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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Approved	[redacted]
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CONTENTS

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**

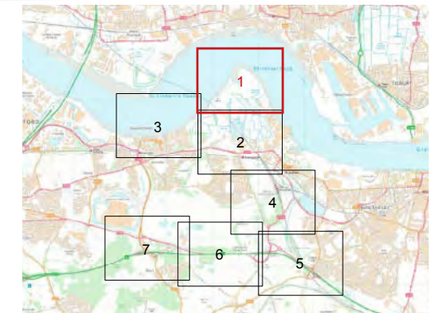
FIGURES

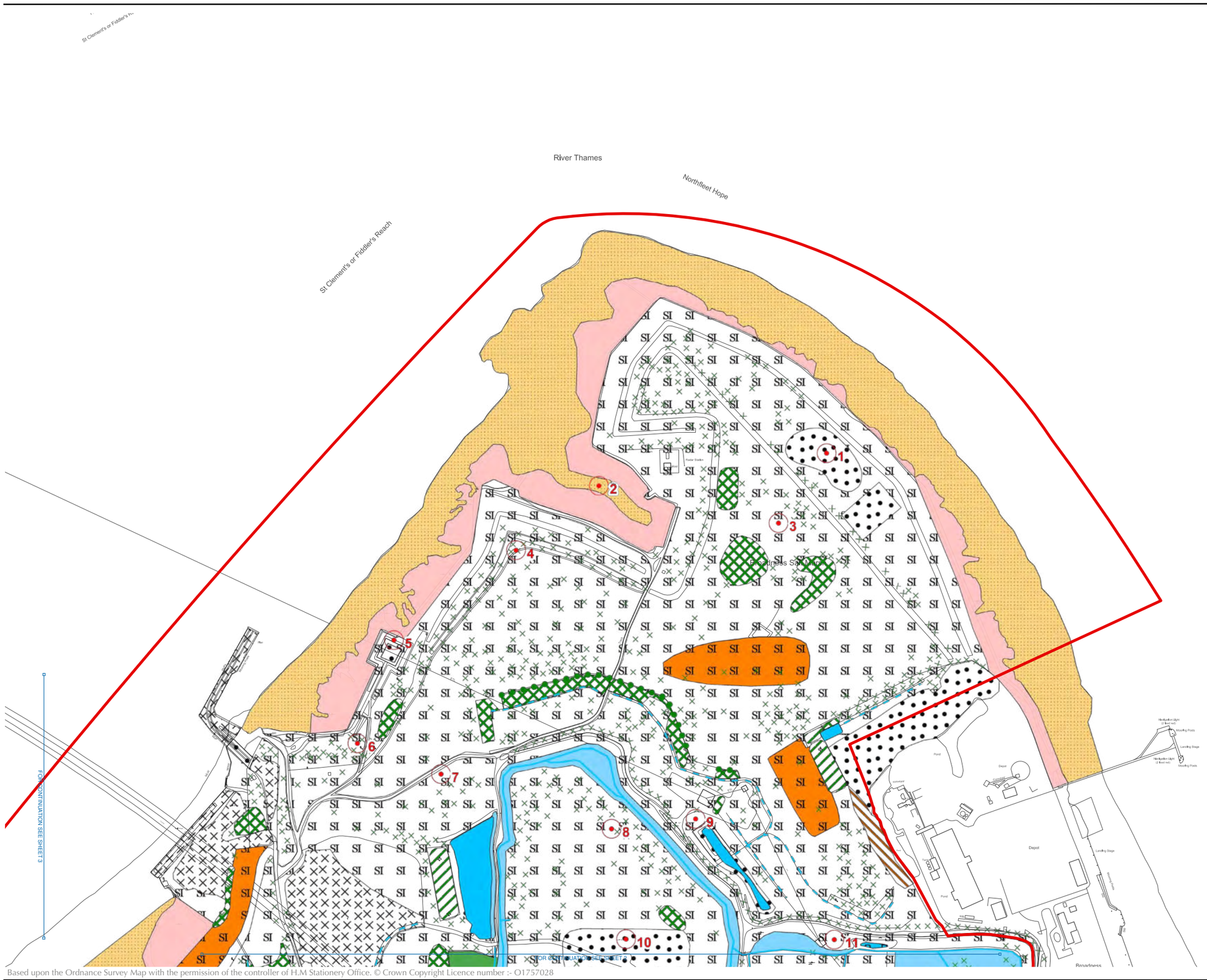
Figure 1

Designated Sites

Figure 2

Phase I Habitat Plan





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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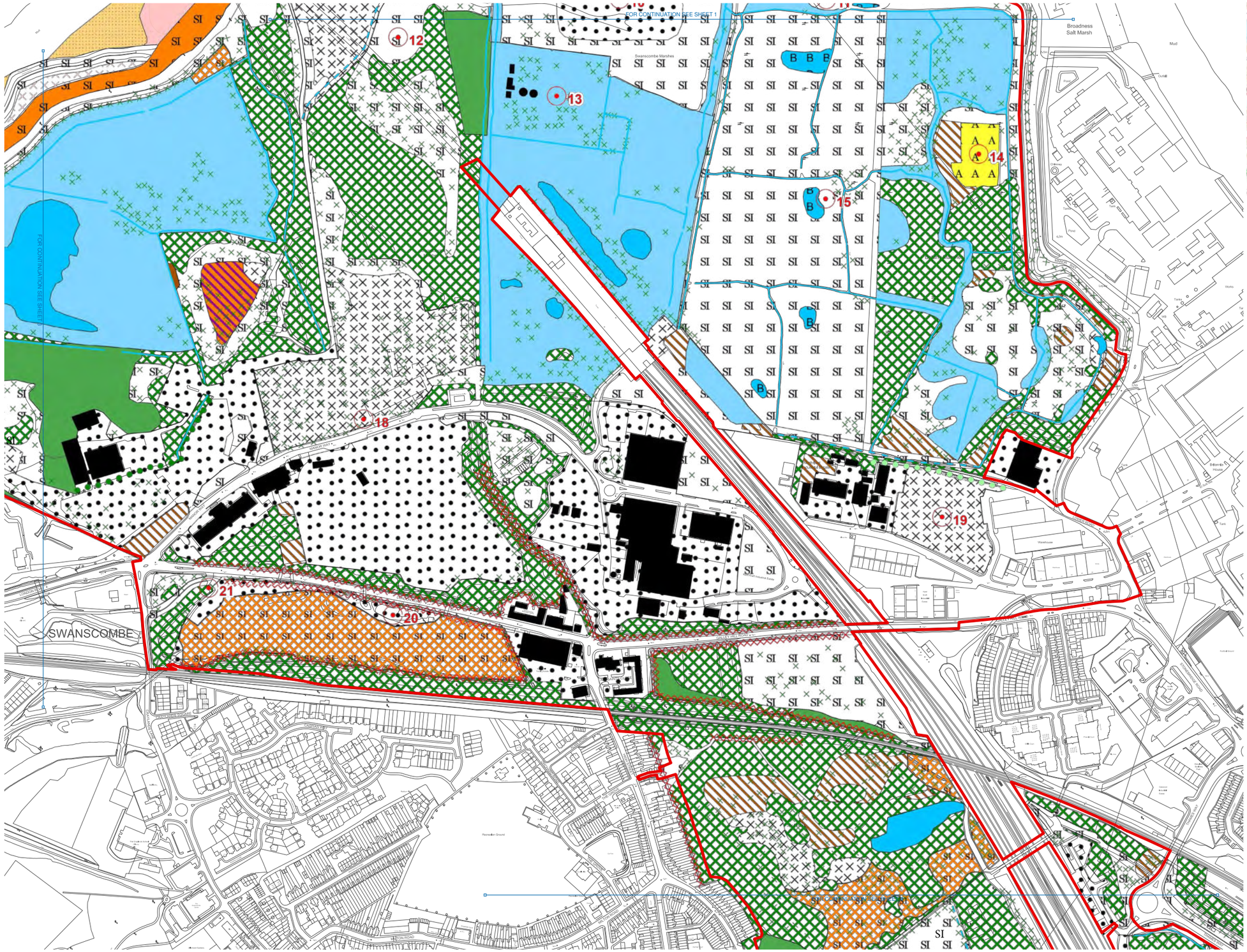
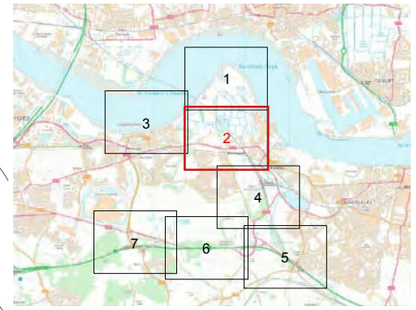
FIGURE 2a
PHASE 1 HABITAT PLAN

February 2016
11120201_Nationally Scarce Plants_27-01-16.indd





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N

0 100 200 Metres

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FIGURE 2b
PHASE 1 HABITAT PLAN

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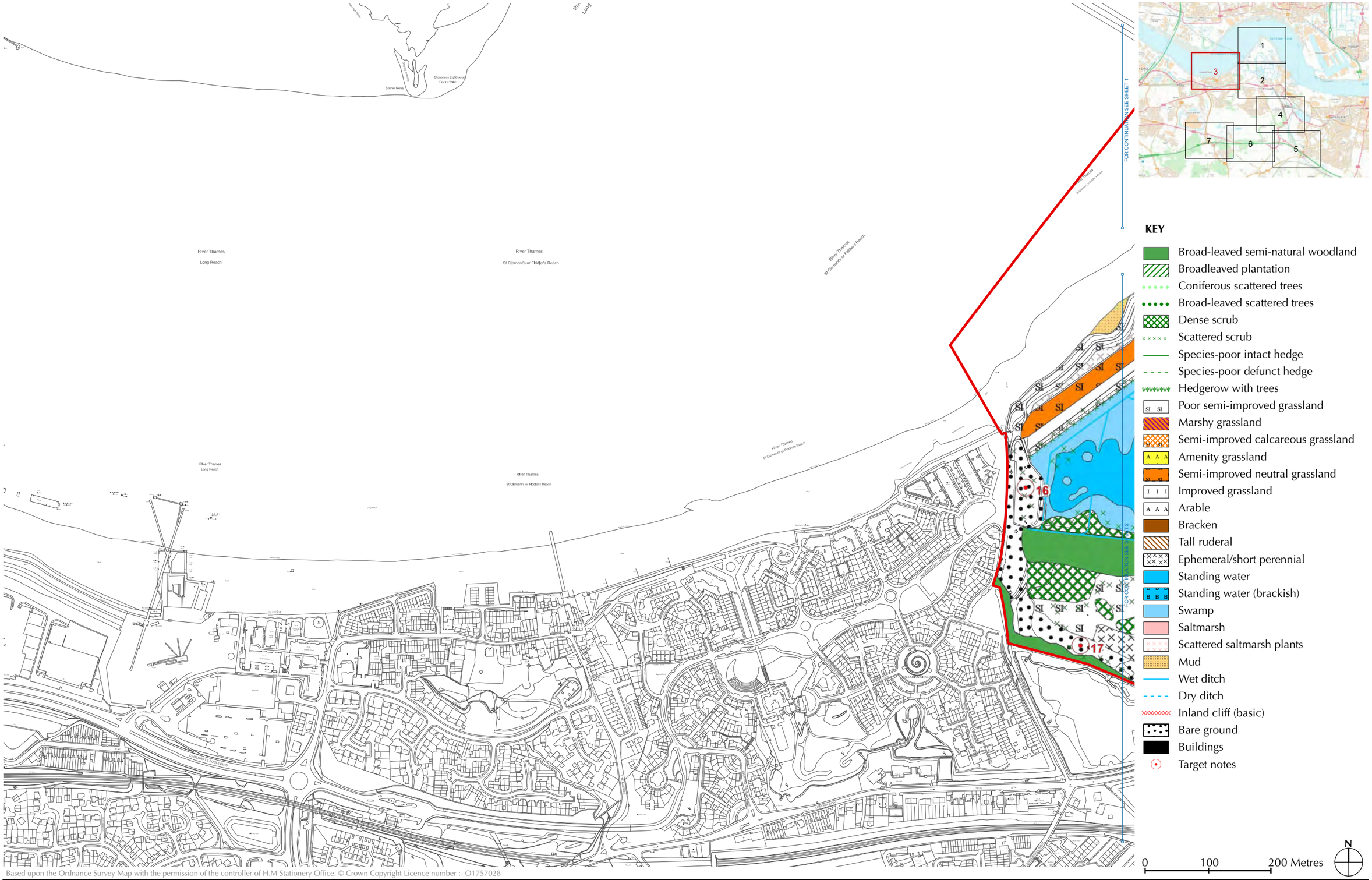

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FIGURE 2c
PHASE 1 HABITAT PLAN

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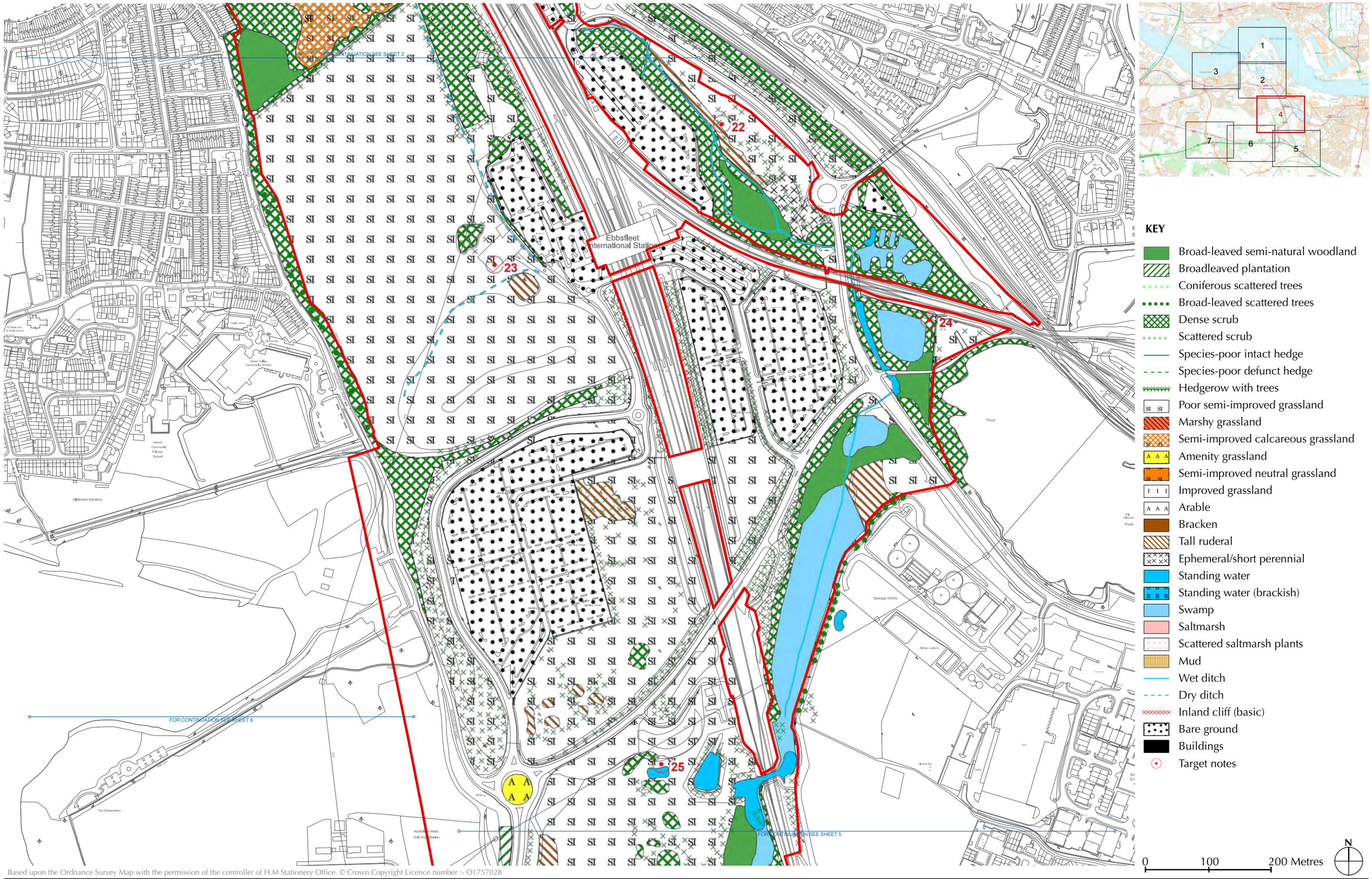

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FIGURE 2d
PHASE 1 HABITAT PLAN

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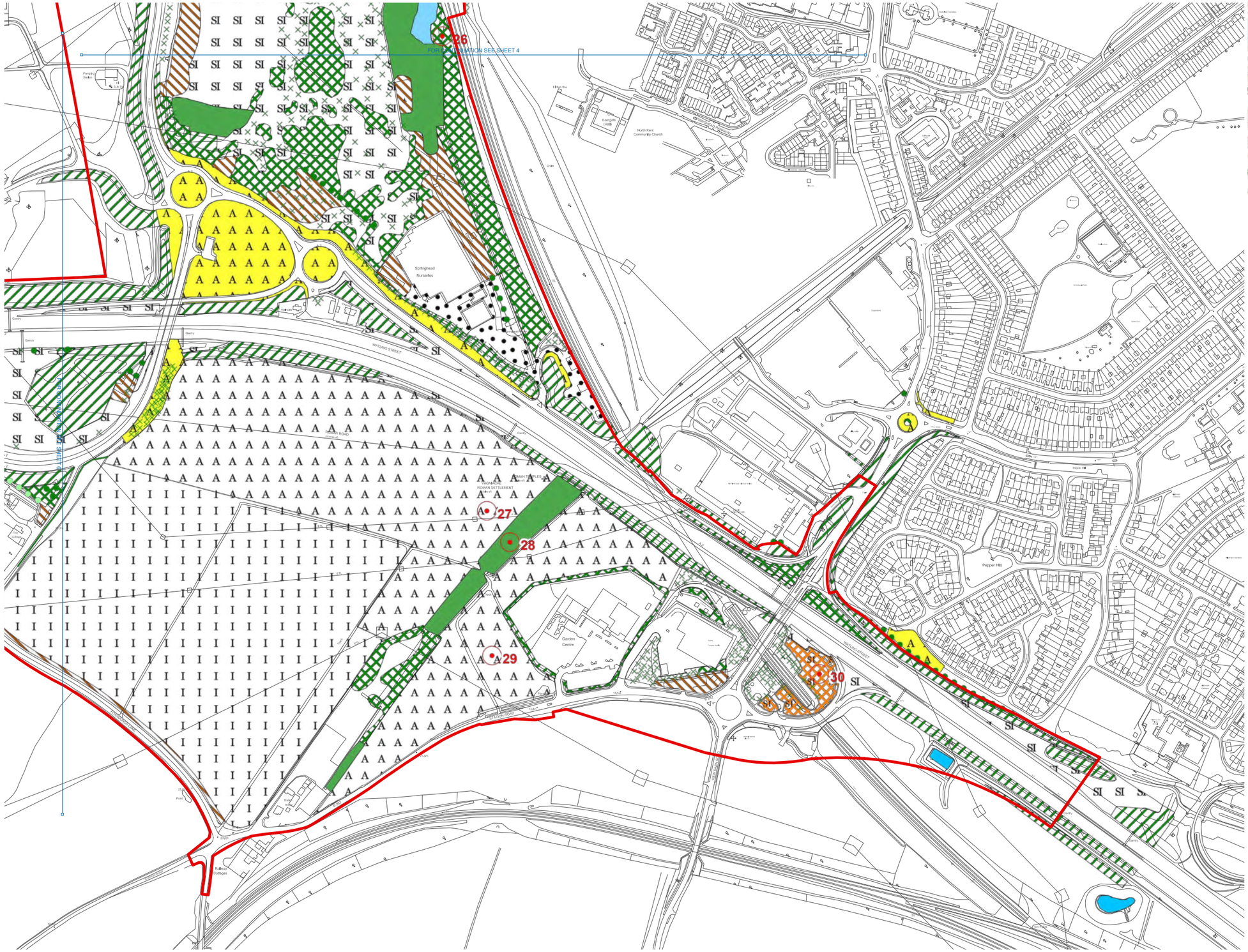

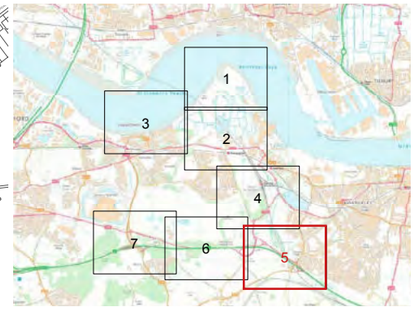

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- Inland cliff (basic)
- Bare ground
- Buildings
- Target notes

0 100 200 Metres

N

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FIGURE 2e
PHASE 1 HABITAT PLAN

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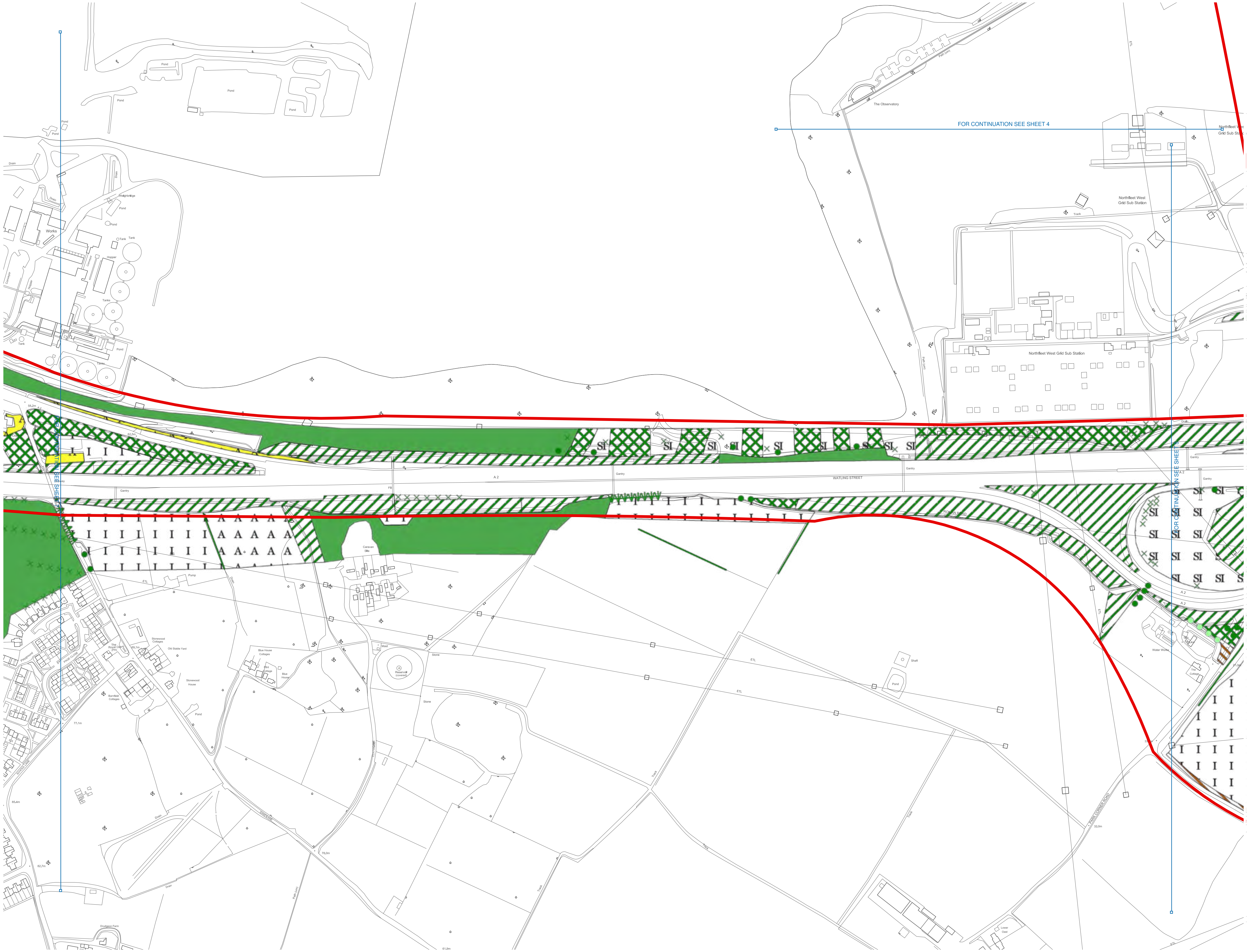

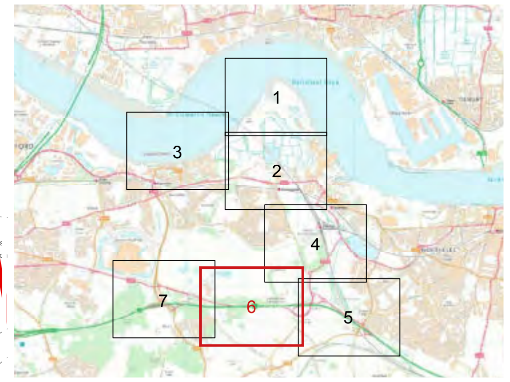

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0 100 200 Metres

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FIGURE 2f
PHASE 1 HABITAT PLAN

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FIGURE 2g
PHASE 1 HABITAT PLAN

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Figure 3

Areas referred to in the text

S - Saltmarsh

G - Grassland & early successional

W - Woodland

P - Ponds

D - Ditches

0 100 200 Metres

N

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FIGURE 3
AREAS REFERRED TO IN THE TEXT

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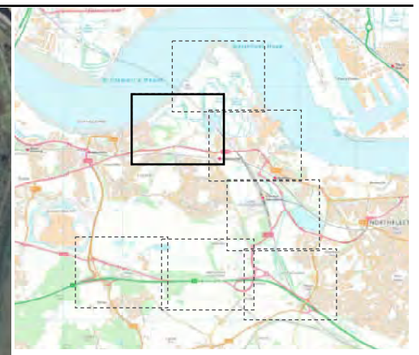
11120201_Figure3_11-02-16.indd



S - Saltmarsh

G - Grassland & early successional

W - Woodland

P - Ponds

D - Ditches

0 100 200 Metres

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FIGURE 3
AREAS REFERRED TO IN THE TEXT

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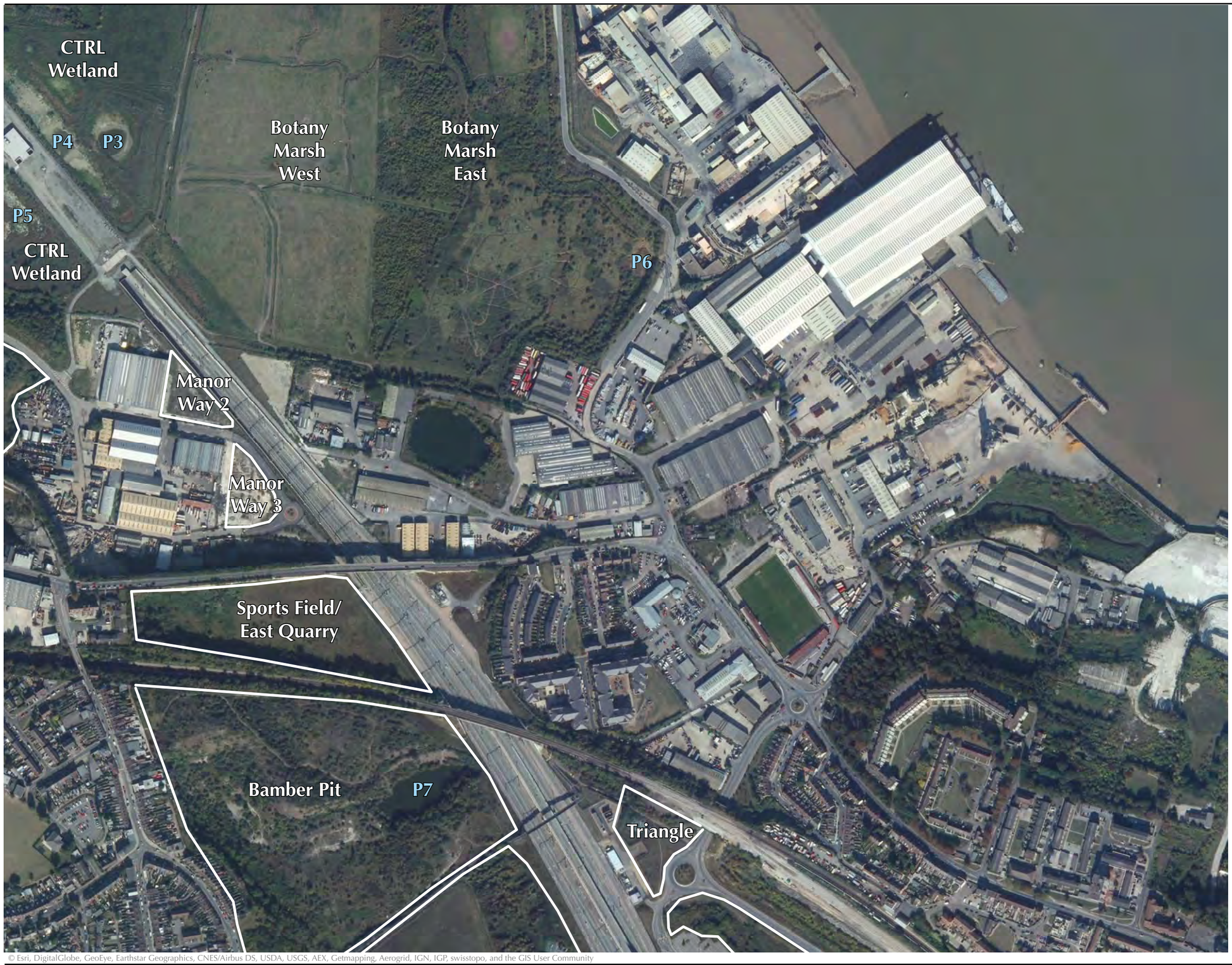

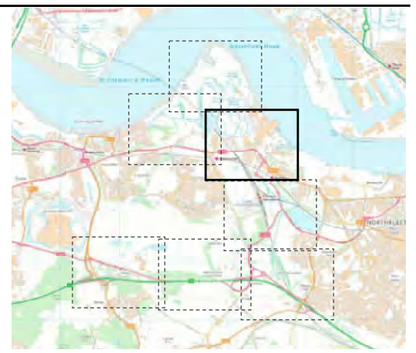

S - Saltmarsh

G - Grassland & early successional

W - Woodland

P - Ponds

D - Ditches

0 100 200 Metres

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FIGURE 3
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February 2016
11120201_Figure3_11-02-16.indd

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FIGURE 3
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FIGURE 3
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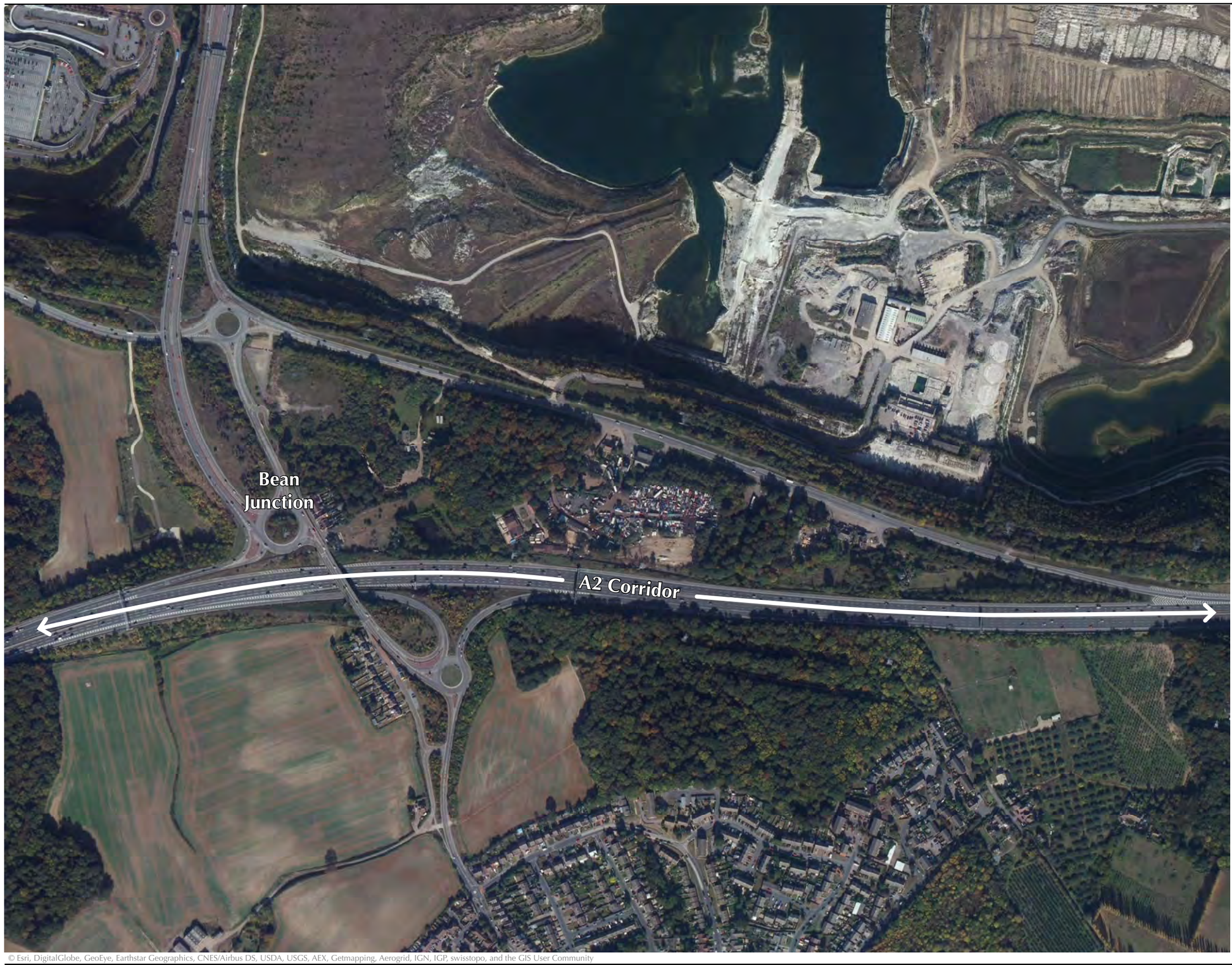

S - Saltmarsh

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0 100 200 Metres

N

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FIGURE 3
AREAS REFERRED TO IN THE TEXT

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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)

0 100 200 Metres

N

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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)

0 100 200 Metres N

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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
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- *Carex divisa* — Divided Sedge
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- *Medicago sativa ssp. falcata* — Sickle Clover

Kent Botanical Recording Group Records:

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- *Pyrola rotundifolia ssp. maritima* — Round-leaved Wintergreen (August 2015)
- *Bupleurum tenuissimum* — Slender Hare's Ear (August 2012)

N

0 100 200 Metres

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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)

0 100 200 Metres N

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LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

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:

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0 100 200 Metres N

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LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

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
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Annex EDP 15
2012/13 Wintering Birds Survey Report (CBA, 2013)

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landscape | environment | heritage

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	[redacted]
	Bill Wadsworth
Position	Senior Associate (Ecology)
Date	30th November 2013
Revision	Final

CONTENTS

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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KN	Knot
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LI	Linnet
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MH	Moorhen
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PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
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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 - 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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BG	Brent Goose
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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

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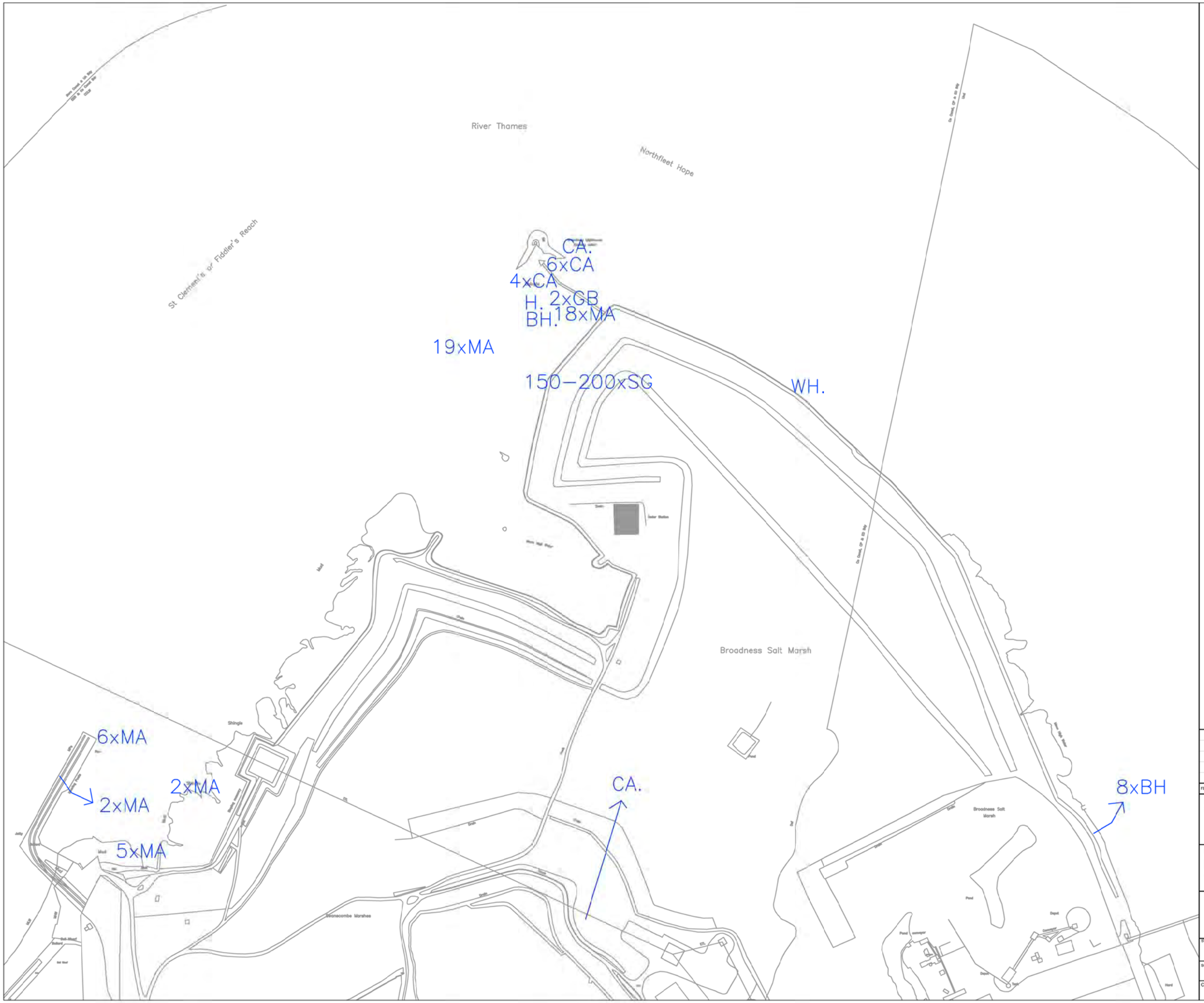
Project:
London Paramount - Wintering Bird Survey

Title:
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



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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

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Project:
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

River Thames

Northfleet Hope

St Clement's or Fiddler's Reach

Broadness Salt Marsh

CU
BW
T.
BH
M.
3xMA
H.
CA
10xMA
T.
30xST
H.
7xHG
8xBH
6xLB
7xM.
GB
17xST
75xSG
L.
3xBH
100xST
CA
44xG
GB
GB
CU
6xGB
11xHG
27x?
MA
CU
BH
24xBH
BH
R.
C
2xT.
16xBH
2xMA
H.
BH
6xBH

KEY

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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 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

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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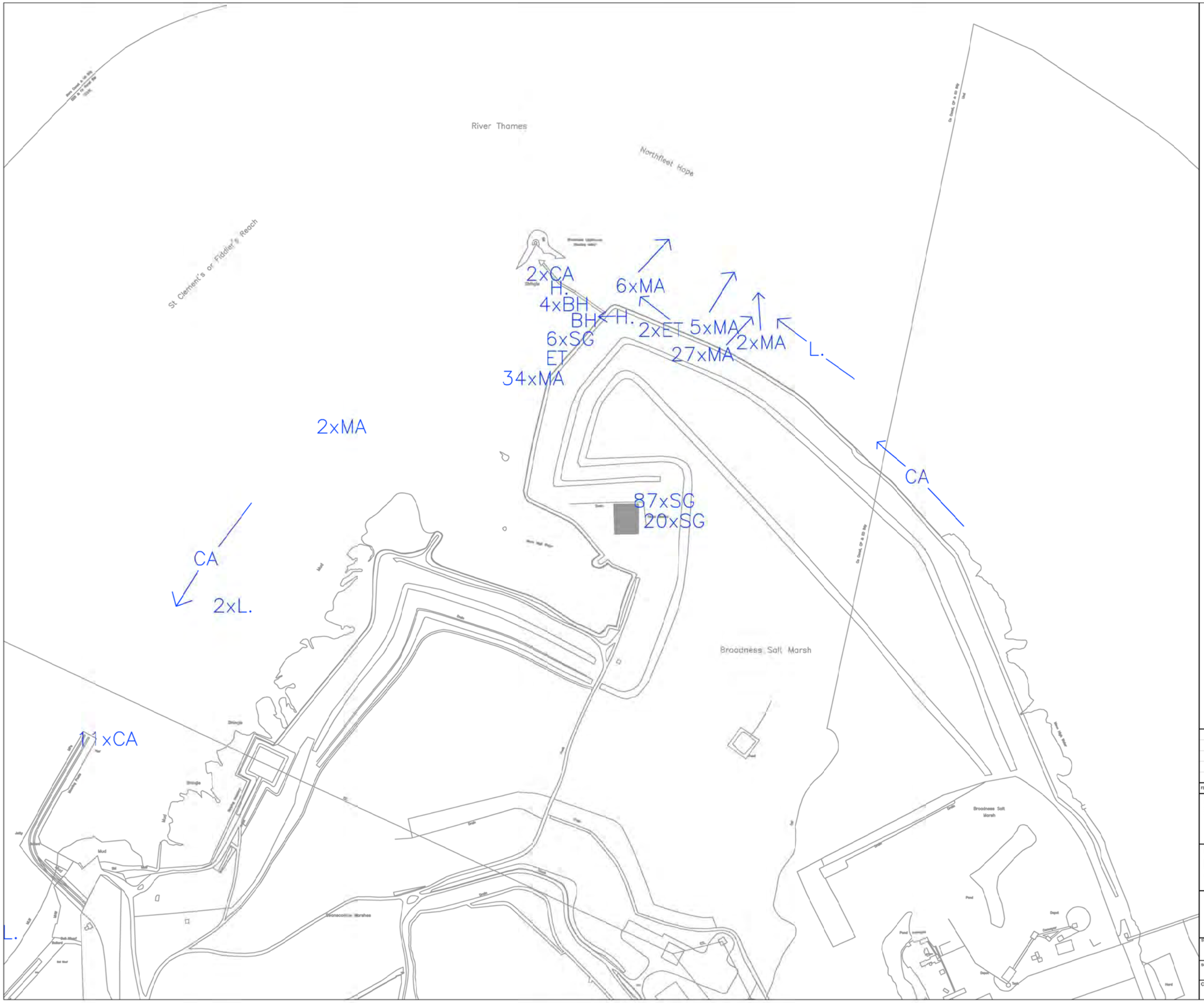
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - October 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
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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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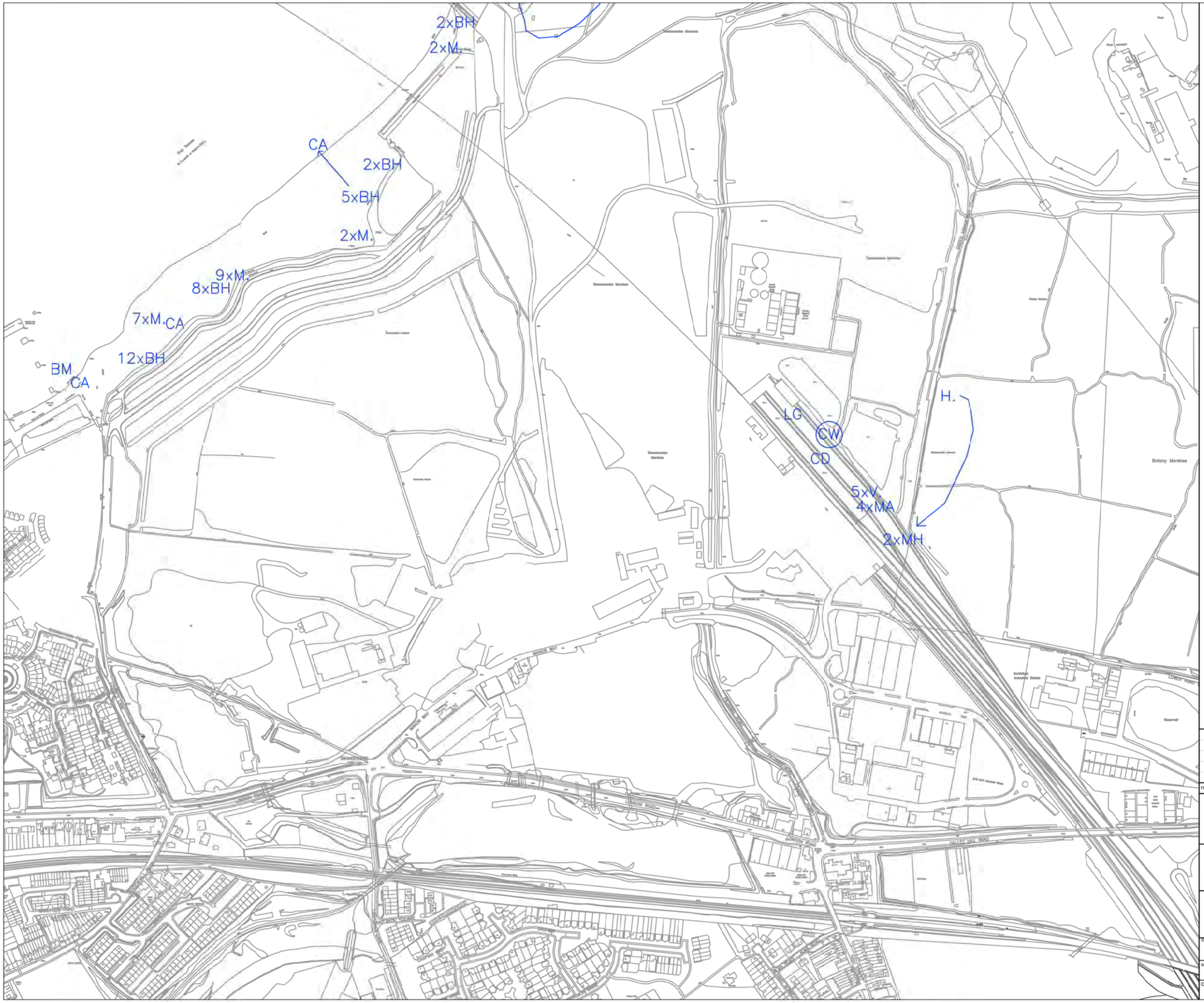
Project:
London Paramount - Wintering Bird Survey

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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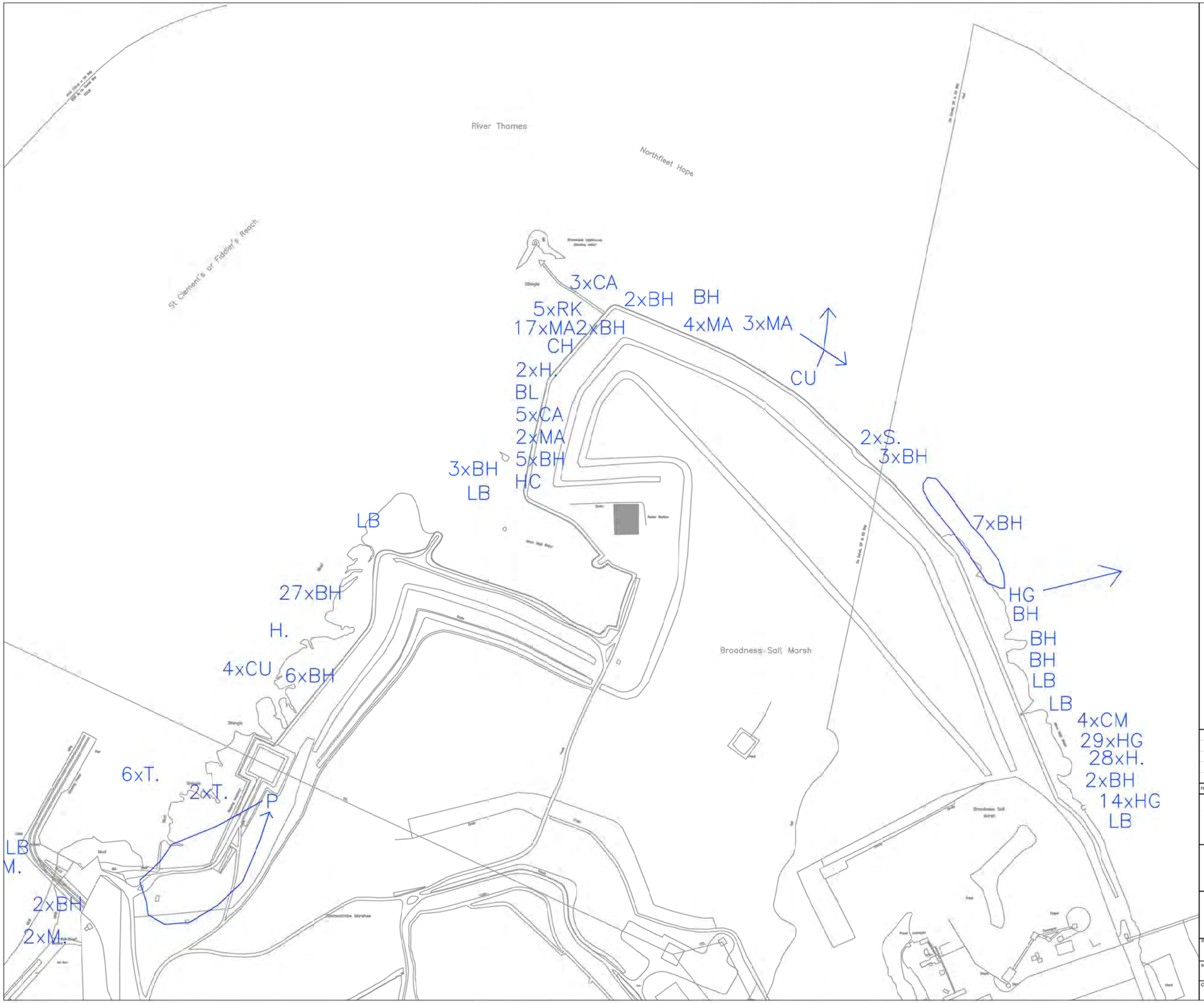
Project:
London Paramount - Wintering Bird Survey

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

15xMA
12xBH
13xBH
7xBH
2xBH
4xMA
2xBH H.
4xBH
TT
2xBH
L.
L. 3xBH
H.
4xBH
2xMA
3xBH
31xBH
T.
2xMA
CW.
HG.
3xMA
T.
1xCO
6xT
1xMH
T.

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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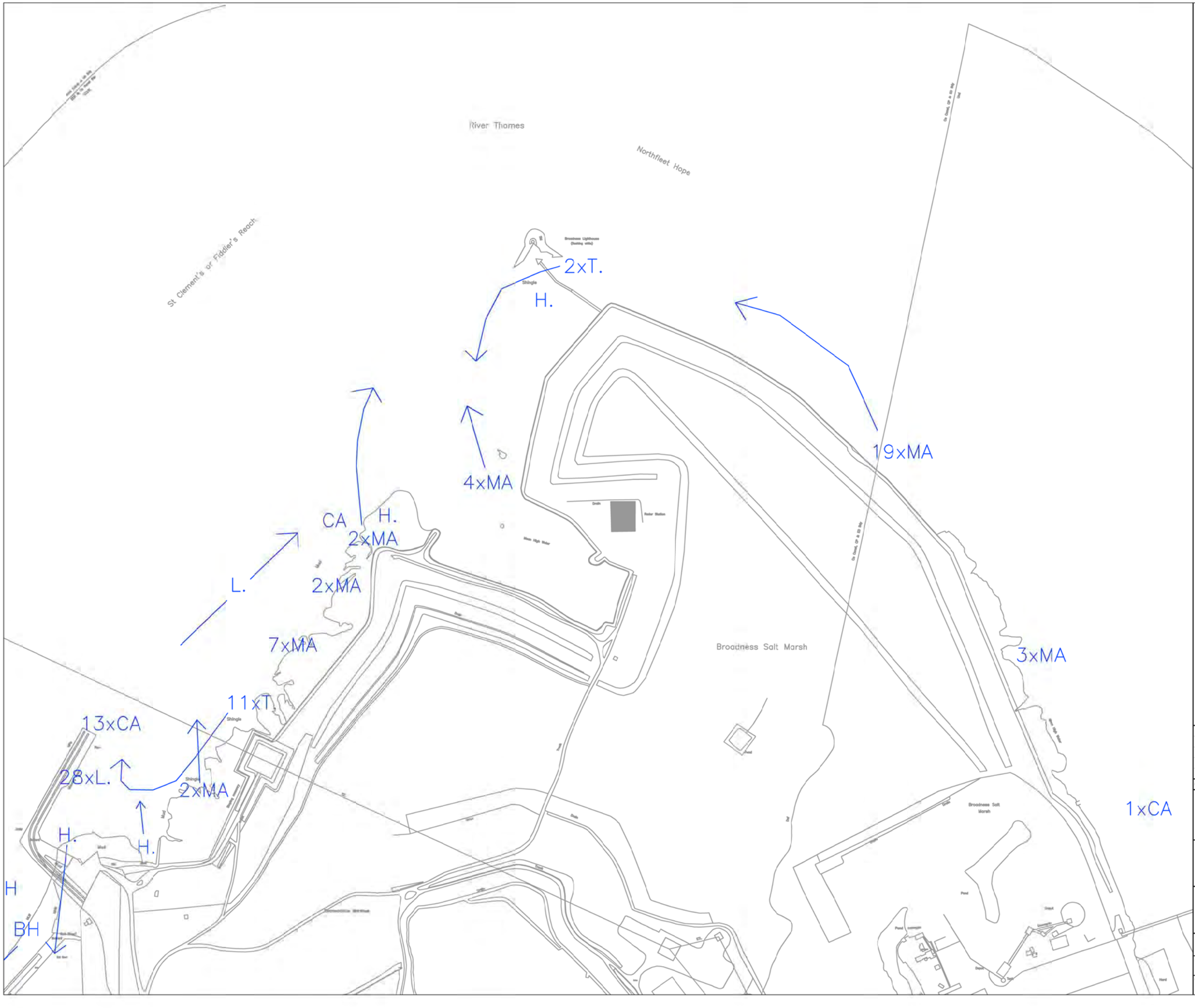
Project:
London Paramount - Wintering Bird Survey

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
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CM	Common Gull
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PE	Peregrine
PH	Pheasant
RB	Reed Bunting
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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

River Thames

Northfleet Hope

St Clement's or Fiddler's Reach

Broadness Salt Marsh

6xTT
6xCA
3xSD
CA
2xMA
4xBH
8xT.
12xRK
2xL.
67xRK
39xL.
4xTT.
26xGA
11xMA
7xT.
3xBH
4xT.
3xMA
12xBH
TT.
L.
CA
CM
15xGA
BH
44xT.
L.
41xT.
2xMA
15xGA
35xL.
22xBH
L.
2xTT
4xGA
MA
16xGA
7xMA
5xT.
9xL.
5L.
3xMA
L.
3xBH
2xMA
LB
LB
GE
LB
LB
3xHG
18xBH

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
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MA	Mallard
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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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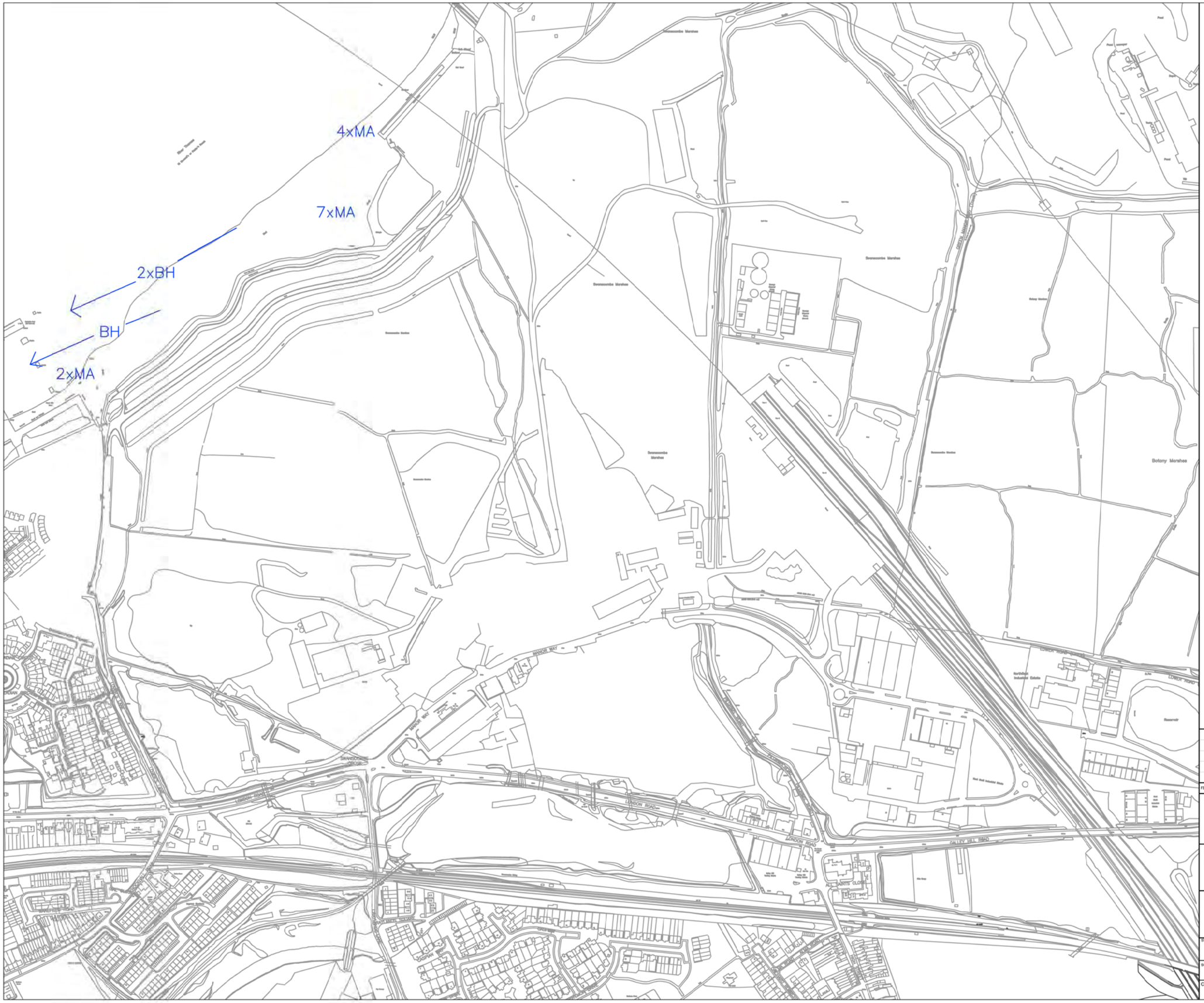
Project:
London Paramount - Wintering Bird Survey

Title:
North Area - December 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
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GK	Greenshank
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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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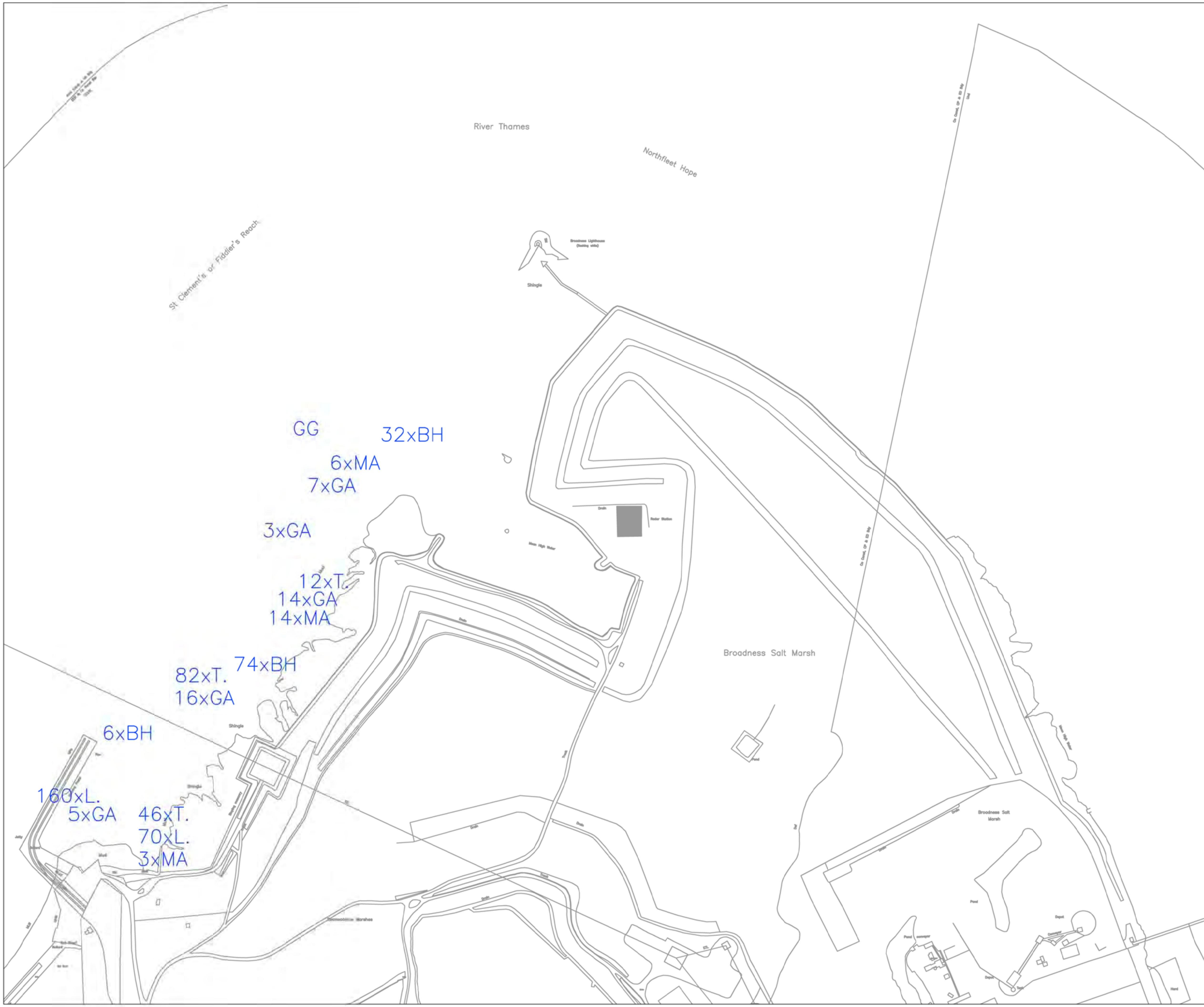
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - 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
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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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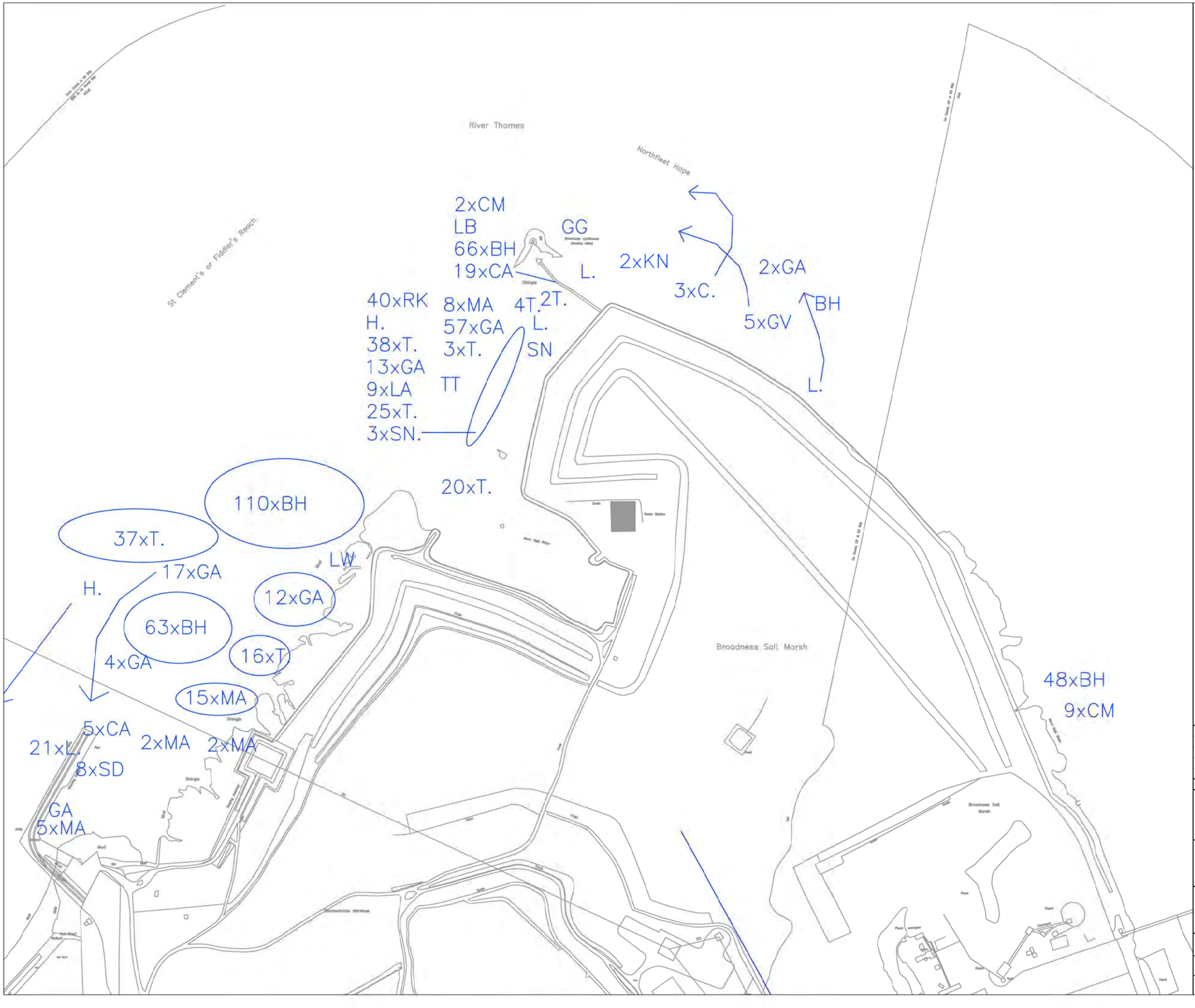
Project:
London Paramount - Wintering Bird Survey

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

47xBH
23xGA
16xMA
2xTT
4xMA
3xRK
CR
1xBH
OC
OC
3xMA
27xST
4xTU
2xMA
2xCO
2xMH
2xSV
17xBH
2xL.
11xHG
230xBH
4xCM
81xBH
2xHG
CM

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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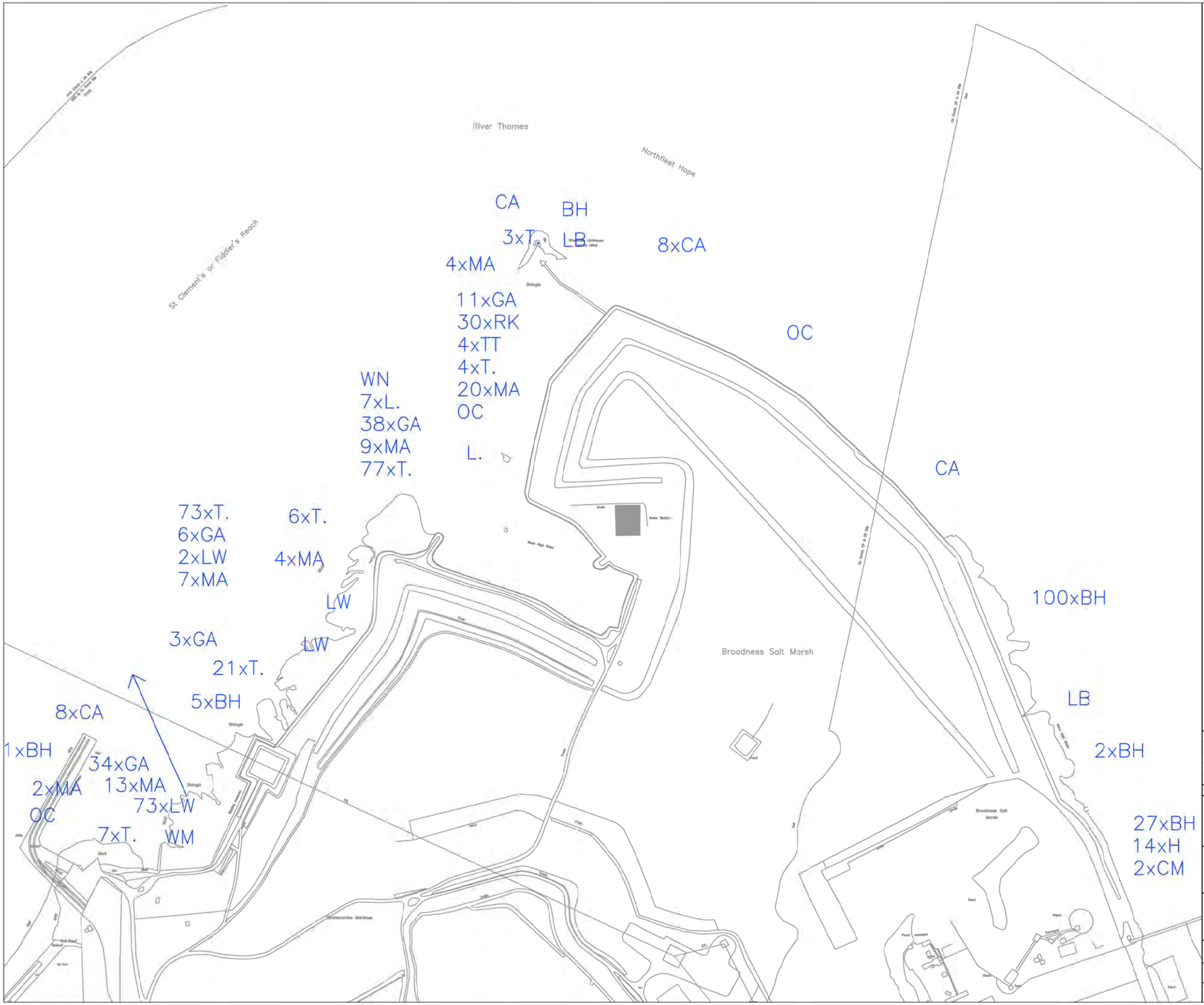
Project:
London Paramount - Wintering Bird Survey

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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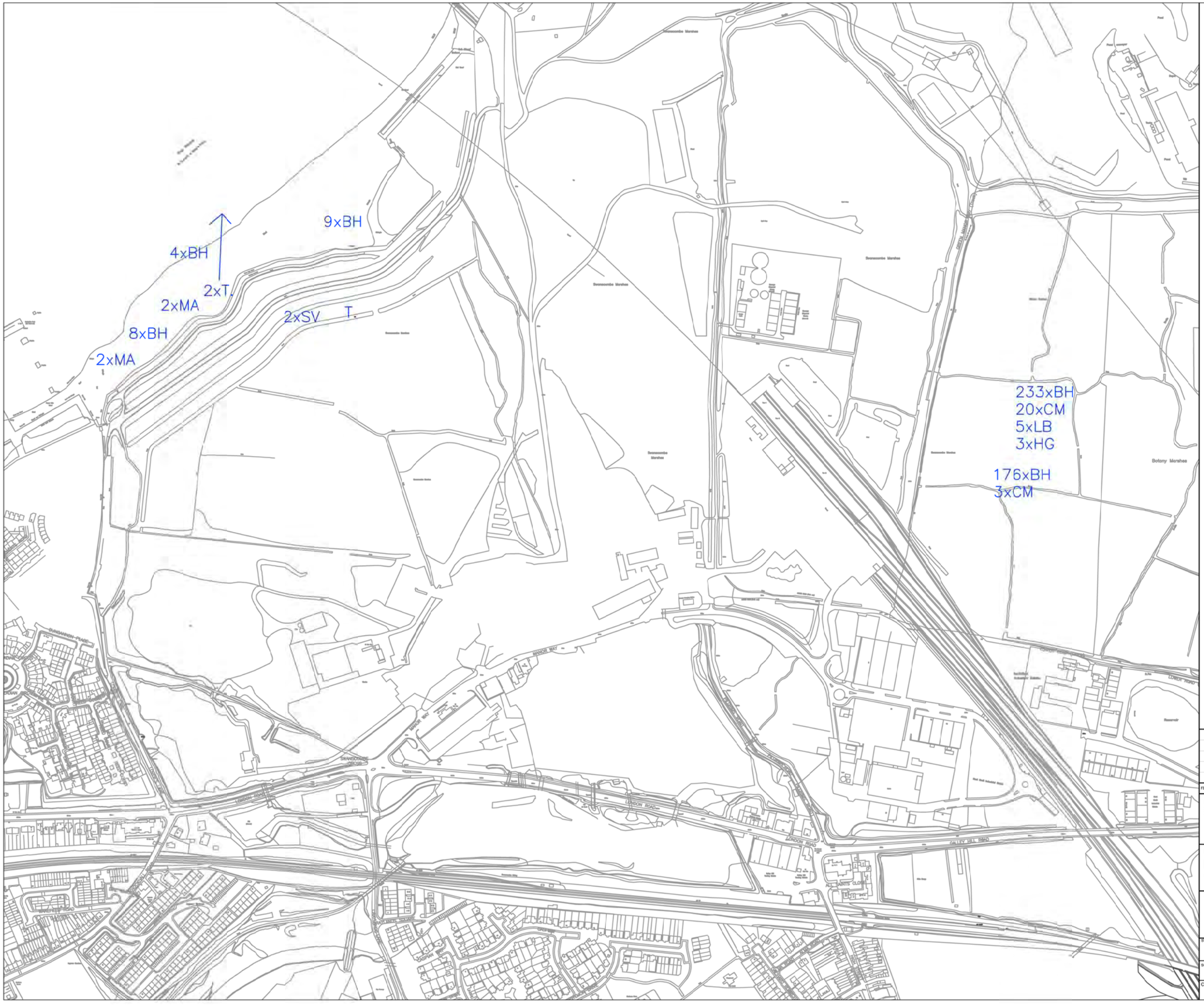
Project:
London Paramount - Wintering Bird Survey

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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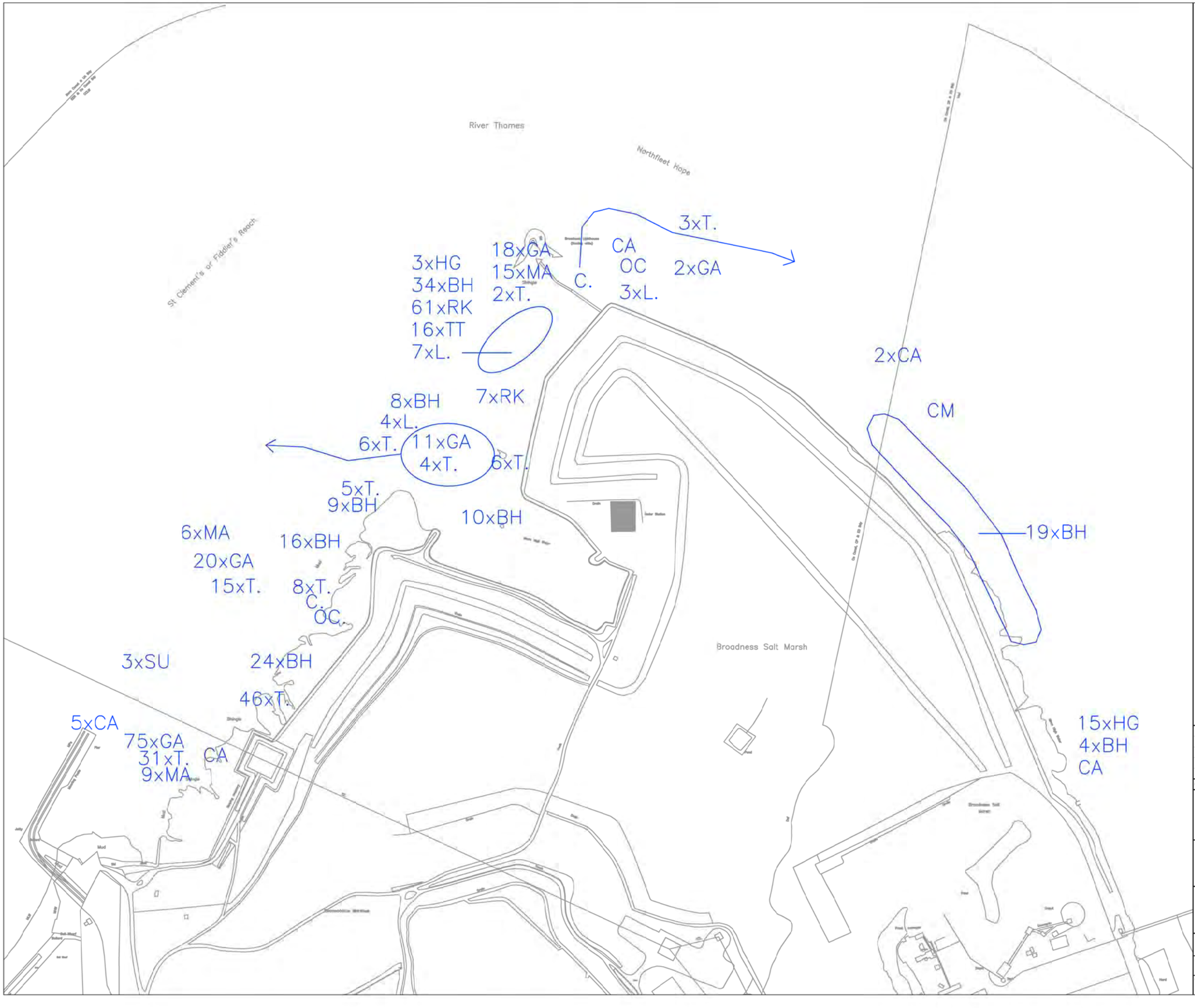
Project:
London Paramount - Wintering Bird Survey

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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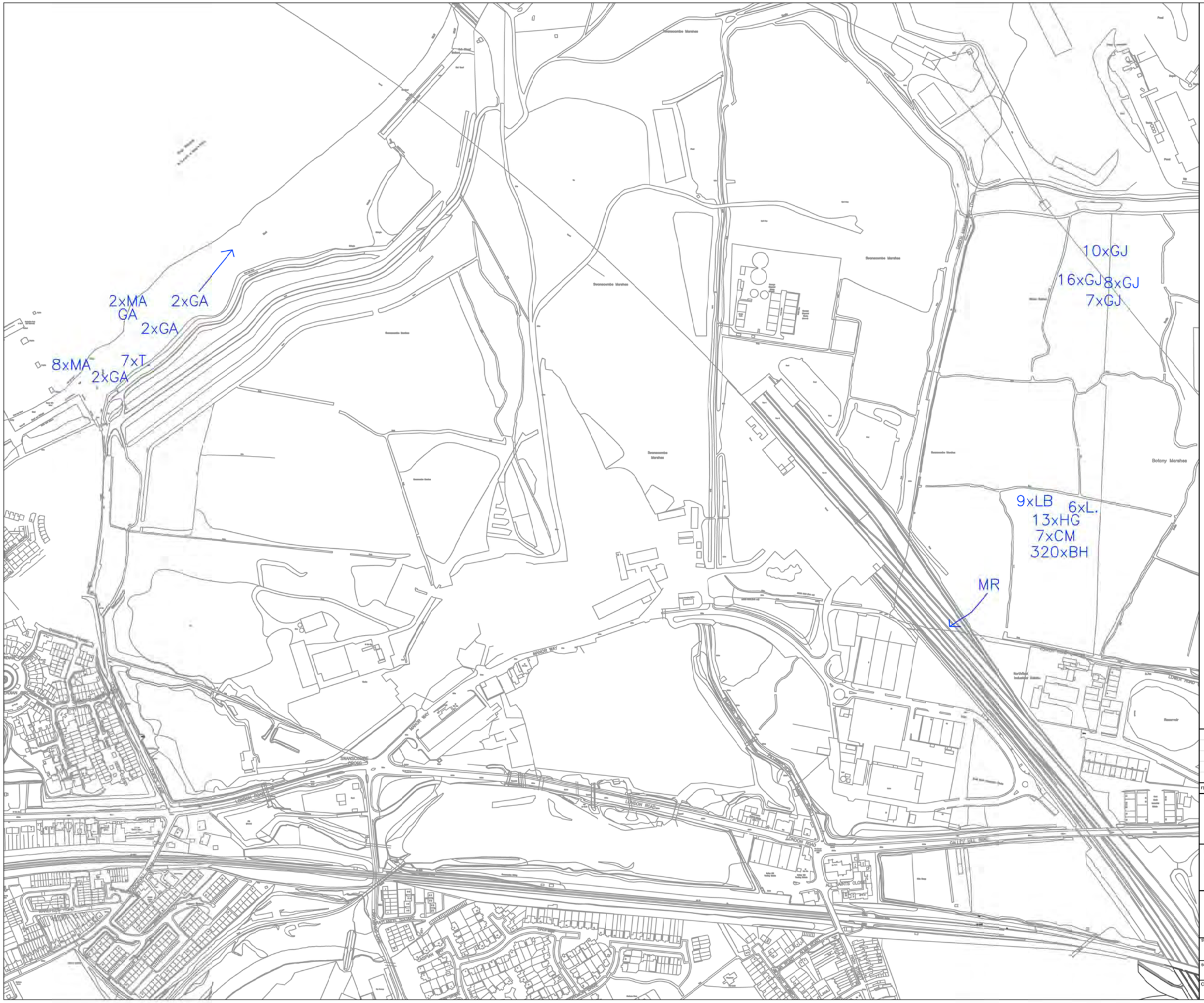
Project:
London Paramount - Wintering Bird Survey

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

revision	description	date	checked by

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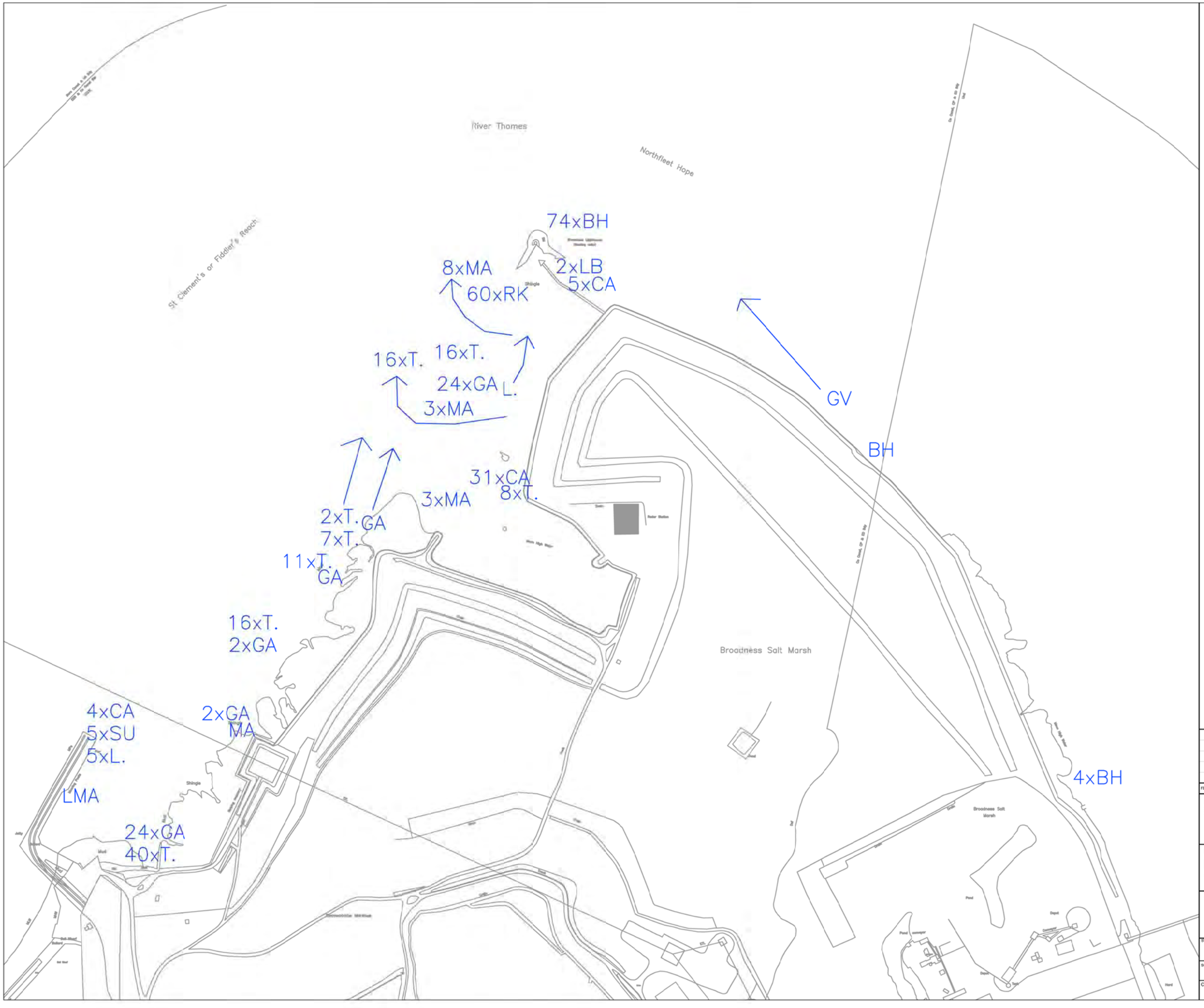
Project:
London Paramount - Wintering Bird Survey

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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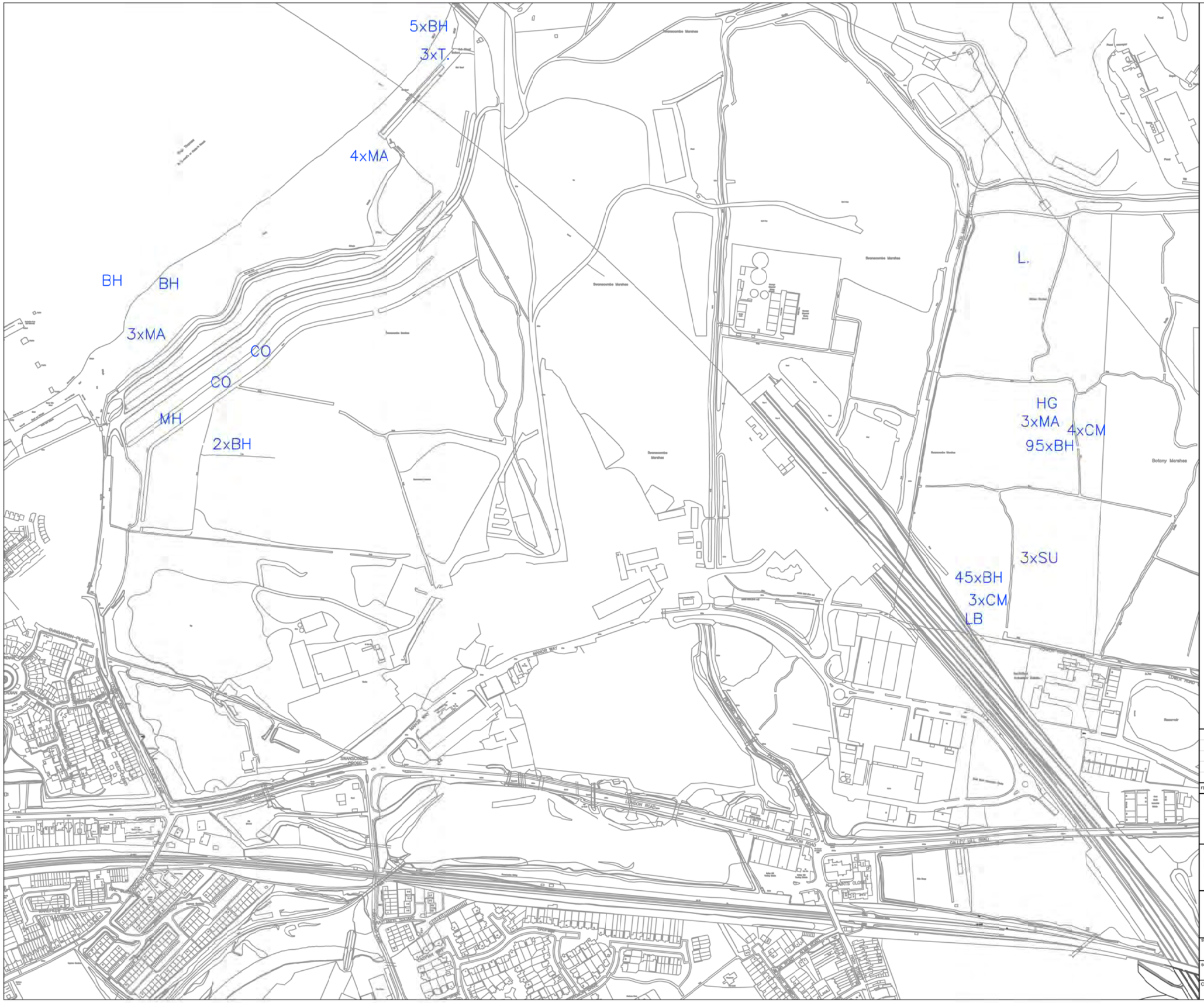
Project:
London Paramount - Wintering Bird Survey

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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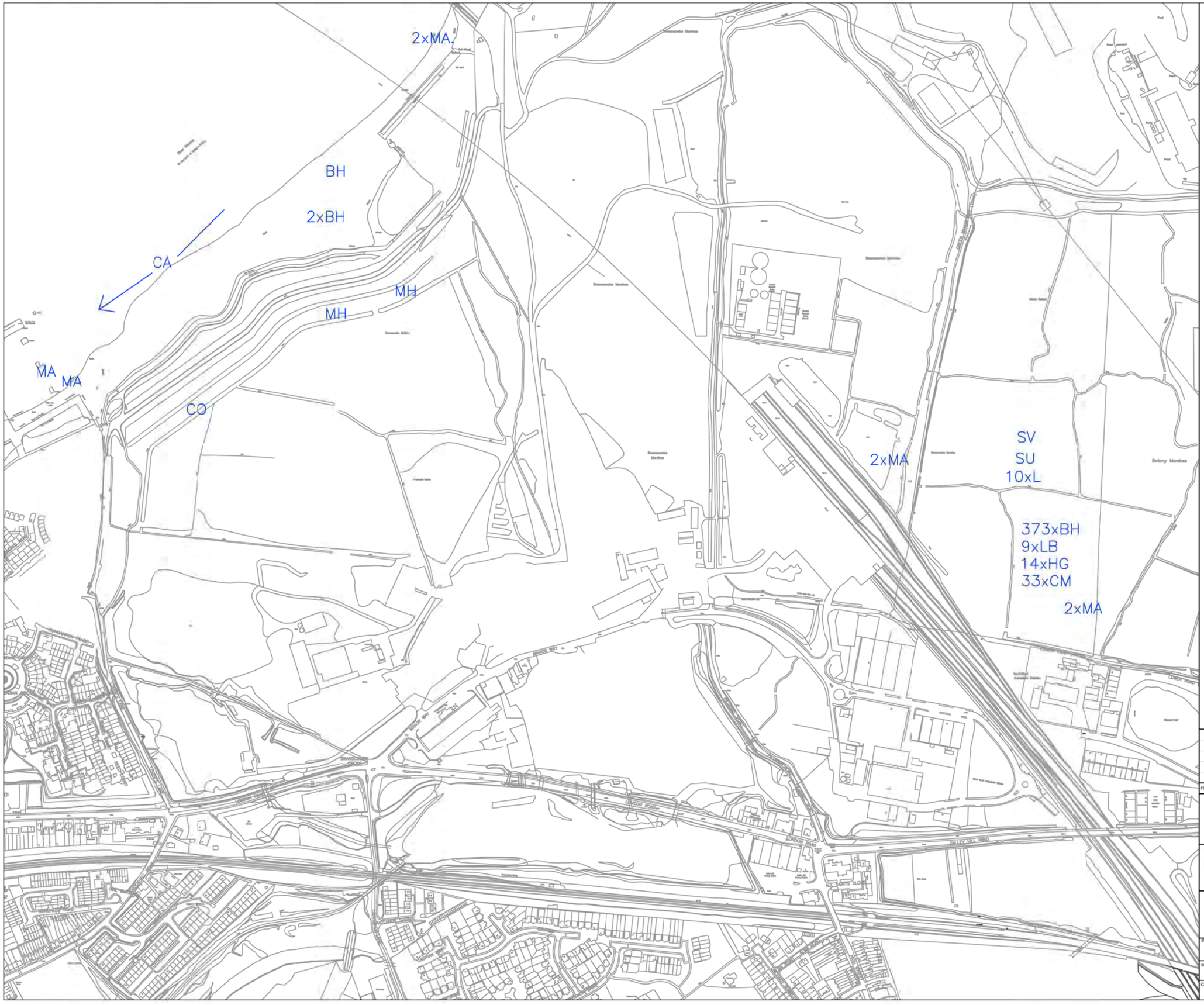
Project:
London Paramount - Wintering Bird Survey

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
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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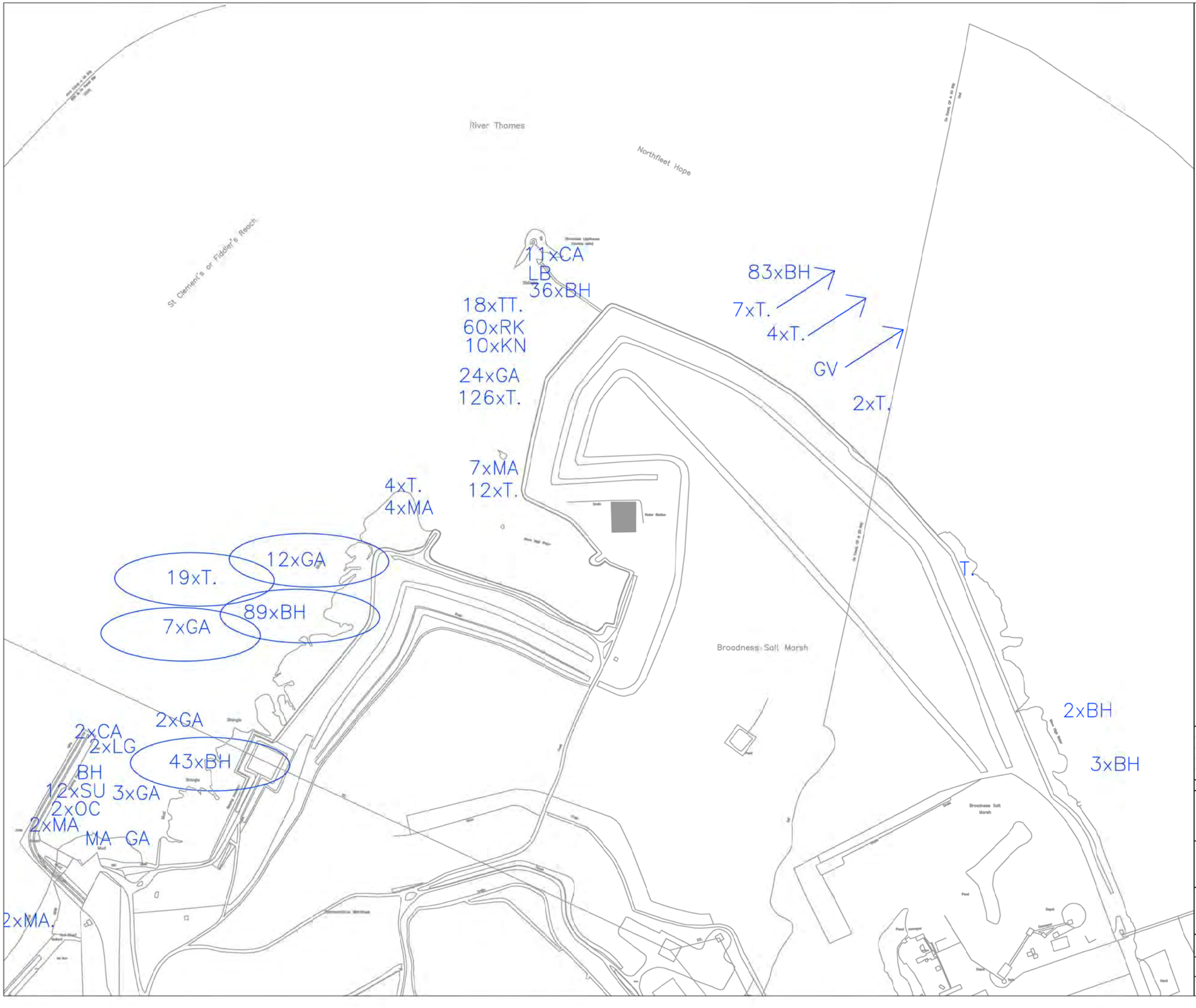
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - March 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
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

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 5055553, Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

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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CONTENTS

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

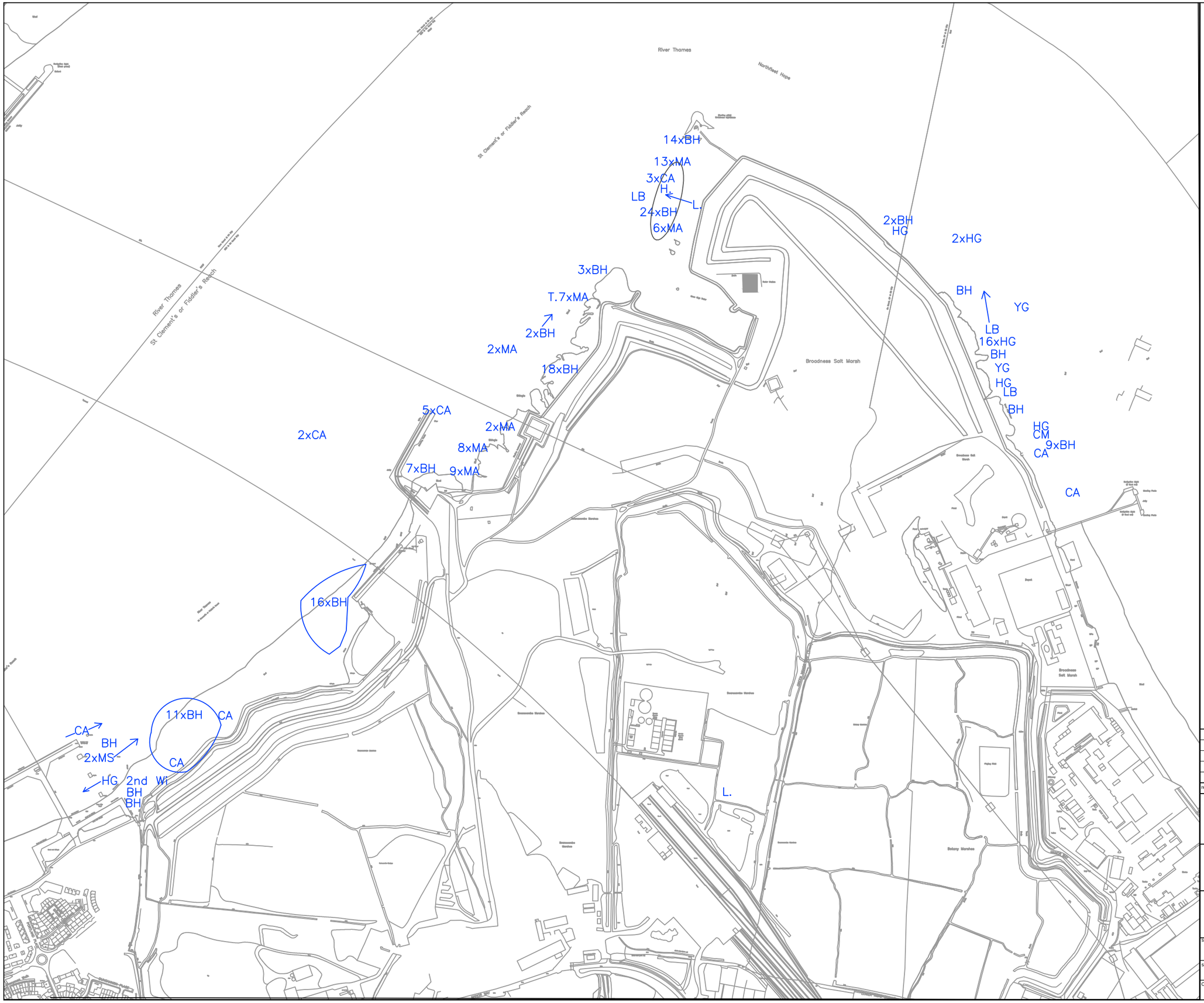
Table 4: Summary of Bird Surveys

	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
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:

September 2014 - Low Tide

status		drawing no.		
		Figure 1		
scale	size	date	drawn	checked
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CAD filename

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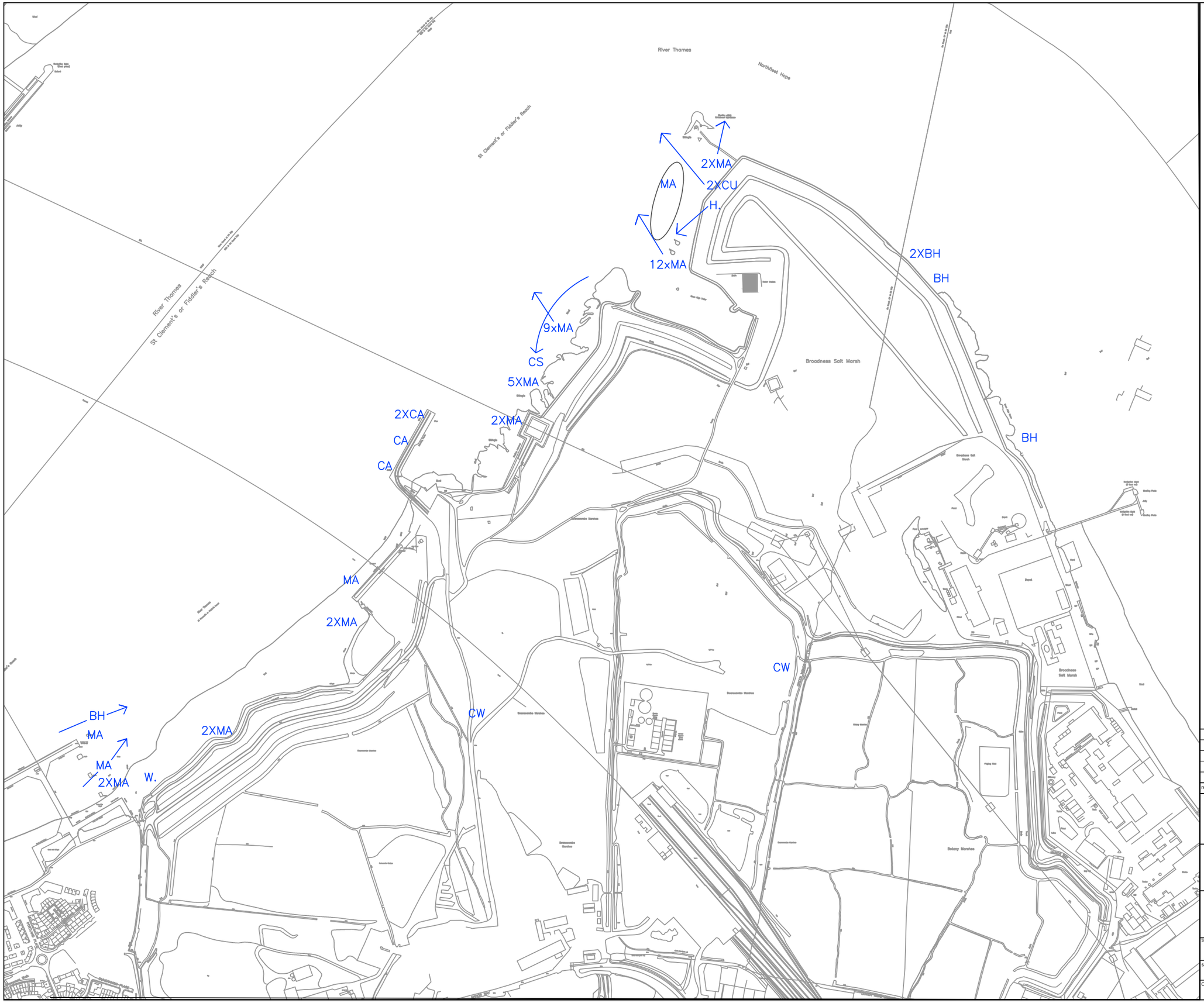

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MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

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Project:

LPER - Wintering Bird Survey

Title:

September 2014 - High Tide

status	drawing no.			
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scale	size	date	drawn	checked
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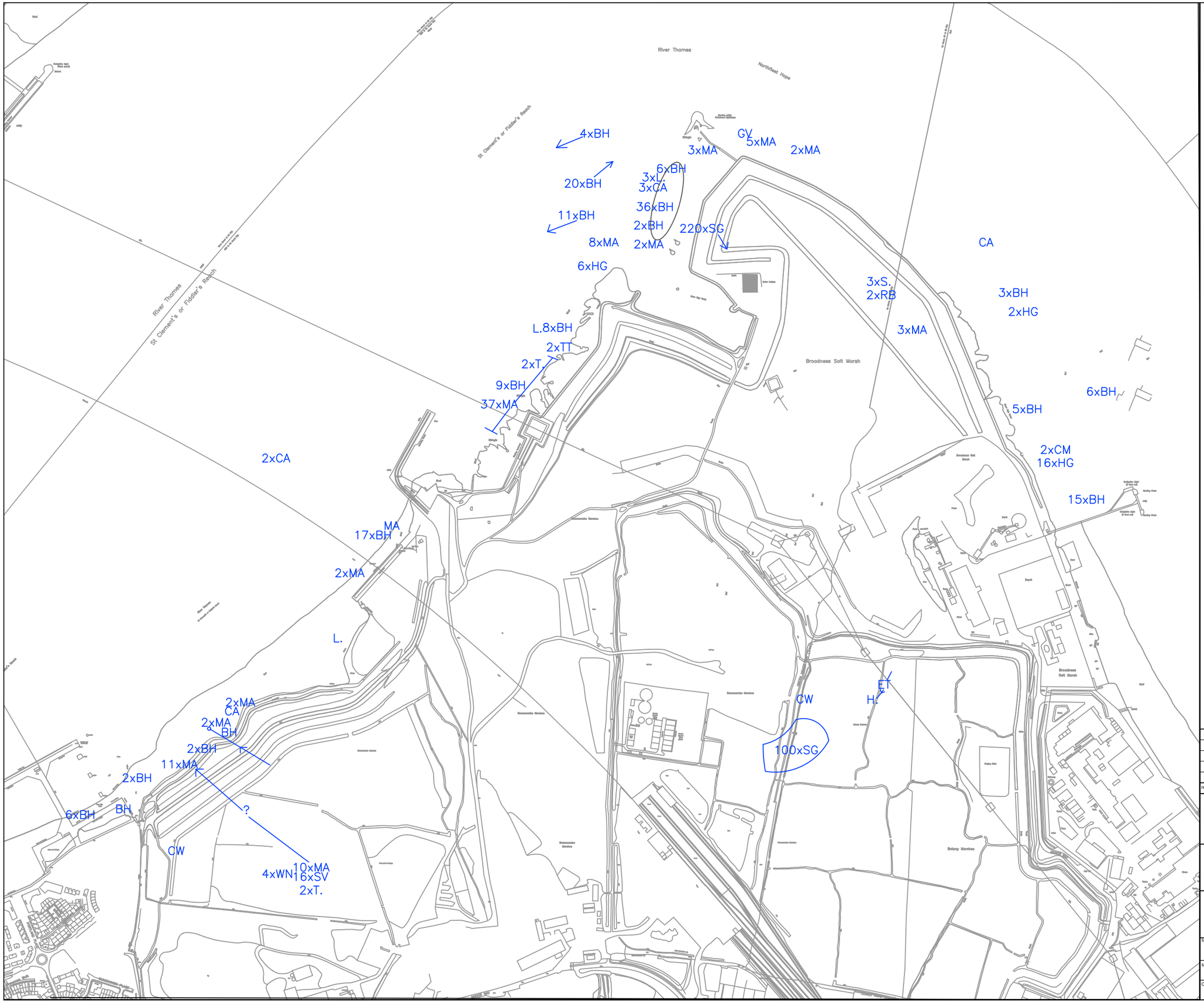

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GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Green Sandpiper
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
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

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

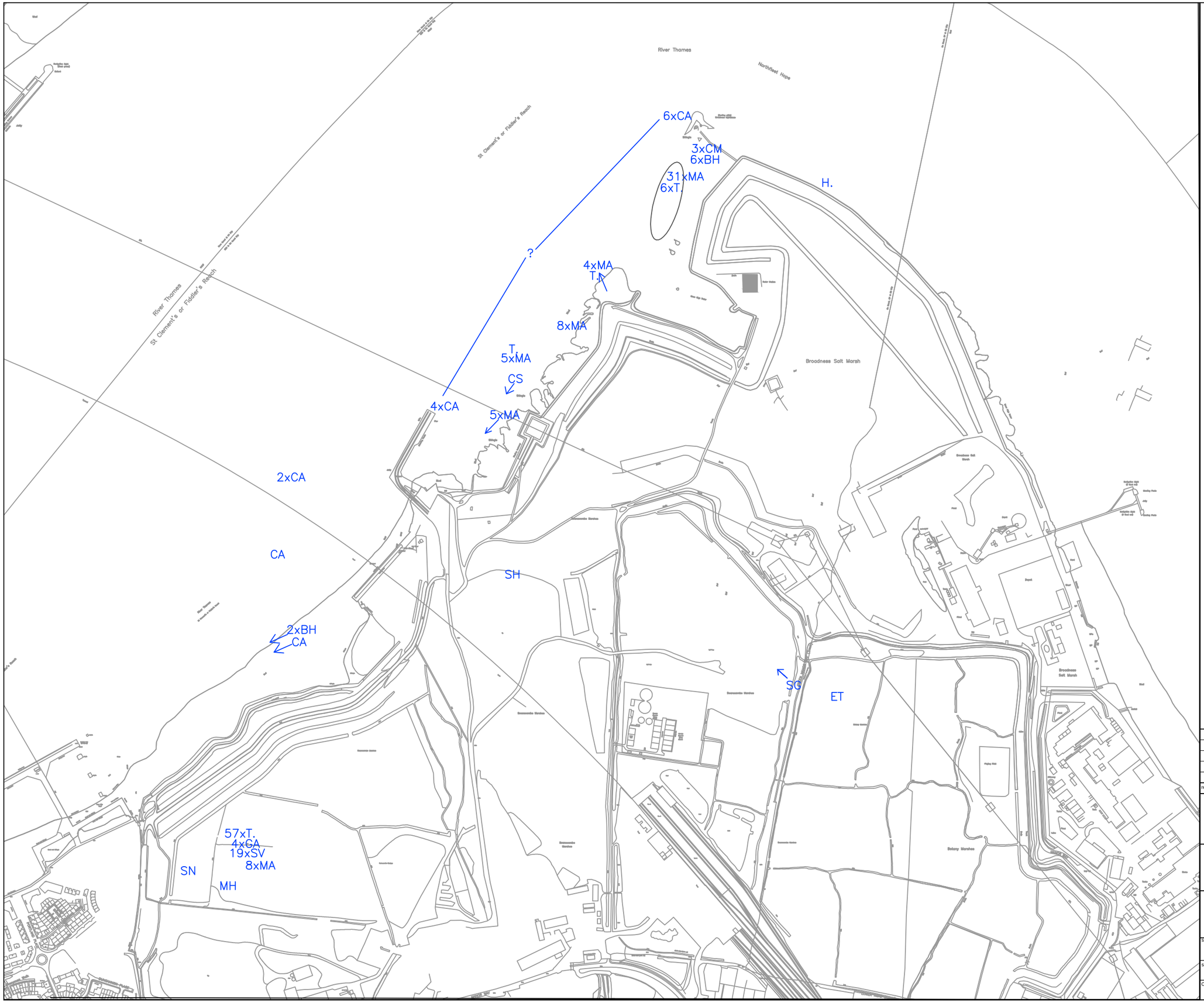
Title:

October 2014 - Low Tide

status		drawing no.		
		Figure 3		
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

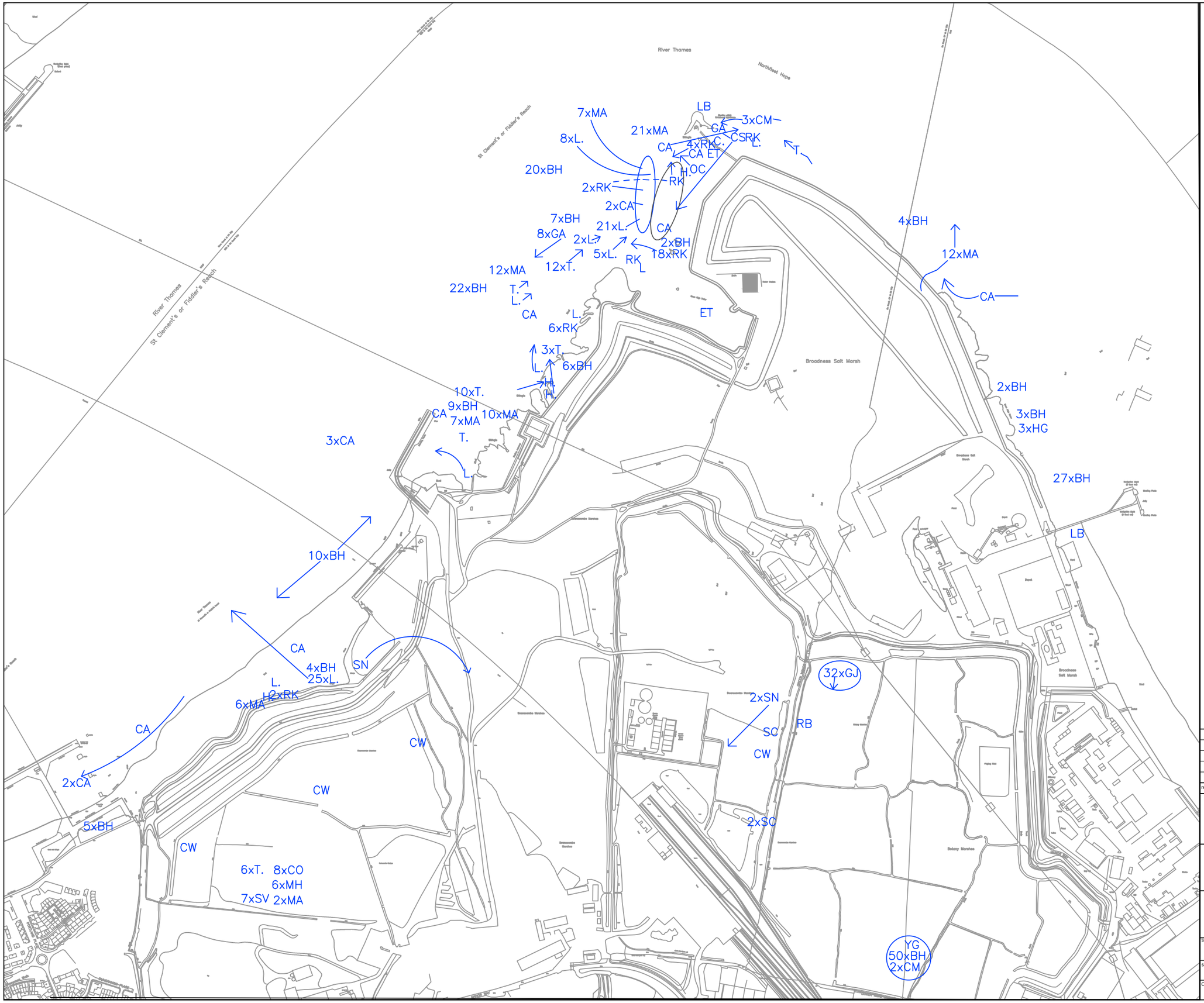
Title:

October 2014 - High Tide

status	drawing no.			
	Figure 4			
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

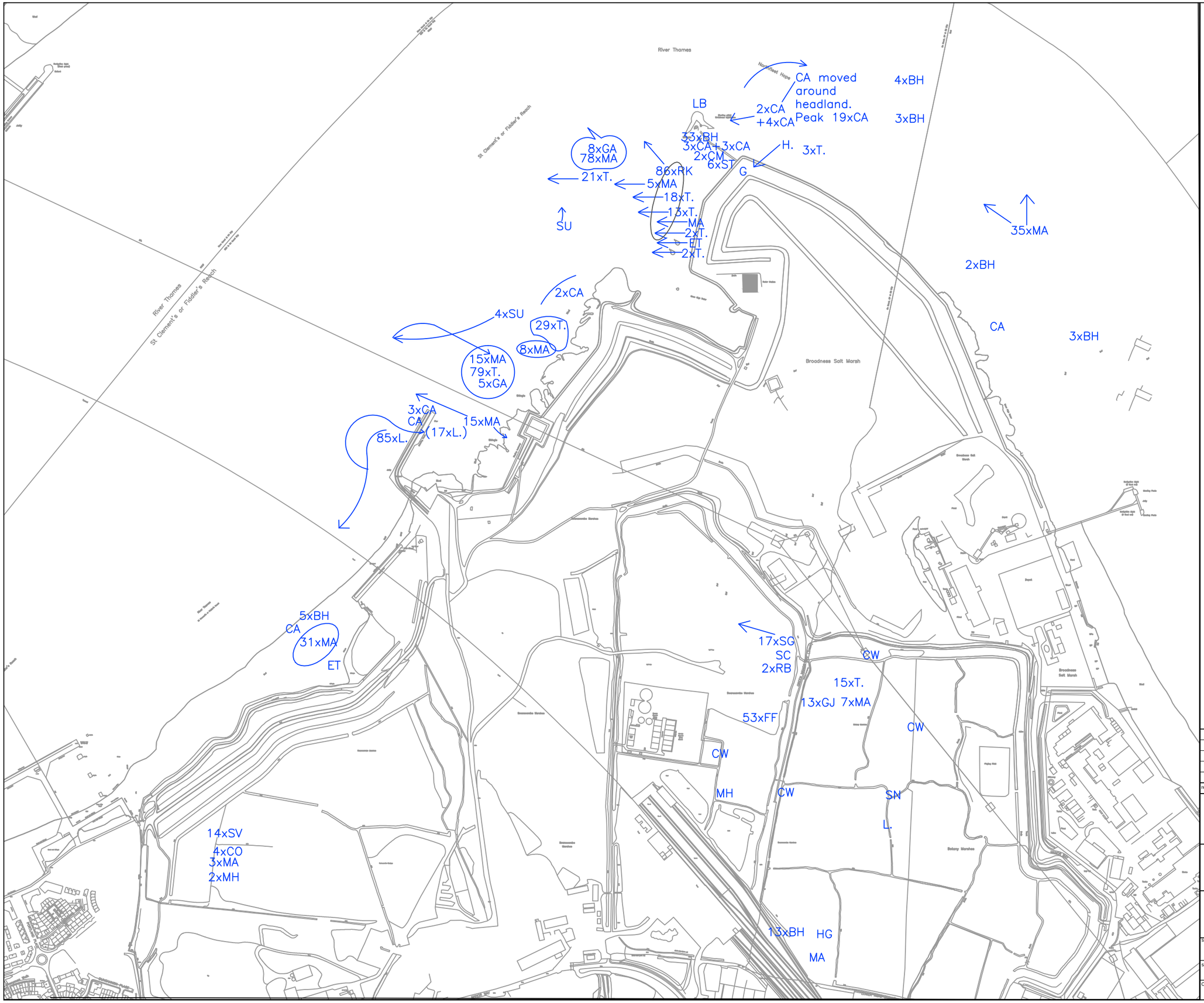
Title:

November 2014 - Low Tide

status	drawing no.			
	Figure 5			
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:

November 2014 - High Tide

status		drawing no.		
		Figure 6		
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

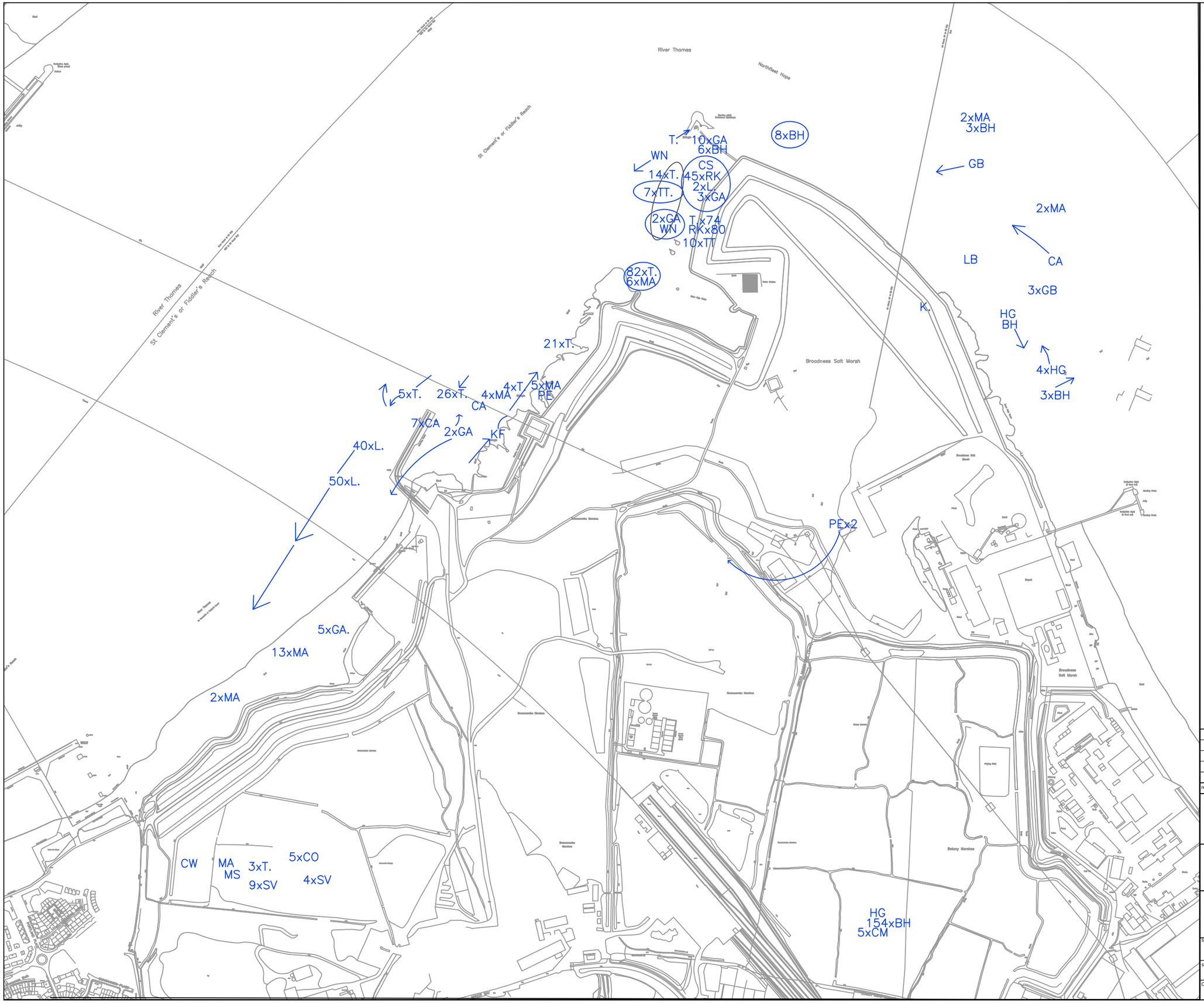
Title:

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

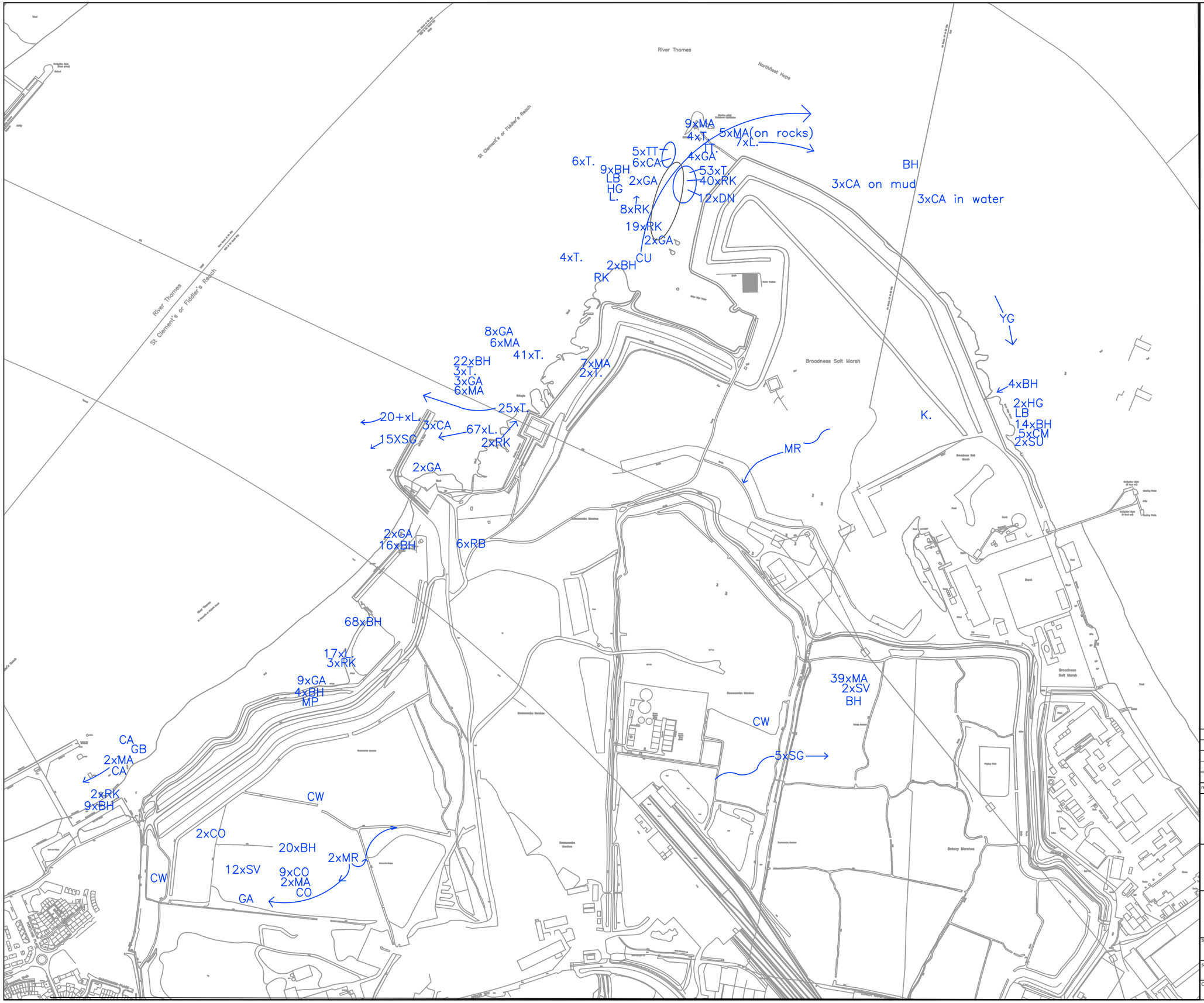
Title:

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

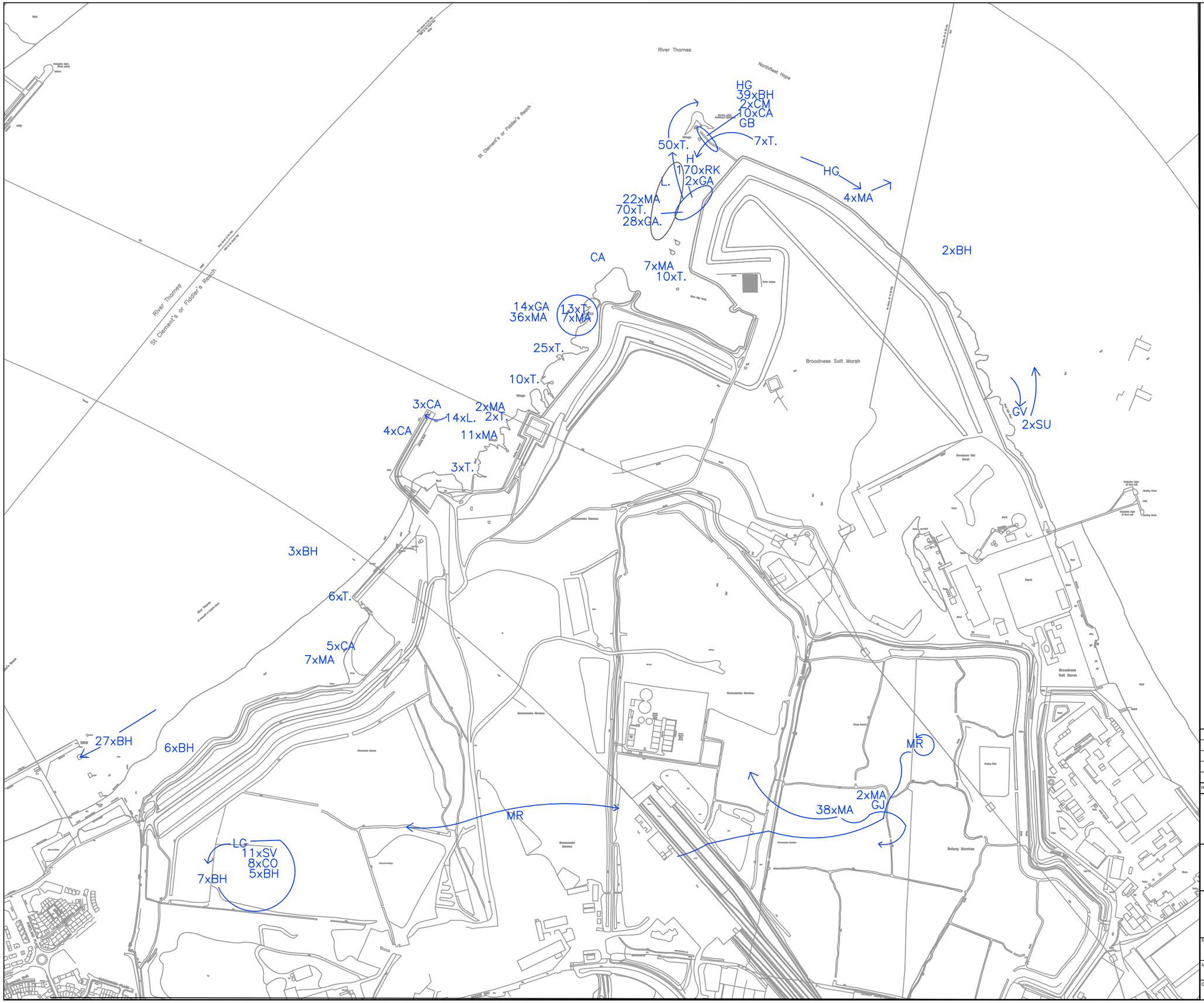
Title:

January 2015 - Low Tide

status		drawing no.		
		Figure 9		
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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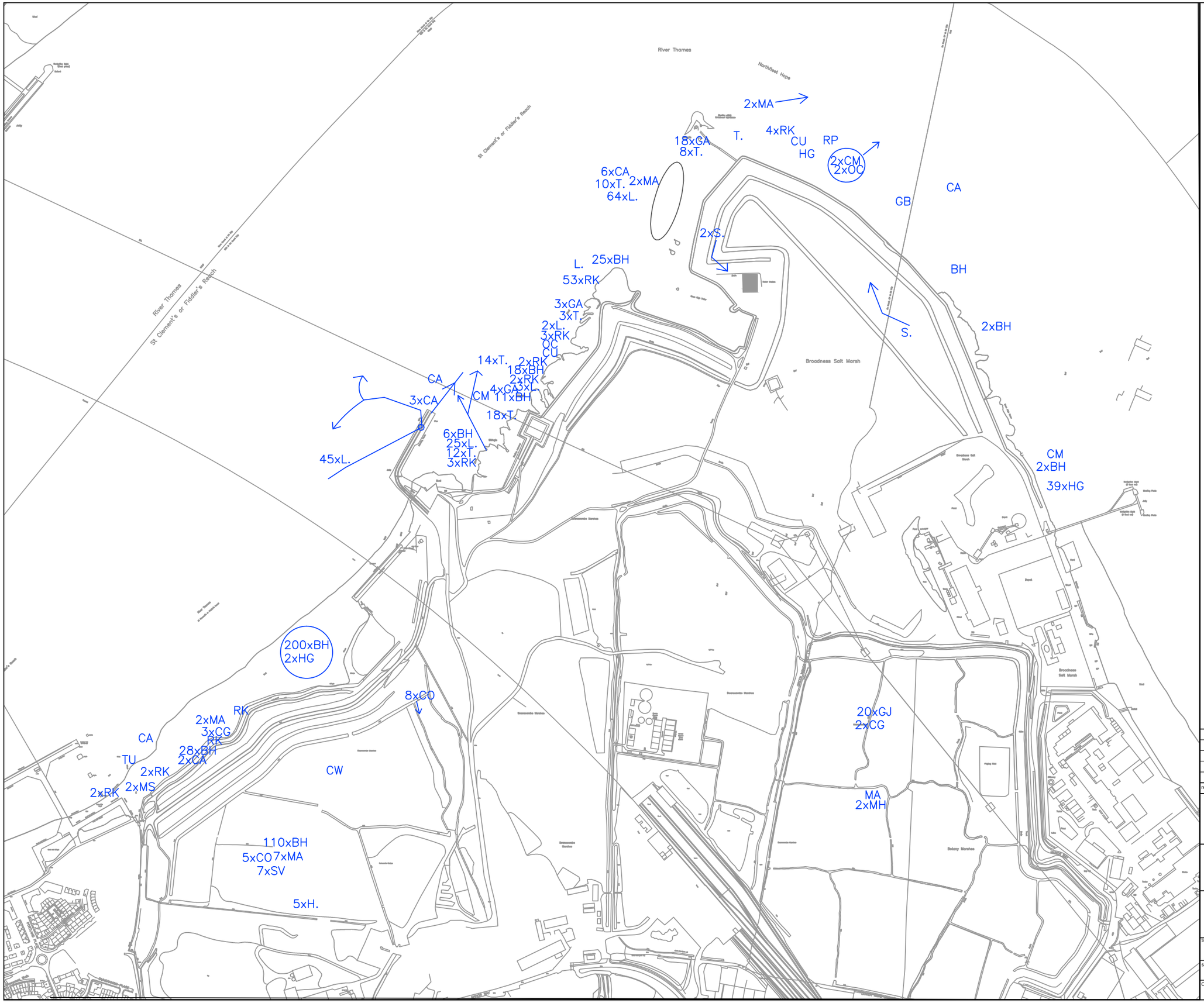
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

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

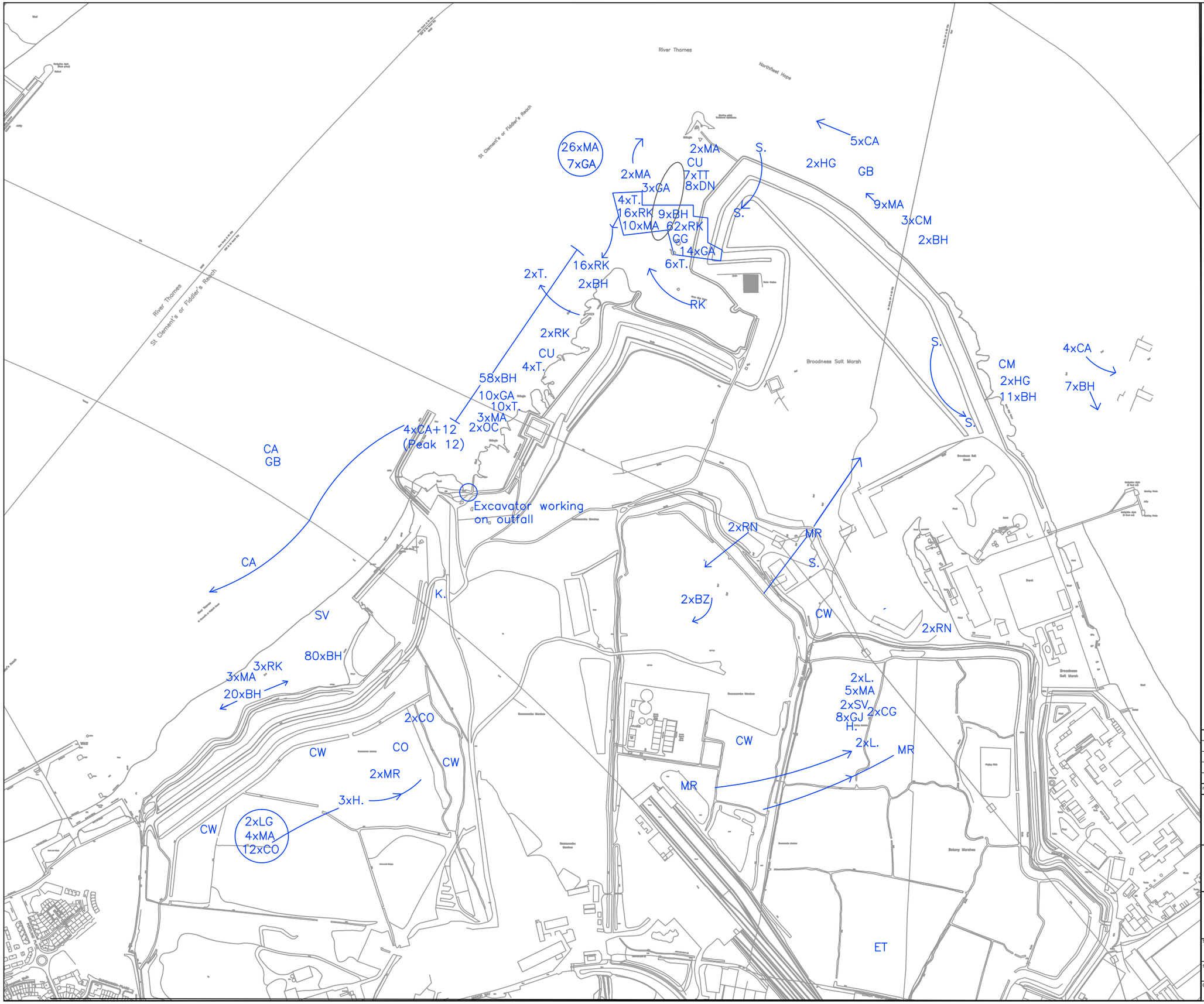
Title:

February 2015 - High Tide

status		drawing no.		
		Figure 12		
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

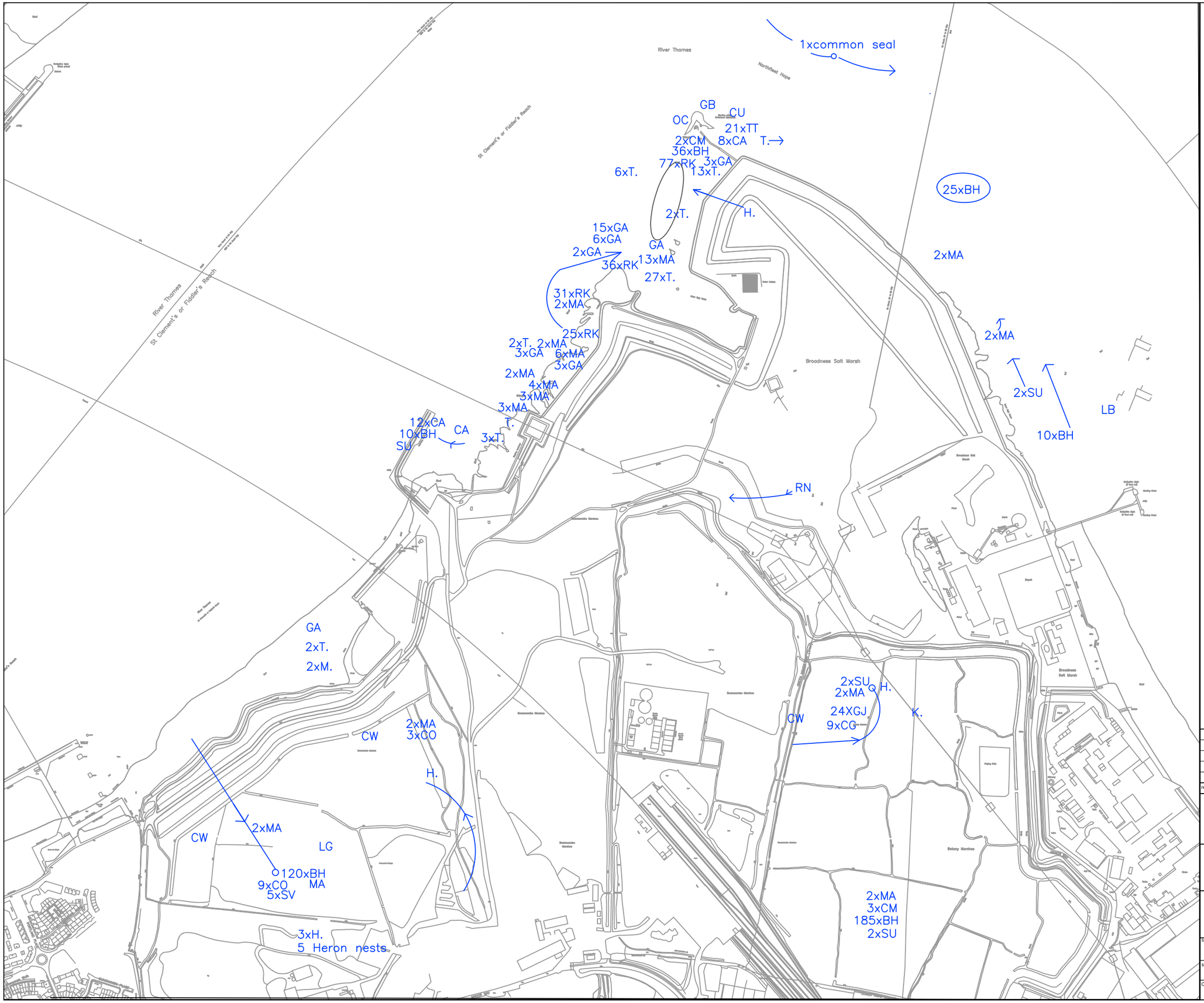
Title:

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:

LPER - Wintering Bird Survey

Title:

March 2015 - High Tide

status		drawing no.		
		Figure 14		
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NTS	**A3**	**15-03-2016**	**AW**	**HL**

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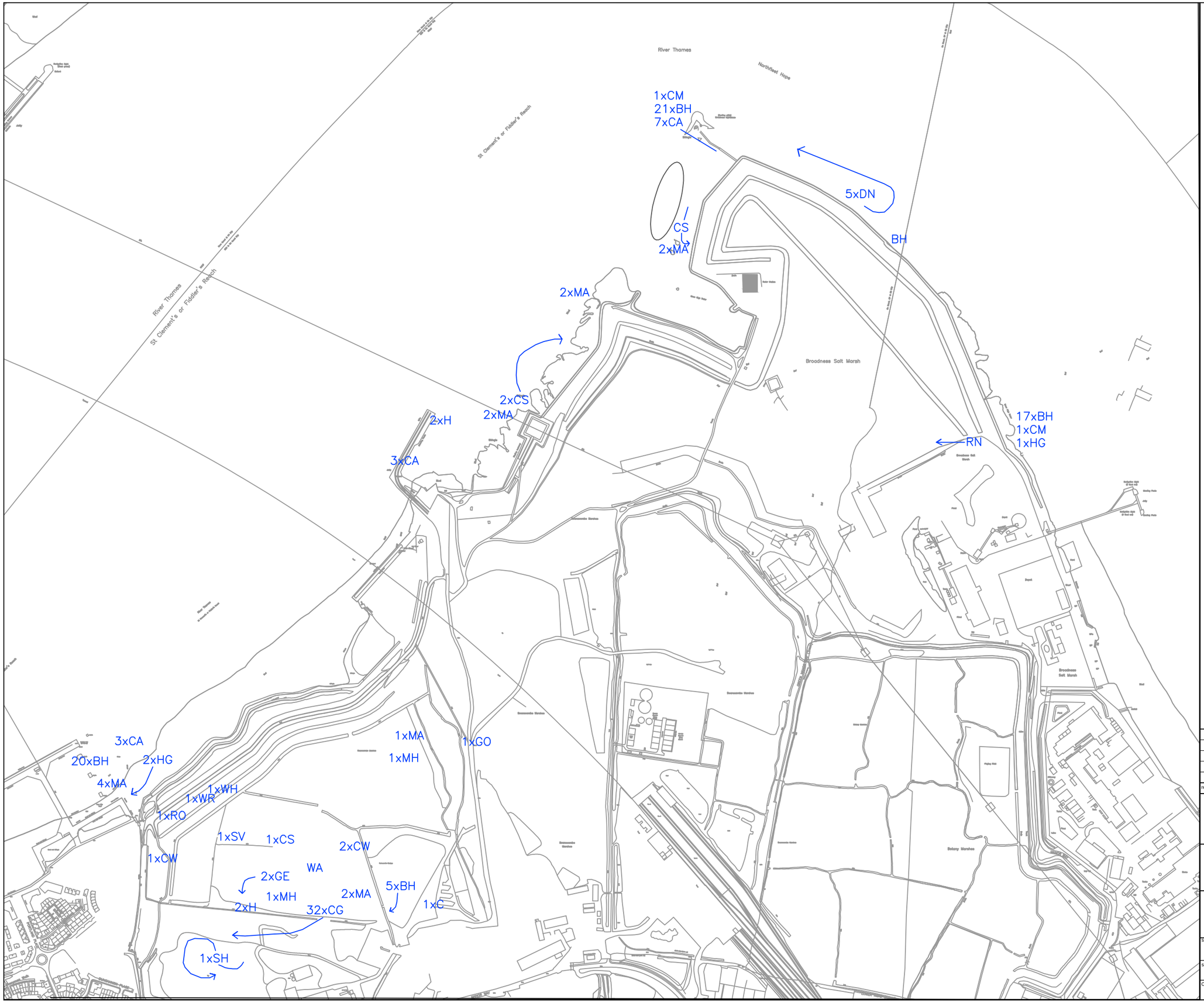

KEY

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
SC	Stonechat
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Project:

LPER - Wintering Bird Survey

Title:

August 2015 - High Tide

status		drawing no.		
		Figure 15		
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

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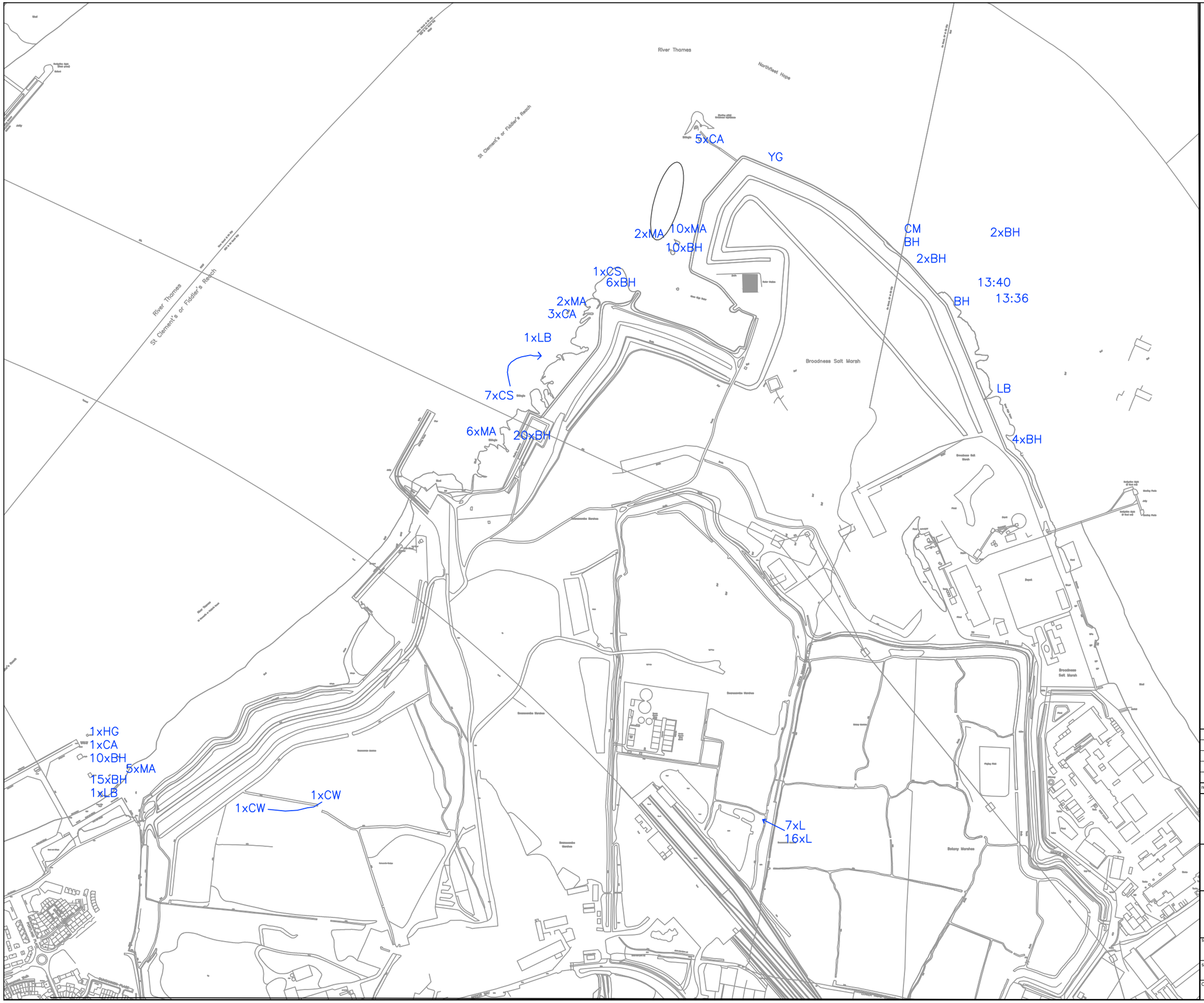

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Project:

LPER - Wintering Bird Survey

Title:

September 2015 - Low Tide

status		drawing no.		
		Figure 16		
scale	size	date	drawn	checked
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CAD filename

Figure_1.dwg

Annex EDP 17
2012 Breeding Birds Survey Report (CBA, 2014)

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cba

London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Breeding Birds Survey Report

January 2014

CHRIS BLANDFORD ASSOCIATES
landscape | environment | heritage

London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Breeding Birds Survey Report

Approved	[redacted]
	Bill Wadsworth
Position	Senior Associate (Ecology)
Date	30th January 2014
Revision	Final

CONTENTS

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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FIGURES

River Thames

Northfleet Hope

St. Clement's or Fiddler's Reach

Broadness Lighthouse (flashing white)

Shingle

Drain

Radar Station

Mean High Water

Mud

Broadness Salt Marsh

Shingle

Pier

Jetty

Mud

Slip

Bell Wharf

Swanscombe Marshes

Pond

Depot

Conveyor

Wharf

Hard

Depot

North Plan

South Plan

MP WH S. WH W WH CH WH SC WH S. WH S. WH S. WH S. WH S. WH SW WH MP WH WH RB WH CH B. B. CH WH SW WH S. WH RB RW LI WH D. WH SW RW MA GO B. WH WR BC SW WR TU RW SW D. WH LI GT WH WH S. WH

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
NTS	**A3**	**03-02-2014**	**MB**	**HL**

CAD filename
Figure_1.dwg

North Plan
South Plan

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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
Figure_1.dwg

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

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CONTENTS

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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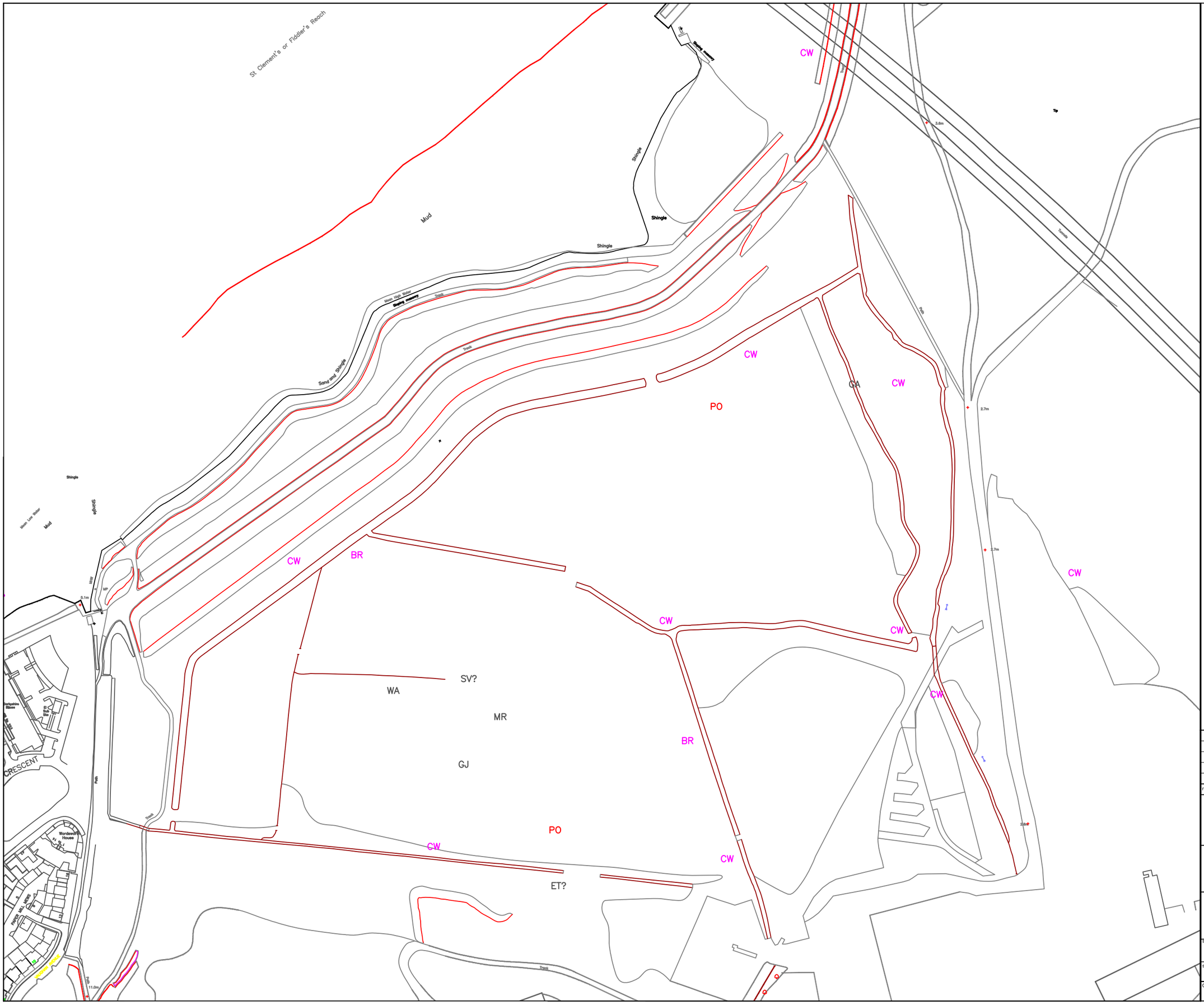
Table 1 - Peninsular Survey results from 2012 and including additional 2015 species

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

revision	description	date	checked by

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Project:
London Paramount Entertainment Resort

Title:
Black Duck Marsh - Cetti's territories and additional species

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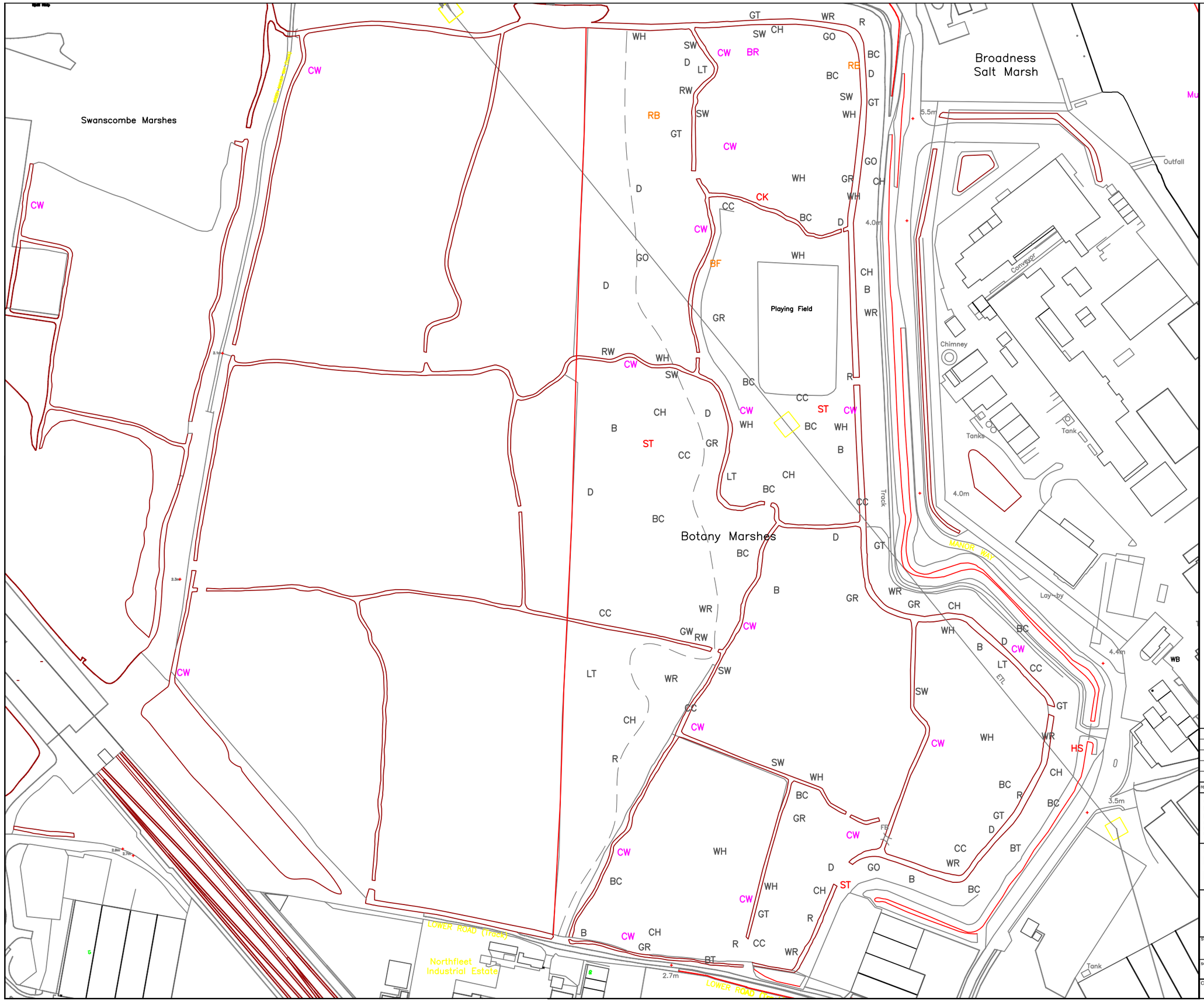

Key

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

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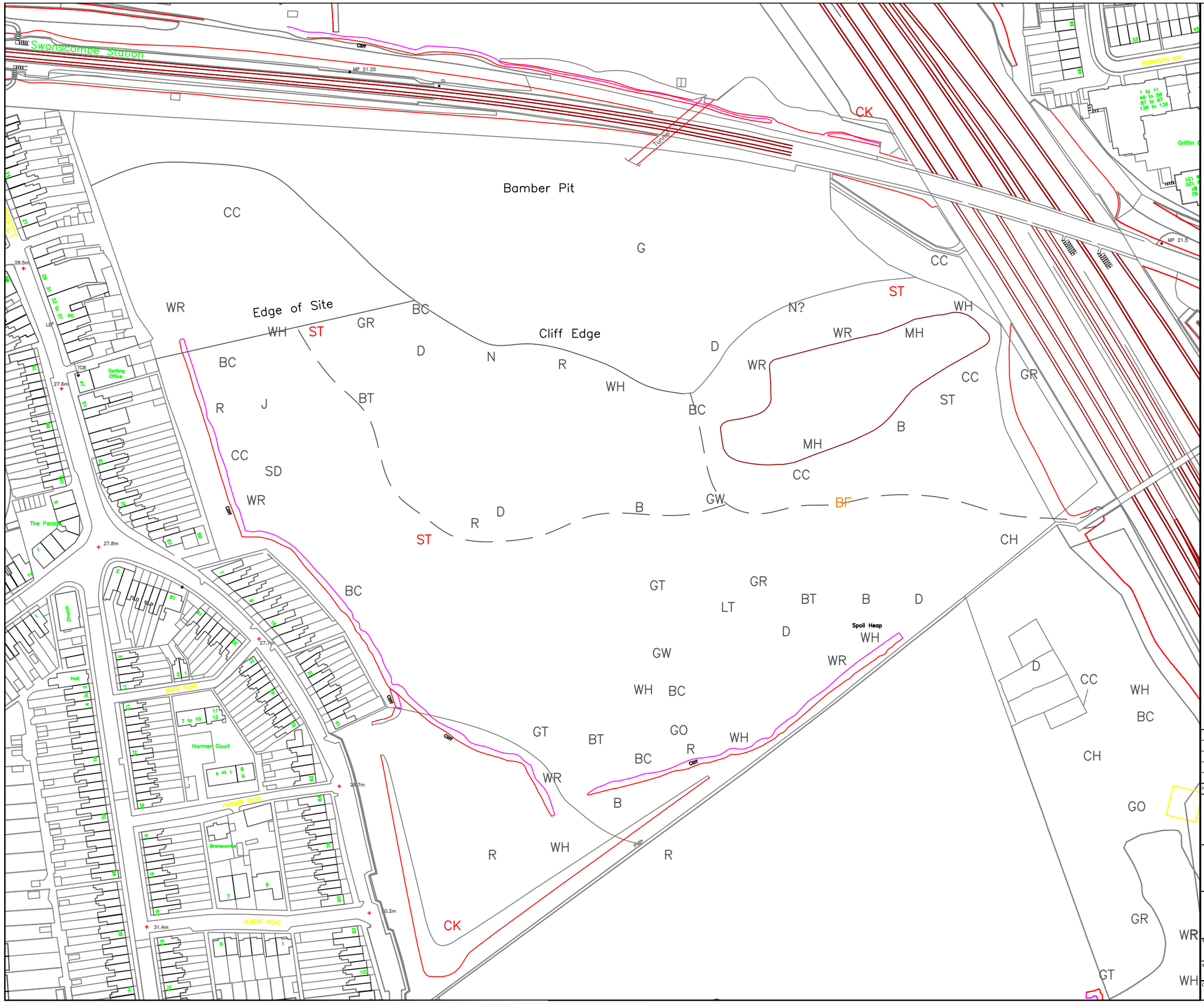

Key

B	Blackbird
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BT	Blue tit
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CO	Coot
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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

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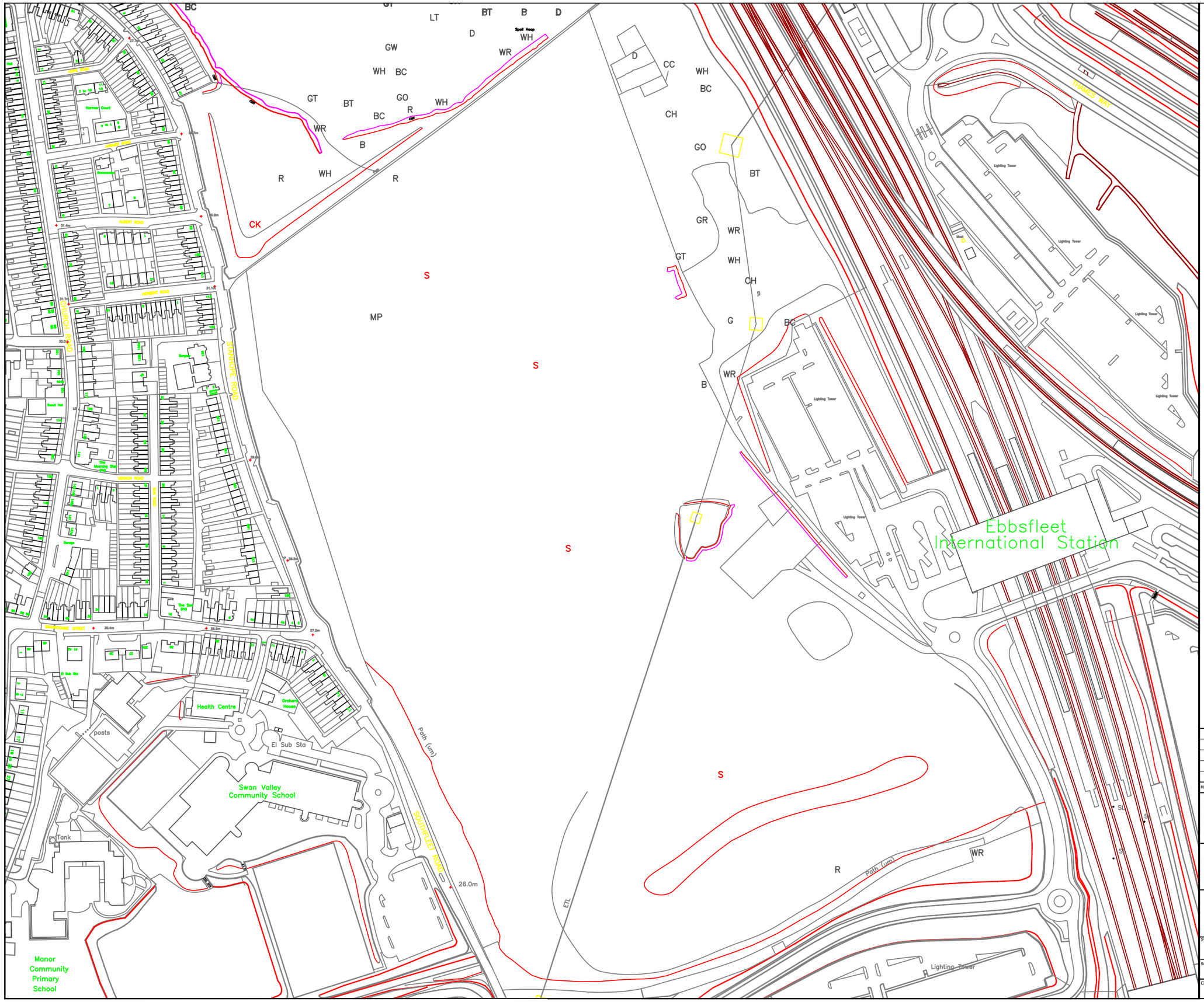

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Pink Schedule 1
Red Red list
Orange Species of principal importance

revision	description	date	checked by

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Project:
London Paramount Entertainment Resort

Title:
North Fleet Landfill

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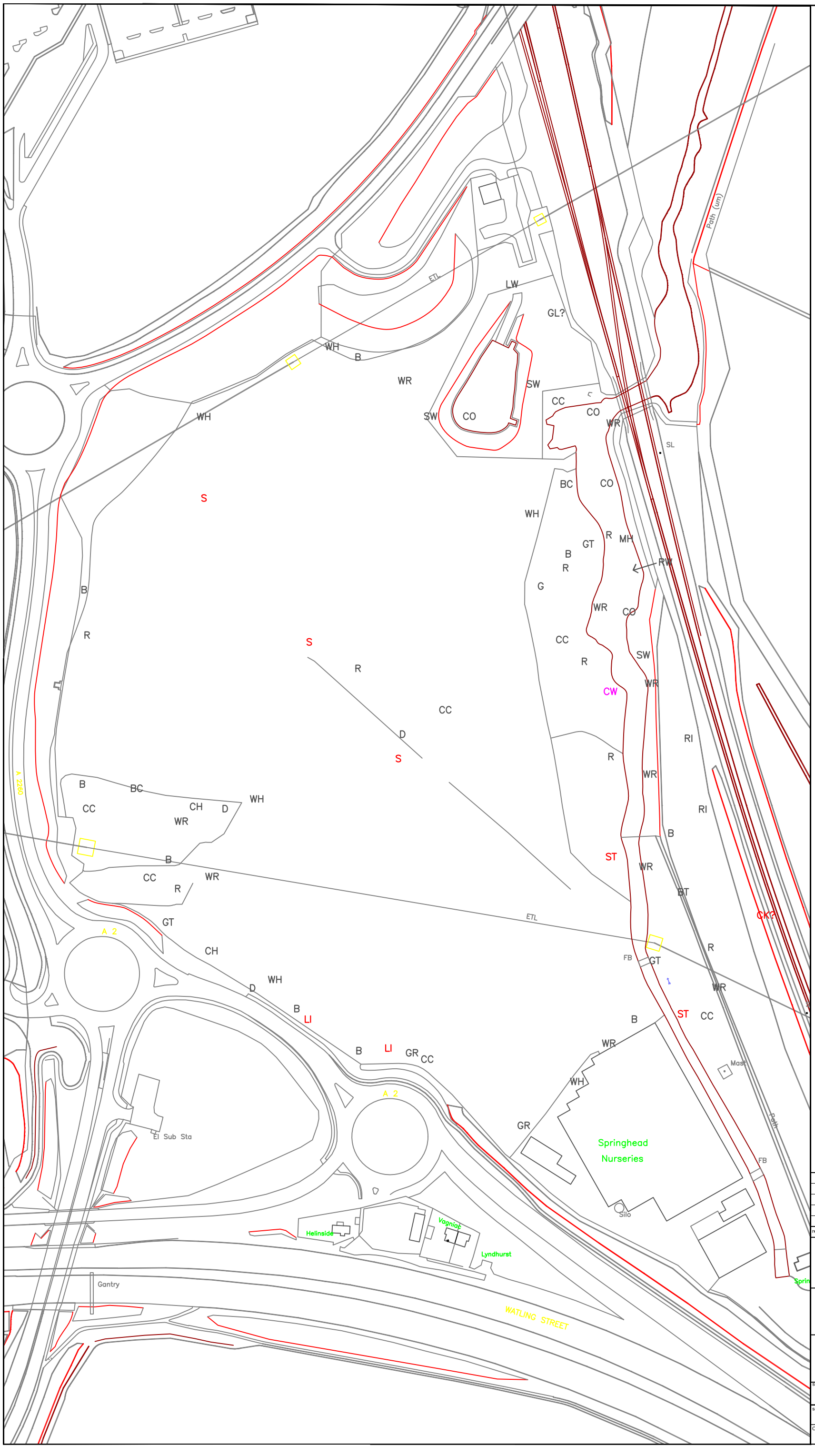

Key

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SD	Stock Dove
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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:
Springhead Nurseries

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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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Director: H G Wrigley (née Lucking) BSc. MIEEM,

Corylus Ecology Ltd Registered in England No 5005553

Registered Office: Henwood House, Henwood, Ashford Kent TN24 8DH

VAT Reg No. 862 2486 14

CONTENTS

Appendices

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 *Start temperature:* 15°C *End temperature:* 14°C *Weather:* 10% cloud cover, light breeze (BF 1)	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	
		T4	No emergence	
		T7	No emergence	
		T11	No emergence	
		T14	No emergence	
		T16	No emergence	
		G1	No emergence	
28/07/2015	*Sunset time:* 20:55hrs *Start temperature:* 18°C *End temperature:* 17°C *Weather:* 60% cloud cover, moderate breeze (BF 2)	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	
		T7	Confirmed emergence of a soprano pipistrelle bat – 27 minutes after sunset	
		T11	No emergence	
		T12	No emergence – ring-necked parakeets present in hole.	
		T13	Possible emergence of a common pipistrelle bat	
		T14	No emergence	
18/08/2015	*Sunset time:* 20:16hrs *Start temperature:* 18°C *End temperature:* 16°C *Weather:* 95% cloud cover, light breeze (BF	T1	No emergence	2hrs, approximately six minutes after sunset, a noctule bat was seen travelling north above the woodland.
		T6	No emergence	
		T8	No emergence	
		T9	No emergence	
		T15	No emergence	
		T16	No emergence	
		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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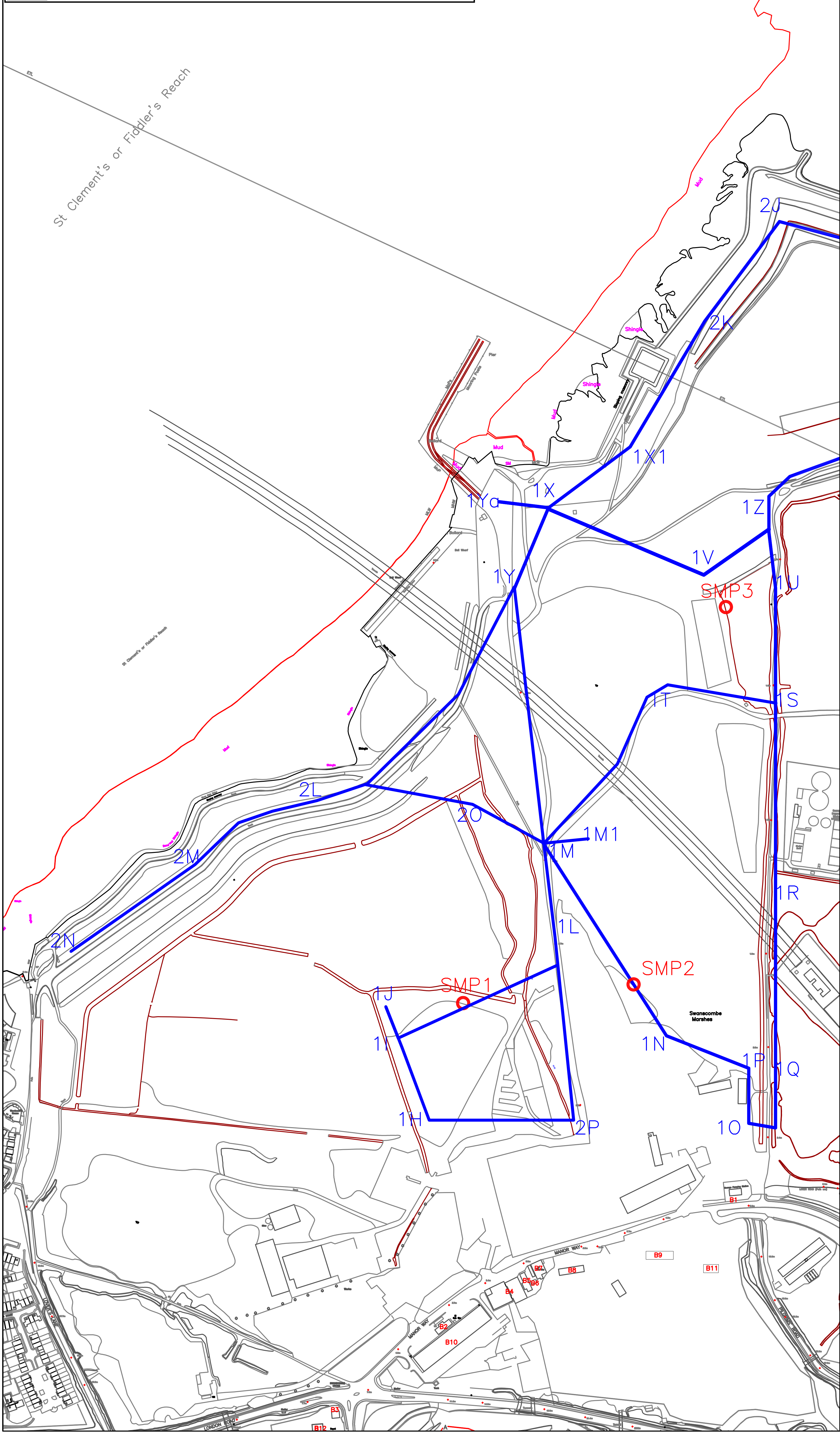
FIGURES

Project: London Paramount Entertainment Resort

Figure 1a: Peninsula (west) transect route and static monitoring points



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Project:
London Paramount

Title:
Peninsula - West Side

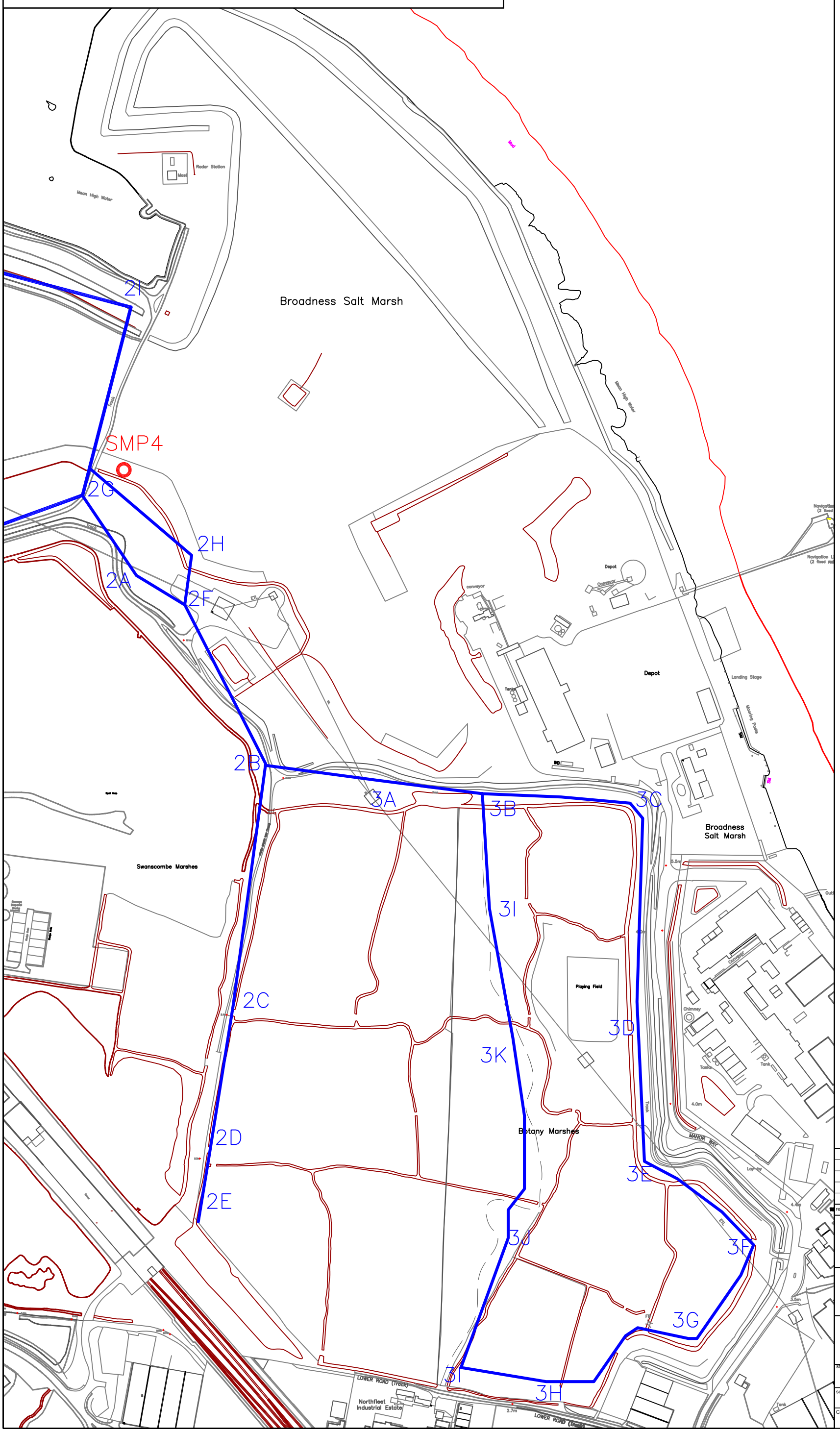
status	drawing no.			
	Figure 1a			

scale	size	date	drawn	checked
NTS	A3	26-05-2016	AW	HL

CAD filename
Figure_1.dwg

Project: London Paramount Entertainment Resort

Figure 1b: Peninsula (east) transect route and static monitoring points



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Project: London Paramount

Title: Peninsula - East Side

status		drawing no. Figure 1b		
scale	size	date	drawn	checked
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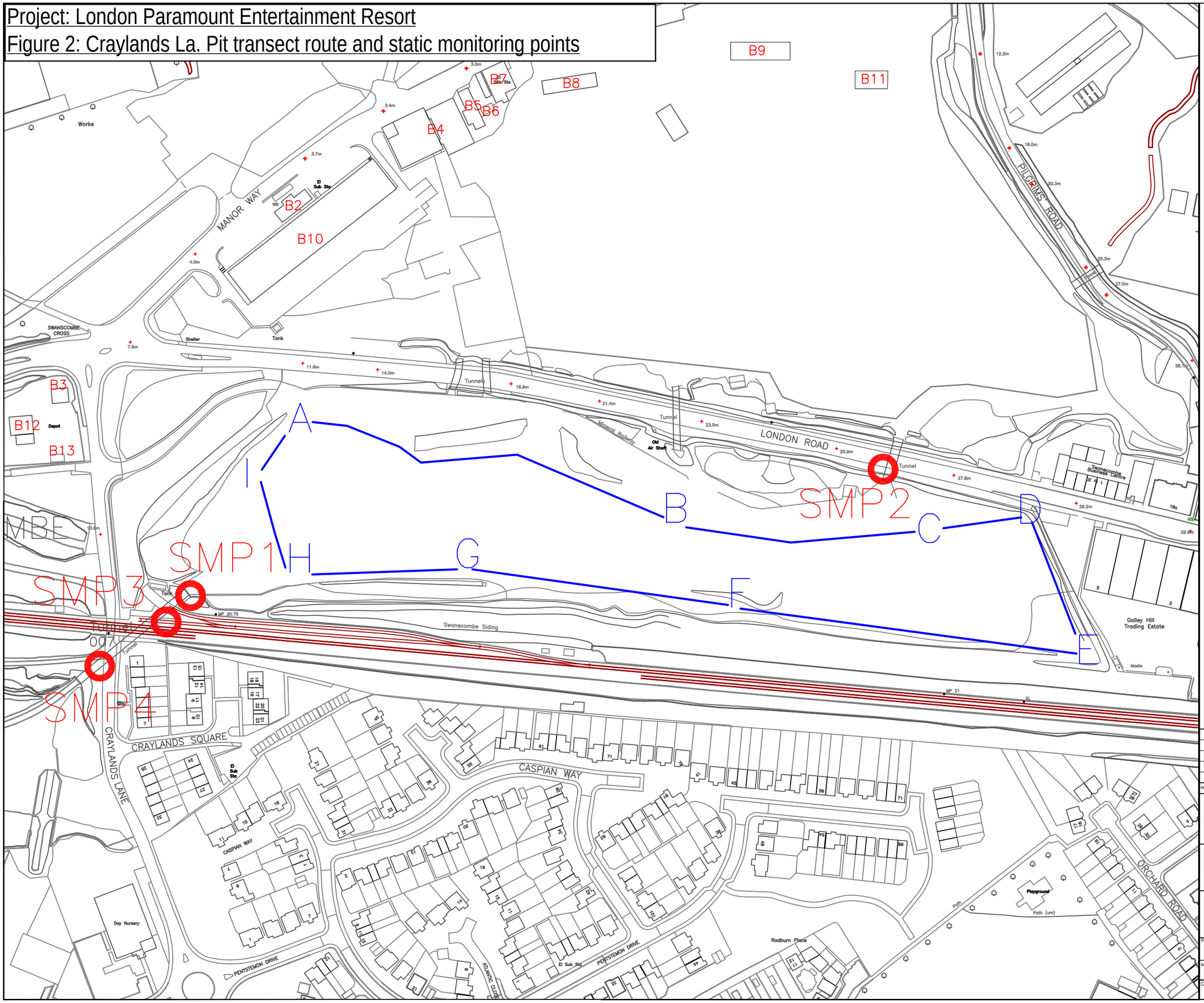
CAD filename: Figure_1.dwg

Project: London Paramount Entertainment Resort

Figure 2: Craylands La. Pit transect route and static monitoring points



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Project:
London Paramount

Title:
Craylands Pit

status		drawing no. Figure 2		
scale	size	date	drawn	checked
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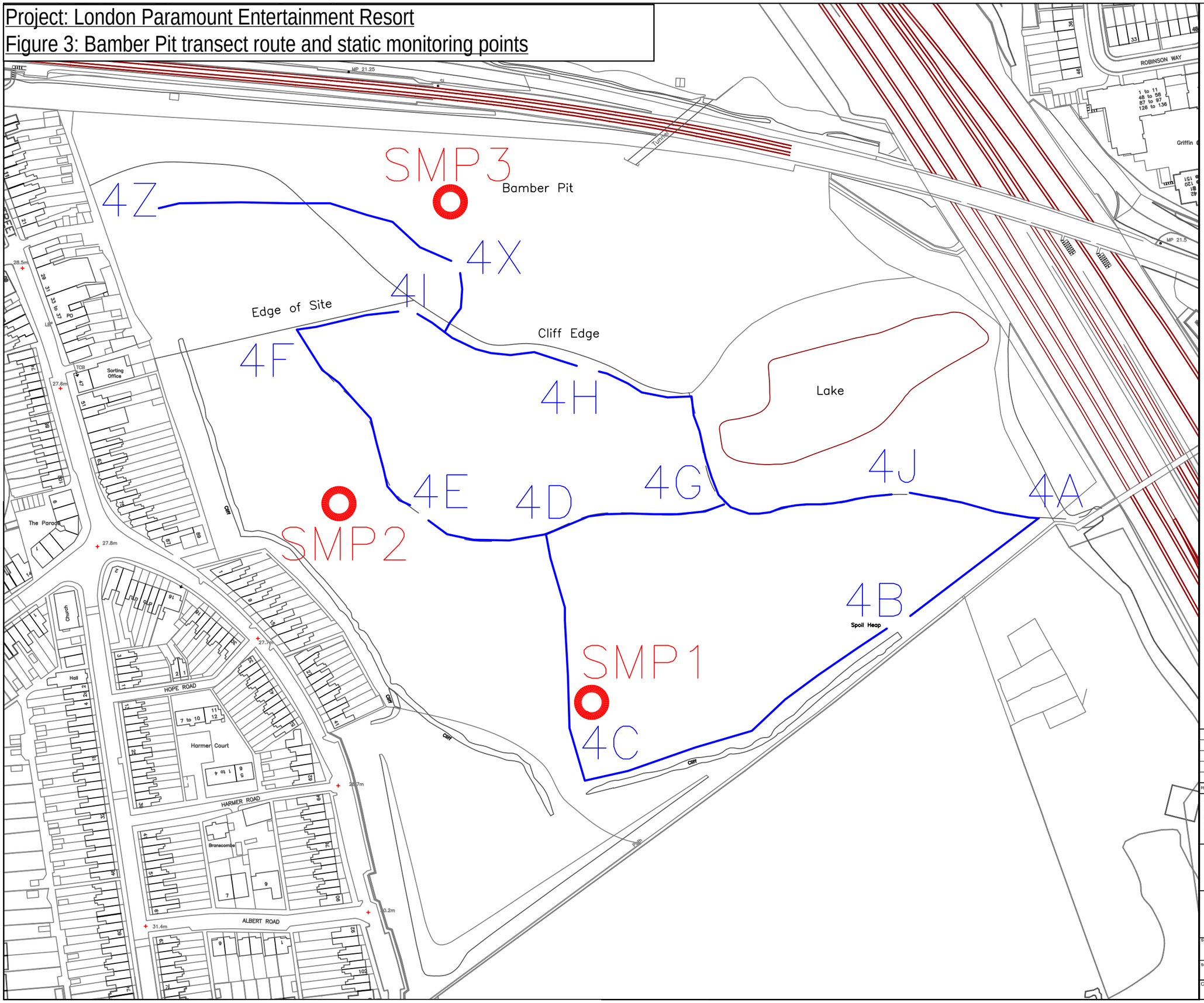
CAD filename
Figure_1.dwg

Project: London Paramount Entertainment Resort

Figure 3: Bamber Pit transect route and static monitoring points



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Project:
London Paramount

Title:
Bamber Pit - Transect and Static Plan

status	drawing no.			
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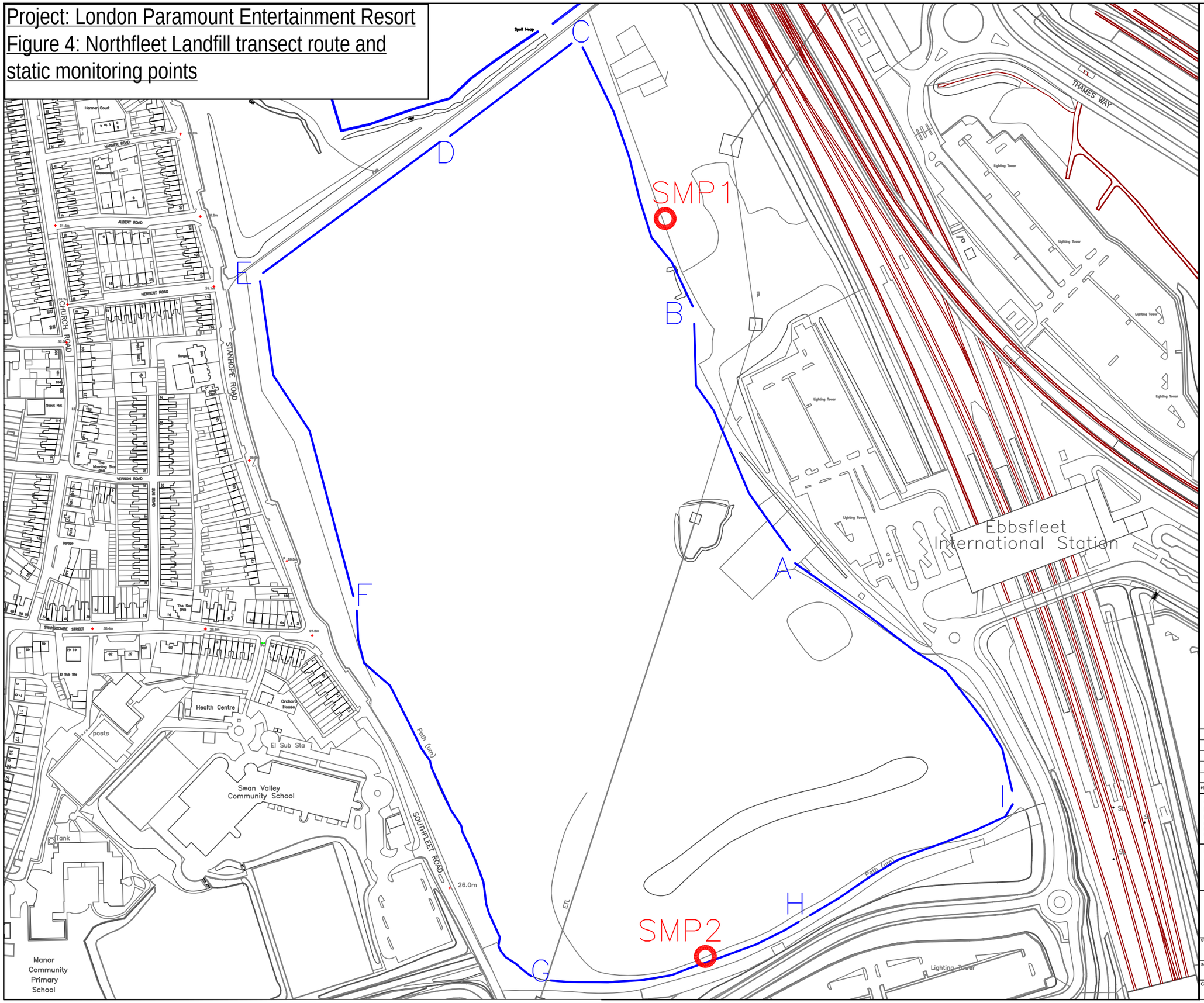
scale	size	date	drawn	checked
NTS	**A3**	**26-05-2016**	**AW**	**HL**

CAD filename
Figure_1.dwg

Project: London Paramount Entertainment Resort
Figure 4: Northfleet Landfill transect route and static monitoring points



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Project:
London Paramount

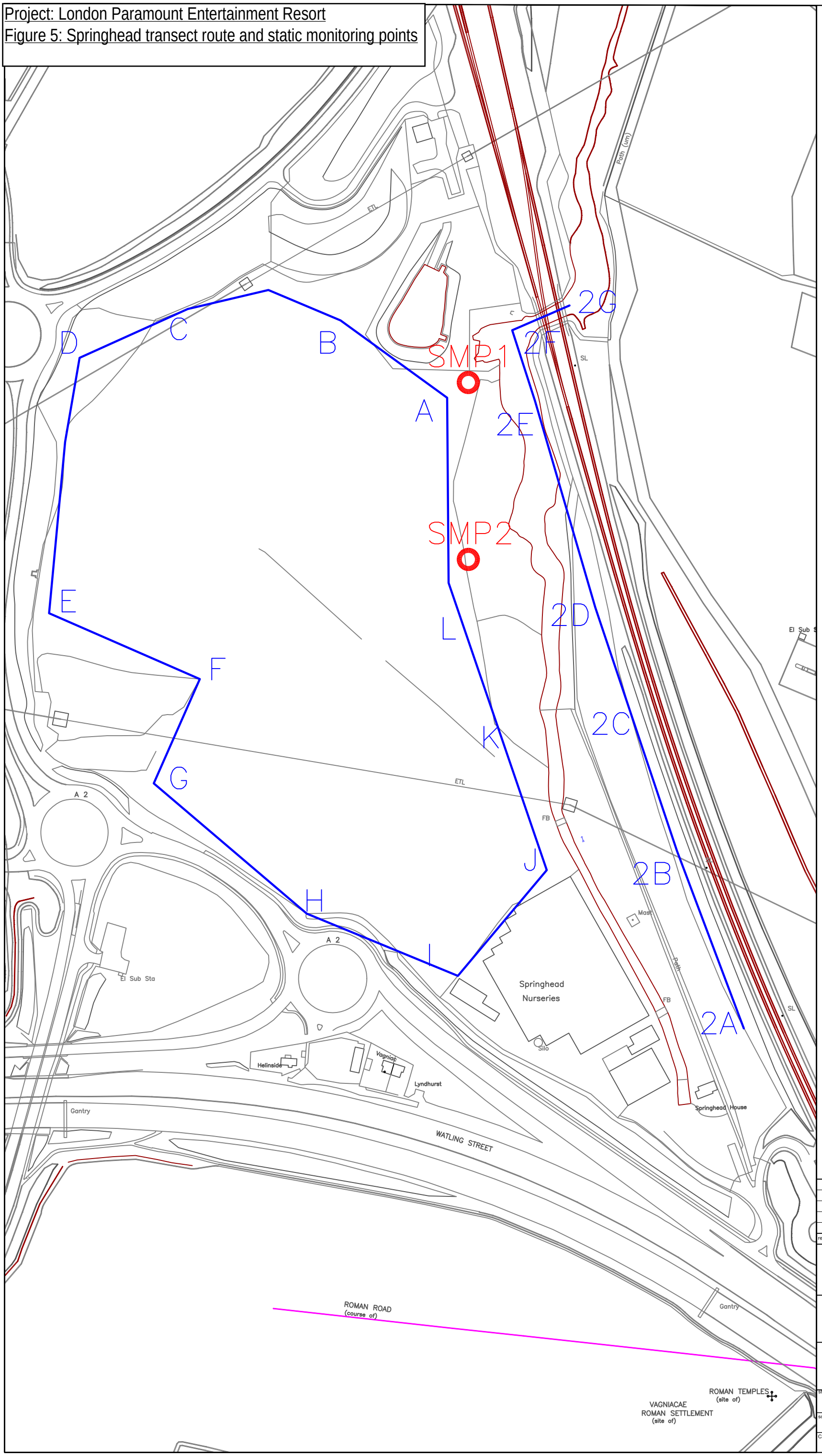
Title:
Northfleet Landfill

status	drawing no.			
	Figure 4			
scale	size	date	drawn	checked
NTS	**A3**	**26-05-2016**	**AW**	**HL**

CAD filename
Figure_1.dwg

Project: London Paramount Entertainment Resort

Figure 5: Springhead transect route and static monitoring points



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Project: London Paramount

Title: Springhead

status		drawing no. Figure 5		
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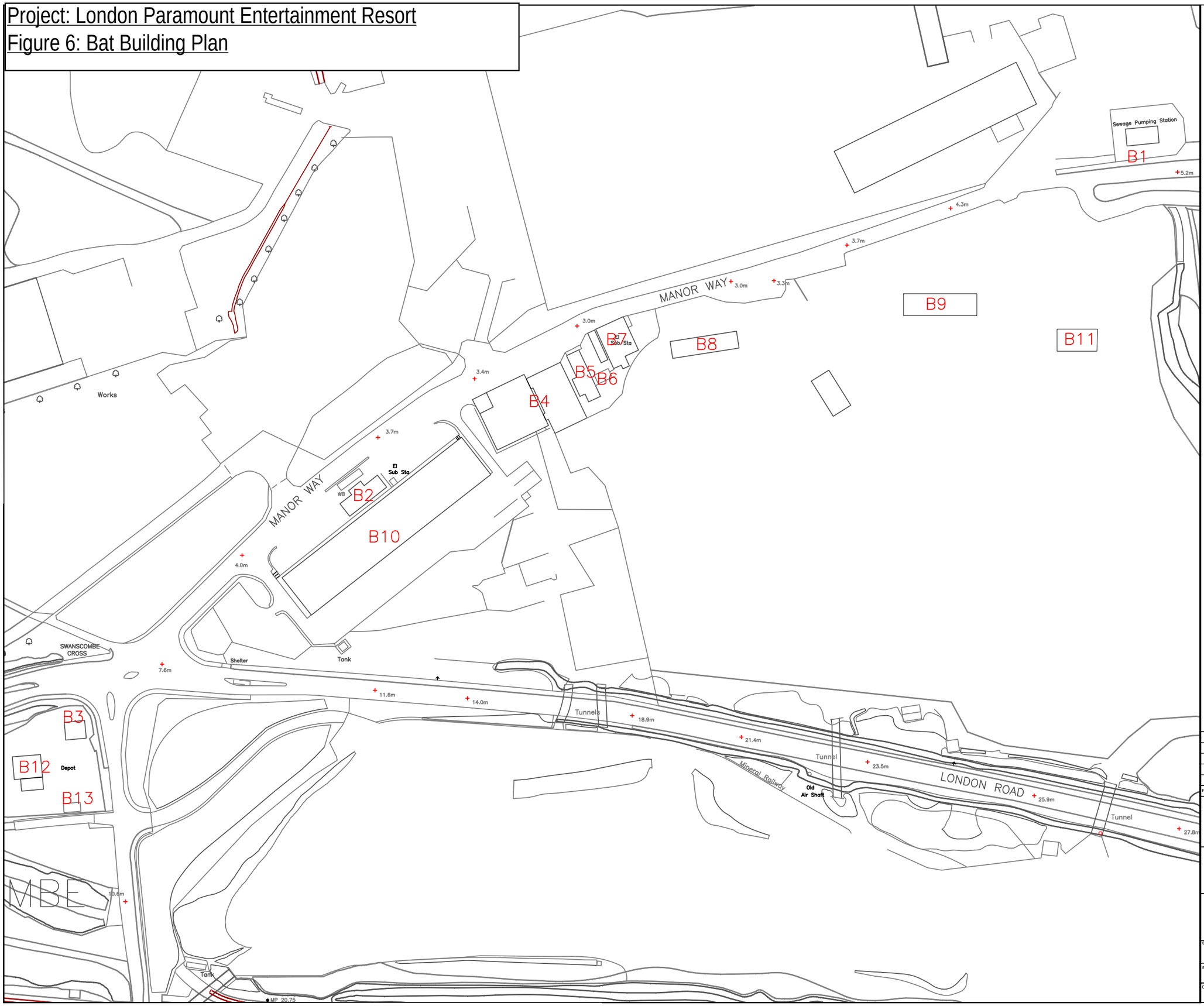
Project: London Paramount Entertainment Resort
Figure 6: Bat Building Plan



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Project:
London Paramount

Title:
Building Plan

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		Figure 6			
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NTS	**A3**	**26-05-2016**	**AW**	**HL**

CAD filename
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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:

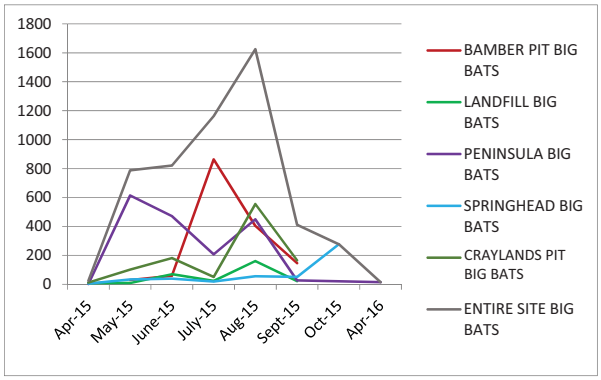
MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
April	0	2	3	0	5	2	5559	516	1	6078	6	0	6	6089	26.24%
May	0	3	26	4	33	2	2615	3	0	2620	0	0	0	2653	11.43%
June	2	11	20	6	39	1	2356	8	0	2365	5	0	5	2409	10.38%
July	1	0	15	3	19	0	1840	1	0	1841	1	0	1	1861	8.02%
August	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:

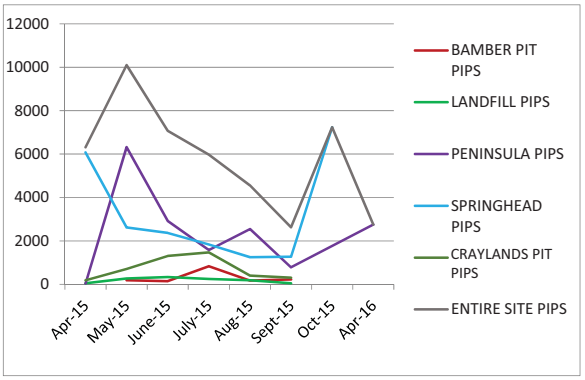
MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
Apr-15	1	7	17	0	25	9	5783	517	2	6311	6	0	6	6342	12.20%
May-15	18	102	618	50	788	13	8679	1405	3	10100	15	0	15	10903	20.97%
June-15	6	218	544	53	821	2	6990	75	3	7070	34	0	34	7925	15.24%
July-15	7	112	631	413	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

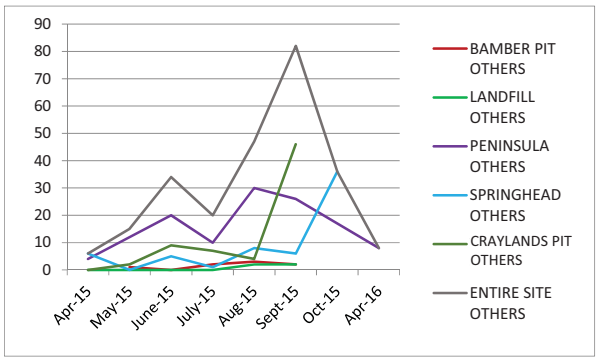
The total number of passes by 'big bats' (*Nyctalus* species and serotine)



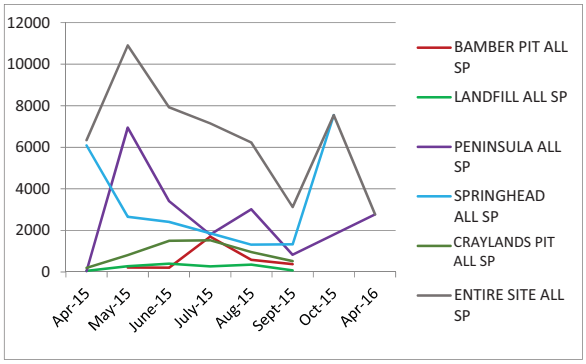
The total number of passes by *Pipistrellus* species



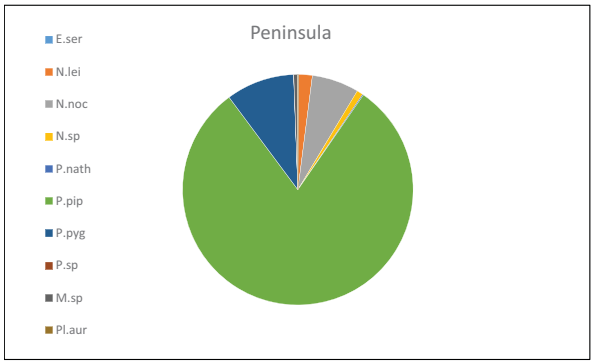
The total number of passes by 'other' species (long-eared bat and *Myotis* species)

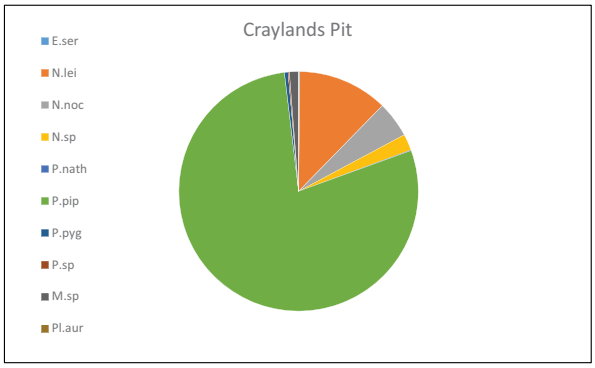


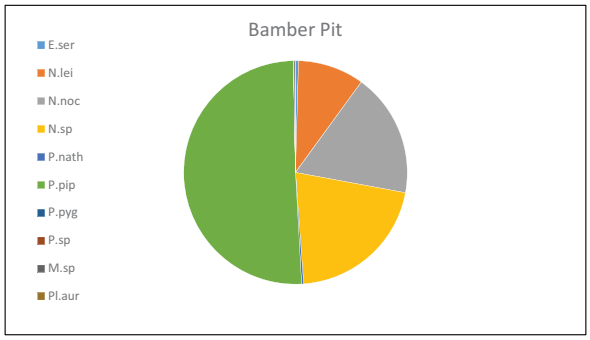
The total number of passes by all species

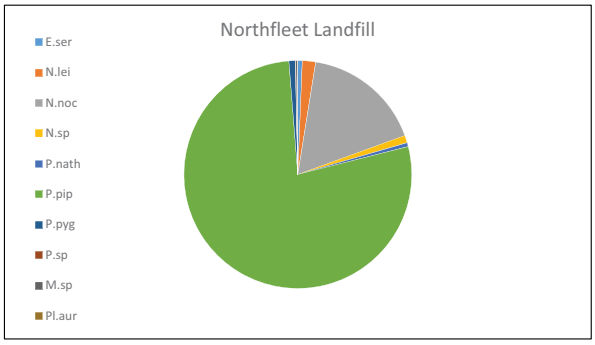


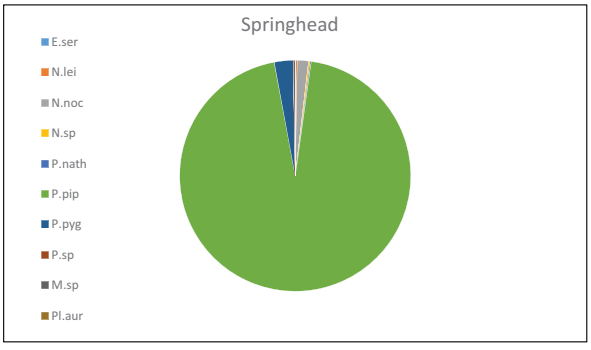
Appendix 3 - Pie charts showing the species assemblage for each survey area recorded during the static monitoring sessions

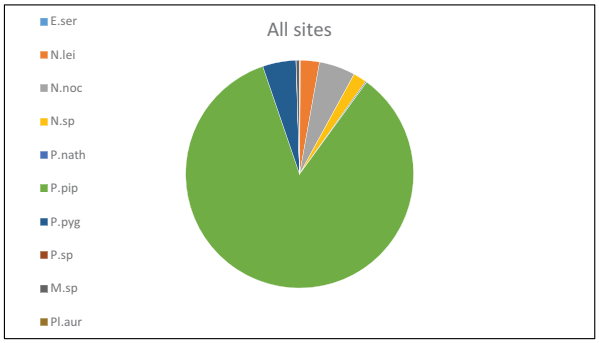












Appendix 4 - Transect summaries for the peninsula

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			

Annex EDP 20
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

CONTENTS

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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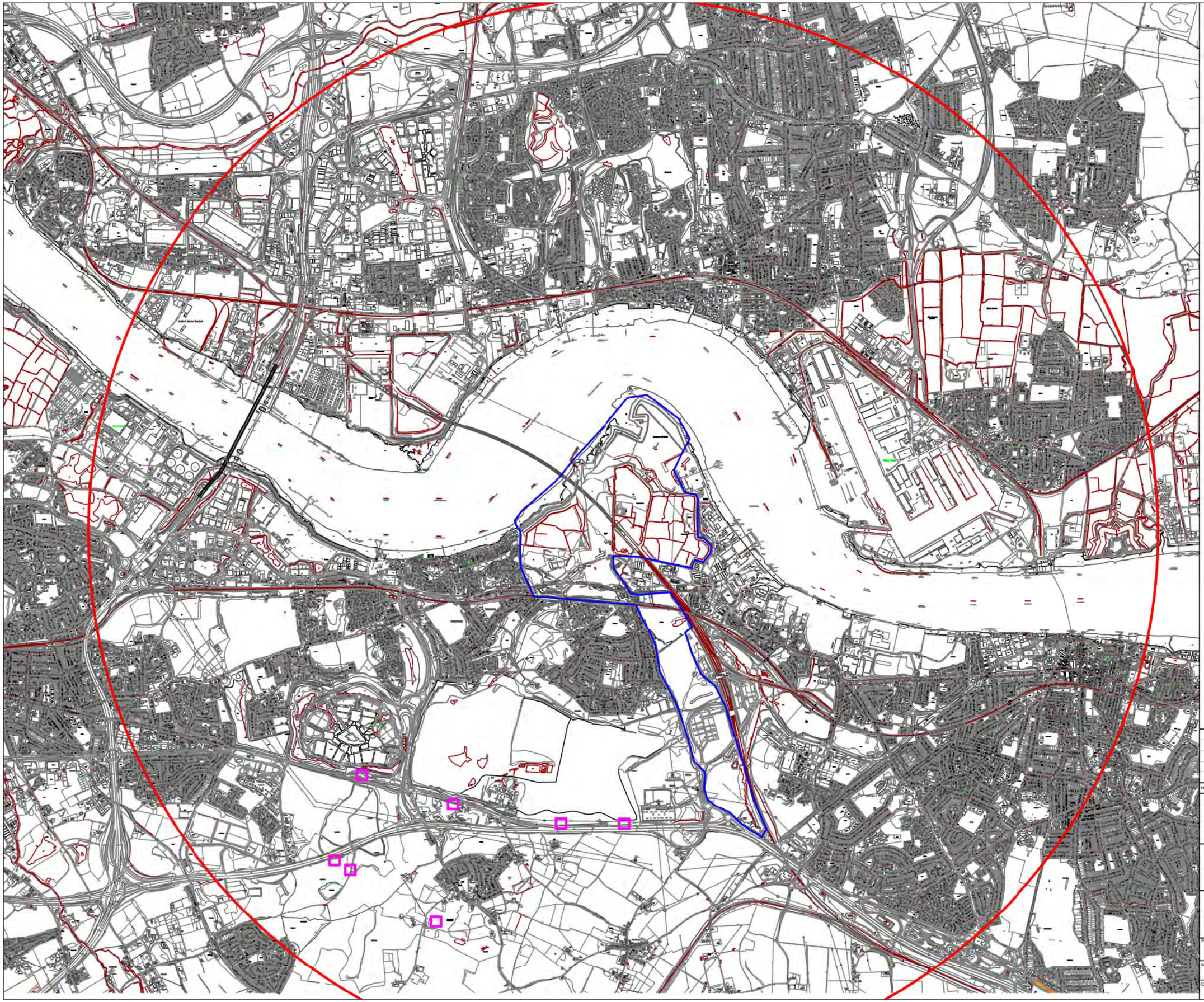
FIGURES



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 5055553. Registered Office: Henwood House, Henwood,Ashford, Kent TN24 8LH

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

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 5005553. Registered Office: Henwood House, Henwood, Ashford, Kent TN24 8DH

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

Corylus Ecology

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Annex EDP 21
2015 Badger Survey Report (CBA February 2016)

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The Planning Inspectorate

Reference	6.2.12.1
Name	London Resort Company Holdings
Document	2015 Badger Survey Report
Status	Confidential

This document contains confidential information and is only available on request to those who have a legitimate need to view it.

Annex EDP 22
2015 Water Vole Survey Report (CBA February 2016)

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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 Water Vole Survey Report

DRAFT

February 2016

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Approved	[redacted]
	Dominic Watkins
Position	Director
Date	15th February 2016
Revision	Draft

CONTENTS

FIGURES

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.

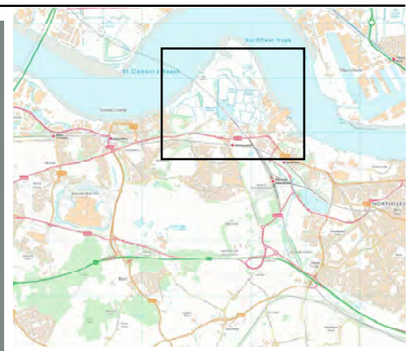
4.0 CONCLUSIONS

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

N

0 150 300 Metres

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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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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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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

0 150 300 Metres

N

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HARVEST MOUSE SURVEY
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FIGURE 1a
SURVEY AREAS

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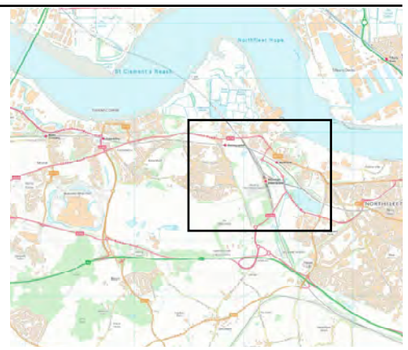

Survey Area

Transect Survey

Patch Survey

0 150 300 Metres

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FIGURE 1b
SURVEY AREAS

February 2016
11120201_Harvest Mouse_11-02-16.indd

Survey Area

Transect Survey

Patch Survey

0 150 300 Metres

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FIGURE 1c
SURVEY AREAS

February 2016
11120201_Harvest Mouse_11-02-16.indd

Nest Records:

- 1 nest
- 2 nests
- 3 nests

0 150 300 Metres

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FIGURE 2a
NEST RECORDS

February 2016
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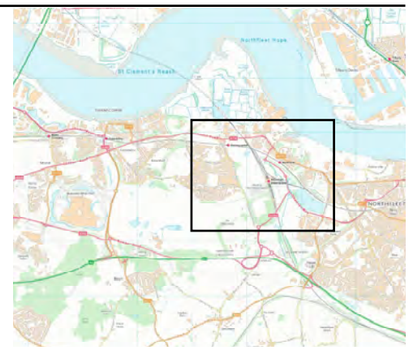

Nest Records:

- 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

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FIGURE 2c
NEST RECORDS

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