrub. The most notable feature of this are locally frequent narrow-leaved everlasting pea and grass vetchling.

3.4.72 The western third and the southern edge support dense scrub, including large stands of bramble with frequent hawthorn, dogwood and elder, and species poor woodland. The woodland canopy is dominated by sycamore or ash and the field layer by nettle and ivy, though a range of other common and widespread species are also present.

3.4.73 The cliffs along the northern, south facing side of the pit are largely bare, although there are small amounts of butterfly bush and perennial wall rocket. The cliffs on the southern, north facing side are largely covered with large festoons of ivy, although a number of other species, including wallflower, yarrow, hawkweed oxtongue and wild carrot are present on ledges in one area. The cliff on the western, east facing, side is intermediate in character. A sandy layer is exposed above the chalk at the top of the cliffs, although this most clearly exposed on the northerly, south facing side.

Bamber Pit

3.4.74 This disused pit supports a mosaic of grassland, scrub, ruderal and open water. The northern half has been landfilled.

3.4.75 The chalk cliff faces on the western and northern sides of the pit support ivy, red valerian *Centranthus ruber*, perennial wall rocket and the invasive non-natives butterfly bush and wall cotoneaster *Cotoneaster horizontalis*.

3.4.76 The southern part of the pit supports a rather species poor to moderately species rich grassland on a moderately sloping, north-facing slope. Much of this is dominated by false oat grass and cocksfoot (NVC MG1 *Arrhenatherum elatius* – False oat grass grassland), although there are some shorter and more open areas with creeping bent and red fescue. Frequent or abundant species include hawkweed oxtongue, perforate St John's wort, black medick, red bartsia, narrow-leaved bird's-foot trefoil, cinquefoil and common knapweed. Other species include beaked hawksbeard, meadow vetchling, wild parsnip wild carrot and occasional narrow-leaved everlasting pea. Forb content is variable but generally in the region of 40-50%.

3.4.77 Parts of the bottom of the pit support sparse, early successional vegetation with patchy grassland (Open Mosaic Habitat on Previously Developed Land) and locally heavy rabbit grazing. This has frequent field forget-me-not *Myosotis arvensis*, viper's bugloss *Echium vulgare*, perforate St. John's-wort, teasel *Dipsacus fullonum*, centaury and yellow-wort. Small

patches of the calcareous grassland species common milkwort Polygala vulgaris and fairy flax *Linum catharticum* and the **Nationally Scarce** divided sedge were present in some of the grassland areas in the base of the Pit as also were several small groups of bee orchid *Ophrys apifera*. In the south eastern part of the Pit there are some small areas of short, heavily rabbit grazed grassland with thyme-leaved sandwort and procumbent pearlwort *Sagina procumbens*.

3.4.78 Much of the northern part of the Pit, which has been used for landfill, supports tall ruderal vegetation dominated by hoary mustard, nettle, hemlock *Conium maculatum*, common mallow *Malva sylvestris* and teasel.

3.4.79 There is scattered and dense scrub throughout the grassland and ruderal vegetation, including bramble, hawthorn, dog rose, dogwood, wild privet and elder. The invasive non-native butterfly bush is also frequent and locally abundant, for example in the base of the Pit, and a number of other non-native trees and shrubs are scattered throughout it. In some areas the scrub is developing into woodland, for example in the south western corner, where there is locally abundant silver birch. The field layer here is species poor and strongly dominated by ivy. The invasive non-native wall Cotoneaster is present in and around this area of developing woodland. On the banks adjoining the water body grey and goat willow are locally abundant.

3.4.80 A water body (**P7**) is located in the eastern part of the pit. The banks are steep and the water appears deep. It supports a few patches of white water-lily *Nymphaea alba* at its western end but no other aquatic vegetation was observed. Due to the steepness of the banks there is little emergent or marginal vegetation, although a few small patches of water mint *Mentha aquatica*, woody nightshade, great willowherb and hemp agrimony are present.

Northfleet Landfill

3.4.81 This landfill site comprises two grassy hills and Bakers Hole geological SSSI lies within the eastern part. The grassland is variable in structure and species composition but generally the most abundant grasses are false oat-grass, cocksfoot, creeping bent and red fescue. The most southerly, south facing slopes are the richest with much common vetch and grass vetchling as well as scattered Nationally Scarce yellow vetchling. There is also a population of the Nationally Scarce Bithyinian vetch in the west of the grassland and a small number of plants of restharrow *Ononis repens* on the north eastern slope of the northern hill. Much of the rest of the grassland is rather coarse and species poor and the ruderal element, including docks, goat's rue and hemlock is locally prominent. Forb content is very variable from less than 10% to around 90% in some of the richer southern parts.

3.4.82 At least partly planted scrub and trees border the western and southern edges of the Site and shrubs have been planted along the northern boundary where there are also stands of bramble. There is a block of dense scrub in the north eastern corner and dense planted trees and scrub on the embankments down towards the CTRL to the east.

3.4.83 There are two upstanding exposures on the eastern side of the site. The northern of these supports dense scrub on its top but the southern one appears to have been recently cleared of scrub and supports tall ruderal vegetation.

CTRL West and East

3.4.84 These comprise two areas west and east of the CTRL south of the car parking areas.

3.4.85 CTRL West is the larger and more varied area. There is a large spoil mound in the north which is dominated by tall ruderal and scrub, including extensive bramble. However, most of the area comprises grassland in which a number of different grass species, including tall fescue *Schedonorus arundinaceus*, false oat-grass, creeping bent, common couch and red fescue are locally abundant. As a result the sward is variable in structure with areas of tall fescue clumps set within an otherwise quite open sward and other areas with a closed and coarse sward. Consequently forb content is variable, from less than 10% to over 80%, but most is less than 50%. Forb species include a range of species typical of the area and noted elsewhere, including frequent grass vetchling more or less throughout, as well as small populations of the Nationally Scarce yellow vetchling and Bithynian vetch. A number of sedge species are present, including extensive hairy sedge *Carex hirta* and a small patch of the Nationally Scarce divided sedge. There are large areas of tall ruderal in the south western part, with abundant goat's rue as well as cleavers and creeping thistle *Cirsium arvense*. There is also scattered and dense scrub, including much goat and grey willow in the south western part and some large stands of bramble.

3.4.86 CTRL East is more homogenous, with a species poor sward dominated by false oat-grass, tall fescue and Yorkshire fog. However, grass vetchling is frequent throughout, narrow-leaved everlasting pea is occasional and there is a small population of the Nationally Scarce yellow vetchling. There are also some small saline or brackish depressions or 'pans' in the western part with approx. 50% cover of hard grass *Parapholis strigosa* and reflexed saltmarsh-grass. Creeping bent and bird's-foot trefoil are abundant around the edges of these features.

CTRL Car Parks

3.4.87 There are a number of car parks adjoining Ebbsfleet International station. These comprise largely of hard standing, but they are mown verges and areas of native and non-native shrub and tree planting. The grassland in the verges comprises largely of species common in the wider landscape, but reflecting its sown origin and management as amenity grassland includes frequent perennial rye-grass *Lolium perenne*.

Triangle

3.4.88 This is a small area between a roundabout on the A226 and the PRoW to the north. It is a mosaic of grassland, ruderal and dense and scattered scrub and trees (partly planted). The grassland is typical of the area, with a prominent ruderal element.

North of Springhead Nursery

3.4.89 This comprises a mosaic of grassland and ruderal, dense and scattered scrub as well as a small area of woodland. It is bordered to the north and west by the A2260 and the south by the A2 and Springhead Nursery. Embankments associated with the adjoining roads form the northern, western and southern edges of the area and there is a flat, landfilled or tipped area below the embankments in the western part. The area is bordered to the east by the Ebbsfleet Corridor, but this is described separately below.

3.4.90 The grassland is very variable, from tall, coarse and rather species poor to short, rabbit grazed areas with a relatively high forb content. The tall coarse areas are dominated by false oat-grass, common couch and cocksfoot with mostly sparse bulky forbs. The short, rabbit grazed areas are distinctive, with generally high forb content, mostly over 50% and up to 90%. Frequent forbs include the following -

Beaked hawksbeard	
Hawkweed ox-tongue	
Black medick	
Spotted medick	*Medicago arabica*
Lesser and hop trefoils	
Wall speedwell	*Veronica arvensis*
Common mouse-ear	*Cerastium fontanum*
Ribwort plantain	

Cut-leaved cranesbill	*Geranium dissectum*
Red bartsia	
Ground ivy	*Glechoma hederacea*
Field forget-me-not	
Common ragwort	*Senecio jacobaea*

Common centaury and yellow-wort are also locally frequent.

3.4.91 There are also grassland areas intermediate in character between these two types and containing species characteristic of both. There are relatively large numbers of pyramidal orchids throughout much of the grassland.

3.4.92 The grassland on the western landfilled area comprises a distinctive species poor, hummocky sward of red fescue. A small number of other grass and forb species are present but do not generally form a significant component.

3.4.93 There are stands of tall ruderal vegetation, including goat's rue, creeping thistle, nettle and teasel, as well as some of the coarser grasses, especially at the base of the western embankment and on the southern embankment.

3.4.94 The scrub is mixed and contains a range of species including much hawthorn, dog rose and dogwood as well as grey willow. There are large stands of bramble.

3.4.95 There is a small area of broad-leaved woodland in the west of the area. Part, but probably not all of this appears to have been planted but it now has a semi-natural character. The canopy comprises a mix of silver birch, ash, sycamore, pedunculate oak *Quercus robur*, grey alder *Alnus incana*, goat willow and grey poplar *Populus* x *canescens*. The shrub layer is also very mixed with sycamore, field maple *Acer campestre*, grey willow, hawthorn, wild privet, wayfaring tree *Viburnum lantana*, dog rose and spindle. The field layer comprises stands of bramble and grassy vegetation in the more open areas and much bare ground in shadier parts.

3.4.96 There is a balancing pond (**P8**) in the north east of the area. The Pond lies within a fenced compound and was viewed from outside the fence. Open water comprises 80-90% of the pond surface, but there is some fringing common reed, reedmace and yellow iris *Iris pseudoacorus*. There is scattered willow scrub on the banks of the pond.

3.4.97 There is also a seasonal or ephemeral pond at the base of the northern embankment. This was dry at the time of the survey with abundant or locally dominant creeping bent, cinquefoil, water pepper *Persicaria hydropiper* and creeping buttercup *Ranunculus repens*.

Ebbsfleet Corrridor

3.4.98 This includes the Ebbsfleet River, a stream or small river, and associated wetland/riparian habitats. The river issues from springs beneath hard standing beside Springhead Nursery and runs broadly northwards until it enters a culvert beneath the A2260 north of Ebbsfleet International Station. For descriptive purposes the area is divided into a number of sections.

3.4.99 **Ebbsfleet Corrridor 1** comprises the uppermost section of the river until it crosses below the CTRL. The first couple of hundred meters beside Springhead Nursery lies within a steep-sided engineered channel with rock armouring. The banks are dominated by tall ruderal vegetation.

3.4.100 Below this, close to the electricity pylon it becomes a more natural channel. It then enters an area of wet woodland where, although there is a channel or channels, the water spreads widely across the whole area. This has a canopy of mature crack willow Salix fragilis, with characteristic features such as fallen or sprawling trees, standing and fallen dead wood and cracks and cavities. In addition to crack willow there is the odd elder, but otherwise there is little in the way of a shrub layer. The field layer comprises largely of abundant or dominant fool's water-cress *Apium nodiflorum* or water cress *Nasturtium rorippa-aquatica*, although there are also stands of nettle, yellow iris and gypsywort *Lycopus europaeus*. Woody nightshade sprawls across the field layer in places as well as into the trees. Other species include great willow herb, broad-leaved willowherb *Epilobium montanum*, creeping buttercup, hairy bittercress *Cardamine 33irsute* and water figwort *Scrophularia auriculata*. The banks to the east and west support tall ruderal vegetation dominated by nettle, and on the eastern side there is a stand of the non-native invasive giant hogweed (TN26). Further to the north the trees become smaller and the canopy more open. There are relatively large areas of open water with common duckweed and water starwort *Callitriche* sp. And stands of common reed and reedmace, as well as many of the wetland species noted above. The river is crossed by the CTRL by a bridge and forms a relatively wide channel at this point.

3.4.101 To the west of the wet woodland there is a narrow strip of drier woodland and dense scrub. This includes planted wild cherry *Prunuis avium* but also a number of mature pedunculate oak and ash.

3.4.102 **Ebbsfleet Corrridor 2** comprises the section between the CTRL and the A2260. A water treatment works is located on the eastern bank of this section and issues into the River. The Ebbsfleet has a more or less straight channel through this area which is adjoined by reedbed, and in the north, next to the A2260 a stand of greater reedmace as well as mature crack

willows. The banks have a range of trees and shrubs including alder and willows, as well as areas of grassland and tall ruderal. The Ebbslfeet goes under the A2260 in a culvert.

3.4.103 **Ebbsfleet Corrridor 3** comprises the section east of the A2260 and next to Blue or Sawyer's Lake. The Ebbsfleet itself runs adjacent and parallel to the road in what appears to be, at least over some or most of its length, an artificial or engineered channel, although this has 'soft' vegetated banks. Much of this section is heavily shaded by willows although there are some open sections and there is a range of aquatic, emergent and marginal species present, including yellow iris, great willowherb, great water dock *Rumex hydrolapathum*, hemp agrimony and lesser pond sedge *Carex acutiformis*. At the northern end of this section the Ebbslfeet goes under the A2260 in a culvert.

3.4.104 Adjoining the river itself are three habitat areas divided from each other by the access track to Blue or Sawyer's Lake and the local railway line. The most southerly of these is wooded or scrubby with much sycamore but also ash and a range of scrub species. There are a number of depressions some of which held water at the time of the survey and others which appear to be seasonally wet. Some were heavily shaded but others not.

3.4.105 The second area comprises a basin into which part of the river flows on its western side. It is filled with stands of common reed, reedmace, lesser pond sedge and branched bur-reed. The quite steep banks comprise dense scrub or woodland.

3.4.106 The third area is a similar basin. It appears to be connected to the second area via a culvert on its southern side from which water discharges, before flowing through the area and out into the Ebbsleet to the west. There is some open water at the western end of this area but much of it is filled with stands of common reed, reedmace and lesser pond sedge. Other species include great water dock and water forget-me-not *Myosotis scorpioides*. There is some willow scrub within the wetland area and the quite steep banks are largely scrubby. The invasive non-native Japanese knotweed (TN24) is present in the north east corner.

3.4.107 **Ebbsfleet Corrridor 4** is the section between the A2260 and Ebbsleet International Station and its associated car parks. Much of this is quite heavily shaded, mainly by mature crack willows, especially in the eastern part. However, there are some more open areas with stands of common reed, lesser pond sedge, yellow iris and branched bur-reed. Although much of the bed of the river is silty, parts of this section have a sandy or gravelly bed with visible chalk in places.

3.4.108 Between the river and the A2260 and running broadly parallel with them are strips of first tall ruderal with much nettle, and then grassland. The invasive non-native species Japanese knotweed and Himalayan balsam *Impatiens glandulifera* (TN22) are present in this area.

3.4.109 At the end of this section the Ebbsfleet enters a culvert and does not emerge until close to where it discharges into the Thames.

A2 Corridor

3.4.110 This comprises a section of the A2 and associated soft estate and other adjoining habitats between and including the Bean, Ebbsfleet and Pepper Hill junctions. Most of this was surveyed by Halcrow Hyder on behalf of the Highways Agency in May 2015 and their results have been made available to the Project through a data sharing agreement. The following description is therefore largely based on the acco0unt in their report[15].

3.4.111 Habitats adjoining the A2 and its junctions comprise largely of a mosaic of grassland, scrub and woodland. Much of the grassland is relatively species poor but some small area of more species rich grassland were identified, for example near the Bean junction, where populations of the **Nationally Scarce** man orchid were also recorded. There is widespread scattered and dense scrub, much of it planted. A number of small wooded areas are present around the Bean junction and east towards the Ebbsfleet junction. These appear to include both semi-natural and plantation woodland. Some of the semi-natural woodland is Ancient and a number of Ancient Woodland Indicator Species, including bluebell *Hyacinthoides non-scripta* and wood anemone *Anemone nemerosa* are present. The A2 adjoins a number of woodlands west of the Ebbsfleet junction, including Darenth Wood SSSI west of Bean Junction and other areas between Bean village and the A2. There are also two ponds located either side of the Bean junction north of the A2.

South of the A2

3.4.112 This comprises largely of land south of the Ebbsfleet and Pepper Hill junctions. Much of this west of the disused railway line is arable and improved grassland. The arable has only very narrow or no headlands supporting very little in the way of arable weeds. The improved grassland is also very species poor and overwhelmingly dominated by perennial rye-grass. Either side of the disused railway line is an area used for horticulture comprising cultivated beds, tree and soft fruit and polytunnels. The disused railway line itself supports dense and scattered scrub and broadleaved semi-natural woodland with mature trees including pedunculate oaks. Further east there is a garden centre and recycling centre and the B262

[15] Halcrow Hyder for Highways England, 2015. A2 Bean & Ebbsfleet Junction Improvements – Preliminary Ecological Appraisal

Station Road has a hedge with trees on its northern side. Grassland areas adjoining the CTRL appear to have been sown with a calcareous grassland seed mix and support what could be characterised as semi-natural calcareous grassland with frequent common knapweed, greater knapweed *Centaurea scabiosa*, ox-eye daisy, bird's-foot trefoil, wild carrot and kidney vetch. There is also a very small population of the Nationally Scarce yellow vetchling.

3.5 Protected and Notable Species

3.5.1 The habitats and features present within the Proposed Development area have the potential to support a range of species protected by law and other notable species. These have been the subject of a range of other specialist surveys and their results are reported elsewhere.

Notable Plant Species

3.5.2 As described above nine Nationally Scarce plant species[16] were recorded during the survey. A further four species were recorded by the Kent Botanical Recording Group between 2012 and 2015. **Table 7** below lists these species with habitat/location (see also **Figures 2** and **3**) and an indication of population size. The greatest concentration and largest populations of these species are located on the Swanscombe Peninsula, especially on Broadness. **Table 8** identifies their England and Great Britain Red Data List status.

Table 7 Nationally Scarce Species recorded, including habitat/location and population size

Common Name	Scientific Name	Habitat/location	Population size
Brackish water-crowfoot	*Ranunculus baudotii*	Open water, including ponds, pools and ditches, both permanent and seasonal. Pools in G5, P4 and P6, Ditches Botany Marsh West and East	Pools in G5 – small P4 and P6 – large Ditches Botany Marsh West and East – medium
Round-leaved wintergreen*	*Pyrola rotundifolia ssp. maritima*	Among ivy and scrub on west facing bank of old rail link to jetty.	Small-medium – more than a hundred rosettes spread over area of several metres with tens of flowering spikes.
Yellow vetchling	*Lathyrus aphaca*	Grassland, Broadness (especially tracks and G3), seawall (G6). Scattered populations elsewhere throughout Proposed Development area.	Broadness/seawall – Large – thousands. Elsewhere – small-medium – tens to hundreds.
Hairy vetchling	*Lathyrus hirsutus*	Grassland, Broadness (especially G3 and adjoining tracks)	Broadness – Large – hundreds to thousands. Botany Marsh East – small – tens.
Bithynian vetch	*Vicia bithynica*	Grassland, Broadness (especially G3 and adjoining tracks), seawall (G6). Scattered populations elsewhere throughout Proposed Development area.	Broadness/seawall – Large – hundreds to thousands. Elsewhere – small-medium – tens to hundreds.

[16] Stewart, A., Pearman, D.A. and Preston, C.D, 1994. Scarce Plants in Britain. JNCC.

Common Name	Scientific Name	Habitat/location	Population size
Sickle medick	*Medicago sativa ssp. falcata*	Grassland, especially G1 beside tracks in the centre of the Peninsula. Mixed with ssp. *sativa* and *varia* and the least frequent/abundant ssp.	Medium – large, at least hundreds
Slender hare's-ear*	*Bupleurum tenuissimum*	Open grass margin to gravelly track between Botany Marsh and Broadness	Small-medium – over 200 plants in 2012
Golden samphire	*Inula crithmoides*	Saltmarsh (S1)	Small - tens of plants on top of sea/riverward side of eroding edge
Man orchid	*Orchis anthropophora*	Grassland (G1) – in small areas either side of E-W track	Small – 50-100 flowering spikes plus non-flowering rosettes
Divided sedge	*Carex divisa*	Grassland – edge of Black Duck Marsh, Botany Marsh East and CTRL West	Edge of Black Duck Marsh – Small – small patch. Botany Marsh East – Medium – patchily present throughout old sports field. CTRL West – small patch.
Annual beard-grass	*Polypogon monspeliensis*	Disturbed areas, western edge/boundary of Black Duck Marsh and Ingress Park development site and Manor Way	Small – tens of plants
Borrer's saltmarsh-grass*	*Puccinellia fasciculata*	Gravelly track east of inlet, Broadness	Small – few plants in 2014
Stiff saltmarsh-grass*	*Puccinellia rupestris*	Gravelly track east of inlet, Broadness	Small – few plants in 2014

* Recorded by KBRG

Table 8 Red Data List status* in England[17] and Great Britain[18] for Nationally Scarce plants recorded

Common Name	Scientific Name	England	Great Britain
Brackish water-crowfoot	*Ranunculus baudotii*	Least Concern (LC)	Least Concern (LC)
Round-leaved wintergreen	*Pyrola rotundifolia ssp. maritima*	Least Concern (LC)	Least Concern (LC)
Yellow vetchling	*Lathyrus aphaca*	Vulnerable (VU)[a]	Vulnerable (VU)
Hairy vetchling	*Lathyrus hirsutus*	Waiting List (WL)	Waiting List (WL) [b]
Bithynian vetch	*Vicia bithynica*	Least Concern (LC)[c]	Vulnerable (VU)

[17] Stroh, P.A., Leach, S.J., August, T.A., Walker, K.J., Pearman, D.A., Rumsey, F.J., Harrower, C.A., Fay, M.F., Martin, J.P., Pankhurst, T., Preston, C.D., and Taylor, I., 2014. A Vascular Plant Red List for England. The Botanical Society of Britain and Ireland.

[18] Cheffings, C.M. and Farrel, L. (eds.), 2005. The Vascular Plants Red Data List for Great Britain. JNCC.

Common Name	Scientific Name	England	Great Britain
Sickle Medick	*Medicago sativa ssp. falcata*	Least Concern (LC)[d]	Least Concern (LC)
Slender Hare's-ear	*Bupleurum tenuissimum*	Vulnerable (VU)[e]	Vulnerable (VU)
Golden samphire	*Inula crithmoides*	Least Concern (LC)	Least Concern (LC)
Man orchid	*Orchis anthropophora*	Endangered (EN)[f]	Endangered (EN)
Divided sedge	*Carex divisa*	Least Concern (LC)[g]	Vulnerable (VU)
Annual beard-grass	*Polypogon monspeliensis*	Least Concern (LC)	Least Concern (LC)
Borrer's Saltmarsh-grass	*Puccinellia fasciculata*	Near Threatened (NT)[h]	Vulnerable (VU)
Stiff Saltmarsh-grass	*Puccinellia rupestris*	Least Concern (LC)[i]	Least Concern (LC)

* IUCN Threat categories – Critically Endangered (CE), Endangered (EN), Vulnerable (VU), Near Threatened (NT)

Waiting List (WL) – not assigined an IUCN category due to inadequate data

[a] 31% decline

[b] on waiting list because studies of native or archaeophyte (long-established alien) status are required

[c] but 58% decline when 1987+ records as a proportion of all records

[d] but 63% decline when 1987+ records as a proportion of all records

[e] 41% decline

[f] >50% decline

[g] but 40% decline when 1987+ records compared with all records

[h] 23% decline

[i] but 45% decline when 1987+ records as a proportion of all records

3.5.3 The following observations on these species are derived from accounts in the Atlas of the Kent Flora[19], A New Atlas of the Kent Flora[20], Kent Red Data Book[21] and Kent Rare Plant Register[22].

Brackish water-crowfoot – some decline due to habitat loss but still quite widespread in ditches in North Kent and Romney Marshes.

Round-leaved wintergreen – very rare in Kent with most populations in the Swanscombe area where it has colonised old chalk pits with some large populations.

[19] Philp, E.G., 1982. Atlas of the Kent Flora, Kent Field Club.
[20] Philp, E.G., 2010. A New Atlas of the Kent Flora. Esex Field Club.
[21] Kent Wildlife Trust for Kent County Council, 1999. Kent Red Data Book.
[22] Kitchener, G. and Kent Botanical Recording Group, 2015. Draft Kent Rare Plant Register.

Yellow vetchling – has declined nationally. Possibly a long-established introduction. Most records in Kent in the area east of Dartford, in which the Proposed Development Area lies, as well as a scattering of records in the Medway Valley.

Hairy vetchling – native status uncertain. Often considered introduced (neophyte in A New Atlas of the Kent Flora) though possibly native beside Thames estuary, especially Essex. The only Kent record in A New Atlas of the Kent Flora at Warden Bay, Isle of Sheppey, but there are records from 2012-15 for the Botany Marshes area in desk study data supplied by KMBRC and KBRG.

Bithynian vetch – has declined nationally. Relatively few records mostly in the north of Kent - only three records in A New Atlas of the Kent Flora, but several near Proposed Development Area in desk study data supplied by KMBRC.

Sickle Medick – a casual introduction in Kent (considered native only in East Anglia, especially Breckland, in the UK).

Slender Hare's-ear – local and uncommon in Kent (North Kent coast and Dungeness) but can be locally frequent or abundant where it occurs.

Man orchid – has declined both nationally and locally. Although present elsewhere the greatest concentration is on the North Downs in Kent and Surrey, where it is still quite widespread.

Divided sedge – has declined throughout Great Britain, including England and Kent. Still relatively common around the low coasts in Kent (e.g. North Kent Marshes, levels beside the River Great Stour and Romney Marsh), especially in coastal grazing marsh.

Golden samphire – although Nationally Scarce its distribution appears to be relatively stable. Greatest concentration in Kent in the saltmarshes in the north of the County (Thames, Medway, Swale). Scattered records elsewhere.

Annual beard-grass – Most records from the North Kent Marshes, especially Medway and Isle of Sheppey.

Borrer's Saltmarsh-grass – most records along the North Kent Coast

Stiff Saltmarsh-grass – rather local and scarce along the North Kent Coast, especially Cliffe area and Swale

3.5.4 In addition to the Nationally Scarce species a number of other species included in the Kent Rare Plant Register were also recorded. These, the location of records and comments on their frequency/abundance and/or population size are listed in **Table 9** below.

Table 9 Kent Rare Plant Register[23] species recorded (excluding Nationally Scarce species) with location and abundance/population size

Common Name	Scientific Name	Location	Abundance/population size
Crosswort	*Cruciata laevipes*	G3	Rare - very few plants

[23] Kitchener, G. and Kent Botanical Recording Group, 2015. Draft Kent Rare Plant Register.

Common Name	Scientific Name	Location	Abundance/population size
Wild strawberry	*Fragaria vesca*	Bamber Pit N of Springhead Nursery	Occasional but locally abundant
Field scabious	*Knautia arvensis*	Grassland beside CTRL nr. Pepper Hill junction	Rare – few plants
Sanfoin	*Onobrychis viciifolia*	G4, Craylands Lane Pit/West Quarry and Grassland beside CTRL nr. Pepper Hill junction	G4 – rare – few plants Craylands Lane Pit/West Quarry – Occasional, locally frequent or abundant (likely to have been sown) CTRL nr. Pepper Hill junction - rare – few plants
Greater plantain (subspecies)	*Plantago major* subsp.*intermedia*	Botany Marsh West	Locally abundant in depressions in wider grassland - thousands
Small pondweed	*Potamogeton pusillus*	P3 and P5	Abundant especially in P3
Heath Speedwell	*Veronica officinalis*	Grassland beside CTRL nr. Pepper Hill junction	Rare – few plants

3.5.5 Worthy of mention among other species recorded are narrow-leaved everlasting pea and narrow-leaved bird's-foot trefoil. The former is widespread and locally frequent throughout the Proposed Development Area and has its greatest concentration in Kent in the Swanscombe area, although there are also records from the area between Canterbury and Dover/Folkestone and from Dungeness. The latter is a characteristic species of coastal grazing marsh, with records concentrated along the north Kent coast, although it does also occur inland. It is one of the principal grassland forb species in the Proposed Development Area, being frequent and locally abundant more or less throughout.

3.6 Non-native Invasive Species

3.6.1 Japanese knotweed *Fallopia japonica*, giant hogweed *Heracleum mategazzianum*, Himalayan balsam *Impatiens glandulifera*, and wall cotoneaster *Cotoneaster horizontalis*, all of which are listed in Schedule 9 (part 2) of the Wildlife and Countryside Act 1981 (as amended), were recorded within the Proposed Development Area at the following locations.

Japanese knotweed

- Beside the pylon, Broadness (TN5)
- Beside Manor Way (TN18)
- Beside the gate, Crayland's Lane Pit/West Quarry (TN21)
- Near the Ebbsfleet (TN22 and TN24)

Giant hogweed

- NE Tip (TN8)
- Beside the Ebbsfleet (TN26)

Himalayan balsam

- Near the Ebbsfleet (TN22)

Wall cotoneaster

- Bamber Pit cliffs

4.0 EVALUATION

4.1 Habitats

4.1.1 **Table 10** lists the habitats and areas considered to be of greatest broad nature conservation importance, identifies their relevant Habitat of Principal Importance under the NERC Act 2006, section 41 and whether they would qualify for selection as Local Wildlife Sites[24].

Table 10 Habitats and areas considered to be of greatest broad nature conservation importance, relevant Habitat of Principal Importance (NERC Act 2006, section 41) and qualification for selection as Local Wildlife Sites

Habitat	Areas	Habitat(s) of Principal Importance	Qualifies as LWS (relevant criteria)
Intertidal sediment	Edge of Swanscombe Peninsula	Intertidal Mudflats	N/A
Saltmarsh	Edge of Swanscombe Peninsula	Coastal Saltmarsh	Yes (CO1)
Reedbed and associated ditches	Black Duck Marsh, CTRL Wetland and Botany Marsh East	Reedbeds	Yes (FE1)
Open water and ponds	Especially Black Duck marsh and P3, P4 and P5	Ponds	Yes (SW1) – Black Duck marsh P3, P4 and P5
Coastal grazing marsh and associated ditches	Botany Marsh West	Coastal and Floodplain Grazing Marsh	
Marshy grassland	Most of G8		
More species and/or forb rich grasslands	Parts of G1, as well as G2, G3, G6, G7, G10, base of Craylands Lane Pit/West Quarry, parts of Bamber Pit and richer parts of North of Springhead Nursery	Open Mosaic Habitat on Previously Developed Land (parts)	Yes (some grasslands supporting Nationally Scarce plant species, see below) (VP2)
Early successional areas	G4, G5 G9 and base of Bamber Pit	Open Mosaic Habitat on Previously Developed Land	
Exposures	e.g. sandy exposures at the top of chalk cliffs, Craylands Lane Pit/West Quarry and exposures at Northfleet Landfill		
Wetland mosaic	Ebbsfleet Corridor	Rivers, Reedbeds, Wet Woodland	Yes – designated – Ebbsfleet Marshes, Northfleet LWS

[24] Kent Wildlife Trust on behalf of the Kent Biodiversity Partnership, 2006. Local Wildlife Sites in Kent (Sites of Nature Conservation Interest) Criteria for Selection and Delineation Version 1.3.

4.1.2 Other habitats such as other grassland, tall ruderal, scrub, woodland and ditches also have value and may be of particular importance for some species or species groups.

4.2 Flora

Notable Species

4.2.1 A scoring system is used for evaluating and selecting sites both as SSSIs and as Local Wildlife Sites in Kent on the basis of their vascular plant species. Sites are eligible for selection as SSSIs if they score 200 points or more and as Local Wildlife Sites if they score 150 points or more. **Nationally Scarce** species score 50 points.

4.2.2 On the basis of the 13 species recorded, on the Swanscombe Peninsula the grassland and early successional/ruderal habitats where these species are present would score 550, and with the salt-marsh (golden samphire) and ponds and ditches (brackish water-crowfoot) would score 650. Based on this at least parts of the Swanscombe Peninsula would be eligible for selection as both SSSI and Local Wildlife Site. However, given the relatively small populations of some of the species, eligibility for selection as SSSI is considered unlikely on the basis of its plant species.

4.2.3 Based on the above it is considered that collectively the areas and habitats supporting the greatest concentrations and largest populations of the **Nationally Scarce** species within Swanscombe Peninsula are of **County Importance** for their plant species. These comprise;

- **G1**, **G2** and **G3** on Broadness and adjoining tracks (yellow vetchling, hairy vetchling, Bithyinian vetch, sickle medick, slender hare's ear, man orchid, Borrer's saltmarsh grass and stiff saltmarsh grass);
- **G6** (yellow vetchling, Bithyinian vetch and sickle medick); and
- **S1** (golden samphire).

4.2.4 Elsewhere on the Swanscombe Peninsula and outside the Peninsula the populations of these species are smaller and more scattered and their presence, with those of other notable species (Kent Rare Plant Register Species excluding Nationally Scarce species) is considered as part of the evaluation of the habitats that support them (4.2.5 and **Table 11** below).

Habitats

4.2.5 Habitats within the Proposed Development area have been evaluated as shown in **Table 11** below. The saltmarsh, reedbed and ponds P3, P4 and P5 are considered to be of County

Importance as they meet criteria for the selection of Local Wildlife Sites in Kent (see **Table 10** above). The more species and forb rich areas of grassland and early successional are considered to be of Local Importance. Most other habitats are considered to be of Parish Importance. G1, G2 and G3 on Broadness, G6, and S1 are not included as they are considered to be of County Importance for the Nationally Scarce plant species they support and are discussed above.

Table 11 Evaluation of habitats (excluding areas identified as being of County Importance for their Nationally Scarce plant species in 4.2.3)

Habitat	Importance	Comments
Arable/horticultural		
South of A2	Parish	Limited arable weed flora
Grassland and early successional		
G1 (excl. Broadness)	Local	Generally rather species poor but of relatively large extent and does contains more species and forb rich areas. Mostly small and scattered populations of several Nationally Scarce species.
G4	Local	Moderate species richness and high forb content, including species characteristic of unimproved grassland
G5	Local	Moderate species richness and high forb content, including species characteristic of unimproved grassland. One Nationally Scarce species.
G7	Local	Small area with moderate species richness and high forb content, including species characteristic of calcareous grassland.
G8	Local	Moderate species richness and high forb content, including species characteristic of unimproved grassland. One Nationally Scarce species.
G9	Local	Moderate species richness and high forb content but includes much hard standing with limited vegetation cover.
G10	Local	Moderate species richness and high forb content, including species characteristic of unimproved grassland.
Botany Marsh West (incl. ditches)	Local	Rather species poor but includes number of species characteristic of coastal grazing marsh including distinctive inundation flora in wet depressions. Small populations of two Nationally Scarce species and one KRPR species.
Botany Marsh east - old sports field	Local	Rather species poor but includes species characteristic of unimproved grassland and grazing marsh and one Nationally Scarce species frequent throughout.
Botany Marsh east (excl. old sports field)	Parish	Species poor coarse sward.
Manor Way 1	Parish	Small area with limited range of common and widespread species.

Habitat	Importance	Comments
Manor Way 2	Parish	Small area of grassland with common and widespread species typical of the area.
Manor Way 3	Local	Small area of grassland with common and widespread species typical of the area, but including two Nationally Scarce species.
Craylands Lane Pit/West Quarry 1	Parish	Small area of rather coarse and species poor grassland
Craylands Lane Pit/West Quarry 2	Local	At least in parts moderate species richness and high forb content, including species characteristic of calcareous grassland and one KRPR species.
Sports Field/East Quarry	Parish	Rather species poor and low forb cover.
Bamber Pit	Local	At least in parts moderate species richness and high forb content, including species characteristic of calcareous grassland, small population of one Nationally Scarce species and one KRPR species.
Northfleet	Local	Rather species poor but at least southern parts are moderately species rich. Two Nationally Scarce species.
CTRL West	Local	Rather species poor though some parts are moderately species rich. Small populations of three Nationally Scarce species.
CTRL East	Parish	Rather species poor but does include some salt tolerant species.
North of Springhead Nursery	Local	At least parts are moderately species rich with high forb content, including species characteristic of unimproved grassland. Small population of one Nationally Scarce species and one KRPR species.
A2 corridor	Local	Most rather species poor but does include some moderately species rich areas
Improved grassland south of A2	Negligible	Very species poor
Grassland adjoining CTRL south of A2	Local	Moderate species richness and high forb content, including species characteristic of calcareous grassland. Small population of one Nationally Scarce species and one KRPR species.
Scrub and woodland		
Scrub	Parish	Characteristic range of generally common species. Includes widespread and locally abundant invasive non-native butterfly bush.
Woodland and plantation	Parish	Small areas of generally species poor secondary woodland of recent development and plantations.
Wetland		
P1	Negligible	No visible aquatic, emergent or marginal vegetation
P2, P6, P7 (Bamber Pit pond) and P8	Parish	Rather species poor aquatic, emergent and marginal vegetation of limited extent.
P3, P4 and P5	County*	Supports range of aquatic species including one Nationally Scarce species and one KRPR species and set within other wider wetland(s)/reedbed.

Habitat	Importance	Comments
Reedbeds (incl. associated ditches) – Black Duck Marsh, CTRL Wetland, Botany Marsh East	County*	Quite extensive though characteristically species poor.
Ditches	Local	Much rather species poor but does include range of aquatic, emergent and marginal species.
Ebbsfleet Corridor	County*	Relatively natural channel with associated riparian and wetland habitat and species, including wet woodland and swamp/reedbed
Salt-marsh and other saline/brackish vegetation		
S2 and S3	County*	Saltmarsh vegetation with range of characteristic species - considered collectively with S1.
Other saline/brackish vegetation	Local	Number of distinctive and characteristic species but of small extent.

* see **Table 10**

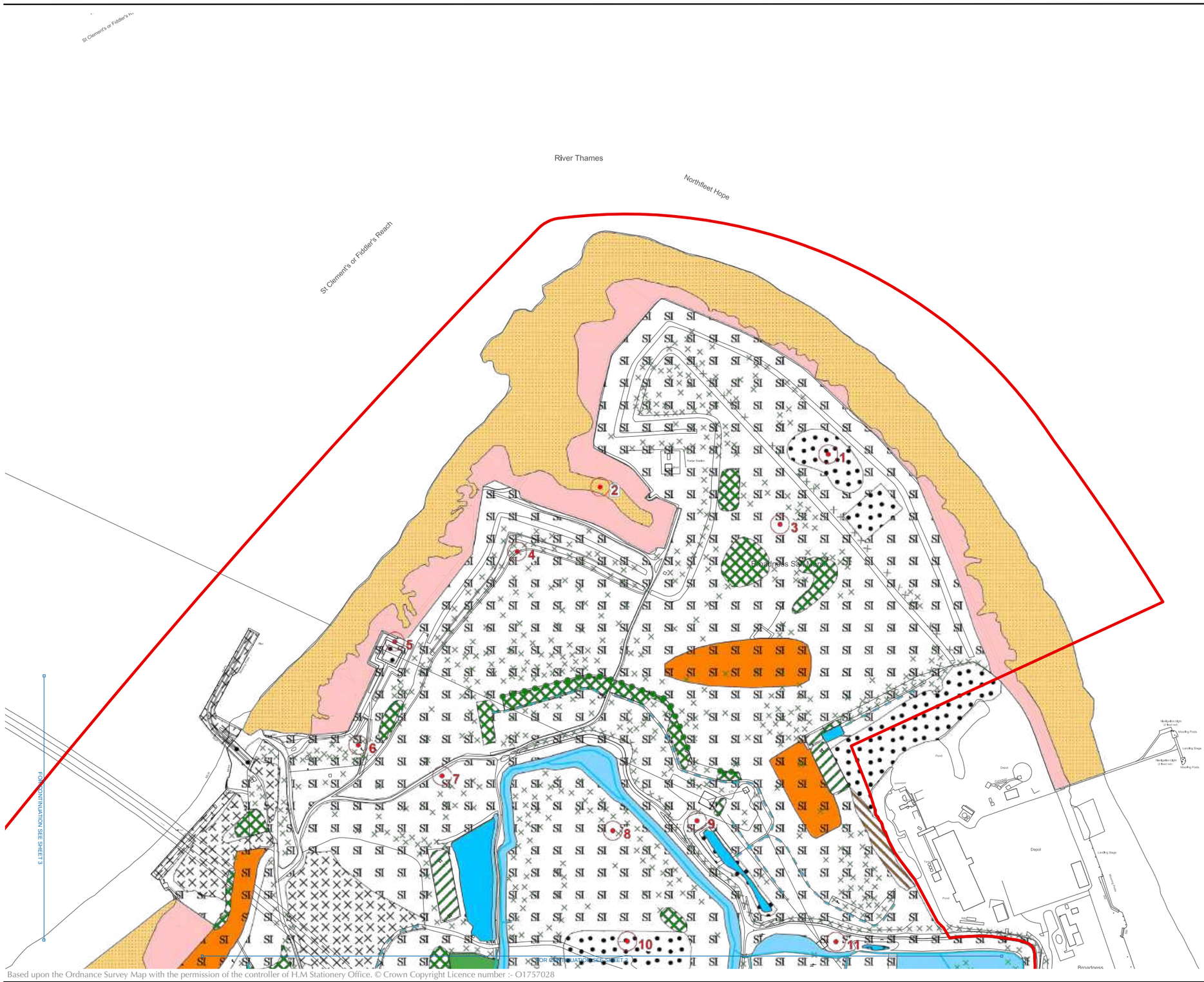
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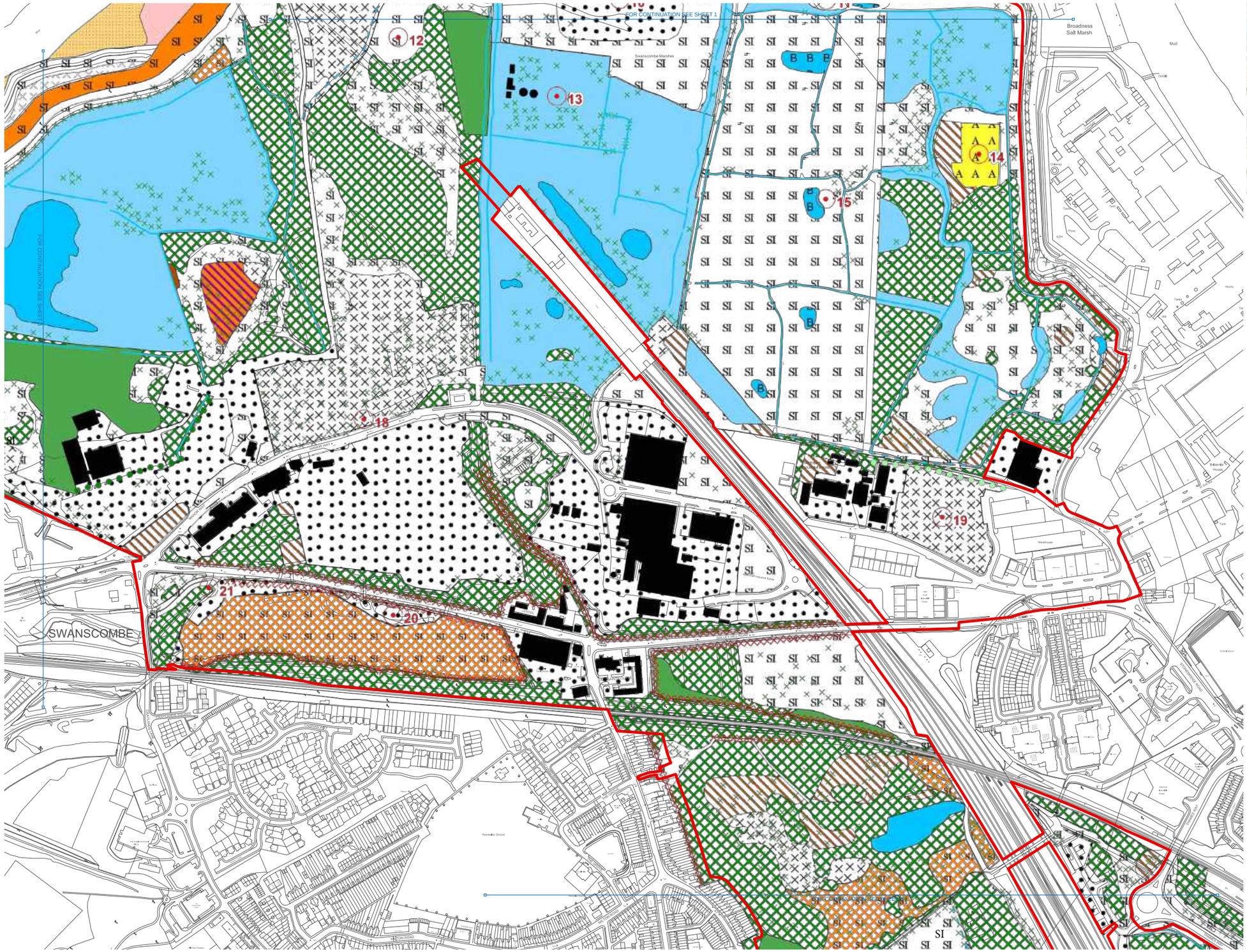
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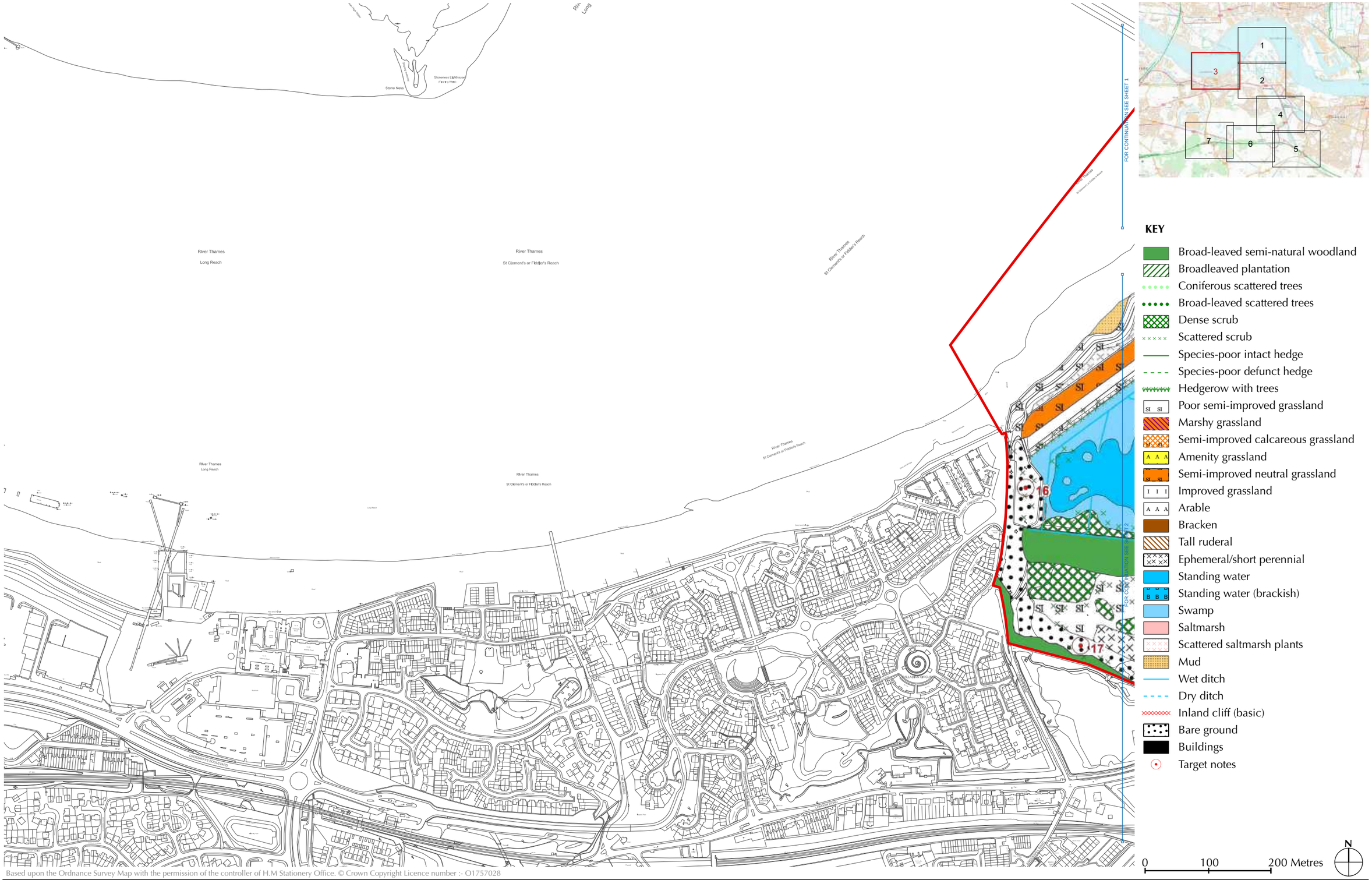
Designated Sites

Figure 2

Phase I Habitat Plan


St Clement's or Fiddler's Reach
River Thames
Northfleet Hope
Coldharbour Salt Marsh
Pumping Station
Pond
Depot
Landing Stage
Mooring Posts
Breakwater
Groyne
Pier
Slipway
Ruins
Pond
Depot
Landing Stage
Breakwater
Pond
Depot
Landing Stage
Mooring Posts
Breakwater
Pond
Depot
Landing Stage
Mooring Posts
Breakwater
Pond
Depot
Landing Stage
Mooring Posts


FOR CONTINUATION SEE SHEET 1
FOR CONTINUATION SEE SHEET 1
FOR CONTINUATION SEE SHEET 1
12
13
14
15
18
19
20
21
SWANSCOMBE
Broadness Salt Marsh
Swanscombe Marshes
Mud
Recreation Ground
Allotments
Bowling Green
Tennis Courts
Pavilion
Sewage Works
Tanks
Pond
Works
Warehouse
Telephone House
Swanscombe Industrial Estate
Swanscombe Industrial Centre
Swanscombe Business Park
Swanscombe Golf Course
Swanscombe Cricket Ground
Swanscombe Recreation Ground
Swanscombe Allotments
Swanscombe Bowling Green
Swanscombe Tennis Courts
Swanscombe Pavilion
Swanscombe Sewage Works
Swanscombe Tanks
Swanscombe Pond
Swanscombe Works
Swanscombe Warehouse
Swanscombe



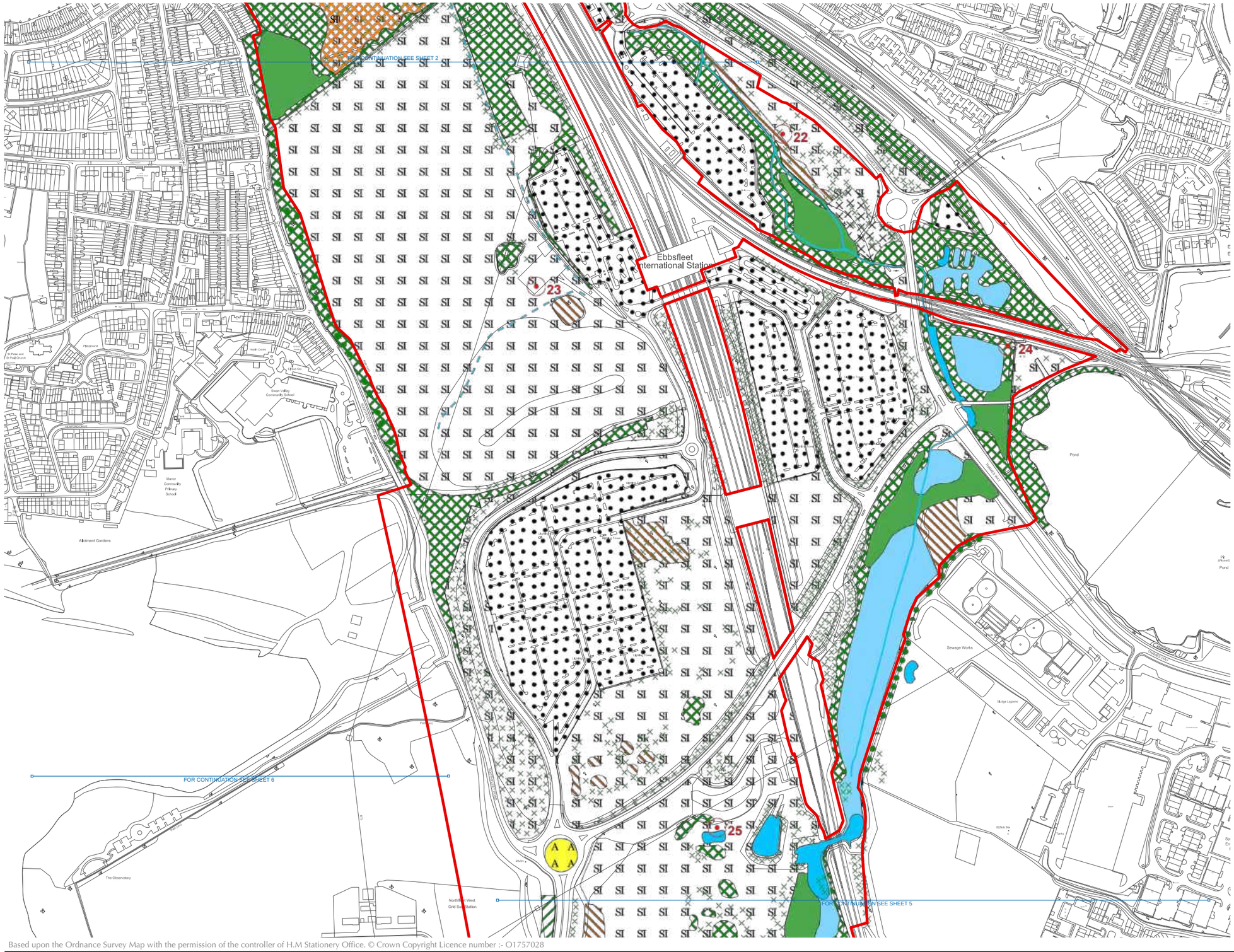
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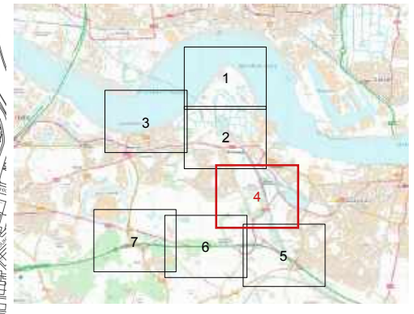
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FIGURE 2c
PHASE 1 HABITAT PLAN

February 2016
11120201_Nationally Scarce Plants_27-01-16.indd





KEY

- Broad-leaved semi-natural woodland
- Broadleaved plantation
- Coniferous scattered trees
- Broad-leaved scattered trees
- Dense scrub
- Scattered scrub
- Species-poor intact hedge
- Species-poor defunct hedge
- Hedgerow with trees
- Poor semi-improved grassland
- Marshy grassland
- Semi-improved calcareous grassland
- Amenity grassland
- Semi-improved neutral grassland
- Improved grassland
- Arable
- Bracken
- Tall ruderal
- Ephemeral/short perennial
- Standing water
- Standing water (brackish)
- Swamp
- Saltmarsh
- Scattered saltmarsh plants
- Mud
- Wet ditch
- Dry ditch
- Inland cliff (basic)
- Bare ground
- Buildings
- Target notes

0 100 200 Metres

N

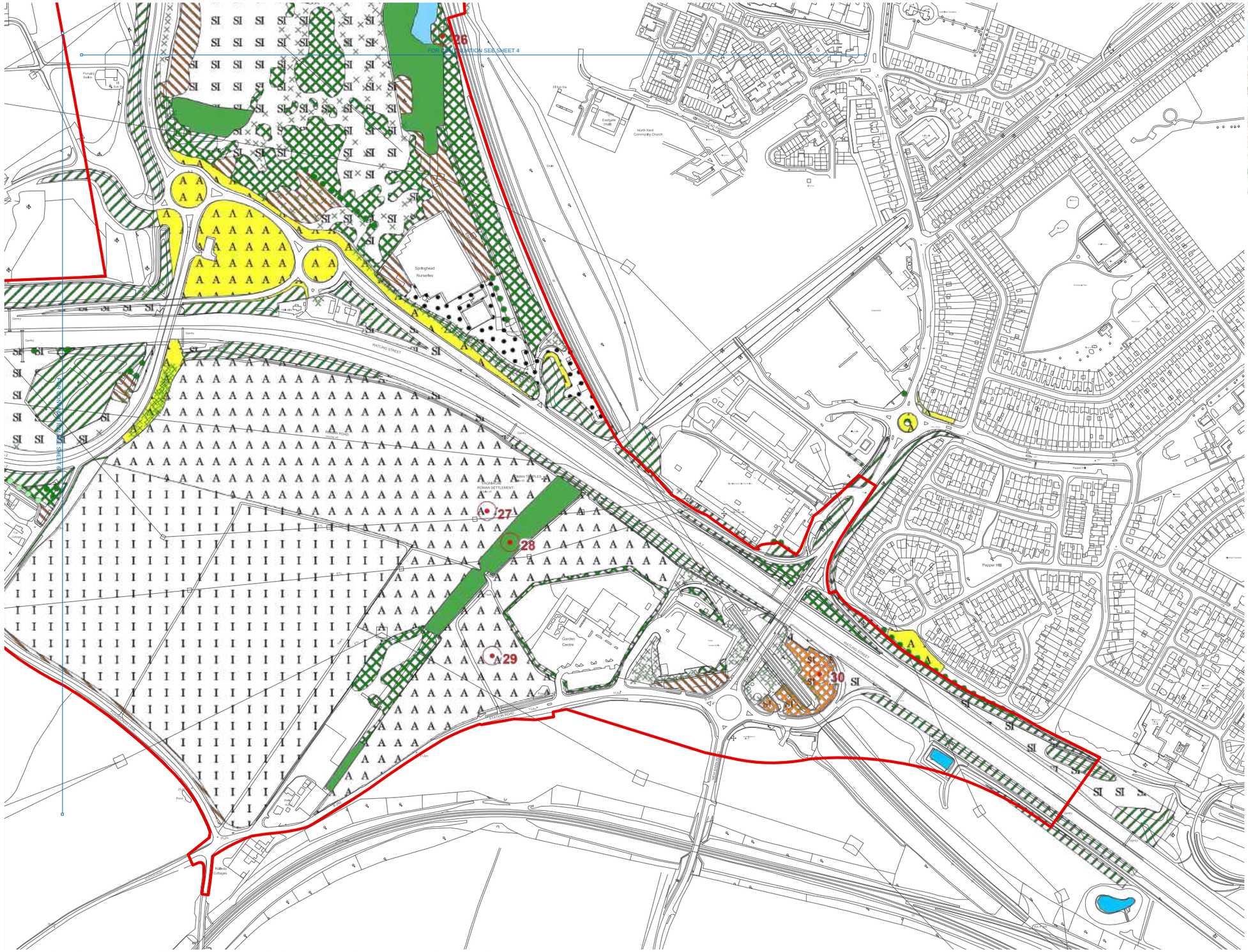
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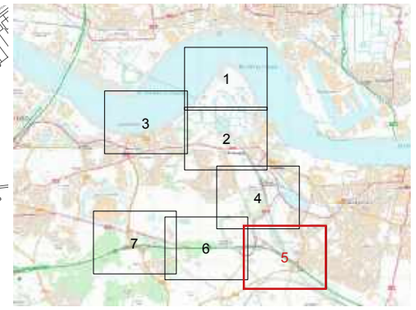
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FIGURE 2d
PHASE 1 HABITAT PLAN

February 2016
11120201_Nationally Scarce Plants_27-01-16.indd





KEY

- Broad-leaved semi-natural woodland
- Broadleaved plantation
- Coniferous scattered trees
- Broad-leaved scattered trees
- Dense scrub
- Scattered scrub
- Species-poor intact hedge
- Species-poor defunct hedge
- Hedgerow with trees
- Poor semi-improved grassland
- Marshy grassland
- Semi-improved calcareous grassland
- Amenity grassland
- Semi-improved neutral grassland
- Improved grassland
- Arable
- Bracken
- Tall ruderal
- Ephemeral/short perennial
- Standing water
- Standing water (brackish)
- Swamp
- Saltmarsh
- Scattered saltmarsh plants
- Mud
- Wet ditch
- Dry ditch
- Inland cliff (basic)
- Bare ground
- Buildings
- Target notes

0 100 200 Metres

N

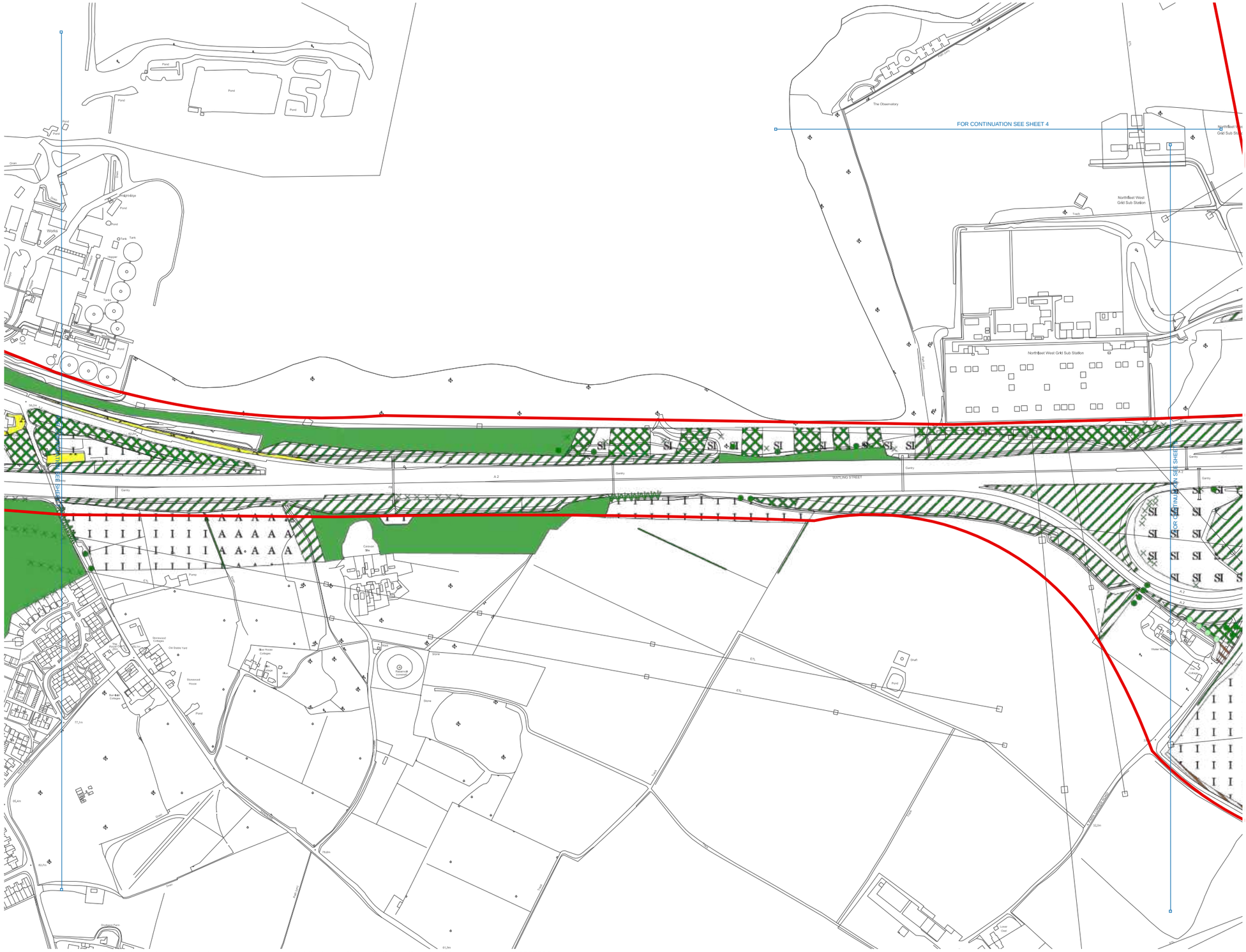
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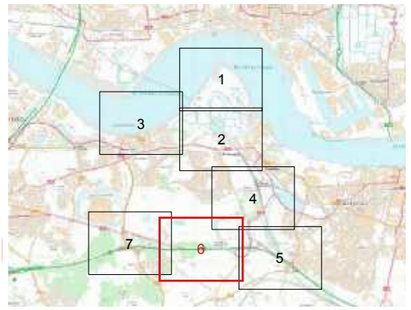
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FIGURE 2e
PHASE 1 HABITAT PLAN

February 2016





KEY

- Broad-leaved semi-natural woodland
- Broadleaved plantation
- Coniferous scattered trees
- Broad-leaved scattered trees
- Dense scrub
- Scattered scrub
- Species-poor intact hedge
- Species-poor defunct hedge
- Hedgerow with trees
- Poor semi-improved grassland
- Marshy grassland
- Semi-improved calcareous grassland
- Amenity grassland
- Semi-improved neutral grassland
- Improved grassland
- Arable
- Bracken
- Tall ruderal
- Ephemeral/short perennial
- Standing water
- Standing water (brackish)
- Swamp
- Saltmarsh
- Scattered saltmarsh plants
- Mud
- Wet ditch
- Dry ditch
- Inland cliff (basic)
- Bare ground
- Buildings
- Target notes

N

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FIGURE 2f
PHASE 1 HABITAT PLAN

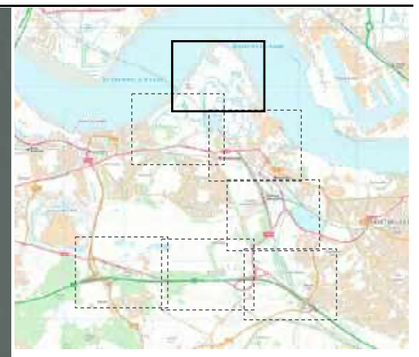
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Bluewater
Darenth Wood
Bean
Bean Farm
A2
Earthwork
Gantry
Subway
Lake
Pond
Quarry
Stone
Works
Timber Yard
Thrift Cottage
Bean Manor Cottage
Pits
Pound
New Cottages
Meeting Field
Allotment Gardens
Community Garden Meet
Woodland
Scrub
Grass
Hedge
Trees
Fence
Track
Path
Road
Building
Ditch
Bank
Cutting
Embankment
Slope
Tank
Tower
Mast
Post
Gate
Stile
Sign
Boundary
Fence
Wall
Hedge
Trees
Scrub
Grass

Figure 3

Areas referred to in the text





S - Saltmarsh

G - Grassland & early successional

W - Woodland

P - Ponds

D - Ditches

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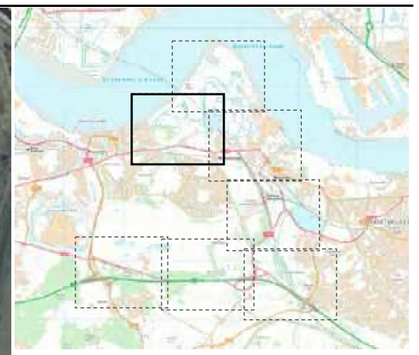
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FIGURE 3
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11120201_Figure3_11-02-16.indd





S - Saltmarsh

G - Grassland & early successional

W - Woodland

P - Ponds

D - Ditches

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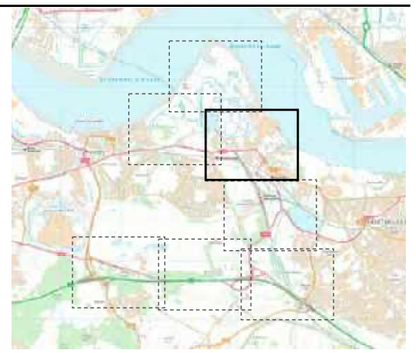
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G - Grassland & early successional

W - Woodland

P - Ponds

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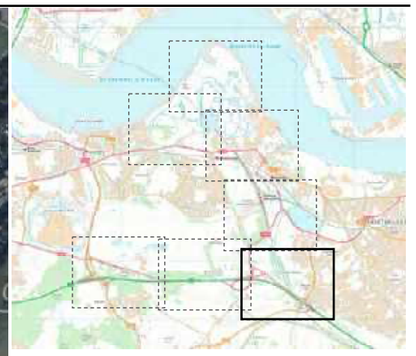
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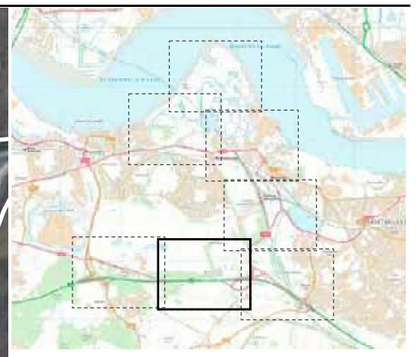
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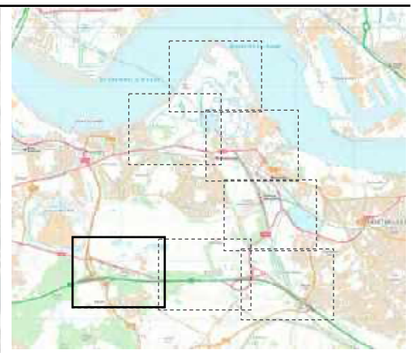
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FIGURE 3
AREAS REFERRED TO IN THE TEXT

February 2016
11120201_Figure3_11-02-16.indd

Figure 4

Nationally Scarce plant species





Survey Records:

- *Lathyrus aphaca* Yellow Vetchling
- *Vicia bithynica* Bithynian vetch
- *Orchis anthropophora* Man Orchid
- *Inula crithmoides* Golden Samphire
- *Carex divisa* Divided Sedge
- *Polypogon monspeliensis* Annual Beard Grass
- *Lathyrus hirsutus* Hairy Vetchling
- *Ranunculus baudotii* Brackish Water-Crowfoot
- *Medicago sativa ssp. falcata* Sickle Clover

Kent Botanical Recording Group Records:

- *Polypogon monspeliensis* Annual Beard Grass (August 2015)
- *Puccinellia fasciculata* Borrers Saltmarsh Grass (July 2014)
- *Puccinellia rupestris* Stiff Saltmarsh Grass (July 2014)
- *Pyrola rotundifolia ssp. maritima* Round-leaved Wintergreen (August 2015)
- *Bupleurum tenuissimum* Slender Hare's Ear (August 2012)

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FIGURE 4a
NATIONALLY SCARCE PLANT SPECIES

February 2016

11120201_Nationally Scarce Plants_27-01-16.indd





Survey Records:

- *Lathyrus aphaca* — Yellow Vetchling
- *Vicia bithynica* — Bithynian vetch
- *Orchis anthropophora* — Man Orchid
- *Inula crithmoides* — Golden Samphire
- *Carex divisa* — Divided Sedge
- *Polypogon monspeliensis* — Annual Beard Grass
- *Lathyrus hirsutus* — Hairy Vetchling
- *Ranunculus baudotii* — Brackish Water-Crowfoot
- *Medicago sativa ssp. falcata* — Sickle Clover

Kent Botanical Recording Group Records:

- *Polypogon monspeliensis* — Annual Beard Grass (August 2015)
- *Puccinellia fasciculata* — Borrers Saltmarsh Grass (July 2014)
- *Puccinellia rupestris* — Stiff Saltmarsh Grass (July 2014)
- *Pyrola rotundifolia ssp. maritima* — Round-leaved Wintergreen (August 2015)
- *Bupleurum tenuissimum* — Slender Hare's Ear (August 2012)

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FIGURE 4b
NATIONALLY SCARCE PLANT SPECIES

February 2016

11120201_Nationally Scarce Plants_27-01-16.indd





Survey Records:

- *Lathyrus aphaca* Yellow Vetchling
- *Vicia bithynica* Bithynian vetch
- *Orchis anthropophora* Man Orchid
- *Inula crithmoides* Golden Samphire
- *Carex divisa* Divided Sedge
- *Polypogon monspeliensis* Annual Beard Grass
- *Lathyrus hirsutus* Hairy Vetchling
- *Ranunculus baudotii* Brackish Water-Crowfoot
- *Medicago sativa ssp. falcata* Sickle Clover

Kent Botanical Recording Group Records:

- *Polypogon monspeliensis* Annual Beard Grass (August 2015)
- *Puccinellia fasciculata* Borrers Saltmarsh Grass (July 2014)
- *Puccinellia rupestris* Stiff Saltmarsh Grass (July 2014)
- *Pyrola rotundifolia ssp. maritima* Round-leaved Wintergreen (August 2015)
- *Bupleurum tenuissimum* Slender Hare's Ear (August 2012)

0 100 200 Metres N

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FIGURE 4c
NATIONALLY SCARCE PLANT SPECIES

February 2016
11120201_Nationally Scarce Plants_27-01-16.indd





Survey Records:

- *Lathyrus aphaca* Yellow Vetchling
- *Vicia bithynica* Bithynian vetch
- *Orchis anthropophora* Man Orchid
- *Inula crithmoides* Golden Samphire
- *Carex divisa* Divided Sedge
- *Polypogon monspeliensis* Annual Beard Grass
- *Lathyrus hirsutus* Hairy Vetchling
- *Ranunculus baudotii* Brackish Water-Crowfoot
- *Medicago sativa ssp. falcata* Sickle Clover

Kent Botanical Recording Group Records:

- *Polypogon monspeliensis* Annual Beard Grass (August 2015)
- *Puccinellia fasciculata* Borrers Saltmarsh Grass (July 2014)
- *Puccinellia rupestris* Stiff Saltmarsh Grass (July 2014)
- *Pyrola rotundifolia ssp. maritima* Round-leaved Wintergreen (August 2015)
- *Bupleurum tenuissimum* Slender Hare's Ear (August 2012)

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FIGURE 4d
NATIONALLY SCARCE PLANT SPECIES

February 2016

11120201_Nationally Scarce Plants_27-01-16.indd





Survey Records:

- *Lathyrus aphaca* Yellow Vetchling
- *Vicia bithynica* Bithynian vetch
- *Orchis anthropophora* Man Orchid
- *Inula crithmoides* Golden Samphire
- *Carex divisa* Divided Sedge
- *Polypogon monspeliensis* Annual Beard Grass
- *Lathyrus hirsutus* Hairy Vetchling
- *Ranunculus baudotii* Brackish Water-Crowfoot
- *Medicago sativa ssp. falcata* Sickle Clover

Kent Botanical Recording Group Records:

- *Polypogon monspeliensis* Annual Beard Grass (August 2015)
- *Puccinellia fasciculata* Borrers Saltmarsh Grass (July 2014)
- *Puccinellia rupestris* Stiff Saltmarsh Grass (July 2014)
- *Pyrola rotundifolia ssp. maritima* Round-leaved Wintergreen (August 2015)
- *Bupleurum tenuissimum* Slender Hare's Ear (August 2012)

0 100 200 Metres N

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FIGURE 4e
NATIONALLY SCARCE PLANT SPECIES

February 2016

11120201_Nationally Scarce Plants_27-01-16.indd

TABLES

Table 1

Target Notes

Table 1 Target Notes

Target Note	Habitat / feature	Comments
1	Leachate collection lagoon	Edges of lagoon support range of halophytic species or species associated with brackish conditions, including spear and grass-leaved orache, red and fig-leaved goosefoot, sea beet, annual seablite and reflexed saltmarsh grass.
2	Saltmarsh and intertidal sediment	Inlet with saltmarsh, lower dominated by sea club-rush, higher by sea couch and intertidal sediment (mud). A range of buildings, structures and boats associated with a club are located within the inlet.
3	Scorched vegetation	Area of scorched vegetation, including grassland and scrub. Probably associated with presence of CKD leachate.
4	Semi-improved neutral grassland	Small areas of relatively species and forb-rich grassland alongside track and banks in this area.
5	Japanese knotweed	Small stand of non-native invasive Japanese knotweed - listed in Schedule 9 (part 2) of the Wildlife and Countryside Act 1981 (as amended)
6	Vegetated rock armour	Rock armour covers surface in this area around and to the south of the pylon. Variable vegetation cover (from bare to fully vegetated) includes grassland, ruderal and scrub
7	Semi-improved neutral grassland	Small areas of relatively species and forb-rich grassland among coarser grassland in areas alongside tracks in this area.
8	Giant hogweed	Stand of non-native invasive giant hogweed - listed in Schedule 9 (part 2) of the Wildlife and Countryside Act 1981 (as amended)
9	Leachate collection lagoon	Edges of lagoon and adjoining areas support range of halophytic species or species associated with brackish conditions, including spear and grass-leaved orache, sea beet, annual seablite, lesser sea spurrey, hard grass and reflexed saltmarsh grass. Grades into coarse and quite species-poor sea couch grassland.
10	Areas on NE Tip disturbed by works winter/spring 2014-15	Disturbance to grassland, ruderal and scrub created small to relatively large bare areas which were re-vegetating during 2015 with species typical of the area.

Target Note	Habitat / feature	Comments
11	Small brackish pool and vegetation	Small, seasonally wet pool and other nearby depressions supporting range of halophytic species or species associated with brackish conditions, including spear and grass-leaved orache, lesser sea spurrey, sea aster, saltmarsh grass, reflexed saltmarsh grass, sea club-rush and saltmarsh rush. Set within wider area of coarse and quite species-poor sea couch grassland.
12	Poor semi-improved grassland	Notable for frequency/abundance of narrow-leaved everlasting pea, a characteristic species of the Swanscombe area.
13	Old water treatment works site – reedbed, tall ruderal and scrub	Area of old works supports mosaic of habitats.
14	Amenity grassland - old sports pitch	Generally rather species poor but includes frequent **Nationally Scarce** divided sedge as well as some hairy buttercup, both species typical of coastal grazing marsh, from which the grassland is likely to have derived.
15	Brackish pools	Seasonal shallow pools support standing water autumn to spring. Dry in summer with distinctive flora including annuals and other short-lived species characteristic of inundation and/or coastal grazing marsh and brackish conditions, such as hairy buttercup, greater plantain (ssp. intermedia), spear and grass-leaved orache, red and fig-leaved goosefoot and the **Nationally Scarce** brackish water-crowfoot.
16	Bare ground	Area disturbed by edge of works on Ingress Park. Small population of the **Nationally Scarce** annual beard-grass
17	Bare ground	Areas cleared for new access road to Ingress Park
18	Japanese knotweed	Stand of non-native invasive Japanese knotweed - listed in Schedule 9 (part 2) of the Wildlife and Countryside Act 1981 (as amended)
19	Ephemeral/short perennial	Open vegetation comprising range of species typical of the area with variable bare ground on site of previous (filled) waterbody. Viewed from track to north.
20	Bare ground	Areas cleared of scrub (incl. much butterfly bush) during winter 2014-15. Re-growing and vegetating during 2015.
21	Japanese knotweed	Small stand of non-native invasive Japanese knotweed – listed in Schedule 9 (part 2) of the Wildlife and Countryside Act 1981 (as amended)

Target Note	Habitat / feature	Comments
22	Japanese knotweed	Stands of non-native invasive Japanese knotweed and Himalayan balsam – both listed in Schedule 9 (part 2) of the Wildlife and Countryside Act 1981 (as amended)
23	Exposures	Two upstanding exposures among grassy landfill site. Form part of Bakers Hole geological SSSI.
24	Japanese knotweed	Stand of non-native invasive Japanese knotweed - listed in Schedule 9 (part 2) of the Wildlife and Countryside Act 1981 (as amended)
25	Seasonal standing water	Seasonal pool. Snipe observed in spring.
26	Giant hogweed	Stand of non-native invasive giant hogweed on bank above watercourse - listed in Schedule 9 (part 2) of the Wildlife and Countryside Act 1981 (as amended)
27	Cultivated horticultural area	Used for vegetable, strawberries etc.
28	Broadleaved semi-natural woodland and scrub	Located on old railway line, including embankments.
29	Horticultural area	Includes tree and bush fruit, cultivated areas, polytunnels etc.
30	Semi-improved calcareous grassland	Probably sown area around CTRL with number of characteristic species, including greater knapweed, lady's bedstraw, field scabious and sanfoin.

Table 2

Saltmarsh Species

Table 2 Saltmarsh species

Species		S1	S2	S3
Aster tripolum	Sea aster	F/LA	O/LF	F/LA
Atriple littoralis	Grass-leaved orache	O/LF		
Atriplex portulacoides	Sea purslane	O/LF	R	O
Atriplex prostrata	Spear-leaved orache	F/LA		
Beta vulgaris ssp. *Maritima*	Sea beet	O/LF		O
Bolboeschoenus maritimus	Sea club-rush	F/LD		
Cochleria anglica	English scurvygrass	O/LF		R
Elytrigia pycnanthus	Sea couch	F/LD	F/LA	LA
Enteromorpha sp.	Green alga	LA		
Festuca rubra	Red fescue	R	O	
Glaux maritima	Sea milkwort	O/LF		O
Inula crithmoides	Golden samphire	R		
Juncus gerardii	Saltmarsh rush	O/LA	F/LA	R
Juncus maritimus	Sea rush	R		
Parapholis strigosa	Hard grass		O/LF	
Phragmites australis	Common reed	LD	F/LA	
Plantago maritima	Sea plantain	F/LA	F/LA	F/LA
Puccinellia distans	Reflexed saltmarsh-grass	LA		
Puccinellia maritima	Common saltmarsh-grass	F/LA	O	O
Salicornia sp.	Glasswort sp.	R		
Spartina anglica	Cord grass	O/LA		
Spergularia marina	Lesser sea spurrey	O/LF	O	
Spergularia media	Greater Sea-spurrey	O		
Suaeda maritima	Annual sea blite	LF		
Triglochon maritima	Sea arrowgrass	F/LA	F/LA	

Nationally Scarce species

DAFOR Scale

D Dominant
A Abundant
F Frequent
O Occasional
R Rare
L Locally or patchily

Table 3

Grassland and early successional/ruderal species – Swanscombe Peninsula

Table 3 Grassland and early successional/ruderal species - Swanscombe Peninsula

Species		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	Botany Marsh West	Botany Marsh West depressions
Agrostis stolonifera	Creeping bent	F/LA		O	O/LA	F/LA		A	F/LA	F/LA	F	F/LA	F/LA
Alopecurus geniculatus	Marsh foxtail											O/LF	O/LA
Anisantha sterilis	Barren brome	O/LA		F/LA	O/LF	O	R		R	F/LA	O		
Arrhenatherum elatius	False oat-grass	F/LA or D	A	O	O/LA	O/LF	F/LA	O	F/LA	F/LA	F/LA	O/LA	
Brachypodium sylvaticum	Wood false-brome						O/LF		R	F/LA			
Bromus commutatus	Meadow brome											O	
Bromus hordaceous	Soft brome	O	O		F/LA	F			R		O/LA	O	
Catapodium rigidum	Fern grass				O	O				O	O		
Cynosorus cristatus	Crested dog's-tail						O/LF						
Dactylis glomerata	Cocksfoot	F/LA	F	O	F	F/LA	F/LA	F/LA	F	F/LA	O	R	
Elytrigia pycnanthus	Sea couch	F/LA or D	O	O	LF/LD	F/LA		F/LA	O/LA	LA		O/LA	
Elytrigia repens	Common couch	F/LA or D		F/LA				O				O/LA	
Festuca rubra	Red fescue	O/LA	F	F	O/LA	F/LA	F	A	O/LA	F/LA	F/LA		
Holcus lanatus	Yorkshire fog	F	F	F	O	F	F		F	F	O	F/LA	
Hordeum murimum	Wall barley					R				R		R	
Lolium perenne	Perennial rye-grass				R	R	O/LF		R	O		F	
Phleum bertolonii	Small cat's-tail	O											
Phragmites australis	Common reed					R	O	R	R	R		F/LA	F/LA
Poa annua	Annual meadow-grass				O		LF			F		LF	
Poa compressa	Flattened meadow-grass					O			O/LF	O/LF			
Poa pratensis	Smooth meadow-grass	O		F/LA	O		F			O			
Poa trivialis	Rough meadow-grass	O		F			F/LA			O		F/LA	
Puccinellia distans	Reflexed saltmarsh grass	O/LA											
Schedonorus arundinaceus	Tall fescue	O/LF	O	F/LA	R	O	F	O		O			
Vulpia bromoides	Squirrel-tail fescue									F/LA	O/LF		
Carex divisa	Divided sedge	R											
Carex flacca	Glaucus sedge							O/LF					
Carex otrubae	False fox sedge									O/LF		O	
Bolboschoenus maritimus	Sea club-rush								LF			O/LA	F
Eleocharis palustris	Common spike-rush								R	LA			LA
Juncus gerardii	Saltmarsh rush					R							
Juncus inflexus	Hard rush	R				R			O/LF	LF		O	
Juncus maritimus	Sea rush					R							
Typha latifolia	Greater reedmace								O				
Achillea millefolium	Yarrow	O	R	O	O	O	O	R	O	R			
Agrimonia eupatoria	Common agrimony	O		O				R				R	
Anacamptis pyramidalis	Pyramidal orchid	R	O										
Anthyllis vulneraria	Kidney vetch	R			R	O	O/LF	F					
Anthriscus sylvestris	Cow parsley			O/LF									
Arctium sp.	Burdock	R											
Arenaria serpyllifolium	Thyme-leaved sandwort												
Artemisia vulgaris	Mugwort	O			O	O	O		R	O			
Aster triploium	Sea aster					R							
Atriplex littoralis	Grass-leaved orache											O	
Atriplex prostrata	Spear-leaved orache											O/LF	F/LA
Ballota nigra	Black horehound	R											
Bellis perennis	Daisy				R	R	O/LF	R					
Beta vulgaris subsp. *maritima*	Sea beet	O					R						
Blackstonia perfoliata	Yellowort	O		R	LF	F	O/LF			O/LF	O/LF		
Centaurea nigra	Common knapweed	R		R					R				

Species		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	Botany Marsh West	Botany Marsh West depressions
Centaurium erythraea	Common centaury	R			LF	F				LF	O/LF		
Centranthus ruber	Red valerian	R			O	O	R		O	O			
Cerastium fontanum	Comon mouse-ear	R		O	LF	O	F		O	O			
Chenopodium ficifolium	Fig-leaved goosefoot												F
Chenopodium polyspermum	Many-seeded goosefoot												F
Chenopodium rubrum	Red goosefoot	R											F
Cirsium arvense	Creeping thistle	O/LF		O		R	O		O	R		O/LA	
Cirsium vulgare	Spear thistle	R										R	
Conyza canadensis	Canadian fleabane												
Crepis vesicaria	Beaked hawks-beard	O/LF	F	F	F	F	O	R	O/LF	F	F	O	
Cruciata laevipes	Crosswort			R									
Dactylorrhiza fuchsii	Common spotted orchid	R				R							
Daucus carota	Wild carrot	F	F	F	F	F	F	F	O/LF	F	F		
Diplotaxis tenuifolia	Perennial wall rocket	O			R	O				O	R		
Dipsacus fullonum	Teasel	R							O	O		R	
Epilobium montanum	Broad-leaved willowherb								R				
Erodium cicutarium	Common storksbill				LF								
Erophila verna	Common whitlowgrass				LF	O							
Eupatoria cannabina	Hemp agrimony					O			O	O			
Euphrasia nemerosa	Common eyebright							O	LF				
Foeniculum vulgare	Fennel				O/LF	O			R	O			
Galega officinalis	Goat's rue	O			O				O	O	O	R	
Galium aparine	Cleavers	R		O	R	R	O			O			
Galium mollugo	Hedge bedstraw	O							R				
Geranium dissectum	Cut-leaved cranesbill	R			O								
Geranium molle	Dove's-foot cranesbill	R			O	R				O	O		
Geranium pyrenaicum	Hedgerow cranesbill	O		R		R							
Hedera helix	Ivy				R			R					
Helminthotheca echioides	Bristly oxtongue	O		O/LF	O		O			O	O	O/LF	
Heracleum mantegazzianum	Giant hogweed	LA											
Heracleum sphodyllium	Hogweed	O/LF		F			O	R	O/LF				
Hieracium sp.	Hawkweed								R				
Hirschfeldia incana	Hoary mustard	R			R					O			
Hypericum hirsutum	Hairy St. John's-wort	R											
Hypericum perforatum	Perforate St. John's-wort	O	R	O/LF	O	O			F	O	O		
Hypochaeris radicata	Cat's ear					R		R	R	R	R		
Inula conyzae	Shepherd's spikenard	O		O									
Lactuca serriola	Prickly lettuce	O/LF			R								
Lactuca virosa	Great Lettuce	O											
Lathyrus aphaca	Yellow vetchling	O/LF	F	LF		R	O/LF					R	
Lathyrus hirsutus	Hairy vetchling	O/LF		F/LA									
Lathyrus latifolius	Broad-leaved everlasting pea	O	O										
Lathyrus nissiola	Grass vetchling	O/LF	R	F/LA	R		O/LF					O/LF	
Lathyrus pratensis	Meadow vetchling	O		O			F	O	R				
Lathyrus sylvestris	Narrow-leaved everlasting pea	O		O								R	
Lepidium coronopus	Swinecres												O/LA
Lepidium draba	Hoary cress	O/LF				R	O/LF			R	R		
Leucanthemum vulgare	Ox-eye daisy	O/LF	F	F	O	F	F	F	O	O	O		
Linaria purpurea	Purple toadflax	O											
Linaria vulgaris	Common toadflax	O			O	R			O	O/LF			
Lotus corniculatus	Bird's-foot trefoil	O	R		O	O	O	R	R	R	R	O	
Lotus tenuis	Narrow-leaved bird's foot trefoil	F	O	R	F/LA	F/LA	F/LA	F/LA	F/LA	F/LA	F/LA	O	
Malva sylvestris	Common mallow	R										R	
Matricaria discodea	Pineappleweed											R	

Species		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	Botany Marsh West	Botany Marsh West depressions
Medicago arabica	Spotted medick			F/LA								R	
Medicago lupulina	Black medick	O		F	F/LA	F	F	O	O/LF	F	F/LA	R	
Medicago sativa ssp. falcata	Sickle medick	O											
Medicago sativa ssp. sativa	Lucerne	O/LF			R	O	O/LF	R					
Medicago sativa ssp. varia	Sand lucerne	O/LF	O			F	F				O		
Melilotus albus	White melilot	O			O	O	O	R	R	F			
Melilotus altissimus	Tall melilot	O			O	O	R			O			
Myosotis arvensis	Field forget-me-not				R		R		R	R			
Odontites verna	Red bartsia	O		O					R	O	O		
Onobrychis vicifolia	Sanfoin				R								
Ophrys apifera	Bee orchid	R											
Orchis anthropophorum	Man orchid	R											
Origanum vulgare	Wild marjoram	O/LF				R		R	O		O		
Ornithogalum umbellatum	Star of Bethlehem				R								
Orobanche minor	Common broomrape	R					R						
Papaver rhoeas	Common poppy												
Pastinaca sativa	Wild parsnip	O/LF											
Persicaria aviculare	Knotweed											O	F
Persicaria maculatum	Redshank												F
Petroselinum segetum	Corn parsley	R		R									
Picris hieracioides	Hawkweed oxtongue	F	F	F	F	F	F	F	O/LF	F	F	R	
Pilosella officinarum	Mouse-ear hawkweed			R		R			O/LA	R	R		
Plantago coronopus	Bucks-horn plantain				LF					O			
Plantago lanceolata	Ribwort plantain	O/LF	F	F	F	F	F	F	F	F	F	O	
Plantago major ssp. *intermedia*	Greater plantain											O/LF	F/LA
Potentilla reptans	Cinquefoil	O/LA	O		O		O/LA		F/LA	F/LA	O/LA	R	
Pulicaria dysenterica	Fleabane	O										O	
Ranunculus acris	Meadow buttercup	R											
Ranunculus baudotii	Brackish water-crowfoot					R							R
Ranunculus bulbosus	Bulbous buttercup												
Ranunculus flammula	Lesser spearwort												
Ranunculus repens	Creeping buttercup	R	O									R	
Ranunculus sardous	Hairy buttercup											O/LF	F/LA
Ranunculus sceleratus	Celery-leaved buttercup												O
Rapiastrum rugosum	Bastard mustard											R	
Reseda lutea	Mignonette	R											
Rhinanthus minor	Yellow rattle	R											
Rumex crispus	Curled dock											O/LF	F
Rumex obtusifolius	Broad-leaved dock	R										O/LF	F
Rumex pulcher	Fiddle dock											O/LF	
Senecio erucifolius	Hoary ragwort	O		O			O	O	O		O	O/LF	
Senecio inaequidens	Narrow-leaved ragwort				O	O				F			
Senecio jacobaea	Common ragwort	O	R		O	O	O		O	F	O		
Senecio squalidus	Oxford ragwort	R			O/LF	O	O			O			
Senecio vulgaris	Groundsel				R								R
Silene latifolia	White campion												
Silene vulgaris	Bladder campion												
Smyrnium olusatrum	Alexanders	O/LF											
Solidago canadensis	Canadian goldenrod									R			
Sonchus arvensis	Perennial sowthistle	R											
Sonchus asper	Prickly sowthistle	R				O				O		R	
Sonchus olraceous	Smooth sowthistle				O								
Spergularia marina	Lesser sea spurrey	LF											
Taraxacum officinale agg.	Dandelion	O		O	O	O		O	O	O	R		

Species		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	Botany Marsh West	Botany Marsh West depressions
Torilis japonica	Upright hedge parsley			R									
Tragopogon porrifolius	Salsify	O					O						
Tragopogon pratensis	Goat's beard	O		R		R	R				O		
Trifolium arvense	Hare's-foot clover								R				
Trifolium campestre	Hop trefoil	O/LF	F				O				O	R	
Trifolium dubium	Lesser hop trefoil	R			F/LA					O	O	R	
Trifolium pratense	Red clover	O/LF	F/LA	F/LA	F	F	F/LA	F	O/LF	F	F	O	
Trifolium repens	White clover	O/LF		O		O	O/LF	F	R	O	R	O/LF	
Tripleurospermum inodorum	Scentless mayweed												O
Tussilago farfara	Coltsfoot	LA				O	O	R	R	O			
Urtica dioica	Nettle	O											
Valerianella dentata	Narrow-fruited corn-salad					R							
Verbena officinalis	Vervain								R				
Veronica arvensis	Wall speedwell				LF					R			
Veronica catenata	Pink water speedwell					R							O
Veronica chamaedrys	Germander speedwell			R			O			R			
Vicia bithyinica	Bithynian vetch	O/LF		F			O/LA		R				
Vicia hirsuta	Hairy tare	O		O									
Vicia sativa	Common vetch	F	F	F	F	F/LA	F	R	F	F/LA	F	O/LF	
Vicia tetrasperma	Smooth tare	O		O/LA					O			O/LF	
Vicia villosa	Fodder vetch	O/LF	O	F/LA			O					R	

Nationally Scarce species (included in Kent Red Data Book and Kent Rare Plant Register)
Kent Rare Plant Register species (excl. Nationally Scarce species)
Indicators of Unimproved Neutral Grassland in Kent (Local Wildlife Sites in Kent - Criteria for Selection and Delineation. Version 1.5, August 2015)
Indicators of Unimproved Calcareous Grassland in Kent (Local Wildlife Sites in Kent - Criteria for Selection and Delineation. Version 1.5, August 2015)
Invasive non-native species - listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended)

DAFOR Scale

D Dominant
A Abundant
F Frequent
O Occasional
R Rare

L Locally or patchily

Table 4

Grassland and early successional/ruderal species – Non-Peninsula

Table 4 Grassland and early successional/ruderal species - Non-Peninsula

Species		Manor Way 1	Manor Way 2 & 3	Craylands Lane Pit/ West Quarry 1	Craylands Lane Pit/ West Quarry 2	Sport's Field/ East Quarry	Bamber Pit	Northfleet Landfill	CTRL West	CTRL East	Triangle	N of Springh'd Nursery	CTRL gslnd nr. Pepper Hill junct.
Agrostis stolonifera	Creeping bent	F/LA	F		F	O/LA	F/LA	F/LA	F/LA	O/LA		F/LA	O
Agrostis capillaris	Common bent												O
Alopecurus pratensis	Meadow foxtail		O/LA						O/LF		O		
Anisantha sterilis	Barren brome	F/LA	F/LA	F/LA			R	O/LF	O	O	O		O
Anthoxanthum odoratum	Sweet vernal-grass				R								
Arrhenatherum elatius	False oat-grass	F	F	A	LF/LA	A/LD	F/LA	F/LA	O/LA	F/LA	F/LA	F/LA	F
Brachypodium sylvaticum	Wood false-brome						LF					O	
Bromus hordaceous	Soft brome	F	F				R/LF	O	O		O/LF	O/LF	F
Cynosorus cristatus	Crested dog's-tail					O				O	O		
Dactylis glomerata	Cocksfoot	O	F	F/LA	LF/LA	F	F/LA	F/LA	F	O	F	F	
Deschampsia cespitosa	Tufted hair-grass							R	O				
Elytrigia pycnanthus	Sea couch					LA		O/LA					
Elytrigia repens	Common couch		O				O	F/LA	O/LA			F/LA	
Festuca rubra	Red fescue		F/LA		F/LA	F/LA	O/LA	F/LA	F/LA	F	F	F/LA	F
Holcus lanatus	Yorkshire fog	F		O/LA	LF/LA	F	F/LA	O		F/LA	O	F	F
Lolium perenne	Perennial rye-grass				O								
Parapholis strigosa	Hard grass									LF			
Phleum bertolonii	Small cat's-tail						O				O		
Phragmites australis	Common reed								O/LA				
Poa annua	Annual meadow-grass	O					O/LA					O/LF	
Poa compressa	Flattened meadow-grass												
Poa pratensis	Smooth meadow-grass	O	F				R	F				F	
Poa trivialis	Rough meadow-grass	O		O/LA			O	O/LA	O/LA	O		F	O
Puccinellia distans	Reflexed saltmarsh grass									LF			
Schedonorus arundinaceus	Tall fescue		F/LA			O			F/LA	F/LA	F		F
Trisetum flavescens	Yellow oat-grass									F	O		
Vulpia bromoides	Squirrel-tail fescue	F/LA	F				O/LF						O
Carex divisa	Divided sedge						R		R				
Carex divulsa	Grey sedge								R				
Carex hirta	Hairy sedge						LA		R/LA				
Carex otrubae	False fox sedge								R				
Carex riparia	Greater pond sedge								R				
Carex sylvatica	Wood sedge								R				
Juncus conglomeratus	Compact rush								R				
Juncus inflexus	Hard rush								R				
Achillea millefolium	Yarrow	R			F	O	O	R	R			O	O
Agrimonia eupatoria	Common agrimony						O					O	
Anacamptis pyramidalis	Pyramidal orchid						O/LF					O/LF	
Anagallis arvensis	Scarlet pimpernel											R	
Anthemis tinctoria	Yellow chamomile												R
Anthyllis vulneraria	Kidney vetch			O	F/LA								LF
Anthriscus sylvestris	Cow parsley			O		O/LA							
Antirrhinum majus	Snapdragon	O											
Arctium sp.	Burdock					O	O						
Arenaria serpyllifolium	Thyme-leaved sandwort						O/LF						
Artemisia vulgaris	Mugwort	O	O			F	O	O	R	LF	O	O	O
Aster novae-belgii	Michaelmas daisy											R	
Ballota nigra	Black horehound					O	O		R			R	
Bellis perennis	Daisy			R				O		R		O	
Beta vulgaris subsp. *maritima*	Sea beet						R	R			R		R
Blackstonia perfoliata	Yellowort	O			O/LF		O/LF		R			O	
Bryonia dioica	White Bryony								R				
Calystegia sepium	Hedge bindweed			O		LA	O/LA					LA	

Species		Manor Way 1	Manor Way 2 & 3	Craylands Lane Pit/ West Quarry 1	Craylands Lane Pit/ West Quarry 2	Sport's Field/ East Quarry	Bamber Pit	Northfleet Landfill	CTRL West	CTRL East	Triangle	N of Springh'd Nursery	CTRL gslnd nr. Pepper Hill junct.
Carduus crispus	Welted thistle												R
Carduus tenuiflorus	Slender thistle					R							
Centaurea nigra	Common knapweed				O/LF	O	O/LA						
Centaurea scabiosa	Greater knapweed					R							F
Centaurium erythraea	Common centaury				F	R	O/LF					O/LF	
Centranthus ruber	Red valerian	O	LF		R	O	R						
Cerastium fontanum	Comon mouse-ear			R	R		O/LF	O	O	R	O	F	LF
Chamerion angustifolium	Rosebay Willowherb						LA						
Cirsium arvense	Creeping thistle	R		O	R	F/LA	O	O/LA		O	F/LA	F/LA	O
Cirsium vulgare	Spear thistle		R	R		F/LA		O	O	O	O	O	R
Conium maculatum	Hemlock						R	O/LA	LA	R	O	O	
Convulvulus arvensis	Field bindweed												R
Conyza canadensis	Canadian fleabane	O											
Crepis capillaris	Smooth hawks-beard												
Crepis vesicaria	Beaked hawks-beard	F	F	R	O	O	O/LF	F	O/LF	O	O	F	O
Dactylorrhiza fuchsii	Common spotted orchid			R	O/LF								
Daucus carota	Wild carrot	F	F	F		O/LF	O	F	O/LF	O	O	O	F
Diplotaxis tenuifolia	Perennial wall rocket	O	O		O	O/LF	O/LF		R				
Dipsacus fullonum	Teasel			R		O/LF	O/LF	O/LF	O		O	O/LF	O/LF
Echium vulgare	Viper's bugloss						O/LF						
Epilobium hirsutum	Great willowherb								LA			O	
Epilobium montanum	Broad-leaved willowherb	R						O	O			O	R
Epilobium parviflorum	Hoary willowherb								O				
Epilobium tetragonum	Square-stalked willowherb											O/LF	
Erysimum cheiri	Wallflower	O	O										
Euphrasia nemerosa	Common eyebright						R						
Foeniculum vulgare	Fennel	LF	O	O		O	R	R	R				
Fragraria vesca	Wild strawberry						O/LA					O/LA	
Galega officinalis	Goat's rue		O	O			O	O/LF	O/LA	O/LF	O/LA	F/LA	
Galium aparine	Cleavers	R		F	R			O/LF	O/LA		O	O	
Galium mollugo	Hedge bedstraw					O	O/LF						O/LF
Galium verum	Lady's bedstraw												O
Geranium dissectum	Cut-leaved cranesbill	R	O				O	O	O	O	F	O/LF	
Geranium molle	Dove's-foot cranesbill		O				O/LF	O	O				
Geranium pyrenaicum	Hedgerow cranesbill							O				O	
Geranium robertianum	Herb Robert	O											
Geum urbanum	Wood avens											R	
Glechoma hederacea	Ground ivy					O	O/LA	O	O	R		O/LF	
Hedera helix	Ivy	LA		F/LA									
Helminthotheca echioides	Bristly oxtongue	F	O	LA	O			O/LF	F	O	O	O/LF	O
Heracleum sphodyllium	Hogweed			R				O/LF				O	
Hirschfeldia incana	Hoary mustard	R	O				O	O	R	R	O/LF		
Hypericum hirsutum	Hairy St. John's-wort											O	
Hypericum perforatum	Perforate St. John's-wort	O	O/LF				F	O	R			O	O
Hypochaeris radicata	Cat's ear	R			O								
Inula conyzae	Shepherd's spikenard					R	R					O	
Knautia arvensis	Field scabious												R
Lactuca serriola	Prickly lettuce	O										R	
Lamium album	White deadnettle		R									R	
Lamium purpureum	Red deadnettle							R					
Lathyrus aphaca	Yellow vetchling		LF					R	O	R	R	R	R
Lathyrus latifolius	Broad-leaved everlasting pea						O	R					
Lathyrus nissiola	Grass vetchling					O/LF		O/LF	F	F	O	O/LF	
Lathyrus pratensis	Meadow vetchling						O/LF						
Lathyrus sylvestris	Narrow-leaved everlasting pea					LF	R		R	O		O	
Lepidium draba	Hoary cress			R			O/LA	O			LF	O	O
Leucanthemum vulgare	Ox-eye daisy		O	F	F/LA		O	O	O	O	R	O	F/LA

Species		Manor Way 1	Manor Way 2 & 3	Craylands Lane Pit/ West Quarry 1	Craylands Lane Pit/ West Quarry 2	Sport's Field/ East Quarry	Bamber Pit	Northfleet Landfill	CTRL West	CTRL East	Triangle	N of Springh'd Nursery	CTRL gslnd nr. Pepper Hill junct.
Linaria purpurea	Purple toadflax	O											
Linaria vulgaris	Common toadflax	O				O/LF	O	R			R	R	
Linum catharticum	Fairy flax						LF						
Lotus corniculatus	Bird's-foot trefoil	R	R	R	O	R	R	R				R	
Lotus tenuis	Narrow-leaved bird's foot trefoil	F	F	O/LF	F/LA	O	O/LA	O/LF	O/LF	O/LF	O	O/LF	F
Malva sylvestris	Common mallow						O	O			O	R	R
Medicago arabica	Spotted medick		O				O/LA	O/LF	O/LF			O/LF	
Medicago lupulina	Black medick	F	O		F		F	O	O		O	F	O/LF
Medicago sativa ssp. sativa	Lucerne	O											
Medicago sativa ssp. varia	Sand lucerne	O					R						R
Melilotus albus	White melilot						R						
Melilotus sp.	Melilot sp.	O						O					R
Mercurialis annua	Annual mercury							R					
Myosotis arvensis	Field forget-me-not	R		O			LF	O	O	O		F	
Odontites verna	Red bartsia	O					O/LF					O/LF	
Onobrychis vicifolia	Sanfoin				O/LF								R
Ononis repens	Restharrow						R	R					
Ophrys apifera	Bee orchid						R				R		
Origanum vulgare	Wild marjoram	O		R	O		R						
Orobanche minor	Common broomrape											R	
Papaver rhoeas	Common poppy						R						R
Pastinaca sativa	Wild parsnip					F	O/LF					O/LF	
Persicaria aviculare	Knotweed								R				
Persicaria maculatum	Redshank											R	
Petroselinum segetum	Corn parsley								R			LF	
Picris hieracioides	Hawkweed oxtongue		F	F	F	F	F/LA	F	O/LF	O		F	F
Pilosella officinarum	Mouse-ear hawkweed	R	R		R		LA						
Plantago lanceolata	Ribwort plantain	F	F	F	F	F	F/LA	F	O	O/LF	F	F	F
Polygala vulgaris	Common milkwort						R						
Potentilla reptans	Cinquefoil			O		O/LA	O/LA	F/LA	O/LA		O/LA	O/LA	LA
Poterium sanguisorba	Salad burnet				O/LF								
Prunella vulgaris	Selheal				O		O					O	O
Pulicaria dysenterica	Fleabane										R	R	
Ranunculus acris	Meadow buttercup				O								
Ranunculus repens	Creeping buttercup		R	O			O	O	O			O	
Reseda lutea	Mignonette						R						
Reseda luteola	Weld						R					R	
Rhinanthus minor	Yellow rattle									R			
Rumex crispus	Curled dock											O	
Rumex obtusifolius	Broad-leaved dock		R	R		R	O	O/LF				O	O
Sagina procumbens	Procumbent pearlwort						O						
Senecio erucifolius	Hoary ragwort				R				R			O	
Senecio inaequidens	Narrow-leaved ragwort					O							
Senecio jacobaea	Common ragwort	O		O	O/LF	O	F	F		O		F	O
Senecio squalidus	Oxford ragwort	O	O										
Sherardia arvensis	Field madder							R					
Silene latifolia	White campion						O	R			R	O	O
Silene vulgaris	Bladder campion											R	O
Solidago canadensis	Canadian goldenrod			LA									
Sonchus asper	Prickly sowthistle	R		R			R	O	O	R			R
Sonchus olraceous	Smooth sowthistle							R					
Tanacetum vulgare	Tansy					O/LA							
Taraxacum officinale agg.	Dandelion			F	O			O	O			O	
Torilis japonica	Upright hedge parsley					O/LA						O	
Tragopogon pratensis	Goat's beard				R			R			O		
Trifolium campestre	Hop trefoil		O				O/LF			F		O/LF	LF
Trifolium dubium	Lesser hop trefoil	O						O	O	O		O/LF	

Species		Manor Way 1	Manor Way 2 & 3	Craylands Lane Pit/ West Quarry 1	Craylands Lane Pit/ West Quarry 2	Sport's Field/ East Quarry	Bamber Pit	Northfleet Landfill	CTRL West	CTRL East	Triangle	N of Springh'd Nursery	CTRL gslnd nr. Pepper Hill junct.
Trifolium pratense	Red clover	O	O		O	O/LF	R	O	O	O			
Trifolium repens	White clover	R			R	O	O/LA	O	R		LF	O	
Tripleurospermum inodorum	Scentless mayweed												R
Tussilago farfara	Coltsfoot	O			O/LF		R	R	R				
Urtica dioica	Nettle			O/LA		O/LA	O/LA	R	O/LA		O/LA	O	
Valerianella dentata	Narrow-fruited corn-salad								R				
Verbascum thapsus	Great mullein	LF	LF				O/LF						
Verbena officinalis	Vervain										R		
Veronica arvensis	Wall speedwell						R	R	LF			O/LF	
Veronica chamaedrys	Germander speedwell			R			R						
Veronica officinalis	Heath Speedwell												R
Veronica persica	Field speedwell							R					
Vicia bithyinica	Bithynian vetch		LF					LF	R				
Vicia cracca	Tufted vetch												R
Vicia hirsuta	Hairy tare							O/LF	O/LF				
Vicia sativa	Common vetch	F	F	F	F	O/LF	O	F/LA	F	F	F	F	
Vicia tetrasperma	Smooth tare						O		O	F	O	O/LF	
Vicia villosa	Fodder vetch									LF			
Acer platanoides	Norway maple			O									
Acer pseudoplatanus	Sycamore	O/LF		F		O	O					O	
Betula pendula	Silver birch	O			O/LF		O		R			O/LF	
Buddleia davidii	Butterfly bush	F/LA	O	F	O/LF	O	O/LF		R	O		O/LF	
Clematis vitalba	Traveller's joy	O		F/LA		O	O					F/LA	
Cornus sanguinea	Dogwood	O			R	F	O/LF					F	
Corylus avellana	Hazel											O	
Crataegus monogyna	Hawthorn	O		F/LA		F/LA	F/LA		O	O		F	
Cytisus scoparius	Broom			R								R	
Fraxinus excelsior	Ash			O		O	O					O	
Prunus spinosa	Blackthorn			O									
Quercus ilex	Holm oak				R								
Quercus robur	Pedunculate oak											O	
Rosa canina	Dog rose	O		O		O	F		O			F	
Rubus fruticosus	Bramble	F/LA		F/LA	O	F/LA	F/LA		O/LA	O		F/LA	
Salix caprea	Goat willow			O	O/LF	O			O			O/LA	
Salix cinerea	Grey willow	R			O				O			F/LA	
Salix fragilis	Crack willow	R											
Sambucus nigra	Elder					O	R					R	
Ulex europaeus	Common gorse		R									O	

Nationally Scarce species
Kent Rare Plant Register species (excl. Nationally Scarce species)
Indicators of Unimproved Neutral Grassland in Kent (Local Wildlife Sites in Kent - Criteria for Selection and Delineation. Version 1.5, August 2015)
Indicators of Unimproved Calcareous Grassland in Kent (Local Wildlife Sites in Kent - Criteria for Selection and Delineation. Version 1.5, August 2015)

DAFOR Scale

D Dominant
A Abundant
F Frequent
O Occasional
R Rare

L Locally or patchily

Table 5

Wetland Species

Table 5 Wetland species

Species		D1	D2	P3	P4	CTRL S incl. P5	Ebbsfleet Corridor 1 N
Agrostis stolonifera	Creeping bent	O	O		LA	O/LA	
Alisma plantago-aquatica	Water-plantain			R	LF	R	
Apium nodiflorum	Fools watercress		R				F/LA
Arrhenatherum elatius	False oat-grass						O
Atriplex prostrata	Spear-leaved orache		O				
Bolboschoenus maritimus	Sea club-rush			LF/LA	LF/LA		
Callitiche sp.	Water starwort				F/LA		O
Calystegia sepium	Hedge bindweed	F/LA	F/LA		O	O	
Cardamine hirsuta	Hairy bittercress						O
Carex otrubae	False fox-sedge		R		O	O	
Chara vulgaris	Common Stonewort			F		LF	
Cirsium arvense	Creeping thistle	F/LA	F/LA		R	O	
Cirsium vulgre	Spear thistle						R
Eleocharis palustris	Common spike-rush				LF/LA	O	
Elytrigia pycnanthus	Sea couch	O	F				
Epilobium hirsutum	Great willowherb	F	F/LA		O/LA	LF/LA	F
Epilobium montnum	Broad-leaved willowherb						F
Eupatoria cannabina	Hemp agrimony	F	F		O		
Galium aparine	Cleavers	O	O		O/LA		
Heracleum mantegazzianum	Giant hogweed						LA
Holcus lanatus	Yorkshire fog						O/LF
Iris pseudacorus	Yellow iris						O
Juncus articulatus	Jointed Rush				LF	O	
Juncus inflexus	Hard rush	O			LF	O/LA	
Lemna minor	Common duckweed				LA		O
Lemna trisulca	Ivy-leaved duckweed						
Lycopus europaeus	Gypsywort	O			O	O	O
Nasturtium rorippa-aquatica	Water cress						F/LA
Oenanthe crocata	Hemlock water-dropwort						O
Phalaris arundinacea	Canary reed-grass						R
Phragmites australis	Common reed	A/D	A/D	LA/LD	LA/LD	LA/LD	O/LD
Potamogeton berchtoldii	Small Pondweed				A		
Potamogeton pusillus	Lesser Pondweed			F/LA		LF	
Pulicaria dysenterica	Fleabane	R	R				
Ranunculua baudotii	Brackish Water-crowfoot			O	O/LA	LF	
Ranunculus repens	Creeping buttercup						O
Ranunculus sceleratus	Celery-leaved buttercup	R	R				
Rubus fruticosus	Bramble						F
Rumex hydrolapathum	Great water dock						O
Rumex obtusifolius	Broad-leaved dock	O	O			O	O
Rumex pulcher	Fiddle dock	O					
Salix alba	White willow	R	O	LF	LF	O/LF	
Salix caprea	Goat willow	R	O	LF	LF	O/LF	O
Salix cinerea	Grey willow	R	O	O	O	O/LF	LF
Salix fragilis	Crack willow	R	O	O	O	O/LF	A
Salix viminilis	Osier willow	R	O			O/LF	
Sambucus nigra	Elder						O
Schoenoplectus tabermaemontani	Grey Club-rush				R		
Scrophularia auriculata	Water figwort						O
Scrophularia nodosa	Common figwort	R	O				
Solanum dolcamara	Bittersweet				O	O	F
Sparganium erectum	Branched bur-reed	R					
Typha angustifolia	Lesser reedmace				LA		
Typha latifolia	Greater reedmace	O	O	R	LA		O/LA
Urtica dioica	Nettle	F	F		R		F/LA
Veronica anagallis-aquatica	Water speedwell						O
Veronica catenata	Pink Water-speedwell				R		
	Filamentous green algae			F	F		

Kent Rare Plant Register species
Invasive non-native species - listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended)

DAFOR Scale

D Dominant
A Abundant
F Frequent
O Occasional
R Rare

L Locally or patchily

Table 6

Woodland Species

Table 6 Woodland species

Species		W1
Canopy		
Acer pseudoplatanus	Sycamore	A
Betula pendula	Silver birch	O
Fraxinus excelsior	Ash	O
Populus tremula	Aspen	R
Shrub		
Acer pseudoplatanus	Sycamore	F/LA
Buddleia davidii	Butterfly bush	O/LA
Cornus sanguinea	Dogwood	F
Crataegus monogyna	Hawthorn	O
Fraxinus excelsior	Ash	F/LA
Ligustrum vulgare	Wild privet	F
Quercus ilex	Holm oak	R
Sambucus nigra	Elder	O
Viburnum lantana	Wayfaring tree	R
Field		
Brachypodium sylvaticum	Wood brome	O
Geranium robertianum	Herb robert	O/LF
Hedera helix	Ivy	A/LD
Lamium album	White deadnettle	R
Rubus fruticosus	Bramble	F/LA
Stachys sylvatica	Hedge woundwort	R
Urtica dioica	Nettle	O

DAFOR Scale

D Dominant
A Abundant
F Frequent
O Occasional
R Rare

L Locally or patchily

DAFOR Scale

D Dominant
A Abundant
F Frequent
O Occasional
R Rare

L Locally or patchily



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Annex EDP 15
2012/13 Wintering Birds Survey Report (CBA, 2013)

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cba

London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012/13 Wintering Birds Survey Report

November 2013

CHRIS BLANDFORD ASSOCIATES
landscape | environment | heritage

London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012/13 Wintering Birds Survey Report

Approved	Bill Wadsworth
Position	Senior Associate (Ecology)
Date	30th November 2013
Revision	Final

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2.0	**METHODOLOGY**	**3**
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4.0	**EVALUATION**	**9**

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2: Estuarine Bird Monitoring: High tide waterfowl counts made during winter 2012/13

3: Estuarine Bird Monitoring: Low tide waterfowl and raptor counts made during winter 2012/13.

4: Summary of Bird Surveys.

FIGURES

1-30: High Tide and Low Tide Bird Counts for September 2012 – March 2013

APPENDICES

I: BTO Species Codes

II: Species List

1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings (LRCH) Ltd. to undertake a series of ecological surveys to inform the Environmental Impact Assessment for the proposed London Paramount development at Swanscombe, North Kent.

1.1.2 This report details the results of the wintering bird surveys undertaken between September 2012 and March 2013.

1.2 Scope

1.2.1 The aims of the wintering bird survey were to:

- Determine the level of use of the survey area by wintering birds and particularly by those species listed in the citations for the nearby SPA and SSSIs (discussed below).

1.3 Survey Limitations

1.3.1 Due to bad weather during January and taking into account suitable tide times and sunrise/sunset times, the earliest the January high tide survey could be undertaken was 1st February 2013. Other than this, there were no limitations to completing the survey.

1.4 Key Findings

1.4.1 The total number of birds recorded during high tide counts ranged between 80 and 1175 with a mean abundance of 572. During low tide counts, abundance ranged between 227 and 718 with a mean abundance of 412. It was considered that the bird numbers were generally at their peak between December and March.

1.4.2 In determining the conservation value of the Site, the results of the surveys were reviewed in relation to the criteria used for the designation of Local Wildlife Sites within Kent for wintering birds. In comparing the survey results with the criteria, none of the thresholds are met. The total number of wetland species recorded is 32 (the threshold is for at least 60 wintering bird species or at least 100 passage bird species) and even including other non-wetland birds including the passerines that are present within the wider site, these thresholds would not be met. Four Kent RDB3 species were recorded but three of these are listed as KRDB3 species

due to their breeding status rather than numbers in winter. Only one species recorded, knot, is a KRDB3 species due to its wintering bird status.

2.0 METHODOLOGY

2.1 Legislative Context

2.1.1 The West Thurrock Lagoon and Marshes SSSI is designated for its wintering wader and wildfowl assemblage for which the area is considered to be one of the most important sites along the Inner Thames Estuary. At its closest point the SSSI is some 1.5km to the west of the Site. The SSSI has extensive mudflats as well as large and secure high tide roosts. Large reed beds are also present which support reed and sedge warblers and breeding populations of bearded tit. Locally important numbers of **teal**, **snipe** and **grey heron** roost in the SSSI

2.1.2 The nearest SPA is the Thames Estuary Marshes SPA/Ramsar, which is approximately 7km east of the Site. The SPA is made up of the South Thames Estuary & Marshes SSSI (south bank of the Thames) and Mucking Flats & Marshes SSSI (north side of the Thames). This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Over winter:

- Avocet *Recurvirostra avosetta*, 276 individuals representing at least 21.7% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)
- Hen Harrier *Circus cyaneus*, 7 individuals representing at least 0.9% of the wintering population in Great Britain (5 year mean 93/4-97/8)

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

On passage:

- Ringed plover *Charadrius hiaticula*, 559 individuals representing at least 1.1% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Over winter:

- Ringed plover *Charadrius hiaticula*, 541 individuals representing at least 1.1% of the wintering Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Assemblage qualification: A wetland of international importance.

2.1.4 The area qualifies under **Article 4.2** of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 33,433 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including redshank *Tringa totanus*, black-tailed godwit *Limosa limosa islandica*, dunlin *Calidris alpina alpina*, lapwing *Vanellus vanellus*, grey plover *Pluvialis squatarola*, shoveler *Anas clypeata*, pintail *Anas acuta*, gadwall *Anas strepera*, shelduck *Tadorna tadorna*, white-fronted goose *Anser albifrons albifrons*, little grebe

Tachybaptus ruficollis, ringed plover *Charadrius hiaticula*, avocet *Recurvirostra avosetta* and whimbrel *Numenius phaeopus*.

2.1.5 The Inner Thames Marshes SSSI is some 6km to the west of the Site. It is designated for the numbers of wintering wildfowl, waders and birds of prey with wintering teal populations reaching levels of international importance.

2.2 Wintering Bird Methodology

2.2.1 Wintering bird surveys were undertaken between September 2012 and March 2013 inclusive. Both high tide and low tide counts were undertaken each month. The surveys were undertaken whenever possible close to the dates for the WEBS data survey dates taken from the British Trust for Ornithology website. The survey dates were dependent on weather and tides. Two surveyors covered the survey area and long range radios were used to try and ensure that double counting of birds did not occur. Binoculars were used by all surveyors with Swarovski and Viking telescopes also used. The surveys aimed to cover all areas that could be directly or indirectly impacted, in terms of their bird interest, by the Project. The locations of surveyed areas and habitats are illustrated in Figure 1.

2.2.2 The surveys were undertaken on the following dates:

High Tide

- 27th September 2012
- 17th October 2012
- 2nd November 2012
- 17th December 2012
- 1st February 2013 (Jan high tide survey delayed due to bad weather on previous survey)
- 22nd February 2013
- 25th March 2013

Low Tide

- 4th October 2012 (September low tide survey delayed due to bad weather on previous survey)
- 19th October 2012
- 1st November 2012
- 17th December 2012
- 25th January 2013
- 18th February 2013
- 22nd March 2013

2.3 Evaluation Methodology

2.3.1 The conservation importance of the breeding and wintering bird populations were determined using the criteria specified below:

(a) the presence of wintering and/or breeding bird populations of significant national and regional conservation importance (>1% of the national or regional resource (using population estimates of WeBS thresholds for wintering waterfowl))
(b) the presence of wintering and/or breeding species of recognised international conservation importance i.e. species listed on Annex I of EC Directive 79/409/EEC on the Conservation of Wild Birds 1979 and species forming part of the qualifying interest of an SPA
(c) the presence of breeding species of recognised national conservation importance i.e. species listed on Schedule 1 of the Wildlife and Countryside Act 1981
(d) the presence of Birds of Conservation Concern (BoCC) red and amber list species (Gregory *et al* 2002).
(e) the presence of species identified as Priority Species in the UK Biodiversity Action Plan

2.3.2 The criteria used for the designation of Local Wildlife Sites (previously known as SINCs or County Wildlife Sites) in Kent (Kent Wildlife Trust, 2005) were used to assess the local importance of the Site for wintering birds. The criteria are designed to be applied to areas of habitat that are discrete and homogenous (i.e. splitting habitats such as woodland and arable rather than considering the two habitats as one site) and are as follows:

"A site should be selected as a Wildlife Site if it can be considered as a single, identifiable unit (as explained above) in terms of its bird fauna and where:

- *It is occupied regularly by at least 2.5% of the county population of any one or more bird species, based on the most recent and authoritative data; or*
- *It holds three or more Kent Red Data Book 3 (KRDB3) species at the appropriate time of year (normally this should not include a combination of breeding and wintering species); or*
- *It holds one of the five largest colonies of colonial seabirds (with the exception of herring gull and black-headed gull), grey heron, little egret or sand martin; or*
- *It has been recorded as being regularly used in recent years by at least 60 wintering bird species; or*
- *It has been recorded as being regularly used in recent years by at least 100 passage bird species."*

Table 1 Examples of evaluation criteria

Value	Examples of Valuation Criteria
International Importance	• High importance and rarity, international scale and limited potential for substitution; • A internationally designated site (Special Area of Conservation SAC, Special Protection Areas SPA); • Presence of Internationally rare species;
National Importance	• High importance and rarity, national scale, or regional scale with limited potential for substitution; • A nationally designated site (Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) etc.;
Regional Importance	• High or medium importance and rarity, local or regional scale, and limited potential for substitution; or, • Any regularly occurring, locally significant population of a Nationally Scarce species or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation.

Value	Examples of Valuation Criteria
County Importance	• High or medium importance and rarity, local or regional scale, and limited potential for substitution. A site designated as being of County Importance i.e. Local Wildlife Site (LWS); • A viable area of Key Habitat identified in the County BAP; • Any regularly occurring locally significant population of a species which is listed on account of its regional rarity or localisation.
Local Importance	• Low or medium importance and rarity, local scale. • Any regularly occurring, locally significant population of a species listed as being Locally Scarce. • Areas of habitat identified as being of Local Value in the relevant Natural Area profile.
Parish Importance	• Low or medium importance and rarity, local scale; • Areas of habitat considered to appreciably enrich the habitat resource within the context of the Parish or Neighbourhood;
Negligible Importance	• Very low importance and rarity, local scale; • Sites or areas, which support few or no habitats, communities or species populations of nature conservation interest.

3.0 RESULTS

3.1 General

3.1.1 Total counts of all species made in the Survey Area at high and low tides are given in **Tables 2** and **3** respectively. Mapped distributions of these are presented in **Figures 1** to **14**. The species codes given are those employed by the British Trust for Ornithology and are given in **Appendix I** with a list of common and scientific names of all species recorded given in **Appendix II**.

3.1.2 A total of 31 species were recorded during the high and low tide visits between 24th November 2011 and 12th March 2012. These were all waterfowl or birds of prey. Smaller bird species were recorded using the survey area which were recorded including reed bunting, redwing, fieldfare, meadow pipit and skylark, however, these were not included within the over bird counts. Surveys were split into High and Low tides with 26 species recorded at low tide and 28 at high tide. Species richness at a single survey visit varied between 10 and 16 species at low tide and six and 19 species at high tide. The greatest diversity was recorded during the January surveys (although the high tide count was on 1st February)

3.2 Species of Interest

3.2.1 The following species are of particular interest as they are included within the closest designated sites. Species of SPA interest are shown in green on **Figures 1-14**.

Thames Estuary Marshes SPA/Ramsar citation

Ringed Plover

3.2.2 No ringed plover were recorded during the surveys.

West Thurrock Lagoon and Marshes SSSI

Teal

3.2.8 Teal were recorded regularly throughout the surveys. The numbers of teal increased from the beginning of the season where 30 or fewer were recorded in September to November inclusive to a peak of 190 recorded during the January high tide survey. The majority of teal were recorded at the northern end of the western side of the peninsula between the jetty and the tip of the peninsula.

Snipe

3.2.9 Snipe were only recorded once when 4 were recorded during the January low tide survey all on the mud flats or on the salt marsh at the north-western tip of the peninsula.

Grey Heron

3.2.10 This species was recorded regularly but in low numbers with a maximum of 4 recorded during the low tide survey in October.

4.0 EVALUATION

4.1 Wintering Birds

4.1.1 Wintering bird surveys were undertaken between September 2012 and March 2013 and both high and low tide surveys were undertaken each month. Due to bad weather on the January date and taking into account suitable tide times and sunrise/sunset times, the earliest the January high tide survey could be undertaken was 1st February 2013.

4.1.2 In general, the assemblage during high and low tides were similar with the numbers and distribution across the survey area changing. Species that occurred at low tide that were not recorded at high tide included snipe, knot, kestrel and curlew whilst those that were recorded at high tide but not at low tide were little egret, tufted duck, greater black-backed gull and marsh harrier.

4.1.3 During low tide the birds were spread widely across the mudflats of the survey area, particularly to the west of the peninsula down to the jetty. The number and diversity of birds was reduced where the area of mudflat and saltmarsh is smaller along the eastern side of the peninsula.

4.1.4 The total number of birds recorded during high tide counts ranged between 80 and 1175 with a mean abundance of 572. During low tide counts, abundance ranged between 227 and 718 with a mean abundance of 412. It was considered that the bird numbers were generally at their peak between December and March.

4.1.5 The most significant increase in numbers was seen with the black-headed gulls, which were recorded at high tide in low numbers (9, 6, 82 and 115), until January 2013 when 526 were recorded, the majority of these in the fields of Botany Marshes. Similarly larger numbers of this species were recorded in February (399) and March (633) when large flocks of gulls were recorded in these fields or flying at the peninsula. Generally smaller numbers of black headed gulls were recorded at low tide with a peak of 290 recorded in January.

4.1.6 The numbers of gadwall recorded increased during the latter part of the winter survey with none recorded until the December survey when 45 were recorded. The peak count of gadwall was 126 recorded during the February low tide survey. Similarly the numbers of teal also increased from the beginning of the season to a peak of 190 recorded during the January high tide survey. Wigeon and tufted duck were only recorded during the January high tide survey.

4.1.7 The majority of birds recorded were waterfowl with fewer waders recorded. The waders that were recorded included snipe (max 4), turnstone (max 16), redshank (max 68), curlew (max 6), knot (2), lapwing (230), grey plover (1) and oystercatcher (3). Lapwing was generally recorded during every month although in higher numbers at high tide with the pier to the west of the peninsula being a favoured roosting area.

Other Species

4.1.8 In addition to the waders and waterfowl other birds were noted in the salt marsh, with skylark regularly recorded. Stonechat, whinchat and wheatear were recorded during the September survey, whilst Cetti's warbler was recorded in September – November inclusive. Flocks of starling were recorded generally in the north and associated with one of the towers, the pylons or the piers.

Birds of Prey

4.1.9 Peregrine and kestrel were both recorded. Peregrine were recorded during the October and January surveys in the vicinity of the survey area. Kestrel were recorded prior to the survey starting or after the survey ended in other parts of the Site as well as during the survey around the water's edge or Botany Marshes. A single marsh harrier was recorded during the February high tide survey over Botany Marshes.

4.2 Evaluation

4.2.1 Reviewing the criteria used for the designation of Local Wildlife Sites within Kent for wintering birds, and comparing with the survey data, none of the thresholds are met. The total number of wetland species recorded is 32 (the threshold is for at least 60 wintering bird species or at least 100 passage bird species) and even including other non-wetland birds including the passerines that are present within the wider site, these thresholds would not be met. Four Kent RDB3 species were recorded but three of these are listed as KRDB3 species due to their breeding status rather than numbers in winter. Only one species recorded, knot, is a KRDB3 species due to its wintering bird status.

4.2.2 The Inner Thames Marshes SSSI is some 6km to the west of the Site. It is designated for the numbers of wintering wildfowl, with wintering teal populations reaching levels of international importance. Similarly teal are noted as being a significant feature of the West Thurrock Lagoon and Marshes SSSI which is part of the Thames Estuary Marshes SPA/Ramsar. No information regarding the numbers of teal recorded is provided within the SSSI citation for these sites. However information produced about Rainham Marshes RSPB reserve which includes Aveley and Wennington Marshes, a substantial part of the Inner Thames Marshes SSSI, record up to 3,500 teal (www.wildessex.net).

4.2.3 The SSSI selection criteria for non-breeding populations of birds is for a site which regularly contain 1% or more of the total British non-breeding population of any species at any season The British wintering population of teal based on WEBS counts is 210 thousand individuals in 2004/05 - 2008/09 (BTO website). The peak count at the subject site was 190 which accounts for 0.09% of the British wintering population and approximately 5.4% of the numbers recorded at Rainham Marshes.

TABLES

Table 2. London Paramount - Estuarine Bird Monitoring: High tide waterfowl counts made during winter 2012/13.

Species	Date						
	27/9/12	**17/10/12**	**2/11/12**	**17/12/12**	**01/02/13**	**22/2/13**	**25/3/13**
Black-headed gull	9	6	82	115	526	399	633
Common gull			2				
Coot	4	2			2		1
Cormorant	12	22	15		21	9	14
Common gull					7	7	33
Gadwall				45	105	97	49
Greater black backed gull	2						
Great crested grebe				1			
Grey heron	1	1	3			1	
Greylag goose						41	
Grey plover							1
Herring gull			3		27	13	14
Lapwing	9	5	29	230	146	12	10
Lesser black-backed gull	3				2	1	10
Little egret		3					
Little grebe			1				
Mallard	40	76	56	36	87	27	23
Marsh harrier						1	
Moorhen		3	1		2		2
Oystercatcher					5		2
Peregrine					1		
Redshank					33	60	60
Shelduck					1	5	2
Shoveller					6		
Teal		12	30	128	190	123	176
Tufted duck					4		
Turnstone					6		18
Wigeon					4		
Total	**80**	**130**	**222**	**555**	**1175**	**796**	**1048**
Species richness	**8**	**9**	**10**	**6**	**19**	**14**	**16**
28	**4006**				Mean spp richness		**11.7143**
					mean abundance		572.286
Linnet							
Meadow pipit							
Pheasant							
Reed bunting							
Skylark							
Starling							

Note: Italicised species were recorded at low tide only (see Table 2).

Table 3. Project C - Estuarine Bird Monitoring: Low tide waterfowl and raptor counts made during winter 2012/13.

Species	Date						
	4/10/12	**19/10/12**	**1/11/12**	**17/12/12**	**25/1/13**	**18/2/13**	**22/3/13**
Black-headed gull	86	100	167	59	290	136	222
Carrion crow						1	
Coot	2	1	1				2
Common gull		1	6	1	11	1	9
Cormorant	3	15	4	2	26	10	6
Curlew	2	6	2				
Gadwall				61	115	126	32
Great crested grebe			1		1		
Grey heron	3	4	2		1		
Grey plover					5		
Herring gull	37	44	12			18	1
Kestrel	2						
Knot					2		
Lapwing	1		42	90	33	14	1
Lesser black-backed gull	28	6	5	1	1		3
Little grebe	1	1					
Mallard	34	54	80	32	68	34	16
Moorhen	2	2	1				1
Oystercatcher						2	
Peregrine		1			1		
Redshank		5	10	67		68	18
Shelduck					8	1	2
Shoveler		1				2	
Snipe					4		
Teal	26	8	33	61	150	128	56
Turnstone			8	13	2	16	13
Total	**227**	**249**	**374**	**387**	**718**	**557**	**382**
Species Richness	13	15	15	10	16	14	14
26	2894				Mean spp richness		13.85714
					mean abundance		413.4286
Carrion Crow							
Fieldfare							
Redwing							
Reed bunting							
Skylark							

Note: Italicised species were recorded at high tide only (see Table 1).

Table 4: Summary of Bird Surveys

	Parameter	2012/13
High Tide	Maximum Species Richness	19 (February)
	Minimum Species Richness	6 (December)
	Mean Species Richness	11.7
	Total Species Richness	28
	Maximum Abundance	1175
	Minimum Abundance	80
	Mean Abundance	572
	Total Abundance	4006

	Parameter	2011/2012
Low Tide	Maximum Species Richness	16 (January)
	Minimum Species Richness	10 (december)
	Mean Species Richness	13.71
	Total Species Richness	29
	Maximum Abundance	718
	Minimum Abundance	227
	Mean Abundance	412.7
	Total Abundance	2889

FIGURES



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
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H.	Grey Heron
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L.	Lapwing
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LI	Linnet
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MH	Moorhen
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PE	Peregrine
PH	Pheasant
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SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - September Low Tide

status		drawing no.		
		Figure 1		
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

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SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
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revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - September Low Tide

status		drawing no.		
		Figure 2		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
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revision	description	date	checked by

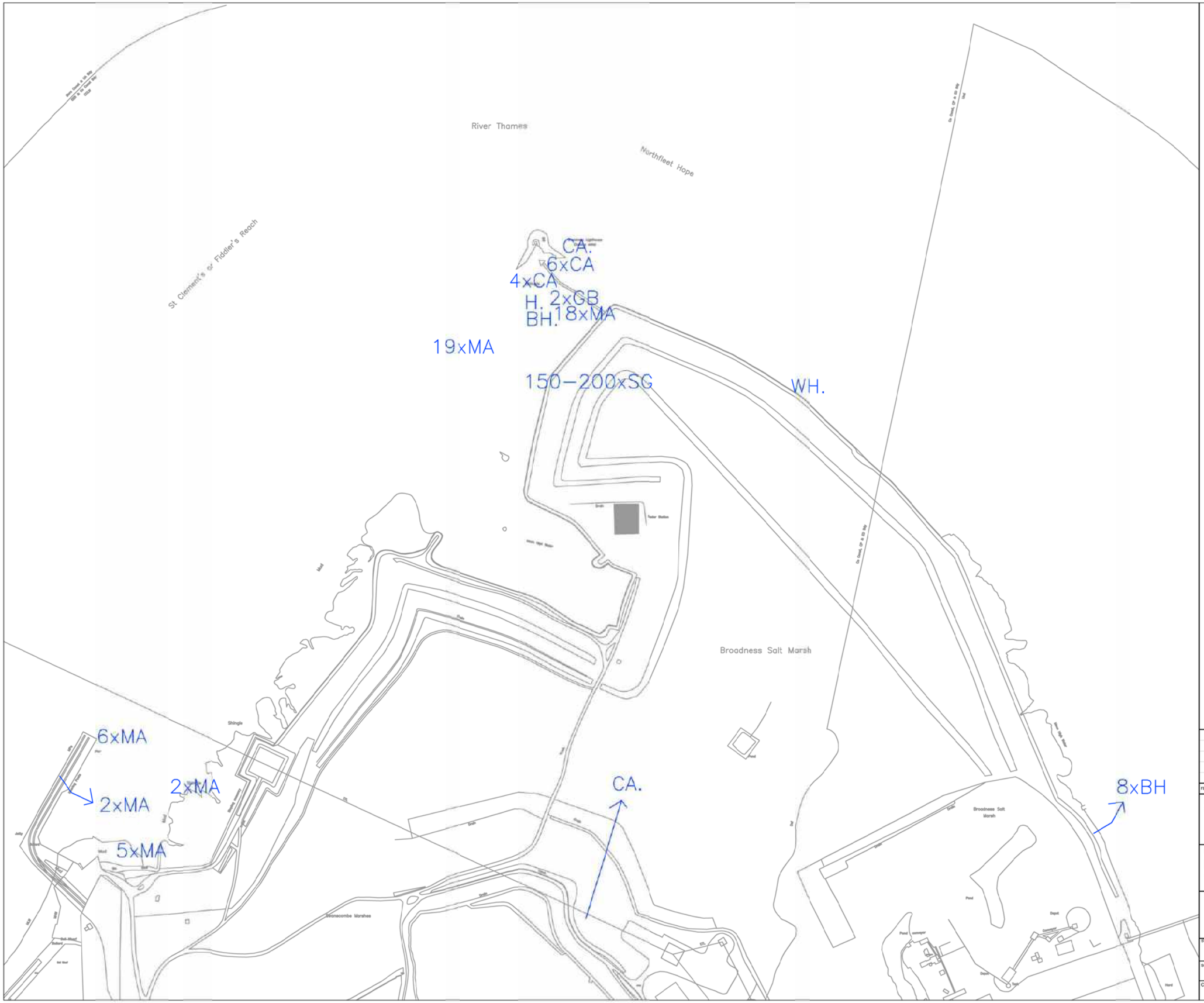
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South Area - September High Tide

status		drawing no.		
		Figure 3		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - September High Tide

status		drawing no.		
		Figure 4		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

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revision	description	date	checked by

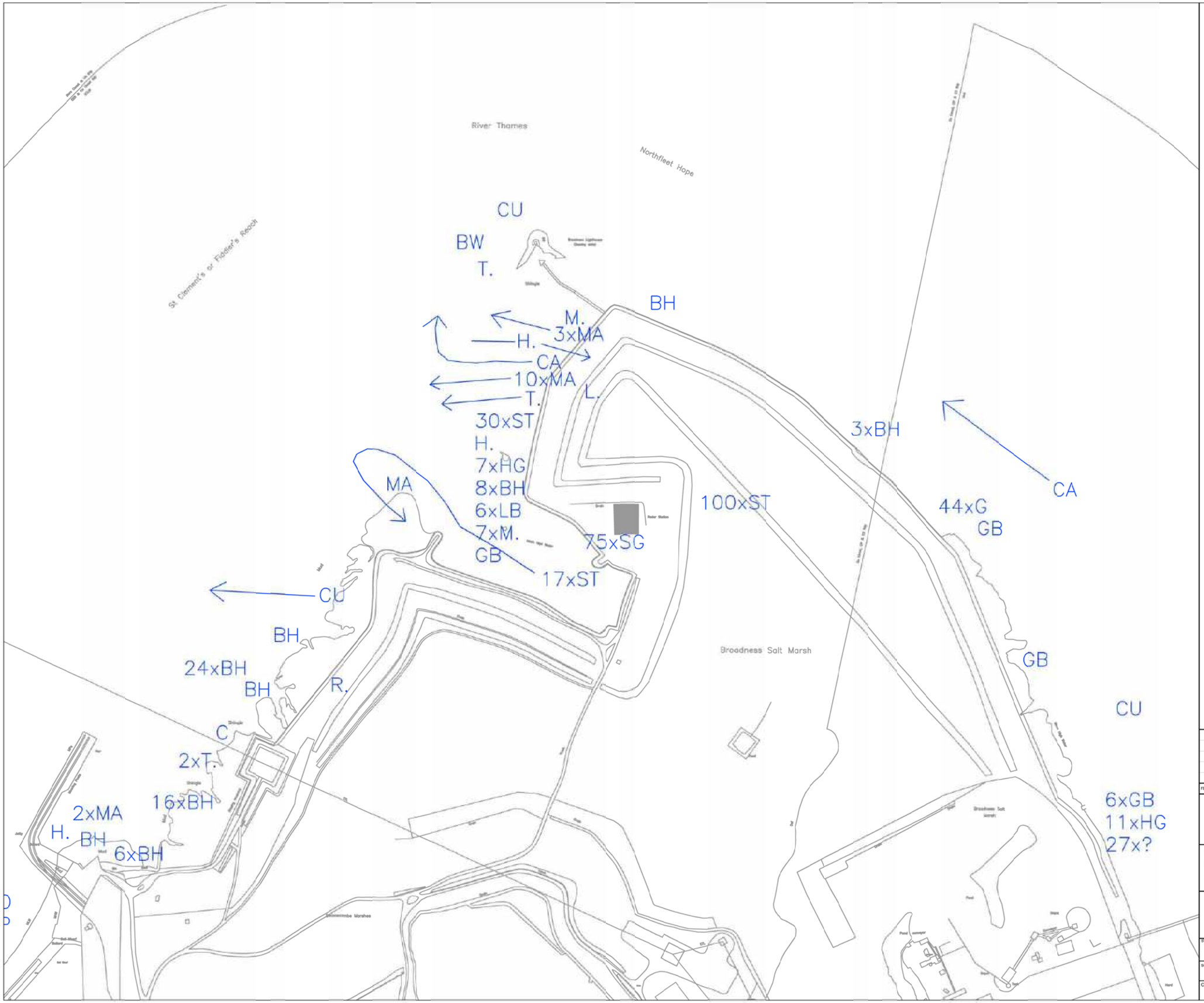
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London Paramount - Wintering Bird Survey

Title:
South Area - October Low Tide

status		drawing no.			
		Figure 5			
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - October Low Tide

status		drawing no.			
		Figure 6			
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

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MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - October High Tide

status		drawing no.			
		Figure 7			
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - October High Tide

status		drawing no.			
		Figure 8			
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

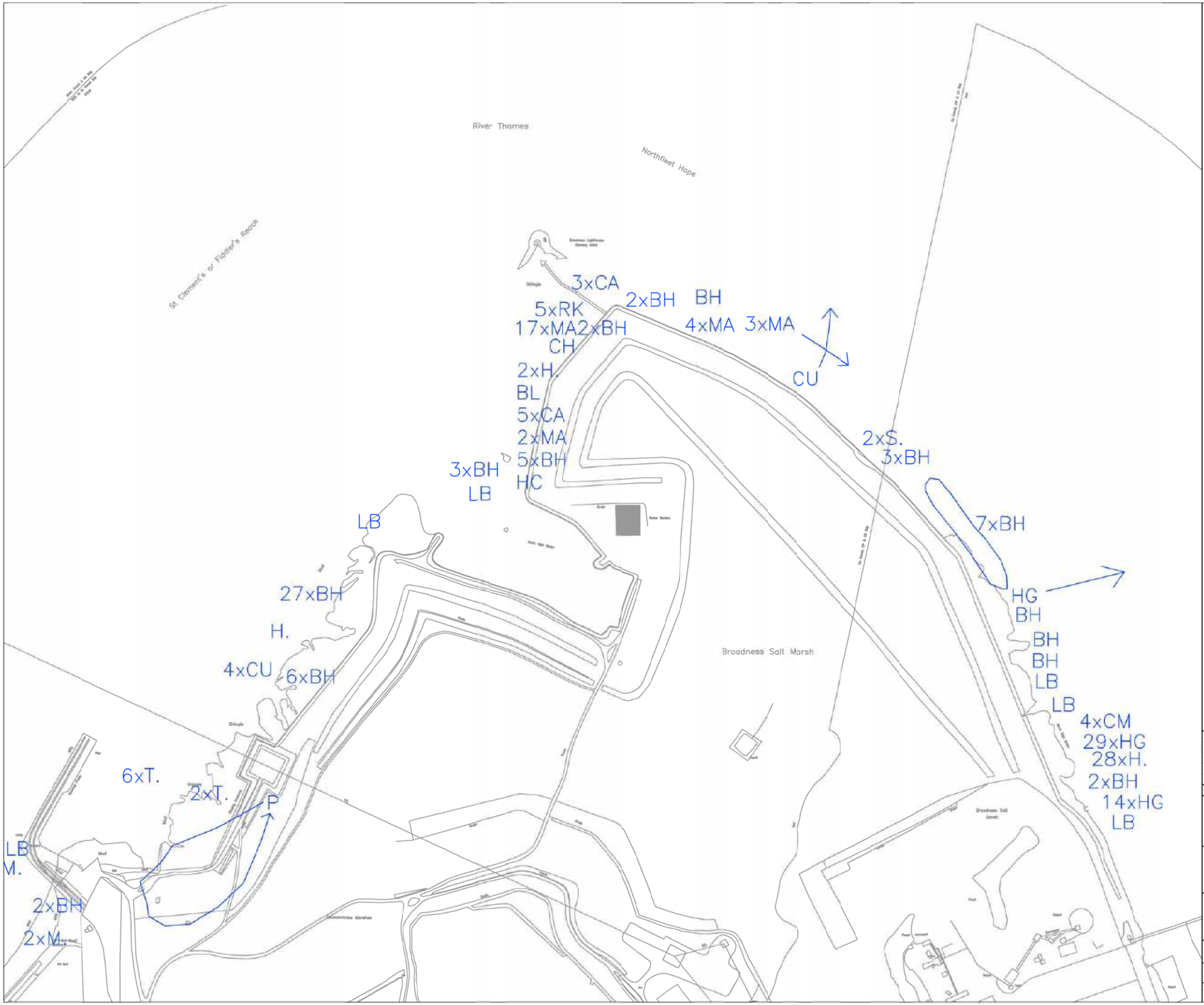
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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - October 19th Low Tide

status		drawing no.			
		Figure 9			
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

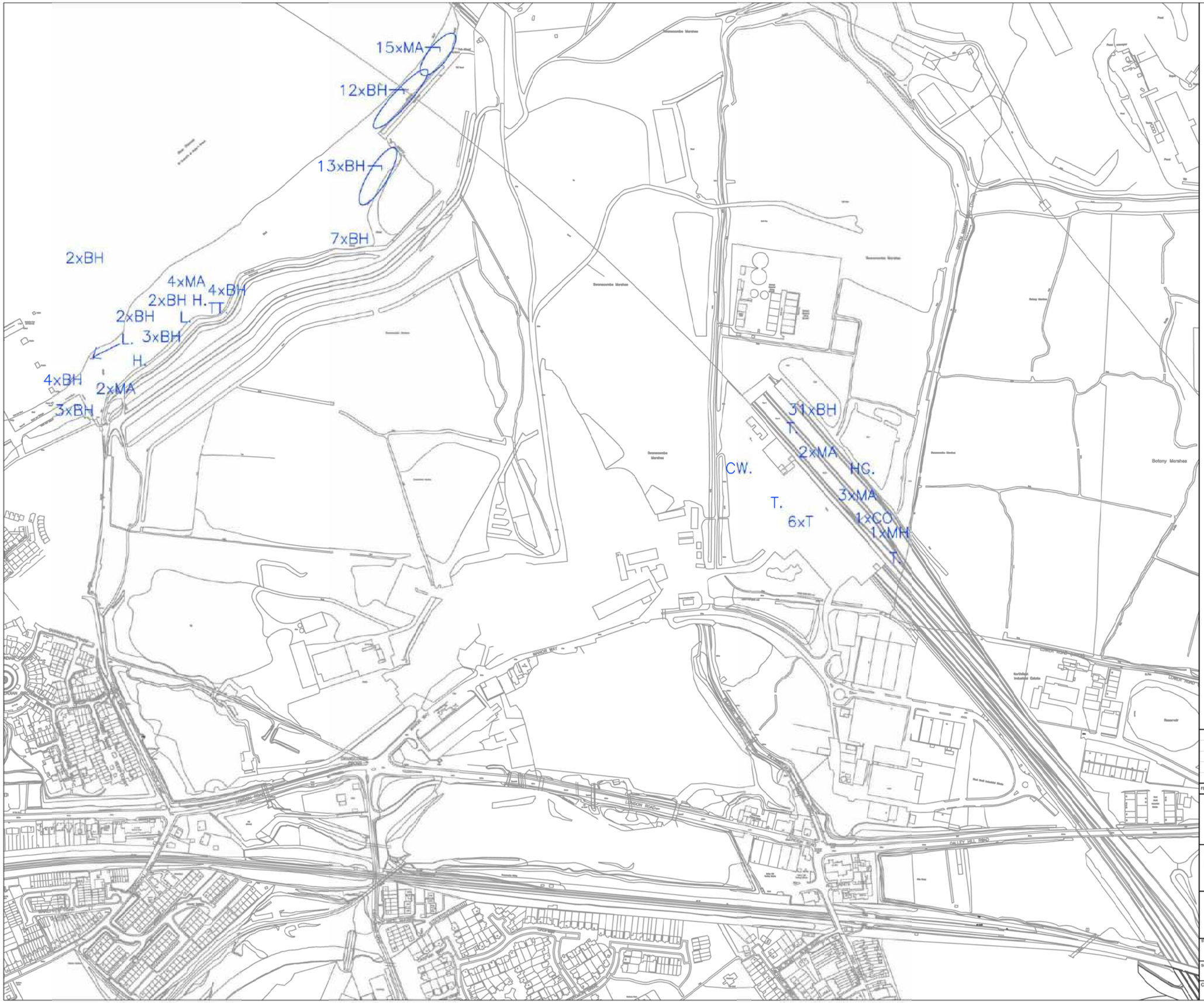
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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - October 19th Low Tide

status		drawing no.			
		Figure 10			
scale	size	date		drawn	checked
NTS	A3	21-10-2013		APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - November Low Tide

status		drawing no.			
		Figure 11			
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - November Low Tide

status		drawing no.		
		Figure 12		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - November High Tide

status		drawing no.		
		Figure 13		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - November High Tide

status	drawing no.			
	Figure 14			
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision | description | date | checked by

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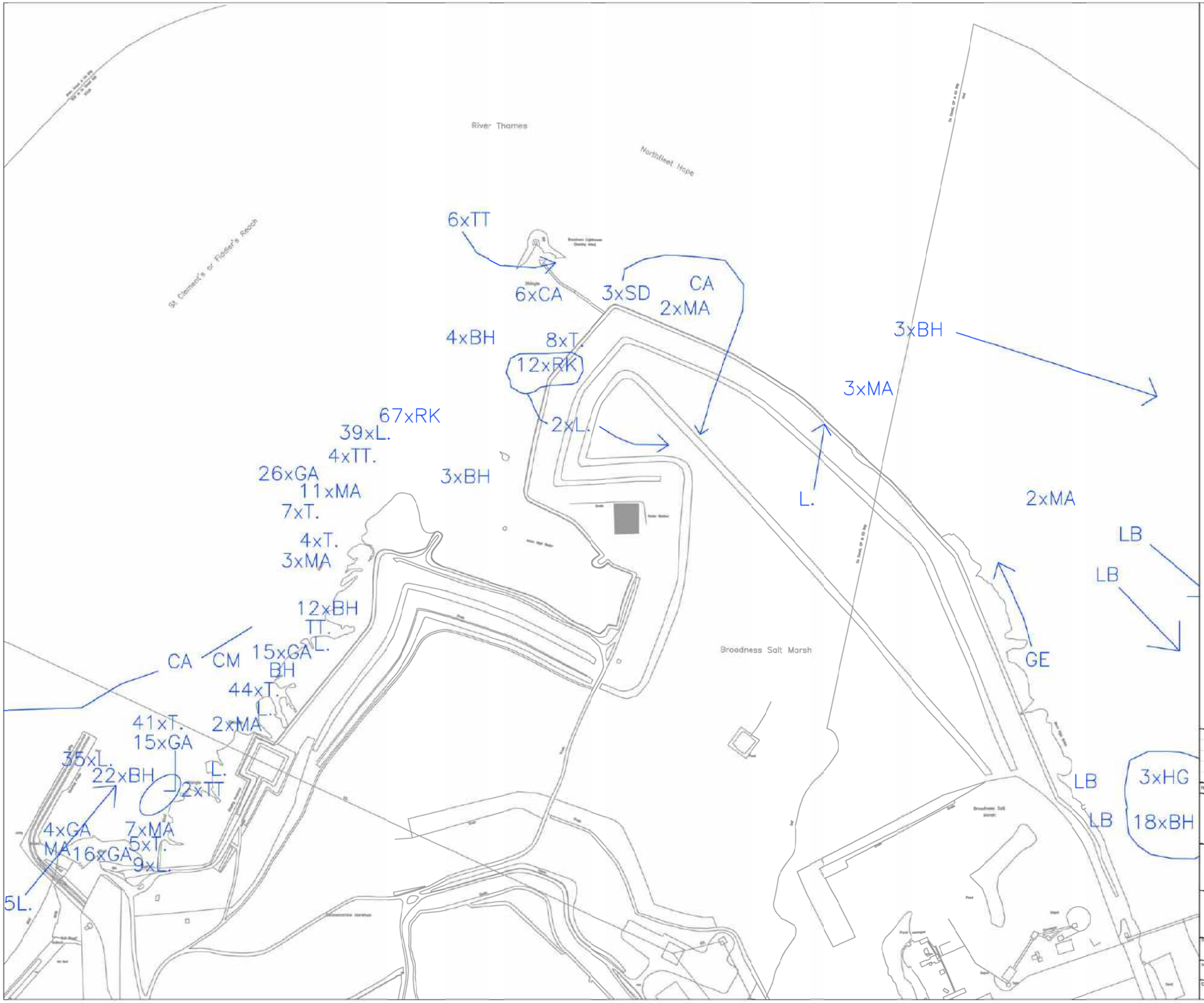
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - December Low Tide

status | drawing no. **Figure 15**

scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	drawn	checked by

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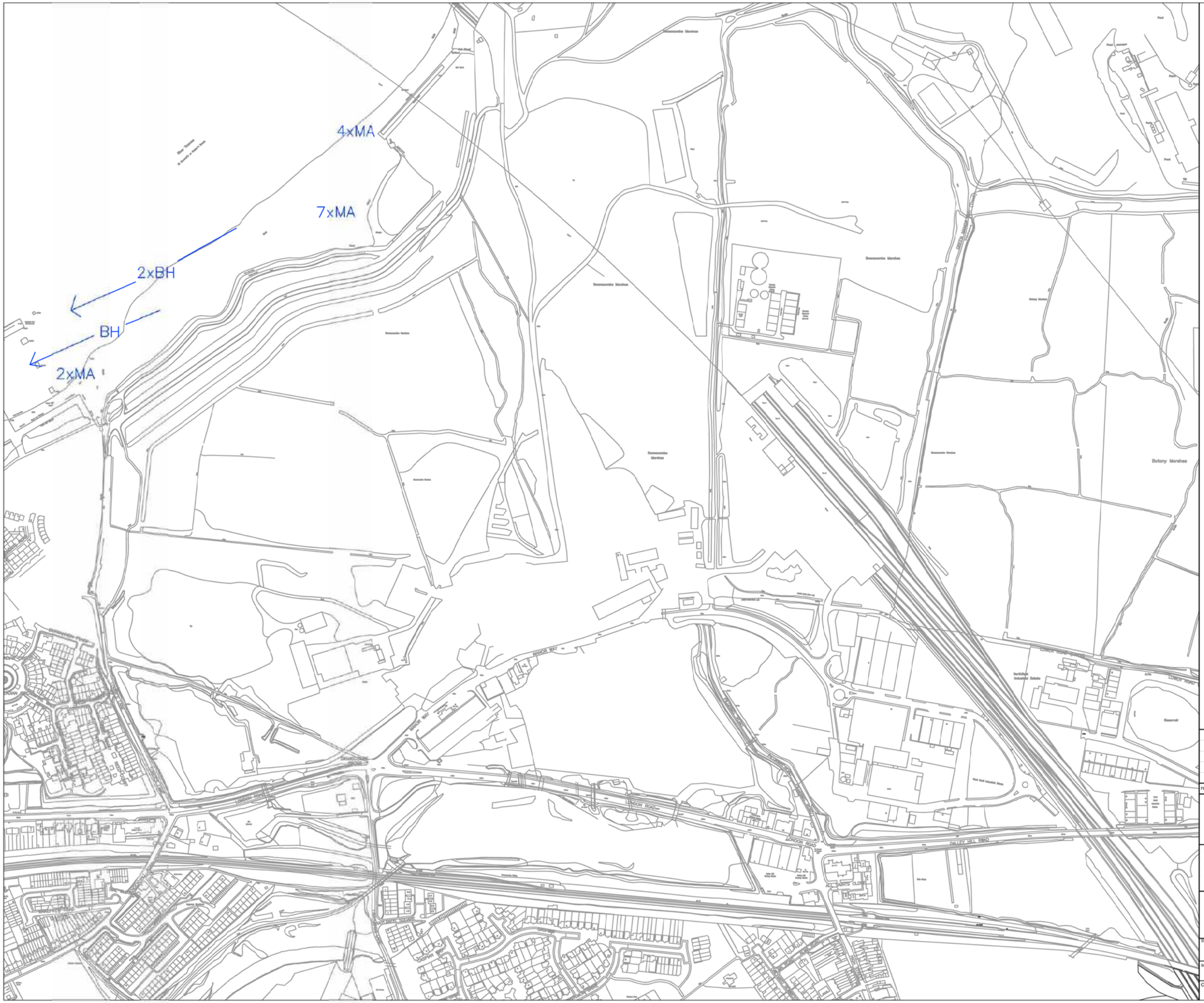
Project:
London Paramount - Wintering Bird Survey

Title:
North Area - December Low Tide

status	drawing no.	
		Figure 16

scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - December High Tide

status		drawing no.			
		Figure 17			
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - December High Tide

status	drawing no.	
	Figure 18	

scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

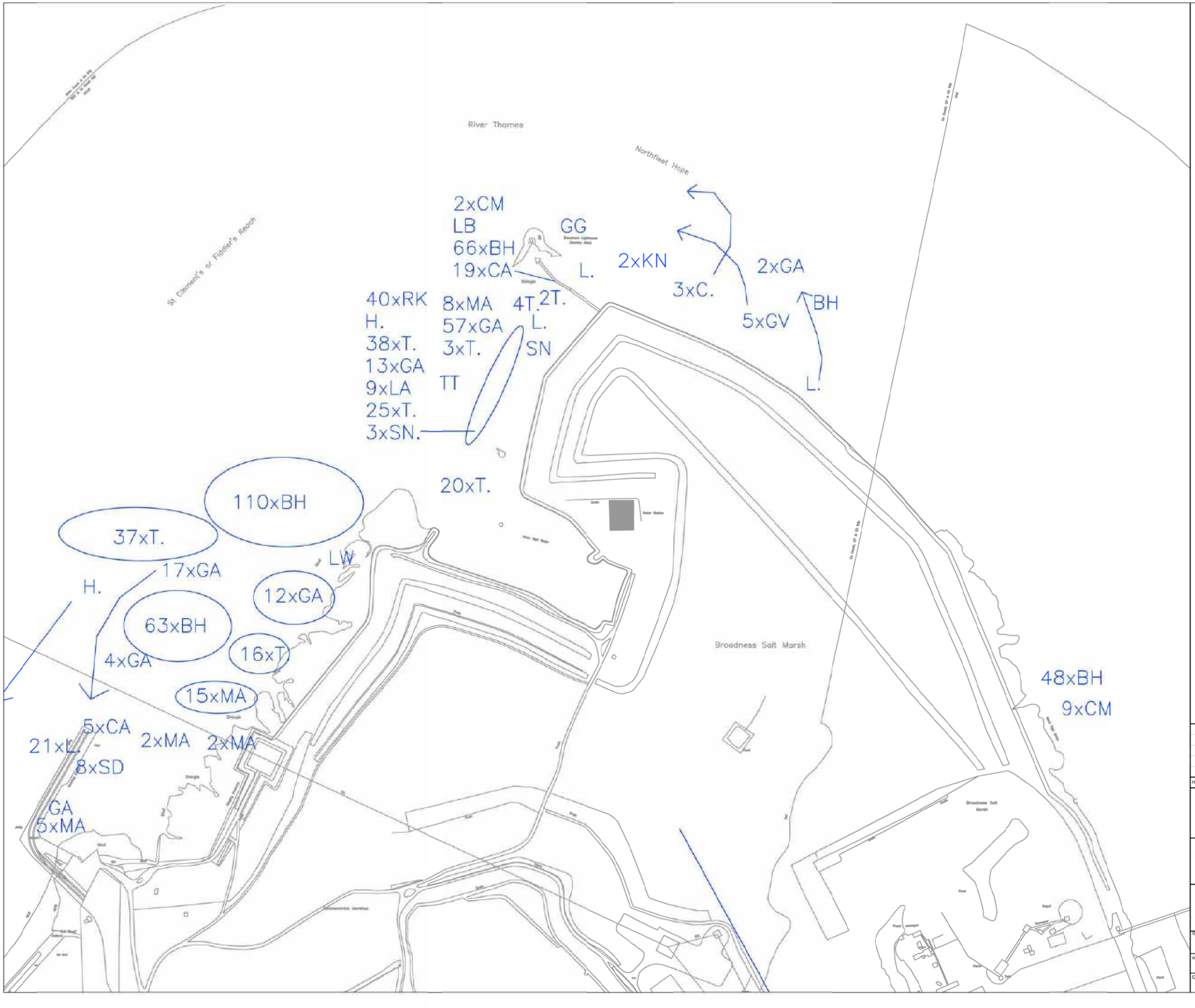
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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - January Low Tide

status	drawing no.			
	Figure 19			
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

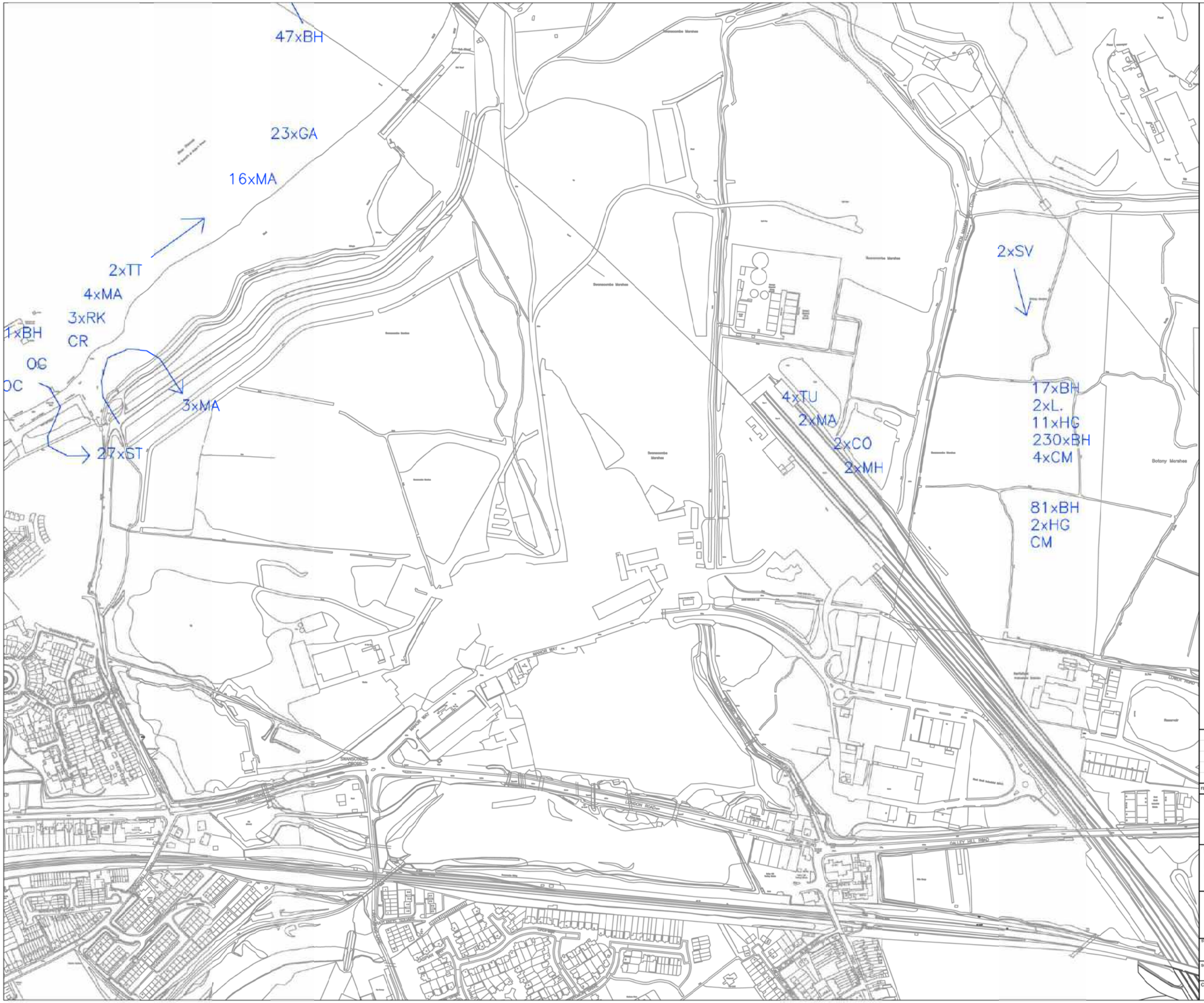
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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - January Low Tide

status	drawing no.			
	Figure 20			
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision | description | date | checked by

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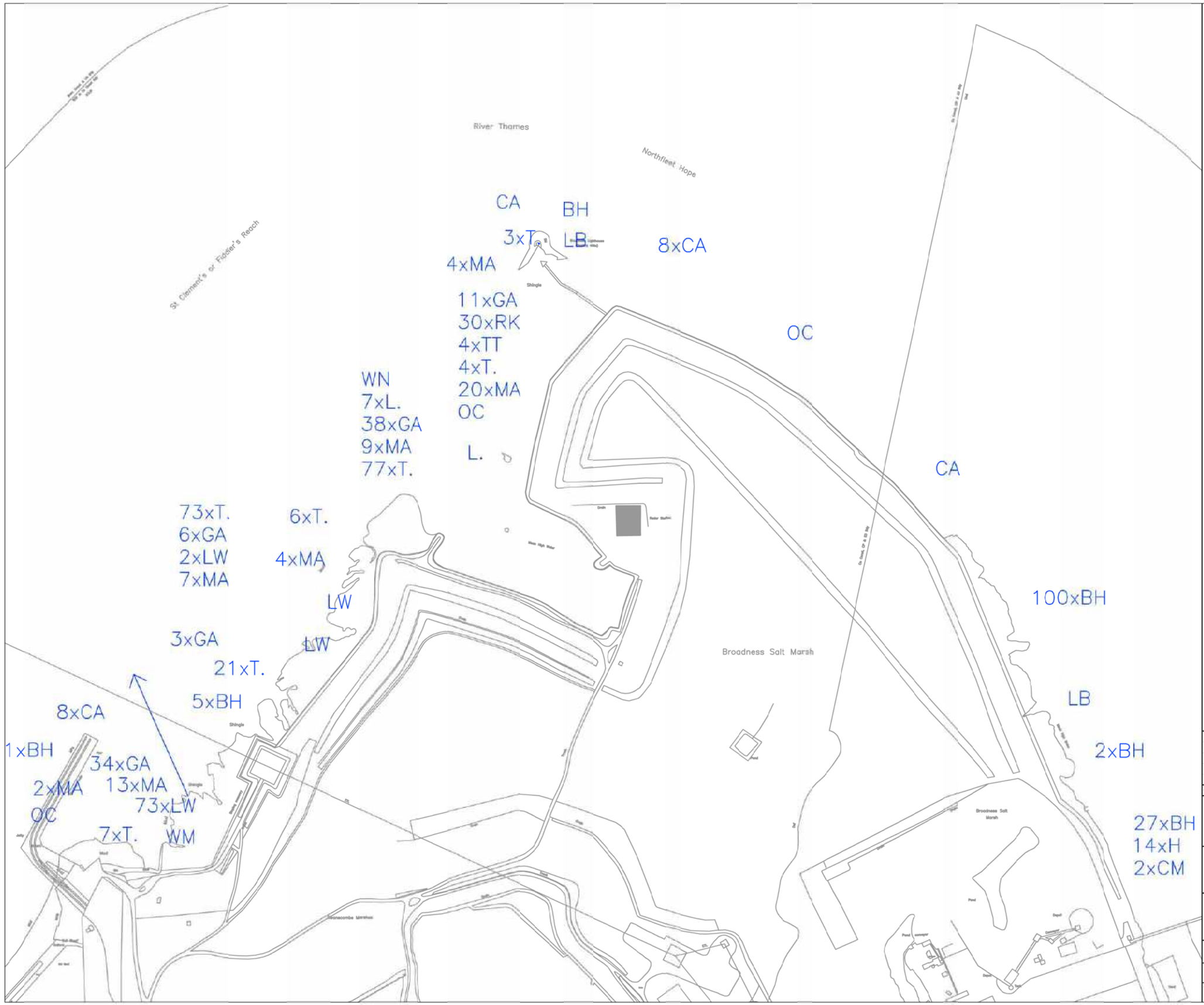
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - January High Tide

status	drawing no.	
	Figure 21	

scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

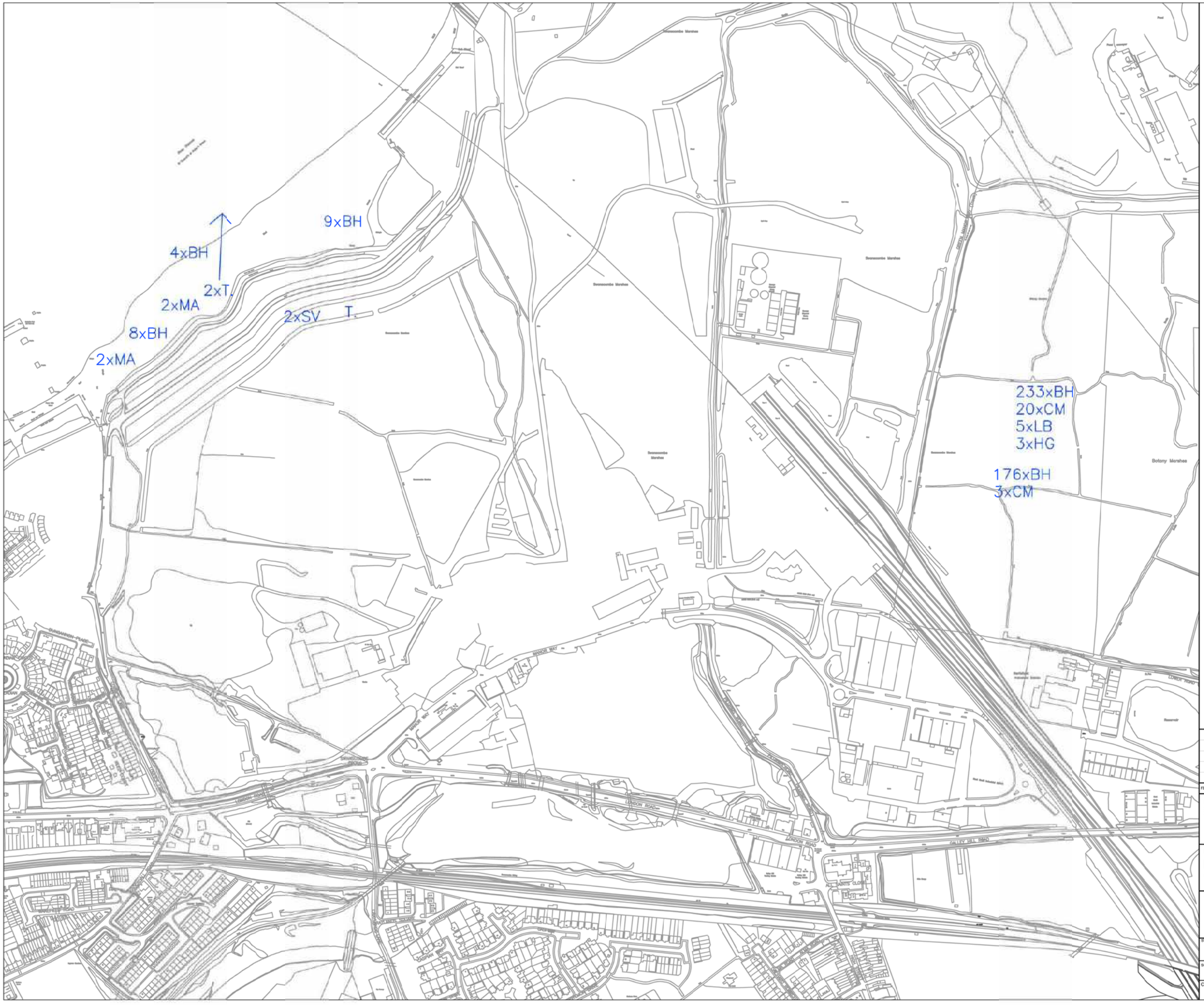
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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - January High Tide

status		drawing no.		
		Figure 22		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

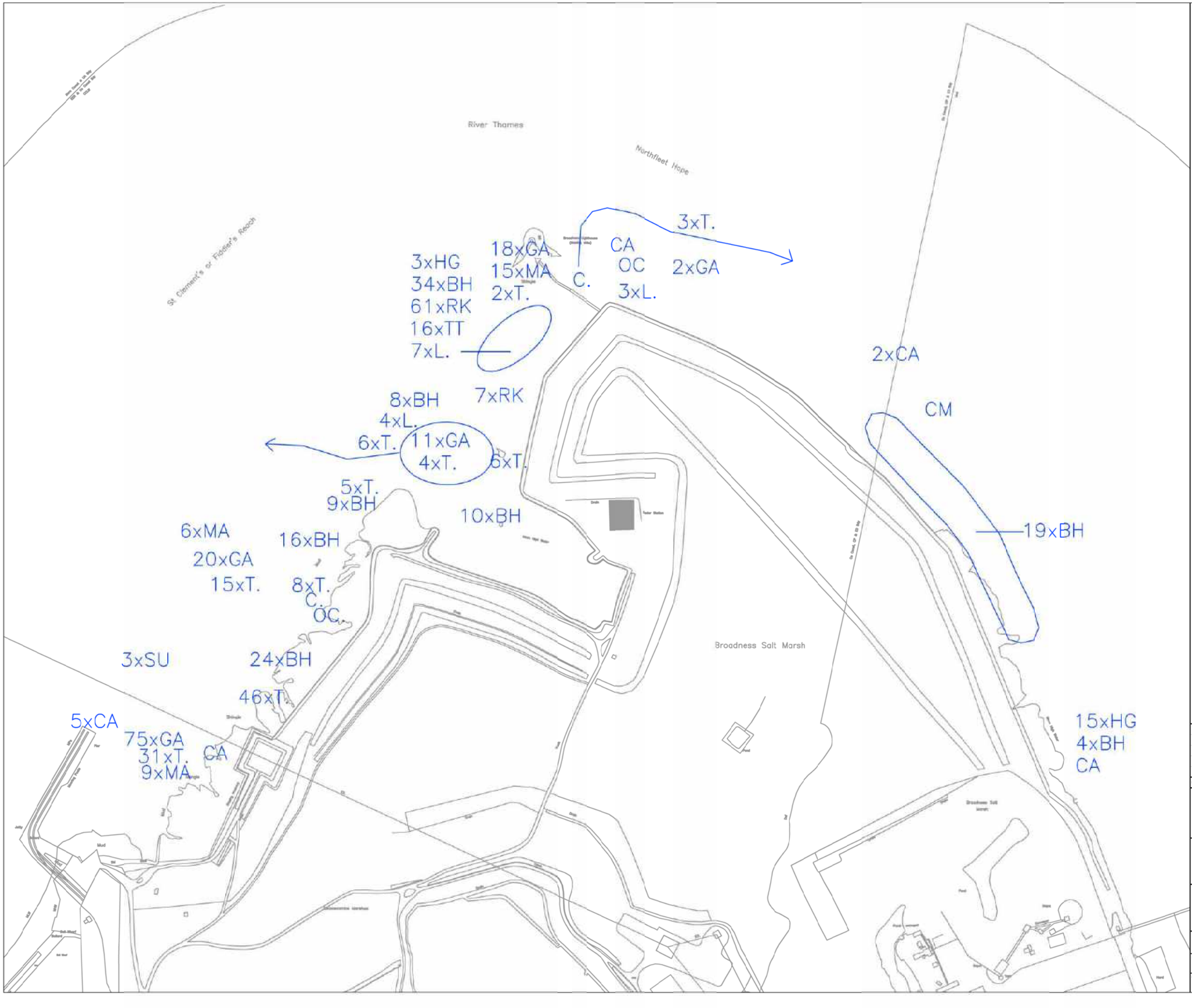
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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - February Low Tide

status		drawing no.		
		Figure 23		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - February Low Tide

status	drawing no.			
	Figure 24			
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

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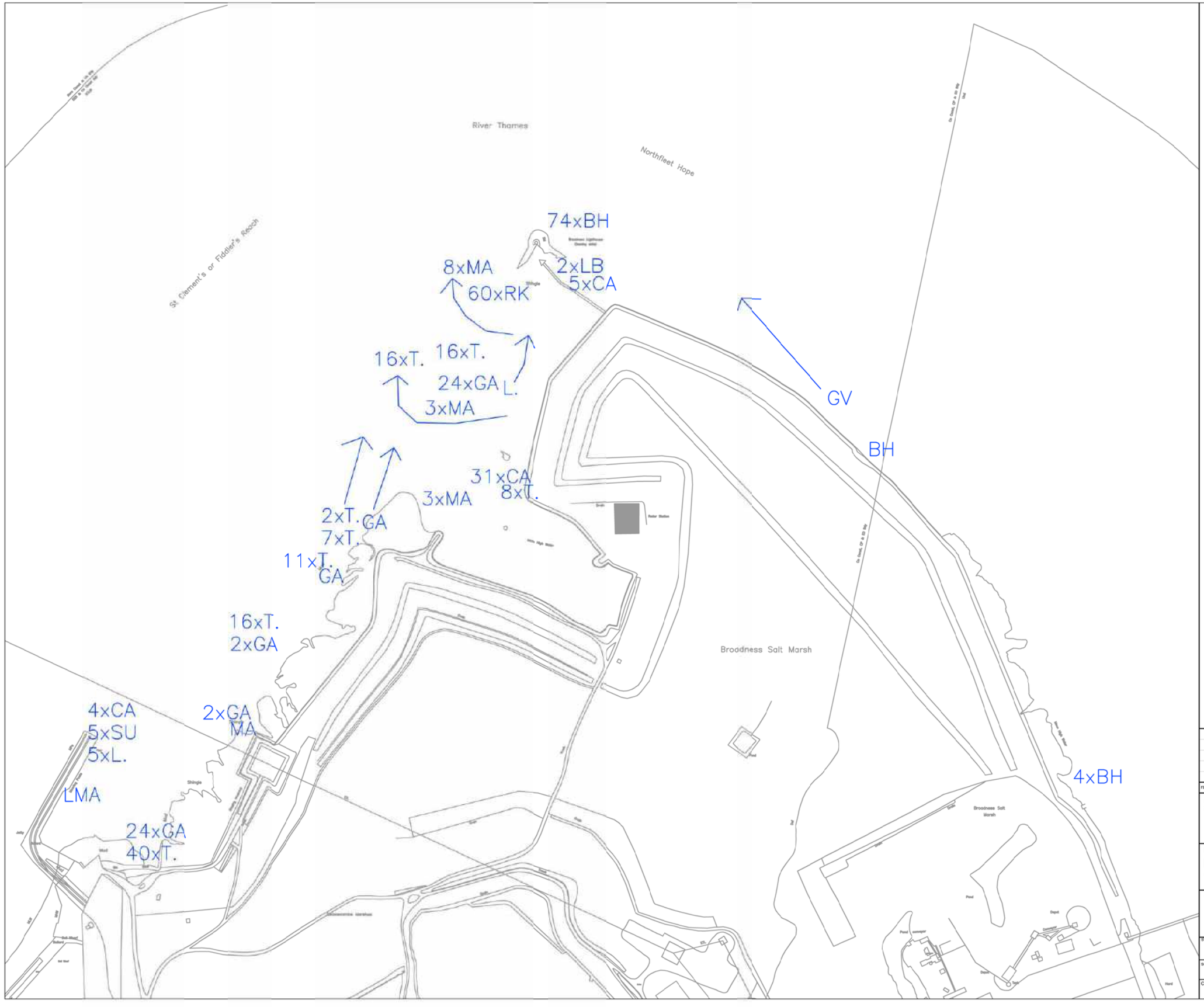
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - February High Tide

status | drawing no. **Figure 25**

scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

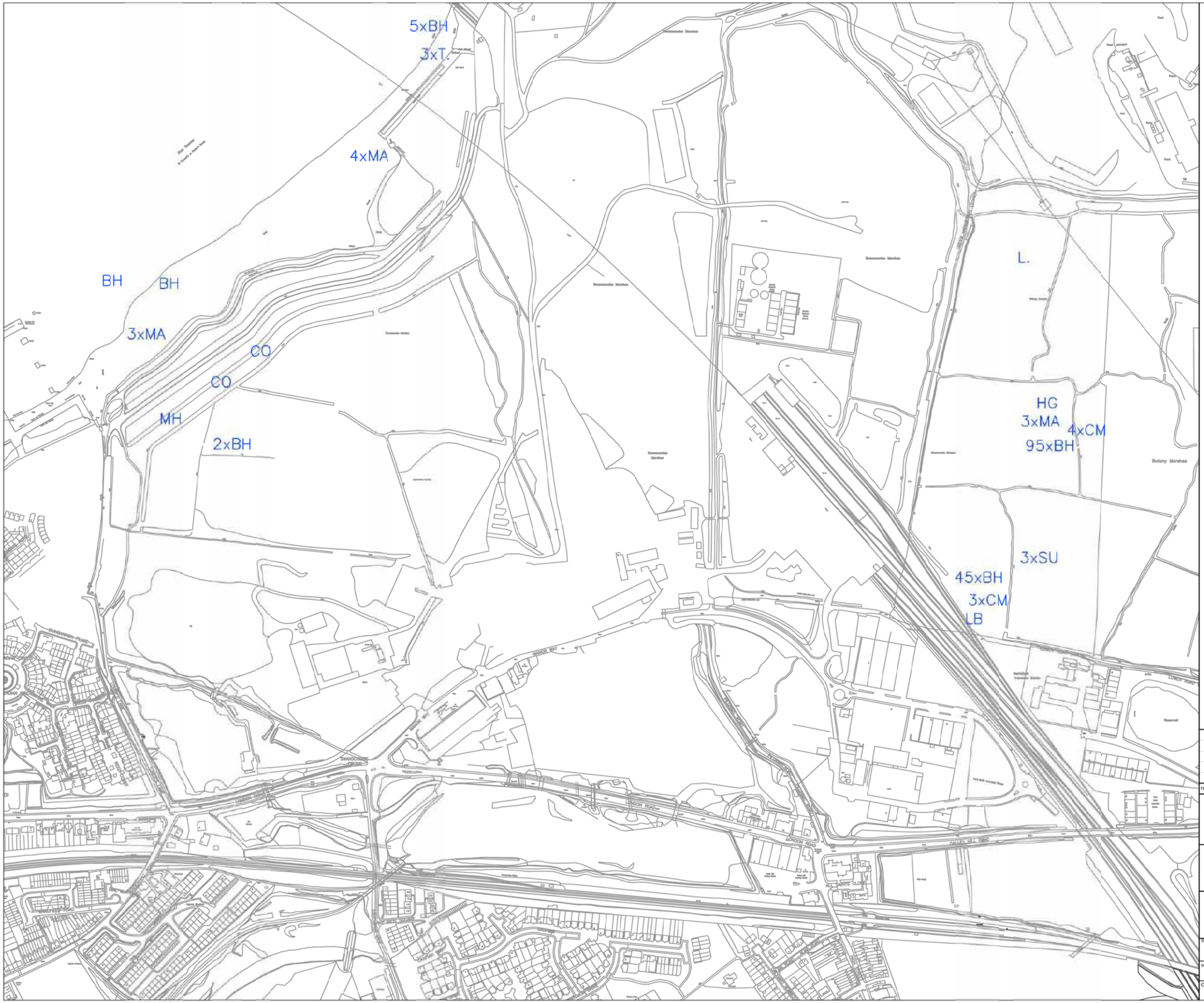
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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - February High Tide

status	drawing no.			
	Figure 26			
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision | description | date | checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - March Low Tide

status | drawing no. **Figure 27**

scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

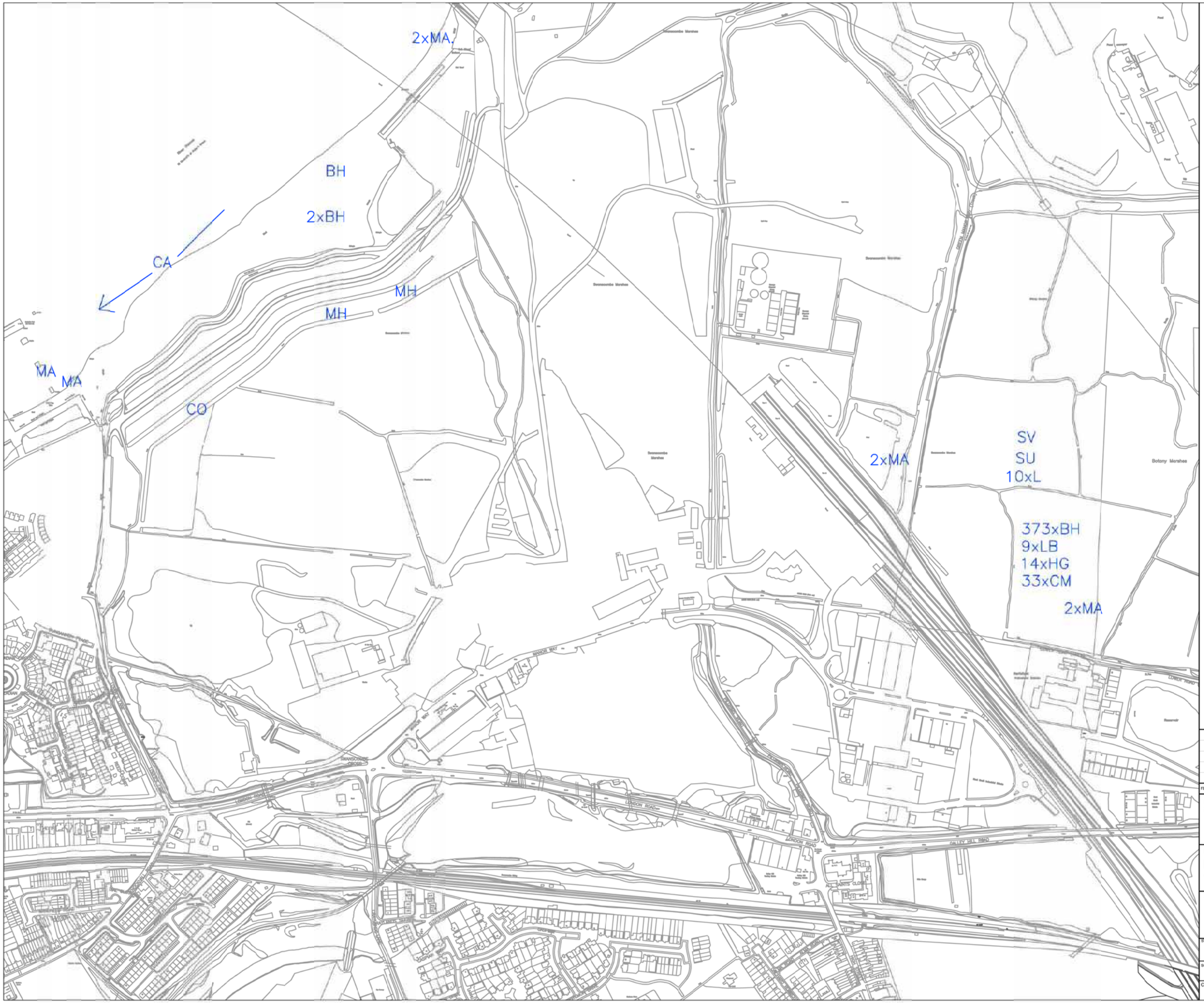
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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - March Low Tide

status		drawing no.			
		Figure 28			
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
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MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

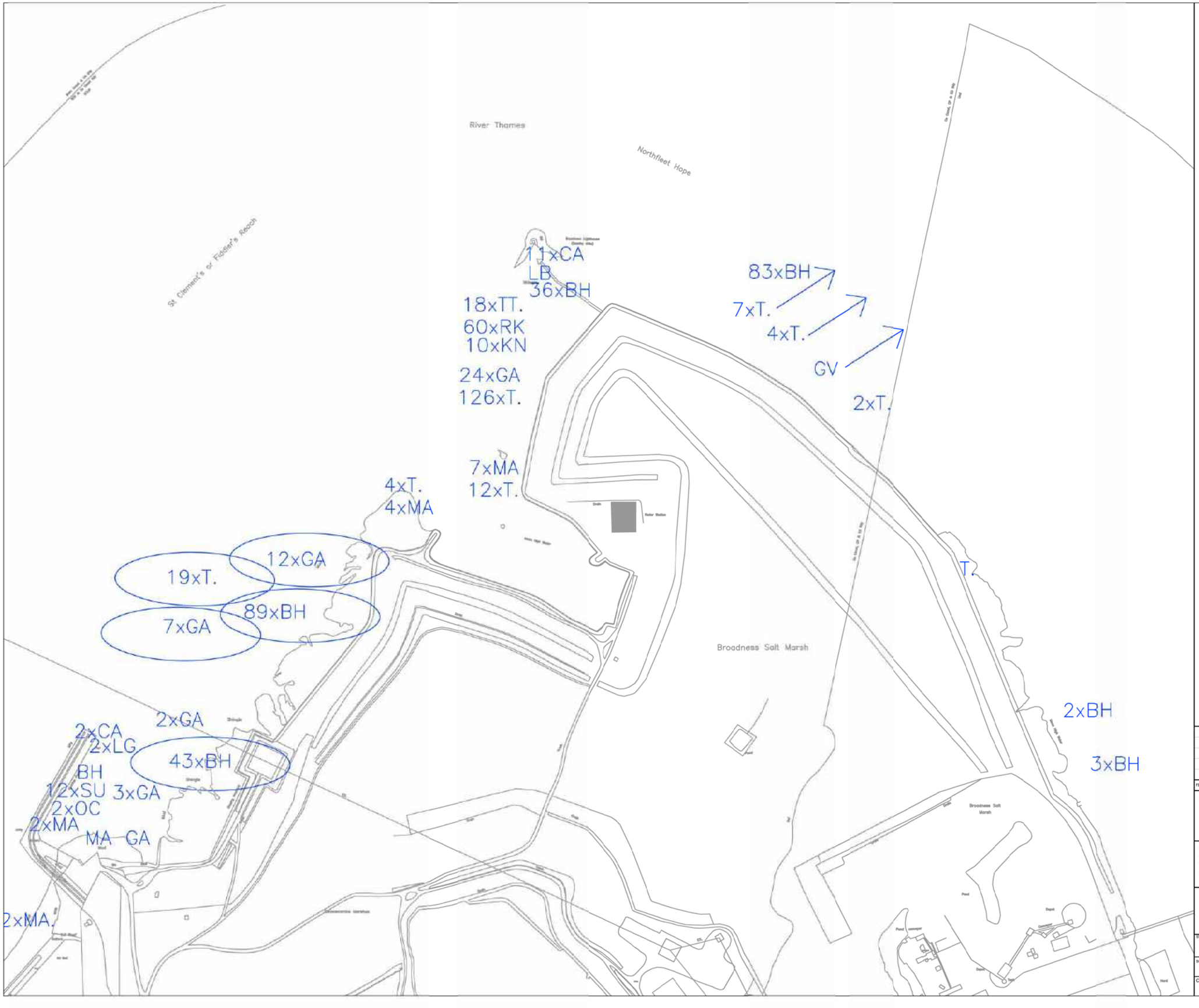
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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - March High Tide

status		drawing no.			
		Figure 29			
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
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L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - March High Tide

status	drawing no.	
	Figure 30	

scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg

APPENDICES

BTO SPECIES CODES

AC	Arctic Skua	GA	Gadwall	LE	Long-eared Owl	SM	Sand Martin
AE	Arctic Tern	GX	Gannet	LT	Long-tailed Tit	SS	Sanderling
AV	Avocet	GW	Garden Warbler	MG	Magpie	TE	Sandwich Tern
BO	Barn Owl	GY	Garganey	MA	Mallard	VI	Savi's Warbler
BY	Barnacle Goose	GC	Goldcrest	MN	Mandarin Duck	SQ	Scarlet Rosefinch
BA	Bar-tailed Godwit	EA	Golden Eagle	MX	Manx Shearwater	SP	Scaup
BR	Bearded Tit	OL	Golden Oriole	MR	Marsh Harrier	CY	Scottish Crossbill
BS	Berwick's Swan	GF	Golden Pheasant	MT	Marsh Tit	SW	Sedge Warbler
BI	Bittern	GP	Golden Plover	MW	Marsh Warbler	NS	Serin
BK	Black Grouse	GN	Goldeneye	MP	Meadow Pipit	SA	Shag
TY	Black Guillemot	GO	Goldfinch	MU	Mediterranean Gull	SU	Shelduck
BX	Black Redstart	GD	Goosander	ML	Merlin	SX	Shorelark
BJ	Black Tern	GI	Goshawk	M.	Mistle Thrush	SE	Short-eared Owl
B.	Blackbird	GH	Grasshopper Warbler	MO	Montagu's Harrier	SV	Shoveler
BC	Blackcap	GB	Great Black-backed Gull	MH	Moorhen	SK	Siskin
BH	Black-headed Gull	GG	Great Crested Grebe	MS	Mute Swan	S.	Skylark
BN	Black-necked Grebe	ND	Great Northern Diver	N.	Nightingale	SZ	Slavonian Grebe
BW	Black-tailed Godwit	NX	Great Skua	NJ	Nightjar	SN	Snipe
BV	Black-throated Diver	GS	Great Spotted Woodpecker	NH	Nuthatch	SB	Snow Bunting
BT	Blue Tit	GT	Great Tit	OP	Osprey	ST	Song Thrush
BU	Bluethroat	GE	Green Sandpiper	OC	Oystercatcher	SH	Sparrowhawk
BL	Brambling	G.	Green Woodpecker	PX	Peafowl/Peacock	AK	Spotted Crake
BG	Brent Goose	GR	Greenfinch	PE	Peregrine	SF	Spotted Flycatcher
BF	Bullfinch	GK	Greenshank	PH	Pheasant	DR	Spotted Redshank
BZ	Buzzard	H.	Grey Heron	PF	Pied Flycatcher	SG	Starling
CG	Canada Goose	P.	Grey Partridge	PW	Pied Wagtail	SD	Stock Dove
CP	Capercaillie	GV	Grey Plover	PG	Pink-footed Goose	SC	Stonechat
C.	Carrion Crow	GL	Grey Wagtail	PT	Pintail	TN	Stone-curlew
CW	Cetti's Warbler	GJ	Greylag Goose	PO	Pochard	TM	Storm Petrel
CH	Chaffinch	GU	Guillemot	PM	Ptarmigan	SL	Swallow
CC	Chiffchaff	FW	Guineafowl (Helmeted)	PU	Puffin	SI	Swift
CF	Chough	HF	Hawfinch	PS	Purple Sandpiper	TO	Tawny Owl
CL	Cirl Bunting	HH	Hen Harrier	Q.	Quail	T.	Teal
CT	Coal Tit	HG	Herring Gull	RN	Raven	TK	Temminck's Stint
CD	Collared Dove	HY	Hobby	RA	Razorbill	TP	Tree Pipit
CM	Common Gull	HZ	Honey Buzzard	RG	Red Grouse	TS	Tree Sparrow
CS	Common Sandpiper	HC	Hooded Crow	KT	Red Kite	TC	Treecreeper
CX	Common Scoter	HP	Hoopoe	ED	Red-backed Shrike	TU	Tufted Duck
CN	Common Tern	HM	House Martin	RM	Red-breasted Merganser	TT	Turnstone
CO	Coot	HS	House Sparrow	RQ	Red-crested Pochard	TD	Turtle Dove
CA	Cormorant	JD	Jackdaw	FV	Red-footed Falcon	TW	Twite
CB	Corn Bunting	J.	Jay	RL	Red-legged Partridge	WA	Water Rail
CE	Corncrake	K.	Kestrel	NK	Red-necked Phalarope	W.	Wheatear
CI	Crested Tit	KF	Kingfisher	LR	Redpoll (Lesser)	WM	Whimbrel
CR	Crossbill (Common)	KI	Kittiwake	RK	Redshank	WC	Whinchat
CK	Cuckoo	KN	Knot	RT	Redstart	WG	White-fronted Goose
CU	Curlew	LM	Lady Amherst's Pheasant	RH	Red-throated Diver	WH	Whitethroat
DW	Dartford Warbler	LA	Lapland Bunting	RE	Redwing	WS	Whooper Swan
DI	Dipper	L.	Lapwing	RB	Reed Bunting	WN	Wigeon
DO	Dotterel	TL	Leach's Petrel	RW	Reed Warbler	WT	Willow Tit
DN	Dunlin	LB	Lesser Black-backed Gull	RZ	Ring Ouzel	WW	Willow Warbler
D.	Dunnock	LS	Lesser Spotted Woodpecker	RP	Ringed Plover	OD	Wood Sandpiper
EG	Egyptian Goose	LW	Lesser Whitethroat	RI	Ring-necked Parakeet	WO	Wood Warbler
E.	Eider	LI	Linnet	R.	Robin	WK	Woodcock
FP	Feral Pigeon	ET	Little Egret	DV	Rock Dove (not feral)	WL	Woodlark
ZL	Feral/hybrid goose	LG	Little Grebe	RC	Rock Pipit	WP	Woodpigeon
ZF	Feral/hybrid mallard type	LU	Little Gull	RO	Rook	WR	Wren
FF	Fieldfare	LO	Little Owl	RS	Roseate Tern	WY	Wryneck
FC	Firecrest	LP	Little Ringed Plover	RY	Ruddy Duck	YW	Yellow Wagtail
F.	Fulmar	AF	Little Tern	RU	Ruff	Y.	Yellowhammer

If you are not submitting your data electronically using BBS-Online, please return your Field Recording Sheets to your Regional Organiser with your other BBS forms. If you would like to submit your results on BBS-Online, please inform your RO, then visit www.bto.org/bbs.

Appendix II: Species List

Common Name	Scientific Name
Black-headed gull	*Chroicocephalus ridibundus*
Carrion crow	*Corvus corone*
Common gull	*Larus canus*
Coot	*Fulica atra*
Cormorant	*Phalacrocorax carbo*
Curlew	*Numenius arquata*
Gadwall	*Anas strepera*
Great black-backed gull	*Larus marinus*
Great crested grebe	*Podiceps cristatus*
Grey heron	*Ardea cinerea*
Greylag goose	*Anser anser*
Grey plover	*Pluvialis squatarola*
Herring gull	*Larus argentatus*
Kestrel	*Falco tinnunculus*
Knot	*Calidris canuta*
Lapwing	*Vanellus vanellus*
Lesser black-backed gull	*Larus fuscus*
Little egret	*Egretta garzetta*
Little grebe	*Tachybaptus ruficollis*
Mallard	*Anas platyrhynchos*
Marsh harrier	*Circus aeruginosus*
Moorhen	*Gallinula chloropus*
Oystercatcher	*Haematopus ostralegus*
Peregrine	*Falco peregrinus*
Redshank	*Tringa totanus*
Shellduck	*Tadorna tadorna*
Shoveler	*Anas clypeata*
Snipe	*Gallinago gallinago*
Teal	*Anas crecca*
Tufted duck	*Aythya fuligula*
Turnstone	*Streptopelia turtur*
Wigeon	*Anas penelope*



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Annex EDP 16
Wintering Bird Survey Report (Corylus Ecology April 2016)

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London Paramount Entertainment resort

WINTERING BIRD SURVEY REPORT

DRAFT

For and on behalf of

Chris Blandford Associates

APRIL 2016

Corylus Ecology

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1.0 INTRODUCTION

1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.2 The Wintering Bird Survey was undertaken by surveyors from Corylus Ecology and CBA. This report details the methodology, results and evaluation of the Wintering Bird survey undertaken between September 2014 and March 2015 with passage migrant surveys undertaken in late August/early September 2015.

Scope of Survey

1.3 The scope of the survey encompassed:

- Undertake a wintering bird survey of the Site to determine numbers of birds using the Site during the wintering period;
- Evaluate the conservation importance of the Site wintering for birds;
- Provide information to inform the impact assessment of the proposals for the area; and,
- Provide information for use in the design and development of ecological mitigation and enhancement measures where appropriate.

Survey Limitations

1.4 Surveys were carried out in good weather conditions. On a single occasion birds had been disturbed by dog walkers at the salt marsh to the west of the peninsular just prior to the wintering bird survey commencing, which is likely to have affected overall counts made during that survey, however no other constraints were noted. Obviously with all such surveys the data represents a sample of the assemblage present as only two surveys were undertaken each month.

Key Findings

1.5 The key findings are:

- total number of wetland species (including birds of prey) recorded over the two wintering bird survey periods of 2012/13 and 2014/15 is 42;
- Additional wetland bird species have been recorded as either incidental records during other surveys or by London Bird Club;
- A total of six birds of prey species have been recorded during the wintering bird and marine mammal surveys;

- A total of three Kent RDB3 species have been recorded over the course of the two survey periods and from records from the London Bird Club, none have been recorded as regularly occurring species
- The wintering bird assemblage is considered to be of County Importance.

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Records for birds were requested from Kent and Medway Biological Records Centre and Essex Field Club for a distance of 2km from the Site. Citations for SSSI's and SPA's have also been reviewed.

2.2 Survey Methodology

2.2.1 Wintering bird surveys were undertaken between September 2014 and March 2015 inclusive with an additional passage migrant survey carried out in August 2015. Both high tide and low tide counts were undertaken each month. The surveys were undertaken whenever possible close to the dates for the WEBS data survey dates taken from the British Trust for Ornithology website. The survey dates were dependent on weather and tides. Two surveyors covered the survey area and long range radios were used to try and ensure that double counting of birds did not occur. Binoculars were used by all surveyors with a Swarovski and Viking AV-80ED with x30 lens telescope also used. The locations of surveyed areas and habitats are illustrated in Figure 1.

2.2.2 The surveys were undertaken on the following dates:

High Tide

- 23rd September 2014
- 22nd October 2014
- 24th November 2014
- 19th December 2014
- 21st January 2015
- 4th February 2015
- 4th March 2015
- 27th August 2015

Low Tide

- 12th September 2014
- 16th October 2014
- 14th November 2014
- 11th December 2014
- 13th January 2015
- 13th February 2015
- 11th March 2015
- 8th September 2015

2.3 Evaluation Methodology

2.3.1 The conservation importance of the breeding and wintering bird populations were determined using the criteria specified below:

(a) the presence of wintering and/or breeding bird populations of significant national and regional conservation importance (>1% of the national or regional resource (using population estimates of WeBS thresholds for wintering waterfowl))

(b) the presence of wintering and/or breeding species of recognised international conservation importance i.e. species listed on Annex I of EC Directive 79/409/EEC on the Conservation of Wild Birds 1979 and species forming part of the qualifying interest of an SPA

(c) the presence of breeding species of recognised national conservation importance i.e. species listed on Schedule 1 of the Wildlife and Countryside Act 1981

(d) the presence of Birds of Conservation Concern (BoCC) red and amber list species (Eaton *et al* 2015).

(e) the presence of species identified as Priority Species in the UK Biodiversity Action Plan

2.3.2 A category of 'local importance' was used for species that did not reach regional importance but were still of some ecological value. This included all species on the red or amber lists of Birds of Conservation Concern: 2002-2007 (Eaton *et al* 2015) and species identified in the Kent Red Data Book (KRDB) (Waite, 2000).

2.3.4 The criteria used for the designation of Local Wildlife Sites (previously known as SINCs or County Wildlife Sites) in Kent (Kent Wildlife Trust, 2005) were used to assess the local importance of the Study Area for birds. The criteria are designed to be applied to areas of habitat that are discrete and homogenous (i.e. splitting habitats such as woodland and arable rather than considering the two habitats as one site) and are as follows:

"*A site should be selected as a Wildlife Site if it can be considered as a single, identifiable unit (as explained above) in terms of its bird fauna and where:*

- *It is occupied regularly by at least 2.5% of the county population of any one or more bird species, based on the most recent and authoritative data; or*
- *It holds three or more Kent Red Data Book 3 (KRDB3) species at the appropriate time of year (normally this should not include a combination of breeding and wintering species); or*
- *It holds one of the five largest colonies of colonial seabirds (with the exception of herring gull and black-headed gull), grey heron, little egret or sand martin; or*
- *It has been recorded as being regularly used in recent years by at least 60 wintering bird species; or*
- *It has been recorded as being regularly used in recent years by at least 100 passage bird species."*

3.0 RESULTS

3.1 Desk Study

Designated Sites

3.1.1 The West Thurrock Lagoon and Marshes SSSI is designated for its wintering wader and wildfowl assemblage for which the area is considered to be one of the most important sites along the Inner Thames Estuary. At its closest point the SSSI is some 1.5km to the west of the Site. The SSSI has extensive mudflats as well as large and secure high tide roosts. Large reed beds are also present which support reed and sedge warblers and breeding populations of bearded tit. Locally important numbers of teal, snipe and grey heron roost in the SSSI

3.1.2 The nearest SPA is the Thames Estuary Marshes SPA/Ramsar site, which is approximately 7km east of the Site. The SPA is made up of the South Thames Estuary & Marshes SSSI (south bank of the Thames) and Mucking Flats & Marshes SSSI (north side of the Thames). This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

3.1.3 The salt marsh/mudflats which support the wading bird assemblage are within the proposed Thames Estuary Marine Conservation Zone (MCZ) but further work is to be undertaken prior to a final decision regarding the designation being made.

Over winter;

- Avocet *Recurvirostra avosetta*, 276 individuals representing at least 21.7% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)
- Hen Harrier *Circus cyaneus*, 7 individuals representing at least 0.9% of the wintering population in Great Britain (5 year mean 93/4-97/8)

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

On passage;

- Ringed plover *Charadrius hiaticula*, 559 individuals representing at least 1.1% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Over winter;

- Ringed plover *Charadrius hiaticula*, 541 individuals representing at least 1.1% of the wintering Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Assemblage qualification: A wetland of international importance.

3.1.5 The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 33,433 individual waterfowl (5 year peak

mean 1991/2 - 1995/6) including redshank *Tringa totanus*, black-tailed godwit *Limosa limosa islandica*, dunlin *Calidris alpina alpina*, lapwing *Vanellus vanellus*, grey plover *Pluvialis squatarola*, shoveler *Anas clypeata*, pintail *Anas acuta*, gadwall *Anas strepera*, shelduck *Tadorna tadorna*, white-fronted goose *Anser albifrons albifrons,* little grebe *Tachybaptus ruficollis*, ringed plover *Charadrius hiaticula*, avocet *Recurvirostra avosetta* and whimbrel *Numenius phaeopus*.

3.1.6 The Inner Thames Marshes SSSI is some 6km to the west of the Site. It is designated for the numbers of wintering wildfowl, waders and birds of prey with wintering teal populations reaching levels of international importance.

Records Centre Data

3.1.7 Kent Bird Records Summary provides records of 210 bird species within 2km of the Site; a total of 32 species are seabirds and a total of 75 species are waders and waterfowl. Other species include passerines and birds of prey. Essex Field Club has not provided any records of birds within the search area.

3.1.8 Of the 210 species, 171 species were recorded in Swanscombe Marsh and 20 species were recorded at Northfleet (OS Grid Reference TQ6174), which falls within the area of the Site known as Northfleet Landfill. The 191 species records from within the Site range from 1963 to 2012; eight of the records are historic and are species which have either reduced in numbers drastically and unlikely to be present within the Site or would be considered rare vagrants which are unusual occurrences in the UK. These records included: glossy ibis *Plegadis falcinellus*, corncrake *Crex crex*, Richard's pipit *Anthus novaeseelandiae*, puffin *Fratercula arctica*, great northern diver, whooper swan *Cygnus Cygnus,* hooded crow *Corvus corone cornix* and black-headed weaver *Ploceus melanocephalus*..

3.1.9 Thirty-nine of the species recorded at Swanscombe Marsh are BoCC Red List species and 89 of the species are on the BoCC Amber Listed. Three of the species recorded at Northfleet are on the BoCC Red List include hawfinch *Coccothraustes coccothraustes*, Arctic skua *Stercorarius parasiticus* and common scoter *Melanitta nigra*. Thirteen species recorded at Northfleet are on the BTO Amber List of Conservation Concern.

3.1.10 Other species that are not on the BoCC Red or Amber lists but that are listed on Schedule 1 of the Wildlife and Countryside Act 1981 and have been recorded from Swanscombe Marsh include hobby *Falco subbuteo*, peregrine *F. peregrinus*, little ringed plover *Charadrius dubius*, brambling *Fringilla montifringilla* and common crossbill *Loxia curistra*. The most recent records for these species range between 2008 and 2012.

3.1.11 With regard to all of the desk study records, the records for species that are associated with habitats onsite for wintering and that are on the BoCC Red List are scaup *Aythya marila*, common scoter *Melanitta nigra*, hen harrier *Circus cyaneus*, ruff *Philomachus pugnax*, black-tailed godwit *Limosa limosa* fieldfare *Turdus pilaris*, redwing *Turdus iliacus*, white-fronted goose *Anser albifrons*, Slavonian grebe *Podiceps auritus* and merlin *Falco columbarius*. These records range from one sighting to 66, with black-tailed godwit recorded 66 times and white fronted goose recorded on a single occasion.

3.1.12 Two species that are associated with habitats onsite for passage migrating and that are on the BoCC Red List are whimbrel *Numenius phaeopus* and whinchat *Saxicola rubetra.*

3.2 Survey Results

3.2.1 Total counts of all species made in the Survey Area at high and low tides are given in Tables 1 and 2 respectively. Species recorded which are not WEBS count species are provided in Table 3. Mapped distributions of these are presented in Figures 1 to 16. The species codes given are those employed by the British Trust for Ornithology and are given in Appendix I with a list of common and scientific names of all species recorded given in Appendix II.

3.2.2 A total of 39 species were recorded during the high and low tide visits between 12th September 2014 and 8th September 2015. These were all waterfowl or birds of prey. Smaller bird species using the survey area and which were recorded include: reed bunting, redwing, fieldfare, meadow pipit and skylark, however, these were not included within the over bird counts. Surveys were split into High and Low tides with 36 species recorded at both high and low tide although the species diversity was different. Species richness at a single survey visit varied between 8 and 25 species at low tide and six and 19 species at high tide. The greatest diversity was recorded during the March low tide survey.

3.2.3 The 'inland' section of the wintering bird survey included the area known as Botany Marshes West and CTRL Wetland. The diversity of species recorded within this specific area was lower than that recorded around the shore line around the peninsular with only 20 species recorded. It is likely that some species within Swanscombe Marshes have been missed or not recorded as there are no elevated areas to be able to see into the reedbeds and no open water is visible.

3.3 Species of Interest

3.3.1 The following species are of particular interest as they are included within the closest designated sites.

Thames Estuary Marshes SPA/Ramsar citation

Populations of European importance

3.3.2 *Ringed Plover:* Only a single ringed plover was recorded during the February low tide survey at the point of the Peninsular.

Assemblage qualification species

3.3.3 *Redshank :* Redshank were regularly recorded at the north-western side of the peninsular and along the mudflats and saltmarsh along the western side down to the jetty. They were not recorded during high or low tide during the September and October 2014 or passage migration survey in August/September 2015. Numbers were generally higher during the high tide counts where numbers ranged from 86 to 182, low tide counts being lower between 35 and 91.

3.3.4 *Dunlin* : this species was not commonly recorded, it was seen twice during the low tide surveys and once during high tide surveys. A small group of five was recorded during the August 2015 high tide survey and 12 and eight recorded in January and March low tide surveys respectively.

3.3.5 *Lapwing*: this species was recorded during all low tide surveys with numbers ranging from 2 to 140 (peak in February 2015). Lapwing were not recorded during the September, October, March and August high tide surveys with numbers ranging from 15 to 92 when they were present.

3.3.6 *Grey plover* - only singletons of this species were recorded during the October and December low tide surveys and the January high tide survey

3.3.7 *Shoveler:* were recorded regularly during the high tide surveys with a peak recorded during the October 2014 survey (19) dropping down to 5 during the March survey and 1 during the August 2015 survey all within Black Duck Marsh. During the low tide surveys they were recorded twice in Botany Marshes but in low numbers (two in January and March each). The remaining records are from Black Duck Marsh where a peak of 16 was recorded in October.

3.3.8 *Gadwall:* this species was regularly recorded principally along the western side of the Peninsular. None were recorded during the September 2014 and August 2015 high tide surveys and similarly none were recorded during the September, October 2014 or September 2015 low tide surveys. Numbers ranged from 4 – 48 during the high tide counts and 9 – 34 during the low tide counts.

3.3.9 *Shelduck:* this species was recorded in low numbers. At low tide they were recorded between November and March (excluding December) whilst at high tide they were only recorded during the December and January counts.

3.3.10 *Little grebe:* this species was not commonly recorded. Single birds were recorded during the January and March high tide surveys whilst two were seen during the March low tide survey, all occasions they were in Black Duck Marsh.

West Thurrock Lagoon and Marshes SSSI

3.3.11 *Teal:*- were recorded regularly throughout the surveys. The numbers of teal increased from the beginning of the winter season where single birds were recorded at low tide during September and October to a peak of 230 recorded during the December high tide survey. The majority of teal were recorded at the northern end of the western side of the peninsula between the jetty and the tip of the peninsula.

3.3.12 *Snipe:* were only recorded during the October and November high tide surveys where single birds were recorded in Black Duck Marsh and Botany Marshes respectively. During the November low tide surveys three were recorded, two flying from Botany Marshes towards Swanscombe Marshes and a third in Black Duck Marsh. During the December low tide survey only a single snipe was recorded on saltmarsh between the jetty and the inlet.

3.3.13 *Grey heron* - This species was recorded regularly but in low numbers with a maximum of 4 recorded during the low tide survey in October. Grey heron nests were recorded during the breeding bird survey in the woodland to the south of Swanscombe Marshes.

3.4 *Incidental Records*

3.4.1 Although no short-eared owl were recorded during the specific wintering bird surveys, this species was recorded during the marine mammal surveys undertaken during the following winter survey period 2015/6. At least two were recorded on 26th November 2015 during the high tide survey with the two birds recorded by two surveyors who would not have been able to se the same bird. This species was recorded during the December low tide survey where it was foraging over the intertidal and grassland areas of the Peninsular. During the January high tide survey on 8th January 2016 it appeared to be roosting at the backshore cliff on the eastern side of the Peninsular. Incidental records of birds recorded during the marine mammal surveys are set out below:

- 15th September 2015 high tide
  - godwit (unknown species) west side of peninsular
- 26th November 2015 high tide
  – short-eared owl (2)
  - whimbrel on west side of the tip of the peninsular
  - 21 turnstone at the tip of the peninsular
- 9th December 2015 high tide
  - 2 marsh harriers
- 3rd December 2015 low tide
  - short-eared owl
- 15th January 2016 low tide
  - 8 brent geese Branta bernicla flew from Black Duck Marsh westwards
- 8th January 2016 high tide
  - 2 marsh harriers
  - Short eared owl

3.4.2 Whimbrel and black tailed godwit are species included within the assemblage qualification for the Thames Estuary Marshes SPA/Ramsar

3.4.3 Records of bird species at Swanscombe Marsh were sought from 'Save Swanscombe Marshes' (http://saveswanscombemarshes.com/) and 'London Bird Club Wiki' (http://londonbirders.wikia.com/wiki/London_Bird_Club_Wiki). Wintering, summer and passage migrant species were noted if the records from the external data sources differed greatly to the records gathered during the wintering, passage migrant and breeding bird surveys completed in 2014/15 or if the species was not recorded during the 2014/15 surveys and are determined as being birds of conservation importance under the Evaluation Methodology. It is not known in all instances exactly where these birds were recorded, for example, how many of the 1500 black headed gull were recorded on land and how many were recorded over the water.

Table 6 - Peak counts of Wintering/Resident Bird Species

Species	Peak Count 2014/5 Surveys	Peak count of 'London Bird Club Wiki'	Peak count of 'Save Swanscombe Marshes'
Black-headed gull[a]	617 recorded on 04/02/2015	1500 recorded on 27/02/2016	-
Water rail[g]	1 recorded on 27/08/2015	5 recorded on 5/01/2015	-
Wigeon[a]	4 recorded on 16/10/2014	1 recorded 23/01/2016	15 recorded 11/03/2016 (highest number this winter)
Lapwing[r]	140 recorded on 13/02/2015	288 recorded on 23/01/2016	288 recorded on 23/01/2016
Dunlin[a]	12 recorded on 13/01/2015	c.150 dunlin recorded on 7/12/2013	Flock of dunlin recorded on 30/01/2016
Ringed plover[r]	1 recorded on 13/02/2015	2 recorded on 15/03/2016	2 recorded on 15/03/2015
Shoveler[a]	19 recorded on 22/10/2014	45 recorded on 6/12/2014	10 recorded on 15/03/2016 and 9/03/2016
Black-tailed Godwit[r]	1 recorded on 15/09/2015	20 recorded on 14/02/2015	-
Brent geese[a]	8 recorded on 15/01/2016	-	9 recorded on 4/11/2015
None WEBS count birds			
Stonechat[g]	3 recorded on 14/11/2014	9 recorded on 10/10/2015	12 recorded 19/12/2015
Starling[r]	320 recorded on 16/10/2014	c.1000 recorded on 9/08/2015	Flock of starling recorded on 27/07/2015
Meadow pipit[a]	Recorded during surveys but not in large numbers.	40 recorded 3/09/2015	40 recorded 31/10/2015
Reed bunting[a]	Recorded during surveys but not in large numbers.	23 recorded on 31/10/2015	26 recorded on 14/03/2015

r – species on the Red List of BoCC, a - species on the Amber List of BoCC, g – species on the Green list of BoCC

Table 7 - Wintering/Resident Birds not recorded during 2014/5 surveys

Species	Peak count of 'London Bird club Wiki'	Peak count of 'Save Swanscombe Marshes'	Kent Ornithological Society
Mediterranean gull[a]	3 recorded 15/03/2016	3 recorded 15/03/2016	
Avocet[a]	10 recorded on 6/12/2014	13 recorded on 13/3/2016	

Common scoter[r]	1 recorded 24/03/2016	1 recorded 24/03/2016	
Dartford warbler[a]	1 recorded on 28/12/2015 and on 29/12/2015	1 recorded on 17/01/2016 and 28/12/2015	
Scandinavian rock pipit	2 recorded 17/03/2016	2 recorded 19/03/2016	
Water pipit[a]	1 recorded on 3/12/2015	1 recorded 6/12/2015	
Black redstart[r]	-	1 recorded 7/11/2015 and 6/11/2015	
Bearded tit[g]	26 recorded on 29/09/2015	4 recorded on 14/03/2015	
Red Kite[g]	1 recorded on 6/05/2014	1 recorded on 4/09/2015	
Firecrest[g]	1 recorded on 25/10/2015	1 recorded on 24/10/2015 (first since 1975)	1 recorded on 3/04/2016

r – species on the Red List of BoCC, a - species on the Amber List of BoCC, g – species on the Green list of BoCC

4.0 EVALUATION

4.1 In general, the assemblage during high and low tides were similar with only the numbers and distribution across the survey area changing. Species which occurred at low tide that were not recorded at high tide included great crested grebe, ringed plover, tufted duck and yellow-legged gull. Those that were recorded at high tide but not at low tide were green sandpiper, peregrine, kingfisher and water rail.

4.2 As with the 2012 surveys, during low tide the birds were spread widely across the mudflats of the survey area, particularly to the west of the peninsula down to the jetty. The number and diversity of birds was reduced where the area of mudflat and saltmarsh is smaller along the eastern side of the peninsula.

4.3 The total number of birds recorded during high tide counts ranged between 53 and 1248 (see Table 4) with a mean abundance of 574 compared to 2012 where it ranged between 80 and 1175 with a mean abundance of 572. During low tide counts, abundance ranged between 139 and 843 with a mean abundance of 482 compared to the 2012 results where the abundance ranged between 227 and 718 with a mean abundance of 436. It was considered that the bird numbers were generally at their peak between December and March.

4.4 There was little difference between the 2012/13 and 2014/15 surveys in terms of the bird species recorded (Table 5). Knot was the only species recorded in 2012/13 that was not recorded during the 2014/15 surveys,

4.5 The most significant increase in numbers was seen with the black-headed gull which were recorded at high tide in relatively low numbers (5, 8, 63) until December 2014 when 175 were recorded and then February 2015 when 617 were recorded and in March 386 were recorded. This pattern is similar to that recorded during the 2012/13 survey season when the high tide counts were low between September and December (9, 6, 82 and 115 respectively) until January 2013 when 526 were recorded followed by further high counts in February (399) and March (633). During both survey periods the high counts were made when large flocks of gulls were recorded in the fields at Botany Marshes or flying at the peninsula. Numbers of this species were more stable during the low tide surveys particularly when compared to the 2012/13 surveys. The peak count in 2014/15 was during the February survey when 403 were recorded with numbers regularly over 100. During the 2012/13 surveys generally smaller numbers of black headed gulls were recorded at low tide with a peak of 290 recorded in January. The London Bird Club recorded a significantly higher number of this species with 1500 recorded in February 2016 although it is not known how far from the peninsular the count extended to.

4.6 The numbers of gadwall recorded increased during the latter part of the winter survey. None were recorded during the September 2014 or 15 surveys with low numbers recorded in October and

November and numbers generally lower during the low tide surveys. A peak of 48 was recorded during high tide in February 2015. The pattern is similar to that recorded during the 2012/13 survey period although the numbers are lower than the earlier survey. During the 2012/13 survey no gadwall were recorded until the December survey when 45 were recorded. The peak count of gadwall was 126 recorded during the February 2013 low tide survey.

4.7 Similarly the numbers of teal also increased from the beginning of the season with higher numbers being recorded between November and February with a peak of 230 recorded during the December 2014 high tide survey. The low tide peak was 148 during the same month. This compares to the 2012/13 surveys where a peak of 190 were recorded during the January 2013 high tide survey. Wigeon and tufted duck were only recorded during the January 2013 high tide survey whilst during the most recent survey period wigeon were recorded in December and January 2015 low tide surveys whilst only a single tufted duck was recorded during the February 2015 low tide survey.

4.8 The 2012/13 and 2014/15 surveys both found that the majority of birds recorded were waterfowl with fewer waders recorded. There were some differences between the numbers of some wading species recorded between the two survey periods. For example, redshank had a peak of 68 recorded during the 2012/13 survey compared to 182 during the 2014/15 surveys and there was a slight increase in the numbers of turnstone recorded from 16 to 21 between the two survey periods. Lapwing, however, were recorded in smaller numbers with a peak of 230 recorded in 2012/13 compared to 140 during the 2014/15 period. In 2012/13 lapwing were recorded during every month although in higher numbers at high tide with the pier to the west of the peninsula being a favoured roosting area. Fewer were recorded in 2014/15 and although the pier was still used higher numbers were recorded on the mud flats. This may be due to the height of the vegetation on the pier being higher and obscuring the view as certainly records of numbers higher than this have been recorded by the London Bird Group with higher counts of 288 lapwing recorded by LBC and SSM in January 2016.

4.9 The other waders that were recorded were in small numbers including snipe (max 4 in 2012/13), curlew (max 6 in 2012/13), knot (2 in 2012/13), grey plover (1 both seasons), green sandpiper (2 in 2014/15) and oystercatcher (3 both seasons).

Birds of Prey

4.10 Five species of birds of prey were recorded during the 2014/15 wintering bird survey, peregrine, kestrel, sparrowhawk, buzzard and marsh harrier. Peregrine was only recorded during the December high tide surveys but two birds were seen within the Site. Buzzard was only seen on one occasion when two were seen over Swanscombe Marshes during the March 2015 low tide survey. Marsh Harrier were first recorded during the January 2014 surveys, a pair nested in Black Duck Marsh and they were not

recorded during the 2015 passage migrant survey in August/September but had returned during the winter marine mammal surveys. During the 2012/13 survey a single marsh harrier was recorded during the February high tide survey over Botany Marshes. A sixth species has since been recorded during marine mammal surveys, short-eared owl which was seen during surveys between November 2015 and January 2016.

Other Species

4.11 In addition to the birds of prey, waders and waterfowl other birds were noted in the salt marsh, with skylark regularly recorded. Stonechat, whinchat and wheatear were recorded during the September survey whilst Cetti's warbler was recorded in September – November inclusive. Flocks of starling were recorded generally in the north and associated with one of the towers, the pylons or the piers with a peak of 320 recorded during the October 2014 survey. Wintering thrushes including redwing and fieldfare were recorded in flocks of over 100. Cetti's warbler retained their presence throughout the winter period with a peak of 5 recorded. It should be noted that the whole peninsular site was not surveyed for the wintering bird surveys, the key survey areas were those bordering the River Thames, Black Duck Marsh (viewed from the sea wall) and Botany Marshes.

Evaluation

4.12 Reviewing the criteria used for the designation of Local Wildlife Sites within Kent for wintering birds, and comparing with the survey data, none of the thresholds are met. The total number of wetland species (including birds of prey) recorded is 42 over the two survey periods. The threshold is for at least 60 wintering bird species or at least 100 passage bird species. Including species recorded by the London Bird Club or SSM this would increase to 45. Four Kent RDB3 species were recorded during the specific wintering bird surveys in 2014/15 (gadwall, cormorant, water rail, redshank) however, all of these are listed as KRDB3 species due to their breeding status rather than numbers in winter. Similarly in 2012/13 four KRDB3 species were recorded one of these was a different species, with knot recorded instead of water rail. Knot being the only species listed as KRDB3 due to its wintering bird status.

4.13 Two further KRDB3 species have been recorded as incidental species to the wintering bird surveys during the marine mammal surveys or have been recorded by other surveyors and listed on the London Ornithological Society web site from the Swanscombe Peninsular. This includes black tailed godwit (possibly recorded during a marine mammal survey and also recorded by LBC) and avocet recorded by LBC and SSM on two occasions. If these species are included then a total of three of the six KRDB3 species listed for their wintering populations have been recorded within the Site, knot, avocet and black-tailed godwit and criteria BI1 is met. However, it is noted that these three species do not appear to be regularly occurring species.

4.14 Species listed on the BoCC Red List for their decline have been recorded within the Site, however, only one of these is listed due to its decline during the non-breeding period. Herring gull has declined by between 53 to 60%. The other red list species including lapwing, curlew, whimbrel and black-tailed godwit are all included due to their breeding population or breeding range decline.

4.15 The Thames Estuary Marshes SPA regularly supports 33,433 individual waterfowl, the site recorded a maximum of 1248 waterfowl which equates to approximately 3.7% of those visiting the SPA with a similar number recorded in 2012/13 (1175 and 3.5%). The mean recorded was lower at 572 which is 1.7% of the number using the SPA.

4.16 Whilst not fulfilling the threshold in terms of numbers of bird species the comparatively small size and fragmented nature of the intertidal and saltmarsh habitats should be considered when evaluating their relative importance to a diverse assemblage of wintering and passage wetland birds and birds of prey recorded on the Site. Furthermore, the number of species regularly recorded on the Site for which the nearby SPA and SSSI's are designated for should also be taken into consideration, along with the location of the Site between the designated areas when evaluating the importance of the Site in the wider area. Taking the above points into consideration the wintering bird assemblage is considered to be of County Importance.'

5.0 CONCLUSIONS

5.1 A total of 42 wintering wetland and bird of prey species were recorded within the Site. Including species recorded by London Bird Club or SSM this would increase to 45. Of these species, a total of three Kent RDB3 species have been recorded over the course of the two survey periods and from records from the London Bird Club, none of these species have been recorded as regularly occurring species. A total of five birds of prey species have been recorded during the wintering bird and marine mammal surveys

5.3 The assemblage and numbers of territories estimated present are considered as being of Local Importance. However, the value of the Site is increased when put into context with the adjacent SPA and the value of the Site for migrating birds on passage. The results of the wintering bird surveys revealed a bird assemblage of County Importance.

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Table 1 Estuarine Bird Monitoring: High tide waterfowl and raptor counts made during winter 2014/15.

Species	Date							
	23/9/14	22/10/14	24/11/14	19/12/14	21/01/15	04/02/15	04/03/15	27/8/15
Black-headed gull	5	8	63	175	89	617	386	64
Canda goose							9	32
Coot			4	5	8	9	12	
Cormorant	4	10	27	9	23	17	20	13
Common gull		3	2	5	2	2	5	2
Common sandpiper	1	1		1				4
Curlew	2						1	
Dunlin								5
Gadwall		4	13	22	44	48	34	
Greater black-backed gull				4	1	1	1	
Green Sandpiper								2
Grey heron	1	1	1		1		6	4
Greylag goose			13		1	15	24	
Grey plover					1			
Herring gull			1	6	2			3
Kestrel				1		1	1	
Kingfisher				1				
Lapwing			86	92	15	53		
Lesser black-backed gull			1	1		1		
Little egret		1	2					
Little grebe					1		1	
Mallard	40	61	199	35	136	76	50	13
Marsh harrier					2	1		
Moorhen		1	3					2
Mute swan				1				
Oystercatcher							1	
Peregrine				2				
Redshank			86	125	170	182	169	
Shelduck			5		2	1	7	
Shoveler		19	14	13	11	3	5	1
Snipe		1	1					
Sparrowhawk		1				1		1
Teal		65	182	230	196	217	57	
Turnstone				17		3	21	
Water rail								1
Wigeon				2				
Total	**53**	**176**	**703**	**747**	**705**	**1248**	**810**	**146**
Species richness	**6**	**13**	**18**	**20**	**18**	**18**	**19**	**13**
				Mean spp richness			**15.6**	
				Mean abundance			573.5	

Note: Italicised species were recorded at low tide only (see Table 2).

Table 2 - Estuarine Bird Monitoring: Low tide waterfowl and raptor counts made during winter 2014/15.

Species	Date							
	12/09/14	**16/10/14**	**14/11/14**	**11/12/14**	**13/1/15**	**13/2/15**	**11/3/15**	**08/9/15**
Black-headed gull	112	154	171	262	170	403	189	69
Buzzard							2	
Canada goose						5	2	
Coot			8	1	12	13	15	
Common gull	1	2	5	6	5	4	4	1
Common sandpiper			1					8
Cormorant	15	7	15	11	17	14	23	9
Curlew				1	1	2	2	
Dunlin					12		8	
Gadwall			9	12	33	25	34	
Great black-backed gull				2	1	1	2	
Great crested grebe							1	
Grey heron	1	1	4	1		5	4	
Greylag goose			32			20	8	
Grey plover		1		1				
Herring gull	22	24	3	26	3	42	4	1
Kestrel					1		1	
Lapwing	2	5	68	103	112	140	4	23
Lesser black-backed gull	3		2	4	2			3
Little egret		1	2				1	
Little grebe							2	
Mallard	47	78	77	30	76	14	64	25
Marsh harrier					3		2	
Moorhen			6			2		
Mute swan	2					2		
Oystercatcher			1			3	2	
Redshank			35	91	75	73	84	
Ringed plover						1		
Shelduck				2	2			
Shoveler		16	7		14	7	3	
Snipe			3	1				
Teal	1	4	34	148	138	66	26	
Tufted duck						1		
Turnstone		2		3	6		7	
Wigeon		4		1				
Yellow-legged gull	2		1	2	1			
Total	**208**	**299**	**484**	**708**	**684**	**843**	**494**	**139**
Species Richness	11	13	20	20	20	21	25	**8**
				Mean species richness			**17.3**	
				Mean abundance			**482.4**	

Nb	Two marsh harrier recorded at same time in Aug 2015 with single birds recorded in 3 different locations at different time. Peak of 2 counted

Table 3 - None WEBS count species

High Tide

Species	Date							
	23/9/14	22/10/14	24/11/14	19/12/14	21/01/15	04/02/15	04/03/15	27/8/15
Cetti's Warbler	2		4	1			3	3
Carrion Crow								1
Fieldfare			53					
Goldfinch								1
Raven							1	1
Reed bunting			2					
Rook								1
Skylark						3		
Song thrush			23					
Starling		1						
Stonechat			1					3
Wheatear	1							
Whitethroat								1
Wren								1

Low tide

Species	Date							
	12/09/14	16/10/14	14/11/14	11/12/14	13/1/15	13/2/15	11/3/15	08/9/15
Cetti's Warbler		2	4		4	1	5	2
Carrion Crow			1					
Fieldfare				50				
Meadow pipit					1			
Raven								4
Redwing				50				
Reed bunting		2	1		6			
Ringed plover						1		
Skylark		3				3		3
Song thrush				8	20			
Starling		320						
Stonechat			3					1

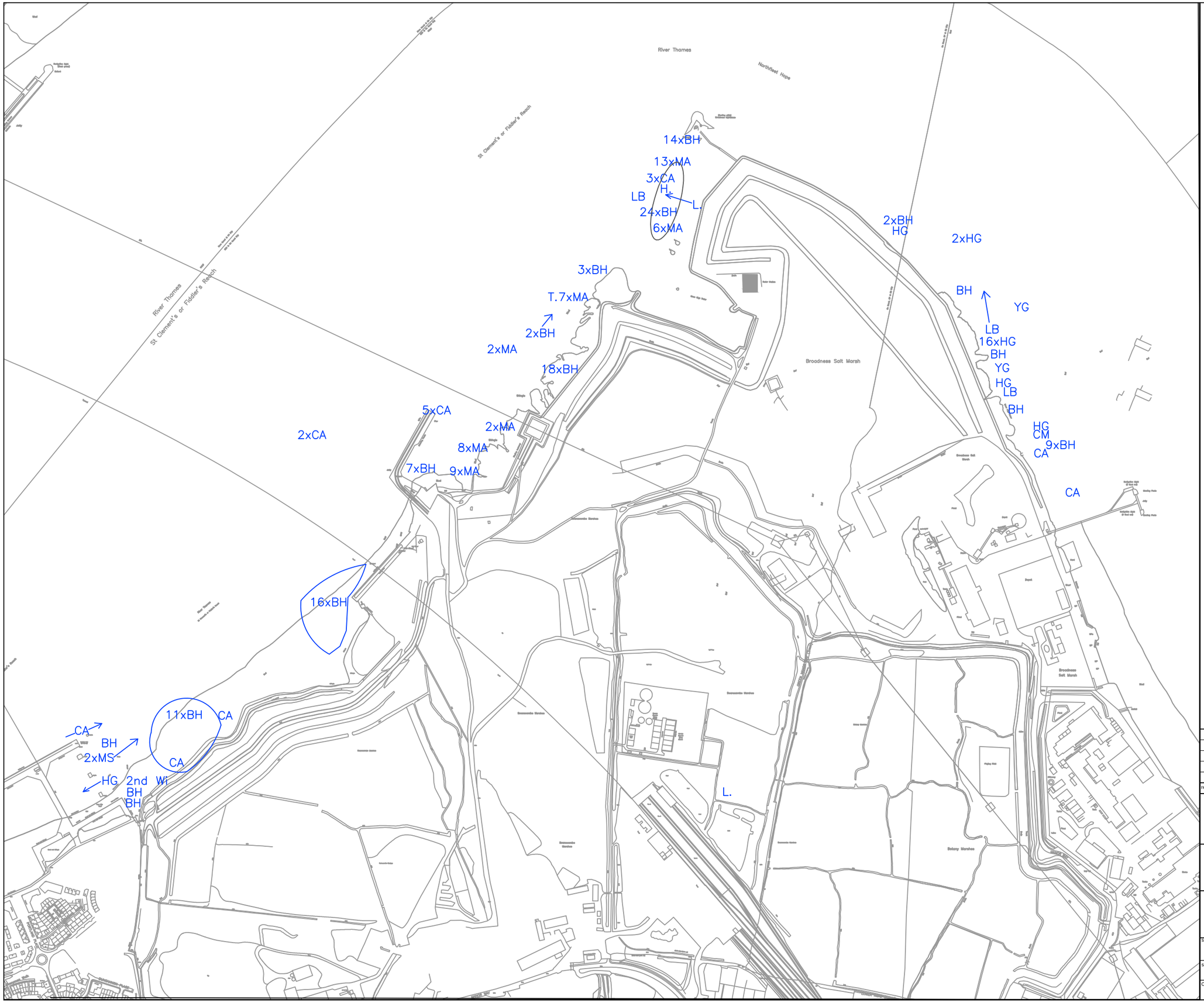
Table 4: Summary of Bird Surveys

	Parameter	2012/13	2014/15
High Tide	Maximum Species Richness	19 (February)	19 (February + March)
	Minimum Species Richness	6 (December)	6 (September)
	Mean Species Richness	11.7	15.6
	Total Species Richness	26	0
	Maximum Abundance	1175	1248
	Minimum Abundance	80	53
	Mean Abundance	572	574
	Total Abundance	4006	0

	Parameter	2012/2013	2014/15
Low Tide	Maximum Species Richness	16 (January)	25 (March)
	Minimum Species Richness	12 (December)	8 (August)
	Mean Species Richness	14	17.3
	Total Species Richness	24	0
	Maximum Abundance	718	843
	Minimum Abundance	227	139
	Mean Abundance	436	482
	Total Abundance	3054	3859

Table 5 - Summary of Bird Species Recorded in 2012/13 and 2014/5

2012/13		2014/15	
Low	**High**	**Low**	**High**
Black-headed gull	Black-headed gull	Black-headed gull	Black-headed gull
		Buzzard	
		Canada Goose	Canada Goose
Coot	Coot	Coot	Coot
Common gull	Common gull	Common gull	Common gull
		Common sandpiper	Common sandpiper
Cormorant	Cormorant	Cormorant	Cormorant
Curlew		Curlew	Curlew
		Dunlin	Dunlin
Gadwall	Gadwall	Gadwall	Gadwall
	Greater black backed gull	Greater black backed gull	Greater black backed gull
Green sandpiper			Green sandpiper
Great crested grebe	Great crested grebe	Great crested grebe	
Grey heron	Grey heron	Grey heron	Grey heron
	Greylag goose	Greylag goose	Greylag goose
Grey plover	**Grey plover**	**Grey plover**	**Grey plover**
Herring gull	Herring gull	Herring gull	Herring gull
		Kestrel	Kestrel
			Kingfisher
Knot			
Lapwing	Lapwing	Lapwing	Lapwing
Lesser black-backed gull	Lesser black-backed gull	Lesser black-backed gull	Lesser black-backed gull
	Little egret	Little egret	Little egret
Little grebe	Little grebe	Little grebe	Little grebe
Mallard	Mallard	Mallard	Mallard
	Marsh harrier	Marsh harrier	Marsh harrier
Moorhen	Moorhen	Moorhen	Moorhen
		Mute swan	Mute swan
Oystercatcher	Oystercatcher	Oystercatcher	Oystercatcher
			Peregrine
Redshank	Redshank	Redshank	Redshank
		Ringed plover	
Shelduck	Shelduck	Shelduck	Shelduck
Shoveller	Shoveller	Shoveler	Shoveller
Snipe		Snipe	Snipe
			Sparrowhawk
Teal	Teal	Teal	Teal
	Tufted duck	Tufted duck	
Turnstone	Turnstone	Turnstone	Turnstone
			Water rail
	Wigeon	Wigeon	Wigeon
		Yellow legged gull	
24	**26**	**36**	**36**



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
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CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
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GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

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Project:

LPER - Wintering Bird Survey

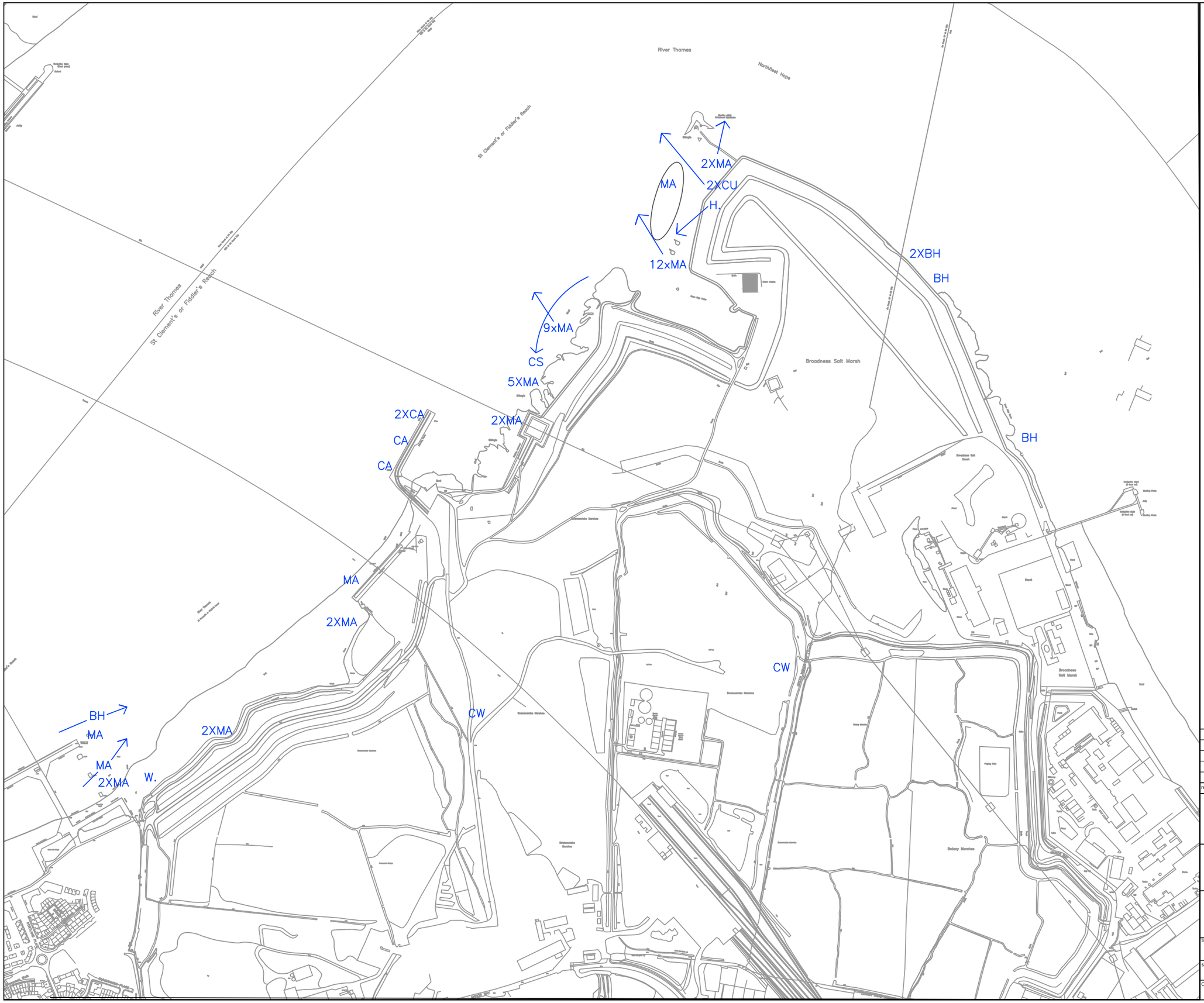
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KEY

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SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

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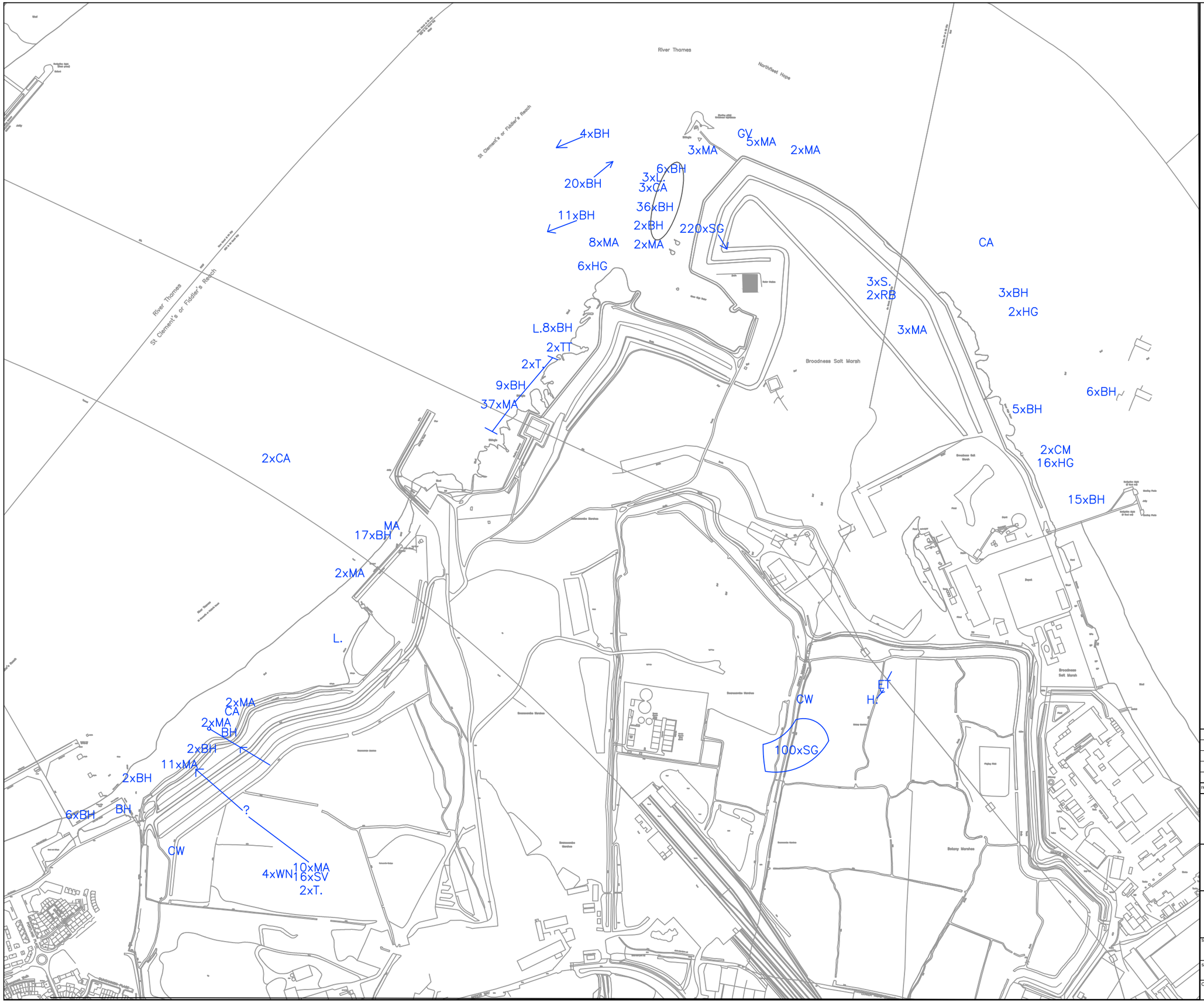
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KEY

BTO SPECIES CODES

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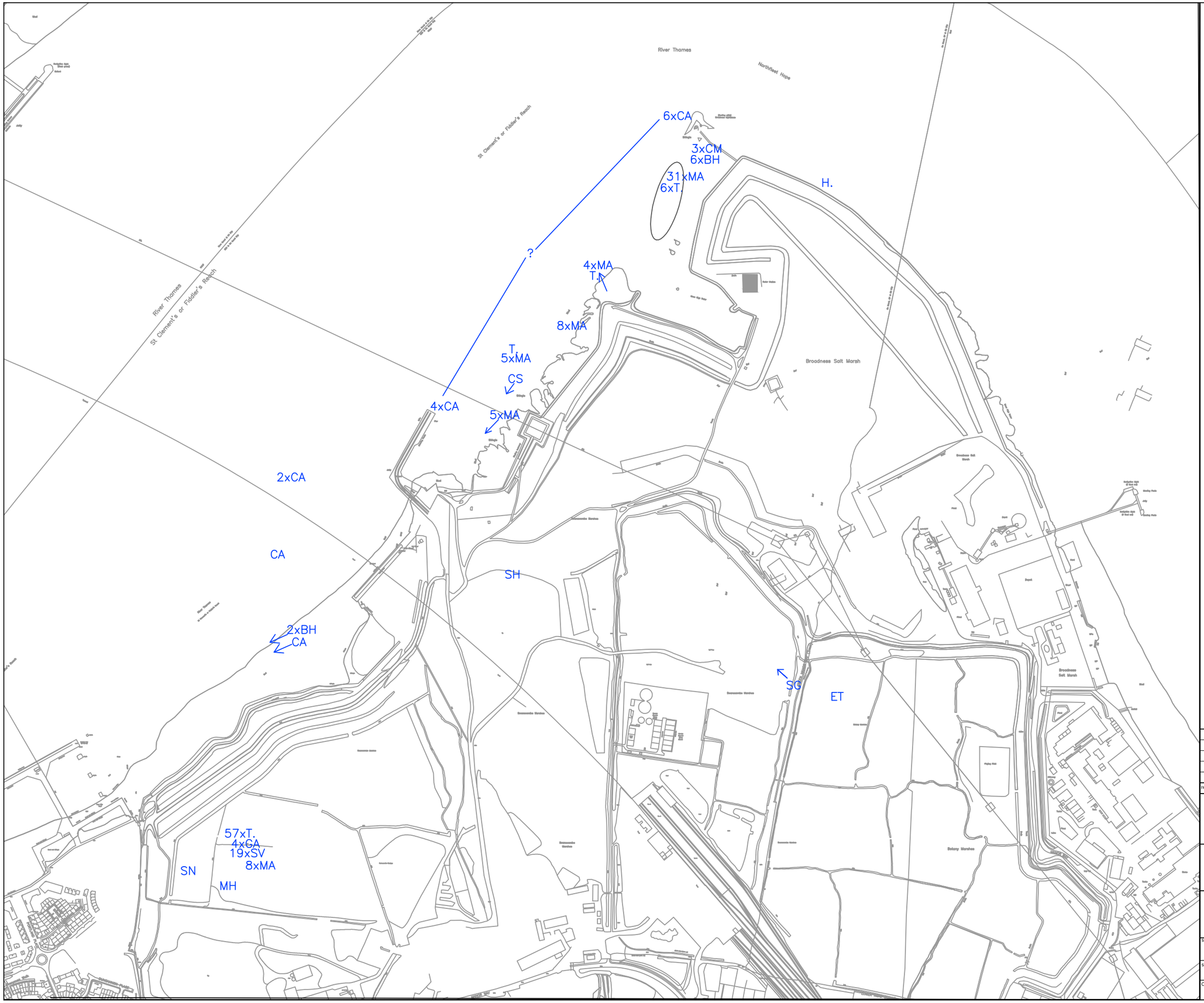
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KEY

BTO SPECIES CODES

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CO	Coot
CM	Common Gull
CS	Common Sandpiper
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OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

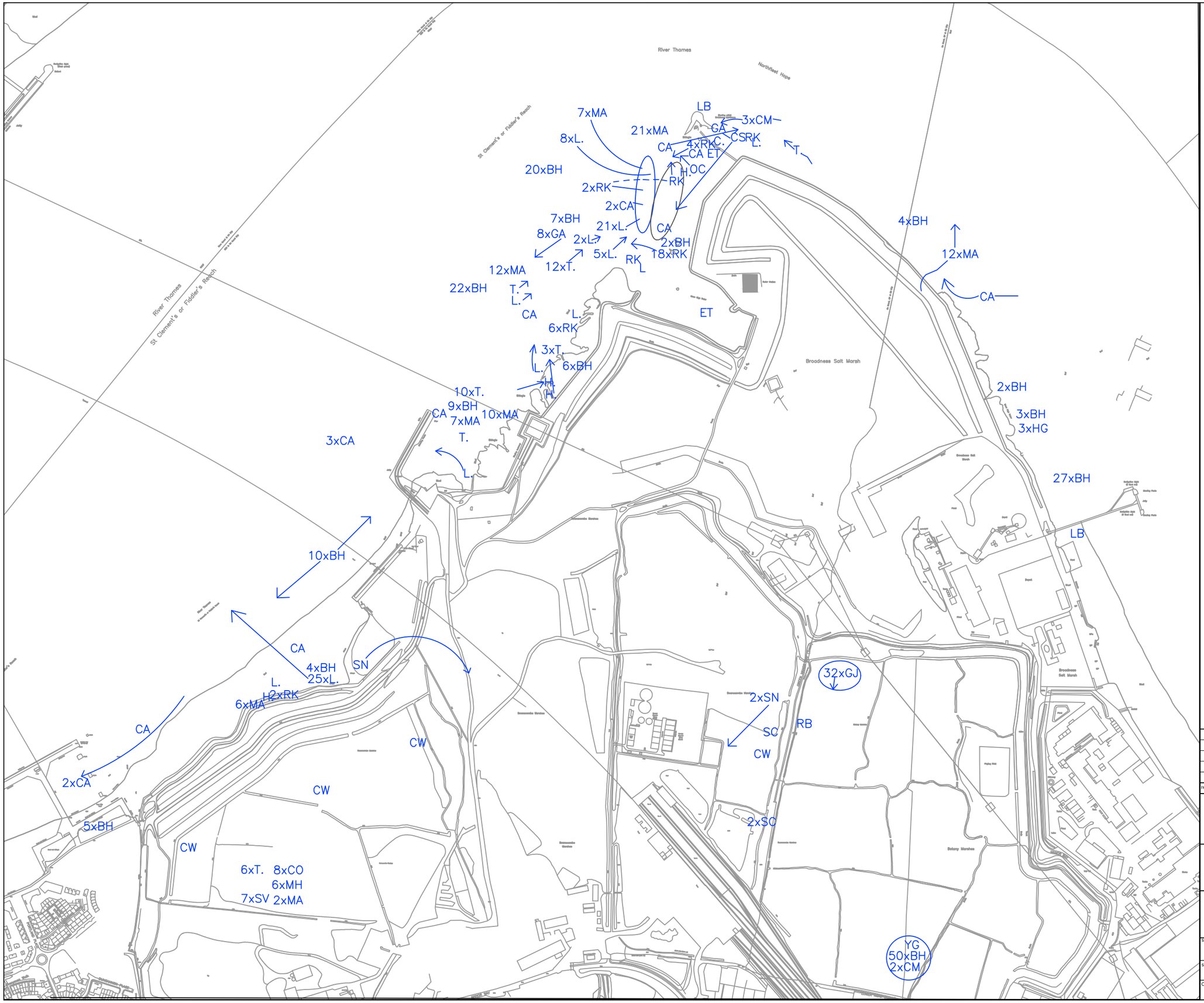
Title:

October 2014 - High Tide

status		drawing no.		
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scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

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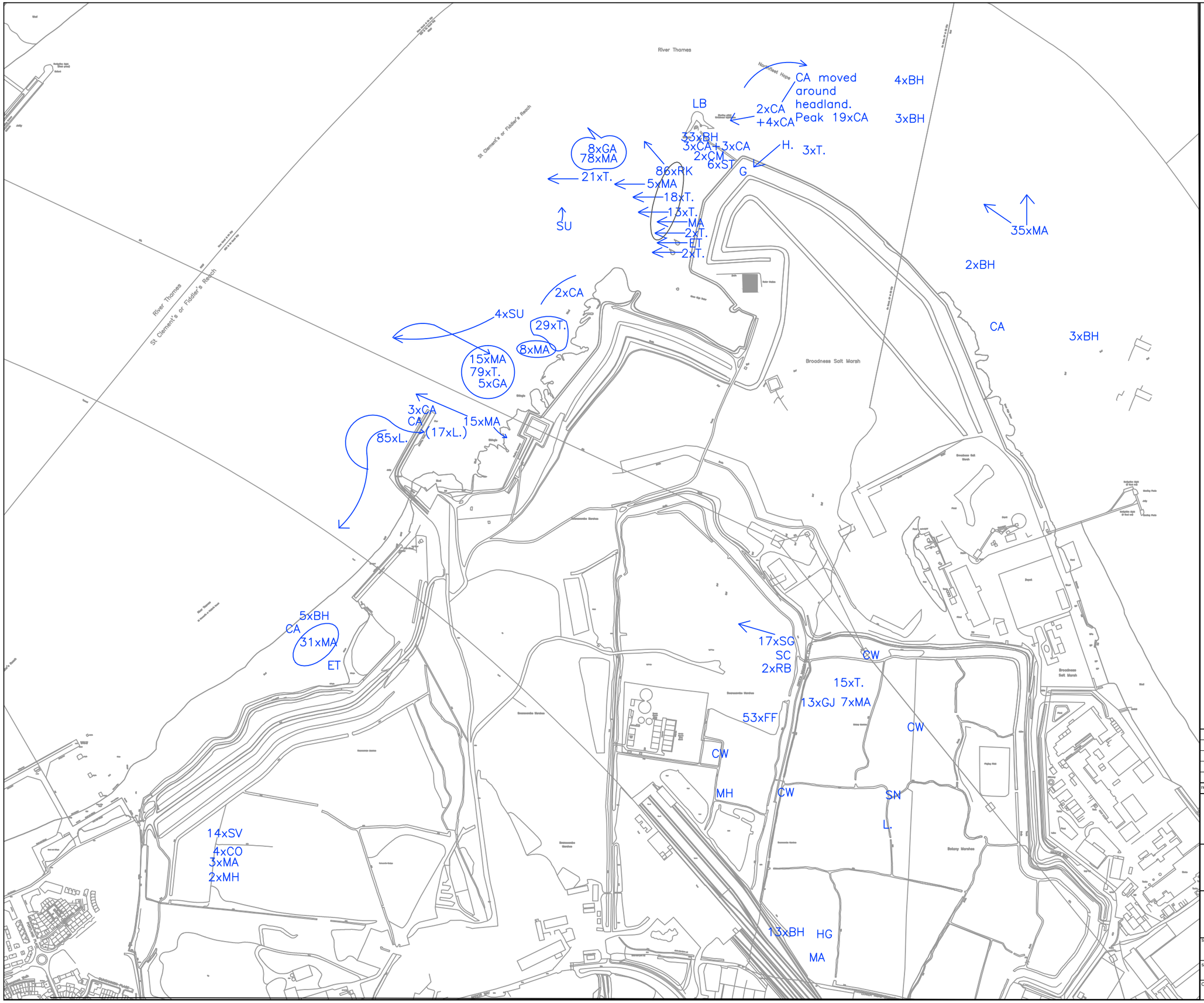
Title:

November 2014 - Low Tide

status		drawing no.		
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scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

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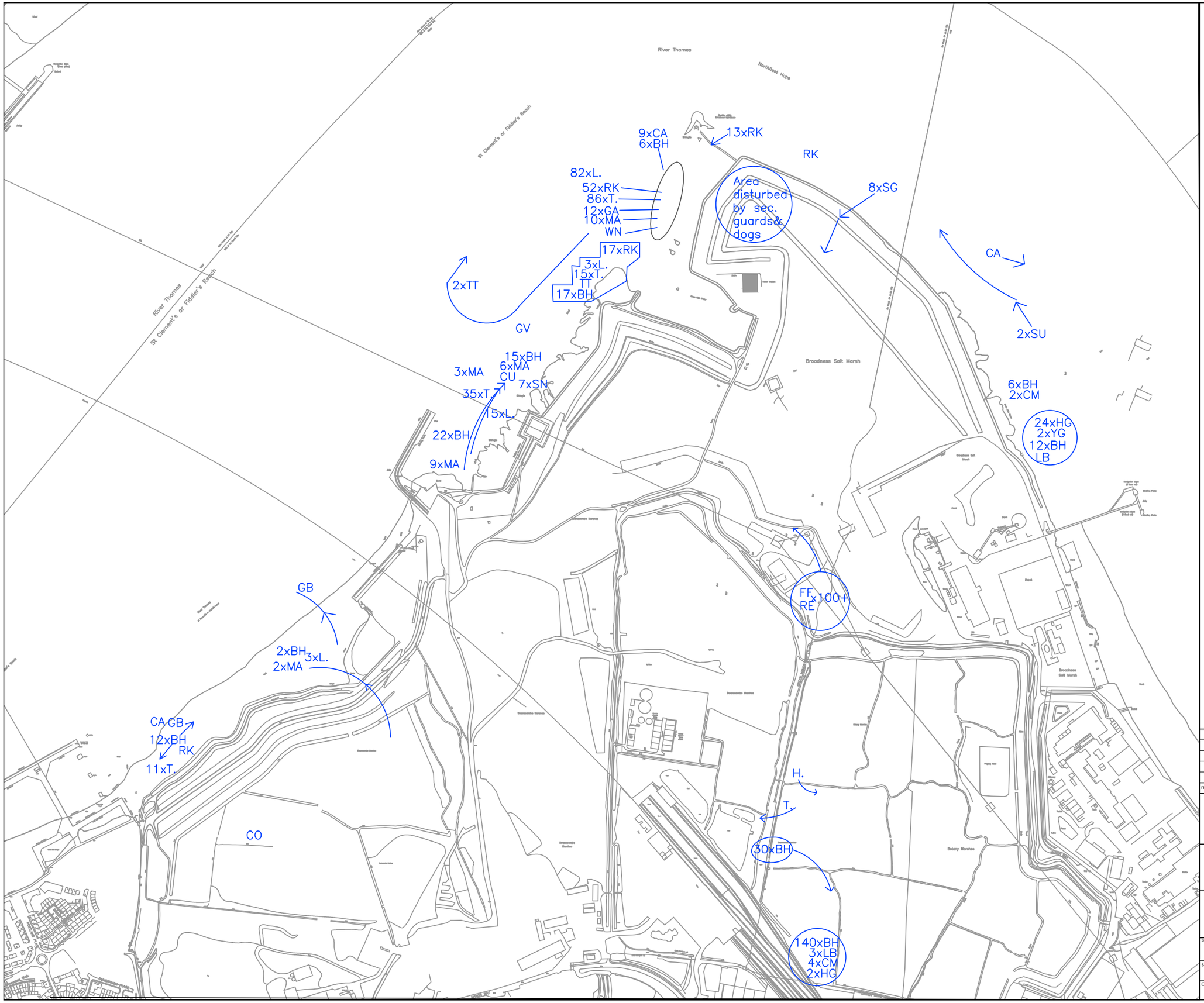
Title:

November 2014 - High Tide

status		drawing no.	
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scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

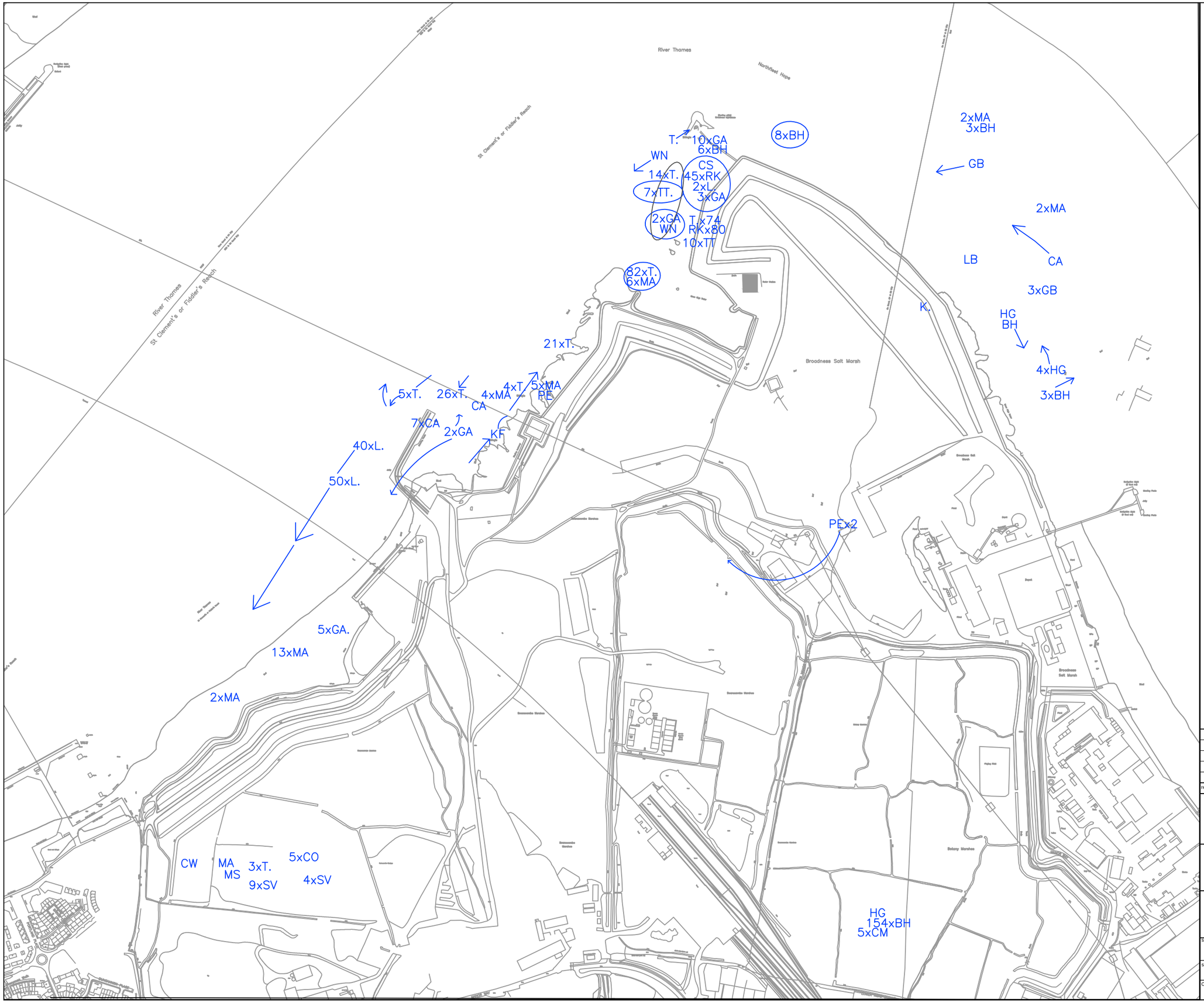
Title:

December 2014 - Low Tide

status	drawing no.			
	Figure 7			
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

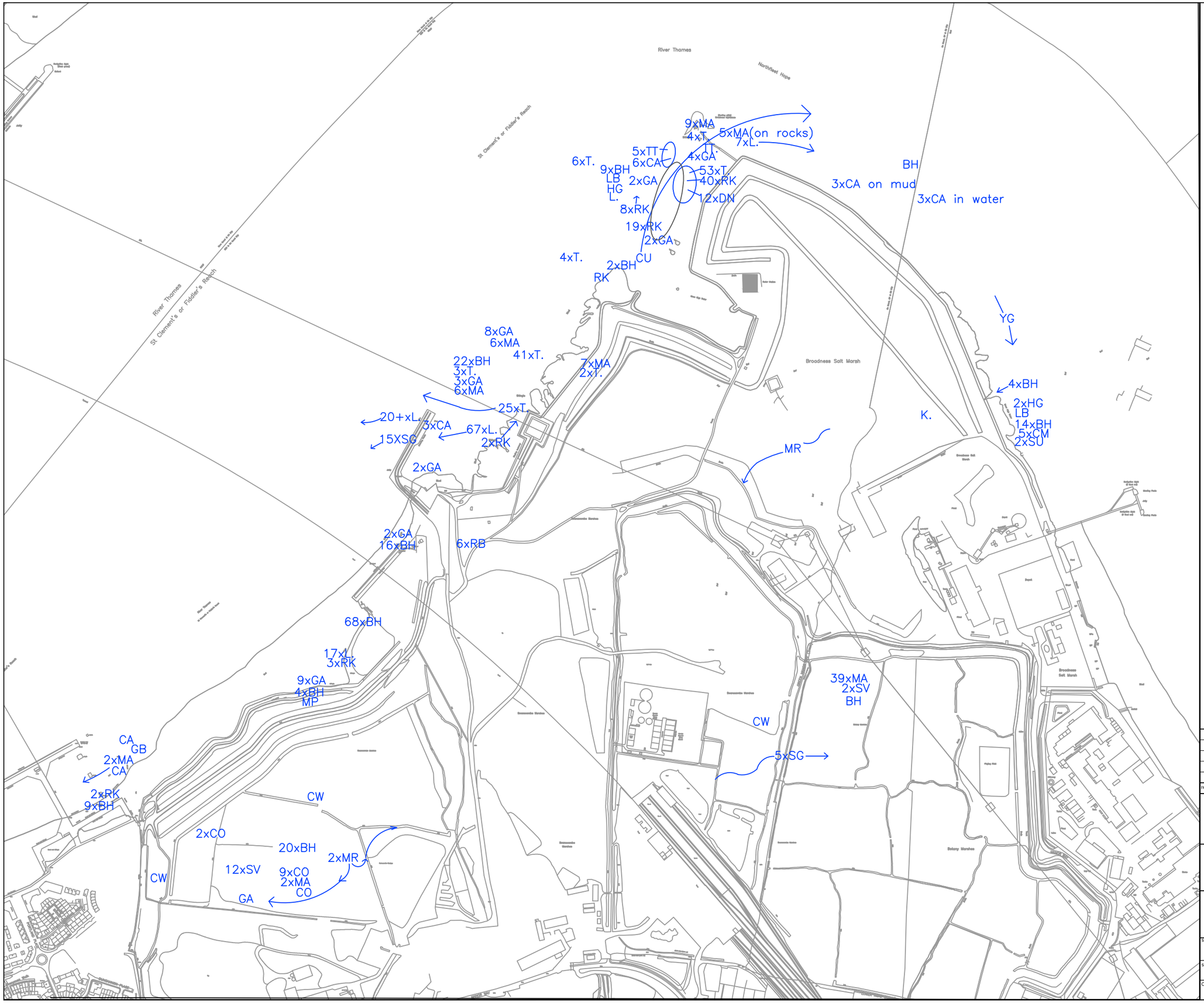
Title:

December 2014 - High Tide

status		drawing no.		
		Figure 8		
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

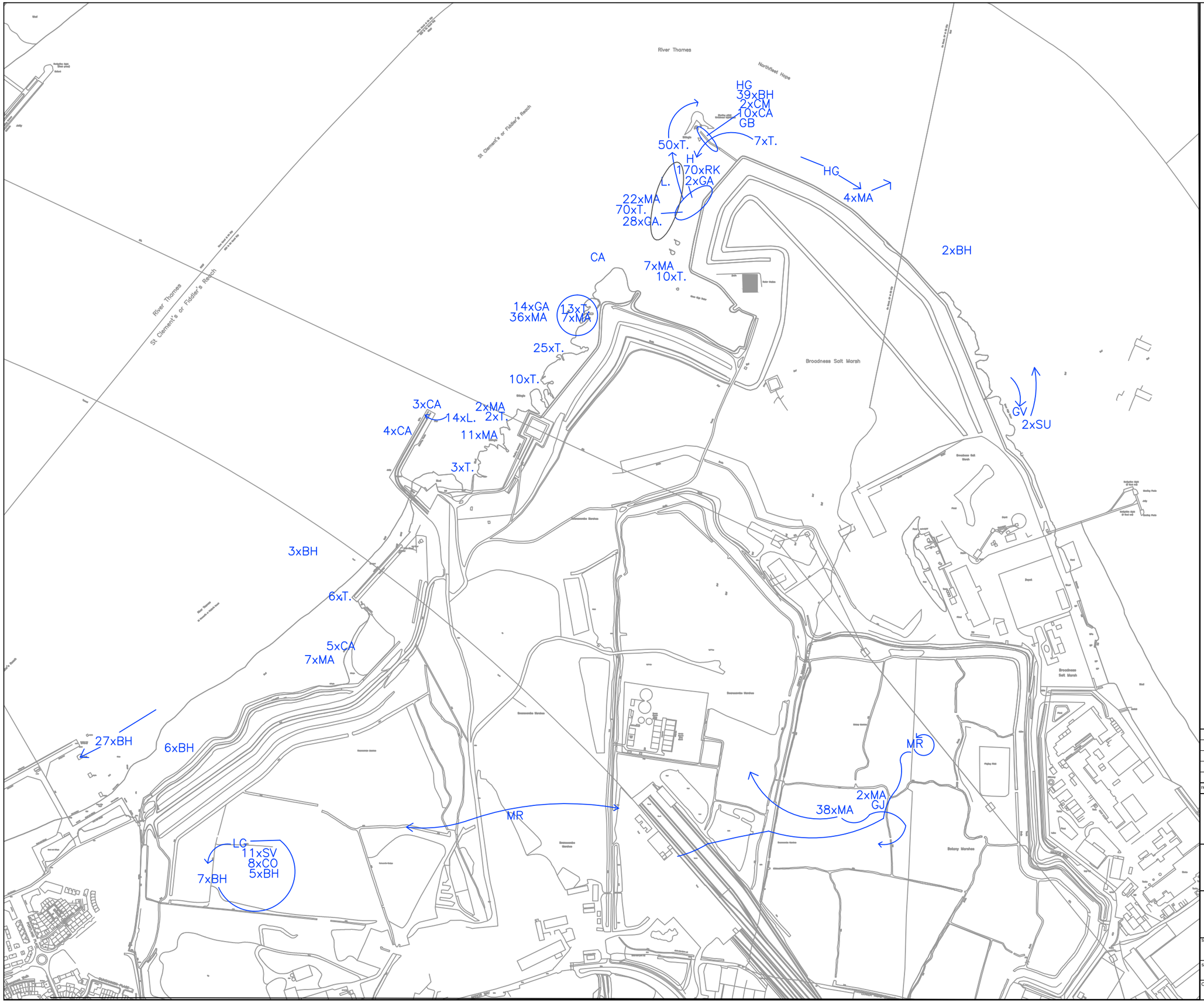
Title:

January 2015 - Low Tide

status		drawing no.		
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scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

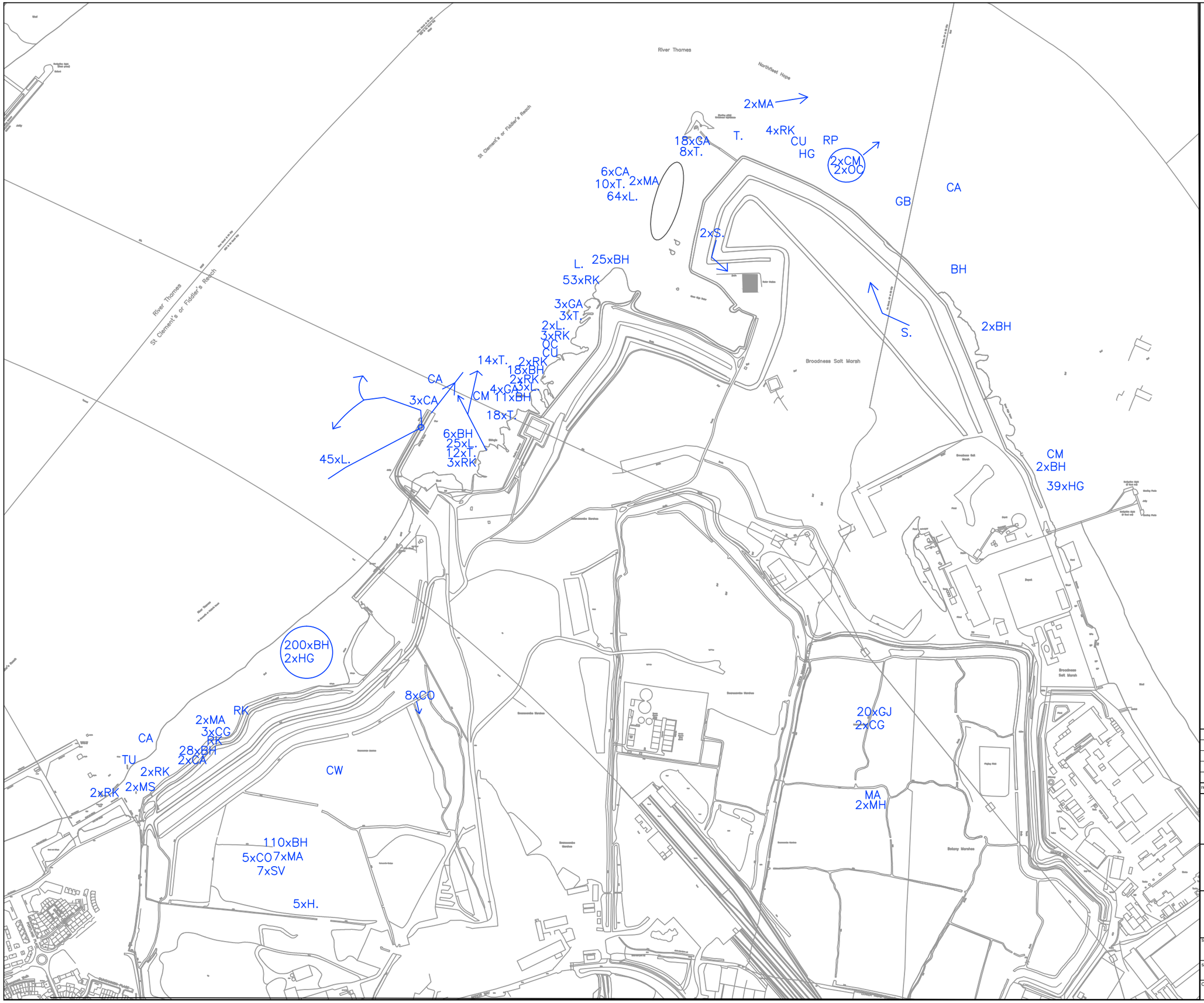
Title:

January 2015 - High Tide

status		drawing no.		
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scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

Title:

February 2015 - Low Tide

status	drawing no.			
	Figure 11			
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

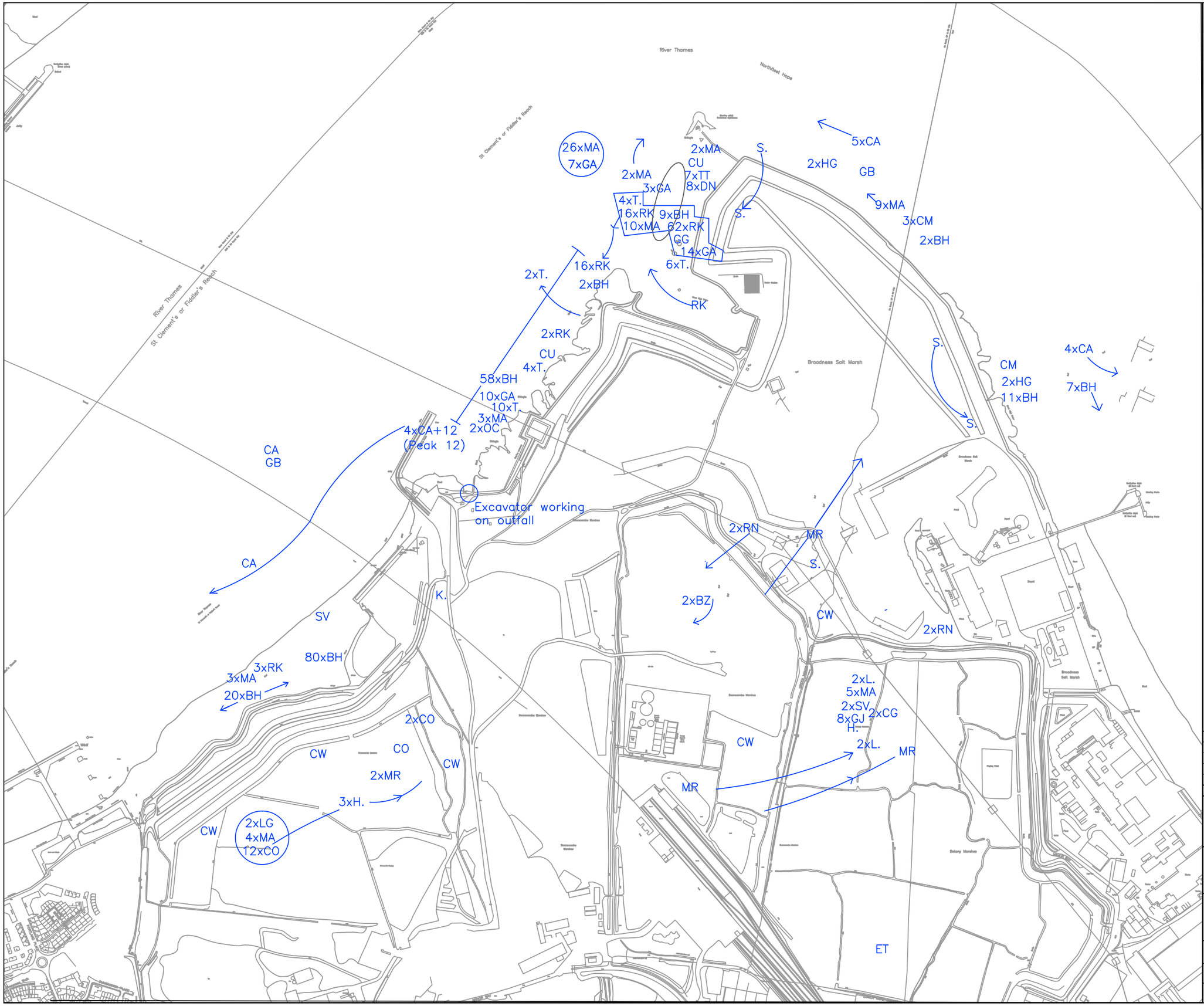
Title:

February 2015 - High Tide

status		drawing no.		
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scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

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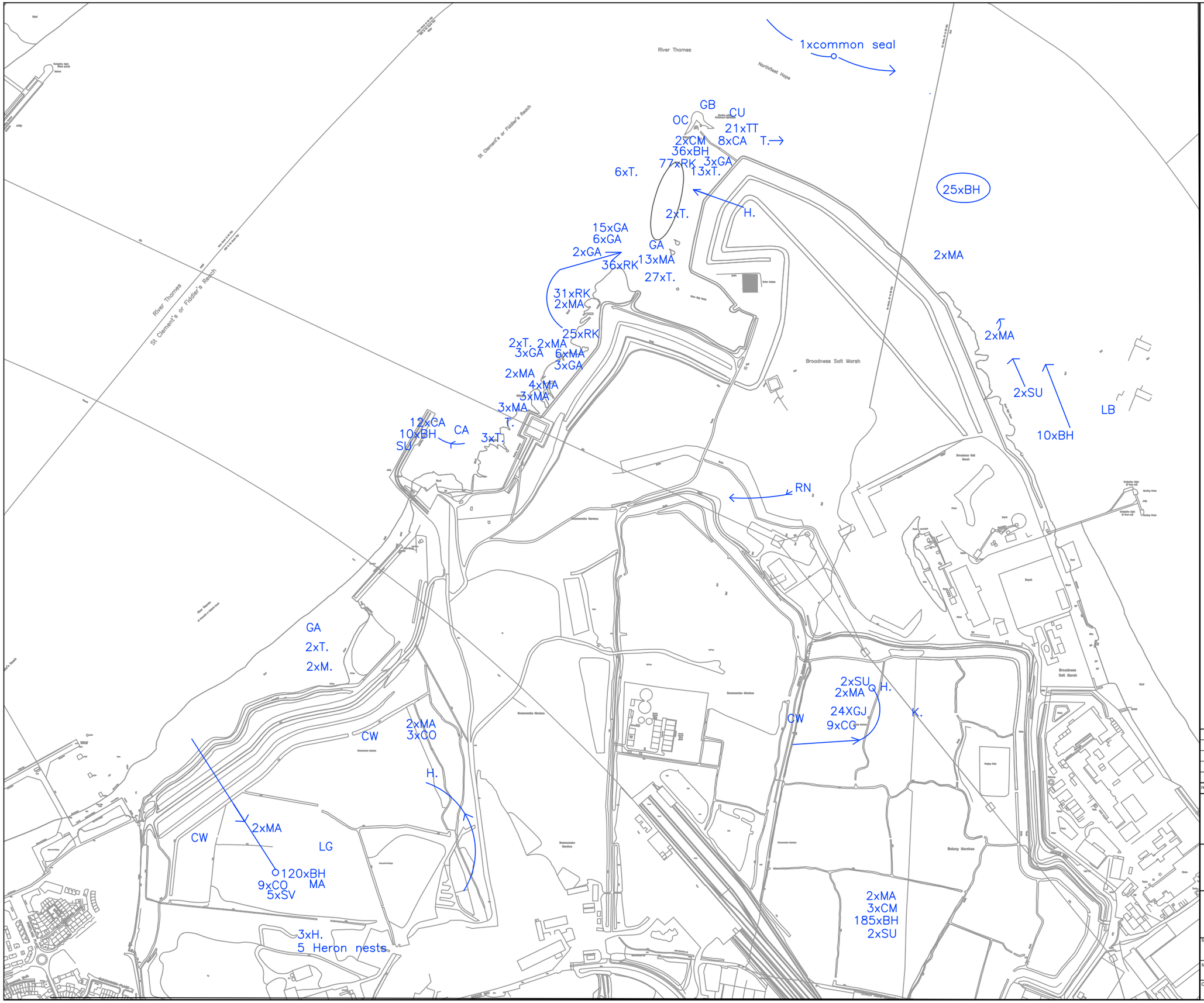
Title:

March 2015 - Low Tide

status		drawing no.		
		Figure 13		
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

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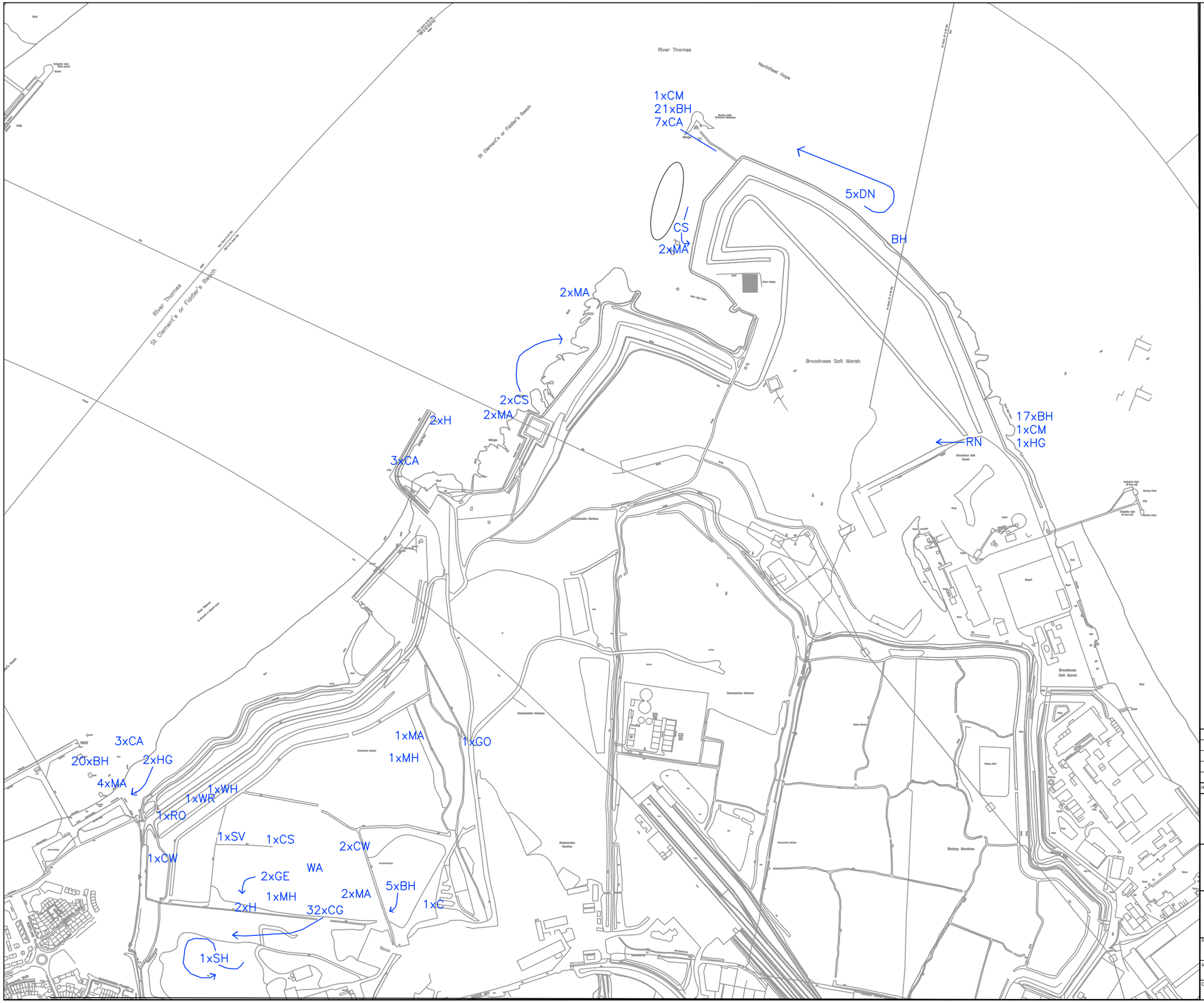
Title:

March 2015 - High Tide

status		drawing no.		
		Figure 14		
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

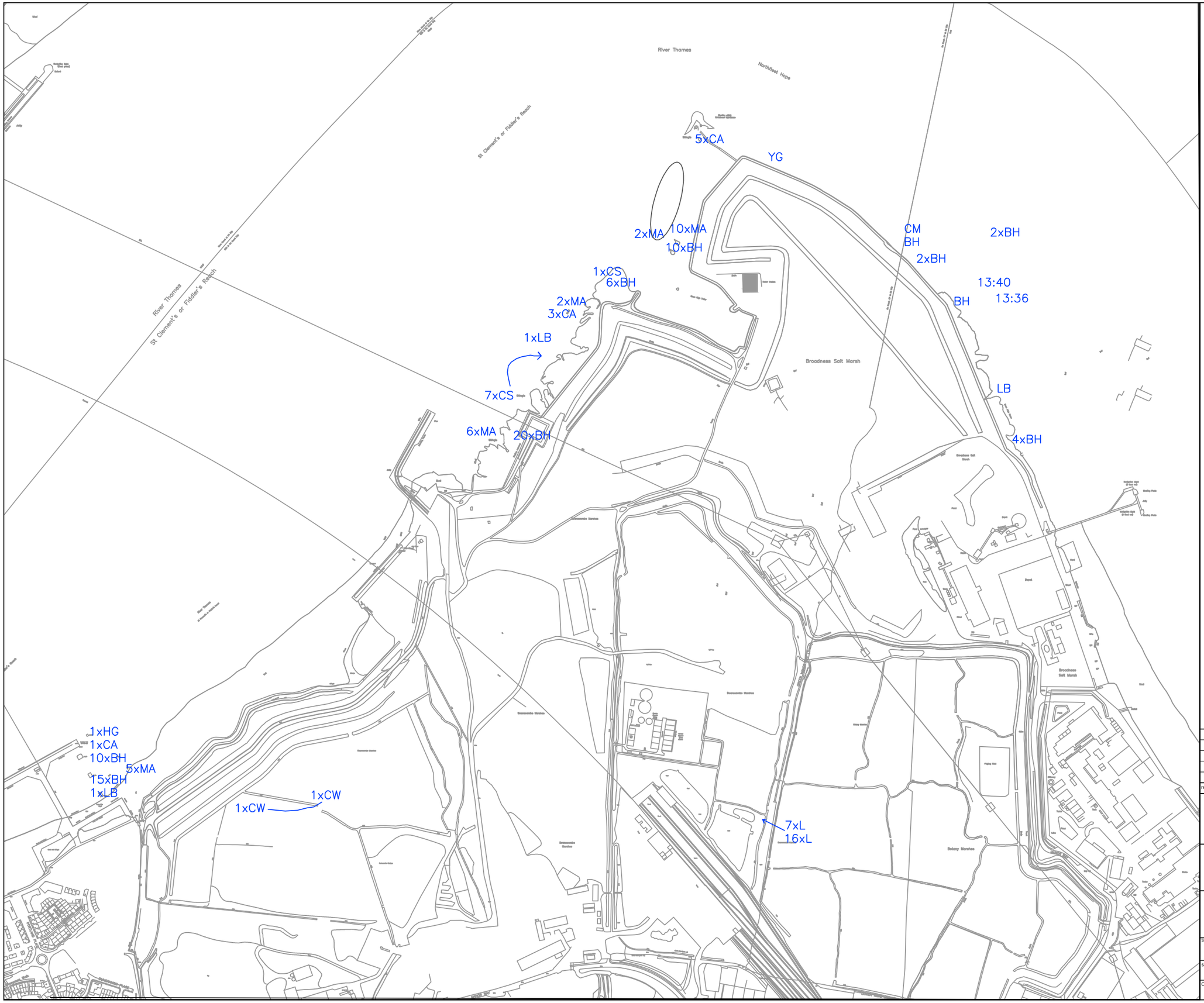
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KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GE	Green Sandpiper
GG	Great Crested Grebe
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
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Project:

LPER - Wintering Bird Survey

Title:

September 2015 - Low Tide

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		Figure 16		
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

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Annex EDP 17
2012 Breeding Birds Survey Report (CBA, 2014)

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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Breeding Birds Survey Report

January 2014

CHRIS BLANDFORD ASSOCIATES
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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Breeding Birds Survey Report

Approved	Bill Wadsworth
Position	Senior Associate (Ecology)
Date	30th January 2014
Revision	Final

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1: BTO Codes

2: Summary of Legislation

1.0 INTRODUCTION

1.1 Background

1.1.1 Chris Blandford Associates (CBA) has been Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings (LRCH) Ltd. to undertake a series of ecological surveys to inform the Environmental Impact Assessment for the proposed London Paramount development at Swanscombe, North Kent. This report details the results of the 2012 breeding bird survey undertaken between April and June 2012.

1.1.2 The West Thurrock Lagoon and Marshes SSSI is designated for its wintering wader and wildfowl assemblage for which the area is considered to be one of the most important sites along the Inner Thames Estuary. At its closest point the SSSI is some 1.5km to the west of the Site. The SSSI has extensive mudflats as well as large and secure high tide roosts. Large reed beds are also present which support reed and sedge warblers and breeding populations of bearded tit. Locally important numbers of teal, snipe and grey heron roost in the SSSI

1.1.3 The nearest SPA is the Thames Estuary Marshes SPA/Ramsar, which is approximately 7km east of the Site. The SPA is made up of the South Thames Estuary & Marshes SSSI (south bank of the Thames) and Mucking Flats & Marshes SSSI (north side of the Thames). This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Over winter

- Avocet *Recurvirostra avosetta*, 276 individuals representing at least 21.7% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)
- Hen Harrier *Circus cyaneus*, 7 individuals representing at least 0.9% of the wintering population in Great Britain (5 year mean 93/4-97/8)

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

On passage

- Ringed plover *Charadrius hiaticula*, 559 individuals representing at least 1.1% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Over winter

- Ringed plover *Charadrius hiaticula*, 541 individuals representing at least 1.1% of the wintering Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

Assemblage qualification: A wetland of international importance.

1.1.5 The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 33,433 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including redshank *Tringa totanus*, black-tailed godwit *Limosa limosa islandica*, dunlin *Calidris alpina alpina*, lapwing *Vanellus vanellus*, grey plover *Pluvialis squatarola*, shoveler *Anas clypeata*, pintail *Anas acuta*, gadwall *Anas strepera*, shelduck *Tadorna tadorna*, white-fronted goose *Anser albifrons albifrons*, little grebe *Tachybaptus ruficollis*, ringed plover *Charadrius hiaticula*, avocet *Recurvirostra avosetta* and whimbrel *Numenius phaeopus*.

1.1.6 The Inner Thames Marshes SSSI is some 6km to the west of the Site. It is designated for the numbers of wintering wildfowl, waders and birds of prey with wintering teal populations reaching levels of international importance.

1.2 Scope of Survey

1.2.1 The scope of the survey encompassed:

- A breeding bird survey of the Site to determine numbers of breeding bird territories;
- A vantage point survey for hobby and barn owl; and,
- Evaluation of the conservation importance of the Site for birds.

2.0 METHODOLOGY

2.1 Survey Methodology

2.1.1 The survey methodology was an adapted Common Bird Census methodology (CBC) which involved standard territory (registration) mapping techniques as detailed in Bibby et al. (2000) and Gilbert et al (1998). This method is based on the observation that many species during the breeding season are territorial. This is found particularly amongst passerines, where territories are often marked by conspicuous song, display, and periodic disputes with neighbouring individuals.

2.1.2 All bird locations were mapped using standard British Trust for Ornithology (BTO) one and two letter species codes on an appropriate field map. Specific diagrammatic codes were also used for singing, calling, movements between areas, flying, carrying food, nest building, aggressive encounters and other behaviour. The expected outcome of this technique is that mapped registrations fall into clusters, approximately coinciding with territories.

2.1.3 Surveying was confined within the proposed Site boundary and this Survey Area was walked at a slow and methodical pace in appropriately fine weather in order to detect, locate and identify all individual birds. All field boundaries and suitable breeding habitats were walked. Due to the size of the Survey Area, the Site was surveyed by two ornithologists on the same day; one covering the north and west of the Site, the second covering the south and east. Visits were undertaken early in the morning according to sunrise time and the earliest start was at 05:20hrs. A section of the Survey Area was fenced off and therefore not accessible. Where possible birds were noted using this area from the adjacent footpaths. At Swanscombe Marshes there is a large area of reed bed habitat and the two surveyors positioned themselves on opposite sides of the reed bed and used long range radios to try to determine the number of reed bed birds singing to avoid double counting. The whole of the accessible Survey Area was covered in each visit, using binoculars to observe bird behaviour.

2.1.4 Surveys were undertaken between April and June 2012, and where possible, each survey visit was approximately ten days apart with a total of six survey visits taking place. The survey dates were as follows:

- 5th April
- 3rd May
- 17th May
- 31st May
- 14th June
- 21st June

2.1.5 For each survey, a fresh field map was used on each survey visit which was then used to create an individual species master map, following the completion of the surveys. This data analysis follows procedures detailed in Gilbert et al. (1998). From the species master map, the number of territories for each species was calculated.

2.1.6 For late flying migrants, for example spotted flycatcher for which fewer potential contacts are possible, only one registration is required to confirm a territory which can also be applied to inconspicuous species, for example lesser spotted woodpecker.

2.1.7 In addition a separate vantage point survey for hobby *Falco subbuteo* was undertaken on 26th July 2012 and an barn owl *Tyto alba* vantage point survey undertaken on 19th July 2012. Cetti's warbler had been identified during an earlier site visit in March 2012 and the standard guidance for surveying this species was followed (Bibby et al. 2000).

2.2 Survey Constraints

2.2.1 The initial survey was undertaken on 5th April 2012 with the second survey not until 3rd May 2012, therefore the territories of some early breeding species may have been missed. In addition, part of the Site could not be fully covered. Part of the Central Spine, the area to the north of the CTRL was inaccessible for the duration of the survey due to health and safety reasons. Therefore some territories will have been undetected in this area.

2.3 Evaluation Methodology

2.3.1 Birds recorded during the survey were placed in both a national and local context in order to identify species of conservation importance. The conservation importance of the breeding bird populations were determined using the criteria specified below.

(a) the presence of breeding species of recognised international conservation importance i.e. species listed on Annex I of EC Directive 79/409/EEC on the Conservation of Wild Birds 1979;
(b) the presence of breeding species of recognised national conservation importance i.e. species listed on Schedule 1 of the Wildlife and Countryside Act 1981;
(c) the presence of Birds of Conservation Concern (BoCC3) Red List species (Eaton et al 2009);
(d) the presence of species identified as Priority Species in the UK Biodiversity Action Plan (UK BAP);
(e) the presence of species listed under the Natural Environment and Rural Communities Act 2006 (NERC Act) Section 41 Species of Principal Importance in England; and
(f) Kent Local Biodiversity Action Plan.

2.3.2 A category of 'Local Importance' was used for species that did not reach regional importance but were still of some ecological value. This included all species on the Red List of Birds of

Conservation Concern (BoCC3): 2009 (Eaton et al 2009) and species identified in the Kent Local Biodiversity Action Plan.

2.3.3 The breeding bird assemblage of the Site was also evaluated against the standard JNCC guidelines for the selection of biological SSSIs (JNCC 1995).

2.3.4 Finally, an additional evaluation method has also been used. Species richness is a simple and effective measure of diversity that can be used to describe conservation value separately for breeding, passage and wintering bird communities. Fuller (1980) provided the following criteria for the evaluation of Sites for the breeding bird diversity where the number of species found breeding in an area can be given a value as shown below:

National	Regional	County	Local
85+	84-70	69-50	49-25

2.3.5 The criteria used for the designation of Local Wildlife Sites (previously known as SINCs or County Wildlife Sites) in Kent (Kent Wildlife Trust, 2005) were used to assess the local importance of the Study Area for birds. The criteria are designed to be applied to areas of habitat that are discrete and homogenous (i.e. splitting habitats such as woodland and arable rather than considering the two habitats as one site) and are as follows:

"A site should be selected as a Wildlife Site if it can be considered as a single, identifiable unit (as explained above) in terms of its bird fauna and where:

- *It is occupied regularly by at least 2.5% of the county population of any one or more bird species, based on the most recent and authoritative data; or*
- *It is occupied regularly as a breeding site by species with a Kent population of 50 or fewer territories; or*
- *It holds ten or more Kent Red Data Book 2 (KRDB2) species in the breeding season; or*
- *It holds three or more Kent Red Data Book 3 (KRDB3) species at the appropriate time of year (normally this should not include a combination of breeding and wintering species).*

3.0 RESULTS

3.1 Survey results

3.1.1 In total 36 bird species were recorded breeding within the Survey Area with a further six species considered likely to be breeding although the territories could not be confirmed. For example, both male and female cuckoos were recorded on several surveys during the period across the Site. The breeding birds are listed in **Table 1** along with the estimated number of territories within the site. The number of territories of very common species including magpie *Pica pica* and wood pigeon *Columba palumbus* were not counted. Population estimates of breeding birds in the UK are also provided (Musgrove et al, 2013).

Table 1 – Breeding bird territory numbers.

Species	**Scientific name**	**Minimum number of pairs**	**Population estimates of birds in the UK. Musgrove *et al 2013*.**
Wood pigeon	*Columba palumbus*	n/a	5,100,000 – 5,700,000
Wren	*Troglodytes troglodytes*	14	7,700,000
Dunnock	*Prunella modularis*	7	2,500,000 [A]
Robin	*Erithacus rubecula*	9	6,700,000
Blackbird	*Turdus merula*	12	5,100,000
Song thrush	*Turdus philomelos*	2	1,100,000
Skylark	*Alauda arvensis*	10	1,400,000
Meadow pipit	*Anthus pratensis*	2	2,000,000
Common whitethroat	*Sylvia communis*	42	1,100,000
Blackcap	*Sylvia atriacapilla*	10	1,200,000
Common chiffchaff	*Phylloscopus collybitta*	9	1,200,000
Cetti's warbler	***Cettia cetti***	**8**	**2,000**
Garden warbler	*Sylvia borin*	1	170,000
European Stonechat	*Saxicola rubicola*	1	59,000
Northern Wheatear	*Oenanthe oenanthe*	1	240,000
Long-tailed tit	*Aegithalos caudatus*	3	330,000
Blue tit	*Cyanistes caeruleus*	4	3,600,000
Great tit	*Parus major*	4	2,600,000
Grey heron	*Ardea cinerea*	5?	13,000
Magpie	*Pica pica*	n/a	600,000
Chaffinch	*Fringilla coelebs*	14	6,200,000
European greenfinch	*Carduelis chloris*	1	1,700,000
European goldfinch	*Carduelis carduelis*	6	1,200,000
Linnet	*Carduelis cannabina*	2	430,000
Reed bunting	*Emberiza schoeniclus*	6	250,000
Reed warbler	*Acrocephalus scirpaceus*	18	130,000
Sedge warbler	*Acrocephalus schoenobaenus*	17	290,000
Tufted duck	*Aythya fuligula*	2	16,000 – 19,000
Mallard	*Anas platyrhynchos*	3	61,000 – 146,000
Moorhen	*Gallinula chloropus*	4	270,000
Mute swan	*Cynus olor*	1	6,400

Species	Scientific name	Minimum number of pairs	Population estimates of birds in the UK. Musgrove *et al 2013*.
Coot	*Fulica atra*	2	31,000
Great spotted woodpecker	*Dendrocopos major*	1	140,000
Northern Lapwing	*Vanellus vanellus*	2	140,000
Stock dove	*Columba oenas*	1	260,000
Rose-ringed parakeet	*Psittacula krameri*	1	8,600
Likely bred on Site but territories not determined			
Common cuckoo	*Cuculus canorus*		15,000
Starling	*Sturnus vulgaris*		1,900,000
Green woodpecker	*Picus viridis*		52,000
Eurasian jay	*Garrulus glandarius*		170,000
Red legged partridge	*Alectoris rufa*		82,000
Recorded but likely not breeding on site			
Lesser whitethroat	*Sylvia curruca*		74,000
Rufous nightingale	*Luscinia megarhynchos*		6,700
Common bullfinch	*Pyrrhula pyrrhula*		220,000
mistle thrush	*Turdus viscivorus*		160,000
carrion crow	*Corvus corone*		
Kestrel	*Falco tinnunculus*		46,000
Barn owl	Tyto alba		
Peregrine	*Falco peregrinus*		1,500

3.1.2 A further three species were recorded on the Site but were considered unlikely to be breeding within the Survey Area, although they may breed elsewhere in the locality: these were shelduck which were regularly recorded within the disturbed ground in the centre of the Site as well as on the water to the west of the Site, and peregrine. Barn owl was recorded once during the bat transect survey on 20th June 2012 near the disused sewage works but subsequent surveys did not record any. Additional records were made on single visits of rufous nightingale, lesser whitethroat, bullfinch and little grebe. A number of birds were recorded associated with the tidal edge which were not considered to be breeding within the Site, these included oystercatcher, cormorant and black headed gull. A little egret was also recorded on a single occasion.

3.1.3 The specific hobby vantage point survey failed to record and hobby, however, kestrel and peregrine were recorded. Kestrel were recorded regularly during the breeding bird surveys but no nest site was found. It was thought most likely that the kestrel breeding site was on the periphery or just outside the Site.

3.1.4 A total of eight territories of Cetti's warbler have been identified. However, during the survey of 3rd May 2012 at least 15 singing Cetti's warbler were recorded but during the next survey the number of singing Cetti's warbler had reduced. This increase in records is considered to be due to birds on passage stopping within the Site during their migration. Cetti's warbler is a species of conservation importance and included on the BoCC3 Red List, UKBAP and NERC

Section 41 list of Species of Principal Importance. The records of higher numbers on 3rd May suggest that a number of birds rested within the Site after migration before moving onto their breeding sites. This is also considered to be the case with common whitethroat whose numbers fluctuated particularly in early May and wheatear, lesser whitethroat where four individuals were recorded during visit 3 on 17th May but not again, nightingale and willow warbler which were also recorded on 17th May only and goldcrest which was recorded only during the final survey. Stonechat has been counted as having a single territory with a bird with nesting material being recorded during the third survey on 17th May 2012; no further records were made of this species until 14th June 2012 when a male and a female were recorded in a different part of the Site.

3.1.5 A small heronry was found in the woodland in the south west of the Site with at least five nests visible from the ground. Visibility to the nests was poor due to the topography of the Site so it was difficult to determine how many of these nests were used during the 2012 breeding season. Territories of mistle thrush *Turdus viscivorus* and carrion crow *Corvus corone* were not identified and it is considered likely that carrion crow possibly nest within the woodland at the southern part of the Site whilst mistle thrush were only recorded very infrequently.

3.1.6 Of the 42 species recorded breeding or potentially breeding within the Site, only a single species included on Schedule 1 of the Wildlife and Countryside Act (as amended) 1981, has been confirmed to be breeding within the Site, this being Cetti's warbler. Six further species including song thrush, common cuckoo, starling, dunnock, linnet, lapwing, skylark and reed bunting met the range of conservation status criteria detailed above by being included in the Red List of Birds of Conservation Concern (BoCC3). These species are detailed in **Table 2**.

Table 2 – Breeding Species at Site meeting conservation status criteria.

Species	**WCA 1981**	**BoCC Red List**	**UK BAP**	**LBAP**	**NERC Act 2006 Section 41***
Cetti's warbler	•				
Song thrush		•	•	•	•
Lapwing		•	•		•
Linnet		•	•	•	•
Common cuckoo		•	•		•
Dunnock			•		•
Reed bunting			•	•	•
Skylark		•	•	•	•
Starling		•	•		•

*Species of Principal Importance in England

3.1.7 The Red List of Birds of Conservation Concern (BoCC3) are species whose breeding population has decreased or whose breeding range has contracted by 50% or more in the preceding 25 years or, those that have declined historically and not shown a substantial recent recovery. All

species other than Cetti's warbler are included as Biodiversity Action Plan Priority Species and in the NERC list of species of principle importance, whilst song thrush, linnet and reed bunting are also included within the Kent Biodiversity Action Plan. Several other species recorded breeding within the Site are 'Amber' listed on the BoCC3 list including dunnock, stock dove and green woodpecker.

3.2 Distribution of breeding species of conservation importance

3.2.1 The distribution of all confirmed territories and other records of the species of conservation importance are indicated in **Figures 1 and 2**.

Cetti's warbler

3.2.2 A total of eight territories of Cetti's warbler were recorded. These were associated with the reed beds and scrubby areas. Four territories were recorded around the Swanscombe Marshes area and three along the pathway adjacent to the sewage works with a further territory to the east of the CTRL line. The species is typically found in wet swampy areas near the water's edge where there is low and fragmented scrubby cover. Male birds mark their territory by singing and can move quite long, linear distances up to 450m in length, although some male territories may overlap in areas with a high density of Cetti's warblers. More than one female may nest within a single male's territory so the total number of territories cannot be considered the same as the number of pairs on the site.

Song thrush

3.2.3 Only two song thrush territories were identified one within the sewage works area the second in the woodland to the south of Swanscombe Marshes. The song thrush is still a relatively common and widespread species throughout the British Isles, despite undergoing a substantial population decline and thus being listed on the BoCC3 Red List.

Common cuckoo

3.2.4 Cuckoo was heard on several occasions during the course of the surveys the earliest being on visit 2 on 3rd May 2012. On 31st May four recordings were made of cuckoo at different times. A male was seen in the Central spine of the Site to the west of the CTRL and a female was seen to the east of the Site near Botany Marshes, a further two registrations of calling birds were recorded on the same date with one over Swanscome Marshes and the second in the centre of the Site in the scrubby area to the west of the sewage works. This species will have used the Site for breeding and laid eggs into the nests of host species such as dunnock and reed warbler.

Reed bunting

3.2.5 At least 6 territories of reed bunting were recorded. These were generally associated with the reed beds of Swanscombe Marshes and the reeds to the east of the CTRL. One pair was recorded in the northern Broadness section of the Site associated with the scrub habitats near the large pylon. Reed bunting is a generally widespread species throughout the UK as a whole, although declines have been noted.

Dunnock

3.2.6 At least 7 territories of dunnock were recorded. This is likely to be an underestimate as they breed early in the season with egg-laying from late March/early April and therefore they may have been under-recorded later in the season meaning that territories were not marked with repeat registrations. The territories were generally recorded in areas of scrub with one recorded within the disused sewage works and three pairs in the area dominated by scrub to the west of this in the Central Spine. A single territory was found to the very west of the Site. Very few recordings were made of this species in the Broadness area. On one occasion two dunnock were recorded near the boat yard. Dunnock tend to nest low down, usually 0.5 – 3.5m above ground level, therefore it is considered possible that there was insufficient cover for the species to the north of the Site where areas of suitable habitat are relatively isolated from each other.

Lapwing

3.2.7 Only two territories of this species were considered likely to be present during the surveys, with both on Botany Marshes. In both areas only two registrations were made at the southern location, on 3rd May a pair of lapwings were recorded and on 17th May a lapwing was showing aggression towards a carrion crow, no further recordings were made of the species and it may have been that the nest was abandoned. Aggressive behaviour between a lapwing and a carrion crow were also recorded to the north on 31st May after displaying behaviour had been recorded on 5th April, however a further record of lapwing was also made on 14th June.

Linnet

3.2.8 Only two territories of this species were recorded although it is considered likely that this is an under recording. The linnet territories were recorded in scrub associated with the landfill in the centre of the Site. No linnets were recorded to the north of the Site until the survey on 31st May when five single birds were recorded. Similarly on 14th June nine single recordings were made in this northern section and on 21st June several small groups of linnets were recorded in different locations to where the single registrations had been made. No territories could be determined as a maximum of two registrations were made in similar areas. For example, one possible territory may be near the boat yard where a single linnet was recorded on 14th June and then small group of 5 birds was recorded on 21st June. The species breeds low down in

dense scrub or thorny trees or bushes; early broods are often in evergreens and later nests in deciduous shrubs when cover is thick. Outside the breeding season linnets often move to more open habitats including salt-marsh, shingle banks and farmland. It is considered likely that the numbers of linnet territories is under recorded with more territories present on the scrub covering the land fill than could be recorded without access over this area.

Skylark

3.2.9 At least 10 territories of this species were recorded most were associated with the open grassland habitats to the north of the Site with one territory recorded along the western edge of the Site and one in the central disturbed ground area. Skylark are ground nesting birds and tend to nest in the open or among short vegetation such as grass or growing crops. There was an increase in the number of registrations of this species made during survey of 5th May; this is considered likely to be birds migrating through the Site.

Starling

3.2.10 No specific nesting areas were determined during the survey. However, post-breeding flocks of juvenile birds were recorded during the first survey in the west of the Site. This indicates that breeding had been completed for many pairs prior to the onset of the survey. The available nesting resources within and adjacent to the Site are considerable. There are a number of trees with suitable nesting places and it is on the urban fringe where there are many buildings offering suitable nesting resources. It is considered highly likely that starling territories were within the Site. Several areas were attractive to feeding flocks and for roosting birds.

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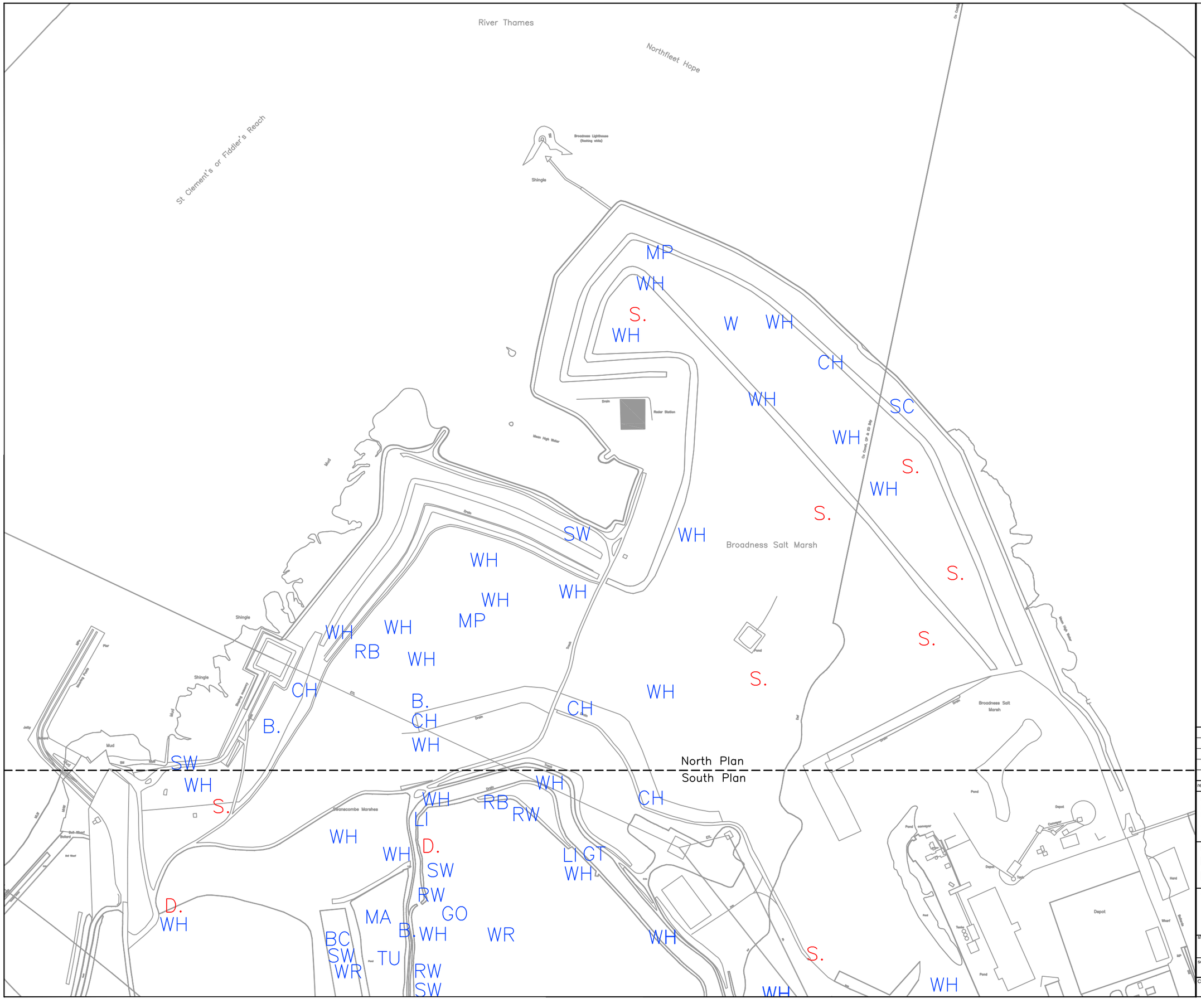
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FIGURES



Key

GW = Garden warbler
CH = Chaffinch
MA = Mallard
MS = Mute swan
WH = Whitethroat
CW = Cetti's warbler (15xcw on 03/05/12)
MH = Moorhen
D. = Dunnock
B. = Blackbird
BC = Blackcap
RW = Reed warbler
S. = Skylark
SW = Sedge warbler
CC = Chiffchaff
WR = Wren
R. = Robin
ST = Song thrush
GR = Greenfinch
GO = Goldfinch
RB = Reed bunting
H. = Grey heron
BT = Blue tit
CO = Coot
GS = Great spotted woodpecker
GT = Great tit
LI = Linnet
L. = Lapwing
LT = Long-tailed tit
MP = Meadow pipit
SD = Stock Dove
SC = Stonechat
TU = Tufted duck
W. = Wheatear

ST = Red BoCC3 SPP1

revision	description	date	checked by

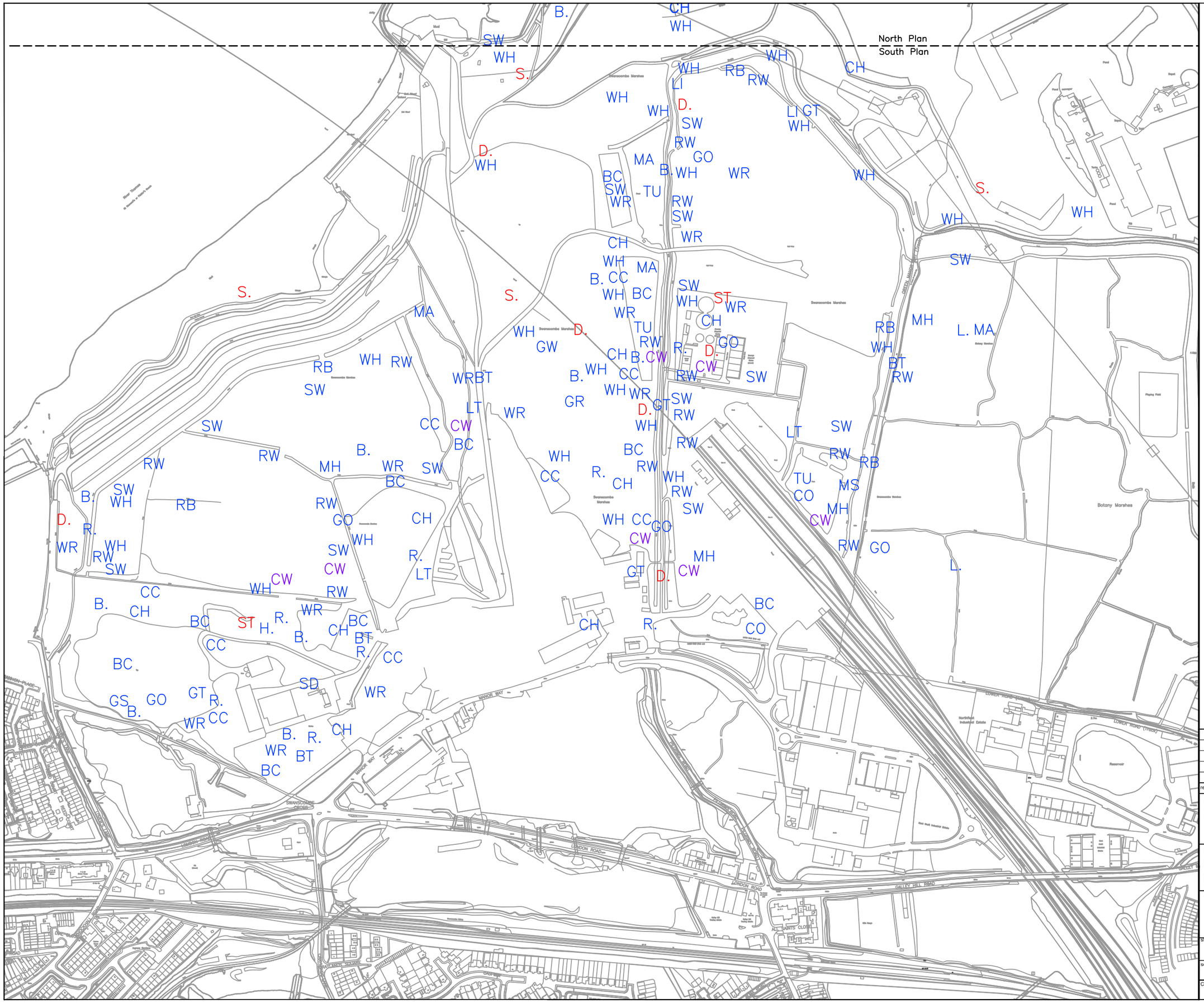
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Project:
London Paramount - Breeding Bird Survey

Title:
Breeding Bird Territories - North

status		drawing no.		
		Figure 1		
scale	size	date	drawn	checked
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Project:
London Paramount - Breeding Bird Survey

Title:
Breeding Bird Territories - South

status		drawing no.		
		Figure 2		
scale	size	date	drawn	checked
NTS	**A3**	**04-02-2014**	**MB**	**HL**

CAD filename
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APPENDICES

Appendix 1: BTO Codes

Species	Code
Wood pigeon	WP
Green woodpecker	G.
Wren	WR
Dunnock	D.
Robin	R.
Blackbird	B.
Song thrush	ST
Common whitethroat	WH
Blackcap	BC
Common chiffchaff	CC
Long-tailed tit	LT
Blue tit	BT
Great tit	GT
Black-billed magpie	MG
Eurasian jay	J.
Chaffinch	CH
European greenfinch	GR
European goldfinch	GO
Eurasian jackdaw	JD
Common bullfinch	BF
Reed warbler	RW
Sedge warbler	SW
Lesser whitethroat	LW
Rufous nightingale	N.
Hobby	HY
Stock dove	SD
Common cuckoo	CK
Starling	SG
Common bullfinch	BF
House sparrow	HS

Appendix 2: Summary of Legislation

Birds are protected by four major pieces of legislations, and in hierarchal order:

- EC Directive on the Conservation of Wild Birds 1979 (The Birds Directive);
- The Conservation (Natural Habitats, &c.) Regulations 1994 (The Habitats Regulations);
- Wildlife and Countryside Act (as amended) 1981; and
- The Countryside and Rights of Way Act 2000 (CRoW Act 2000).

The Birds Directive was adopted by the EC in response to the 1979 Bern Convention on the conservation of European habitats and species. Birds are listed in Annex 1 of the Birds Directive with its purpose to maintain the favourable status of all wild birds' species and identify and classification of Special Protection Areas (SPA's).

The Wildlife and Countryside Act (as amended) 1981 gives protection to all birds during the breeding season which includes Schedule 1 affording special protection to birds. Schedule 1 birds are protected at all times.

The CRoW Act 2000 strengthened aspects of the Wildlife and Countryside Act legislation, importantly adding that 'reckless' disturbance of birds, including those listed on Schedule 1 during the breeding season is now subject to prosecution under the law.

In the UK, the provisions of the Birds Directive are implemented through the WCA 1981 and The Conservation (Natural Habitats, &c.) Regulations 1994.

Listings

The gradual decline in certain UK bird species has been further emphasised by the Population Status of Birds in the UK – Birds of Conservation Concern3 (BoCC3) 2009 listings (Eaton et al 2009). Birds are listed against specific criteria into Red, Amber and Green lists. Red listed birds include those that are globally threatened, or have suffered historical population declines. For example, a rapid (>50%) decline in UK breeding population over last 25 years or a rapid (>50%) contraction of UK breeding range over last 25 years.

In response to the Convention of Biological Diversity (Rio) 1992, the UK implemented the launch of Biodiversity: the UK Action Plan in 1994 (UK BAP). This outlined the UK Biodiversity Action Plan for dealing with biodiversity conservation in response to the Rio Convention, which listed several species and habitats of biological importance with specific national priorities and targets. More recently the 'List of habitats and species important to biological conservation in England', prepared under Part 3, section 74 of the CRoW Act 2000, has been produced (Defra, 2000) which largely mirrors the UK BAP list.



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Annex EDP 18
Common Bird Survey Report (Corylus Ecology April 2016)

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London Paramount Entertainment resort

COMMON BIRD SURVEY (CBC) REPORT

DRAFT

For and on behalf of

Chris Blandford Associates

APRIL 2016

Corylus Ecology

Unit A3 Speldhurst Business Park, Langton Road, Speldhurst, Tunbridge Wells, Kent. TN3 0NR
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Figure 3 – Survey results Bamber Pit

Figure 4 – Survey results Northfleet Landfill

Figure 3 – Survey results Springhead Nursery

Appendices

Appendix 1 – Survey Dates

1.0 INTRODUCTION

1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.2 The Breeding Bird Survey was undertaken by surveyors from Corylus Ecology and CBA. This report details the methodology, results and evaluation of the Breeding Bird survey undertaken between March and June 2015 with an additional later visits conducted in July 2015 to look for late arriving species or to carry out Vantage Point surveys for specific birds of prey.

Scope of Survey

1.3 The scope of the survey encompassed:

- Undertake a breeding bird survey of the new areas of the Site where access was previously not possible to determine numbers of breeding bird territories;
- Carry out species specific Cetti's warbler and nightingale surveys;
- Carry out a vantage point survey for hobby and barn owl;
- Evaluate the conservation importance of the Site for birds; and,
- Provide information to inform the impact assessment of the proposals for the area.

Survey Limitations

1.4 The surveys were all carried out in good weather conditions and during the dates required by the species specific survey methodologies. The surveys were limited by access and suitable vantage points particularly for the northern part of Black Duck Marsh and the CTRL Wetlands. This is considered to be a standard limitation when wetlands and reedbed systems are present within a survey area.

1.5 Access into Bamber Pit was restricted for the duration of the breeding bird surveys with access only permitted in the northern section later in the summer. It is considered that territories of quiet and more elusive bird species such as bull finch may have been missed in this area.

Key Findings

1.6 The breeding bird assemblage within the Peninsular fulfils the criteria to be considered County Importance in the following ways:

- the Peninsular supports at least 54 breeding bird species (*Fuller* and KWT).
- supports more than three KRDB3 species (nine are recorded). (KWT)

- supports at least 2.5% of the county population of one or more bird species - Cetti's warbler, grasshopper warbler and bearded tit.

1.7 Based on the range of species of conservation importance recorded it is considered that the Peninsular should be considered as being of at least Regional Importance for its breeding birds. The assemblage recorded within the Peninsular supported: -

- at least three Schedule 1 species breeding in 2015,
- 11 BoCC Red List species and Species of Principal Importance and
- seven species monitored by the Rare Breeding Bird Panel -.

1.8 The three other survey areas, Bamber Pit, Northfleet Landfill and Springhead Nurseries supported fewer bird species and therefore fewer of the species of conservation importance. The evaluations of these areas is set out below:

- Botany Marshes – Local Importance
- Springhead Nursery – Local Importance
- Northfleet Landfill – Neighbourhood Importance

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Records for birds were requested from Kent and Medway Biological Records Centre and Essex Field Club for a distance of 2km from the Site. Citations for SSSI's and SPA's have also been reviewed.

2.2 Survey Methodology

CBC Survey

2.2.1 The survey methodology was an adapted Common Bird Census methodology (CBC) which involved standard territory (registration) mapping techniques as detailed in Bibby *et al*. (2000) and Gilbert *et al* (1998). This method is based on the observation that many species during the breeding season are territorial. This is found particularly amongst passerines, where territories are often marked by conspicuous song, display, and periodic disputes with neighbouring individuals.

2.2.2 All bird locations were mapped using standard British Trust for Ornithology (BTO) one and two letter species codes on an appropriate field map. Specific diagrammatic codes were also used for singing, calling, movements between areas, flying, carrying food, nest building, aggressive encounters and other behaviour. The expected outcome of this technique is that mapped registrations fall into clusters, approximately coinciding with territories.

2.2.3 The Survey Areas were walked at a slow and methodical pace in appropriately fine weather in order to detect, locate and identify all individual birds. All field boundaries and suitable breeding habitats were walked.

2.2.4 Surveys were undertaken between April and June, and where possible, each survey visit was approximately ten days apart with a total of six survey visits taking place.

2.2.5 For each survey, a fresh field map was used on each survey visit which was then used to create an individual species master map, following the completion of the surveys. This data analysis follows procedures detailed in Gilbert *et al*. (1998). The number of territories for each species was calculated from the species master map.

2.2.6 For late flying migrants, for example spotted flycatcher *Muscicapa striata* for which fewer potential contacts are possible, only one registration is required to confirm a territory which can also be applied to inconspicuous species.

2012 Surveys

2.2.7 The Peninsular (excluding Botany Marsh East) was subject to a CBC survey in 2012. Due to the size of the Peninsular Survey Area, the Site was surveyed by two ornithologists on the same day; one covering the north and west of the Site, the second covering the south and east. Visits were undertaken early in the morning according to sunrise time and the earliest start was at 04:45hrs.

2015 Surveys

2.2.8 Further CBC surveys were undertaken in 2015 extending to the areas where access had not been possible in 2012. The areas are as follows;

- Botany Marsh – Full CBC survey
- Springhead Nursery – Full CBC survey
- Bamber Pit – Full CBC survey
- Northfleet Landfill – Full CBC survey

2.2.9 In addition, during the winter bird surveys undertaken in autumn/winter 2014/15 it was noticed that the habitat within Black Duck Marsh had changed significantly since 2012 with higher water levels and a greater extent of reed bed. The Channel Tunnel Rail Link Wetland (CTRL Wetland) had also changed with the areas of visible open water seen during the 2012 surveys completely obscured by reed bed. As the majority of the habitats on the Peninsular had not changed since 2012 and rather than re-surveying the entire Peninsular Survey Area only Black Duck Marsh and the marshes surrounding the Channel Tunnel Rail Link (CTRL Wetland) were subject to the following specific surveys:

- Black Duck Marsh - Species specific surveys for Cetti's warbler and nightingale plus update of CBC to record species not recorded in 2012;
- CTRL Wetland - Species specific surveys for Cetti's warbler and nightingale

Cetti's Warbler Specific Surveys

2.2.10 Cetti's warbler *Cettia cetti* had been recorded during the 2012 surveys within Black Duck Marsh and the CTRL Marsh and were known to occur within Botany Marshes. Surveys to specifically determine the number of territories of this species were therefore undertaken. Gilbert *et al.* (1998) specify three surveys between dawn and 11am. The male birds patrol their territory boundaries at about half hourly intervals and can move quite long distances with linear territories along rivers extending up to 450m long. The aim is therefore to record simultaneously or countersinging male birds. For the subject survey surveyors worked in pairs across the Site communicating with long-range radios; two either side of Black Duck Marsh, two either side of the CTRL reedbeds and two through Botany Marshes. Maps showing

200m lengths of ditches were used to help determine distances. The three surveys were undertaken within the following timeframes:

1) Between end March and mid-April;
2) Between mid-April and mid-May
3) Between mid-May and early June

Nightingale

2.2.11 Nightingale *Luscinia megarhynchos* had been recorded during the 2012 CBC survey of the peninsular but were not confirmed breeding. However, due to this record specific nightingale surveys were planned. Gilbert *et al*. (1998) specifies at least two but preferably four surveys in May with one between 7th – 15th May. These surveys are recommended as being midnight to dawn but that the first five hours of daylight are acceptable. The more recent BTO surveys have a slightly different methodology. At least two early morning surveys are recommended during the early spring (21st April to 20th May) with two nocturnal visits during 18th May to 4th June. The main aim of the nocturnal surveys is to discover whether singing birds already detected by the daytime surveys are in song during the hours of midnight to 03:00, which would be indicative of unpaired individuals. The timeframe of the surveys are as follows:

1) Mid to end April – early morning after dawn
2) Early to mid-May - early morning after dawn
3) Post-midnight survey week commencing 18th May
4) Post-midnight survey week commencing 1st June

Vantage Point Surveys for Raptors

2.1.7 In addition to the CBC surveys separate vantage point (VP) surveys for hobby *Falco subbuteo* and barn owl *Tyto alba* were undertaken. The Peninsular was subject to this survey type during 2012 and both the Peninsular and Springhead Nursery were subject to VP surveys in 2015.

2.3 Evaluation Methodology

2.3.1 Birds recorded during the survey were placed in both a national and local context in order to identify species of conservation importance. The conservation importance of the breeding bird populations were determined using the criteria specified below.

(a) the presence of breeding species of recognised international conservation importance i.e. species listed on Annex I of EC Directive 79/409/EEC on the Conservation of Wild Birds 1979;
(b) the presence of breeding species of recognised national conservation importance i.e. species listed on Schedule 1 of the Wildlife and Countryside Act 1981;

(c) the presence of Birds of Conservation Concern (BoCC4) Red List species (Eaton *et al* 2015);
(d) the presence of species identified as Priority Species in the UK Biodiversity Action Plan (UK BAP)
(e) the presence of species identified on the IUCN European Red List
(f) the presence of species listed under the Natural Environment and Rural Communities Act 2006 (NERC Act) Section 41 Species of Principal Importance in England; and
(g) Kent Local Biodiversity Action Plan.

2.3.2 A category of 'Local Importance' was used for species that did not reach regional or County importance but were still of some ecological value. This included all species on the Red List of Birds of Conservation Concern (BoCC4): 2015 (Eaton *et al* 2009) and species identified in the Kent Local Biodiversity Action Plan.

2.3.3 The breeding bird assemblage of the Site was also evaluated against the standard JNCC guidelines for the selection of biological SSSIs (JNCC 1995).

2.3.4 Finally, an additional evaluation method has also been used. Species richness is a simple and effective measure of diversity that can be used to describe conservation value separately for breeding, passage and wintering bird communities. Fuller (1980) provided the following criteria for the evaluation of Sites for the breeding bird diversity where the number of species found breeding in an area can be given a value as shown below:

National	*Regional*	*County*	*Local*
85+	84-70	69-50	49-25

2.3.5 The criteria used for the designation of Local Wildlife Sites (previously known as SINCs or County Wildlife Sites) in Kent were used to assess the local importance of the Study Area for birds (Kent Wildlife Trust, 2015). The criteria are designed to be applied to areas of habitat that are discrete and homogenous (i.e. splitting habitats such as woodland and arable rather than considering the two habitats as one site) and are as follows:

"*A site should be selected as a Wildlife Site if it can be considered as a single, identifiable unit (as explained above) in terms of its bird fauna and where:*

- *It is occupied regularly by at least 2.5% of the county population of any one or more bird species, based on the most recent and authoritative data; or*
- *It is occupied regularly as a breeding site by species with a Kent population of 50 or fewer territories; or*
- *It holds ten or more Kent Red Data Book 2 (KRDB2) species in the breeding season; or*

- *It holds three or more Kent Red Data Book 3 (KRDB3) species at the appropriate time of year (normally this should not include a combination of breeding and wintering species);*
- *It holds one of the five largest colonies of colonial seabirds (with the exception of herring gull and black-headed gull), grey heron, little egret or sand martin; or*
- *It has been recorded as being regularly used in recent years by at least 50 breeding bird species.*

3.0 RESULTS

3.1 Desk Study

Designated Sites

3.1.1 The West Thurrock Lagoon and Marshes SSSI is designated for its bird assemblage. Whilst the principle reasons for its designation are the wintering wader and wildfowl assemblage the citation also refers to the presence of large reed beds which support reed and sedge warblers and breeding populations of bearded tit. At its closest point the SSSI is some 1.5km to the west of the Site.

3.1.2 The Inner Thames Marshes SSSI is some 6km to the west of the Site. It is designated for the numbers of wintering wildfowl, waders and birds of prey with wintering teal populations reaching levels of international importance.

3.1.2 The nearest SPA is the Thames Estuary Marshes SPA/Ramsar, which is approximately 7km east of the Site. The SPA is made up of the South Thames Estuary & Marshes SSSI (south bank of the Thames) and Mucking Flats & Marshes SSSI (north side of the Thames). This site qualifies for supporting specific species which winter within the SPA.

Records Centre Data

3.1.3 Kent Bird Records Summary provides records of 220 bird species within 2km of the Site. Essex Field Club have not provided any records of birds within the search area.

3.1.4 Of the 220 species, 172 species were recorded in Swanscombe Marsh and 21 species were recorded at Northfleet (OS Grid Reference TQ6174), which falls within the area of the Site known as Northfleet Landfill. The 193 species records from within the Site range from 1963 to 2012; eight of the records are historic and are species which have either reduced in numbers drastically and unlikely to be present within the Site or would be considered rare vagrants which are unusual occurrences in the UK. These records included: glossy ibis *Plegadis falcinellus*, corncrake *Crex crex*, Richard's pipit *Anthus novaeseelandiae*, puffin *Fratercula arctica*, great northern diver, whooper swan *Cygnus Cygnus,* hooded crow *Corvus corone cornix* and black-headed weaver *Ploceus melanocephalus*..

3.1.5 Thirty-eight of the species recorded and confirmed breeding at Swanscombe Marsh are BoCC Red List species. These include turtle dove *Steptopelia turtur* recorded 33 times between 1999 and 2007, cuckoo *Cuculus canorus,* yellow wagtail *Motacilla flava*, grasshopper warbler *Locustella naevia*, nightingale *Luscinia megarhynchos*, grey partridge *Perdix perdix*, lapwing *Vanellus vanellus*, marsh tit *Parus palustris*, starling *Sturnus vulgaris*, house sparrow *Passer domesticus*, linnet *Carduelis cannabina*, lesser redpoll *Carduelis cabaret,* lesser spotted woodpecker *Dendrocopus major*, skylark *Alauda arvensis*, yellowhammer *Emberiza citronella,* mistle thrush *Turdus viscivours*, grey wagtail

Motacilla cinerea and corn bunting *Millaria*. The summer species records range from three sightings to 73 sightings; cuckoo was recorded 73 times between 1994 and 2012. There are three records for grasshopper warbler from 2001 and 11 records for nightingale from 2011. There are 60 species on the BoCC Amber List including dunnock *Prunella modularis* and kestrel *Falco tinnunculus*.

3.1.6 Other species that are not on the BoCC Red or Amber lists but that are listed on Schedule 1 of the Wildlife and Countryside Act 1981 and have been recorded from Swanscombe Marsh include hobby *Falco subbuteo*, peregrine *F. peregrinus*, little ringed plover *Charadrius dubius*, brambling *Fringilla montifringilla* and common crossbill *Loxia curistra*. The most recent records for these species range between 2008 and 2012.

3.1.7 Five of the species recorded at Northfleet are on the BoCC Red List including hawfinch *Coccothraustes coccothraustes,* this species was recorded in the winter of 1990 and summer of 1992. Three species Arctic skua *Stercorarius parasiticus*,common scoter *Melanitta nigra* and Slavonian grebe *Podiceps auritus* were recorded in the winter; Arctic skua was recorded four times in 2008,common scoter was recorded three times in 2003 and Slavonian grebe was recorded four times between 2004 and 2012. Artic skua and common scoter are likely to be have been wintering species recorded along the Thames. There are summer and winter records for shag *Phalacrocorax aristotelis*. Eight species recorded at Northfleet are on the BTO BoCC Amber List.

3.1.8 The records for species recorded in the wider desk study area which are associated with habitats found onsite during the summer and are on the BoCC Red List are: tree sparrow *P. montanus* (breeding record, historic 1968), spotted flycatcher *Muscicapa striata* (breeding record) and tree pipit *Anthis trivialis* (breeding record, historic 1968), all three species were recorded near Longfield (OS Grid Reference TQ67), some 2.6km to the south of the edge of the Site or 5.8km from southern boundary of peninsular in 1968 and 2011.

3.1.9 There are also records for BoCC red list species that have been recorded at Swanscombe Marshes but have not been shown as being breeding records within the KMBRC data. These include herring gull *Larus argentatus,* black redstart *Phoenicurus ochruros,* kittiwake *Rissa tridactyla* ringed plover *Charadrius hiaticula,* woodcock *Scolopax rusitcola*, curlew *Numenius arquata.* All of these species were recorded at Swanscombe Marsh. There are 95 records of ringed plover and 90 records for curlew, records for both species range from between 1994 and 2012 and include summer and winter records. There are three records for black redstart all in 2010.

3.2 2012 Peninsular Surveys

3.2.1 In total 36 bird species were recorded breeding within the Peninsular Survey Area in 2012 with a further six species considered likely to be breeding although the territories could not be confirmed. For example, both male and female cuckoo were recorded on several surveys during the period across the Site. The breeding birds are listed in Table 1 along with the estimated number of territories within the site. The number of territories of very common species including magpie *Pica pica* and wood pigeon *Columba palumbus* were not counted. Population estimates of breeding birds in the UK are also provided (Musgrove *et al*, 2013).

3.2.2 A further three species were recorded on the Site but were considered unlikely to be breeding within the Survey Area, although they may breed elsewhere in the locality: these were shelduck *Tadorna tadorna* which were regularly recorded within the disturbed ground in the centre of the Site as well as on the water to the west of the Site, and peregrine *Falco peregrinus*. Barn owl was recorded once during the bat transect survey on 20th June 2012 near the disused sewage works but subsequent surveys did not record any. Additional records were made on single visits of rufous nightingale, lesser whitethroat *Sylvia curruca*, bullfinch *Pyrrhula pyrrhula* and little grebe *Tachybaptus ruficollis*. A number of birds were recorded associated with the tidal edge which were not considered to be breeding within the Site, these included oystercatcher *Haematopus ostralegus*, cormorant *Phalacrocorax carbo* and black-headed gull *Chroicocephalus ridibundus*.

3.2.3 The specific hobby vantage point survey in 2012 failed to record hobby, however, kestrel and peregrine were recorded. Kestrel were recorded regularly during the breeding bird surveys but no nest site was found. It was thought most likely that the kestrel breeding site was on the periphery or just outside the Site.

3.2.4 A total of eight territories of Cetti's warbler were been identified. However, during the survey of 3rd May 2012 at least 15 singing Cetti's warbler were recorded but during the next survey the number of singing Cetti's warbler had reduced.

3.2.5 A small heronry was found in the woodland in the south west of the Site with at least five nests visible from the ground. Visibility to the nests was poor due to the topography of the Site so it was difficult to determine how many of these nests were used during the 2012 breeding season. Territories of mistle thrush and carrion crow *Corvus corone* were not identified and it is considered likely that carrion crow possibly nest within the woodland at the southern part of the Site whilst mistle thrush were only recorded very infrequently.

2015 Update survey of Blackduck Marsh and additional confirmed Species

3.2.6 During the 2015 surveys further species were recorded breeding within the Black Duck Marsh area which hadn't been recorded in 2012; these are listed in Table 1. The most significant of these were: marsh harrier *Circus aeruginosus* and bearded tit *Panurus biarmicus*. A single territory of marsh harrier was recorded within the marsh with male and female bird recorded regularly. At least two territories of bearded tit were recorded one to the east and one to the west. Both of these species are Schedule 1 listed bird species on the Wildlife and Countryside Act (as amended).

3.2.7 In addition, pochard *Aythya ferina*, gadwall *Anas strepera*, little grebe, little egret *Egretta garzetta* and water rail *Rallus aquaticus* were recorded but either infrequently (in the case of water rail) or by sound only (little grebe and water rail) and so it could not be completely confirmed whether they bred within this area of wetland or not, or how many territories were present although it is considered likely that they did (the little egret within or near to the heronry).

3.2.8 Within the wider Peninsular two species were recorded breeding which had not been recorded in 2012, these were: grasshopper warbler breeding in scrub to the north of Botany Marshes and raven *Corvus corax* which was recorded breeding on the large pylon at the south eastern corner of Broadness.

3.2.9 Specific Vantage Point surveys were undertaken on 16th July 2015 to look specifically for presence of hobby and barn owl. Neither of these species were recorded, kestrel was the only bird of prey recorded on that date. However, a barn owl was recorded flying between Botany Marsh West and the NE Tip on 16th June 2015 c 22.30hrs during bat survey. Kestrel were found breeding in Craylands Pit just south of the peninsular.

3.2.10 The specific Cetti's warbler surveys recorded a total of 20 male birds with individual territories within the Peninsular. Of these 20, eight were in or near to Black Duck Marsh, and 11 in Botany Marsh West and CTRL wetland areas. A single territory was recorded to the north in scrub near to the Jetty to the west of Broadness.

3.3 2015 Botany Marshes East

3.3.1 A total of 26 bird species were recorded breeding and two further species likely breeding, making a total of 28 species within the Botany Marshes East Survey Area in 2015. The breeding birds are listed in Table 2 along with the estimated number of territories within the site.

3.3.2 A total of 14 male Cetti's warblers with individual territories were recorded. In addition one, possibly two territories of bearded tit were also recorded in the north of the survey area. Both of these species are included within Schedule 1.

3.3.3 A further three BoCC Red List species were recorded with breeding territories within this area including song thrush *Turdus philomelos*, house sparrow and cuckoo. Little egret was recorded regularly within the wetland areas within this part of the survey area and was seen hunting and eating frogs on one occasion. No nest was recorded here.

3.4 Bamber Pit

3.4.1 A total of 22 bird species were recorded breeding within the Bamber Pit Survey Area in 2015 with a further four species considered likely to be breeding although the territories could not be confirmed. For example, cuckoo was recorded on three surveys in three locations across the Site. The breeding birds are listed in Table 2 along with the estimated number of territories within the site.

3.4.2 A further five species were recorded on the Site but were considered unlikely to be breeding within Bamber Pit, although they may breed elsewhere in the locality: these were tawny owl (during bat surveys) starling *Sturnus vulgaris* and mallard *Anas platyrhynchos*, pochard and little grebe which were occasionally recorded within the Site, the latter three on the lake.

3.4.3 The northern and southern sections of the Site are dominated by dense bramble scrub and thickets of elder *Sambucus nigra* and willow *Salix* sp. with a large open, gravelly area in the centre. There is a quarry lake in the east of the Site. The lake is surrounded by dense vegetation. Activity and territories were concentrated in the dense scrub in the south and north of the Site and around the quarry lake. Territories outside these areas were infrequent or absent, particularly the areas of low vegetation and gravel in the centre of the Site. The highest number of territories recorded for a single species were whitethroat *Sylvia communis* (seven territories) and blackcap *Sylvia atricapilla* (six), distributed across the Survey Area. Single territories were identified for jay *Garrulus glandarius*, long-tailed tit *Aegithalos caudatus*, goldfinch *Carduelis carduelis* and chaffinch *Fringilla coelebs*.

3.4.4 A single nightingale territory was identified with a possible second territory present within the Site. This species was first recorded during a dusk bat survey on 22nd April 2015 when two nightingale were recorded singing, one to the north of the quarry lake and a second to the west alongside the northern cliff edge. During the morning surveys nightingale were confirmed during visits 3 to 6 by the northern cliff edge only. During the specific evening nightingale survey, a single nightingale was heard in the vegetation to the north of the quarry lake. However, earlier in the evening during a bat survey a nightingale had been heard in the location of the confirmed territory. Nightingale is included on the BoCC4 Red List.

3.4.5 With regard to other species of conservation significance three song thrush territories were identified, two along the northern cliff edge and one in the central area. Two species, song thrush and cuckoo are included on the BoCC4 Red List, UKBAP and NERC Section 41 list of Species of Principal Importance. Four song thrush territories were recorded whilst cuckoo were heard during three surveys; twice along the northern edge of the Site and once in the south-west corner of the Site. Five dunnock *Prunella modularis* territories and one bullfinch territory were identified. Both species are included on the BoCC4 Amber List.

3.5 Springhead Nursery

3.5.1 A total of 25 bird species were recorded breeding within the Springhead Nursery Survey Area in 2015 with a further two species recorded on Site and considered likely breeding although exact territories were not identified. The breeding birds are listed in Table 2 along with the estimated number of territories within the site.

3.5.2 The Site consists of a large area of tall grassland dominated by coarser species with patches of bramble *Rubus fruticosus* agg. sp. scrub throughout. In the south-west corner is a small fragment of broadleaved woodland. The eastern section of the Site is dominated by the wetland habitats of the Ebbsfleet, with riparian vegetation dominated by sedges and willow and a strip of broadleaved woodland to the east and west. Activity and territories were concentrated in east along the Ebbsfleet, the fragment of woodland in the south-west and at the boundaries of the Site. Territories outside of these areas were restricted to a patch of denser bramble scrub in the centre of the Site, or restricted to species associated with open grassland habitats such as skylark *Alauda arvensis* (two territories). Skylark is included on the BoCC4 Red List, UKBAP and NERC Section 41 list of Species of Principal Importance.

3.5.3 With regards other species of conservation significance a single Cetti's warbler territory was identified in the centre of the eastern section of the site, in the habitats surrounding the Ebbsfleet. Two song thrush (see 3.4.3) territories were identified, toward the south-east corner of the site, three dunnock (see 3.4.3) territories were identified; one in the centre of the Site and one in the south-west corner. Two linnet territory was identified in the south of the Site. Linnet is included on the BoCC4 Red List, UKBAP and NERC Section 41 list of Species of Principal Importance. Four coot *Fulica atra* territories were identified, three located at the northern section of the Ebbsfleet and one in the balancing pond. Common coot are included on the IUCN European Red List, classified as of 'Least Concern'. Two ring-necked parakeet *Psittacula krameri* territories were identified in the south-east section of the site near the Ebbsfleet. Ring-necked parakeets are a non-native species established in the wild in Britain and included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). The highest number of territories recorded for single species were wren (10 territories) and blackbird (seven) and whitethroat (six), distributed across

the Site. Single territories were identified for blue tit *Cyanistes caeruleus*, chaffinch, greenfinch *Carduelis chloris* and great tit *Parus major*

3.5.4 A further two species are considered likely to be breeding although the territories could not be confirmed. Cuckoo (see 3.4.3) was recorded on one survey in the south-east corner by the Ebbsfleet. A second record of cuckoo was made in the south of the Ebbsfleet during a dusk bat survey. Grey wagtail *Motacilla cinerea* was recorded in the north-east corner of the Site on one survey. A second record of grey wagtail in the north-east corner was made during a reptile survey of the adjacent grassland. Grey wagtail is included on the BoCC4 Red List, UKBAP and NERC Section 41 list of Species of Principal Importance. A lesser whitethroat was recorded in the north of the Survey Area during the final CBC survey. This species was not recorded during the earlier surveys which was similar to the findings of the other survey areas. This species was also recorded in Botany Marshes east during the final CBC survey. It is considered that this was likely a breeding bird that had arrived late in the season. Meadow pipit *Anthus pratensis* was recorded during the first survey only and is not considered to have bred during the 2015 breeding period.

3.5.5 Specific Vantage Point surveys were undertaken on 23 July 2015 of Springhead Nursery to look specifically for presence of hobby and barn owl. Neither of these species were recorded during the specific survey. Other raptors were recorded during this survey; Buzzard *Buteo buteo* was recorded flying over the Survey Area in a westerly direction and a kestrel was also recorded in the south. A hobby was recorded when surveyors traversed the Site before a bat survey was undertaken on 28th July 2015 and a tawny owl *Strix aluco* was also recorded during the same bat survey. These were the only recordings of these two species.

3.6 Northfleet Landfill

3.6.1 A total of 15 bird species were recorded breeding within the Northfleet Landfill Survey Area in 2015. A further species, starling, was recorded on Site and considered likely breeding although exact territories were not identified The breeding birds are listed in Table 2 along with the estimated number of territories within the site.

3.6.2 The Site is dominated by a large area of short grassland with fragments of scrub and hedgerow at the boundaries and in the north-east corner. Activity and territories were concentrated in the dense scrub vegetation in the north-east corner of the Site. Territories outside of these areas were infrequent or absent and include two robin territories at the northern and southern hedgerow boundaries of the Site and a wren territory in the south-east corner of the Site, or restricted to species associated with open grassland habitats. The highest number of territories recorded for a single species was four, for skylark (see section 3.6.3) distributed evenly across the centre of the survey area. A single territory was

identified for meadow pipit *Anthus pratensis* toward the north-west corner of the Site. Meadow pipit is a species of principal conservation importance, classified as 'Vulnerable' on the IUCN European Red List and is included on the BoCC4 Amber List. A single dunnock (see 3.4.3) territory was identified in the north-east corner of the Site.

3.7 Summary

3.7.1 Of the 54 species recorded breeding or potentially breeding across the survey areas (excluding rose-ringed parakeet and Canda goose which are introduced), three species included on Schedule 1 of the Wildlife and Countryside Act (as amended) 1981, have been confirmed to be breeding, these are: Cetti's warbler, marsh harrier and bearded tit. Eleven further species confirmed as breeding across the survey areas including song thrush, grasshopper warbler, common cuckoo, starling, dunnock, linnet, lapwing, skylark and reed bunting met the range of conservation status criteria detailed above by being included in the Red List of Birds of Conservation Concern (BoCC4). These species are detailed in Table 2.

Table 2 – Breeding Species at Site meeting conservation status criteria.

Species	WCA 1981	BoCC4 Red List	UK BAP	RBBP	NERC Act 2006 Section 41*	IUCN European Red List	Kent Red Data Book
Cetti's warbler	•			•			KRDB1
Bearded tit	•			•			KRDB3
Marsh harrier	•			•			KRDB1
Grasshopper warbler		•			•		KRDB1
Song thrush*		•	•		•		KRDB2
Lapwing		•	•		•		
Linnet*		•	•		•		KRDB2
Common cuckoo		•	•		•		
House Sparrow		•			•		KRDB3
Dunnock			•		•		
Meadow pipit			•			•	
Nightingale		•					KRDB3
Reed bunting*			•		•		KRDB2
Skylark*		•	•		•		KRDB2
Stone chat							KRDB1
Reed warbler							KRDB3
Starling		•	•		•		
Grey wagtail		•					
Bullfinch					•		KRDB2
Stonechat							KRDB1

Species	WCA 1981	BoCC4 Red List	UK BAP	RBBP	NERC Act 2006 Section 41*	IUCN European Red List	Kent Red Data Book
Gadwall							KRDB3
Little egret				•			KRDB3
Shoveller				•			-cu
Pochard		•		•			KRDB3
Water rail				•			KRDB3

*Listed in the Kent BAP

3.7 The Red List of Birds of Conservation Concern (BoCC4) are species whose breeding population has decreased or whose breeding range has contracted by 50% or more in the preceding 25 years or, those that have declined historically and not shown a substantial recent recovery. Several other species recorded breeding within the Site are 'Amber' listed on the BoCC4 list including dunnock, meadow pipit, stock dove and green woodpecker. The IUCN European Red List is a review of the status of European species according to IUCN Regional Red Listing guidelines. It identifies species threatened with extinction at a European level (UK and continental Europe) so that appropriate conservation action can be taken to improve their status. Meadow pipit is classified as 'Near Threatened' on continental Europe but is classified as 'Vulnerable' in the UK (EU27). Whilst common coot is classified as 'Near Threatened' on continental Europe it is classified as of 'Least Concern' in the UK (EU27).

4.0 EVALUATION

4.1 The results of the breeding bird survey indicate that the breeding bird community present within the Site is considered to be of County Significance based on the Fuller criteria, with up to 54 species recorded breeding or likely breeding within the Peninsula (including Botany Marshes east). A further seven species were recorded but are not considered to be breeding within the Site. The next threshold for bird assemblage based on the Fuller criteria would be 69 or greater species breeding. The species present and confirmed to be breeding are typical of the habitats present within the Site which are dominated by a mixture of open water with reed beds, areas of dense scrub and open grassland and areas of broadleaved woodland. The Pensinsular represents a significant area of open land and unmanaged vegetated habitats within a generally densely urbanised landscape.

4.2 The number of species within the other survey areas, Bamber Pit, Northfleet Landfill and Springhead Nurseries, was recorded to be lower. This is to be expected due to their size and/or the comparatively limited and fragmented nature of the habitats present within the respective site boundaries. The number of breeding species recorded in Bamber Pit was 23. At Springhead Nurseries 24 species were breeding, with two further species likely breeding and two additional species recorded but likely not breeding. At Northfleet Landfill only 15 species were recorded breeding with a single species recorded as likely breeding.

4.3 A total of 20 species of conservation importance were found to be breeding or likely breeding within the wider survey area. Three species, Cetti's warbler, marsh harrier and bearded tit are included on Schedule 1 of the Wildlife and Countryside Act (as amended) 1981. The majority of species are those which have suffered substantial recent population declines and/or a contraction in range nationally, though remain relatively common through Kent and the wider British Isles.

Distribution of breeding species of conservation importance

4.4 The distribution of all confirmed territories and other records of the species of conservation importance are indicated in Figures 1 - 5.

Species on Schedule 1 WCA 1981

Cetti's warbler

4.5 During the 2012 surveys a total of eight male territories of Cetti's warbler were recorded within Black Duck Marsh, the CTRL Wetland and Botany Marsh West (access was not permitted in Botany Marsh East). A survey carried out by Entec recorded a total of 13 male territories in Botany Marsh East in 2010.

4.6 In 2015, a total of 35 territories of Cetti's warbler was recorded on the Peninsular with a single territory confirmed within the Ebbsfleet Corridor 1. They were all associated with the reed beds and scrubby areas. Within the main Peninsular Site, 10 were in or near to Black Duck Marsh, and 11 in Botany Marsh West and the CTRL Wetland and 14 within Botany Marsh East. The species is typically found in wet swampy areas near the water's edge where there is low and fragmented scrubby cover. Male birds mark their territory by singing and can move quite long, linear distances up to 450m in length, although some male territories may overlap in areas with a high density of Cetti's warblers. More than one female may nest within a single male's territory so the total number of territories cannot be considered the same as the number of pairs on the site.

4.7 Cetti's warbler is also included on the BoCC4 Red List, UKBAP and NERC Section 41 list of Species of Principal Importance. The national population trend must be reviewed when assessing the significance of these recordings. The Cetti's warbler is considered to have a population of approximately 2000 breeding pairs in the UK (Musgrove *et al* 2013). The Rare Breeding Birds Panel (RBBP) (Holling *et al* 2014) reported a decline in territories in 2012 compared to 2011 but recognised a general increase in numbers of this species within the UK after recent cold winters with a 5 year mean of 1,873 breeding pairs. Within Kent the species appears to be under recorded. Just 53 territories were reported in the RBBP report for 2012 although Kent Ornithological Society believes the population is between 500 and 1000 territories. In 2012 Black Duck Marshes and the CTRL Wetlands supported 0.4% of the British breeding population and 1.6% of the Kent population (based on a population of 500). If the population is at the higher end of this range (based on a population of 1000) then Black Duck Marshes and the CTRL Wetlands supported 0.8% of the Kent population in 2012. In 2015 the Peninsular supported 35 male territories which is 1.75% of the British breeding population or between 7% and 3.5% of the Kent population of this species.

Marsh harrier

4.8 A pair of marsh harrier was recorded breeding within Black Duck Marsh during the 2015 breeding season. However, birds were seen regularly foraging over Botany Marshes East. They were also spotted flying further south, and were seen from Bamber Pit flying in a southerly direction. Nests are often isolated although nesting territories of up to c.10 pairs in the same marsh may be grouped in "neighbourhoods" (Snow and Perrins 1998). In areas of high density, occupied nests are often between 50 – 300m apart, but may sometimes be as close as 20m. Pairs are loosely territorial within the breeding marsh but only the area immediately round the nest is consistently defended against trespass by own species.

4.9 This species was not recorded during the 2012 breeding bird season but was recorded from January 2015 onwards. The 2012 RBBP report found that in Kent only 10 pairs were recorded breeding and five

probable breeding pairs although it was considered that the species is markedly under-recorded and a county estimate is 100 pairs (Holling *et al* 2012). The 2013 RBBP report received data for 17 breeding pairs in Kent but suggested 80 – 100 pairs in the county (Holling *et al* 2014). Using this data based on 17 breeding pairs the single breeding pair at Black Duck Marsh represents 5.9% of the total county population. It should be noted that as county recorders and the RBBP consider the breeding population to be under-recorded this percentage is likely to be an overestimate. If the upper figure (100) of breeding pairs in the county is used then the single pair at Black Duck Marsh represents just 1% of the county population. Based on the current species' breeding status in Kent the single breeding pair in Black Duck Marsh represents between ranging between 1% and 5.9% of the County population

Bearded tit

4.10 Bearded tit were recorded during the 2015 survey season in Black Duck Marsh and in Botany Marsh East with a small flock of juveniles and moulted adults (two to four pairs) recorded in Black Duck Marsh and at least two pairs in Botany Marsh. Bearded tits prefer areas of extensive reed bed, with foraging restricted almost exclusively on reeds in wetland habitats. Bearded tit feed on invertebrates during the summer and seeds in late autumn and winter. They need a variety of habitats within the reed bed, including dry areas for nesting and wetter areas for foraging. They often take insects from the water surface whilst perching on fallen reeds. Bearded tit are gregarious birds often forming flocks outside the breeding season but will form pairs in February or March which are loosely colonial but not territorial. Juveniles form flocks shortly after independence with adults joining the flock after breeding.

4.11 The five year mean of breeding pairs in the UK was 527 in 2012 and 533 in 2013 with the number of confirmed and probable breeding pairs recorded by the RBBP as 566 and 618 in the two years respectively. Within Kent bearded tit were recorded from 13 sites with 125 confirmed and probable breeding pairs in both 2012 and 2013 (Holling *et al* 2012, 2014). It should be noted that it can be problematic to accurately confirm the number of pairs on a particular site due to the nature of reed beds which consist of tall, dense vegetation and fragmented or continuous waterbodies which may significantly hinder the survey effort. It is therefore considered that the population is a minimum of four pairs (at least two pairs within Botany Marsh, and between two to four pairs at Black Duck Marsh). Using the most recent breeding population data (125 pairs in Kent, Holling *et al* 2014) the four pairs would equate to a mean 3.2% of the Kent population.

4.12 This species was not recorded in 2012 within either Black Duck Marsh or the CTRL Wetlands. This is likely to be due to the change of habitats across the wetland areas of the Site becoming more suitable for this species. The ground conditions at the start of the breeding bird survey in 2012 were significantly drier than the current conditions and the reed bed habitat was smaller. There was a dry path along the southern edge of Black Duck Marsh in front of the woodland which part way through the 2012 survey

season became wet and by the 2014 wintering bird survey in September 2014 was impassable. Furthermore, the extent of common reed in the breeding season of 2012 was comparatively limited however by summer 2015 it had significantly increased and was extensive throughout Black Duck Marsh, the western edge of Botany Marsh and the CTRL Wetlands.

Species on BoCC4 Red List, NERC Section 41, UK BAP and IUCN Red List

Water rail

4.12 As with the bearded tit, water rail were not recorded in 2012. They were recorded infrequently in 2015 but local bird recorders heard them more frequently in Black Duck Marsh (*Pers comm.*). This species' status on the IUCN European Red List is classified as of 'Least Concern' (Ashpole *et al* 2015). Population trends for this species are not known but it is thought to be decreasing across its range, although not yet meeting the criterion (30% decline over ten years or three generations) to be classed as 'Vulnerable' (Ashpole et al 2015). Water rail is classified as a KRDB3 species. The RBBP 2012 estimated 1,184 breeding pairs with an estimated 250 territories in Kent and in 2013 a five year mean of 1315 breeding pairs with an estimate of 95 territories in Kent although this was based only on the number of occupied tetrads during survey work carried out between 2007-12 (Holling *et al* 2014). Many records for the UK were for birds 'present during the breeding season' rather than confirmed breeding. Due to the shy and elusive habitats of this species and their favoured habitat of dense vegetation it can be difficult to confirm breeding. The number of breeding pairs at Black Duck Marsh is currently unknown.

Grasshopper Warbler

4.13 This species was not recorded during surveys in 2012. A breeding territory of this species was recorded in the south-east corner of Broadness in 2015. Grasshopper warbler is included on the BoCC4 Red List and is a Kent Red Data Book 1 species. As with water rail, grasshopper warbler is a difficult species for a surveyor to confirm breeding status, due to its skulking and elusive behaviour (Clements *et al* 2015). The Kent Breeding Bird Atlas suggests that the likely population during the Atlas period (2008 – 2013) was between 15 and 30 pairs (Clements *et al* 2015). Based on the uppermost estimate, the presence of a single territory would result in the site supporting 3.3% of the Kentish population. If the lower estimate is more accurate, the site would be found to support 6.6% of the county population.

Song Thrush

4.14 The song thrush is still a relatively common and widespread species throughout the British Isles, despite undergoing a substantial population decline (13% decline in south-east England 1995 – 2012 according to the BTO) and thus being listed on the BoCC4 Red List and on KRDB2. Breeding pairs of this species were recorded in Botany Marsh East (4 pairs), Bamber Pit (3) and Springhead Nursery (2). During the

2012 surveys only two song thrush territories were identified in the survey area (which excluded Botany Marsh East) one within the sewage works area the second in the woodland to the south of Swanscombe Marshes.

Common Cuckoo

4.15 Cuckoo was heard on several occasions during the course of the 2015 surveys with the earliest being on the 24th April at Bamber Pit and Botany Marshes East. They were recorded regularly on surveys after the 24th April in Botany Marshes East with registrations heard over the whole survey area. In Bamber Pit they were recorded on 8th May and 12th June and also recorded in the Northfleet Landfill Site. This species has been in decline for at least three decades, with declines severest in south-east England, although their range across Kent is still relatively widespread (Clements *et al* 2015). They are included on BoCC4 Red List and on KRDB2. Cuckoo will have used the Site for breeding and is likely to have laid eggs into the nests of host species such as dunnock and reed warbler, both of which are relatively common and widespread throughout the Survey Area. The Kent Atlas (2015) estimates the Kent population to be between 500 and 1,000 pairs (Clements *et al* 2015). Each female bird can lay between 1 and 25 eggs and the breeding dispersion is thought to consist of home ranges rather than exclusive territories. In 2012 both male and female birds were seen, in 2014 no female birds were seen but the advertising call of the male bird was recorded. The Kent Atlas noted a pattern of decline in Kent suggesting that those in the wetland areas parasitizing reed warblers are faring better than those that use dunnock as the host species. This theory is based on an apparent reduction in range on the North Downs and High Weald (Clements *et al* 2015).

Common pochard

4.16 Pochard was recorded in Black Duck Marsh with three seen on 24th April 2015 in one of the ditches to the north of the marsh and a male and a female recorded on 29th May 2015 to the south of the marsh. A single male pochard was also recorded on the same date in Bamber Pit. Although no evidence of breeding was recorded it is considered likely that the species bred within Black Duck Marsh. The species is included on BoCC4 Amber List and on KRDB3. The common pochard is included within the RBBP report with a five year mean of 659 breeding pairs in 2012 and 653 in 2013. In Kent in 2012 the RBBP records the number of confirmed breeding pairs as 69 with a total number of pairs (confirmed breeding and probably breeding) as 87. In 2013 these numbers are 36 and 36 respectively. The Kent Atlas suggests the population is 150-200 pairs within the county. Therefore the presence of a single breeding pair would result in the site supporting between 0.5% and 0.6% of the Kentish population.

Reed Bunting

4.17 At least two territories of reed bunting were recorded both of these in Botany Marshes East. The species is included on BoCC4 Amber List but is not included on the KRDB. No reed bunting were recorded

within Springhead Nursery although it is noted that parts of the wetland area are not visible from either the footpath along CTRL or from within the woodland or river bank. IN 2012, at least 6 territories of reed bunting were recorded. These were generally associated with the reed beds of Swanscombe Marshes and the reed beds to the east of the CTRL Wetlands. One pair was recorded in the northern Broadness section of the Site associated with the scrub habitats near the large pylon. Reed bunting is a generally widespread species throughout the UK as a whole, although declines (down 29% between 1995 – 2012 in south-east England – BTO) have been noted.

Dunnock

4.18 A number of dunnock were recorded within the four survey areas. This species is included on BoCC4 Amber List but is not included on the KRDB. The species is considered to be declining in south-east England (Clements *et al* 2015). A total of 11 breeding territories were recorded within Botany Marsh East; five in Bamber Pit, three in Springhead and a single territory in Northfleet Landfiill. In 2012 within the main peninsular site at least seven territories of dunnock were recorded. The territories were generally recorded in areas of scrub. Very few recordings were made of this species in the Broadness area in 2012 and the territory in Northfleet Landfill was in the north-east in the scrubby area. Dunnock tend to nest low down, usually 0.5 – 3.5m above ground level, therefore it is considered possible that there was insufficient cover for the species in Broadness in 2012 and within Northfleet Landfill (Snow and Perrins 1998).

Linnet

4.19 Only two territories of this species were recorded although it is considered likely that this is an under recording. Linnet is included on BoCC4 Red List and on KRDB2 and is considered to have undergone a substantial regional and national population decline (43% decline in south-east England 1995 – 2012 according to BTO). The two territories were both found in the south of Springhead Nursery. The species breeds low down in dense scrub or thorny trees or bushes; early broods are often in evergreens and later nests in deciduous shrubs when cover is thick (Snow and Perrins 1998). A group of three were recorded centrally within the Springhead Nursery site during the first survey on 30th March 2015 but were not recorded in this area again, all other registrations being to the south of the site. This species was recorded once in Bamber Pit during the 24 April survey but not during any of the further surveys.

Skylark

4.20 At least four territories of this species were recorded within the Northfleet Landfill and a further two territories were recorded in the northern half of Springhead Nursery. Skylark is included on BoCC4 Red List and on KRDB2 and is considered to be suffering a continuing decline (29% decline in south-east England 1995 – 2012 according to BTO). Skylark are ground nesting birds and tend to nest in the open or among short vegetation such as grass or growing crops (Snow and Perrins 1998). During the 2012

surveys at least ten territories of this species were recorded during the surveys of the peninsular and most were associated with the open grassland habitats in Broadness with one territory recorded along the western edge of the peninsular and one in the central disturbed ground area.

Starling

4.21 Starling is included on BoCC4 Red List and on KRDB2 and is considered to be suffering a steep decline nationally in both numbers and breeding territories (64% decline in south-east England 1995 – 2012 according to BTO). No specific nesting areas were determined during the 2012 and 2015 survey. However, post-breeding flocks of juvenile birds were recorded during the first surveys. The presence of juvenile birds indicates that breeding had been completed for many pairs prior to the onset of the survey. The available nesting resources for this species within and adjacent to the Site are considerable. Starling are adaptable and can be found in a wide variety of habitats but favour mixed-use arable and woodland habitats along with brownfield sites. There are a number of trees with suitable nesting places and on the urban fringe are many buildings offering suitable nesting resources. It is considered highly likely that starling territories were within the Site. Several areas are attractive to feeding flocks and for roosting birds.

RBBP Species

Little egret

4.22 This species is included within the RBBP reports and is also a KRDB3 species. Up to four little egrets were recorded in Botany Marshes west and single birds were seen in the vicinity of the heronry to the south of Black Duck Marsh. It is considered likely that the species is nesting within the heronry although this has not been confirmed to date. The height of the trees in this area makes it difficult to see nests and birds in the trees. The RBBP 2012 estimated 819 breeding pairs with an estimated 171 territories in Kent and in 2013 a five year mean of 816 breeding pairs with an estimate of 83 territories in Kent. The Kent Atlas suggests the population is 100-150 pairs within the county.

4.23 Shoveller is included within the RBBP reports and is Amber listed on BoCC4. Single male birds were seen in late April in Black Duck Marsh and based on the methodology for surveys for dabbling ducks (Gilbert et al) this is considered sufficient to suggest probable breeding. The RBBP 2012 estimated 872 breeding pairs (5- year mean 1012) with an estimated 50 territories in Kent and in 2013 a five year mean of 974 breeding pairs with an estimate of 19 territories in Kent. The Kent Atlas suggests the population is 50-100 pairs within the county. A single breeding pair in Black Duck Marsh would equate to between 1% and 2% of the County population.

Summary

4.24 Based on the Criteria set out in the Kent Criteria the Site fulfils the requirements based on Kent RDB species by supporting at least three KRDB3 species at the appropriate time of year. Seven KRDB3 species have been recorded: bearded tit, house sparrow, nightingale, gadwall, reed warbler, pochard and water rail have all been recorded breeding or likely breeding within the site.

4.25 The Kent Criteria also has criteria for the number of KRDB2 species supported. The threshold is for ten KRDB2 species however, total number of KRDB2 species is only 11, some of these 11 species have specific habitat requirements such as nightjar which is unlikely to be found on the habitats within the Site. Of the eight KRDB2 species which could be present due to the habitats found within the Site, five were recorded: bullfinch, song thrush, skylark, linnet and reed bunting. A sixth KRDB2 species, tree sparrow was also identified in the scrub to the north of Botany Marsh east on a single occasion. Spotted flycatcher and turtle dove could be expected to be found within the Peninsular or Springhead Nursery. Furthermore, the Site does support three KRDB1 species although there is no criteria set out for this level of species, these are stonechat, wheatear and Cetti's warbler.

4.26 The numbers of breeding territories recorded is likely to be an underestimate for some species either because they are quiet and elusive (such as bullfinch) or because the habitats within the Site make it difficult to accurately plot individuals, for example the dense scrub habitats and reed beds where access is limited. In some instances, assessment of a territory was based on only two registrations on different dates. It was noted that on individual survey occasions there was often an increase in the numbers of birds from a particular species and it is likely that these were migrating birds on passage such as Cetti's warbler, whitethroat and lesser whitethroat.

4.27 The West Thurrock Lagoon and Marshes SSSI which is some 1.5km to the west of the Site is designated in part due to its large reed beds which support reed and sedge warblers and breeding populations of bearded tit.

4.28 The breeding bird assemblage within the Peninsular fulfils the criteria to be considered County Importance in the following ways:

- the Peninsular supports at least 54 breeding bird species (*Fuller* and KWT).
- supports more than three KRDB3 species (nine are recorded). (KWT)
- supports at least 2.5% of the county population of one or more bird species - Cetti's warbler, grasshopper warbler and bearded tit.

4.29 Based on the range of species of conservation importance recorded it is considered that the Peninsular should be considered as being of at least Regional Importance for its breeding birds. The assemblage recorded within the Peninsular supported: -

- at least three Schedule 1 species breeding in 2015,
- 11 BoCC Red List species and Species of Principal Importance and
- seven species monitored by the Rare Breeding Bird Panel -.

4.30 The three other survey areas, Bamber Pit, Northfleet Landfill and Springhead Nurseries supported fewer bird species and therefore fewer of the species of conservation importance. The evaluations of these areas is set out below:

Botany Marshes – Local Importance

- 23 species
- Five species of conservation importance
    - Three BoCC4 red list species, cuckoo, nightingale, song thrush
    - Two Species of Principal Importance, dunnock and bullfinch

Northfleet Landfill – Neighbourhood Importance

- 15 species
- Two species of conservation importance
    - One BoCC4 red list species skylark;
    - Two species of Principal Importance, dunnock and skylark.

Springhead Nurseries – Local Importance

- 26 species
- Six species of conservation importance
    - One Schedule 1 species Cetti's warbler
    - Five BoCC red list species Skylark, cuckoo, linnet, song thrush, grey wagtail,
    - Six species of Principal Importance, dunnock skylark cuckoo, linnet song thrush, bullfinch

5.0 CONCLUSIONS

5.1 Breeding bird surveys were undertaken in 2015 of four new areas, Botany Marshes East, Bamber Pit, Northfleet Landfill and Springhead Nursery. In addition, update surveys for specific species, namely Cetti's warbler and nightingale were undertaken for Black Duck Marsh and CTRL Wetland following on from the breeding bird survey undertaken in the peninsular in 2012. The habitats within these two areas had changed since the 2012 surveys with the reed beds becoming more extensive than in 2012. During the Cetti's warbler and nightingale surveys species which had not been recorded during 2012 were noted and the surveys were extended to include these species.

5.2 A total of 54 species have been recorded breeding in the peninsular combining the 2012 and 2015 data. Three species listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) have been recorded breeding within the Site, Cetti's warbler, bearded tit and marsh harrier. A fourth Schedule 1 species barn owl has been recorded infrequently on the peninsular but is not considered likely to be breeding within the Survey Areas.

5.3 The results of the breeding bird surveys revealed a breeding bird assemblage in Bamber Pit and Springhead Nursery of at least Local Importance and within Northfleet Landfill of Neighbourhood Importance. The results of the surveys within the Peninsular revealed a breeding bird assemblage of at least County Importance for the number of bird species recorded. It is considered to be of Regional Importance for the number of species which are of conservation significance.

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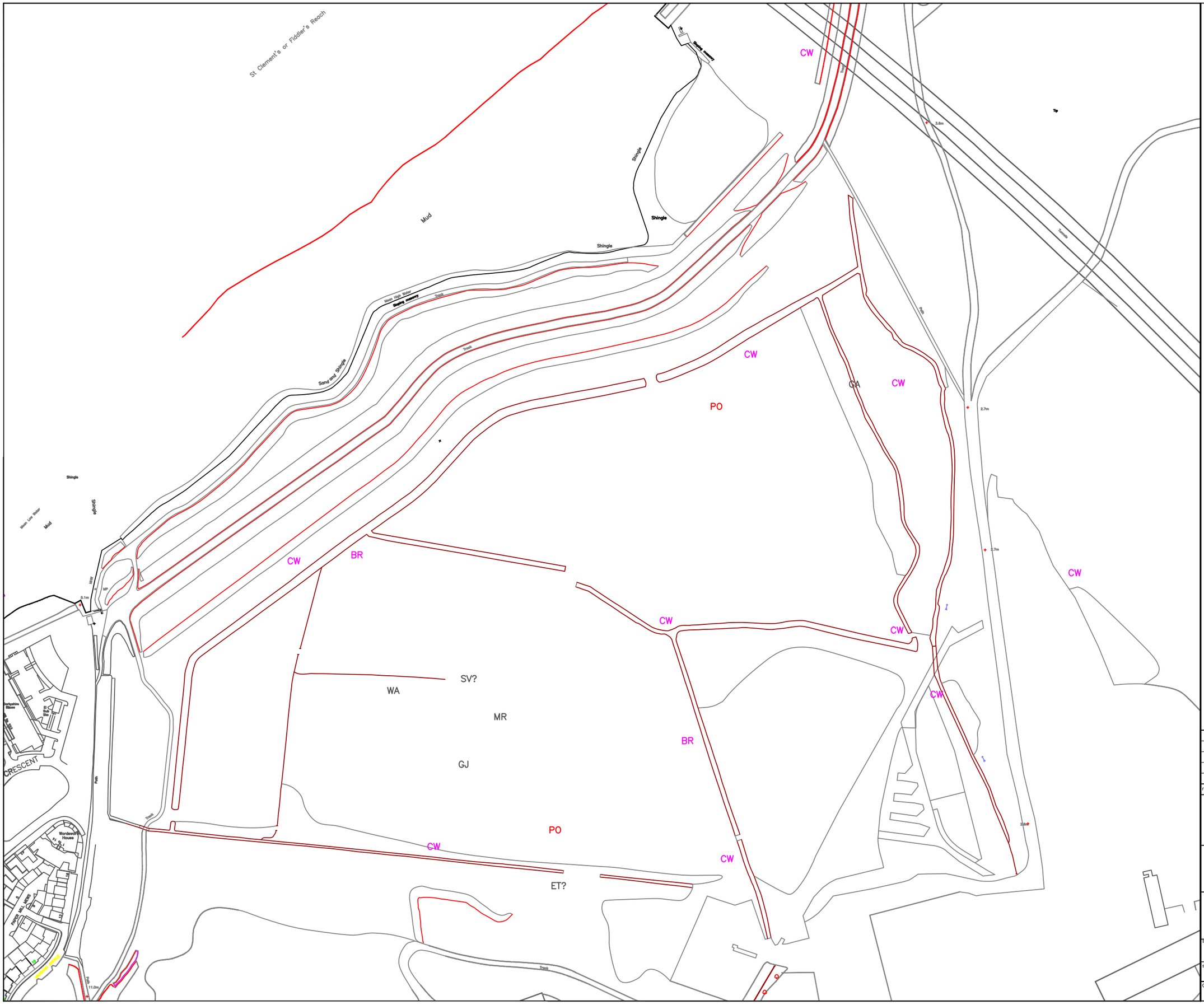
http://www.birdlife.org/datazone/userfiles/file/Species/erlob/summarypdfs/22725141_rallus_aquaticus.pdf

Table 1 - Peninsular Survey results from 2012 and including additional 2015 species

Species	Scientific name	Minimum number of pairs in 2012/2015	Population estimates of birds in the UK. Musgrove *et al 2013* .
Wood pigeon	*Columba palumbus*	n/a	5,100,000 – 5,700,000
Wren	*Troglodytes troglodytes*	14	7,700,000
Dunnock	*Prunella modularis*	7	2,500,000 [A]
Robin	*Erithacus rubecula*	9	6,700,000
Blackbird	*Turdus merula*	12	5,100,000
Song thrush	*Turdus philomelos*	2	1,100,000
Skylark	*Alauda arvensis*	10	1,400,000
Meadow pipit	*Anthus pratensis*	2	2,000,000
Common whitethroat	*Sylvia communis*	42	1,100,000
Blackcap	*Sylvia atriacapilla*	10	1,200,000
Common chiffchaff	*Phylloscopus collybitta*	9	1,200,000
Cetti's warbler	*Cettia cetti*	11 and 21	2,000
Garden warbler	*Sylvia borin*	1	170,000
European Stonechat	*Saxicola rubicola*	1	59,000
Northern Wheatear	*Oenanthe oenanthe*	1	240,000
Long-tailed tit	*Aegithalos caudatus*	3	330,000
Blue tit	*Cyanistes caeruleus*	4	3,600,000
Great tit	*Parus major*	4	2,600,000
Grey heron	*Ardea cinerea*	5?	13,000
Magpie	*Pica pica*	n/a	600,000
Chaffinch	*Fringilla coelebs*	14	6,200,000
European greenfinch	*Carduelis chloris*	1	1,700,000
European goldfinch	*Carduelis carduelis*	6	1,200,000
Linnet	*Carduelis cannabina*	2	430,000
Reed bunting	*Emberiza schoeniclus*	6	250,000
Reed warbler	*Acrocephalus scirpaceus*	18	130,000
Sedge warbler	*Acrocephalus schoenobaenus*	17	290,000
Tufted duck	*Aythya fuligula*	2	16,000 – 19,000
Mallard	*Anas platyrhynchos*	3	61,000 – 146,000
Moorhen	*Gallinula chloropus*	4	270,000
Mute swan	*Cynus olor*	1	6,400
Coot	*Fulica atra*	2	31,000
Great spotted woodpecker	*Dendrocopos major*	1	140,000
Northern Lapwing	*Vanellus vanellus*	2	140,000
Stock dove	*Columba oenas*	1	260,000
Rose-ringed parakeet	*Psittacula krameri*	1	8,600
Likely bred on Site but territories not determined			
Common cuckoo	*Cuculus canorus*		15,000
Starling	*Sturnus vulgaris*		1,900,000
Green woodpecker	*Picus viridis*		52,000
Eurasian jay	*Garrulus glandarius*		170,000
Red legged partridge	*Alectoris rufa*		82,000
Lesser whitethroat	*Sylvia curruca*		74,000
Common bullfinch	*Pyrrhula pyrrhula*		220,000
Recorded but likely not breeding on site			
Rufous nightingale	*Luscinia megarhynchos*		6,700
Mistle thrush	*Turdus viscivorus*		160,000
Carrion crow	*Corvus corone*		1,000,000
Kestrel	*Falco tinnunculus*		46,000
Barn owl	Tyto alba		4,000
Peregrine	*Falco peregrinus*		1,500
Additional Species recorded in 2015 confirmed breeding on site			
Marsh harrier	*Circus aeruginosus*	1	320-380
Grasshopper warbler	*Locustella naevia*	1	13,000
Bearded tit	*Luscinia megarhynchos*	*2*	630
Little grebe	*Tachybaptus ruficollis*		3,900–7,800
Pochard	*Aythya ferina*	2?	350–630
Greylag goose	*Anser anser*	2?	46,000
Gadwall	*Anas strepera*	2?	690–1,730
Likely bred on Site but territories/number of territories not determined			
Water rail	*Rallus aquaticus*	1?	1,100
Little egret	*Egretta garzetta*	1?	4,500
Shoveller	*Anas clypeata*	1?	310–1,020
Shelduck	*Tadorna tadorna*	1?	15,000

Table 2 - Bird Survey Results 2015

Species	Scientific name	Minimum number of pairs				Population estimates of birds in the UK. Musgrove *et al 2013*.
		Botany Marshes	Bamber Pit	Springhead	Northfleet Landfill	
Wood pigeon	*Columba palumbus*	Y	Y	Y		5,100,000 – 5,700,000
Wren	*Troglodytes troglodytes*	8	6	1	2	7,700,000
Dunnock	*Prunella modularis*	11	5	3	1	2,500,000 [A]
House sparrow	*Passer domesticus*	1				5,300,000
Robin	*Erithacus rubecula*	6	5	7	2	6,700,000
Blackbird	*Turdus merula*	7	4	9	1	5,100,000
Song thrush	*Turdus philomelos*	3	4	2		1,100,000
Skylark	*Alauda arvensis*			3	4	1,400,000
Meadow pipit	*Anthus pratensis*				1	2,000,000
Common whitethroat	*Sylvia communis*	13	7	6	1	1,100,000
Blackcap	*Sylvia atriacapilla*	13	6	2	1	1,200,000
Common chiffchaff	*Phylloscopus collybitta*	9	5	7	1	1,200,000
Cetti's warbler	*Cettia cetti*	14		1		2,000
Garden warbler	*Sylvia borin*	1	2			170,000
Rufous nightingale	*Luscinia megarhynchos*		1			6,700
Bearded tit	*Panurus biarmicus*	1 to 2				630
Long-tailed tit	*Aegithalos caudatus*	4	1			330,000
Blue tit	*Cyanistes caeruleus*	2	3	1	1	3,600,000
Great tit	*Parus major*	7	2	3	1	2,600,000
Grey heron	*Ardea cinerea*					13,000
Magpie	*Pica pica*	Y	Y	Y	Y	600,000
Chaffinch	*Fringilla coelebs*	10	1	2	1	6,200,000
Common bullfinch	*Pyrrhula pyrrhula*	1	1			220,000
European greenfinch	*Carduelis chloris*	6	3	2	1	1,700,000
European goldfinch	*Carduelis carduelis*	4	1			1,200,000
Linnet	*Carduelis cannabina*			2		430,000
Reed bunting	*Emberiza schoeniclus*	2				250,000
Reed warbler	*Acrocephalus scirpaceus*	3		1		130,000
Sedge warbler	*Acrocephalus schoenobaenus*	8		3		290,000
Moorhen	*Gallinula chloropus*		2	1		270,000
Coot	*Fulica atra*			4		31,000
Great spotted woodpecker	*Dendrocopos major*					140,000
Green woodpecker	*Picus viridis*		1	1	1	52,000
Eurasian jay	*Garrulus glandarius*	Y	1			170,000
Stock dove	*Columba oenas*		1			260,000
Common cuckoo	*Cuculus canorus*	Y	Y	Y		15,000
Grey wagtail	*Motacilla cinerea*			1		38,000
Rose-ringed parakeet	*Psittacula krameri*			2		8,600
	TOTAL	26	23	25	15	
Likely bred on Site but territories not determined						
Lesser whitethroat	*Sylvia curruca*	Y		Y		74,000
Great spotted woodpecker	*Dendrocopos major*			Y		
Starling	*Sturnus vulgaris*	Y			Y	1,900,000
Recorded but likely not breeding on site						
Mistle thrush	*Turdus viscivorus*	Y				160,000
Grey heron	*Ardea cinerea*			Y		13,000
Common sandpiper	*Actitis hypoleucos*	Y				15,000
Carrion crow	*Corvus corone*					1,000,000
Kestrel	*Falco tinnunculus*					46,000
Barn owl	Tyto alba					4,000
Peregrine	*Falco peregrinus*					1,500
Mallard	*Anas platyrhynchos*		Y	Y		61,000 – 146,000



Key

BR	Bearded tit
CW	Cetti's Warbler
ET	Little egret
GA	Gadwall
GJ	Grey lag goose
MR	Marsh harrier
PO	Pochard
SV	Shoveller
WA	Water rail

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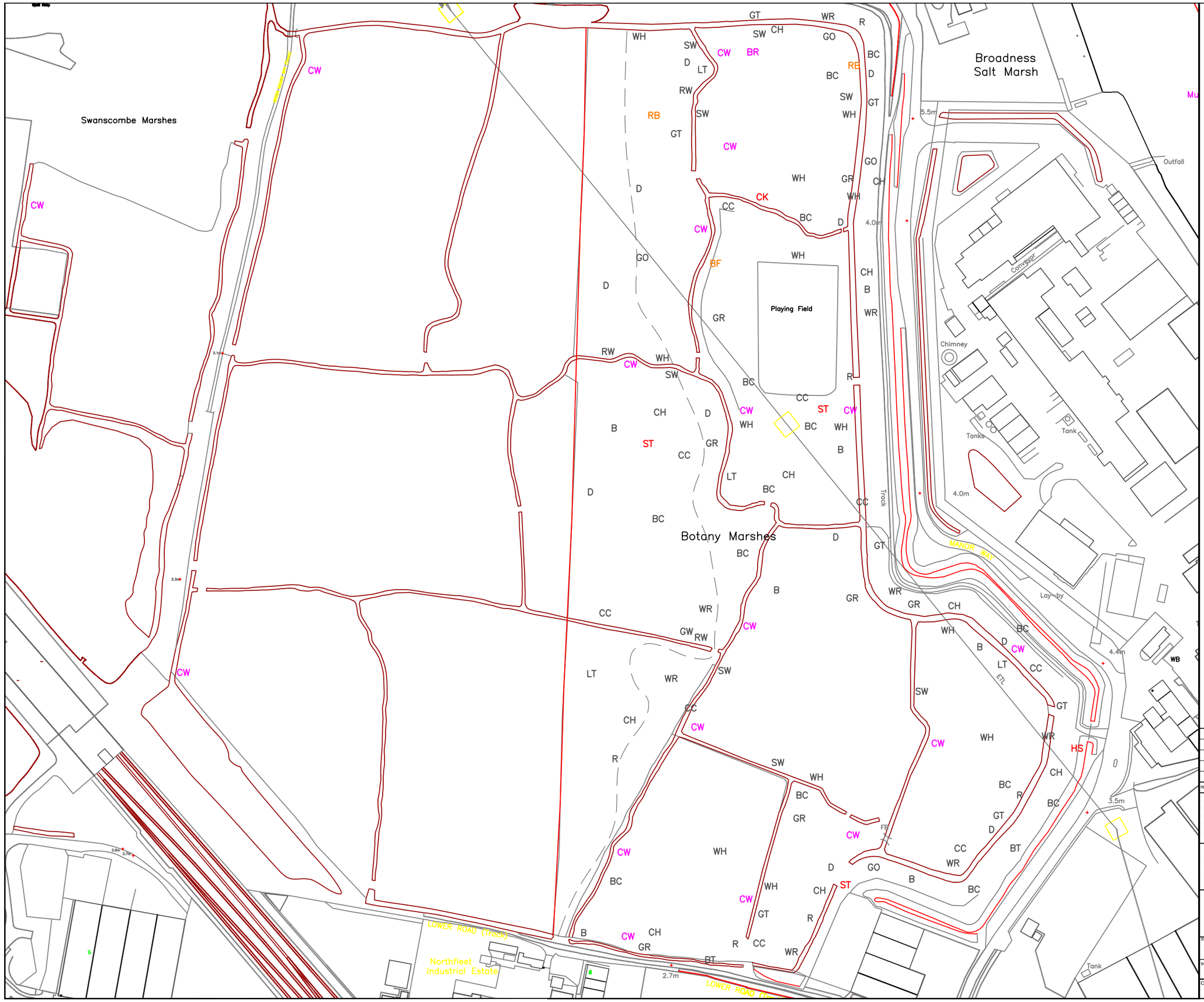
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Project:
London Paramount Entertainment Resort

Title:
Black Duck Marsh - Cetti's territories and additional species

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Key

B	Blackbird
BC	Black cap
BF	Bullfinch
BR	Bearded tit
BT	Blue tit
CC	Chiffchaff
CH	Chaffinch
CW	Cetti's warbler
CK	Cuckoo
D	Dunnock
GH	Grasshopper warbler
GO	Goldfinch
GR	Greenfinch
GT	Great tit
GW	Garden warbler
HS	House sparrow
LT	Long tailed tit
LW	Lesser Whitethroat
R	Robin
RB	Reed bunting
RW	Reed warbler
ST	Song thrush
SW	Sedge warbler
WH	White throat
WR	Wren

Pink Schedule 1
Red Red list
Orange Species of principal importance

revision	description	date	checked by

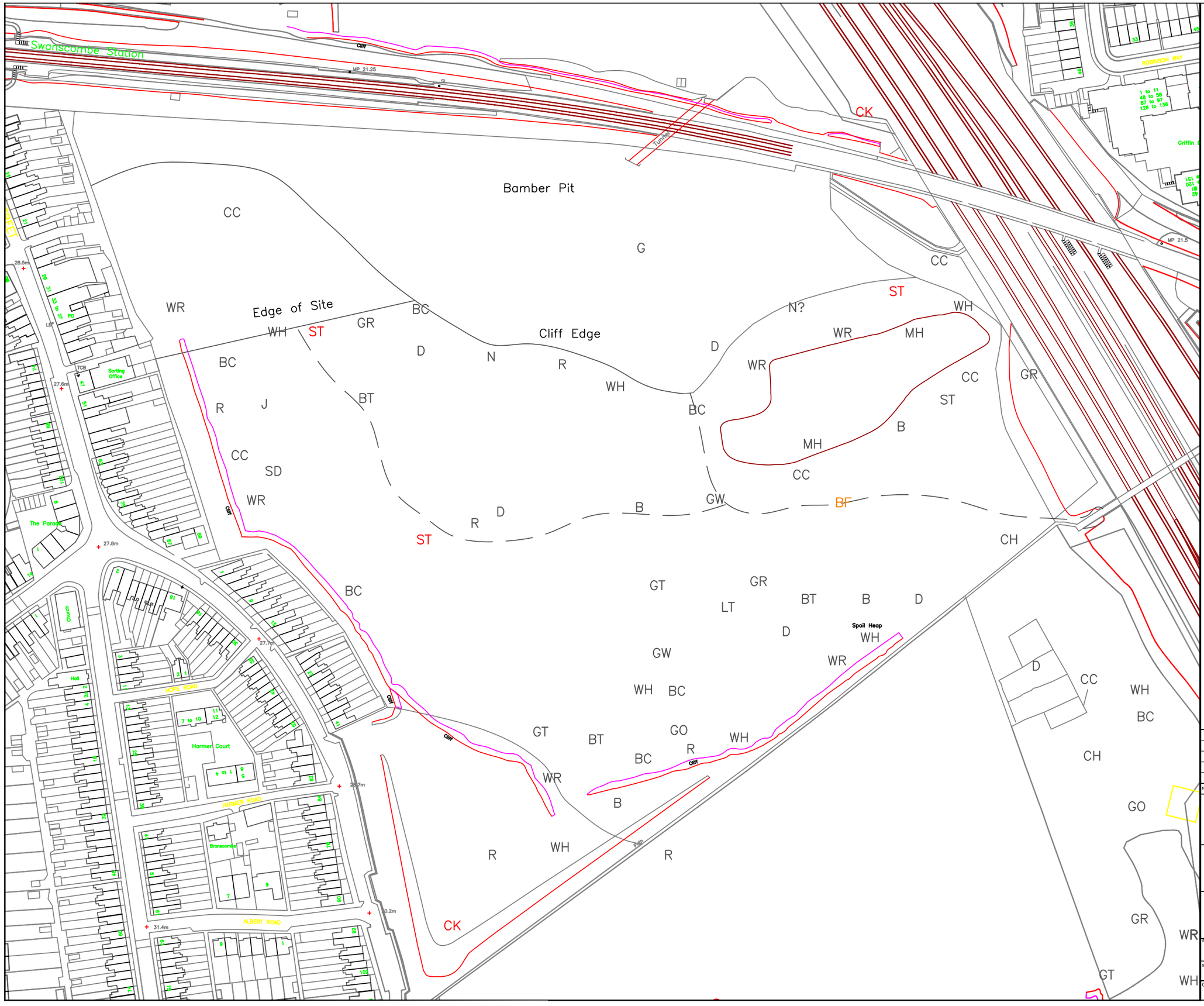
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Project:
London Paramount Entertainment Resort

Title:
Botany Marsh

status		drawing no.		
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scale	size	date	drawn	checked
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CAD filename
Figure_1.dwg



Key

B	Blackbird
BC	Black cap
BF	Bullfinch
BR	Bearded tit
BT	Blue tit
CC	Chiffchaff
CH	Chaffinch
CK	Cuckoo
CO	Coot
CW	Cetti's warbler
D	Dunnock
G	Green woodpecker
GH	Grasshopper warbler
GL	Grey wagtail
GO	Goldfinch
GR	Greenfinch
GT	Great tit
GW	Garden warbler
H	Heron
HS	House sparrow
LT	Long tailed tit
J	Jay
LI	Linnet
LT	Long-tailed tit
MH	Moorhen
MP	Meadow pipit
N	Nightingale
R	Robin
RB	Reed bunting
RW	Reed warbler
S	Skylark
SD	Stock Dove
ST	Song thrush
SW	Sedge warbler
WH	White throat
WR	Wren

Pink Schedule 1
Red Red list
Orange Species of principal importance

revision	description	date	checked by

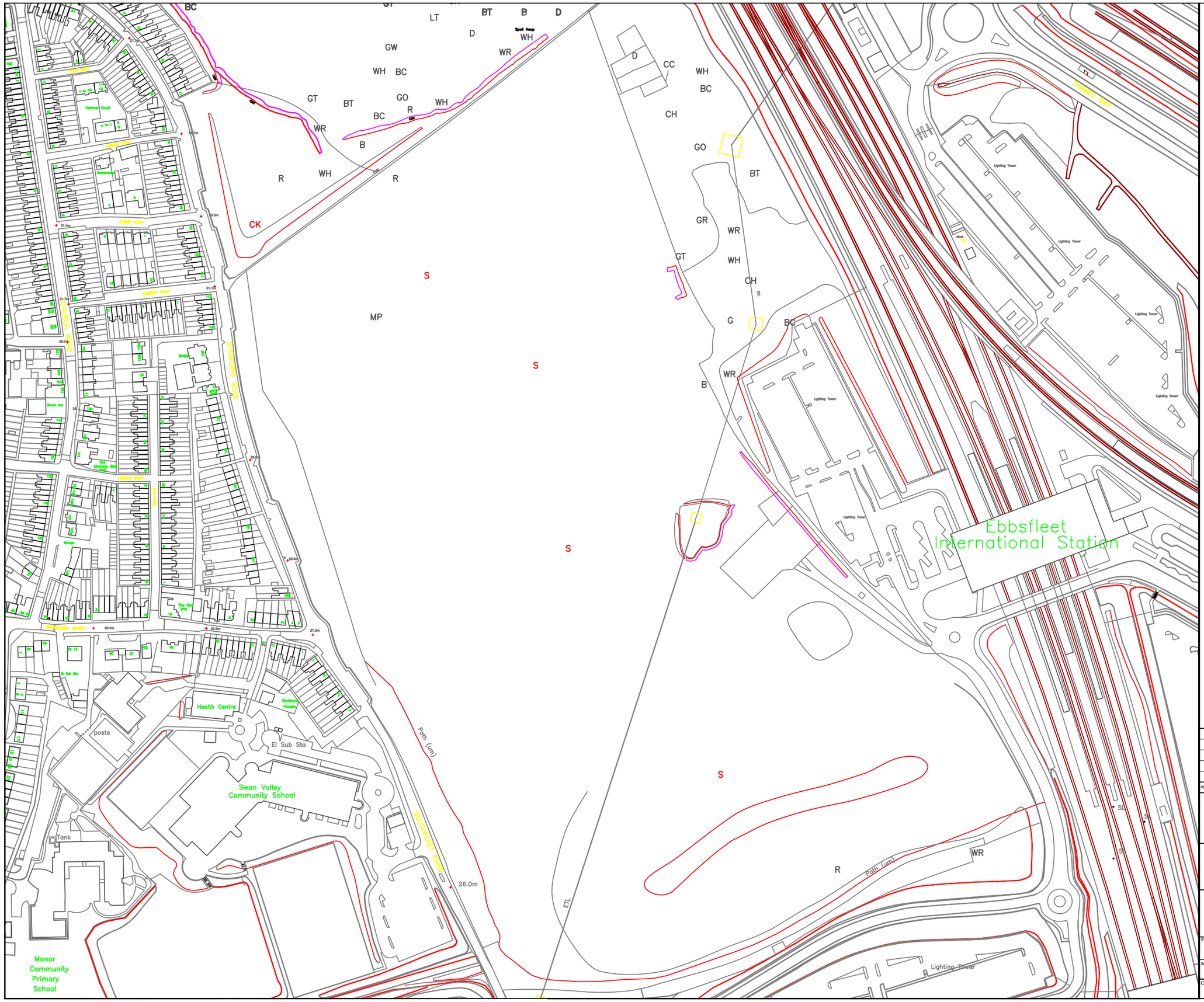
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Project:
London Paramount Entertainment Resort

Title:
Bamber Pit

status	drawing no.			
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CAD filename
Figure_1.dwg



Key

B	Blackbird
BC	Black cap
BF	Bullfinch
BR	Bearded tit
BT	Blue tit
CC	Chiffchaff
CH	Chaffinch
CK	Cuckoo
CO	Coot
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RB	Reed bunting
RW	Reed warbler
S	Skylark
SD	Stock Dove
ST	Song thrush
SW	Sedge warbler
WH	White throat
WR	Wren

Pink Schedule 1
Red Red list
Orange Species of principal importance

revision	description	date	checked by

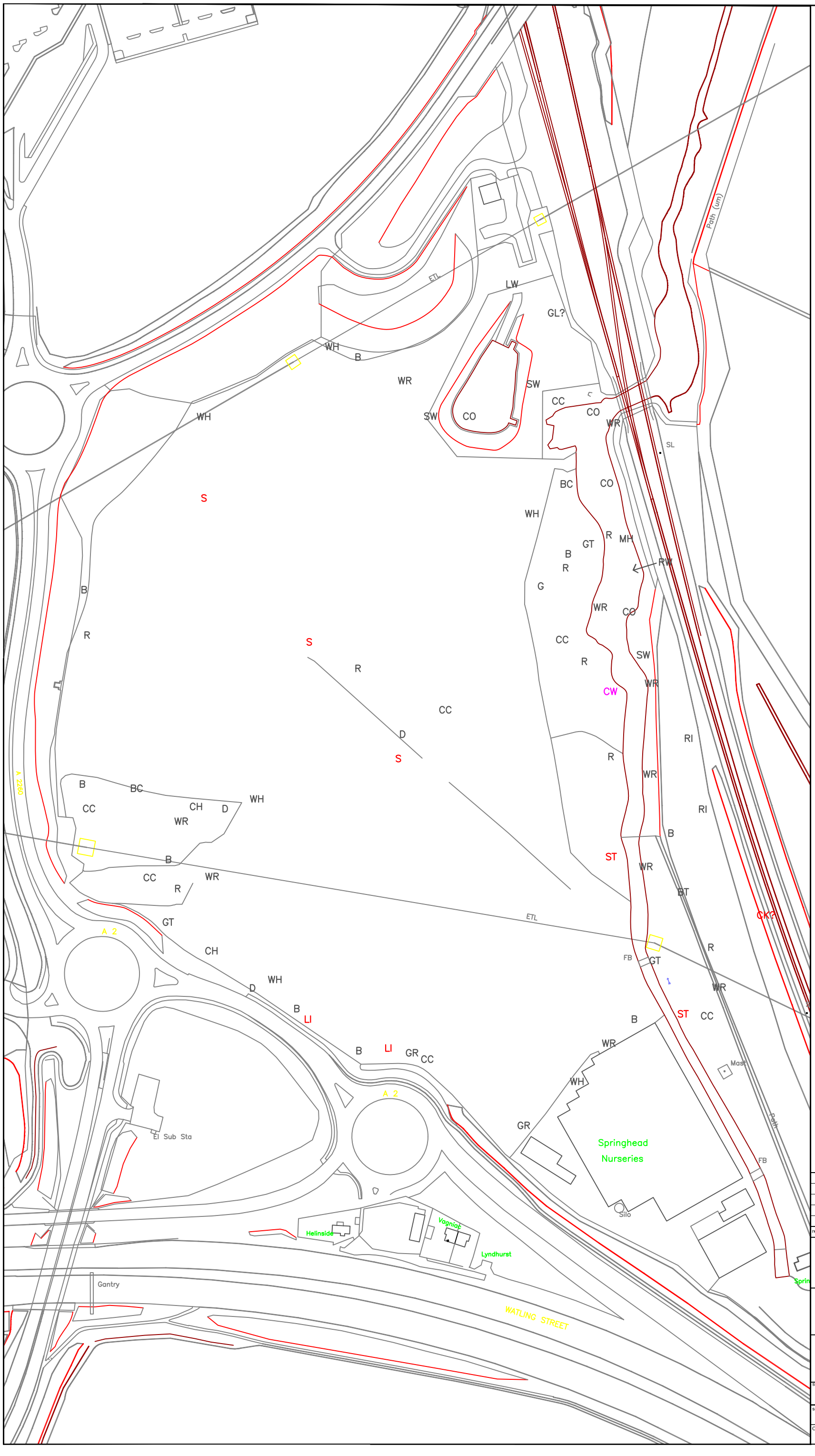
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Project:
London Paramount Entertainment Resort

Title:
North Fleet Landfill

status	drawing no.			
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scale	size	date	drawn	checked
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CAD filename
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revision	description	date	checked by

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Project:
London Paramount Entertainment Resort

Title:
Springhead Nurseries

status	drawing no.
	Figure 5

scale	size	date	drawn	checked
NTS	A3	16 -06-2013	AW	HL

CAD filename
Figure_1.dwg

APPENDIX 1 – Survey Dates

2012 Survey Dates

- 5th April
- 3rd May
- 17th May
- 31st May
- 14th June
- 21st June

2015 Survey Dates

Full CBC surveys were undertaken on the following dates:

1. 30 March 2015
2. 15 April 2015
3. 24 April 2015
4. 8 May 2015
5. 29 May 2015
6. 12 June 2015

Specific Cetti's warbler surveys were undertaken on the following dates:

1. 30 March 2015
2. 24 April 2015
3. 29 May 2015

Specific nightingale surveys were undertaken on the following dates:

1. 24 April 2015 – morning survey
2. 8 May 2015 – morning survey
3. 19/20 May 2015 – night survey
4. 6 June 2015

Annex EDP 19
Bat Activity Report 2015 (Corylus Ecology June 2016)

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London Paramount Entertainment Resort

Bat Activity Report 2015

For and on behalf of

Chris Blandford Associates

June 2016

CORYLUS ECOLOGY

Unit A3 Speldhurst Business Park, Langton Road, Speldhurst, Tunbridge Wells, Kent. TN3 0NR

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Appendix 2 – Line graphs showing the total number of bat passes recorded during the static monitoring period
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Appendix 8 – Transect surveys summary table for Springhead

1.0 INTRODUCTION

1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.2 The Bat Surveys have been undertaken by Corylus Ecology Ltd on behalf of CBA. This report details the results of the bat surveys undertaken in 2015-16 within the following survey areas of the Site:

- The Peninsula including Botany Marshes to the east;
- Craylands La. Pit;
- Northfleet Landfill;
- Bamber Pit; and
- Springhead.

Scope of Survey

1.3 The aims of the bat surveys were to:

- determine the presence/likely absence of bats in trees identified as being suitable for roosting bats;
- determine the potential for and presence/likely absence of bats in tunnels identified as being suitable for roosting bats;
- identify species present within the survey areas;
- identify key areas of habitat for bats; and
- evaluate the importance of the bat assemblage within the Site.

Existing Information

1.4 Surveys of the Peninsula (excluding Botany Marshes) were undertaken in 2012. The results of these surveys are provided in a separate report (Corylus Ecology, 2016).

Survey area descriptions and habitats

1.5 Table 1 below provides a summary of the habitat types at each Site and the quality of these habitats in regard to bats. The habitats within the survey areas have been assessed according to the Bat Conservation Trust's Good Practice Guidelines (Collins, 2016).

Table 1 – Habitat types of each Site surveyed

Survey area name	Approximate size of the survey area	Description of main habitat types	Quality of bat habitat (in reference to Collins, 2016)
Peninsula	167 ha	The majority of the survey area consists of unmanaged grassland with frequent areas of scrub vegetation. There are two main areas of reed bed: Black Duck Marsh in the west, Botany Marsh in the east. Patches of ephemeral vegetation are present in the central and southern areas, where bare ground and concrete have recently become vegetated. Several areas of the site are relatively well lit, such as the area near to the cement works in the east.	'Low'
Craylands La. Pit	6 ha	An abandoned quarry which consists predominantly of bare ground which has been colonised by grassland vegetation. The margins of the quarry are more vegetated with buddleia, bramble and other scrub vegetation. The survey area is relatively well lit by LED lights located along the A226 road to the north.	'Low'
Northfleet Landfill	25 ha	A vegetated former landfill site which is dominated by grassland. There is an area of scrub vegetation in the north-eastern area, as well as treelines on the northern and western boundaries. The southern and eastern areas of the survey area are particularly well lit as they are adjacent to Ebbsfleet International.	'Low'
Bamber Pit	10 ha	A former quarry which is vegetated by well-developed scrub and unmanaged grassland vegetation. There is a large lake (approximately 4,800m² in size) in the eastern part of the survey area. The southern section of the survey area is well lit as there are LED lamps along the footpath between this site and the Northfleet Landfill site to the south. The northern area is also well lit due to the presence of the high speed railway line which forms the northern boundary.	'Moderate'
Springhead	26 ha	An area dominated by unmanaged grassland and scrub vegetation. There is a small area of woodland (approximately 3.8ha in area) in the east of the survey area; the Ebbsfleet stream runs through this woodland. A balancing pond is located in the north-eastern corner of the survey area. The survey area is bounded by dual carriageways on the northern, western and southern sides. The majority of the survey area is relatively well lit by the street lights along the A2 and A2260. However, the woodland is dark and sheltered, providing good quality foraging habitat as well as potential roosting features in multiple trees.	'Moderate'

2.0 METHODOLOGY

2.1 Bat Tree Assessment

2.1.1 A ground level investigation of all suitable trees within the Springhead survey area was carried out to identify bat potential. This survey was undertaken on the 12th of June 2015.

2.1.2 Bats may use any crack or hole (such as woodpecker holes), splits or flaking bark and ivy (JNCC, 2004). Bats will also use different roosts at different times of the year. It can therefore often be difficult to definitely locate bat roosts in trees. Field signs to look for include dark streaking below holes and crevices, droppings under access points. Chattering noises emitted by bats may also be audible, particularly during the summer, however, even where bats are known to occur, such signs are not always evident.

2.1.3 Trees were placed into one of three categories as described below in accordance with Table 8.4 page 60 of Bat Conservation Trust Good Practice Survey Guidelines 2nd Edition 2012:

1*. Trees with multiple, highly suitable features capable of supporting larger roosts;
1. Trees with definite bat potential but supporting features suitable for use by singleton bats;
2. No obvious potential although the tree is of a size and age that elevated surveys may result in cracks or crevices being found or the tree supports some features which may have limited potential to support bats; and,
3. Trees with no potential.

2.1.4 Trees were also noted if they supported ivy *Hedera Helix*. Ivy can do one of two things; very old, dense ivy can provide cavities for bats between the thick interwoven stems and the tree trunk or it can conceal features in the tree itself. The former would be classed as Category 1; the latter would be Category 2.

2.2 Bat Building and Tunnel Assessment

2.2.1 Bat building assessments of the buildings to the south of the peninsula were undertaken in August 2015 by Helen Lucking (Licence number CLS 1269) of Corylus Ecology. The external surveys consisted of an assessment of areas for potential for bats to roost; these include timber soffits, gable ends and roof tiles.

2.2.2 The tunnels were assessed for their potential to support day roosting and hibernating bats on 6th July 2015. Potential for bats to access the tunnels was assessed, and cracks and crevices in the brickwork were assessed.

2.3 Bat Activity Surveys

2.3.1 Activity surveys have been undertaken throughout the survey season with multiple surveyors to allow the survey areas to be covered adequately and safely. The aim of the activity surveys was to provide information during the active season, including the main breeding period. The dates on which the surveys were carried out are shown in Table 2 below:

Table 2: Dates of activity surveys

Survey areas	April 2015	May 2015	June 2015	July 2015	August 2015	September 2015
Peninsula	22nd April	19th May	16th June	14th July	11th August	22nd September
Craylands La. Pit	28th April	28th May			11th August	22nd September
Bamber Pit	22nd April	19th May	16th June	28th July	18th August	8th September
Northfleet Landfill			23rd June	28th July		
Springhead			23rd June	28th July	18th August	8th September

2.3.2 Transects were identified before the surveys and monitoring points marked along their length. Transects were designed to cover as much of the Site which is likely to be affected as possible and included areas of key habitat type and structure, such as woodland edge and field boundaries. The monitoring points were located at intersection points where possible. It should be noted that the lengths of each section of transect between each monitoring point was not standardised to a set length. This is because no statistical analysis is to be undertaken regarding the numbers of bats in specific areas or types of habitat. In the process of carrying out surveys for an impact assessment, the important issues are to cover the Site adequately with sufficient survey effort, as well as to use published and peer reviewed research information regarding the use of different habitats used by bats.

2.3.3 The transect surveys commenced approximately 45 minutes after sunset, with an emergence survey of a tree or other feature with bat potential prior to this (if there was one on the route). If there was not a suitable feature, a static observation/vantage point survey was carried out to observe the direction of flight of the first bats within each of the survey areas (see below). The 2012 Bat Conservation Trust (BCT) guidelines, which were the most relevant at the time of the surveys, stated that transects should commence 15 minutes before sunset; however, the methodology used follows Warren, Waters *et al* 2000. If transects commenced ¼ hour prior to sunset, the first 30 minutes or so would likely have no bat passes. This would result in a bias of negative results for those parts of the survey area which are

walked during the first 30 minutes, as well as bias the first 45 minutes towards earlier emerging species such as *Nyctalus* and *Pipistrelle* bats. The aim of these transect surveys was to identify key commuting and foraging habitats within the Site. The surveys therefore started with a static point (co-incidental with the emergence survey of a tree or other suitable feature), with the transect starting during the main active period and continuing for approximately 2hrs after sunset. The new BCT guidelines (Collins, 2016) are now in line with this and state that activity surveys should commence at sunset and continue for between 2-3 hours after sunset. During the surveys the time of each bat pass, the species and (where it was possible to observe) information regarding bat behaviour, such foraging and flight direction, was recorded. Elekon Batloggers were used and calls subsequently analysed on 'Bat Explorer' software.

2.3.4 The principal surveyors used for the transect surveys were Helen Lucking (CLS 1269), Jenny Passmore (2016-23195-CLS-CLS), Alex Watkinson (C179184), Christian Gunn (2015-13609-CLS-CLS) and Paul Spencer (2015-12115-CLS-CLS) of Corylus Ecology, with additional surveyors including Becky Clover and Louise Ryan of Corylus Ecology, Peter Scrimshaw (CLS 3105) of Hesperus Ecology and Bill Wadsworth and Richard Bickers of CBA.

2.4 Vantage Point Surveys

2.4.1 Vantage point surveys were undertaken when there were no suitable roosting features, such as a tree or rock crevice, on which to carry out an emergence survey. Vantage point surveys can be used to provide information about the behaviour of early-emerging and high-flying bats such as noctule. They can provide information about numbers of bats and their direction of travel, which may assist in identifying the direction of any roosts and early evening foraging grounds (Collins, 2016). Surveyors were positioned at specific points along the transect routes, preferably at a high point or in an open area with wide visibility. The vantage point survey was carried out for approximately 45 minutes after sunset, after which a transect route was walked.

2.5 Tree Emergence Surveys

2.5.1 Evening emergence surveys were carried out of trees with bat potential within the woodland at Springhead. The emergence surveys were carried out prior to each transect so that all Category 1* and 1 trees were surveyed at least once during the 2015 bat survey season. The majority had two emergence surveys with only T5, T9 and T13 having a single survey (see Table 4). The surveys commenced 15 minutes before sunset and continued until at least one hour and 15 minutes after sunset or later if it was still possible to see the tree, in accordance with the BCT guidelines (2012).

2.6 Static Monitoring Surveys

2.6.1 In addition to transect surveys, Wildlife Acoustics SM3 detectors were set at Static Monitoring Points (SMPs). Four SMPs were located on the peninsula and two SMPs were located at each of the other survey areas. SM3 bat detectors were positioned in suitable locations such as within areas of woodland, along significant treelines, and at other notable linear features. The locations of the SMPs are shown in Figures 1 - 5.

2.6.2 Static detectors were set out for a minimum of five consecutive nights per month between April and September 2015. This was the case at every survey area except Bamber Pit; access was not granted for this survey area until May 2015. The detectors were therefore set out at this location between May and September 2015. There were occasional technical faults with the detectors; in this instance, the detectors were re-set where possible, such as on the peninsula in April 2016. The dates of these technical faults are given in the results section.

2.7 Data Loggers

2.7.1 Data loggers were placed in several of the tunnels in order to record levels of bat activity in late summer and autumn. The activity logger is a frequency division bat detector (Batbox Baton) linked to a threshold detection circuit; once the ultrasonic audio level is above a settable threshold level, a bat pass is registered and further ultrasound is ignored for ~5 seconds, to prevent multiple counts from single bat pass. The threshold circuit sends a pulse for each pass to a Tinytag Count Logger, which records the total number of passes in every 20 minute period, to give an indication of bat activity levels; there are 20 x 60 = 1200 seconds in each 20 minute period, so the maximum possible count (for continuous bat activity) is 1200 / 5 = 240. The detector and threshold circuit are housed in a sealed plastic container with the microphone set behind a thin diaphragm; they are powered by a large 12V battery and the Tinytag logger is mounted externally and has its own internal battery. The detector will pick up all ultrasonic activity (not just bats), so the data has to be examined to make sure that it is giving a believable indication of activity (i.e. that activity occurs at night and stops in the day). The data is viewed and plotted in Tinytag Explorer software.

2.8 Bat Sound Analysis

2.8.1 The sonograms were subsequently uploaded on to the computer software 'BatExplorer' for analysis of the emergence and transect surveys. The SM3 recordings were analysed using a combination of 'Analook', 'BatSound' and 'BatExplorer' software. The sonograms were analysed and compared with identification parameters given in Parsons and Jones (2000) and Russ (1999 & 2013) and also compared with library recordings made by the surveyors. It should be noted that it is not always possible to identify each bat pass to species level due either to poor recordings of their echolocations or due to

similarities between echolocations of bat species not allowing confidence of identification. It should also be noted that bats will vary their echolocation in different habitats and their calls may therefore not always resemble 'typical' echolocation calls. Where identification has not been possible suggestions of likely bat species have been provided. No auto-identification software was used in the process.

2.8.2 The pipistrelle bats can often be confidently identified by the frequency at which the peak energy is recorded, around 45kHz for the common pipistrelle and around 55kHz for the soprano pipistrelle. The *Myotis* genus is generally the hardest to separate to species level due to the plasticity of the calls and overlapping of call characteristics between the different species. Where the sonogram quality has allowed, parameters including call duration, pulse interval, start frequency, end frequency and peak energy have been recorded.

2.8.3 After the data from each survey area had been analysed, each location was categorised in terms of the 'importance' of its bat population. This was in accordance with the 'Guidelines for Ecological Impact Assessment in the UK and Ireland' (CIEEM, 2016).

3.0 RESULTS

3.1 Desk Study

3.1.1 Kent Bat Group has provided 64 non-roost records of bats and 105 roost location records. The following ten bat species have been recorded within a 5km radius of the Site: serotine *Eptesicus serotinus*, Daubenton's *Myotis daubentonii*, whiskered *M. mystacinus*, Natterer's *M. nattereri*, Leisler's *Nyctalus leisleri*, noctule *N. noctula*, Nathusius' pipistrelle *Pipistrellus nathusii*, common pipistrelle *P. pipistrellus*, soprano pipistrelle *P. pygmaeus* and brown long-eared *Plectous auritus.*

3.1.2 Fourteen of the 105 roost records are of maternity roosts and these are maternity roosts of *Pipistrellus* sp. and serotine bat. The nearest maternity roost record is of a pipistrelle maternity roost, some 1.2km to the west of the edge of the Site. There are 11 records from this location and these range between 1987 and 2006. The most recent record in 2006 is for 76 individual bats and this is the peak count of bats at this location.

3.1.3 There are three records of a serotine maternity roost and these are all from the same location, some 2.6km to the west of the edge of the Site. Two of the maternity records are from 1992 and one is from 1993; there was a peak count of 14 bats seen at close observation in 1992.

3.1.4 There are 135 records of hibernating bats within a 5km radius of the Site and these range between 1985 and 2013. Forty-four of these records are of Daubenton's bats, 22 are of brown long-eared bat, 26 are of Natterer's bat, 25 are of whiskered / Brandt's / Alcathoe bat, one is of a noctule bat, three are of a common pipistrelle, one is of *Pipistrellus* sp., three are of a bat from the *Myotis* genera and ten records have not been assigned to species level. There are records of hibernating bats from four different locations within 600m to the west of the edge of the Site. The nearest location is 260m from the edge of the Site and these include records of brown long-eared bat and common pipistrelle in 2000 and a bat from the *Myotis* genera in 2001. The second location is 313m from the edge of the Site and this is a record of a Daubenton's bat in 2001. The third location is 415m from the edge of the Site and there are records of noctule bat in 2002, Daubenton's bat in 2003 and 2005, common pipistrelle in 2002 and 2007 and *Pipistrellus* sp. bat in 2002. The fourth location is 600m from the edge of the Site and this location includes 122 records of hibernating bats including Daubenton's, brown long-eared, *Myotis* sp. and whiskered / Brandt's / Alcathoe. The records from this forth location date from between 1985 and 2013.

3.1.5 The nearest records of flying bats are from 105m to the south and 120m to the east of the edge of the Site, and these are of noctule bat in 2011.

3.1.6 The Essex Field Club has provided 339 records of bats within 2km of the Site. The following species have been recorded by Essex Field Club: serotine, Daubenton's, Natterer's, Leisler's, noctule, common pipistrelle, soprano pipistrelle and brown long-eared.

3.1.7 The nearest record of a bat recorded by the Essex Field Club is from approximately 995m to the east of the Site, beyond the River Thames along Manor Way Road. This record is of a common pipistrelle bat in 2007.

3.1.8 There is a total of 13 records of Daubenton's bats and these date between 1986 and 2014. The nearest record is an historic record from 1986, some 1.2km to the north of the edge of the Site and beyond the River Thames. Three of the 13 records are from 2014 and the closest records are from two locations in Grays Chalks Quarry Nature Reserve to the north of the River Thames, approximately 1.8km and 1.9km to the north of the edge of the Site. Natterer's bat, Leisler's bat and common pipistrelle bat have also been recorded in Grays Chalks Nature Reserve at four different locations in 2010, 2011, 2013 and 2014.

3.1.9 There are seven records of a serotine bat from a single location north of the River Thames in 1991, some 2.1km to the north of the edge of the Site. The nearest and most recent record of a brown long-eared bat is from 1.9km to the north of the Site in 2014. The nearest record of a noctule bat is from 1.3km to the north of the edge of the site in 2004.

3.2 Bat Building Assessment

3.2.1 Several buildings to the south of the peninsula were assessed for their potential to support day roosting bats on 29th July 2015. The buildings were subject to external inspections only as internal access was not possible at the time of the survey. The locations of the buildings are show in Figure 6.

3.2.2 Building B1 (to the north of Manor Way) is a single-storey plant room which measures approximately 15m long and 8m wide. The walls are constructed from brick and the roof is pitched and covered with machine-cut clay tiles. There are plastic soffits at the tops of the walls which are tightly fitted to the brickwork. Gaps were noted at the ends of the roof tiles; these gaps are considered to have low potential to support crevice-dwelling bats. There are several street lights located immediately to the south of the building, and the building itself has motion-sensor security lights fitted to the walls. This reduces the building's suitability to support a bat roost.

3.2.3 Building B2 is a single-storey building which is adjacent to the northern side of a large warehouse (B10) between Manor Way and London Road. It measures approximately 20m long and 8m wide. The building is constructed from brick, with wooden soffits and a pitched roof which is covered with machine-cut

cement roof and ridge tiles. Several small gaps were noted beneath the roof tiles. The building is considered to have low potential to support low numbers of crevice-dwelling bats. There are several street lights and floodlights located immediately to the north on Manor Way, as well as security lights mounted on the large warehouse immediately to the south of the building: the illumination caused by these lights reduces the suitability of the building to support a bat roost.

3.2.4 Building B3 is located in the corner between Craylands Lane and London Road. It is a two-storey brick building with a flat roof. The roof is covered in bitumen felt and there are wooden barge boards around the tops of the walls; gaps were noted between these barge boards and the brickwork. Metal grills have been fitted over the broken windows, restricting bat access into the building. Street lights are located immediately to the north and east of the building on Craylands Lane and Manor Road: the illumination of the area immediately surrounding the building reduces its suitability to be used as a bat roost. It is considered that this building has low potential to support low numbers of crevice-dwelling bats.

3.2.5 Building B4 is a warehouse-type building located to the south of Manor Way. It has brick foundations and the upper walls are constructed from corrugated metal sheeting. The roof is pitched and constructed from corrugated metal sheeting. The materials used do not provide a stable thermal environment for bats. Although a full inspection was not possible, it is considered that the building has no potential to support day roosting bats.

3.2.6 Building B5 is a small brick building with a flat roof which is covered in bitumen roofing felt. No access points were noted during the survey. Although a full inspection was not possible, it is considered that the building has negligible potential to support day roosting bats.

3.2.7 Building B6 is a two-storey brick building with a pitched roof which is covered in what appears to be corrugated asbestos sheeting. No access points were noted and the roof's material would cause the inside of the building to fluctuate in temperature. Although a full inspection was not possible, it is considered that the building has no potential to support day roosting bats.

3.2.8 Building B7 is a large building to the east of B6: the western section is single-storey and the eastern section is two-storey. The building has breeze block walls, which are rendered, and the roof is flat. There are several broken windows throughout the second storey of the building which would allow bat access into at least the second floor rooms. However, the open windows are likely to illuminate the rooms inside during the day and the absence of a roof void reduces the suitability of the building to be used as a day roost. The building has some potential to be used as a night roost or feeding perch.

3.2.9 Building B8 is a large, modern prefab-type building located to the east of B7. It has a flat roof which appears to be covered with bitumen roofing felt. No access points were noted and the building does not have a roof void. Although a full inspection was not possible, it is considered that the building has no potential to support day roosting bats.

3.2.10 Building B9 is a second modern prefab-type building located to the east of B8. It is of a similar construction to B8 and also has no potential to support day roosting bats.

3.2.11 Building B10 is a large warehouse located between Manor Way and London Road. The walls are constructed from a combination of brick and corrugated metal sheeting. The roof is pitched and is also constructed from corrugated metal sheeting. No access points were noted and the building materials used would not provide a stable thermal environment for bats. Although a full inspection was not possible, it is considered that the building has no potential to support day roosting bats.

3.2.12 Building B11 is a small warehouse to the south-east of B9. The walls are constructed from corrugated metal sheeting, and the roof is pitched and appears to be covered with clear plastic. The building has no potential to support day roosting bats.

3.2.13 Building B12 is located to the west of B3. It is a single-storey building which has brick walls and a pitched roof which is covered in corrugated metal sheeting. The building does not have a void and the metal sheeting would fluctuate in temperature, reducing its suitability to be used as a bat roost. No access points were seen from the road. Although a full inspection was not possible, it is considered that the building has negligible potential to support day roosting bats.

3.2.14 Building B13 is a small brick building to the south of B3 and B12. From the road it appears to have a corrugated metal sheet roof which is mono-pitched. The building could not be fully inspected but it is considered to have negligible potential to support day roosting bats.

3.3 Bat Tree Assessment and Emergence Survey Results

3.3.1 The only section of the Survey Area which has trees large enough to support roosting bats is Springhead. There are a number of large standard trees along the length of the River Ebbsfleet. Eighteen category 1 or 1* trees were identified during the tree assessment in April 2014 and a single tree was assigned a category 2. The results of the survey are described in Table 3 - Bat Tree Assessment below and the location of the trees are marked on Figure 5.

Table 3 - Bat Tree Assessment

ID	Species	Category	DBH	Features	Grid Reference
T1	Ash	1*	1m	Woodpecker hole on south side of trunk at 4m. Marks/staining at entrance. Good feature. Some clutter at entrance. Tree marked with yellow ribbon.	TQ 61586 73291 Tree 1034
T2	Ash	1*	0.75m	Rot/split at base - cavity appears to extend up into tree at least 60cm but likely much higher. Feature on south-west side. Tree marked with pink ribbon.	TQ 61572 73171 Tree 1039
T3	Oak	1*	0.9m	Various features - rotten branches all over, splits and cracks. 3 woodpecker holes on NE side of main leader at 8/9m. Tree marked with hazard tape.	TQ 61566 73088 Tree 1055
T4	Oak	1	0.8m	Numerous snagged ends and cracked branches. Rotten leading branch with dry holes - good potential. Feature at 8m on eastern leader (vertical branch). Tree marked with yellow ribbon.	TQ 61564 73079 Tree 1056
G1	3xwillows	1*	0.4m-0.6m	Three mature willows in river - not accessible on foot but visible from bank. Each tree has a large woodpecker hole with some marks/stems.	TQ 61609 73004 Tree N/W
T5	Crack willow	1*	0.8m	Woodpecker hole at 6m on south-west side. Tree marked with pink ribbon	TQ 61605 73024 Tree 1075
T6	Crack willow	1	0.6m	One dead fallen tree. Two woodpecker holes on vertical leader at 4m on east side. Best hole on north side at 4m.	TQ 61606 73020 Tree 1079
T7	Crack willow	1*	0.5m	Leaning trunk - dead branch and 3 woodpecker holes at 6m to 7m on west side. Need to wade across stream to view, but tree inaccessible from south.	Emergence point =TQ 61613 73028 Tree N/A
T8	Crack willow	1	0.2m	Part of multistemmed willow (x5 trunks). Woodpecker hole marked on broken trunk at 3.5m, but hole doesn't extend. Limb on south side has category 1 woodpecker hole at 6m on south side, good hole visible from T9. Marked with green ribbon.	TQ 61612 73024 Tree 1077
T9	Crack willow	1	0.7m	Large willow that is leaning north-east. Woodpecker hole on north side of trunk at 4-5cm, but hole may be shallow. Woodpecker hole on east side at 11m to 12m: visible from path. Marked with hazard tape.	TQ 61612 73023 Tree 1081
T10	Cherry	2	0.3m	Twin stem cherry. Scar on south side at 2m. Woodpecker holes and rot but features do not extend - low potential for singleton bats.	TQ 61585 72992
T11	Crack willow	1*	0.4m	Mature ash with dead leading branch to south. Three woodpecker holes at 4m and 6m on east side - visible from path to east.	TQ Tree N/A
T12	Crack willow	1*	0.3m	Woodpecker holes at 10m on north-east side visible from path/slope. To the left of three stumps.	TQ 61629 72985
T13	Crack Willow	1 or 2	0.5m	Limb heading north west 45° from upright with split/delamanation forming. Also raised bark lower on main stem.	TQ 61629 72985
T14	Crack willow	1 or 2	0.6m	Fungus tree. Split on north west side - maybe woodpecker hole on south side - honey bees seen.	TQ 61629 72985
T16	Crack willow	1	1m	Large mature multistemmed tree. Woodpecker hole on south east leader at 7m. Three smaller rot holes on X-shaped leader at 9m on the east	TQ 61629 773071

ID	Species	Category	DBH	Features	Grid Reference
				side. Marked by hazard tape.	
T17	Crack willow	1	0.6m	Woodpecker hole around 5m up on western side. Access near tree very restricted due to presence of giant hogweed.	TQ 6160 7302

3.3.2 Emergence surveys of several of the trees within the woodland at Springhead were carried out between June and September 2015. The results of these surveys are shown below in Table 4. One of the main features in T14 was being used by honey bees and the feature on T12 was being used by ring-necked parakeets; emergence surveys were therefore not carried out as bats are unlikely to be present alongside these other species.

3.3.3 It can be seen from Table 4 that one tree was confirmed as a bat roost during the surveys: a soprano pipistrelle bat emerged from T7 (a crack willow) on 28th of July 2015. Due to the difficulty of surveying within a cluttered woodland environment, there were several occasions when surveyors could not confirm that a bat had emerged from a tree. These were recorded as 'possible' emergences from trees T4 and T13, as well as a group of trees to the north of T15. The surveyors concluded that these bats may have emerged due to the passes being early in the evening and the fact that other nearby surveyors did not record the bats beforehand, suggesting that the bats had emerged from somewhere nearby. These unconfirmed bat roosts are detailed below:

- T4 – On 28th July 2015 a common pipistrelle bat was recorded at 21:29hrs (approximately 34 minutes after sunset) close to the north-western side of the tree. This was followed by two soprano pipistrelle bats which appeared to come from the same location at 21:31hrs and 21:32hrs. The bats appeared to be suddenly in the vicinity of the tree, leading the surveyor to speculate that the bats had emerged in quick succession.
- T13 – On 28th July 2015 a common pipistrelle bat was recorded at 21:29hrs (approximately 34 minutes after sunset). The bat appeared low down on the tree and the surveyor thought it likely that it had emerged from under a lifted section of bark.
- Unknown tree to the north of T15 – On 18th August 2015 at 20:49hrs (approximately 33 minutes after sunset) a common pipistrelle bat appeared to swoop down from the canopy to the north of T15. Its direction of flight and the timing of the bat pass led the surveyor to speculate that the bat may have emerged from one of several trees to the north of T15.

Table 4: Bat emergence survey results for Springhead (2015)

Date of survey	Environmental conditions	Tree ID	Results of emergence survey	First bat pass during survey
23/06/2015	*Sunset time:* 21:17hrs	T1	No emergence	At 21:44hrs, approximately 27 minutes after sunset, a common pipistrelle bat was recorded foraging in the northern area of the woodland near to T1.
		T2	No emergence	
		T3	No emergence	
	Start temperature: 15°C	T4	No emergence	
		T7	No emergence	
	End temperature: 14°C	T11	No emergence	
		T14	No emergence	
	Weather: 10% cloud cover, light breeze (BF 1)	T16	No emergence	
		G1	No emergence	
28/07/2015	*Sunset time:* 20:55hrs	T3	No emergence	At 21:14hrs, approximately 19 minutes after sunset, a noctule bat was heard but not seen in the central area of the woodland.
		T4	Possible emergence of one common pipistrelle bat and two soprano pipistrelle bats	
	Start temperature: 18°C	T7	Confirmed emergence of a soprano pipistrelle bat – 27 minutes after sunset	
		T11	No emergence	
	End temperature: 17°C	T12	No emergence – ring-necked parakeets present in hole.	
	Weather: 60% cloud cover, moderate breeze (BF 2)	T13	Possible emergence of a common pipistrelle bat	
		T14	No emergence	
18/08/2015	*Sunset time:* 20:16hrs	T1	No emergence	2hrs, approximately six minutes after sunset, a noctule bat was seen travelling north above the woodland.
		T6	No emergence	
	Start temperature: 18°C	T8	No emergence	
		T9	No emergence	
	End temperature: 16°C	T15	No emergence	
		T16	No emergence	
	Weather: 95% cloud cover, light breeze (BF	T17	No emergence	
		G1	No emergence	

	1)			
08/09/2015	*Sunset time:* 19:30hrs	T2	No emergence	At 19:36 hours, approximately six minutes after sunset, a noctule bat was heard but not seen in the centre of the woodland.
		T5	No emergence	
	Start temperature: 14°C	T8	No emergence	
		T15	No emergence	
	End temperature: 14°C	T16	No emergence	
	Weather: 100% cloud cover, light breeze (BF 1)	T17	No emergence	

3.4 Bat Surveys

Peninsula

3.4.1 One transect survey was undertaken every month from April – September 2015. These began with a vantage point survey during which the surveyors observed an area of the peninsula for approximately 45 minutes to see whether bats were entering the survey area from a particular direction: the vantage points were located at point 1i overlooking Black Duck Marsh, at 2E in the south of the peninsula and between 1R and 1S in the centre of the peninsula. After the vantage point survey two transect routes were walked: route 1 covered the western area of the peninsula and route 2 covered the eastern area (see Figure 1). In July an additional transect route in the centre of the peninsula was also surveyed.

Vantage point surveys

3.4.2 During the vantage point surveys low numbers of bats were observed entering the peninsula, as well as commuting and foraging. In April three common pipistrelle bats were seen commuting across the survey area from east to west by the surveyors positioned on the bank above Black Duck Marsh. Low levels of foraging activity were recorded in the 'triangle' of grassland in this western area between points 1H, 1I and 1L in May. In June and September foraging noctule bats were also recorded in this area above Black Duck Marsh, and in September a noctule was observed flying north-west to south-east across this area. In August and September two common pipistrelle bats flew into the survey area from the south, seen by the surveyors positioned at 2E.

Transect surveys

3.4.3 A total of six bat species were recorded on the peninsula during the transect surveys: common pipistrelle, noctule, soprano pipistrelle, Leisler's, Nathusius' pipistrelle and serotine. A total of 328 passes were recorded on route 1 (west) and 433 passes were recorded on route 2 (east). During every

month except July and September there were more bat passes recorded on the eastern route than the western route. Table 5 below summarises the total numbers of bat passes per transect route.

Table 5: Transect survey summary for the peninsula

Date	Total number of bat passes recorded on western transect route 1	Total number of bat passes recorded on eastern transect route 2	Total number of bat passes recorded on central transect route 3
22/04/2015	5	72	N/A
19/05/2015	60	66	N/A
16/06/2015	94	120	N/A
14/07/2015	85	69	92
11/08/2015	41	74	N/A
22/09/2015	43	32	N/A
TOTAL	328 passes	433 passes	92 passes

3.4.4 During the survey on 22nd April 2015 one species was recorded: common pipistrelle bat. Only five passes were recorded on the western transect route; all were recorded in the southern central part of the route between points 1I, 2P, 1L, 1M and 1N. On the eastern transect route 72 common pipistrelle bat passes were recorded. The highest levels of bat activity were recorded in the western area adjacent to lagoon P2 and the south-eastern area around Botany Marsh. Common pipistrelle bats were observed foraging over lagoon P2 and around the wildlife pond at Botany Marsh East at the south-eastern tip of the route.

3.4.5 During the transect survey on 19th May 2015 three bat species were recorded: common pipistrelle, noctule and Leisler's bat. Leisler's bat was only recorded by the surveyors on the eastern route near to lagoon P2. A similar number of bat passes were recorded on both transect routes: 60 on the western route and 66 on the eastern route. The highest levels of bat activity on the western route were recorded around 1i and 1H around Black Duck Marsh; foraging common pipistrelle bats were also observed in the 'triangle' of long grassland and scrub in this area. On the eastern transect route the highest levels of bat activity were recorded in the western area around the lagoon P2 and in the far eastern area around Botany Marsh East between points 3C and 3F. Multiple common pipistrelle bats were recorded foraging over the wildlife pond at Botany Marsh East in the far eastern section of the route.

3.4.6 On the 16th of June 2015 five bat species were recorded: common pipistrelle, noctule, soprano pipistrelle, Leisler's and Nathusius' pipistrelle. Leisler's and Nathusius' pipistrelle were recorded on the western transect route only. A greater number of passes were recorded on the eastern route: 120 passes were recorded here compared with 94 in the west. Noctules were recorded foraging around

Black Duck Marsh and in the centre of the eastern route (points 1M-1Ma) and common, soprano and Nathusius' pipistrelle and Leisler's bat were all recorded foraging in the far western part of the route along the sea wall. The highest level of activity by common pipistrelle bat occurred around the lagoon P2 on the western route. The areas of the eastern transect where the highest levels of bat foraging activity occurred were the eastern and northern areas, around Botany Marsh.

3.4.7 During the survey on 14th July 2015 an additional central transect route was surveyed and a total of three bat species were recorded: common and soprano pipistrelle and noctule. Soprano pipistrelle was not recorded on the eastern transect route. The greatest number of bat passes were recorded on the central route: 92 passes were recorded here compared with 85 on the western route and 69 in the east. The highest levels of bat foraging activity on the western route occurred in the central and northern areas around 1M – 1Y, with all three species recorded in the western area along the sea wall. The bat activity on the eastern route was concentrated around the central path adjacent to the CTRL Wetlands, as well as the north-eastern and south-eastern areas around Botany Marsh; high levels of foraging were recorded in this area. Low numbers of common pipistrelle bats were recorded in all areas of the central route and the greatest number of foraging bat passes were recorded in the north and north-western areas near to the lagoon P2.

3.4.8 On the 11th of August 2015 five bat species were recorded: common and soprano pipistrelle, noctule, Leisler's and serotine. Common and soprano pipistrelle, noctule and Leisler's bat were recorded on the western route, whereas common pipistrelle, serotine and Leisler's bat were recorded on the eastern route. A higher number of bat passes was recorded on the eastern route, with 74 here compared to 41 passes in the west. On the western route the highest levels of bat activity were recorded along the sea wall and near to Black Duck Marsh, and foraging common pipistrelle bats were also observed over the lagoon P2. On the eastern transect route the highest levels of bat activity occurred in the northern section between points 2B and 3B. Foraging bats were recorded around points 2C and 2B along the ditch lines, as well as over the wildlife pond at Botany Marsh East. Only three common pipistrelle bats were recorded during the pre-dawn survey on the morning of the 12th of August: a single bat was recorded at 04:00 (1 hour and 37 minutes before sunrise) near to Black Duck Marsh and two bats were recorded at 04:39 (58 minutes before sunrise) foraging over the wildlife pond at Botany Marsh East.

3.4.9 During the survey on the 22nd of September 2015 three bat species were recorded: common and soprano pipistrelle and noctule. Only common pipistrelle bats were recorded on the eastern route, whereas on the western route noctule and soprano pipistrelle were also recorded. On the eastern transect route common pipistrelle bats were recorded in the central area (between points 2E and 2B) and foraging bats were observed near to the wildlife pond at Botany Marsh East. On the western route a

high number of noctule foraging passes were recorded around Black Duck Marsh, and low numbers of common and soprano pipistrelle bats were recorded to the north-east of Black Duck Marsh and around the lagoon P2.

3.4.10 Table 6 below shows the overall species composition recorded during the transect surveys on the peninsula.

Table 6: Bat passes recorded during the activity surveys on the peninsula

Species	Total number of passes	%
Common pipistrelle bat	698	81.8%
Noctule bat	115	13.5%
Soprano pipistrelle bat	21	2.5%
Leisler's bat	14	1.6%
Nathusius' pipistrelle bat	4	0.5%
Serotine	1	0.1%
Total	853	

Static monitoring surveys

3.4.11 Four static monitoring devices were installed on the peninsula for five consecutive nights during the months of May to September 2015 and in April 2016. SMP1 was located in the south-west of the survey area, SMP2 in the west, SMP3 in the centre and SMP4 in the north (see Figure 1).

3.4.12 A minimum of eight bat species were recorded during the static monitoring surveys: common and soprano pipistrelle, noctule, Leisler's, bats from the *Myotis* genus, serotine, Nathusius' pipistrelle and long-eared bat. This species assemblage is similar to that recorded during the transect surveys, with the addition of bats from the *Myotis* genus and long-eared bat. All of the species apart from long-eared bat were recorded in varying numbers at all four SMPs; long-eared bat was only recorded on one occasion at SMP3.

3.4.13 The dominant species during all of the static monitoring sessions was common pipistrelle bat: 80.18% of the total passes recorded were attributable to this species. The highest number of passes by this species was recorded at SMP4 (6,738), with fewer at SMP2 (3,843) and SMP3 (2,734) and the lowest number at SMP1 (1,744). The second most dominant species was soprano pipistrelle bat: 9.6% of the total passes were attributable to this species, with the majority (1,398 of the 1,803 passes) recorded in May 2015. A total of 1,242 noctule bat passes were recorded (6.61% of the total), and there were fewer Leisler's bat passes and unidentified *Nyctalus* passes which constituted just 2.77% of the total. Low

numbers of serotine and Nathusius' pipistrelle bat passes were recorded: 21 and 26 passes respectively.

3.4.14 Bats from the *Myotis* genus and long-eared bat were not identified during the transect surveys but were recorded by the static monitoring devices. A total of 105 passes by bats from the *Myotis* genus were recorded (0.56% of the total), the majority of which occurred at SMP3 immediately to the north-west of the lagoon P2 (68 of the passes). A single long-eared bat pass was recorded at SMP3 in August.

3.4.15 Tables 7 and 8 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 7: Static monitoring survey results from the peninsula

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	15,059	80.18%	89.94%
	Soprano pipistrelle	1,803	9.60%	
	Nathusius' pipistrelle	26	0.14%	
	Unidentified *Pipistrellus* species	4	0.02%	
Nyctalus	Noctule	1,242	6.61%	9.38%
	Leisler's bat	357	1.90%	
	Unidentified *Nyctalus* species	163	0.87%	
Myotis	Unidentified *Myotis* species	105	0.56%	0.56%
Eptesicus	Serotine	21	0.11%	0.11%
Plecotus	Long-eared bat	1	0.01%	0.01%
	Total	18,781		

Table 8: Static monitoring survey results from the peninsula per month

Month	Total number of bat passes at SMP1	Total number of bat passes at SMP2	Total number of bat passes at SMP3	Total number of bat passes at SMP4	Total number of passes per month
April 2016 [1]	110	1,294	252	1,117	2,773
May 2015	688	2,128	1,570	2,562	6,948
June 2015	1,140	770	257	1,242	3,409
July 2015	396	218	162	1,021	1,797
August 2015	282	463	821	1,455	3,021
September 2015	78	*Technical issue – no data*	144	611	833*
Total	2,694	4,873*	3,206	8,008	

[1] NB data from 2016 not 2015 due to technical issues

* Total affected by technical issues with the detectors

Craylands La. Pit

Bat activity surveys

3.4.16 Bat activity surveys were undertaken at Craylands La. Pit on 28th April, 28th May, 11th August and 22nd September 2015. Emergence surveys of suitable roosting features located in the southern chalk cliff were undertaken for the first 45 minutes of each survey, after which the surveyors walked a transect route around the quarry (see Figure 2). A total of four bat species were recorded during the surveys: common pipistrelle, soprano pipistrelle, noctule and Leisler's bat. No bats emerged from the features which were observed in the southern chalk cliff during any of the surveys.

3.4.17 Very low levels of bat activity were recorded during the activity surveys in April and May: just five bat passes were recorded in April and 18 passes in May. Activity levels were higher in August, with a total of 72 passes recorded, and the highest level of bat activity was recorded in September: 102 bat passes were recorded during this survey. Low levels of foraging activity by common pipistrelle bat were recorded throughout the survey area during the August and September surveys.

3.4.18 In April all five of the bat passes were by common pipistrelle bats which were recorded in the southern section of the quarry. During the survey in May the species composition was very different to April, with 10 of the 18 passes recorded (56%) attributable to Leisler's bat. The species composition was very similar in August: 56% of the total passes recorded were by Leisler's bat. No Leisler's bats were recorded during the September survey. Noctule bats were recorded regularly in August and September, with 23.6% and 18.6% of passes attributable to this species in these two months respectively. Three

passes by soprano pipistrelle bat were recorded in September in the south-western corner of the quarry, but this species was not recorded during any of the other activity surveys.

3.4.19 During the transect survey in August moderate levels of activity by Leisler's bat and common pipistrelle bat were recorded in the north-eastern and eastern areas of the quarry, between points B, C, D and E. In September the highest levels of bat activity were recorded along the western and southern sides of the quarry, particularly between points F, G, H and A. All of the bat species identified during the surveys were recorded in all areas of the quarry, with the exception of soprano pipistrelle bat which was only recorded in the south-western corner of the survey area.

3.4.20 Table 9 below shows the total numbers of passes and the overall species composition at Craylands Pit over the four activity surveys.

Table 9: Bat passes recorded during the activity surveys at Craylands La. Pit

Species	Total number of passes	% of total
Common pipistrelle	105	53.3%
Leisler's bat	50	25.4%
Noctule bat	36	18.3%
Soprano pipistrelle	3	1.5%
Unidentified *Nyctalus* species	3	1.5%
Total	197	

Static monitoring surveys

3.4.21 Two static monitoring devices were installed at Craylands Pit for five consecutive nights every month between April and September 2015. SMP1 was located in the south-western corner of the quarry and SMP2 was located in the north-eastern area of the quarry inside tunnel 016 which connects Craylands Pit with Manor Way 1.

3.4.22 At least four additional bat species were recorded during the static monitoring than during the activity surveys, with a minimum of eight species identified. The species recorded during the static monitoring sessions were common pipistrelle, Leisler's, noctule, bats from the *Myotis* genus, soprano pipistrelle, serotine, Nathusius' pipistrelle and long-eared bat. A greater species diversity was recorded at SMP1, with serotine and Nathusius' pipistrelle recorded at this location but not at SMP2.

3.4.23 During every month except August the dominant species recorded was common pipistrelle bat. Overall this species constituted 78.65% of the total passes recorded. The dominant species in August was

Leisler's bat, with 49.17% of the passes attributable to this species compared to 40.73% of calls by common pipistrelle bat in this month. A relatively large proportion of the total passes were attributable to bats from the *Nyctalus* genus: overall 19.2% of passes were by these larger species, with the dominant species being Leisler's bat which contributed 12.14% of the total passes recorded. Soprano pipistrelle bat was recorded at both SMPs in similar numbers: 11 passes were recorded at SMP1 and 15 at SMP2, representing 0.47% of the total. A peak of 14 passes by this species was recorded in June.

3.4.24 Bats from the *Myotis* genus, serotine, Nathusius' pipistrelle and long-eared bat were not recorded during the activity surveys but were identified from the static monitoring. *Myotis* bats were recorded in similar numbers at both static monitoring locations: 30 passes were recorded at SMP1 and 34 at SMP2, constituting 1.16% of the total passes. Bats from the *Myotis* genus were recorded during every month except April, with numbers peaking in September when 9.65% of passes were attributable to this genus. Serotine was recorded in low numbers at SMP1 only: a total of ten serotine passes (0.18% of the total) were recorded, with a peak of five passes in August. Nathusius' pipistrelle bat was also recorded at SMP1 only and constituted just 0.09% of the total passes, with a peak of three passes in May. Very low numbers of long-eared bat passes were recorded and calls by this species made up just 0.07% of the total: three passes were recorded at SMP1 in September and a single pass was recorded at SMP2 in July.

3.4.25 Tables 10 and 11 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 10: Static monitoring survey results from Craylands La. Pit

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	4,335	78.65%	79.39%
	Soprano pipistrelle	26	0.47%	
	Nathusius' pipistrelle	5	0.09%	
	Unidentified *Pipistrellus* species	10	0.18%	
Nyctalus	Noctule	268	4.86%	19.2%
	Leisler's bat	669	12.14%	
	Unidentified *Nyctalus* species	121	2.20%	
Eptesicus	Serotine	10	0.18%	0.18%
Myotis	Unidentified *Myotis* species	64	1.16%	1.16%
Plecotus	Long-eared bat	4	0.07%	0.07%
	Total	5,512		

Table 11: Static monitoring survey results from Craylands La. Pit per month

Month	Total number of bat passes at SMP1	Total number of passes at SMP2
April	154	44
May	351	460
June	504	993
July	642	886
August	202	758
September	271	247
Total	2,124	3,288

Data Logger and Static monitoring survey of tunnel 007

3.4.26 Tunnels within Craylands La. Pit were assessed for their potential to support roosting bats. Tunnel 007 is an old railway tunnel and runs from Craylands La. Pit in the south-west to another old pit to the south. The entrance to the tunnel at Craylands La. Pit is closed with a solid metal gate. There is a gap low down in the gate where bats could emerge from. Videos were set at the entrance of the tunnel during all bat surveys of this area and no bats were recorded emerging from the entrance. The wall structure is intact and in good condition along much of the length, but there are holes into the brick work along the side of the walls which could be used by hibernating bats.

3.4.27 A data logger was installed in tunnel 007 from 29th July to 15th October 2015. A total of 8,855 passes were recorded over 78 nights. The highest activity level recorded was 150 passes per 20 minutes from 23:00hrs on 9th September, and there was a higher level of activity than had previously been recorded between 23:00hrs and 01:00hrs on this night. There was this single spike of activity on 9th September, with other peaks of generally less than 100 passes per 20 minutes, and on most nights of less than 50 passes per 20 minutes. It is not known whether these passes were due to swarming activity or whether they were attributable to foraging bats.

3.4.28 At other known swarming sites high levels of sustained activity have been seen for over four hours late at night, which has not been the case in this tunnel. If these were swarming bats in September, it is not considered that the swarming activity was sustained through the season as the activity levels were much lower again by October. We have learnt to recognise the signs of swarming activity at other sites, by observing the build-up of nightly activity levels through the late summer period; it usually peaks in late September, then falls away again through October and into November, depending on weather conditions. This build-up of activity was not seen in tunnel 007; it can therefore be concluded that the tunnel is not a significant swarming site.

3.4.29 Following on from the results of the data loggers, two static bat detectors were set within tunnel 007 for a total of ten nights between 29th September and 9th October 2015 in order to assess whether bat swarming activity was occurring within the structure. SMP3 was located near to the entrance of the tunnel at the north-eastern end, and SMP4 was located at the south-western end. Data were recorded at SMP3 until the 9th of October, however the detector at SMP4's batteries appeared to run out after the 7th of October.

3.4.30 A total of 11 bat passes were recorded at SMP3: these were all by long-eared bats and included both social calls and echolocation calls. Three passes were recorded on the 29th of September between 00:49hrs and 00:51hrs; these passes are considered to have been attributable to a single bat. This also occurred on the 30th of September: there were three long-eared bat passes between 23:19hrs and 23:23hrs, followed by three passes within one minute at 00:08hrs. Single long-eared bat passes were recorded on the 8th and 9th of September.

3.4.31 A total of 19 bat passes were recorded at SMP4 and the species diversity was greater at this location than at SMP3: common pipistrelle bat, long-eared bat, soprano pipistrelle bat and a bat from the *Myotis* genus were all recorded. Like at SMP3, a combination of echolocation and social calls were identified. The most frequently recorded species at SMP4 was common pipistrelle bat, with ten out of the total of 19 passes attributable to this species. Six long-eared bat passes were recorded, as well as two passes

by soprano pipistrelle bat and a single social call by a bat from the *Myotis* genus. As was the case at SMP3, the highest number of bat passes was recorded on the 30th of September – six passes were recorded at both locations on this night. However, whereas at SMP3 bats were only recorded on four nights, at SMP4 data were recorded on eight nights (every night between the 29th of September and 7th of October, with the exception of no bat passes on the 5th of October).

3.4.32 It can be seen that there was no bat swarming activity during this period, as the peak number of bat passes recorded on a single night was just six at each location. The data show that a greater diversity of species flew past or near to SMP4 (the south-western end of the tunnel) than SMP3. A summary of the results from the static monitoring survey in tunnel 007 is shown below in table 12.

Table 12: Static monitoring survey results from tunnel 007

Species	Total number of passes at SMP1	Total number of passes at SMP2
Common pipistrelle bat	0	10
Long-eared bat	11	6
Soprano pipistrelle bat	0	2
Myotis species	0	1
Total	11	19

Hibernation potential survey – Tunnel 007

3.4.33 Four combined temperature and humidity loggers were installed within and at the entrance of tunnel 007 from 15th October 2015 until 15th April 2016. Three loggers were placed at equally spaced intervals inside the tunnel, and one was located externally near to the north-eastern door. The survey aimed to identify whether the tunnel provides a suitable environment for hibernating bats during the winter.

3.4.34 The temperature inside the tunnel ranged from around 15°C in November 2015 to 1°C in January 2016, fluctuating greatly alongside the external temperature. During the coldest period around the 20th of January 2016, the temperature throughout the majority of the tunnel was below 3°C, whilst the external temperature was around -1°C. The humidity at the mid-point of the tunnel dropped to 70%, which is relatively dry.

Bamber Pit

Bat activity surveys

3.4.35 One bat activity survey was undertaken every month from April – September 2015. The surveys began with a vantage point survey of the western side of the quarry for the first 45 minutes, after which a

transect route was walked around Bamber Pit (see Figure 3). A total of five bat species were recorded during the activity surveys: Leisler's, common pipistrelle, noctule, Nathusius' pipistrelle and soprano pipistrelle bat. No bats were recorded emerging from the western chalk cliff during any of the surveys.

3.4.36 During the bat activity surveys on 22nd April and 19th May 2015 very low levels of bat activity were recorded: a total of four and three common pipistrelle bats were recorded on these dates respectively. During the April survey all four bats were recorded in the western part of the transect route around points 4C, 4D and 4F, whilst during the May survey three bats were all recorded to the west of the lake around points 4G and 4H.

3.4.37 The survey on 16th June recorded a much higher level of activity by common pipistrelle bats than during the previous months' surveys. Out of a total of 50 passes recorded during the survey, 48 of the passes (96%) were attributable to this species. A single Nathusius' pipistrelle bat was recorded flying over the quarry from east to west during the emergence survey, and one noctule bat was recorded in the western section of the transect route between points 4E and 4F. During the June activity survey the areas of the transect route with the highest levels of bat activity were in the south-eastern and western areas of Bamber Pit, around points 4A, 4B, 4E and 4F.

3.4.38 The activity surveys on 28th July, 18th August and 8th September showed a significant increase in the diversity of bat species using Bamber Pit, and the July and August surveys also showed a much higher level of overall bat activity. The survey in July recorded the highest number of bat passes (160) of any of the surveys at Bamber Pit, by a greater diversity of bats than had previously been recorded: four species were identified (common and soprano pipistrelle, Leisler's and noctule). The number of passes recorded per species was relatively even between common pipistrelle, noctule and Leisler's: these three species attributed 26.9%, 32.5% and 40% of the passes respectively. A single soprano pipistrelle bat pass was also recorded during the first part of the survey in the western area of the quarry. Bats were recorded in all areas of Bamber Pit, with the highest levels of activity occurring around the centre of the quarry (points 4A, 4D and 4G) and the eastern tip of the transect near to the railway (point 4A).

3.4.39 During the August activity survey a similar number of bat passes was recorded to that in July. A total of 127 passes by a combination of common pipistrelle, noctule and Leisler's bat were recorded. The majority of passes (68.5%) were attributable to Leisler's bat. Passes by common pipistrelle constituted only 13.4% of the total activity, whilst noctule bat passes constituted 18.1%. Activity levels were fairly consistent throughout the transect route, with the exception of no bats recorded around point 4C in the south of the survey area. The areas with the highest levels of activity were similar to those in June and July, with the addition of a greater number of passes around point 4F in the west of the survey area.

3.4.40 The level of bat activity was lower during the September survey than in July and August, with a total of 61 passes recorded. An additional two transect points were added during this survey due to access to this area being granted: these were 4X and 4Z in the north-western corner of the quarry; no bat passes were recorded around these points. The same three species which were recorded in August were also recorded in September and the majority of the passes recorded during this survey were attributable to Leisler's: 57.4% of the passes were by this species, with 41% by common pipistrelle bat and 1.6% by noctule bat. The bat activity during this survey was concentrated in the western area (around points 4E and 4F) and the majority of the bat passes were recorded in the centre of the quarry, to the west of the lake around points 4G and 4H. There were very few or no bat passes recorded around the other sections of the transect route.

3.4.41 Table 13 below shows the total numbers of passes over all six activity surveys and the overall species composition at Bamber Pit.

Table 13: Bat passes recorded during the activity surveys at Bamber Pit

Species	Total number of passes	%
Leisler's bat	186	45.9%
Common pipistrelle bat	140	34.6%
Noctule bat	77	19%
Nathusius' pipistrelle bat	1	0.2%
Soprano pipistrelle bat	1	0.2%
Total	405	

Static monitoring surveys

3.4.42 Two static monitoring devices were installed in Bamber Pit for five consecutive nights during the months of May – September 2015. SMP1 was located in the south-western area of the quarry and SMP2 was located in the west of the survey area (see Figure 3). During the September static monitoring session the detectors were set at SMP2 and SMP3, which was located in the north of the quarry.

3.4.43 A wider diversity of species was recorded during the static monitoring than during the activity surveys, with a minimum of seven species identified compared to the five species recorded during the activity surveys. The species recorded during the static monitoring were common pipistrelle, noctule, Leisler's, serotine, Nathusius' pipistrelle, bats from the *Myotis* genus and long-eared bat. Soprano pipistrelle was recorded during the transect surveys but was not picked up by the static monitoring devices.

3.4.44 The dominant species recorded by the two static detectors was common pipistrelle, which constituted 50.6% of the total passes; very similar numbers of this species were recorded at both SMP1 and SMP2, with 756 and 799 passes recorded at these two locations respectively. A large proportion of the total passes recorded were by *Nyctalus* species (noctule and Leisler's bats): between the three SMPs a total of 1,489 passes were attributable to this genus, constituting 48.4% of the total recorded.

3.4.45 Serotine, long-eared bat and bats from the *Myotis* genus were not identified during the activity surveys but were recorded during the static monitoring. Serotine and bats from the *Myotis* genus were recorded at SMP1 and SMP2, and two long-eared bat passes were recorded at SMP2 in August only. The numbers of passes by these additional species were low: 0.42% of the total passes were attributable to serotine, 0.2% to *Myotis* species and 0.07% to long-eared bat. Nathusius' pipistrelle was recorded at all three SMPs, with the majority of passes (seven out of a total of nine) occurring in September.

3.4.46 Tables 14 and 15 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 14: Static monitoring survey results from Bamber Pit

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	1,555	50.57%	50.89%
	Nathusius' pipistrelle	9	0.29%	
	Unidentified *Pipistrellus* species	1	0.03%	
Nyctalus	Noctule	550	17.89%	48.42%
	Leisler's bat	295	9.59%	
	Unidentified *Nyctalus* species	644	20.94%	
Eptesicus	Serotine	13	0.42%	0.42%
Myotis	Unidentified *Myotis* species	6	0.20%	0.20%
Plecotus	Long-eared bat	2	0.07%	0.07%
	Total	3,075		

Table 15: Static monitoring survey results from Bamber Pit per month

Month (2015)	Total number of bat passes at SMP1	Total number of bat passes at SMP2	Total number of bat passes at SMP3
May	160	54	
June	106	100	
July	687	1,015	
August	160	421	
September	135		237
Total	1,248	1,590	237

Northfleet Landfill

Bat activity surveys

3.4.47 Bat transect surveys were undertaken at the Northfleet Landfill site on 23rd June and 28th July 2015. The level of bat activity recorded was greater during the June transect: a total of 58 bat passes were recorded during this survey compared to just 12 passes in July. The transect route is shown in Figure 4.

3.4.48 A total of five bat species were recorded during the transects: common pipistrelle, noctule, Leisler's, soprano pipistrelle and serotine. During both surveys the dominant species recorded was common pipistrelle bat: this species contributed 79% of the passes in June and 83% in July. In June 11 noctule bat passes were recorded: it is considered that all of these passes were attributable to two individual noctule bats which were observed flying high over the eastern and north-western areas of the survey area. No noctule bats were recorded in July. A single pass by a serotine was recorded in June, and single passes by soprano pipistrelle and Leisler's bat were recorded in July.

3.4.49 During the survey in June the areas where the highest level of bat activity occurred were around points B, C and E in the northern and north-eastern areas of the Site. Low numbers of bats were recorded in all areas of the transect in June, with the exception of point G in the south-western corner, where no bats were recorded. In contrast to June, during the July survey no bat passes were recorded around points B and C in the north-east of the survey area, and none were recorded around point I in the south-eastern corner. The highest levels of bat activity in the July survey were recorded around points E and F in the north-west of the survey area, with very low levels of activity recorded in all other areas. It can be seen that bat activity was concentrated around the treelines in the north-western part of the survey area during both surveys.

3.4.50 Table 16 below shows the total numbers of passes recorded during the two transect surveys and the overall species composition at Northfleet Landfill.

Table 16: Bat passes recorded during the activity surveys at Northfleet Landfill

Species	Total number of passes	% of total
Common pipistrelle	56	80%
Noctule bat	11	15.7%
Serotine	1	1.4%
Soprano pipistrelle	1	1.4%
Leisler's bat	1	1.4%
Total	70	

Static monitoring surveys

3.4.51 Two static monitoring devices were installed in Northfleet Landfill for five consecutive nights during the months of April to September. SMP1 was located in the northern part of the eastern treeline and SMP2 was located along the southern boundary of Northfleet landfill (see Figure 4). During the April static monitoring session the detector at SMP2 malfunctioned and no data were obtained. There was also a malfunction at SMP1 on the fifth night of the static monitoring in April and therefore only four nights of data were recorded. The data from SMP1 have been included in the totals discussed below, but no comparisons regarding activity levels can be drawn between April and the following months due to a lack of consistency.

3.4.52 At least two additional species which were not identified during the transect surveys were recorded by the static detectors: Nathusius' pipistrelle and bats from the *Myotis* genus. In total a minimum of seven species were recorded during the static monitoring surveys: common pipistrelle, noctule, Leisler's, soprano pipistrelle, serotine, Nathusius' pipistrelle and bats from the *Myotis* genus.

3.4.53 The dominant species at both SMPs was common pipistrelle bat, which constituted 77.7% of the total passes recorded. This was also the case during the transect surveys in June and July, when 80% of the total passes were attributable to this species. A much higher number of passes by common pipistrelle bat were recorded at SMP2 (852 passes) than at SMP1 (258 passes). The second most dominant species was noctule bat, which attributed 16.9% of the total passes. The numbers of passes by noctule bats were similar at both SMPs: 106 at SMP1 compared with 136 at SMP2. Noctule bat passes peaked in August: 40% of the total passes by this species occurred in this month compared with just 2.5% in May and 4.1% in September. Bats from the *Myotis* genus were only recorded at SMP1, with only two passes recorded at this location in both August and September. All other species were recorded at both SMPs.

3.4.54 Common pipistrelle and noctule were recorded in every month surveyed, whereas the other five species were not: serotine, bats from the *Mytotis* genus and soprano pipistrelle were recorded in low numbers during August and September, Nathusius' pipistrelle in April and September, and Leisler's in every month except April.

3.4.55 Tables 17 and 18 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 17: Static monitoring survey results from Northfleet Landfill

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	1,110	77.68%	79.20%
	Soprano pipistrelle	13	0.91%	
	Nathusius' pipistrelle	8	0.56%	
	Unidentified *Pipistrellus* species	1	0.07%	
Nyctalus	Noctule	242	16.93%	19.87%
	Leisler's bat	27	1.89%	
	Unidentified *Nyctalus* species	15	1.05%	
Eptesicus	Serotine	9	0.63%	0.63%
Myotis	Unidentified *Myotis* species	4	0.28%	0.28%
	Total	1,429		

Table 18: Static monitoring survey results from Northfleet Landfill per month

Month	Total number of bat passes at SMP1	Total number of bat passes at SMP2
April	55*	*Technical error – no data*
May	31	246
June	151	253
July	76	193
August	59	292
September	29	44
Total	401	1,028

* Only four nights of data recorded

Springhead

Bat activity surveys

3.4.56 One bat activity survey was undertaken every month from June – September 2015. The surveys began with an emergence survey of several of the trees within the woodland for the first 45 minutes, after which the surveyors walked two separate transect routes around the survey area: route 1 surveyed the perimeter of the main field, and route 2 was along the eastern edge of the woodland along the public footpath (see Figure 5). There is no accessible route between transect routes 1 and 2 and, to cover the two areas, transect route 1 was walked by two sets of surveyors walking opposite ways around the field whilst route 2 was repeatedly walked up and down by one set of surveyors. It is therefore considered that, whilst the perimeter of the field had double the amount of surveyors walking the route, the repeated walking of route 1 would have compensated for this increased survey effort. Below are the results of the transect surveys only; for the results of the tree emergence surveys see Table 4.

3.4.57 A minimum of eight bat species were recorded at Springhead during the activity surveys: common pipistrelle, noctule, bats from the *Myotis* genus (including positively identified Daubenton's and Natterer's bats), soprano pipistrelle, Leisler's, serotine and long-eared bat.

3.4.58 The surveyors on transect route 2 (the woodland path) recorded a far higher level of bat activity during every survey than the surveyors on route 1. Table 19 below summarises the total numbers of bat passes per transect route. It can be seen that a far greater number of bat passes were recorded on route 2: 774 passes were recorded here as opposed to 285 on route 1.

Table 19: Transect survey summary for Springhead

Date	Total number of bat passes recorded on transect route 1	Total number of bat passes recorded on transect route 2
23/06/2015	Surveyor 1: 18 passes Surveyor 2: 23 passes	Surveyor 1: 67 passes
28/07/2015	Surveyor 1: 84 passes	Surveyor 1: 166 passes
18/08/2015	Surveyor 1: 14 passes Surveyor 2: 55 passes	Surveyor 1: 193 passes Surveyor 2: 146 passes
08/09/2015	Surveyor 1: 66 passes Surveyor 2: 25 passes	Surveyor 1: 202 passes
TOTAL	285 passes	774 passes

3.4.59 During the survey on 23rd June 2015 a minimum of four bat species were recorded: common pipistrelle, noctule, bats from the *Myotis* genus and soprano pipistrelle bat. Common pipistrelle, noctule and bats

from the *Myotis* genus were recorded on route 1 whilst only common and soprano pipistrelle bats were recorded on route 2. A total of 108 bat passes were recorded by three surveyors: two surveyors walked transect route 1 and one walked route 2. The highest levels of bat activity were recorded along the woodland edge (route 2), where there was a fairly constant level of foraging activity by pipistrelle bats along the length of the treeline and around the Ebbsfleet. On route 1 the area with the most bat activity was around point A: the balancing pond in the north-east of the survey area.

3.4.60 On 28th July 2015 five bat species were recorded: common and soprano pipistrelle, noctule, Leisler's and serotine. Common pipistrelle, noctule, serotine and Leisler's bat were recorded on route 1, whilst common and soprano pipistrelle, serotine and Leisler's bat were recorded on route 2. A total of 250 bat passes were recorded by two surveyors: one surveyor walked each transect route. Like in June, the highest level of bat activity was recorded along the woodland edge, with multiple foraging passes by pipistrelle bats recorded in this area. Moderate levels of bat activity were recorded in all areas of route 1, with more bats recorded in the western area of the survey area, around the patch of immature woodland, than in June. Serotine was also recorded in this western area, which it had not been previously, with three brief passes and one foraging pass recorded here.

3.4.61 During the survey on 18th August 2015 a minimum of six bat species were recorded: common pipistrelle, noctule, bats from the *Myotis* genus (including positively identified Daubenton's and Natterer's bats), soprano pipistrelle and Leisler's bat. Common pipistrelle, Leisler's, bats from the *Myotis* genus and noctule were recorded on route 1, whilst common and soprano pipistrelle, Leisler's and *Myotis* bats were recorded on route 2. A total of 408 bat passes were recorded by four surveyors: two surveyors walked each transect route. The majority of the bat activity occurred along the woodland edge, with multiple groups of foraging pipistrelle bats here. Two or three Daubenton's bats were observed foraging beneath the bridge near to point 2F and a Natterer's bat was recorded near to the centre of the treeline. There were low numbers of bats recorded in all areas of route 1, with the highest levels of bat activity occurring around the woodland edge near to the Ebbsfleet.

3.4.62 On 8th September 2015 a minimum of five bat species were recorded: common pipistrelle, bats from the *Myotis* genus, soprano pipistrelle, Leisler's and long-eared bat. All the above species were recorded on route 1, whilst only common and soprano pipistrelle bats were recorded on route 2. A single long-eared bat was recorded in the northern area of the woodland edge, near to the balancing pond. A total of 293 bat passes were recorded by three surveyors: two walked transect route 1 and one walked route 2. Low levels of bat activity were recorded in all areas of transect route 1, with the majority of the passes recorded along the woodland edge in the eastern area of the route.

3.4.63 Table 20 below shows the overall species composition at Springhead recorded during the transect surveys.

Table 20: Bat passes recorded during the activity surveys at Springhead

Species	Total number of passes	%
Common pipistrelle bat	952	89.9%
Noctule bat	54	5.1%
Myotis species	21	2.0%
Soprano pipistrelle bat	16	1.5%
Leisler's bat	11	1.0%
Serotine	4	0.4%
Long-eared bat	1	0.1%
Total	1,059	

Static monitoring surveys

3.4.64 Two static monitoring devices were installed at Springhead for five consecutive nights during the months of April to October. There was a technical fault with the detector which was installed at SMP1 during September, resulting in no data being recoverable; the devices were therefore both set from 29th September to 3rd October in order to collect data from this period. SMP1 was located in the centre of the main treeline in the east of the survey area, and SMP2 was located at the northern end of the same treeline near to the balancing pond (see Figure 5).

3.4.65 A minimum of seven species were recorded during the static monitoring surveys: common pipistrelle, soprano pipistrelle, noctule, bats from the *Myotis* genus, Leisler's, Nathusius' pipistrelle and serotine. This species assemblage is similar to the assemblage recorded during the transect surveys, with the addition of Nathusius' pipistrelle and exclusion of long-eared bat. All of the species apart from serotine were recorded in varying numbers at both SMPs: serotine was only recorded at SMP1.

3.4.66 The dominant species during all of the static monitoring sessions was common pipistrelle bat: 94.88% of the total passes recorded were attributable to this species. Similar numbers of calls by this species were recorded at both SMP1 and SMP2, with 10,381 and 11,632 passes by this species recorded at these two locations respectively. The second most dominant species was soprano pipistrelle bat: 2.63% of the total passes were by this species, with a peak of 516 passes in April compared to a range of between one and 42 passes during the other months. Low numbers of bats from the *Nyctalus* genus were recorded, with 2.05% of passes attributable to this genus.

3.4.67 Nathusius' pipistrelle bat was not identified during the transect surveys but was recorded by the static monitoring devices. A total of 13 passes by this species were recorded at SMP1 and 22 passes at

SMP2. Nathusius' pipistrelle was not recorded in July or August and a peak of 27 passes by this species was recorded in late September/early October.

3.4.68 Tables 21 and 22 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 21: Static monitoring survey results from Springhead

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	22,013	94.88%	97.66%
	Soprano pipistrelle	610	2.63%	
	Nathusius' pipistrelle	35	0.15%	
	Unidentified *Pipistrellus* species	2	0.01%	
Nyctalus	Noctule	368	1.59%	2.05%
	Leisler's bat	56	0.24%	
	Unidentified *Nyctalus* species	50	0.22%	
Myotis	Unidentified *Myotis* species	62	0.27%	0.27%
Eptesicus	Serotine	6	0.03%	0.03%
	Total	23,202		

Table 22: Static monitoring survey results from Springhead per month

Month	Total number of bat passes at SMP1	Total number of bat passes at SMP2
April	2,514	3,575
May	1,114	1,539
June	501	1,908
July	1,343	518
August	390	925
September	*Technical issue – no data*	1,327
Late September/early October	4,782	2,766
Total	10,644	12,558

4.0 EVALUATION

4.1 Whole Survey Area

4.1.1 Within the combined survey area nine bat species have been positively recorded.

- Common pipistrelle
- Soprano pipistrelle
- Nathusius' pipistrelle
- Noctule
- Leisler's
- Natterer's
- Daubenton's
- Serotine
- Long-eared bat

4.1.2 Passes by bats from the *Myotis* genus which could not be identified to species level were recorded. Natterer's bats can be positively identified from calls where the end frequencies were below 25kHz: a parameter which is considered to be an indicative feature of the Natterer's call (*pers comm*. D. Hill and G. Jones, 2006) and these were only recorded at Springhead. Several Daubenton's bats were identified from their characteristic flight pattern low over water; this was only observed on the Ebbsfleet at Springhead. However, the species is likely to be present within the wider survey area, although this was not confirmed. Other *Myotis* species which are considered likely to be present within the entire survey area, include whiskered and Brandt's. However, there is no reliable way of specifically determining whether such other *Myotis* species are present on the Site without examining the bats in the hand.

4.1.3 A total of 62,317 bat passes were recorded by the static detectors and subject to sonogram analysis out of 104,917 sound files. A further 2,584 bat passes were recorded by the surveyors during the bat activity surveys.

4.1.4 All nine species were recorded at Springhead with eight species being recorded at the peninsula, Craylands La. Pit and Bamber Pit. However, at Springhead both Daubenton's and Natterer's bat were positively identified and confirmed present whilst at the other survey areas only unidentified *Myotis* bats could be determined. At Northfleet Landfill a minimum of seven species was recorded with no long-eared bat being recorded during either the transect surveys or the static monitoring survey.

4.1.5 The five survey areas have been surveyed individually and the importance of the bat assemblage at each Site has been assessed in the following pages. At a landscape level these areas are linked by low and medium quality habitat and wildlife corridors. There are barriers that may impact on certain species'

ability to move between each Site but it is considered likely that, due to this connectivity, bats are able to use one or more of these habitats at any one evening or different times of year.

4.2 Peninsula

4.2.1 At least eight species were recorded on the peninsula. Calls by *Myotis* bats were heard but could not be confirmed to species level. A greater number of bat species was recorded during the static monitoring survey than during the transect surveys: six species were recorded during the transects, whilst a minimum of eight were recorded by the static monitoring devices. Bats from the *Myotis* genus and long-eared bat were identified during the static monitoring surveys only. All but one of the eight species identified by the static monitoring surveys were recorded at all four SMPs; long-eared bat was only recorded at SMP3 at the northern tip of lagoon P2.

4.2.2 During the transect surveys a greater diversity of species was recorded in the western and central areas of the peninsula than in the east. Common pipistrelle was recorded across all areas, and soprano pipistrelle was recorded across the majority of the survey area, although most frequently in the western and central areas. Noctule and Leisler's bat were also recorded most frequently in the western and central areas of the peninsula. Nathusius' pipistrelle was only recorded close to the sea wall on the western transect route (route 1) and serotine was only recorded in the centre of the eastern route (route 2); both of these species were only recorded on one occasion during the transect surveys. In the east of the peninsula, from point 3A eastwards, the only species recorded during the transect surveys were common and soprano pipistrelle. As there were no static monitoring devices set in this eastern area of the peninsula it is not known whether additional species were active at times other than when the transect surveys were carried out. The static monitoring surveys showed that *Myotis* bats, Nathusius' pipistrelle and serotine were also active in the central, western and northern areas of the survey area, as these species were recorded at every SMP, although in moderate to low numbers. With the exception of long-eared bat, all of the species were recorded at every static monitoring location in varying numbers.

4.2.3 Overall the highest level of bat activity was recorded at SMP4: 8,008 (42.64%) of the total passes recorded were at this location in the north of the survey area. During every month surveyed, with the exception of April 2016, the highest level of activity occurred at SMP4. In April 2016 the highest level of activity occurred at SMP2, and overall the second highest level of activity occurred at this location in the centre of the peninsula: 4,873 passes were recorded at this location, despite the detector malfunctioning in September 2015. Similar levels of activity were recorded at SMP1 and SMP3 with 2,694 and 3,206 passes were recorded respectively.

4.2.4 During the transect surveys the overall level of bat activity was generally higher on the eastern transect, which passed close to SMP2 and SMP4. July and September were the exception when more bat passes were recorded on the western transect route. Regarding areas of significant bat activity the transect surveys indicate that there are four key areas where bat foraging activity consistently occurred. These include the waterbodies of Black Duck Marsh, the lagoon P2 and the wildlife pond at Botany Marsh East. These areas are considered to hold the most value for bat foraging. The species recorded foraging in these areas are common and soprano pipistrelle and noctule bat. These species, as well as Nathusius' pipistrelle and Leisler's bat, were also recorded regularly foraging along the sea wall on the western edge of the peninsula.

4.2.5 The dominant species recorded during all of the transect surveys was common pipistrelle. The dominance of this species ranged from 52% of all passes in September 2015 to 92.9% in May. Overall 81.8% of the total passes recorded on all of the transect surveys were attributable to this species. The second most dominant species during the transect surveys was noctule bat, contributing 13.5% of the total passes. Although a predominantly tree roosting species, noctule bats can be found in a range of habitats and are considered to be generalist feeders, foraging both in open habitats and over woodland, as well as having a strong preference for water (Altringham, 2003). All of these habitat types are found within the survey area. The dominant species during all of the static monitoring surveys was also common pipistrelle, contributing 80.18% of the total passes. In a contrast to the transect surveys, the second most dominant species recorded by the static detectors was soprano pipistrelle, contributing 9.6% of the total passes. The majority of the passes by soprano pipistrelle (62.2%) were recorded at SMP4 in the northern part of the peninsula.

4.2.6 The two more common and widespread species of pipistrelle have been found to have different habitat requirements, with the common pipistrelle foraging in a wide range of habitats whilst the soprano pipistrelle is more strongly associated with wetland habitats (Vaughan, Jones and Harris, 1997). More recent research suggests that the soprano pipistrelle selects roosts with a significant proportion of surrounding habitats being wetland within 2km of the roost, and spends a high percentage of foraging time over static or slow moving water adjacent to mature trees up to 2.3km from its roost (Davidson-Watts, 2006). A relatively high number of soprano pipistrelle bat passes (1,803 on the static detectors) were recorded here compared with the other survey areas (610 passes at Springhead and less than 50 passes at all other locations). This difference is likely due to the relatively large areas of wetland habitat on the peninsula at Botany Marsh, Black Duck Marsh and lagoon P2.

4.2.7 A comparatively moderate number of passes by bats from the *Nyctalus* genus were recorded throughout all surveys, with some 9.38% of the passes recorded during the static monitoring surveys and 15.1% of

the passes on the transect surveys attributable to bats from this genus. Noctule bat was recorded more frequently and in greater numbers than Leisler's bat. The number of noctule bat passes recorded by the static monitoring devices peaked in May with 525 passes recorded during this month compared to a range of 12 – 364 passes during the other months. During the transect surveys the number of noctule bat passes varied with peaks of 34 in June and 35 each in July and September, and a low of three in August and eight in May. The proportion of passes by this species during the transect surveys was greatest during September when the 35 recorded passes equated to 46.7% of all bat passes, although this was due to the relatively low level of activity recorded by pipistrelle bats during this month.

4.2.8 The species richness varied slightly throughout the months surveyed with six species recorded in September, seven in April, May, June and July and eight in August. Serotine was recorded during every month except September, and a single long-eared bat pass was recorded in August. Species richness was relatively consistent throughout the entire survey period, with the same six species (common, soprano and Nathusius' pipistrelle, noctule, Leisler's and bats from the *Myotis* genus) recorded during every static monitoring session, although in varying numbers.

4.2.9 Nathusius' pipistrelle is a fairly uncommon species in the UK with a restricted distribution, and only a small number of known maternity colonies (JNCC, 2007). These maternity roosts have been located in traditionally built stone and red brick wall cavities and under flat roofs. Maternity roosts are frequently shared with soprano pipistrelle and the majority of roosts are located close to waterbodies, predominantly large freshwater lakes (JNCC, 2007). Nathusius' pipistrelle roosts are often found in association with wetland habitats and this is likely to be related to their preferred prey items (Flaquer, C et al., 2009). It is therefore concurrent that this species was recorded along the sea wall and near to Black Duck Marsh in the west of the peninsula. Both areas provide suitable wetland foraging habitat for Nathusius' pipistrelle, as well as favourable habitat for soprano pipistrelle, which also tends to prefer wetland habitat for foraging.

4.2.10 The static monitoring surveys recorded the highest level of activity during May with 6,948 passes recorded, representing 36.99% of the total bat activity. The month with the lowest level of bat activity was September with 833 passes recorded. This was also the case during the transect surveys, during which the lowest number of bat passes (a total of 75) was recorded in September. During the transect surveys the greatest numbers of bat passes were recorded in June and July. In contrast however, during the static monitoring the second lowest level of activity occurred in July: just 1,797 passes.

4.2.11 With regard to early passes in relation to average emergence time, there were early passes by common pipistrelle bats during two of the transect surveys. During the transect surveys in May and August this

species was recorded 28 and 26 minutes after sunset respectively. During the May transect survey a common pipistrelle was recorded at point 1I adjacent to Black Duck Marsh and in August at 2E, flying into the survey area from the south. The mean emergence time for common pipistrelle has been calculated as 25 minutes after sunset (Davidson-Watts and Jones, 2006), thus these early passes suggest that these bats were likely roosting nearby. No continuous movement of bats (i.e. to suggest a maternity roost) into the areas under observation during the vantage point survey was noted.

4.2.12 The earliest pass recorded during any of the transect surveys was a noctule bat some 18 minutes after sunset on the 22nd of September near to Black Duck Marsh in the west of the peninsula. There were also early noctule bat passes recorded during several of the static monitoring surveys. The majority of first passes recorded by the static detectors were by noctule bats with the earliest of these recorded some seven minutes after sunset on 11th May 2015 at SMP1. Noctule bats have a median emergence time of five minutes after sunset (Altringham, 2003), and the presence of the earliest noctule some seven minutes after sunset suggests that it may have been roosting close to the peninsula in May. Noctule bats roost almost exclusively in trees but can sometimes be found in buildings (Altringham, 2003). The woodland to the south of the survey area was surveyed in 2012 and several trees with bat roost potential were recorded in this area.

4.2.13 There were occasional early passes by pipistrelle species during several of the static monitoring surveys, the earliest of which were common pipistrelle bats recorded 24 minutes after sunset on the 14th of May and 13th of June. As stated above, this is close to the mean emergence time for the species. There was one relatively early pass by a Leisler's bat recorded 22 minutes after sunset on 11th May at SMP2. Leisler's bat tends to emerge approximately 10-15 minutes after sunset (Jones & Walsh, 2001), and Altringham reports a median emergence time of 18 minutes after sunset (Altringham, 2003). This record from 22 minutes after sunset therefore suggests that the species may have been roosting nearby. There were no early passes in relation to emergence time by serotine, bats from the *Myotis* genus, Nathusius' pipistrelle or long-eared bat.

4.2.14 The closest bat pass to sunrise was by a noctule bat recorded some 17 minutes before sunrise on the 15th of May at SMP1. During all of the static monitoring sessions there were bat passes recorded less than an hour before sunrise and throughout the night, indicating bats consistently forage and commute within the peninsula. The pre-dawn transect survey in August showed a very low level of bat activity in the two hours before sunrise, however it is considered that this is due to weather conditions deteriorating during this survey and the data largely conflicts with the findings of the static monitoring surveys.

4.2.15 Research into the habitat preferences for foraging of vespertilionid bats (Walsh and Harris, 1996) found that habitats associated with broadleaved woodland, particularly the woodland edge, and water were most preferred for foraging, whilst arable land, moorland and improved grassland were strongly avoided. As well as the selective preference of habitats for foraging by bats, it has also been shown that certain habitats have strong correlations with bat abundance: riverine, woodland, lacustrine and vegetation corridors (hedgerows, tree lines et al) have a strong positive effect on bat numbers, by comparison there is a strong negative association with large, open areas of arable land (Walsh and Harris, 1996). The same research found that broad-leaved woodland and riparian habitats were of 'pivotal' importance to bats, moreover semi-natural broad-leaved woodland and open water sheltered by tree cover are considered to be the prime foraging habitats for species such as Natterer's bat, (Smith and Racey, 2002). The habitats within the peninsula are discussed below in relation to these assertions.

4.2.16 The total level of bat activity recorded was considered to be comparatively moderate: 18,781 bat passes were recorded overall by four detectors, compared with over 23,000 passes recorded by only two detectors at nearby Springhead. The peninsula is located within an area generally supporting poor habitat quality for bats. It is surrounded by sub-optimal urban and industrial habitats to the south and the River Thames to the north, with similarly dense residential, commercial and industrial development (including Tilbury Docks) on the northern bank of the river. There are occasional small fragments of woodland within the landscape to the south of the peninsula, including to the west of Swanscombe near to the Swanscome Skull site SSSI. However, these areas of woodland are isolated from the peninsula by train lines, a main road, several quarries and other commercial developments. There are no continuous areas of good quality bat habitat which connect to the peninsula. Within the peninsula there is limited woodland habitat, although there are several areas of maturing scrub, planted and scattered trees and a small area of broad-leaved woodland to the south of Black Duck Marsh. These areas are dominated by sycamore *Acer pseudoplatanus* with hawthorn *Crateagus monogyna,* blackthorn *Prunus spinosa* and field maple *Acer campestre*. Despite the lack of wooded habitats, the peninsula does contain areas of what may be considered optimal (for some species) bat foraging habitat, in particular the high quality wetland and marsh habitats of Black Duck Marsh, the CTRL wetlands and Botany Marsh.

4.2.17 Overall, given the level of activity, behaviour and the number and diversity of species recorded it is considered that the value of the bat assemblage on the peninsula is of Local Importance.

4.3 Craylands La. Pit

4.3.1 At least eight species were recorded at Craylands Pit. Calls by *Myotis* bats were heard but could not be confirmed to species level. A greater number of species were recorded during the static monitoring

surveys than during the activity surveys. Common pipistrelle, soprano pipistrelle, noctule and Leisler's bat were recorded during the activity surveys, whilst the static monitoring surveys recorded the following additional species: bats from the *Myotis* genus, serotine, Nathusius' pipistrelle and long-eared bat. Overall six of these species were recorded in all areas of Craylands La. Pit, whereas serotine and Nathusius' pipistrelle were recorded at SMP1 only. All seven species occurred in May, July and September, compared to six in April and August and five in June.

4.3.2 Three areas with bat roosting features were noted within the southern chalk cliff and were subject to bat emergence surveys. No bats emerged from any of the features during the surveys. There was an early pass, 25 minutes after sunset, by a common pipistrelle bat in May. This bat was recorded foraging briefly in the south-western area of the survey area, but was not seen emerging from any of the cliff features.

4.3.3 Overall a higher level of bat activity was recorded at SMP2 (inside tunnel 016) than SMP1 in Craylands La. Pit: 3,388 passes were recorded at SMP2 (within tunnel 006) compared to 2,124 at SMP1 (in the south-west of the pit). This equates to an average of 113 passes per night at SMP2 over 30 nights' worth of data. However, SMP2 was not the 'busiest' location during every month; in April and September SMP1 recorded the highest level of bat activity. Although the overall activity levels were lower at SMP1, a greater species diversity was recorded at this location, with serotine and Nathusius' pipistrelle recorded here but not at SMP2. The A226 runs immediately north of Craylands Pit and light from the street lights extends over much of the central and eastern part of the Pit. The area of tunnel 006 is darker and creates a link through to Manor Way 1. Whilst the majority of passes recorded were by common pipistrelle (77%) there was also a relatively high number of passes by Leisler's bat (605 or 18%). It is considered likely that the common pipistrelles were foraging at the front of the cliff and potentially into or through the tunnel whilst Leisler's bat are regularly recorded outside the tunnel within the Pit.

4.3.4 The dominant species overall was common pipistrelle bat: this species contributed 53.3% of the total passes during the activity surveys and 78.65% during the static monitoring surveys. A relatively large proportion of the total passes recorded were attributable to bats from the *Nyctalus* genus: overall 19.2% of passes recorded during the static monitoring surveys were by this species. The dominant species from this genus was Leisler's bat which contributed 12.14% of the total passes recorded. This result reflects the findings of the activity surveys, during which *Nyctalus* species contributed 43.7% of the total passes recorded. Leisler's bat was the second most dominant species overall with a peak in numbers in August from both the static and activity surveys. Leisler's and noctule bats are found in a range of habitats and are generalist feeders which will forage in the open (Altringham, 2003). Noctule and

Leisler's bats have been recorded foraging around white street lights and are generally less affected by street lights than other more light sensitive bats.

4.3.5 Very low levels of bat activity were recorded during the transect surveys in April and May; the lowest level of activity was also recorded in April by the static monitoring devices. The static monitoring surveys showed the highest levels of bat activity in June and July: similar numbers of passes were recorded during these months, with 1,497 passes in June and 1,528 in July. The number of common pipistrelle bat passes increased every month between April and July, after which the numbers reduced until September. Research has found that common pipistrelles appear to make more foraging flights to a greater number of feeding locations than the soprano pipistrelle, although the foraging areas are likely to be closer to the roost. This appeared to be most marked during the lactation period. In comparison pipistrelle was found to make fewer foraging bouts but travel further distances to the foraging areas (Davidson-Watts and Jones, 2006). This may explain the higher number of passes by common pipistrelles during the June and July periods when the bats are likely to be heavily pregnant or lactating, as suggested in the research. Other species showed slightly different patterns of activity throughout the months: for example, passes by Leisler's bat peaked in June and August, and noctule and *Myotis* bats peaked in September.

4.3.6 There were early bat passes during two of the emergence and transect surveys. In May a common pipistrelle bat was recorded 25 minutes after sunset foraging briefly in the south-western area of Craylands La. Pit. This early record suggests that it was roosting nearby. In September a noctule bat was recorded 15 minutes after sunset; this bat was seen flying high over the survey area from the south and was not roosting within it. During April and August the first bat passes recorded were 57 minutes and 45 minutes after sunset respectively.

4.3.7 There were early passes during all of the static monitoring sessions, the earliest of which was a noctule bat recorded six minutes after sunset on the 24th of May at SMP1. With a median emergence time of five minutes after sunset, the presence of this noctule just six minutes after sunset suggests that it is likely to be roosting nearby. There is a small block of woodland located approximately 70m to the south-west of the quarry across Craylands Lane; it is possible that there is a noctule roost in this woodland or in Springhead where numerous trees with bat potential have been noted, especially as noctule bats were recorded flying over the survey area from the south during the activity surveys.

4.3.8 The earliest pass by a Leisler's bat was recorded 14 minutes after sunset on the 13th of August, suggesting a roost is local to the survey area. Like noctule bats, Leisler's will roost in trees but are also found in bat boxes and buildings (Altringham, 2003).

4.3.9 The earliest pass by a bat from the *Myotis* genus was 66 minutes after sunset on the 20th of July. The *Myotis* bats have a variety of median emergence times: whiskered bats emerge approximately 32 minutes after sunset, whereas Natterer's emerge at around 75 minutes after sunset and Daubenton's at around 84 minutes after sunset (Altringham, 2003). *Myotis* species are known to roost in a variety of trees, buildings and other built structures. It is considered that low numbers of *Myotis* bats may be roosting nearby and using Craylands La. Pit to forage. There were no early passes by long-eared bat or serotine and only low numbers of passes were recorded by these species.

4.3.10 The bat pass closest to sunrise was a common pipistrelle bat recorded 20 minutes prior to sunrise on the 13th of August, indicating that bats forage within the survey area for the majority of the night. There were relatively consistent passes throughout the night during the majority of the static monitoring surveys.

4.3.11 The tunnel (007) which links Craylands La. Pit to the vegetated pit to the south-west was monitored with data loggers in late summer and autumn and with static detectors in late September and October. The data loggers recorded spikes of activity in early September but the static detectors recorded only limited activity in late September/October, with long-eared bats recorded during this period. It is considered that the tunnel could be used by some relatively low level swarming bats early in the season, but the swarming activity was not sustained.

4.3.12 The overall habitat quality of Craylands La. Pit is considered to be 'Low' (Collins, 2016), consisting predominantly of bare ground which has been colonised by grassland vegetation, with the margins more vegetated with patches of scrub. The immediate surrounding area is suburban: there is residential and industrial development on all sides of the Pit. There are occasional small fragments of woodland within the landscape to the south-west, including an area near to the Swanscombe Skull Site. This area is partially connected to the south-western corner of the survey area, with the railway line and Craylands Lane in between. When comparing the total number of passes recorded during the static monitoring at Craylands Pit with other Sites in the local area, the general bat activity is of a moderate level. However, a survey constraint of the static monitoring is that the numbers of bats cannot be counted and bat behaviour cannot be observed; only *bat passes* are recorded, meaning that one bat foraging near to the detector can accumulate a large amount of data. The transect surveys aimed to observe bat behaviour within the Pit: they showed that there were low levels of activity in all areas, with low levels of foraging by common pipistrelle bat during August and September. Given the level of activity observed by the surveyors and the number of species recorded, it is considered that the value of the bat assemblage in Craylands La. Pit is of Neighbourhood Importance.

4.4 Bamber Pit

4.4.1 At least eight species were recorded at Bamber Pit. Calls by Myotis bats were recorded but could not be confirmed to species level. A wider diversity of species were recorded during the static monitoring than during the activity surveys, with a minimum of seven species identified compared with five during the activity surveys. A single soprano pipistrelle bat was recorded during the transect survey in July but this species was not recorded during the static monitoring. Serotine, long-eared bat and bats from the *Myotis* genus were recorded by the static detectors; these species had not been previously identified during the transect surveys. Overall six species were recorded at all three static monitoring points, with the exception of long-eared bat which was recorded at SMP2 only. Leisler's, noctule and common pipistrelle were recorded in all areas of the survey area during the transect surveys; individual soprano and Nathusius' pipistrelle were recorded in the western area of Bamber Pit only.

4.4.2 Overall a higher level of bat activity was recorded at SMP2 than SMP1. When the detectors were set at these two locations between May and August, 37% of the total passes were recorded at SMP1 compared with 63% at SMP2. During the September survey a higher level of bat activity was recorded at SMP3 in the north-west of the survey area than at SMP2 with 64% of the total bat passes recorded at SMP3 compared with 36% at SMP2. The results of the static monitoring surveys therefore indicate that a higher level of bat activity occurred in the northern area of Bamber Pit around SMP2 and SMP3. This section of the Pit is more consistently dark than the southern area, with fewer streetlights nearby.

4.4.3 The transect surveys showed that the areas of Bamber Pit with the highest levels of bat activity were in the centre of the quarry (around the path to the west of the lake), the western area around points 4E and 4F (close to SMP2), and the eastern tip of the transect near to the railway. The eastern tip of the transect route (around point 4A) is well-lit and adjacent to the bridge over the railway. However, the area beneath the bridge is well connected to an area of scrub which extends into the Northfleet Landfill site to the south; it is considered that this may be why the levels of activity were fairly high here, as bats may have been commuting to this area of suitable foraging habitat to the south. The activity levels were generally lower in the area near to the southern path which is relatively well lit (points 4B and 4C) – this correlates with the lower levels of activity recorded at SMP1 in this area.

4.4.4 The static monitoring surveys showed that the dominant species changed throughout the months: during April and May common pipistrelle bat was the only species recorded, in June common pipistrelle bat was dominant (contributing 96% of passes), and from July onwards bats from the Nyctalus genus were dominant. In July a total of 860 passes (50.5%) were attributed to *Nyctalus* bats: 76 passes were attributed to Leisler's, 408 (24%) to noctule and a further 376 or 22% of the passes were by unidentified

Nyctalus bats. During August a total of 400 passes (69%) were attributed to *Nyctalus* bats with 170 (68.5%) being attributed to Leisler's, only 32 to noctule and a further 198 unidentified *Nyctalus* bats. The activity surveys showed a similar pattern with the proportion of bats from the *Nyctalus* genus increasing throughout the season: 11.6% of passes were attributable to this genus in May, and the percentage increased every month until its peak at 70% in August. The species richness was similar during all of the months surveyed: six species were recorded during the static monitoring surveys in every month except June, when only four species were recorded. Nathusius' pipistrelle, bats from the *Myotis* genus and long-eared bat were not recorded in every month.

4.4.5 As was the case during the activity surveys, the static monitoring surveys showed the highest level of activity during July: 1,702 passes were recorded during this session, representing 55.4% of the total activity. Similar to the activity surveys, the months with the lowest levels of activity recorded were May and June, with 214 and 206 passes respectively. This peak was as a result of a significantly increased number of passes recorded by common pipistrelle and *Nyctalus* bats (a total of 835 passes common pipistrelle were recorded in July compared to 147 in June and 174 in August with 860 passes by *Nyctalus* bats in July compared to 57 and 400 in June and August respectively). As set out in section 4.3.5, common pipistrelle bats tend to make a high number of foraging flights between the roost and feeding areas during the lactation period. It is therefore considered likely that bats from a maternity roost nearby commute through and forage within Bamber Pit.

4.4.6 There were early passes during the activity surveys between June and September. In June a Nathusius' pipistrelle bat was recorded 12 minutes after sunset in the western area of the survey area. Nathusius' pipistrelle roosts are often found in association with wetland habitats and this is likely to be related to their preferred prey items (Flaquer, et al., 2009). In this case, there is a relatively large lake in the eastern part of Bamber Pit. Only a small amount of research has been done into the average emergence times of Nathusius' pipistrelle bats, however they are considered to emerge at a similar time to common and soprano pipistrelle bats: around 25 minutes after sunset. An early pass by the species 12 minutes after sunset therefore suggests that this bat was roosting close by or within the survey area.

4.4.7 There were early passes by common pipistrelle bats during the July and August activity surveys (28 minutes and 30 minutes after sunset respectively). The mean emergence time for common pipistrelles has been calculated as 25 minutes after sunset (Davidson-Watts and Jones, 2006), and the times of these two passes suggest that there is a roost nearby. In September the first bat recorded was a Leisler's bat at 31 minutes after sunset but given that this species tends to emerge approximately 10-15 minutes after sunset this timing cannot be used to suggest any close roost areas.

4.4.8 There were early bat passes recorded during all of the static monitoring sessions, the earliest of which was a common pipistrelle bat recorded one minute after sunset on the 25th of May. There was a noctule bat pass 12 minutes after sunset in September at SMP2. Noctule bats have a median emergence time of five minutes after sunset (Altringham, 2003), and a pass by this species 12 minutes after sunset indicates that the bat may have been roosting nearby. The bat pass closest to sunrise was a common pipistrelle bat which was recorded 11 minutes before sunrise on the 23rd of May.

4.4.9 There were bat passes recorded close to sunset and sunrise during all of the months surveyed by static monitoring. During every month there were early passes by common pipistrelle bats, the earliest of which was recorded two minutes after sunset on the 13th of August at SMP2.

4.4.10 There were no early passes by serotine, long-eared bat or *Myotis* species during the five night static monitoring sessions and no significantly early passes by noctule or Leisler's bats.

4.4.11 The bat pass closest to sunrise was a common pipistrelle bat recorded 11 minutes before sunrise on the 23rd of May at SMP1. Passes were recorded less than an hour before sunrise during every static monitoring session, suggesting that bats forage and/or commute within the survey area throughout the majority of the night.

4.4.12 The habitat quality of Bamber Pit is considered to be 'Moderate' (Collins, 2016). It contains good quality foraging habitat as it is dominated by well-developed scrub vegetation, and there is a large waterbody in the eastern part of the survey area. Bamber Pit is relatively well connected to the treelines and grassland at the Northfleet Landfill site to the south, but other than this it is fairly isolated from any areas of high quality habitat (such as woodland) in the wider landscape. When comparing the total number of passes recorded during the static monitoring at Bamber Pit with other survey areas in the local area, the general bat activity is of a moderate level. The transect surveys also showed that there was a moderate level of bat activity throughout Bamber Pit, with foraging by common pipistrelle, noctule and Leisler's bat recorded in all areas of the route. Given the level of activity and the number of species recorded, it is considered that the value of the bat assemblage in Bamber Pit is of Local Importance.

4.5 Northfleet Landfill

4.5.1 A minimum of seven species have been recorded using the Northfleet Landfill site during the surveys. The only species not recorded here that was recorded in other parts of the Site was long-eared bat. Passes by bats from the *Myotis* genus which could not be identified to species level were recorded.

4.5.2 A greater number of species were recorded during the static monitoring surveys than during the transect surveys. Common and soprano pipistrelle, noctule, Leisler's and serotine were recorded during the transect surveys, whilst the static monitoring surveys also recorded bats from the *Myotis* genus (four passes) and Nathusius' pipistrelle (eight passes). All of the species were recorded at both static monitoring points, with the exception of *Myotis* bats which were only recorded at SMP1 in the northern treeline.

4.5.3 Overall a higher level of bat activity was recorded at SMP2 in the south of the Landfill than at SMP1 in the north-east of the survey area, despite there being no data from SMP2 in April. Excluding April, during every month there were consistently more passes at SMP2 than SMP1, and overall 71.9% of the total passes were recorded at this location. During the transect survey in June the areas with the highest levels of bat activity were in the northern and north-eastern areas of the Landfill, around the scrub and treeline which adjoins the public footpath between this survey area and Bamber Pit to the north. However, during the July transect survey no bats were recorded in this north-eastern area of Northfleet landfill; the activity was concentrated around the north-western area, with very low levels of activity in all other areas. However, a constraint of the transect surveys is that data may be biased to areas of the route where the surveyors were located at different times of the evening.

4.5.4 Overall the highest levels of bat activity were in the northern, southern and western areas of the Northfleet landfill. Negligible levels of activity were recorded in the eastern side and particularly the south-eastern section of the survey area, which adjoin the well-lit roads around Ebbsfleet International. This is to be expected, as artificial light is negatively correlated with levels of bat activity. The higher level of activity around SMP2 may be explained by the presence of the treeline in this area, with larger and more mature trees here compared to the scrub vegetation around SMP1. The western treeline also creates a darker and more sheltered corridor for commuting and foraging bats.

4.5.5 The dominant species overall was common pipistrelle bat: this species contributed 80% of the total passes during the transect surveys, and 77.7% during the static monitoring. The second most dominant species was noctule bat, contributing 15.7% of the passes during the transect surveys and 16.9% of the static monitoring passes. The number of noctule bat passes peaked in August, with 143 passes in this month compared with a low of six passes in May. This increase in number of passes correlates with an increase in the number of passes by this species from the nearby Bamber Pit.

4.5.6 The month with the highest level of bat activity recorded by the static monitoring devices was June: 404 passes, 29.4% of the total (May to September), were recorded in this month. A similar number of passes (351) were recorded in August, constituting 25.6% of the total. The lowest level of bat activity was

recorded in September: just 73 passes were recorded in this month. The greatest species diversity was recorded in September: all seven species were recorded in this month compared with three species in April and May (from static data), four in June, four in July (from static and transect data) and six in August. Serotine, *Myotis* bats and soprano pipistrelle were recorded later in the season (in August and September only) by the static monitoring devices and only individual passes by these species were noted during the transect surveys in June and July.

4.5.7 There were no early passes recorded during either of the transect surveys. The first bat recorded on 23rd June was a noctule bat 44 minutes after sunset, and the first pass on 28th July was a common pipistrelle bat 58 minutes after sunset.

4.5.8 In contrast to the transect surveys, there were early bat passes recorded during several of the static monitoring sessions. The earliest pass was by a noctule bat 16 minutes after sunset on the 19th of August. Nearly all of the first passes recorded were by noctule bats, although none were recorded earlier than 16 minutes after sunset. As noctule bats have a median emergence time of five minutes after sunset (Altringham, 2003), this bat could have flown some distance from its roost before arriving at Northfleet Landfill. On two occasions common pipistrelle bats were the first species recorded; the earliest of these was at 26 minutes after sunset on the 24th of June. This is close to the mean emergence time for this species, which may indicate that a common pipistrelle bat was roosting in close proximity to the Landfill on this occasion. No other passes by common pipistrelle bat were recorded less than 30 minutes after sunset, and there was not regular early activity by this species during any of the static monitoring surveys.

4.5.9 There were no early passes by soprano pipistrelle or Nathusius' pipistrelle bat recorded: the earliest pass by a soprano pipistrelle was 1 hour and 15 minutes after sunset, and the earliest Nathusius' pipistrelle was recorded 1 hour and 39 minutes after sunset. There were no significantly early passes by Leisler's or serotine bats. The earliest Leisler's bat pass was recorded 27 minutes after sunset in May at SMP2. The earliest pass by serotine was recorded 43 minutes after sunset at SMP1 in August. Serotine bats emerge approximately 20 minutes after sunset and occasionally at sunset (Jones & Walsh, 2001). There were no early passes by *Myotis* bats and all of the calls by this species were recorded after midnight.

4.5.10 The bat pass recorded closest to sunrise was a common pipistrelle bat recorded 36 minutes before sunrise on the 31st of May. Bats were recorded less than 45 minutes before sunrise in all months except April and September: in September the last bat recorded at SMP2 was a noctule bat nearly five hours

before sunrise. The times of these passes to sunrise suggest that, between May and August, bats use the landfill area to forage and/or commute throughout the night.

4.5.11 The habitat quality of the Northfleet landfill site is considered to be 'Low' (Collins, 2016), consisting predominantly of short grassland with scrub in the north-eastern corner and treelines on the northern and western boundaries. The immediate surrounding area is suburban: the well-lit Ebbsfleet International and its large car park are located to the south and east, and there is residential development to the west. Northfleet Landfill is not connected to any areas of woodland, although Bamber Pit is located to the north: this contains predominantly scrub vegetation and a large lake. When comparing the total number of passes recorded during the static monitoring at Northfleet Landfill with the other survey areas, the general bat activity is of a low level; it had the lowest level of bat activity of any of the survey areas. Given the level of activity observed by the surveyors and the number of species recorded, it is considered that the value of the bat assemblage in Northfleet Landfill is of Neighbourhood Importance.

4.6 Springhead

4.6.1 All of the species of bat that have been recorded within the whole Site were recorded at Springhead. Passes by Natterer's and Daubenton's were also confirmed. A similar diversity of species was recorded during the static monitoring and the transect surveys: a minimum of seven species were recorded using each method, with Nathusius' pipistrelle only recorded using the static monitoring devices and long-eared bat only recorded on one transect survey in September. Overall six of the seven species identified by the static monitoring surveys were recorded at both SMPs: serotine was only recorded at SMP1 in the centre of the treeline. The transect surveys also showed that the majority of the species were recorded in all areas of the Springhead site, with the exception of serotine which was only recorded around the woodland edge. Long-eared bat was recorded on only one occasion at the northern tip of the woodland edge. However, this species echolocates far more quietly than other species, and therefore is often under-recorded when there are other bat calls and ambient noise also being recorded.

4.6.2 Overall, a slightly higher level of bat activity was recorded at SMP2 (near to the balancing pond) than SMP1. When the early September data are excluded in order to ensure the data are comparable for each location (due to the technical fault with SMP1), a total of 10,644 passes were recorded at SMP1 (48.66% of the total) compared with 11,231 at SMP2 (51.34% of the total). Higher levels of activity did not occur at SMP2 during every month: in July and late September/October there were more bat passes at SMP1. As the two static monitoring points are both located on the woodland edge in the east of the survey area, it is considered that the detectors recorded similar foraging and commuting activity possibly by some of the same bats. They were set in these locations due to the assessment of the habitat value

within the Springhead site. Locating a static point along the western side of the woodland was considered but it was decided that there was a high risk of the detector being disturbed by the public in this area; the detectors were therefore both located on the eastern treeline. Lower levels of bat activity were recorded in the western and southern areas of the survey area by the surveyors on transect route 1, with the majority of the bats recorded in the eastern part of the route adjacent to the woodland. It can be seen from the transect surveys that this woodland edge habitat in the east of the survey area is by far the most important feature for bat foraging.

4.6.3 The dominant species recorded during all of the transect surveys was common pipistrelle bat: out of a total of 1,059 passes, 952 were by this species (89.9%). Similarly during the static monitoring sessions the dominant species was also common pipistrelle bat, contributing 94.88% of the total passes. Unlike the transect surveys, the second most dominant species recorded by the static devices was soprano pipistrelle bat, contributing 2.63% of the total passes. The soprano pipistrelle is more strongly associated with wetland habitats (Vaughan, Jones and Harris, 1997). More recent research suggests that the soprano pipistrelle selects roosts with a significant proportion of surrounding habitats being wetland within 2km of the roost, and spends a high percentage of foraging time over static or slow moving water adjacent to mature trees up to 2.3km from its roost (Davidson-Watts, 2006). The majority of the passes by soprano pipistrelle bats were recorded at SMP2: 578 were recorded here compared to 32 at SMP1. It is considered that this is due to the location of SMP2 being near to the balancing pond and the Ebbsfleet.

4.6.4 The second most dominant species during the transect surveys was noctule bat, which constituted 5.1% of the total passes. A lower proportion of bat passes recorded during the static monitoring surveys were by bats from the *Nyctalus* genus, with 2.1% of passes attributable to this genus. The number of passes by *Nyctalus* species generally increased throughout the months, peaking with 474 passes in late September/early October compared to just five passes in April. This was not the case for the transect surveys, during which numbers of bats from the *Nyctalus* genus peaked in July and were much lower in August and September.

4.6.5 The species richness varied throughout the months surveyed: five species were recorded in May and July, six in April and August, seven in June and eight in September/October. Serotine, Nathusius' pipistrelle and long-eared bat were not recorded in every month: serotine was not recorded in April or May, Nathusius' pipistrelle in July or August, and long-eared bat was only recorded once in September.

4.6.6 The static monitoring surveys showed the highest level of activity during September/October: 7,548 passes were recorded during this session, representing 32.53% of the total activity. A high level of

activity was also recorded in April, with 6,089 passes during this month. The months with the lowest levels of activity recorded by the static devices were July and August: 1,861 and 1,315 passes were recorded respectively. This is in contrast to the results of the transect surveys: in August the greatest numbers of bat passes were recorded throughout the survey area.

4.6.7 The emergence surveys of trees confirmed one tree roost of a singleton soprano pipistrelle bat and a further three as possible common pipistrelle roosts. There were further early passes during all of the activity surveys. These included a pass by a common pipistrelle bat 27 minutes after sunset in June within the northern part of the woodland. With the mean emergence time for this species being 25 minutes after sunset the time of this pass suggests that this bat was using a roost nearby in the woodland. During the surveys in July, August and September the first passes were by noctule bats, the earliest of which were recorded six minutes after sunset in August and September. With a median emergence time of five minutes after sunset (Altringham, 2003), this suggests that it is likely to be roosting very close by. Noctule bats roost almost exclusively in tree holes (Altringham, 2003), suggesting that a roost may be present within the woodland or in nearby woodland. There were also early passes recorded during all of the static monitoring sessions, the earliest of which were noctule bats recorded three minutes after sunset on both the 17th of September and 4th of October at SMP2. Again, this suggests a noctule roost is located either within the woodland, or close by.

4.6.8 The bat pass closest to sunrise was a noctule recorded 18 minutes before sunrise on the 26th July. There were bat passes close to sunrise during all of the months surveyed, indicating that bats forage around the woodland edge throughout the whole night.

4.6.9 The habitat quality at Springhead is considered to be 'Moderate' (Collins, 2016). The woodland in the eastern part of the survey area, as well as the Ebbsfleet and balancing pond, provide good quality foraging habitat, but this is not continuous or well connected to other areas of high quality habitat in the wider landscape. The majority of the centre of the Springhead contains moderate quality habitat in the form of scrub and grassland. When comparing the total number of bat passes recorded during the static monitoring at Springhead with other sites in the local area, the general bat activity is of a relatively high level. Over 23,000 bat passes were recorded overall by the two static detectors, compared with 1,429 at nearby Northfleet Landfill and 3,075 at Bamber Pit to the north. The transect surveys also showed that there is a high level of bat activity here compared with other survey areas in the local area. High levels of foraging activity by common and soprano pipistrelle bats were recorded along the woodland edge, and Daubenton's bats were observed foraging beneath the bridge over the Ebbsfleet stream. Daubenton's bats' preferred foraging habitat is over water (Altringham, 2003); the stream and balancing pond in the north-east of Springhead provide good feeding opportunities for this species, as well as Natterer's bat,

soprano and Nathusius' pipistrelle which were also recorded during the surveys. Given the level of activity and the number of species recorded, it is considered that the value of the bat assemblage at Springhead is of Local Importance. Springhead had the highest level of bat activity of any of the survey areas.

4.7 Tunnels

Evaluation – Swarming activity surveys

4.7.1 'Autumn swarming' occurs when bats fly in and out of a cave entrance (or similar) for a variety of reasons which are not yet fully understood. For example, the sites may be meeting places for display and mating, or swarming may allow the exploration of winter roosts (Dietz, von Helversen and Nill). As tunnel 007 is a semi-enclosed space and has some potential as a swarming site, static monitoring surveys were undertaken from late September to early October 2015.

4.7.2 The static monitoring survey of tunnel 007 showed that no bat swarming activity occurred in late September/early October 2015. The peak number of bat passes recorded on a single night was just six at each static monitoring location. There were several social calls recorded; this is to be expected in late summer and autumn, and may be those of song flighting males (Altringham, 2003) searching for a mate in the area.

4.7.3 The data show that a greater diversity of species flew past or near to SMP2 (the south-western end of tunnel 007) than SMP1. This may be because SMP2 is located close to the end of the tunnel which adjoins a small area of woodland to the south-west. The habitat which adjoins this end of the tunnel is of higher quality than the habitat near to SMP1 in the quarry. The bat species which were foraging within the woodland may therefore have been recorded by the static monitoring device at this end of the tunnel.

4.7.4 The data logger surveys of tunnels 006, 018 and 014A showed that no swarming activity occurred during the period surveyed. In tunnel 007 there was a peak in activity in early September 2015, although the activity levels never reached a high level (when comparing this data with data from known swarming sites). It is not known whether the more frequent passes recorded in early September were due to low numbers of swarming bats or whether they were attributable to foraging bats triggering the data logger. At other known swarming sites high levels of sustained activity have been seen for over four hours late at night, which has not been the case in tunnel 007. If these were swarming bats in September, it is not considered that the swarming activity was sustained as the activity levels were much lower again by October.

Evaluation - Hibernation potential survey

4.7.5 Bats typically require a humid environment with a cool internal ambient temperature for hibernation. The preferred hibernation roost temperatures for most bat species is between 2°C – 10°C (Altringham 2003) with humidity levels in the region of 90% humidity (JNCC, 2004).

4.7.6 The temperature and humidity monitoring in tunnel 007 found that the temperature inside the tunnel fluctuates greatly along with the external temperature. Humidity levels fell to approximately 70% relative humidity at the mid-point of the tunnel, which is relatively dry and not in the preferred humidity range for hibernating bats. It can be inferred from the data gathered during the survey that tunnel 007 is not suitable as a hibernation roost due to relatively large humidity and temperature fluctuations. The tunnel does not provide a stable environment for hibernating bats and it is considered that, with a hard ground frost, the internal temperature is likely to be close to 0°C. The tunnel is open at the south-western end where a metal grill prevents human access. There is therefore potential for significant air flow through the tunnel, which affects the stability of both the internal temperature and humidity. It may be that the tunnel could be used as an occasional temporary shelter or night roost, but is not likely to be used as a permanent winter roost.

5.0 CONCLUSIONS

5.1 Bat surveys were undertaken in 2015 of five areas: the Swanscombe Peninsula, Craylands La. Pit, Bamber Pit, Northfleet Landfill and Springhead. The surveys included an assessment of buildings, trees and tunnels, as well as activity surveys and static bat detector surveys.

5.2 A total of nine species have been recorded within the whole Site. Unidentified *Myotis* bats were recorded in all areas but at Springhead two species were confirmed: Natterer's and Daubenton's bats. A tree roost has been identified in the Springhead survey area and two further likely tree roosts were also determined.

5.3 The results of the bat surveys revealed a bat assemblage in the Peninsula, Craylands La. Pit, Bamber Pit and Springhead of at least 'Local Importance', and within Northfleet Landfill of 'Neighbourhood Importance'.

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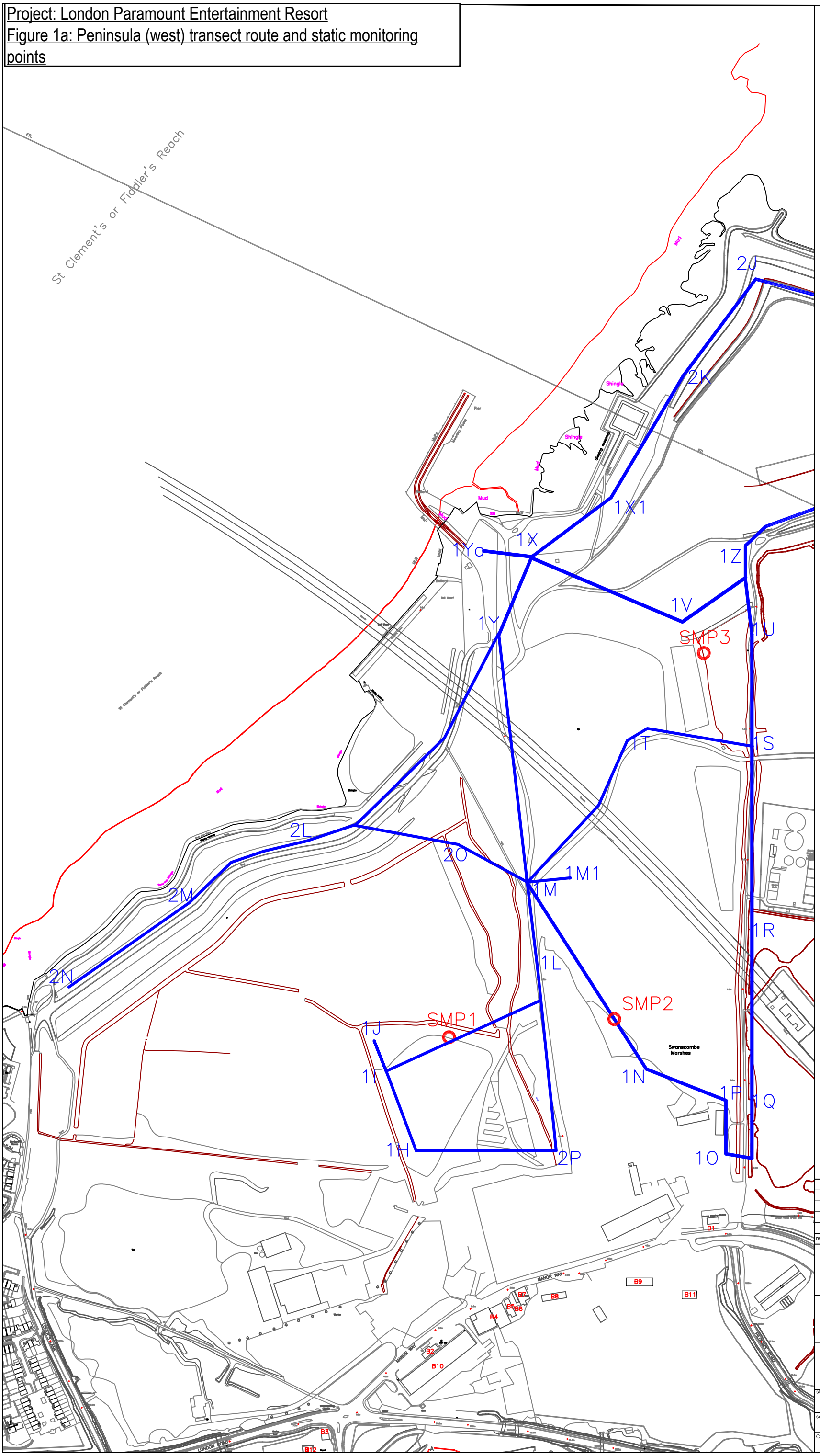
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FIGURES

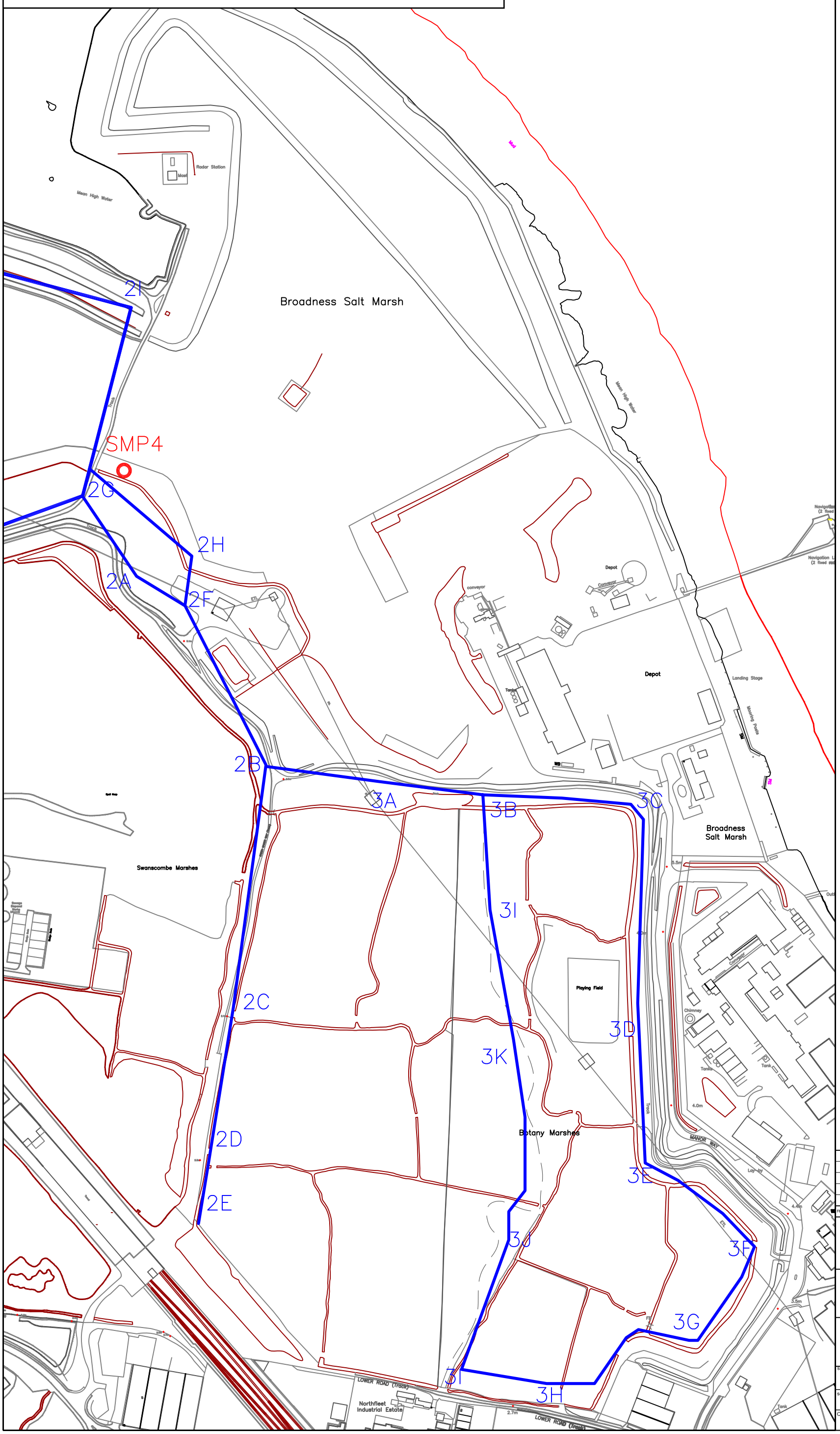
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Figure 1a: Peninsula (west) transect route and static monitoring points


St Clement's or Fiddler's Reach
Mud
Shingle
Mud
Shingle
Mud
Mud
Shingle
Mud
Mud
Mud

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Figure 1b: Peninsula (east) transect route and static monitoring points



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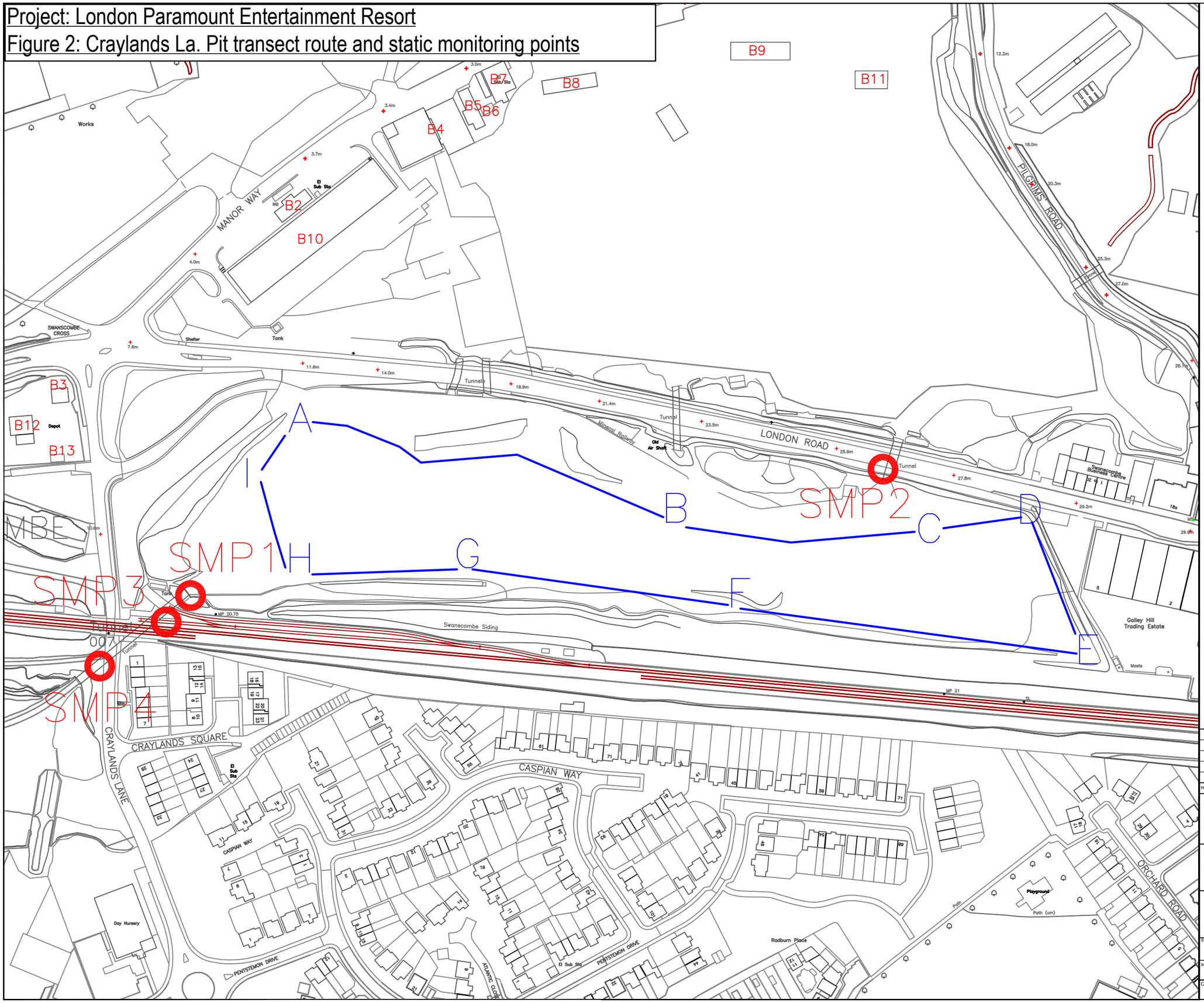
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Figure 2: Craylands La. Pit transect route and static monitoring points



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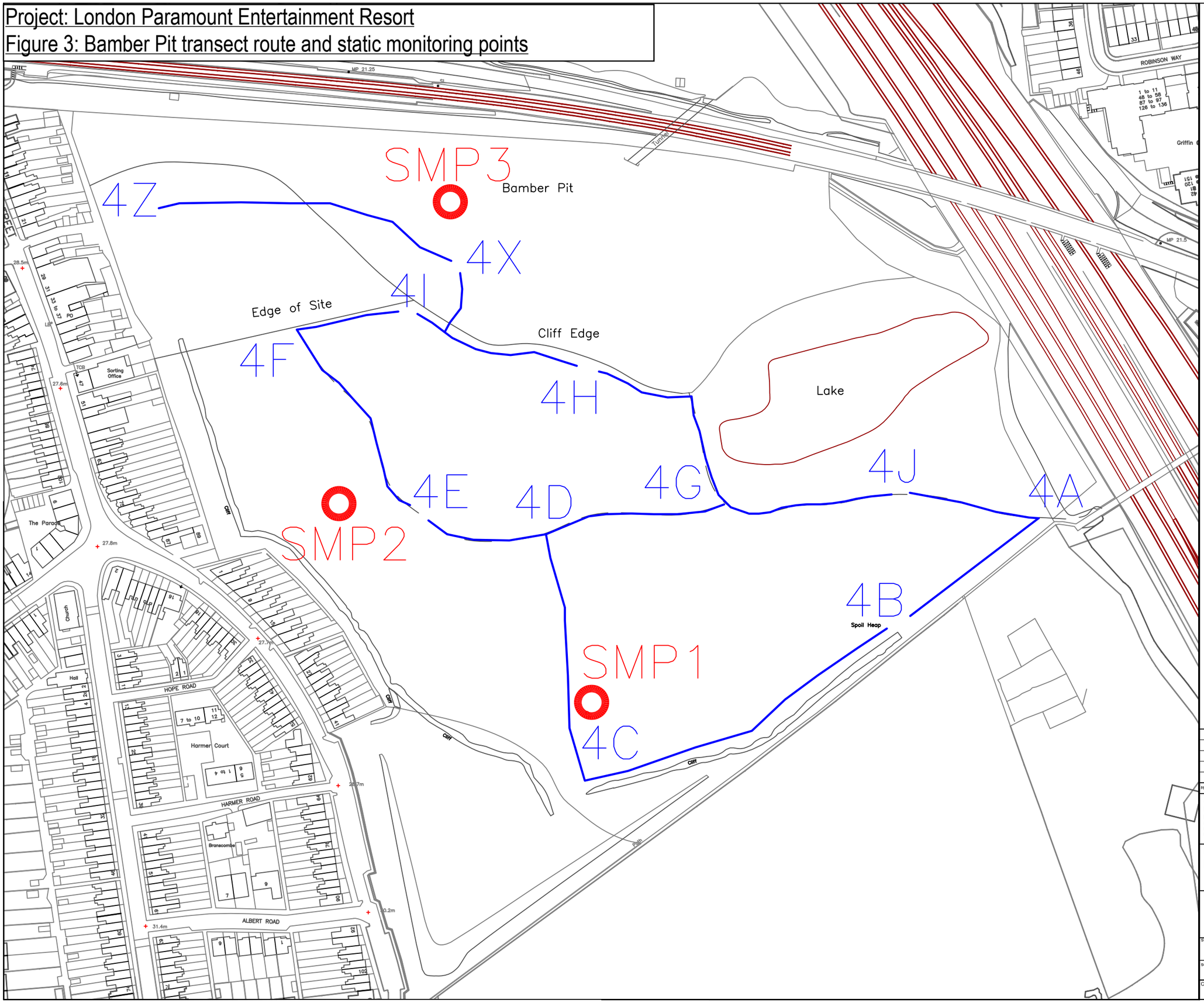
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Figure 3: Bamber Pit transect route and static monitoring points



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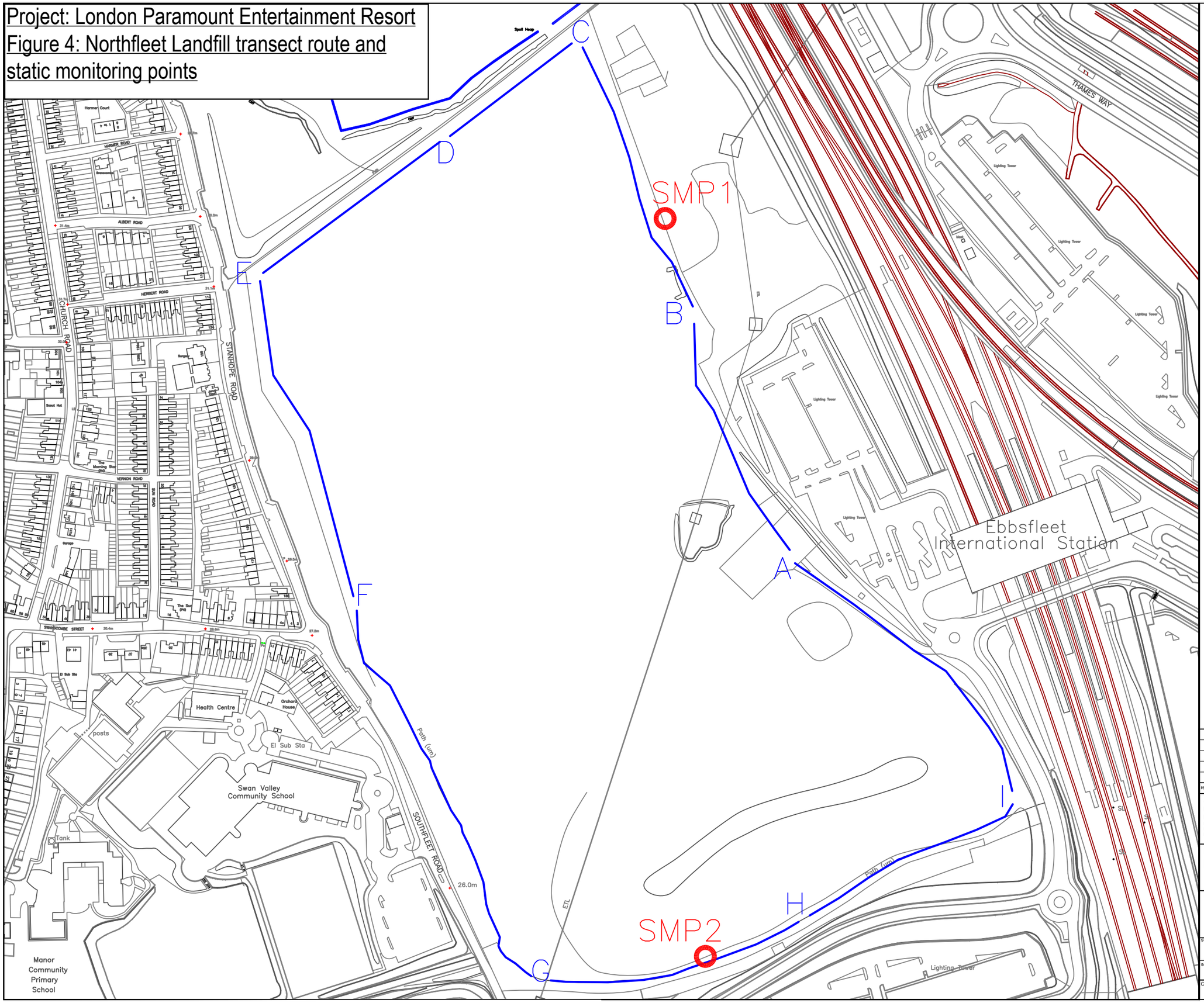
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Title:
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Figure 4: Northfleet Landfill transect route and static monitoring points



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Project:
London Paramount

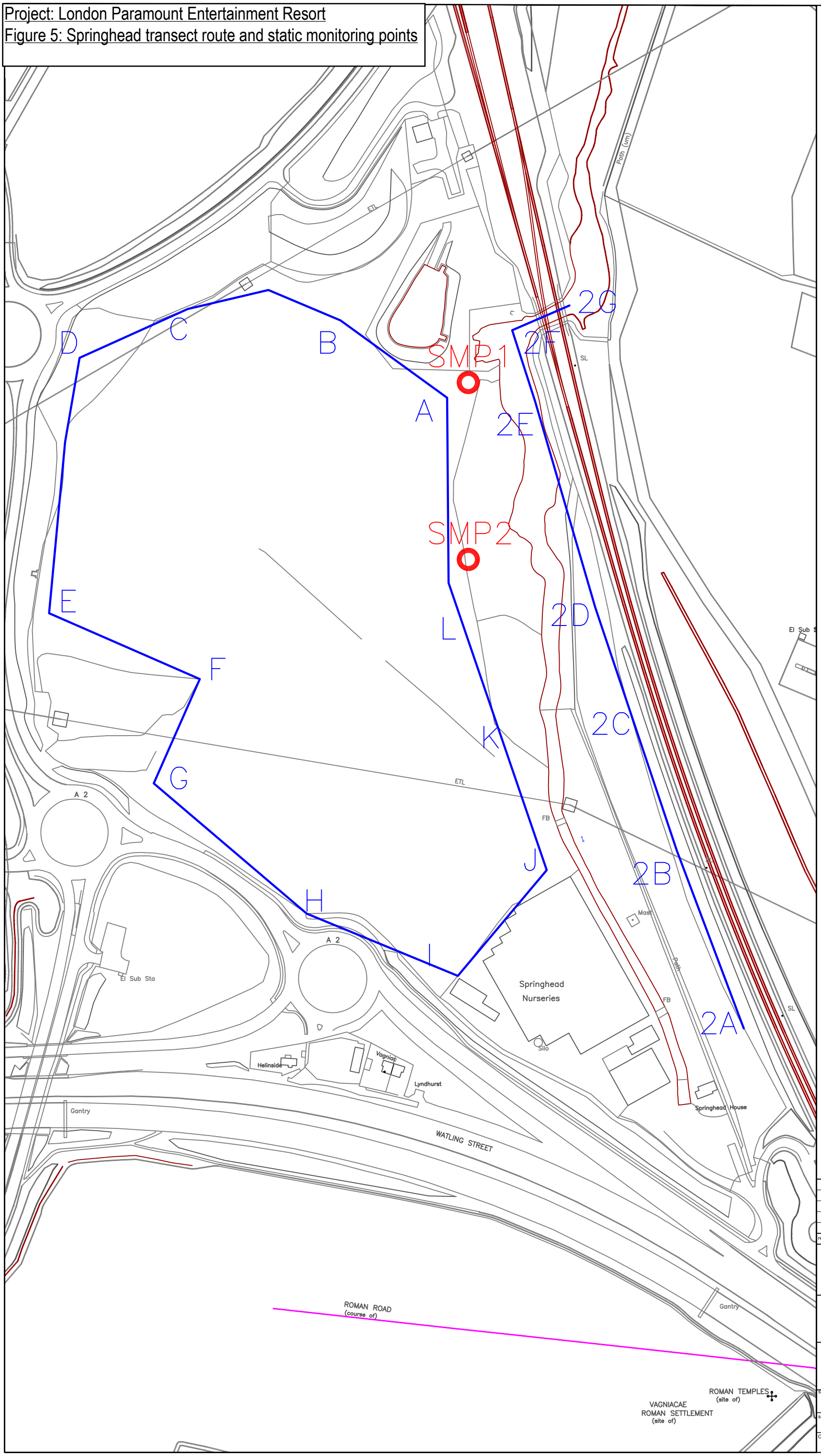
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Figure 5: Springhead transect route and static monitoring points



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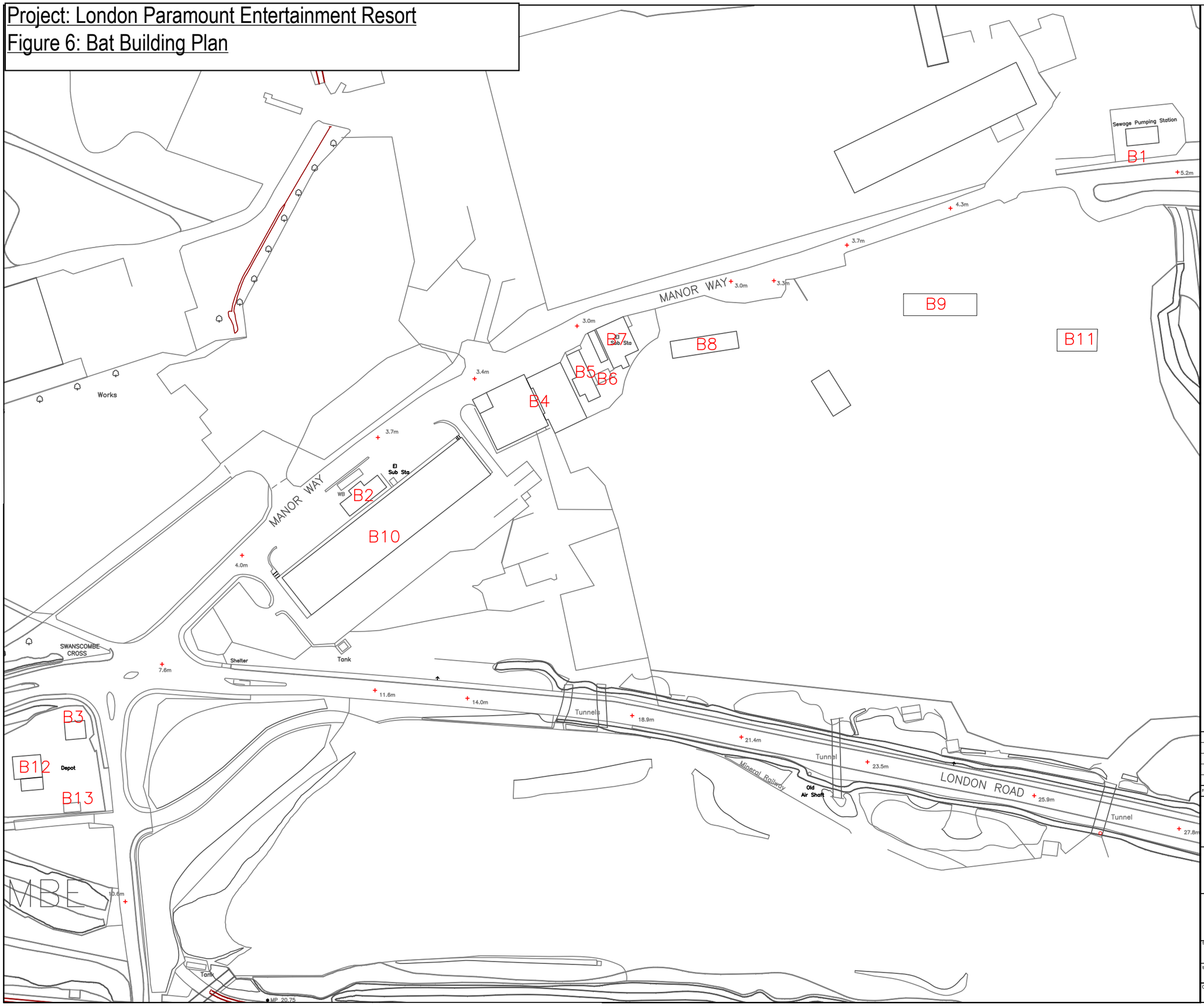
Project: London Paramount

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Figure 6: Bat Building Plan



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Project:
London Paramount

Title:
Building Plan

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APPENDICES

Appendix 1 - Tables showing the species per month totals for each survey area recorded during the static monitoring

PENINSULA OVERALL SPECIES PER MONTH TOTALS:

MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
(Apr-15)	0	0	2	0	2	0	39	0	0	39	4	0	4	45	(N/A)
May-15	13	49	525	27	614	7	4914	1398	3	6322	12	0	12	6948	36.99%
Jun-15	2	86	364	19	471	1	2864	53	0	2918	20	0	20	3409	18.15%
Jul-15	2	10	181	14	207	2	1492	86	0	1580	10	0	10	1797	9.57%
Aug-16	2	205	141	101	449	2	2389	151	0	2542	29	1	30	3021	16.09%
Sep-15	0	6	19	2	27	6	702	71	1	780	26	0	2	833	4.44%
Apr-16	2	1	12	0	15	8	2698	44	0	2750	8	0	8	2773	14.76%
TOTALS	21	357	1242	163	1783	26	15059	1803	4	16892	105	1	82	18781	100.00%
%	0.11%	1.90%	6.61%	0.87%	9.49%	0.14%	80.18%	9.60%	0.02%	89.94%	0.56%	0.01%	0.44%	100.00%	18781

NB. 'Big Bats' refer to species from the *Nyctalus* genus and serotine

CRAYLANDS PIT OVERALL SPECIES PER MONTH TOTALS:

MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
April	1	5	6	0	12	1	183	1	1	186	0	0	0	198	3.59%
May	3	43	47	9	102	3	700	4	0	707	2	0	2	811	14.71%
June	0	108	50	24	182	0	1290	14	2	1306	9	0	9	1497	27.16%
July	1	20	16	14	51	0	1469	1	0	1470	6	1	7	1528	27.72%
August	5	472	34	44	555	0	391	4	6	401	4	0	4	960	17.42%
September	0	21	115	30	166	1	302	2	1	306	43	3	46	518	9.40%
TOTALS	10	669	268	121	1068	5	4335	26	10	4376	64	4	68	5512	100.00%
%	0.18%	12.14%	4.86%	2.20%	19.38%	0.09%	78.65%	0.47%	0.18%	79.39%	1.16%	0.07%	1.23%	100.00%	5512

BAMBER PIT OVERALL SPECIES PER MONTH TOTALS:

MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
May	2	4	14	10	30	1	182	0	0	183	1	0	1	214	6.96%
June	2	7	46	4	59	0	147	0	0	147	0	0	0	206	6.70%
July	3	76	408	376	863	1	835	0	1	837	2	0	2	1702	55.35%
August	4	170	32	198	404	0	174	0	0	174	1	2	3	581	18.89%
September	2	38	50	56	146	7	217	0	0	224	2	0	2	372	12.10%
TOTALS	13	295	550	644	1502	9	1555	0	1	1565	6	2	8	3075	100.00%
%	0.42%	9.59%	17.89%	20.94%	48.85%	0.29%	50.57%	0.00%	0.03%	50.89%	0.20%	0.07%	0.26%	100.00%	3075

NORTHFLEET LANDFILL SITE OVERALL SPECIES PER MONTH TOTALS:

MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
April	0	0	8	0	8	6	41	0	0	47	0	0	0	55	3.85%
May	0	3	6	0	9	0	268	0	0	268	0	0	0	277	19.38%
June	0	6	64	0	70	0	333	0	1	334	0	0	0	404	28.27%
July	0	6	11	6	23	0	246	0	0	246	0	0	0	269	18.82%
August	8	5	143	5	161	0	178	10	0	188	2	0	2	351	24.56%
September	1	7	10	4	22	2	44	3	0	49	2	0	2	73	5.11%
TOTALS	9	27	242	15	293	8	1110	13	1	1132	4	0	4	1429	100.00%
%	0.63%	1.89%	16.93%	1.05%	20.50%	0.56%	77.68%	0.91%	0.07%	79.22%	0.28%	0.00%	0.28%	100.00%	1429

SPRINGHEAD OVERALL SPECIES PER MONTH TOTALS:

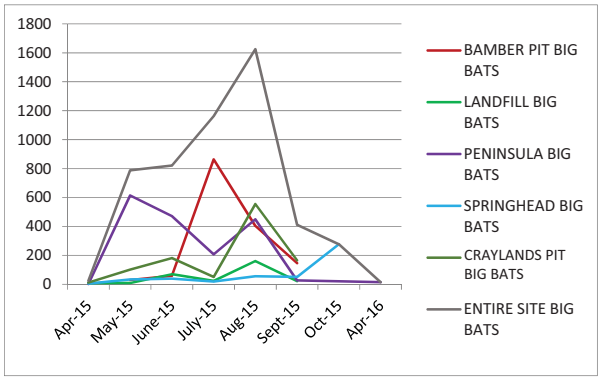
MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
April	0	2	3	0	5	2	5559	516	1	6078	6	0	6	6089	26.24%
May	0	3	26	4	33	2	2615	3	0	2620	0	0	0	2653	11.43%
June	2	11	20	6	39	1	2356	8	0	2365	5	0	5	2409	10.38%
July	1	0	15	3	19	0	1840	1	0	1841	1	0	1	1861	8.02%
August	2	3	40	11	56	0	1247	4	0	1251	8	0	8	1315	5.67%
September	0	5	42	4	51	3	1230	36	1	1270	6	0	6	1327	5.72%
October	1	32	222	22	277	27	7166	42	0	7235	36	0	36	7548	32.53%
TOTALS	6	56	368	50	480	35	22013	610	2	22660	62	0	62	23202	100.00%
%	0.03%	0.24%	1.59%	0.22%	2.07%	0.15%	94.88%	2.63%	0.01%	97.66%	0.27%	0.00%	0.27%	100.00%	23202

ENTIRE SITE OVERALL SPECIES PER MONTH TOTALS:

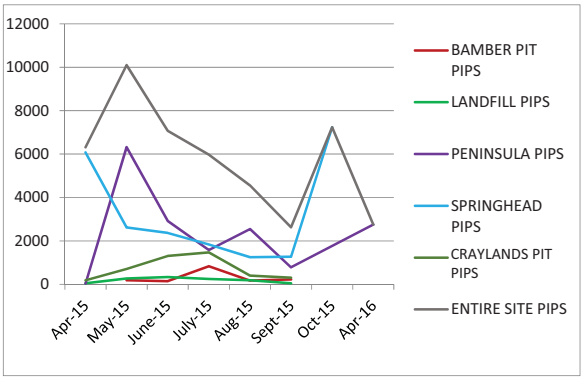
MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
Apr-15	1	7	17	0	25	9	5783	517	2	6311	6	0	6	6342	12.20%
May-15	18	102	618	50	788	13	8679	1405	3	10100	15	0	15	10903	20.97%
June-15	6	218	544	53	821	2	6990	75	3	7070	34	0	34	7925	15.24%
July-15	7	112	631	413	1163	3	5882	88	1	5974	19	1	20	7157	13.76%
Aug-15	21	855	390	359	1625	2	4379	169	6	4556	44	3	47	6228	11.98%
Sept-15	3	77	236	96	412	19	2495	112	3	2629	79	3	82	3123	6.01%
Oct-15	1	32	222	22	277	27	7166	42	0	7235	36	0	36	7548	14.52%
Apr-16	2	1	12	0	15	8	2698	44	0	2750	8	0	8	2773	5.33%
TOTALS	59	1404	2670	993	5126	83	44072	2452	18	46625	241	7	248	51999	100.00%
%	0.11%	2.70%	5.13%	1.91%	9.86%	0.16%	84.76%	4.72%	0.03%	89.67%	0.46%	0.01%	0.48%	100.00%	51999

Appendix 2 - Line graphs showing the total number of passes recorded during the static monitoring period

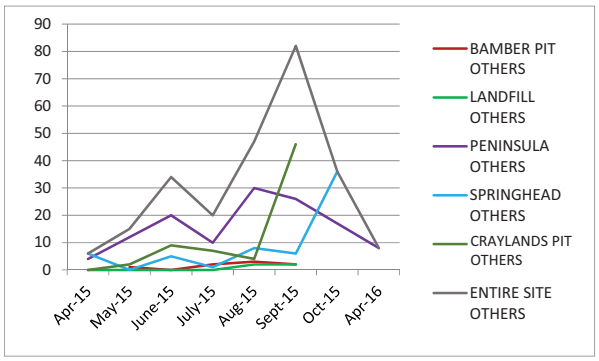
The total number of passes by 'big bats' (*Nyctalus* species and serotine)



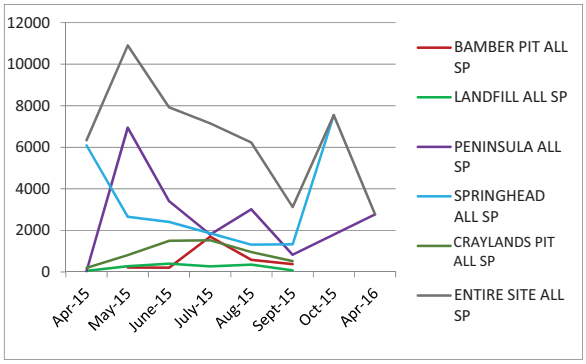
The total number of passes by *Pipistrellus* species



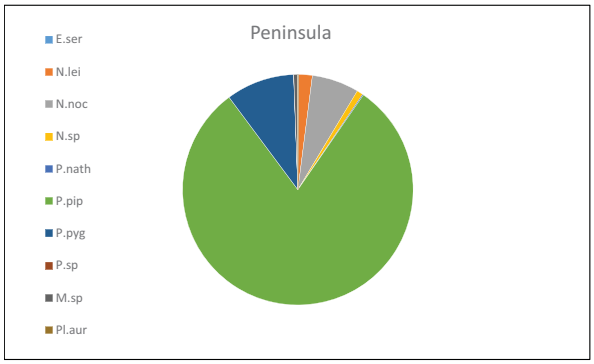
The total number of passes by 'other' species (long-eared bat and *Myotis* species)

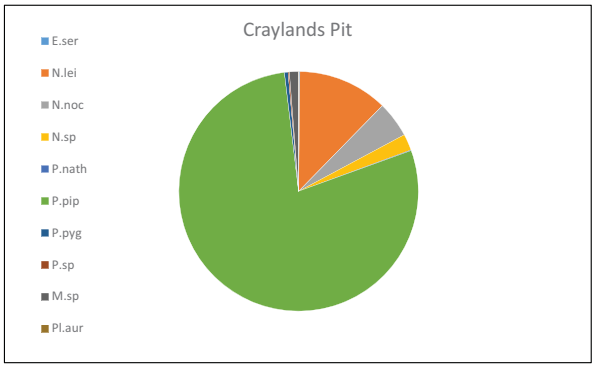


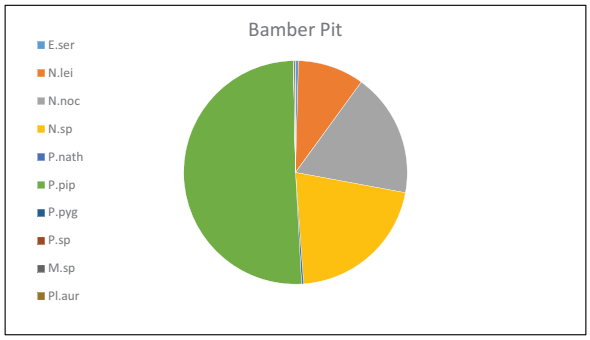
The total number of passes by all species

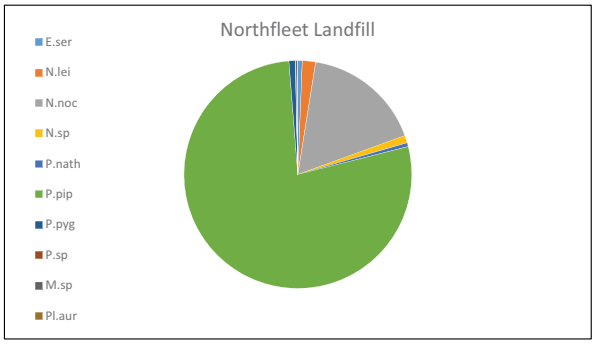


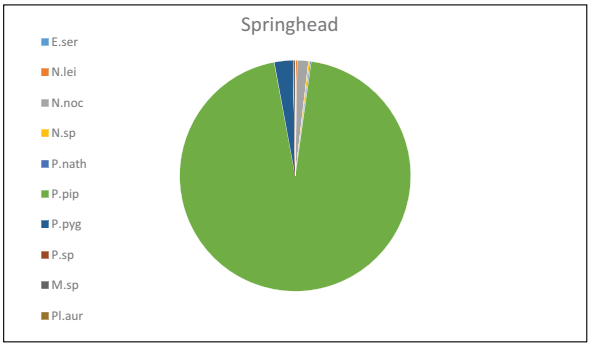
Appendix 3 - Pie charts showing the species assemblage for each survey area recorded during the static monitoring sessions

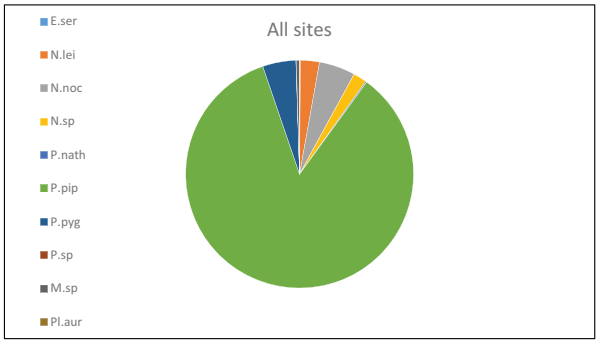












Appendix 4 - Transect summaries for the peninsula

Date	Environmental conditions	Species	Number of passes during transects	Percentage of passes	Time of first bat pass	Areas with highest levels of bat activity
22/04/2015	Dry, BF 3, 0% cloud Start temp: 12 Sunset time: 20:06	Pipistrellus pipistrellus	77	100.0	Common pipistrelle bat recorded at 20:49, 43 mins after sunset, by Black Duck marsh	The western transect route was very quiet (only 5 passes which were all around the centre of the route) compared to 72 passes on the eastern route. The western and south-eastern areas of the eastern route had the highest level of activity - around points 1S, 1U and 3D-3H.
		Nyctalus noctula				
		Myotis species				
		Pipistrellus pygmaeus				
		Nyctalus leisleri				
		Eptesicus serotinus				
		Plecotus auritus				
		Total	77	100.0		
19/05/2015	Light rain shower, BF 2, 60-100% cloud Start temp: 9 Sunset time: 20:50	Pipistrellus pipistrellus	117	92.9	Common pipistrelle bat recorded at 21:18, 28 mins after sunset, by Black Duck marsh	Activity levels were fairly balanced on both transects - 60 passes were recorded on the western route and 66 on the eastern route. Leisler's bats were only recorded on the eastern route near to lagoon P2. The highest levels of activity on the eastern route occurred around 1U, 2F, 3F and 3C (in the north-west of the route above lagoon P2 and far east of the site). On the western route bats were only recorded at points 1I and 1H by Black Duck Marsh.
		Nyctalus noctula	8	6		
		Myotis species				
		Pipistrellus pygmaeus				
		Nyctalus leisleri	1	1		
		Eptesicus serotinus				
		Plecotus auritus				
		Total	126	100.0		
16/06/2015	Dry, BF 2, 10% cloud Start temp: 17 Sunset time: 21:16	Pipistrellus pipistrellus	160	74.8	Noctule bat recorded at 21:38, 22 mins after sunset, by Black Duck marsh	120 passes were recorded on the eastern route - it was quietest around the western part of the route and fairly consistent passes by common pipistrelles were recorded in the east and north (points 2F, 2B, 3B, 3K, 3F, 3I). Soprano pipistrelle was only recorded in the east (points 3K, 3B), and noctule was only recorded at 1Q in the south-west of the route. 94 passes were recorded on the western route - noctules were recorded around 1i by Black Duck Marsh, around 1M/1M1 (in the centre). Common, soprano and Nathusius' pipistrelles and Leisler's bat were recorded all around the western area by the sea wall, and there was common pipistrelle activity around lagoon P2.
		Nyctalus noctula	34	15.9		
		Myotis species				
		Pipistrellus pygmaeus	6	2.8		
		Nyctalus leisleri	10	4.7		
		Pipistrellus nathusii	4	1.9		
		Plecotus auritus				
		Total	214	100.0		
14/07/2015	Drizzly at start but dry by 21:30, 100% cloud, BF 1 Start temp: 19 Finish temp: 16 Sunset time: 21:12	Pipistrellus pipistrellus	201	81.7	Noctule bat recorded at 21:44, 32 mins after sunset, at 2E in southern central area	69 passes were recorded on the eastern route - noctules were recorded around the southern area of the central path, common pipistrelles around the central path, in the north-eastern area around 3B/3K, and in the south-eastern area. 85 passes were recorded on the western route - noctules were recorded around the southern part of the central path (1L/1M), common pipistrelles around the northern central area (1M-1Y), common and soprano pipistrelle and noctules were recorded along the sea wall (NW and centre of wall). 92 passes were recorded on the central route - noctules were recorded around points B/C in the centre, common and soprano pipistrelle around the northern area, noctule in the north-west, and common pipistrelles in low numbers in all other areas.
		Nyctalus noctula	35	14.2		
		Myotis species				
		Pipistrellus pygmaeus	10	4.1		
		Nyctalus leisleri				
		Eptesicus serotinus				
		Plecotus auritus				
		Total	246	100.0		
11/08/2015	Light rain throughout, 100% cloud, BF 1 Start temp: 17 evening, 15 dawn Sunset time: 20:29	Pipistrellus pipistrellus	104	90.4	Common pipistrelle bat recorded at 20:55, 26 mins after sunset, at 2E in southern central area	74 passes were recorded on the eastern route - most common pipistrelles were recorded in the north central area (2B, 3B) and eastern and north-eastern areas, Leisler's were recorded in the north-west by 2A/2B, DAWN SURVEY = 1 common pipistrelle bat at 04:39-04:43 at point 3F in the south-eastern area. 41 passes were recorded on the western route - noctules were recorded in the central area (1i-1L), soprano pipistrelles near to lagoon P2 (1R-1U), common pipistrelles and noctules around lagoon P2 and to the north-west of it (to 1X), common pipistrelles were recorded along the sea wall, and Leisler's and noctule were recorded in the centre (1Y/1L). DAWN SURVEY = 1 common pipistrelle recorded at 04:00 at 1i-1M near Black Duck Marsh.
		Nyctalus noctula	3	2.6		
		Myotis species				
		Pipistrellus pygmaeus	4	3.5		
		Nyctalus leisleri	3	2.6		
		Eptesicus serotinus	1	0.9		
		Plecotus auritus				
		Total	115	100.0		
22/09/2015	Dry, BF 1, 40% cloud Start temp: 11 Finish temp: 10.5 Sunset time: 18:58	Pipistrellus pipistrellus	39	52.0	Noctule bat recorded at 19:16, 18 mins after sunset, at point 1i near Black Duck Marsh	32 passes were recorded on the eastern route - these were all common pipistrelles along the central path (2E-2B) and in the south-eastern corner (3F-3E). 43 passes were recorded on the western route - lots of noctule passes were recorded near 1i-1L near Black Duck Marsh, lower number of common pipistrelles were recorded around the centre of the route and by lagoon P2, and 1 soprano pipistrelle was recorded between 1L and 1Ma in centre.
		Nyctalus noctula	35	46.7		
		Myotis species				
		Pipistrellus pygmaeus	1	1.3		
		Nyctalus leisleri				
		Eptesicus serotinus				
		Plecotus auritus				
		Total	75	100.0		

Appendix 5 - Transect summaries for Craylands Pit

Date	Environmental conditions	Species	Number of passes	Percentage of passes	Time of first bat pass	Areas with highest levels of bat activity
28/04/2015	Sunset time: 20:13	Pipistrellus pipistrellus	5	100	Common pipistrelle bat recorded 57 minutes after sunset	Whole site was very quiet - 2 bat passes were heard by each surveyor near to the southern cliff. A single common pipistrelle was seen flying from the south-east then across the site.
		Pipistrellus pygmaeus				
	Start temp: 9	Nyctalus sp.				
		Nyctalus noctula				
	Finish temp: 6.5	Nyctalus leisleri				
		Total	5			
28/05/2015	Sunset time: 21:01	Pipistrellus pipistrellus	7	38.9	Common pipistrelle bat recorded 25 minutes after sunset	Very quiet throughout. Surveyor 1 only heard bats during the emergence survey. Surveyor 2 recorded single bats (1 Leisler's and 1 common pipistrelle) in the north-eastern corner, the central northern area and north-western corner. Two Leisler's bats flew in from east to west and from north to south - both were flying high over the site.
		Pipistrellus pygmaeus				
	Start temp: 13.3	Nyctalus sp.	1	5.6		
		Nyctalus noctula				
	Finish temp: 12	Nyctalus leisleri	10	56		
		Total	18			
11/08/2015	Sunset time: 20:29	Pipistrellus pipistrellus	13	18.1	Leisler's bat recorded 15 minutes after sunset	Surveyor 1 only recorded bats along the southern and western edges of the quarry - common pipistrelles, noctules and Leisler's were recorded in this area. Surveyor 2 recorded low numbers of bat passes in all areas - they recorded Leislers in all areas, common pipistrelles in the northern and southern areas, noctules in the western area, and all 3 species during the emergence survey in the south.
		Pipistrellus pygmaeus				
	Start temp: 17.2	Nyctalus sp.	2	2.8		
		Nyctalus noctula	17	23.6		
	Finish temp: 16.9	Nyctalus leisleri	40	56		
		Total	72			
22/09/2015	Sunset time:18:59	Pipistrellus pipistrellus	80	78.4	Noctule bat recorded 15 minutes after sunset	Surveyor 1 only recorded common pipistrelles around the north-western corner and along the western edge. Noctules and common pipistrelles were recorded around the south-eastern corner during the emergence survey. Surveyor 2 recorded noctule, common pipistrelle and soprano pipistrelle in the south-western corner and in the depression down by the tunnel, and common pipistrelle in the north-western corner by the entrance gate.
		Pipistrellus pygmaeus	3	3		
	Start temp: 13	Nyctalus sp.				
		Nyctalus noctula	19	18.6		
	Finish temp: 11	Nyctalus leisleri				
		Total	102			

Appendix 6 - Transect summaries for Bamber Pit

Date	Environmental conditions	Species	Number of passes	Percentage of passes	Time of first bat pass	Areas with highest numbers of bats
22/04/2015	Average temp: 9.25 Sunset: 20:07	Pipistrellus pipistrellus	4	100	Common pipistrelle bat recorded 41 minutes after sunset	Bats were only heard at points 4C, 4D and 4F. No bats were recorded during the emergence survey.
		Pipistrellus pygmaeus				
		Pipistrellus nathusii				
		Nyctalus noctula				
		Nyctalus leisleri				
		Total	4			
19/05/2015	Sunset: 20:46 Start temp: 10 Finish temp: 8	Pipistrellus pipistrellus	3	100	Common pipistrelle bat recorded 1 hour and 34 minutes after sunset	Bats were only heard at points 4G and 4H. No bats were recorded during the emergence survey.
		Pipistrellus pygmaeus				
		Pipistrellus nathusii				
		Nyctalus noctula				
		Nyctalus leisleri				
		Total	3			
16/06/2015	Sunset: 21:15 Start temp: 16 Finish temp: 14	Pipistrellus pipistrellus	48	96	Nathusius' pipistrelle bat recorded 28 minutes after sunset	The majority of the bats were recorded at points 4A, 4B, 4E, 4F - it was very quiet at 4G and 4H. Eight bats were heard during the emergence survey, but no bats emerged from the cliff. A bat was seen flying into the site along the top of the western cliff during the emergence survey, and bats flew in from the east and south.
		Pipistrellus pygmaeus				
		Pipistrellus nathusii	1	2		
		Nyctalus noctula	1	2		
		Nyctalus leisleri				
		Total	50			
28/07/2015	Sunset: 20:54 Start temp: 16 Finish temp: 14	Pipistrellus pipistrellus	43	26.9	Common pipistrelle bat recorded 28 minutes after sunset	The majority of the bats were recorded at points 4A, 4D, 4G and 4H. Bats were recorded in varying numbers in all areas of the site. 19 bats were recorded during the emergence survey but no bats emerged from the cliff. A bat was seen at the top of the cliff during the emergence survey, and a small bat flew west to east across the site.
		Pipistrellus pygmaeus	1	1		
		Pipistrellus nathusii				
		Nyctalus noctula	52	32.5		
		Nyctalus leisleri	64	40		
		Total	160			
18/08/2015	Sunset: 20:14 Start temp: 17 Finish temp: 17	Pipistrellus pipistrellus	17	13.4	Common pipistrelle bat recorded 30 minutes after sunset	The majority of the bats were recorded at points 4A, 4D, 4F and 4G. The activity levels were fairly consistent throughout the site, but no bats were recorded at point 4C. Four bats were recorded during the emergence survey but no bats emerged from the cliff.
		Pipistrellus pygmaeus				
		Pipistrellus nathusii				
		Nyctalus noctula	23	18.1		
		Nyctalus leisleri	87	68.5		
		Total	127			
08/09/2016	Sunset: 19:34 Start temp: 16 Finish temp: 17	Pipistrellus pipistrellus	25	41.0	Leisler's bat recorded 31 minutes after sunset	The majority of the activity occurred around points 4G and 4H. It was very quiet elsewhere apart from at the location of the emergence survey in the west of the site. 32 bats were recorded during the emergence survey but no bats emerged from the cliff; only foraging was observed.
		Pipistrellus pygmaeus				
		Pipistrellus nathusii				
		Nyctalus noctula	1	1.6		
		Nyctalus leisleri	35	57.4		
		Total	61			

Appendix 7 - Transect summaries for Northfleet Landfill

Date	Environmental conditions	Species	Number of passes	Percentage of passes	Time of first bat pass	Areas with highest levels of bat activity
23/06/2015	Start temp: 14	Pipistrellus pipistrellus	46	79	Noctule bat recorded 44 minutes after sunset between points A and B.	The highest numbers of bats were recorded around points B, C and E. Lower numbers of bats were also recorded at A, D, F, H, I. No bats recorded at G.
	Finish temp: 12	Eptesicus serotinus	1	1.72		
		Nyctalus noctula	11	18.97		
	Sunset time: 21:17	Total	58			
20/07/2015	Start temp: 16.3, Finish temp: 14.2	Pipistrellus pipistrellus	10	83.3	Common pipistrelle bat recorded 58 minutes after sunset between points D and E.	The highest numbers of bats were recorded around points E and F. Low numbers of bats (1 or 2) recorded at A, D, G, H, J. No bats recorded at points B, C or I.
		Pipistrellus pygmaeus	1	8		
	Sunset time: 20:53	Nyctalus leisleri	1	8		
		Total	12			

Appendix 8 - Transect summaries for Springhead

Date	Environmental conditions	Species	Number of passes during transect	Percentage of total passes	Time of first bat pass	Areas with highest levels of activity
23/06/2015	Start temp: 15	Pipistrellus pipistrellus	100	92.6	21:44hrs - approx. 27 mins after sunset. This was a common pipistrelle bat foraging in the woodland.	Activity occurred all along the woodland path (route 2). On route 1 the highest levels of activity were along the woodland edge and by the balancing pond (point A). More activity occurred overall on route 2 (woodland path): there was a total of 41 passes on route 1 and 67 on route 2. Pipistrelle species were foraging along the woodland edge and around the Ebbsfleet.
		Nyctalus noctula	6	5.6		
		Myotis species	1	0.9		
		Pipistrellus pygmaeus	1	0.9		
	Finish temp: 14	Nyctalus leisleri				
		Eptesicus serotinus				
	Sunset time: 21:17	Plecotus auritus				
		Total	108			
28/07/2015	Start temp: 18	Pipistrellus pipistrellus	193	77.2	21:14hrs - 19 mins after sunset. This was a noctule bat which was heard but not seen in the woodland.	Bats were recorded in all areas of the site. There was much more activity on route 2 along the woodland edge than in the rest of the site: 84 passes were recorded on route 1 and 166 on route 2. Multiple foraging passes by pipistrelle species were recorded.
		Nyctalus noctula	44	18		
		Myotis species				
		Pipistrellus pygmaeus	3	1.2		
	Finish temp: 17	Nyctalus leisleri	6	2		
		Eptesicus serotinus	4	2		
	Sunset time: 20:55	Plecotus auritus				
		Total	250			
18/08/2015	Start temp: 18	Pipistrellus pipistrellus	374	91.7	20:22hrs - 6 minutes after sunset. This was a noctule bat heard in the wood; the bat was travelling north.	Low numbers of bats were recorded in all areas of route 1 (total of 69 passes on this route). The majority of activity on this route was along the woodland edge - foraging pipistrelles were recorded here. A higher level of activity was recorded on route 2 (339 passes) and groups of foraging pipistrelles were recorded. Two or three Daubenton's bats were foraging under the railway and a Natterer's bat was recorded in the centre of the woodland.
		Nyctalus noctula	4	1.0		
		Myotis species	18	4.4		
		Pipistrellus pygmaeus	8	2.0		
	Finish temp: 16	Nyctalus leisleri	4	1.0		
		Eptesicus serotinus				
	Sunset time: 20:16	Plecotus auritus				
		Total	408			
08/09/2015	Start temp: 14	Pipistrellus pipistrellus	285	97.3	19:36hrs - 6 minutes after sunset. This was a noctule bat which was heard but not seen in the woodland.	No activity was recorded in the south-western area of the site. The majority of the activity occurred along the woodland edge again. Foraging bats were recorded by the bridge in the woodland and social calls were also recorded. A total of 202 passes were recorded on route 2 (woodland) and 91 on route 1.
		Nyctalus noctula				
		Myotis species	2	0.7		
		Pipistrellus pygmaeus	4	0.7		
	Finish temp: 14	Nyctalus leisleri	1	0.3		
		Eptesicus serotinus				
	Sunset time: 19:30	Plecotus auritus	1	0.3		
		Total	293			

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Dormouse Report (Corylus Ecology February 2016)

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London Paramount Entertainment Resort

DORMOUSE REPORT

DRAFT

For and on behalf of

Chris Blandford Associates

FEBRUARY 2016

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1.0 INTRODUCTION

1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.2 The Dormouse Assessment was undertaken by Corylus Ecology Ltd on behalf of CBA. This report details the assessment of the dormouse habitat within the Springhead site (hereinafter referred to as the 'Site') undertaken in 2015.

1.3 The hazel dormouse *Muscardinus avellanarius* is listed on the UK Biodiversity Steering Group Short List of Globally Threatened/Declining Species, it is a Red Data Book species for the UK and also a UK Biodiversity Action Plan Priority Species. The population is suggested to be declining, largely due to changes in woodland management (reduction of food sources and viable habitat) habitat fragmentation and loss and inappropriate management of hedgerows (Harris and Yalden 2008).

1.4 In 2001 the dormouse population in the United Kingdom was estimated in the region of 500,000 (Macdonald and Tattersall, 2001), more recently the latest data published by the JNCC (Battersby, 2005) indicates that the present UK population may be as low as 40,000. Although declining in the UK, dormice are believed to be widespread in southern counties (from Devon to Kent) but with only a patchy distribution. The Red Data Book for Kent, (Waite, 2000), describes Kent as one of the strongholds for dormice and that they have been recorded from suitable woodland throughout the county. Population densities are generally thought to be a maximum of 10 adults per hectare, even in good habitats.

1.5 Dormice are nocturnal mammals which are rarely seen. They live in deciduous woodland, hedgerows and dense scrub and can spend their entire lives up in the branches. It builds summer nests, often of stripped honeysuckle bark in which the female will give birth to up to seven young. They hibernate during the winter months, in a dense nest built in a tree cavity or similar, sheltered place. Dormice cannot digest the cellulose from leaves so they eat a range of seasonally available buds, flowers, hazelnuts, berries and insects and rely on high quality, varied habitat to provide these resources (English Nature, 2006).

Scope of Survey

1.6 The scope of the survey encompassed:

- Assess the likelihood of dormice occurring within the Springhead Site,
- Evaluate the conservation importance of the Site in relation to dormice;
- Provide information for use in the design and development of ecological mitigation and enhancement measures where appropriate.

Key Findings

1.7 It is considered highly unlikely that dormice will occur within the Springhead Site.

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Desk study records were requested from the Kent and Medway Biological Records Centre (KMBRC) for a distance of 3km from the Site.

2.2 Survey Methodology

2.2.1 An assessment of habitat within and adjacent to the Site was undertaken by an experienced and licenced dormouse surveyor. In addition to the Site survey, historic aerial photographs were studied to assess the level of historic connectivity to the wider countryside.

3.0 RESULTS

3.1 Desk Study

3.1.1 A number of records of dormice have been provided within the 3km desk study area. The nearest record is from 2014, in vegetation along the northern embankment of the A2 some 780m to the west of the Springhead Site. There are three further records along the A2 in the same area and adjacent to the A296, dating from August, October and November 2014. A further record for this species is from 2002 for a dormouse to the south of the A2, some 2km to the west of the Site. The record is from an EPS licence for works to this section of the A2, granted by Natural England when the A2/A282 junction was improved.

3.1.2 Additional records for dormice occur near to the Bluewater shopping centre, adjacent to the A269 dating from 2011, and to the south-west at Beacon Country Park dating from 2001 and 2004.

3.2 Habitat Assessment

3.2.1 The habitats within the Springhead Site are relatively new with bramble *Rubus fruticosus* agg. sp. rapidly developing in the south. These areas of bramble scrub vary in density, height and connectivity. The woodland along the Ebbsfleet is mixed broadleaved deciduous with a varied shrub layer, but dominated by crack willow *Salix fragilis* and riparian vegetation, with occasional mature, standard pendunculate oak *Quercus robur*, ash *Fraxinus excelsior* and sycamore *Acer pseudoplatanus* on the higher ground and hawthorn *Crataegus monogyna* and elder *Prunus spinosa* dominating the shrub layer. There are areas of species-poor planting including stands of closely planted cherry *Prunus* sp.

3.2.2 An analysis of aerial photographs of the area reveals the following:

1999 The Springhead Site was an arable field with a small section of scrub/woodland to the west (which is still present). The extent of woodland vegetation along the Ebbsfleet appears limited. Apparently mature vegetation was present along the embankment of the A2 extending to the west of the Site.

2003 The Springhead Site was largely cleared for the construction of the new road layout for the A2 junction and as a compound for the Ebbsfleet International Train station development. Part of the small section of scrub/woodland to the west of the Springhead site in 1999 has been retained. The mature vegetation along the embankment of the A2 immediately to the south and west of the Springhead site has been cleared for these road improvement works.

2006 The new road junction had been completed and the Springhead Site has grassed over. The small section of scrub/woodland in the west of the Site in 1999 is still present. The extent of woodland vegetation along the Ebbsfleet is extending in a southerly direction along the river.

2007 As 2006, but new landscape planting is evident along the northern road embankments of the A2 and the new junction.

4.0 EVALUATION

4.1 The habitats within the Springhead Site have been assessed for their potential to support dormice principally due to the known presence of dormice along the A2 corridor. The closest record of this species along the A2 corridor is some 780m to the west of the Site.

4.2 Vegetation within the Springhead Site is developing into good quality dormouse habitat with a matrix of heavily fruiting and flowering scrub and tree species present. However, it can be seen from historic aerial photographs that the majority of the Springhead site was utilised as a compound during the construction of the Channel Tunnel Rail Link (CTRL) and the Ebbsfleet International Station between 2003 and 2006. the scrub habitats within the area have developed since the compound has been removed. In 1990, prior to the Site's use as a compound, this area was an arable field with minimal connectivity between the fragments of woodland along the Ebbsfleet, the eastern side of the Springhead Site and the vegetation bordering the A2 to the south.

4.3 It is therefore concluded that dormice were unlikely to be present within the Springhead Site during the 1990s due to the low amount of suitable dormouse habitat on the Site in this period. Furthermore the development of the new A2 road junction in 2003 removed the remaining and limited connective vegetation along the A2 corridor in the west. The planting along the A2 is developing into a more structurally suitable habitat for dormice, however the level of connectivity currently present is not considered sufficient for dormice to have extended their range from the retained mature vegetation 780m to the west of the Site - where dormice have been recorded (see section 3.1.1)- and along the A2 embankment to the Springhead Site.

5.0 CONCLUSIONS

5.1 The habitats within the Springhead Site have been assessed for their potential to support dormice. Whilst the scrub and woodland habitats are developing into habitats sufficiently large and diverse enough to support dormice, they are still considered to be isolated and fragmentary, and separated from more favourable habitats where dormice are known to be present, such as along the A2 corridor. The historic use of the Springhead Site since the 1990s results in an assessment concluding that dormice would not be present on the Site.

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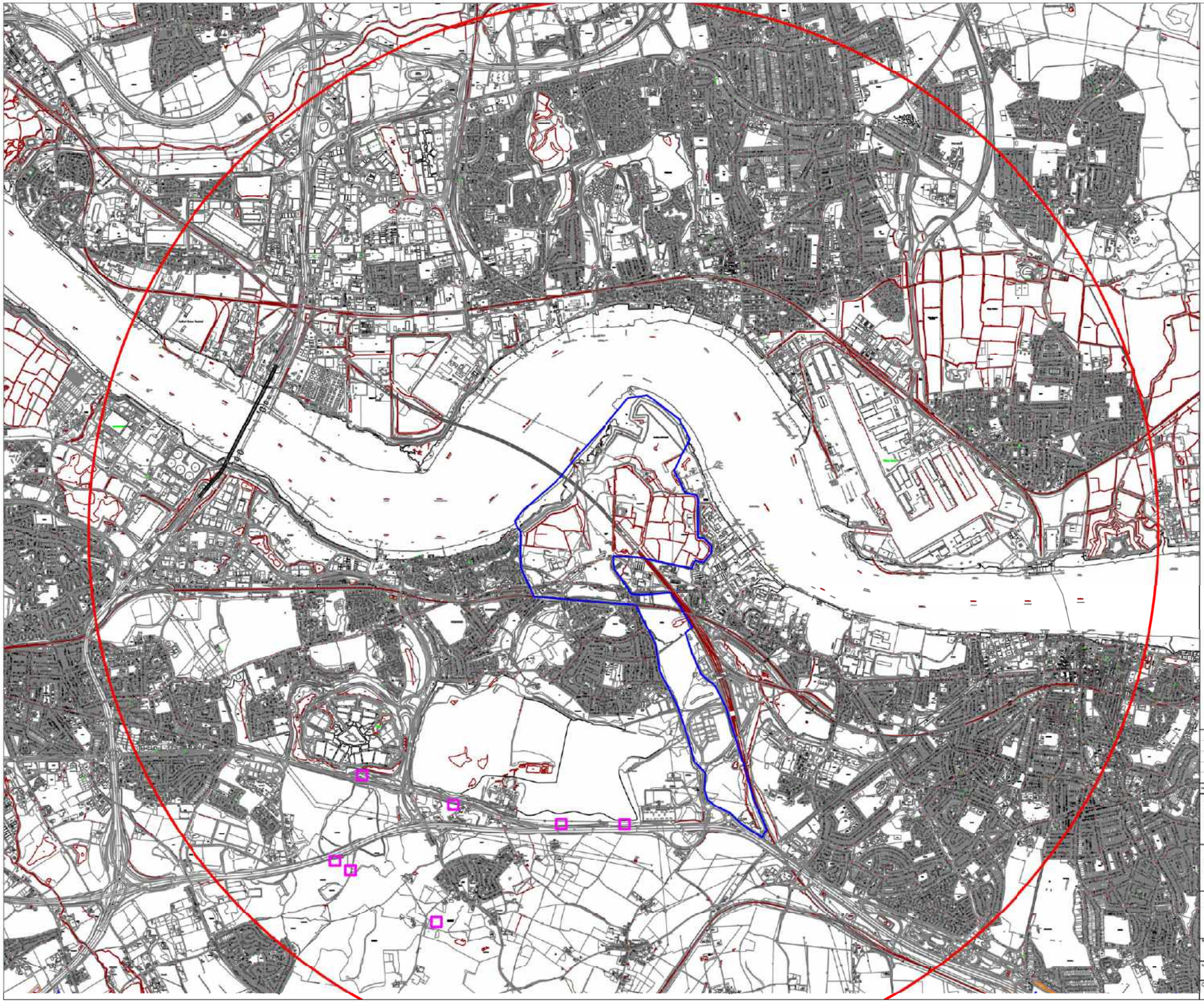
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FIGURES



Key

Site Area

5KM Radius

Dormouse Record

revision	description	date	checked by

Corylus Ecology Ltd, Unit A3, Speldhurst Business Park, Went Farm, Langton Road, Speldhurst, Kent TN3 0NR Corylus Ecology is the trading name of Corylus Ecology Ltd registered in England, No 8000000. Registered Office: Hernwood House

CORYLUS ECOLOGY

Project:

London Paramount

Title:

Desk Study Plan

status		drawing no.		
		Figure 1		
scale	size	date	drawn	checked
NTS	A3	19-10-2016	AW	HL

CAD filename

Figure_1.dwg

Key

- Dormouse Record
- Dormouse Habitat
- Newly Planted Verges

revision	description	date	checked by

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Project:

London Paramount

Title:

Connectivity between Springhead and known Dormouse location

status		drawing no.		
		Figure 2		
scale	size	date	drawn	checked
NTS	**A3**	**19-02-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg

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2015 Badger Survey Report (CBA February 2016)

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London Paramount Entertainment Resort

2015 Badger Survey Report

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February 2016

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cba

London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 Badger Survey Report

Confidential

Approved	
	Dominic Watkins
Position	Director
Date	15th February 2016
Revision	Draft

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1: Location of Badger Setts

1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.1.2 The badger survey and desk study was undertaken by CBA. This report details the methodology, results and conclusions of the desk study and survey undertaken during spring and summer 2015.

1.2 Scope of Survey

1.2.1 The scope of the survey encompassed identifying whether badgers and their setts were present within or adjacent to the Proposed Development Area.

1.3 Key Findings

1.3.1 No signs of badgers were found within or adjacent to most of the Proposed Development Area. Badger setts were found only in the A2 Corridor around the Bean junction and between the Ebbsfleet and Pepper Hill junctions (**Figure 1**).

1.4 Status

1.4.1 The badger is listed within the UK BAP Long List of Globally Threatened /Declining Species (HMSO, 1995) and is protected under the Protection of Badgers Act 1992, which provides extensive protection to badgers and their setts. It is illegal to wilfully kill, injure or maim a badger, intentionally interfere with a badger sett, damage or destroy all or part of a sett, obstruct a sett entrance or disturb a badger occupying a sett.

1.5 Badger Ecology

1.5.1 Badgers are widespread throughout Britain (especially in the south and south-west), and are most common in lowland areas of woods and pastures. They live in social groups occupying well-defined territories, their boundaries often marked by groups of dung pits known as latrines and by scent from glands or urine, often adjacent to a clearly defined badger path. In Britain

social groups can consist of up to 23 members (average six adults) and territory size varies from 30ha to 150ha depending on habitat richness. Foraging marks, latrines, well-worn paths and badger hair caught on barbed wire or brambles are all useful indications of badger activity.

1.5.2 Badgers are omnivores and their diet includes earthworms (often the main food source), other invertebrates, small vertebrates, wild fruits, nuts, bulbs and cereal crops. Where food is scarce, the territory will need to be large.

1.5.3 Badger setts are classified according to their size, function and level of use. Within the territory of each social group there is usually a large, continuously occupied main sett which is normally used for breeding. In some cases, close to the main sett there may be an annexe sett, which is effectively a more infrequently used addition to the main sett that is sometimes used when the group in the main sett is large and/or when the main sett has been damaged or has suffered from interference. Within a territory there are sometimes one or two subsidiary setts and typically these have between three to five entrances. Subsidiary setts can be quite active, and occasionally may be used for breeding, or become disused for short periods of time. Outlying setts often only have a single entrance and may be unoccupied for long periods of time[1].

1.6 Confidentiality

1.6.1 The findings of this report are confidential in order to protect badgers from persecution. The location of badgers or their setts should not be made public.

[1] Roper, T.J., 2010. New Naturalist: Badger. Collins

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Desk Study data was obtained from Kent and Medway Biological Records Centre (KMBRC) in January 2015.

2.2 Field Survey

2.2.1 The survey was conducted on during spring and summer 2015. The entire Proposed Development Area excluding the A2 corridor was thoroughly walked and any signs of badgers recorded, including setts, footprints, latrines, hairs and foraging signs, in order to assess the presence and status of badgers on site.

2.2.2 The A2 corridor was surveyed in the same way over the same period by Halcrow Hyder and their results have been made available to the Project through a data sharing agreement.

2.2.3 Survey methods for the identification of badger setts (as well as other signs of badger activity) employed for this survey have been used extensively elsewhere with consistent results. Signs of badger activity are clear to an experienced surveyor.

2.2.4 There were some areas, such as areas of dense scrub or very steep banks that could not be accessed. However, careful inspections were carried out along the boundaries of these areas for signs of badgers.

3.0 RESULTS

3.1 Desk Study

3.1.1 There were no records from within or immediately adjacent to the Proposed Development Area. There were a relatively large number of records from the Darenth Wood and Darenth area, to the south west of the Proposed Development Area, as well as from south of the village of Bean, near Southfleet and near the station in Northfleet.

3.2 Survey

3.2.1 The location of badger setts is illustrated in **Figure 1**. Two active badger setts (Setts 1 and 2), a disused sett (Sett 3) and a partially used hole (Sett 4) were identified by Halcrow Hyder during their survey of the A2 corridor and the following account is derived from their report[2].

Sett 1 - comprised a probable main sett of five well-used holes and two partially-used holes on a steep scrubby embankment comprising the northern end of an old railway embankment where it adjoins the A2. Dense scrub made it impossible to fully access the bank and assess the sett.

Sett 2 - comprised a main sett of four well-used holes, three-partially used holes and six disused holes located along a wooded embankment.

Sett 3 - comprised six entrance holes with no recent signs of activity and is considered likely to be a disused main sett.

Sett 4 - comprised a single partially-used hole in an embankment and is considered likely to be an outlier sett

3.2.2 No other badger signs, including setts were recorded within or adjacent to the proposed Development Area.

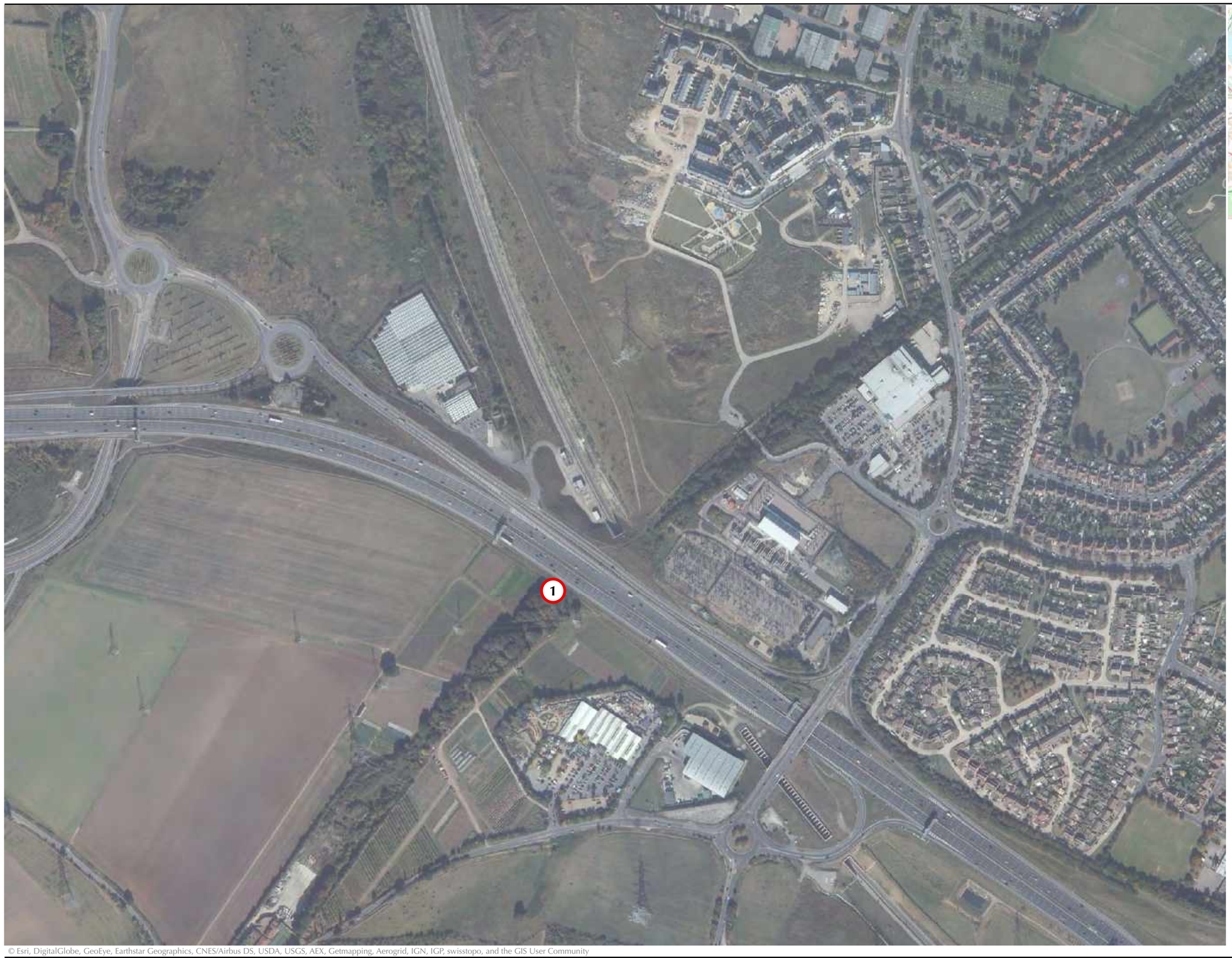
[2] Halcrow Hyder for Highways England, 2015. A2 Bean & Ebbsfleet Junction Improvements – Preliminary Ecological Appraisal

4.0 CONCLUSIONS

4.1 Badger Presence

4.1.1 Badgers appear to be absent from the majority of the Proposed Development Area, with badger setts only recorded in the A2 Corridor around the Bean junction and between the Ebbsfleet and Pepper Hill junctions.

FIGURES





Survey Records:

1 Badger Sett

0 100 200 Metres

N

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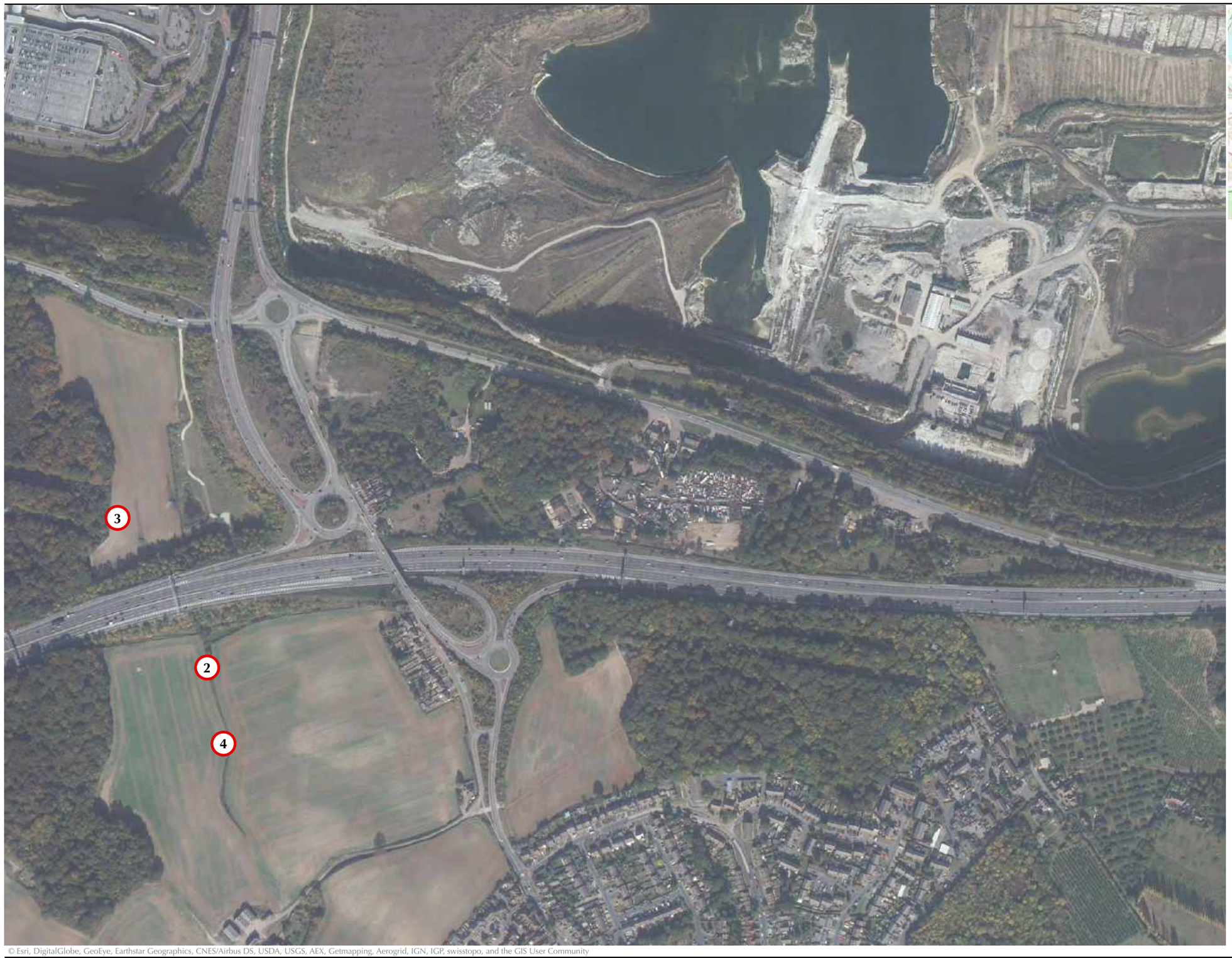
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LONDON PARAMOUNT ENTERTAINMENT RESORT
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FIGURE 1a
LOCATION OF BADGER SETTS

February 2016

11120201_Badger Survey_12-02-16.indd





Survey Records:

1 Badger Sett

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0 100 200 Metres N

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FIGURE 1b
LOCATION OF BADGER SETTS

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Annex EDP 22
2015 Water Vole Survey Report (CBA February 2016)

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2015 Water Vole Survey Report

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(LRCH) Ltd.

London Paramount Entertainment Resort

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Date	15th February 2016
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FIGURES

1: Survey Areas

1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.1.2 The water vole desk study and survey was undertaken by CBA. This report details the methodology, results and evaluation of the desk study as well as survey undertaken during August-September 2015.

1.2 Aims

1.2.1 The aims of the water vole desk study and survey were to,

- understand the distribution of records of water voles in relation to the Proposed Development Area;
- identify whether water voles are present within the Proposed Development Area;
- evaluate any water vole populations present within the Proposed Development Area in relation to their nature conservation importance.

1.3 Previous Surveys

1.3.1 Water vole field signs were recorded during surveys carried out by CBA on the Swanscombe Peninsula, for example along ditches in and around Black Duck Marsh in 2012. These comprised small quantities of feeding remains and droppings in association with burrows, indicating the presence of a probably small population.

1.4 Water Vole Ecology

1.4.1 Water voles occur throughout Britain, mainly along well vegetated banks of slow flowing rivers, ditches, dykes and lakes. They excavate extensive burrow systems into the banks of waterways, which have sleeping/nest chambers at various levels in the steepest parts of the bank and usually have underwater entrances. Feeding areas comprise patches of short cropped vegetation, sometimes with piles of chopped food, and are often found close to or around burrow entrances. Water voles tend to be active more during the day than at night. Male voles live along about 130 metres of water bank, while females have ranges about 70 metres long.

They deposit distinctive, blunt ended black, shiny faeces in latrines, which occur throughout and at the edges of their range during the breeding season.

1.5 Status

1.5.1 Water voles have been lost from nearly 90% of the sites where it occurred in the last century as a result of habitat loss and fragmentation, and predation by the introduced mink *Neovision vison*.

1.5.2 The water vole is a UK Biodiversity Action Plan (BAP) Priority Species and a Species of Principal Importance in England.

1.6 Legislation

1.6.1 The water vole is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981. Under this it is an offence to;

- intentionally capture, kill or injure water voles;
- damage, destroy or block access to their places of shelter or protection (on purpose or by not taking enough care);
- disturb them in a place of shelter or protection (on purpose or by not taking enough care); or,
- possess, sell, control or transport live or dead water voles or parts of them (not water voles bred in captivity).

1.7 Key Findings.

1.7.1 No recent signs of water voles were found during the surveys and it is concluded that they are absent from the Proposed Development Area.

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Desk-top study data, including records of water voles, for the proposed Development Area and a 2km buffer, was obtained from Kent and Medway Biological Records Centre (KMBRC) in January 2015.

2.1.2 Other documents consulted were;

- Ecological Statement for the Springhead Spine Road and Bridge Link[1]

2.2 Survey

2.2.1 The water vole survey followed the standard guidance contained in the Water Vole Conservation Handbook[2].

2.2.2 The survey was carried out during August (Swanscombe Peninsula) and September (Ebbsfleet) 2015. All watercourses and waterbodies surveyed were searched for signs of water vole presence/absence. These included;

- latrines;
- burrows;
- feeding remains;
- footprints; and
- live sightings or sound of animals entering water.

2.2.3 **Figure 1** illustrates the areas surveyed. These included ditches and ponds across the Swanscombe Peninsula and along the Ebbsfleet Stream from near its source beside Springhead Nursery to shortly before it enters a culvert beneath Northfleet. Where continuous access along the bank(s) of a waterbody or watercourse was not possible spot checks were carried out approximately every ten metres, or as possible. Some sections of ditch, for example those on Black Duck Marsh on the Swanscombe Peninsula were surveyed using canoes.

[1] Middlemarch Environmental, 2009. Springhead Quarter, Ebbsfleet. Springhead Spine Road Phase II and Springhead Bridge Link, Ecological Statement.
[2] Strachan, R., Moorhouse, T. and Gelling, M. (2006).Water Vole Conservation Handbook.Second Edition. Wildlife Conservation Research Unit, Oxford

3.0 RESULTS

3.1 Desk Study

3.1.1 There are 12 records from the marshes on Swanscombe peninsula during the period 2000-03.

3.1.2 The Ecological Statement for the Springhead Spine Road and Bridge Link reported the presence of positive field signs for water voles on the Ebbsfleet in 2004-07.

3.2 Survey

3.2.1 Small numbers of holes were recorded in the banks of some drainage ditches on Swanscombe peninsula. However, other field signs to provide conclusive evidence for the presence of water voles were recorded during the survey.

4.0 CONCLUSIONS

4.1 Survey Conclusions

4.1.1 Despite previous records of water voles on Swanscombe Peninsula and along the Ebbsfleet, current survey evidence strongly suggests that water voles are absent from the Proposed Development Area.

4.1.2 The reason(s) for the loss of water voles from these areas is not clear. However, on Swanscombe Peninsula anecdotal evidence suggests that it could, in part, be due to fluctuating and recently high water levels, which may have excluded them by flooding from at least some areas, such as Black Duck Marsh.

FIGURES





Ditches and Watercourses

Waterbodies/Ponds

0 150 300 Metres

N

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WATER VOLE SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
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FIGURE 1a
SURVEY AREAS - SWANSCOMBE PENINSULA

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11120201_Water Vole_11-02-16.indd





Ditches and Watercourses

Waterbodies/Ponds

0 150 300 Metres

N

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WATER VOLE SURVEY
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FIGURE 1b
SURVEY AREAS - EBBSFLEET STREAM

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Annex EDP 23
2015 Harvest Mouse Survey Report (CBA February 2016)

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London Paramount Entertainment Resort

2015 Harvest Mouse Survey Report

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2015 Harvest Mouse Survey Report

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	Dominic Watkins
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1: Harvest mouse survey results

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1: Harvest mouse survey areas

2: Harvest mouse survey records

1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.1.2 The harvest mouse desk study and survey was undertaken by CBA. This report details the methodology, results and evaluation of the desk study as well as survey undertaken during December 2015.

1.2 Aims

1.2.1 The aims of the harvest mouse survey were to,

- understand the distribution of records of water voles in relation to the Proposed Development Area;
- identify whether water voles are present within the Proposed Development Area;
- evaluate any water vole populations present within the Proposed Development Area in relation to their nature conservation importance.

1.3 Harvest Mouse ecology

1.3.1 The harvest mouse *Micromys minutus* is Britain's smallest mouse. Areas of tall grass, road side verges, hedgerows, reed beds, dykes and salt marshes provide suitable habitat. They are the only British mammal to build nests of woven grass well above ground, for example among grass stalks, bramble and scrub edges. They eat a mixture of seeds, berries and insects. Harvest mice usually have two or three litters a year between late May and October, but into December if mild. Most litters are born in August. Populations can fluctuate significantly in size between years or over several years.

1.4 Status

1.4.1 Harvest mice are thought to have declined in recent years, considered likely to be due to changes in habitat and agricultural management. As a result they are a Biodiversity Action Plan (BAP) Priority Species and Species of Principal Importance in England.

1.5 Key Findings

1.5.1 The presence of harvest mice, indicated by records of harvest mouse nests, was identified on Swanscombe Peninsula, especially Broadness, but also among grassland and scrub to the south east of Black Duck Marsh.

1.5.2 There have also been records of harvest mouse nests from Botany Marsh East in 2010.

1.5.3 Outside Swanscombe Peninsula no harvest mouse nests were found in the area North of Springhead Nursery.

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Desk-top study data for the proposed Development Area and a 2km buffer was obtained from Kent and Medway Biological Records Centre (KMBRC) in January 2015.

2.1.2 Ecological survey results for Botany Marsh East[1] were also reviewed.

2.2 Survey

2.2.1 The survey methodology was broadly based on the Mammal Society's National Harvest Mouse Survey Instructions and comprised searching strips (approx. five to ten metres wide) or patches (approx. ten by ten metres) of suitable vegetation for nests. Approx. one hour was allocated to searching each 200m of strip and 5-10 minutes to each patch. Two to three surveyors searched each strip or patch.

2.2.2 When a nest was found its location and other details, including the habitat and vegetation in which the nest was found, the species from which the nest was constructed and height of nest and supporting vegetation were recorded.

2.2.3 A number of areas of suitable habitat across Swanscombe peninsula (Areas 1-10) were surveyed and one area outside the Peninsula, North of Springhead Nursery (Area 11), as illustrated in **Figure 1**.

[1] Entec UK Limited for Britannia Refined Metals, 2011. Northfleet Site Ecological Assessment: Ecological Baseline Report

3.0 RESULTS

3.1 Desk Study

3.1.1 The KMBRC data included a single old (1960's) record of harvest mouse from Swanscombe Peninsula.

3.1.2 Harvest mouse nests were recorded in Botany Marsh East in 2010[2].

3.2 Survey

Records

3.2.1 A summary of the survey results are provided in **Table 1**. **Figure 2** illustrates the location of records of harvest mouse nests. A total of 28 nests were recorded on Swanscombe Peninsula, of which eight were fragments and 20 complete nests. The majority were recorded in Broadness (Areas 4, 5, 6 and 7), which forms the northern part of the Peninsula, probably due to the abundance of suitable habitat. However, several were also recorded in Area 1, a triangle of grassland and scrub to the south east of Black Duck Marsh.

3.2.2 Outside Swanscombe Peninsula no harvest mouse nests were recorded in Area 11 North of Springhead Nursery.

Nest characteristics

3.2.3 Nest material was not always clearly identifiable but tended to reflect the relative abundance of larger grasses close to the nest, with false oat-grass the most frequently used species, with occasional cocksfoot and tall fescue and sea couch locally significant.

3.2.4 Based on the dimensions most of the nests appear to have been for breeding, although some of the smaller ones may have been non-breeding nests.

3.2.5 Nest height ranged from 6 to 75cm, with a mean of 40cm.

[2] Entec UK Limited for Britannia Refined Metals, 2011. Northfleet Site Ecological Assessment: Ecological Baseline Report

4.0 CONCLUSIONS

4.1 Records

4.1.1 The survey was undertaken as a series of sample surveys of suitable habitat within the Proposed Development Area and has confirmed the presence of a population of harvest mice on the Swanscombe Peninsula. This appears to have its highest density on Broadness, the northern part of the Peninsula, although nests were also recorded in one other area near Black Duck Marsh.

4.1.2 The widespread presence and continuity of suitable habitat across the Peninsula, including both grassland and reedbed suggests that harvest mice are likely to be widely distributed across the Peninsula.

4.1.3 Outside the Peninsula the lack of recorded nests in Area 11 North of Springhead Nursery suggests harvest mice may be absent from this area. More generally, although suitable habitat exists elsewhere within the Proposed Development Area, for example in the Sport's Field/East Quarry, Bamber Pit and around the edges of Northfleet Landfill, the more fragmented nature of the habitats in these areas, the barriers to dispersal, such as busy roads, rail lines and cliffs between them, and a possible lack of historical habitat continuity/availability, are likely to lower the probability of harvest mice being present in these areas.

TABLES

Table 1 Harvest mouse survey results

Area 1 Triangle

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location (TQ)	Nest type
1		False oat-grass	40	1	60030 75451	Fragment
2	10 x 6	False oat-grass	75	1.25	8m west	Complete
3		False oat-grass	20	0.9	9m west	Fragment
4	9 x 5	False oat-grass	30	1.25	59955 75415	Complete
5	6 x 6	False oat-grass, bracken, hemp agrimony	50	1.5	5m west	Fragment

Area 2 Centre South Edge

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
None recorded						

Area 3 Centre

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
1		Cocksfoot, false oat-grass	46	0.7	60483 76090	Fragment

Area 4 Broadness Centre

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
1		False oat-grass	20	0.4	60471 76184	Fragment
2	5 x 6	Cocksfoot, false oat-grass	30	1.5	61202 72879	Complete
3	12 x 10	False oat-grass, thistle	6	0.5	4m north	Complete
4	6 x 6	False oat-grass	50	1	60812 76244	Complete
5	4 x 8	Cocksfoot, false oat-grass	47	1.1	2m south	Complete
6	6 x 3	False oat-grass	30	1	8m north	Fragment
7	6 x 9	False oat-grass	57	0.8	60892 76309	Complete
8	9 x 7	False oat-grass	50	0.7	60893 76314	Complete
9	12 x 7	False oat-grass	67	1.1	5m west	Complete

Area 5 Broadness Tip

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
1		Tall fescue	10	0.6	60755 76434	Fragment
2	6 x 7	Sea couch, tall fescue	40	0.8	60577 76492	Complete
3	7 x 6	Sea couch, tall fescue	25	1.1	60759 76508	Complete
4	7.5 x 7.5	Sea couch, tall fescue	45	0.6	60735 76513	Complete
5	6 x 7	Sea couch, tall fescue	40	0.7	1m east	Complete
6	5 x 6	Sea couch, tall fescue	50	0.9	60775 76540	Complete
7	6 x 6	Cocksfoot	55	0.75	60726 76562	Complete
8	7 x 5	Tall fescue	60	1	60705 76551	Fragment
9	7 x 3	Tall fescue	15	1.1	60701 76555	Complete
10	8 x 4	Tall fescue	30	1.2	60660 76591	Complete

Area 6 Broadness West

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
1	5 x 5	Cocksfoot	45	1.2	60417 76263	Complete

Area 7 Broadness South East

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
1	7 x 6	Tall fescue	45	0.7	60840 76120	Complete
2	8 x 7	Tall fescue	30	0.8	5m east	Complete

Area 8 CTRL Wetland/Botany Marshes

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
None recorded						

Area 9 SW Tip

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
None recorded						

Area 10 Black Duck Marsh Edge

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
None recorded						

Area 11 North of Springhead Nursery

Nest	Nest size (cm)	Nest spp	Nest height (cm)	Veg height (m)	Location	Nest type
None recorded						

FIGURES





Survey Area

Transect Survey

Patch Survey

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0 150 300 Metres

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FIGURE 1a
SURVEY AREAS

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Survey Area

Transect Survey

Patch Survey

0 150 300 Metres

N

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FIGURE 1b
SURVEY AREAS

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Survey Area

Transect Survey

Patch Survey

0 150 300 Metres

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LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1c
SURVEY AREAS

February 2016

11120201_Harvest Mouse_11-02-16.indd





Nest Records:

- 1 nest
- 2 nests
- 3 nests

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0 150 300 Metres

N

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FIGURE 2a
NEST RECORDS

February 2016
11120201_Harvest Mouse Nests_11-02-16.indd





Nest Records:

- 1 nest
- 2 nests
- 3 nests

0 150 300 Metres

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FIGURE 2b
NEST RECORDS

February 2016
11120201_Harvest Mouse Nests_11-02-16.indd





Nest Records:

- 1 nest
- 2 nests
- 3 nests

0 150 300 Metres

N

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FIGURE 2c
NEST RECORDS

February 2016
11120201_Harvest Mouse Nests_11-02-16.indd



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Annex EDP 24
2012 Amphibian Survey Report (CBA, 2012)

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cba

London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Amphibian Survey Report

November 2012

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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Amphibian Survey Report

Approved	Bill Wadsworth
	Bill Wadsworth
Position	Senior Associate (Ecology)
Date	30th November 2012
Revision	Final

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1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings (LRCH) Ltd. to undertake a series of ecological surveys to inform the Environmental Impact Assessment for the proposed London Paramount development at Swanscombe, North Kent.

1.1.2 This report details the results of the amphibian survey undertaken between April and June 2012.

1.2 Scope

1.2.1 The scope of the survey was to determine:

- habitat suitability assessments for all waterbodies within the proposed development area that have the potential to support amphibians; and
- the presence and status of amphibians using a series of ponds and ditches, with specific reference to great crested newts *Triturus cristatus* (a species considered fully protected by law).

Survey Limitations

1.2.2 Most of the waterbodies consisted of steep-sided, deep water, lagoons, ditches and drains, many of which contained significant deposits of silt. The waterbodies were too deep for surveyors to safely wade in and be able to set traps effectively and therefore for both health and safety and practical reasons, it was not possible to deploy bottle trapping as a survey technique.

1.2.3 Additionally, some waterbodies within 500m of the proposed development area were not surveyed due to access restrictions.

1.3 Key Findings

Great Crested Newts

1.3.1 The results of the amphibian survey suggest that great crested newts are not present in any of the surveyed water bodies on the Swanscombe peninsula north of the A226. No signs of this species were recorded during the survey in 2012 and the desk-top study revealed no historical records either. The HSI scores suggest that most of the water bodies on the peninsula are highly

suitable habitats so it may be that the A226 as a busy main road has proved to be an effective barrier preventing colonisation of this area.

1.3.2 Further survey work may be required to establish whether or not great crested newts are present elsewhere within the proposed development area, but for which access has not yet been possible. The lake in Bamber pit where great crested newts were recorded in 1985 scored just 0.41 on the HSI due to the high densities of fish. It may be that the fish were introduced to the lake since the record was made as it now seems highly unlikely great crested newts are found in this area.

Other Amphibian Species

1.3.3 The results of the survey suggest that a small population of smooth newts and an unknown population of marsh frogs are found on the Swanscombe peninsula, mainly concentrated around Swanscombe Marshes.

2.0 METHODOLOGY

2.1 Background

2.1.1 There are six native species of amphibian in the UK of which five, common frog *Rana temporaria*, common toad *Bufo bufo*, smooth newt *Lissotriton vulgaris*, palmate newt *Lissotriton helveticus*, and great crested newt could be expected to occur within the proposed development area. The sixth, natterjack toad *Bufo calamita*, is very restricted in its distribution and does not occur within or near to the proposed development area.

2.2 Great Crested Newt Ecology

2.2.1 The great crested newt is the largest of the three British native newt species, reaching a maximum length of 14.5cm for males and 16cm for females. Great crested newts spend much of the year on land where they need a variety of different conditions to provide food, shelter and places to spend the winter. Like all amphibians, great crested newts rely on water for breeding and for the development of the larval stage and so return to ponds in the spring to breed. Eggs are laid singly on underwater leaves near the water margin between late February and early August, but usually between April and June, with each female laying several hundred eggs. The efts normally take three months to develop into young newts before leaving the water, but some may over-winter as efts. Juvenile newts disperse up to 1km, only returning to ponds to breed when sexually mature after one to three years. Adult newts leave the ponds from July onwards, generally staying within 200 – 500m of the ponds. From October or November, they hibernate in damp, frost-free environments, sometimes underground.

2.2.2 On land, great crested newts are found in cool, moist conditions under debris or in dense vegetation. They feed on both land and in water, eating small aquatic animals such as water fleas and insect larvae and terrestrial invertebrates, especially worms.

2.2.3 Despite the decline of this species in recent years, the great crested newt is still quite widespread in Great Britain and is numerous locally in parts of lowland England. Studies in the 1980's indicated a national rate of colony loss of approximately 2% over five years. The decline can be put down to loss of suitable breeding ponds caused by water table reduction, in-filling for development, changing farming practices, waste disposal, neglect or fish stocking and the degradation, loss and fragmentation of terrestrial habitats. The British population remains, however, among the largest in Europe and Britain therefore has an international responsibility for the species.

2.3 Legislation

2.3.1 All British amphibian species receive legal conservation protection in the United Kingdom, though the degree to which different species are protected varies.

2.3.2 The Wildlife and Countryside Act 1981 (WCA) (as amended) transposes into UK law the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The 1981 Act was recently amended by the Countryside and Rights of Way (CRoW) Act 2000. The great crested newt is considered 'fully protected' as it is listed under Schedule 5 of the 1981 Act, and is therefore subject to the provisions of Section 9, which makes it an offence to:

- Intentionally kill, injure or take a great crested newt [Section 9(1)];
- Possess or control any live or dead specimen or anything derived from a great crested newt [Section 9(2)];
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt [Section 9(4)(a)];
- Intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for that purpose [Section 9(4)(b)];
- Sell, offer for sale, possess or transport for the purpose of sale or publish advertisements to buy or sell a great crested newt [section 9(5)].

2.3.3 The other more common amphibian species are protected against sale (Section 9(5)) only. In all cases, the legislation applies to all life stages including, eggs, efts (the larval stage), juveniles and adults.

2.3.4 The great crested newt is a UK Biodiversity Action Plan priority species and is considered sufficiently threatened in Europe to be included in the Habitats Directive and the Conservation of Habitats and Species Regulations 2010 (the 'Habitats Regulations'). The Habitats Regulations transpose into UK law Council Directive 92/43/EEC of the 21st May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats (and Species) Directive). The great crested newt is listed on Annex II and Annex IV (European protected species). Annex II relates to the designations of special areas of conservation (SACs) for this species (underlining their conservation significance even where they occur outside SACs). Annex IV requires member states to construct a system of protection as outlined in Article 12, this is done through inclusion on Schedule 2 of the Regulations. Regulation 39 makes it an offence to:

- Deliberately capture or kill a great crested newt [Regulation 39(1)(a)].
- Deliberately disturb a great crested newt [Regulation 39(1)(b)].
- Deliberately take or destroy the eggs of a great crested newt [regulation (1)(c].
- Damage or destroy a breeding site or resting place of a great crested newt [Regulation 39(1)(d)].

2.4 Scope of Survey

2.4.1 The requirement to undertake an amphibian survey results from the protected status of the great crested newt and its possible presence within the development area, identified during the desk-top study and Phase 1 habitat survey carried out in April-May 2012. The main body of the proposed development area (north of the A226) supports a large network of ditches and 8 lakes/ponds. In addition there are two large lakes in former quarries located south of the A226. The water bodies north of the A226 are linked by a mosaic of terrestrial habitats of varying quality for supporting amphibians, whilst the lakes south of the A226 appear to be isolated.

2.4.2 The results of the desk-top study, showing the locations of amphibian records in and around Swanscombe are displayed in **Figure 1.** Only species records provided by Kent and Medway Biological Records Centre (KMBRC) with an accurate grid reference of at least 6 figures (100m square) are displayed. This left just relatively few amphibian records in the Swanscombe area, with a distinct lack of records on the peninsula north of the A226.

2.4.3 The results of the Phase 1 habitat survey suggest that overall there is a large amount of suitable habitat for amphibians on the peninsula which is mainly comprised of rough grassland and scrub, and with small areas of broadleaved woodland. Most of this habitat is continuous and links to a number of ditches and ponds. South of the A226 the largest continuous blocks of suitable habitat are present in Bamber pit and surrounding locations in Ebbsfleet valley where areas of rough grassland, scrub and woodland are present.

2.5 Survey Methodology

2.5.1 Within the main body of the proposed development area (north of the A226) the following water bodies were surveyed for amphibians:

- the network of drainage ditches on Swanscombe Marshes (D2-D5, D7 & D9)
- the drainage ditches to the east and west of the Channel Tunnel Rail Link (HS1) and old sewage works (D10-D12)
- the pond situated north-west of the old sewage works (P3)
- the pond situated north-east of the old sewage works (P4)
- the ponds south of the HS1 (P5)

2.5.2 The remaining water bodies were deemed unsuitable for great crested newts (mainly due to being choked with reed), too dangerous to access or permission had not been given to access the land on which they are situated. The locations of all the water bodies surveyed are set out in **Figure 2** and descriptions of each are provided below.

2.5.3 Surveys were conducted on 4 separate occasions from 30th April to 15th June 2012 between the hours of 20:30 and 23:30. Torchlight surveys and egg searches were the principal survey techniques used. Bottle trapping was not used as a technique due to the difficulty of accessing steep sided ditches, containing in excess of 1m depth water and deep deposits of silt. On each night of survey the water bodies were given a vegetation and turbidity score between 0 and 5. A vegetation score of 0 indicating a water body clear of vegetation and 5 completely choked. A turbidity score of 0 indicating a clear water body and 5 extremely murky.

2.5.4 The surveys were carried out in suitable weather conditions, according to guidance provided by the Herpetofauna Groups of Britain and Ireland (HGBI)[1] and Froglife[2]. Torching was undertaken shortly after dusk on still, warm evenings above 5ºC with the aid of a 1 million candle power torch. Full details of the weather conditions during the surveys are given in **Table 2.**

2.5.5 The surveys were specifically aimed at detecting great crested newts in their various life stages, but also included surveys for other amphibians and incidental fish records, particularly as fish can have a determining influence on the presence of great crested newts.

2.5.6 Smooth and palmate newts can be difficult to distinguish in the field using torchlight searches so where the species was uncertain the record was made as smooth/palmate newt.

2.6 Evaluation Methodology

2.6.1 In order to assess the importance of the ponds in relation to their amphibian assemblages the population size class assessment set out in Section 5.8.3 of the English Nature guidelines[3] was used. The purpose for using this assessment is to recognise the inherent difficulty and range of factors that can affect the determination of the size of a given population. As EN's guidelines state "… surveys may reveal from around 2% to 30% of the population … recent evidence has revealed even greater variation". EN therefore recommends the use of the following size classifications as a minimum for interpreting survey results. The size classifications are set out in **Table 1** below.

Table 1 Great Crested Newt Population Size Class Assessment

Species	Low/Small Population	Good/Medium Population	Exceptional/Large
Great crested newt	<10	11-100	>100

[1] HGBI (1998) *Evaluating Local Mitigation/Translocation Programmes: Maintaining Best Practice and Lawful Standards.* HGBI Advisory Notes (ARGs). HGBI, c/o Froglife, Halesworth, Unpubl.
[2] Froglife (2003) *Advice Sheet 11 – Surveying for (Great Crested) Newt Conservation.* Froglife, Halesworth.
[3] English Nature (2001) *Great Crested Newt Mitigation Guidelines.*

2.6.2 The results of the surveys can be further supported using data relating to the quality of the pond and surrounding terrestrial habitat. This is known as the Habitat Suitability Index (HSI), or Oldham Criteria, after the paper's author (Oldham *et al*, 2000[4]). This methodology enables the ponds to be evaluated for their suitability for great crested newts, against a set of defined criteria. The calculation produces a figure in the range 0 – 1, where the closer the figure tends towards 1, the better the quality of habitat.

[4] Oldham, R. S., Keeble, J., Swan, M. J. S. and Jefcote, M. (2000). *Evaluating the suitability of habitat for the great crested newt (Triturus cristatus)*. Herpetological Journal **10** pp143-155.

3.0 RESULTS

3.1 Water Body Descriptions

Ditch Descriptions

3.1.1 The ditches surveyed have been labelled D (Ditch) 1 to D16 respectively and are shown in **Figure 2**.

3.1.2 **D1:** This is a short section of ditch in the south-west corner of the survey area. It has approximately 100m long and 5m wide with very steep sides and shallow water that drains into a culvert. It is mainly shaded by scrub and has hard standing on the banks.

3.1.3 **D2:** This ditch is sandwiched between the edge of Swanscombe Marshes and an area of rough grassland with scattered scrub. The ditch itself is approximately 200m long and 5m wide with open water in the channel to a depth of 0.5m. The west margin is fringed by common reed and to the east there is bracken *Pteridium aquilinum* and bramble *Rubus fruticosus* scrub.

3.1.4 **D3:** This ditch runs along the northern boundary of some broadleaved woodland in the south-west corner of the survey area. It is approximately 500m long, 6m wide and 0.5m deep. The southern margin is overhung by trees leaving the water quite shaded and the eastern boundary is heavily scrubbed with bramble along much of its length. To the north of the ditch is Swanscombe Marshes.

3.1.5 **D4-D7:** These ditches dividing Swanscombe Marshes are all quite similar in character. Typically they are 6m wide with common reed *Phragmites australis* dominating the bank and channel vegetation. There is little other vegetation besides the occasional patches of reedmace *Typha latifolia*. Water depth in the channels is variable but in most there are quite large areas of open water. The approximate lengths of the ditches are as follows:

- D4 – 650m
- D5 – 300m
- D6 – 200m
- D7 – 150m

3.1.6 **D8-D9:** These ditches are situated at the east of Swanscombe Marshes and are mostly inaccessible as they are surrounded by dense scrub. D8 is approximately 250m long and D9 500m. Both look to be approximately 6m wide with open water up to 1m deep.

3.1.7 **D10:** This ditch runs along the eastern boundary of a landfill and is bordered on the west by dense hawthorn *Crataegus monogyna* and willow *Salix spp.* scrub that grades into a narrow woodland belt. On the eastern boundary there is a fringe of common reed and some emergent reedmace. It is steep-sided, approximately 500m long, 5m wide and with standing water in the channel at variable depth. Moving south to north the water drops from around 0.5m to a negligible depth where vegetation chokes the channel. Numerous fish were observed in the ditch, possibly sticklebacks.

3.1.8 **D11:** This ditch runs opposite to D10 bordering P5, the old sewage works and another landfill. It is approximately 750m long and 5m wide with varying water depth along its length. In three locations it opens up into small pools of water approximately 0.5m deep but along most of its length the channel is quite heavily vegetated with common reed and reedmace and there are no areas of open water. In the pools numerous fish were observed, again possibly sticklebacks. At the north end there is a section of ditch that looks to have recently been dredged, allowing shallow water to flow into a culvert.

3.1.9 **D12:** This ditch runs along the northern margin of a landfill and to the east of a large area of swamp. It is approximately 900m long, 5m wide and has very shallow (5cm) or no standing water along much of its length. The channel has become totally choked with common reed and it looks soon to dry up completely.

3.1.10 **D13:** This is a French drain that runs along the southern boundary of a planted shelterbelt and then appears to feed P4. It is approximately 1000m long, 2m wide and up to 1m deep. For much of its length a gravel bottom can be seen.

3.1.11 **D14:** This is a dry ditch bordering the southern margin of a large area of ephemeral/short perennial vegetation central to the survey area. It is approximately 200m long, 1m wide and 0.5m deep. It does not appear to ever collect water.

3.1.12 **D15:** This ditch is a part of the River Ebbsfleet that opens up next to the A226 at the southern end of the survey area. It is approximately 150m long, 5m wide and has standing water around 0.5m deep. The ditch is mainly surrounded by dense scrub and an area of swamp to the east and the main road borders the western side. In terms of the wider landscape the ditch is in a highly fragmented habitat with a large lake (P9), main roads and urban development all in close proximity.

3.1.13 **D16:** This ditch runs parallel to D16 and is very similar in character. It is approximately 400m long, 3m wide and up to 1m deep. There is little or no standing water along much of its length, the channel is choked with common reed and it looks soon to dry up completely. In terms of

the wider landscape this ditch borders the western margin of Botany Marshes, a large area of cattle-grazed grassland.

Lake/Pond Descriptions

3.1.14 The lakes and ponds surveyed have been labelled P (Pond) 1 to P10 respectively and are shown in **Figure 2**.

3.1.15 **P1:** This lake is situated immediately north of the A226 in the south-west corner of the survey area that has developed in an old quarry. It is approximately 9500m^2 in size with a perimeter of around 450m and unknown depth. It is surrounded by very steep sides covered by woodland and dense willow scrub and was deemed inaccessible and dangerous to survey. There is little apparent aquatic vegetation except for the occasional clumps of hard rush *Juncus inflexus*. Waterfowl were observed using this lake during the Phase 1 habitat surveys carried out by CBA. In terms of the wider landscape the lake is bordered by rough grassland and woodland to the north and east, a main road to the south and urban development to the west.

3.1.16 **P2:** This pond is situated at the bottom of a very steep sided valley in the north-west corner of the survey area. It is too dangerous to access but appears to be approximately 700m^2 in size with a perimeter of around 100m. Woodland and scrub line the banks and there is a lot of rubbish strewn down the sides and in the water at the bottom. Much of the pond looked to be shaded by the trees. In terms of the wider landscape there are large areas of woodland, rough grassland and scrub to the east and urban development to the west.

3.1.17 **P3:** This lake is situated between two former landfills at the north end of the survey area. It is roughly rectangular in shape, 7500m^2 in size and has a 425m perimeter. Most of this perimeter is fringed by common reed and there is a strip of broadleaved woodland on the western banks. There is little to no aquatic vegetation visible and the water was discoloured red/brown, possibly contaminated by landfill leachate. Waterfowl have been observed using this water body. In terms of the wider landscape it is surrounded by extensive areas of rough grassland, scrub, ditches and woodland.

3.1.18 **P4:** This pond is situated to the north-west of Botany Marshes and looks like it was recently created or modified. It is quite uniformly rectangular, approximately 900m^2 in size with a 125m perimeter. The banks are steep with bare soil and the water quality looks very poor. It is red/brown in colour, possibly contaminated with landfill leachate and there is little/no aquatic vegetation or invertebrates to be seen. In terms of the wider landscape this pond is surrounded by extensive areas of rough grassland, scrub and ditches.

3.1.19 **P5:** This is a series of shallow ponds situated immediately south of the HS1. They are rapidly becoming vegetated over by common reed and reedmace and the open water remaining probably exceeds no more than 2000m^2 in extent. The average depth of water in the pools is no more than 0.1m. The ponds grade into marshy grassland to the south with hard rush, creeping bent *Agrostis stolonifera* and great willowherb *Epilobium hirsutum*. Waterfowl and small fish, possibly sticklebacks, have been observed using these water bodies. In terms of the wider landscape the ponds are surrounded by large areas of ephemeral/short perennial vegetation, scrub, ditches and rough grassland. The HS1 presents a potential barrier to the north.

3.1.20 **P6:** This lake is situated between the HS1 and old sewage works. It appears to be man-made and covers a large area approximately 14000m^2 in size with a 950m perimeter. The extent of open water looks to be much less than this as the lake is surrounded by a very large swamp and common reed is encroaching. Several species of waterfowl have been observed on the lake including tufted duck *Aythya fuligula* and mute swan *Cygnus olor*. In terms of the wider landscape this lake is mainly surrounded by swamp, the cattle-grazed fields of Botany Marshes are to the east and the HS1 is situated to the south.

3.1.21 **P7:** This pond is situated just north of the A226 within an industrial estate. It is roughly circular in shape, 7000m^2 in size and has a 300m perimeter. The surrounding banks looked to have been recently disturbed and were characterised by ruderal vegetation. Waterfowl were observed using this pond during the Phase 1 habitat survey. In terms of the wider landscape only the northern boundary of the pond features suitable terrestrial habitat for amphibians where large areas of rough grassland and scrub can be found.

3.1.22 **P8:** This lake is situated at the base of a large former quarry pit just south of the A226. It is approximately 5000m^2 in size with a 350m perimeter and unknown depth. The steep sides are covered with dense scrub and mature trees. Large fish, possibly carp, were observed in the water. The quarry within which the lake is situated is approximately 11ha and comprises a complex mosaic of short and tall grassland, scrub, and birch woodland.

3.1.23 **P9:** This very large lake fills the bottom of an old quarry pit east of the A226 in the south-east corner of the survey area. It is over 100,000m^2 in size with a perimeter of approximately 1500m. It is surrounded by very steep chalk escarpments with dense scrub and in terms of the wider landscape it is mostly enclosed by main roads, the HS1 and urban development.

3.1.24 **P10:** This is a small, shallow pool of water that extends from the ditches on Botany Marshes. It is no more than 750m^2 in size with a 150m perimeter and is heavily vegetated with reed. The water is likely to dry up during seasons with little rainfall. There is little to no aquatic

vegetation visible and the water was discoloured red/brown, possibly contaminated by landfill leachate. In terms of the wider landscape the pond is surrounded by large areas of rough grassland.

3.2 Survey Results

3.2.1 Weather conditions during the survey are summarised in **Table 2**. Every evening was dry and warm with a varying degree of cloud cover.

3.2.2 The full results of the survey are given in **Tables 3-6** and shown in **Figure 3**. Just two amphibian species were confirmed as being present on the Swanscombe Peninsula, smooth newt and marsh frog *Pelophylax ridibundus* a non-native species introduced to Kent in 1935. The marsh frog was not seen during the survey but its characteristic laughing calls were heard on the 17th and 25th May towards the north end of Swanscombe Marshes.

3.2.3 Smooth newts were recorded in D3, D4 and P5. 19 animals were recorded in total over the survey period with the peak count occurring on 17th May when 10 animals were recorded in D3 and 1 in D4.

3.2.4 In addition 6 adult newts and 2 efts only identifiable as smooth or palmate were recorded in D3, D4 and P5. Palmate and smooth newt larvae are indistinguishable in the field and adult females can only be distinguished by the degree of spotting on the throat, therefore need to be caught to be identified.

3.2.5 A tadpole was recorded in D4 on 30th April, likely to be that of the marsh frog as no other frog species was recorded during the survey. Fish were recorded in D4, D10, D11 and P5. These were mainly small, stickleback-like species.

3.2.6 A condition assessment of the water bodies is given in **Table 7.** The degree of vegetation cover and turbidity varied between water bodies and survey nights but most of the scores were low.

Table 2 Weather Conditions

Date	Cloud (%)	Rain	Start Time / Temperature (ºC)	End Time / Temperature (ºC)
30/04/12	50	0	20-45hrs / 15	23-40hrs / 14
17/05/12	70	0	20-55hrs / 18	23-50hrs / 17
25/05/12	100	0	21-10hrs / 15	23-40hrs / 15
15/06/12	80	0	21-20hrs / 14	23-30hrs / 13

Table 3 Survey Results – 30/04/12

Species	Ditch/Pond							
	D2	D4	D7	D10	D11	D12	P3	P4
Great crested newt	-	-	-	-	-	-	-	-
Smooth newt	-	1	-	-	-	-	-	-
Palmate newt	-	-	-	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-	-	-	-
Common frog	-	-	-	-	-	-	-	-
Common toad	-	-	-	-	-	-	-	-
Tadpole	-	1	-	-	-	-	-	-
Fish	-	-	-	Y	Y	-	-	-

Table 4 Survey Results – 17/05/12

Species	Ditch/Pond							
	D2	D3	D4	D7	D10	D11	P3	P5
Great crested newt	-	-	-	-	-	-	-	-
Smooth newt	-	10	1	-	-	-	-	-
Palmate newt	-	-	-	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-	-	-	1
Common frog	-	-	-	-	-	-	-	-
Common toad	-	-	-	-	-	-	-	-
Tadpole	-	-	-	-	-	-	-	-
Fish	-	-	-	-	Y	Y	-	Y

Table 5 Survey Results – 25/05/12

Species	Ditch/Pond				
	D3	D4	D10	D11	P5
Great crested newt	-	-	-	-	-
Smooth newt	-	-	-	-	1
Palmate newt	-	-	-	-	-
Smooth/palmate newt	4	1	-	-	-
Common frog	-	-	-	-	-
Common toad	-	-	-	-	-
Tadpole	-	-	-	-	-
Fish	-	-	Y	Y	Y

Table 6 Survey Results – 15/06/12

Species	Ditch/Pond				
	D3	D4	D5	D7	D9
Great crested newt	-	-	-	-	-
Smooth newt	6	-	-	-	-
Palmate newt	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-
Smooth/palmate newt eft	2	-	-	-	-
Common frog	-	-	-	-	-
Common toad	-	-	-	-	-
Tadpole	-	-	-	-	-
Fish	-	Y	-	-	-

Table 7 Water Body Condition Assessment

Water Body	Date	Turbidity Score	Vegetation Score
D2	30/04/12	0	1
	17/05/12	0	2
D3	17/05/12	1	1
	25/05/12	2	2
	15/06/12	0-1	1-2
D4	30/04/12	0	1
	17/05/12	1	2
	25/05/12	1	1
	15/06/12	0	1-2
D5	15/06/12	0	3
D7	30/04/12	0	1
	17/05/12	0	2
	15/06/12	0	2
D9	15/06/12	0	2
D10	30/04/12	3	1
	17/05/12	4	1
	25/05/12	4	2
D11	30/04/12	1-4	1-4
	17/05/12	1-4	1-4
	25/05/12	1-4	1-4
D12	30/04/12	1	3-4
P3	30/04/12	3	0
	17/05/12	3	1
P4	30/04/12	2	0
P5	17/05/12	0	1
	25/05/12	0-3	0-3

3.3 Habitat Suitability Index Scores

3.3.1 Habitat Suitability Index (HSI) scores were calculated for all the water bodies to aid evaluation of the ponds/ditches and their surrounding habitats for their suitability for great crested newts.

3.3.2 As shown in **Tables 8** and **9**, most of the water bodies on scored quite highly and the average score was 0.71 (a perfect great crested newt habitat would score 1). The reason for such high scores across the board is due to the large numbers of ditches and ponds within 1km of each other and large areas of suitable terrestrial habitat within a 500m radius.

3.3.3 Low scores were mainly influenced by poor water quality and high densities of fish, which meant that on average the ponds scored slightly lower than the ditches.

Table 8 HSI Scores for Ponds

Pond	1	2	3	4	5	6	7	8	9	10
Score	0.79	0.78	0.54	0.55	0.67	0.79	0.87	0.41	0.47	0.55

Table 9 HSI Scores for Ditches

Ditch	1	2	3	4	5	6	7	8	9	10	11	12	15	16
Score	0.81	0.86	0.86	0.74	0.85	0.86	0.87	0.79	0.79	0.81	0.55	0.57	0.77	0.58

FIGURES



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KEY

Species

- Great crested newt
- Smooth newt
- Palmate newt
- Common toad
- Common frog

2000 Date of record

It should be noted that species locations are approximate - based on at least 6 figure grid references with an accuracy of 100m

0 200 400 m

N

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FIGURE 1
Amphibian Records
(based on desk-top study data provided by KMBRC)

KEY

- Accessible open water
- Accessible ditch with open water
- Inaccessible open water
- Inaccessible ditch with open water
- Dry / heavily vegetated ditch
- P1 Pond 1
- D1 Ditch 1

0 100 200 m

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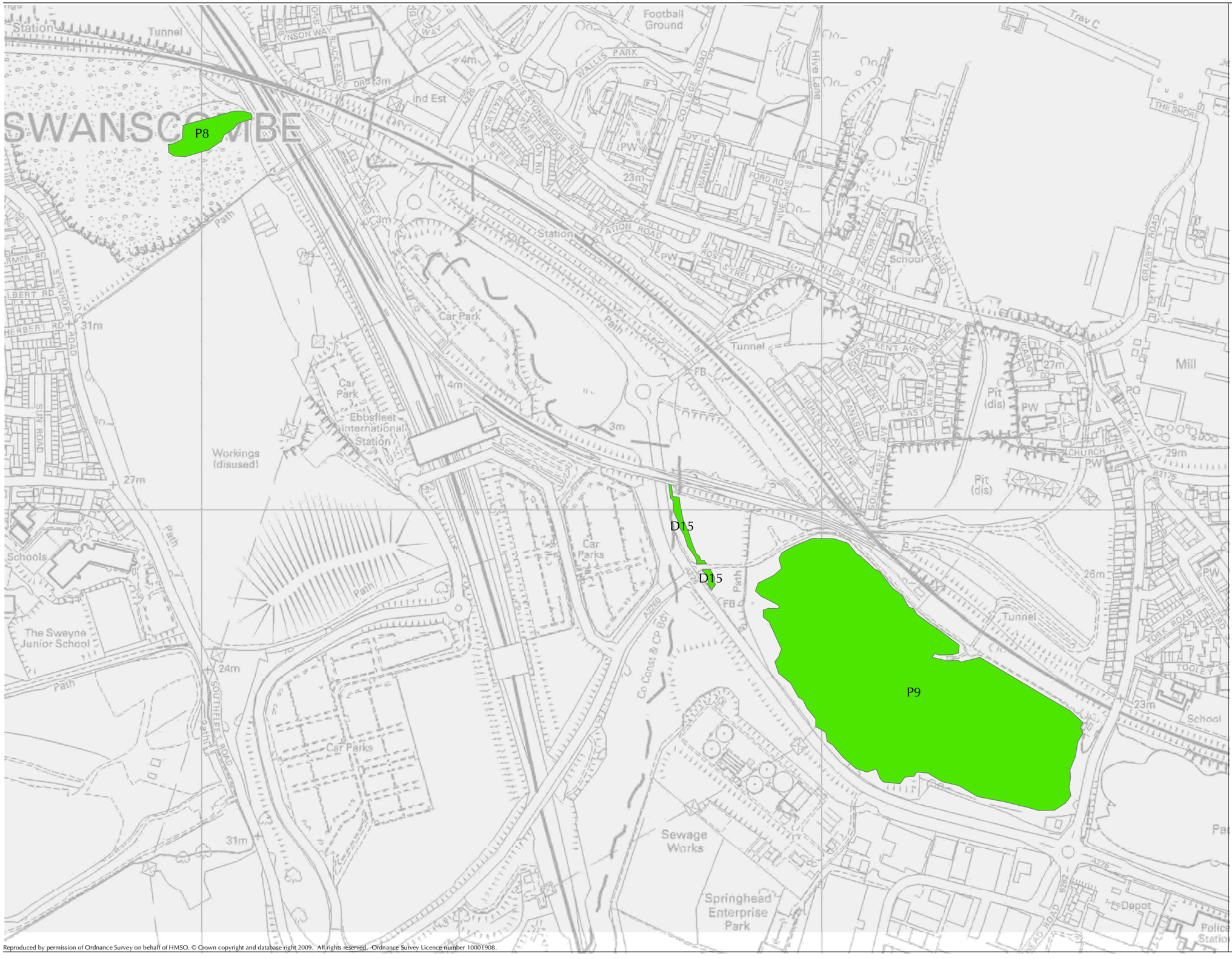
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FIGURE 2a

Location and Status of Water Bodies on Site

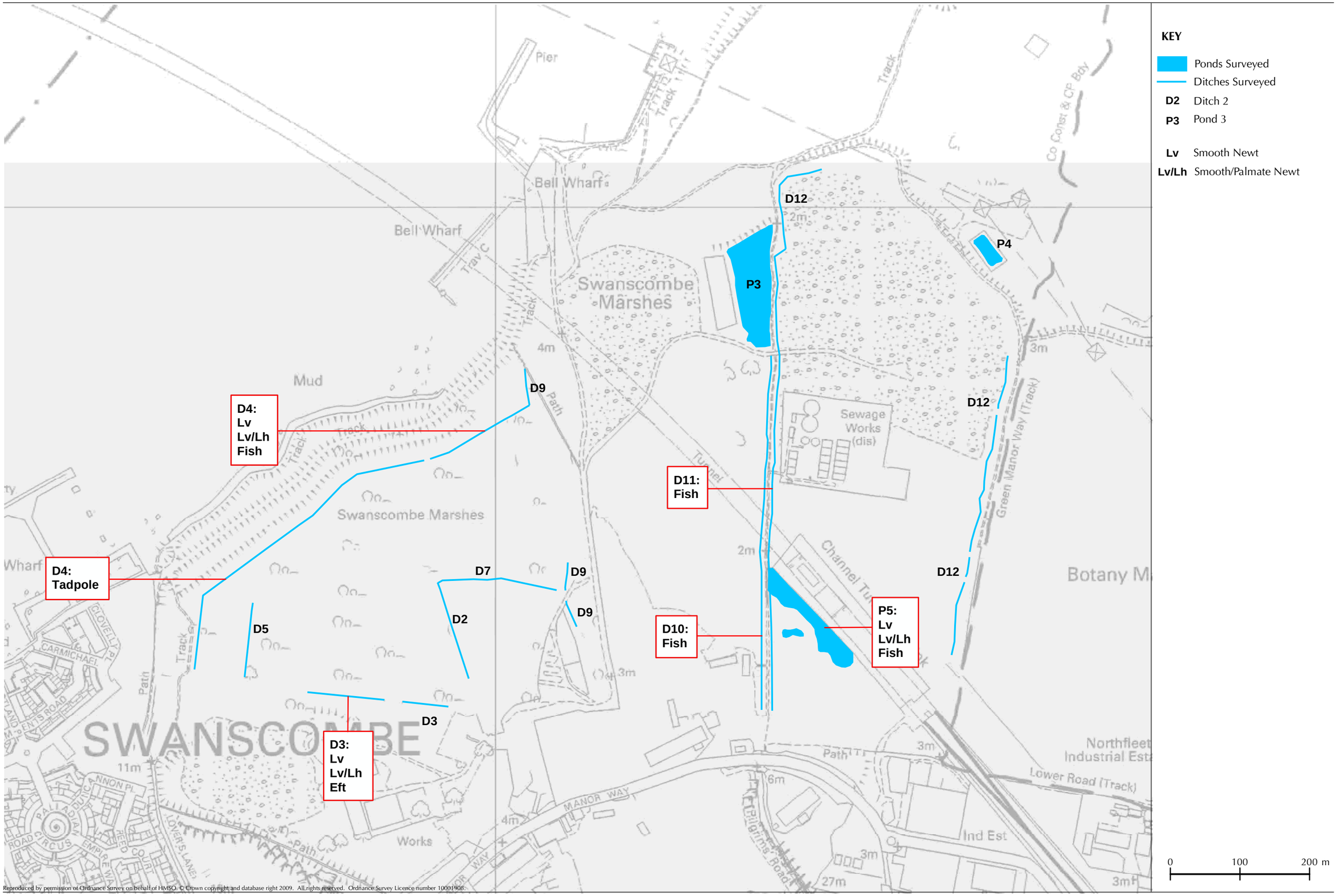
JUNE 2012



KEY

- Accessible open water
- Accessible ditch with open water
- Inaccessible open water
- Inaccessible ditch with open water
- Dry / heavily vegetated ditch
- P1 Pond 1
- D1 Ditch 1

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FIGURE 3
Amphibian Records made during the 2012 Survey

APPENDICES

APPENDIX A
Site Photographs



Figure A1 Lake with surrounding willow scrub and steep-sided woodland covered banks (P1)



Figure A2 Lake fringed with common reed. The water is discoloured red/brown in places- possibly due to leachate pollution (P3)



Figure A3 Pond with steep-sided bare soil banks. The water is discoloured red/brown- possibly due to leachate contamination (P4)



Figure A4 Shallow ponds surrounded by marshy grassland (P5)



Figure A5 Lake surrounded with swamp dominated by common reed (P6)



Figure A6 A typical ditch on Swanscombe marshes – 5m wide channel dominated by common reed on the banks and occasional bulrush (D7)



Figure A7 A ditch choked with common reed (D16)



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Annex EDP 25
2015 Amphibian Survey Report (CBA February 2016)

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London Paramount Entertainment Resort

2015 Amphibian Survey Report

DRAFT

February 2016

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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 Harvest Mouse Survey Report

Approved	Dominic Watkins
Position	Director
Date	15th February 2016
Revision	Draft

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2: HSI calculations

3: ADAS eDNA Sample Analysis

1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.1.2 The amphibian/great crested newt desk study and survey was undertaken by CBA. This report details the methodology, results and evaluation of the desk study as well as survey undertaken during June 2015.

1.2 Aims

1.2.1 The aims of the amphibian/great crested newt desk study and survey were to,

- Understand the distribution of records of amphibians in relation to the Proposed Development Area;
- identify whether great crested newts are present within the Proposed Development Area;
- evaluate any great crested newt populations present within the Proposed Development Area in relation to their nature conservation importance.

1.3 Previous Surveys

1.3.1 Amphibian surveys were carried out by CBA in 2012 of a number of ponds and ditches on the Swanscombe Peninsula[1]. These identified a probably small population of smooth newt and a population of marsh frogs. The survey report is included as **Appendix 1**.

1.4 Great Crested Newt Ecology

1.4.1 The great crested newt is the largest of the three British native newt species, reaching a maximum length of 14.5cm for males and 16cm for females. Great crested newts spend much of the year on land where they need a variety of different conditions to provide food, shelter and places to spend the winter. Like all amphibians, great crested newts rely on water for breeding and for the development of the larval stage and so return to ponds in the spring to breed. Eggs are laid singly on underwater leaves near the water margin between late February and early August, but usually between April and June, with each female laying several hundred

[1] Chris Blandford Associates for London Resort Company Holdings, 2012. London Paramount Amphibian Survey Report

eggs. The efts normally take three months to develop into young newts before leaving the water, but some may over-winter as efts. Juvenile newts disperse up to 1km, only returning to ponds to breed when sexually mature after one to three years. Adult newts leave the ponds from July onwards, generally staying within 200 – 500m of the ponds. From October or November, they hibernate in damp, frost-free environments, sometimes underground.

1.4.2 On land, great crested newts are found in cool, moist conditions under debris or in dense vegetation. They feed on both land and in water, eating small aquatic animals such as water fleas and insect larvae and terrestrial invertebrates, especially worms.

1.4.3 Despite the decline of this species in recent years, the great crested newt is still quite widespread in Great Britain and is numerous locally in parts of lowland England. Studies in the 1980's indicated a national rate of colony loss of approximately 2% over five years. The decline can be put down to loss of suitable breeding ponds caused by water table reduction, in-filling for development, changing farming practices, waste disposal, neglect or fish stocking and the degradation, loss and fragmentation of terrestrial habitats. The British population remains, however, among the largest in Europe and Britain therefore has an international responsibility for the species.

1.5 Legislation

1.5.1 All British amphibian species receive legal conservation protection in the United Kingdom, though the degree to which different species are protected varies.

1.5.2 The Wildlife and Countryside Act 1981 (WCA) (as amended) transposes into UK law the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The 1981 Act was recently amended by the Countryside and Rights of Way (CRoW) Act 2000. The great crested newt is considered 'fully protected' as it is listed under Schedule 5 of the 1981 Act, and is therefore subject to the provisions of Section 9, which makes it an offence to:

- Intentionally kill, injure or take a great crested newt [Section 9(1)];
- Possess or control any live or dead specimen or anything derived from a great crested newt [Section 9(2)];
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt [Section 9(4)(a)];
- Intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for that purpose [Section 9(4)(b)];
- Sell, offer for sale, possess or transport for the purpose of sale or publish advertisements to buy or sell a great crested newt [section 9(5)].

1.5.3 The other more common amphibian species are protected against sale (Section 9(5)) only. In all cases, the legislation applies to all life stages including, eggs, efts (the larval stage), juveniles and adults.

1.5.4 The great crested newt is a UK Biodiversity Action Plan priority species and is considered sufficiently threatened in Europe to be included in the Habitats Directive and the Conservation of Habitats and Species Regulations 2010 (the 'Habitats Regulations'). The Habitats Regulations transpose into UK law Council Directive 92/43/EEC of the 21st May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats (and Species) Directive). The great crested newt is listed on Annex II and Annex IV (European protected species). Annex II relates to the designations of special areas of conservation (SACs) for this species (underlining their conservation significance even where they occur outside SACs). Annex IV requires member states to construct a system of protection as outlined in Article 12, this is done through inclusion on Schedule 2 of the Regulations. Regulation 39 makes it an offence to:

- Deliberately capture or kill a great crested newt [Regulation 39(1)(a)].
- Deliberately disturb a great crested newt [Regulation 39(1)(b)].
- Deliberately take or destroy the eggs of a great crested newt [regulation (1)(c].
- Damage or destroy a breeding site or resting place of a great crested newt [Regulation 39(1)(d)].

1.6 Key Findings

1.6.1 The 2012 survey and 2015 eDNA results suggest that no waterbodies within the Proposed Development Area are used for breeding by great crested newts. However, it is possible that populations recorded nearby may use terrestrial habitat within the Proposed Development Area, although the risk is considered to be low due to the presence of barriers to dispersal, such as roads and the CTRL.

1.6.2 There were incidental records of smooth newt and marsh frog from the Swanscombe Peninsula, smooth newt from Botany Marsh East and smooth newt and common toad from Bamber Pit.

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Desk-top study data, including records of amphibian species, for the proposed Development Area and a 2km buffer, was obtained from Kent and Medway Biological Records Centre (KMBRC) in January 2015.

2.1.2 The report of the 2012 survey of ditches and ponds on Swanscombe peninsula is noted above.

2.2 Survey

2.2.1 A number of ponds and ditches, described below, were surveyed across the Proposed Development Area and their locations are illustrated in **Figure 1**. On Swanscombe Peninsula the survey areas were selected to include all ponds considered potentially suitable and to provide good geographical coverage of the ditch network.

① Bamber Pit Pond - a relatively large pond located in the bottom of a disused chalk pit, Bamber Pit. The banks are steep and the water appears deep. It supports only small patches of aquatic, emergent or marginal vegetation and is set within a mosaic of unmanaged grassland, ruderal and scrub. There appears to be a large fish population, and is actively fished.

② Black Duck Marsh Ditch N – is a relatively wide (approx. 8m) ditch which runs along the northern edge of Black Duck Marsh. It is fringed on both sides by one to two metres of common reed *Phragmites australis* with approximately five metres of open water. Black Duck Marsh, comprising reedbed and open water, is to the south and to the north is managed and unmanaged grassland and an access road.

③ Black Duck Marsh Ditch E (N) – is a ditch which runs along the northern part of the eastern edge of Black Duck Marsh. It is largely set within dense scrub but patchy common reed is present along the ditch edges with approximately five metres of open water. There is reedbed and scrub to the west and unmanaged grassland, scrub and an access road to the east.

④ Black Duck Marsh Ditch E (S) – is a relatively wide (approx. 8m) ditch which runs along the southern part of the eastern edge of Black Duck Marsh. It is fringed with common reed on both sides with approximately five metres of open water. To the west is reedbed and to the east unmanaged grassland and scrub mosaic.

⑤ Swanscombe Centre – ditches and lagoon - comprises two ditches either side of a north-south access track and a lagoon at their northern end, all located in the centre of Swanscombe Peninsula. The ditches include dense common reed, especially in the eastern ditch, which has little open water, and the northern part of the western ditch. The southern section of the western ditch is more open, with 3-4m open water and patchy emergent and marginal

vegetation including reedmace *Typha* spp. and branched bur reed *Sparganium erectum* as well as common reed. The lagoon is relatively large with little or no aquatic vegetation but is fringed by common reed up to approximately ten metres wide. At the southern end especially there is a significant quantity of what appears to be cement kiln dust or similar material in the sediment. Both ditches and lagoon are all set within a mosaic of unmanaged grassland, dense and scattered scrub and reedbed.

⑥ CTRL Wetland N - comprises two ponds located within the wider CTRL wetland (largely reedbed) north of the CTRL compound. The southern pond is large. It is fringed by reed up to ten metres wide on the southern side. The northern side is more varied with rock armouring and stands of reedmace as well as a range of other species. Aquatic vegetation is abundant, with small pondweed *Potamogeton berchtoldii*, water starwort *Callitriche* sp. and brackish water-crowfoot *Ranunculus baudotii*. The northern pond is a smaller, roughly circular pond 30-40m in diameter and up to approx. 20cm in depth set within reedbed and with a fringe of sea club-rush. There is abundant aquatic vegetation comprising least pondweed *Potamogeton pusillus* and common stonewort *Chara vulgaris*.

⑦ CTRL Wetland S - is a pond located within the wider CTRL wetland (largely reedbed) south of the CTRL compound. It is fringed by reedbed and reedmace as well as some hard rush *Juncus effusus*. Aquatic vegetation includes least pondweed and common stonewort.

⑧ CTRL Wetland/Botany Marsh Ditches - comprises two ditches either side of a grassy access track between the CTRL Wetland (reedbed and open water) to the west and Botany Marshes (grazing marsh with ditches) to the east. Both are dominated by dense common reed with little or no open water.

⑨ Botany Marshes Ditch N - is a section of recently (winter 2014-15) de-silted ditch approximately three metres wide on the northern edge of Botany Marsh East. It is set within reedbed and scattered scrub but also adjoins the grazing marsh of Botany Marsh West and there is extensive unmanaged grassland to the north.

⑩ Botany Marshes Pond – is a new pond dug during winter 2014-15 on the eastern edge of Botany Marsh East. Much of it and the adjoining banks are bare of vegetation although there are small stands of common reed and reedmace and some brackish water-crowfoot. It is connected to a ditch running north and south along the eastern edge of Botany Marsh east and is set within a mosaic of grassland, reedbed and dense and scattered scrub.

⑳ Balancing Pond - lies within a wider mosaic of mostly unmanaged grassland and scrub. Open water comprises 80-90% of the pond, but there is some fringing common reed and reedmace and scattered willow scrub on the banks. The pond discharges into the Ebbsfleet to the east.

2.2.2 Two further waterbodies, labelled Ⓐ and Ⓑ in **Figure 1** are present on Swanscombe Peninsula but were not surveyed as they are currently operational leachate treatment lagoons and contain no vegetation little or no visible invertebrates.

Habitat Suitability Index (HSI)

2.2.3 A Habitat Suitability Index assessment (as developed by Oldham et al.[2]) for great crested newts was carried out for each pond and ditch surveyed (Figure 1). This methodology enables the ponds to be evaluated for their suitability for great crested newts, against a set of defined criteria. The calculation produces a score in the range 0 – 1, where the higher the score, the better the quality of habitat.

2.2.4 However, it should be borne in mind that the survey areas include a number of ditch sections on Swanscombe peninsula and the HSI methodology was developed for ponds, not ditches. This can cause difficulties, for example in calculating area, where ditch sections surveyed form part of a larger connected network, or when calculating the number of ponds within 1km. In all cases the ditch sections surveyed formed part of ditches greater than 2000m^2, so this feature was not included in the calculations. For the purposes of pond count each separate ditch section was considered as a pond. The assessment of water quality was based on the results of aquatic invertebrate surveys [TO BE REFERENCED IN THE FINAL REPORT] and that for fish was based in part on a fish survey [TO BE REFERENCED IN THE FINAL REPORT] of some of the waterbodies, as well as other observations. Both the aquatic invertebrate and fish surveys were carried out during 2015. Where survey areas include more than one waterbody and where these differ in character, for example ⑤ Swanscombe Centre – ditches and lagoon, they have been scored separately

2.2.5 In addition to the scoring, a system has been developed by the Amphibian and Reptile Groups of the UK[3] for using HSI scores to define pond suitability for great crested newts on a categorical scale, from poor to excellent, as shown in **Table 1**.

Table 1 Pond suitability for great crested newts based on HSI scores

HSI 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

[2] Oldham, R. S., Keeble, J., Swan, M. J. S. and Jefcote, M. (2000). Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). Herpetological Journal 10 pp143-155.
[3] Amphibian and Reptile Groups of the United Kingdom 2010. ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index

eDNA Survey

2.2.6 Environmental DNA is DNA that is released into the environment by organisms. In recent years a methodology for surveying for great crested newt DNA has been developed as a means of screening for presence or absence of this species within waterbodies during the breeding season. If great crested newt DNA is identified as present within a waterbody further surveys can be undertaken to determine population size class.

2.2.7 The methodology for collection and analysis of samples followed that developed by the Freshwater Habitats Trust[4]. Samples were collected from all ponds and ditches except the Balancing Pond on the 16th of June 2015 and analysed by ADAS.

2.2.8 Samples from three locations around the Balancing Pond were collected by Hyder Consulting (UK) Limited between 22nd-24th June 2015 and analysed by FERA using the same methodology. The results were made available to the project through a data sharing agreement.

[4] Biggs, J., Ewald, N., Valentini, A., Gaboriaud, C., Griffiths, R.A., Foster, J., Wilkinson, J., Arnett, A., Williams, P. and Dunn, F. (2014). Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. Technical advice note for field and laboratory sampling of great crested newt (*Triturus cristatus*) environmental DNA. Freshwater Habitats Trust, Oxford.

3.0 RESULTS

3.1 Desk Study

3.1.1 KMBRC Desk Study data records for amphibians were more or less unchanged from those reported in the 2012 Amphibian Survey Report and as presented in **Figure 1** of that report.

3.1.2 Common frog, common toad, smooth newt, palmate newt and great crested newt have all been recorded from within the Proposed Development Area or nearby. The most significant records (2000 onwards) for great crested newt are from a railway tunnel ditch in Northfleet (2000), a roadside drain in the Ebbsfleet Valley (2000), a pond beside the Southfleet Road/B259 (2001) and from within Eastern Quarry (2002-03). Great crested newts were also recorded from the Bamber Pit area in 1985-86.

3.2 Habitat Suitability Index

3.2.1 HSI scores and pond suitability assessments are provided in **Table 2**. All the ditches and ponds on Swanscombe Peninsula are assessed as good or excellent for great crested newts. This is due in large part to the density of waterbodies on the peninsula. ⑳ Balancing Pond has a lower score, and is of average suitability, due largely to the absence of nearby ponds. Only ① Bamber Pit Pond is assessed as of poor suitability, due to a combination of high fish density, low macrophyte cover and the lack of ponds nearby. The full HSI calculations are provided in **Appendix 2**.

Table 2 Habitat Suitability Index scores (for great crested newt)

Survey Area	HSI score	Pond suitability
① Bamber Pit Pond	0.40	Poor
② Black Duck Marsh Ditch N	0.80	Excellent
③ Black Duck Marsh Ditch E (N)	0.73	Good
④ Black Duck Marsh Ditch E (S)	0.80	Excellent
⑤ Swanscombe Centre - ditches	0.85	Excellent
⑤ Swanscombe Centre - lagoon	0.77	Good
⑥ CTRL Wetland N (N)	0.95	Excellent
⑥ CTRL Wetland N (S)	0.94	Excellent
⑦ CTRL Wetland S	0.95	Excellent
⑧ CTRL Wetland/Botany Marsh Ditches	0.84	Excellent
⑨ Botany Marshes Ditch N	0.74	Good
⑩ Botany Marshes Pond	0.88	Excellent
⑳ Balancing Pond	0.68	Average

3.3 eDNA Survey

3.3.1 All samples returned a negative result for the presence of great crested newt DNA except two, those for survey areas ⑧ CTRL Wetland/Botany Marsh Ditches and ⑨ Botany Marshes Ditch N, which returned undetermined results due to the unavoidable presence of silt in the samples. The full laboratory report is available in **Appendix 3**.

3.3.2 Due to the negative results no further surveys were undertaken.

3.4 Incidental records

3.4.1 There were single records of smooth newt from near the centre of Swanscombe Peninsula and of smooth newt and common toad in Bamber Pit from under roofing felt heat traps during the reptile survey. Smooth newts were also observed in ditches in Botany Marsh East and marsh frogs were heard calling in Black Duck Marsh on a number of occasions.

4.0 CONCLUSIONS

4.1 Amphibians

4.1.1 The desk study and survey results indicate that the Swanscombe Peninsula supports a probably small population of smooth newts and a population of marsh frogs, that Botany Marsh East supports smooth newts and Bamber Pit supports populations of smooth newt and common toad.

4.2 Great Crested Newts

4.2.1 Based on the negative 2012 survey and 2015 eDNA results it is considered very unlikely that great crested newts use any waterbodies within the Proposed Development Area for breeding. Although two of the eDNA results were undetermined, given the context of these among otherwise negative results across the Swanscombe Peninsula it is considered very unlikely these samples would have returned positive results in the absence of silt contamination.

4.2.2 Given historical records for the presence of great crested newts from within 500m of the Proposed Development Area, and the availability of suitable terrestrial habitat, it is possible that great crested newts may use parts of the Proposed Development Area during their terrestrial phase. However, due to the presence of barriers to dispersal, e.g. built development, major road networks, the Ebbsfleet corridor and the CTRL, between the location of records and habitat within the Proposed Development Area, it is considered this is a very low risk.

FIGURES





1 Survey Areas

A Other Water Features

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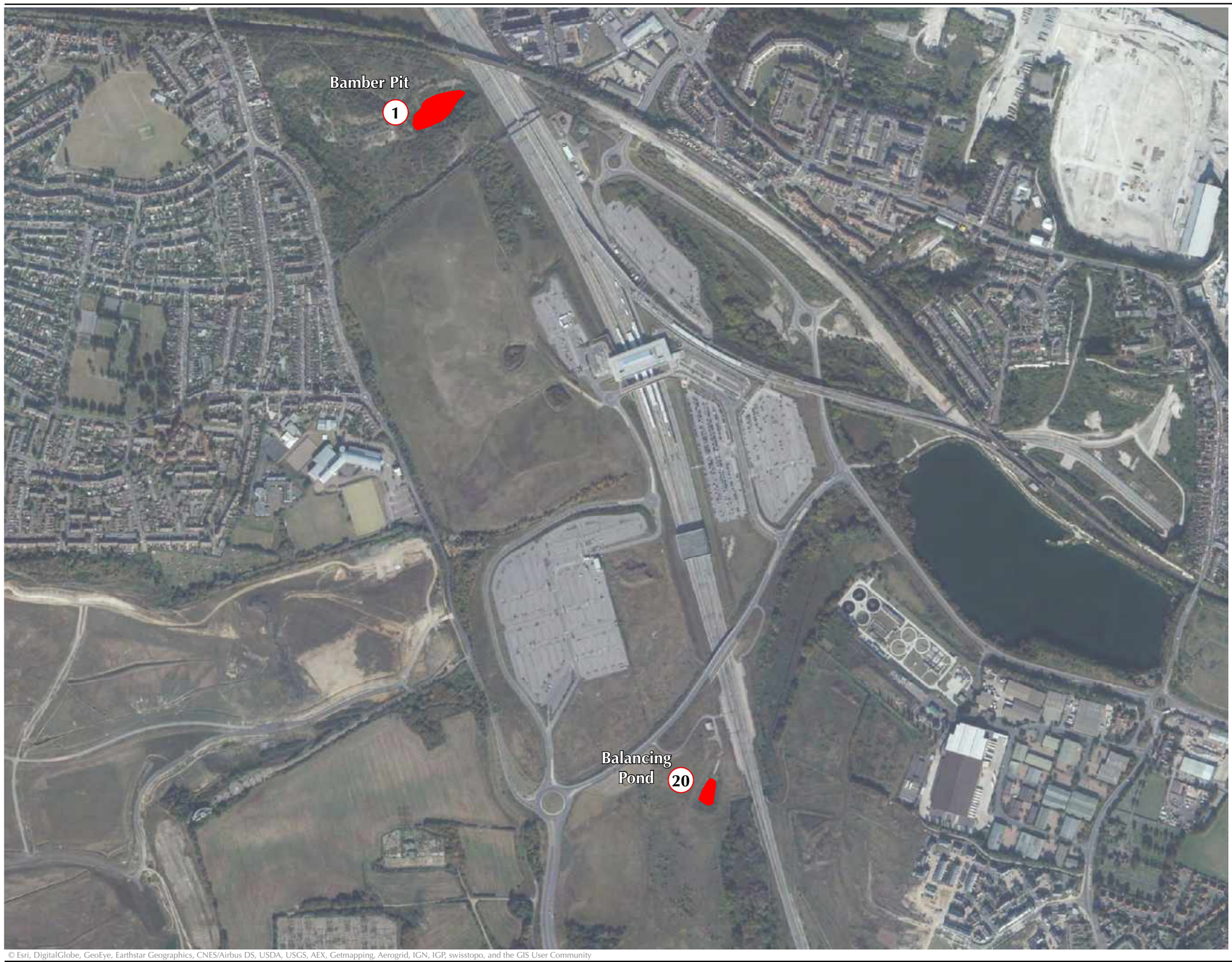
0 150 300 Metres

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AMPHIBIAN - GREAT CRESTED NEWT - SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1a
GREAT CRESTED NEWT
eDNA SAMPLE SITE LOCATIONS

February 2016
11120201_Amphibians_11-02-16.indd





1 Survey Areas

A Other Water Features

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0 150 300 Metres

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AMPHIBIAN - GREAT CRESTED NEWT - SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1b
GREAT CRESTED NEWT
eDNA SAMPLE SITE LOCATIONS

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APPENDICES

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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Amphibian Survey Report

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1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings (LRCH) Ltd. to undertake a series of ecological surveys to inform the Environmental Impact Assessment for the proposed London Paramount development at Swanscombe, North Kent.

1.1.2 This report details the results of the amphibian survey undertaken between April and June 2012.

1.2 Scope

1.2.1 The scope of the survey was to determine:

- habitat suitability assessments for all waterbodies within the proposed development area that have the potential to support amphibians; and
- the presence and status of amphibians using a series of ponds and ditches, with specific reference to great crested newts *Triturus cristatus* (a species considered fully protected by law).

Survey Limitations

1.2.2 Most of the waterbodies consisted of steep-sided, deep water, lagoons, ditches and drains, many of which contained significant deposits of silt. The waterbodies were too deep for surveyors to safely wade in and be able to set traps effectively and therefore for both health and safety and practical reasons, it was not possible to deploy bottle trapping as a survey technique.

1.2.3 Additionally, some waterbodies within 500m of the proposed development area were not surveyed due to access restrictions.

1.3 Key Findings

Great Crested Newts

1.3.1 The results of the amphibian survey suggest that great crested newts are not present in any of the surveyed water bodies on the Swanscombe peninsula north of the A226. No signs of this species were recorded during the survey in 2012 and the desk-top study revealed no historical records either. The HSI scores suggest that most of the water bodies on the peninsula are highly

suitable habitats so it may be that the A226 as a busy main road has proved to be an effective barrier preventing colonisation of this area.

1.3.2 Further survey work may be required to establish whether or not great crested newts are present elsewhere within the proposed development area, but for which access has not yet been possible. The lake in Bamber pit where great crested newts were recorded in 1985 scored just 0.41 on the HSI due to the high densities of fish. It may be that the fish were introduced to the lake since the record was made as it now seems highly unlikely great crested newts are found in this area.

Other Amphibian Species

1.3.3 The results of the survey suggest that a small population of smooth newts and an unknown population of marsh frogs are found on the Swanscombe peninsula, mainly concentrated around Swanscombe Marshes.

2.0 METHODOLOGY

2.1 Background

2.1.1 There are six native species of amphibian in the UK of which five, common frog *Rana temporaria*, common toad *Bufo bufo*, smooth newt *Lissotriton vulgaris*, palmate newt *Lissotriton helveticus*, and great crested newt could be expected to occur within the proposed development area. The sixth, natterjack toad *Bufo calamita*, is very restricted in its distribution and does not occur within or near to the proposed development area.

2.2 Great Crested Newt Ecology

2.2.1 The great crested newt is the largest of the three British native newt species, reaching a maximum length of 14.5cm for males and 16cm for females. Great crested newts spend much of the year on land where they need a variety of different conditions to provide food, shelter and places to spend the winter. Like all amphibians, great crested newts rely on water for breeding and for the development of the larval stage and so return to ponds in the spring to breed. Eggs are laid singly on underwater leaves near the water margin between late February and early August, but usually between April and June, with each female laying several hundred eggs. The efts normally take three months to develop into young newts before leaving the water, but some may over-winter as efts. Juvenile newts disperse up to 1km, only returning to ponds to breed when sexually mature after one to three years. Adult newts leave the ponds from July onwards, generally staying within 200 – 500m of the ponds. From October or November, they hibernate in damp, frost-free environments, sometimes underground.

2.2.2 On land, great crested newts are found in cool, moist conditions under debris or in dense vegetation. They feed on both land and in water, eating small aquatic animals such as water fleas and insect larvae and terrestrial invertebrates, especially worms.

2.2.3 Despite the decline of this species in recent years, the great crested newt is still quite widespread in Great Britain and is numerous locally in parts of lowland England. Studies in the 1980's indicated a national rate of colony loss of approximately 2% over five years. The decline can be put down to loss of suitable breeding ponds caused by water table reduction, in-filling for development, changing farming practices, waste disposal, neglect or fish stocking and the degradation, loss and fragmentation of terrestrial habitats. The British population remains, however, among the largest in Europe and Britain therefore has an international responsibility for the species.

2.3 Legislation

2.3.1 All British amphibian species receive legal conservation protection in the United Kingdom, though the degree to which different species are protected varies.

2.3.2 The Wildlife and Countryside Act 1981 (WCA) (as amended) transposes into UK law the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The 1981 Act was recently amended by the Countryside and Rights of Way (CRoW) Act 2000. The great crested newt is considered 'fully protected' as it is listed under Schedule 5 of the 1981 Act, and is therefore subject to the provisions of Section 9, which makes it an offence to:

- Intentionally kill, injure or take a great crested newt [Section 9(1)];
- Possess or control any live or dead specimen or anything derived from a great crested newt [Section 9(2)];
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt [Section 9(4)(a)];
- Intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for that purpose [Section 9(4)(b)];
- Sell, offer for sale, possess or transport for the purpose of sale or publish advertisements to buy or sell a great crested newt [section 9(5)].

2.3.3 The other more common amphibian species are protected against sale (Section 9(5)) only. In all cases, the legislation applies to all life stages including, eggs, efts (the larval stage), juveniles and adults.

2.3.4 The great crested newt is a UK Biodiversity Action Plan priority species and is considered sufficiently threatened in Europe to be included in the Habitats Directive and the Conservation of Habitats and Species Regulations 2010 (the 'Habitats Regulations'). The Habitats Regulations transpose into UK law Council Directive 92/43/EEC of the 21st May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats (and Species) Directive). The great crested newt is listed on Annex II and Annex IV (European protected species). Annex II relates to the designations of special areas of conservation (SACs) for this species (underlining their conservation significance even where they occur outside SACs). Annex IV requires member states to construct a system of protection as outlined in Article 12, this is done through inclusion on Schedule 2 of the Regulations. Regulation 39 makes it an offence to:

- Deliberately capture or kill a great crested newt [Regulation 39(1)(a)].
- Deliberately disturb a great crested newt [Regulation 39(1)(b)].
- Deliberately take or destroy the eggs of a great crested newt [regulation (1)(c].
- Damage or destroy a breeding site or resting place of a great crested newt [Regulation 39(1)(d)].

2.4 Scope of Survey

2.4.1 The requirement to undertake an amphibian survey results from the protected status of the great crested newt and its possible presence within the development area, identified during the desk-top study and Phase 1 habitat survey carried out in April-May 2012. The main body of the proposed development area (north of the A226) supports a large network of ditches and 8 lakes/ponds. In addition there are two large lakes in former quarries located south of the A226. The water bodies north of the A226 are linked by a mosaic of terrestrial habitats of varying quality for supporting amphibians, whilst the lakes south of the A226 appear to be isolated.

2.4.2 The results of the desk-top study, showing the locations of amphibian records in and around Swanscombe are displayed in **Figure 1.** Only species records provided by Kent and Medway Biological Records Centre (KMBRC) with an accurate grid reference of at least 6 figures (100m square) are displayed. This left just relatively few amphibian records in the Swanscombe area, with a distinct lack of records on the peninsula north of the A226.

2.4.3 The results of the Phase 1 habitat survey suggest that overall there is a large amount of suitable habitat for amphibians on the peninsula which is mainly comprised of rough grassland and scrub, and with small areas of broadleaved woodland. Most of this habitat is continuous and links to a number of ditches and ponds. South of the A226 the largest continuous blocks of suitable habitat are present in Bamber pit and surrounding locations in Ebbsfleet valley where areas of rough grassland, scrub and woodland are present.

2.5 Survey Methodology

2.5.1 Within the main body of the proposed development area (north of the A226) the following water bodies were surveyed for amphibians:

- the network of drainage ditches on Swanscombe Marshes (D2-D5, D7 & D9)
- the drainage ditches to the east and west of the Channel Tunnel Rail Link (HS1) and old sewage works (D10-D12)
- the pond situated north-west of the old sewage works (P3)
- the pond situated north-east of the old sewage works (P4)
- the ponds south of the HS1 (P5)

2.5.2 The remaining water bodies were deemed unsuitable for great crested newts (mainly due to being choked with reed), too dangerous to access or permission had not been given to access the land on which they are situated. The locations of all the water bodies surveyed are set out in **Figure 2** and descriptions of each are provided below.

2.5.3 Surveys were conducted on 4 separate occasions from 30th April to 15th June 2012 between the hours of 20:30 and 23:30. Torchlight surveys and egg searches were the principal survey techniques used. Bottle trapping was not used as a technique due to the difficulty of accessing steep sided ditches, containing in excess of 1m depth water and deep deposits of silt. On each night of survey the water bodies were given a vegetation and turbidity score between 0 and 5. A vegetation score of 0 indicating a water body clear of vegetation and 5 completely choked. A turbidity score of 0 indicating a clear water body and 5 extremely murky.

2.5.4 The surveys were carried out in suitable weather conditions, according to guidance provided by the Herpetofauna Groups of Britain and Ireland (HGBI)[1] and Froglife[2]. Torching was undertaken shortly after dusk on still, warm evenings above 5ºC with the aid of a 1 million candle power torch. Full details of the weather conditions during the surveys are given in **Table 2.**

2.5.5 The surveys were specifically aimed at detecting great crested newts in their various life stages, but also included surveys for other amphibians and incidental fish records, particularly as fish can have a determining influence on the presence of great crested newts.

2.5.6 Smooth and palmate newts can be difficult to distinguish in the field using torchlight searches so where the species was uncertain the record was made as smooth/palmate newt.

2.6 Evaluation Methodology

2.6.1 In order to assess the importance of the ponds in relation to their amphibian assemblages the population size class assessment set out in Section 5.8.3 of the English Nature guidelines[3] was used. The purpose for using this assessment is to recognise the inherent difficulty and range of factors that can affect the determination of the size of a given population. As EN's guidelines state "… surveys may reveal from around 2% to 30% of the population … recent evidence has revealed even greater variation". EN therefore recommends the use of the following size classifications as a minimum for interpreting survey results. The size classifications are set out in **Table 1** below.

Table 1 Great Crested Newt Population Size Class Assessment

Species	Low/Small Population	Good/Medium Population	Exceptional/Large
Great crested newt	<10	11-100	>100

[1] HGBI (1998) *Evaluating Local Mitigation/Translocation Programmes: Maintaining Best Practice and Lawful Standards*. HGBI Advisory Notes (ARGs). HGBI, c/o Froglife, Halesworth, Unpubl.
[2] Froglife (2003) *Advice Sheet 11 – Surveying for (Great Crested) Newt Conservation*. Froglife, Halesworth.
[3] English Nature (2001) *Great Crested Newt Mitigation Guidelines*.

2.6.2 The results of the surveys can be further supported using data relating to the quality of the pond and surrounding terrestrial habitat. This is known as the Habitat Suitability Index (HSI), or Oldham Criteria, after the paper's author (Oldham *et al*, 2000[4]). This methodology enables the ponds to be evaluated for their suitability for great crested newts, against a set of defined criteria. The calculation produces a figure in the range 0 – 1, where the closer the figure tends towards 1, the better the quality of habitat.

[4] Oldham, R. S., Keeble, J., Swan, M. J. S. and Jefcote, M. (2000). *Evaluating the suitability of habitat for the great crested newt (Triturus cristatus)*. Herpetological Journal **10** pp143-155.

3.0 RESULTS

3.1 Water Body Descriptions

Ditch Descriptions

3.1.1 The ditches surveyed have been labelled D (Ditch) 1 to D16 respectively and are shown in **Figure 2**.

3.1.2 **D1:** This is a short section of ditch in the south-west corner of the survey area. It has approximately 100m long and 5m wide with very steep sides and shallow water that drains into a culvert. It is mainly shaded by scrub and has hard standing on the banks.

3.1.3 **D2:** This ditch is sandwiched between the edge of Swanscombe Marshes and an area of rough grassland with scattered scrub. The ditch itself is approximately 200m long and 5m wide with open water in the channel to a depth of 0.5m. The west margin is fringed by common reed and to the east there is bracken *Pteridium aquilinum* and bramble *Rubus fruticosus* scrub.

3.1.4 **D3:** This ditch runs along the northern boundary of some broadleaved woodland in the south-west corner of the survey area. It is approximately 500m long, 6m wide and 0.5m deep. The southern margin is overhung by trees leaving the water quite shaded and the eastern boundary is heavily scrubbed with bramble along much of its length. To the north of the ditch is Swanscombe Marshes.

3.1.5 **D4-D7:** These ditches dividing Swanscombe Marshes are all quite similar in character. Typically they are 6m wide with common reed *Phragmites australis* dominating the bank and channel vegetation. There is little other vegetation besides the occasional patches of reedmace *Typha latifolia*. Water depth in the channels is variable but in most there are quite large areas of open water. The approximate lengths of the ditches are as follows:

- D4 – 650m
- D5 – 300m
- D6 – 200m
- D7 – 150m

3.1.6 **D8-D9:** These ditches are situated at the east of Swanscombe Marshes and are mostly inaccessible as they are surrounded by dense scrub. D8 is approximately 250m long and D9 500m. Both look to be approximately 6m wide with open water up to 1m deep.

3.1.7 **D10:** This ditch runs along the eastern boundary of a landfill and is bordered on the west by dense hawthorn *Crataegus monogyna* and willow *Salix spp.* scrub that grades into a narrow woodland belt. On the eastern boundary there is a fringe of common reed and some emergent reedmace. It is steep-sided, approximately 500m long, 5m wide and with standing water in the channel at variable depth. Moving south to north the water drops from around 0.5m to a negligible depth where vegetation chokes the channel. Numerous fish were observed in the ditch, possibly sticklebacks.

3.1.8 **D11:** This ditch runs opposite to D10 bordering P5, the old sewage works and another landfill. It is approximately 750m long and 5m wide with varying water depth along its length. In three locations it opens up into small pools of water approximately 0.5m deep but along most of its length the channel is quite heavily vegetated with common reed and reedmace and there are no areas of open water. In the pools numerous fish were observed, again possibly sticklebacks. At the north end there is a section of ditch that looks to have recently been dredged, allowing shallow water to flow into a culvert.

3.1.9 **D12:** This ditch runs along the northern margin of a landfill and to the east of a large area of swamp. It is approximately 900m long, 5m wide and has very shallow (5cm) or no standing water along much of its length. The channel has become totally choked with common reed and it looks soon to dry up completely.

3.1.10 **D13:** This is a French drain that runs along the southern boundary of a planted shelterbelt and then appears to feed P4. It is approximately 1000m long, 2m wide and up to 1m deep. For much of its length a gravel bottom can be seen.

3.1.11 **D14:** This is a dry ditch bordering the southern margin of a large area of ephemeral/short perennial vegetation central to the survey area. It is approximately 200m long, 1m wide and 0.5m deep. It does not appear to ever collect water.

3.1.12 **D15:** This ditch is a part of the River Ebbsfleet that opens up next to the A226 at the southern end of the survey area. It is approximately 150m long, 5m wide and has standing water around 0.5m deep. The ditch is mainly surrounded by dense scrub and an area of swamp to the east and the main road borders the western side. In terms of the wider landscape the ditch is in a highly fragmented habitat with a large lake (P9), main roads and urban development all in close proximity.

3.1.13 **D16:** This ditch runs parallel to D16 and is very similar in character. It is approximately 400m long, 3m wide and up to 1m deep. There is little or no standing water along much of its length, the channel is choked with common reed and it looks soon to dry up completely. In terms of

the wider landscape this ditch borders the western margin of Botany Marshes, a large area of cattle-grazed grassland.

Lake/Pond Descriptions

3.1.14 The lakes and ponds surveyed have been labelled P (Pond) 1 to P10 respectively and are shown in **Figure 2**.

3.1.15 **P1:** This lake is situated immediately north of the A226 in the south-west corner of the survey area that has developed in an old quarry. It is approximately 9500m^2 in size with a perimeter of around 450m and unknown depth. It is surrounded by very steep sides covered by woodland and dense willow scrub and was deemed inaccessible and dangerous to survey. There is little apparent aquatic vegetation except for the occasional clumps of hard rush *Juncus inflexus*. Waterfowl were observed using this lake during the Phase 1 habitat surveys carried out by CBA. In terms of the wider landscape the lake is bordered by rough grassland and woodland to the north and east, a main road to the south and urban development to the west.

3.1.16 **P2:** This pond is situated at the bottom of a very steep sided valley in the north-west corner of the survey area. It is too dangerous to access but appears to be approximately 700m^2 in size with a perimeter of around 100m. Woodland and scrub line the banks and there is a lot of rubbish strewn down the sides and in the water at the bottom. Much of the pond looked to be shaded by the trees. In terms of the wider landscape there are large areas of woodland, rough grassland and scrub to the east and urban development to the west.

3.1.17 **P3:** This lake is situated between two former landfills at the north end of the survey area. It is roughly rectangular in shape, 7500m^2 in size and has a 425m perimeter. Most of this perimeter is fringed by common reed and there is a strip of broadleaved woodland on the western banks. There is little to no aquatic vegetation visible and the water was discoloured red/brown, possibly contaminated by landfill leachate. Waterfowl have been observed using this water body. In terms of the wider landscape it is surrounded by extensive areas of rough grassland, scrub, ditches and woodland.

3.1.18 **P4:** This pond is situated to the north-west of Botany Marshes and looks like it was recently created or modified. It is quite uniformly rectangular, approximately 900m^2 in size with a 125m perimeter. The banks are steep with bare soil and the water quality looks very poor. It is red/brown in colour, possibly contaminated with landfill leachate and there is little/no aquatic vegetation or invertebrates to be seen. In terms of the wider landscape this pond is surrounded by extensive areas of rough grassland, scrub and ditches.

3.1.19 **P5:** This is a series of shallow ponds situated immediately south of the HS1. They are rapidly becoming vegetated over by common reed and reedmace and the open water remaining probably exceeds no more than 2000m^2 in extent. The average depth of water in the pools is no more than 0.1m. The ponds grade into marshy grassland to the south with hard rush, creeping bent *Agrostis stolonifera* and great willowherb *Epilobium hirsutum*. Waterfowl and small fish, possibly sticklebacks, have been observed using these water bodies. In terms of the wider landscape the ponds are surrounded by large areas of ephemeral/short perennial vegetation, scrub, ditches and rough grassland. The HS1 presents a potential barrier to the north.

3.1.20 **P6:** This lake is situated between the HS1 and old sewage works. It appears to be man-made and covers a large area approximately 14000m^2 in size with a 950m perimeter. The extent of open water looks to be much less than this as the lake is surrounded by a very large swamp and common reed is encroaching. Several species of waterfowl have been observed on the lake including tufted duck *Aythya fuligula* and mute swan *Cygnus olor*. In terms of the wider landscape this lake is mainly surrounded by swamp, the cattle-grazed fields of Botany Marshes are to the east and the HS1 is situated to the south.

3.1.21 **P7:** This pond is situated just north of the A226 within an industrial estate. It is roughly circular in shape, 7000m^2 in size and has a 300m perimeter. The surrounding banks looked to have been recently disturbed and were characterised by ruderal vegetation. Waterfowl were observed using this pond during the Phase 1 habitat survey. In terms of the wider landscape only the northern boundary of the pond features suitable terrestrial habitat for amphibians where large areas of rough grassland and scrub can be found.

3.1.22 **P8:** This lake is situated at the base of a large former quarry pit just south of the A226. It is approximately 5000m^2 in size with a 350m perimeter and unknown depth. The steep sides are covered with dense scrub and mature trees. Large fish, possibly carp, were observed in the water. The quarry within which the lake is situated is approximately 11ha and comprises a complex mosaic of short and tall grassland, scrub, and birch woodland.

3.1.23 **P9:** This very large lake fills the bottom of an old quarry pit east of the A226 in the south-east corner of the survey area. It is over 100,000m^2 in size with a perimeter of approximately 1500m. It is surrounded by very steep chalk escarpments with dense scrub and in terms of the wider landscape it is mostly enclosed by main roads, the HS1 and urban development.

3.1.24 **P10:** This is a small, shallow pool of water that extends from the ditches on Botany Marshes. It is no more than 750m^2 in size with a 150m perimeter and is heavily vegetated with reed. The water is likely to dry up during seasons with little rainfall. There is little to no aquatic

vegetation visible and the water was discoloured red/brown, possibly contaminated by landfill leachate. In terms of the wider landscape the pond is surrounded by large areas of rough grassland.

3.2 Survey Results

3.2.1 Weather conditions during the survey are summarised in **Table 2**. Every evening was dry and warm with a varying degree of cloud cover.

3.2.2 The full results of the survey are given in **Tables 3-6** and shown in **Figure 3**. Just two amphibian species were confirmed as being present on the Swanscombe Peninsula, smooth newt and marsh frog *Pelophylax ridibundus* a non-native species introduced to Kent in 1935. The marsh frog was not seen during the survey but its characteristic laughing calls were heard on the 17th and 25th May towards the north end of Swanscombe Marshes.

3.2.3 Smooth newts were recorded in D3, D4 and P5. 19 animals were recorded in total over the survey period with the peak count occurring on 17th May when 10 animals were recorded in D3 and 1 in D4.

3.2.4 In addition 6 adult newts and 2 efts only identifiable as smooth or palmate were recorded in D3, D4 and P5. Palmate and smooth newt larvae are indistinguishable in the field and adult females can only be distinguished by the degree of spotting on the throat, therefore need to be caught to be identified.

3.2.5 A tadpole was recorded in D4 on 30th April, likely to be that of the marsh frog as no other frog species was recorded during the survey. Fish were recorded in D4, D10, D11 and P5. These were mainly small, stickleback-like species.

3.2.6 A condition assessment of the water bodies is given in **Table 7.** The degree of vegetation cover and turbidity varied between water bodies and survey nights but most of the scores were low.

Table 2 Weather Conditions

Date	Cloud (%)	Rain	Start Time / Temperature (ºC)	End Time / Temperature (ºC)
30/04/12	50	0	20-45hrs / 15	23-40hrs / 14
17/05/12	70	0	20-55hrs / 18	23-50hrs / 17
25/05/12	100	0	21-10hrs / 15	23-40hrs / 15
15/06/12	80	0	21-20hrs / 14	23-30hrs / 13

Table 3 Survey Results – 30/04/12

Species	Ditch/Pond							
	D2	D4	D7	D10	D11	D12	P3	P4
Great crested newt	-	-	-	-	-	-	-	-
Smooth newt	-	1	-	-	-	-	-	-
Palmate newt	-	-	-	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-	-	-	-
Common frog	-	-	-	-	-	-	-	-
Common toad	-	-	-	-	-	-	-	-
Tadpole	-	1	-	-	-	-	-	-
Fish	-	-	-	Y	Y	-	-	-

Table 4 Survey Results – 17/05/12

Species	Ditch/Pond							
	D2	D3	D4	D7	D10	D11	P3	P5
Great crested newt	-	-	-	-	-	-	-	-
Smooth newt	-	10	1	-	-	-	-	-
Palmate newt	-	-	-	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-	-	-	1
Common frog	-	-	-	-	-	-	-	-
Common toad	-	-	-	-	-	-	-	-
Tadpole	-	-	-	-	-	-	-	-
Fish	-	-	-	-	Y	Y	-	Y

Table 5 Survey Results – 25/05/12

Species	Ditch/Pond				
	D3	D4	D10	D11	P5
Great crested newt	-	-	-	-	-
Smooth newt	-	-	-	-	1
Palmate newt	-	-	-	-	-
Smooth/palmate newt	4	1	-	-	-
Common frog	-	-	-	-	-
Common toad	-	-	-	-	-
Tadpole	-	-	-	-	-
Fish	-	-	Y	Y	Y

Table 6 Survey Results – 15/06/12

Species	Ditch/Pond				
	D3	D4	D5	D7	D9
Great crested newt	-	-	-	-	-
Smooth newt	6	-	-	-	-
Palmate newt	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-
Smooth/palmate newt eft	2	-	-	-	-
Common frog	-	-	-	-	-
Common toad	-	-	-	-	-
Tadpole	-	-	-	-	-
Fish	-	Y	-	-	-

Table 7 Water Body Condition Assessment

Water Body	Date	Turbidity Score	Vegetation Score
D2	30/04/12	0	1
	17/05/12	0	2
D3	17/05/12	1	1
	25/05/12	2	2
	15/06/12	0-1	1-2
D4	30/04/12	0	1
	17/05/12	1	2
	25/05/12	1	1
	15/06/12	0	1-2
D5	15/06/12	0	3
D7	30/04/12	0	1
	17/05/12	0	2
	15/06/12	0	2
D9	15/06/12	0	2
D10	30/04/12	3	1
	17/05/12	4	1
	25/05/12	4	2
D11	30/04/12	1-4	1-4
	17/05/12	1-4	1-4
	25/05/12	1-4	1-4
D12	30/04/12	1	3-4
P3	30/04/12	3	0
	17/05/12	3	1
P4	30/04/12	2	0
P5	17/05/12	0	1
	25/05/12	0-3	0-3

3.3 Habitat Suitability Index Scores

3.3.1 Habitat Suitability Index (HSI) scores were calculated for all the water bodies to aid evaluation of the ponds/ditches and their surrounding habitats for their suitability for great crested newts.

3.3.2 As shown in **Tables 8** and **9**, most of the water bodies on scored quite highly and the average score was 0.71 (a perfect great crested newt habitat would score 1). The reason for such high scores across the board is due to the large numbers of ditches and ponds within 1km of each other and large areas of suitable terrestrial habitat within a 500m radius.

3.3.3 Low scores were mainly influenced by poor water quality and high densities of fish, which meant that on average the ponds scored slightly lower than the ditches.

Table 8 HSI Scores for Ponds

Pond	1	2	3	4	5	6	7	8	9	10
Score	0.79	0.78	0.54	0.55	0.67	0.79	0.87	0.41	0.47	0.55

Table 9 HSI Scores for Ditches

Ditch	1	2	3	4	5	6	7	8	9	10	11	12	15	16
Score	0.81	0.86	0.86	0.74	0.85	0.86	0.87	0.79	0.79	0.81	0.55	0.57	0.77	0.58

4.0 EVALUATION

4.1 Great Crested Newts

4.1.1 The results of the amphibian survey suggest that great crested newts are not present in any of the surveyed water bodies on the Swanscombe peninsula north of the A226. No signs of this species were recorded during the survey in 2012 and the desk-top study revealed no historical records either. The HSI scores suggest that most of the water bodies on the peninsula are highly suitable habitats so it may be that the A226 as a busy main road has proved to be an effective barrier preventing colonisation of this area.

4.1.2 Further survey work may be required to establish whether or not great crested newts are present elsewhere within the proposed development area, but for which access has not yet been possible. The lake in Bamber pit where great crested newts were recorded in 1985 scored just 0.41 on the HSI due to the high densities of fish. It may be that the fish were introduced to the lake since the record was made as it now seems highly unlikely great crested newts are found in this area.

4.2 Other Amphibian Species

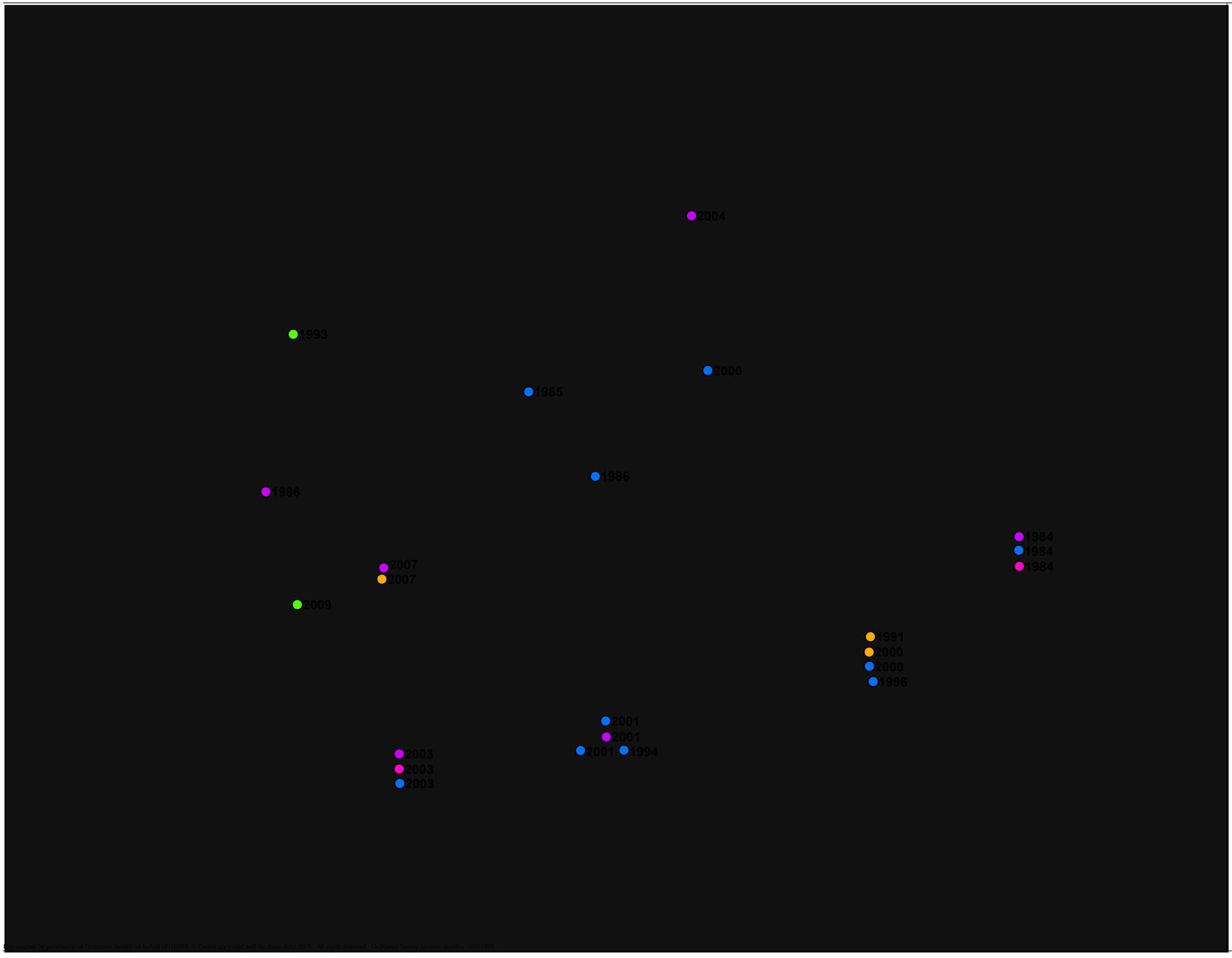
4.2.1 The results of the survey suggest that a small population of smooth newts and an unknown population of marsh frogs are found on the Swanscombe peninsula, mainly concentrated around Swanscombe Marshes.

5.0 CONCLUSIONS

5.1.1 Overall, it is concluded that great crested newts are not present in the surveyed water bodies on the Swanscombe Peninsula north of the A226. Further survey work may be required to establish whether or not they are present elsewhere within the proposed development area, for which access will be required.

5.1.2 A small population of smooth newts and an unknown population of marsh frogs (an invasive species) are the only amphibians currently found on the Swanscombe peninsula, mainly concentrated around Swanscombe Marshes.

FIGURES



KEY

Species

- Great crested newt
- Smooth newt
- Palmate newt
- Common toad
- Common frog

2000 Date of record

It should be noted that species locations are approximate - based on at least 6 figure grid references with an accuracy of 100m

0 200 400 m

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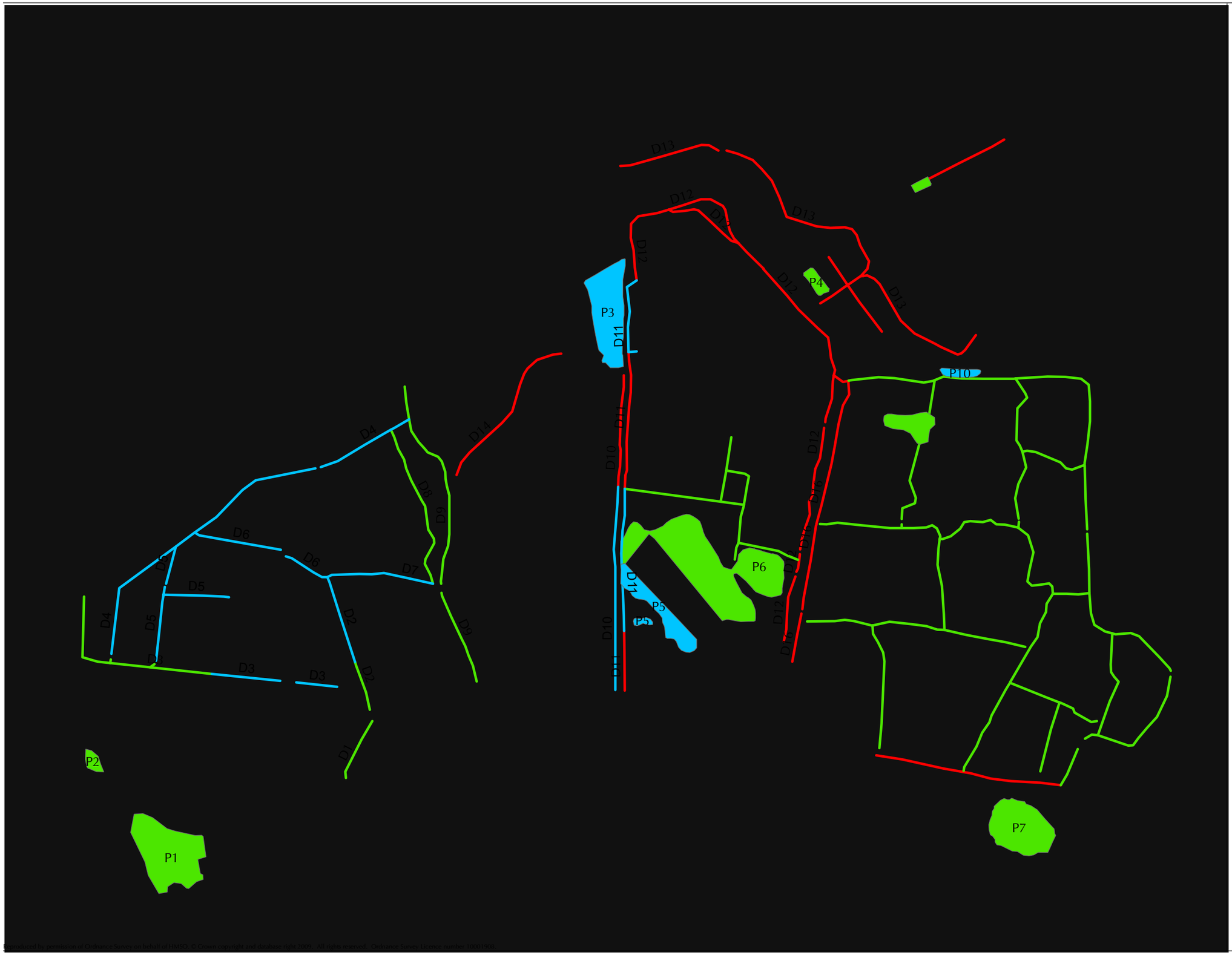
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environment landscape planning

JUNE 2012

LONDON PARAMOUNT
Amphibian Survey Report

N

FIGURE 1
Amphibian Records
(based on desk-top study data provided by KMBRC)



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environment landscape planning

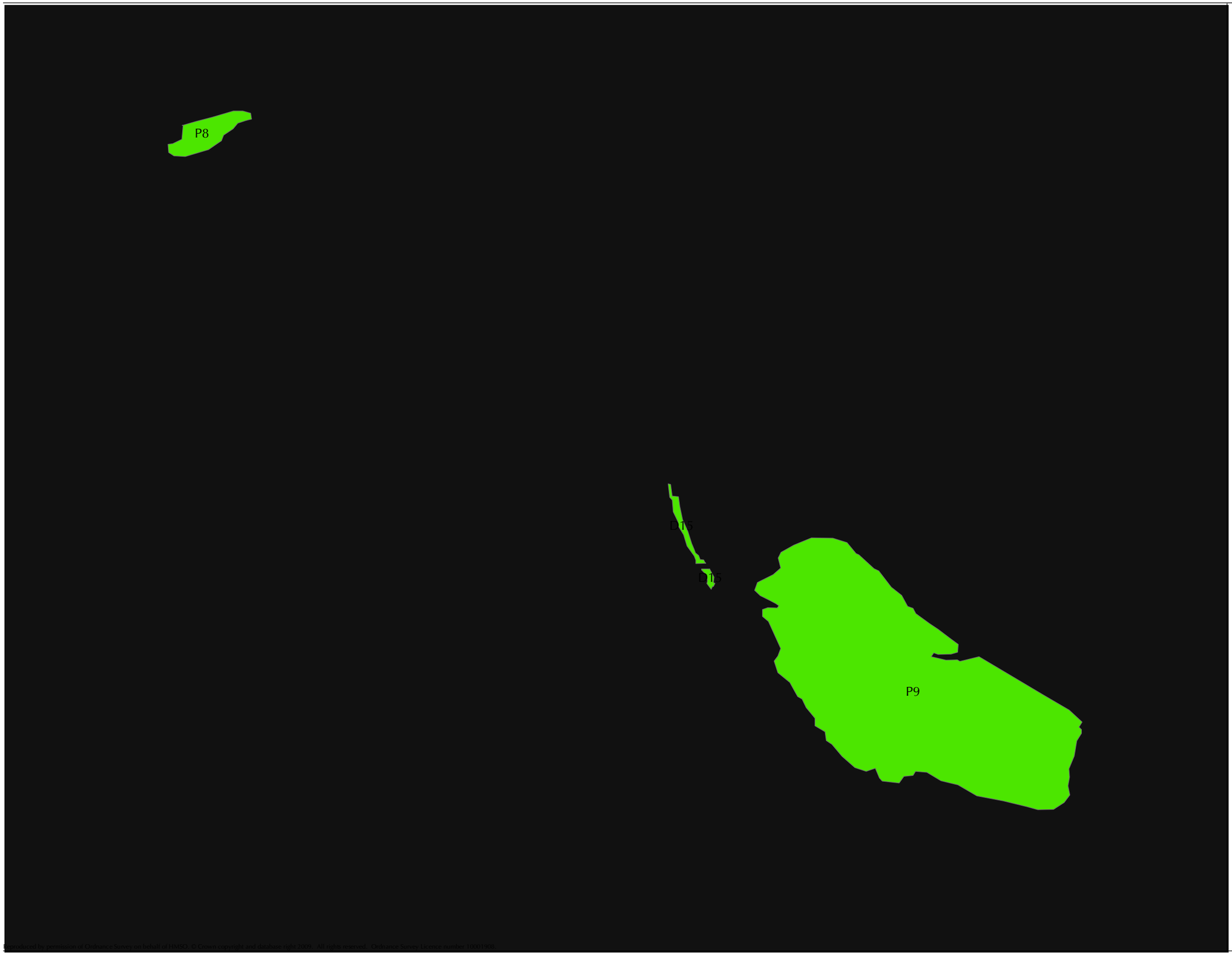
JUNE 2012

LONDON PARAMOUNT
Amphibian Survey Report

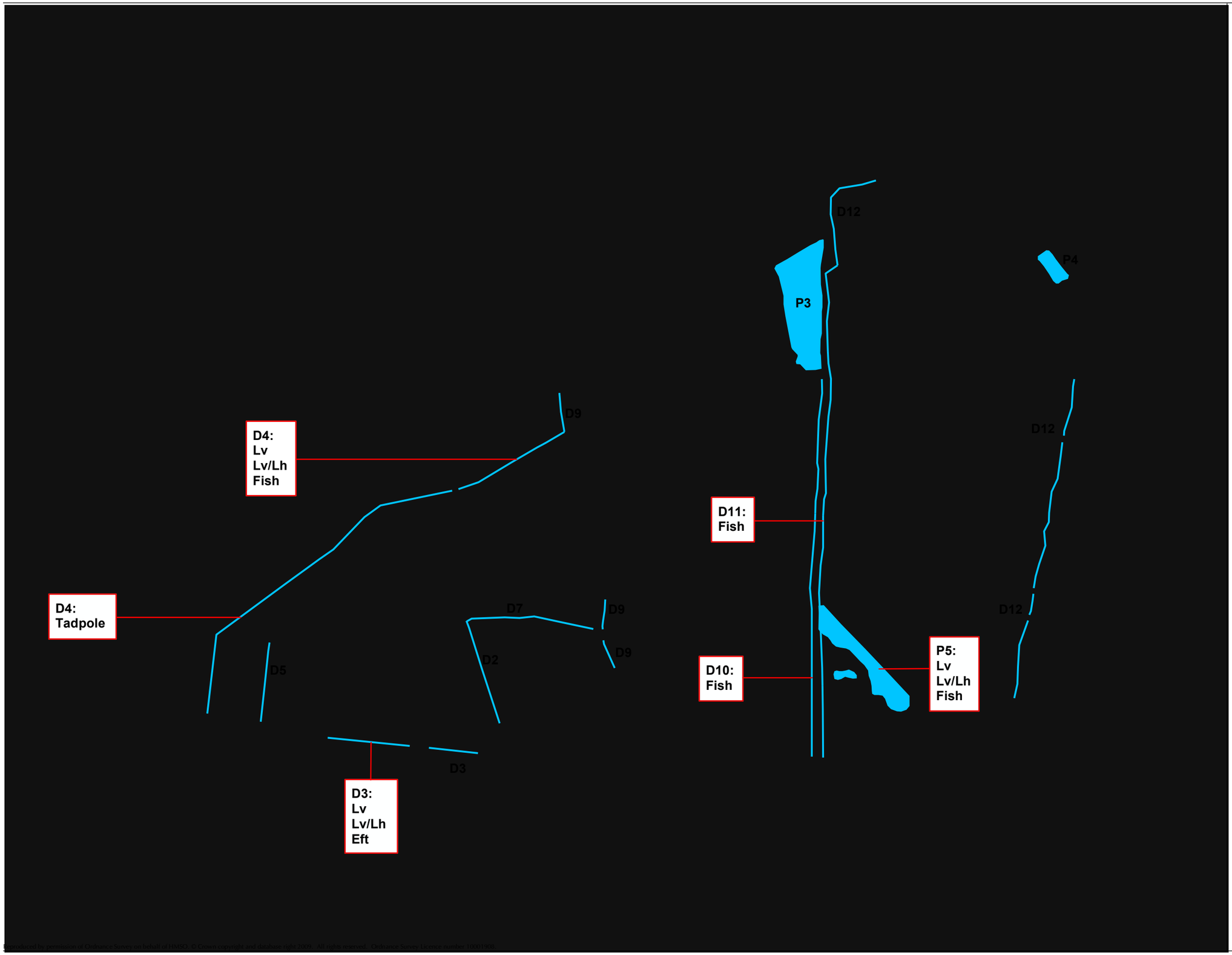
N

FIGURE 2a

Location and Status of Water Bodies on Site



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APPENDICES

APPENDIX A
Site Photographs



Figure A1 Lake with surrounding willow scrub and steep-sided woodland covered banks (P1)



Figure A2 Lake fringed with common reed. The water is discoloured red/brown in places- possibly due to leachate pollution (P3)



Figure A3 Pond with steep-sided bare soil banks. The water is discoloured red/brown- possibly due to leachate contamination (P4)



Figure A4 Shallow ponds surrounded by marshy grassland (P5)



Figure A5 Lake surrounded with swamp dominated by common reed (P6)



Figure A6 A typical ditch on Swanscombe marshes – 5m wide channel dominated by common reed on the banks and occasional bulrush (D7)



Figure A7 A ditch choked with common reed (D16)



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Appendix 2: Habitat Suitability Index assessment and scores

Waterbody	1 Geo location	2 Size	3 Permanence	4 Wtr qual	5 Shade	6 Wtrfowl	7 Fish	8 Pond count within 1km	9 Terr habitat	10 Macrophytes	Product	HSI score
① Bamber Pit Pond	1		0.9	0.67	0.8	0.67	0.01	0.1	1	0.3	0.0001	0.40
	SE England - area A	n/a >2000m2	Never dries	Mod invert diversity	Approx 70%	Few birds	High fish density	No ponds within Ikm without major barriers present - major roads or rail lines. Ponds may be present in Swanscombe to west but none idd	Good	Almost no macrophytes		
② Black Duck Marsh Ditch N	1		0.9	1	1	0.67	0.33	0.9	1	0.6	0.1075	0.80
	SE England - area A	n/a >2000m2	Never dries	High invert diversity	Little	Few birds	Small numbers of stickleback	2.5/km2	Good	Approx 30%		
③ Black Duck Marsh Ditch E (N)	1		0.9	1	0.6	0.67	0.33	0.93	1	0.4	0.0444	0.73
	SE England - area A	n/a >2000m2	Never dries	High invert diversity	Approx 80%	Few birds	Small numbers of stickleback	2.9/km2	Good	Approx 10%		
④ Black Duck Marsh Ditch E (S)	1		0.9	1	1	0.67	0.33	0.93	1	0.6	0.1110	0.80
	SE England - area A	n/a >2000m2	Never dries	High invert diversity	<60%	Few birds	Small numbers of stickleback	2.9/km2	Good	Approx 30%		
⑤ Swanscombe Centre - ditches	1		0.9	0.67	1	1	0.33	0.95	1	1	0.1890	0.85
	SE England - area A	n/a >2000m2	Never dries	Mod invert diversity	<60%	No effect	Small numbers of stickleback	3.2/km2	Good	70-80% overall		
⑤ Swanscombe Centre - lagoon	1		0.9	0.67	1	1	0.33	0.95	1	0.4	0.0756	0.77
	SE England - area A	n/a >2000m2	Never dries	Mod invert diversity	Little	No effect	Small numbers of stickleback	3.2/km2	Good	Approx 10%		
⑥ CTRL Wetland N (N)	1	0.92	0.9	1	1	1	1	0.95	1	0.7	0.5985	0.95
	SE England - area A	Approx 1,200m2	Never dries	High invert diversity	Little	No effect	Absent	3.2/km2	Good	Approx 40%		
⑥ CTRL Wetland N (S)	1		0.9	1	1	0.67	1	0.95	1	0.9	0.5156	0.94
	SE England - area A	n/a >2000m2	Never dries	High invert diversity	Little	Few birds	Absent	3.2/km2	Good	Approx 60%		
⑦ CTRL Wetland S	1	0.8	1	1	1	1	1	0.95	1	0.6	0.5700	0.95
	SE England - area A	Approx 400m2	Rarely dries	High invert diversity	Little	No effect	Absent	3.2/km2	Good	Approx 30%		
⑧ CTRL Wetland/Botany Marsh Ditches	1		1	0.67	1	1	0.33	0.95	1	0.8	0.1680	0.84
	SE England - area A	n/a >2000m2	Rarely dries	Mod invert diversity	Little	No effect	Small numbers of stickleback	3.2/km2	Good	Approx 80%		
⑨ Botany Marshes Ditch N	1		0.9	0.67	1	0.67	0.33	0.93	1	0.4	0.0496	0.74
	SE England - area A	n/a part of larger ditch >2000m2	Never dries	Mod invert diversity	Little	Few birds	Small numbers of stickleback	2.9/km2	Good	Approx 10%		
⑩ Botany Marshes Pond	1		0.9	1	1	1	1	0.9	1	0.35	0.2835	0.88
	SE England - area A		Never dries	High invert diversity	Little	No effect	Absent	2.5/km2	Good	Approx 5%		
⑳ Balancing Pond	1	0.85	0.9	1	1	0.67	0.67	0.1	1	0.5	0.0202	0.68
	SE England - area A	Approx 1,700m2	Never dries	High invert diversity	Little	Few birds	No fish known but possibly present	No ponds within Ikm without major barriers present - major roads, rail lines, Ebbsfleet etc.	Good	Approx 20%		

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Sample/Report ID: 2015-1043
Client Identifier: Pond 4
Date of Receipt: 22/06/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	02/07/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1044
Client Identifier: top 6
Date of Receipt: 22/06/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1045
Client Identifier: top 7
Date of Receipt: 22/06/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	02/07/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1046
Client Identifier: Pond 10
Date of Receipt: 22/06/15

Condition on Receipt: Low Sediment
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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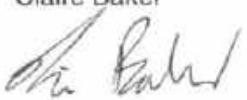
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Sample/Report ID: 2015-1047
Client Identifier: Pond 9
Date of Receipt: 22/06/15

Condition on Receipt: High Sediment
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Indeterminate	Real time PCR	26/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1048
Condition on Receipt: Low Sediment
Visual Inspection of Volume: Passed
Client Identifier: Pond 5
Description: 6x50mL - pond water samples in preservatives
Date of Receipt: 22/06/15
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1049 | Condition on Receipt: Low Sediment | Visual Inspection of Volume: Passed

Client Identifier: Pond 1 | Description: 6x50mL - pond water samples in preservatives

Date of Receipt: 22/06/15 | Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1050
Client Identifier: Pond 8
Date of Receipt: 22/06/15

Condition on Receipt: High Sediment
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Indeterminate	Real time PCR	29/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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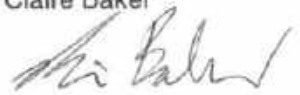
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Sample/Report ID: 2015-151
Client Identifier: Pond 2
Date of Receipt: 22/06/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1052
Client Identifier: Pond 3
Date of Receipt: 22/06/15

Condition on Receipt: Good
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	26/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:		Signed:	
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Appendix 1: qPCR GCN eDNA analysis results breakdown

q-PCR GCN eDNA analysis Results

Experimental Samples	Number of Positive Replicate Reactions*
Extraction Blank	0 of 12
Pond 4	0 of 12
Top 6	0 of 12
Top 7	0 of 12
Pond 10	0 of 12
Pond 9	0 of 12
Pond 5	0 of 12
Pond 1	0 of 12
Pond 8	0 of 12
Pond 2	0 of 12
Pond 3	0 of 12

Controls	Number of Positive Replicate Reactions*
Negative PCR Control (Nuclease Free Water)	0 of 4
Positive Control GCN DNA 10^{-1} ng/µL	4 of 4
Positive Control GCN DNA 10^{-2} ng/µL	4 of 4
Positive Control GCN DNA 10^{-3} ng/µL	4 of 4
Positive Control GCN DNA 10^{-4} ng/µL	4 of 4

Inhibition Control	Number of Positive Replicate Reactions at Expected C_t value†
Pond 4	2 of 2
Top 6	2 of 2
Top 7	2 of 2
Pond 10	2 of 2
Pond 9	0 of 2
Pond 5	2 of 2
Pond 1	2 of 2
Pond 8	0 of 2
Pond 2	2 of 2
Pond 3	2 of 2

Degradation Control

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Expected rate of decay	None expected within time frame
Pond 4	Within Limits
Top 6	Within Limits
Top 7	Within Limits
Pond 10	Within Limits
Pond 9	Evidence of decay or residual inhibition
Pond 5	Within Limits
Pond 1	Within Limits
Pond 8	Evidence of decay or residual inhibition
Pond 2	Within Limits
Pond 3	Within Limits

* A sample is considered as positive for great crested newt if any of the replicates are positive.
† If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

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Annex EDP 26
2015 & 2016 Reptile Survey Report (CBA August 2016)

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CHRIS BLANDFORD ASSOCIATES
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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 & 2016 Reptile Survey Report

DRAFT

August 2016

CHRIS BLANDFORD ASSOCIATES
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London Resort Company Holdings
(LRCH) Ltd.

London Paramount Entertainment Resort

2015 & 2016 Reptile Survey Report

Approved	
	Dominic Watkins
Position	Director
Date	19th August 2016
Revision	Draft

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1.0 INTRODUCTION

1.1 General

1.1.1 Chris Blandford Associates (CBA) has been appointed by London Resort Company Holdings Limited ('LRCH or 'the Applicant') to coordinate a programme of ecological surveys to inform the Environmental Impact Assessment and design of the London Paramount Entertainment Resort (LPER) project ('the Entertainment Resort' or the 'Proposed Development').

1.1.2 The reptile desk study and survey was undertaken by CBA. This report details the methodology, results and evaluation of the desk study and of the survey undertaken during April, May and June (spring/early summer) and September and October (autumn) 2015, and during April and May 2016.

1.2 Aims

1.2.1 The aims of the reptile survey were to,

- identify whether reptile species are present within the Proposed Development Area;
- evaluate any reptile populations and assemblages present within the Proposed Development Area in relation to their nature conservation importance.

1.3 Reptile Legislation

1.3.1 All British reptiles are afforded some degree of legal protection under Schedule 5 of the Wildlife and Countryside Act 1981 (W&CA (as amended) 1981) largely as a consequence of a national decline in numbers associated with habitat loss.

1.3.2 The degree to which different species are protected varies. Smooth snake *Coronella austriaca* and sand lizard *Lacerta agilis* are considered 'fully protected'. However, both of these species are restricted in their distribution and would not occur in this study area. The other, more common reptile species, slow-worm *Anguis fragilis*, common lizard *Lacerta vivipara*, adder *Vipera berus* and grass snake *Natrix natrix* are only protected under Part of Section 9(1) and all of Section 9(5), making it an offence to:

- Intentionally kill, injure or take [Section 9(1)];
- Sell, offer for sale, possess or transport for the purpose of sale or publish advertisements to buy or sell [Section 9(5)]

1.3.3 In all cases, the legislation applies to all life stages including eggs, juveniles and adults.

1.4 Listings

1.4.1 In response to the Convention on Biological Diversity (the Rio Summit) 1992, the UK introduced the UK Biodiversity Action Plan in 1994 (UK BAP). Initially, the sand lizard was the only reptile species with a specific UK BAP Species Action Plan. However, in 2007 the UK BAP was reviewed and several new species were added, including slow-worm, common lizard, smooth snake, adder, and grass snake. More recently the 'List of habitats and species important to biological conservation in England', prepared under Part 3, section 74 of the CRoW Act 2000, has been produced (Defra, 2000), and which largely mirrors the UK BAP list.

1.5 Survey Limitations

1.5.1 Due largely to access restrictions there was variation in the number of surveys carried out between different parts of the Proposed Development Area. For example some areas (e.g. the North East Tip, Sports Field/East Quarry and the northern part of Bamber Pit) were only surveyed during the autumn (Sept/Oct) survey period. **Figure 1** illustrates the location of survey areas identified in the report text and tables.

1.5.2 Variation in survey effort was addressed through further surveys being undertaken in the spring and early summer of 2016. **Table 1** identifies the date of surveys, the areas covered by each survey and the number of surveys per area, for both the 2015 spring/early summer and autumn survey periods, and the spring/early summer surveys conducted in 2016.

1.6 Key Findings

1.6.1 Three species of reptile, common lizard, slow worm and grass snake were recorded during the surveys, of which common lizard was the most widespread and abundant, being recorded in all survey areas and with an exceptional population on Swanscombe Peninsula.

1.6.2 Swanscombe Peninsula, Craylands Lane Pit/West Quarry, Bamber Pit and North of Springhead Nursery qualify as Key Reptile Sites and would be eligible for designation as Local Wildlife Sites based on their reptile populations/assemblages. They are therefore considered to be of County Importance for reptiles. All other areas are considered to be of Local Importance.

2.0 METHOD

2.1 Desk Study

2.1.1 The following Desk Study Data was considered.

Kent and Medway Biological Records Centre (KMBRC) - Desk-top study data, including records of reptile species, for the proposed Development Area and a 2km buffer, was obtained from in January 2015.
2003 Swanscombe Peninsula - reptile survey results dating from 2003 for a number of areas across Swanscombe Peninsula[1].
2010 Botany Marsh East - reptile survey results dating from 2010[2] were also obtained for Botany Marsh East from the landowner.

2.2 Field Survey Methodology

2.2.1 Areas with the potential to support reptiles were identified within the Proposed Development Area. These included habitats such as rough and tussocky grassland, tall ruderal ('weedy') vegetation, hedgerows, scrub and woodland edge, and features such as rubble and log piles and especially areas with combinations (mosaics) of these habitats, or transitions (ecotones) between them. It also included other. These habitats, or their combination, provide reptile species with, for example, suitable areas of cover, and for basking, foraging and dispersal.

2.2.2 The survey methodology was based on guidelines for reptile surveying provided by Froglife[3] and the Herpetofauna Workers' Manual[4], and involved placing heat traps in appropriate locations within the areas identified and described above as having the potential to support reptiles. The heat traps comprised heavy-duty mineral roofing felt (felts), half of which were approximately 0.5m x 0.5m and the other half of approximately 1m x 0.5m in size.

2.2.3 Froglife (1999) suggest placing a minimum of ten heat traps per hectare, and a total of 791 felts were placed in all accessible parts of the Proposed Development Area (Swanscombe Peninsula excluding the North East Tip, Manor Way, Craylands lane Pit/West Quarry, the southern part of Bamber Pit (Bamber South), Northfleet Landfill, and North of Springhead Nursery) in late March and early April 2015. A further 20 felts were placed in CTRL West in late April once access had been agreed.

[1] Halcrow Group Limited for Land Securities Development, 2004. Swanscombe Peninsula West: Reptile Survey Report, September 2003
[2] Entec UK Limited for Britannia Refined Metals, 2011. Northfleet Site Ecological Assessment: Ecological Baseline Report
[3] Froglife 1999. Advice Sheet 10 – Reptile Survey. An Introduction to planning, conducting and interpreting surveys for snake and lizard conservation.
[4] Gent, T and Gibson, S (eds) 1998. Herpetofauna Workers' Manual. JNCC, Peterborough

2.2.4 In addition, where present (Swanscombe Peninsula, Crayland's Lane Pit/West Quarry and Bamber South), old heat traps from previous reptile surveys were also utilised. These were generally relocated to suitable positions nearby and significantly increased the number and density of heat traps in these areas. A small number of sheets of corrugated tin (tins) were also used, mainly on the Swanscombe Peninsula. Survey areas and the location of felts within the Proposed Development Area are illustrated in **Figure 1**.

2.2.5 Due to the relatively continuous nature of the habitats present the Swanscombe Peninsula (Peninsula – Peninsula West, Peninsula Centre and Broadness) was, as far as possible, treated as a single survey area and covered by single surveys. Therefore, during the spring/early summer survey period the Proposed Development Area was divided between the Peninsula and the relatively more fragmented Non-Peninsula areas (Manor Way, Craylands lane Pit/West Quarry, Bamber South, Northfleet Landfill, CTRL West and North of Springhead Nursery - **Figure 1**). In some cases both Peninsula and Non-Peninsula were surveyed during single survey events (e.g. the morning or afternoon of a single day) but on other occasions they were subject to separate survey events, for example during the morning and afternoon of single days (e.g. Peninsula surveyed in the morning and Non-Peninsula in the afternoon and vice-versa). In total, the whole of the Peninsula was surveyed 14 times and Peninsula West and Centre combined were surveyed on an additional five and four occasions respectively. The Non-Peninsula was surveyed 14-18 times (**Table 1**).

2.2.6 During each survey in each area all heat traps (including old traps) and surrounding habitat and features were checked for the presence of reptiles, and any reptiles observed were identified and recorded.

2.2.7 A further 101 felts were placed in the areas that were not accessible for survey during the spring/early summer survey period, i.e. the North East Tip, Sport's Field/East Quarry and the northern part of Bamber Pit (Bamber North) during June and late August/early September. This made a total of 912 felts for the Proposed Development Area as a whole.

2.2.8 Surveys during the autumn survey period were carried out paying particular attention to those areas not surveyed during the spring/early summer survey period. However, they also included further surveys of areas covered during the spring/early summer period. The whole Peninsula (Peninsula West and Centre, North East Tip and Broadness) was surveyed on one occasion but the separate parts (especially Broadness) were surveyed a number of times (**Table 1**).

2.2.9 Prior to the commencement of the 2016 surveys a further five heat traps were added to the array in CTRL West, eight in Bamber Pit North, 30 within the Central Peninsula area and 27 on

Broadness, bringing the overall total to around 982 covering the whole of the Proposed Development Area.

2.2.10 Additionally, 23 heat traps situated along the western boundary of Broadness were relocated slightly further inland.

2.2.11 The number of felts placed in each survey area is listed below.

Peninsula		**Non-Peninsula**	
Peninsula West	169	Manor Way	10
Peninsula Centre	229	Crayland's lane Pit/West Quarry	45
Broadness	194	Sport's Field/East Quarry	43
North east Tip	47	Bamber North	19
		Bamber South	56
Total	**639**	Northfleet Landfill	64
		CTRL West	25
		North of Springhead Nursery	81

2.3 Evaluation Methodology

2.3.1 Guidelines for the selection of SSSIs[5] provide criteria for identifying nationally important populations and assemblages of reptiles. In addition, the methodology developed by Froglife[6] for the identification of Key Reptile Sites can be used to evaluate the importance of reptile populations / assemblages that do not meet these criteria. This is based on the maximum count of individuals obtained of each species during any single survey (summarised in **Table 2**). To qualify as a Key Reptile Site the site in question must meet at least one of the following criteria:

- support three or more reptile species;
- support two snake species;
- support an exceptional population of one species (see **Table 2**);
- supports an assemblage of species scoring at least four (see **Table 2**); or
- where it does not meet other criteria but population(s) present are of particular regional importance due to local rarity.

Guidance for the selection of Local Wildlife Sites in Kent[7] for reptiles is based on this methodology.

[5] JNCC 1989. Guidelines for selection of biological SSSI's. Peterborough
[6] Froglife 1999. Advice Sheet 10 – Reptile Survey. An Introduction to planning, conducting and interpreting surveys for snake and lizard conservation
[7] Kent Wildlife Trust on behalf of the Kent Nature Partnership, 2015. Local Wildlife Sites in Kent - Criteria for Selection and Delineation Version 1.5

Table 2 Population size class and scores used in the evaluation of reptile assemblages for the identification of Key Reptile Sites. Numbers refer to the maximum number of individual adults recorded during a single survey.

	Low Population ***Score 1***	**Good Population** ***Score 2***	**Exceptional Population** ***Score 3***
Adder	<5	5-10	>10
Grass snake	<5	5-10	>10
Slow worm	<5	5-20	>20
Common lizard	<5	5-20	>20

3.0 RESULTS

3.1 Desk Study

KMBRC

3.1.1 Desk study data received from KMBRC included records of common lizard, slow worm and grass snake from within and adjoining the proposed Development Area. Common lizards have been recorded from Swanscombe Peninsula and the Bamber Pit/Northfleet Landfill area. Slow worms have been recorded from a location near the western end of Craylands lane Pit/West Quarry, the Bamber Pit/Northfleet Landfill area and from within Swanscombe. Grass snakes have been recorded from the Swanscombe Peninsula, the Bamber Pit/Northfleet Landfill area and along the Ebbsfleet immediately east of the CTRL.

2003 Swanscombe Peninsula

3.1.2 Common lizards were widely recorded across the Peninsula and a small number of grass snakes were recorded close to Black Duck Marsh.

2010 Botany Marsh east

3.1.3 A good population of common lizard and small populations of slow worm and grass snake (see **Table 2**) were recorded in Botany Marsh East in 2010.

3.2 Survey results

3.2.1 Weather conditions during the surveys are detailed in **Table 3**.

3.2.2 Three species of reptile, common lizard, slow worm and grass snake were recorded during the survey. Details of all reptile records are provided in **Table 4** and locations where reptiles were recorded are illustrated in **Figure 2**. **Table 5** summarises the reptile species recorded in each survey area. **Table 6** identifies the number of reptiles of each species recorded during each survey, for all individuals and for adults only, and identifies the peak counts (adults only) for each species for each survey area. **Table 7** summarises the peak counts for each species for each survey area.

3.2.3 Common lizards were the most widespread and abundant species recorded. They were recorded in all survey areas. The highest peak count was of 49 adults on the Peninsula on the 23rd May 2016 pm. The next highest counts were 14 in Bamber South (15th May 2015 pm) and

11 in North of Springhead Nursery (15th May 2015 pm, 21st May 2015 am and 20th May 2016 pm)).

3.2.4 Slow worms were recorded in four of the survey areas. The highest peak counts were of 13 adults in Craylands Lane Pit/West Quarry (15th June 2015 am) and 7 in Bamber South (4th June 2015 am). A peak count of three was recorded on three occasions in North of Springhead Nursery and of two on two occasions in Bamber Pit North in May 2016. There was a single record of one individual on the Peninsula (24th April 2015 pm).

3.2.5 Grass snakes were recorded in all survey areas except Sports Field/East Quarry and CTRL West. The highest peak count was of six adults on the Peninsula on 8th June 2015 pm. A peak count of three was recorded in Bamber South (16th April 2015 am) and all other areas recorded a peak count of one. Grass snakes were also recorded in Botany Marsh East.

3.2.6 Adult, sub-adult and juvenile life stages of all three species were recorded.

Records by Area

Peninsula

3.2.7 Common lizards were recorded throughout the peninsula, but at lower density on Broadness than elsewhere, and here most records were from the embankments on its southern fringe. Grass snakes were recorded throughout the west and centre of the peninsula (but not Broadness), but there was a particular concentration of records in the west, in the areas surrounding and adjoining Black Duck Marsh. The single record of slow worm was from alongside the track between the CTRL Wetland to the west and Botany Marsh to the east.

3.2.8 The North East Tip was patchily but quite heavily disturbed by works during winter and spring of 2014-15 and only small numbers of common lizards were recorded here in autumn 2015.

Manor Way

3.2.9 Small numbers of common lizard and grass snake were recorded along the northern and eastern boundaries respectively.

Craylands Lane Pit/West Quarry

3.2.10 As well as common lizards this generated the largest number of records of slow worm of any part of the Proposed Development Area. There was a single record of grass snake, at the western end of the Pit.

Sports Field/East Quarry

3.2.11 Common lizards were recorded throughout the quarry but the highest density was in its northern half.

Bamber Pit (North and South)

3.2.12 Good numbers of all three species were consistently recorded throughout the larger, southern part of the Pit (Bamber South) and along the adjoining embankment beside the CTRL. Suitable habitat is more limited in the north of the Pit and only small numbers of common lizard, slow worm and grass snake were recorded here.

Northfleet Landfill

3.2.13 Common lizard and smaller numbers of grass snake were recorded along the southern, eastern and northern boundaries. Common lizards were also recorded in areas around the exposures near the centre.

CTRL West

3.2.14 Common lizards were recorded from the (spoil) mounds in the northern part of this area.

North of Springhead Nursery

3.2.15 Common lizard and grass snake were recorded throughout this area and slow worm largely along the eastern edge, adjoining the woodland along the Ebbsfleet.

4.0 EVALUATION

4.1 Survey Evaluation

4.1.1 Using Froglife's methodology[8] (section 2.2) **Table 8** identifies the population size class for each species, the number of species recorded and the assemblage score for each survey area. It also identifies which areas qualify as Key Reptile Sites and the relevant qualifying criteria.

4.1.2 The Peninsula, Craylands Lane Pit/West Quarry, Bamber Pit and North of Springhead Nursery qualify as Key Reptile Sites and would be eligible for designation as Local Wildlife Sites[9] based on their reptile populations/assemblages. They are therefore considered to be of County Importance for reptiles. All other areas are considered to be of Local Importance.

[8] Froglife 1999. Advice Sheet 10 – Reptile Survey. An Introduction to planning, conducting and interpreting surveys for snake and lizard conservation

[9] Kent Wildlife Trust on behalf of the Kent Nature Partnership, 2015. Local Wildlife Sites in Kent - Criteria for Selection and Delineation Version 1.5

TABLES

Table 1 Date and number of surveys

Spring/early summer

Date/time	Pen W + C	Pen all	Non-Pen	Comments
16/04/2015 am			✓	
20/04/2015 am		✓		
20/04/2015 pm			✓	
24/04/2015 am			✓	CTRL bank by Bamber Pit 1st surveyed
24/04/2015 pm	✓			
28/04/2015 am		✓		
11/05/2015 am		✓		
11/05/2015 pm			✓	CTRL W first surveyed
15/05/2015 am		✓	✓	
19/05/2015 am		✓	✓	
21/05/2015 am	✓		✓	
26/05/2015 pm	✓		✓	
01/06/2015 am		✓		
04/06/2015 am			✓	
08/06/2015 pm		✓	✓	
11/06/2015 am		✓	✓	
15/06/2015 am		✓	✓	
Total	**3**	**9**	**12**	

Autumn

Date/time	Pen W	Pen C	Bdness	NE Tip	Mnr Way	W Quarry	E Quarry	Bamber N	Bamber S	Nthflt L	CTRL W	N of Sprnghd
02/09/2015 pm							✓					
14/09/2015 am				✓								
14/09/2015 pm			✓									
22/09/2015 am				✓								
22/09/2015 pm			✓									
23/09/2015 am				✓			✓	✓	✓			
23/09/2015 pm	✓	✓	✓									
24/09/2015 am					✓		✓	✓				
24/09/2015 pm						✓					✓	
25/09/2015 am									✓			✓
28/09/2015 am-pm	✓							✓				
29/09/2015 am												✓
29/09/2015 pm			✓				✓	✓			✓	
30/09/2015 am							✓	✓	✓			
30/09/2015 pm			✓		✓	✓				✓		
01/10/2015 am	✓	✓		✓								
01/10/2015 pm							✓	✓				
08/10/2015 am				✓			✓	✓				
08/10/2015 pm												✓
Total	**3**	**2**	**5**	**5**	**2**	**2**	**7**	**7**	**3**	**1**	**2**	**3**

Spring / early summer 2016

Date / Time	Whole Pen	Bdness	E Quarry	Bamber N	Nthflt L	CTRL W
27/04/2016 pm		✓		✓	✓	✓
28/04/2016 am	✓					
06/05/2016 am	✓		✓	✓	✓	✓
13/05/2016 am	✓		✓	✓	✓	✓
16/05/2016 pm			✓	✓		
19/05/2016 pm			✓	✓		✓
20/05/2016 pm			✓	✓	✓	✓
23/05/2016 pm	✓		✓	✓	✓	✓
27/05/2016 am			✓	✓		✓
Total	**4**	**1**	**7**	**8**	**6**	**7**

Spring/early summer + autumn

Area	Whole Pen	Pen W	Pen C	Bdness	NE Tip	Mnr Way	W Quarry	E Quarry	Bamber N	Bamber S	Nthflt L	CTRL W	N of Sprnghd
Total	**14**	**19**	**18**	**19**	**9**	**14**	**14**	**14**	**15**	**15**	**18**	**16**	**15**

Table 3 Weather conditions during surveys

Spring/early summer Date/time	Temp (°C)	Wind (Beaufort)	Cloud (%)	Rain
16/04/2015 am	15-19	2-4	5-60	No
20/04/2015 am	14-17.5	2-4	<5	No
20/04/2015 pm	19.5-17	2-4	<5	No
24/04/2015 am	12-15.5	1-2	80	No
24/04/2015 pm	21-20	1-2	General v thin	No
28/04/2015 am	12-18	1-3	10-20	No
11/05/2015 pm	24-19	1-2	10-50	No
15/05/2015 am	13-18	1-3	50-100	No - but drying after overnight rain
19/05/2015 am	13-18	4	50-90	Occasional light showers in latter part
21/05/2015 am	16-20	1-2	20-80	No
26/05/2015 pm	20-18	1	50-80	No
01/06/2015 am	16-19.5	2-3	50-100	One short shower halfway
04/06/2015 am	16-20	1-2	0-30	No
08/06/2015 pm	18-16	2-4	80-100	No
11/06/2015 am	19-20	3-4	0	No
15/06/2015 am	17-19	3-4	90-20s	No

Autumn Date/time	Temp (°C)	Wind (Beaufort)	Cloud (%)	Rain
02/09/2015 pm	18	2	50	Recent shower bt dry during survey
14/09/2015 am	19		0	No
14/09/2015 am	18		40	No
14/09/2015 pm	19-16	1-2	60	No
22/09/2015 am	18		40	No
22/09/2015 pm	18		50	No
23/09/2015 am	15-19	1-3	<5-25	No - ground wet after rain but drying
23/09/2015 pm	19-18	3	20-100	No - drying after early rain
24/09/2015 am	17.5-19.5	2-4	40-100	No
24/09/2015 pm	19.5-18	3-4	70-50	No
25/09/2015 am	16-18		40	No
28/09/2015 am-pm	16-17		50	No
29/09/2015 am	19-20	4-5	10-20	No
29/09/2015 pm	21-19	4-5	10-20	No
30/09/2015 am	17.5-19.5	4-5	30-10	No
30/09/2015 pm	20.5-18	4-5	10-20	No
01/10/2015 am	19-20	4-5	10-30	No
01/10/2015 pm	19-18	4-5	30-10	No
08/10/2015 am	18-19	1-2	10-30	No
08/10/2015 pm	19-18.5	2-3	50-60	No

Spring 2016 Date/time	Temp (°C)	Wind (Beaufort)	Cloud (%)	Rain
27/04/2016 pm				No
28/04/2016 am				No
06/05/2016 am	14-19	1-2	10	No
13/05/2016 am	15-20	3-4	30-10	No
16/05/2016 pm	16-17	0-1	70	No
19/05/2016 pm	16-17	1-2	90	No
20/05/2016 pm	14-17	2-4	50	No
23/05/2016 pm	15-19	2-4	90-40	No - a few spots later
27/05/2016 am	14	1-2	70	No

Table 4 Reptile survey results (excluding areas with no records)

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
30/03/2015 am	Peninsula	247	1	cl	a	Old felt nearby during set up
02/04/2015 pm	Bamber Pit S	763-774	3	sw	2a + 1j	Under old felts along south edge of pit during set up
		796	1	gs	a	Basking nearby during set up
13/04/2015 am	N of Springhd Nursery	705	1	cl	a	
		706	1	cl	a	
		711	1	cl	a	
15/04/2015 am	Peninsula	3	1	cl	a	Nearby
		25	1	gs	a	Nearby
		62	1	cl	a	Nearby, in trough between embankments
		415	1	cl	a	Nearby
		595-596	1	cl	a	Nearby
16/04/2015 am	West Quarry	625	1	sw	a	Old felt nearby
		633	1	cl	a	Old felt nearby
		635	1	sw	a	
		635	1	cl	j	
		636	2	sw	1a + 1sa	
		637	2	sw	a	Old felt nearby
		638	1	sw	sa	
		639	1	sw	j	
		640	1	sw	a	
	Bamber Pit S	762	1	cl	a	
		764	2	sw	a	Old felt nearby
		764	1	gs	a	Old felt nearby
		772	2	cl	1a + 1j	
		774	1	sw	a	
		782	1	sw	a	Old felt nearby
		783	1	gs	a	
		785	1	sw	a	
		785	1	cl	a	
		792				1 toad
		802	2	sw	a	Old felt nearby
		809	1	gs	a	Dead nearby
		810	1	cl	j	Old felt nearby
	Northfleet Landfill	214	1	cl	a	
		217	2	cl	a	
	N of Springhd Nursery	698	1	cl	a	
		715	2	cl	j	
		716	1	cl	a	
		717	1	cl	sa	
		734	1	cl	a	
20/04/2015 am	Peninsula	4	1	gs	sa	
		6	1	cl	a	
		58-60	1	cl	a	Old felt nearby
		120	1	cl	a	
		227	1	cl	a	Nearby
		238	1	cl	a	
		257	1	cl	j	On path nearby
		267	2	gs	j	Under old felts nearby
		281	1	cl	a	Nearby, on rock armour immediately SE of pylon
		397	1	cl	a	
		449	1	cl	a	
		496	1	cl	a	
		596	1	cl	a	
		598	1	cl	a	
	Botany Marsh East	644	1	gs	a	
20/04/2015 pm	West Quarry	618	1	cl	a	
		634	1	sw	a	
		637	1	sw	sa	
		639	1	sw	j	
		640	1	sw	a	
	Bamber Pit S	765	1	cl	a	Nearby
		764	1	cl	sa	Old felt nearby
		764	1	sw	a	Old felt nearby
		774	1	sw	a	
		776	1	cl	a	Old felt nearby
		779	1	cl	a	Nearby
		792				1 toad
		802	2	sw	a	Old felt nearby
		802	1	cl	a	Old felt nearby
		809	1	cl	j	
	Northfleet Landfill	202	1	gs	a	
		206	1	cl	j	
	N of Springhd Nursery	696	1	cl	sa	
		706	1	cl	j	
		710	1	cl	a	
		711	1	cl	a	
		712	1	cl	a	
		715	3	cl	j	
		722	1	cl	j	
		735	1	cl	a	
		739	1	cl	a	
		742	1	cl	sa	
		746	1	cl	j	
		747	1	cl	a	
		748	1	cl	a	
		752	1	cl	a	
22/04/2015 pm	Peninsula	281-306	1	cl	a	On path, SW corner of inlet
24/04/2015 am	Manor Way	820	1	cl	sa	
	West Quarry	618	1	sw	j	
		625	1	sw	a	Old felt nearby
		636	2	sw	1a + 1j	
		637	1	sw	a	Old felt nearby
		638	1	sw	j	
		640	1	sw	a	
		840	1	cl	j	
		841	1	sw	a	
		844	1	sw	a	
	Bamber Pit S	761-774	12	sw	5a + 2sa + 5j	Along S edge of site
		766	1	cl	j	
		787	3	cl	1a + 2sa	Old felt nearby
		790	2	cl	sa	Old felt nearby
		792	1	sw	sa	Old felt nearby
		847	3	cl	2a + 1sa	
	Northfleet Landfill	200	1	cl	a	
		202	1	gs	a	
		205	1	cl	a	
		206	1	cl	a	
		212	1	cl	j	
		220	1	cl	j	
		223	1	cl	a	
	N of Springhd Nursery	710	1	cl	a	
		711	1	cl	a	
		712	1	cl	a	
		714	1	sw	j	
		715	1	cl	a	
		730	1	cl	a	
		746	1	cl	a	
		752	1	cl	a	
		756	1	cl	a	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
24/04/2015 pm	Peninsula	3	1	cl	j	
		20	1	cl	a	Old felt nearby
		20	1	cl	a	
		26	1	cl	a	
		51	1	cl	a	Old felt nearby
		57	1	cl	a	
		58	1	cl	a	
		59	1	cl	a	
		69	1	gs	a	
		71	1	cl	a	
		92	1	cl	a	Old felt nearby
		145	1	sw	a	
		229	1	cl	a	
		230	2	cl	1a + 1j	Old felt nearby
		384	1	gs	a	Nearby, crossing track
		395	1	cl	a	
		398	1	cl	sa	Old felt nearby
		415-420	2	cl	a	Old felts in area to S
		473	2	cl	a	
		485	1	cl	a	
		494	2	cl	a	
		496	1	cl	a	
		497	1	cl	a	
		512	1	cl	a	
		514	1	cl	a	
		517	1	cl	a	
		522	1	cl	a	
		531	1	cl	a	
		550	1	cl	a	
28/04/2015 am	Peninsula	3	1	cl	a	
		9-10	1	cl	a	Between felts
		18-19	1	cl	a	Old felt between
		40	1	cl	a	On bank beside marsh SE of felt
		69	1	gs	a	
		108	1	cl	a	Tin on other side of track
		226-227	1	gs	a	Between felts
		235	1	cl	a	
		238	1	cl	a	
		242-243	1	gs	a	By log pile between felts
		243	1	cl	a	
		253	1	cl	a	
		256	1	cl	a	
		256-257	1	cl	a	Between felts
		399	1	cl	a	Old felt nearby
		422	1	cl	a	Old felt nearby
		430-431	1	cl	a	Old felt nearby
		497	1	cl	a	
11/05/2015 pm	Peninsula	7	1	cl	a	Old felt nearby
		13	1	cl	a	
		17-18	1	cl	a	Between felts
		55	1	cl	a	On tin beside herp fence on boundary with construction site
		120	2	cl	1a + 1j	
		135	1	cl	a	
		145	1	gs	a	
		148	1	cl	a	
		227	1	cl	a	
		229	2	cl	1a + 1sa	
		232	2	gs	sa	Tin nearby
		232	1	gs	sa	
		234	1	cl	a	Nearby
		238	1	gs	sa	
		267	1	gs	a	Old felt nearby - 10m to S
		291	1	cl	a	
		348	1	cl	a	
		410	1	cl	a	Old felt nearby, on mound
		416	1	gs	a	Old felt to S
		421	1	cl	sa	Old felt nearby
		430-431	1	cl	a	Old felt between
		455	1	cl	a	
		459	2	cl	sa	
		472	1	cl	a	
		479	1	cl	a	Old felt nearby
		481	1	cl	a	
		515	1	cl	a	
		521	1	cl	a	
		534	2	cl	a	
		568	1	cl	a	
11/05/2015 pm	West Quarry	606	1	sw	j	
		612	1	sw	a	Old felt nearby
		615	1	cl	a	
		616	1	cl	j	Old felt nearby
		636	2	sw	1a + 1j	Old felt on other side of track
		637	2	sw	1a + 1j	
	Bamber Pit S	761	1	cl	a	Old felt nearby
		766	2	cl	a	Old felt nearby
		766	1	gs	j	Old felt nearby
		768	2	cl	a	
		769	1	cl	a	Old felt nearby
		770	2	cl	a	Old felt nearby
		771	1	cl	a	
		771	2	sw	1a + 1j	
		772	3	cl	a	Old felt nearby
		779	1	cl	j	Old felt nearby
		787	1	sw	j	Old felt nearby
		796	1	gs	j	Old felt nearby
		802	1	sw	sa	Old felt nearby
		846	1	cl	a	
	Northfleet Landfill	204	1	cl	j	
		206	1	cl	a	
		218	1	cl	a	
		219	1	cl	j	
		221	1	gs	j	
	N of Springhd Nursery	681	1	cl	a	
		690	1	cl	a	
		693	1	cl	a	
		697	1	cl	a	
		697	1	sw	j	
		705	1	sw	j	
		708	1	cl	a	
		709	1	cl	a	
		716	1	cl	a	
		757	1	cl	a	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
15/05/2015 am	Peninsula	3	1	cl	a	
		14	1	cl	a	Old felt nearby
		20	1	cl	j	
		25	1	cl	a	
		30	1	cl	a	
		57	1	gs	a	
		97	1	cl	a	Old felt nearby
		145	1	cl	a	
		227	1	gs	a	Old felt nearby
		230	2	cl	j	Old felt nearby
		278	1	cl	a	
		284	1	cl	a	
		397	1	cl	a	Old felt nearby
		406	1	cl	a	Nearby
		407	1	cl	a	
		473	1	cl	a	
		512	1	cl	j	
		570	1	cl	sa	
		598	1	cl	a	
	West Quarry	631-632	5	sw	sa	Old felt between
		841	1	sw	a	
		844	1	sw	a	
	Bamber Pit S	762	2	cl	sa	
		763	1	cl	a	Old felt nearby
		766	1	gs	j	
		766	3	cl	1a +2sa	Old felts nearby
		769	2	cl	a	Old felts nearby
		770	3	cl	2a + 1sa	Old felts nearby
		773	1	cl	a	
		776	1	cl	sa	
		782	1	cl	sa	Old felt nearby
		790	2	cl	1a + 1sa	
		790	1	cl	a	Old felt nearby
		792	1	cl	sa	
		794	1	cl	sa	
		795	1	gs	a	
		796	1	cl	a	
		799	1	cl	a	Old felt nearby
		800	2	cl	a	
		847	1	cl	a	
		848	3	cl	2a + 1sa	
		850	1	cl	sa	
	Northfleet Landfill		1	cl	a	On grass
		216	1	cl	a	
		217	1	cl	a	
	N of Springhd Nursery	696	1	cl	a	
		706	1	cl	sa	
		708	1	cl	a	
		711	3	cl	a	
		712	1	cl	a	
		714	1	cl	a	
		714	1	gs	j	
		724	1	cl	a	
		736	1	cl	sa	
		739	2	cl	1a + 1sa	
		740	1	cl	a	
		740	1	gs	sa	
		749	1	cl	1a + 1sa	
		751	1	cl	sa	
		752	1	cl	a	
		756	2	cl	sa	
		756	2	gs	j	
		760	1	cl	a	
19/05/2015 am	Peninsula	7	1	cl	a	
		12	1	gs	a	
		13	1	cl	a	
		24	1	cl	j	
		57	1	gs	a	
		68	1	gs	a	
		124	1	cl	a	
		137	1	cl	a	
		145	1	cl	a	
		226	1	gs	a	
		227	3	cl	1a +2j	Old felts nearby
		227	2	gs	j	Old felt nearby
		228	1	cl	a	
		243	1	cl	sa	
		245	1	cl	a	
		277	2	gs	j	
		291	1	cl	a	
		397	1	cl	sa	Old felt nearby
		398	1	cl	a	
		512	1	cl	a	
		568	1	cl	a	
	West Quarry	616	2	cl	j	
		616	1	cl	j	Old felt nearby
		632	1	sw	j	Old felt nearby
		635	1	cl	a	
		637	1	sw	j	
		637	1	sw	j	Old felt nearby
		638	1	sw	a	Old felt opposite side of track
		842	1	sw	a	Old carpet few m to N
	Bamber Pit S	764	1	sw	j	
		766	1	cl	a	Old felt nearby
		770	3	cl	j	Old felts nearby
		772	1	cl	j	Old felt nearby
		772	4	cl	2a +1sa +1j	
		772	1	gs	j	Old felt nearby
		773	1	cl	sa	Old felt nearby
		774	1	cl	j	Old felt nearby
		775	1	cl	a	Old felt nearby
		777	1	cl	a	Old felt nearby
		778	1	cl	j	
		787	4	cl	1a +2sa +1j	
		792	3	cl	1a +2j	Old felt nearby
		799	1	gs	j	Old felt nearby
		802	1	cl	a	
		802	1	gs	j	
		846	1	cl	sa	
		847	1	cl	a	
	Northfleet Landfill	174	1	cl	a	
		225				Piece of sw
	N of Springhd Nursery	740	1	gs	sa	
		751	1	gs	j	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
21/05/2015 am	Peninsula	25	1	cl	sa	
		76	1	cl	a	
		124	1	cl	a	
		145	1	cl	a	
		226	1	cl	a	Old felt nearby
		227	1	gs	a	Old felt nearby
		240	1	cl	sa	Old felt nearby
		400	1	cl	a	
		406	1	cl	a	
		421-422	1	cl	a	Old felt between
		430-431	1	cl	a	Old felt between
		473	1	cl	a	
		831	1	cl	a	
	West Quarry	601	2	sw	1a + 1j	
		632	1	sw	a	Old carpet nearby
		635	1	cl	a	Old felt down towards tunnel
		635	1	sw	a	Old felt down towards tunnel
		638	2	sw	1sa + 1j	Old felt nearby
		639	1	sw	j	
		640	1	sw	a	
		844	1	sw	j	
	Bamber Pit S	764	3	sw	a	Old felt 5m to W
		764	1	gs	sa	Old felt 5m to W
		766	1	gs	a	Old felt 10m to W
		767	1	cl	a	Old felt nearby
		771	1	sw	a	
		771	2	sw	j	Old felt 10m to S
		773	1	sw	a	Old felt nearby
		776	1	gs	sa	
		776	1	gs	sa	Old felt 10m to N
		780	1	cl	a	
		785	1	cl	a	Old felt nearby
		787	1	cl	sa	Old felt 10m to N
		787	1	cl	sa	
		787	1	gs	j	Old felt nearby
		792	1	cl	a	Old felt 5m to N
		793	1	cl	a	Old felt nearby
		793	1	gs	j	Old felt 10m to S
		802	1	sw	a	Old felt nearby
		802	2	cl	a	Old felt nearby
		802	1	gs	sa	Old felt nearby
		806	1	sw	a	
	N of Springhd Nursery	708	3	cl	1a + 2sa	
		709	1	cl	sa	
		710	1	cl	a	
		715	2	cl	sa	
		717	1	cl	a	
		719	1	cl	sa	
		722	1	gs	j	
		724	2	cl	1a + 1sa	
		726	2	gs	sa	
		726	1	cl	a	Nearby
		736	1	cl	a	
		739	1	cl	a	
		740	2	cl	1a + 1sa	
		740	1	gs	a	
		744	1	cl	a	
		747	1	cl	a	
		748	1	cl	a	
		756	2	gs	sa	
		757	1	gs	sa	
26/05/2015 pm	Peninsula	20	1	cl	a	Old felt nearby
		21	1	cl	a	Old felt nearby
		50	1	gs	a	
		57	1	cl	a	
		145	1	cl	a	
		256	1	cl	a	Old felt nearby
		262	2	gs	j	Old felt nearby
		473	1	cl	a	
		543	1	gs	a	
	West Quarry	601	1	sw	a	
		606	1	sw	sa	
		632	1	sw	sa	Old carpet nearby
		634	1	sw	a	Old felt nearby
		635	1	sw	sa	Old felt down towards tunnel
		636	1	cl	a	
		637	1	sw	sa	Old felt nearby
		638	1	sw	sa	Old felt nearby
		639	1	sw	sa	Old felt nearby
		640	1	sw	a	
		640	1	sw	sa	Old felt nearby
		640	1	sw	sa	Old felt nearby
		843	1	cl	a	
	Bamber Pit S	764	1	cl	a	Old felt nearby
		765	2	cl	a	Old felt nearby
		766	2	cl	1a + 1j	
		785	1	cl	j	
		798	1	gs	j	Old felt nearby
		846	1	cl	a	
	Northfleet Landfill	174	1	cl	a	
		208	1	cl	a	
		220	1	cl	a	
		223	1	cl	a	
		224	1	cl	a	
		827	2	cl	a	
		828	1	cl	a	
	N of Springhd Nursery	693	1	cl	a	
		699	1	cl	j	
		700	2	cl	1a +1j	
		710	1	cl	j	
		711	1	cl	a	
		756	1	gs	j	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
01/06/2015 am	Peninsula	1	3	cl	j	Old felts to W
		30	1	gs	j	Old felt nearby
		48	1	gs	sa	Old felt nearby
		58	1	cl	j	Old felt nearby
		62	1	cl	a	
		67	1	cl	j	
		80	1	cl	a	
		153	1	cl	a	
		267	1	gs	sa	Old felt nearby
		280	1	cl	a	
		317	1	cl	a	
		397	1	cl	a	Old felt 10m to E
		411	1	cl	a	
		411	1	cl	sa	Old felt nearby
		412	1	cl	a	Tin nearby
		414	1	cl	a	
		424	1	cl	a	
		429	1	cl	a	
		447	1	cl	a	Old felt 10m to SE
		473	1	cl	a	
		496-497	1	cl	a	Old felt between
		536	1	gs	a	
		541-542				Gs skin beneath old felt between, on S side of mound
		553	1	cl	a	Old felt in far SW corner of area
		596	1	cl	a	
04/06/2015 am	West Quarry	633	1	sw	a	
		635	1	sw	a	
		635	1	cl	a	Old felt nearby
	Bamber Pit S	763	1	sw	a	Old felt 5m to E
		763	1	sw	j	Old felt 5m to S
		764	1	sw	j	Old felt 10m to W
		766	1	sw	a	
		771	1	cl	a	Old felt 5m to N
		772	2	cl	a	
		773	1	cl	a	
		775	1	sw	sa	
		776	1	cl	a	
		776	1	sw	j	
		779	1	sw	a	
		781-782	1	sw	a	Old felt between
		782	1	sw	a	
		787	1	sw	a	
		787	1	sw	a	Old felt 5m to E
	Northfleet Landfill	202	1	gs	a	
		824	2	gs	j	
	N of Springhd Nursery	708	3	sw	a	
		708	1	gs	j	
		711	1	cl	a	
		714	2	sw	a	
		715	1	sw	a	
		724	1	cl	a	
		751	1	cl	a	
08/06/2015 pm	Peninsula	1	1	cl	j	Old felt nearby
		2	1	cl	a	
		18	1	cl	j	Old felt nearby
		39	2	gs	a	Old felt 5m to E
		39	1	cl	a	Old felt 5m to W
		40	1	gs	a	Old felt 5m to S
		58	1	cl	a	
		59	1	cl	j	
		62	1	cl	a	
		67	2	cl	a	
		68	1	cl	a	
		70	1	cl	a	
		71	1	cl	a	
		75	1	cl	a	
		98	1	cl	a	Old felt nearby
		226	1	gs	a	Old felt nearby
		227	4	cl	3a + 1j	Old felts nearby
		227	1	gs	j	Old felt nearby
		228	1	gs	a	Old felt nearby
		230	1	gs	a	Old felt nearby
		232	1	gs	j	Old felt nearby
		232	1	cl	a	
		256	1	gs	j	
		257	1	cl	a	Old felt nearby
		257	2	gs	j	Old felt nearby
		260	1	cl	j	Old felt nearby
		277	1	gs	j	
		281	1	cl	sa	
		282-283	1	cl	a	Old felt between
		286	1	cl	sa	
		362	1	cl	sa	
		397	1	cl	a	Old felt on bank at S end of lagoon
		398	1	cl	a	
		414	1	cl	a	
		431	1	cl	a	
		447	1	cl	a	
		455	1	cl	a	
		455	2	cl	a	Old felt nearby
		480	2	cl	a	
		502	1	cl	a	Old felt nearby
		532	1	cl	a	Western one
		590	1	cl	a	
		836	1	cl	a	Old felt nearby
	Manor Way	817	1	cl	a	
	West Quarry	611	2	sw	j	
		617	1	cl	a	Old felt nearby
		624	1	sw	a	
		632	3	sw	j	Carpet tile nearby
		633	1	sw	sa	
		635	3	cl	sa	Old felt down towards tunnel
		635	1	cl	a	Old felt nearby
		637	1	sw	a	
		637	4	sw	1a +3j	Old felt nearby
		640	2	sw	a	
		840	1	sw	sa	
		841	1	cl	a	
		841	1	sw	a	
		844	1	sw	a	
	Bamber Pit S	765	1	cl	a	Old felt nearby
		774	1	sw	a	
		774	1	cl	a	Old felt nearby
		775	1	cl	a	Old felt nearby
		776	2	cl	j	Old felt nearby
		787	1	cl	j	Old felt nearby
		796	1	cl	a	Old felt nearby
		800	3	sw	j	
	Northfleet Landfill	198	1	gs	j	
		212	1	cl	sa	
	N of Springhd Nursery	704	1	cl	a	
		706	1	cl	j	
		708	1	cl	a	
		708	2	sw	a	
		710	1	cl	a	
		710	1	cl	a	
		711	2	cl	a	
		712	1	cl	a	
		712	1	sw	a	
		714	1	sw	j	
		715	1	sw	j	
		715	1	cl	a	
		719	1	cl	j	
		740	1	cl	a	
		756	1	gs	j	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
11/06/2015 am	Peninsula	80	1	gs	a	
		240	1	gs	a	
		252	1	gs	a	
		257	2	gs	j	Old felt nearby
		398-400	1	cl	a	Old felt between
		409-410	1	cl	sa	
		415	1	cl	a	Old felt nearby
		510	1	cl	a	Old felt between
	West Quarry	621	1	cl	a	Old felt nearby
		621	1	sw	a	Old felt nearby
		632	1	sw	j	Old carpet nearby
		635	1	sw	a	Old felt down towards tunnel
		635	1	cl	a	
		640	2	sw	j	
	Bamber Pit S	787	1	cl	a	Old felt nearby
		791	1	cl	a	Old felt nearby
		802	1	gs	a	Old felt nearby
		802	2	sw	a	Old felts nearby
		851				gs skin
	N of Springhd Nursery	708	1	sw	a	
		710	1	sw	a	
		711	1	cl	a	In vegetation nearby
		712	1	sw	a	
		715	1	gs	j	
		715	1	sw	sa	
		739	1	gs	j	
15/06/2015 am	Peninsula	1	1	cl	a	Old felt nearby
		2	2	cl	j	
		6	1	cl	a	
		14	1	cl	a	
		114	1	cl	a	
		129	1	cl	j	
		226	2	cl	j	Old felt nearby
		226	2	gs	1a + 1j	Old felt nearby
		243	1	cl	j	Old felt nearby
		252	1	cl	a	
		252	2	gs	a	
		253	1	gs	a	
		257	1	gs	j	Old felt nearby
	West Quarry	606	1	sw	sa	
		611	1	sw	sa	
		624	2	sw	a	Old felt nearby
		624	1	sw	a	
		632-633	4	sw	sa	Old felt between
		635	1	sw	a	Old felt nearby
		635	1	sw	a	
		637	3	sw	1a +2sa	Old felt nearby
		840	2	sw	1a + 1sa	
		841	2	sw	a	
		843	5	sw	4a + 1sa	
		844	2	sw	1a + 1sa	
	Bamber Pit S	762	1	cl	sa	Old felt nearby
		763	1	cl	a	Old felt nearby
		766	2	sw	a	Old felt nearby
		774	2	cl	1a + 1sa	Old felt nearby
		846	1	cl	a	
	N of Springhd Nursery	708	1	sw	sa	
		712	2	sw	a	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
02/09/2015 pm	East Quarry	914	1	cl	a	
14/09/2015 am	NE Tip	162	1	cl	a	
		163	2	cl	a	
14/09/2015 pm	Broadness	126	1	cl	a	
		135	1	cl	a	
		150	1	cl	a	
		158	1	cl	a	
		330	1	cl	a	
		578	2	cl	sa	Tin near pylon
22/09/2015 pm	Broadness	126	1	cl	a	
		129	1	cl	sa	
		136	1	cl	sa	
		152	1	cl	a	
		158	2	cl	a	
		338	1	cl	a	
23/09/2015 am	East Quarry	900	1	cl	a	
		916	1	cl	a	Nearby
	Bamber Pit S	761	1	cl	j	
		766	1	gs	sa	Old felt nearby
		769	1	cl	a	Old felt nearby
		770	1	toad	j	Old felt nearby
		776	1	cl	sa	Old felt nearby
		777	1	cl	a	Old felt nearby
		782	1	sw	a	
		785	1	cl	sa	Old felt nearby
		785	1	gs	j	Old felt nearby
		786	1	cl	j	Old felt nearby
		791	1	cl	a	Old felt nearby
		793	1	cl	j	10 m to S
		794	1	cl	j	
		796	1	gs	j	Old felt nearby
		797	1	gs	sa	Old felt nearby
		799	1	gs	sa	
		847	1	sw	a	
		850	2	sw	a	
23/09/2015 pm	Peninsula W	7	1	cl	j	Old felt nearby
		14	1	cl	j	Old felt nearby
		15	2	cl	a	
		17	1	cl	j	
		19	2	cl	sa	
		19	1	cl	j	Old felt nearby
		20	1	cl	j	
		25	1	cl	a	
		27	1	cl	j	
		30	1	cl	a	
		30	1	gs	a	
		30	3	cl	2sa + 1j	Old felt nearby
		33	1	cl	sa	
		50	1	cl	j	
		55	1	cl	j	Old felt nearby
		57	3	cl	j	Old felt nearby
		58	1	cl	sa	Old felt nearby
		59	2	cl	sa	Old felt nearby
		59	1	cl	sa	
		60	1	cl	sa	
		62	1	cl	a	
		64	2	cl	a	Old felt nearby
		65	4	cl	1a +3sa	
		66	4	cl	1a +3sa	
		71	1	cl	sa	
		84	1	cl	sa	Old felt nearby
		97	3	cl	sa	
		232	1	cl	j	
		247	1	cl	j	
		252	1	gs	a	
		254	1	cl	a	
		254	1	cl	a	Old felt nearby
		255	1	cl	j	
		271	1	cl	j	
		832	3	cl	sa	
		835	1	cl	sa	
	Peninsula Centre	103	1	cl	a	
		104	3	cl	1a + 1sa + 1j	
		114	2	cl	1sa + 1j	
		397	1	cl	a	Old felt 10m W
		397	2	cl	1a + 1j	Old felt 5m E
		397	3	cl	a	Old felt 10m E
		398	3	cl	2a + 1j	Old felt nearby
		399	1	cl	a	Old felt 30m W
		399	1	cl	j	Old felt 30m W
		402	3	cl	2a + 1sa	Old felt nearby
		402	1	sm newt		Old felt nearby
		402	1	gs	a	Old felt 10m W S side of track
		406	1	cl	a	Old felt nearby
		406	2	cl	j	
		409	1	cl	j	
		409-410	1	cl	j	Old felt between
		411	1	cl	a	
		412	3	cl	1a + 2j	Old felt nearby
		414	1	cl	sa	
		417	3	cl	2a + 1sa	Old felt 50m S
		418	2	cl	a	Old felt 50m S
		420	1	cl	j	
		420	1	cl	j	Old felt 50m S
		420	1	cl	j	Old felt 100m S
		420	2	cl	1a + 1sa	Old felt on S edge of mound 130m S
		420	3	cl	2sa + 1j	Old felt on S edge of mound 130m S
		440	1	cl	a	
		472	1	cl	a	
		474	1	cl	a	
		486	1	cl	j	
		487	1	cl	j	
		492	1	cl	a	
		494	1	cl	j	Plywood nearby
		495	1	cl	j	Old felt nearby
		497	1	cl	j	
		536	2	cl	1a + 1j	
		551	1	cl	j	Old felt nearby
		553	2	cl	j	Old felt SW corner of compound
	Broadness	112	1	cl	sa	
		124	1	cl	j	
		125	1	cl	j	
		128	1	cl	a	
		132	1	cl	a	
		590	1	cl	sa	
24/09/2015 am	Manor Way	816	1	gs	sa	
		817	1	gs	sa	
		819	1	cl	a	
	Bamber Pit N	948	1	gs	sa	
	East Quarry	900	1	cl	sa	
		901	2	cl	1a +1sa	
		902	3	cl	1sa + 2j	
		905	2	cl	1a +1sa	
		908	1	cl	j	
		909	2	cl	sa	
		910	1	cl	a	
		911	1	cl	j	
		912	1	cl	j	
		914	1	cl	a	
		915	1	cl	sa	
		916	1	cl	j	
		931	1	cl	sa	
		932	1	cl	j	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
24/09/2015 pm	West Quarry	601	2	sw	a	
		601	3	cl	j	
		602	1	cl	sa	
		603	1	cl	j	Old felt nearby
		605	1	sw	j	
		617	1	cl	j	
		624	1	sw	a	
		631	1	cl	sa	
		632	2	sw	sa	Carpet tile nearby
		633	1	cl	j	Old tyre nearby
		634	1	sw	a	
		635	2	sw	1a +1sa	
		635	1	cl	a	Old felt 20m W
		635	1	sw	a	Old felt 40m W on bank to tunnel
		635	3	sw	1a + 1sa + 1j	Old felt 50m W on bank to tunnel
		636	1	sw	j	
		638	1	sw	j	
		639	1	cl	j	
		840	3	sw	a	
		840	2	cl	j	
		840	1	gs	j	
		841	1	sw	a	
		841	2	cl	a	
		843	1	cl	j	
		844	1	cl	j	
		844	2	sw	j	
		616-617	4	cl	1a + 2sa + 1j	
	CTRL W	853	1	cl	a	
		856	3	cl	sa	
25/09/2015 am	Bamber Pit S	766	2	gs	j	Old felts nearby
		770	1	cl	a	
		791	1	cl	sa	
		794	1	cl	sa	Old felt nearby
		847	1	sw	a	
		850	1	sw	sa	
	N of Springhd Nursery	688	1	cl	a	
		694	1	cl	sa	
		708	1	sw	sa	
		712	1	sw	sa	
		739	1	cl	a	
		754	1	cl	a	
28/09/2015 am-pm	Peninsula W	35	1	cl	a	
		38	1	cl	a	
		58	1	cl	a	
		60	1	cl	sa	
		64	1	cl	sa	
		65	1	cl	a	
		69	2	cl	sa	
		87	1	cl	a	
		226	1	cl	a	
		247	1	gs	j	
		831	1	cl	a	
		834	1	cl	a	
	Bamber Pit N	948	1	gs	a	
		950	1	cl	a	
		952	1	cl	a	
29/09/2015 am	N of Springhd Nursery	686	1	cl	a	
		697	1	cl	a	
		707	1	cl	a	Old felt nearby
		711	1	cl	a	
		715	1	sw	a	
		716	1	cl	a	
		737	1	cl	a	
		742	1	gs	j	
		748	1	cl	a	
		750	3	cl	2a + 1sa	
		751	2	cl	a	
29/09/2015 pm	Broadness	122	1	cl	sa	
		124	1	cl	a	
		126	1	cl	sa	
		136	1	cl	a	
		152	1	cl	sa	
		154	1	cl	sa	
		155	1	cl	j	
		338	1	cl	a	
		579	1	cl	a	
		584	1	cl	sa	
		599	1	cl	sa	
	East Quarry	909	2	cl	a	
		930	1	cl	j	
		932	1	cl	sa	
		934	1	cl	sa	
	Bamber Pit N	952	1	cl	sa	
	CTRL W	853	6	cl	a	
30/09/2015 am	East Quarry	900	4	cl	3sa + 1j	
		901	2	cl	a	
		902	1	cl	a	
		904	1	cl	sa	
		905	1	cl	sa	
		909	1	cl	sa	
		914	1	cl	sa	
		929		cl		Shed skin (tail)
		938	1	cl	sa	
	Bamber Pit N	950	1	cl	sa	
	Bamber Pit S	762	1	cl	sa	
		762	1	sm newt	j	Old felt nearby
		763	1	cl	a	Old felt 5m E
		763	1	gs	j	Old felt 5m S
		763	1	sw	a	Old felt 5m S
		764	1	sw	j	
		764	1	cl	a	Old felt nearby
		766	1	gs	j	Old felt 10m E
		766	1	cl	a	Old felt 10m E
		767	1	cl	a	Old felt nearby
		770	1	cl	j	
		770	1	cl	a	Old felt 5m W
		770	1	cl	sa	10m W
		771	1	cl	sa	Nr in grass
		772	2	cl	sa	
		775	1	cl	a	
		775	1	gs	j	Old felt 5m E
		776	1	cl	sa	Old felt 10m N
		776	1	cl	sa	Old felt 20m N
		776	1	cl	j	Old felt 25m NE
		777	1	cl	sa	Old felt nearby
		779	1	sw	a	
		779	1	cl	a	
		784	2	cl	1a + 1j	
		785	1	cl	a	Old felt 5m E
		785	1	gs	j	Old felt 5m E
		787	1	cl	j	Old felt 5m N
		787	2	cl	j	
		787	1	sw	a	
		791	1	cl	a	
		800	1	sw	a	
		806	1	sw	a	
		846	2	cl	1sa + 1j	
		849	1	cl	j	
		850	1	sw	a	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
30/09/2015 pm	Broadness	126	1	cl	sa	
		128	1	cl	a	
		129	1	cl	a	
		131	1	cl	a	
		152	1	cl	sa	
		155	1	cl	a	
		158	1	cl	a	
		338	1	cl	a	
		585	1	cl	sa	
	Manor Way	815	1	gs	a	
	West Quarry	616	1	cl	a	
		617	1	cl	a	
		618	1	cl	a	
		624	2	sw	a	
		635	2	sw	a	
		635	2	sw	a	Old felt 20m W
		636	1	cl	a	Old felt nearby
		637	1	sw	a	Old felt nearby
		638	3	sw	1sa + 2j	
		638	1	cl	sa	
		840	1	sw	a	
		844	3	sw	1sa + 2j	
		616-617	1	cl	a	Old felt between
	Northfleet Landfill	188	10	cl	2a + 6sa + 2j	
		192	1	cl	a	
		823	1	cl	sa	
01/10/2015 am	Peninsula Centre	105	1	cl	sa	
		114	1	cl	a	
		115	1	cl	a	
		118	1	cl	a	Old felt 20m S
		398	1	cl	j	Old felt nearby
		401	3	cl	sa	Old felt N side of track
		401	1	cl	sa	Old felt N side of track
		402	1	cl	j	Old felt nearby
		402	1	cl	a	Old felt nearby
		402	1	cl	a	Old felt 20m W
		406	1	cl	j	
		411	1	cl	a	
		411	1	cl	j	Old felt nearby
		412	1	gs	a	
		412	1	cl	sa	
		412	1	cl	j	Tin 20m S
		415	1	cl	a	Old felt 10m SE
		416	1	cl	sa	Old felt 20m S
		420	1	cl	a	Old felt 20m S
		420	1	cl	a	Old felt 50m S
		452	1	cl	a	Old felt 10m W
		458	1	cl	sa	
		458	1	cl	j	Old felt nearby
		459	1	cl	sa	
		495	1	cl	sa	Old felt 10m N
		497	1	cl	a	Old felt nearby
		512	1	cl	a	Old felt 10m E
		532 E	1	cl	a	Old felt 20m E
	Peninsula W	21	1	cl	a	
		32	1	cl	sa	
		59	1	cl	a	
		65	1	cl	a	
		69	1	cl	sa	
		93	1	cl	a	
		100	1	cl	a	
		226	1	cl	a	
		228	1	cl	sa	
		235	1	cl	a	
		238	1	cl	sa	
		247	1	gs	sa	
		254	1	cl	sa	
		834	1	cl	sa	
	NE Tip	655	1	cl	a	Old felt nearby
		657	1	cl	a	
01/10/2015 pm	East Quarry	902	1	cl	sa	
		908	1	cl	j	
		909	1	cl	sa	
		917	1	cl	j	
		927	1	cl	a	
		932	1	cl	sa	
		936	1	cl	j	
		940	1	cl	j	
		942	2	cl	j	
	Bamber Pit N	948	1	gs	j	
		952	1	cl	sa	
08/10/2015 am	East Quarry	942	2	cl	sa	
	Bamber Pit N	950	1	cl	sa	
08/10/2015 pm	N of Springhd Nursery	681	1	cl	j	
		682	3	cl	sa	
		694	1	cl	a	
		695	2	cl	sa	
		700	1	cl	j	
		705	1	cl	a	
		706	1	cl	sa	
		711	1	cl	a	
		712	1	gs	sa	
		712	5	cl	3sa + 2j	
		714	1	cl	a	
		720	1	cl	j	
		721	1	gs	j	
		724	6	cl	j	
		734	1	cl	sa	
		737	4	cl	2a + 2sa	
		751	2	cl	1a + 1sa	
		755	1	cl	sa	
		757	1	cl	j	

Table 5 Species recorded by survey area

Area	cl	sw	gs
Peninsula	✓	✓	✓
Botany Marsh East			✓
Manor Way	✓		✓
West Quarry	✓	✓	✓
East Quarry	✓		
Bamber Pit N	✓	✓	✓
Bamber Pit S	✓	✓	✓
Northfleet Landfill	✓	✓	✓
CTRL W	✓		
N of Springhd Nursery	✓	✓	✓

Table 6 Survey summary - number of individuals and adults recorded by area and species (excluding areas with no records)

Spring/early summer		**cl**		**sw**		**gs**	
Date and time	**Area**	**All**	**Adults**	**All**	**Adults**	**All**	**Adults**
16/04/2015 am	West Quarry	2	1	9	5		
	Bamber South	5	3	7	5	3	**3**
	Northfleet Landfill	3	3				
	N of Springhd Nursery	6	3				
20/04/2015 am	Peninsula	12	11				1
	Botany Marsh East					1	**1**
20/04/2015 pm	West Quarry	1	1		2		
	Bamber South	6	4	4	4		
	Northfleet Landfill	1				1	**1**
	N of Springhd Nursery	16	8				
24/04/2015 am	Manor Way	1	**1**				
	West Quarry	1		9	6		
	Bamber South	9	3	13	5		
	Northfleet Landfill	6	4			1	**1**
	N of Springhd Nursery	8	8	1			
24/04/2015 pm	Peninsula	30	27	1	**1**	2	2
28/04/2015 am	Peninsula	15	15			3	3
11/05/2015 pm	Peninsula	28	24			6	3
	West Quarry	2	1	6	3		
	Bamber South	14	13	4	1	2	
	Northfleet Landfill	4	2			1	
	N of Springhd Nursery	8	8	2			
15/05/2015 am	Peninsula	18	13			2	2
	West Quarry			7	2		
	Bamber South	27	**14**			2	1
	Northfleet Landfill	3	3				
	N of Springhd Nursery	19	**11**			4	
19/05/2015 am	Peninsula	17	12			6	4
	West Quarry	4	1	4	2		
	Bamber South	24	9				
	Northfleet Landfill	1	1			2	
	N of Springhd Nursery					1	
21/05/2015 am	Peninsula	12	10				1
	West Quarry	1	1	9	4		
	Bamber South	9	6	9	7		1
	N of Springhd Nursery	19	**11**			7	**1**
26/05/2015 pm	Peninsula	6	6			4	2
	West Quarry	2	2	11	3		
	Bamber South	7	3			1	
	Northfleet Landfill	7	7				
	N of Springhd Nursery	6	3			1	
01/06/2015 am	Peninsula	22	16				1
04/06/2015 am	West Quarry	1	1	2	2		
	Bamber South	5	5	11	**7**		
	Northfleet Landfill					3	**1**
	N of Springhd Nursery	3	3	6	**3**	1	
08/06/2015 pm	Peninsula	39	29			12	**6**
	Manor Way	1	**1**				
	West Quarry	6	3	17	7		
	Bamber South	7	4	4	1		
	Northfleet Landfill	1				1	
	N of Springhd Nursery	11	9	5	**3**	1	
11/06/2015 am	Peninsula	4	3			5	3
	West Quarry	2	2	5	2		
	Bamber South	2	2	2	2	1	1
	N of Springhd Nursery	1	1	4	**3**	2	
15/06/2015 am	Peninsula	11	5			6	4
	West Quarry			25	**13**		
	Bamber South	5	3	2	2		
	N of Springhd Nursery			3	2		
	Peak counts (adults only)						

Autumn		cl		sw		gs	
Date and time	**Area**	**All**	**Adults**	**All**	**Adults**	**All**	**Adults**
02/09/2015 pm	East Quarry	1	1				
14/09/2015 am	NE Tip	3	**3**				
14/09/2015 pm	Broadness	14	**10**				
22/09/2015 pm	Broadness	7	5				
23/09/2015 am	East Quarry	2	2				
	Bamber South	9	3	4	4	5	
23/09/2015 pm	Peninsula West	52	**11**			2	**2**
	Peninsula Centre	57	23			1	**1**
	Broadness	6	2				
24/09/2015 am	Manor Way	1	**1**			2	
	Bamber North					1	
	East Quarry	19	**4**				
24/09/2015 pm	West Quarry	20	4	20	9	1	
	CTRL West	4	1				
25/09/2015 am	Bamber South	3	1	2	1	1	
	N of Springhd Nursery	4	3	2			
28/09/2015 am-pm	Peninsula West	12	8			1	
	Bamber North	2	2			1	**1**
29/09/2015 am	N of Springhd Nursery	12	10	1	1	1	
29/09/2015 pm	Broadness	11	4				
	East Quarry	5	2				
	Bamber North	1					
	CTRL West	6	**6**				
30/09/2015 am	East Quarry	12	2				
	Bamber North	1					
	Bamber South	27	10	7	6	4	
30/09/2015 pm	Broadness	9	6				
	Manor Way					1	**1**
	West Quarry	6	**5**	14	8		
	Northfleet Landfill	12	3				
01/10/2015 am	Peninsula Centre	29	13			1	**1**
	Broadness	15	7				
	NE Tip	2	2				
01/10/2015 pm	East Quarry	10	1				
	Bamber North	1				1	
08/10/2015 am	East Quarry	2					
	Bamber North	1					
08/10/2015 pm	N of Springhd Nursery	34	7			2	
	Peak counts (adults only) for each survey area						

Spring 2016		cl		sw		gs	
Date and time	**Area**	**All**	**Adults**	**All**	**Adults**	**All**	**Adults**
27/04/16 pm	Broadness	1	1				
	Bamber North			1	1		
	Northfleet Landfill	1		1	1	1	1
	CTRL West	1					
28/04/2016 am	Peninsula West	3	3			1	1
	Peninsula Centre	8	5				
	NE Tip	1					
06/05/2016 am	Peninsula West					2	
	Peninsula Centre	5	2				
	Broadness	3	3				
13/05/2016 am	Peninsula Centre	6	4				
	Bamber North			2	1		
	Northfleet Landfill	1	1				
16/05/2016 pm	East Quarry	2	1				
	Bamber North	1		1	1	2	
19/05/2016 pm	East Quarry	4	4				
	Bamber North	4	**3**	2	**2**	4	
20/05/2016 pm	East Quarry	7	**6**				
	Bamber North	4	2	1	1	4	
	Northfleet Landfill	17	**11**				
23/05/2016 pm	Peninsula West	17	9*			4	
	Peninsula Centre	40	**34***			5	1
	Broadness	7	6*			1	
	East Quarry	3	3				
	Bamber North	2	2	3	**2**	4	
27/05/2016 am	Bamber North	2	2			5	
	CTRL West	1	1				
	Peak counts (adults only) for each survey area						

*49 cl for whole Peninsula (West + Centre + Broadness)

Table 7 Peak counts (adults)

Area	cl	sw	gs
Peninsula W	11		2
Peninsula Centre	34		1
Broadness	10		
Peninsula	36	1	6
Manor Way	1		1
West Quarry	5	13	
East Quarry	6		
Bamber North	3	2	1
Bamber South	14	7	3
Northfleet Landfill	11		1
CTRL West	6		
N of Springhd Nursery	11	3	1

Table 8 Population size class, assemblage score and qualifying Key Reptile Sites*

Area	cl	sw	gs	No. spp.	Score	Key Reptile Site	Qualifying criteria
Peninsula W	Good		Low	2	3		
Peninsula Centre	Exceptional		Low	2	4	✓	3 + 4
Broadness	Good			2	2		
Peninsula	Exceptional	Low	Good	3	6	✓	1 + 3 + 4
Manor Way	Low		Low	2	2		
West Quarry	Good	Good		3	4	✓	1 + 4
East Quarry	Good			1	2		
Bamber North	Low	Low	Low	2	3	✓	1
Bamber South	Good	Good	Low	3	5	✓	1 + 4
Northfleet Landfill	Good		Low	2	3		
CTRL West	Good			1	2		
N of Springhd Nursery	Good	Low	Low	3	4	✓	1 + 4

* Based on - Froglife, 1999. Froglife Advice Sheet 10: Reptile Survey

Key Reptile Site - qualifying criteria
1. Supports 3 or more reptile species
2. Supports 2 snake species
3. Supports an exceptional population of one species
4. Supports an assemblage of species scoring at least 4

FIGURES





KEY

346 Heat Trap (2015 & 2016 survey)

366a Heat Trap (additional for 2016 survey)

306 Heat Trap (traps relocated after 2015 survey and repositioned for 2016 survey)

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0 50 100 Metres

N

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FIGURE 1a
SURVEY AREAS AND HEAT TRAPS

August 2016





KEY

346 Heat Trap

0 50 100 Metres

N

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FIGURE 1b
SURVEY AREAS AND HEAT TRAPS

August 2016