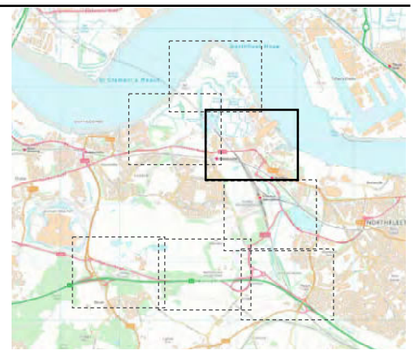

S - Saltmarsh

G - Grassland & early successional

W - Woodland

P - Ponds

D - Ditches

0 100 200 Metres N

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LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 3
AREAS REFERRED TO IN THE TEXT

February 2016
11120201_Figure3_11-02-16.indd

S - Saltmarsh

G - Grassland & early successional

W - Woodland

P - Ponds

D - Ditches

N

0 100 200 Metres

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LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

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

S - Saltmarsh

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N

0 100 200 Metres

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LONDON RESORT COMPANY HOLDINGS

FIGURE 3
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11120201_Figure3_11-02-16.indd

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0 100 200 Metres

N

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FIGURE 3
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LONDON RESORT COMPANY HOLDINGS

FIGURE 3
AREAS REFERRED TO IN THE TEXT

February 2016
11120201_Figure3_11-02-16.indd

Figure 4

Nationally Scarce plant species

Survey Records:

- *Lathyrus aphaca* Yellow Vetchling
- *Vicia bithynica* Bithynian vetch
- *Orchis anthropophora* Man Orchid
- *Inula crithmoides* Golden Samphire
- *Carex divisa* Divided Sedge
- *Polypogon monspeliensis* Annual Beard Grass
- *Lathyrus hirsutus* Hairy Vetchling
- *Ranunculus baudotii* Brackish Water-Crowfoot
- *Medicago sativa ssp. falcata* Sickle Clover

Kent Botanical Recording Group Records:

- *Polypogon monspeliensis* Annual Beard Grass (August 2015)
- *Puccinellia fasciculata* Borrers Saltmarsh Grass (July 2014)
- *Puccinellia rupestris* Stiff Saltmarsh Grass (July 2014)
- *Pyrola rotundifolia ssp. maritima* Round-leaved Wintergreen (August 2015)
- *Bupleurum tenuissimum* Slender Hare's Ear (August 2012)

0 100 200 Metres N

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LONDON PARAMOUNT ENTERTAINMENT RESORT
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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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LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 4b
NATIONALLY SCARCE PLANT SPECIES

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

Survey Records:

- *Lathyrus aphaca* — Yellow Vetchling
- *Vicia bithynica* — Bithynian vetch
- *Orchis anthropophora* — Man Orchid
- *Inula crithmoides* — Golden Samphire
- *Carex divisa* — Divided Sedge
- *Polypogon monspeliensis* — Annual Beard Grass
- *Lathyrus hirsutus* — Hairy Vetchling
- *Ranunculus baudotii* — Brackish Water-Crowfoot
- *Medicago sativa ssp. falcata* — Sickle Clover

Kent Botanical Recording Group Records:

- *Polypogon monspeliensis* — Annual Beard Grass (August 2015)
- *Puccinellia fasciculata* — Borrers Saltmarsh Grass (July 2014)
- *Puccinellia rupestris* — Stiff Saltmarsh Grass (July 2014)
- *Pyrola rotundifolia ssp. maritima* — Round-leaved Wintergreen (August 2015)
- *Bupleurum tenuissimum* — Slender Hare's Ear (August 2012)

0 100 200 Metres

N

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LONDON RESORT COMPANY HOLDINGS

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:

- *Polypogon monspeliensis* — Annual Beard Grass (August 2015)
- *Puccinellia fasciculata* — Borrers Saltmarsh Grass (July 2014)
- *Puccinellia rupestris* — Stiff Saltmarsh Grass (July 2014)
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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
A Abundant
F Frequent
O Occasional
R Rare

L Locally or patchily

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

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CHRIS BLANDFORD ASSOCIATES
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 [redacted]

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
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 - 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

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
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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 - September Low Tide

status		drawing no.		
		Figure 2		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg

KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
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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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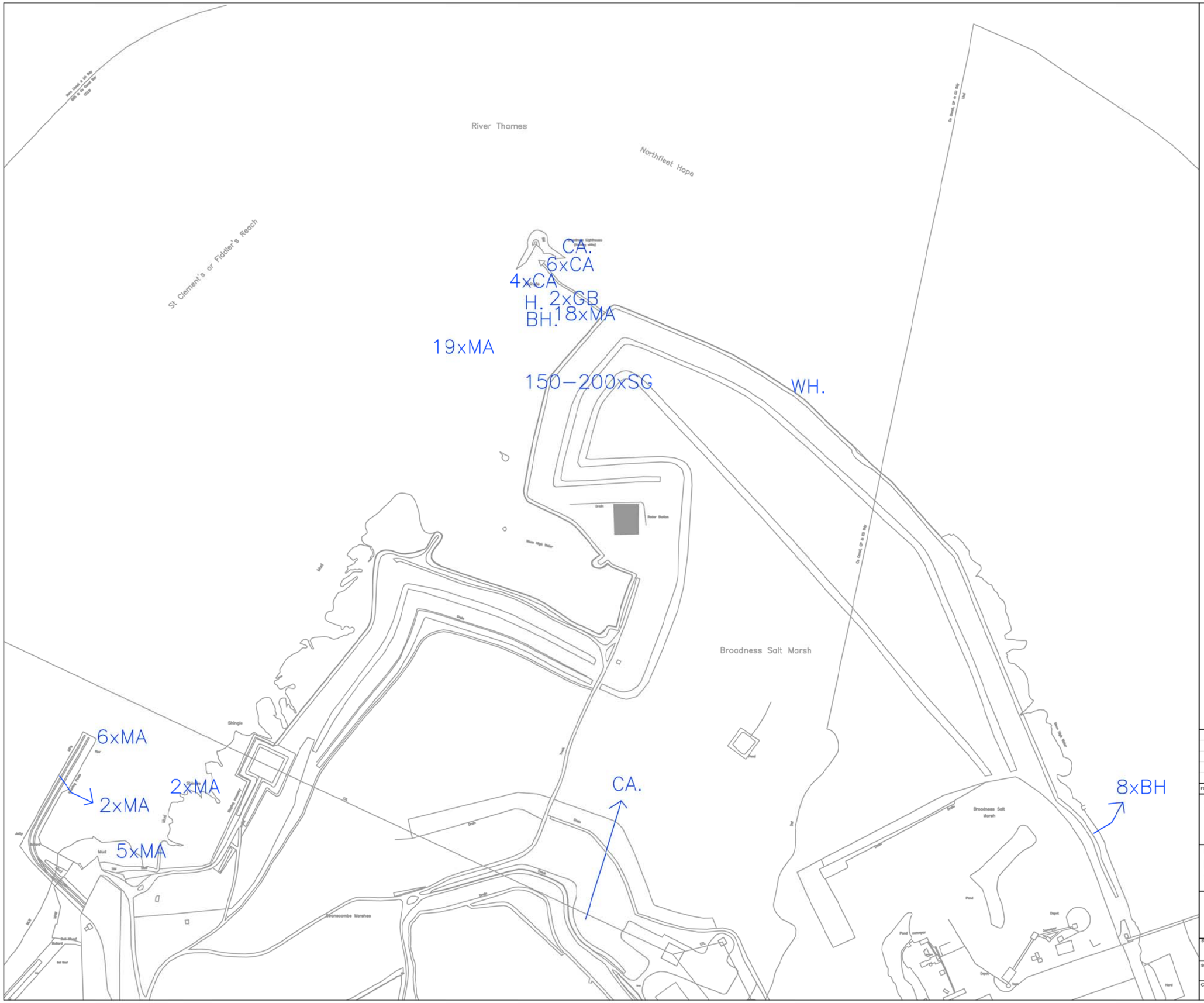
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - September High Tide

status		drawing no.		
		Figure 3		
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

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 - September High Tide

status		drawing no.		
		Figure 4		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg

KEY

BTO SPECIES CODES

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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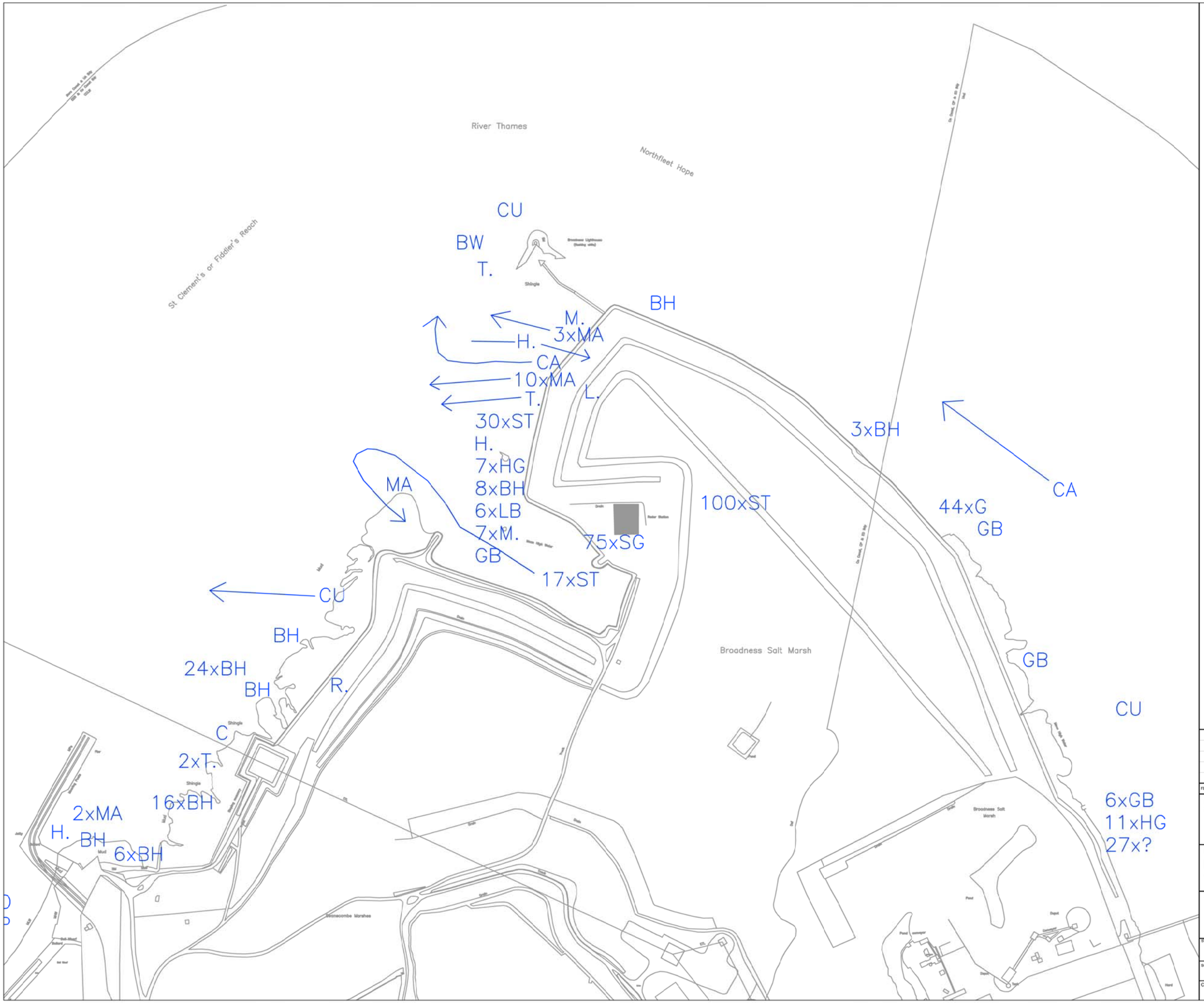
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - October Low Tide

status		drawing no.		
		Figure 5		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

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 Low Tide

status		drawing no.		
		Figure 6		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg

2xL.

5xCA 2xCA

BH

2xT.
MH

BH

2xCO

2xMH

10xT.

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
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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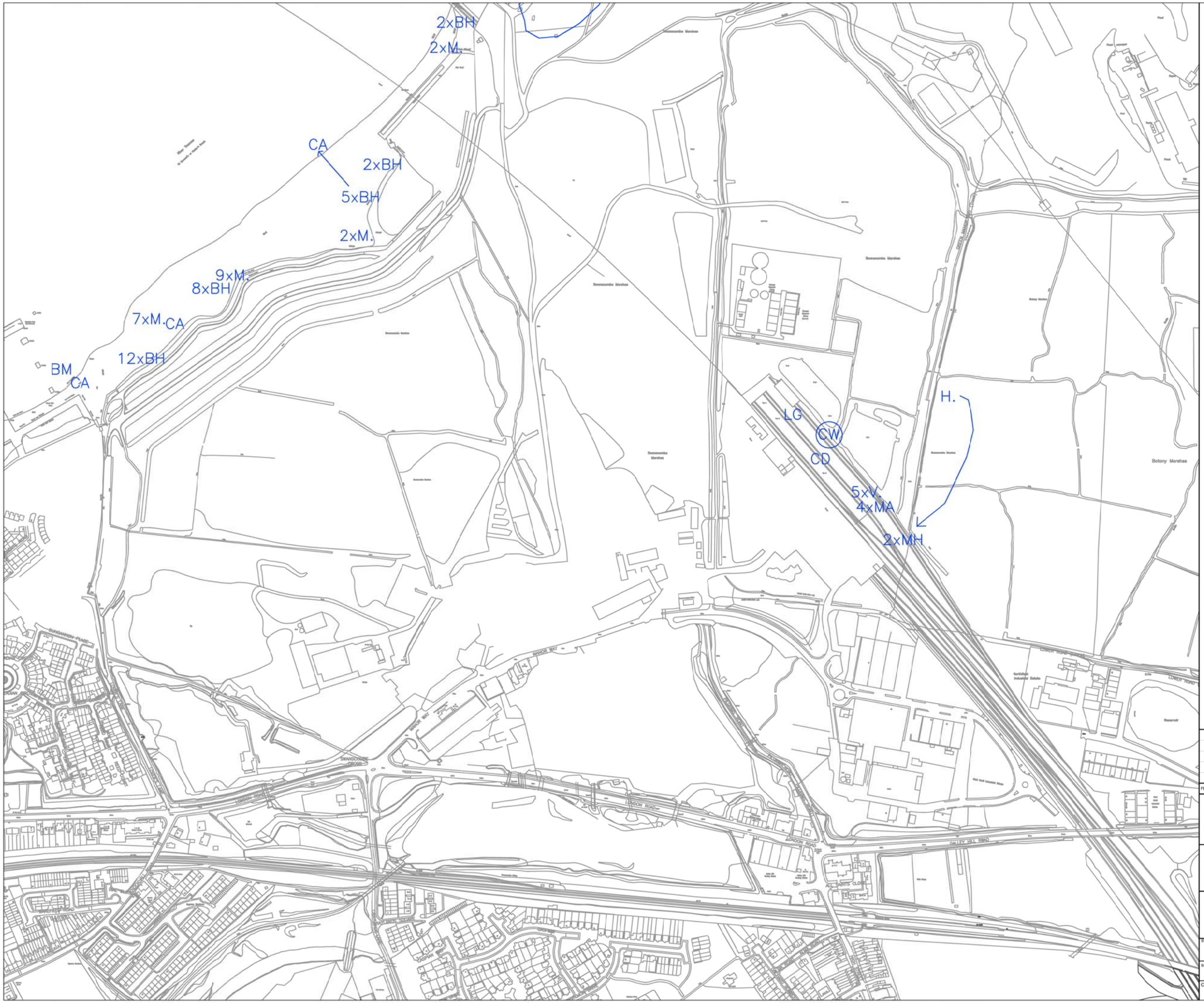
Project:
London Paramount - Wintering Bird Survey

Title:
North Area - October High Tide

status		drawing no.		
		Figure 8		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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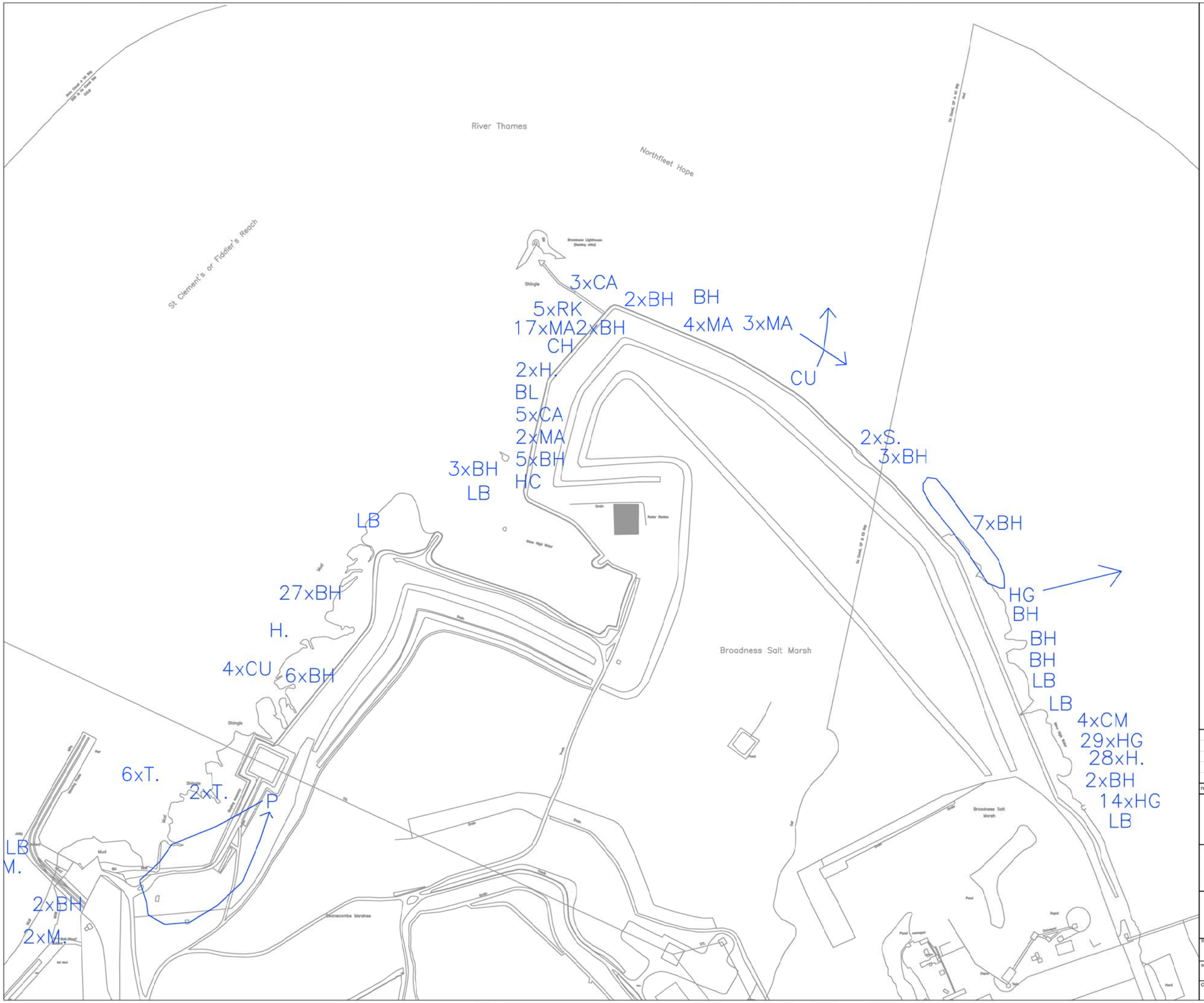
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - October 19th Low Tide

status		drawing no.		
		Figure 9		
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - October 19th Low Tide

status		drawing no.	
			Figure 10

scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg

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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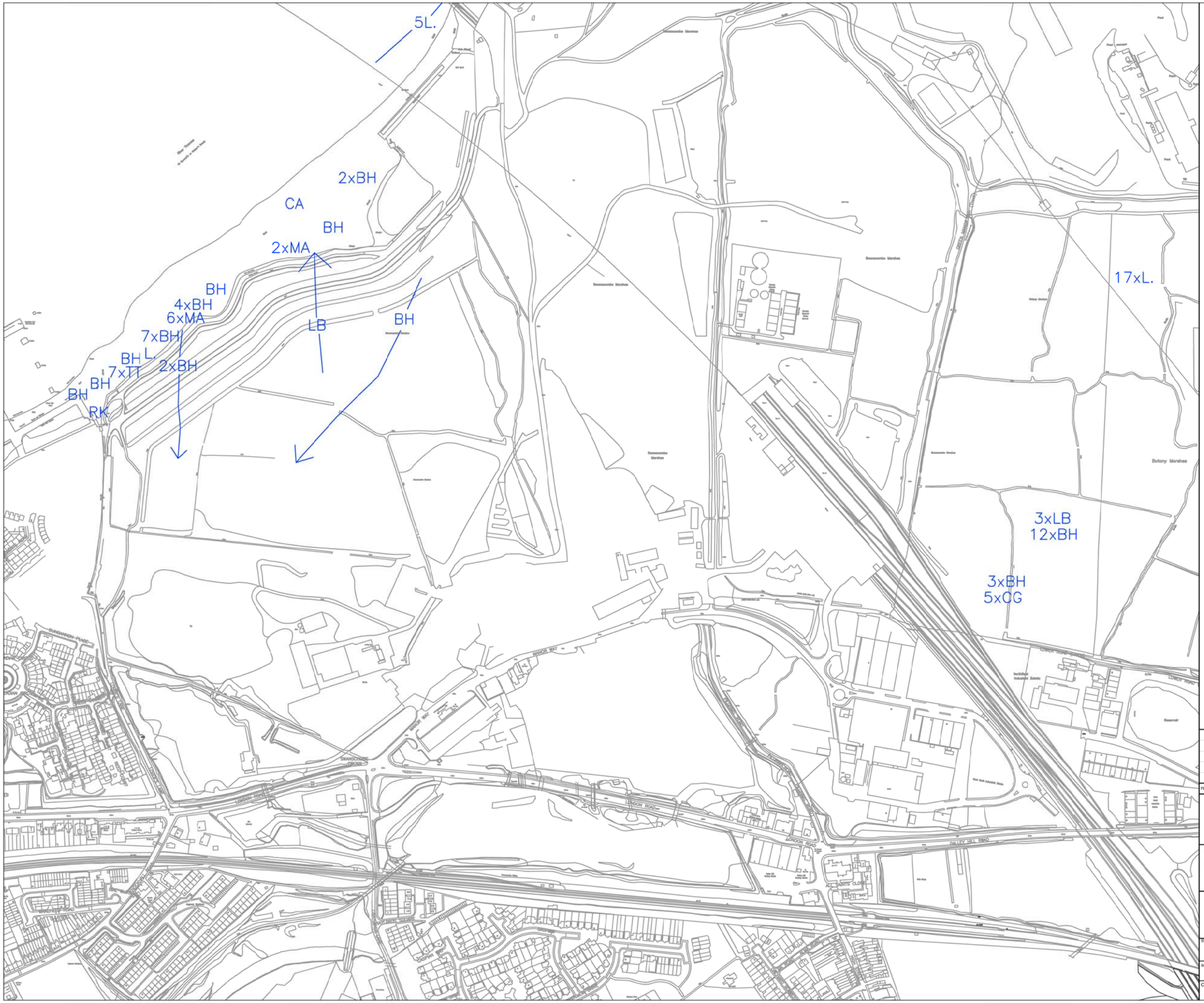
Project:
London Paramount - Wintering Bird Survey

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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CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
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MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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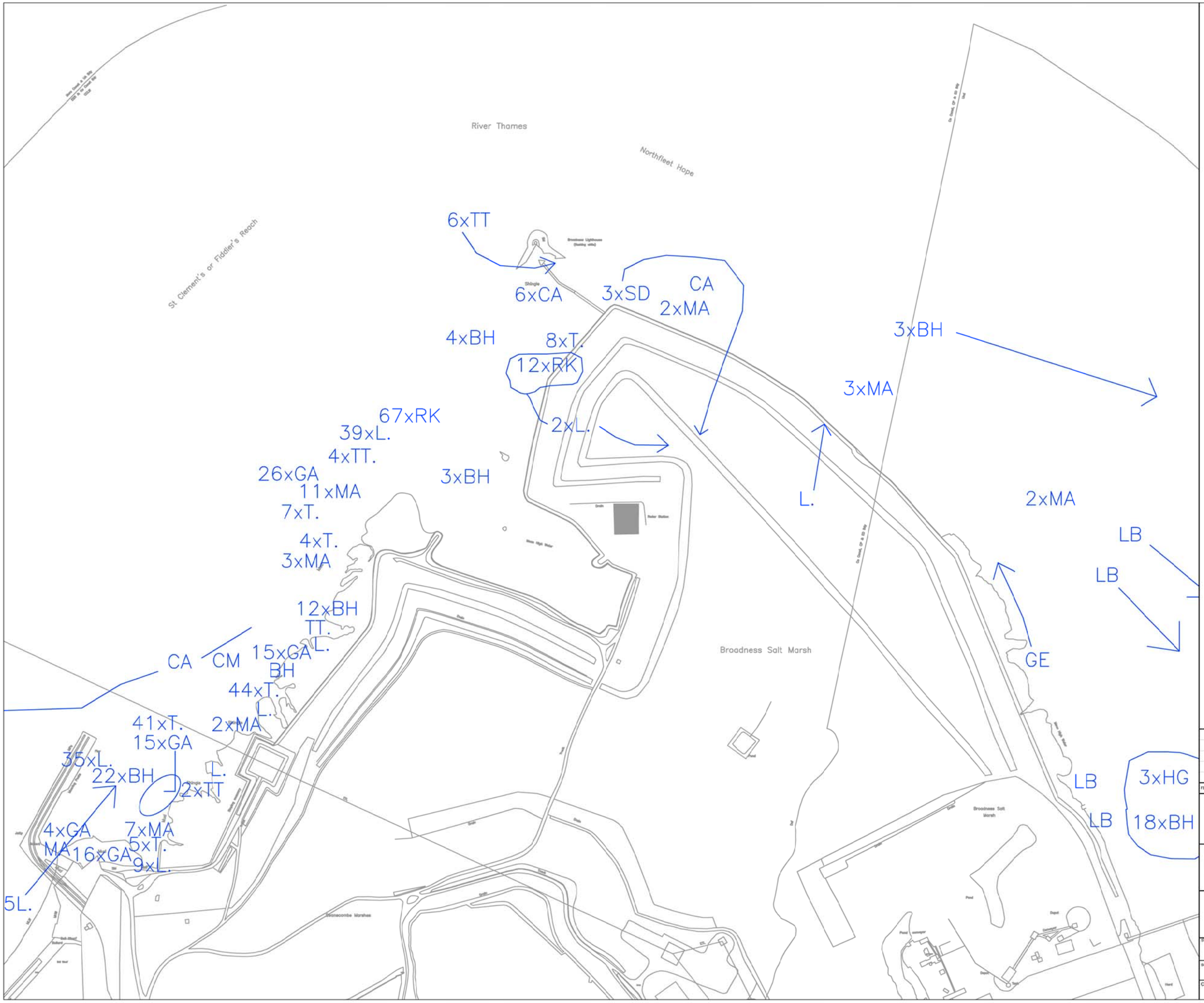
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - December Low Tide

status		drawing no.		
		Figure 15		
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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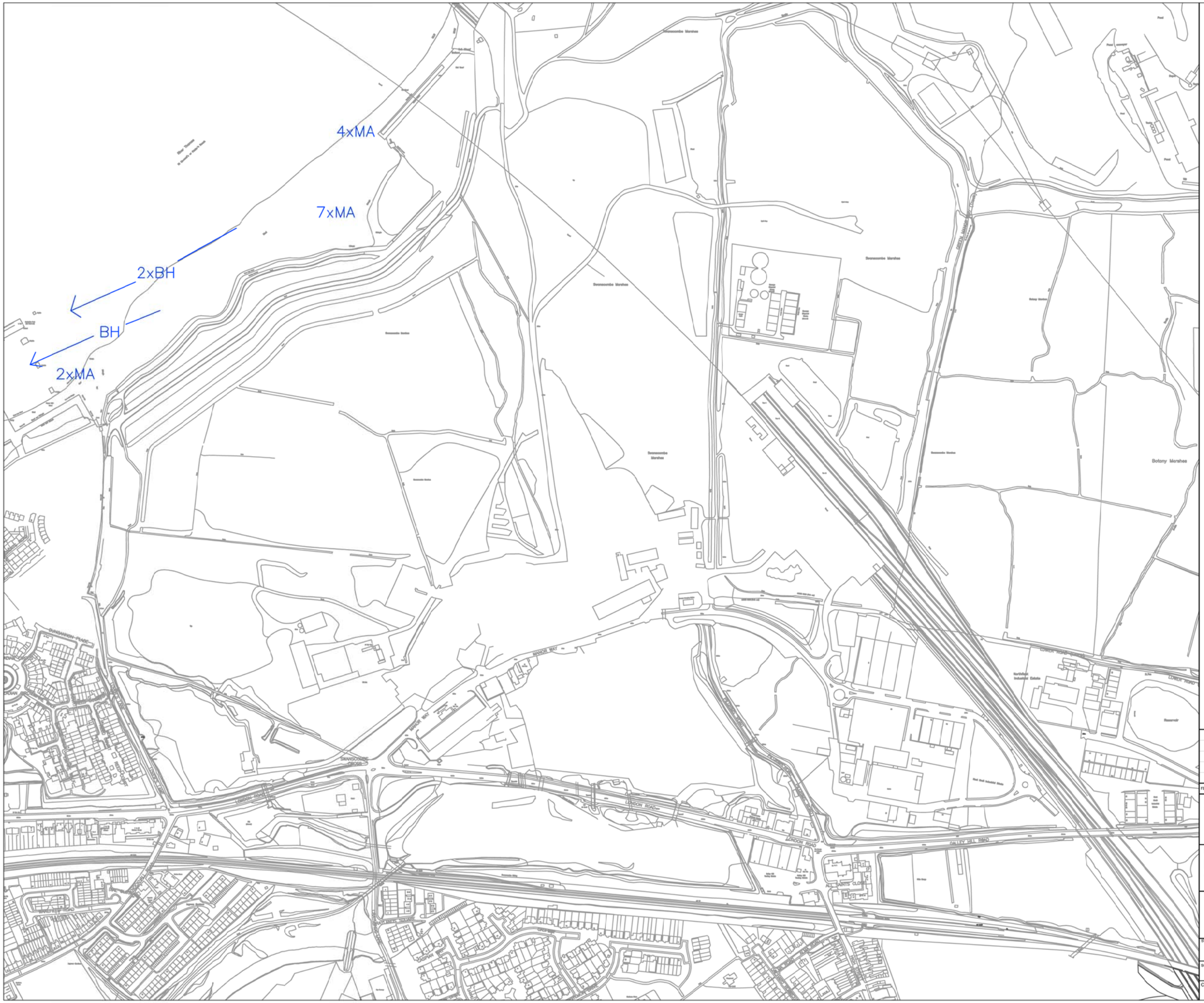
Project:
London Paramount - Wintering Bird Survey

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
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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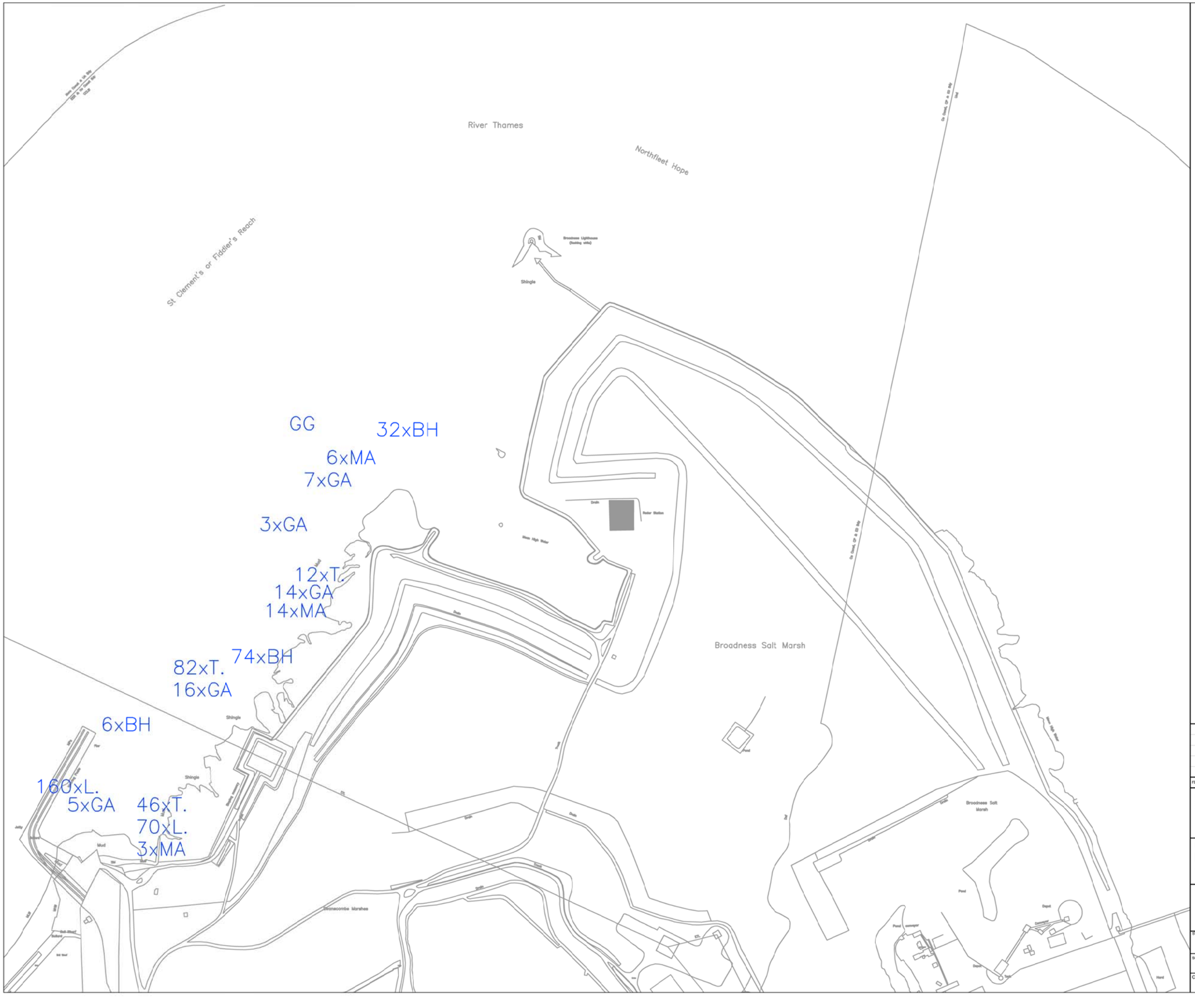
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - December High Tide

status		drawing no.		
		Figure 17		
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - December High Tide

status		drawing no.			
		Figure 18			
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg

KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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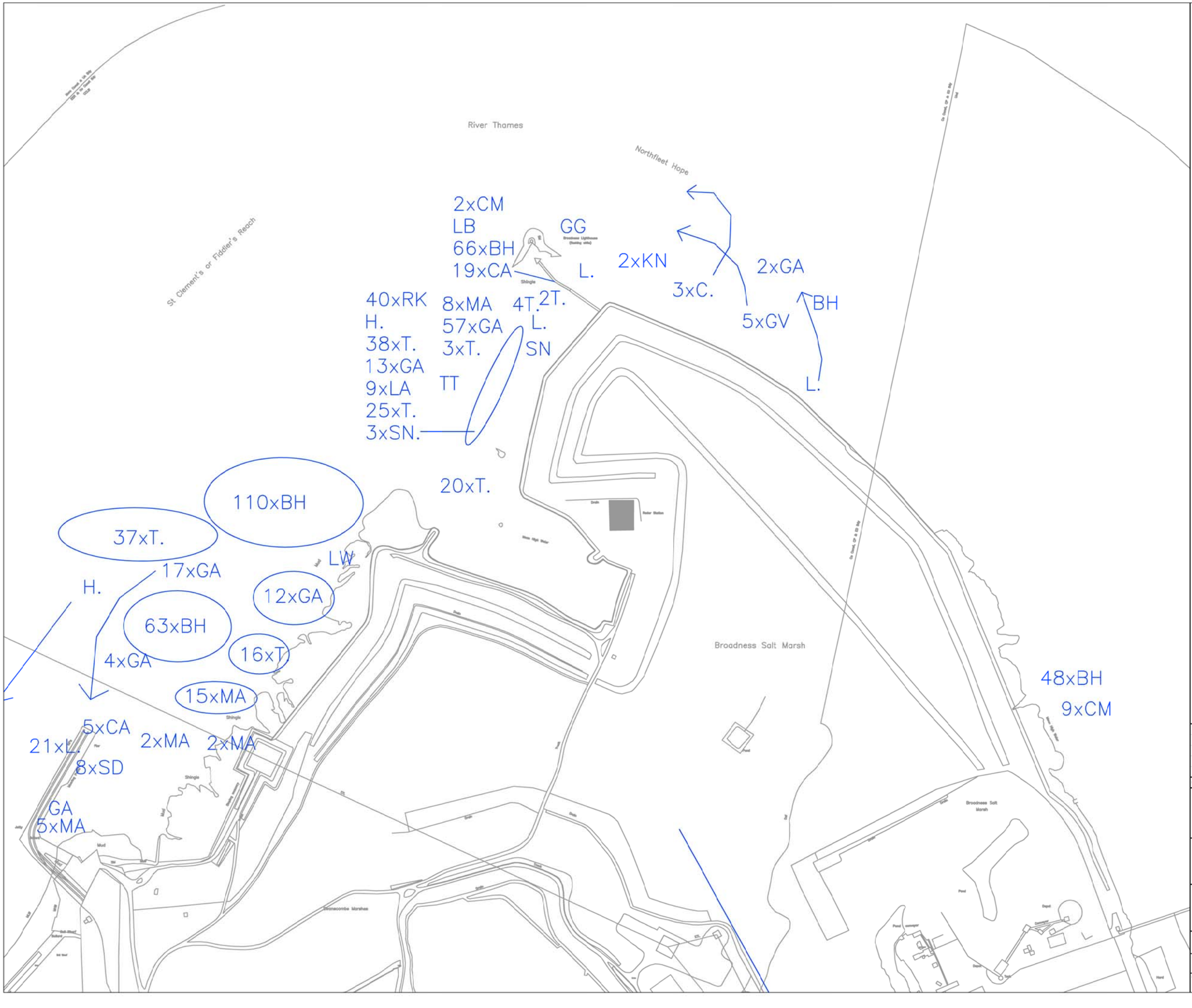
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - January Low Tide

status	drawing no.			
	Figure 19			
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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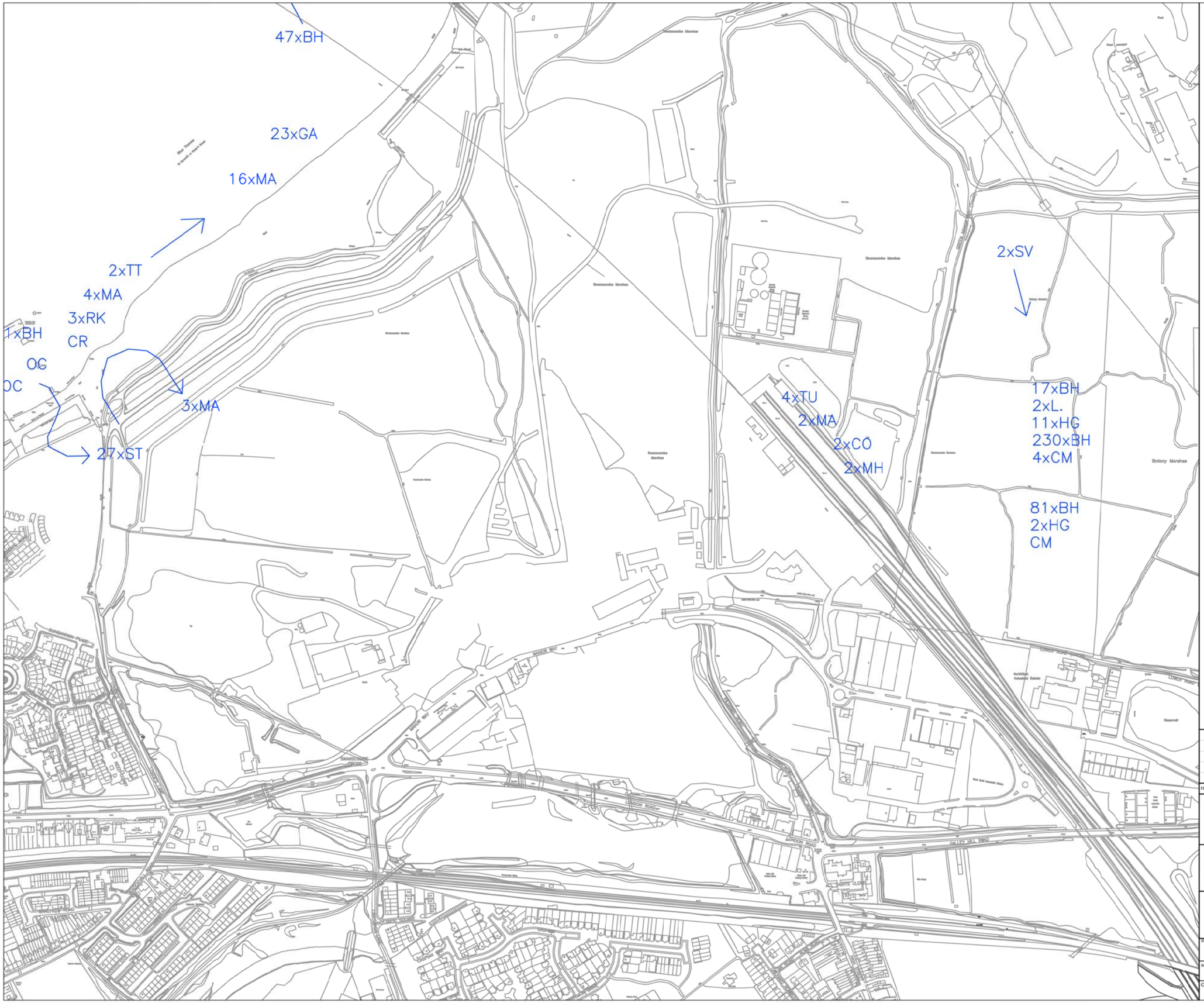
Project:
London Paramount - Wintering Bird Survey

Title:
North Area - January Low Tide

status	drawing no.			
	Figure 20			
scale	size	date	drawn	checked
NTS	**A3**	**21-10-2013**	**APW**	**HL**

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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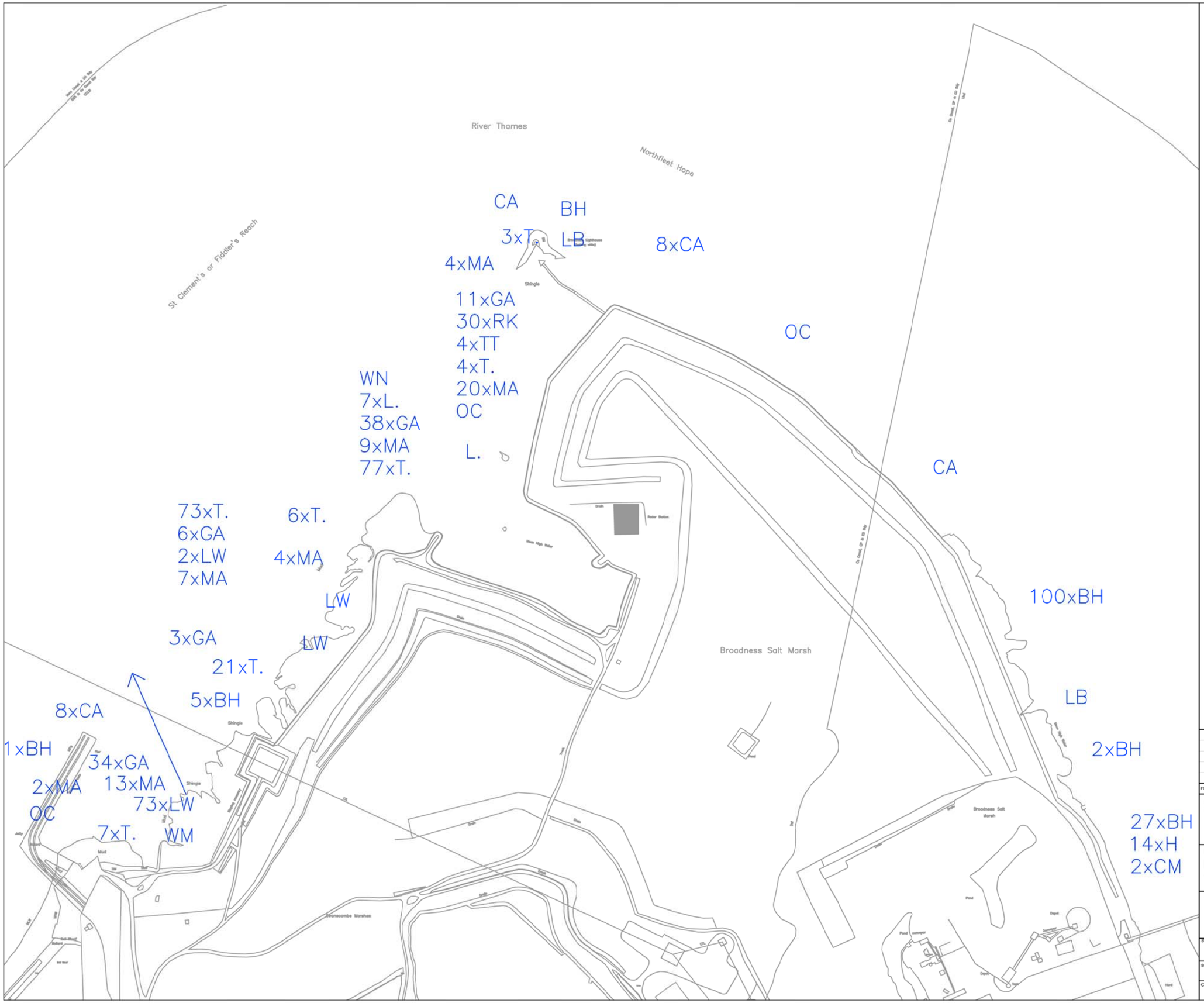
Project:
London Paramount - Wintering Bird Survey

Title:
South Area - January High Tide

status		drawing no.		
		Figure 21		
scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

revision	description	date	checked by

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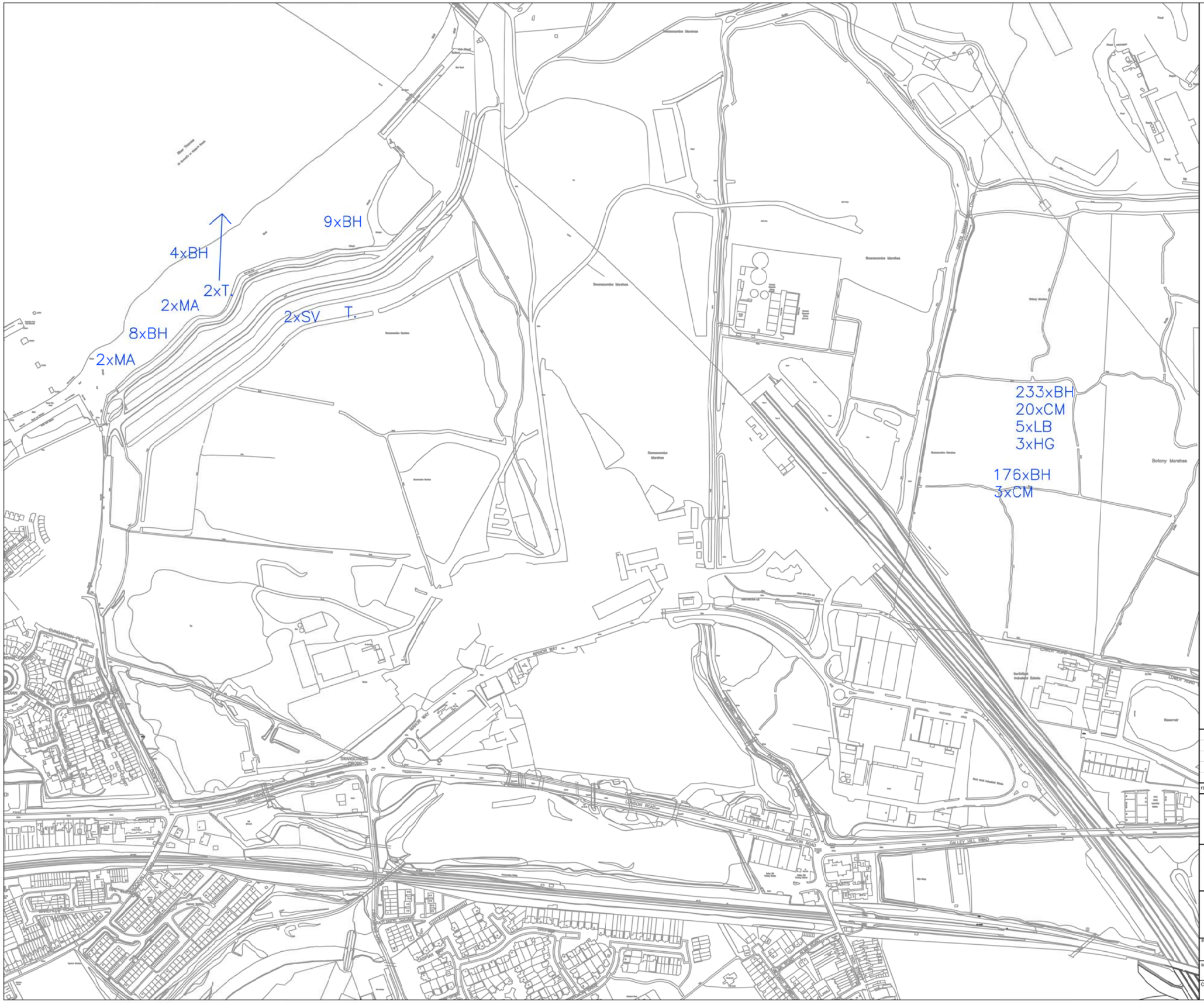
Project:
London Paramount - Wintering Bird Survey

Title:
North Area - January High Tide

status		drawing no.	
			Figure 22

scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

CAD filename
Figure_1.dwg



KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
C.	Carrion Crow
CA	Cormorant
CG	Canada Goose
CO	Coot
CM	Common Gull
CS	Common Sandpiper
CU	Curlew
DN	Dunlin
ET	Little Egret
FF	Fieldfare
GA	Gadwall
GK	Greenshank
GB	Great Black-backed Gull
G.	Green Woodpecker
GP	Golden Plover
GV	Grey Plover
H.	Grey Heron
HG	Herring Gull
K.	Kestrel
KN	Knot
L.	Lapwing
LB	Lesser Back-backed Gull
LG	Little Grebe
LI	Linnet
MA	Mallard
MP	Meadow Pipit
MH	Moorhen
OC	Oystercatcher
PE	Peregrine
PH	Pheasant
RB	Reed Bunting
RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
SU	Shelduck
SV	Shoveler
SC	Stonechat
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon

rev	revision	description	date	checked by

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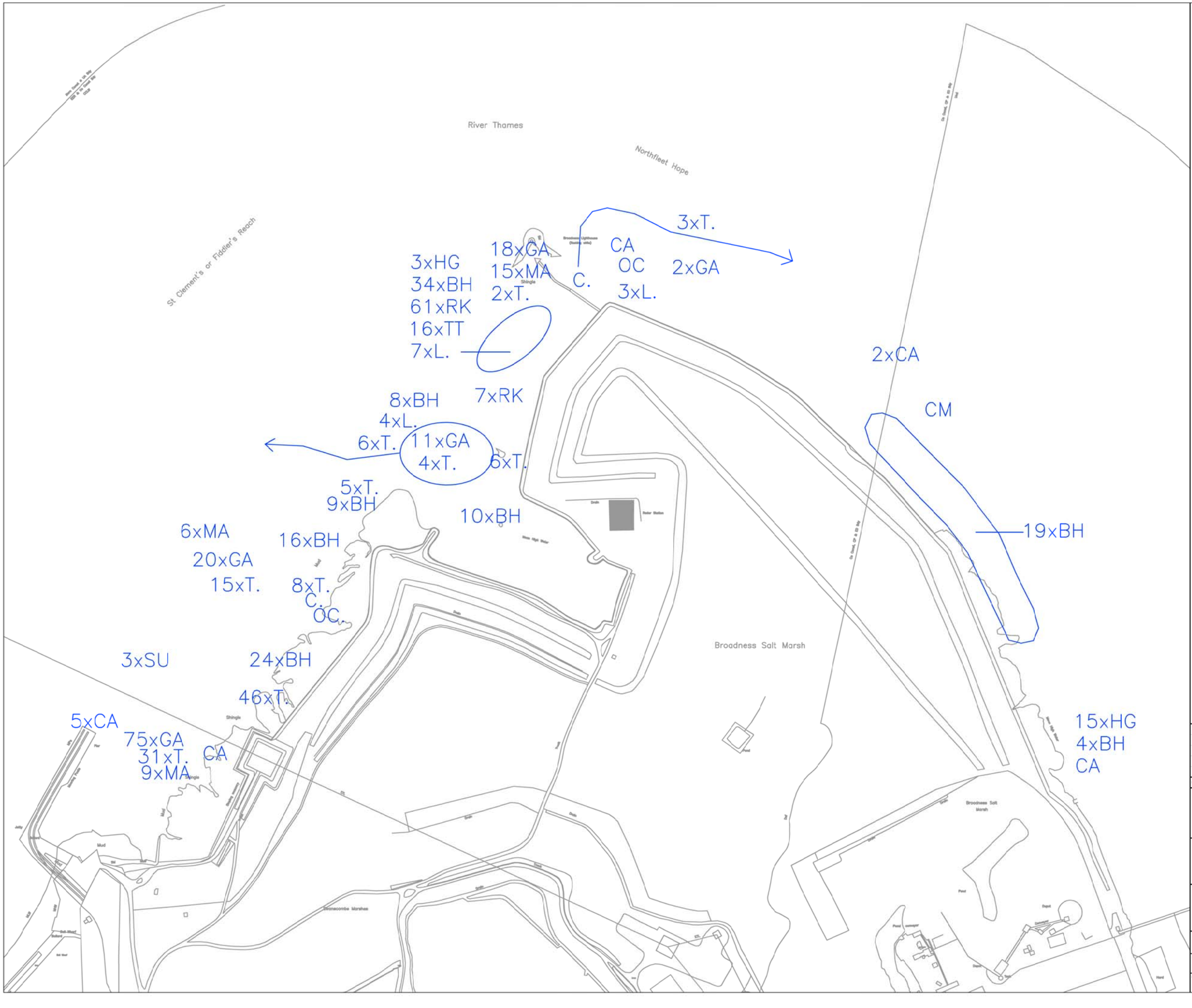
Project:
London Paramount - Wintering Bird Survey

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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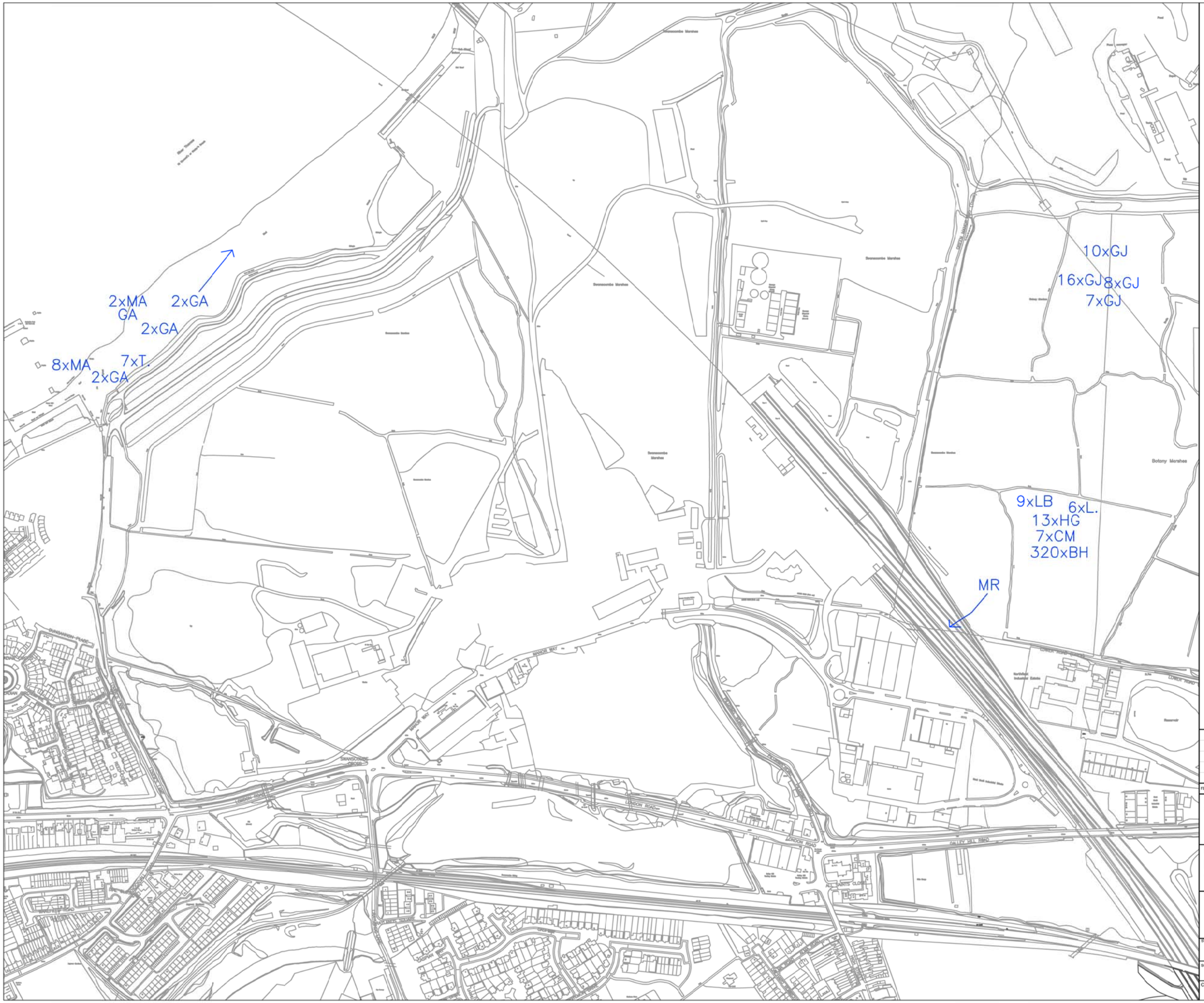
Project:
London Paramount - Wintering Bird Survey

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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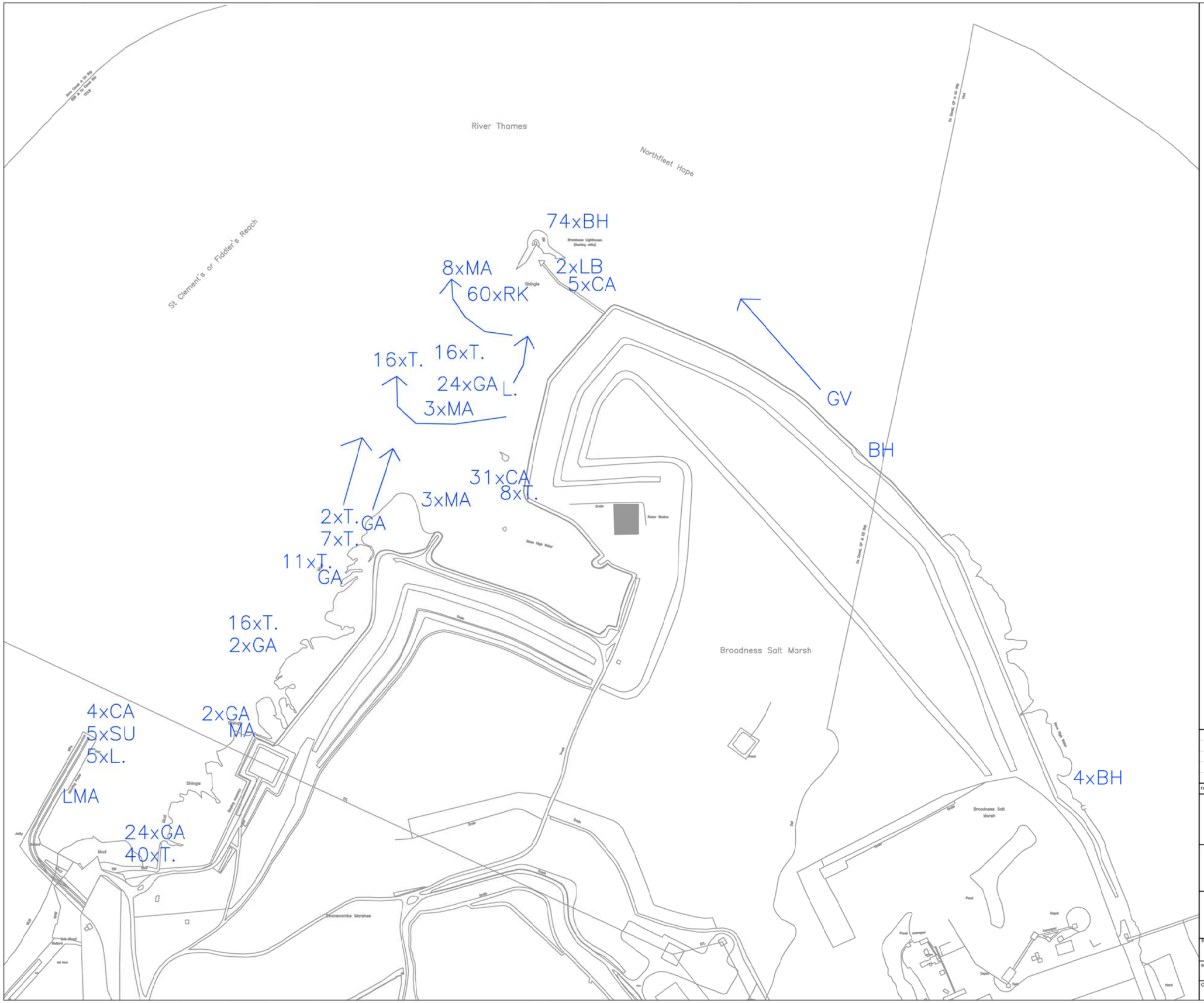
Project:
London Paramount - Wintering Bird Survey

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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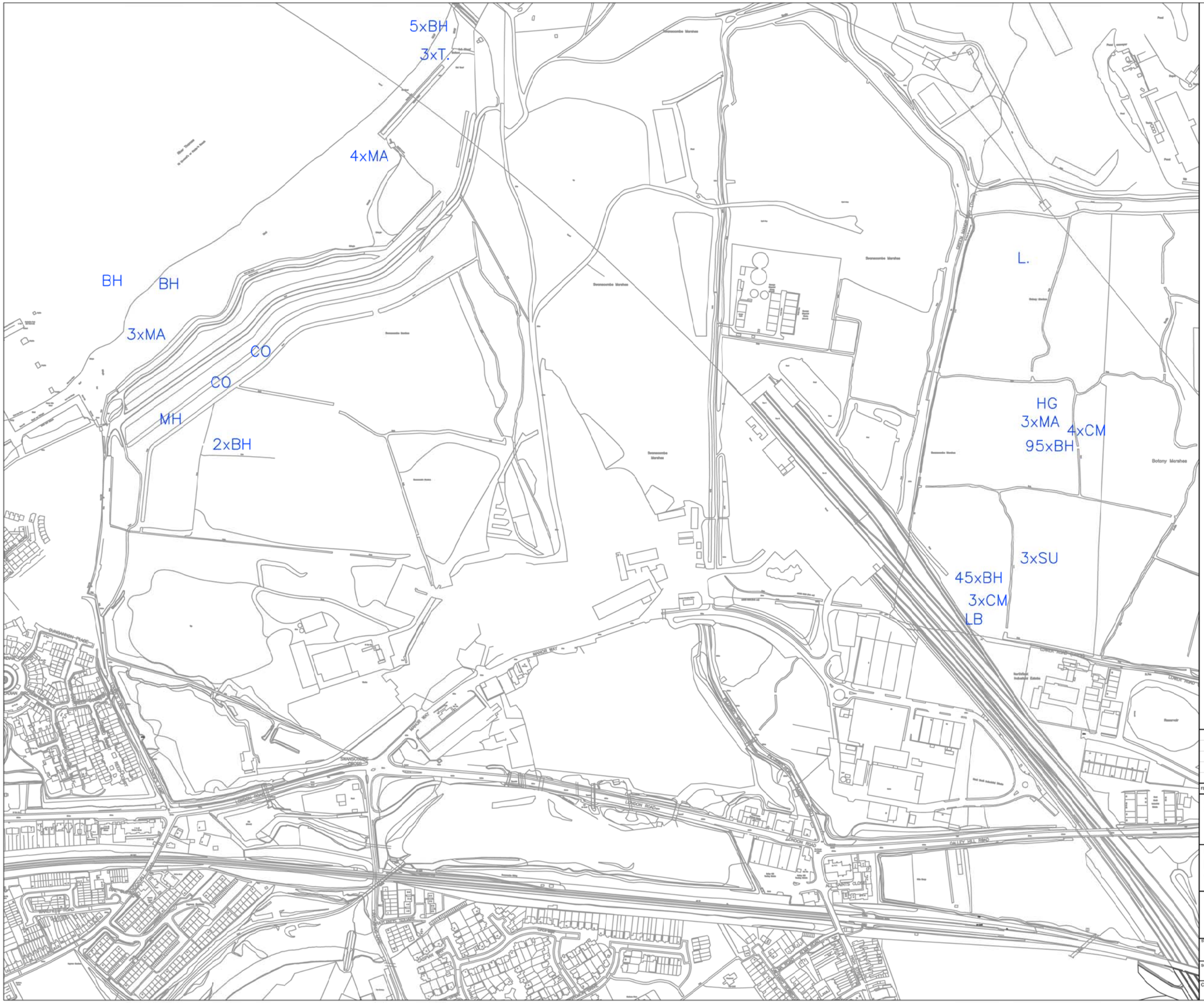
Project:
London Paramount - Wintering Bird Survey

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**

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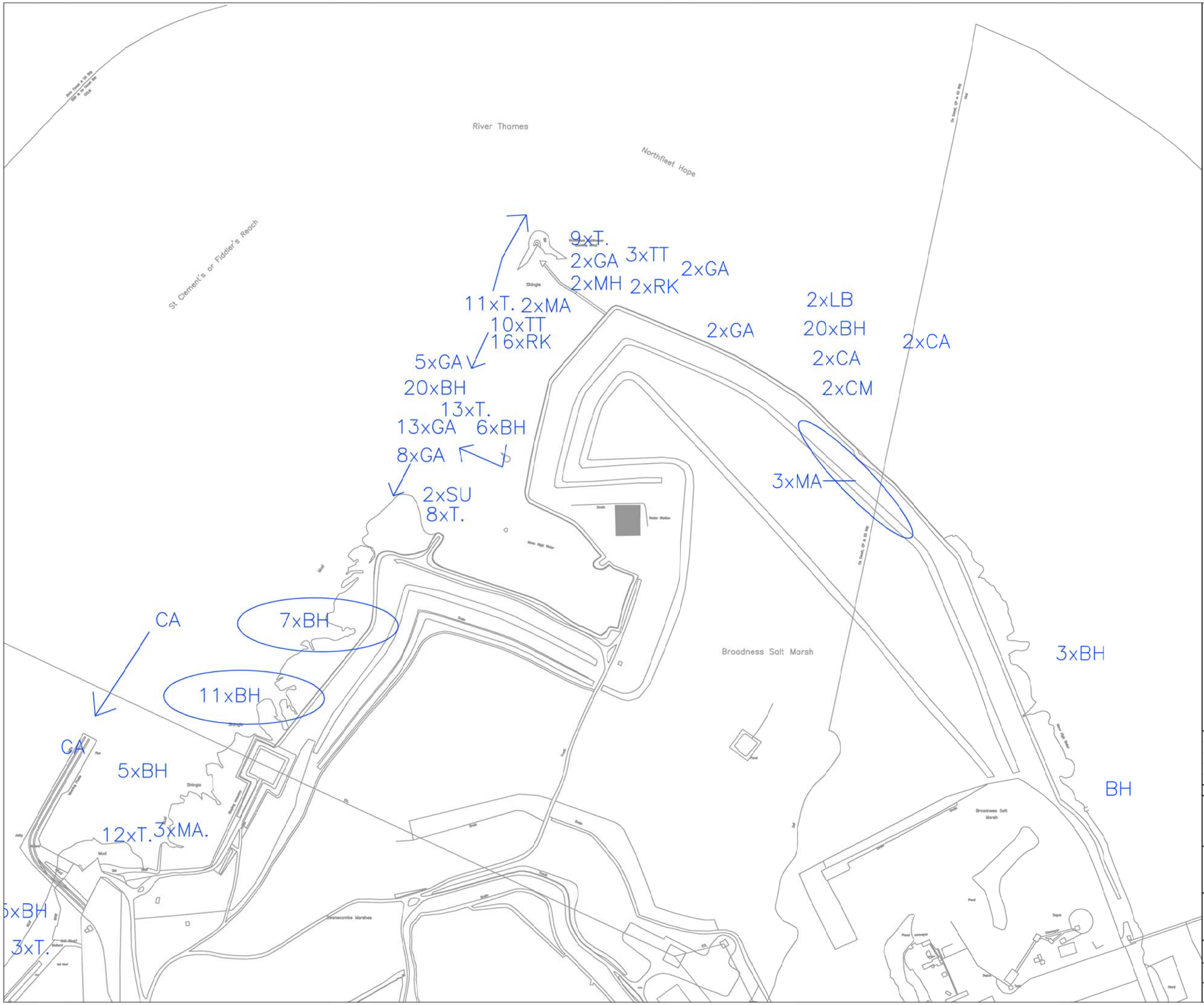

KEY

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
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
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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - March Low Tide

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NTS	A3	21-10-2013	APW	HL

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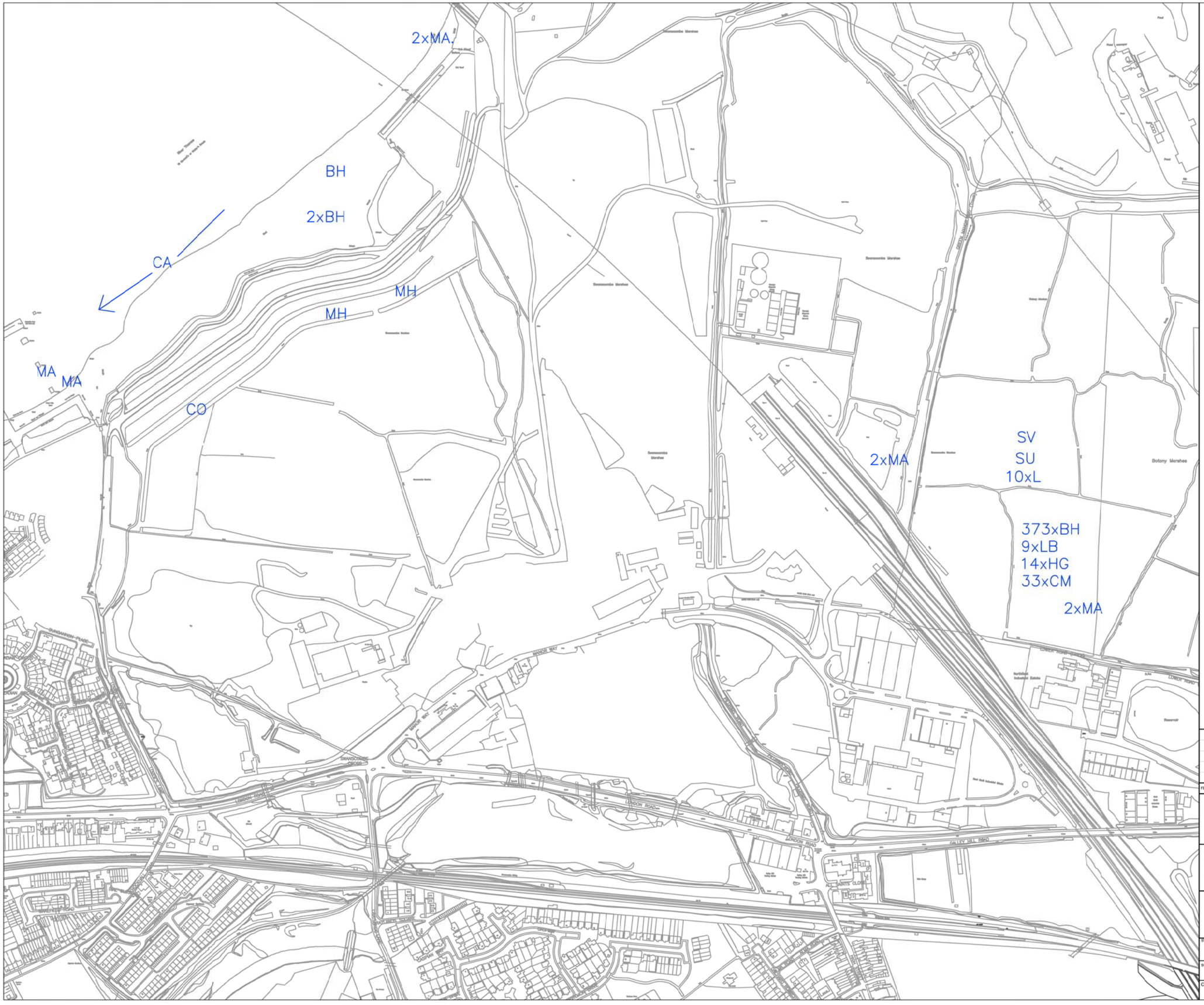

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Project:
London Paramount - Wintering Bird Survey

Title:
South Area - March High Tide

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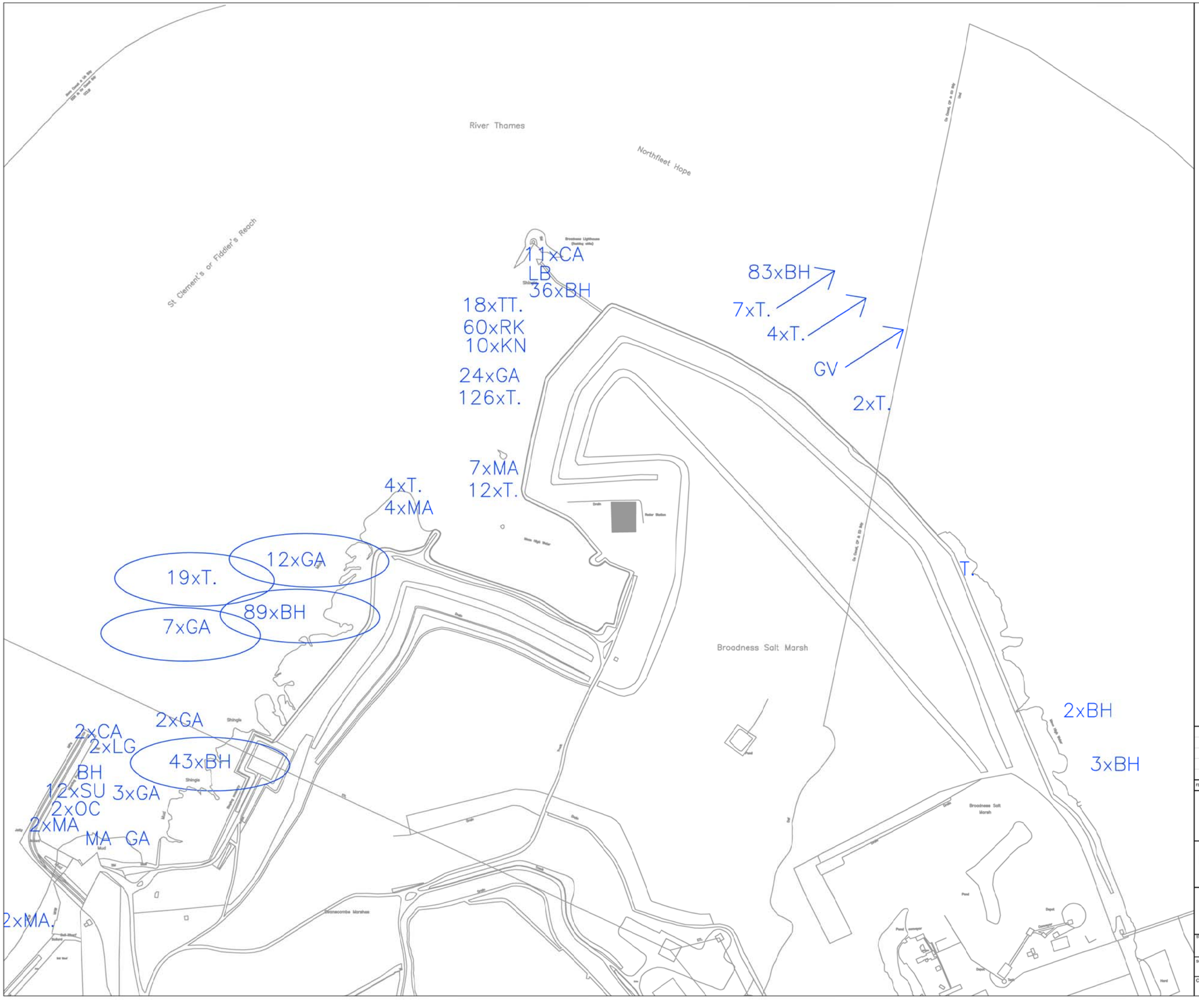

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G.	Green Woodpecker
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HG	Herring Gull
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KN	Knot
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PH	Pheasant
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RK	Redshank
RP	Ringed Plover
S.	Skylark
SE	Short-eared Owl
SH	Sparrowhawk
SN	Snipe
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Project:
London Paramount - Wintering Bird Survey

Title:
North Area - March High Tide

status	drawing no.			
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scale	size	date	drawn	checked
NTS	A3	21-10-2013	APW	HL

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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 [redacted]

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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Directors C J Blandford BA DipLD MLA FLI • M E Antonia BSc EnvSci RSA DipPA • D Watkins BSc MSc AMIEnvSci

Annex EDP 16
Wintering Bird Survey Report (Corylus Ecology April 2016)

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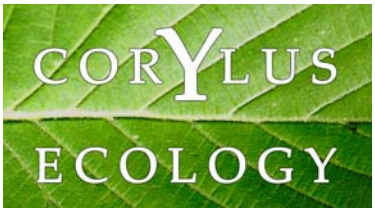

London Paramount Entertainment resort

WINTERING BIRD SURVEY REPORT

DRAFT

For and on behalf of

Chris Blandford Associates

APRIL 2016

Corylus Ecology

Unit A3 Speldhurst Business Park, Langton Road, Speldhurst, Tunbridge Wells, Kent. TN3 0NR
Telephone: 01892 861868 E-mail: info@corylus-ecology.co.uk

Directors: 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

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' [redacted] and 'London Bird Club Wiki' [redacted] 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

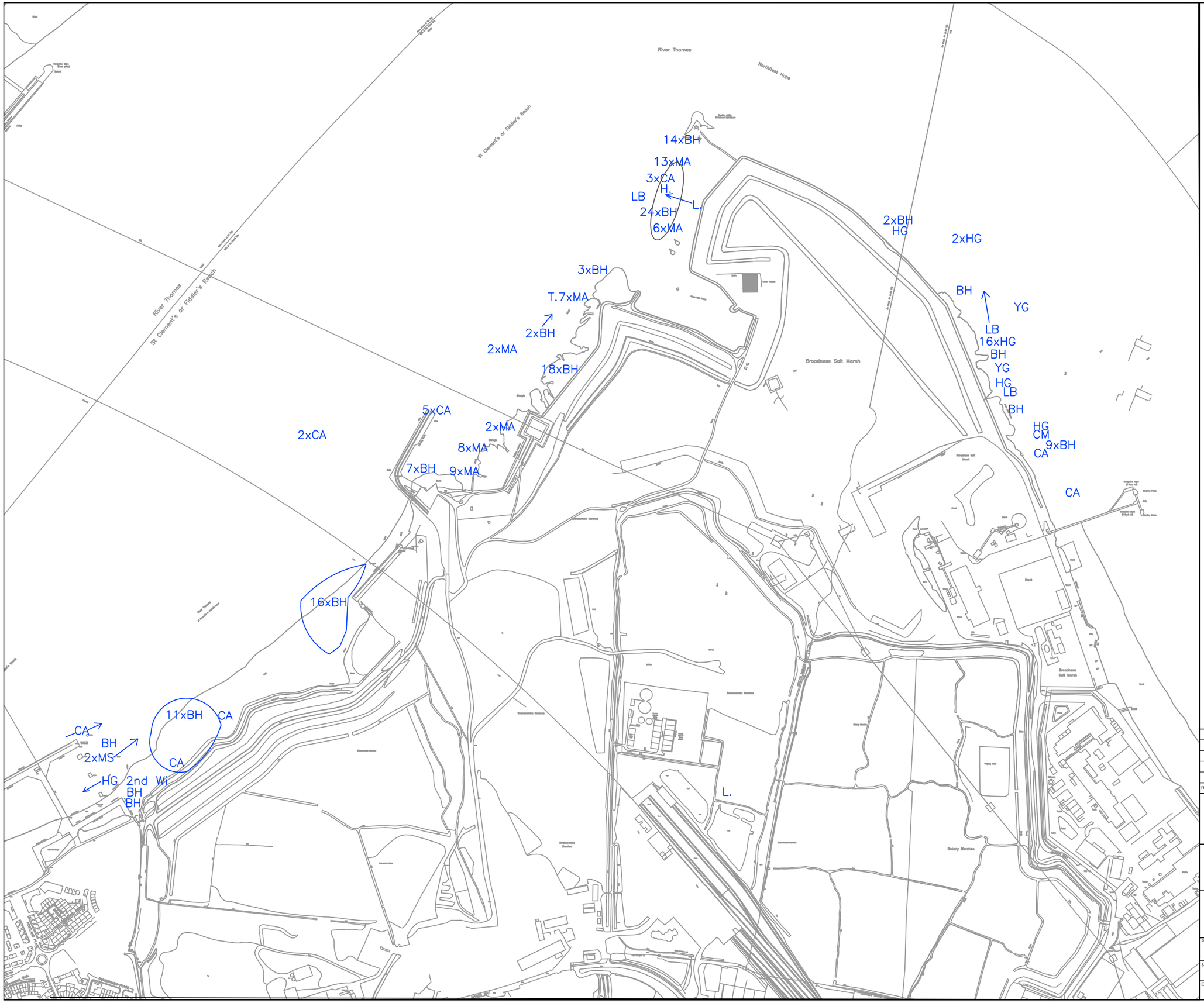
Table 4: Summary of Bird Surveys

	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.		
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scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

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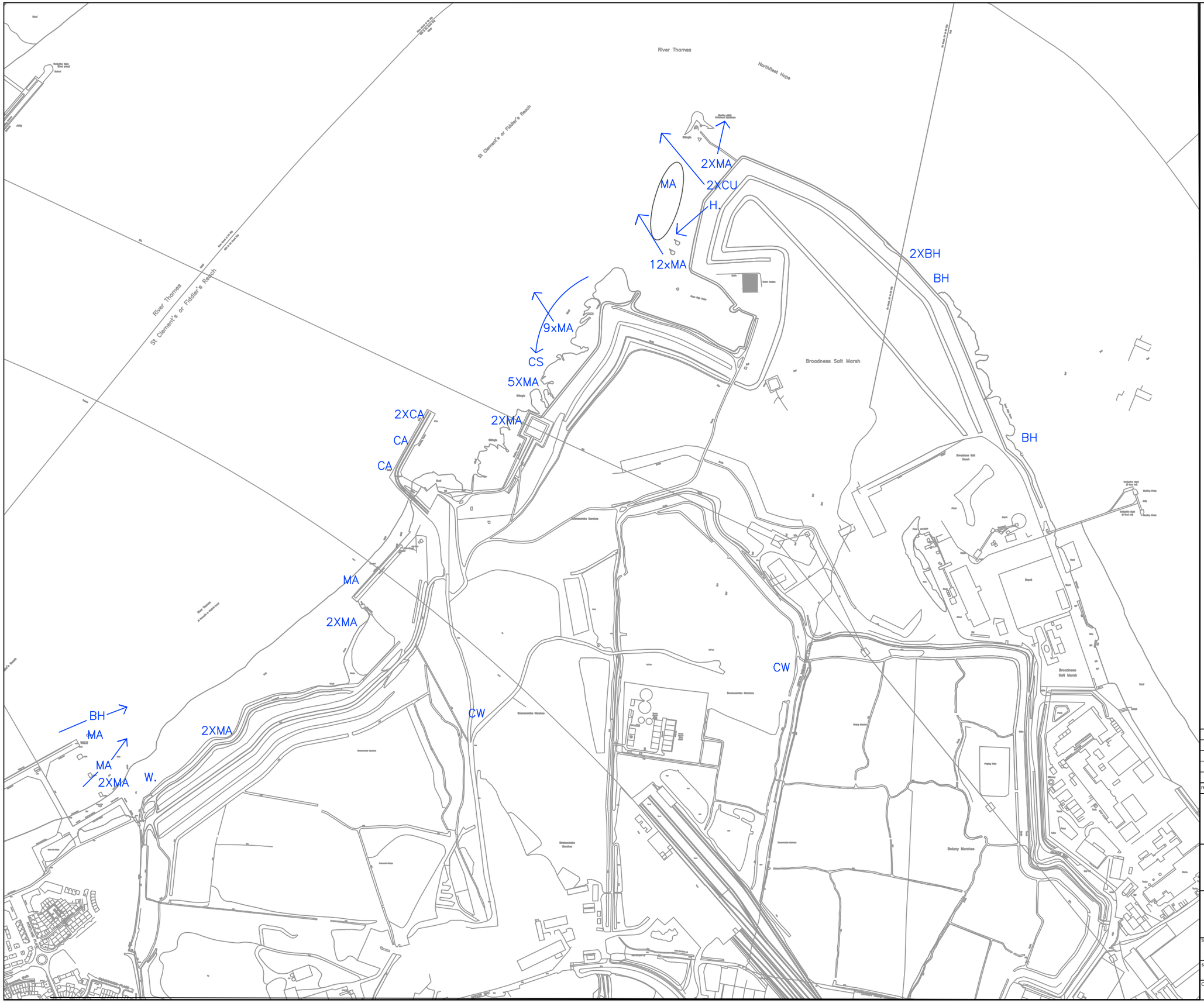

KEY

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
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 - High Tide

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

CAD filename

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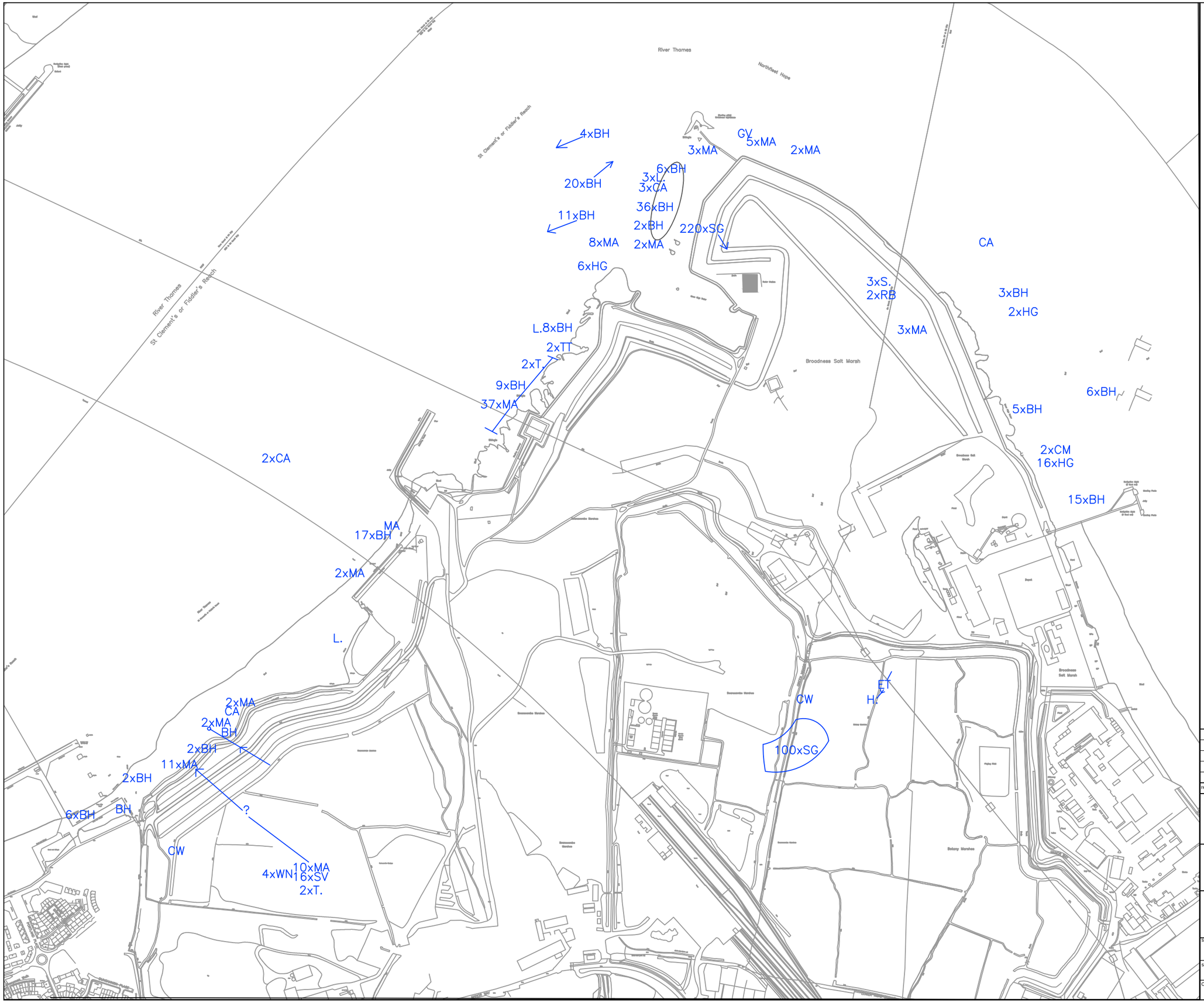

KEY

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
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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 - Low Tide

status		drawing no.		
		Figure 3		
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

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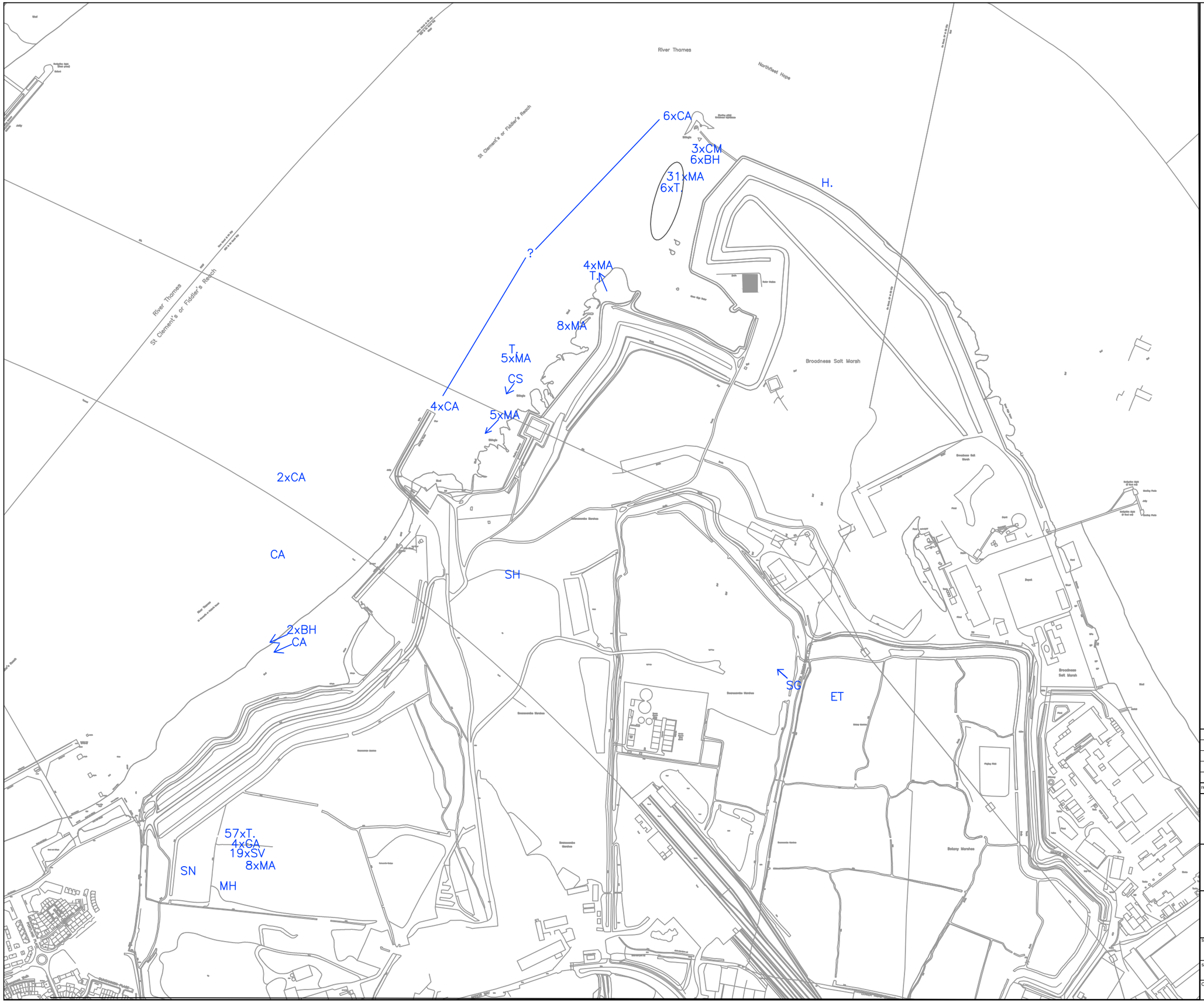

KEY

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
T.	Teal
TT	Turnstone
W.	Wheatear
WA	Water Rail
WN	Wigeon
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

Title:

October 2014 - High Tide

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

CAD filename

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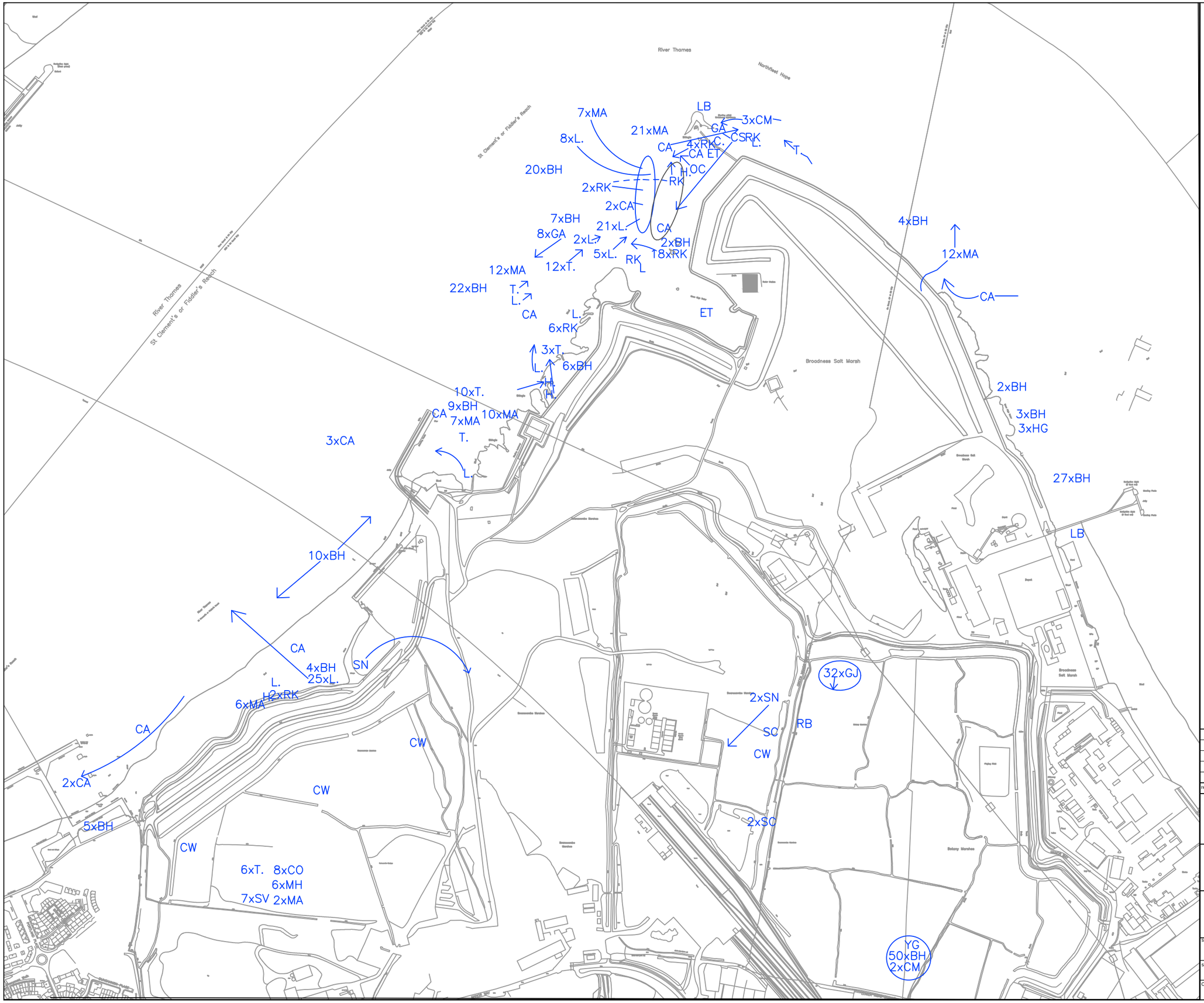

KEY

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
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.		
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scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

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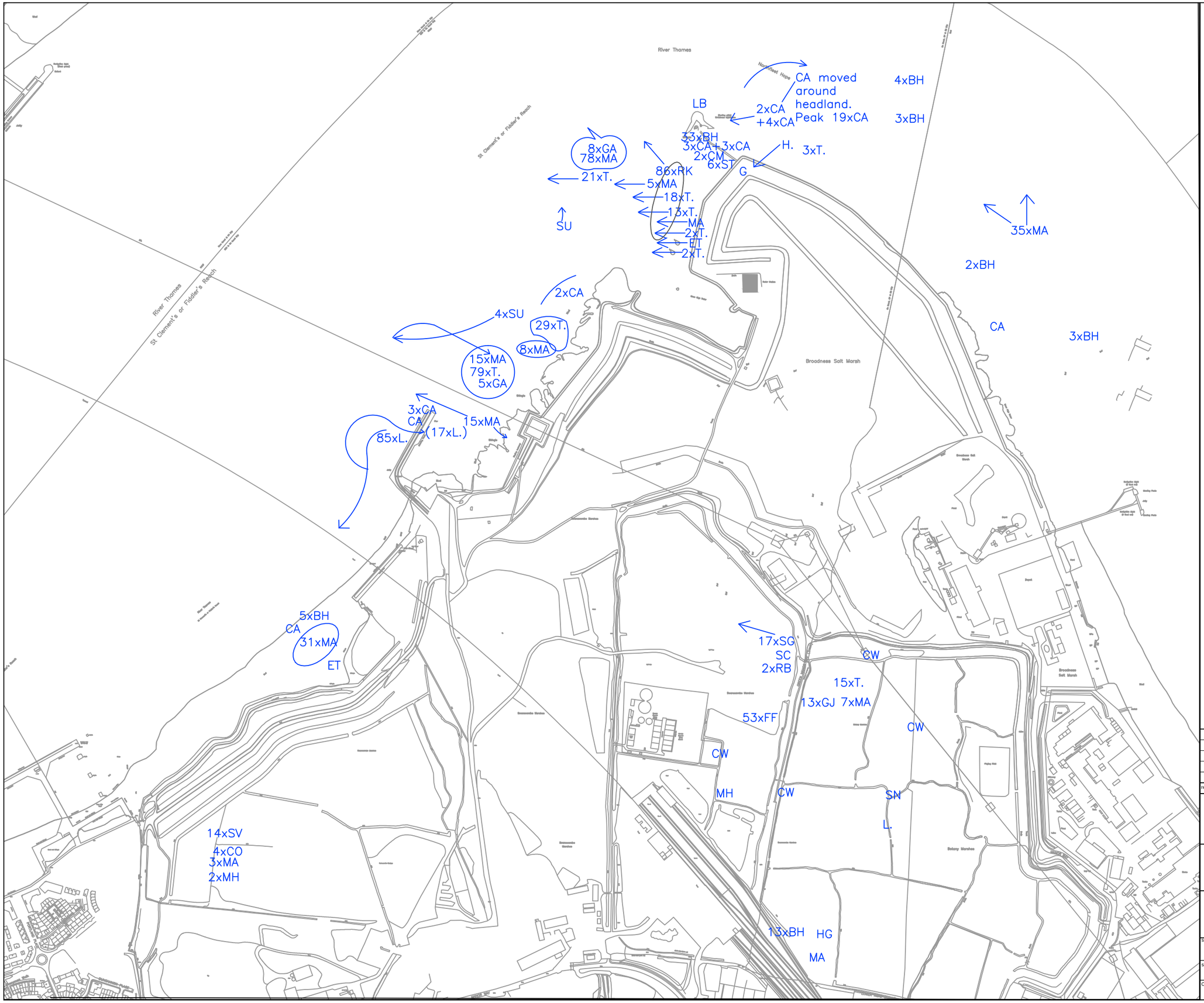

KEY

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
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.			
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scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

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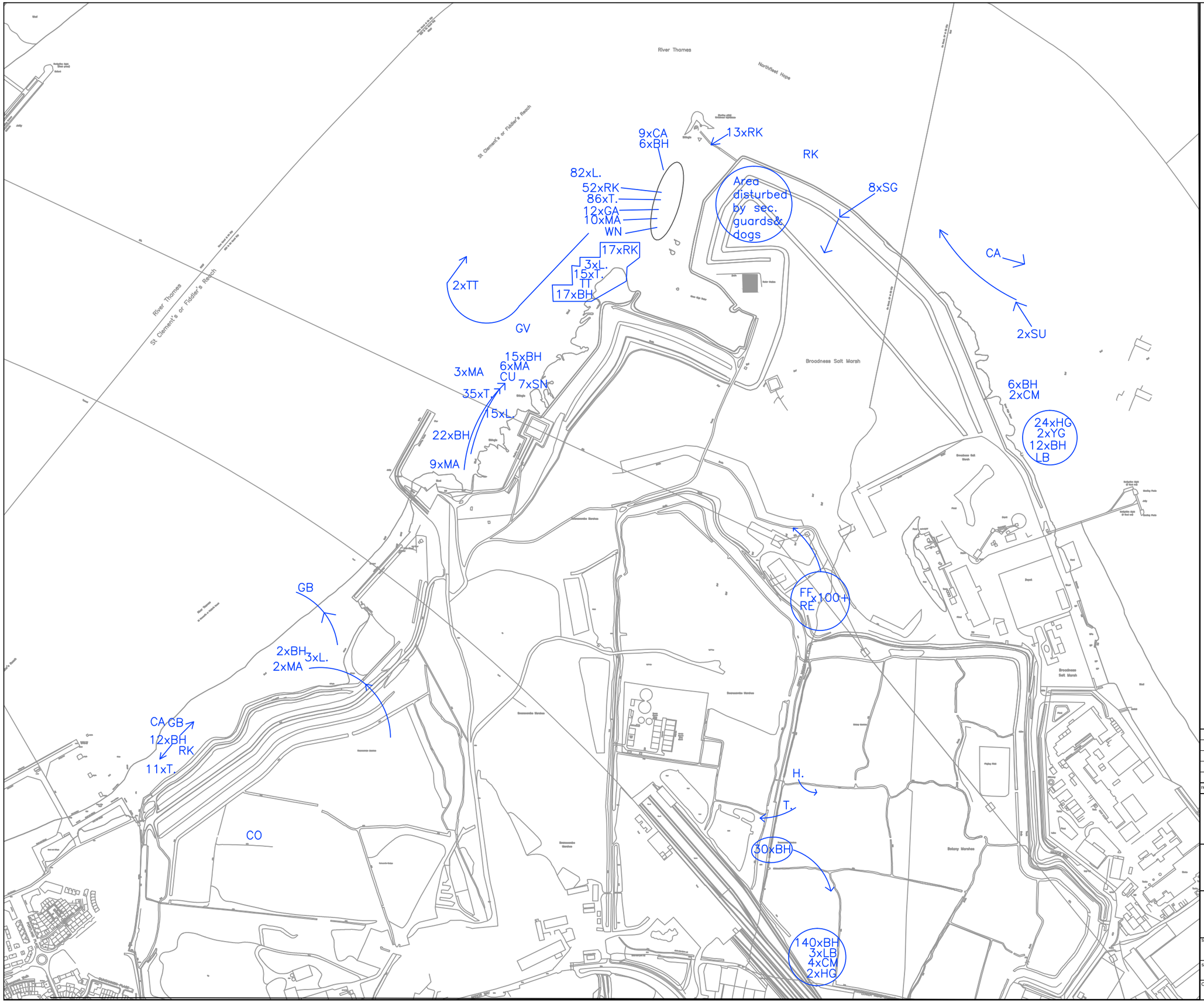

KEY

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
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

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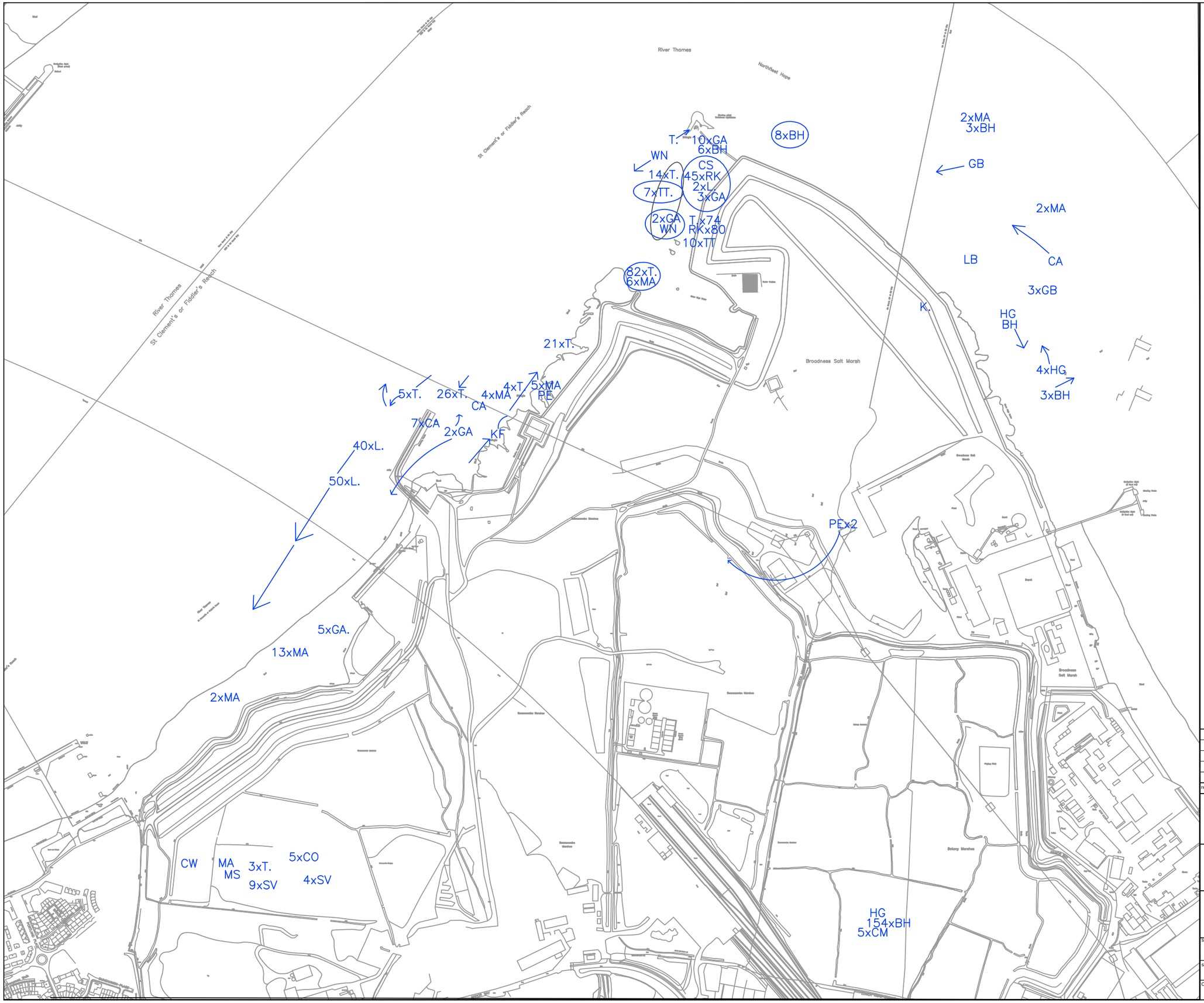

KEY

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
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GP	Golden Plover
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GV	Grey Plover
H.	Grey Heron
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MH	Moorhen
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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
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		
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NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

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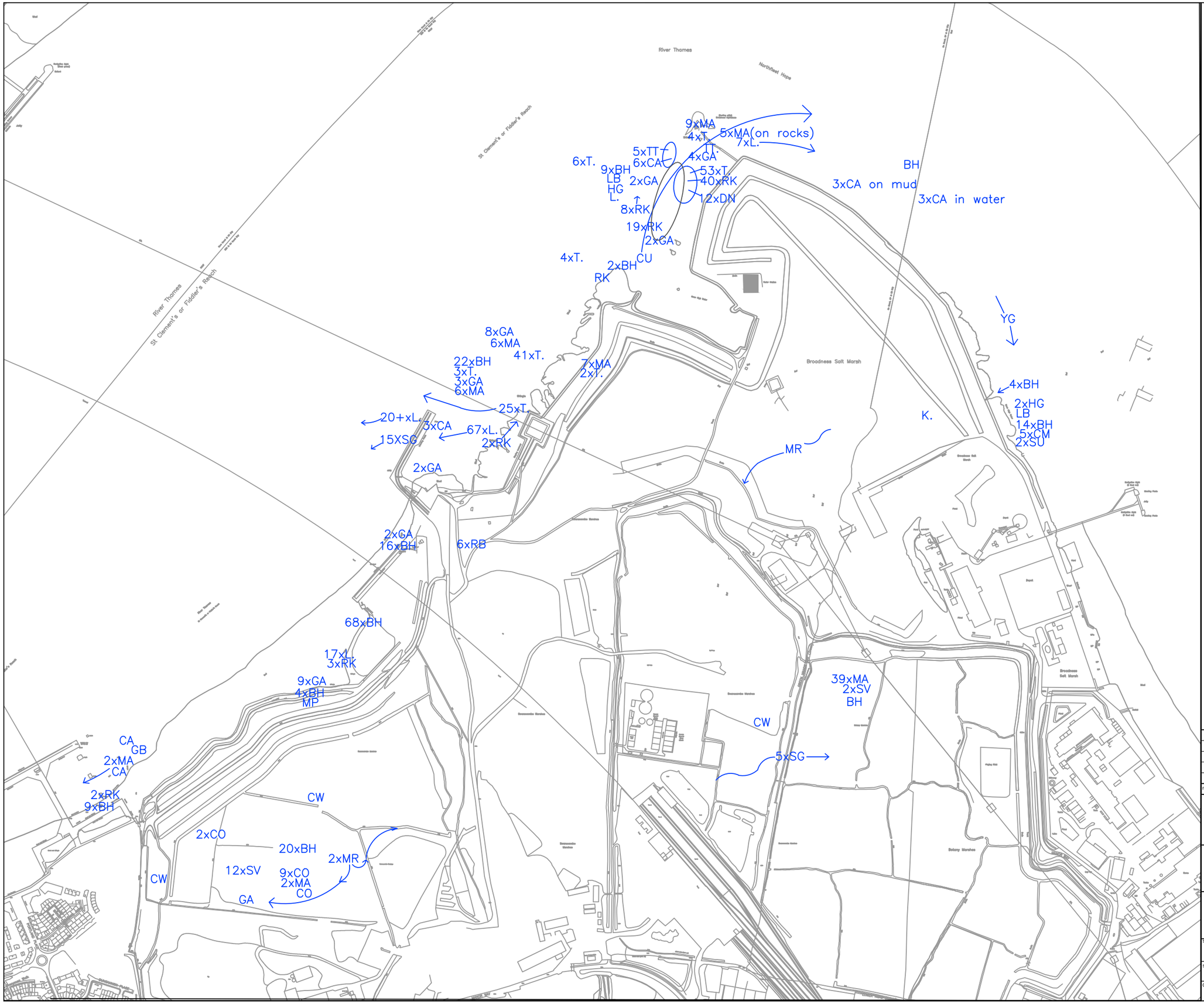

KEY

BTO SPECIES CODES

AV	Avocet
BG	Brent Goose
BA	Bar-tailed Godwit
BH	Black-headed Gull
BW	Black-tailed Godwit
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G.	Green Woodpecker
GP	Golden Plover
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GV	Grey Plover
H.	Grey Heron
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MA	Mallard
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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
YG	Yellow Legged Gull

revision	description	date	checked by

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Project:

LPER - Wintering Bird Survey

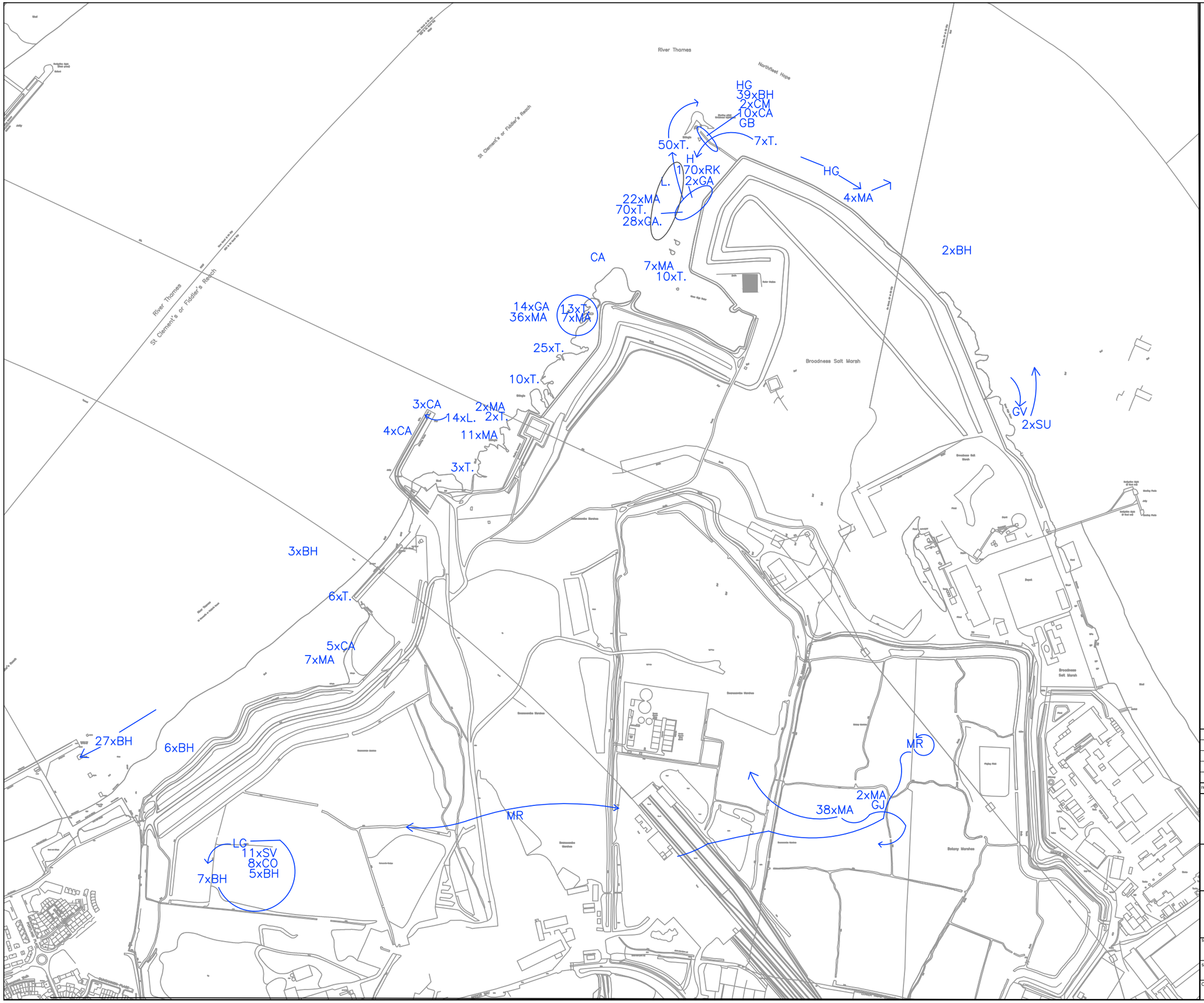
Title:

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
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GP	Golden Plover
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H.	Grey Heron
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K.	Kestrel
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L.	Lapwing
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MH	Moorhen
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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
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

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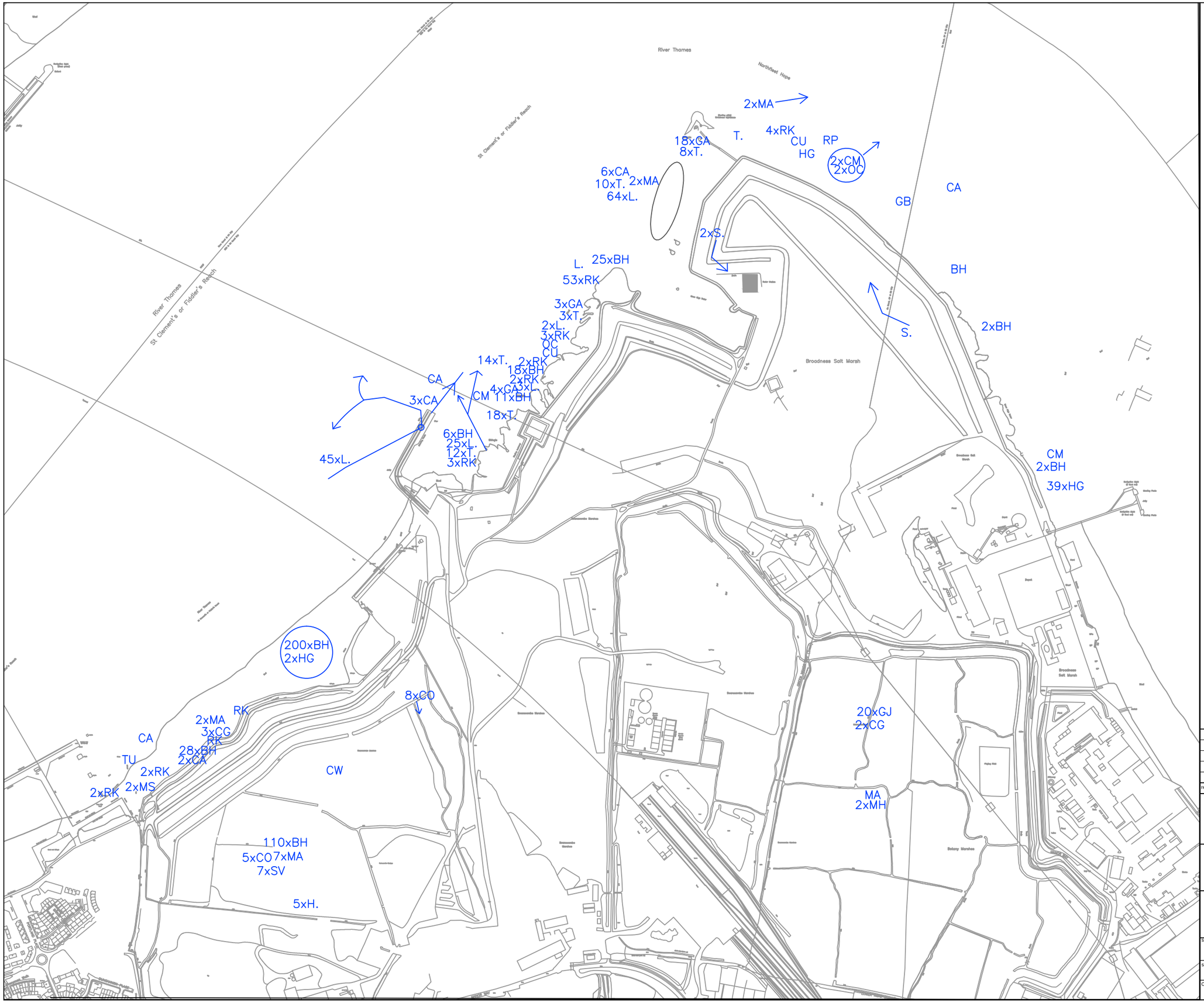

KEY

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
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GK	Greenshank
GB	Great Black-backed Gull
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GP	Golden Plover
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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

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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
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Title:

February 2015 - High Tide

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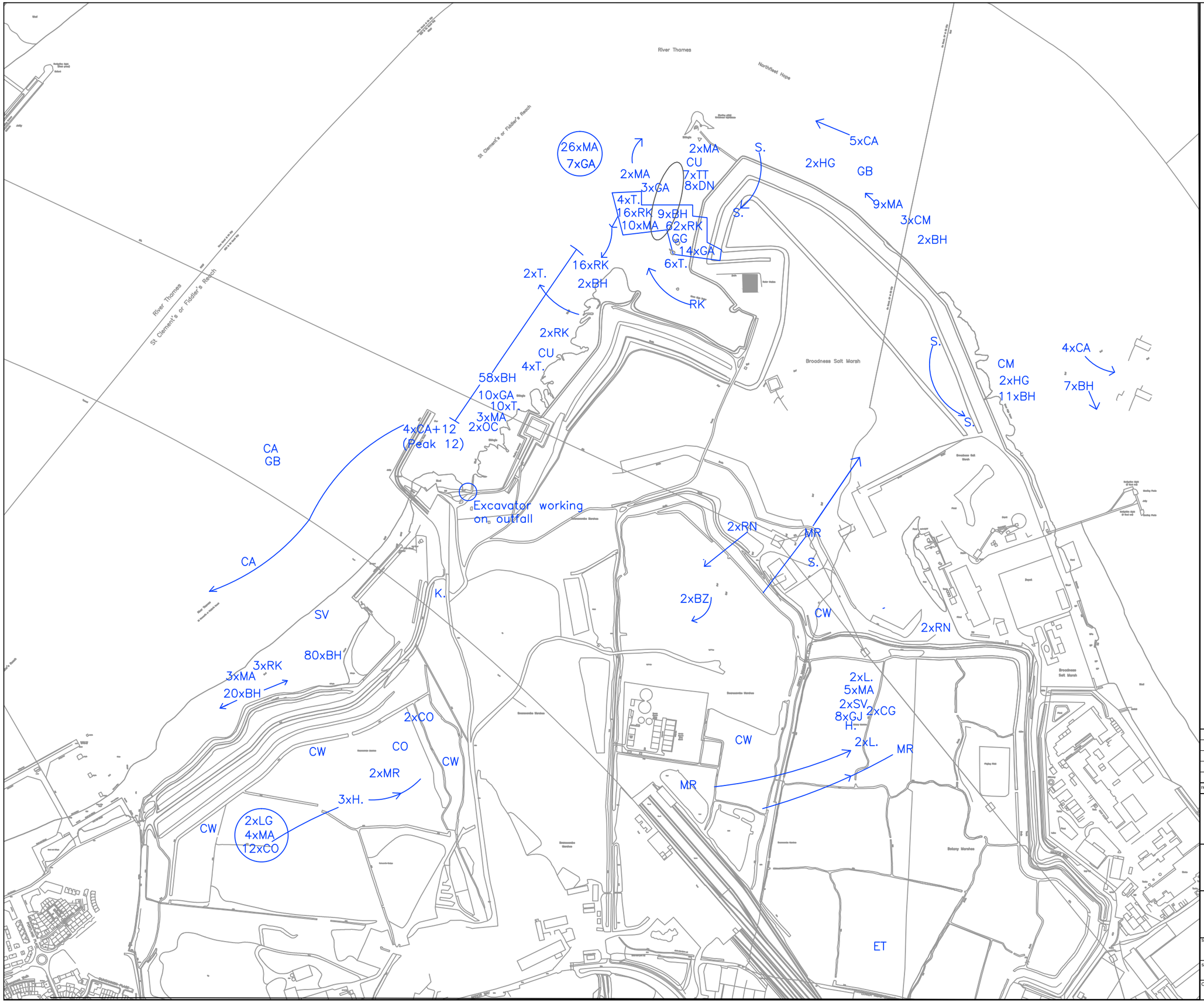

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Project:

LPER - Wintering Bird Survey

Title:

March 2015 - Low Tide

status		drawing no.		
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CAD filename

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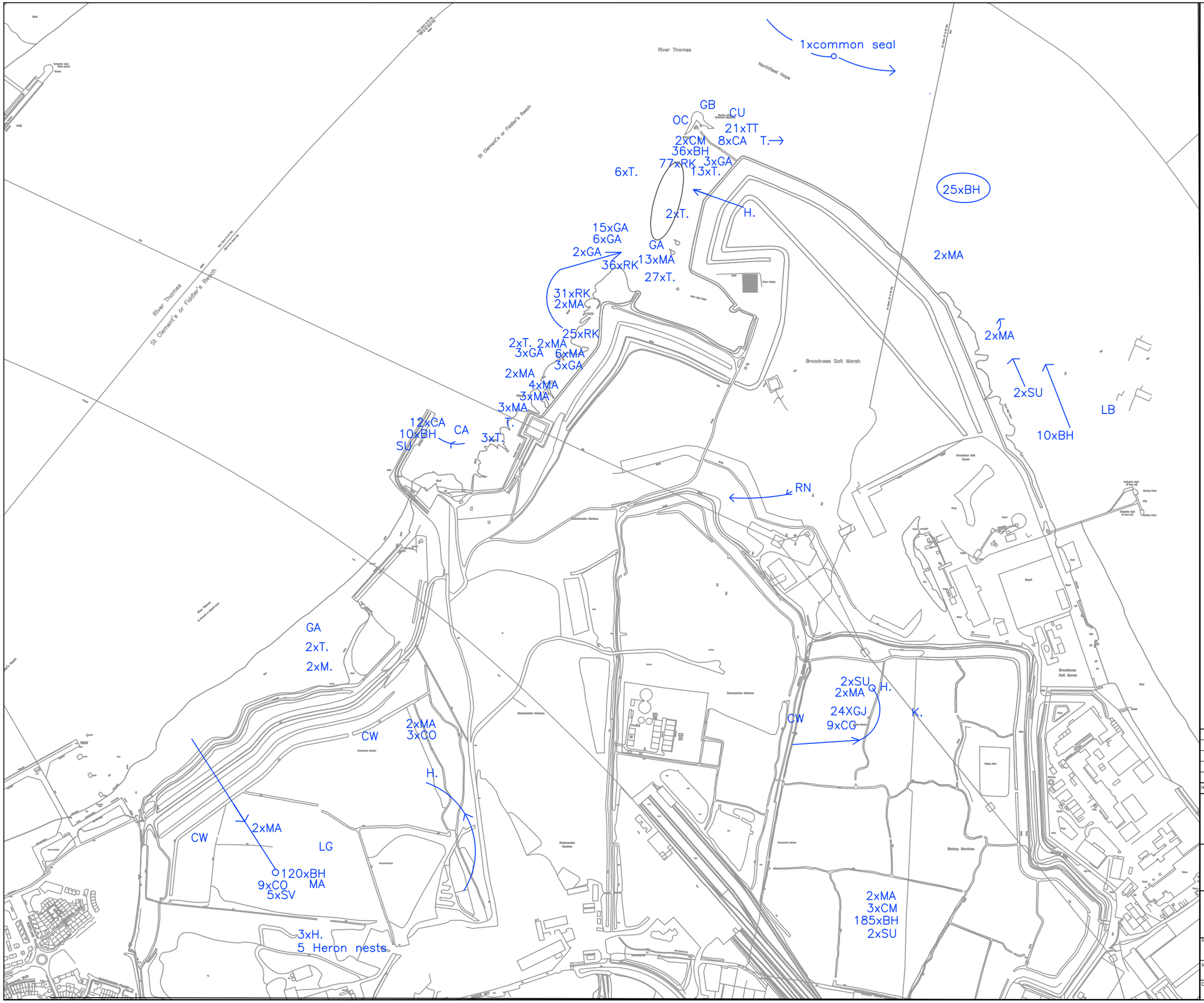

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Project:

LPER - Wintering Bird Survey

Title:

March 2015 - High Tide

status	drawing no.			
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CAD filename

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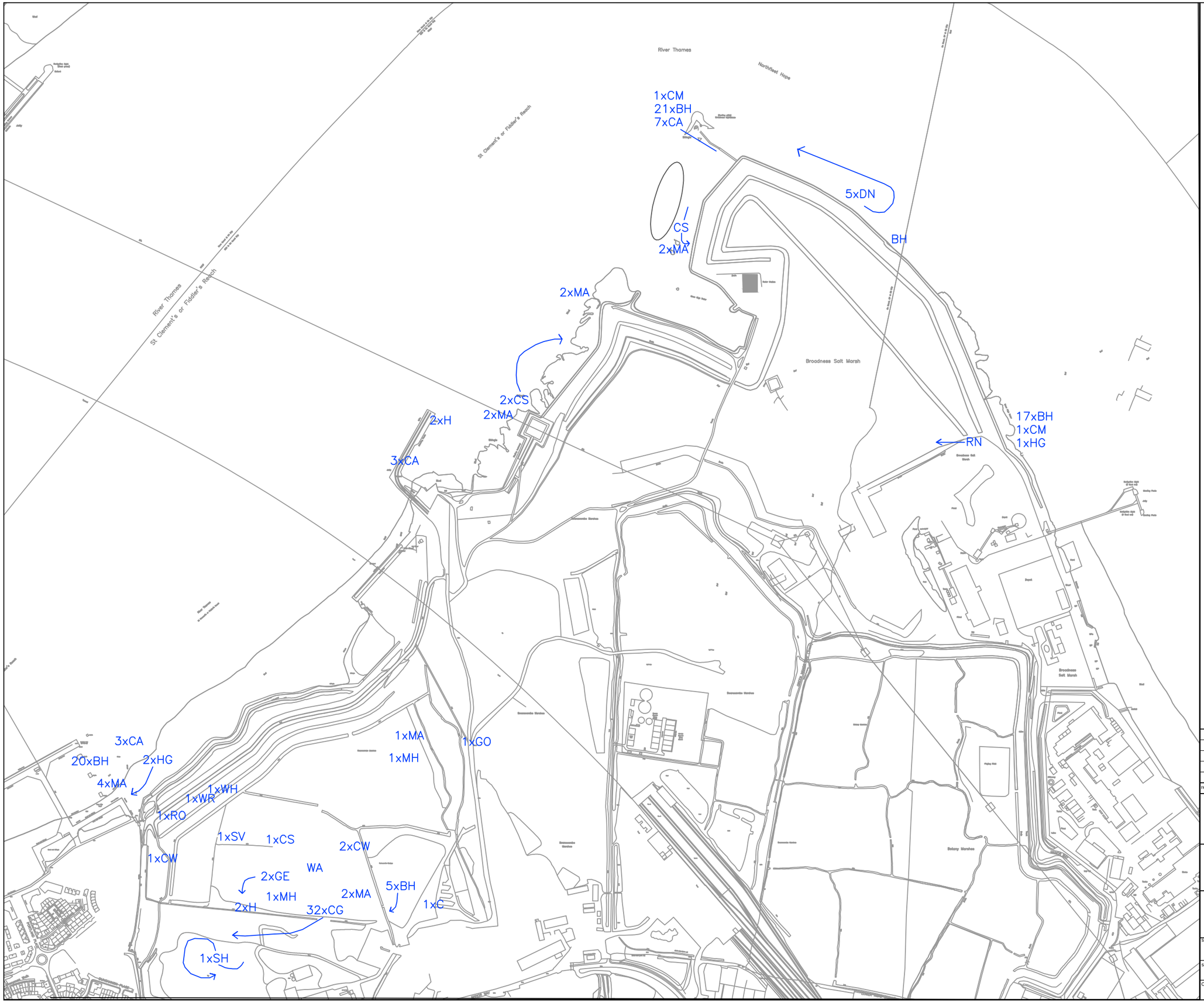

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Project:

LPER - Wintering Bird Survey

Title:

August 2015 - High Tide

status		drawing no.		
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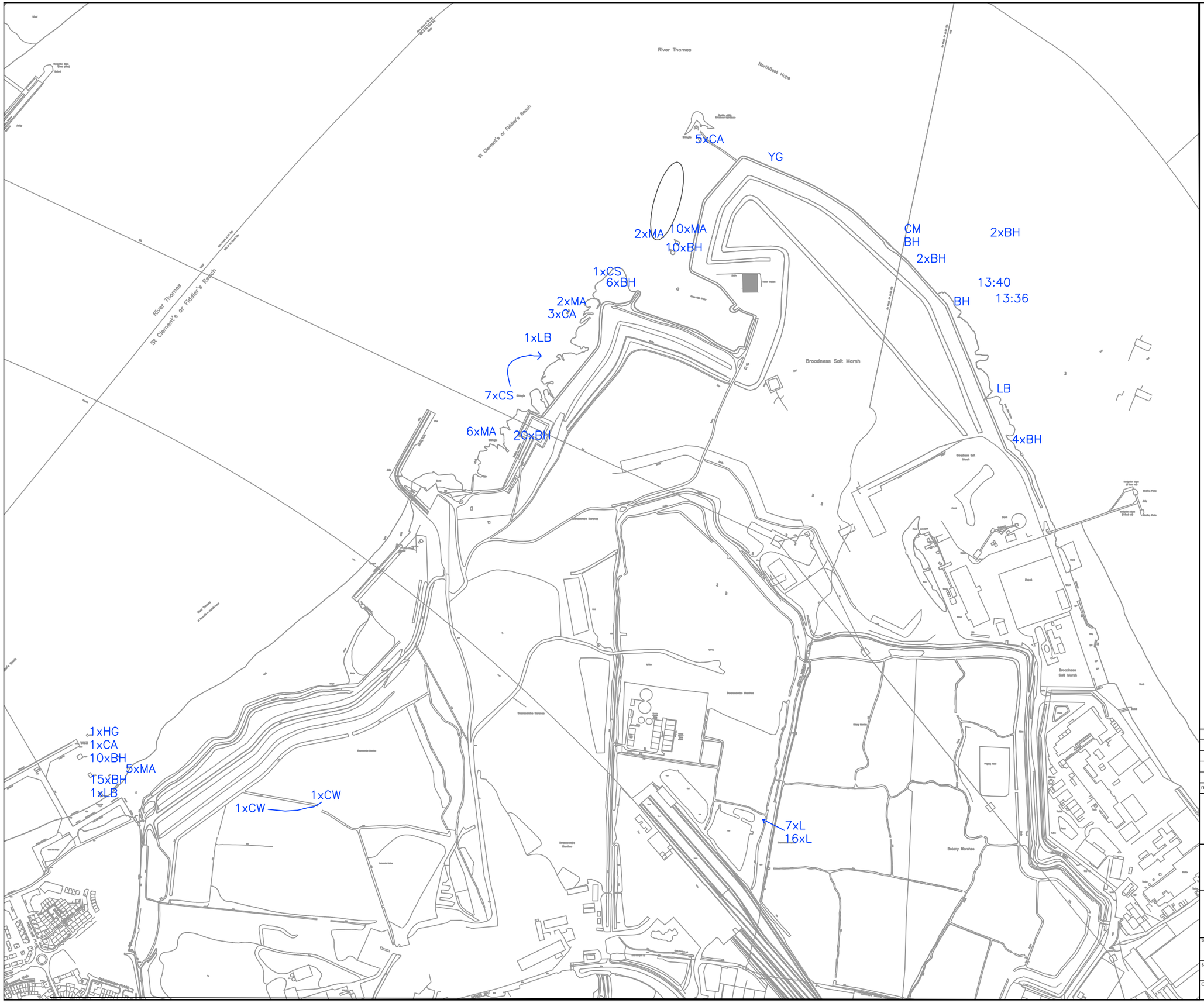

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Project:

LPER - Wintering Bird Survey

Title:

September 2015 - Low Tide

status		drawing no.		
		Figure 16		
scale	size	date	drawn	checked
NTS	**A3**	**15-03-2016**	**AW**	**HL**

CAD filename

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

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landscape | environment | heritage

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

Slipway

Swanscombe Marshes

Depot

Conveyor

Pond

Wharf

Hard

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

Key

GW = Garden warbler
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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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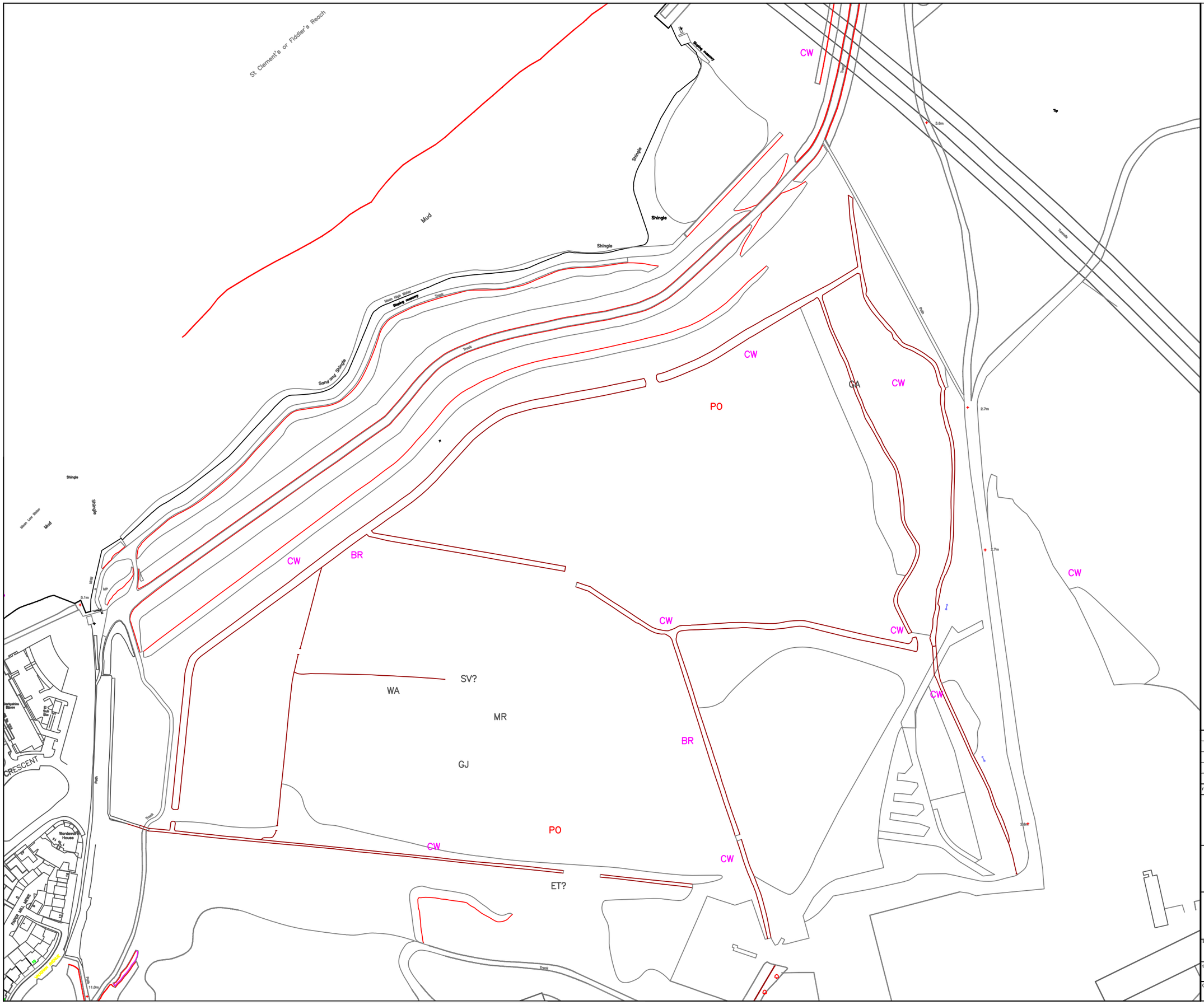
Table 1 - Peninsular Survey results from 2012 and including additional 2015 species

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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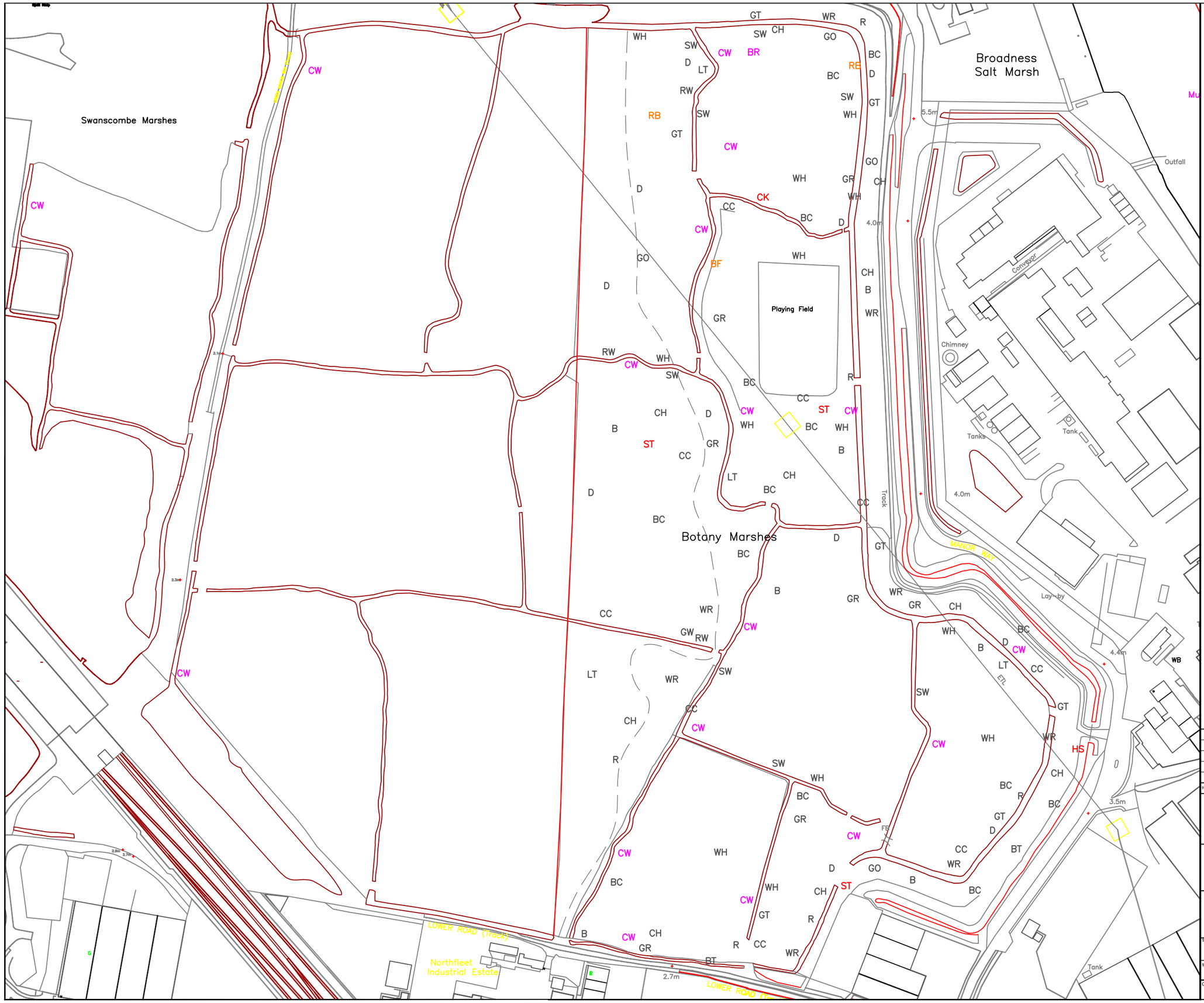

Key

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

status	drawing no.			
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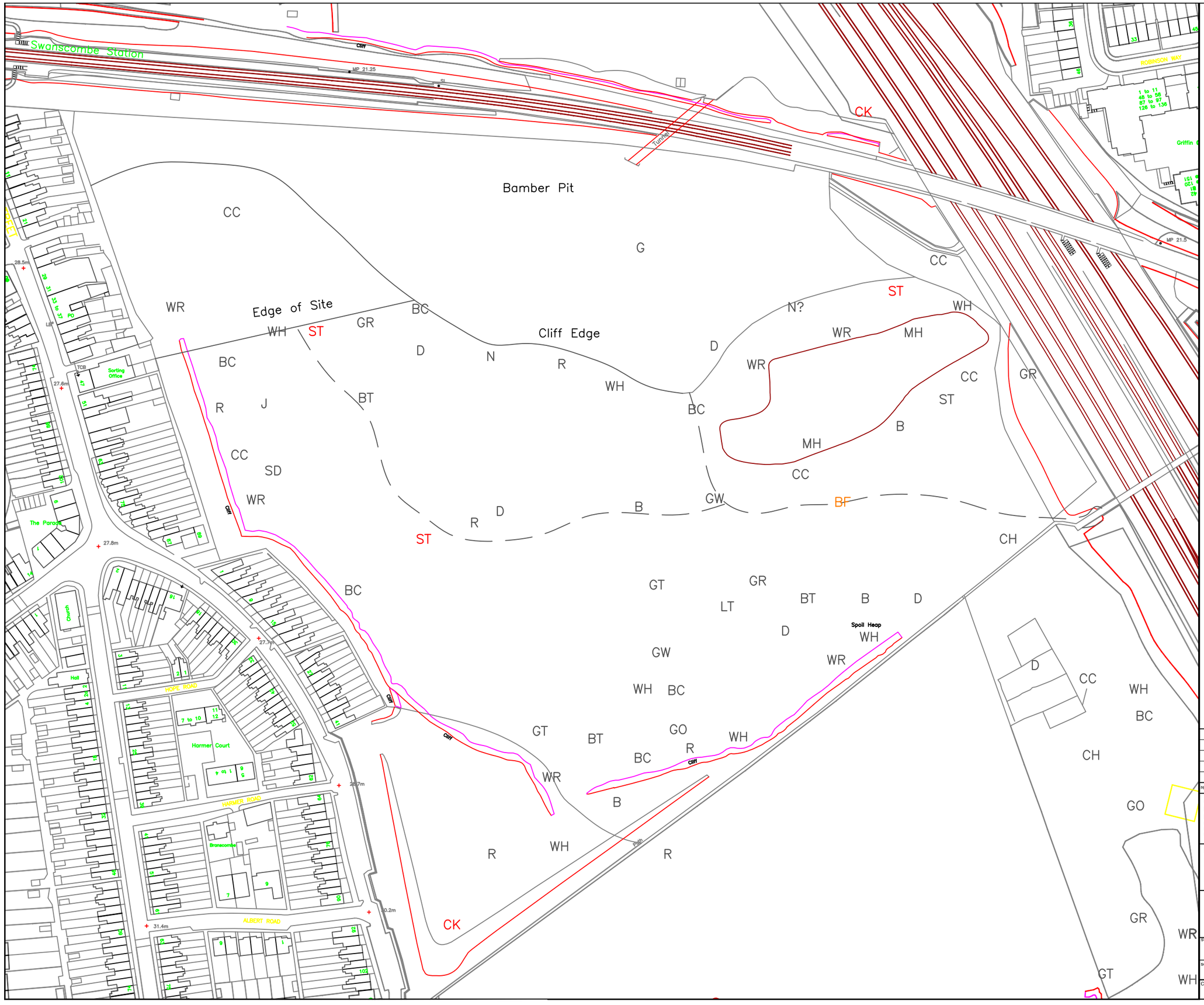

Key

B	Blackbird
BC	Black cap
BF	Bullfinch
BR	Bearded tit
BT	Blue tit
CC	Chiffchaff
CH	Chaffinch
CK	Cuckoo
CO	Coot
CW	Cetti's warbler
D	Dunnock
G	Green woodpecker
GH	Grasshopper warbler
GL	Grey wagtail
GO	Goldfinch
GR	Greenfinch
GT	Great tit
GW	Garden warbler
H	Heron
HS	House sparrow
LT	Long tailed tit
J	Jay
LI	Linnet
LT	Long-tailed tit
MH	Moorhen
MP	Meadow pipit
N	Nightingale
R	Robin
RB	Reed bunting
RW	Reed warbler
S	Skylark
SD	Stock Dove
ST	Song thrush
SW	Sedge warbler
WH	White throat
WR	Wren

Pink Schedule 1
Red Red list
Orange Species of principal importance

revision	description	date	checked by

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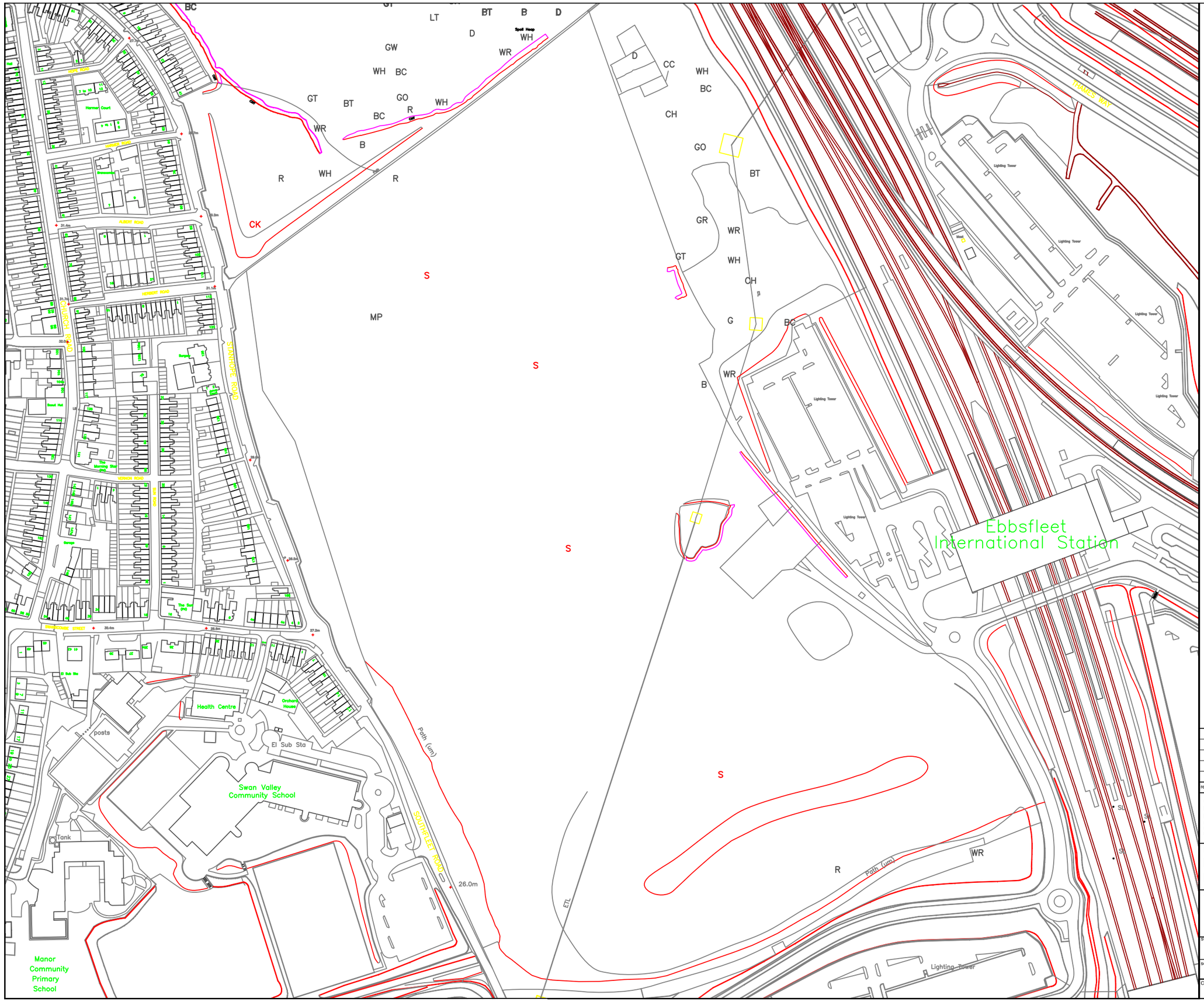
Project:
London Paramount Entertainment Resort

Title:
Bamber Pit

status	drawing no.			
	Figure 3			
scale	size	date	drawn	checked
NTS	**A3**	**16-06-2015**	**AW**	**HL**

CAD filename
Figure_1.dwg



Key

B	Blackbird
BC	Black cap
BF	Bullfinch
BR	Bearded tit
BT	Blue tit
CC	Chiffchaff
CH	Chaffinch
CK	Cuckoo
CO	Coot
CW	Cetti's warbler
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revision	description	date	checked by

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Project:
London Paramount Entertainment Resort

Title:
North Fleet Landfill

status	drawing no.			
	Figure 4			
scale	size	date	drawn	checked
NTS	A3	16-06-2015	AW	HL

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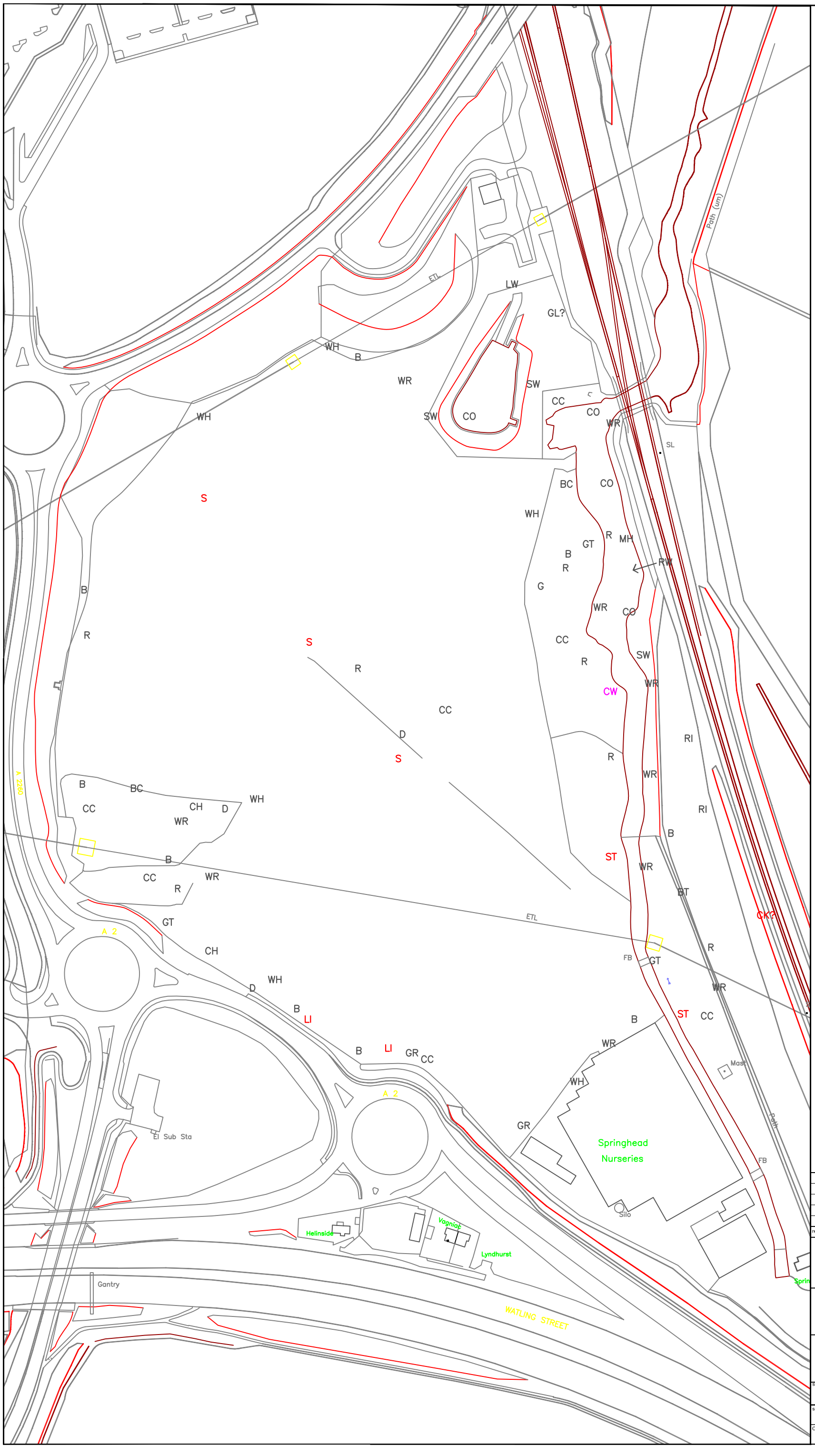
Figure_1.dwg



Key

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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:
Springhead Nurseries

status	drawing no.			
	Figure 5			
scale	size	date	drawn	checked
NTS	A3	16 -06-2013	AW	HL

CAD filename
Figure_1.dwg

APPENDIX 1 – Survey Dates

2012 Survey Dates

- 5th April
- 3rd May
- 17th May
- 31st May
- 14th June
- 21st June

2015 Survey Dates

Full CBC surveys were undertaken on the following dates:

1. 30 March 2015
2. 15 April 2015
3. 24 April 2015
4. 8 May 2015
5. 29 May 2015
6. 12 June 2015

Specific Cetti's warbler surveys were undertaken on the following dates:

1. 30 March 2015
2. 24 April 2015
3. 29 May 2015

Specific nightingale surveys were undertaken on the following dates:

1. 24 April 2015 – morning survey
2. 8 May 2015 – morning survey
3. 19/20 May 2015 – night survey
4. 6 June 2015

Annex EDP 19
Bat Activity Report 2015 (Corylus Ecology June 2016)

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London Paramount Entertainment Resort

Bat Activity Report 2015

For and on behalf of

Chris Blandford Associates

June 2016

CORYLUS ECOLOGY

Unit A3 Speldhurst Business Park, Langton Road, Speldhurst, Tunbridge Wells, Kent. TN3 0NR

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

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

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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	T1	No emergence	At 21:44hrs, approximately 27 minutes after sunset, a common pipistrelle bat was recorded foraging in the northern area of the woodland near to T1.
		T2	No emergence	
		T3	No emergence	
	Start temperature: 15°C	T4	No emergence	
		T7	No emergence	
	End temperature: 14°C	T11	No emergence	
		T14	No emergence	
	Weather: 10% cloud cover, light breeze (BF 1)	T16	No emergence	
		G1	No emergence	
28/07/2015	*Sunset time:* 20:55hrs	T3	No emergence	At 21:14hrs, approximately 19 minutes after sunset, a noctule bat was heard but not seen in the central area of the woodland.
		T4	Possible emergence of one common pipistrelle bat and two soprano pipistrelle bats	
	Start temperature: 18°C	T7	Confirmed emergence of a soprano pipistrelle bat – 27 minutes after sunset	
		T11	No emergence	
	End temperature: 17°C	T12	No emergence – ring-necked parakeets present in hole.	
	Weather: 60% cloud cover, moderate breeze (BF 2)	T13	Possible emergence of a common pipistrelle bat	
		T14	No emergence	
18/08/2015	*Sunset time:* 20:16hrs	T1	No emergence	2hrs, approximately six minutes after sunset, a noctule bat was seen travelling north above the woodland.
		T6	No emergence	
	Start temperature: 18°C	T8	No emergence	
		T9	No emergence	
	End temperature: 16°C	T15	No emergence	
		T16	No emergence	
	Weather: 95% cloud cover, light breeze (BF	T17	No emergence	
		G1	No emergence	

	1)			
08/09/2015	*Sunset time:* 19:30hrs	T2	No emergence	At 19:36 hours, approximately six minutes after sunset, a noctule bat was heard but not seen in the centre of the woodland.
		T5	No emergence	
	Start temperature: 14°C	T8	No emergence	
		T15	No emergence	
	End temperature: 14°C	T16	No emergence	
	Weather: 100% cloud cover, light breeze (BF 1)	T17	No emergence	

3.4 Bat Surveys

Peninsula

3.4.1 One transect survey was undertaken every month from April – September 2015. These began with a vantage point survey during which the surveyors observed an area of the peninsula for approximately 45 minutes to see whether bats were entering the survey area from a particular direction: the vantage points were located at point 1i overlooking Black Duck Marsh, at 2E in the south of the peninsula and between 1R and 1S in the centre of the peninsula. After the vantage point survey two transect routes were walked: route 1 covered the western area of the peninsula and route 2 covered the eastern area (see Figure 1). In July an additional transect route in the centre of the peninsula was also surveyed.

Vantage point surveys

3.4.2 During the vantage point surveys low numbers of bats were observed entering the peninsula, as well as commuting and foraging. In April three common pipistrelle bats were seen commuting across the survey area from east to west by the surveyors positioned on the bank above Black Duck Marsh. Low levels of foraging activity were recorded in the 'triangle' of grassland in this western area between points 1H, 1I and 1L in May. In June and September foraging noctule bats were also recorded in this area above Black Duck Marsh, and in September a noctule was observed flying north-west to south-east across this area. In August and September two common pipistrelle bats flew into the survey area from the south, seen by the surveyors positioned at 2E.

Transect surveys

3.4.3 A total of six bat species were recorded on the peninsula during the transect surveys: common pipistrelle, noctule, soprano pipistrelle, Leisler's, Nathusius' pipistrelle and serotine. A total of 328 passes were recorded on route 1 (west) and 433 passes were recorded on route 2 (east). During every

month except July and September there were more bat passes recorded on the eastern route than the western route. Table 5 below summarises the total numbers of bat passes per transect route.

Table 5: Transect survey summary for the peninsula

Date	Total number of bat passes recorded on western transect route 1	Total number of bat passes recorded on eastern transect route 2	Total number of bat passes recorded on central transect route 3
22/04/2015	5	72	N/A
19/05/2015	60	66	N/A
16/06/2015	94	120	N/A
14/07/2015	85	69	92
11/08/2015	41	74	N/A
22/09/2015	43	32	N/A
TOTAL	328 passes	433 passes	92 passes

3.4.4 During the survey on 22nd April 2015 one species was recorded: common pipistrelle bat. Only five passes were recorded on the western transect route; all were recorded in the southern central part of the route between points 1I, 2P, 1L, 1M and 1N. On the eastern transect route 72 common pipistrelle bat passes were recorded. The highest levels of bat activity were recorded in the western area adjacent to lagoon P2 and the south-eastern area around Botany Marsh. Common pipistrelle bats were observed foraging over lagoon P2 and around the wildlife pond at Botany Marsh East at the south-eastern tip of the route.

3.4.5 During the transect survey on 19th May 2015 three bat species were recorded: common pipistrelle, noctule and Leisler's bat. Leisler's bat was only recorded by the surveyors on the eastern route near to lagoon P2. A similar number of bat passes were recorded on both transect routes: 60 on the western route and 66 on the eastern route. The highest levels of bat activity on the western route were recorded around 1i and 1H around Black Duck Marsh; foraging common pipistrelle bats were also observed in the 'triangle' of long grassland and scrub in this area. On the eastern transect route the highest levels of bat activity were recorded in the western area around the lagoon P2 and in the far eastern area around Botany Marsh East between points 3C and 3F. Multiple common pipistrelle bats were recorded foraging over the wildlife pond at Botany Marsh East in the far eastern section of the route.

3.4.6 On the 16th of June 2015 five bat species were recorded: common pipistrelle, noctule, soprano pipistrelle, Leisler's and Nathusius' pipistrelle. Leisler's and Nathusius' pipistrelle were recorded on the western transect route only. A greater number of passes were recorded on the eastern route: 120 passes were recorded here compared with 94 in the west. Noctules were recorded foraging around

Black Duck Marsh and in the centre of the eastern route (points 1M-1Ma) and common, soprano and Nathusius' pipistrelle and Leisler's bat were all recorded foraging in the far western part of the route along the sea wall. The highest level of activity by common pipistrelle bat occurred around the lagoon P2 on the western route. The areas of the eastern transect where the highest levels of bat foraging activity occurred were the eastern and northern areas, around Botany Marsh.

3.4.7 During the survey on 14th July 2015 an additional central transect route was surveyed and a total of three bat species were recorded: common and soprano pipistrelle and noctule. Soprano pipistrelle was not recorded on the eastern transect route. The greatest number of bat passes were recorded on the central route: 92 passes were recorded here compared with 85 on the western route and 69 in the east. The highest levels of bat foraging activity on the western route occurred in the central and northern areas around 1M – 1Y, with all three species recorded in the western area along the sea wall. The bat activity on the eastern route was concentrated around the central path adjacent to the CTRL Wetlands, as well as the north-eastern and south-eastern areas around Botany Marsh; high levels of foraging were recorded in this area. Low numbers of common pipistrelle bats were recorded in all areas of the central route and the greatest number of foraging bat passes were recorded in the north and north-western areas near to the lagoon P2.

3.4.8 On the 11th of August 2015 five bat species were recorded: common and soprano pipistrelle, noctule, Leisler's and serotine. Common and soprano pipistrelle, noctule and Leisler's bat were recorded on the western route, whereas common pipistrelle, serotine and Leisler's bat were recorded on the eastern route. A higher number of bat passes was recorded on the eastern route, with 74 here compared to 41 passes in the west. On the western route the highest levels of bat activity were recorded along the sea wall and near to Black Duck Marsh, and foraging common pipistrelle bats were also observed over the lagoon P2. On the eastern transect route the highest levels of bat activity occurred in the northern section between points 2B and 3B. Foraging bats were recorded around points 2C and 2B along the ditch lines, as well as over the wildlife pond at Botany Marsh East. Only three common pipistrelle bats were recorded during the pre-dawn survey on the morning of the 12th of August: a single bat was recorded at 04:00 (1 hour and 37 minutes before sunrise) near to Black Duck Marsh and two bats were recorded at 04:39 (58 minutes before sunrise) foraging over the wildlife pond at Botany Marsh East.

3.4.9 During the survey on the 22nd of September 2015 three bat species were recorded: common and soprano pipistrelle and noctule. Only common pipistrelle bats were recorded on the eastern route, whereas on the western route noctule and soprano pipistrelle were also recorded. On the eastern transect route common pipistrelle bats were recorded in the central area (between points 2E and 2B) and foraging bats were observed near to the wildlife pond at Botany Marsh East. On the western route a

high number of noctule foraging passes were recorded around Black Duck Marsh, and low numbers of common and soprano pipistrelle bats were recorded to the north-east of Black Duck Marsh and around the lagoon P2.

3.4.10 Table 6 below shows the overall species composition recorded during the transect surveys on the peninsula.

Table 6: Bat passes recorded during the activity surveys on the peninsula

Species	Total number of passes	%
Common pipistrelle bat	698	81.8%
Noctule bat	115	13.5%
Soprano pipistrelle bat	21	2.5%
Leisler's bat	14	1.6%
Nathusius' pipistrelle bat	4	0.5%
Serotine	1	0.1%
Total	853	

Static monitoring surveys

3.4.11 Four static monitoring devices were installed on the peninsula for five consecutive nights during the months of May to September 2015 and in April 2016. SMP1 was located in the south-west of the survey area, SMP2 in the west, SMP3 in the centre and SMP4 in the north (see Figure 1).

3.4.12 A minimum of eight bat species were recorded during the static monitoring surveys: common and soprano pipistrelle, noctule, Leisler's, bats from the *Myotis* genus, serotine, Nathusius' pipistrelle and long-eared bat. This species assemblage is similar to that recorded during the transect surveys, with the addition of bats from the *Myotis* genus and long-eared bat. All of the species apart from long-eared bat were recorded in varying numbers at all four SMPs; long-eared bat was only recorded on one occasion at SMP3.

3.4.13 The dominant species during all of the static monitoring sessions was common pipistrelle bat: 80.18% of the total passes recorded were attributable to this species. The highest number of passes by this species was recorded at SMP4 (6,738), with fewer at SMP2 (3,843) and SMP3 (2,734) and the lowest number at SMP1 (1,744). The second most dominant species was soprano pipistrelle bat: 9.6% of the total passes were attributable to this species, with the majority (1,398 of the 1,803 passes) recorded in May 2015. A total of 1,242 noctule bat passes were recorded (6.61% of the total), and there were fewer Leisler's bat passes and unidentified *Nyctalus* passes which constituted just 2.77% of the total. Low

numbers of serotine and Nathusius' pipistrelle bat passes were recorded: 21 and 26 passes respectively.

3.4.14 Bats from the *Myotis* genus and long-eared bat were not identified during the transect surveys but were recorded by the static monitoring devices. A total of 105 passes by bats from the *Myotis* genus were recorded (0.56% of the total), the majority of which occurred at SMP3 immediately to the north-west of the lagoon P2 (68 of the passes). A single long-eared bat pass was recorded at SMP3 in August.

3.4.15 Tables 7 and 8 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 7: Static monitoring survey results from the peninsula

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	15,059	80.18%	89.94%
	Soprano pipistrelle	1,803	9.60%	
	Nathusius' pipistrelle	26	0.14%	
	Unidentified *Pipistrellus* species	4	0.02%	
Nyctalus	Noctule	1,242	6.61%	9.38%
	Leisler's bat	357	1.90%	
	Unidentified *Nyctalus* species	163	0.87%	
Myotis	Unidentified *Myotis* species	105	0.56%	0.56%
Eptesicus	Serotine	21	0.11%	0.11%
Plecotus	Long-eared bat	1	0.01%	0.01%
	Total	18,781		

Table 8: Static monitoring survey results from the peninsula per month

Month	Total number of bat passes at SMP1	Total number of bat passes at SMP2	Total number of bat passes at SMP3	Total number of bat passes at SMP4	Total number of passes per month
April 2016 [1]	110	1,294	252	1,117	2,773
May 2015	688	2,128	1,570	2,562	6,948
June 2015	1,140	770	257	1,242	3,409
July 2015	396	218	162	1,021	1,797
August 2015	282	463	821	1,455	3,021
September 2015	78	*Technical issue – no data*	144	611	833*
Total	2,694	4,873*	3,206	8,008	

[1] NB data from 2016 not 2015 due to technical issues

* Total affected by technical issues with the detectors

Craylands La. Pit

Bat activity surveys

3.4.16 Bat activity surveys were undertaken at Craylands La. Pit on 28th April, 28th May, 11th August and 22nd September 2015. Emergence surveys of suitable roosting features located in the southern chalk cliff were undertaken for the first 45 minutes of each survey, after which the surveyors walked a transect route around the quarry (see Figure 2). A total of four bat species were recorded during the surveys: common pipistrelle, soprano pipistrelle, noctule and Leisler's bat. No bats emerged from the features which were observed in the southern chalk cliff during any of the surveys.

3.4.17 Very low levels of bat activity were recorded during the activity surveys in April and May: just five bat passes were recorded in April and 18 passes in May. Activity levels were higher in August, with a total of 72 passes recorded, and the highest level of bat activity was recorded in September: 102 bat passes were recorded during this survey. Low levels of foraging activity by common pipistrelle bat were recorded throughout the survey area during the August and September surveys.

3.4.18 In April all five of the bat passes were by common pipistrelle bats which were recorded in the southern section of the quarry. During the survey in May the species composition was very different to April, with 10 of the 18 passes recorded (56%) attributable to Leisler's bat. The species composition was very similar in August: 56% of the total passes recorded were by Leisler's bat. No Leisler's bats were recorded during the September survey. Noctule bats were recorded regularly in August and September, with 23.6% and 18.6% of passes attributable to this species in these two months respectively. Three

passes by soprano pipistrelle bat were recorded in September in the south-western corner of the quarry, but this species was not recorded during any of the other activity surveys.

3.4.19 During the transect survey in August moderate levels of activity by Leisler's bat and common pipistrelle bat were recorded in the north-eastern and eastern areas of the quarry, between points B, C, D and E. In September the highest levels of bat activity were recorded along the western and southern sides of the quarry, particularly between points F, G, H and A. All of the bat species identified during the surveys were recorded in all areas of the quarry, with the exception of soprano pipistrelle bat which was only recorded in the south-western corner of the survey area.

3.4.20 Table 9 below shows the total numbers of passes and the overall species composition at Craylands Pit over the four activity surveys.

Table 9: Bat passes recorded during the activity surveys at Craylands La. Pit

Species	Total number of passes	% of total
Common pipistrelle	105	53.3%
Leisler's bat	50	25.4%
Noctule bat	36	18.3%
Soprano pipistrelle	3	1.5%
Unidentified *Nyctalus* species	3	1.5%
Total	197	

Static monitoring surveys

3.4.21 Two static monitoring devices were installed at Craylands Pit for five consecutive nights every month between April and September 2015. SMP1 was located in the south-western corner of the quarry and SMP2 was located in the north-eastern area of the quarry inside tunnel 016 which connects Craylands Pit with Manor Way 1.

3.4.22 At least four additional bat species were recorded during the static monitoring than during the activity surveys, with a minimum of eight species identified. The species recorded during the static monitoring sessions were common pipistrelle, Leisler's, noctule, bats from the *Myotis* genus, soprano pipistrelle, serotine, Nathusius' pipistrelle and long-eared bat. A greater species diversity was recorded at SMP1, with serotine and Nathusius' pipistrelle recorded at this location but not at SMP2.

3.4.23 During every month except August the dominant species recorded was common pipistrelle bat. Overall this species constituted 78.65% of the total passes recorded. The dominant species in August was

Leisler's bat, with 49.17% of the passes attributable to this species compared to 40.73% of calls by common pipistrelle bat in this month. A relatively large proportion of the total passes were attributable to bats from the *Nyctalus* genus: overall 19.2% of passes were by these larger species, with the dominant species being Leisler's bat which contributed 12.14% of the total passes recorded. Soprano pipistrelle bat was recorded at both SMPs in similar numbers: 11 passes were recorded at SMP1 and 15 at SMP2, representing 0.47% of the total. A peak of 14 passes by this species was recorded in June.

3.4.24 Bats from the *Myotis* genus, serotine, Nathusius' pipistrelle and long-eared bat were not recorded during the activity surveys but were identified from the static monitoring. *Myotis* bats were recorded in similar numbers at both static monitoring locations: 30 passes were recorded at SMP1 and 34 at SMP2, constituting 1.16% of the total passes. Bats from the *Myotis* genus were recorded during every month except April, with numbers peaking in September when 9.65% of passes were attributable to this genus. Serotine was recorded in low numbers at SMP1 only: a total of ten serotine passes (0.18% of the total) were recorded, with a peak of five passes in August. Nathusius' pipistrelle bat was also recorded at SMP1 only and constituted just 0.09% of the total passes, with a peak of three passes in May. Very low numbers of long-eared bat passes were recorded and calls by this species made up just 0.07% of the total: three passes were recorded at SMP1 in September and a single pass was recorded at SMP2 in July.

3.4.25 Tables 10 and 11 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 10: Static monitoring survey results from Craylands La. Pit

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	4,335	78.65%	79.39%
	Soprano pipistrelle	26	0.47%	
	Nathusius' pipistrelle	5	0.09%	
	Unidentified *Pipistrellus* species	10	0.18%	
Nyctalus	Noctule	268	4.86%	19.2%
	Leisler's bat	669	12.14%	
	Unidentified *Nyctalus* species	121	2.20%	
Eptesicus	Serotine	10	0.18%	0.18%
Myotis	Unidentified *Myotis* species	64	1.16%	1.16%
Plecotus	Long-eared bat	4	0.07%	0.07%
	Total	5,512		

Table 11: Static monitoring survey results from Craylands La. Pit per month

Month	Total number of bat passes at SMP1	Total number of passes at SMP2
April	154	44
May	351	460
June	504	993
July	642	886
August	202	758
September	271	247
Total	2,124	3,288

Data Logger and Static monitoring survey of tunnel 007

3.4.26 Tunnels within Craylands La. Pit were assessed for their potential to support roosting bats. Tunnel 007 is an old railway tunnel and runs from Craylands La. Pit in the south-west to another old pit to the south. The entrance to the tunnel at Craylands La. Pit is closed with a solid metal gate. There is a gap low down in the gate where bats could emerge from. Videos were set at the entrance of the tunnel during all bat surveys of this area and no bats were recorded emerging from the entrance. The wall structure is intact and in good condition along much of the length, but there are holes into the brick work along the side of the walls which could be used by hibernating bats.

3.4.27 A data logger was installed in tunnel 007 from 29th July to 15th October 2015. A total of 8,855 passes were recorded over 78 nights. The highest activity level recorded was 150 passes per 20 minutes from 23:00hrs on 9th September, and there was a higher level of activity than had previously been recorded between 23:00hrs and 01:00hrs on this night. There was this single spike of activity on 9th September, with other peaks of generally less than 100 passes per 20 minutes, and on most nights of less than 50 passes per 20 minutes. It is not known whether these passes were due to swarming activity or whether they were attributable to foraging bats.

3.4.28 At other known swarming sites high levels of sustained activity have been seen for over four hours late at night, which has not been the case in this tunnel. If these were swarming bats in September, it is not considered that the swarming activity was sustained through the season as the activity levels were much lower again by October. We have learnt to recognise the signs of swarming activity at other sites, by observing the build-up of nightly activity levels through the late summer period; it usually peaks in late September, then falls away again through October and into November, depending on weather conditions. This build-up of activity was not seen in tunnel 007; it can therefore be concluded that the tunnel is not a significant swarming site.

3.4.29 Following on from the results of the data loggers, two static bat detectors were set within tunnel 007 for a total of ten nights between 29th September and 9th October 2015 in order to assess whether bat swarming activity was occurring within the structure. SMP3 was located near to the entrance of the tunnel at the north-eastern end, and SMP4 was located at the south-western end. Data were recorded at SMP3 until the 9th of October, however the detector at SMP4's batteries appeared to run out after the 7th of October.

3.4.30 A total of 11 bat passes were recorded at SMP3: these were all by long-eared bats and included both social calls and echolocation calls. Three passes were recorded on the 29th of September between 00:49hrs and 00:51hrs; these passes are considered to have been attributable to a single bat. This also occurred on the 30th of September: there were three long-eared bat passes between 23:19hrs and 23:23hrs, followed by three passes within one minute at 00:08hrs. Single long-eared bat passes were recorded on the 8th and 9th of September.

3.4.31 A total of 19 bat passes were recorded at SMP4 and the species diversity was greater at this location than at SMP3: common pipistrelle bat, long-eared bat, soprano pipistrelle bat and a bat from the *Myotis* genus were all recorded. Like at SMP3, a combination of echolocation and social calls were identified. The most frequently recorded species at SMP4 was common pipistrelle bat, with ten out of the total of 19 passes attributable to this species. Six long-eared bat passes were recorded, as well as two passes

by soprano pipistrelle bat and a single social call by a bat from the *Myotis* genus. As was the case at SMP3, the highest number of bat passes was recorded on the 30th of September – six passes were recorded at both locations on this night. However, whereas at SMP3 bats were only recorded on four nights, at SMP4 data were recorded on eight nights (every night between the 29th of September and 7th of October, with the exception of no bat passes on the 5th of October).

3.4.32 It can be seen that there was no bat swarming activity during this period, as the peak number of bat passes recorded on a single night was just six at each location. The data show that a greater diversity of species flew past or near to SMP4 (the south-western end of the tunnel) than SMP3. A summary of the results from the static monitoring survey in tunnel 007 is shown below in table 12.

Table 12: Static monitoring survey results from tunnel 007

Species	Total number of passes at SMP1	Total number of passes at SMP2
Common pipistrelle bat	0	10
Long-eared bat	11	6
Soprano pipistrelle bat	0	2
Myotis species	0	1
Total	11	19

Hibernation potential survey – Tunnel 007

3.4.33 Four combined temperature and humidity loggers were installed within and at the entrance of tunnel 007 from 15th October 2015 until 15th April 2016. Three loggers were placed at equally spaced intervals inside the tunnel, and one was located externally near to the north-eastern door. The survey aimed to identify whether the tunnel provides a suitable environment for hibernating bats during the winter.

3.4.34 The temperature inside the tunnel ranged from around 15°C in November 2015 to 1°C in January 2016, fluctuating greatly alongside the external temperature. During the coldest period around the 20th of January 2016, the temperature throughout the majority of the tunnel was below 3°C, whilst the external temperature was around -1°C. The humidity at the mid-point of the tunnel dropped to 70%, which is relatively dry.

Bamber Pit

Bat activity surveys

3.4.35 One bat activity survey was undertaken every month from April – September 2015. The surveys began with a vantage point survey of the western side of the quarry for the first 45 minutes, after which a

transect route was walked around Bamber Pit (see Figure 3). A total of five bat species were recorded during the activity surveys: Leisler's, common pipistrelle, noctule, Nathusius' pipistrelle and soprano pipistrelle bat. No bats were recorded emerging from the western chalk cliff during any of the surveys.

3.4.36 During the bat activity surveys on 22nd April and 19th May 2015 very low levels of bat activity were recorded: a total of four and three common pipistrelle bats were recorded on these dates respectively. During the April survey all four bats were recorded in the western part of the transect route around points 4C, 4D and 4F, whilst during the May survey three bats were all recorded to the west of the lake around points 4G and 4H.

3.4.37 The survey on 16th June recorded a much higher level of activity by common pipistrelle bats than during the previous months' surveys. Out of a total of 50 passes recorded during the survey, 48 of the passes (96%) were attributable to this species. A single Nathusius' pipistrelle bat was recorded flying over the quarry from east to west during the emergence survey, and one noctule bat was recorded in the western section of the transect route between points 4E and 4F. During the June activity survey the areas of the transect route with the highest levels of bat activity were in the south-eastern and western areas of Bamber Pit, around points 4A, 4B, 4E and 4F.

3.4.38 The activity surveys on 28th July, 18th August and 8th September showed a significant increase in the diversity of bat species using Bamber Pit, and the July and August surveys also showed a much higher level of overall bat activity. The survey in July recorded the highest number of bat passes (160) of any of the surveys at Bamber Pit, by a greater diversity of bats than had previously been recorded: four species were identified (common and soprano pipistrelle, Leisler's and noctule). The number of passes recorded per species was relatively even between common pipistrelle, noctule and Leisler's: these three species attributed 26.9%, 32.5% and 40% of the passes respectively. A single soprano pipistrelle bat pass was also recorded during the first part of the survey in the western area of the quarry. Bats were recorded in all areas of Bamber Pit, with the highest levels of activity occurring around the centre of the quarry (points 4A, 4D and 4G) and the eastern tip of the transect near to the railway (point 4A).

3.4.39 During the August activity survey a similar number of bat passes was recorded to that in July. A total of 127 passes by a combination of common pipistrelle, noctule and Leisler's bat were recorded. The majority of passes (68.5%) were attributable to Leisler's bat. Passes by common pipistrelle constituted only 13.4% of the total activity, whilst noctule bat passes constituted 18.1%. Activity levels were fairly consistent throughout the transect route, with the exception of no bats recorded around point 4C in the south of the survey area. The areas with the highest levels of activity were similar to those in June and July, with the addition of a greater number of passes around point 4F in the west of the survey area.

3.4.40 The level of bat activity was lower during the September survey than in July and August, with a total of 61 passes recorded. An additional two transect points were added during this survey due to access to this area being granted: these were 4X and 4Z in the north-western corner of the quarry; no bat passes were recorded around these points. The same three species which were recorded in August were also recorded in September and the majority of the passes recorded during this survey were attributable to Leisler's: 57.4% of the passes were by this species, with 41% by common pipistrelle bat and 1.6% by noctule bat. The bat activity during this survey was concentrated in the western area (around points 4E and 4F) and the majority of the bat passes were recorded in the centre of the quarry, to the west of the lake around points 4G and 4H. There were very few or no bat passes recorded around the other sections of the transect route.

3.4.41 Table 13 below shows the total numbers of passes over all six activity surveys and the overall species composition at Bamber Pit.

Table 13: Bat passes recorded during the activity surveys at Bamber Pit

Species	Total number of passes	%
Leisler's bat	186	45.9%
Common pipistrelle bat	140	34.6%
Noctule bat	77	19%
Nathusius' pipistrelle bat	1	0.2%
Soprano pipistrelle bat	1	0.2%
Total	405	

Static monitoring surveys

3.4.42 Two static monitoring devices were installed in Bamber Pit for five consecutive nights during the months of May – September 2015. SMP1 was located in the south-western area of the quarry and SMP2 was located in the west of the survey area (see Figure 3). During the September static monitoring session the detectors were set at SMP2 and SMP3, which was located in the north of the quarry.

3.4.43 A wider diversity of species was recorded during the static monitoring than during the activity surveys, with a minimum of seven species identified compared to the five species recorded during the activity surveys. The species recorded during the static monitoring were common pipistrelle, noctule, Leisler's, serotine, Nathusius' pipistrelle, bats from the *Myotis* genus and long-eared bat. Soprano pipistrelle was recorded during the transect surveys but was not picked up by the static monitoring devices.

3.4.44 The dominant species recorded by the two static detectors was common pipistrelle, which constituted 50.6% of the total passes; very similar numbers of this species were recorded at both SMP1 and SMP2, with 756 and 799 passes recorded at these two locations respectively. A large proportion of the total passes recorded were by *Nyctalus* species (noctule and Leisler's bats): between the three SMPs a total of 1,489 passes were attributable to this genus, constituting 48.4% of the total recorded.

3.4.45 Serotine, long-eared bat and bats from the *Myotis* genus were not identified during the activity surveys but were recorded during the static monitoring. Serotine and bats from the *Myotis* genus were recorded at SMP1 and SMP2, and two long-eared bat passes were recorded at SMP2 in August only. The numbers of passes by these additional species were low: 0.42% of the total passes were attributable to serotine, 0.2% to *Myotis* species and 0.07% to long-eared bat. Nathusius' pipistrelle was recorded at all three SMPs, with the majority of passes (seven out of a total of nine) occurring in September.

3.4.46 Tables 14 and 15 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 14: Static monitoring survey results from Bamber Pit

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	1,555	50.57%	50.89%
	Nathusius' pipistrelle	9	0.29%	
	Unidentified *Pipistrellus* species	1	0.03%	
Nyctalus	Noctule	550	17.89%	48.42%
	Leisler's bat	295	9.59%	
	Unidentified *Nyctalus* species	644	20.94%	
Eptesicus	Serotine	13	0.42%	0.42%
Myotis	Unidentified *Myotis* species	6	0.20%	0.20%
Plecotus	Long-eared bat	2	0.07%	0.07%
	Total	3,075		

Table 15: Static monitoring survey results from Bamber Pit per month

Month (2015)	Total number of bat passes at SMP1	Total number of bat passes at SMP2	Total number of bat passes at SMP3
May	160	54	
June	106	100	
July	687	1,015	
August	160	421	
September	135		237
Total	1,248	1,590	237

Northfleet Landfill

Bat activity surveys

3.4.47 Bat transect surveys were undertaken at the Northfleet Landfill site on 23rd June and 28th July 2015. The level of bat activity recorded was greater during the June transect: a total of 58 bat passes were recorded during this survey compared to just 12 passes in July. The transect route is shown in Figure 4.

3.4.48 A total of five bat species were recorded during the transects: common pipistrelle, noctule, Leisler's, soprano pipistrelle and serotine. During both surveys the dominant species recorded was common pipistrelle bat: this species contributed 79% of the passes in June and 83% in July. In June 11 noctule bat passes were recorded: it is considered that all of these passes were attributable to two individual noctule bats which were observed flying high over the eastern and north-western areas of the survey area. No noctule bats were recorded in July. A single pass by a serotine was recorded in June, and single passes by soprano pipistrelle and Leisler's bat were recorded in July.

3.4.49 During the survey in June the areas where the highest level of bat activity occurred were around points B, C and E in the northern and north-eastern areas of the Site. Low numbers of bats were recorded in all areas of the transect in June, with the exception of point G in the south-western corner, where no bats were recorded. In contrast to June, during the July survey no bat passes were recorded around points B and C in the north-east of the survey area, and none were recorded around point I in the south-eastern corner. The highest levels of bat activity in the July survey were recorded around points E and F in the north-west of the survey area, with very low levels of activity recorded in all other areas. It can be seen that bat activity was concentrated around the treelines in the north-western part of the survey area during both surveys.

3.4.50 Table 16 below shows the total numbers of passes recorded during the two transect surveys and the overall species composition at Northfleet Landfill.

Table 16: Bat passes recorded during the activity surveys at Northfleet Landfill

Species	Total number of passes	% of total
Common pipistrelle	56	80%
Noctule bat	11	15.7%
Serotine	1	1.4%
Soprano pipistrelle	1	1.4%
Leisler's bat	1	1.4%
Total	70	

Static monitoring surveys

3.4.51 Two static monitoring devices were installed in Northfleet Landfill for five consecutive nights during the months of April to September. SMP1 was located in the northern part of the eastern treeline and SMP2 was located along the southern boundary of Northfleet landfill (see Figure 4). During the April static monitoring session the detector at SMP2 malfunctioned and no data were obtained. There was also a malfunction at SMP1 on the fifth night of the static monitoring in April and therefore only four nights of data were recorded. The data from SMP1 have been included in the totals discussed below, but no comparisons regarding activity levels can be drawn between April and the following months due to a lack of consistency.

3.4.52 At least two additional species which were not identified during the transect surveys were recorded by the static detectors: Nathusius' pipistrelle and bats from the *Myotis* genus. In total a minimum of seven species were recorded during the static monitoring surveys: common pipistrelle, noctule, Leisler's, soprano pipistrelle, serotine, Nathusius' pipistrelle and bats from the *Myotis* genus.

3.4.53 The dominant species at both SMPs was common pipistrelle bat, which constituted 77.7% of the total passes recorded. This was also the case during the transect surveys in June and July, when 80% of the total passes were attributable to this species. A much higher number of passes by common pipistrelle bat were recorded at SMP2 (852 passes) than at SMP1 (258 passes). The second most dominant species was noctule bat, which attributed 16.9% of the total passes. The numbers of passes by noctule bats were similar at both SMPs: 106 at SMP1 compared with 136 at SMP2. Noctule bat passes peaked in August: 40% of the total passes by this species occurred in this month compared with just 2.5% in May and 4.1% in September. Bats from the *Myotis* genus were only recorded at SMP1, with only two passes recorded at this location in both August and September. All other species were recorded at both SMPs.

3.4.54 Common pipistrelle and noctule were recorded in every month surveyed, whereas the other five species were not: serotine, bats from the *Mytotis* genus and soprano pipistrelle were recorded in low numbers during August and September, Nathusius' pipistrelle in April and September, and Leisler's in every month except April.

3.4.55 Tables 17 and 18 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 17: Static monitoring survey results from Northfleet Landfill

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	1,110	77.68%	79.20%
	Soprano pipistrelle	13	0.91%	
	Nathusius' pipistrelle	8	0.56%	
	Unidentified *Pipistrellus* species	1	0.07%	
Nyctalus	Noctule	242	16.93%	19.87%
	Leisler's bat	27	1.89%	
	Unidentified *Nyctalus* species	15	1.05%	
Eptesicus	Serotine	9	0.63%	0.63%
Myotis	Unidentified *Myotis* species	4	0.28%	0.28%
	Total	1,429		

Table 18: Static monitoring survey results from Northfleet Landfill per month

Month	Total number of bat passes at SMP1	Total number of bat passes at SMP2
April	55*	*Technical error – no data*
May	31	246
June	151	253
July	76	193
August	59	292
September	29	44
Total	401	1,028

* Only four nights of data recorded

Springhead

Bat activity surveys

3.4.56 One bat activity survey was undertaken every month from June – September 2015. The surveys began with an emergence survey of several of the trees within the woodland for the first 45 minutes, after which the surveyors walked two separate transect routes around the survey area: route 1 surveyed the perimeter of the main field, and route 2 was along the eastern edge of the woodland along the public footpath (see Figure 5). There is no accessible route between transect routes 1 and 2 and, to cover the two areas, transect route 1 was walked by two sets of surveyors walking opposite ways around the field whilst route 2 was repeatedly walked up and down by one set of surveyors. It is therefore considered that, whilst the perimeter of the field had double the amount of surveyors walking the route, the repeated walking of route 1 would have compensated for this increased survey effort. Below are the results of the transect surveys only; for the results of the tree emergence surveys see Table 4.

3.4.57 A minimum of eight bat species were recorded at Springhead during the activity surveys: common pipistrelle, noctule, bats from the *Myotis* genus (including positively identified Daubenton's and Natterer's bats), soprano pipistrelle, Leisler's, serotine and long-eared bat.

3.4.58 The surveyors on transect route 2 (the woodland path) recorded a far higher level of bat activity during every survey than the surveyors on route 1. Table 19 below summarises the total numbers of bat passes per transect route. It can be seen that a far greater number of bat passes were recorded on route 2: 774 passes were recorded here as opposed to 285 on route 1.

Table 19: Transect survey summary for Springhead

Date	Total number of bat passes recorded on transect route 1	Total number of bat passes recorded on transect route 2
23/06/2015	Surveyor 1: 18 passes Surveyor 2: 23 passes	Surveyor 1: 67 passes
28/07/2015	Surveyor 1: 84 passes	Surveyor 1: 166 passes
18/08/2015	Surveyor 1: 14 passes Surveyor 2: 55 passes	Surveyor 1: 193 passes Surveyor 2: 146 passes
08/09/2015	Surveyor 1: 66 passes Surveyor 2: 25 passes	Surveyor 1: 202 passes
TOTAL	285 passes	774 passes

3.4.59 During the survey on 23rd June 2015 a minimum of four bat species were recorded: common pipistrelle, noctule, bats from the *Myotis* genus and soprano pipistrelle bat. Common pipistrelle, noctule and bats

from the *Myotis* genus were recorded on route 1 whilst only common and soprano pipistrelle bats were recorded on route 2. A total of 108 bat passes were recorded by three surveyors: two surveyors walked transect route 1 and one walked route 2. The highest levels of bat activity were recorded along the woodland edge (route 2), where there was a fairly constant level of foraging activity by pipistrelle bats along the length of the treeline and around the Ebbsfleet. On route 1 the area with the most bat activity was around point A: the balancing pond in the north-east of the survey area.

3.4.60 On 28th July 2015 five bat species were recorded: common and soprano pipistrelle, noctule, Leisler's and serotine. Common pipistrelle, noctule, serotine and Leisler's bat were recorded on route 1, whilst common and soprano pipistrelle, serotine and Leisler's bat were recorded on route 2. A total of 250 bat passes were recorded by two surveyors: one surveyor walked each transect route. Like in June, the highest level of bat activity was recorded along the woodland edge, with multiple foraging passes by pipistrelle bats recorded in this area. Moderate levels of bat activity were recorded in all areas of route 1, with more bats recorded in the western area of the survey area, around the patch of immature woodland, than in June. Serotine was also recorded in this western area, which it had not been previously, with three brief passes and one foraging pass recorded here.

3.4.61 During the survey on 18th August 2015 a minimum of six bat species were recorded: common pipistrelle, noctule, bats from the *Myotis* genus (including positively identified Daubenton's and Natterer's bats), soprano pipistrelle and Leisler's bat. Common pipistrelle, Leisler's, bats from the *Myotis* genus and noctule were recorded on route 1, whilst common and soprano pipistrelle, Leisler's and *Myotis* bats were recorded on route 2. A total of 408 bat passes were recorded by four surveyors: two surveyors walked each transect route. The majority of the bat activity occurred along the woodland edge, with multiple groups of foraging pipistrelle bats here. Two or three Daubenton's bats were observed foraging beneath the bridge near to point 2F and a Natterer's bat was recorded near to the centre of the treeline. There were low numbers of bats recorded in all areas of route 1, with the highest levels of bat activity occurring around the woodland edge near to the Ebbsfleet.

3.4.62 On 8th September 2015 a minimum of five bat species were recorded: common pipistrelle, bats from the *Myotis* genus, soprano pipistrelle, Leisler's and long-eared bat. All the above species were recorded on route 1, whilst only common and soprano pipistrelle bats were recorded on route 2. A single long-eared bat was recorded in the northern area of the woodland edge, near to the balancing pond. A total of 293 bat passes were recorded by three surveyors: two walked transect route 1 and one walked route 2. Low levels of bat activity were recorded in all areas of transect route 1, with the majority of the passes recorded along the woodland edge in the eastern area of the route.

3.4.63 Table 20 below shows the overall species composition at Springhead recorded during the transect surveys.

Table 20: Bat passes recorded during the activity surveys at Springhead

Species	Total number of passes	%
Common pipistrelle bat	952	89.9%
Noctule bat	54	5.1%
Myotis species	21	2.0%
Soprano pipistrelle bat	16	1.5%
Leisler's bat	11	1.0%
Serotine	4	0.4%
Long-eared bat	1	0.1%
Total	1,059	

Static monitoring surveys

3.4.64 Two static monitoring devices were installed at Springhead for five consecutive nights during the months of April to October. There was a technical fault with the detector which was installed at SMP1 during September, resulting in no data being recoverable; the devices were therefore both set from 29th September to 3rd October in order to collect data from this period. SMP1 was located in the centre of the main treeline in the east of the survey area, and SMP2 was located at the northern end of the same treeline near to the balancing pond (see Figure 5).

3.4.65 A minimum of seven species were recorded during the static monitoring surveys: common pipistrelle, soprano pipistrelle, noctule, bats from the *Myotis* genus, Leisler's, Nathusius' pipistrelle and serotine. This species assemblage is similar to the assemblage recorded during the transect surveys, with the addition of Nathusius' pipistrelle and exclusion of long-eared bat. All of the species apart from serotine were recorded in varying numbers at both SMPs: serotine was only recorded at SMP1.

3.4.66 The dominant species during all of the static monitoring sessions was common pipistrelle bat: 94.88% of the total passes recorded were attributable to this species. Similar numbers of calls by this species were recorded at both SMP1 and SMP2, with 10,381 and 11,632 passes by this species recorded at these two locations respectively. The second most dominant species was soprano pipistrelle bat: 2.63% of the total passes were by this species, with a peak of 516 passes in April compared to a range of between one and 42 passes during the other months. Low numbers of bats from the *Nyctalus* genus were recorded, with 2.05% of passes attributable to this genus.

3.4.67 Nathusius' pipistrelle bat was not identified during the transect surveys but was recorded by the static monitoring devices. A total of 13 passes by this species were recorded at SMP1 and 22 passes at

SMP2. Nathusius' pipistrelle was not recorded in July or August and a peak of 27 passes by this species was recorded in late September/early October.

3.4.68 Tables 21 and 22 below provide a summary of the species composition and number of bat passes recorded during the static monitoring surveys each month.

Table 21: Static monitoring survey results from Springhead

Genus	Species	Total number of passes	% of total passes by species	% of total passes by genus
Pipistrellus	Common pipistrelle	22,013	94.88%	97.66%
	Soprano pipistrelle	610	2.63%	
	Nathusius' pipistrelle	35	0.15%	
	Unidentified *Pipistrellus* species	2	0.01%	
Nyctalus	Noctule	368	1.59%	2.05%
	Leisler's bat	56	0.24%	
	Unidentified *Nyctalus* species	50	0.22%	
Myotis	Unidentified *Myotis* species	62	0.27%	0.27%
Eptesicus	Serotine	6	0.03%	0.03%
	Total	23,202		

Table 22: Static monitoring survey results from Springhead per month

Month	Total number of bat passes at SMP1	Total number of bat passes at SMP2
April	2,514	3,575
May	1,114	1,539
June	501	1,908
July	1,343	518
August	390	925
September	*Technical issue – no data*	1,327
Late September/early October	4,782	2,766
Total	10,644	12,558

4.0 EVALUATION

4.1 Whole Survey Area

4.1.1 Within the combined survey area nine bat species have been positively recorded.

- Common pipistrelle
- Soprano pipistrelle
- Nathusius' pipistrelle
- Noctule
- Leisler's
- Natterer's
- Daubenton's
- Serotine
- Long-eared bat

4.1.2 Passes by bats from the *Myotis* genus which could not be identified to species level were recorded. Natterer's bats can be positively identified from calls where the end frequencies were below 25kHz: a parameter which is considered to be an indicative feature of the Natterer's call (*pers comm*. D. Hill and G. Jones, 2006) and these were only recorded at Springhead. Several Daubenton's bats were identified from their characteristic flight pattern low over water; this was only observed on the Ebbsfleet at Springhead. However, the species is likely to be present within the wider survey area, although this was not confirmed. Other *Myotis* species which are considered likely to be present within the entire survey area, include whiskered and Brandt's. However, there is no reliable way of specifically determining whether such other *Myotis* species are present on the Site without examining the bats in the hand.

4.1.3 A total of 62,317 bat passes were recorded by the static detectors and subject to sonogram analysis out of 104,917 sound files. A further 2,584 bat passes were recorded by the surveyors during the bat activity surveys.

4.1.4 All nine species were recorded at Springhead with eight species being recorded at the peninsula, Craylands La. Pit and Bamber Pit. However, at Springhead both Daubenton's and Natterer's bat were positively identified and confirmed present whilst at the other survey areas only unidentified *Myotis* bats could be determined. At Northfleet Landfill a minimum of seven species was recorded with no long-eared bat being recorded during either the transect surveys or the static monitoring survey.

4.1.5 The five survey areas have been surveyed individually and the importance of the bat assemblage at each Site has been assessed in the following pages. At a landscape level these areas are linked by low and medium quality habitat and wildlife corridors. There are barriers that may impact on certain species'

ability to move between each Site but it is considered likely that, due to this connectivity, bats are able to use one or more of these habitats at any one evening or different times of year.

4.2 Peninsula

4.2.1 At least eight species were recorded on the peninsula. Calls by *Myotis* bats were heard but could not be confirmed to species level. A greater number of bat species was recorded during the static monitoring survey than during the transect surveys: six species were recorded during the transects, whilst a minimum of eight were recorded by the static monitoring devices. Bats from the *Myotis* genus and long-eared bat were identified during the static monitoring surveys only. All but one of the eight species identified by the static monitoring surveys were recorded at all four SMPs; long-eared bat was only recorded at SMP3 at the northern tip of lagoon P2.

4.2.2 During the transect surveys a greater diversity of species was recorded in the western and central areas of the peninsula than in the east. Common pipistrelle was recorded across all areas, and soprano pipistrelle was recorded across the majority of the survey area, although most frequently in the western and central areas. Noctule and Leisler's bat were also recorded most frequently in the western and central areas of the peninsula. Nathusius' pipistrelle was only recorded close to the sea wall on the western transect route (route 1) and serotine was only recorded in the centre of the eastern route (route 2); both of these species were only recorded on one occasion during the transect surveys. In the east of the peninsula, from point 3A eastwards, the only species recorded during the transect surveys were common and soprano pipistrelle. As there were no static monitoring devices set in this eastern area of the peninsula it is not known whether additional species were active at times other than when the transect surveys were carried out. The static monitoring surveys showed that *Myotis* bats, Nathusius' pipistrelle and serotine were also active in the central, western and northern areas of the survey area, as these species were recorded at every SMP, although in moderate to low numbers. With the exception of long-eared bat, all of the species were recorded at every static monitoring location in varying numbers.

4.2.3 Overall the highest level of bat activity was recorded at SMP4: 8,008 (42.64%) of the total passes recorded were at this location in the north of the survey area. During every month surveyed, with the exception of April 2016, the highest level of activity occurred at SMP4. In April 2016 the highest level of activity occurred at SMP2, and overall the second highest level of activity occurred at this location in the centre of the peninsula: 4,873 passes were recorded at this location, despite the detector malfunctioning in September 2015. Similar levels of activity were recorded at SMP1 and SMP3 with 2,694 and 3,206 passes were recorded respectively.

4.2.4 During the transect surveys the overall level of bat activity was generally higher on the eastern transect, which passed close to SMP2 and SMP4. July and September were the exception when more bat passes were recorded on the western transect route. Regarding areas of significant bat activity the transect surveys indicate that there are four key areas where bat foraging activity consistently occurred. These include the waterbodies of Black Duck Marsh, the lagoon P2 and the wildlife pond at Botany Marsh East. These areas are considered to hold the most value for bat foraging. The species recorded foraging in these areas are common and soprano pipistrelle and noctule bat. These species, as well as Nathusius' pipistrelle and Leisler's bat, were also recorded regularly foraging along the sea wall on the western edge of the peninsula.

4.2.5 The dominant species recorded during all of the transect surveys was common pipistrelle. The dominance of this species ranged from 52% of all passes in September 2015 to 92.9% in May. Overall 81.8% of the total passes recorded on all of the transect surveys were attributable to this species. The second most dominant species during the transect surveys was noctule bat, contributing 13.5% of the total passes. Although a predominantly tree roosting species, noctule bats can be found in a range of habitats and are considered to be generalist feeders, foraging both in open habitats and over woodland, as well as having a strong preference for water (Altringham, 2003). All of these habitat types are found within the survey area. The dominant species during all of the static monitoring surveys was also common pipistrelle, contributing 80.18% of the total passes. In a contrast to the transect surveys, the second most dominant species recorded by the static detectors was soprano pipistrelle, contributing 9.6% of the total passes. The majority of the passes by soprano pipistrelle (62.2%) were recorded at SMP4 in the northern part of the peninsula.

4.2.6 The two more common and widespread species of pipistrelle have been found to have different habitat requirements, with the common pipistrelle foraging in a wide range of habitats whilst the soprano pipistrelle is more strongly associated with wetland habitats (Vaughan, Jones and Harris, 1997). More recent research suggests that the soprano pipistrelle selects roosts with a significant proportion of surrounding habitats being wetland within 2km of the roost, and spends a high percentage of foraging time over static or slow moving water adjacent to mature trees up to 2.3km from its roost (Davidson-Watts, 2006). A relatively high number of soprano pipistrelle bat passes (1,803 on the static detectors) were recorded here compared with the other survey areas (610 passes at Springhead and less than 50 passes at all other locations). This difference is likely due to the relatively large areas of wetland habitat on the peninsula at Botany Marsh, Black Duck Marsh and lagoon P2.

4.2.7 A comparatively moderate number of passes by bats from the *Nyctalus* genus were recorded throughout all surveys, with some 9.38% of the passes recorded during the static monitoring surveys and 15.1% of

the passes on the transect surveys attributable to bats from this genus. Noctule bat was recorded more frequently and in greater numbers than Leisler's bat. The number of noctule bat passes recorded by the static monitoring devices peaked in May with 525 passes recorded during this month compared to a range of 12 – 364 passes during the other months. During the transect surveys the number of noctule bat passes varied with peaks of 34 in June and 35 each in July and September, and a low of three in August and eight in May. The proportion of passes by this species during the transect surveys was greatest during September when the 35 recorded passes equated to 46.7% of all bat passes, although this was due to the relatively low level of activity recorded by pipistrelle bats during this month.

4.2.8 The species richness varied slightly throughout the months surveyed with six species recorded in September, seven in April, May, June and July and eight in August. Serotine was recorded during every month except September, and a single long-eared bat pass was recorded in August. Species richness was relatively consistent throughout the entire survey period, with the same six species (common, soprano and Nathusius' pipistrelle, noctule, Leisler's and bats from the *Myotis* genus) recorded during every static monitoring session, although in varying numbers.

4.2.9 Nathusius' pipistrelle is a fairly uncommon species in the UK with a restricted distribution, and only a small number of known maternity colonies (JNCC, 2007). These maternity roosts have been located in traditionally built stone and red brick wall cavities and under flat roofs. Maternity roosts are frequently shared with soprano pipistrelle and the majority of roosts are located close to waterbodies, predominantly large freshwater lakes (JNCC, 2007). Nathusius' pipistrelle roosts are often found in association with wetland habitats and this is likely to be related to their preferred prey items (Flaquer, C et al., 2009). It is therefore concurrent that this species was recorded along the sea wall and near to Black Duck Marsh in the west of the peninsula. Both areas provide suitable wetland foraging habitat for Nathusius' pipistrelle, as well as favourable habitat for soprano pipistrelle, which also tends to prefer wetland habitat for foraging.

4.2.10 The static monitoring surveys recorded the highest level of activity during May with 6,948 passes recorded, representing 36.99% of the total bat activity. The month with the lowest level of bat activity was September with 833 passes recorded. This was also the case during the transect surveys, during which the lowest number of bat passes (a total of 75) was recorded in September. During the transect surveys the greatest numbers of bat passes were recorded in June and July. In contrast however, during the static monitoring the second lowest level of activity occurred in July: just 1,797 passes.

4.2.11 With regard to early passes in relation to average emergence time, there were early passes by common pipistrelle bats during two of the transect surveys. During the transect surveys in May and August this

species was recorded 28 and 26 minutes after sunset respectively. During the May transect survey a common pipistrelle was recorded at point 1I adjacent to Black Duck Marsh and in August at 2E, flying into the survey area from the south. The mean emergence time for common pipistrelle has been calculated as 25 minutes after sunset (Davidson-Watts and Jones, 2006), thus these early passes suggest that these bats were likely roosting nearby. No continuous movement of bats (i.e. to suggest a maternity roost) into the areas under observation during the vantage point survey was noted.

4.2.12 The earliest pass recorded during any of the transect surveys was a noctule bat some 18 minutes after sunset on the 22nd of September near to Black Duck Marsh in the west of the peninsula. There were also early noctule bat passes recorded during several of the static monitoring surveys. The majority of first passes recorded by the static detectors were by noctule bats with the earliest of these recorded some seven minutes after sunset on 11th May 2015 at SMP1. Noctule bats have a median emergence time of five minutes after sunset (Altringham, 2003), and the presence of the earliest noctule some seven minutes after sunset suggests that it may have been roosting close to the peninsula in May. Noctule bats roost almost exclusively in trees but can sometimes be found in buildings (Altringham, 2003). The woodland to the south of the survey area was surveyed in 2012 and several trees with bat roost potential were recorded in this area.

4.2.13 There were occasional early passes by pipistrelle species during several of the static monitoring surveys, the earliest of which were common pipistrelle bats recorded 24 minutes after sunset on the 14th of May and 13th of June. As stated above, this is close to the mean emergence time for the species. There was one relatively early pass by a Leisler's bat recorded 22 minutes after sunset on 11th May at SMP2. Leisler's bat tends to emerge approximately 10-15 minutes after sunset (Jones & Walsh, 2001), and Altringham reports a median emergence time of 18 minutes after sunset (Altringham, 2003). This record from 22 minutes after sunset therefore suggests that the species may have been roosting nearby. There were no early passes in relation to emergence time by serotine, bats from the *Myotis* genus, Nathusius' pipistrelle or long-eared bat.

4.2.14 The closest bat pass to sunrise was by a noctule bat recorded some 17 minutes before sunrise on the 15th of May at SMP1. During all of the static monitoring sessions there were bat passes recorded less than an hour before sunrise and throughout the night, indicating bats consistently forage and commute within the peninsula. The pre-dawn transect survey in August showed a very low level of bat activity in the two hours before sunrise, however it is considered that this is due to weather conditions deteriorating during this survey and the data largely conflicts with the findings of the static monitoring surveys.

4.2.15 Research into the habitat preferences for foraging of vespertilionid bats (Walsh and Harris, 1996) found that habitats associated with broadleaved woodland, particularly the woodland edge, and water were most preferred for foraging, whilst arable land, moorland and improved grassland were strongly avoided. As well as the selective preference of habitats for foraging by bats, it has also been shown that certain habitats have strong correlations with bat abundance: riverine, woodland, lacustrine and vegetation corridors (hedgerows, tree lines et al) have a strong positive effect on bat numbers, by comparison there is a strong negative association with large, open areas of arable land (Walsh and Harris, 1996). The same research found that broad-leaved woodland and riparian habitats were of 'pivotal' importance to bats, moreover semi-natural broad-leaved woodland and open water sheltered by tree cover are considered to be the prime foraging habitats for species such as Natterer's bat, (Smith and Racey, 2002). The habitats within the peninsula are discussed below in relation to these assertions.

4.2.16 The total level of bat activity recorded was considered to be comparatively moderate: 18,781 bat passes were recorded overall by four detectors, compared with over 23,000 passes recorded by only two detectors at nearby Springhead. The peninsula is located within an area generally supporting poor habitat quality for bats. It is surrounded by sub-optimal urban and industrial habitats to the south and the River Thames to the north, with similarly dense residential, commercial and industrial development (including Tilbury Docks) on the northern bank of the river. There are occasional small fragments of woodland within the landscape to the south of the peninsula, including to the west of Swanscombe near to the Swanscome Skull site SSSI. However, these areas of woodland are isolated from the peninsula by train lines, a main road, several quarries and other commercial developments. There are no continuous areas of good quality bat habitat which connect to the peninsula. Within the peninsula there is limited woodland habitat, although there are several areas of maturing scrub, planted and scattered trees and a small area of broad-leaved woodland to the south of Black Duck Marsh. These areas are dominated by sycamore *Acer pseudoplatanus* with hawthorn *Crateagus monogyna,* blackthorn *Prunus spinosa* and field maple *Acer campestre*. Despite the lack of wooded habitats, the peninsula does contain areas of what may be considered optimal (for some species) bat foraging habitat, in particular the high quality wetland and marsh habitats of Black Duck Marsh, the CTRL wetlands and Botany Marsh.

4.2.17 Overall, given the level of activity, behaviour and the number and diversity of species recorded it is considered that the value of the bat assemblage on the peninsula is of Local Importance.

4.3 Craylands La. Pit

4.3.1 At least eight species were recorded at Craylands Pit. Calls by *Myotis* bats were heard but could not be confirmed to species level. A greater number of species were recorded during the static monitoring

surveys than during the activity surveys. Common pipistrelle, soprano pipistrelle, noctule and Leisler's bat were recorded during the activity surveys, whilst the static monitoring surveys recorded the following additional species: bats from the *Myotis* genus, serotine, Nathusius' pipistrelle and long-eared bat. Overall six of these species were recorded in all areas of Craylands La. Pit, whereas serotine and Nathusius' pipistrelle were recorded at SMP1 only. All seven species occurred in May, July and September, compared to six in April and August and five in June.

4.3.2 Three areas with bat roosting features were noted within the southern chalk cliff and were subject to bat emergence surveys. No bats emerged from any of the features during the surveys. There was an early pass, 25 minutes after sunset, by a common pipistrelle bat in May. This bat was recorded foraging briefly in the south-western area of the survey area, but was not seen emerging from any of the cliff features.

4.3.3 Overall a higher level of bat activity was recorded at SMP2 (inside tunnel 016) than SMP1 in Craylands La. Pit: 3,388 passes were recorded at SMP2 (within tunnel 006) compared to 2,124 at SMP1 (in the south-west of the pit). This equates to an average of 113 passes per night at SMP2 over 30 nights' worth of data. However, SMP2 was not the 'busiest' location during every month; in April and September SMP1 recorded the highest level of bat activity. Although the overall activity levels were lower at SMP1, a greater species diversity was recorded at this location, with serotine and Nathusius' pipistrelle recorded here but not at SMP2. The A226 runs immediately north of Craylands Pit and light from the street lights extends over much of the central and eastern part of the Pit. The area of tunnel 006 is darker and creates a link through to Manor Way 1. Whilst the majority of passes recorded were by common pipistrelle (77%) there was also a relatively high number of passes by Leisler's bat (605 or 18%). It is considered likely that the common pipistrelles were foraging at the front of the cliff and potentially into or through the tunnel whilst Leisler's bat are regularly recorded outside the tunnel within the Pit.

4.3.4 The dominant species overall was common pipistrelle bat: this species contributed 53.3% of the total passes during the activity surveys and 78.65% during the static monitoring surveys. A relatively large proportion of the total passes recorded were attributable to bats from the *Nyctalus* genus: overall 19.2% of passes recorded during the static monitoring surveys were by this species. The dominant species from this genus was Leisler's bat which contributed 12.14% of the total passes recorded. This result reflects the findings of the activity surveys, during which *Nyctalus* species contributed 43.7% of the total passes recorded. Leisler's bat was the second most dominant species overall with a peak in numbers in August from both the static and activity surveys. Leisler's and noctule bats are found in a range of habitats and are generalist feeders which will forage in the open (Altringham, 2003). Noctule and

Leisler's bats have been recorded foraging around white street lights and are generally less affected by street lights than other more light sensitive bats.

4.3.5 Very low levels of bat activity were recorded during the transect surveys in April and May; the lowest level of activity was also recorded in April by the static monitoring devices. The static monitoring surveys showed the highest levels of bat activity in June and July: similar numbers of passes were recorded during these months, with 1,497 passes in June and 1,528 in July. The number of common pipistrelle bat passes increased every month between April and July, after which the numbers reduced until September. Research has found that common pipistrelles appear to make more foraging flights to a greater number of feeding locations than the soprano pipistrelle, although the foraging areas are likely to be closer to the roost. This appeared to be most marked during the lactation period. In comparison pipistrelle was found to make fewer foraging bouts but travel further distances to the foraging areas (Davidson-Watts and Jones, 2006). This may explain the higher number of passes by common pipistrelles during the June and July periods when the bats are likely to be heavily pregnant or lactating, as suggested in the research. Other species showed slightly different patterns of activity throughout the months: for example, passes by Leisler's bat peaked in June and August, and noctule and *Myotis* bats peaked in September.

4.3.6 There were early bat passes during two of the emergence and transect surveys. In May a common pipistrelle bat was recorded 25 minutes after sunset foraging briefly in the south-western area of Craylands La. Pit. This early record suggests that it was roosting nearby. In September a noctule bat was recorded 15 minutes after sunset; this bat was seen flying high over the survey area from the south and was not roosting within it. During April and August the first bat passes recorded were 57 minutes and 45 minutes after sunset respectively.

4.3.7 There were early passes during all of the static monitoring sessions, the earliest of which was a noctule bat recorded six minutes after sunset on the 24th of May at SMP1. With a median emergence time of five minutes after sunset, the presence of this noctule just six minutes after sunset suggests that it is likely to be roosting nearby. There is a small block of woodland located approximately 70m to the south-west of the quarry across Craylands Lane; it is possible that there is a noctule roost in this woodland or in Springhead where numerous trees with bat potential have been noted, especially as noctule bats were recorded flying over the survey area from the south during the activity surveys.

4.3.8 The earliest pass by a Leisler's bat was recorded 14 minutes after sunset on the 13th of August, suggesting a roost is local to the survey area. Like noctule bats, Leisler's will roost in trees but are also found in bat boxes and buildings (Altringham, 2003).

4.3.9 The earliest pass by a bat from the *Myotis* genus was 66 minutes after sunset on the 20th of July. The *Myotis* bats have a variety of median emergence times: whiskered bats emerge approximately 32 minutes after sunset, whereas Natterer's emerge at around 75 minutes after sunset and Daubenton's at around 84 minutes after sunset (Altringham, 2003). *Myotis* species are known to roost in a variety of trees, buildings and other built structures. It is considered that low numbers of *Myotis* bats may be roosting nearby and using Craylands La. Pit to forage. There were no early passes by long-eared bat or serotine and only low numbers of passes were recorded by these species.

4.3.10 The bat pass closest to sunrise was a common pipistrelle bat recorded 20 minutes prior to sunrise on the 13th of August, indicating that bats forage within the survey area for the majority of the night. There were relatively consistent passes throughout the night during the majority of the static monitoring surveys.

4.3.11 The tunnel (007) which links Craylands La. Pit to the vegetated pit to the south-west was monitored with data loggers in late summer and autumn and with static detectors in late September and October. The data loggers recorded spikes of activity in early September but the static detectors recorded only limited activity in late September/October, with long-eared bats recorded during this period. It is considered that the tunnel could be used by some relatively low level swarming bats early in the season, but the swarming activity was not sustained.

4.3.12 The overall habitat quality of Craylands La. Pit is considered to be 'Low' (Collins, 2016), consisting predominantly of bare ground which has been colonised by grassland vegetation, with the margins more vegetated with patches of scrub. The immediate surrounding area is suburban: there is residential and industrial development on all sides of the Pit. There are occasional small fragments of woodland within the landscape to the south-west, including an area near to the Swanscombe Skull Site. This area is partially connected to the south-western corner of the survey area, with the railway line and Craylands Lane in between. When comparing the total number of passes recorded during the static monitoring at Craylands Pit with other Sites in the local area, the general bat activity is of a moderate level. However, a survey constraint of the static monitoring is that the numbers of bats cannot be counted and bat behaviour cannot be observed; only *bat passes* are recorded, meaning that one bat foraging near to the detector can accumulate a large amount of data. The transect surveys aimed to observe bat behaviour within the Pit: they showed that there were low levels of activity in all areas, with low levels of foraging by common pipistrelle bat during August and September. Given the level of activity observed by the surveyors and the number of species recorded, it is considered that the value of the bat assemblage in Craylands La. Pit is of Neighbourhood Importance.

4.4 Bamber Pit

4.4.1 At least eight species were recorded at Bamber Pit. Calls by Myotis bats were recorded but could not be confirmed to species level. A wider diversity of species were recorded during the static monitoring than during the activity surveys, with a minimum of seven species identified compared with five during the activity surveys. A single soprano pipistrelle bat was recorded during the transect survey in July but this species was not recorded during the static monitoring. Serotine, long-eared bat and bats from the *Myotis* genus were recorded by the static detectors; these species had not been previously identified during the transect surveys. Overall six species were recorded at all three static monitoring points, with the exception of long-eared bat which was recorded at SMP2 only. Leisler's, noctule and common pipistrelle were recorded in all areas of the survey area during the transect surveys; individual soprano and Nathusius' pipistrelle were recorded in the western area of Bamber Pit only.

4.4.2 Overall a higher level of bat activity was recorded at SMP2 than SMP1. When the detectors were set at these two locations between May and August, 37% of the total passes were recorded at SMP1 compared with 63% at SMP2. During the September survey a higher level of bat activity was recorded at SMP3 in the north-west of the survey area than at SMP2 with 64% of the total bat passes recorded at SMP3 compared with 36% at SMP2. The results of the static monitoring surveys therefore indicate that a higher level of bat activity occurred in the northern area of Bamber Pit around SMP2 and SMP3. This section of the Pit is more consistently dark than the southern area, with fewer streetlights nearby.

4.4.3 The transect surveys showed that the areas of Bamber Pit with the highest levels of bat activity were in the centre of the quarry (around the path to the west of the lake), the western area around points 4E and 4F (close to SMP2), and the eastern tip of the transect near to the railway. The eastern tip of the transect route (around point 4A) is well-lit and adjacent to the bridge over the railway. However, the area beneath the bridge is well connected to an area of scrub which extends into the Northfleet Landfill site to the south; it is considered that this may be why the levels of activity were fairly high here, as bats may have been commuting to this area of suitable foraging habitat to the south. The activity levels were generally lower in the area near to the southern path which is relatively well lit (points 4B and 4C) – this correlates with the lower levels of activity recorded at SMP1 in this area.

4.4.4 The static monitoring surveys showed that the dominant species changed throughout the months: during April and May common pipistrelle bat was the only species recorded, in June common pipistrelle bat was dominant (contributing 96% of passes), and from July onwards bats from the Nyctalus genus were dominant. In July a total of 860 passes (50.5%) were attributed to *Nyctalus* bats: 76 passes were attributed to Leisler's, 408 (24%) to noctule and a further 376 or 22% of the passes were by unidentified

Nyctalus bats. During August a total of 400 passes (69%) were attributed to *Nyctalus* bats with 170 (68.5%) being attributed to Leisler's, only 32 to noctule and a further 198 unidentified *Nyctalus* bats. The activity surveys showed a similar pattern with the proportion of bats from the *Nyctalus* genus increasing throughout the season: 11.6% of passes were attributable to this genus in May, and the percentage increased every month until its peak at 70% in August. The species richness was similar during all of the months surveyed: six species were recorded during the static monitoring surveys in every month except June, when only four species were recorded. Nathusius' pipistrelle, bats from the *Myotis* genus and long-eared bat were not recorded in every month.

4.4.5 As was the case during the activity surveys, the static monitoring surveys showed the highest level of activity during July: 1,702 passes were recorded during this session, representing 55.4% of the total activity. Similar to the activity surveys, the months with the lowest levels of activity recorded were May and June, with 214 and 206 passes respectively. This peak was as a result of a significantly increased number of passes recorded by common pipistrelle and *Nyctalus* bats (a total of 835 passes common pipistrelle were recorded in July compared to 147 in June and 174 in August with 860 passes by *Nyctalus* bats in July compared to 57 and 400 in June and August respectively). As set out in section 4.3.5, common pipistrelle bats tend to make a high number of foraging flights between the roost and feeding areas during the lactation period. It is therefore considered likely that bats from a maternity roost nearby commute through and forage within Bamber Pit.

4.4.6 There were early passes during the activity surveys between June and September. In June a Nathusius' pipistrelle bat was recorded 12 minutes after sunset in the western area of the survey area. Nathusius' pipistrelle roosts are often found in association with wetland habitats and this is likely to be related to their preferred prey items (Flaquer, et al., 2009). In this case, there is a relatively large lake in the eastern part of Bamber Pit. Only a small amount of research has been done into the average emergence times of Nathusius' pipistrelle bats, however they are considered to emerge at a similar time to common and soprano pipistrelle bats: around 25 minutes after sunset. An early pass by the species 12 minutes after sunset therefore suggests that this bat was roosting close by or within the survey area.

4.4.7 There were early passes by common pipistrelle bats during the July and August activity surveys (28 minutes and 30 minutes after sunset respectively). The mean emergence time for common pipistrelles has been calculated as 25 minutes after sunset (Davidson-Watts and Jones, 2006), and the times of these two passes suggest that there is a roost nearby. In September the first bat recorded was a Leisler's bat at 31 minutes after sunset but given that this species tends to emerge approximately 10-15 minutes after sunset this timing cannot be used to suggest any close roost areas.

4.4.8 There were early bat passes recorded during all of the static monitoring sessions, the earliest of which was a common pipistrelle bat recorded one minute after sunset on the 25th of May. There was a noctule bat pass 12 minutes after sunset in September at SMP2. Noctule bats have a median emergence time of five minutes after sunset (Altringham, 2003), and a pass by this species 12 minutes after sunset indicates that the bat may have been roosting nearby. The bat pass closest to sunrise was a common pipistrelle bat which was recorded 11 minutes before sunrise on the 23rd of May.

4.4.9 There were bat passes recorded close to sunset and sunrise during all of the months surveyed by static monitoring. During every month there were early passes by common pipistrelle bats, the earliest of which was recorded two minutes after sunset on the 13th of August at SMP2.

4.4.10 There were no early passes by serotine, long-eared bat or *Myotis* species during the five night static monitoring sessions and no significantly early passes by noctule or Leisler's bats.

4.4.11 The bat pass closest to sunrise was a common pipistrelle bat recorded 11 minutes before sunrise on the 23rd of May at SMP1. Passes were recorded less than an hour before sunrise during every static monitoring session, suggesting that bats forage and/or commute within the survey area throughout the majority of the night.

4.4.12 The habitat quality of Bamber Pit is considered to be 'Moderate' (Collins, 2016). It contains good quality foraging habitat as it is dominated by well-developed scrub vegetation, and there is a large waterbody in the eastern part of the survey area. Bamber Pit is relatively well connected to the treelines and grassland at the Northfleet Landfill site to the south, but other than this it is fairly isolated from any areas of high quality habitat (such as woodland) in the wider landscape. When comparing the total number of passes recorded during the static monitoring at Bamber Pit with other survey areas in the local area, the general bat activity is of a moderate level. The transect surveys also showed that there was a moderate level of bat activity throughout Bamber Pit, with foraging by common pipistrelle, noctule and Leisler's bat recorded in all areas of the route. Given the level of activity and the number of species recorded, it is considered that the value of the bat assemblage in Bamber Pit is of Local Importance.

4.5 Northfleet Landfill

4.5.1 A minimum of seven species have been recorded using the Northfleet Landfill site during the surveys. The only species not recorded here that was recorded in other parts of the Site was long-eared bat. Passes by bats from the *Myotis* genus which could not be identified to species level were recorded.

4.5.2 A greater number of species were recorded during the static monitoring surveys than during the transect surveys. Common and soprano pipistrelle, noctule, Leisler's and serotine were recorded during the transect surveys, whilst the static monitoring surveys also recorded bats from the *Myotis* genus (four passes) and Nathusius' pipistrelle (eight passes). All of the species were recorded at both static monitoring points, with the exception of *Myotis* bats which were only recorded at SMP1 in the northern treeline.

4.5.3 Overall a higher level of bat activity was recorded at SMP2 in the south of the Landfill than at SMP1 in the north-east of the survey area, despite there being no data from SMP2 in April. Excluding April, during every month there were consistently more passes at SMP2 than SMP1, and overall 71.9% of the total passes were recorded at this location. During the transect survey in June the areas with the highest levels of bat activity were in the northern and north-eastern areas of the Landfill, around the scrub and treeline which adjoins the public footpath between this survey area and Bamber Pit to the north. However, during the July transect survey no bats were recorded in this north-eastern area of Northfleet landfill; the activity was concentrated around the north-western area, with very low levels of activity in all other areas. However, a constraint of the transect surveys is that data may be biased to areas of the route where the surveyors were located at different times of the evening.

4.5.4 Overall the highest levels of bat activity were in the northern, southern and western areas of the Northfleet landfill. Negligible levels of activity were recorded in the eastern side and particularly the south-eastern section of the survey area, which adjoin the well-lit roads around Ebbsfleet International. This is to be expected, as artificial light is negatively correlated with levels of bat activity. The higher level of activity around SMP2 may be explained by the presence of the treeline in this area, with larger and more mature trees here compared to the scrub vegetation around SMP1. The western treeline also creates a darker and more sheltered corridor for commuting and foraging bats.

4.5.5 The dominant species overall was common pipistrelle bat: this species contributed 80% of the total passes during the transect surveys, and 77.7% during the static monitoring. The second most dominant species was noctule bat, contributing 15.7% of the passes during the transect surveys and 16.9% of the static monitoring passes. The number of noctule bat passes peaked in August, with 143 passes in this month compared with a low of six passes in May. This increase in number of passes correlates with an increase in the number of passes by this species from the nearby Bamber Pit.

4.5.6 The month with the highest level of bat activity recorded by the static monitoring devices was June: 404 passes, 29.4% of the total (May to September), were recorded in this month. A similar number of passes (351) were recorded in August, constituting 25.6% of the total. The lowest level of bat activity was

recorded in September: just 73 passes were recorded in this month. The greatest species diversity was recorded in September: all seven species were recorded in this month compared with three species in April and May (from static data), four in June, four in July (from static and transect data) and six in August. Serotine, *Myotis* bats and soprano pipistrelle were recorded later in the season (in August and September only) by the static monitoring devices and only individual passes by these species were noted during the transect surveys in June and July.

4.5.7 There were no early passes recorded during either of the transect surveys. The first bat recorded on 23rd June was a noctule bat 44 minutes after sunset, and the first pass on 28th July was a common pipistrelle bat 58 minutes after sunset.

4.5.8 In contrast to the transect surveys, there were early bat passes recorded during several of the static monitoring sessions. The earliest pass was by a noctule bat 16 minutes after sunset on the 19th of August. Nearly all of the first passes recorded were by noctule bats, although none were recorded earlier than 16 minutes after sunset. As noctule bats have a median emergence time of five minutes after sunset (Altringham, 2003), this bat could have flown some distance from its roost before arriving at Northfleet Landfill. On two occasions common pipistrelle bats were the first species recorded; the earliest of these was at 26 minutes after sunset on the 24th of June. This is close to the mean emergence time for this species, which may indicate that a common pipistrelle bat was roosting in close proximity to the Landfill on this occasion. No other passes by common pipistrelle bat were recorded less than 30 minutes after sunset, and there was not regular early activity by this species during any of the static monitoring surveys.

4.5.9 There were no early passes by soprano pipistrelle or Nathusius' pipistrelle bat recorded: the earliest pass by a soprano pipistrelle was 1 hour and 15 minutes after sunset, and the earliest Nathusius' pipistrelle was recorded 1 hour and 39 minutes after sunset. There were no significantly early passes by Leisler's or serotine bats. The earliest Leisler's bat pass was recorded 27 minutes after sunset in May at SMP2. The earliest pass by serotine was recorded 43 minutes after sunset at SMP1 in August. Serotine bats emerge approximately 20 minutes after sunset and occasionally at sunset (Jones & Walsh, 2001). There were no early passes by *Myotis* bats and all of the calls by this species were recorded after midnight.

4.5.10 The bat pass recorded closest to sunrise was a common pipistrelle bat recorded 36 minutes before sunrise on the 31st of May. Bats were recorded less than 45 minutes before sunrise in all months except April and September: in September the last bat recorded at SMP2 was a noctule bat nearly five hours

before sunrise. The times of these passes to sunrise suggest that, between May and August, bats use the landfill area to forage and/or commute throughout the night.

4.5.11 The habitat quality of the Northfleet landfill site is considered to be 'Low' (Collins, 2016), consisting predominantly of short grassland with scrub in the north-eastern corner and treelines on the northern and western boundaries. The immediate surrounding area is suburban: the well-lit Ebbsfleet International and its large car park are located to the south and east, and there is residential development to the west. Northfleet Landfill is not connected to any areas of woodland, although Bamber Pit is located to the north: this contains predominantly scrub vegetation and a large lake. When comparing the total number of passes recorded during the static monitoring at Northfleet Landfill with the other survey areas, the general bat activity is of a low level; it had the lowest level of bat activity of any of the survey areas. Given the level of activity observed by the surveyors and the number of species recorded, it is considered that the value of the bat assemblage in Northfleet Landfill is of Neighbourhood Importance.

4.6 Springhead

4.6.1 All of the species of bat that have been recorded within the whole Site were recorded at Springhead. Passes by Natterer's and Daubenton's were also confirmed. A similar diversity of species was recorded during the static monitoring and the transect surveys: a minimum of seven species were recorded using each method, with Nathusius' pipistrelle only recorded using the static monitoring devices and long-eared bat only recorded on one transect survey in September. Overall six of the seven species identified by the static monitoring surveys were recorded at both SMPs: serotine was only recorded at SMP1 in the centre of the treeline. The transect surveys also showed that the majority of the species were recorded in all areas of the Springhead site, with the exception of serotine which was only recorded around the woodland edge. Long-eared bat was recorded on only one occasion at the northern tip of the woodland edge. However, this species echolocates far more quietly than other species, and therefore is often under-recorded when there are other bat calls and ambient noise also being recorded.

4.6.2 Overall, a slightly higher level of bat activity was recorded at SMP2 (near to the balancing pond) than SMP1. When the early September data are excluded in order to ensure the data are comparable for each location (due to the technical fault with SMP1), a total of 10,644 passes were recorded at SMP1 (48.66% of the total) compared with 11,231 at SMP2 (51.34% of the total). Higher levels of activity did not occur at SMP2 during every month: in July and late September/October there were more bat passes at SMP1. As the two static monitoring points are both located on the woodland edge in the east of the survey area, it is considered that the detectors recorded similar foraging and commuting activity possibly by some of the same bats. They were set in these locations due to the assessment of the habitat value

within the Springhead site. Locating a static point along the western side of the woodland was considered but it was decided that there was a high risk of the detector being disturbed by the public in this area; the detectors were therefore both located on the eastern treeline. Lower levels of bat activity were recorded in the western and southern areas of the survey area by the surveyors on transect route 1, with the majority of the bats recorded in the eastern part of the route adjacent to the woodland. It can be seen from the transect surveys that this woodland edge habitat in the east of the survey area is by far the most important feature for bat foraging.

4.6.3 The dominant species recorded during all of the transect surveys was common pipistrelle bat: out of a total of 1,059 passes, 952 were by this species (89.9%). Similarly during the static monitoring sessions the dominant species was also common pipistrelle bat, contributing 94.88% of the total passes. Unlike the transect surveys, the second most dominant species recorded by the static devices was soprano pipistrelle bat, contributing 2.63% of the total passes. The soprano pipistrelle is more strongly associated with wetland habitats (Vaughan, Jones and Harris, 1997). More recent research suggests that the soprano pipistrelle selects roosts with a significant proportion of surrounding habitats being wetland within 2km of the roost, and spends a high percentage of foraging time over static or slow moving water adjacent to mature trees up to 2.3km from its roost (Davidson-Watts, 2006). The majority of the passes by soprano pipistrelle bats were recorded at SMP2: 578 were recorded here compared to 32 at SMP1. It is considered that this is due to the location of SMP2 being near to the balancing pond and the Ebbsfleet.

4.6.4 The second most dominant species during the transect surveys was noctule bat, which constituted 5.1% of the total passes. A lower proportion of bat passes recorded during the static monitoring surveys were by bats from the *Nyctalus* genus, with 2.1% of passes attributable to this genus. The number of passes by *Nyctalus* species generally increased throughout the months, peaking with 474 passes in late September/early October compared to just five passes in April. This was not the case for the transect surveys, during which numbers of bats from the *Nyctalus* genus peaked in July and were much lower in August and September.

4.6.5 The species richness varied throughout the months surveyed: five species were recorded in May and July, six in April and August, seven in June and eight in September/October. Serotine, Nathusius' pipistrelle and long-eared bat were not recorded in every month: serotine was not recorded in April or May, Nathusius' pipistrelle in July or August, and long-eared bat was only recorded once in September.

4.6.6 The static monitoring surveys showed the highest level of activity during September/October: 7,548 passes were recorded during this session, representing 32.53% of the total activity. A high level of

activity was also recorded in April, with 6,089 passes during this month. The months with the lowest levels of activity recorded by the static devices were July and August: 1,861 and 1,315 passes were recorded respectively. This is in contrast to the results of the transect surveys: in August the greatest numbers of bat passes were recorded throughout the survey area.

4.6.7 The emergence surveys of trees confirmed one tree roost of a singleton soprano pipistrelle bat and a further three as possible common pipistrelle roosts. There were further early passes during all of the activity surveys. These included a pass by a common pipistrelle bat 27 minutes after sunset in June within the northern part of the woodland. With the mean emergence time for this species being 25 minutes after sunset the time of this pass suggests that this bat was using a roost nearby in the woodland. During the surveys in July, August and September the first passes were by noctule bats, the earliest of which were recorded six minutes after sunset in August and September. With a median emergence time of five minutes after sunset (Altringham, 2003), this suggests that it is likely to be roosting very close by. Noctule bats roost almost exclusively in tree holes (Altringham, 2003), suggesting that a roost may be present within the woodland or in nearby woodland. There were also early passes recorded during all of the static monitoring sessions, the earliest of which were noctule bats recorded three minutes after sunset on both the 17th of September and 4th of October at SMP2. Again, this suggests a noctule roost is located either within the woodland, or close by.

4.6.8 The bat pass closest to sunrise was a noctule recorded 18 minutes before sunrise on the 26th July. There were bat passes close to sunrise during all of the months surveyed, indicating that bats forage around the woodland edge throughout the whole night.

4.6.9 The habitat quality at Springhead is considered to be 'Moderate' (Collins, 2016). The woodland in the eastern part of the survey area, as well as the Ebbsfleet and balancing pond, provide good quality foraging habitat, but this is not continuous or well connected to other areas of high quality habitat in the wider landscape. The majority of the centre of the Springhead contains moderate quality habitat in the form of scrub and grassland. When comparing the total number of bat passes recorded during the static monitoring at Springhead with other sites in the local area, the general bat activity is of a relatively high level. Over 23,000 bat passes were recorded overall by the two static detectors, compared with 1,429 at nearby Northfleet Landfill and 3,075 at Bamber Pit to the north. The transect surveys also showed that there is a high level of bat activity here compared with other survey areas in the local area. High levels of foraging activity by common and soprano pipistrelle bats were recorded along the woodland edge, and Daubenton's bats were observed foraging beneath the bridge over the Ebbsfleet stream. Daubenton's bats' preferred foraging habitat is over water (Altringham, 2003); the stream and balancing pond in the north-east of Springhead provide good feeding opportunities for this species, as well as Natterer's bat,

soprano and Nathusius' pipistrelle which were also recorded during the surveys. Given the level of activity and the number of species recorded, it is considered that the value of the bat assemblage at Springhead is of **Local Importance**. Springhead had the highest level of bat activity of any of the survey areas.

4.7 Tunnels

Evaluation – Swarming activity surveys

4.7.1 'Autumn swarming' occurs when bats fly in and out of a cave entrance (or similar) for a variety of reasons which are not yet fully understood. For example, the sites may be meeting places for display and mating, or swarming may allow the exploration of winter roosts (Dietz, von Helversen and Nill). As tunnel 007 is a semi-enclosed space and has some potential as a swarming site, static monitoring surveys were undertaken from late September to early October 2015.

4.7.2 The static monitoring survey of tunnel 007 showed that no bat swarming activity occurred in late September/early October 2015. The peak number of bat passes recorded on a single night was just six at each static monitoring location. There were several social calls recorded; this is to be expected in late summer and autumn, and may be those of song flighting males (Altringham, 2003) searching for a mate in the area.

4.7.3 The data show that a greater diversity of species flew past or near to SMP2 (the south-western end of tunnel 007) than SMP1. This may be because SMP2 is located close to the end of the tunnel which adjoins a small area of woodland to the south-west. The habitat which adjoins this end of the tunnel is of higher quality than the habitat near to SMP1 in the quarry. The bat species which were foraging within the woodland may therefore have been recorded by the static monitoring device at this end of the tunnel.

4.7.4 The data logger surveys of tunnels 006, 018 and 014A showed that no swarming activity occurred during the period surveyed. In tunnel 007 there was a peak in activity in early September 2015, although the activity levels never reached a high level (when comparing this data with data from known swarming sites). It is not known whether the more frequent passes recorded in early September were due to low numbers of swarming bats or whether they were attributable to foraging bats triggering the data logger. At other known swarming sites high levels of sustained activity have been seen for over four hours late at night, which has not been the case in tunnel 007. If these were swarming bats in September, it is not considered that the swarming activity was sustained as the activity levels were much lower again by October.

Evaluation - Hibernation potential survey

4.7.5 Bats typically require a humid environment with a cool internal ambient temperature for hibernation. The preferred hibernation roost temperatures for most bat species is between 2°C – 10°C (Altringham 2003) with humidity levels in the region of 90% humidity (JNCC, 2004).

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

5.0 CONCLUSIONS

5.1 Bat surveys were undertaken in 2015 of five areas: the Swanscombe Peninsula, Craylands La. Pit, Bamber Pit, Northfleet Landfill and Springhead. The surveys included an assessment of buildings, trees and tunnels, as well as activity surveys and static bat detector surveys.

5.2 A total of nine species have been recorded within the whole Site. Unidentified *Myotis* bats were recorded in all areas but at Springhead two species were confirmed: Natterer's and Daubenton's bats. A tree roost has been identified in the Springhead survey area and two further likely tree roosts were also determined.

5.3 The results of the bat surveys revealed a bat assemblage in the Peninsula, Craylands La. Pit, Bamber Pit and Springhead of at least 'Local Importance', and within Northfleet Landfill of 'Neighbourhood Importance'.

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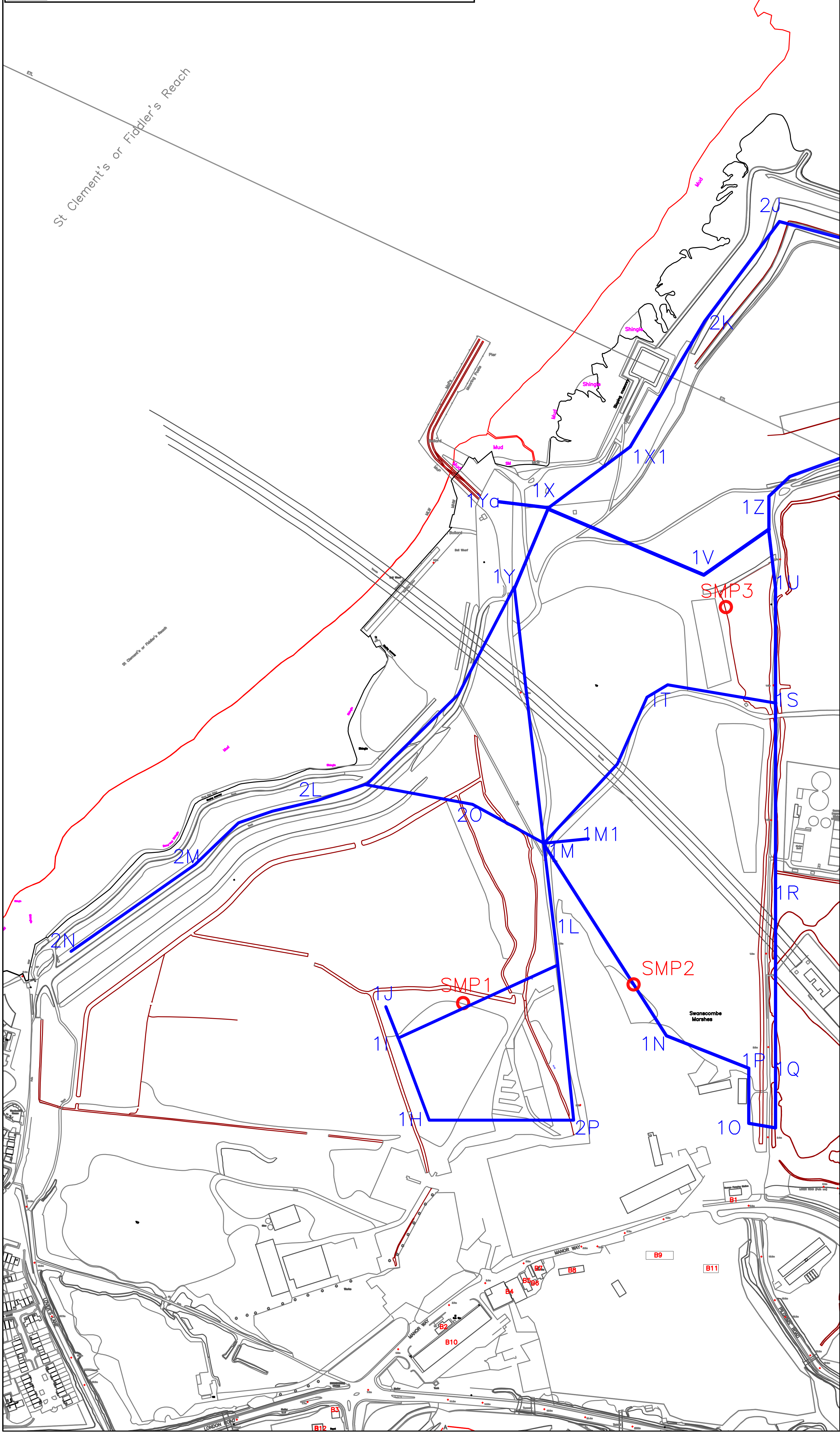
FIGURES

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

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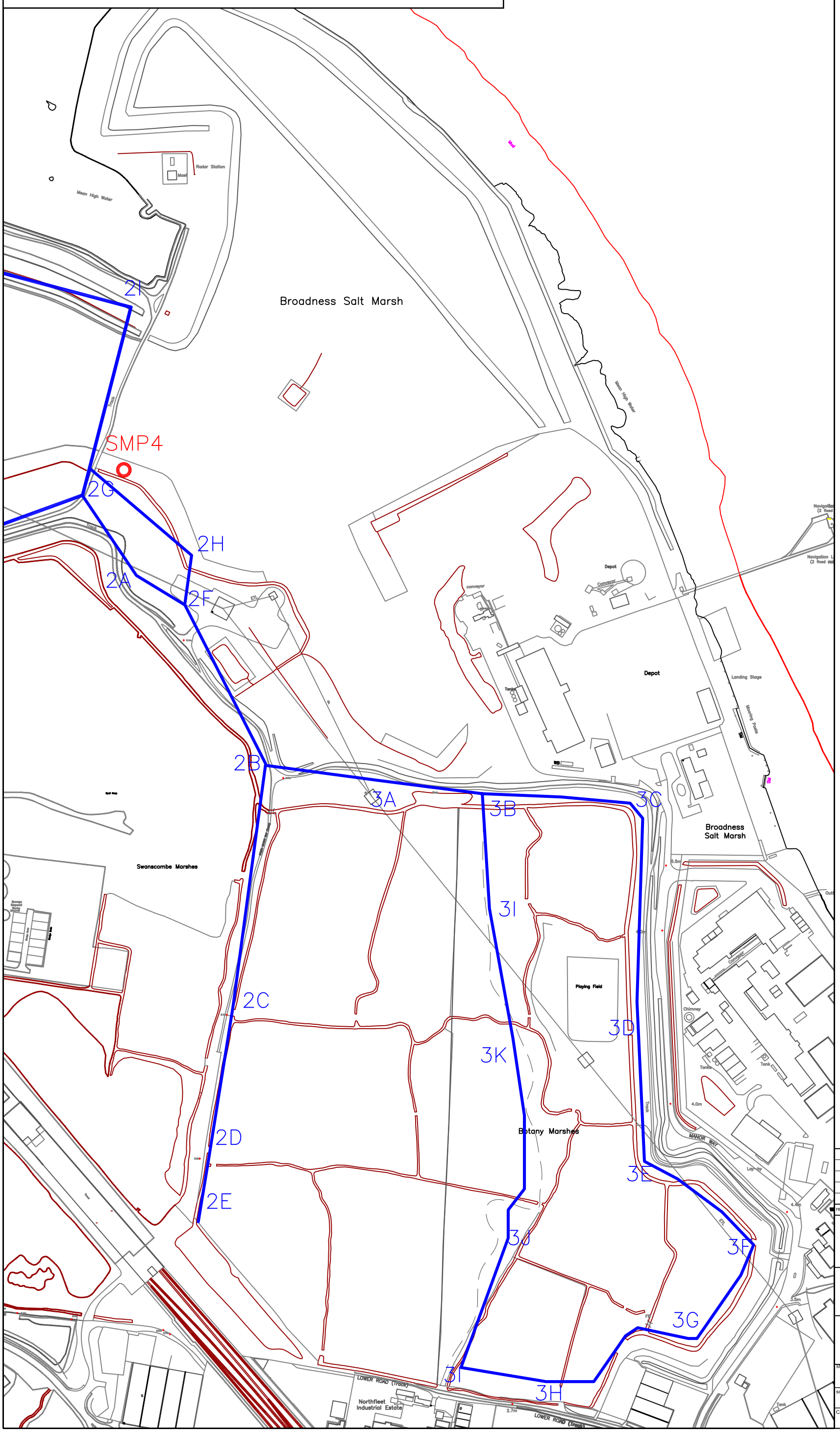
Project: London Paramount Entertainment Resort

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



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Title:
Peninsula - East Side

status		drawing no. Figure 1b		
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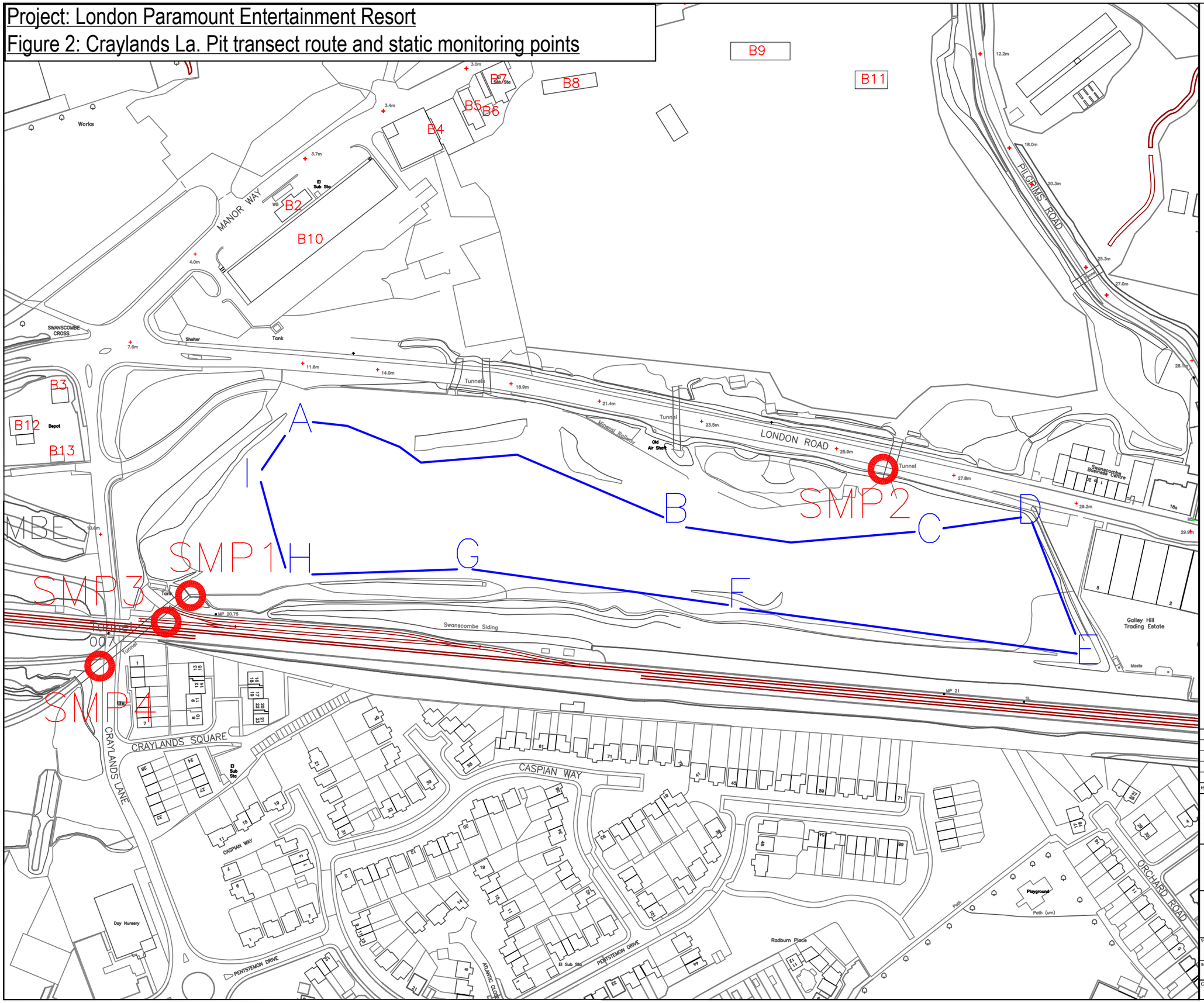
Figure 2: Craylands La. Pit transect route and static monitoring points



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Title:
Craylands Pit

status		drawing no. Figure 2		
scale	size	date	drawn	checked
NTS	A3	26-05-2016	AW	HL

CAD filename
Figure_1.dwg

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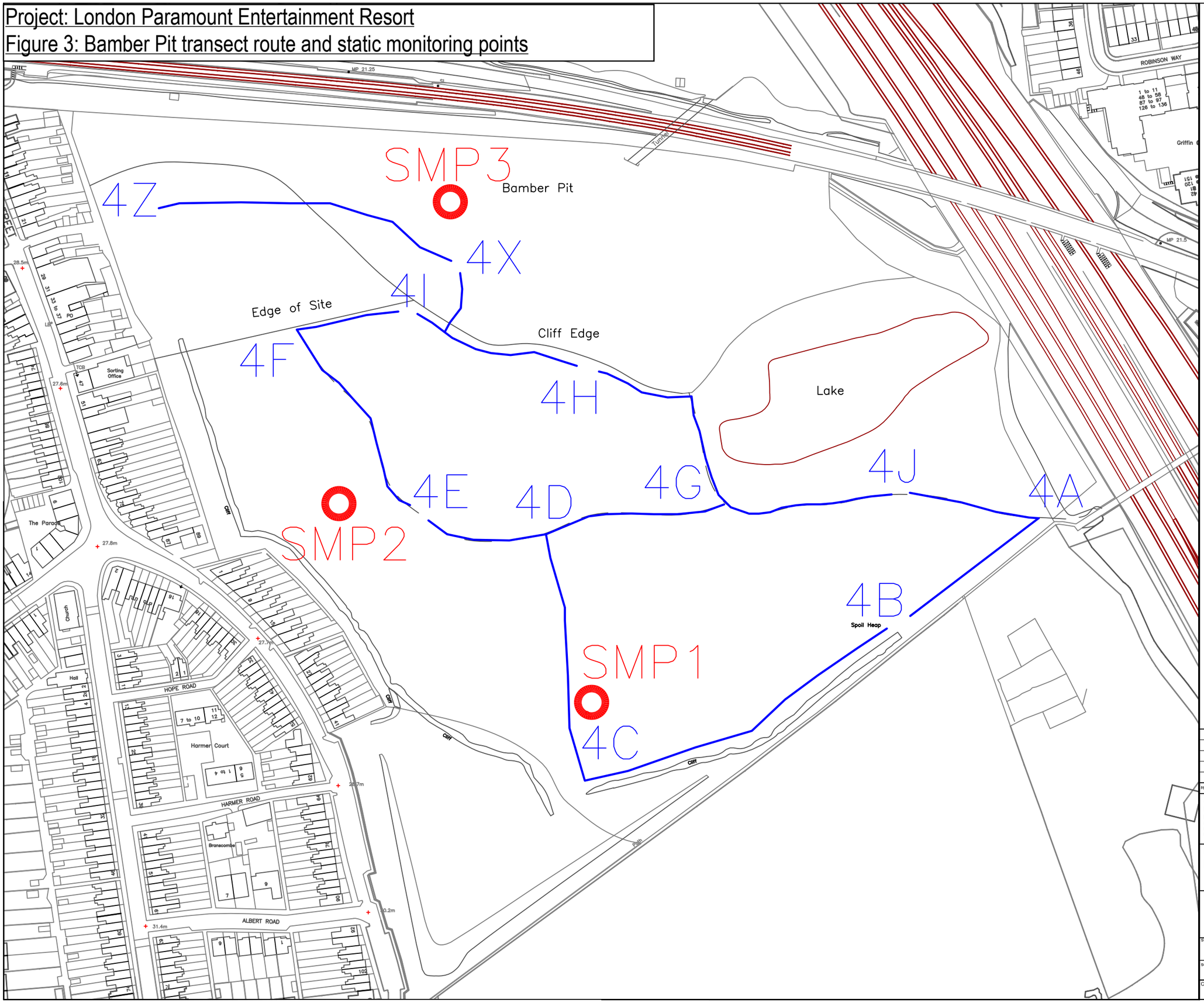
Figure 3: Bamber Pit transect route and static monitoring points



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Project:
London Paramount

Title:
Bamber Pit - Transect and Static Plan

status	drawing no.			
	Figure 3			
scale	size	date	drawn	checked
NTS	**A3**	**26-05-2016**	**AW**	**HL**

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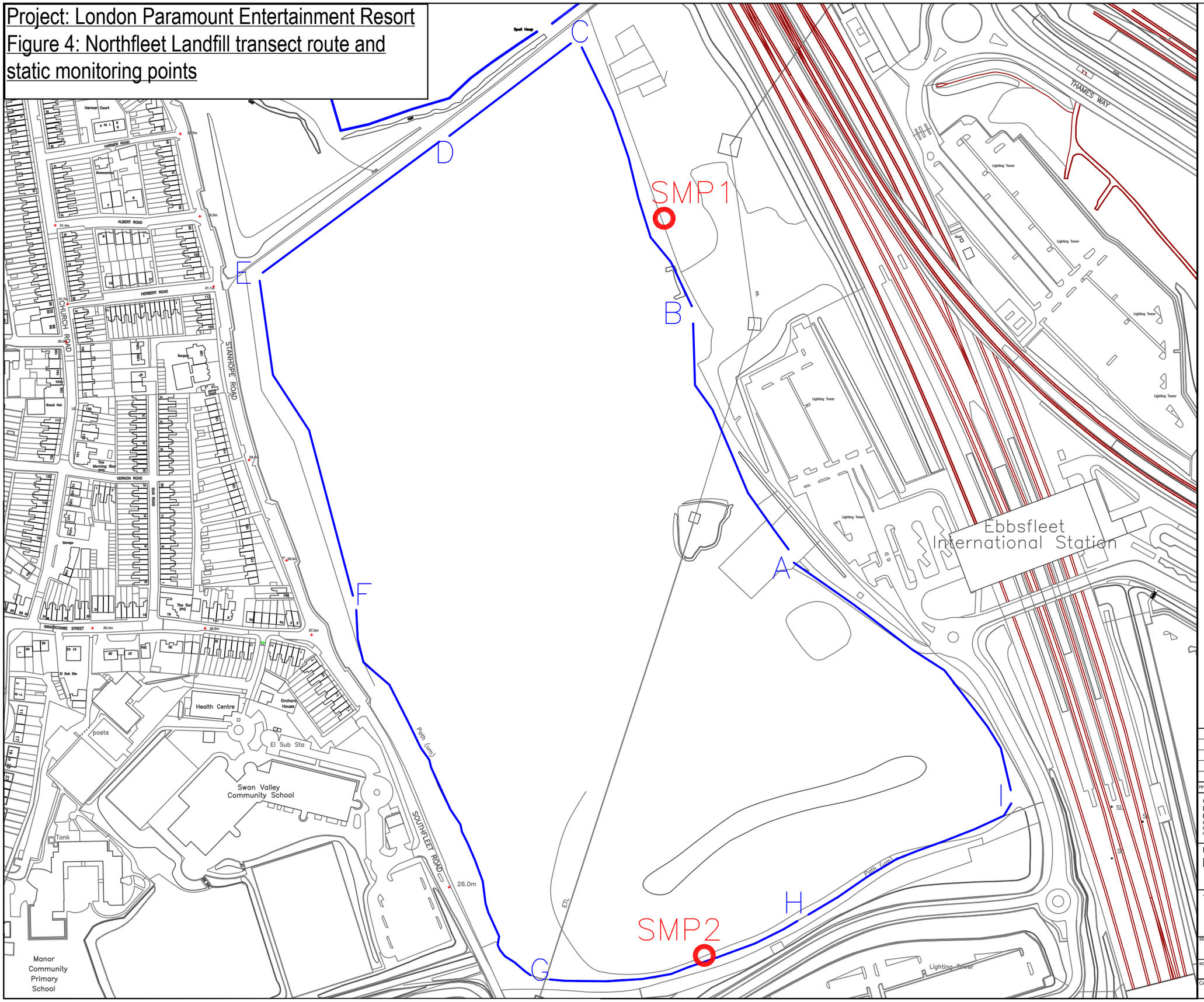
Project: London Paramount Entertainment Resort
Figure 4: Northfleet Landfill transect route and static monitoring points



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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**

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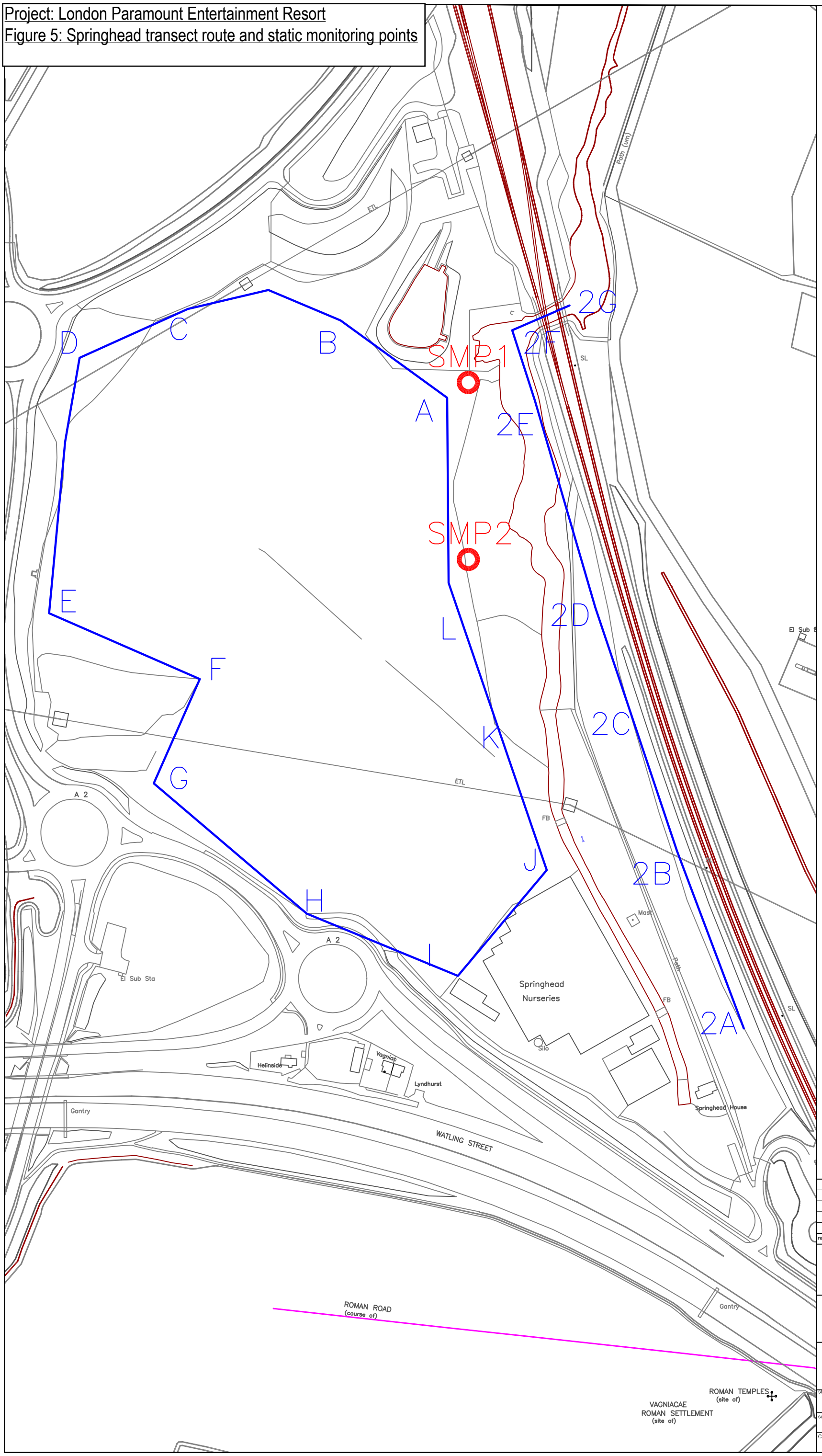
Figure 5: Springhead transect route and static monitoring points



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Project: London Paramount

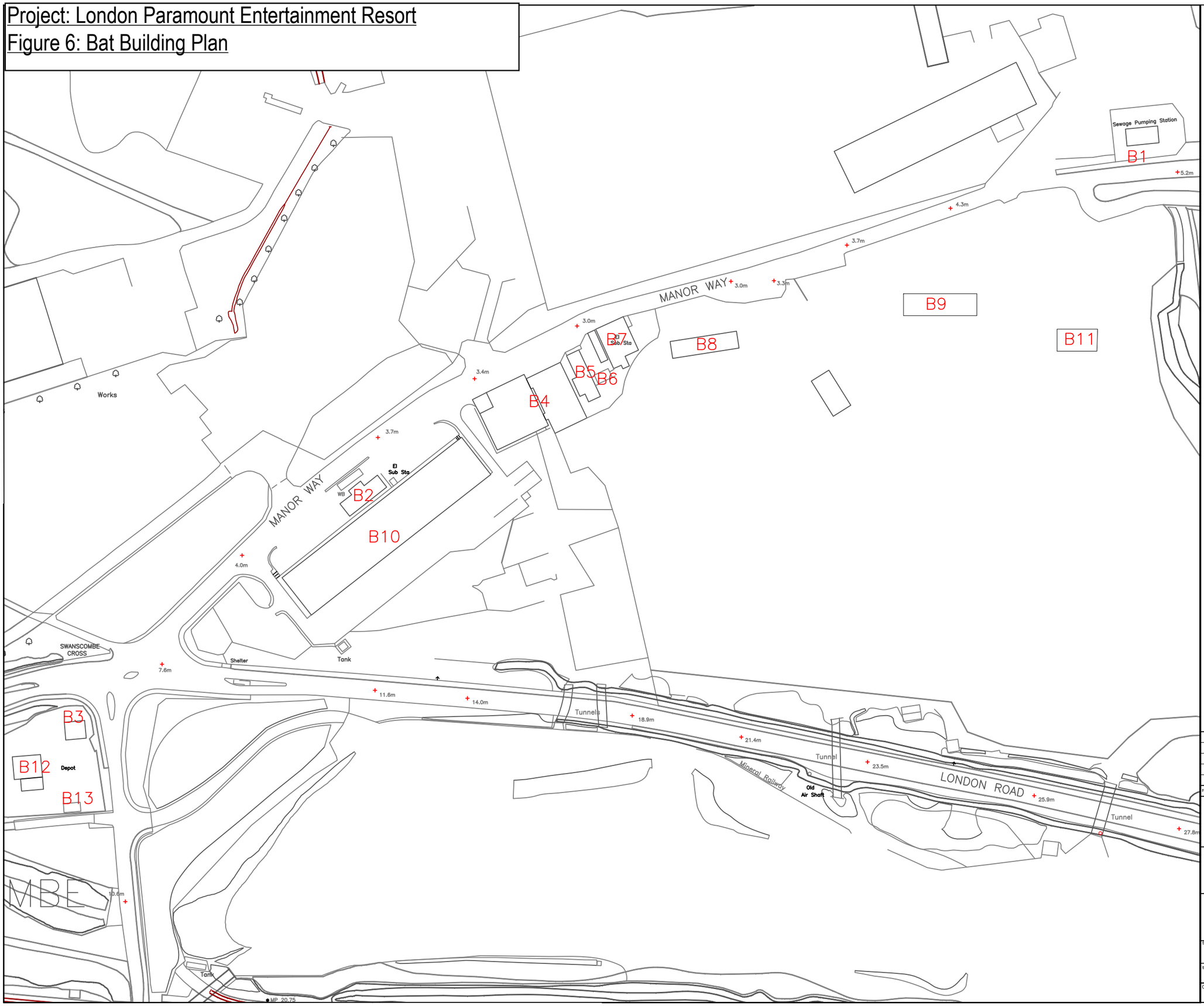
Title: Springhead

status		drawing no. Figure 5		
scale	size	date	drawn	checked
NTS	A3	26 -05-2016	AW	HL

CAD filename: Figure_1.dwg

Project: London Paramount Entertainment Resort

Figure 6: Bat Building Plan



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Project:
London Paramount

Title:
Building Plan

status		drawing no.			
		Figure 6			
scale	size	date	drawn	checked
NTS	**A3**	**26-05-2016**	**AW**	**HL**

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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:

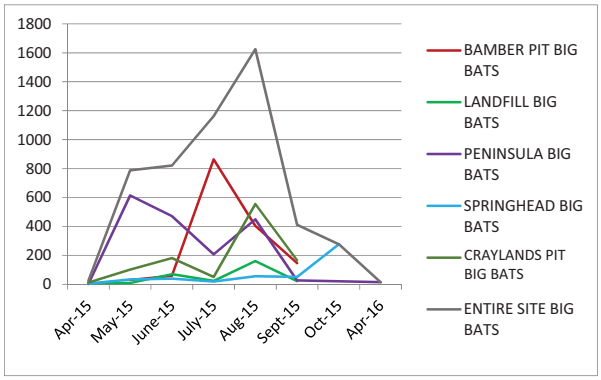
MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
April	0	2	3	0	5	2	5559	516	1	6078	6	0	6	6089	26.24%
May	0	3	26	4	33	2	2615	3	0	2620	0	0	0	2653	11.43%
June	2	11	20	6	39	1	2356	8	0	2365	5	0	5	2409	10.38%
July	1	0	15	3	19	0	1840	1	0	1841	1	0	1	1861	8.02%
August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

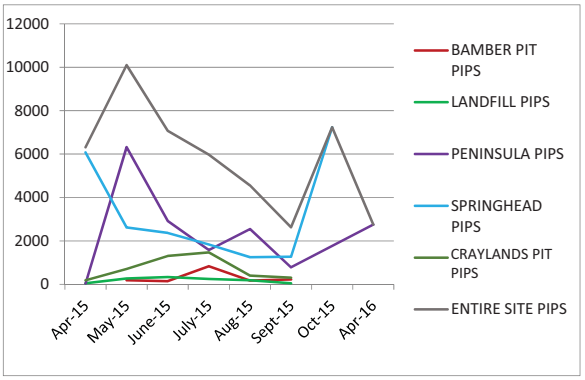
MONTH	E.ser	N.lei	N.noc	N.sp	BIG BATS	P.nath	P.pip	P.pyg	P.sp	PIPS	M.sp	Pl.aur	OTHERS	TOTALS	%
Apr-15	1	7	17	0	25	9	5783	517	2	6311	6	0	6	6342	12.20%
May-15	18	102	618	50	788	13	8679	1405	3	10100	15	0	15	10903	20.97%
June-15	6	218	544	53	821	2	6990	75	3	7070	34	0	34	7925	15.24%
July-15	7	112	631	413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

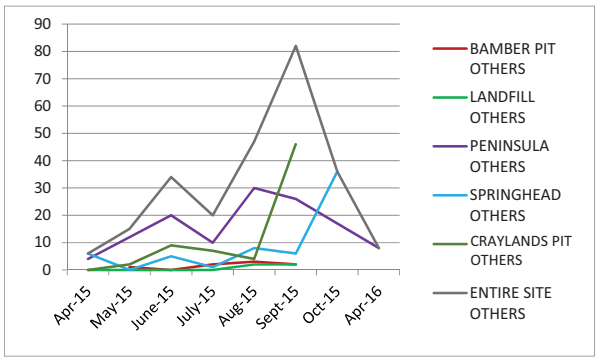
The total number of passes by 'big bats' (*Nyctalus* species and serotine)



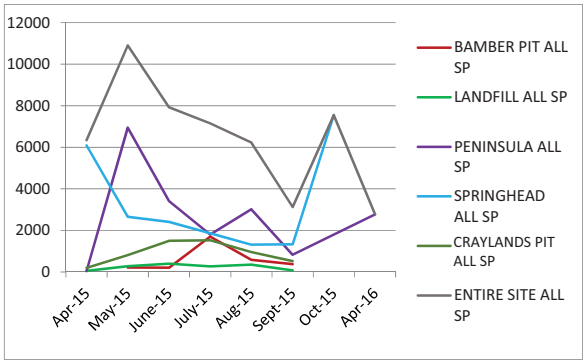
The total number of passes by *Pipistrellus* species



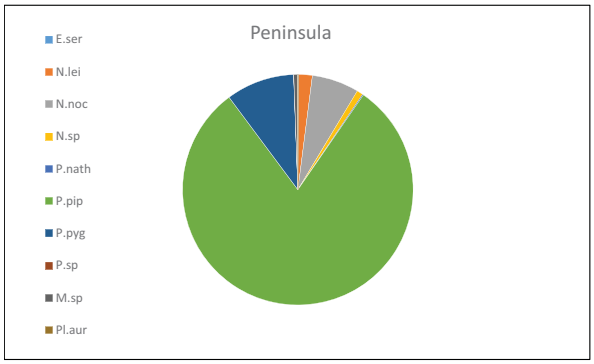
The total number of passes by 'other' species (long-eared bat and *Myotis* species)

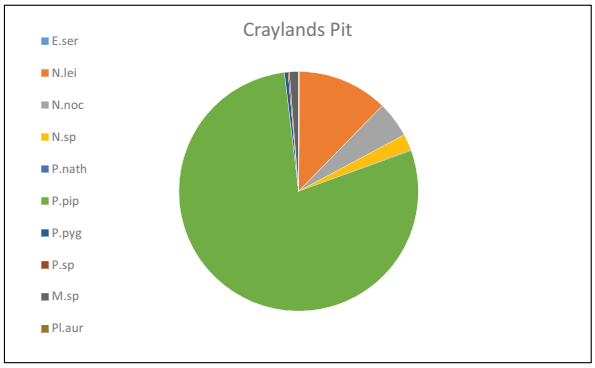


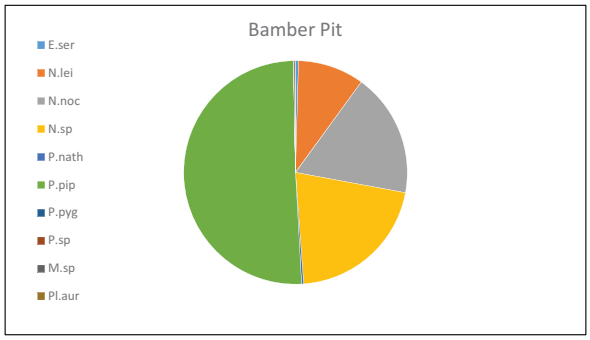
The total number of passes by all species

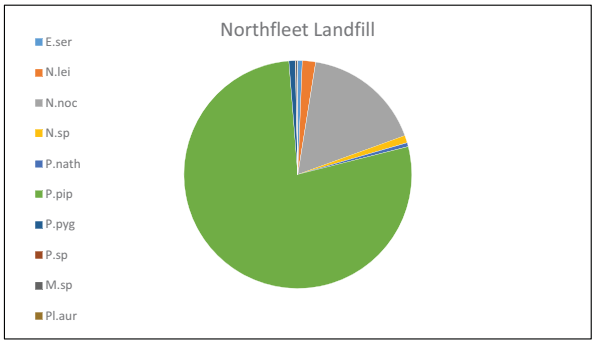


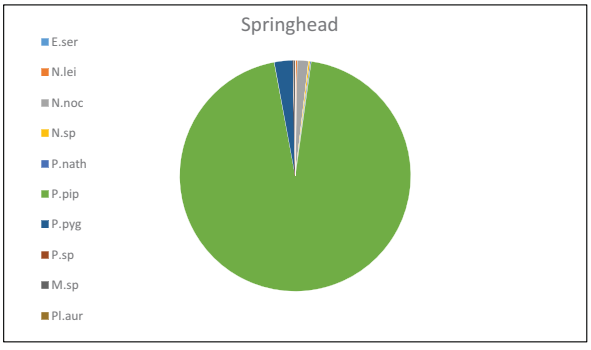
Appendix 3 - Pie charts showing the species assemblage for each survey area recorded during the static monitoring sessions

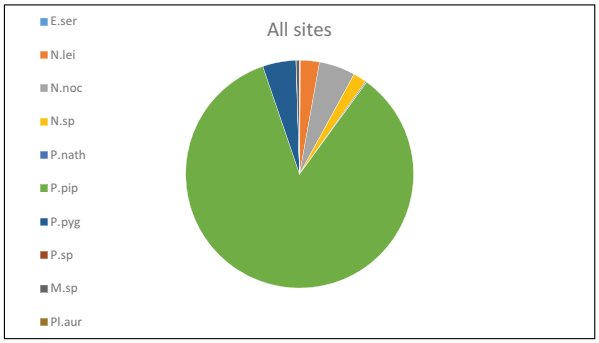












Appendix 4 - Transect summaries for the peninsula

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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English Nature. 2006. *The Dormouse Conservation Handbook: Second Edition.* English Nature Peterborough.

Harris S and Yalden (eds) 2008. *Mammals of the British Isles: Handbook 4th Edition.* The Mammal Society

Macdonald, D. W. and Tattersall, F. 2001. *Britain's Mammals the Challenge for Conservation.* Mammals Trust UK.

Waite, A 2000 The Red Data Book for Kent

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

CORYLUS ECOLOGY

Project:

London Paramount

Title:

Desk Study Plan

status		drawing no.		
		Figure 1		
scale	size	date	drawn	checked
NTS	A3	19-10-2016	AW	HL

CAD filename

Figure_1.dwg

Key

- Dormouse Record
- Dormouse Habitat
- Newly Planted Verges

revision	description	date	checked by

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Project:

London Paramount

Title:

Connectivity between Springhead and known Dormouse location

status		drawing no.		
		Figure 2		
scale	size	date	drawn	checked
NTS	**A3**	**19-02-2016**	**AW**	**HL**

CAD filename

Figure_1.dwg

Corylus Ecology

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VAT Reg No. 862 2486 14

Annex EDP 21
Confidential Badger Report

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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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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 Water Vole Survey Report

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.

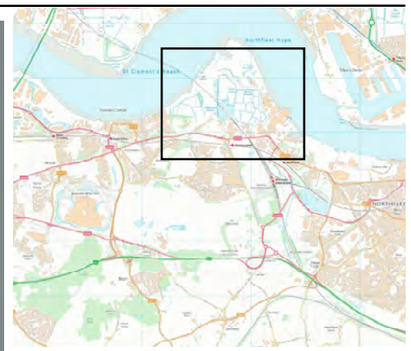
4.0 CONCLUSIONS

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
LONDON RESORT COMPANY HOLDINGS

FIGURE 1a
SURVEY AREAS - SWANSCOMBE PENINSULA

February 2016
11120201_Water Vole_11-02-16.indd

Ditches and Watercourses

Waterbodies/Ponds

0 150 300 Metres

N

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WATER VOLE SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
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FIGURE 1b
SURVEY AREAS - EBBSFLEET STREAM

February 2016
11120201_Water Vole_11-02-16.indd

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Annex EDP 23
2015 Harvest Mouse Survey Report (CBA February 2016)

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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 Harvest Mouse Survey Report

DRAFT

February 2016

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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 Harvest Mouse Survey Report

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

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 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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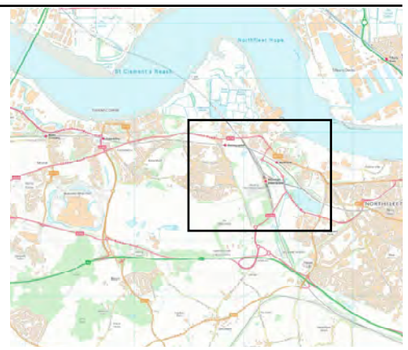
HARVEST MOUSE SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1a
SURVEY AREAS

February 2016
11120201_Harvest Mouse_11-02-16.indd



Survey Area

Transect Survey

Patch Survey

0 150 300 Metres

N

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HARVEST MOUSE SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1b
SURVEY AREAS

February 2016
11120201_Harvest Mouse_11-02-16.indd

Survey Area

Transect Survey

Patch Survey

0 150 300 Metres

N

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HARVEST MOUSE SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1c
SURVEY AREAS

February 2016
11120201_Harvest Mouse_11-02-16.indd

Nest Records:

- 1 nest
- 2 nests
- 3 nests

0 150 300 Metres

N

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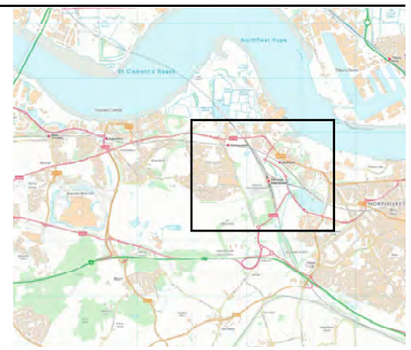
HARVEST MOUSE SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 2a
NEST RECORDS

February 2016
11120201_Harvest Mouse Nests_11-02-16.indd



Nest Records:

- 1 nest
- 2 nests
- 3 nests

0 150 300 Metres

N

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FIGURE 2b
NEST RECORDS

February 2016
11120201_Harvest Mouse Nests_11-02-16.indd

Nest Records:

- 1 nest
- 2 nests
- 3 nests

0 150 300 Metres

N

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HARVEST MOUSE SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
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FIGURE 2c
NEST RECORDS

February 2016
11120201_Harvest Mouse Nests_11-02-16.indd

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Annex EDP 24
2012 Amphibian Survey Report (CBA, 2012)

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cba

London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Amphibian Survey Report

November 2012

CHRIS BLANDFORD ASSOCIATES
landscape | environment | heritage

London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Amphibian Survey Report

Approved	[redacted]
	Bill Wadsworth
Position	Senior Associate (Ecology)
Date	30th November 2012
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 amphibian survey undertaken between April and June 2012.

1.2 Scope

1.2.1 The scope of the survey was to determine:

- habitat suitability assessments for all waterbodies within the proposed development area that have the potential to support amphibians; and
- the presence and status of amphibians using a series of ponds and ditches, with specific reference to great crested newts *Triturus cristatus* (a species considered fully protected by law).

Survey Limitations

1.2.2 Most of the waterbodies consisted of steep-sided, deep water, lagoons, ditches and drains, many of which contained significant deposits of silt. The waterbodies were too deep for surveyors to safely wade in and be able to set traps effectively and therefore for both health and safety and practical reasons, it was not possible to deploy bottle trapping as a survey technique.

1.2.3 Additionally, some waterbodies within 500m of the proposed development area were not surveyed due to access restrictions.

1.3 Key Findings

Great Crested Newts

1.3.1 The results of the amphibian survey suggest that great crested newts are not present in any of the surveyed water bodies on the Swanscombe peninsula north of the A226. No signs of this species were recorded during the survey in 2012 and the desk-top study revealed no historical records either. The HSI scores suggest that most of the water bodies on the peninsula are highly

suitable habitats so it may be that the A226 as a busy main road has proved to be an effective barrier preventing colonisation of this area.

1.3.2 Further survey work may be required to establish whether or not great crested newts are present elsewhere within the proposed development area, but for which access has not yet been possible. The lake in Bamber pit where great crested newts were recorded in 1985 scored just 0.41 on the HSI due to the high densities of fish. It may be that the fish were introduced to the lake since the record was made as it now seems highly unlikely great crested newts are found in this area.

Other Amphibian Species

1.3.3 The results of the survey suggest that a small population of smooth newts and an unknown population of marsh frogs are found on the Swanscombe peninsula, mainly concentrated around Swanscombe Marshes.

2.0 METHODOLOGY

2.1 Background

2.1.1 There are six native species of amphibian in the UK of which five, common frog *Rana temporaria*, common toad *Bufo bufo*, smooth newt *Lissotriton vulgaris*, palmate newt *Lissotriton helveticus*, and great crested newt could be expected to occur within the proposed development area. The sixth, natterjack toad *Bufo calamita*, is very restricted in its distribution and does not occur within or near to the proposed development area.

2.2 Great Crested Newt Ecology

2.2.1 The great crested newt is the largest of the three British native newt species, reaching a maximum length of 14.5cm for males and 16cm for females. Great crested newts spend much of the year on land where they need a variety of different conditions to provide food, shelter and places to spend the winter. Like all amphibians, great crested newts rely on water for breeding and for the development of the larval stage and so return to ponds in the spring to breed. Eggs are laid singly on underwater leaves near the water margin between late February and early August, but usually between April and June, with each female laying several hundred eggs. The efts normally take three months to develop into young newts before leaving the water, but some may over-winter as efts. Juvenile newts disperse up to 1km, only returning to ponds to breed when sexually mature after one to three years. Adult newts leave the ponds from July onwards, generally staying within 200 – 500m of the ponds. From October or November, they hibernate in damp, frost-free environments, sometimes underground.

2.2.2 On land, great crested newts are found in cool, moist conditions under debris or in dense vegetation. They feed on both land and in water, eating small aquatic animals such as water fleas and insect larvae and terrestrial invertebrates, especially worms.

2.2.3 Despite the decline of this species in recent years, the great crested newt is still quite widespread in Great Britain and is numerous locally in parts of lowland England. Studies in the 1980's indicated a national rate of colony loss of approximately 2% over five years. The decline can be put down to loss of suitable breeding ponds caused by water table reduction, in-filling for development, changing farming practices, waste disposal, neglect or fish stocking and the degradation, loss and fragmentation of terrestrial habitats. The British population remains, however, among the largest in Europe and Britain therefore has an international responsibility for the species.

2.3 Legislation

2.3.1 All British amphibian species receive legal conservation protection in the United Kingdom, though the degree to which different species are protected varies.

2.3.2 The Wildlife and Countryside Act 1981 (WCA) (as amended) transposes into UK law the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The 1981 Act was recently amended by the Countryside and Rights of Way (CRoW) Act 2000. The great crested newt is considered 'fully protected' as it is listed under Schedule 5 of the 1981 Act, and is therefore subject to the provisions of Section 9, which makes it an offence to:

- Intentionally kill, injure or take a great crested newt [Section 9(1)];
- Possess or control any live or dead specimen or anything derived from a great crested newt [Section 9(2)];
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt [Section 9(4)(a)];
- Intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for that purpose [Section 9(4)(b)];
- Sell, offer for sale, possess or transport for the purpose of sale or publish advertisements to buy or sell a great crested newt [section 9(5)].

2.3.3 The other more common amphibian species are protected against sale (Section 9(5)) only. In all cases, the legislation applies to all life stages including, eggs, efts (the larval stage), juveniles and adults.

2.3.4 The great crested newt is a UK Biodiversity Action Plan priority species and is considered sufficiently threatened in Europe to be included in the Habitats Directive and the Conservation of Habitats and Species Regulations 2010 (the 'Habitats Regulations'). The Habitats Regulations transpose into UK law Council Directive 92/43/EEC of the 21st May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats (and Species) Directive). The great crested newt is listed on Annex II and Annex IV (European protected species). Annex II relates to the designations of special areas of conservation (SACs) for this species (underlining their conservation significance even where they occur outside SACs). Annex IV requires member states to construct a system of protection as outlined in Article 12, this is done through inclusion on Schedule 2 of the Regulations. Regulation 39 makes it an offence to:

- Deliberately capture or kill a great crested newt [Regulation 39(1)(a)].
- Deliberately disturb a great crested newt [Regulation 39(1)(b)].
- Deliberately take or destroy the eggs of a great crested newt [regulation (1)(c].
- Damage or destroy a breeding site or resting place of a great crested newt [Regulation 39(1)(d)].

2.4 Scope of Survey

2.4.1 The requirement to undertake an amphibian survey results from the protected status of the great crested newt and its possible presence within the development area, identified during the desk-top study and Phase 1 habitat survey carried out in April-May 2012. The main body of the proposed development area (north of the A226) supports a large network of ditches and 8 lakes/ponds. In addition there are two large lakes in former quarries located south of the A226. The water bodies north of the A226 are linked by a mosaic of terrestrial habitats of varying quality for supporting amphibians, whilst the lakes south of the A226 appear to be isolated.

2.4.2 The results of the desk-top study, showing the locations of amphibian records in and around Swanscombe are displayed in **Figure 1.** Only species records provided by Kent and Medway Biological Records Centre (KMBRC) with an accurate grid reference of at least 6 figures (100m square) are displayed. This left just relatively few amphibian records in the Swanscombe area, with a distinct lack of records on the peninsula north of the A226.

2.4.3 The results of the Phase 1 habitat survey suggest that overall there is a large amount of suitable habitat for amphibians on the peninsula which is mainly comprised of rough grassland and scrub, and with small areas of broadleaved woodland. Most of this habitat is continuous and links to a number of ditches and ponds. South of the A226 the largest continuous blocks of suitable habitat are present in Bamber pit and surrounding locations in Ebbsfleet valley where areas of rough grassland, scrub and woodland are present.

2.5 Survey Methodology

2.5.1 Within the main body of the proposed development area (north of the A226) the following water bodies were surveyed for amphibians:

- the network of drainage ditches on Swanscombe Marshes (D2-D5, D7 & D9)
- the drainage ditches to the east and west of the Channel Tunnel Rail Link (HS1) and old sewage works (D10-D12)
- the pond situated north-west of the old sewage works (P3)
- the pond situated north-east of the old sewage works (P4)
- the ponds south of the HS1 (P5)

2.5.2 The remaining water bodies were deemed unsuitable for great crested newts (mainly due to being choked with reed), too dangerous to access or permission had not been given to access the land on which they are situated. The locations of all the water bodies surveyed are set out in **Figure 2** and descriptions of each are provided below.

2.5.3 Surveys were conducted on 4 separate occasions from 30th April to 15th June 2012 between the hours of 20:30 and 23:30. Torchlight surveys and egg searches were the principal survey techniques used. Bottle trapping was not used as a technique due to the difficulty of accessing steep sided ditches, containing in excess of 1m depth water and deep deposits of silt. On each night of survey the water bodies were given a vegetation and turbidity score between 0 and 5. A vegetation score of 0 indicating a water body clear of vegetation and 5 completely choked. A turbidity score of 0 indicating a clear water body and 5 extremely murky.

2.5.4 The surveys were carried out in suitable weather conditions, according to guidance provided by the Herpetofauna Groups of Britain and Ireland (HGBI)[1] and Froglife[2]. Torching was undertaken shortly after dusk on still, warm evenings above 5ºC with the aid of a 1 million candle power torch. Full details of the weather conditions during the surveys are given in **Table 2.**

2.5.5 The surveys were specifically aimed at detecting great crested newts in their various life stages, but also included surveys for other amphibians and incidental fish records, particularly as fish can have a determining influence on the presence of great crested newts.

2.5.6 Smooth and palmate newts can be difficult to distinguish in the field using torchlight searches so where the species was uncertain the record was made as smooth/palmate newt.

2.6 Evaluation Methodology

2.6.1 In order to assess the importance of the ponds in relation to their amphibian assemblages the population size class assessment set out in Section 5.8.3 of the English Nature guidelines[3] was used. The purpose for using this assessment is to recognise the inherent difficulty and range of factors that can affect the determination of the size of a given population. As EN's guidelines state "… surveys may reveal from around 2% to 30% of the population … recent evidence has revealed even greater variation". EN therefore recommends the use of the following size classifications as a minimum for interpreting survey results. The size classifications are set out in **Table 1** below.

Table 1 Great Crested Newt Population Size Class Assessment

Species	Low/Small Population	Good/Medium Population	Exceptional/Large
Great crested newt	<10	11-100	>100

[1] HGBI (1998) *Evaluating Local Mitigation/Translocation Programmes: Maintaining Best Practice and Lawful Standards.* HGBI Advisory Notes (ARGs). HGBI, c/o Froglife, Halesworth, Unpubl.
[2] Froglife (2003) *Advice Sheet 11 – Surveying for (Great Crested) Newt Conservation.* Froglife, Halesworth.
[3] English Nature (2001) *Great Crested Newt Mitigation Guidelines.*

2.6.2 The results of the surveys can be further supported using data relating to the quality of the pond and surrounding terrestrial habitat. This is known as the Habitat Suitability Index (HSI), or Oldham Criteria, after the paper's author (Oldham *et al*, 2000[4]). This methodology enables the ponds to be evaluated for their suitability for great crested newts, against a set of defined criteria. The calculation produces a figure in the range 0 – 1, where the closer the figure tends towards 1, the better the quality of habitat.

[4] Oldham, R. S., Keeble, J., Swan, M. J. S. and Jefcote, M. (2000). *Evaluating the suitability of habitat for the great crested newt (Triturus cristatus)*. Herpetological Journal **10** pp143-155.

3.0 RESULTS

3.1 Water Body Descriptions

Ditch Descriptions

3.1.1 The ditches surveyed have been labelled D (Ditch) 1 to D16 respectively and are shown in **Figure 2**.

3.1.2 **D1:** This is a short section of ditch in the south-west corner of the survey area. It has approximately 100m long and 5m wide with very steep sides and shallow water that drains into a culvert. It is mainly shaded by scrub and has hard standing on the banks.

3.1.3 **D2:** This ditch is sandwiched between the edge of Swanscombe Marshes and an area of rough grassland with scattered scrub. The ditch itself is approximately 200m long and 5m wide with open water in the channel to a depth of 0.5m. The west margin is fringed by common reed and to the east there is bracken *Pteridium aquilinum* and bramble *Rubus fruticosus* scrub.

3.1.4 **D3:** This ditch runs along the northern boundary of some broadleaved woodland in the south-west corner of the survey area. It is approximately 500m long, 6m wide and 0.5m deep. The southern margin is overhung by trees leaving the water quite shaded and the eastern boundary is heavily scrubbed with bramble along much of its length. To the north of the ditch is Swanscombe Marshes.

3.1.5 **D4-D7:** These ditches dividing Swanscombe Marshes are all quite similar in character. Typically they are 6m wide with common reed *Phragmites australis* dominating the bank and channel vegetation. There is little other vegetation besides the occasional patches of reedmace *Typha latifolia*. Water depth in the channels is variable but in most there are quite large areas of open water. The approximate lengths of the ditches are as follows:

- D4 – 650m
- D5 – 300m
- D6 – 200m
- D7 – 150m

3.1.6 **D8-D9:** These ditches are situated at the east of Swanscombe Marshes and are mostly inaccessible as they are surrounded by dense scrub. D8 is approximately 250m long and D9 500m. Both look to be approximately 6m wide with open water up to 1m deep.

3.1.7 **D10:** This ditch runs along the eastern boundary of a landfill and is bordered on the west by dense hawthorn *Crataegus monogyna* and willow *Salix spp.* scrub that grades into a narrow woodland belt. On the eastern boundary there is a fringe of common reed and some emergent reedmace. It is steep-sided, approximately 500m long, 5m wide and with standing water in the channel at variable depth. Moving south to north the water drops from around 0.5m to a negligible depth where vegetation chokes the channel. Numerous fish were observed in the ditch, possibly sticklebacks.

3.1.8 **D11:** This ditch runs opposite to D10 bordering P5, the old sewage works and another landfill. It is approximately 750m long and 5m wide with varying water depth along its length. In three locations it opens up into small pools of water approximately 0.5m deep but along most of its length the channel is quite heavily vegetated with common reed and reedmace and there are no areas of open water. In the pools numerous fish were observed, again possibly sticklebacks. At the north end there is a section of ditch that looks to have recently been dredged, allowing shallow water to flow into a culvert.

3.1.9 **D12:** This ditch runs along the northern margin of a landfill and to the east of a large area of swamp. It is approximately 900m long, 5m wide and has very shallow (5cm) or no standing water along much of its length. The channel has become totally choked with common reed and it looks soon to dry up completely.

3.1.10 **D13:** This is a French drain that runs along the southern boundary of a planted shelterbelt and then appears to feed P4. It is approximately 1000m long, 2m wide and up to 1m deep. For much of its length a gravel bottom can be seen.

3.1.11 **D14:** This is a dry ditch bordering the southern margin of a large area of ephemeral/short perennial vegetation central to the survey area. It is approximately 200m long, 1m wide and 0.5m deep. It does not appear to ever collect water.

3.1.12 **D15:** This ditch is a part of the River Ebbsfleet that opens up next to the A226 at the southern end of the survey area. It is approximately 150m long, 5m wide and has standing water around 0.5m deep. The ditch is mainly surrounded by dense scrub and an area of swamp to the east and the main road borders the western side. In terms of the wider landscape the ditch is in a highly fragmented habitat with a large lake (P9), main roads and urban development all in close proximity.

3.1.13 **D16:** This ditch runs parallel to D16 and is very similar in character. It is approximately 400m long, 3m wide and up to 1m deep. There is little or no standing water along much of its length, the channel is choked with common reed and it looks soon to dry up completely. In terms of

the wider landscape this ditch borders the western margin of Botany Marshes, a large area of cattle-grazed grassland.

Lake/Pond Descriptions

3.1.14 The lakes and ponds surveyed have been labelled P (Pond) 1 to P10 respectively and are shown in **Figure 2**.

3.1.15 **P1:** This lake is situated immediately north of the A226 in the south-west corner of the survey area that has developed in an old quarry. It is approximately 9500m^2 in size with a perimeter of around 450m and unknown depth. It is surrounded by very steep sides covered by woodland and dense willow scrub and was deemed inaccessible and dangerous to survey. There is little apparent aquatic vegetation except for the occasional clumps of hard rush *Juncus inflexus*. Waterfowl were observed using this lake during the Phase 1 habitat surveys carried out by CBA. In terms of the wider landscape the lake is bordered by rough grassland and woodland to the north and east, a main road to the south and urban development to the west.

3.1.16 **P2:** This pond is situated at the bottom of a very steep sided valley in the north-west corner of the survey area. It is too dangerous to access but appears to be approximately 700m^2 in size with a perimeter of around 100m. Woodland and scrub line the banks and there is a lot of rubbish strewn down the sides and in the water at the bottom. Much of the pond looked to be shaded by the trees. In terms of the wider landscape there are large areas of woodland, rough grassland and scrub to the east and urban development to the west.

3.1.17 **P3:** This lake is situated between two former landfills at the north end of the survey area. It is roughly rectangular in shape, 7500m^2 in size and has a 425m perimeter. Most of this perimeter is fringed by common reed and there is a strip of broadleaved woodland on the western banks. There is little to no aquatic vegetation visible and the water was discoloured red/brown, possibly contaminated by landfill leachate. Waterfowl have been observed using this water body. In terms of the wider landscape it is surrounded by extensive areas of rough grassland, scrub, ditches and woodland.

3.1.18 **P4:** This pond is situated to the north-west of Botany Marshes and looks like it was recently created or modified. It is quite uniformly rectangular, approximately 900m^2 in size with a 125m perimeter. The banks are steep with bare soil and the water quality looks very poor. It is red/brown in colour, possibly contaminated with landfill leachate and there is little/no aquatic vegetation or invertebrates to be seen. In terms of the wider landscape this pond is surrounded by extensive areas of rough grassland, scrub and ditches.

3.1.19 **P5:** This is a series of shallow ponds situated immediately south of the HS1. They are rapidly becoming vegetated over by common reed and reedmace and the open water remaining probably exceeds no more than 2000m^2 in extent. The average depth of water in the pools is no more than 0.1m. The ponds grade into marshy grassland to the south with hard rush, creeping bent *Agrostis stolonifera* and great willowherb *Epilobium hirsutum*. Waterfowl and small fish, possibly sticklebacks, have been observed using these water bodies. In terms of the wider landscape the ponds are surrounded by large areas of ephemeral/short perennial vegetation, scrub, ditches and rough grassland. The HS1 presents a potential barrier to the north.

3.1.20 **P6:** This lake is situated between the HS1 and old sewage works. It appears to be man-made and covers a large area approximately 14000m^2 in size with a 950m perimeter. The extent of open water looks to be much less than this as the lake is surrounded by a very large swamp and common reed is encroaching. Several species of waterfowl have been observed on the lake including tufted duck *Aythya fuligula* and mute swan *Cygnus olor*. In terms of the wider landscape this lake is mainly surrounded by swamp, the cattle-grazed fields of Botany Marshes are to the east and the HS1 is situated to the south.

3.1.21 **P7:** This pond is situated just north of the A226 within an industrial estate. It is roughly circular in shape, 7000m^2 in size and has a 300m perimeter. The surrounding banks looked to have been recently disturbed and were characterised by ruderal vegetation. Waterfowl were observed using this pond during the Phase 1 habitat survey. In terms of the wider landscape only the northern boundary of the pond features suitable terrestrial habitat for amphibians where large areas of rough grassland and scrub can be found.

3.1.22 **P8:** This lake is situated at the base of a large former quarry pit just south of the A226. It is approximately 5000m^2 in size with a 350m perimeter and unknown depth. The steep sides are covered with dense scrub and mature trees. Large fish, possibly carp, were observed in the water. The quarry within which the lake is situated is approximately 11ha and comprises a complex mosaic of short and tall grassland, scrub, and birch woodland.

3.1.23 **P9:** This very large lake fills the bottom of an old quarry pit east of the A226 in the south-east corner of the survey area. It is over 100,000m^2 in size with a perimeter of approximately 1500m. It is surrounded by very steep chalk escarpments with dense scrub and in terms of the wider landscape it is mostly enclosed by main roads, the HS1 and urban development.

3.1.24 **P10:** This is a small, shallow pool of water that extends from the ditches on Botany Marshes. It is no more than 750m^2 in size with a 150m perimeter and is heavily vegetated with reed. The water is likely to dry up during seasons with little rainfall. There is little to no aquatic

vegetation visible and the water was discoloured red/brown, possibly contaminated by landfill leachate. In terms of the wider landscape the pond is surrounded by large areas of rough grassland.

3.2 Survey Results

3.2.1 Weather conditions during the survey are summarised in **Table 2**. Every evening was dry and warm with a varying degree of cloud cover.

3.2.2 The full results of the survey are given in **Tables 3-6** and shown in **Figure 3**. Just two amphibian species were confirmed as being present on the Swanscombe Peninsula, smooth newt and marsh frog *Pelophylax ridibundus* a non-native species introduced to Kent in 1935. The marsh frog was not seen during the survey but its characteristic laughing calls were heard on the 17th and 25th May towards the north end of Swanscombe Marshes.

3.2.3 Smooth newts were recorded in D3, D4 and P5. 19 animals were recorded in total over the survey period with the peak count occurring on 17th May when 10 animals were recorded in D3 and 1 in D4.

3.2.4 In addition 6 adult newts and 2 efts only identifiable as smooth or palmate were recorded in D3, D4 and P5. Palmate and smooth newt larvae are indistinguishable in the field and adult females can only be distinguished by the degree of spotting on the throat, therefore need to be caught to be identified.

3.2.5 A tadpole was recorded in D4 on 30th April, likely to be that of the marsh frog as no other frog species was recorded during the survey. Fish were recorded in D4, D10, D11 and P5. These were mainly small, stickleback-like species.

3.2.6 A condition assessment of the water bodies is given in **Table 7.** The degree of vegetation cover and turbidity varied between water bodies and survey nights but most of the scores were low.

Table 2 Weather Conditions

Date	Cloud (%)	Rain	Start Time / Temperature (ºC)	End Time / Temperature (ºC)
30/04/12	50	0	20-45hrs / 15	23-40hrs / 14
17/05/12	70	0	20-55hrs / 18	23-50hrs / 17
25/05/12	100	0	21-10hrs / 15	23-40hrs / 15
15/06/12	80	0	21-20hrs / 14	23-30hrs / 13

Table 3 Survey Results – 30/04/12

Species	Ditch/Pond							
	D2	D4	D7	D10	D11	D12	P3	P4
Great crested newt	-	-	-	-	-	-	-	-
Smooth newt	-	1	-	-	-	-	-	-
Palmate newt	-	-	-	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-	-	-	-
Common frog	-	-	-	-	-	-	-	-
Common toad	-	-	-	-	-	-	-	-
Tadpole	-	1	-	-	-	-	-	-
Fish	-	-	-	Y	Y	-	-	-

Table 4 Survey Results – 17/05/12

Species	Ditch/Pond							
	D2	D3	D4	D7	D10	D11	P3	P5
Great crested newt	-	-	-	-	-	-	-	-
Smooth newt	-	10	1	-	-	-	-	-
Palmate newt	-	-	-	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-	-	-	1
Common frog	-	-	-	-	-	-	-	-
Common toad	-	-	-	-	-	-	-	-
Tadpole	-	-	-	-	-	-	-	-
Fish	-	-	-	-	Y	Y	-	Y

Table 5 Survey Results – 25/05/12

Species	Ditch/Pond				
	D3	D4	D10	D11	P5
Great crested newt	-	-	-	-	-
Smooth newt	-	-	-	-	1
Palmate newt	-	-	-	-	-
Smooth/palmate newt	4	1	-	-	-
Common frog	-	-	-	-	-
Common toad	-	-	-	-	-
Tadpole	-	-	-	-	-
Fish	-	-	Y	Y	Y

Table 6 Survey Results – 15/06/12

Species	Ditch/Pond				
	D3	D4	D5	D7	D9
Great crested newt	-	-	-	-	-
Smooth newt	6	-	-	-	-
Palmate newt	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-
Smooth/palmate newt eft	2	-	-	-	-
Common frog	-	-	-	-	-
Common toad	-	-	-	-	-
Tadpole	-	-	-	-	-
Fish	-	Y	-	-	-

Table 7 Water Body Condition Assessment

Water Body	Date	Turbidity Score	Vegetation Score
D2	30/04/12	0	1
	17/05/12	0	2
D3	17/05/12	1	1
	25/05/12	2	2
	15/06/12	0-1	1-2
D4	30/04/12	0	1
	17/05/12	1	2
	25/05/12	1	1
	15/06/12	0	1-2
D5	15/06/12	0	3
D7	30/04/12	0	1
	17/05/12	0	2
	15/06/12	0	2
D9	15/06/12	0	2
D10	30/04/12	3	1
	17/05/12	4	1
	25/05/12	4	2
D11	30/04/12	1-4	1-4
	17/05/12	1-4	1-4
	25/05/12	1-4	1-4
D12	30/04/12	1	3-4
P3	30/04/12	3	0
	17/05/12	3	1
P4	30/04/12	2	0
P5	17/05/12	0	1
	25/05/12	0-3	0-3

3.3 Habitat Suitability Index Scores

3.3.1 Habitat Suitability Index (HSI) scores were calculated for all the water bodies to aid evaluation of the ponds/ditches and their surrounding habitats for their suitability for great crested newts.

3.3.2 As shown in **Tables 8** and **9**, most of the water bodies on scored quite highly and the average score was 0.71 (a perfect great crested newt habitat would score 1). The reason for such high scores across the board is due to the large numbers of ditches and ponds within 1km of each other and large areas of suitable terrestrial habitat within a 500m radius.

3.3.3 Low scores were mainly influenced by poor water quality and high densities of fish, which meant that on average the ponds scored slightly lower than the ditches.

Table 8 HSI Scores for Ponds

Pond	1	2	3	4	5	6	7	8	9	10
Score	0.79	0.78	0.54	0.55	0.67	0.79	0.87	0.41	0.47	0.55

Table 9 HSI Scores for Ditches

Ditch	1	2	3	4	5	6	7	8	9	10	11	12	15	16
Score	0.81	0.86	0.86	0.74	0.85	0.86	0.87	0.79	0.79	0.81	0.55	0.57	0.77	0.58

FIGURES

KEY

Species

- Great crested newt
- Smooth newt
- Palmate newt
- Common toad
- Common frog

2000 Date of record

It should be noted that species locations are approximate - based on at least 6 figure grid references with an accuracy of 100m

0 200 400 m

N

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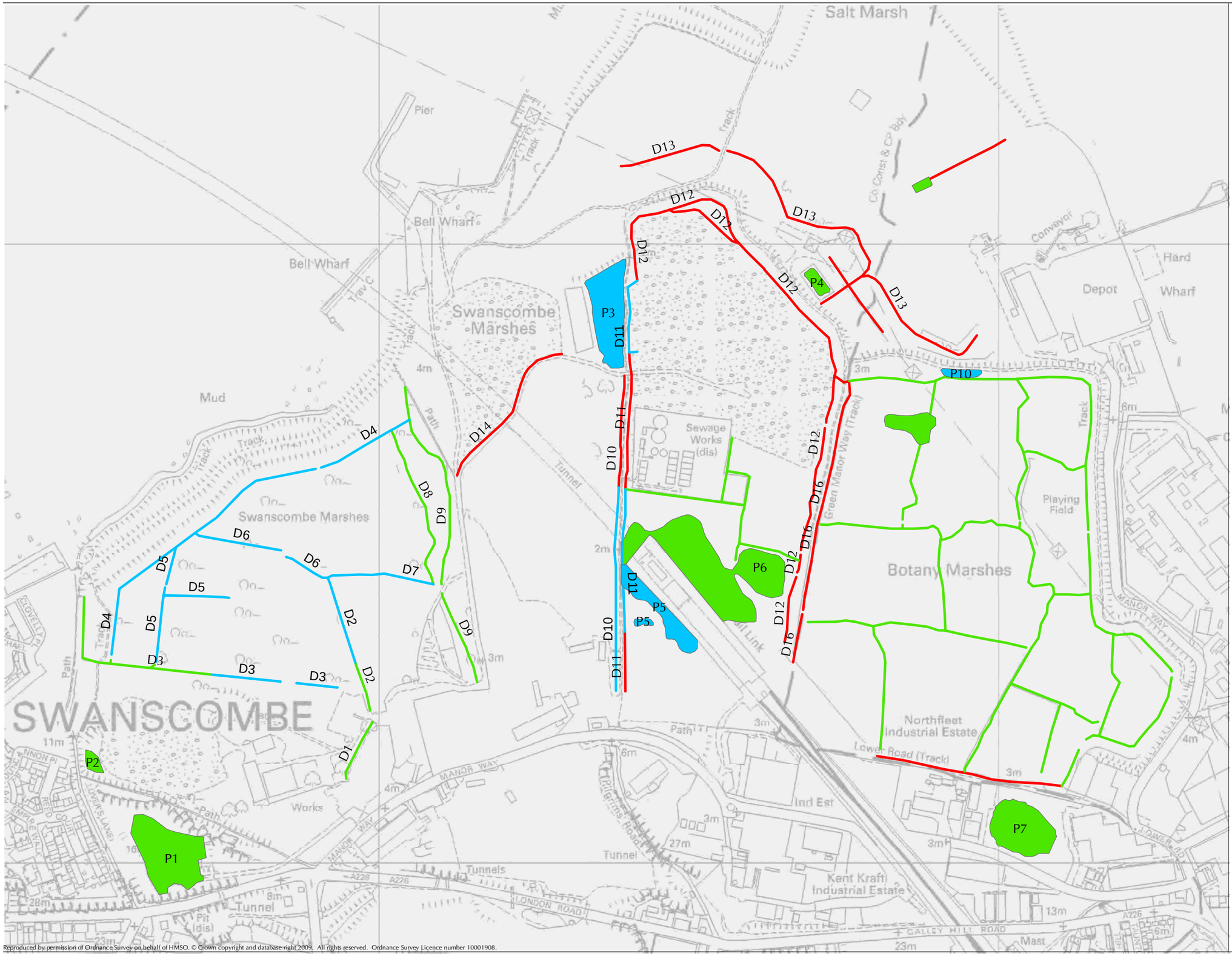
LONDON PARAMOUNT
Amphibian Survey Report

FIGURE 1
Amphibian Records
(based on desk-top study data provided by KMBRC)



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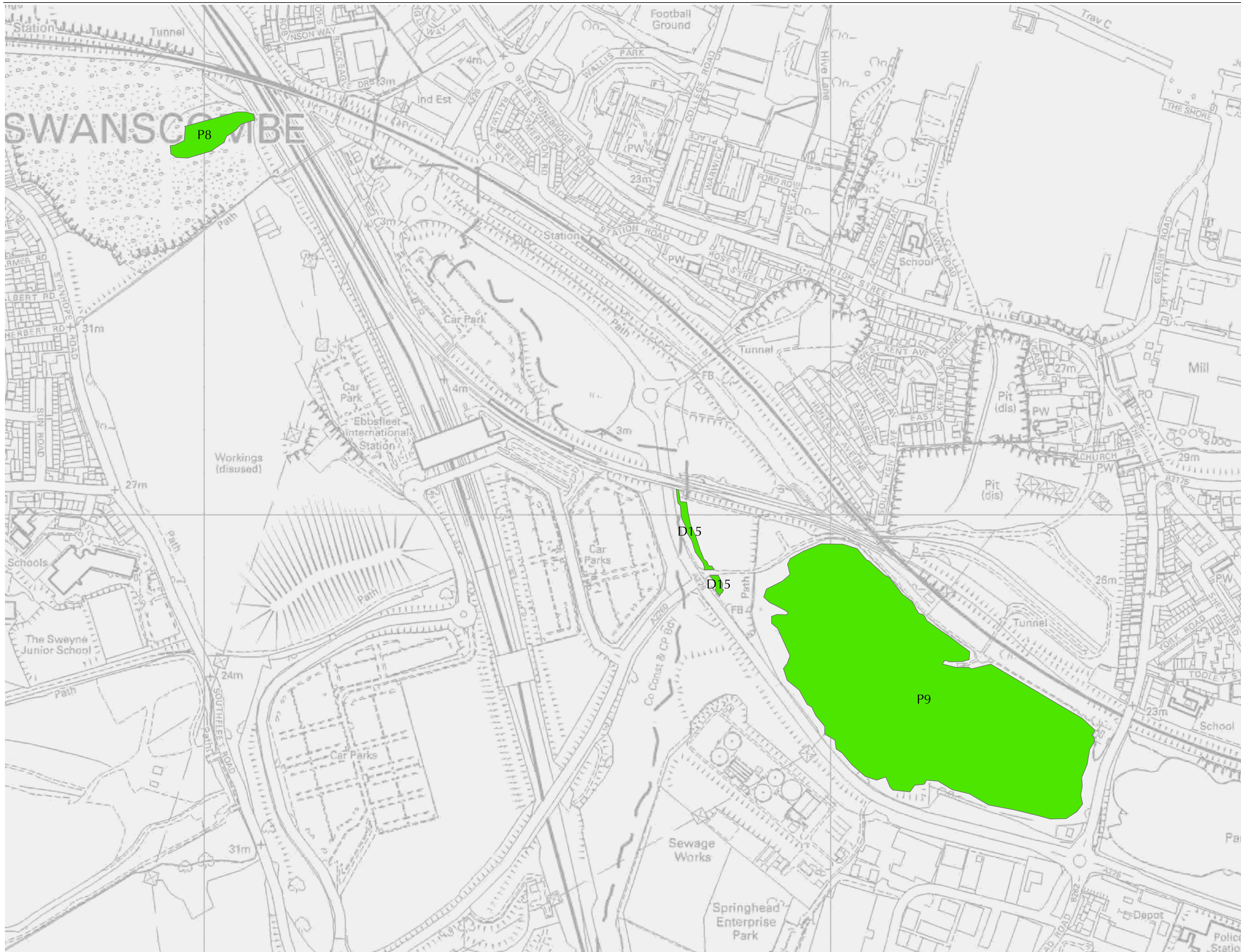
N

FIGURE 2a

Location and Status of Water Bodies on Site



KEY

- Accessible open water
- Accessible ditch with open water
- Inaccessible open water
- Inaccessible ditch with open water
- Dry / heavily vegetated ditch
- P1 Pond 1
- D1 Ditch 1

0 100 200 m

N

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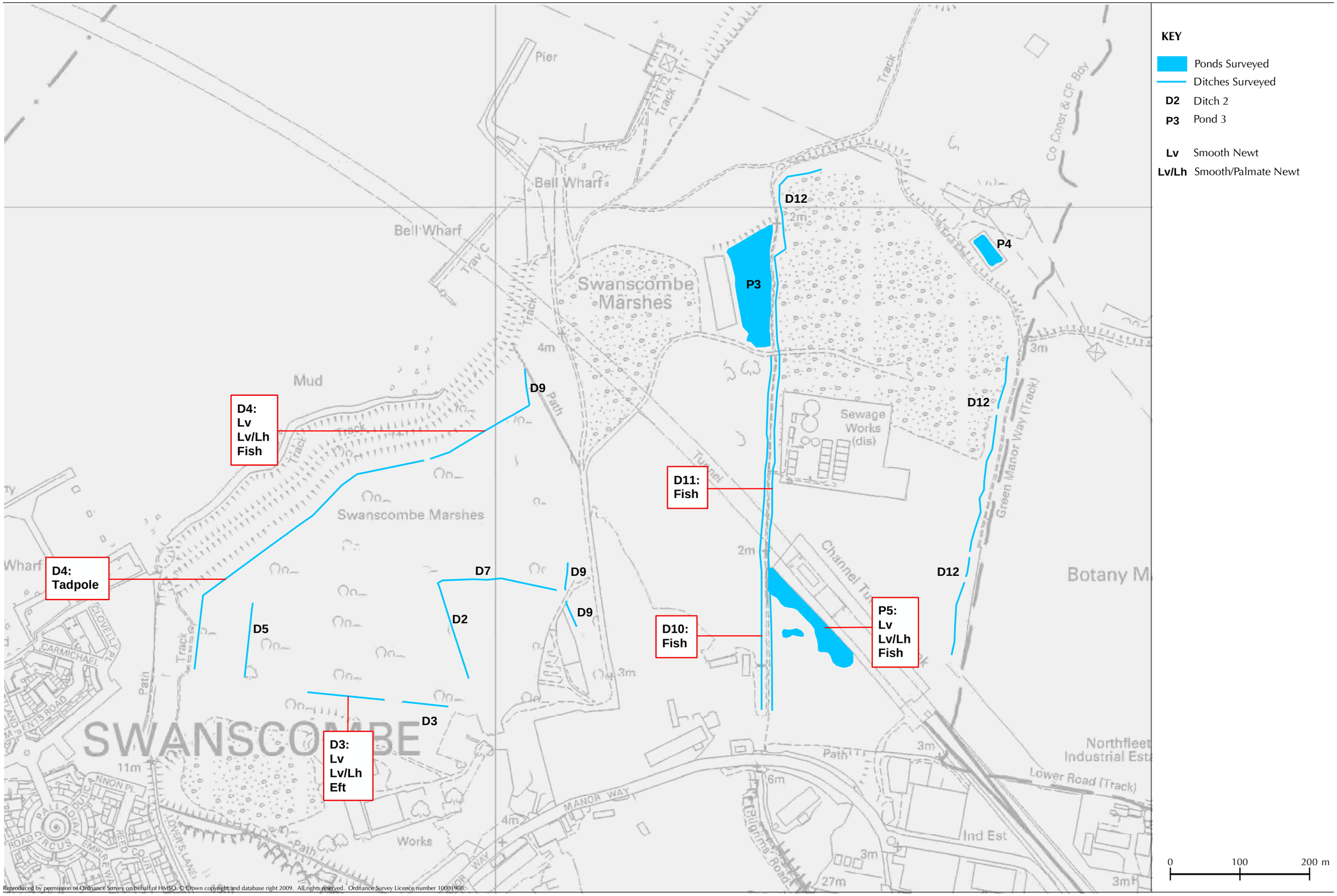
Amphibian Survey Report

FIGURE 2b

Location and Status of Water Bodies on Site



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LONDON PARAMOUNT
Amphibian Survey Report

N

FIGURE 3
Amphibian Records made during the 2012 Survey

JUNE 2012

APPENDICES

APPENDIX A
Site Photographs

Figure A1 Lake with surrounding willow scrub and steep-sided woodland covered banks (P1)

Figure A2 Lake fringed with common reed. The water is discoloured red/brown in places- possibly due to leachate pollution (P3)

Figure A3 Pond with steep-sided bare soil banks. The water is discoloured red/brown- possibly due to leachate contamination (P4)

Figure A4 Shallow ponds surrounded by marshy grassland (P5)

Figure A5 Lake surrounded with swamp dominated by common reed (P6)

Figure A6 A typical ditch on Swanscombe marshes – 5m wide channel dominated by common reed on the banks and occasional bulrush (D7)

Figure A7 A ditch choked with common reed (D16)

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Annex EDP 25
2015 Amphibian Survey Report (CBA February 2016)

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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 Amphibian Survey Report

DRAFT

February 2016

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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 Harvest Mouse Survey Report

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

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 amphibian/great crested newt desk study and survey was undertaken by CBA. This report details the methodology, results and evaluation of the desk study as well as survey undertaken during June 2015.

1.2 Aims

1.2.1 The aims of the amphibian/great crested newt desk study and survey were to,

- Understand the distribution of records of amphibians in relation to the Proposed Development Area;
- identify whether great crested newts are present within the Proposed Development Area;
- evaluate any great crested newt populations present within the Proposed Development Area in relation to their nature conservation importance.

1.3 Previous Surveys

1.3.1 Amphibian surveys were carried out by CBA in 2012 of a number of ponds and ditches on the Swanscombe Peninsula[1]. These identified a probably small population of smooth newt and a population of marsh frogs. The survey report is included as **Appendix 1**.

1.4 Great Crested Newt Ecology

1.4.1 The great crested newt is the largest of the three British native newt species, reaching a maximum length of 14.5cm for males and 16cm for females. Great crested newts spend much of the year on land where they need a variety of different conditions to provide food, shelter and places to spend the winter. Like all amphibians, great crested newts rely on water for breeding and for the development of the larval stage and so return to ponds in the spring to breed. Eggs are laid singly on underwater leaves near the water margin between late February and early August, but usually between April and June, with each female laying several hundred

[1] Chris Blandford Associates for London Resort Company Holdings, 2012. London Paramount Amphibian Survey Report

eggs. The efts normally take three months to develop into young newts before leaving the water, but some may over-winter as efts. Juvenile newts disperse up to 1km, only returning to ponds to breed when sexually mature after one to three years. Adult newts leave the ponds from July onwards, generally staying within 200 – 500m of the ponds. From October or November, they hibernate in damp, frost-free environments, sometimes underground.

1.4.2 On land, great crested newts are found in cool, moist conditions under debris or in dense vegetation. They feed on both land and in water, eating small aquatic animals such as water fleas and insect larvae and terrestrial invertebrates, especially worms.

1.4.3 Despite the decline of this species in recent years, the great crested newt is still quite widespread in Great Britain and is numerous locally in parts of lowland England. Studies in the 1980's indicated a national rate of colony loss of approximately 2% over five years. The decline can be put down to loss of suitable breeding ponds caused by water table reduction, in-filling for development, changing farming practices, waste disposal, neglect or fish stocking and the degradation, loss and fragmentation of terrestrial habitats. The British population remains, however, among the largest in Europe and Britain therefore has an international responsibility for the species.

1.5 Legislation

1.5.1 All British amphibian species receive legal conservation protection in the United Kingdom, though the degree to which different species are protected varies.

1.5.2 The Wildlife and Countryside Act 1981 (WCA) (as amended) transposes into UK law the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The 1981 Act was recently amended by the Countryside and Rights of Way (CRoW) Act 2000. The great crested newt is considered 'fully protected' as it is listed under Schedule 5 of the 1981 Act, and is therefore subject to the provisions of Section 9, which makes it an offence to:

- Intentionally kill, injure or take a great crested newt [Section 9(1)];
- Possess or control any live or dead specimen or anything derived from a great crested newt [Section 9(2)];
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt [Section 9(4)(a)];
- Intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for that purpose [Section 9(4)(b)];
- Sell, offer for sale, possess or transport for the purpose of sale or publish advertisements to buy or sell a great crested newt [section 9(5)].

1.5.3 The other more common amphibian species are protected against sale (Section 9(5)) only. In all cases, the legislation applies to all life stages including, eggs, efts (the larval stage), juveniles and adults.

1.5.4 The great crested newt is a UK Biodiversity Action Plan priority species and is considered sufficiently threatened in Europe to be included in the Habitats Directive and the Conservation of Habitats and Species Regulations 2010 (the 'Habitats Regulations'). The Habitats Regulations transpose into UK law Council Directive 92/43/EEC of the 21st May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats (and Species) Directive). The great crested newt is listed on Annex II and Annex IV (European protected species). Annex II relates to the designations of special areas of conservation (SACs) for this species (underlining their conservation significance even where they occur outside SACs). Annex IV requires member states to construct a system of protection as outlined in Article 12, this is done through inclusion on Schedule 2 of the Regulations. Regulation 39 makes it an offence to:

- Deliberately capture or kill a great crested newt [Regulation 39(1)(a)].
- Deliberately disturb a great crested newt [Regulation 39(1)(b)].
- Deliberately take or destroy the eggs of a great crested newt [regulation (1)(c].
- Damage or destroy a breeding site or resting place of a great crested newt [Regulation 39(1)(d)].

1.6 Key Findings

1.6.1 The 2012 survey and 2015 eDNA results suggest that no waterbodies within the Proposed Development Area are used for breeding by great crested newts. However, it is possible that populations recorded nearby may use terrestrial habitat within the Proposed Development Area, although the risk is considered to be low due to the presence of barriers to dispersal, such as roads and the CTRL.

1.6.2 There were incidental records of smooth newt and marsh frog from the Swanscombe Peninsula, smooth newt from Botany Marsh East and smooth newt and common toad from Bamber Pit.

2.0 METHODOLOGY

2.1 Desk Study

2.1.1 Desk-top study data, including records of amphibian species, for the proposed Development Area and a 2km buffer, was obtained from Kent and Medway Biological Records Centre (KMBRC) in January 2015.

2.1.2 The report of the 2012 survey of ditches and ponds on Swanscombe peninsula is noted above.

2.2 Survey

2.2.1 A number of ponds and ditches, described below, were surveyed across the Proposed Development Area and their locations are illustrated in **Figure 1**. On Swanscombe Peninsula the survey areas were selected to include all ponds considered potentially suitable and to provide good geographical coverage of the ditch network.

① Bamber Pit Pond - a relatively large pond located in the bottom of a disused chalk pit, Bamber Pit. The banks are steep and the water appears deep. It supports only small patches of aquatic, emergent or marginal vegetation and is set within a mosaic of unmanaged grassland, ruderal and scrub. There appears to be a large fish population, and is actively fished.

② Black Duck Marsh Ditch N – is a relatively wide (approx. 8m) ditch which runs along the northern edge of Black Duck Marsh. It is fringed on both sides by one to two metres of common reed *Phragmites australis* with approximately five metres of open water. Black Duck Marsh, comprising reedbed and open water, is to the south and to the north is managed and unmanaged grassland and an access road.

③ Black Duck Marsh Ditch E (N) – is a ditch which runs along the northern part of the eastern edge of Black Duck Marsh. It is largely set within dense scrub but patchy common reed is present along the ditch edges with approximately five metres of open water. There is reedbed and scrub to the west and unmanaged grassland, scrub and an access road to the east.

④ Black Duck Marsh Ditch E (S) – is a relatively wide (approx. 8m) ditch which runs along the southern part of the eastern edge of Black Duck Marsh. It is fringed with common reed on both sides with approximately five metres of open water. To the west is reedbed and to the east unmanaged grassland and scrub mosaic.

⑤ Swanscombe Centre – ditches and lagoon - comprises two ditches either side of a north-south access track and a lagoon at their northern end, all located in the centre of Swanscombe Peninsula. The ditches include dense common reed, especially in the eastern ditch, which has little open water, and the northern part of the western ditch. The southern section of the western ditch is more open, with 3-4m open water and patchy emergent and marginal

vegetation including reedmace *Typha* spp. and branched bur reed *Sparganium erectum* as well as common reed. The lagoon is relatively large with little or no aquatic vegetation but is fringed by common reed up to approximately ten metres wide. At the southern end especially there is a significant quantity of what appears to be cement kiln dust or similar material in the sediment. Both ditches and lagoon are all set within a mosaic of unmanaged grassland, dense and scattered scrub and reedbed.

⑥ CTRL Wetland N - comprises two ponds located within the wider CTRL wetland (largely reedbed) north of the CTRL compound. The southern pond is large. It is fringed by reed up to ten metres wide on the southern side. The northern side is more varied with rock armouring and stands of reedmace as well as a range of other species. Aquatic vegetation is abundant, with small pondweed *Potamogeton berchtoldii*, water starwort *Callitriche* sp. and brackish water-crowfoot *Ranunculus baudotii*. The northern pond is a smaller, roughly circular pond 30-40m in diameter and up to approx. 20cm in depth set within reedbed and with a fringe of sea club-rush. There is abundant aquatic vegetation comprising least pondweed *Potamogeton pusillus* and common stonewort *Chara vulgaris*.

⑦ CTRL Wetland S - is a pond located within the wider CTRL wetland (largely reedbed) south of the CTRL compound. It is fringed by reedbed and reedmace as well as some hard rush *Juncus effusus*. Aquatic vegetation includes least pondweed and common stonewort.

⑧ CTRL Wetland/Botany Marsh Ditches - comprises two ditches either side of a grassy access track between the CTRL Wetland (reedbed and open water) to the west and Botany Marshes (grazing marsh with ditches) to the east. Both are dominated by dense common reed with little or no open water.

⑨ Botany Marshes Ditch N - is a section of recently (winter 2014-15) de-silted ditch approximately three metres wide on the northern edge of Botany Marsh East. It is set within reedbed and scattered scrub but also adjoins the grazing marsh of Botany Marsh West and there is extensive unmanaged grassland to the north.

⑩ Botany Marshes Pond – is a new pond dug during winter 2014-15 on the eastern edge of Botany Marsh East. Much of it and the adjoining banks are bare of vegetation although there are small stands of common reed and reedmace and some brackish water-crowfoot. It is connected to a ditch running north and south along the eastern edge of Botany Marsh east and is set within a mosaic of grassland, reedbed and dense and scattered scrub.

⑳ Balancing Pond - lies within a wider mosaic of mostly unmanaged grassland and scrub. Open water comprises 80-90% of the pond, but there is some fringing common reed and reedmace and scattered willow scrub on the banks. The pond discharges into the Ebbsfleet to the east.

2.2.2 Two further waterbodies, labelled Ⓐ and Ⓑ in **Figure 1** are present on Swanscombe Peninsula but were not surveyed as they are currently operational leachate treatment lagoons and contain no vegetation little or no visible invertebrates.

Habitat Suitability Index (HSI)

2.2.3 A Habitat Suitability Index assessment (as developed by Oldham et al.[2]) for great crested newts was carried out for each pond and ditch surveyed (Figure 1). This methodology enables the ponds to be evaluated for their suitability for great crested newts, against a set of defined criteria. The calculation produces a score in the range 0 – 1, where the higher the score, the better the quality of habitat.

2.2.4 However, it should be borne in mind that the survey areas include a number of ditch sections on Swanscombe peninsula and the HSI methodology was developed for ponds, not ditches. This can cause difficulties, for example in calculating area, where ditch sections surveyed form part of a larger connected network, or when calculating the number of ponds within 1km. In all cases the ditch sections surveyed formed part of ditches greater than 2000m^2, so this feature was not included in the calculations. For the purposes of pond count each separate ditch section was considered as a pond. The assessment of water quality was based on the results of aquatic invertebrate surveys [TO BE REFERENCED IN THE FINAL REPORT] and that for fish was based in part on a fish survey [TO BE REFERENCED IN THE FINAL REPORT] of some of the waterbodies, as well as other observations. Both the aquatic invertebrate and fish surveys were carried out during 2015. Where survey areas include more than one waterbody and where these differ in character, for example ⑤ Swanscombe Centre – ditches and lagoon, they have been scored separately

2.2.5 In addition to the scoring, a system has been developed by the Amphibian and Reptile Groups of the UK[3] for using HSI scores to define pond suitability for great crested newts on a categorical scale, from poor to excellent, as shown in **Table 1**.

Table 1 Pond suitability for great crested newts based on HSI scores

HSI score	Pond suitability
< 0.5	poor
0.5-0.59	below average
0.6-0.69	average
0.7-0.79	good
> 0.8	excellent

[2] Oldham, R. S., Keeble, J., Swan, M. J. S. and Jefcote, M. (2000). Evaluating the suitability of habitat for the great crested newt (*Triturus cristatus*). Herpetological Journal 10 pp143-155.
[3] Amphibian and Reptile Groups of the United Kingdom 2010. ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index

eDNA Survey

2.2.6 Environmental DNA is DNA that is released into the environment by organisms. In recent years a methodology for surveying for great crested newt DNA has been developed as a means of screening for presence or absence of this species within waterbodies during the breeding season. If great crested newt DNA is identified as present within a waterbody further surveys can be undertaken to determine population size class.

2.2.7 The methodology for collection and analysis of samples followed that developed by the Freshwater Habitats Trust[4]. Samples were collected from all ponds and ditches except the Balancing Pond on the 16th of June 2015 and analysed by ADAS.

2.2.8 Samples from three locations around the Balancing Pond were collected by Hyder Consulting (UK) Limited between 22nd-24th June 2015 and analysed by FERA using the same methodology. The results were made available to the project through a data sharing agreement.

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

3.0 RESULTS

3.1 Desk Study

3.1.1 KMBRC Desk Study data records for amphibians were more or less unchanged from those reported in the 2012 Amphibian Survey Report and as presented in **Figure 1** of that report.

3.1.2 Common frog, common toad, smooth newt, palmate newt and great crested newt have all been recorded from within the Proposed Development Area or nearby. The most significant records (2000 onwards) for great crested newt are from a railway tunnel ditch in Northfleet (2000), a roadside drain in the Ebbsfleet Valley (2000), a pond beside the Southfleet Road/B259 (2001) and from within Eastern Quarry (2002-03). Great crested newts were also recorded from the Bamber Pit area in 1985-86.

3.2 Habitat Suitability Index

3.2.1 HSI scores and pond suitability assessments are provided in **Table 2**. All the ditches and ponds on Swanscombe Peninsula are assessed as good or excellent for great crested newts. This is due in large part to the density of waterbodies on the peninsula. ⑳ Balancing Pond has a lower score, and is of average suitability, due largely to the absence of nearby ponds. Only ① Bamber Pit Pond is assessed as of poor suitability, due to a combination of high fish density, low macrophyte cover and the lack of ponds nearby. The full HSI calculations are provided in **Appendix 2**.

Table 2 Habitat Suitability Index scores (for great crested newt)

Survey Area	HSI score	Pond suitability
① Bamber Pit Pond	0.40	Poor
② Black Duck Marsh Ditch N	0.80	Excellent
③ Black Duck Marsh Ditch E (N)	0.73	Good
④ Black Duck Marsh Ditch E (S)	0.80	Excellent
⑤ Swanscombe Centre - ditches	0.85	Excellent
⑤ Swanscombe Centre - lagoon	0.77	Good
⑥ CTRL Wetland N (N)	0.95	Excellent
⑥ CTRL Wetland N (S)	0.94	Excellent
⑦ CTRL Wetland S	0.95	Excellent
⑧ CTRL Wetland/Botany Marsh Ditches	0.84	Excellent
⑨ Botany Marshes Ditch N	0.74	Good
⑩ Botany Marshes Pond	0.88	Excellent
⑳ Balancing Pond	0.68	Average

3.3 eDNA Survey

3.3.1 All samples returned a negative result for the presence of great crested newt DNA except two, those for survey areas ⑧ CTRL Wetland/Botany Marsh Ditches and ⑨ Botany Marshes Ditch N, which returned undetermined results due to the unavoidable presence of silt in the samples. The full laboratory report is available in **Appendix 3**.

3.3.2 Due to the negative results no further surveys were undertaken.

3.4 Incidental records

3.4.1 There were single records of smooth newt from near the centre of Swanscombe Peninsula and of smooth newt and common toad in Bamber Pit from under roofing felt heat traps during the reptile survey. Smooth newts were also observed in ditches in Botany Marsh East and marsh frogs were heard calling in Black Duck Marsh on a number of occasions.

4.0 CONCLUSIONS

4.1 Amphibians

4.1.1 The desk study and survey results indicate that the Swanscombe Peninsula supports a probably small population of smooth newts and a population of marsh frogs, that Botany Marsh East supports smooth newts and Bamber Pit supports populations of smooth newt and common toad.

4.2 Great Crested Newts

4.2.1 Based on the negative 2012 survey and 2015 eDNA results it is considered very unlikely that great crested newts use any waterbodies within the Proposed Development Area for breeding. Although two of the eDNA results were undetermined, given the context of these among otherwise negative results across the Swanscombe Peninsula it is considered very unlikely these samples would have returned positive results in the absence of silt contamination.

4.2.2 Given historical records for the presence of great crested newts from within 500m of the Proposed Development Area, and the availability of suitable terrestrial habitat, it is possible that great crested newts may use parts of the Proposed Development Area during their terrestrial phase. However, due to the presence of barriers to dispersal, e.g. built development, major road networks, the Ebbsfleet corridor and the CTRL, between the location of records and habitat within the Proposed Development Area, it is considered this is a very low risk.

FIGURES

1 Survey Areas

A Other Water Features

0 150 300 Metres

N

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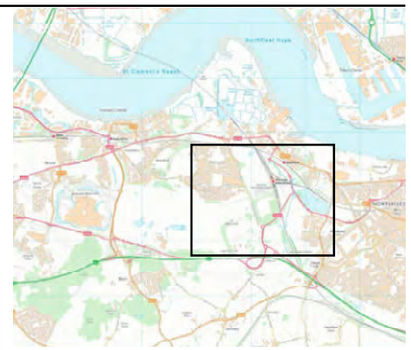
AMPHIBIAN - GREAT CRESTED NEWT - SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1a
GREAT CRESTED NEWT
eDNA SAMPLE SITE LOCATIONS

February 2016
11120201_Amphibians_11-02-16.indd



1 Survey Areas

A Other Water Features

0 150 300 Metres

N

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AMPHIBIAN - GREAT CRESTED NEWT - SURVEY
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1b
GREAT CRESTED NEWT
eDNA SAMPLE SITE LOCATIONS

February 2016
11120201_Amphibians_11-02-16.indd

APPENDICES

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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Amphibian Survey Report

November 2012

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London Resort Company Holdings (LRCH) Ltd.

London Paramount

2012 Amphibian Survey Report

Approved	[redacted]
	Bill Wadsworth
Position	Senior Associate (Ecology)
Date	30th November 2012
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 amphibian survey undertaken between April and June 2012.

1.2 Scope

1.2.1 The scope of the survey was to determine:

- habitat suitability assessments for all waterbodies within the proposed development area that have the potential to support amphibians; and
- the presence and status of amphibians using a series of ponds and ditches, with specific reference to great crested newts *Triturus cristatus* (a species considered fully protected by law).

Survey Limitations

1.2.2 Most of the waterbodies consisted of steep-sided, deep water, lagoons, ditches and drains, many of which contained significant deposits of silt. The waterbodies were too deep for surveyors to safely wade in and be able to set traps effectively and therefore for both health and safety and practical reasons, it was not possible to deploy bottle trapping as a survey technique.

1.2.3 Additionally, some waterbodies within 500m of the proposed development area were not surveyed due to access restrictions.

1.3 Key Findings

Great Crested Newts

1.3.1 The results of the amphibian survey suggest that great crested newts are not present in any of the surveyed water bodies on the Swanscombe peninsula north of the A226. No signs of this species were recorded during the survey in 2012 and the desk-top study revealed no historical records either. The HSI scores suggest that most of the water bodies on the peninsula are highly

suitable habitats so it may be that the A226 as a busy main road has proved to be an effective barrier preventing colonisation of this area.

1.3.2 Further survey work may be required to establish whether or not great crested newts are present elsewhere within the proposed development area, but for which access has not yet been possible. The lake in Bamber pit where great crested newts were recorded in 1985 scored just 0.41 on the HSI due to the high densities of fish. It may be that the fish were introduced to the lake since the record was made as it now seems highly unlikely great crested newts are found in this area.

Other Amphibian Species

1.3.3 The results of the survey suggest that a small population of smooth newts and an unknown population of marsh frogs are found on the Swanscombe peninsula, mainly concentrated around Swanscombe Marshes.

2.0 METHODOLOGY

2.1 Background

2.1.1 There are six native species of amphibian in the UK of which five, common frog *Rana temporaria*, common toad *Bufo bufo*, smooth newt *Lissotriton vulgaris*, palmate newt *Lissotriton helveticus*, and great crested newt could be expected to occur within the proposed development area. The sixth, natterjack toad *Bufo calamita*, is very restricted in its distribution and does not occur within or near to the proposed development area.

2.2 Great Crested Newt Ecology

2.2.1 The great crested newt is the largest of the three British native newt species, reaching a maximum length of 14.5cm for males and 16cm for females. Great crested newts spend much of the year on land where they need a variety of different conditions to provide food, shelter and places to spend the winter. Like all amphibians, great crested newts rely on water for breeding and for the development of the larval stage and so return to ponds in the spring to breed. Eggs are laid singly on underwater leaves near the water margin between late February and early August, but usually between April and June, with each female laying several hundred eggs. The efts normally take three months to develop into young newts before leaving the water, but some may over-winter as efts. Juvenile newts disperse up to 1km, only returning to ponds to breed when sexually mature after one to three years. Adult newts leave the ponds from July onwards, generally staying within 200 – 500m of the ponds. From October or November, they hibernate in damp, frost-free environments, sometimes underground.

2.2.2 On land, great crested newts are found in cool, moist conditions under debris or in dense vegetation. They feed on both land and in water, eating small aquatic animals such as water fleas and insect larvae and terrestrial invertebrates, especially worms.

2.2.3 Despite the decline of this species in recent years, the great crested newt is still quite widespread in Great Britain and is numerous locally in parts of lowland England. Studies in the 1980's indicated a national rate of colony loss of approximately 2% over five years. The decline can be put down to loss of suitable breeding ponds caused by water table reduction, in-filling for development, changing farming practices, waste disposal, neglect or fish stocking and the degradation, loss and fragmentation of terrestrial habitats. The British population remains, however, among the largest in Europe and Britain therefore has an international responsibility for the species.

2.3 Legislation

2.3.1 All British amphibian species receive legal conservation protection in the United Kingdom, though the degree to which different species are protected varies.

2.3.2 The Wildlife and Countryside Act 1981 (WCA) (as amended) transposes into UK law the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The 1981 Act was recently amended by the Countryside and Rights of Way (CRoW) Act 2000. The great crested newt is considered 'fully protected' as it is listed under Schedule 5 of the 1981 Act, and is therefore subject to the provisions of Section 9, which makes it an offence to:

- Intentionally kill, injure or take a great crested newt [Section 9(1)];
- Possess or control any live or dead specimen or anything derived from a great crested newt [Section 9(2)];
- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt [Section 9(4)(a)];
- Intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for that purpose [Section 9(4)(b)];
- Sell, offer for sale, possess or transport for the purpose of sale or publish advertisements to buy or sell a great crested newt [section 9(5)].

2.3.3 The other more common amphibian species are protected against sale (Section 9(5)) only. In all cases, the legislation applies to all life stages including, eggs, efts (the larval stage), juveniles and adults.

2.3.4 The great crested newt is a UK Biodiversity Action Plan priority species and is considered sufficiently threatened in Europe to be included in the Habitats Directive and the Conservation of Habitats and Species Regulations 2010 (the 'Habitats Regulations'). The Habitats Regulations transpose into UK law Council Directive 92/43/EEC of the 21st May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats (and Species) Directive). The great crested newt is listed on Annex II and Annex IV (European protected species). Annex II relates to the designations of special areas of conservation (SACs) for this species (underlining their conservation significance even where they occur outside SACs). Annex IV requires member states to construct a system of protection as outlined in Article 12, this is done through inclusion on Schedule 2 of the Regulations. Regulation 39 makes it an offence to:

- Deliberately capture or kill a great crested newt [Regulation 39(1)(a)].
- Deliberately disturb a great crested newt [Regulation 39(1)(b)].
- Deliberately take or destroy the eggs of a great crested newt [regulation (1)(c].
- Damage or destroy a breeding site or resting place of a great crested newt [Regulation 39(1)(d)].

2.4 Scope of Survey

2.4.1 The requirement to undertake an amphibian survey results from the protected status of the great crested newt and its possible presence within the development area, identified during the desk-top study and Phase 1 habitat survey carried out in April-May 2012. The main body of the proposed development area (north of the A226) supports a large network of ditches and 8 lakes/ponds. In addition there are two large lakes in former quarries located south of the A226. The water bodies north of the A226 are linked by a mosaic of terrestrial habitats of varying quality for supporting amphibians, whilst the lakes south of the A226 appear to be isolated.

2.4.2 The results of the desk-top study, showing the locations of amphibian records in and around Swanscombe are displayed in **Figure 1.** Only species records provided by Kent and Medway Biological Records Centre (KMBRC) with an accurate grid reference of at least 6 figures (100m square) are displayed. This left just relatively few amphibian records in the Swanscombe area, with a distinct lack of records on the peninsula north of the A226.

2.4.3 The results of the Phase 1 habitat survey suggest that overall there is a large amount of suitable habitat for amphibians on the peninsula which is mainly comprised of rough grassland and scrub, and with small areas of broadleaved woodland. Most of this habitat is continuous and links to a number of ditches and ponds. South of the A226 the largest continuous blocks of suitable habitat are present in Bamber pit and surrounding locations in Ebbsfleet valley where areas of rough grassland, scrub and woodland are present.

2.5 Survey Methodology

2.5.1 Within the main body of the proposed development area (north of the A226) the following water bodies were surveyed for amphibians:

- the network of drainage ditches on Swanscombe Marshes (D2-D5, D7 & D9)
- the drainage ditches to the east and west of the Channel Tunnel Rail Link (HS1) and old sewage works (D10-D12)
- the pond situated north-west of the old sewage works (P3)
- the pond situated north-east of the old sewage works (P4)
- the ponds south of the HS1 (P5)

2.5.2 The remaining water bodies were deemed unsuitable for great crested newts (mainly due to being choked with reed), too dangerous to access or permission had not been given to access the land on which they are situated. The locations of all the water bodies surveyed are set out in **Figure 2** and descriptions of each are provided below.

2.5.3 Surveys were conducted on 4 separate occasions from 30th April to 15th June 2012 between the hours of 20:30 and 23:30. Torchlight surveys and egg searches were the principal survey techniques used. Bottle trapping was not used as a technique due to the difficulty of accessing steep sided ditches, containing in excess of 1m depth water and deep deposits of silt. On each night of survey the water bodies were given a vegetation and turbidity score between 0 and 5. A vegetation score of 0 indicating a water body clear of vegetation and 5 completely choked. A turbidity score of 0 indicating a clear water body and 5 extremely murky.

2.5.4 The surveys were carried out in suitable weather conditions, according to guidance provided by the Herpetofauna Groups of Britain and Ireland (HGBI)[1] and Froglife[2]. Torching was undertaken shortly after dusk on still, warm evenings above 5ºC with the aid of a 1 million candle power torch. Full details of the weather conditions during the surveys are given in **Table 2.**

2.5.5 The surveys were specifically aimed at detecting great crested newts in their various life stages, but also included surveys for other amphibians and incidental fish records, particularly as fish can have a determining influence on the presence of great crested newts.

2.5.6 Smooth and palmate newts can be difficult to distinguish in the field using torchlight searches so where the species was uncertain the record was made as smooth/palmate newt.

2.6 Evaluation Methodology

2.6.1 In order to assess the importance of the ponds in relation to their amphibian assemblages the population size class assessment set out in Section 5.8.3 of the English Nature guidelines[3] was used. The purpose for using this assessment is to recognise the inherent difficulty and range of factors that can affect the determination of the size of a given population. As EN's guidelines state "… surveys may reveal from around 2% to 30% of the population … recent evidence has revealed even greater variation". EN therefore recommends the use of the following size classifications as a minimum for interpreting survey results. The size classifications are set out in **Table 1** below.

Table 1 Great Crested Newt Population Size Class Assessment

Species	Low/Small Population	Good/Medium Population	Exceptional/Large
Great crested newt	<10	11-100	>100

[1] HGBI (1998) *Evaluating Local Mitigation/Translocation Programmes: Maintaining Best Practice and Lawful Standards.* HGBI Advisory Notes (ARGs). HGBI, c/o Froglife, Halesworth, Unpubl.
[2] Froglife (2003) *Advice Sheet 11 – Surveying for (Great Crested) Newt Conservation.* Froglife, Halesworth.
[3] English Nature (2001) *Great Crested Newt Mitigation Guidelines.*

2.6.2 The results of the surveys can be further supported using data relating to the quality of the pond and surrounding terrestrial habitat. This is known as the Habitat Suitability Index (HSI), or Oldham Criteria, after the paper's author (Oldham *et al*, 2000[4]). This methodology enables the ponds to be evaluated for their suitability for great crested newts, against a set of defined criteria. The calculation produces a figure in the range 0 – 1, where the closer the figure tends towards 1, the better the quality of habitat.

[4] Oldham, R. S., Keeble, J., Swan, M. J. S. and Jefcote, M. (2000). *Evaluating the suitability of habitat for the great crested newt (Triturus cristatus)*. Herpetological Journal **10** pp143-155.

3.0 RESULTS

3.1 Water Body Descriptions

Ditch Descriptions

3.1.1 The ditches surveyed have been labelled D (Ditch) 1 to D16 respectively and are shown in **Figure 2**.

3.1.2 **D1:** This is a short section of ditch in the south-west corner of the survey area. It has approximately 100m long and 5m wide with very steep sides and shallow water that drains into a culvert. It is mainly shaded by scrub and has hard standing on the banks.

3.1.3 **D2:** This ditch is sandwiched between the edge of Swanscombe Marshes and an area of rough grassland with scattered scrub. The ditch itself is approximately 200m long and 5m wide with open water in the channel to a depth of 0.5m. The west margin is fringed by common reed and to the east there is bracken *Pteridium aquilinum* and bramble *Rubus fruticosus* scrub.

3.1.4 **D3:** This ditch runs along the northern boundary of some broadleaved woodland in the south-west corner of the survey area. It is approximately 500m long, 6m wide and 0.5m deep. The southern margin is overhung by trees leaving the water quite shaded and the eastern boundary is heavily scrubbed with bramble along much of its length. To the north of the ditch is Swanscombe Marshes.

3.1.5 **D4-D7:** These ditches dividing Swanscombe Marshes are all quite similar in character. Typically they are 6m wide with common reed *Phragmites australis* dominating the bank and channel vegetation. There is little other vegetation besides the occasional patches of reedmace *Typha latifolia*. Water depth in the channels is variable but in most there are quite large areas of open water. The approximate lengths of the ditches are as follows:

- D4 – 650m
- D5 – 300m
- D6 – 200m
- D7 – 150m

3.1.6 **D8-D9:** These ditches are situated at the east of Swanscombe Marshes and are mostly inaccessible as they are surrounded by dense scrub. D8 is approximately 250m long and D9 500m. Both look to be approximately 6m wide with open water up to 1m deep.

3.1.7 **D10:** This ditch runs along the eastern boundary of a landfill and is bordered on the west by dense hawthorn *Crataegus monogyna* and willow *Salix spp.* scrub that grades into a narrow woodland belt. On the eastern boundary there is a fringe of common reed and some emergent reedmace. It is steep-sided, approximately 500m long, 5m wide and with standing water in the channel at variable depth. Moving south to north the water drops from around 0.5m to a negligible depth where vegetation chokes the channel. Numerous fish were observed in the ditch, possibly sticklebacks.

3.1.8 **D11:** This ditch runs opposite to D10 bordering P5, the old sewage works and another landfill. It is approximately 750m long and 5m wide with varying water depth along its length. In three locations it opens up into small pools of water approximately 0.5m deep but along most of its length the channel is quite heavily vegetated with common reed and reedmace and there are no areas of open water. In the pools numerous fish were observed, again possibly sticklebacks. At the north end there is a section of ditch that looks to have recently been dredged, allowing shallow water to flow into a culvert.

3.1.9 **D12:** This ditch runs along the northern margin of a landfill and to the east of a large area of swamp. It is approximately 900m long, 5m wide and has very shallow (5cm) or no standing water along much of its length. The channel has become totally choked with common reed and it looks soon to dry up completely.

3.1.10 **D13:** This is a French drain that runs along the southern boundary of a planted shelterbelt and then appears to feed P4. It is approximately 1000m long, 2m wide and up to 1m deep. For much of its length a gravel bottom can be seen.

3.1.11 **D14:** This is a dry ditch bordering the southern margin of a large area of ephemeral/short perennial vegetation central to the survey area. It is approximately 200m long, 1m wide and 0.5m deep. It does not appear to ever collect water.

3.1.12 **D15:** This ditch is a part of the River Ebbsfleet that opens up next to the A226 at the southern end of the survey area. It is approximately 150m long, 5m wide and has standing water around 0.5m deep. The ditch is mainly surrounded by dense scrub and an area of swamp to the east and the main road borders the western side. In terms of the wider landscape the ditch is in a highly fragmented habitat with a large lake (P9), main roads and urban development all in close proximity.

3.1.13 **D16:** This ditch runs parallel to D16 and is very similar in character. It is approximately 400m long, 3m wide and up to 1m deep. There is little or no standing water along much of its length, the channel is choked with common reed and it looks soon to dry up completely. In terms of

the wider landscape this ditch borders the western margin of Botany Marshes, a large area of cattle-grazed grassland.

Lake/Pond Descriptions

3.1.14 The lakes and ponds surveyed have been labelled P (Pond) 1 to P10 respectively and are shown in **Figure 2**.

3.1.15 **P1:** This lake is situated immediately north of the A226 in the south-west corner of the survey area that has developed in an old quarry. It is approximately 9500m^2 in size with a perimeter of around 450m and unknown depth. It is surrounded by very steep sides covered by woodland and dense willow scrub and was deemed inaccessible and dangerous to survey. There is little apparent aquatic vegetation except for the occasional clumps of hard rush *Juncus inflexus*. Waterfowl were observed using this lake during the Phase 1 habitat surveys carried out by CBA. In terms of the wider landscape the lake is bordered by rough grassland and woodland to the north and east, a main road to the south and urban development to the west.

3.1.16 **P2:** This pond is situated at the bottom of a very steep sided valley in the north-west corner of the survey area. It is too dangerous to access but appears to be approximately 700m^2 in size with a perimeter of around 100m. Woodland and scrub line the banks and there is a lot of rubbish strewn down the sides and in the water at the bottom. Much of the pond looked to be shaded by the trees. In terms of the wider landscape there are large areas of woodland, rough grassland and scrub to the east and urban development to the west.

3.1.17 **P3:** This lake is situated between two former landfills at the north end of the survey area. It is roughly rectangular in shape, 7500m^2 in size and has a 425m perimeter. Most of this perimeter is fringed by common reed and there is a strip of broadleaved woodland on the western banks. There is little to no aquatic vegetation visible and the water was discoloured red/brown, possibly contaminated by landfill leachate. Waterfowl have been observed using this water body. In terms of the wider landscape it is surrounded by extensive areas of rough grassland, scrub, ditches and woodland.

3.1.18 **P4:** This pond is situated to the north-west of Botany Marshes and looks like it was recently created or modified. It is quite uniformly rectangular, approximately 900m^2 in size with a 125m perimeter. The banks are steep with bare soil and the water quality looks very poor. It is red/brown in colour, possibly contaminated with landfill leachate and there is little/no aquatic vegetation or invertebrates to be seen. In terms of the wider landscape this pond is surrounded by extensive areas of rough grassland, scrub and ditches.

3.1.19 **P5:** This is a series of shallow ponds situated immediately south of the HS1. They are rapidly becoming vegetated over by common reed and reedmace and the open water remaining probably exceeds no more than 2000m^2 in extent. The average depth of water in the pools is no more than 0.1m. The ponds grade into marshy grassland to the south with hard rush, creeping bent *Agrostis stolonifera* and great willowherb *Epilobium hirsutum*. Waterfowl and small fish, possibly sticklebacks, have been observed using these water bodies. In terms of the wider landscape the ponds are surrounded by large areas of ephemeral/short perennial vegetation, scrub, ditches and rough grassland. The HS1 presents a potential barrier to the north.

3.1.20 **P6:** This lake is situated between the HS1 and old sewage works. It appears to be man-made and covers a large area approximately 14000m^2 in size with a 950m perimeter. The extent of open water looks to be much less than this as the lake is surrounded by a very large swamp and common reed is encroaching. Several species of waterfowl have been observed on the lake including tufted duck *Aythya fuligula* and mute swan *Cygnus olor*. In terms of the wider landscape this lake is mainly surrounded by swamp, the cattle-grazed fields of Botany Marshes are to the east and the HS1 is situated to the south.

3.1.21 **P7:** This pond is situated just north of the A226 within an industrial estate. It is roughly circular in shape, 7000m^2 in size and has a 300m perimeter. The surrounding banks looked to have been recently disturbed and were characterised by ruderal vegetation. Waterfowl were observed using this pond during the Phase 1 habitat survey. In terms of the wider landscape only the northern boundary of the pond features suitable terrestrial habitat for amphibians where large areas of rough grassland and scrub can be found.

3.1.22 **P8:** This lake is situated at the base of a large former quarry pit just south of the A226. It is approximately 5000m^2 in size with a 350m perimeter and unknown depth. The steep sides are covered with dense scrub and mature trees. Large fish, possibly carp, were observed in the water. The quarry within which the lake is situated is approximately 11ha and comprises a complex mosaic of short and tall grassland, scrub, and birch woodland.

3.1.23 **P9:** This very large lake fills the bottom of an old quarry pit east of the A226 in the south-east corner of the survey area. It is over 100,000m^2 in size with a perimeter of approximately 1500m. It is surrounded by very steep chalk escarpments with dense scrub and in terms of the wider landscape it is mostly enclosed by main roads, the HS1 and urban development.

3.1.24 **P10:** This is a small, shallow pool of water that extends from the ditches on Botany Marshes. It is no more than 750m^2 in size with a 150m perimeter and is heavily vegetated with reed. The water is likely to dry up during seasons with little rainfall. There is little to no aquatic

vegetation visible and the water was discoloured red/brown, possibly contaminated by landfill leachate. In terms of the wider landscape the pond is surrounded by large areas of rough grassland.

3.2 Survey Results

3.2.1 Weather conditions during the survey are summarised in **Table 2**. Every evening was dry and warm with a varying degree of cloud cover.

3.2.2 The full results of the survey are given in **Tables 3-6** and shown in **Figure 3**. Just two amphibian species were confirmed as being present on the Swanscombe Peninsula, smooth newt and marsh frog *Pelophylax ridibundus* a non-native species introduced to Kent in 1935. The marsh frog was not seen during the survey but its characteristic laughing calls were heard on the 17th and 25th May towards the north end of Swanscombe Marshes.

3.2.3 Smooth newts were recorded in D3, D4 and P5. 19 animals were recorded in total over the survey period with the peak count occurring on 17th May when 10 animals were recorded in D3 and 1 in D4.

3.2.4 In addition 6 adult newts and 2 efts only identifiable as smooth or palmate were recorded in D3, D4 and P5. Palmate and smooth newt larvae are indistinguishable in the field and adult females can only be distinguished by the degree of spotting on the throat, therefore need to be caught to be identified.

3.2.5 A tadpole was recorded in D4 on 30th April, likely to be that of the marsh frog as no other frog species was recorded during the survey. Fish were recorded in D4, D10, D11 and P5. These were mainly small, stickleback-like species.

3.2.6 A condition assessment of the water bodies is given in **Table 7.** The degree of vegetation cover and turbidity varied between water bodies and survey nights but most of the scores were low.

Table 2 Weather Conditions

Date	Cloud (%)	Rain	Start Time / Temperature (ºC)	End Time / Temperature (ºC)
30/04/12	50	0	20-45hrs / 15	23-40hrs / 14
17/05/12	70	0	20-55hrs / 18	23-50hrs / 17
25/05/12	100	0	21-10hrs / 15	23-40hrs / 15
15/06/12	80	0	21-20hrs / 14	23-30hrs / 13

Table 3 Survey Results – 30/04/12

Species	Ditch/Pond							
	D2	D4	D7	D10	D11	D12	P3	P4
Great crested newt	-	-	-	-	-	-	-	-
Smooth newt	-	1	-	-	-	-	-	-
Palmate newt	-	-	-	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-	-	-	-
Common frog	-	-	-	-	-	-	-	-
Common toad	-	-	-	-	-	-	-	-
Tadpole	-	1	-	-	-	-	-	-
Fish	-	-	-	Y	Y	-	-	-

Table 4 Survey Results – 17/05/12

Species	Ditch/Pond							
	D2	D3	D4	D7	D10	D11	P3	P5
Great crested newt	-	-	-	-	-	-	-	-
Smooth newt	-	10	1	-	-	-	-	-
Palmate newt	-	-	-	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-	-	-	1
Common frog	-	-	-	-	-	-	-	-
Common toad	-	-	-	-	-	-	-	-
Tadpole	-	-	-	-	-	-	-	-
Fish	-	-	-	-	Y	Y	-	Y

Table 5 Survey Results – 25/05/12

Species	Ditch/Pond				
	D3	D4	D10	D11	P5
Great crested newt	-	-	-	-	-
Smooth newt	-	-	-	-	1
Palmate newt	-	-	-	-	-
Smooth/palmate newt	4	1	-	-	-
Common frog	-	-	-	-	-
Common toad	-	-	-	-	-
Tadpole	-	-	-	-	-
Fish	-	-	Y	Y	Y

Table 6 Survey Results – 15/06/12

Species	Ditch/Pond				
	D3	D4	D5	D7	D9
Great crested newt	-	-	-	-	-
Smooth newt	6	-	-	-	-
Palmate newt	-	-	-	-	-
Smooth/palmate newt	-	-	-	-	-
Smooth/palmate newt eft	2	-	-	-	-
Common frog	-	-	-	-	-
Common toad	-	-	-	-	-
Tadpole	-	-	-	-	-
Fish	-	Y	-	-	-

Table 7 Water Body Condition Assessment

Water Body	Date	Turbidity Score	Vegetation Score
D2	30/04/12	0	1
	17/05/12	0	2
D3	17/05/12	1	1
	25/05/12	2	2
	15/06/12	0-1	1-2
D4	30/04/12	0	1
	17/05/12	1	2
	25/05/12	1	1
	15/06/12	0	1-2
D5	15/06/12	0	3
D7	30/04/12	0	1
	17/05/12	0	2
	15/06/12	0	2
D9	15/06/12	0	2
D10	30/04/12	3	1
	17/05/12	4	1
	25/05/12	4	2
D11	30/04/12	1-4	1-4
	17/05/12	1-4	1-4
	25/05/12	1-4	1-4
D12	30/04/12	1	3-4
P3	30/04/12	3	0
	17/05/12	3	1
P4	30/04/12	2	0
P5	17/05/12	0	1
	25/05/12	0-3	0-3

3.3 Habitat Suitability Index Scores

3.3.1 Habitat Suitability Index (HSI) scores were calculated for all the water bodies to aid evaluation of the ponds/ditches and their surrounding habitats for their suitability for great crested newts.

3.3.2 As shown in **Tables 8** and **9**, most of the water bodies on scored quite highly and the average score was 0.71 (a perfect great crested newt habitat would score 1). The reason for such high scores across the board is due to the large numbers of ditches and ponds within 1km of each other and large areas of suitable terrestrial habitat within a 500m radius.

3.3.3 Low scores were mainly influenced by poor water quality and high densities of fish, which meant that on average the ponds scored slightly lower than the ditches.

Table 8 HSI Scores for Ponds

Pond	1	2	3	4	5	6	7	8	9	10
Score	0.79	0.78	0.54	0.55	0.67	0.79	0.87	0.41	0.47	0.55

Table 9 HSI Scores for Ditches

Ditch	1	2	3	4	5	6	7	8	9	10	11	12	15	16
Score	0.81	0.86	0.86	0.74	0.85	0.86	0.87	0.79	0.79	0.81	0.55	0.57	0.77	0.58

4.0 EVALUATION

4.1 Great Crested Newts

4.1.1 The results of the amphibian survey suggest that great crested newts are not present in any of the surveyed water bodies on the Swanscombe peninsula north of the A226. No signs of this species were recorded during the survey in 2012 and the desk-top study revealed no historical records either. The HSI scores suggest that most of the water bodies on the peninsula are highly suitable habitats so it may be that the A226 as a busy main road has proved to be an effective barrier preventing colonisation of this area.

4.1.2 Further survey work may be required to establish whether or not great crested newts are present elsewhere within the proposed development area, but for which access has not yet been possible. The lake in Bamber pit where great crested newts were recorded in 1985 scored just 0.41 on the HSI due to the high densities of fish. It may be that the fish were introduced to the lake since the record was made as it now seems highly unlikely great crested newts are found in this area.

4.2 Other Amphibian Species

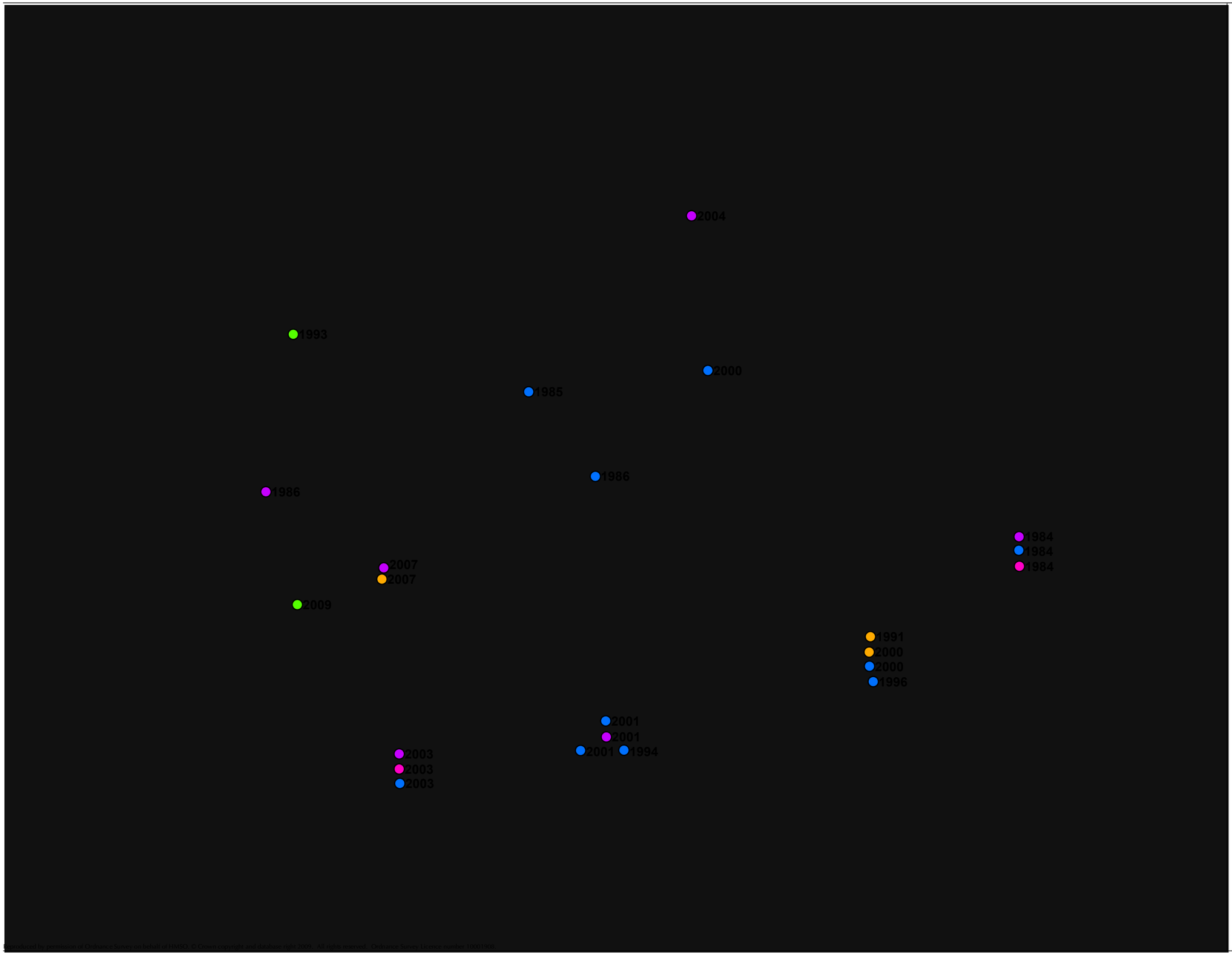
4.2.1 The results of the survey suggest that a small population of smooth newts and an unknown population of marsh frogs are found on the Swanscombe peninsula, mainly concentrated around Swanscombe Marshes.

5.0 CONCLUSIONS

5.1.1 Overall, it is concluded that great crested newts are not present in the surveyed water bodies on the Swanscombe Peninsula north of the A226. Further survey work may be required to establish whether or not they are present elsewhere within the proposed development area, for which access will be required.

5.1.2 A small population of smooth newts and an unknown population of marsh frogs (an invasive species) are the only amphibians currently found on the Swanscombe peninsula, mainly concentrated around Swanscombe Marshes.

FIGURES



KEY

Species

- Great crested newt
- Smooth newt
- Palmate newt
- Common toad
- Common frog

2000 Date of record

It should be noted that species locations are approximate - based on at least 6 figure grid references with an accuracy of 100m

0 200 400 m

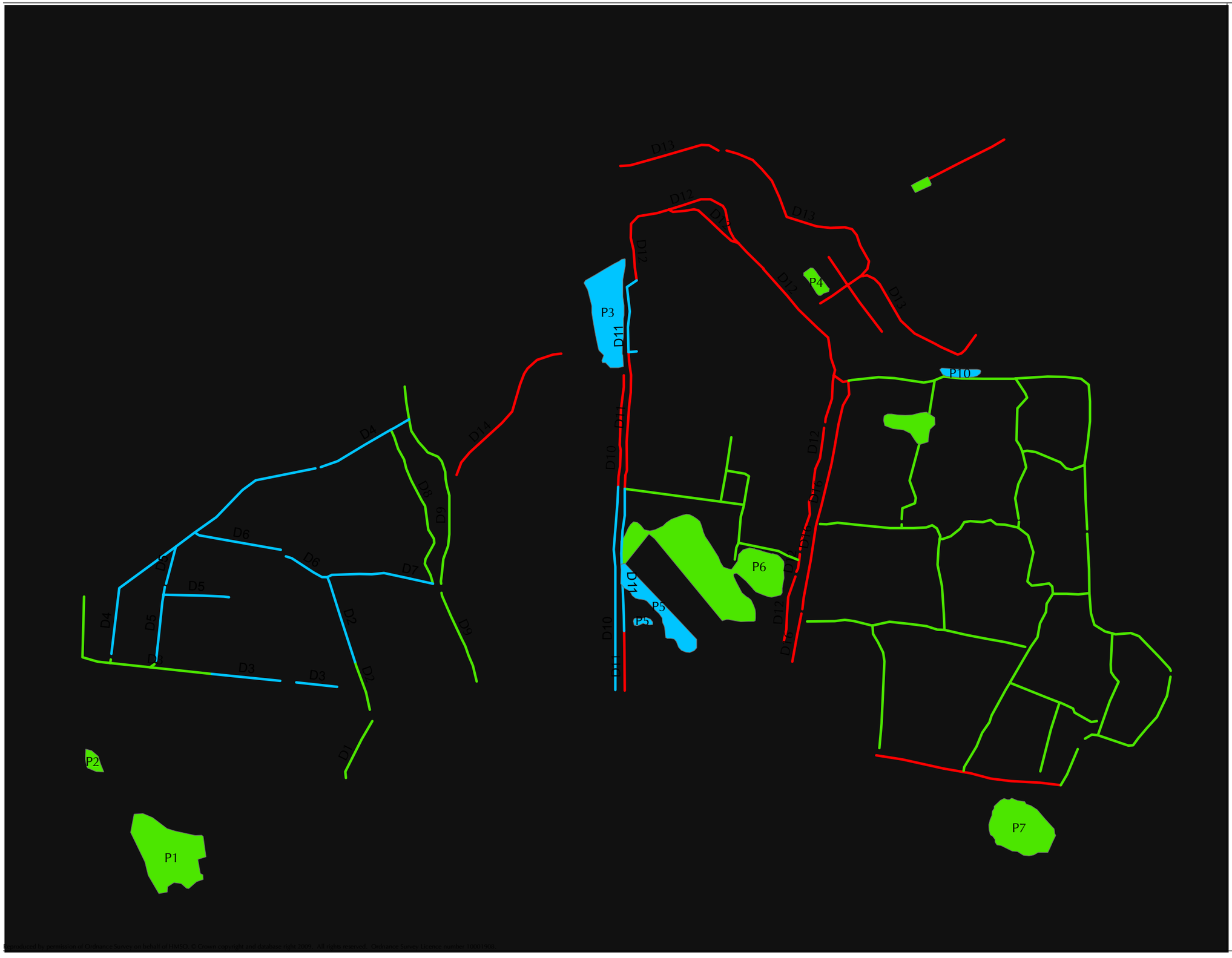
CHRIS BLANDFORD ASSOCIATES
environment landscape planning

JUNE 2012

LONDON PARAMOUNT
Amphibian Survey Report

N

FIGURE 1
Amphibian Records
(based on desk-top study data provided by KMBRC)



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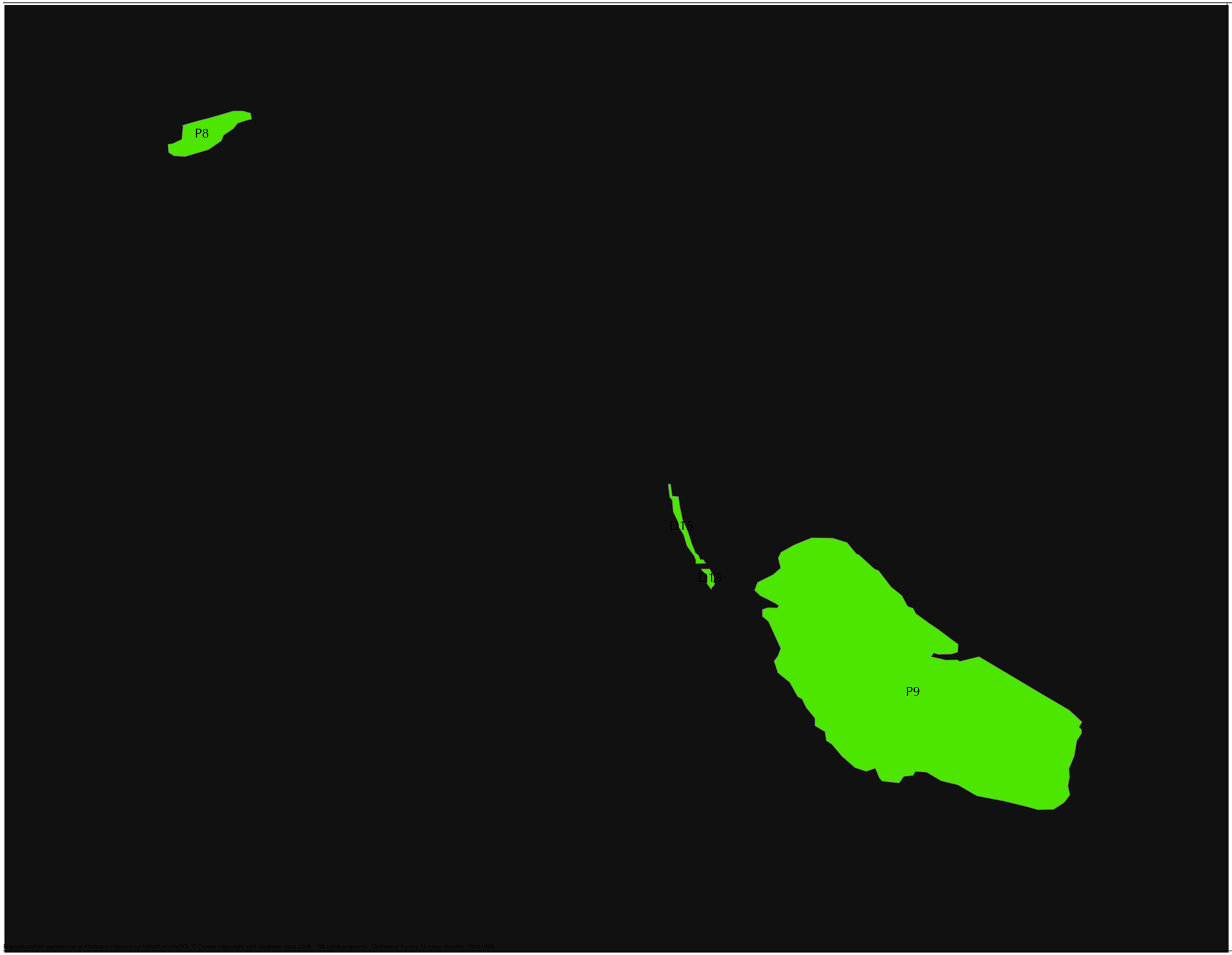
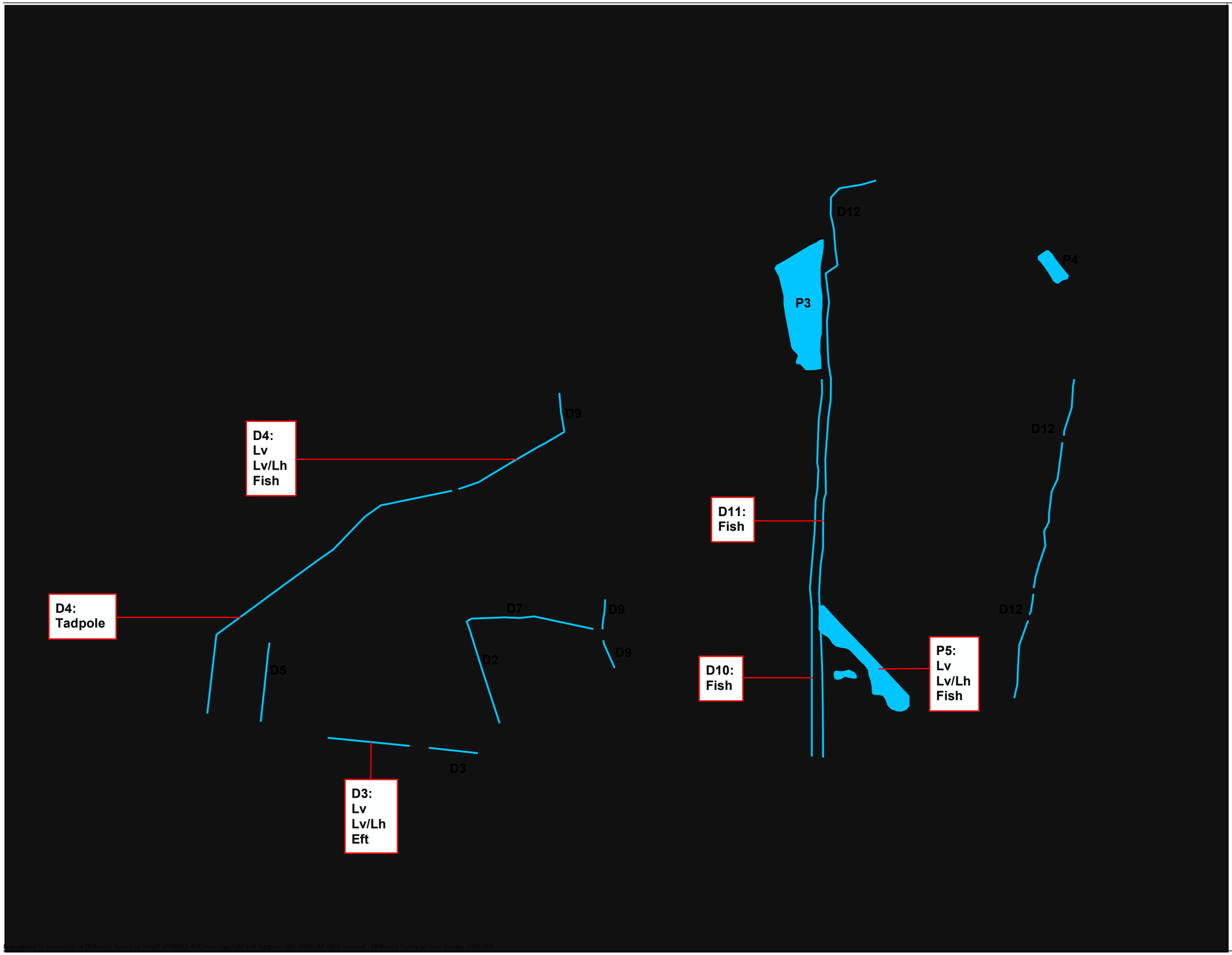
LONDON PARAMOUNT
Amphibian Survey Report

N

FIGURE 2a

Location and Status of Water Bodies on Site





APPENDICES

APPENDIX A
Site Photographs

Figure A1 Lake with surrounding willow scrub and steep-sided woodland covered banks (P1)

Figure A2 Lake fringed with common reed. The water is discoloured red/brown in places- possibly due to leachate pollution (P3)

Figure A3 Pond with steep-sided bare soil banks. The water is discoloured red/brown- possibly due to leachate contamination (P4)

Figure A4 Shallow ponds surrounded by marshy grassland (P5)

Figure A5 Lake surrounded with swamp dominated by common reed (P6)

Figure A6 A typical ditch on Swanscombe marshes – 5m wide channel dominated by common reed on the banks and occasional bulrush (D7)

Figure A7 A ditch choked with common reed (D16)

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Appendix 2: Habitat Suitability Index assessment and scores

Waterbody	1 Geo location	2 Size	3 Permanence	4 Wtr qual	5 Shade	6 Wtrfowl	7 Fish	8 Pond count within 1km	9 Terr habitat	10 Macrophytes	Product	HSI score
① Bamber Pit Pond	1		0.9	0.67	0.8	0.67	0.01	0.1	1	0.3	0.0001	0.40
	SE England - area A	n/a >2000m2	Never dries	Mod invert diversity	Approx 70%	Few birds	High fish density	No ponds within Ikm without major barriers present - major roads or rail lines. Ponds may be present in Swanscombe to west but none idd	Good	Almost no macrophytes		
② Black Duck Marsh Ditch N	1		0.9	1	1	0.67	0.33	0.9	1	0.6	0.1075	0.80
	SE England - area A	n/a >2000m2	Never dries	High invert diversity	Little	Few birds	Small numbers of stickleback	2.5/km2	Good	Approx 30%		
③ Black Duck Marsh Ditch E (N)	1		0.9	1	0.6	0.67	0.33	0.93	1	0.4	0.0444	0.73
	SE England - area A	n/a >2000m2	Never dries	High invert diversity	Approx 80%	Few birds	Small numbers of stickleback	2.9/km2	Good	Approx 10%		
④ Black Duck Marsh Ditch E (S)	1		0.9	1	1	0.67	0.33	0.93	1	0.6	0.1110	0.80
	SE England - area A	n/a >2000m2	Never dries	High invert diversity	<60%	Few birds	Small numbers of stickleback	2.9/km2	Good	Approx 30%		
⑤ Swanscombe Centre - ditches	1		0.9	0.67	1	1	0.33	0.95	1	1	0.1890	0.85
	SE England - area A	n/a >2000m2	Never dries	Mod invert diversity	<60%	No effect	Small numbers of stickleback	3.2/km2	Good	70-80% overall		
⑤ Swanscombe Centre - lagoon	1		0.9	0.67	1	1	0.33	0.95	1	0.4	0.0756	0.77
	SE England - area A	n/a >2000m2	Never dries	Mod invert diversity	Little	No effect	Small numbers of stickleback	3.2/km2	Good	Approx 10%		
⑥ CTRL Wetland N (N)	1	0.92	0.9	1	1	1	1	0.95	1	0.7	0.5985	0.95
	SE England - area A	Approx 1,200m2	Never dries	High invert diversity	Little	No effect	Absent	3.2/km2	Good	Approx 40%		
⑥ CTRL Wetland N (S)	1		0.9	1	1	0.67	1	0.95	1	0.9	0.5156	0.94
	SE England - area A	n/a >2000m2	Never dries	High invert diversity	Little	Few birds	Absent	3.2/km2	Good	Approx 60%		
⑦ CTRL Wetland S	1	0.8	1	1	1	1	1	0.95	1	0.6	0.5700	0.95
	SE England - area A	Approx 400m2	Rarely dries	High invert diversity	Little	No effect	Absent	3.2/km2	Good	Approx 30%		
⑧ CTRL Wetland/Botany Marsh Ditches	1		1	0.67	1	1	0.33	0.95	1	0.8	0.1680	0.84
	SE England - area A	n/a >2000m2	Rarely dries	Mod invert diversity	Little	No effect	Small numbers of stickleback	3.2/km2	Good	Approx 80%		
⑨ Botany Marshes Ditch N	1		0.9	0.67	1	0.67	0.33	0.93	1	0.4	0.0496	0.74
	SE England - area A	n/a part of larger ditch >2000m2	Never dries	Mod invert diversity	Little	Few birds	Small numbers of stickleback	2.9/km2	Good	Approx 10%		
⑩ Botany Marshes Pond	1		0.9	1	1	1	1	0.9	1	0.35	0.2835	0.88
	SE England - area A		Never dries	High invert diversity	Little	No effect	Absent	2.5/km2	Good	Approx 5%		
⑳ Balancing Pond	1	0.85	0.9	1	1	0.67	0.67	0.1	1	0.5	0.0202	0.68
	SE England - area A	Approx 1,700m2	Never dries	High invert diversity	Little	Few birds	No fish known but possibly present	No ponds within Ikm without major barriers present - major roads, rail lines, Ebbsfleet etc.	Good	Approx 20%		

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Sample/Report ID: 2015-1043
Client Identifier: Pond 4
Date of Receipt: 22/06/15

Condition on Receipt: Good
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Visual Inspection of Volume: Passed

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	02/07/15

Report Prepared by: Dr Helen Rees
Signed: [redacted]
Position: Senior Research Scientist
Date of preparation: 02/07/15

Report Issued by: Claire Baker
Signed: [redacted]
Position: Research Scientist
Date of issue: 02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1044
Client Identifier: top 6
Date of Receipt: 22/06/15

Condition on Receipt: Good
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Visual Inspection of Volume: Passed

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by: Dr Helen Rees
Signed: [redacted]
Position: Senior Research Scientist
Date of preparation: 02/07/15

Report Issued by: Claire Baker
Signed: [redacted]
Position: Research Scientist
Date of issue: 02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Email: [redacted]

Sample/Report ID: 2015-1045
Client Identifier: top 7
Date of Receipt: 22/06/15

Condition on Receipt: Good
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Visual Inspection of Volume: Passed

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	02/07/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:	[redacted]	Signed:	[redacted]
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1046
Client Identifier: Pond 10
Date of Receipt: 22/06/15

Condition on Receipt: Low Sediment
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by: Dr Helen Rees
Signed: [redacted]
Position: Senior Research Scientist
Date of preparation: 02/07/15

Report Issued by: Claire Baker
Signed: [redacted]
Position: Research Scientist
Date of issue: 02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1047
Client Identifier: Pond 9
Date of Receipt: 22/06/15

Condition on Receipt: High Sediment
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Visual Inspection of Volume: Passed

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Indeterminate	Real time PCR	26/06/15

Report Prepared by:	Dr Helen Rees	Report Issued by:	Claire Baker
Signed:	[redacted]	Signed:	[redacted]
Position:	Senior Research Scientist	Position:	Research Scientist
Date of preparation:	02/07/15	Date of issue:	02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1048
Client Identifier: Pond 5
Date of Receipt: 22/06/15

Condition on Receipt: Low Sediment
Visual Inspection of Volume: Passed
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by: Dr Helen Rees
Signed: [redacted]
Position: Senior Research Scientist
Date of preparation: 02/07/15

Report Issued by: Claire Baker
Signed: [redacted]
Position: Research Scientist
Date of issue: 02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Email [redacted]

Sample/Report ID: 2015-1049
Client Identifier: Pond 1
Date of Receipt: 22/06/15

Condition on Receipt: Low Sediment
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Visual Inspection of Volume: Passed

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by: Dr Helen Rees
Signed: [redacted]
Position: Senior Research Scientist
Date of preparation: 02/07/15

Report Issued by: Claire Baker
Signed: [redacted]
Position: Research Scientist
Date of issue: 02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-1050
Client Identifier: Pond 8
Date of Receipt: 22/06/15

Condition on Receipt: High Sediment
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Visual Inspection of Volume: Passed

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Indeterminate	Real time PCR	29/06/15

Report Prepared by: Dr Helen Rees
Signed: [redacted]
Position: Senior Research Scientist
Date of preparation: 02/07/15

Report Issued by: Claire Baker
Signed: [redacted]
Position: Research Scientist
Date of issue: 02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Sample/Report ID: 2015-151
Client Identifier: Pond 2
Date of Receipt: 22/06/15

Condition on Receipt: Good
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Visual Inspection of Volume: Passed

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	30/06/15

Report Prepared by: Dr Helen Rees
Signed: [redacted]
Position: Senior Research Scientist
Date of preparation: 02/07/15

Report Issued by: Claire Baker
Signed: [redacted]
Position: Research Scientist
Date of issue: 02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

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Email [redacted]

Sample/Report ID: 2015-1052
Client Identifier: Pond 3
Date of Receipt: 22/06/15

Condition on Receipt: Good
Description: 6x50mL - pond water samples in preservatives
Material Tested: DNA extracted from pond water samples

Visual Inspection of Volume: Passed

Determinant	Result	Method	Date of Analysis
Great Crested Newt	Negative	Real time PCR	26/06/15

Report Prepared by: Dr Helen Rees
Signed: [redacted]
Position: Senior Research Scientist
Date of preparation: 02/07/15

Report Issued by: Claire Baker
Signed: [redacted]
Position: Research Scientist
Date of issue: 02/07/15

Notes: eDNA analysis was carried out in accordance with the stipulated methodology found in the Technical Advice Note (WC1067 Appendix 5 Technical Advice Note) published by DEFRA and adopted by Natural England.

Appendix 1: qPCR GCN eDNA analysis results breakdown

q-PCR GCN eDNA analysis Results

Experimental Samples	Number of Positive Replicate Reactions*
Extraction Blank	0 of 12
Pond 4	0 of 12
Top 6	0 of 12
Top 7	0 of 12
Pond 10	0 of 12
Pond 9	0 of 12
Pond 5	0 of 12
Pond 1	0 of 12
Pond 8	0 of 12
Pond 2	0 of 12
Pond 3	0 of 12

Controls	Number of Positive Replicate Reactions*
Negative PCR Control (Nuclease Free Water)	0 of 4
Positive Control GCN DNA 10^{-1} ng/µL	4 of 4
Positive Control GCN DNA 10^{-2} ng/uL	4 of 4
Positive Control GCN DNA 10^{-3} ng/µL	4 of 4
Positive Control GCN DNA 10^{-4} ng/µL	4 of 4

Inhibition Control	Number of Positive Replicate Reactions at Expected C_t value†
Pond 4	2 of 2
Top 6	2 of 2
Top 7	2 of 2
Pond 10	2 of 2
Pond 9	0 of 2
Pond 5	2 of 2
Pond 1	2 of 2
Pond 8	0 of 2
Pond 2	2 of 2
Pond 3	2 of 2

Degradation Control

Expected rate of decay	None expected within time frame
Pond 4	Within Limits
Top 6	Within Limits
Top 7	Within Limits
Pond 10	Within Limits
Pond 9	Evidence of decay or residual inhibition
Pond 5	Within Limits
Pond 1	Within Limits
Pond 8	Evidence of decay or residual inhibition
Pond 2	Within Limits
Pond 3	Within Limits

* A sample is considered as positive for great crested newt if any of the replicates are positive.
† If the expected C_t value is not achieved, the sample is considered inhibited and is diluted as per the technical advice note prior to amplification with great crested newt primer and probes.

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Annex EDP 26
2015 & 2016 Reptile Survey Report (CBA August 2016)

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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 & 2016 Reptile Survey Report

DRAFT

August 2016

CHRIS BLANDFORD ASSOCIATES
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London Resort Company Holdings (LRCH) Ltd.

London Paramount Entertainment Resort

2015 & 2016 Reptile Survey Report

Approved	[redacted]
	Dominic Watkins
Position	Director
Date	19th August 2016
Revision	Draft

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 reptile desk study and survey was undertaken by CBA. This report details the methodology, results and evaluation of the desk study and of the survey undertaken during April, May and June (spring/early summer) and September and October (autumn) 2015, and during April and May 2016.

1.2 Aims

1.2.1 The aims of the reptile survey were to,

- identify whether reptile species are present within the Proposed Development Area;
- evaluate any reptile populations and assemblages present within the Proposed Development Area in relation to their nature conservation importance.

1.3 Reptile Legislation

1.3.1 All British reptiles are afforded some degree of legal protection under Schedule 5 of the Wildlife and Countryside Act 1981 (W&CA (as amended) 1981) largely as a consequence of a national decline in numbers associated with habitat loss.

1.3.2 The degree to which different species are protected varies. Smooth snake *Coronella austriaca* and sand lizard *Lacerta agilis* are considered 'fully protected'. However, both of these species are restricted in their distribution and would not occur in this study area. The other, more common reptile species, slow-worm *Anguis fragilis*, common lizard *Lacerta vivipara*, adder *Vipera berus* and grass snake *Natrix natrix* are only protected under Part of Section 9(1) and all of Section 9(5), making it an offence to:

- Intentionally kill, injure or take [Section 9(1)];
- Sell, offer for sale, possess or transport for the purpose of sale or publish advertisements to buy or sell [Section 9(5)]

1.3.3 In all cases, the legislation applies to all life stages including eggs, juveniles and adults.

1.4 Listings

1.4.1 In response to the Convention on Biological Diversity (the Rio Summit) 1992, the UK introduced the UK Biodiversity Action Plan in 1994 (UK BAP). Initially, the sand lizard was the only reptile species with a specific UK BAP Species Action Plan. However, in 2007 the UK BAP was reviewed and several new species were added, including slow-worm, common lizard, smooth snake, adder, and grass snake. More recently the 'List of habitats and species important to biological conservation in England', prepared under Part 3, section 74 of the CRoW Act 2000, has been produced (Defra, 2000), and which largely mirrors the UK BAP list.

1.5 Survey Limitations

1.5.1 Due largely to access restrictions there was variation in the number of surveys carried out between different parts of the Proposed Development Area. For example some areas (e.g. the North East Tip, Sports Field/East Quarry and the northern part of Bamber Pit) were only surveyed during the autumn (Sept/Oct) survey period. **Figure 1** illustrates the location of survey areas identified in the report text and tables.

1.5.2 Variation in survey effort was addressed through further surveys being undertaken in the spring and early summer of 2016. **Table 1** identifies the date of surveys, the areas covered by each survey and the number of surveys per area, for both the 2015 spring/early summer and autumn survey periods, and the spring/early summer surveys conducted in 2016.

1.6 Key Findings

1.6.1 Three species of reptile, common lizard, slow worm and grass snake were recorded during the surveys, of which common lizard was the most widespread and abundant, being recorded in all survey areas and with an exceptional population on Swanscombe Peninsula.

1.6.2 Swanscombe Peninsula, Craylands Lane Pit/West Quarry, Bamber Pit and North of Springhead Nursery qualify as Key Reptile Sites and would be eligible for designation as Local Wildlife Sites based on their reptile populations/assemblages. They are therefore considered to be of County Importance for reptiles. All other areas are considered to be of Local Importance.

2.0 METHOD

2.1 Desk Study

2.1.1 The following Desk Study Data was considered.

Kent and Medway Biological Records Centre (KMBRC) - Desk-top study data, including records of reptile species, for the proposed Development Area and a 2km buffer, was obtained from in January 2015.
2003 Swanscombe Peninsula - reptile survey results dating from 2003 for a number of areas across Swanscombe Peninsula[1].
2010 Botany Marsh East - reptile survey results dating from 2010[2] were also obtained for Botany Marsh East from the landowner.

2.2 Field Survey Methodology

2.2.1 Areas with the potential to support reptiles were identified within the Proposed Development Area. These included habitats such as rough and tussocky grassland, tall ruderal ('weedy') vegetation, hedgerows, scrub and woodland edge, and features such as rubble and log piles and especially areas with combinations (mosaics) of these habitats, or transitions (ecotones) between them. It also included other. These habitats, or their combination, provide reptile species with, for example, suitable areas of cover, and for basking, foraging and dispersal.

2.2.2 The survey methodology was based on guidelines for reptile surveying provided by Froglife[3] and the Herpetofauna Workers' Manual[4], and involved placing heat traps in appropriate locations within the areas identified and described above as having the potential to support reptiles. The heat traps comprised heavy-duty mineral roofing felt (felts), half of which were approximately 0.5m x 0.5m and the other half of approximately 1m x 0.5m in size.

2.2.3 Froglife (1999) suggest placing a minimum of ten heat traps per hectare, and a total of 791 felts were placed in all accessible parts of the Proposed Development Area (Swanscombe Peninsula excluding the North East Tip, Manor Way, Craylands lane Pit/West Quarry, the southern part of Bamber Pit (Bamber South), Northfleet Landfill, and North of Springhead Nursery) in late March and early April 2015. A further 20 felts were placed in CTRL West in late April once access had been agreed.

[1] Halcrow Group Limited for Land Securities Development, 2004. Swanscombe Peninsula West: Reptile Survey Report, September 2003
[2] Entec UK Limited for Britannia Refined Metals, 2011. Northfleet Site Ecological Assessment: Ecological Baseline Report
[3] Froglife 1999. Advice Sheet 10 – Reptile Survey. An Introduction to planning, conducting and interpreting surveys for snake and lizard conservation.
[4] Gent, T and Gibson, S (eds) 1998. Herpetofauna Workers' Manual. JNCC, Peterborough

2.2.4 In addition, where present (Swanscombe Peninsula, Crayland's Lane Pit/West Quarry and Bamber South), old heat traps from previous reptile surveys were also utilised. These were generally relocated to suitable positions nearby and significantly increased the number and density of heat traps in these areas. A small number of sheets of corrugated tin (tins) were also used, mainly on the Swanscombe Peninsula. Survey areas and the location of felts within the Proposed Development Area are illustrated in **Figure 1**.

2.2.5 Due to the relatively continuous nature of the habitats present the Swanscombe Peninsula (Peninsula – Peninsula West, Peninsula Centre and Broadness) was, as far as possible, treated as a single survey area and covered by single surveys. Therefore, during the spring/early summer survey period the Proposed Development Area was divided between the Peninsula and the relatively more fragmented Non-Peninsula areas (Manor Way, Craylands lane Pit/West Quarry, Bamber South, Northfleet Landfill, CTRL West and North of Springhead Nursery - **Figure 1**). In some cases both Peninsula and Non-Peninsula were surveyed during single survey events (e.g. the morning or afternoon of a single day) but on other occasions they were subject to separate survey events, for example during the morning and afternoon of single days (e.g. Peninsula surveyed in the morning and Non-Peninsula in the afternoon and vice-versa). In total, the whole of the Peninsula was surveyed 14 times and Peninsula West and Centre combined were surveyed on an additional five and four occasions respectively. The Non-Peninsula was surveyed 14-18 times (**Table 1**).

2.2.6 During each survey in each area all heat traps (including old traps) and surrounding habitat and features were checked for the presence of reptiles, and any reptiles observed were identified and recorded.

2.2.7 A further 101 felts were placed in the areas that were not accessible for survey during the spring/early summer survey period, i.e. the North East Tip, Sport's Field/East Quarry and the northern part of Bamber Pit (Bamber North) during June and late August/early September. This made a total of 912 felts for the Proposed Development Area as a whole.

2.2.8 Surveys during the autumn survey period were carried out paying particular attention to those areas not surveyed during the spring/early summer survey period. However, they also included further surveys of areas covered during the spring/early summer period. The whole Peninsula (Peninsula West and Centre, North East Tip and Broadness) was surveyed on one occasion but the separate parts (especially Broadness) were surveyed a number of times (**Table 1**).

2.2.9 Prior to the commencement of the 2016 surveys a further five heat traps were added to the array in CTRL West, eight in Bamber Pit North, 30 within the Central Peninsula area and 27 on

Broadness, bringing the overall total to around 982 covering the whole of the Proposed Development Area.

2.2.10 Additionally, 23 heat traps situated along the western boundary of Broadness were relocated slightly further inland.

2.2.11 The number of felts placed in each survey area is listed below.

Peninsula		**Non-Peninsula**	
Peninsula West	169	Manor Way	10
Peninsula Centre	229	Crayland's lane Pit/West Quarry	45
Broadness	194	Sport's Field/East Quarry	43
North east Tip	47	Bamber North	19
		Bamber South	56
Total	**639**	Northfleet Landfill	64
		CTRL West	25
		North of Springhead Nursery	81

2.3 Evaluation Methodology

2.3.1 Guidelines for the selection of SSSIs[5] provide criteria for identifying nationally important populations and assemblages of reptiles. In addition, the methodology developed by Froglife[6] for the identification of Key Reptile Sites can be used to evaluate the importance of reptile populations / assemblages that do not meet these criteria. This is based on the maximum count of individuals obtained of each species during any single survey (summarised in **Table 2**). To qualify as a Key Reptile Site the site in question must meet at least one of the following criteria:

- support three or more reptile species;
- support two snake species;
- support an exceptional population of one species (see **Table 2**);
- supports an assemblage of species scoring at least four (see **Table 2**); or
- where it does not meet other criteria but population(s) present are of particular regional importance due to local rarity.

Guidance for the selection of Local Wildlife Sites in Kent[7] for reptiles is based on this methodology.

[5] JNCC 1989. Guidelines for selection of biological SSSI's. Peterborough
[6] Froglife 1999. Advice Sheet 10 – Reptile Survey. An Introduction to planning, conducting and interpreting surveys for snake and lizard conservation
[7] Kent Wildlife Trust on behalf of the Kent Nature Partnership, 2015. Local Wildlife Sites in Kent - Criteria for Selection and Delineation Version 1.5

Table 2 Population size class and scores used in the evaluation of reptile assemblages for the identification of Key Reptile Sites. Numbers refer to the maximum number of individual adults recorded during a single survey.

	Low Population ***Score 1***	**Good Population** ***Score 2***	**Exceptional Population** ***Score 3***
Adder	<5	5-10	>10
Grass snake	<5	5-10	>10
Slow worm	<5	5-20	>20
Common lizard	<5	5-20	>20

3.0 RESULTS

3.1 Desk Study

KMBRC

3.1.1 Desk study data received from KMBRC included records of common lizard, slow worm and grass snake from within and adjoining the proposed Development Area. Common lizards have been recorded from Swanscombe Peninsula and the Bamber Pit/Northfleet Landfill area. Slow worms have been recorded from a location near the western end of Craylands lane Pit/West Quarry, the Bamber Pit/Northfleet Landfill area and from within Swanscombe. Grass snakes have been recorded from the Swanscombe Peninsula, the Bamber Pit/Northfleet Landfill area and along the Ebbsfleet immediately east of the CTRL.

2003 Swanscombe Peninsula

3.1.2 Common lizards were widely recorded across the Peninsula and a small number of grass snakes were recorded close to Black Duck Marsh.

2010 Botany Marsh east

3.1.3 A good population of common lizard and small populations of slow worm and grass snake (see **Table 2**) were recorded in Botany Marsh East in 2010.

3.2 Survey results

3.2.1 Weather conditions during the surveys are detailed in **Table 3**.

3.2.2 Three species of reptile, common lizard, slow worm and grass snake were recorded during the survey. Details of all reptile records are provided in **Table 4** and locations where reptiles were recorded are illustrated in **Figure 2**. **Table 5** summarises the reptile species recorded in each survey area. **Table 6** identifies the number of reptiles of each species recorded during each survey, for all individuals and for adults only, and identifies the peak counts (adults only) for each species for each survey area. **Table 7** summarises the peak counts for each species for each survey area.

3.2.3 Common lizards were the most widespread and abundant species recorded. They were recorded in all survey areas. The highest peak count was of 49 adults on the Peninsula on the 23rd May 2016 pm. The next highest counts were 14 in Bamber South (15th May 2015 pm) and

11 in North of Springhead Nursery (15th May 2015 pm, 21st May 2015 am and 20th May 2016 pm)).

3.2.4 Slow worms were recorded in four of the survey areas. The highest peak counts were of 13 adults in Craylands Lane Pit/West Quarry (15th June 2015 am) and 7 in Bamber South (4th June 2015 am). A peak count of three was recorded on three occasions in North of Springhead Nursery and of two on two occasions in Bamber Pit North in May 2016. There was a single record of one individual on the Peninsula (24th April 2015 pm).

3.2.5 Grass snakes were recorded in all survey areas except Sports Field/East Quarry and CTRL West. The highest peak count was of six adults on the Peninsula on 8th June 2015 pm. A peak count of three was recorded in Bamber South (16th April 2015 am) and all other areas recorded a peak count of one. Grass snakes were also recorded in Botany Marsh East.

3.2.6 Adult, sub-adult and juvenile life stages of all three species were recorded.

Records by Area

Peninsula

3.2.7 Common lizards were recorded throughout the peninsula, but at lower density on Broadness than elsewhere, and here most records were from the embankments on its southern fringe. Grass snakes were recorded throughout the west and centre of the peninsula (but not Broadness), but there was a particular concentration of records in the west, in the areas surrounding and adjoining Black Duck Marsh. The single record of slow worm was from alongside the track between the CTRL Wetland to the west and Botany Marsh to the east.

3.2.8 The North East Tip was patchily but quite heavily disturbed by works during winter and spring of 2014-15 and only small numbers of common lizards were recorded here in autumn 2015.

Manor Way

3.2.9 Small numbers of common lizard and grass snake were recorded along the northern and eastern boundaries respectively.

Craylands Lane Pit/West Quarry

3.2.10 As well as common lizards this generated the largest number of records of slow worm of any part of the Proposed Development Area. There was a single record of grass snake, at the western end of the Pit.

Sports Field/East Quarry

3.2.11 Common lizards were recorded throughout the quarry but the highest density was in its northern half.

Bamber Pit (North and South)

3.2.12 Good numbers of all three species were consistently recorded throughout the larger, southern part of the Pit (Bamber South) and along the adjoining embankment beside the CTRL. Suitable habitat is more limited in the north of the Pit and only small numbers of common lizard, slow worm and grass snake were recorded here.

Northfleet Landfill

3.2.13 Common lizard and smaller numbers of grass snake were recorded along the southern, eastern and northern boundaries. Common lizards were also recorded in areas around the exposures near the centre.

CTRL West

3.2.14 Common lizards were recorded from the (spoil) mounds in the northern part of this area.

North of Springhead Nursery

3.2.15 Common lizard and grass snake were recorded throughout this area and slow worm largely along the eastern edge, adjoining the woodland along the Ebbsfleet.

4.0 EVALUATION

4.1 Survey Evaluation

4.1.1 Using Froglife's methodology[8] (section 2.2) **Table 8** identifies the population size class for each species, the number of species recorded and the assemblage score for each survey area. It also identifies which areas qualify as Key Reptile Sites and the relevant qualifying criteria.

4.1.2 The Peninsula, Craylands Lane Pit/West Quarry, Bamber Pit and North of Springhead Nursery qualify as Key Reptile Sites and would be eligible for designation as Local Wildlife Sites[9] based on their reptile populations/assemblages. They are therefore considered to be of County Importance for reptiles. All other areas are considered to be of Local Importance.

[8] Froglife 1999. Advice Sheet 10 – Reptile Survey. An Introduction to planning, conducting and interpreting surveys for snake and lizard conservation

[9] Kent Wildlife Trust on behalf of the Kent Nature Partnership, 2015. Local Wildlife Sites in Kent - Criteria for Selection and Delineation Version 1.5

TABLES

Table 1 Date and number of surveys

Spring/early summer

Date/time	Pen W + C	Pen all	Non-Pen	Comments
16/04/2015 am			✓	
20/04/2015 am		✓		
20/04/2015 pm			✓	
24/04/2015 am			✓	CTRL bank by Bamber Pit 1st surveyed
24/04/2015 pm	✓			
28/04/2015 am		✓		
11/05/2015 am		✓		
11/05/2015 pm			✓	CTRL W first surveyed
15/05/2015 am		✓	✓	
19/05/2015 am		✓	✓	
21/05/2015 am	✓		✓	
26/05/2015 pm	✓		✓	
01/06/2015 am		✓		
04/06/2015 am			✓	
08/06/2015 pm		✓	✓	
11/06/2015 am		✓	✓	
15/06/2015 am		✓	✓	
Total	**3**	**9**	**12**	

Autumn

Date/time	Pen W	Pen C	Bdness	NE Tip	Mnr Way	W Quarry	E Quarry	Bamber N	Bamber S	Nthflt L	CTRL W	N of Sprnghd
02/09/2015 pm							✓					
14/09/2015 am				✓								
14/09/2015 pm			✓									
22/09/2015 am				✓								
22/09/2015 pm			✓									
23/09/2015 am				✓			✓	✓	✓			
23/09/2015 pm	✓	✓	✓									
24/09/2015 am					✓		✓	✓				
24/09/2015 pm						✓					✓	
25/09/2015 am									✓			✓
28/09/2015 am-pm	✓							✓				
29/09/2015 am												✓
29/09/2015 pm			✓				✓	✓			✓	
30/09/2015 am							✓	✓	✓			
30/09/2015 pm			✓		✓	✓				✓		
01/10/2015 am	✓	✓		✓								
01/10/2015 pm							✓	✓				
08/10/2015 am				✓			✓	✓				
08/10/2015 pm												✓
Total	**3**	**2**	**5**	**5**	**2**	**2**	**7**	**7**	**3**	**1**	**2**	**3**

Spring / early summer 2016

Date / Time	Whole Pen	Bdness	E Quarry	Bamber N	Nthflt L	CTRL W
27/04/2016 pm		✓		✓	✓	✓
28/04/2016 am	✓					
06/05/2016 am	✓		✓	✓	✓	✓
13/05/2016 am	✓		✓	✓	✓	✓
16/05/2016 pm			✓	✓		
19/05/2016 pm			✓	✓		✓
20/05/2016 pm			✓	✓	✓	✓
23/05/2016 pm	✓		✓	✓	✓	✓
27/05/2016 am			✓	✓		✓
Total	**4**	**1**	**7**	**8**	**6**	**7**

Spring/early summer + autumn

Area	Whole Pen	Pen W	Pen C	Bdness	NE Tip	Mnr Way	W Quarry	E Quarry	Bamber N	Bamber S	Nthflt L	CTRL W	N of Sprnghd
Total	**14**	**19**	**18**	**19**	**9**	**14**	**14**	**14**	**15**	**15**	**18**	**16**	**15**

Table 3 Weather conditions during surveys

Spring/early summer Date/time	Temp (°C)	Wind (Beaufort)	Cloud (%)	Rain
16/04/2015 am	15-19	2-4	5-60	No
20/04/2015 am	14-17.5	2-4	<5	No
20/04/2015 pm	19.5-17	2-4	<5	No
24/04/2015 am	12-15.5	1-2	80	No
24/04/2015 pm	21-20	1-2	General v thin	No
28/04/2015 am	12-18	1-3	10-20	No
11/05/2015 pm	24-19	1-2	10-50	No
15/05/2015 am	13-18	1-3	50-100	No - but drying after overnight rain
19/05/2015 am	13-18	4	50-90	Occasional light showers in latter part
21/05/2015 am	16-20	1-2	20-80	No
26/05/2015 pm	20-18	1	50-80	No
01/06/2015 am	16-19.5	2-3	50-100	One short shower halfway
04/06/2015 am	16-20	1-2	0-30	No
08/06/2015 pm	18-16	2-4	80-100	No
11/06/2015 am	19-20	3-4	0	No
15/06/2015 am	17-19	3-4	90-20s	No

Autumn Date/time	Temp (°C)	Wind (Beaufort)	Cloud (%)	Rain
02/09/2015 pm	18	2	50	Recent shower bt dry during survey
14/09/2015 am	19		0	No
14/09/2015 am	18		40	No
14/09/2015 pm	19-16	1-2	60	No
22/09/2015 am	18		40	No
22/09/2015 pm	18		50	No
23/09/2015 am	15-19	1-3	<5-25	No - ground wet after rain but drying
23/09/2015 pm	19-18	3	20-100	No - drying after early rain
24/09/2015 am	17.5-19.5	2-4	40-100	No
24/09/2015 pm	19.5-18	3-4	70-50	No
25/09/2015 am	16-18		40	No
28/09/2015 am-pm	16-17		50	No
29/09/2015 am	19-20	4-5	10-20	No
29/09/2015 pm	21-19	4-5	10-20	No
30/09/2015 am	17.5-19.5	4-5	30-10	No
30/09/2015 pm	20.5-18	4-5	10-20	No
01/10/2015 am	19-20	4-5	10-30	No
01/10/2015 pm	19-18	4-5	30-10	No
08/10/2015 am	18-19	1-2	10-30	No
08/10/2015 pm	19-18.5	2-3	50-60	No

Spring 2016 Date/time	Temp (°C)	Wind (Beaufort)	Cloud (%)	Rain
27/04/2016 pm				No
28/04/2016 am				No
06/05/2016 am	14-19	1-2	10	No
13/05/2016 am	15-20	3-4	30-10	No
16/05/2016 pm	16-17	0-1	70	No
19/05/2016 pm	16-17	1-2	90	No
20/05/2016 pm	14-17	2-4	50	No
23/05/2016 pm	15-19	2-4	90-40	No - a few spots later
27/05/2016 am	14	1-2	70	No

Table 4 Reptile survey results (excluding areas with no records)

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
30/03/2015 am	Peninsula	247	1	cl	a	Old felt nearby during set up
02/04/2015 pm	Bamber Pit S	763-774	3	sw	2a + 1j	Under old felts along south edge of pit during set up
		796	1	gs	a	Basking nearby during set up
13/04/2015 am	N of Springhd Nursery	705	1	cl	a	
		706	1	cl	a	
		711	1	cl	a	
15/04/2015 am	Peninsula	3	1	cl	a	Nearby
		25	1	gs	a	Nearby
		62	1	cl	a	Nearby, in trough between embankments
		415	1	cl	a	Nearby
		595-596	1	cl	a	Nearby
16/04/2015 am	West Quarry	625	1	sw	a	Old felt nearby
		633	1	cl	a	Old felt nearby
		635	1	sw	a	
		635	1	cl	j	
		636	2	sw	1a + 1sa	
		637	2	sw	a	Old felt nearby
		638	1	sw	sa	
		639	1	sw	j	
		640	1	sw	a	
	Bamber Pit S	762	1	cl	a	
		764	2	sw	a	Old felt nearby
		764	1	gs	a	Old felt nearby
		772	2	cl	1a + 1j	
		774	1	sw	a	
		782	1	sw	a	Old felt nearby
		783	1	gs	a	
		785	1	sw	a	
		785	1	cl	a	
		792				1 toad
		802	2	sw	a	Old felt nearby
		809	1	gs	a	Dead nearby
		810	1	cl	j	Old felt nearby
	Northfleet Landfill	214	1	cl	a	
		217	2	cl	a	
	N of Springhd Nursery	698	1	cl	a	
		715	2	cl	j	
		716	1	cl	a	
		717	1	cl	sa	
		734	1	cl	a	
20/04/2015 am	Peninsula	4	1	gs	sa	
		6	1	cl	a	
		58-60	1	cl	a	Old felt nearby
		120	1	cl	a	
		227	1	cl	a	Nearby
		238	1	cl	a	
		257	1	cl	j	On path nearby
		267	2	gs	j	Under old felts nearby
		281	1	cl	a	Nearby, on rock armour immediately SE of pylon
		397	1	cl	a	
		449	1	cl	a	
		496	1	cl	a	
		596	1	cl	a	
		598	1	cl	a	
	Botany Marsh East	644	1	gs	a	
20/04/2015 pm	West Quarry	618	1	cl	a	
		634	1	sw	a	
		637	1	sw	sa	
		639	1	sw	j	
		640	1	sw	a	
	Bamber Pit S	765	1	cl	a	Nearby
		764	1	cl	sa	Old felt nearby
		764	1	sw	a	Old felt nearby
		774	1	sw	a	
		776	1	cl	a	Old felt nearby
		779	1	cl	a	Nearby
		792				1 toad
		802	2	sw	a	Old felt nearby
		802	1	cl	a	Old felt nearby
		809	1	cl	j	
	Northfleet Landfill	202	1	gs	a	
		206	1	cl	j	
	N of Springhd Nursery	696	1	cl	sa	
		706	1	cl	j	
		710	1	cl	a	
		711	1	cl	a	
		712	1	cl	a	
		715	3	cl	j	
		722	1	cl	j	
		735	1	cl	a	
		739	1	cl	a	
		742	1	cl	sa	
		746	1	cl	j	
		747	1	cl	a	
		748	1	cl	a	
		752	1	cl	a	
22/04/2015 pm	Peninsula	281-306	1	cl	a	On path, SW corner of inlet
24/04/2015 am	Manor Way	820	1	cl	sa	
	West Quarry	618	1	sw	j	
		625	1	sw	a	Old felt nearby
		636	2	sw	1a + 1j	
		637	1	sw	a	Old felt nearby
		638	1	sw	j	
		640	1	sw	a	
		840	1	cl	j	
		841	1	sw	a	
		844	1	sw	a	
	Bamber Pit S	761-774	12	sw	5a + 2sa + 5j	Along S edge of site
		766	1	cl	j	
		787	3	cl	1a + 2sa	Old felt nearby
		790	2	cl	sa	Old felt nearby
		792	1	sw	sa	Old felt nearby
		847	3	cl	2a + 1sa	
	Northfleet Landfill	200	1	cl	a	
		202	1	gs	a	
		205	1	cl	a	
		206	1	cl	a	
		212	1	cl	j	
		220	1	cl	j	
		223	1	cl	a	
	N of Springhd Nursery	710	1	cl	a	
		711	1	cl	a	
		712	1	cl	a	
		714	1	sw	j	
		715	1	cl	a	
		730	1	cl	a	
		746	1	cl	a	
		752	1	cl	a	
		756	1	cl	a	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
24/04/2015 pm	Peninsula	3	1	cl	j	
		20	1	cl	a	Old felt nearby
		20	1	cl	a	
		26	1	cl	a	
		51	1	cl	a	Old felt nearby
		57	1	cl	a	
		58	1	cl	a	
		59	1	cl	a	
		69	1	gs	a	
		71	1	cl	a	
		92	1	cl	a	Old felt nearby
		145	1	sw	a	
		229	1	cl	a	
		230	2	cl	1a + 1j	Old felt nearby
		384	1	gs	a	Nearby, crossing track
		395	1	cl	a	
		398	1	cl	sa	Old felt nearby
		415-420	2	cl	a	Old felts in area to S
		473	2	cl	a	
		485	1	cl	a	
		494	2	cl	a	
		496	1	cl	a	
		497	1	cl	a	
		512	1	cl	a	
		514	1	cl	a	
		517	1	cl	a	
		522	1	cl	a	
		531	1	cl	a	
		550	1	cl	a	
28/04/2015 am	Peninsula	3	1	cl	a	
		9-10	1	cl	a	Between felts
		18-19	1	cl	a	Old felt between
		40	1	cl	a	On bank beside marsh SE of felt
		69	1	gs	a	
		108	1	cl	a	Tin on other side of track
		226-227	1	gs	a	Between felts
		235	1	cl	a	
		238	1	cl	a	
		242-243	1	gs	a	By log pile between felts
		243	1	cl	a	
		253	1	cl	a	
		256	1	cl	a	
		256-257	1	cl	a	Between felts
		399	1	cl	a	Old felt nearby
		422	1	cl	a	Old felt nearby
		430-431	1	cl	a	Old felt nearby
		497	1	cl	a	
11/05/2015 pm	Peninsula	7	1	cl	a	Old felt nearby
		13	1	cl	a	
		17-18	1	cl	a	Between felts
		55	1	cl	a	On tin beside herp fence on boundary with construction site
		120	2	cl	1a + 1j	
		135	1	cl	a	
		145	1	gs	a	
		148	1	cl	a	
		227	1	cl	a	
		229	2	cl	1a + 1sa	
		232	2	gs	sa	Tin nearby
		232	1	gs	sa	
		234	1	cl	a	Nearby
		238	1	gs	sa	
		267	1	gs	a	Old felt nearby - 10m to S
		291	1	cl	a	
		348	1	cl	a	
		410	1	cl	a	Old felt nearby, on mound
		416	1	gs	a	Old felt to S
		421	1	cl	sa	Old felt nearby
		430-431	1	cl	a	Old felt between
		455	1	cl	a	
		459	2	cl	sa	
		472	1	cl	a	
		479	1	cl	a	Old felt nearby
		481	1	cl	a	
		515	1	cl	a	
		521	1	cl	a	
		534	2	cl	a	
		568	1	cl	a	
11/05/2015 pm	West Quarry	606	1	sw	j	
		612	1	sw	a	Old felt nearby
		615	1	cl	a	
		616	1	cl	j	Old felt nearby
		636	2	sw	1a + 1j	Old felt on other side of track
		637	2	sw	1a + 1j	
	Bamber Pit S	761	1	cl	a	Old felt nearby
		766	2	cl	a	Old felt nearby
		766	1	gs	j	Old felt nearby
		768	2	cl	a	
		769	1	cl	a	Old felt nearby
		770	2	cl	a	Old felt nearby
		771	1	cl	a	
		771	2	sw	1a + 1j	
		772	3	cl	a	Old felt nearby
		779	1	cl	j	Old felt nearby
		787	1	sw	j	Old felt nearby
		796	1	gs	j	Old felt nearby
		802	1	sw	sa	Old felt nearby
		846	1	cl	a	
	Northfleet Landfill	204	1	cl	j	
		206	1	cl	a	
		218	1	cl	a	
		219	1	cl	j	
		221	1	gs	j	
	N of Springhd Nursery	681	1	cl	a	
		690	1	cl	a	
		693	1	cl	a	
		697	1	cl	a	
		697	1	sw	j	
		705	1	sw	j	
		708	1	cl	a	
		709	1	cl	a	
		716	1	cl	a	
		757	1	cl	a	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
15/05/2015 am	Peninsula	3	1	cl	a	
		14	1	cl	a	Old felt nearby
		20	1	cl	j	
		25	1	cl	a	
		30	1	cl	a	
		57	1	gs	a	
		97	1	cl	a	Old felt nearby
		145	1	cl	a	
		227	1	gs	a	Old felt nearby
		230	2	cl	j	Old felt nearby
		278	1	cl	a	
		284	1	cl	a	
		397	1	cl	a	Old felt nearby
		406	1	cl	a	Nearby
		407	1	cl	a	
		473	1	cl	a	
		512	1	cl	j	
		570	1	cl	sa	
		598	1	cl	a	
	West Quarry	631-632	5	sw	sa	Old felt between
		841	1	sw	a	
		844	1	sw	a	
	Bamber Pit S	762	2	cl	sa	
		763	1	cl	a	Old felt nearby
		766	1	gs	j	
		766	3	cl	1a +2sa	Old felts nearby
		769	2	cl	a	Old felts nearby
		770	3	cl	2a + 1sa	Old felts nearby
		773	1	cl	a	
		776	1	cl	sa	
		782	1	cl	sa	Old felt nearby
		790	2	cl	1a + 1sa	
		790	1	cl	a	Old felt nearby
		792	1	cl	sa	
		794	1	cl	sa	
		795	1	gs	a	
		796	1	cl	a	
		799	1	cl	a	Old felt nearby
		800	2	cl	a	
		847	1	cl	a	
		848	3	cl	2a + 1sa	
		850	1	cl	sa	
	Northfleet Landfill		1	cl	a	On grass
		216	1	cl	a	
		217	1	cl	a	
	N of Springhd Nursery	696	1	cl	a	
		706	1	cl	sa	
		708	1	cl	a	
		711	3	cl	a	
		712	1	cl	a	
		714	1	cl	a	
		714	1	gs	j	
		724	1	cl	a	
		736	1	cl	sa	
		739	2	cl	1a + 1sa	
		740	1	cl	a	
		740	1	gs	sa	
		749	1	cl	1a + 1sa	
		751	1	cl	sa	
		752	1	cl	a	
		756	2	cl	sa	
		756	2	gs	j	
		760	1	cl	a	
19/05/2015 am	Peninsula	7	1	cl	a	
		12	1	gs	a	
		13	1	cl	a	
		24	1	cl	j	
		57	1	gs	a	
		68	1	gs	a	
		124	1	cl	a	
		137	1	cl	a	
		145	1	cl	a	
		226	1	gs	a	
		227	3	cl	1a +2j	Old felts nearby
		227	2	gs	j	Old felt nearby
		228	1	cl	a	
		243	1	cl	sa	
		245	1	cl	a	
		277	2	gs	j	
		291	1	cl	a	
		397	1	cl	sa	Old felt nearby
		398	1	cl	a	
		512	1	cl	a	
		568	1	cl	a	
	West Quarry	616	2	cl	j	
		616	1	cl	j	Old felt nearby
		632	1	sw	j	Old felt nearby
		635	1	cl	a	
		637	1	sw	j	
		637	1	sw	j	Old felt nearby
		638	1	sw	a	Old felt opposite side of track
		842	1	sw	a	Old carpet few m to N
	Bamber Pit S	764	1	sw	j	
		766	1	cl	a	Old felt nearby
		770	3	cl	j	Old felts nearby
		772	1	cl	j	Old felt nearby
		772	4	cl	2a +1sa +1j	
		772	1	gs	j	Old felt nearby
		773	1	cl	sa	Old felt nearby
		774	1	cl	j	Old felt nearby
		775	1	cl	a	Old felt nearby
		777	1	cl	a	Old felt nearby
		778	1	cl	j	
		787	4	cl	1a +2sa +1j	
		792	3	cl	1a +2j	Old felt nearby
		799	1	gs	j	Old felt nearby
		802	1	cl	a	
		802	1	gs	j	
		846	1	cl	sa	
		847	1	cl	a	
	Northfleet Landfill	174	1	cl	a	
		225				Piece of sw
	N of Springhd Nursery	740	1	gs	sa	
		751	1	gs	j	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
21/05/2015 am	Peninsula	25	1	cl	sa	
		76	1	cl	a	
		124	1	cl	a	
		145	1	cl	a	
		226	1	cl	a	Old felt nearby
		227	1	gs	a	Old felt nearby
		240	1	cl	sa	Old felt nearby
		400	1	cl	a	
		406	1	cl	a	
		421-422	1	cl	a	Old felt between
		430-431	1	cl	a	Old felt between
		473	1	cl	a	
		831	1	cl	a	
	West Quarry	601	2	sw	1a + 1j	
		632	1	sw	a	Old carpet nearby
		635	1	cl	a	Old felt down towards tunnel
		635	1	sw	a	Old felt down towards tunnel
		638	2	sw	1sa + 1j	Old felt nearby
		639	1	sw	j	
		640	1	sw	a	
		844	1	sw	j	
	Bamber Pit S	764	3	sw	a	Old felt 5m to W
		764	1	gs	sa	Old felt 5m to W
		766	1	gs	a	Old felt 10m to W
		767	1	cl	a	Old felt nearby
		771	1	sw	a	
		771	2	sw	j	Old felt 10m to S
		773	1	sw	a	Old felt nearby
		776	1	gs	sa	
		776	1	gs	sa	Old felt 10m to N
		780	1	cl	a	
		785	1	cl	a	Old felt nearby
		787	1	cl	sa	Old felt 10m to N
		787	1	cl	sa	
		787	1	gs	j	Old felt nearby
		792	1	cl	a	Old felt 5m to N
		793	1	cl	a	Old felt nearby
		793	1	gs	j	Old felt 10m to S
		802	1	sw	a	Old felt nearby
		802	2	cl	a	Old felt nearby
		802	1	gs	sa	Old felt nearby
		806	1	sw	a	
	N of Springhd Nursery	708	3	cl	1a + 2sa	
		709	1	cl	sa	
		710	1	cl	a	
		715	2	cl	sa	
		717	1	cl	a	
		719	1	cl	sa	
		722	1	gs	j	
		724	2	cl	1a + 1sa	
		726	2	gs	sa	
		726	1	cl	a	Nearby
		736	1	cl	a	
		739	1	cl	a	
		740	2	cl	1a + 1sa	
		740	1	gs	a	
		744	1	cl	a	
		747	1	cl	a	
		748	1	cl	a	
		756	2	gs	sa	
		757	1	gs	sa	
26/05/2015 pm	Peninsula	20	1	cl	a	Old felt nearby
		21	1	cl	a	Old felt nearby
		50	1	gs	a	
		57	1	cl	a	
		145	1	cl	a	
		256	1	cl	a	Old felt nearby
		262	2	gs	j	Old felt nearby
		473	1	cl	a	
		543	1	gs	a	
	West Quarry	601	1	sw	a	
		606	1	sw	sa	
		632	1	sw	sa	Old carpet nearby
		634	1	sw	a	Old felt nearby
		635	1	sw	sa	Old felt down towards tunnel
		636	1	cl	a	
		637	1	sw	sa	Old felt nearby
		638	1	sw	sa	Old felt nearby
		639	1	sw	sa	Old felt nearby
		640	1	sw	a	
		640	1	sw	sa	Old felt nearby
		640	1	sw	sa	Old felt nearby
		843	1	cl	a	
	Bamber Pit S	764	1	cl	a	Old felt nearby
		765	2	cl	a	Old felt nearby
		766	2	cl	1a + 1j	
		785	1	cl	j	
		798	1	gs	j	Old felt nearby
		846	1	cl	a	
	Northfleet Landfill	174	1	cl	a	
		208	1	cl	a	
		220	1	cl	a	
		223	1	cl	a	
		224	1	cl	a	
		827	2	cl	a	
		828	1	cl	a	
	N of Springhd Nursery	693	1	cl	a	
		699	1	cl	j	
		700	2	cl	1a +1j	
		710	1	cl	j	
		711	1	cl	a	
		756	1	gs	j	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
01/06/2015 am	Peninsula	1	3	cl	j	Old felts to W
		30	1	gs	j	Old felt nearby
		48	1	gs	sa	Old felt nearby
		58	1	cl	j	Old felt nearby
		62	1	cl	a	
		67	1	cl	j	
		80	1	cl	a	
		153	1	cl	a	
		267	1	gs	sa	Old felt nearby
		280	1	cl	a	
		317	1	cl	a	
		397	1	cl	a	Old felt 10m to E
		411	1	cl	a	
		411	1	cl	sa	Old felt nearby
		412	1	cl	a	Tin nearby
		414	1	cl	a	
		424	1	cl	a	
		429	1	cl	a	
		447	1	cl	a	Old felt 10m to SE
		473	1	cl	a	
		496-497	1	cl	a	Old felt between
		536	1	gs	a	
		541-542				Gs skin beneath old felt between, on S side of mound
		553	1	cl	a	Old felt in far SW corner of area
		596	1	cl	a	
04/06/2015 am	West Quarry	633	1	sw	a	
		635	1	sw	a	
		635	1	cl	a	Old felt nearby
	Bamber Pit S	763	1	sw	a	Old felt 5m to E
		763	1	sw	j	Old felt 5m to S
		764	1	sw	j	Old felt 10m to W
		766	1	sw	a	
		771	1	cl	a	Old felt 5m to N
		772	2	cl	a	
		773	1	cl	a	
		775	1	sw	sa	
		776	1	cl	a	
		776	1	sw	j	
		779	1	sw	a	
		781-782	1	sw	a	Old felt between
		782	1	sw	a	
		787	1	sw	a	
		787	1	sw	a	Old felt 5m to E
	Northfleet Landfill	202	1	gs	a	
		824	2	gs	j	
	N of Springhd Nursery	708	3	sw	a	
		708	1	gs	j	
		711	1	cl	a	
		714	2	sw	a	
		715	1	sw	a	
		724	1	cl	a	
		751	1	cl	a	
08/06/2015 pm	Peninsula	1	1	cl	j	Old felt nearby
		2	1	cl	a	
		18	1	cl	j	Old felt nearby
		39	2	gs	a	Old felt 5m to E
		39	1	cl	a	Old felt 5m to W
		40	1	gs	a	Old felt 5m to S
		58	1	cl	a	
		59	1	cl	j	
		62	1	cl	a	
		67	2	cl	a	
		68	1	cl	a	
		70	1	cl	a	
		71	1	cl	a	
		75	1	cl	a	
		98	1	cl	a	Old felt nearby
		226	1	gs	a	Old felt nearby
		227	4	cl	3a + 1j	Old felts nearby
		227	1	gs	j	Old felt nearby
		228	1	gs	a	Old felt nearby
		230	1	gs	a	Old felt nearby
		232	1	gs	j	Old felt nearby
		232	1	cl	a	
		256	1	gs	j	
		257	1	cl	a	Old felt nearby
		257	2	gs	j	Old felt nearby
		260	1	cl	j	Old felt nearby
		277	1	gs	j	
		281	1	cl	sa	
		282-283	1	cl	a	Old felt between
		286	1	cl	sa	
		362	1	cl	sa	
		397	1	cl	a	Old felt on bank at S end of lagoon
		398	1	cl	a	
		414	1	cl	a	
		431	1	cl	a	
		447	1	cl	a	
		455	1	cl	a	
		455	2	cl	a	Old felt nearby
		480	2	cl	a	
		502	1	cl	a	Old felt nearby
		532	1	cl	a	Western one
		590	1	cl	a	
		836	1	cl	a	Old felt nearby
	Manor Way	817	1	cl	a	
	West Quarry	611	2	sw	j	
		617	1	cl	a	Old felt nearby
		624	1	sw	a	
		632	3	sw	j	Carpet tile nearby
		633	1	sw	sa	
		635	3	cl	sa	Old felt down towards tunnel
		635	1	cl	a	Old felt nearby
		637	1	sw	a	
		637	4	sw	1a +3j	Old felt nearby
		640	2	sw	a	
		840	1	sw	sa	
		841	1	cl	a	
		841	1	sw	a	
		844	1	sw	a	
	Bamber Pit S	765	1	cl	a	Old felt nearby
		774	1	sw	a	
		774	1	cl	a	Old felt nearby
		775	1	cl	a	Old felt nearby
		776	2	cl	j	Old felt nearby
		787	1	cl	j	Old felt nearby
		796	1	cl	a	Old felt nearby
		800	3	sw	j	
	Northfleet Landfill	198	1	gs	j	
		212	1	cl	sa	
	N of Springhd Nursery	704	1	cl	a	
		706	1	cl	j	
		708	1	cl	a	
		708	2	sw	a	
		710	1	cl	a	
		710	1	cl	a	
		711	2	cl	a	
		712	1	cl	a	
		712	1	sw	a	
		714	1	sw	j	
		715	1	sw	j	
		715	1	cl	a	
		719	1	cl	j	
		740	1	cl	a	
		756	1	gs	j	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
11/06/2015 am	Peninsula	80	1	gs	a	
		240	1	gs	a	
		252	1	gs	a	
		257	2	gs	j	Old felt nearby
		398-400	1	cl	a	Old felt between
		409-410	1	cl	sa	
		415	1	cl	a	Old felt nearby
		510	1	cl	a	Old felt between
	West Quarry	621	1	cl	a	Old felt nearby
		621	1	sw	a	Old felt nearby
		632	1	sw	j	Old carpet nearby
		635	1	sw	a	Old felt down towards tunnel
		635	1	cl	a	
		640	2	sw	j	
	Bamber Pit S	787	1	cl	a	Old felt nearby
		791	1	cl	a	Old felt nearby
		802	1	gs	a	Old felt nearby
		802	2	sw	a	Old felts nearby
		851				gs skin
	N of Springhd Nursery	708	1	sw	a	
		710	1	sw	a	
		711	1	cl	a	In vegetation nearby
		712	1	sw	a	
		715	1	gs	j	
		715	1	sw	sa	
		739	1	gs	j	
15/06/2015 am	Peninsula	1	1	cl	a	Old felt nearby
		2	2	cl	j	
		6	1	cl	a	
		14	1	cl	a	
		114	1	cl	a	
		129	1	cl	j	
		226	2	cl	j	Old felt nearby
		226	2	gs	1a + 1j	Old felt nearby
		243	1	cl	j	Old felt nearby
		252	1	cl	a	
		252	2	gs	a	
		253	1	gs	a	
		257	1	gs	j	Old felt nearby
	West Quarry	606	1	sw	sa	
		611	1	sw	sa	
		624	2	sw	a	Old felt nearby
		624	1	sw	a	
		632-633	4	sw	sa	Old felt between
		635	1	sw	a	Old felt nearby
		635	1	sw	a	
		637	3	sw	1a +2sa	Old felt nearby
		840	2	sw	1a + 1sa	
		841	2	sw	a	
		843	5	sw	4a + 1sa	
		844	2	sw	1a + 1sa	
	Bamber Pit S	762	1	cl	sa	Old felt nearby
		763	1	cl	a	Old felt nearby
		766	2	sw	a	Old felt nearby
		774	2	cl	1a + 1sa	Old felt nearby
		846	1	cl	a	
	N of Springhd Nursery	708	1	sw	sa	
		712	2	sw	a	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
02/09/2015 pm	East Quarry	914	1	cl	a	
14/09/2015 am	NE Tip	162	1	cl	a	
		163	2	cl	a	
14/09/2015 pm	Broadness	126	1	cl	a	
		135	1	cl	a	
		150	1	cl	a	
		158	1	cl	a	
		330	1	cl	a	
		578	2	cl	sa	Tin near pylon
22/09/2015 pm	Broadness	126	1	cl	a	
		129	1	cl	sa	
		136	1	cl	sa	
		152	1	cl	a	
		158	2	cl	a	
		338	1	cl	a	
23/09/2015 am	East Quarry	900	1	cl	a	
		916	1	cl	a	Nearby
	Bamber Pit S	761	1	cl	j	
		766	1	gs	sa	Old felt nearby
		769	1	cl	a	Old felt nearby
		770	1	toad	j	Old felt nearby
		776	1	cl	sa	Old felt nearby
		777	1	cl	a	Old felt nearby
		782	1	sw	a	
		785	1	cl	sa	Old felt nearby
		785	1	gs	j	Old felt nearby
		786	1	cl	j	Old felt nearby
		791	1	cl	a	Old felt nearby
		793	1	cl	j	10 m to S
		794	1	cl	j	
		796	1	gs	j	Old felt nearby
		797	1	gs	sa	Old felt nearby
		799	1	gs	sa	
		847	1	sw	a	
		850	2	sw	a	
23/09/2015 pm	Peninsula W	7	1	cl	j	Old felt nearby
		14	1	cl	j	Old felt nearby
		15	2	cl	a	
		17	1	cl	j	
		19	2	cl	sa	
		19	1	cl	j	Old felt nearby
		20	1	cl	j	
		25	1	cl	a	
		27	1	cl	j	
		30	1	cl	a	
		30	1	gs	a	
		30	3	cl	2sa + 1j	Old felt nearby
		33	1	cl	sa	
		50	1	cl	j	
		55	1	cl	j	Old felt nearby
		57	3	cl	j	Old felt nearby
		58	1	cl	sa	Old felt nearby
		59	2	cl	sa	Old felt nearby
		59	1	cl	sa	
		60	1	cl	sa	
		62	1	cl	a	
		64	2	cl	a	Old felt nearby
		65	4	cl	1a +3sa	
		66	4	cl	1a +3sa	
		71	1	cl	sa	
		84	1	cl	sa	Old felt nearby
		97	3	cl	sa	
		232	1	cl	j	
		247	1	cl	j	
		252	1	gs	a	
		254	1	cl	a	
		254	1	cl	a	Old felt nearby
		255	1	cl	j	
		271	1	cl	j	
		832	3	cl	sa	
		835	1	cl	sa	
	Peninsula Centre	103	1	cl	a	
		104	3	cl	1a + 1sa + 1j	
		114	2	cl	1sa + 1j	
		397	1	cl	a	Old felt 10m W
		397	2	cl	1a + 1j	Old felt 5m E
		397	3	cl	a	Old felt 10m E
		398	3	cl	2a + 1j	Old felt nearby
		399	1	cl	a	Old felt 30m W
		399	1	cl	j	Old felt 30m W
		402	3	cl	2a + 1sa	Old felt nearby
		402	1	sm newt		Old felt nearby
		402	1	gs	a	Old felt 10m W S side of track
		406	1	cl	a	Old felt nearby
		406	2	cl	j	
		409	1	cl	j	
		409-410	1	cl	j	Old felt between
		411	1	cl	a	
		412	3	cl	1a + 2j	Old felt nearby
		414	1	cl	sa	
		417	3	cl	2a + 1sa	Old felt 50m S
		418	2	cl	a	Old felt 50m S
		420	1	cl	j	
		420	1	cl	j	Old felt 50m S
		420	1	cl	j	Old felt 100m S
		420	2	cl	1a + 1sa	Old felt on S edge of mound 130m S
		420	3	cl	2sa + 1j	Old felt on S edge of mound 130m S
		440	1	cl	a	
		472	1	cl	a	
		474	1	cl	a	
		486	1	cl	j	
		487	1	cl	j	
		492	1	cl	a	
		494	1	cl	j	Plywood nearby
		495	1	cl	j	Old felt nearby
		497	1	cl	j	
		536	2	cl	1a + 1j	
		551	1	cl	j	Old felt nearby
		553	2	cl	j	Old felt SW corner of compound
	Broadness	112	1	cl	sa	
		124	1	cl	j	
		125	1	cl	j	
		128	1	cl	a	
		132	1	cl	a	
		590	1	cl	sa	
24/09/2015 am	Manor Way	816	1	gs	sa	
		817	1	gs	sa	
		819	1	cl	a	
	Bamber Pit N	948	1	gs	sa	
	East Quarry	900	1	cl	sa	
		901	2	cl	1a +1sa	
		902	3	cl	1sa + 2j	
		905	2	cl	1a +1sa	
		908	1	cl	j	
		909	2	cl	sa	
		910	1	cl	a	
		911	1	cl	j	
		912	1	cl	j	
		914	1	cl	a	
		915	1	cl	sa	
		916	1	cl	j	
		931	1	cl	sa	
		932	1	cl	j	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
24/09/2015 pm	West Quarry	601	2	sw	a	
		601	3	cl	j	
		602	1	cl	sa	
		603	1	cl	j	Old felt nearby
		605	1	sw	j	
		617	1	cl	j	
		624	1	sw	a	
		631	1	cl	sa	
		632	2	sw	sa	Carpet tile nearby
		633	1	cl	j	Old tyre nearby
		634	1	sw	a	
		635	2	sw	1a +1sa	
		635	1	cl	a	Old felt 20m W
		635	1	sw	a	Old felt 40m W on bank to tunnel
		635	3	sw	1a + 1sa + 1j	Old felt 50m W on bank to tunnel
		636	1	sw	j	
		638	1	sw	j	
		639	1	cl	j	
		840	3	sw	a	
		840	2	cl	j	
		840	1	gs	j	
		841	1	sw	a	
		841	2	cl	a	
		843	1	cl	j	
		844	1	cl	j	
		844	2	sw	j	
		616-617	4	cl	1a + 2sa + 1j	
	CTRL W	853	1	cl	a	
		856	3	cl	sa	
25/09/2015 am	Bamber Pit S	766	2	gs	j	Old felts nearby
		770	1	cl	a	
		791	1	cl	sa	
		794	1	cl	sa	Old felt nearby
		847	1	sw	a	
		850	1	sw	sa	
	N of Springhd Nursery	688	1	cl	a	
		694	1	cl	sa	
		708	1	sw	sa	
		712	1	sw	sa	
		739	1	cl	a	
		754	1	cl	a	
28/09/2015 am-pm	Peninsula W	35	1	cl	a	
		38	1	cl	a	
		58	1	cl	a	
		60	1	cl	sa	
		64	1	cl	sa	
		65	1	cl	a	
		69	2	cl	sa	
		87	1	cl	a	
		226	1	cl	a	
		247	1	gs	j	
		831	1	cl	a	
		834	1	cl	a	
	Bamber Pit N	948	1	gs	a	
		950	1	cl	a	
		952	1	cl	a	
29/09/2015 am	N of Springhd Nursery	686	1	cl	a	
		697	1	cl	a	
		707	1	cl	a	Old felt nearby
		711	1	cl	a	
		715	1	sw	a	
		716	1	cl	a	
		737	1	cl	a	
		742	1	gs	j	
		748	1	cl	a	
		750	3	cl	2a + 1sa	
		751	2	cl	a	
29/09/2015 pm	Broadness	122	1	cl	sa	
		124	1	cl	a	
		126	1	cl	sa	
		136	1	cl	a	
		152	1	cl	sa	
		154	1	cl	sa	
		155	1	cl	j	
		338	1	cl	a	
		579	1	cl	a	
		584	1	cl	sa	
		599	1	cl	sa	
	East Quarry	909	2	cl	a	
		930	1	cl	j	
		932	1	cl	sa	
		934	1	cl	sa	
	Bamber Pit N	952	1	cl	sa	
	CTRL W	853	6	cl	a	
30/09/2015 am	East Quarry	900	4	cl	3sa + 1j	
		901	2	cl	a	
		902	1	cl	a	
		904	1	cl	sa	
		905	1	cl	sa	
		909	1	cl	sa	
		914	1	cl	sa	
		929		cl		Shed skin (tail)
		938	1	cl	sa	
	Bamber Pit N	950	1	cl	sa	
	Bamber Pit S	762	1	cl	sa	
		762	1	sm newt	j	Old felt nearby
		763	1	cl	a	Old felt 5m E
		763	1	gs	j	Old felt 5m S
		763	1	sw	a	Old felt 5m S
		764	1	sw	j	
		764	1	cl	a	Old felt nearby
		766	1	gs	j	Old felt 10m E
		766	1	cl	a	Old felt 10m E
		767	1	cl	a	Old felt nearby
		770	1	cl	j	
		770	1	cl	a	Old felt 5m W
		770	1	cl	sa	10m W
		771	1	cl	sa	Nr in grass
		772	2	cl	sa	
		775	1	cl	a	
		775	1	gs	j	Old felt 5m E
		776	1	cl	sa	Old felt 10m N
		776	1	cl	sa	Old felt 20m N
		776	1	cl	j	Old felt 25m NE
		777	1	cl	sa	Old felt nearby
		779	1	sw	a	
		779	1	cl	a	
		784	2	cl	1a + 1j	
		785	1	cl	a	Old felt 5m E
		785	1	gs	j	Old felt 5m E
		787	1	cl	j	Old felt 5m N
		787	2	cl	j	
		787	1	sw	a	
		791	1	cl	a	
		800	1	sw	a	
		806	1	sw	a	
		846	2	cl	1sa + 1j	
		849	1	cl	j	
		850	1	sw	a	

Date and time	Area	Heat trap	Number	Species	Life stage	Comments
30/09/2015 pm	Broadness	126	1	cl	sa	
		128	1	cl	a	
		129	1	cl	a	
		131	1	cl	a	
		152	1	cl	sa	
		155	1	cl	a	
		158	1	cl	a	
		338	1	cl	a	
		585	1	cl	sa	
	Manor Way	815	1	gs	a	
	West Quarry	616	1	cl	a	
		617	1	cl	a	
		618	1	cl	a	
		624	2	sw	a	
		635	2	sw	a	
		635	2	sw	a	Old felt 20m W
		636	1	cl	a	Old felt nearby
		637	1	sw	a	Old felt nearby
		638	3	sw	1sa + 2j	
		638	1	cl	sa	
		840	1	sw	a	
		844	3	sw	1sa + 2j	
		616-617	1	cl	a	Old felt between
	Northfleet Landfill	188	10	cl	2a + 6sa + 2j	
		192	1	cl	a	
		823	1	cl	sa	
01/10/2015 am	Peninsula Centre	105	1	cl	sa	
		114	1	cl	a	
		115	1	cl	a	
		118	1	cl	a	Old felt 20m S
		398	1	cl	j	Old felt nearby
		401	3	cl	sa	Old felt N side of track
		401	1	cl	sa	Old felt N side of track
		402	1	cl	j	Old felt nearby
		402	1	cl	a	Old felt nearby
		402	1	cl	a	Old felt 20m W
		406	1	cl	j	
		411	1	cl	a	
		411	1	cl	j	Old felt nearby
		412	1	gs	a	
		412	1	cl	sa	
		412	1	cl	j	Tin 20m S
		415	1	cl	a	Old felt 10m SE
		416	1	cl	sa	Old felt 20m S
		420	1	cl	a	Old felt 20m S
		420	1	cl	a	Old felt 50m S
		452	1	cl	a	Old felt 10m W
		458	1	cl	sa	
		458	1	cl	j	Old felt nearby
		459	1	cl	sa	
		495	1	cl	sa	Old felt 10m N
		497	1	cl	a	Old felt nearby
		512	1	cl	a	Old felt 10m E
		532 E	1	cl	a	Old felt 20m E
	Peninsula W	21	1	cl	a	
		32	1	cl	sa	
		59	1	cl	a	
		65	1	cl	a	
		69	1	cl	sa	
		93	1	cl	a	
		100	1	cl	a	
		226	1	cl	a	
		228	1	cl	sa	
		235	1	cl	a	
		238	1	cl	sa	
		247	1	gs	sa	
		254	1	cl	sa	
		834	1	cl	sa	
	NE Tip	655	1	cl	a	Old felt nearby
		657	1	cl	a	
01/10/2015 pm	East Quarry	902	1	cl	sa	
		908	1	cl	j	
		909	1	cl	sa	
		917	1	cl	j	
		927	1	cl	a	
		932	1	cl	sa	
		936	1	cl	j	
		940	1	cl	j	
		942	2	cl	j	
	Bamber Pit N	948	1	gs	j	
		952	1	cl	sa	
08/10/2015 am	East Quarry	942	2	cl	sa	
	Bamber Pit N	950	1	cl	sa	
08/10/2015 pm	N of Springhd Nursery	681	1	cl	j	
		682	3	cl	sa	
		694	1	cl	a	
		695	2	cl	sa	
		700	1	cl	j	
		705	1	cl	a	
		706	1	cl	sa	
		711	1	cl	a	
		712	1	gs	sa	
		712	5	cl	3sa + 2j	
		714	1	cl	a	
		720	1	cl	j	
		721	1	gs	j	
		724	6	cl	j	
		734	1	cl	sa	
		737	4	cl	2a + 2sa	
		751	2	cl	1a + 1sa	
		755	1	cl	sa	
		757	1	cl	j	

Table 5 Species recorded by survey area

Area	cl	sw	gs
Peninsula	✓	✓	✓
Botany Marsh East			✓
Manor Way	✓		✓
West Quarry	✓	✓	✓
East Quarry	✓		
Bamber Pit N	✓	✓	✓
Bamber Pit S	✓	✓	✓
Northfleet Landfill	✓	✓	✓
CTRL W	✓		
N of Springhd Nursery	✓	✓	✓

Table 6 Survey summary - number of individuals and adults recorded by area and species (excluding areas with no records)

Spring/early summer		**cl**		**sw**		**gs**	
Date and time	**Area**	**All**	**Adults**	**All**	**Adults**	**All**	**Adults**
16/04/2015 am	West Quarry	2	1	9	5		
	Bamber South	5	3	7	5	3	**3**
	Northfleet Landfill	3	3				
	N of Springhd Nursery	6	3				
20/04/2015 am	Peninsula	12	11				1
	Botany Marsh East					1	**1**
20/04/2015 pm	West Quarry	1	1		2		
	Bamber South	6	4	4	4		
	Northfleet Landfill	1				1	**1**
	N of Springhd Nursery	16	8				
24/04/2015 am	Manor Way	1	**1**				
	West Quarry	1		9	6		
	Bamber South	9	3	13	5		
	Northfleet Landfill	6	4			1	**1**
	N of Springhd Nursery	8	8	1			
24/04/2015 pm	Peninsula	30	27	1	**1**	2	2
28/04/2015 am	Peninsula	15	15			3	3
11/05/2015 pm	Peninsula	28	24			6	3
	West Quarry	2	1	6	3		
	Bamber South	14	13	4	1	2	
	Northfleet Landfill	4	2			1	
	N of Springhd Nursery	8	8	2			
15/05/2015 am	Peninsula	18	13			2	2
	West Quarry			7	2		
	Bamber South	27	**14**			2	1
	Northfleet Landfill	3	3				
	N of Springhd Nursery	19	**11**			4	
19/05/2015 am	Peninsula	17	12			6	4
	West Quarry	4	1	4	2		
	Bamber South	24	9				
	Northfleet Landfill	1	1			2	
	N of Springhd Nursery					1	
21/05/2015 am	Peninsula	12	10				1
	West Quarry	1	1	9	4		
	Bamber South	9	6	9	7		1
	N of Springhd Nursery	19	**11**			7	**1**
26/05/2015 pm	Peninsula	6	6			4	2
	West Quarry	2	2	11	3		
	Bamber South	7	3			1	
	Northfleet Landfill	7	7				
	N of Springhd Nursery	6	3			1	
01/06/2015 am	Peninsula	22	16				1
04/06/2015 am	West Quarry	1	1	2	2		
	Bamber South	5	5	11	**7**		
	Northfleet Landfill					3	**1**
	N of Springhd Nursery	3	3	6	**3**	1	
08/06/2015 pm	Peninsula	39	29			12	**6**
	Manor Way	1	**1**				
	West Quarry	6	3	17	7		
	Bamber South	7	4	4	1		
	Northfleet Landfill	1				1	
	N of Springhd Nursery	11	9	5	**3**	1	
11/06/2015 am	Peninsula	4	3			5	3
	West Quarry	2	2	5	2		
	Bamber South	2	2	2	2	1	1
	N of Springhd Nursery	1	1	4	**3**	2	
15/06/2015 am	Peninsula	11	5			6	4
	West Quarry			25	**13**		
	Bamber South	5	3	2	2		
	N of Springhd Nursery			3	2		

Peak counts (adults only)

Autumn		cl		sw		gs	
Date and time	**Area**	**All**	**Adults**	**All**	**Adults**	**All**	**Adults**
02/09/2015 pm	East Quarry	1	1				
14/09/2015 am	NE Tip	3	**3**				
14/09/2015 pm	Broadness	14	**10**				
22/09/2015 pm	Broadness	7	5				
23/09/2015 am	East Quarry	2	2				
	Bamber South	9	3	4	4	5	
23/09/2015 pm	Peninsula West	52	**11**			2	**2**
	Peninsula Centre	57	23			1	**1**
	Broadness	6	2				
24/09/2015 am	Manor Way	1	**1**			2	
	Bamber North					1	
	East Quarry	19	**4**				
24/09/2015 pm	West Quarry	20	4	20	9	1	
	CTRL West	4	1				
25/09/2015 am	Bamber South	3	1	2	1	1	
	N of Springhd Nursery	4	3	2			
28/09/2015 am-pm	Peninsula West	12	8			1	
	Bamber North	2	2			1	**1**
29/09/2015 am	N of Springhd Nursery	12	10	1	1	1	
29/09/2015 pm	Broadness	11	4				
	East Quarry	5	2				
	Bamber North	1					
	CTRL West	6	**6**				
30/09/2015 am	East Quarry	12	2				
	Bamber North	1					
	Bamber South	27	10	7	6	4	
30/09/2015 pm	Broadness	9	6				
	Manor Way					1	**1**
	West Quarry	6	**5**	14	8		
	Northfleet Landfill	12	3				
01/10/2015 am	Peninsula Centre	29	13			1	**1**
	Broadness	15	7				
	NE Tip	2	2				
01/10/2015 pm	East Quarry	10	1				
	Bamber North	1				1	
08/10/2015 am	East Quarry	2					
	Bamber North	1					
08/10/2015 pm	N of Springhd Nursery	34	7			2	
	Peak counts (adults only) for each survey area						

Spring 2016		cl		sw		gs	
Date and time	**Area**	**All**	**Adults**	**All**	**Adults**	**All**	**Adults**
27/04/16 pm	Broadness	1	1				
	Bamber North			1	1		
	Northfleet Landfill	1		1	1	1	1
	CTRL West	1					
28/04/2016 am	Peninsula West	3	3			1	1
	Peninsula Centre	8	5				
	NE Tip	1					
06/05/2016 am	Peninsula West					2	
	Peninsula Centre	5	2				
	Broadness	3	3				
13/05/2016 am	Peninsula Centre	6	4				
	Bamber North			2	1		
	Northfleet Landfill	1	1				
16/05/2016 pm	East Quarry	2	1				
	Bamber North	1		1	1	2	
19/05/2016 pm	East Quarry	4	4				
	Bamber North	4	**3**	2	**2**	4	
20/05/2016 pm	East Quarry	7	**6**				
	Bamber North	4	2	1	1	4	
	Northfleet Landfill	17	**11**				
23/05/2016 pm	Peninsula West	17	9*			4	
	Peninsula Centre	40	**34***			5	1
	Broadness	7	6*			1	
	East Quarry	3	3				
	Bamber North	2	2	3	**2**	4	
27/05/2016 am	Bamber North	2	2			5	
	CTRL West	1	1				
	Peak counts (adults only) for each survey area						

*49 cl for whole Peninsula (West + Centre + Broadness)

Table 7 Peak counts (adults)

Area	cl	sw	gs
Peninsula W	11		2
Peninsula Centre	34		1
Broadness	10		
Peninsula	36	1	6
Manor Way	1		1
West Quarry	5	13	
East Quarry	6		
Bamber North	3	2	1
Bamber South	14	7	3
Northfleet Landfill	11		1
CTRL West	6		
N of Springhd Nursery	11	3	1

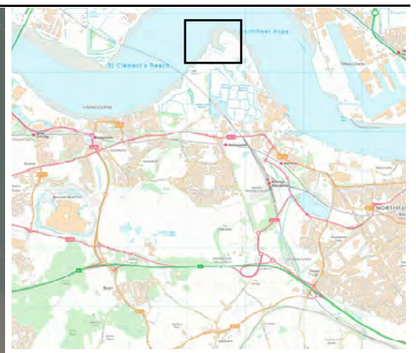
Table 8 Population size class, assemblage score and qualifying Key Reptile Sites*

Area	cl	sw	gs	No. spp.	Score	Key Reptile Site	Qualifying criteria
Peninsula W	Good		Low	2	3		
Peninsula Centre	Exceptional		Low	2	4	✓	3 + 4
Broadness	Good			2	2		
Peninsula	Exceptional	Low	Good	3	6	✓	1 + 3 + 4
Manor Way	Low		Low	2	2		
West Quarry	Good	Good		3	4	✓	1 + 4
East Quarry	Good			1	2		
Bamber North	Low	Low	Low	2	3	✓	1
Bamber South	Good	Good	Low	3	5	✓	1 + 4
Northfleet Landfill	Good		Low	2	3		
CTRL West	Good			1	2		
N of Springhd Nursery	Good	Low	Low	3	4	✓	1 + 4

* Based on - Froglife, 1999. Froglife Advice Sheet 10: Reptile Survey

Key Reptile Site - qualifying criteria
1. Supports 3 or more reptile species
2. Supports 2 snake species
3. Supports an exceptional population of one species
4. Supports an assemblage of species scoring at least 4

FIGURES



KEY

346 Heat Trap (2015 & 2016 survey)

366a Heat Trap (additional for 2016 survey)

306 Heat Trap (traps relocated after 2015 survey and repositioned for 2016 survey)

0 50 100 Metres

N

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LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1a
SURVEY AREAS AND HEAT TRAPS

August 2016

KEY

346 Heat Trap

0 50 100 Metres

N

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LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 1b
SURVEY AREAS AND HEAT TRAPS

August 2016
11120202_Reptile Report_08-16.indd

KEY

346 Heat Trap (2015 & 2016 survey)

414 Heat Trap (additional for 2016 survey)

0 50 100 Metres

N

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FIGURE 1c
SURVEY AREAS AND HEAT TRAPS

August 2016

KEY

346 Heat Trap

0 50 100 Metres

N

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FIGURE 1d
SURVEY AREAS AND HEAT TRAPS

August 2016

KEY

346 Heat Trap

© Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

0 50 100 Metres

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FIGURE 1e
SURVEY AREAS AND HEAT TRAPS

August 2016
11120202_Reptile Report_08-16.indd

KEY

346 Heat Trap (2015 & 2016 survey)

345a Heat Trap (additional for 2016 survey)

0 50 100 Metres

N

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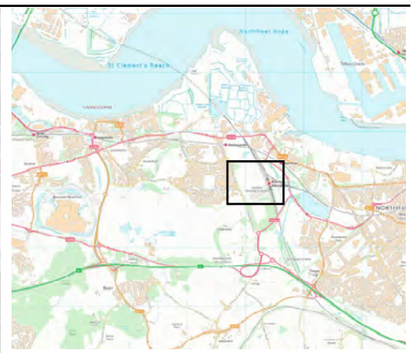
FIGURE 1f
SURVEY AREAS AND HEAT TRAPS

August 2016



KEY

346 Heat Trap

0 50 100 Metres

N

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FIGURE 1g
SURVEY AREAS AND HEAT TRAPS

August 2016

KEY

346 Heat Trap (2015 & 2016 survey)

870b Heat Trap (additional for 2016 survey)

0 50 100 Metres

N

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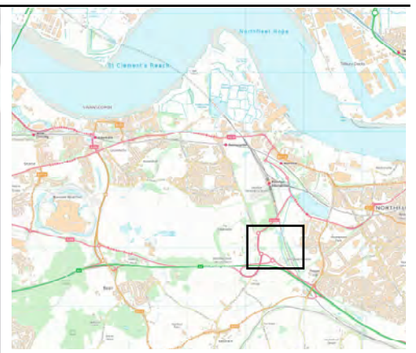
LONDON RESORT COMPANY HOLDINGS

FIGURE 1h
SURVEY AREAS AND HEAT TRAPS

August 2016



KEY

346 Heat Trap

0 50 100 Metres

N

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LONDON PARAMOUNT ENTERTAINMENT RESORT
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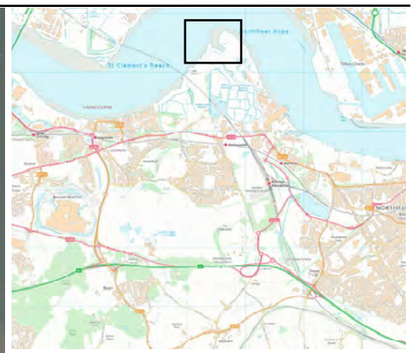
FIGURE 1i
SURVEY AREAS AND HEAT TRAPS



Survey Records:

- Common Lizard
- Grass Snake
- Slow Worm

0 50 100 Metres

N

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LONDON RESORT COMPANY HOLDINGS

FIGURE 2a
LOCATION OF REPTILE RECORDS

August 2016
11120202_Reptile Report_08-16.indd

Survey Records:

- Common Lizard
- Grass Snake
- Slow Worm

0 50 100 Metres

N

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LONDON RESORT COMPANY HOLDINGS

FIGURE 2b
LOCATION OF REPTILE RECORDS

August 2016

Survey Records:

- Common Lizard
- Grass Snake
- Slow Worm

0 50 100 Metres

N

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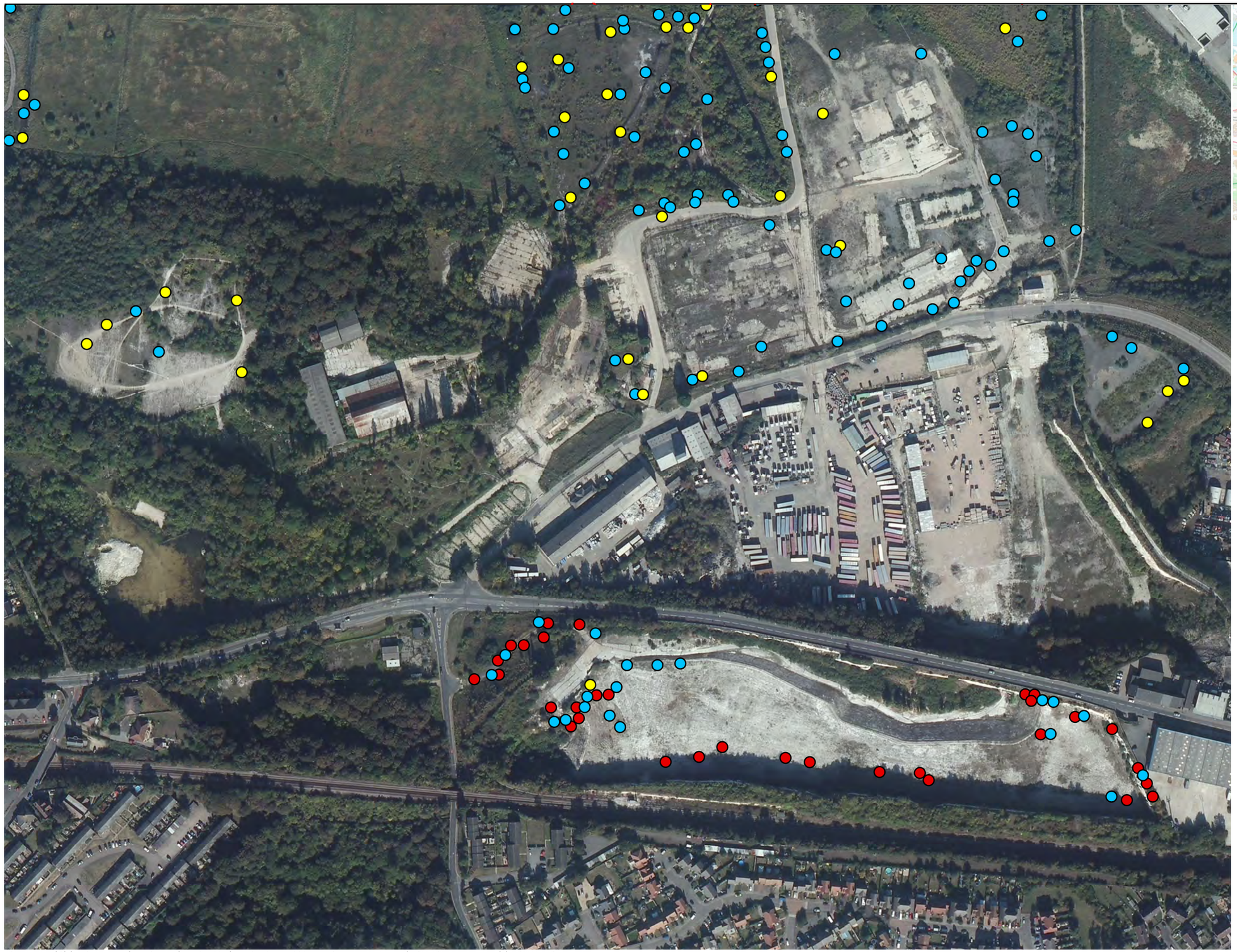
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 2c
LOCATION OF REPTILE RECORDS

August 2016
11120202_Reptile Report_08-16.indd



Survey Records:

- Common Lizard
- Grass Snake
- Slow Worm

0 50 100 Metres

N

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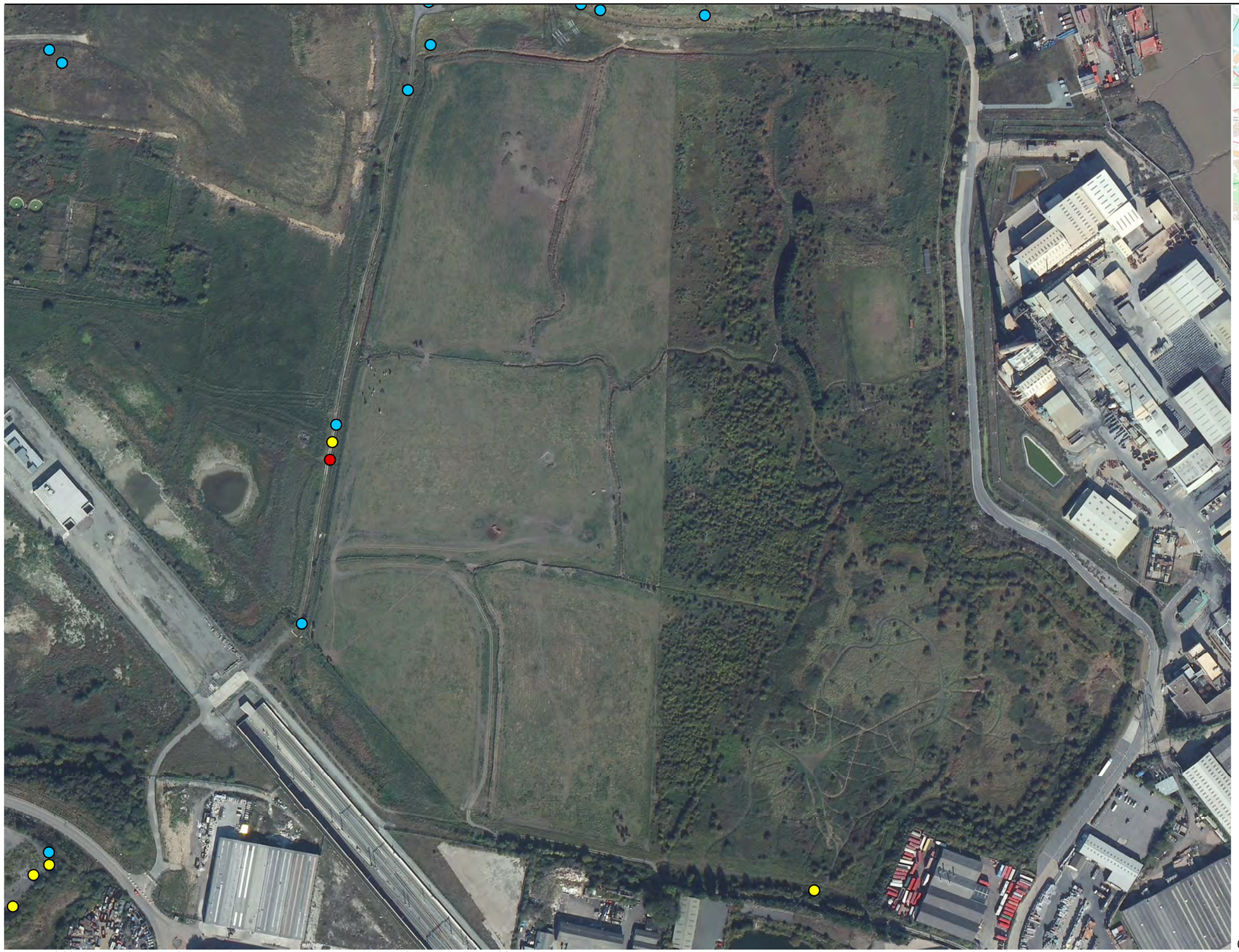
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 2d
LOCATION OF REPTILE RECORDS

August 2016



Survey Records:

- Common Lizard
- Grass Snake
- Slow Worm

0 50 100 Metres

N

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FIGURE 2e
LOCATION OF REPTILE RECORDS

August 2016
11120202_Reptile Report_08-16.indd

Survey Records:

- Common Lizard
- Grass Snake
- Slow Worm

0 50 100 Metres

N

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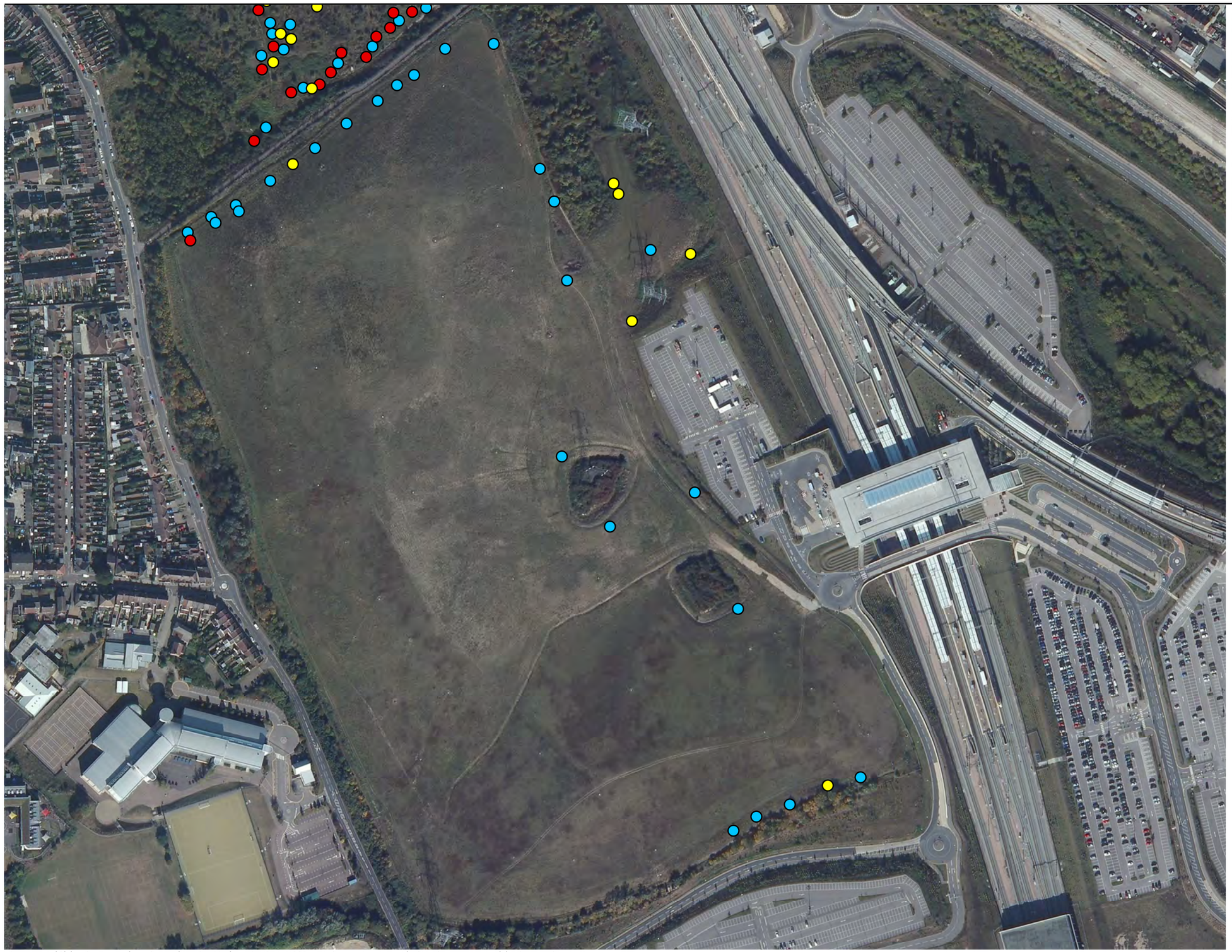
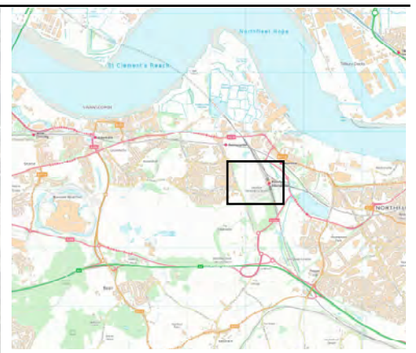
LONDON RESORT COMPANY HOLDINGS

FIGURE 2f
LOCATION OF REPTILE RECORDS

August 2016





Survey Records:

- Common Lizard
- Grass Snake
- Slow Worm

0 50 100 Metres

N

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LONDON PARAMOUNT ENTERTAINMENT RESORT
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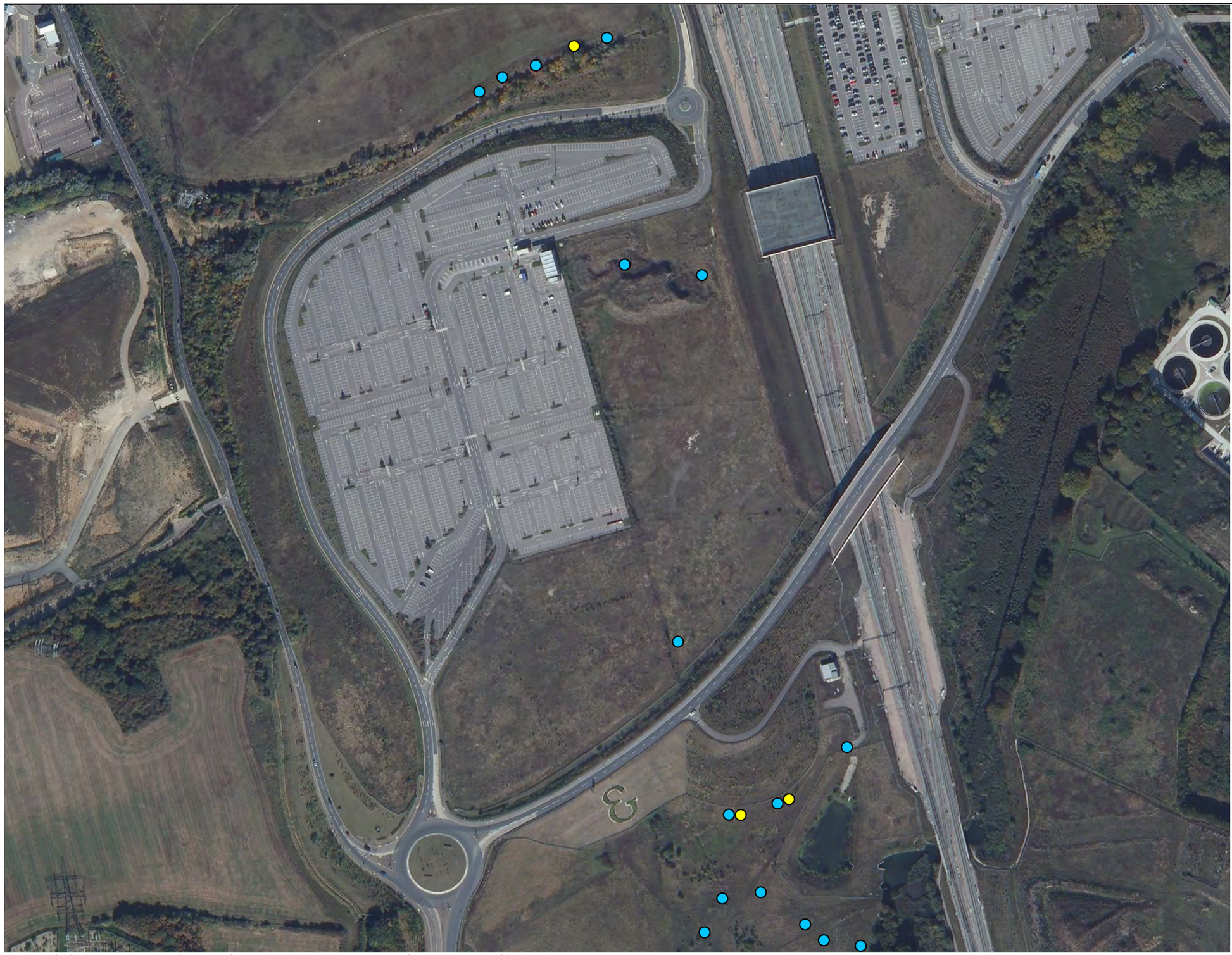
FIGURE 2g
LOCATION OF REPTILE RECORDS

August 2016



Survey Records:

- Common Lizard
- Grass Snake
- Slow Worm

0 50 100 Metres

N

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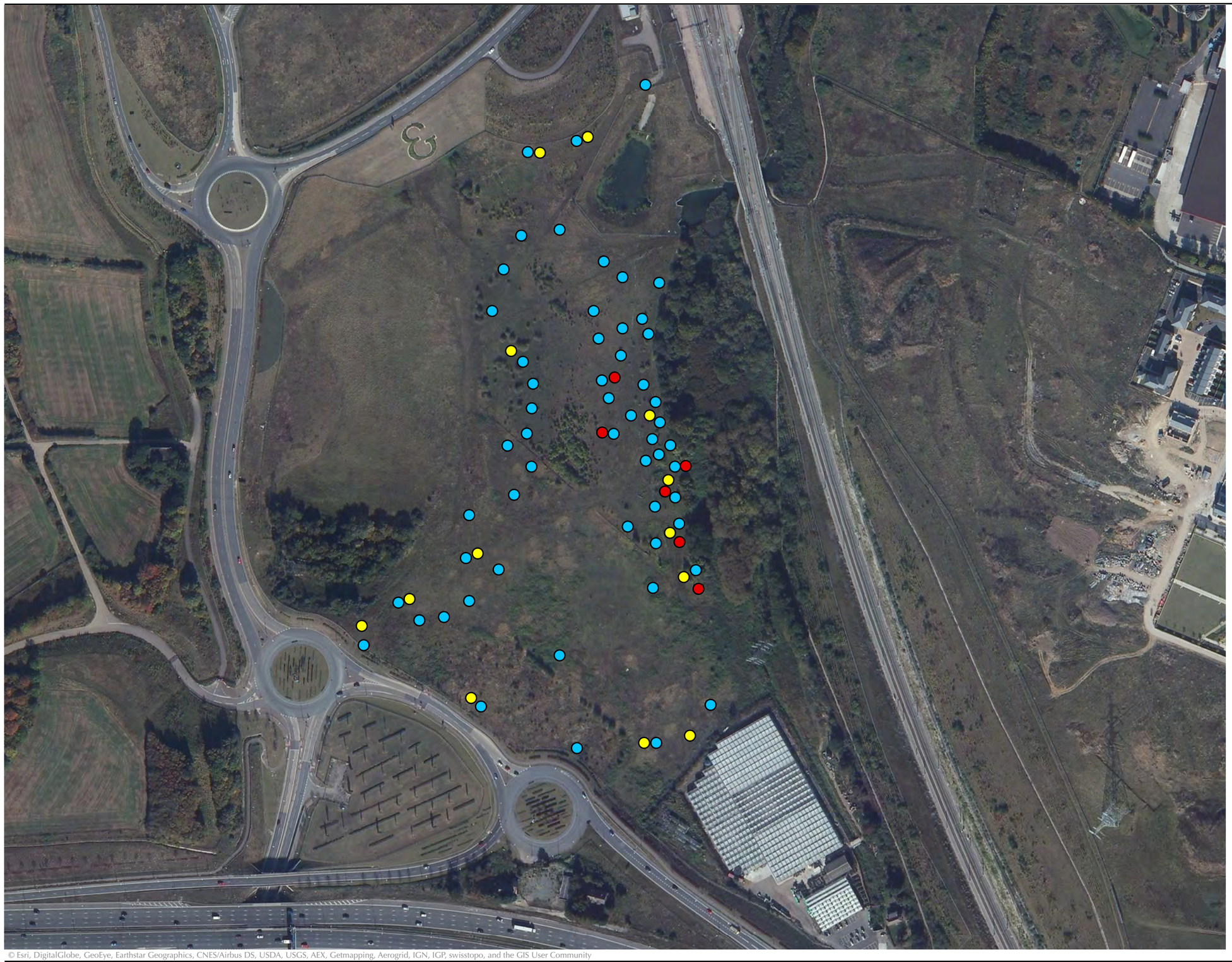
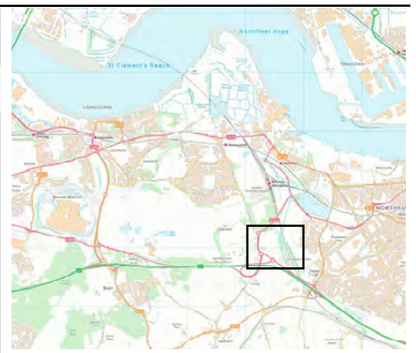
LONDON PARAMOUNT ENTERTAINMENT RESORT
LONDON RESORT COMPANY HOLDINGS

FIGURE 2h
LOCATION OF REPTILE RECORDS

August 2016





Survey Records:

- Common Lizard
- Grass Snake
- Slow Worm

N

0 50 100 Metres

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Annex EDP 27
2012 Terrestrial Invertebrate Survey Report (CBA, 2012)

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London Resort Company Holdings
(LRCH) Ltd.

London Paramount

2012 Terrestrial Invertebrate Survey Report

October 2012

CHRIS BLANDFORD ASSOCIATES
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London Resort Company Holdings
(LRCH) Ltd.

London Paramount

2012 Terrestrial Invertebrate Survey Report

Approved	[redacted]
	Bill Wadsworth
Position	Senior Associate (Ecology)
Date	31st October 2012
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. This report details the results of the terrestrial invertebrate surveys undertaken between March and September 2012.

1.2 Aims

1.2.1 The aims of the survey were to identify and evaluate the the invertebrate species and communities present that could potentially be affected by the proposed development.

1.3 The Site

1.3.1 The proposed development site occupies an area that runs from the current industrial units at Manor Way, Swanscombe, northwards to the Thames, in grid squares TQ6075 and TQ6076. The terrestrial invertebrate survey brief included a survey and comparison of this area with an area to the west in grid square TQ5975, running along the recently re-profiled sea wall.

1.3.2 For the purposes of this survey, the proposed development area was divided into a northern section (bounded by the access track to the small boat yard on the edge of the Thames) and a southern section. These areas were called Swanscombe North (allocated grid TQ605765) and Swanscombe South (allocated grid TQ605760). In addition the 'comparison area' was called Swanscombe West (allocated grid TQ597755) - see **Figure 1.**

1.3.3 Parts of the proposed development site have been quarried for chalk for the cement works in the past, and considerable parts of the quarried and marsh areas central to the Swanscombe Peninsula have been tipped with fly ash.

1.3.4 A large area of Swanscombe South appears to have been used for washing out mobile cement mixers and the drainage here is rather impeded. A considerable proportion of the rest of Swanscombe South was fenced off and hence not accessed for the survey.

1.3.5 It was considered that the readily accessible sections would supply enough data for overall assessment of the site without the additional constraint of getting access and, possibly, escort for the fenced-off areas. There would not have been enough time on survey rounds to visit all areas thoroughly in any case and a degree of selectivity over site selection at each visit was inevitable.

1.3.6 The sea-wall has fairly recently been re-aligned and heightened. Only a small amount of fly ash had been tipped on the marshes on this western side, and, apart from the lack of grazing (they are now very isolated from any other farmland and rather small) these must provide a fairly good representation of the original condition of the Swanscombe Marshes peninsula.

1.3.7 The division between Swanscombe North and Swanscombe South was decided in order to assess whether a significant proportion of species were unique to either area, with Swanscombe West as a control for the wider fauna of the area. This information would be of importance in informing decisions regarding likely enhancement areas for the conservation of the faunal interest of the site.

1.3.8 Additional areas in the overall extent of interest for the proposed developement have been previously surveyed as part of the decommissioning of the Cement Works (Northfleet Cement

Works 2008, Baker Shepherd Gillespie). Whilst no direct comparison of these areas was made as part of the current survey it would be possible to do this with the agreement of the commissioning parties. The areas of highest entomological interest in this context are shown on **Figure 1** as well as the three survey areas for the current project.

2.0 METHODOLOGY

2.4.1 The survey was undertaken by invertebrate specialists Mike Edwards (Edwards Ecological Services Ltd.) and Peter Hodge.

2.4.2 Mike Edwards focused on surveying Hymenoptera aculeata (Ants, Bees and Wasps); some Diptera groups - Bibionidae (St Mark's Flies), Larger Brachycera (Robberflies and allies), Syrphidae (Hoverflies); Sciomyzidae (Snail-killing Flies) and Tipulidae (Craneflies); Orthoptera (Grasshoppers and Crickets).

2.4.3 Peter Hodge focused on surveying Hemiptera-homoptera (Hopper bugs only); Hemiptera-heteroptera (Bugs); Coleoptera (Beetles); Lepidoptera (Butterflies and Moths - day-flying groups only); some Diptera (Empididiae, Dolichopidae, Tephritidae (Picture-wing Flies).

2.4.4 Species from other insect groups were recorded as seen and recognised.

2.4.5 Survey visits took place in good recording conditions on the following seven occasions:

- 23/3/2012 (ME only)
- 11/04/2012; 15/06/2012; 27/06/2012; 23/07/2012; 14/08/2012; 21/09/2012 (ME and PH)

2.4.6 No visit was made during May as the weather conditions were not suitable in this month; appropriate seasonal coverage was obtained by undertaking visits early and late June.

2.4.7 Insects were recorded by a mix of direct observation and sweep netting. Voucher specimens of rare or difficult to distinguish species were retained for subsequent examination/confirmation in the laboratory.

2.4.8 As already noted, time constraints meant that sampling had to be selective on each visit. Swanscombe West was consistently surveyed on each occasion, with a two-hour sample being taken each afternoon. Effort was concentrated in Swanscombe North or South during alternate visits, with approximately 2.5 and 1 hour morning searches on each section per visit. Suction samples were taken in suitable locations over all the sample areas in June and September, the data from these samples has been combined with the rest of the samples. No water samples were taken for aquatic insects, although some insects with aquatic associations were recorded in the general samples.

3.0 RESULTS

3.1 Swanscombe North

3.1.1 This area is shown in more detail in **Figure 2**, where it can be seen to be of approximately equal area to Swanscombe South. The majority of both of these areas was old fly ash tip with some ditches/open water fringed by stands of Common Reed *Phragmites australis*. There is a narrow border of saltmarsh vegetation along the boundary with the River Thames. Considerable seepage of yellowish effluent from the tipping is present in both fresh and brackish situations.

3.1.2 Small areas where soil had been moved about subsequent to the main tipping (**Image 1**) and/or where gentle disturbance due to walkers forming paths (**Image 2**) were of high significance for both aculeate Hymenoptera and phytophagous Coleoptera. This was due to both the creation of areas of bare and re-vegetating ground as a physical feature, and to the presence of a diverse flora associated with these areas. Suction samples were taken on these patches.

3.1.3 Much of the fly ash infill was covered in mature, dense, tall grassland with fairly mature scrub growth. Some areas had clearly had scrub removed in the fairly recent past as the bushes were uniformly shorter, probably by the simple expedient of bull-dozing, and not for conservation-minded purposes (**Images 3, 4 ,5**). These areas were, likewise, much richer in plants and insects than the older, less disturbed grasslands.

3.1.4 The reed-fringed edges of the water-courses here were swept on survey visits but were of little interest, possibly because the water quality itself looked to be very low. One interesting species was discovered by careful inspection of the old cigar galls on the reed stems, the yellow-faced bee *Hylaeus pectoralis*.

Image 1 A small area at the north-western end of Swanscombe North. Here spoil from elsewhere had been recently moved about, providing good nest sites for aculeates and forage resources for both these insects and phytophagous Coleoptera.

Image 2 Similar processes of intermittent disturbances, this time provided by passing walkers and push-bikes along the Thamesside path, also provided good habitat for aculeate Hymenoptera and phytophagous Coleoptera.

3.1.5 The female of this bee hollows out the old larval chamber caused in the flowering stem of reed by the gall-forming fly *Lipara lucens* and uses this as a nest chamber. It can therefore only use reed stems which are more than one year old. Originally thought to be confined to the Broads, it has proved to be more widespread, although a strict wetland habitat specialist. Although not recorded in Swanscombe West it is likely to be present here too.

3.1.6 The other wetland habitat present, that of the brackish saltmarsh, notably around the small creek, also had a number of specialist insects associated with it, despite its small area and the poor quality of parts of it, probably due to seepage from the tipping. These included the BAP mining bee *Colletes halophilus* which collects its pollen exclusively from the flowers of Sea Aster *Aster tripolium* and is only found along the coasts of the English Channel in the whole world (**Image 6**). This bee nests in small areas of dry bare ground close to its food plant. The bee was also found in the Swanscombe South and West samples.

Image 3 Tall grassland with maturing scrub, fairly typical of much of the old Fly Ash tip.

Image 4 Intermittent disturbances of the grassland provided more diversity of ecological niche. This strip alongside one of the trackways had probably been bull-dozed for some reason in the fairly recent past. It is unlikely that cutting alone would have made the differences seen here.

Image 5 This area was occasionally flooded as evidenced by the water held on it after some of the heavy summer rain of 2012. Part of it had also been burnt the year before.

Image 6 The mining bee *Colletes halophilus* at its only pollen source, the flowers of Sea Aster.

3.1.7 Another saltmarsh specialist found here was the large soldier fly *Stratiomys singularior* (**Image 7**), whose larva live in the wet mud and small pools of the saltmarsh and associated ditches. Although only recorded in this sample area it might reasonably be expected in Swanscombe West as well.

Image 7 *Stratiomys singularior* is a large and fairly arresting soldier fly associated with saltmarsh and brackish ditches.

3.2 Swanscombe South

3.2.1 As noted above, a considerable part of Swanscombe South was fenced off, whilst the most extreme southern section, around the exit point for the Cross-Channel Rail Link, was extensive wet reedbed. Access to both these areas was not straightforward and they were not surveyed.

3.2.2 This left a roughly equivalent area of similar composition to be compared with the Swanscombe North area in order to establish whether there were likely to be major differences in faunal composition between Swanscombe North (more likely to be suitable for use as a habitat enhancement area) and the rest of the site, which has been proposed for development. **Image 8** gives an overall view of the mature grassland and wetland components and **Image 9** the more skeletal component.

3.2.3 This skeletal area was initially expected to be of high value for a range of aculeate Hymenoptera and phytophagous beetles similar to those found in what appeared to be similar situations in the Swanscombe North sample. However despite careful searches and suction sampling, the area did not appear to be of high value for these invertebrate groups. This may be explained by flooding, which occured after a spell of very heavy rain in the middle of the survey period and lasted for several weeks.

3.2.4 What was initially considered to be a layer of bare, if rather hard, chalk left after quarrying activity was not this at all, but probably the residues from washing out ready-mix cement mixers. The clue was present all along with the presence of a number of small areas of open water in this area, something which would have been extremely unlikely on mineral chalk, unless at the water-table, which it clearly was not.

Image 8 Much of Swanscombe South was tall mature grassland, with small ditches and bodies of open water fringed by reeds.

Image 9 A large area on the western edge of the sample zone was of a much more skeletal structure where, it appears, Readymix cement mixers had been washed out, creating a layer of fairly impervious chalky material.

3.2.5 The main interest of this area was along the edges where occasional disturbances had, as elsewhere on site, encouraged the development of a legume-rich sward, including stands of Kidney Vetch *Anthyllis vulneraria* (**Image 10**), Red Clover *Trifolium pratense* and Meadow Vetchling *Lathyrus pratensis*. These plants were well visited by a number of bee species, including frequently by the BAP bumblebee *Bombus humilis* (**Image 11**). As on other nearby sites the Bumblebee *Bombus sylvarum* was not present, this species now seems to be limited in the Thames Estuary to areas east of Tilbury.

3.2.6 The other, smaller, areas of bare and re-vegetating ground, mainly along trackways did prove to hold a similar fauna to the North Swanscombe sample. Interesting examples of this fauna include the weevil *Sibinia arenariae* (**Image 12**), found under plants of Sea Spurrey *Spergularia* spp. growing along the trackway being sampled with a suction sampler in **Image 13**. This weevil was not recorded in either of the other compartments, but is considered likely to be present if enough plants were to be searched.

Image 10 The more broken-up edges of this area supported good stands of legumes, such as this Kidney Vetch, which was popular with queens of the bumblebee in **Image 11.**

Image 11 The bumblebee *Bombus humilis*.

Image 12 The tiny weevil *Sibina arenariae* was found by searching the ground under one of its food plants, Sea Spurrey. This plant was growing along the trackway being suction-sampled in **Image 13.**

Image 13 Using a suction sampler to help find small insects in short vegetation. This technique is much more time-efficient for recording small beetles and bugs than hand-searching. However, as with *Sibina arenariae* in **Image 12,** it is worth doing both techniques during a survey.

3.2.7 Another insect found associated with these areas in all sample areas was the potter wasp *Odynerus melanocephalus*, another BAP species. **Image 14** shows a female wasp at the mud tower typical of this species and carrying a small green larva of the weevil *Hypera postica*, which is the prey of this species. The weevil is also associated with these areas of fairly sparse vegetation as it feeds on trefoils and medicks growing in them.

3.2.8 There was no saltmarsh component to this sample area and the margins of the ditches produced little of note beyond a nest of the yellow-faced bee *Hylaeus pectoralis* (see 3.1.5).

3.3 Swanscombe West

3.3.1 This area (**Figure 3**) was not under consideration for development at the time of survey, but was included both to provide some idea of where species recorded in the other areas were as well and to provide some information regarding the likely value of similar river defence/management works as potential enhancement areas for the overall site.

Image 14 This potter wasp *Odynerus melanocephalus*, which was found nesting on all three sample areas, is much better than us at finding its particular prey, the larvae of the weevil *Hypera postica*. The paralysed prey (green) can just be seen being carried into the low mud 'chimney' at the entrance to the wasp's nest.

3.3.2 The area had examples of all the broad habitat types present in the North and South samples, some of which were being maintained by deliberate management strategies, and others which were examples of incidental, but very valuable, consequences of previous use. The components and their location is indicated on **Figure 3**.

3.3.3 In this later category comes, almost inevitably, the skeletal vegetation component which is so important in the rest of the site. This is not surprising as most management outcomes are aimed at a 'complete' end point - a wood or permanent grassland perhaps. The skeletal vegetation structure, with its matrix of bare ground and intermittent vegetation is, in these terms, an incomplete outcome going towards somewhere and requires a rather different approach to its maintenance.This point will be returned to in section 4 of this Report which suggests some ideas for mitigation management strategies.

3.3.4 The main area with this component was on the approach to the old wharf (**Image 15)**, although there was also a small area of fairly recently tipped, or re-distributed, fly ash on the landward side of the road at the eastern end of this sample area (**Image 16**). This latter area provides a good example of a fairly recently disturbed area which is approaching the point at which some further disturbance would be required to re-start the important successional process.

Image 15 This area of well-drained, skeletal vegetation is typical of several areas on the overall survey area. It owes its physical structure to the lumpy, rubble-like material which had been put here, probably to aid loading movements associated with the wharf, but elsewhere as an unintended consequence of industrial use. Such areas are very warm and usually well-drained (although sub-surface compaction can alter this) with an invertebrate fauna more often found associated with sand-dune systems.

Image 16 Also with an unintended ecological consequence of industrial use, the pulverised fly ash which has been tipped here is often rather less well-drained, but also has physical and chemical properties more often associated with sand dune systems. Ironically, this 'industrial waste', often dumped on top of wet grazing marsh, has provided excellent invertebrate habitat in several places along the Thames - of a completely different nature than the original habitat and owing much of its interest to the insects originally associated with the gravel terraces to the north of the river- now largely quarried away.

3.3.5 The fauna recorded here was similar to that found on this sort of habitat component elsewhere on site.

3.3.6 The saltmarsh component was larger here than on the Swanscombe North area and without modification through effluent from fly-ash tipping (**Image 17**). It held a number of important saltmarsh insects and is of high value as a remnant of a formerly much more widespread component of the tidal/brackish Thames in London, despite its small size. These include the mining bee *Colletes halophilus* (see 3.1.6), the weevil *Mecinus collaris* which make a gall in the flower head of Sea Plantain *Plantago maritima* and the plant hoppers *Aphrodes aestuarinus* and *A. aestuarius*, both of which are associated with Shrubby Seablite *Suaeda maritima*.

3.3.7 The old sea-wall had been left after the (re?)building of the new wall and a, low-lying area of occasionally inundated grassland and incipient reed bed now lies between the two walls (**Image 18**). Both this area and the grasslands of the re-profiled sea wall were being managed on a cyclical cutting basis (**Images 18, 19, 20, 21**).

3.3.8 The outcome of this has been an overall good continuity of forage resources for associated insects and a varied plant community. Most of the insects associated with the grasslands on all the sample sites were recorded on these grasslands too. This area provides a good example of part of an overall management enhancement strategy for the entire site.

Image 17 The saltmarsh component, although not large in extent, still held a good representation of typical saltmarsh species.

Image 18 The occasionally inundated grassland lying between the old and new sea walls. Image taken in August. Note the highly floriferous grassland.

Image 19 The same area as in **Image 18** after cutting in June. Not all the grassland had been cut at the same time however- as shown in **Images 20** and **21** below.

Image 20 An area of longer grassland left on the sea wall. This has maintained forage resources for a wide variety of insects, whilst also meeting wider management constraints.

Image 21 An area of longer grassland left on the sea wall. This has maintained forage resources for a wide variety of insects, whilst also meeting wider management constraints.

4.0 EVALUATION

4.1 Habitats

4.1.1 Part of the site was originally a chalk outcrop which has been quarried away for making cement. In places the chalk bedrock is still present, making a well-drained, calcareous skeletal substrate. Most of the area, however, is more recent than this chalk, being derived from the extensive tipping of pulverised fly ash (PVA) on former grazing marsh during the latter part of the last century. This in-filing has, in most areas, brought the land surface well above the natural water level and has given rise to a generally well-drained, calcareous soil. This is often droughted, although subsequent compaction or addition of cement wastes have made some areas more liable to retain local surface water.

4.1.2 As the site was filled different areas would have been disturbed in turn as the overall level was increased. This disturbance served to rotationally create areas of re-colonising grassland, with plenty of open spaces - an analogue of the calcareous grassland developed on deeper soils such as those on much of Salisbury Plain Training Area (especially where light tank training has been carried out) or some of the upper sections of the North and South Downs. These taller grasslands are different in structure and composition to the short turf which develops, especially under hard grazing pressure, on areas of exposed chalk bedrock or steep slopes on chalk and, whilst sharing many of the same species, are different in their overall invertebrate fauna.

4.1.3 Succession to scrub and woodland is retarded by the droughted nature and low-nutrient status of the substrate. The regular, cyclical disturbance has had a further restricting influence - this is probably what happened relatively recently in the areas shown in **Images 4** and **16**. This sort of fairly dramatic, cyclical re-profiling of the habitat is of high value for invertebrates.

4.1.4 More recently the management of the grassland along the re-built sea wall on Swanscombe West gives an excellent example of the sort of cyclical mowing regime which helps maintain a plant-rich sward (**Photos 18-20**), although this could be enhanced through the removal of the arisings.

4.1.5 Swanscombe North (**Figure 1**) is of particular note as it holds a very wide representation of the fauna present and, importantly, serves to also buffer the small but significant river-side salt-marsh habitats.

4.2 Species

4.2.1 The total number of species recorded, by sample area and recognised conservation significance are presented in **Table 1**.

4.2.2 The individual species listed as being of conservation significance and an evaluation of this significance at a regional and national level forms **Table 2**.

Table 1 Total Number of Species Recorded on Site

Sample Area	Total No. Species	No. Species Considered Significiant	No. Species Unique to that Area	No. Species Considered Significiant
All areas	479	80	-	-
Swanscombe North	327	49	145	26
Swanscombe South	208	26	63	11
Swanscombe West	219	36	75	19

Table 2 Species of Conservation Significance Recorded on Site

Key: N = Found in Swanscombe North
S = Found in Swanscombe South
W = Found in Swanscome West
Status = Current conservation status
LS = Local Significance
NS = National Significance

Species	N	S	W	Status	Comment	LS	NS
ARANEAE (Spiders)							
Araneidae							
Argiope bruennichi	1	0	0	Nationally Scarce a	Great increase in distribution and frequency. Temperature critical. Requires downgrading.	Low	Low
ORTHOPTERA (Crickets and Grasshoppers)							
Tettigoniidae (Bush Crickets)							
Conocephalus fuscus	0	0	1	Nationally Scarce a	Temperature critical. Needs revision downwards.	Low	Low
Metrioptera roeselii	0	1	0	Nationally Scarce b	Temperature critical. Needs revision downwards.	Low	Low
HEMIPTERA-HETEROPTERA (Bugs)							
Miridae (Capsid Bugs)							
Lygus pratensis	1	0	0	RDB 3	Recent increase in records suggests this species should be downgraded.	Medium	Medium
HEMIPTERA-HOMOPTERA (Bugs)							
Cicadellidae (Leafhoppers)							
Aphrodes aestuarinus	0	0	1	Nationally Scarce b	Justified, habitat restricted.	High	High
Aphrodes aestuarius	0	0	1	Nationally Scarce	Justified, habitat restricted.	High	High
Cixiidae (Planthoppers)							

Species	N	S	W	Status	Comment	LS	NS
Oliarus panzeri	0	0	1	Nationally Scarce	Justified, habitat restricted.	High	High
LEPIDOPTERA (Butterflies and Moths)							
Arctiidae (Tiger Moths)							
Tyria jacobaeae	1	1	0	UK BAP	Modern assessment. Very widespread with a very common foodplant (Common Ragwort). A different categorisation from most the other species.	Medium	Medium
Geometridae (Looper Moths)							
Scotopteryx bipunctaria	1	0	1	Nationally Scarce b	Justified, habitat restricted. Possibly also a migrant, which would down-grade it.	High-Medium	High-Medium
Scotopteryx chenopodiata	1	0	1	UK BAP	Modern assessment, declines in a widespread and common moth, cf *Tyria jacobae*.	Medium	Medium
Lasiocampidae							
Malacosoma neustria	1	0	0	UK BAP	Modern assessment, declines in a widespread and common moth, cf *Tyria jacobae*.	Medium	Medium
Sesiidae (Clearwing Moths)							
Bembecia ichneumoniformis	1	1	1	Nationally Scarce b	Greatly overlooked by moth recorders. An active, day-flying moth which we have found fairly frequently in suitable habitats. Needs downgrading.	Medium	Medium

Species	N	S	W	Status	Comment	LS	NS
COLEOPTERA (Beetles)							
Apionidae (Weevils)							
Catapion curtisii	1	0	0	Nationally Scarce a	Justified.	High	High
Oxystoma cerdo	0	1	0	Nationally Scarce b	Increasing, possibly downgrade?	Medium	Medium
Protapion filirostre	0	0	1	Nationally Scarce b	Justified.	High	High
Carabidae (Ground Beetles)							
Brachinus crepitans	1	0	0	Nationally Scarce b	? Justified.	High	High
Ophonus ardosiacus	1	0	0	Nationally Scarce b	Justified.	High	High
Cerambycidae (Long-horn Beetles)							
Phytoecia cylindrica	0	1	0	Nationally Scarce b	? Justified. Evidence of expansion.	Medium	Medium
Coccinellidae (Ladybird Beetles)							
Hippodamia variegata	0	1	1	Nationally Scarce b	Very widespread along Thames Corridor.	Listed as High (Essex Red List as *Adonia variegata*), but we suggest this should be Low as it has increased markedly[1].	Medium
Cryptophagidae (Fungus beetles)							
Atomaria scutellaris	0	0	1	RDB K	Justified.	High	High

1. Confirmed by the entry in The Ladybirds of Britain and Ireland.

Species	N	S	W	Status	Comment	LS	NS
Curculionidae (Weevils)							
Mecinus collaris	0	0	1	Nationally Scarce b	Justified, habitat restricted.	High	High
Mecinus janthinus	0	1	0	Nationally Scarce a	Justified.	High	High
Phyllobius vespertinus	1	0	0	Nationally Scarce b	Justified, habitat restricted.	High	High
Pselactus spadix	0	0	1	Nationally Scarce b	?Justified, habitat restricted, but often frequent.	Medium	Medium
Rhinusa linariae	1	0	0	Nationally Scarce a	Justified.	High	High
Sibinia arenariae	0	1	0	Nationally Scarce b	Justified, habitat restricted.	High	High
Sitona cinerascens	1	0	0	RDB K	Justified.	High	High
Sitona macularius	1	1	0	Nationally Scarce b	Justified.	High	High
Sitona waterhousei	0	0	1	Nationally Scarce b	Justified.	High	High
Tychius schneideri	0	0	1	Nationally Scarce b	Justified, habitat restricted.	High	High
Tychius squamulatus	1	0	0	Nationally Scarce b	Justified.	High	High
Zacladus exiguus	0	1	0	Nationally Scarce b	Justified.	High	High
Drilidae							
Drilus flavescens	1	0	1	Nationally Scarce a	Justified.	High	High
Elateridae (Click Beetles)							
Athous campyloides	1	0	0	Nationally Scarce b	?Justified, apparently spreading.	Medium	Medium
Mordellidae (Tumbling Flower Beetles)							
Mordellistena acuticollis	1	0	1	RDB K	?Justified. Many new *Mordellistena* have been found recently in the UK.	Medium	Medium
Rhynchitidae (Weevils)							
Temnocerus tomentosus	1	0	0	Nationally Scarce b	Justified.	High	High

Species	N	S	W	Status	Comment	LS	NS
DIPTERA (Flies)							
Conopidae (Thick-headed Flies)							
Myopa strandi	0	0	1	RDB 3	Very ocasional, but this might be due in part at least to its very short adult life cycle.	High	High
Zodion cinereum	1	1	0	Nationally Scarce b	Very ocasional, but this might be due in part at least to its very short adult life cycle.	High	High
Stratiomyidae (Soldierflies)							
Stratiomys singularior	1	0	0	Nationally Scarce	Justified, habitat restricted.	High	High
Syrphidae (Hoverflies)							
Cheilosia cynocephala	1	0	0	Nationally Scarce	Justified, indeed may need uprating.	High	High
Pipizella maculipennis	0	0	1	RDB 3	Justified.	High	High
Pipizella virens	1	1	0	Nationally Scarce b	Justified.	High	High
Tachinidae (Parasite Flies)							
Cistogaster globosa	1	1	0	RDB 1	Probably needs downgrading, although much less frequent than in the 1990s	High	High
Gymnosoma nitens	0	1	0	RDB 1	Justified.	High	High
Tephritidae (Picture-wing Flies)							
Merzomyia westermanni	1	0	1	Nationally Scarce	? Perhaps needs downgrading.	Medium	Medium
Orellia falcata	0	1	0	Nationally Scarce	Justified.	High	High
Ulidiidae							

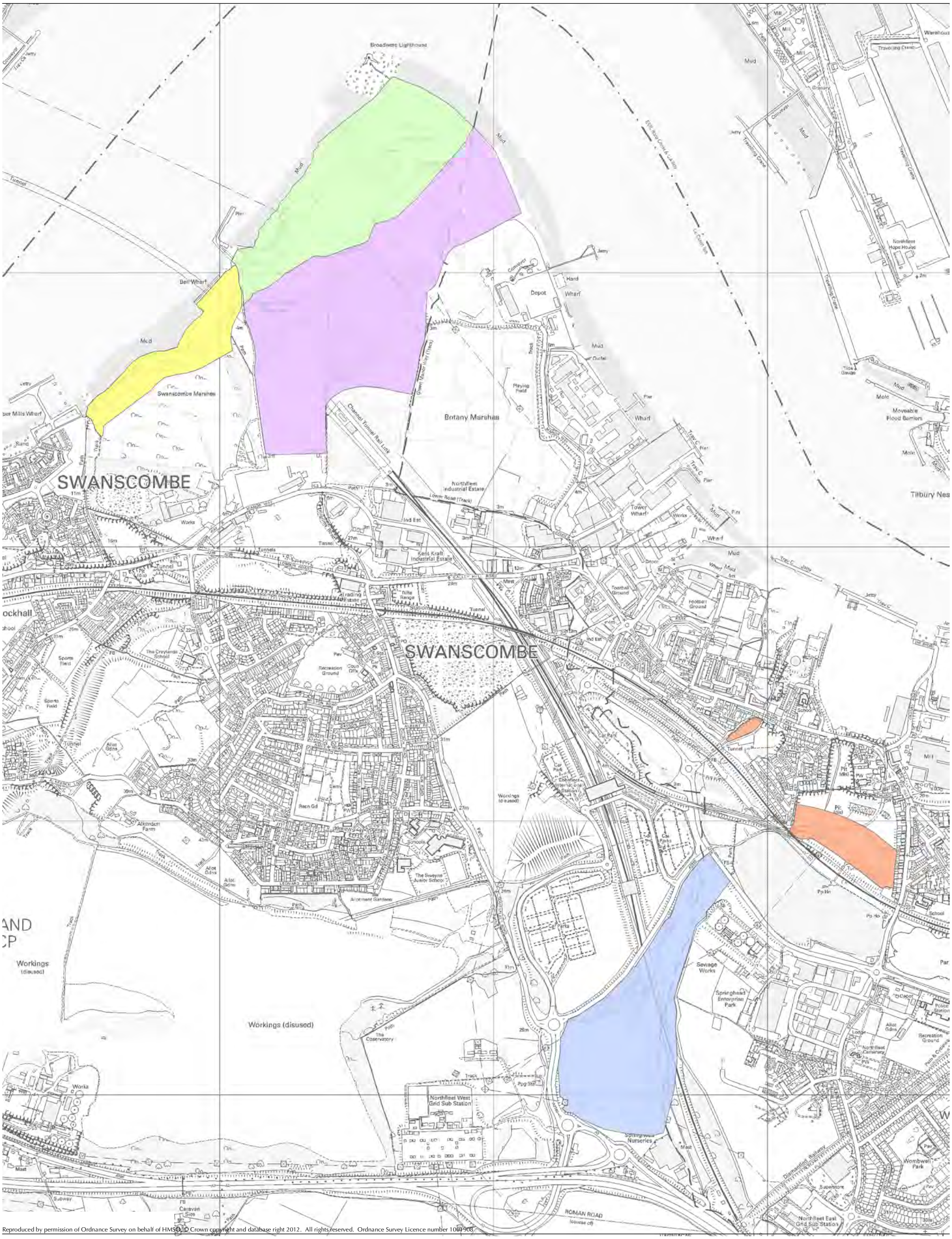
Species	N	S	W	Status	Comment	LS	NS
Dorycera graminum	1	0	0	RDB 3. UK BAP	Have found this species in most of the grassland sites we have surveyed along the Thames. Not found elsewhere.	Medium	High
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)							
Andrenidae (Mining Bees)							
Andrena alfkenella	1	0	0	RDB 3	Justified.	High	High
Andrena labiata	0	1	0	Nationally Scarce a	Become much more frequent over past ten years. Possibly requires downgrading.	High	Medium
Andrena minutuloides	1	1	1	Nationally Scarce a	Become much more frequent over past ten years. Possibly requires downgrading.	Medium	Medium
Andrena pilipes s.s	0	0	1	Nationally Scarce b	Justified.	High	High
Apidae (Bees)							
Bombus humilis	1	0	1	UK BAP	Modern assessment.	High. Part of largest area of potentially protected grassland habitat for this species in north of Thames corridor.	High. Restrict. range in UK. Major pop. in SE.
Ceratina cyanea	1	1	1	RDB 3	Increased distribution markedly in modern times.	Medium	Medium
Nomada flavopicta	0	0	1	Nationally Scarce b	Justified.	High	High

Species	N	S	W	Status	Comment	LS	NS
Nomada fucata	1	0	1	Nationally Scarce a	Needs revision downward. No threat.	Low	Low
Nomada fulvicornis	1	1	0	RDB 3	Justified.	High	High
Nomada hirtipes	1	0	0	RDB 3	Perhaps needs downgrading.	High	High
Colletidae (Bees)							
Colletes halophilus	1	1	1	Nationally Scarce a. UK BAP	Justified.	High	High
Colletes marginatus	0	0	1	Nationally Scarce a	Justified.	High	High
Hylaeus cornutus	1	0	0	Nationally Scarce a	Much more widespread now than previously. Needs downgrading.	Medium	Medium
Crabronidae (Solitary Wasps)							
Ectemnius dives	1	0	0	Nationally Scarce b	? Justified, perhaps needs downgrading.	Medium	Medium
Ectemnius sexcinctus	0	0	1	Nationally Scarce b	Justified.	High	High
Lestiphorus bicinctus	1	0	0	Nationally Scarce b	Justified.	High	High
Nysson trimaculatus	1	0	0	Nationally Scarce b	Perhaps needs downgrading.	Medium	Medium
Psenulus schencki	1	0	0	Nationally Scarce a	Justified.	High	High
Formicidae (Ants)							
Myrmica specioides	1	1	0	RDB 3	Inreceased distribution means this species needs downgrading.	Medium	Medium
Ponera coarctata	0	0	1	Nationally Scarce b	A cryptic species, but with few records - ? justified.	High	High
Halicitidae (Mining Bees)							
Lasioglossum malachurum	0	0	1	Nationally Scarce a	Needs revision downward. No threat.	Low	Low

Species	N	S	W	Status	Comment	LS	NS
Lasioglossum pauperatum	0	1	0	RDB 3	Justified.	Medium. Fairly frequent on unimprov. grassland sites in Thames Corridor.	High
Lasioglossum pauxillum	1	1	1	Nationally Scarce a	Needs revision downward. Currently spread northwards. Can be commonest species in wide variety of habitats in S. England. No threat.	Low	Low
Lasioglossum puncticolle	1	1	1	Nationally Scarce b	Justified.	Medium. Fairly frequent on unimprov. grassland sites in Thames Corridor.	High
Sphecodes crassus	0	1	0	Nationally Scarce b	Justified?	Medium	Medium but I.D. difficult
Sphecodes reticulatus	1	0	0	Nationally Scarce a	?Justified.	High	Medium
Sphecodes rubicundus	1	0	0	Nationally Scarce a	Justified.	High	High
Megachilidae (Leafcutter and Mason Bees)							
Megachile leachella	1	1	1	Nationally Scarce b	More widespread than orignally thought. Needs downgrading. Habitat restricted.	Medium	Medium
Melittidae (Bees)							
Melitta leporina	0	0	1	Nationally Scarce b	Justified.	High	High
Melitta tricincta	1	0	1	Nationally Scarce b	? Justified.	Medium	Medium

Species	N	S	W	Status	Comment	LS	NS
Pompilidae (Spider-hunting Wasps)							
Priocnemis cordivalvata	1	0	0	Nationally Scarce b	Justified, possibly needs revision upwards.	High	High
Vespidae (Social and Potter Wasps)							
Odynerus melanocephalus	1	0	1	Nationally Scarce a. UK BAP	Justified.	High	High

FIGURES



KEY

- Swanscombe West
- Swanscombe North
- Swansombe South
- Cement Works and Quarry
- Grassland East of Ebbsfleet Station

0 250 500 m

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N

FIGURE 1
Areas Referred to in the Report

MAY 2013

KEY

Swanscombe North

Swansombe South

0 75 150 m

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N

FIGURE 2
Swanscombe North and South Sampling Areas

KEY

Indicated in the descriptions above are the main areas of habitat sampled.
No sampling took place south of the ditch running parallel to, and south of the road.

0 50 100 m

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N

FIGURE 3
Swanscombe West Sampling Areas

MAY 2013

APPENDIX A
Total List of Species Recorded

Table A1 Total List of Species Recorded on Site
Key: N = Found in Swanscombe North
S = Found in Swanscombe South
W = Found in Swanscome West
Status = Current conservation status

Species	N	S	W	Status	Distribution	Notes
ARANEAE (Spiders)						
Agelenidae						
Agelena labyrinthica	0	0	1		Southern Widespread	Commonly found. Amongst rough grassland and heathland. It spins its funnel web near ground level amongst tall vegetation, heather and occasionally in gorse preying on mainly grasshoppers.
Argiope bruennichi	1	0	0	Nationally Scarce a	Southern Restricted	Frequently found, but very southern, Expanding range recently. The species preys particularly on Grasshoppers.
ODONATA (Damsel and Dragonflies)						
Aeshnidae (Hawker Dragonflies)						
Aeshna cyanea	1	0	0		Universal	Commonly found in the south, but scarcer towards the north. Breeds in still waters of various sizes, including garden ponds. Possibly associated with open woodland conditions.
Coenagrionidae (Damselflies)						
Enallagma cyathigerum	1	0	0		Universal	Common Blue Damselfly. Commonly found. Breeds in a variety of open waters.
Ischnura elegans	1	0	0		Universal	Blue-tailed Damselfly. Commonly found. A very adaptable species as a larva.
Libellulidae (Darter Dragonflies)						
Sympetrum striolatum	1	0	1		Universal	Common Darter Dragonfly. Abundantly found. Associated with a range of still and slowly-flowing water bodies.

Species	N	S	W	Status	Distribution	Notes
ORTHOPTERA (Crickets and Grasshoppers)						
Acrididae (Grasshoppers)						
Chorthippus albomarginatus	1	0	1		Southern Restricted	Lesser Marsh Grasshopper. Locally common in wet grasslands in southen and midland England. Tends to be coastal.
Chorthippus brunneus	1	1	1		Universal	Field Grasshopper. Commonly found. A ready coloniser of disturbed areas with a sparse vegetation.
Chorthippus parallelus	0	0	1		Universal	Meadow Grasshopper. Commonly found in a variety of grassy habitats.
Omocestus viridulus	1	0	0		Universal	Common Green Grasshopper. Commonly found. Long grass in moister situations.
Tetrigidae (Groundhoppers)						
Tetrix subulata	0	1	0		Southern Widespread	Slender Ground-hopper. Frequently found in wet places.
Tetrix undulata	0	0	1		Universal	Common Ground-hopper. Commonly found in damp places with areas of bare mud.
Tettigoniidae (Bush Crickets)						
Conocephalus fuscus	0	0	1	Nationally Scarce a	Southern Widespread	Long-winged Cone-head. Commonly found. Increasingly widespread throughout southern England.
Leptophyes punctatissima	1	0	0		Southern Widespread	Speckled Bush-cricket. Commonly found. Strongly biased towards southern England and Wales. Scrub.
Meconema thalassinum	0	0	1		Southern Widespread	Oak Bush-cricket. Commonly found. Wooded localities in the southern British Isles.
Metrioptera roeselii	0	1	0	Nationally Scarce b	Southern Restricted	Roesel's Bush-cricket. Commonly found in long grasslands and spreading rapidly in southern Britain.

Species	N	S	W	Status	Distribution	Notes
Tettigonia viridissima	0	0	1		Southern Restricted	Great Green Bush Cricket. Locally frequently found. Associated with scrubby grassland, but needs thin turf for oviposition.
DERMAPTERA (Earwigs)						
Forficulidae (Earwigs)						
Forficula auricularia	1	1	0		Universal	Common Earwig. Very commonly found.
MECOPTERA, MEGALOPTERA, NEUROPTERA (Lacewings and allies)						
Hemerobiidae (Brown Lacewings)						
Micromus angulatus	0	0	1		Southern Widespread	Local and infrequently found. In a variety of habitats.
HEMIPTERA-HETEROPTERA (Bugs)						
Berytinidae (Stiltbugs)						
Cymus melanocephalus	0	0	1		Southern Widespread	Commonly found on rushes, *Juncus*.
Coreidae (Squashbugs)						
Coreus marginatus	1	1	1		Southern Widespread	Commonly found. On *Rumex* and *Polygonum*.
Coriomeris denticulatus	1	1	0		Southern widespread	Frequently found. Feeds on legumes.
Lygaeidae (Groundbugs)						
Ischnodemus sabuleti	1	1	1		Southern Restricted	Commonly found. Usually in wetland habitats. Reedbeds.
Nysius senecionis	0	0	1		Southern Widespread	Locally frequently found, on ragwort and Common Fleabane. Recent colonist.
Peritrechus geniculatus	0	1	0		Southern Widespread	Commonly found, in dry grassland habitats.

Species	N	S	W	Status	Distribution	Notes
Taphropeltus contractus	1	0	0		Universal	Commonly found. sparsely-vegetated, dry soils amongst leaf litter.
Miridae (Capsid Bugs)						
Adelphocoris lineolatus	1	1	1		Universal	Commonly found. The larval food plants are all Fabaceae, although the adults may be on Asteraceae.
Closterotomus norwegicus	1	1	1		Universal	Commonly found on a variety of plants.
Deraeocoris lutescens	1	0	1		Southern Widespread	Commonly found. On a variety of tree foliage.
Europiella artemisiae	1	0	0		Southern Widespread	Commonly found. Associated with *Artemesia*.
Europiella artemisiae	1	0	0		Southern Widespread	Commonly found. Associated with *Artemesia*.
Heterotoma planicornis	1	0	0		Universal	Commonly found on a variety of plant species.
Leptopterna dolabrata	0	1	0		Universal	Commonly found. Associated with grasses.
Leptopterna ferrugata	0	0	1		Universal	Commonly found. Associated with grasses.
Liocoris tripustulatus	1	0	0		Universal	Commonly found, on Stinging Nettle *Urtica dioica*.
Lygus maritimus	1	0	0		Southern widespread	Frequently found. It occurs in a range of open habitats on a variety of host-plants including mayweed, fat hen and sorrel.
Lygus pratensis	1	0	0	RDB 3	Southern Restricted	Infrequently found, There has been much taxonomic confusion in the past and many old records are unreliable. Found in a variety of habitats including woodland rides and grassland. Biology and ecology are uncertain. Increasing recently.
Macrotylus horvathi	1	0	0		Southern Restricted	Infrequently found. Associated with *Ballota nigra*. Recently found in Britain, currently known from Kent only.
Macrotylus paykulli	0	1	0		Southern widespread	Commonly found, Rest Harrow.

Species	N	S	W	Status	Distribution	Notes
Notostira elongata	1	1	1		Southern Widespread	Commonly found, associated with grasses.
Orthocephalus saltator	0	0	1		Universal	Commonly found on a variety of herbaceous plants.
Orthops campestris	1	0	0		Universal	Commonly found, on several species of Apiaceae.
Orthops kalmii	1	0	0		Universal	Commonly found. On several species of Apiaceae, the eggs are laid in the flower-head.
Orthotylus flavosparsus	0	0	1		Universal	Frequently found. On Chenopodaceae, especially Fat Hen, goosefoots and oraches. Most frequent in coastal habitats.
Orthotylus moncreaffi	0	0	1		Southern Widespread	Coastal habitats, on Chenopodaceae, especially Sea Purslane.
Phytocoris varipes	1	0	1		Southern Widespread	Commonly found associated with grasses.
Plagiognathus chrysanthemi	1	0	1		Universal	Commonly found. On a variety of herbaceous plants.
Stenodema calcarata	0	0	1		Universal	Commonly found. Associated with grasses.
Trigonotylus ruficornis	0	0	1		Universal	Commonly found associated with grasses.
Nabidae (Damselbugs)						
Himacerus mirmicoides	0	1	0		Southern Widespread	Commonly found. In grassland habitats.
Nabis flavomarginatus	1	0	0		Universal	Commonly found. It lives amongst grasses, especially where they grow in damp areas or become tussocky. Widely distributed throughout the British Isles.
Pentatomidae (Sheildbugs)						
Aelia acuminata	1	1	1		Southern Restricted	Commonly found, associated with grasses.
Dolycoris baccarum	1	0	1		Universal	Commonly found. On a variety of herbaceous plants.

Species	N	S	W	Status	Distribution	Notes
Eurydema oleracea	1	0	0		Southern Restricted	Infrequently found. It feeds on the leaves of various crucifers, especially horse-radish and garlic mustard. Perhaps increased in recent years.
Eurydema oleracea	1	0	0		Southern Restricted	Infrequently found. It feeds on the leaves of various crucifers, especially horse-radish and garlic mustard. Perhaps increased in recent years.
Palomena prasina	1	0	0		Universal	Commonly found on a variety of herbaceous plants.
Picromerus bidens	1	0	0		Universal	Commonly found, on a variety of plants, often on heather.
Podops inuncta	0	1	0		Southern Widespread	Frequently found. in dry grassland habitats.
Sciocoris cursitans	1	0	0		Southern Restricted	Frequently found, but local. On dry sandy or chalky soils. Associated with low-growing plants such as Potentilla and Pilosella.
Scutelleridae (Shieldbugs)						
Eurygaster testudinaria	1	0	0		Southern Restricted	Frequently found. Local, associated with grasses.
Tingidae (Lacebugs)						
Acalypta parvula	0	1	0		Universal	Frequently found.
HEMIPTERA-HOMOPTERA (Bugs)						
Cercopidae (Froghoppers)						
Aphrophora alni	1	1	1		Universal	Commonly found, on a variety of trees and shrubs.
Neophilaenus campestris	1	1	1		Southern Widespread	Locally frequently found. Associated with calcareous grassland.
Philaenus spumarius	1	1	1		Universal	Commonly found. On a variety of trees and herbaceous plants.
Cicadellidae (Leafhoppers)						

Species	N	S	W	Status	Distribution	Notes
Aphrodes aestuarinus	0	0	1	Nationally Scarce b	Southern Restricted	Infrequently found. Saltmarshes between Dorset and Norfolk. Possibly associated with Shrubby Seablite *Suaeda maritima*.
Aphrodes aestuarius	0	0	1	Nationally Scarce	Southern Widespread	Infrequently found. A coastal species (Lancashire to Lincolnshire) with an association with Shrubby Seablite *Suaeda vera* and possibly Annual Seablite *Suaeda maritima*. Associations with Saltmarsh Grass *Pucinella maritima* and Sea Purslane *Atriplex portulacoides*.
Paramesus obtusifrons	1	0	0		Southern Widespread	Locally frequently found. Associated with coastal marshes. On *Bolboschoenus maritimus* and, possibly, *Phragmites communis*.
Cixiidae (Planthoppers)						
Cixius pilosus	1	0	0		Universal	Commonly found. Dry grassland.
Oliarus panzeri	0	0	1	Nationally Scarce	Southern Restricted	Locally Infrequently found. The ecology is poorly understood but it may prefer areas that are periodically waterlogged but which dry out and crack in summer. The foodplants are unknown but the nymphs are thought to be root feeders.
Delphacidae (Planthoppers)						
Asiraca clavicornis	1	0	1		Southern Restricted	Locally Frequently found. On grasses. Apparently much declined but still frequent in the London district.
Issidae (Planthoppers)						
Issus coleoptratus	1	0	1		Southern Widespread	Frequently Found. Associated with ivy *Hedera helix*.
Membracidae (Planthoppers)						
Centrotus cornutus	0	1	0		Universal	Frequently found, but local, feed on sap of oak.
LEPIDOPTERA (Butterflies and Moths)						

Species	N	S	W	Status	Distribution	Notes
Arctiidae (Tiger Moths)						
Phragmatobia fuliginosa	1	0	0		Universal	Ruby Tiger Moth. Commonly found. The hairy larvae feed on a variety of low plants.
Tyria jacobaeae	1	1	0	UK BAP	Universal	The Cinnabar moth. Commonly found. Larvae feed on Ragwort.
Geometridae (Looper Moths)						
Scotopteryx bipunctaria	1	0	1	Nationally Scarce b	Southern Restricted	The Chalk Carpet moth. Frequently found. The larva feeds on common bird's-foot trefoil, other trefolis, vetches and clovers. A species of calcareous sites, preferring those with rocks or bare ground.
Scotopteryx chenopodiata	1	0	1	UK BAP	Universal	Shaded Broad-bar moth. Frequently found. The larva feeds on species of vetch and clover.
Hesperiidae (Skipper Butterflies)						
Thymelicus lineola	0	0	1		Southern Restricted	Essex Skipper butterfly. Commonly found. The larva feeds on various grasses, particularly cock's-foot and creeping soft-grass. More or less restricted to southern and eastern England, but apparently spreading.
Thymelicus sylvestris	1	1	1		Southern Widespread	Small Skipper butterfly. Commonly found. The larva feeds on grasses, especially Holcus spp.
Lasiocampidae						
Malacosoma neustria	1	0	0	UK BAP	Universal	The Lackey Moth. Frequently found. The hairy larvae are initially gregarious and feed on many deciduous trees and shrubs.
Lycaenidae (Blue Butterflies)						
Celastrina argiolus	1	1	0		Southern Widespread	Holly Blue butterfly. Commonly found. There are two generations a year, larvae of the first feeding principally on the flowers of holly and of the second on buds of ivy.

Species	N	S	W	Status	Distribution	Notes
Polyommatus icarus	1	1	1		Universal	Common Blue butterfly. Commonly found. The larva feeds on various legumes, especially bird's-foot trefoil.
Noctuidae (Cut-worm Moths)						
Autographa gamma	1	0	0		Migrant	Silver Y moth. Migrant. Very commonly found. It flies readily by day and can be seen at dusk hovering over nectar sources.
Euclidia glyphica	0	0	1		Universal	Burnet Companion moth. Commonly found. The larvae feeds on trefoils and clovers.
Nymphalidae (Nymphalid, Fritillary and Brown Buterflies)						
Maniola jurtina	0	0	1		Universal	Meadow Brown butterfly. Commonly found. The larva feeds on many species of grass, preferring the finer varieties. It occurs in open grassy situations.
Pararge aegeria	1	0	0		Universal	Speckled Wood butterfly. Commonly found. Associated with shady woodlands, although it still requires patches of sunlight. The larva feeds on grasses, usually in sheltered situations such as woodland and scrub.
Polygonia c-album	0	1	0		Southern Widespread	Comma butterfly. Commonly found. The larva feeds on the leaves of nettle, elm and hop.
Pyronia tithonus	1	0	1		Southern Widespread	Gatekeeper butterfly. Commonly found. The larva feeds on various grasses, narrow-bladed species being preferred.
Pieridae (White Butterflies)						
Gonepteryx rhamni	0	1	0		Southern Widespread	Brimstone butterfly. Commonly found. The larva feeds on buckthorns.
Pieris brassicae	1	0	0		Universal	Large White butterfly. Commonly found. The larva feeds on various wild crucifers and legumes as well as cultivated cabbage.

Species	N	S	W	Status	Distribution	Notes
Pieris napi	0	1	0		Universal	Green-veined White. Commonly found. The larva feeds on wild crucifers, preferring those growing in damp and sheltered areas.
Pieris rapae	1	0	0		Universal	Small White butterfly. Commonly found. The larva feeds on a range of wild crucifers as well as cultivated ones.
Pyralidae						
Sitochroa palealis	1	1	0		Southern Restricted	Very locally frequently found. Larvae in a web in the seed heads of Daucus carota.
Sesiidae						
Bembecia ichneu-moniformis	1	1	1	Nationally Scarce b	Southern Widespread	6-Belted Clearwing. Locally frequently found, but easily missed. Flies fast in sunshine. Wasp mimic. Larva feeds at roots of *Lotus corniculatus* and *Anthyllis vulneraria*.
Zygaenidae (Burnett Moths)						
Zygaena filipendulae	0	0	1		Universal	6-spot Burnet moth. Commonly found. The larva feeds on bird's-foot trefoil but also needs long grass on which to make its cocoon.
COLEOPTERA (Beetles)						
Apionidae (Weevils)						
Aspidapion aeneum	1	1	0		Southern Widespread	Frequently found. On mallow *Malva* species.
Aspidapion radiolus	1	1	0		Universal	Frequently found. On mallow *Malva* species.
Catapion curtisii	1	0	0	Nationally Scarce a	Southern Restricted	Very local, rarely found. There are recent (post-1970) records from only a few coastal sites in the Isle of Wight, South Hampshire, Phytophagous. The larvae develop in galls in the rootstocks of white clover *Trifolium repens* and strawberry clover *Trifolium fragiferum*. Adults have also been recorded from subterranean clover *Trifolium subterraneum* in the Isle of Wight.

Species	N	S	W	Status	Distribution	Notes
Eutrichapion ervi	1	0	1		Universal	Commonly found. On vetches, especially *Lathyrus pratensis*.
Eutrichapion viciae	1	0	0		Universal	Frequently found, on Yellow Vetchling *Lathyrus pratensis*.
Holotrichapion pisi	1	1	1		Universal	Commonly found. Associated with *Medicago* species, larvae develop in vegetative buds.
Ischnopterapion loti	1	1	1		Universal	Commonly found, on Bird's-foot Trefoil *Lotus corniculatus*.
Malvapion malvae	1	1	0		Southern Restricted	Frequently found. On mallow *Malva* species.
Oxystoma cerdo	0	1	0	Nationally Scarce b	Southern Widespread	Widespread but local, formerly confined to the midlands and northern Britain. Now recorded widely in south-east England, where it is possibly a recent colonist. Phytophagous. Associated with vetches, especially tufted vetch *Vicia cracca*. The larvae develop in the pods feeding on the seeds.
Oxystoma pomonae	1	0	1		Southern Restricted	Frequently found. On Yellow Vetchling *Lathyrus pratensis*.
Perapion violaceum	0	0	1		Universal	Commonly found, on dock *Rumex* species.
Protapion apricans	1	1	1		Universal	Commonly found, on Red Clover *Trifolium pratense*.
Protapion assimile	1	0	0		Universal	Commonly found. On *Trifolium* species.
Protapion filirostre	0	0	1	Nationally Scarce b	Southern Widespread	Locally frequently found. On *Trifolium campestre, T. dubium* & *T. aureum*. Larvae in flower heads.
Protapion trifolii	0	1	1		Southern Widespread	Commonly found. On clover *Trifolium pratense* & *T. medium*.
Pseudapion rufirostre	1	1	0		Southern Widespread	Frequently found. On mallow *Malva* species.
Pseudapion rufirostre	1	1	0		Southern Widespread	Frequently found. On mallow *Malva* species.
Stenopterapion meliloti	1	1	1		Southern Restricted	Locally frequently found. Associated with *Melilotus*, larvae develop in the stems.
Stenopterapion tenue	1	0	1		Southern Widespread	Commonly found. On *Medicago* and probably *Melilotus* species.

Species	N	S	W	Status	Distribution	Notes
Bruchididae (Seed Weevils)						
Bruchidius imbricornis	1	0	0		Southern Restricted	Locally frequently found. A very recent discovery. Associated with Goat's Rue *Calega officinalis*. Larvae develop and pupate in the seeds.
Bruchidius varius	1	1	1		Southern Restricted	Commonly found, on clover *Trifolium pratense & T. medium*.
Bruchus brachialis	1	1	1		Southern Restricted	Locally commonly found, on Fodder Vetch *Vicia villosus*. Larvae develop in the seed pods.
Bruchus loti	1	1	1		Southern Restricted	Commonly found, on Bird's-foot Trefoil *Lotus corniculatus*.
Bruchus rufimanus	1	0	1		Southern Widespread	Commonly found. On Yellow Vetchling *Lathyrus pratensis*. also on stored legume crops.
Bruchus rufipes	1	1	1		Southern Restricted	Commonly found. On Fabaceae.
Byrrhidae						
Curimopsis maritima	1	0	0		Southern Widespread	Commonly found. Associated with sparsely-vegetated, dry soils, mostly coastal.
Cantharidae (Soldier Beetles)						
Cantharis cryptica	0	1	1		Universal	Commonly found. Associated with areas of lush vegetation.
Cantharis lateralis	1	0	1		Southern Widespread	Commonly found, associated with grassland habitats.
Cantharis nigra	1	0	0		Universal	Commonly found. In lowland marshes and meadows.
Cantharis rustica	1	0	0		Southern Widespread	Commonly found, in a variety of grassland habitats.
Malthinus flaveolus	0	0	1		Universal	Commonly found, on the foliage of trees and shrubs.
Malthinus seriepunctatus	0	0	1		Southern Widespread	Commonly found, in broadleaf woodland habitats.
Rhagonycha fulva	1	1	1		Universal	Commonly found. In a wide variety of habitats.
Carabidae (Ground Beetles)						

Species	N	S	W	Status	Distribution	Notes
Amara tibialis	1	0	0		Universal	Commonly found. Sandy soils.
Badister bullatus	0	1	0		Universal	Commonly found.
Bembidion lunulatum	1	0	0		Southern Widespread	Commonly found.
Bembidion minimum	0	0	1		Universal	Commonly found. On mud and in tidal debris in estuaries and saltmarshes.
Bembidion properans	1	1	1		Southern Widespread	Commonly found. Associated with open sunny places.
Brachinus crepitans	1	0	0	Nationally Scarce b	Southern Restricted	Frequently found but local. Associated with open stoney places, particularly on calcareous soils. It has been found in chalk and limestone quarries, the margins of arable fields, clay-pits, and in various coastal habitats including stabilised shingle beaches. Adults are gregarious and are found under stones or at plant roots. Adults are predatory and the larvae are probably parasitic on pupae of other beetles.
Brachinus crepitans	1	0	0	Nationally Scarce b	Southern Restricted	Frequently found but local. Associated with open stony places, particularly on calcareous soils. It has been found in chalk and limestone quarries, the margins of arable fields, clay-pits, and in various coastal habitats including stabilised shingle beaches. Adults are gregarious and are found under stones or at plant roots. Adults are predatory and the larvae are probably parasitic on pupae of other beetles.
Calathus fuscipes	1	0	0		Universal	Commonly found. Associated with open habitats.
Cicindela campestris	0	1	0		Universal	Green Tiger Beetle. Locally frequently found. Strongly associated with open habitats with sunny bare ground, including heaths or moors.
Curtonotus aulicus	1	0	0		Universal	Commonly found, adults feed on seeds of Asteraceae.

Species	N	S	W	Status	Distribution	Notes
Curtonotus aulicus	1	0	0		Universal	Commonly found, adults feed on seeds of Asteraceae.
Curtonotus convexiusculus	0	0	1		Universal	Frequently found, coastal, but also found in dry open situations well inland.
Dicheirotrichus gustavi	0	0	1		Universal	Commonly found. A saltmarsh species living around the high tide mark.
Harpalus affinis	1	0	0		Universal	Commonly found.
Microlestes maurus	1	0	0		Southern Restricted	Commonly found. Associated with leaf litter on dry soils.
Notiophilus biguttatus	1	0	0		Universal	Very commonly found. In many different habitats, including gardens.
Ophonus ardosiacus	1	0	0	Nationally Scarce b	Southern Restricted	Found mainly on chalk but occasionally on clay soils, in cultivated land, undercliffs, cliff-tops, sea walls and upper levels of beaches. Phytophagous, feeding mainly on seeds.
Paradromius linearis	1	1	1		Universal	Commonly found, in grassland habitats.
Pterostichus madidus	1	0	0		Universal	Commonly found, in a wide variety of habitats.
Syntomus foveatus	1	1	1		Universal	Commonly found, on open dry soils, including arable land.
Cerambycidae (Long-horn Beetles)						
Grammoptera ruficornis	0	0	1		Southern Widespread	Commonly found in woodland habitats. Larvae develop in small twigs.
Phytoecia cylindrica	0	1	0	Nationally Scarce b	Southern Widespread	Infrequently found. The larvae live in umbelifer stems in open grasslands.
Pseudovadonia livida	0	1	0		Southern Restricted	Commonly found. In dry grassland.
Stenurella melanura	0	1	1		Southern Widespread	Locally commonly found, adults visit flowers, breeds in dead wood.
Chrysomelidae (Leaf Beetles)						
Aphthona euphorbiae	0	0	1		Southern Widespread	Commonly found, often on ivy, a pest of flax *Linum* species.

Species	N	S	W	Status	Distribution	Notes
Cassida rubiginosa	0	0	1		Universal	Commonly found, on thistles.
Chrysolina americana	1	0	0		Southern Restricted	A recent arrival from the Mediterranean region with a distribution centred around London although there are several records from elsewhere. Associated with Lavender and Rosemary.
Chrysolina hyperici	1	0	0		Southern Widespread	Commonly found,on St John's-wort *Hypericum* species.
Crepidodera aurata	1	0	0		Universal	Commonly found, on willows *Salix* species.
Cryptocephalus aureolus	1	0	1		Universal	Frequently found. Adults are usually seen in the flowers of yellow Asteraceae growing in short turf. It is not known what the larvae do.
Cryptocephalus fulvus	1	1	1		Southern Widespread	Locally commonly found, in dry grassland.
Cryptocephalus hypochaeridis	1	1	1		Southern Widespread	Frequently found on calcareous grasslands. Adults usually seen in flowers, especially those of Asteracea. Details of life-history not known.
Cryptocephalus labiatus	1	0	0		Universal	Commonly found, on foliage of broadleaf trees.
Cryptocephalus moraei	1	0	0		Southern Widespread	Frequently found. The adults and larvae feed on St. John's-wort growing in short vegetation.
Longitarsus melanocephalus	0	0	1		Universal	Common, on Ribwort Plantain *Plantago lanceolata*.
Longitarsus pratensis	1	1	0		Universal	Commonly found, on Ribwort Plantain *Plantago lanceolata*.
Longitarsus succineus	1	0	0		Universal	Commonly found. Both adults and larvae feed on the foliage of various Asteraceae.
Neocrepidodera transversa	0	1	0		Universal	Commonly found. On thistles.
Phyllotreta nigripes	1	0	1		Universal	Commonly found, on Brassicaceae.
Coccinellidae (Ladybird Beetles)						

Species	N	S	W	Status	Distribution	Notes
Adalia decempunctata	1	0	1		Universal	Commonly found, on foliage of broadleaf trees.
Halyzia sedecimguttata	0	0	1		Southern Widespread	Commonly found, on tree foliage, often on Sycamore.
Harmonia axyridis	1	1	1		Southern Widespread	Harlequin Ladybird. Commonly found. A fairly large ladybird occurring in a wide range of colour patterns. It occurs on various herbaceous plants and trees, the larvae being predatory on aphids and other insects. A recent addition to the British fauna, spreading rapidly.
Hippodamia variegata	0	1	1	Nationally Scarce b	Southern Widespread	Frequently found but local in southern England and Wales. Associated with a variety of habitats especially dry grassland on sandy soils. The larvae and adults are predatory upon aphids.
Nephus redtenbacheri	0	0	1		Universal	Frequently found, but local, in sparsely vegetated grassland. Feeds on scale insects.
Propylea quattuordecim-punctata	1	1	1		Universal	Commonly found. In a wide variety of habitats.
Psyllobora vigintiduo-punctata	1	1	1		Southern Widespread	Commonly found. In grassland habitats.
Rhyzobius litura	1	1	1		Universal	Commonly found, in grassland habitats. Feeds on scale insects.
Subcoccinella vigintiquattuor-punctata	1	1	0		Universal	Commonly found, in dry grassland.
Tytthaspis sedecimpunctata	0	1	1		Universal	16-spot ladybird. Commonly found, in wet grassland.
Cryptophagidae (Fungus beetles)						
Antherophagus pallens	1	0	0		Universal	Commonly found. In the nests of Bumblebees.

Species	N	S	W	Status	Distribution	Notes
Atomaria scutellaris	0	0	1	RDB K	Southern Restricted	Infrequently found. For many years this tiny beetle was known in Britain only from the Isles of Scilly. However, it has recently become established in south-east England. It has been found in a variety of habitats but is perhaps most frequent near the coast.
Ephistemus globulus	0	1	0		Universal	Commonly found. In decaying vegetation.
Curculionidae (Weevils)						
Anthonomus pedicularius	0	1	0		Universal	Commonly found. On hawthorn *Crataegus* species.
Barypeithes pellucidus	1	0	0		Southern Restricted	Commonly found on low growing plants.
Ceutorhynchus contractus	1	0	0		Universal	Commonly found. In a variety of grassland and ruderal habitats. Polyphagous on a wide variety of Brassicaceae.
Ceutorhynchus obstrictus	1	1	1		Universal	Commonly found. Feeds on Brassicaceae.
Ceutorhynchus pallidactylus	1	0	0		Universal	Commonly found, on Brassicaceae.
Ceutorhynchus turbatus	1	1	1		Southern Widespread	Frequently found. Mainly southern England and East Anglia, recently in North Wales, probably spreading, as is the host plant. On open, often disturbed ground, associated with Hoary Cress *Lepidium draba*, larvae develop in the fruits, pupates in the soil. First found in Britain in 1951.
Ceutorhynchus typhae	1	0	0		Universal	Commonly found, on Brassicaceae.
Curculio glandium	0	0	1		Southern Restricted	Commonly found, on oak.
Dorytomus taeniatus	1	0	0		Universal	Commonly found, on willows *Salix* species.
Euophryum confine	0	1	0		Southern Widespread	Commonly found. Breeds in dead wood, a native of New Zealand.
Hypera nigrirostris	1	0	0		Universal	Commonly found, on clover, especially *Trifolium pratense*.

Species	N	S	W	Status	Distribution	Notes
Hypera plantaginis	1	0	0		Universal	Commonly found. On various species of Fabaceae.
Hypera postica	1	1	1		Southern Widespread	Commonly found. Feeds on Fabaceae.
Lixus scabricollis	1	0	0		Southern Restricted	Commonly found. Coastal, recent colonist. Sea Beet.
Mecinus collaris	0	0	1	Nationally Scarce b	Universal	Locally frequently found. In saltmarshes. Phytophagous. Associated with Sea Plantain *Plantago maritima*. The larvae develop in galls in the flowering stem, just below the inflorescence. Populations are frequently affected by parasitism.
Mecinus janthinus	0	1	0	Nationally Scarce a	Southern Restricted	First discovered in Britain in 1948, this small bluish weevil has been recorded since 1970 from East Kent, West Kent and South Essex, with older records for Surrey and Middlesex. Found on disturbed ground, grassland and road verges, often on chalky soils. Phytophagous. Associated with Common Toadflax *Linaria vulgaris*.
Mecinus labilis	0	1	0		Southern Widespread	Locally frequently found. On Plantains.
Mecinus pascuorum	1	1	1		Universal	Commonly found, on Ribwort Plantain *Plantago lanceolata*.
Mecinus pyraster	1	1	0		Universal	Commonly found, on Ribwort Plantain *Plantago lanceolata*.
Otiorhynchus ovatus	1	1	0		Universal	Frequently found. On sandy soils
Otiorhynchus rugosostriatus	1	0	0		Universal	Frequently found. Local in England and Wales, uncommon in Scotland. Parthenogenetic and polyphagous, a minor pest of soft fruit.
Phyllobius pyri	0	0	1		Universal	Commonly found, on a variety of tree species.
Phyllobius roboretanus	1	0	1		Southern Widespread	Commonly found, in grassland habitats.

Species	N	S	W	Status	Distribution	Notes
Phyllobius vespertinus	1	0	0	Nationally Scarce b	Southern Widespread	Locally frequently found. Coastal. Found amongst herbaceous vegetation in saltmarshes and other coastal habitats. Phytophagous and probably polyphagous, but an association with *Artemisia maritima* has been suggested.
Phyllobius virideaeris	1	1	1		Universal	Commonly found. In Grassland habitats.
Polydrusus pulchellus	1	0	0		Universal	Frequently found. Confined to saltmarsh habitats where it has been associated with *Artemisia maritime* and Chenopodaceae but it is thought to be polyphagous.
Pselactus spadix	0	0	1	Nationally Scarce b	Southern Widespread	Commonly found. Coastal. Phytophagous. A wood-boring species which forms colonies in driftwood and old wooden sea defences.
Rhinusa antirrhini	1	1	1		Southern Widespread	Commonly found. Usually found inside the flowers of *Linaria vulgaris*, it is possible that the larvae develop in the flowers.
Rhinusa linariae	1	0	0	Nationally Scarce a	Southern Restricted	Infrequently found and localised. Phytophagous, the larvae develop in root galls on Common Toadflax *Linaria vulgaris*.
Sibinia arenariae	0	1	0	Nationally scarce b	Southern widespread	Locally frequently found along the coasts of southern England and parts of Wales. Phytophagous. It is associated with rock spurry *Spergularia rupestris*, sea spurry *Spergularia marina* and sand spurry *Spergularia rubra*.

Species	N	S	W	Status	Distribution	Notes
Sitona cinerascens	1	0	0	RDB K	Southern Restricted	Infrequently found and very local. According to Hyman & Parsons (1992) this weevil is known as British from a single specimen without data in the Stephens collection in the Natural History Museum (London), however, a population was recently discovered on Canvey Island, South Essex and a single example was swept at Cuckmere Haven in 2005. Phytophagous. The host plant is apparently Slender Bird's-foot Trefoil *Lotus tenuis* and possibly other *Lotus* species but the life history remains unknown. Not listed in the Insect Red Data Book (Shirt, 1987).
Sitona cylindricollis	1	1	0		Southern Widespread	Locally frequently found. Associated with *Melilotus*.
Sitona hispidulus	1	0	1		Universal	Commonly found, on *Trifolium* species.
Sitona humeralis	1	1	1		Universal	Frequently found. *Medicago*.
Sitona lepidus	0	1	1		Universal	Commonly found, on various species of Fabaceae.
Sitona lineatus	1	1	1		Universal	Commonly found. On various species of Fabaceae.
Sitona macularius	1	1	0	Nationally Scarce b	Universal	Infrequently found and very local. Occurs in grassland habitats, particularly on chalky soils. Phytophagous, associated with a variety of leguminous plants including Sainfoin *Onobrychis viciifolia*, Wild Liquorice *Astragalus glycyphyllos*, Bird's-foot Trefoil *Lotus corniculatus*, tare, *Vicia* and medick *Medicago*. The larvae feed on the roots and root nodules.
Sitona puncticollis	0	0	1		Universal	Locally frequently found. Associated with Clovers.
Sitona regensteinensis	0	1	0		Universal	Commonly found, on *Cytisus scoparius, Ulex* and *Genista*.
Sitona sulcifrons	1	1	1		Universal	Locally comonly found. Feeds on Trifolium species.
Sitona waterhousei	0	0	1	Nationally Scarce b	Southern Widespread	Infrequently found, Local, *Lotus* Coastal landslips, sandy grassland.

Species	N	S	W	Status	Distribution	Notes
Trachyphloeus angustisetulus	1	0	1		Universal	Locally infrequently found. Associated with bare and re-vegetating ground.
Trichosirocalus troglodytes	1	1	1		Universal	Commonly found, on Ribwort Plantain *Plantago lanceolata*.
Tychius breviusculus	1	0	1		Southern Restricted	Infrequently found and very local. A recent discovery in Britain, currently known from ruderal sites close to the River Thames between London and Canvey Island where it is well established in several places. Also recorded from one site on the Dorset coast. Associated with *Melilotus* species, possibly preferring White Melilot *M. alba*.
Tychius junceus	1	1	0		Universal	Infrequently found and local In open grassland habitats on light soils. Associated with medicks, e.g., Black Medick *Medicago lupulina*.
Tychius meliloti	0	1	0		Southern Widespread	Infrequently found and localised. On melilot *Melilotus* species.
Tychius picirostris	0	0	1		Universal	Commonly found, on *Trifolium* species.
Tychius schneideri	0	0	1	Nationally Scarce b	Southern Restricted	Frequently found, but local. Phytophagous. It is found on calcareous grassland, cliff-tops and shingle beach habitats where its foodplant Kidney Vetch *Anthyllis vulneraria* grows.
Tychius squamulatus	1	0	0	Nationally Scarce b	Southern Restricted	Infrequently found. In grassland habitats on sandy soils, possibly preferring calcareous conditions. Phytophagous, associated with Bird's-foot Trefoil *Lotus corniculatus*. The larvae develop in the seed pods.
Tychius stephensi	1	1	0		Southern Restricted	Locally frequently found. In dry grasslands, associated with *Trifolium* species.
Zacladus exiguus	0	1	0	Nationally Scarce b	Southern Widespread	Locally infrequently found. Associated with the smaller-flowered Cranesbills, especially Cut Leaved and Hedgerow Cranesbill *Geranium dissectum* and *G. pyrenaicum*.
Drilidae						

Species	N	S	W	Status	Distribution	Notes
Drilus flavescens	1	0	1	Nationally Scarce a	Southern Restricted	Infrequently found and local. Recent records for only the Isle of Wight, Hampshire, Surrey, Kent and Sussex. Seldom found away from chalk grassland, the larvae feed on snails. The female is flightless.
Elateridae (Click Beetles)						
Agriotes sputator	1	1	1		Southern Widespread	Commonly found, in grassland habitats.
Agrypnus murinus	1	0	0		Southern Widespread	Commonly found in dry grassland.
Athous campyloides	1	0	0	Nationally Scarce b	Southern Restricted	Most records for this local click beetle are for South-east England. Adults are active at dusk for a short period in June and July. The wireworm larvae feed on plant roots. The species appears to be spreading in Britain.
Geotrupidae (Dung Beetles)						
Typhaeus typhoeus	1	1	0		Southern Widespread	Locally frequently found, in dung (mainly rabbit) on sandy soils.
Kateretidae						
Brachypterolus linariae	1	1	0		Southern Widespread	Commonly found. Breeds in the flowers of *Linaria* species.
Brachypterolus pulicarius	1	1	1		Universal	Frequently found. Associated with the flowers and seeds of Toadflax, *Linum* spp.
Lathridiidae						
Cartodere bifasciata	0	1	0		Universal	Very commonly found. Associated with decaying vegetable material.
Corticarina fuscula	0	0	1		Universal	Commonly found, in a variety of habitats.
Cortinicara gibbosa	0	1	0		Universal	Commonly found, in a variety of habitats.
Melyridae						
Anthocomus rufus	0	1	1		Southern Restricted	Commonly found. Reedbeds.
Axinotarsus marginalis	0	1	0		Southern Restricted	Commonly found. In grassland and woodland edge habitats.

Species	N	S	W	Status	Distribution	Notes
Cordylepherus viridis	1	1	1		Southern Restricted	Frequently found, in dry grassland.
Dasytes	0	1	1		Southern Restricted	Commonly found on flowers in hedges.
Malachius bipustulatus	1	1	0		Southern Widespread	Commonly found, on flowers in grassland and woodland.
Mordellidae (Tumbling Flower Beetles)						
Mordellistena acuticollis	1	0	1	RDB K	Southern Restricted	Infrequently found. Probably a recent colonist in Britain, this species was first recorded from Eriswell Lode near Mildenhall, West Suffolk and Shooter's Hill, West Kent in 1983 and 1984 respectively. It has recently been recorded from most counties in south-east England and East Anglia. Phytophagous. Associated with Mugwort *Artemisia vulgaris*, the larvae probably develop in the stems.
Mordellistena variegata	0	1	0		Southern Restricted	Locally frequently found. Adults found on flowers of hogweed and other species of umbels. Larval host uncertain but probably develop in plant stems.
Mordellochroa abdominalis	0	0	1		Southern Widespread	Frequently found, but local. Adults occur on flowers and larvae probably develop in dead wood or plant stems.
Nitidulidae (Pollen Beetles)						
Meligethes aeneus	1	1	1		Universal	Commonly found. Breeds in flowers of Brassicaceae.
Meligethes carinulatus	1	0	0		Southern Widespread	Frequently found on Bird's-foot Trefoil *Lotus corniculatus*.
Meligethes ruficornis	1	1	0		Southern Widespread	Infrequently found and localised. Breeds in flowers of *Ballota nigra*.
Oedemeridae						
Oedemera lurida	1	1	1		Southern Widespread	Commonly found. On a variety of flowers.

Species	N	S	W	Status	Distribution	Notes
Oedemera nobilis	0	1	0		Southern Widespread	Commonly found. On a variety of flowers.
Rhynchitidae (Weevils)						
Tatianaerhynchites aequatus	1	0	1		Universal	Commonly found. Feeds on hawthorn.
Temnocerus tomentosus	1	0	0	Nationally Scarce b	Southern Widespread	It occurs on various species of sallow and poplar, the larvae developing in the leaf buds. Local but widely distributed in England and Wales.
Scirtidae						
Cyphon laevipennis	0	0	1		Universal	Commonly found. Associated with *Phragmites* beds.
Scraptiidae						
Anaspis pulicaria	1	1	1		Southern Widespread	Commonly found, on a variety of flowers.
Staphylinidae (Rove Beetles)						
Astenus lyonessius	0	0	1		Southern Widespread	Commonly found. Amongst leaf litter in open-structured grassland.
Brachygluta helferi	0	0	1		Southern Widespread	Frequently found, amongst litter in saltmarshes. Assumed to be a predator.
Cypha longicornis	1	0	0		Universal	Commonly found, amongst litter on the ground.
Drusilla canaliculata	1	0	0		Southern Widespread	Commonly found, in dry grassland habitats.
Megalinus glabratus	1	0	0		Universal	Commonly found.
Metopsia clypeata	0	1	1		Universal	Commonly found. In moss and ground litter. Life history unknown.
Sepedophilus nigripennis	0	1	0		Universal	Commonly found, amongst litter on the ground.
Stenus aceris	1	0	0		Southern Widespread	Commonly found, but scarer in the north. At roots of grass and in moss in both grassland and woodland habitats, chiefly in lowland situations.
Stenus fulvicornis	1	0	0		Universal	Commonly found, in wetland habitats.

Species	N	S	W	Status	Distribution	Notes
Tachyporus atriceps	0	0	1		Universal	Commonly found. In grasslands amongst leaf litter and mosses.
Tachyporus hypnorum	1	1	0		Universal	Commonly found, amongst litter on the ground.
Tenebrionidae (Darkling Beetles)						
Isomira murina	1	1	1		Southern Widespread	Commonly found. In dry grassland.
Lagria hirta	1	0	0		Universal	Commonly found. Associated with hedgerows and scrub.
Nacerdes melanura	0	1	1		Universal	Commonly found. The Wharf-borer. Coastal. Breeds in old timber and driftwood along the shoreline.
DIPTERA (Flies)						
Asilidae (Robberflies)						
Dioctria atricapilla	0	1	0		Southern Widespread	Commonly found. Dry, grassy areas and heaths.
Dioctria baumhaueri	1	0	0		Southern Widespread	Commonly found. Dry, grassy areas and heaths at the edge of woodland.
Dioctria rufipes	1	1	1		Universal	Frequently found. The adult is an active predator of flying insects, the larvae are soil-dwelling predators.
Dysmachus trigonus	0	1	0		Universal.	Locally commonly found. On heaths and dry, sandy grasslands in southern England. Coastal sand-dunes further north.
Leptogaster cylindrica	1	1	1		Southern Widespread.	Frequently found in long grass. The adult is an active predator of flying insects, the larvae are soil-dwelling predators.
Machimus atricapillus	1	0	0		Southern Widespread	Commonly found. Dry grasslands and scrub.
Machimus cingulatus	0	0	1		Southern Widespread	Commonly found south of London, infrequent elsewhere. Dry grasslands, heaths and scrub.
Bibionidae (St Mark's Flies)						
Bibio johannis	1	1	1		Universal	Very commonly found. The larvae feed in grassland.
Dilophus febrilis	0	0	1		Universal	Very commonly found. The larvae feed in grassland.

Species	N	S	W	Status	Distribution	Notes
Bombylius major	1	1	0		Southern Widespread	Commonly found. A cleptoparasite of a variety of springtime ground-nesting solitary bees.
Chloropidae						
Lipara lucens	0	1	0		Southern Widespread	Commonly found. The larvae gall the flowering stem of Common Reed, making a cigar-gall.
Conopidae (Thick-headed Flies)						
Conops quadrifasciatus	1	0	0		Universal	Commonly found. A parasite of bumble bee workers.
Myopa strandi	0	0	1	RDB 3	Southern Restricted	Rarely found. The larvae are internal parasites of solitary bees of the genus *Andrena*.
Sicus ferrugineus	1	1	0		Universal	Commonly found. A parasite of bumble bee workers.
Zodion cinereum	1	1	0	Nationally Scarce b	Southern Widespread	Rarely found. A parasitoid of adult bees.
Dolichopodidae						
Machaerium maritimae	1	0	0		Universal	Commonly found. Saltmarshes.
Scellus notatus	1	1	0		Universal	Frequently found. Local, in woodland and scrub.
Empididae (Dance Flies)						
Empis tessellata	1	0	0		Universal	Commonly found. Both adults and larvae are predatory.
Limoniidae (Craneflies)						
Limonia nubeculosa	1	0	0		Universal	Commonly found. Damp woodlands. The larvae feed in dead wood.
Symplecta stictica	1	0	1		Universal	Commonly found, especially associated with marshy coasts.
Platystomatidae						
Platystoma seminationis	1	0	0		Universal	Commonly found. The larvae develop in decaying vegetable matter in damp places.
Sciomyzidae (Snail-killing Flies)						

Species	N	S	W	Status	Distribution	Notes
Coremacera marginata	1	1	1		Universal	Frequently found. Associated with dry habitats. The larvae prey on terrestrial snails.
Limnia unguicornis	1	1	1		Universal	Commonly found in both wet and dry grassland.
Pherbellia cinerella	1	0	1		Universal	Commonly found in grassland.
Pherbina coryleti	1	0	1		Universal	Frequently found. Associated with a variety of wet habitats. The larvae prey on both aquatic and terrestrial snails.
Trypetoptera punctulata	0	1	0		Universal	Frequently found in a wide range of habitats. Biology unknown.
Stratiomyidae (Soldierflies)						
Beris vallata	0	0	1		Universal	Commonly found in a variety of habitats.
Chloromyia formosa	1	1	1		Universal	Commonly found. Breeds in rotting vegetation.
Chorisops tibialis	1	1	0		Southern Widespread	Frequently found in woodland rides and scrub-edge.
Microchrysa flavicornis	1	0	0		Universal	Commonly found. Breeds in rotting vegetation.
Nemotelus notatus	1	1	1		Universal	Frequently found. A species of coastal wetlands.
Stratiomys singularior	1	0	0	Nationally Scarce	Southern Widespread	Locally frequently found. Associated with brackish ditches, hence usually coastal.
Syrphidae (Hoverflies)						
Cheilosia cynocephala	1	0	0	Nationally Scarce	Southern Widesrpread	Infrequently found. Associated with thistles in alkaline grasslands. Has been reared from *Carduus nutans*.
Cheilosia impressa	1	0	0		Universal	Frequently found. Damp woodlands.
Cheilosia proxima	1	0	0		Universal	Commonly found. The larvae mine roots of *Cirsium* spp. Unrecorded from Ireland.
Cheilosia vernalis	1	0	0		Universal	Commonly found. The larvae mine the roots of a number of perennial plants.

Species	N	S	W	Status	Distribution	Notes
Chrysotoxum bicinctum	1	1	0		Universal	Frequently found. Dry grasslands and heaths, often near scrub. Probably feeds on aphids on roots. There may also be an association with ants.
Chrysotoxum festivum	1	0	1		Southern Widespread	Infrequently found. Grasslands at the margins of woodland or scrub, particularly in southern England.
Eristalinus aeneus	1	1	1		Universal	Abundance: Commonly found very close to shore-line. Breeds in rotting vegetable matter, particularly seaweed.
Eristalinus sepulchralis	1	0	0		Universal	Commonly found. Organically rich pools, especially on coastal grazing marshes. The larvae are semi-aquatic, occurring in rotting vegetation and in water enriched with animal dung.
Eristalis arbustorum	1	1	1		Universal	Very commonly found. The larvae live in organically rich wet mud.
Eristalis horticola	1	0	0		Universal	Commonly found. Local towards the north of the U.K.. The larvae live in organically rich wet mud.
Eristalis intricarius	1	0	0		Universal	Commonly found. Often in woodland clearings.
Eristalis pertinax	1	0	0		Universal	Very commonly found. The larvae live in organically rich wet mud.
Eupeodes corollae	1	0	0		Universal	Very commonly found everywhere. The larvae feed on aphids. A migratory species.
Eupeodes luniger	1	0	1		Universal	Commonly found. The larvae prey on aphids on conifers.
Helophilus pendulus	1	0	0		Universal	Very commonly found. The larvae live in organically rich wet mud.
Helophilus trivittatus	1	0	1		Universal	Infrequently found. Most often associated with grazing marshes and coastal meadows. Increased in distribution and found over many more habitat types recently.
Melanostoma mellinum	1	0	1		Universal	Very commonly found. A grassland species.
Melanostoma scalare	0	0	1		Universal	Very commonly found. A grassland species.
Myathropa florea	1	0	1		Universal	Commonly found. The larvae live in wet, decaying leaves.

Species	N	S	W	Status	Distribution	Notes
Paragus haemorrhous	0	1	0		Universal	Commonly found. Associated with patches of bare ground in short grassland.
Pipizella maculipennis	0	0	1	RDB 3	Southern Widespread	Rarely found. A species of dry grassland and woodland. The larvae feed on aphids on roots.
Pipizella viduata	1	1	1		Universal	Commonly found. A species of dry grassland. The larvae feed on aphids on umbellifer roots.
Pipizella virens	1	1	0	Nationally Scarce b	Southern Widespread	Infrequently found. Possible association with aphids on roots of umbellifers.
Sphaerophoria rueppellii	1	0	1		Universal	Locally commonly found in the south-east. Uncommonly found elsewhere. Usually In dry grassland, although it has been also found along the edges of saltmarsh.
Sphaerophoria scripta	1	1	1		Universal	Very commonly found in the southern half of the British Isles. A grassland species, the larvae feed on aphids and Homoptera living in the ground layer.
Sphaerophoria taeniata	1	0	0		Universal	Frequently found. Associated with wet meadows.
Syritta pipiens	1	1	0		Universal	Very commonly found in most places throughout Britain. The larvae live in decaying vegetation.
Syrphus ribesii	1	0	0		Universal	Very commonly found. A migratory species. The larvae feed on aphids.
Tropidia scita	1	1	0		Universal	Locally common. A species of lush fen and marsh.
Xanthogramma pedissequum	0	1	0		Southern Widespread	Frequently found on dry grasslands. There is an association with *Lasius* ant nests.
Xylota segnis	1	0	0		Universal	Commonly found. Woodlands and hedgerows. A dead-wood breeding species which will even use sawdust.
Tabanidae (Horseflies)						
Chrysops relictus	1	1	1		Universal	Frequently found. Associated with wet woodlands. Commoner in Scotland than *C. caecutiens*.

Species	N	S	W	Status	Distribution	Notes
Cistogaster globosa	1	1	0	RDB 1	Southern Restricted	Locally frequent, becoming more so. Dry grassland with bare ground. Parasitic on Bishops Mitre Bug.
Gymnosoma nitens	0	1	0	RDB 1	Southern Restricted	Infrequently found, and very local. In common with many other tachind flies associated with Hemiptera this species has become more widespread in the recent component of the fauna of Thames corridor gravel terrace sites. Parasitises *Sciocoris curtisans* and possibly other shield-bugs.
Tephritidae (Picture-wing Flies)						
Campiglossa misella	1	0	0		Southern Restricted	Locally frequently found. Larvae attack the flower spike of *Artemisia vulgaris*, inducing a stem gall in the first generation and developing in the capitula in the second generation.
Campiglossa plantaginis	1	0	0		Southern Widespread	Found locally in southern Britain. Mainly found in coastal districts, especially saltmarshes. Associated with *Artemisia maritimia* and *A. vulgaris*. Larvae attack the capitula of the host plants. Has als obeen found in the Brecks, where it was associated with Ragwort.
Chaetorellia jaceae	1	0	0		Southern Restricted	Frequently found. The larvae develop in the seed heads of Asteraceae.
Merzomyia westermanni	1	0	1	Nationally scarce	Southern Restricted	Frequently found. Local in south-east England but perhaps more frequent than originally thought. The larvae develop in the flower-heads of ragwort *Senecio* species.
Orellia falcata	0	1	0	Nationally Scarce	Southern Restricted	Infrequently found. The larvae develop in the roots of Goat's Beard, *Tragopogon pratensis*.
Tephritis divisa	1	0	0		Southern Restricted	Commonly found. Recent arrival from southern Europe. Associated with *Picris echioides*.
Urophora cardui	0	1	0		Southern Restricted	Commonly found, on Creeping Thistles *Cirsium vulgare*.

Species	N	S	W	Status	Distribution	Notes
Urophora quadrifasciata	1	0	0		Southern Restricted	Commonly found on Hardheads *Centaurea nigra*.
Therevidae (Stiletto Flies)						
Thereva nobilitata	0	1	0		Universal	Commonly found. The commonest Therevid fly, often associated with dry grasslands. The larva lives in loose soil.
Tipulidae (Craneflies)						
Nephrotoma appendiculata	0	0	1		Universal	Commonly found. A species of dry grassland.
Nephrotoma flavescens	1	1	0		Universal	Commonly found. A species of dry grasslands.
Tipula oleracea	1	0	1		Universal	Commonly found. Associated with pastures on wet soils.
Ulidiidae						
Dorycera graminum	1	0	0	RDB 3. UK BAP	Southern Restricted	Frequently found. Associated with taller grasslands, often dry ones. However, the larval food plant is unknown; it may be the roots or inflorescences of grasses.
HYMENOPTERA SYMPHYTA (Sawflies)						
Argidae						
Arge cyanocrocea	0	0	1		Southern Widespread	The Rose Sawfly. The larvae fed on the leaves of Rosacae, especially brambles.
Tenthredinidae						
Athalia rosae	1	0	0		Southern Widespread	Very commonly found. The larva feeds on various species of crucifer, and was formerly a pest of turnips.
HYMENOPTERA PARASITICA (Ichneumon Wasps and allies)						
Chalcididae (Parasitic Wasps)						
Brachymeria minuta	1	0	0		Southern Widespread	Infrequently found. An internal parasite of sarcophagid flies.
Gasteruptiidae (Parasitic Wasps)						

Species	N	S	W	Status	Distribution	Notes
Gasteruption jaculator	1	0	0		Southern Restricted	Commonly found. A clepto-parasite of stem-nesting bees.
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)						
Andrenidae (Mining Bees)						
Andrena alfkenella	1	0	0	RDB 3	Southern Restricted	Infrequently found. Strongly associated with calcareous grassland in south-eastern England, also associated with heathland edge in south-western England. Polylectic.
Andrena bicolor	0	1	1		Universal	Very commonly found. Polylectic. Ground nesting.
Andrena carantonica	0	0	1		Universal	Commonly found. Several females may share a common burrow entrance. Polylectic.
Andrena chrysosceles	0	0	1		Southern Widespread.	Commonly found. Especially associated with clay woodlands. Polylectic. Ground nesting.
Andrena dorsata	1	1	1		Southern Widespread	Commonly found. Often the dominant species in southern Britain. Polylectic.
Andrena flavipes	1	1	1		Southern Restricted.	Commonly found. Forms very large colonies, especially in bare ground. Polylectic. Ground nesting.
Andrena haemorrhoa	0	1	0		Universal	Commonly found. Females nest singly but males often congregate on blackthorn and hawthorn blossoms. Polylectic. Ground nesting.
Andrena labialis	1	0	1		Southern Widespread	Local species of old meadowlands. Oligolectic on the flowers of Fabacaea.
Andrena labiata	0	1	0	Nationally Scarce a	Southern Restricted	Locally frequent. Old meadowland and heathy grassland species. Polylectic, although it is often found associated with the flowers of Germander Speedwell, *Veronica chamaedrys*.
Andrena minutula	0	1	0		Universal	Commonly found. Polylectic. Ground nesting.

Species	N	S	W	Status	Distribution	Notes
Andrena minutuloides	1	1	1	Nationally Scarce a	Southern Restricted	Infrequently found. Strongly associated with sandy and calcareous grasslands. Polylectic.
Andrena nigroaenea	1	0	0		Universal.	Commonly found. Polylectic. Ground nesting.
Andrena nitida	1	1	0		Southern Widespread	Commonly found. A species of meadows. Polylectic. Ground nesting.
Andrena pilipes s.s	0	0	1	Nationally Scarce b	Southern Restricted.	A recent split, this is the commoner of two species formerly known as *Andrena pilipes*.
Andrena praecox	1	1	0		Southern Widespread	Locally frequently found. Oligolectic on blossom of sallows.
Andrena semilaevis	1	0	0		Universal	Commonly found. Polylectic, although with an apparent preference for Apiaceae.
Andrena wilkella	1	1	1		Universal	Frequently found in unimproved meadows. Oligolectic on Fabaceae. Ground nesting.
Panurgus calcaratus	1	1	0		Southern Widespread	Locally frequently found. Oligolectic, associated with yellow flowered Asteraceae (composites). Ground nesting.
Apidae (Bees)						
Anthophora bimaculata	1	1	1		Southern Restricted.	Locally commonly found in heathy localities. Nests in the ground. Polylectic.
Anthophora plumipes	0	1	0		Southern Widespread	Commonly found. Nests in the ground or cliffs and walls.
Bombus hortorum	1	1	1		Universal	Very commonly found. Polylectic. Nests underground in cavities.
Bombus humilis	1	0	1	UK BAP	Southern Widespread	BAP species. Frequently found. A declining species, more frequent in coastal localities of the south-west. Associated with taller grasslands, but with plenty of perennial flowers present. Surface nesting.
Bombus lapidarius	1	1	1		Universal	Very commonly found. Nests underground in cavities. Polylectic.
Bombus pascuorum	1	1	1		Universal	Very commonly found. Polylectic. Nests in surface litter.
Bombus pratorum	1	1	1		Universal	Very commonly found. Polylectic. Nests underground as well as in aerial cavities, including bird boxes.

Species	N	S	W	Status	Distribution	Notes
Bombus terrestris	1	1	1		Universal	Very commonly found. Polylectic. Nests underground in cavities.
Bombus vestalis	1	0	0		Southern Widespread	Commonly found. Breeds in nests of B. terrestris.
Ceratina cyanea	1	1	1	RDB 3	Southern Restricted	Locally frequently found. This small blue bee is our only Carpenter Bee, so called because of their habit of drilling burrows in wood in which to make their nests. They do this with their strong mandibles. *Ceratina* drills out the soft pith of dead ramble stems, both for nests which are provisioned during May and June, and for overwintering by the adults which emerge from these summer nests. Overwintering is communal, unmated males and females pack into drilled stems, following in the one which made the burrow. I have found up to ten adults in one stem.
Nomada fabriciana	0	0	1		Universal	Commonly found. Parasitises several *Andrena* species. Ground nesting.
Nomada flavoguttata	1	1	0		Universal	Commonly found. Parasitises several *Andrena* species. Ground nesting.
Nomada flavopicta	0	0	1	Nationally Scarce b	Southern Widespread	Infrequently found. A cleptoparasite of *Mellitta* bees.
Nomada fucata	1	0	1	Nationally Scarce a	Southern Restricted.	Frequently found. Becoming much more widespread recently. The host of this species, *Andrena flavipes*, has always been more widespread than the *Nomada*.
Nomada fulvicornis	1	1	0	RDB 3	Southern Restricted	Infrequently found. Predominantly a heathland bee, as are its host species, *Andrena bimaculata* and *A. tibialis*.
Nomada goodeniana	1	1	0		Universal	Commonly found. Parasitises several *Andrena* species. Ground nesting.
Nomada hirtipes	1	0	0	RDB 3	Southern Restricted	Rarely found. A Cleptoparasite of the rare mining bee *Andrena bucephala*.

Species	N	S	W	Status	Distribution	Notes
Nomada marshamella	0	1	0		Universal	Commonly found. Parasitises several *Andrena* species.
Chrysididae (Cuckoo Wasps)						
Chyrsis viridula	1	1	0		Southern Widespread.	Locally common. Parasitises the Eumenid wasps of the Genus *Odynerus*.
Hedychrum niemelai	1	0	0		Southern Restricted	Frequently found, but local. Sandy places. A cleptoparasite of *Cerceris* spp.. I have found the species associated with wind-blown sand deposits on Cornish sea cliffs. A species which is increasing its range at the moment.
Pseudomalus auratus	1	0	0		Southern Widespread	Frequently found, particularly from reared nests. Parasitises stem nesting aculeates.
Pseudospinola neglecta	0	1	0		Southern Widespread	Locally frequent. Parasitises the Eumenid wasp *Odynerus spinipes* and probably *O. melanocephala*.
Colletidae (Bees)						
Colletes daviesanus	0	0	1		Universal	Locally common, sometimes in extensive colonies on sandstone cliffs. Oligolectic on Asteracea.
Colletes halophilus	1	1	1	Nationally Scarce a. UK BAP	Southern Restricted.	A UK BAP species. Locally frequently found. The female gathers pollen from the flowers of Sea Aster, *Aster tripolium*. Nests are made in dry clay banks and sandy areas.
Colletes marginatus	0	0	1	Nationally Scarce a	Southern Widespread	Locally common in coastal dunes in southern Britain, with a population in the East Anglian Brecks. Often forages at Bramble. Polylectic although Westrich lists it as oligiolectic on Fabaceae. Ground nesting.
Colletes similis	0	1	0		Southern Widespread	Usually infrequently found, although the commonest Colletes on the coasts of Devon and Cornwall. Ground nesting. Oligolectic on Asteraceae.
Hylaeus brevicornis	1	1	0		Southern Widespread	Commonly found. Polylectic. Dead-stem nesting.

Species	N	S	W	Status	Distribution	Notes
Hylaeus cornutus	1	0	0	Nationally Scarce a	Southern Restricted	Frequently found. A species of open woodland edge habitat. Polylectic, but often associated with umbellifers. Become much commoner during the past ten years. Nests in hollow stems.
Hylaeus dilatatus	1	0	0		Southern Restricted	Locally frequently found. Nests in dead Bramble stems. Polylectic. Previously known as *Hylaeus annularis*.
Hylaeus hyalinatus	1	0	0		Southern Widespread	Commonly found, especially in coastal situations.
Hylaeus pectoralis	0	1	0		Southern Restricted	Infrequently found. A species of dry reedbeds and associated grassland. Utilises the old gall-chambers of the fly *Lipara lucens* on Common Reed, *Phragmites australis*, as a nesting site. Polylectic.
Crabronidae (Solitary Wasps)						
Astata boops	1	0	0		Southern Restricted	Frequently found, but local. Nests in bare, often sandy, places. Preys on shieldbug nymphs. Ground nesting.
Cerceris rybyensis	0	0	1		Southern Restricted	Locally commonly found. Heathland and downland. Preys on various solitary bees. Ground nesting.
Diodontus minutus	1	1	0		Southern Widespread	Commonly found in sandy places. Preys on aphids. Ground nesting.
Dryudella pinguis	0	0	1		Universal	Infrequently found. Dry, sandy places. Preys on shieldbug and Lygaeid bug nymphs. Ground nesting.
Ectemnius continuus	1	1	1		Universal	Commonly found in a variety of habitats. Dead-wood nesting. Preys on flies.
Ectemnius dives	1	0	0	Nationally Scarce b	Southern Widespread	Local and infrequently found. This species has been increasing its range and frequency over the past twenty years. Dead wood nesting. Hunts flies.
Ectemnius lituratus	0	1	0		Southern Widespread	Commonly found. Dead-wood nesting. Hunts flies.

Species	N	S	W	Status	Distribution	Notes
Ectemnius sexcinctus	0	0	1	Nationally Scarce b	Southern Widespread	Occasional specimens, but distributed widely in southern England. Dead-wood nesting. Hunts flies.
Entomognathus brevis	1	0	1		Southern Widespread	Commonly found in sandy places. Preys on small leaf-beetles (Chrysomellidae). Ground nesting.
Lestiphorus bicinctus	1	0	0	Nationally Scarce b	Southern Restricted	Infrequently found and local. Preys on froghoppers (Hemiptera Homoptera)
Lindenius albilabris	0	1	1		Universal	Commonly found. Preys on Mirid bugs or sometimes small Diptera. Nests in hard-packed bare ground.
Nysson trimaculatus	1	0	0	Nationally Scarce b	Southern Widespread	Infrequently found, a cleptoparasite of *Gorytes* spp.
Oxybelus uniglumis	0	1	0		Southern Widespread	Very commonly found in sandy places. Preys on flies. Ground nesting.
Passaloecus gracilis	1	0	0		Southern Widespread	Infrequently found. Preys on aphids on herbaceous plants. Dead wood nesting.
Pemphredon inornata	0	1	0		Southern Widespread	Commonly found. Preys on aphids. Dead-wood nesting.
Pemphredon lethifer	1	0	1		Southern Widespread	Commonly found. Preys on aphids. Nests in the soft pith of dead stems, such as bramble. The main chamber is helical down the stem, with side chambers dropping off this.
Psenulus pallipes	1	0	0		Southern Widespread	Infrequently found. Associated with woodland and hedgerows. Preys on aphids and nests in dead wood.
Psenulus schencki	1	0	0	Nationally Scarce a	Southern Restricted	Rarely found. Nests in hollow dead stems, although scarce it seems to have no strong habitat preference. Preys on Psyllid bugs (Homoptera)
Trypoxylon attenuatum	1	1	0		Universal	Commonly found. Preys on small spiders. Stem nesting.
Dryinidae (Solitary Waps)						
Gonatopus bicolor	0	0	1		Southern Widespread	Infrequently found. Parasitises Leaf-hoppers (Cicadellidae).
Formicidae (Ants)						

Species	N	S	W	Status	Distribution	Notes
Formica cunicularia	1	1	1		Southern Restricted	Locally commonly found. Southern heathland, downland and coastal localities.
Formica fusca	1	0	0		Universal	Commonly found in many habitats, although largely replaced by *F. lemani* towards the north.
Lasius flavus	0	1	0		Universal	Commonly found. The large, dome-shaped nests are an indicator of long-established pasture.
Lasius niger s.s.	1	1	1		Universal	Very commonly found. Dry habitats.
Leptothorax acervorum	1	0	0		Universal	Commonly found in many habitats.
Myrmica ruginodis	1	0	0		Universal	Commonly found in many habitats.
Myrmica sabuleti	1	0	1		Universal	Locally commonly found. Short turf and bare ground.
Myrmica scabrinodis	1	1	1		Universal	Commonly found in a variety of open habitats.
Myrmica specioides	1	1	0	RDB 3	Southern Restricted	Infrequently found. Associated with sparsely vegetated soils, often shingle or gravel. Increasing range during the 2000's.
Ponera coarctata	0	0	1	Nationally Scarce b	Southern Restricted	Rarely found. Largely associated with coastal areas with warmth. Subterranean.
Halicitdae (Mining Bees)						
Halictus rubicundus	1	0	0		Universal	Commonly found. A eusocial species. Ground nesting. Polylectic.
Halictus tumulorum	1	0	0		Universal	Commonly found. A eusocial species. Polylectic. Ground nesting.
Lasioglossum albipes	0	1	0		Universal	Commonly found. A eusocial species. Polylectic. Ground nesting.
Lasioglossum calceatum	1	1	1		Universal	Commonly found. A eusocial species. Polylectic. Ground nesting.
Lasioglossum leucozonium	1	0	1		Southern Widespread	Commonly found in a variety of habitats. Polylectic. Ground nesting.
Lasioglossum malachurum	0	0	1	Nationally Scarce a	Southern Restricted	Commonly found. Eusocial species which forms large colonies. Formerly, a largely coastal species. Increased its range during the 1990s. Does not merit Nationally Scarce status now. Polylectic.

Species	N	S	W	Status	Distribution	Notes
Lasioglossum minutissimum	1	1	0		Southern Restricted	Locally frequently found. Associated with sandy places. Polylectic.
Lasioglossum pauperatum	0	1	0	RDB 3	Southern Restricted	Infrequently found. Largely associated with warm areas on sandy or chalky soils. Polylectic.
Lasioglossum pauxillum	1	1	1	Nationally Scarce a	Southern Restricted	Commonly found. Polylectic and eusocial. Became much commoner during the 1990s, does not merit Nationally Scarce status now. Ground nesting.
Lasioglossum punctatissimum	1	1	0		Southern Widespread	Commonly found. Sandy places. Polylectic.
Lasioglossum puncticolle	1	1	1	Nationally Scarce b	Southern Restricted	Locally frequently found. A species of clay meadows and woodland rides. Polylectic. Ground-nesting.
Lasioglossum villosulum	1	1	0		Universal	Commonly found. Polylectic. Ground nesting.
Sphecodes crassus	0	1	0	Nationally Scarce b	Southern Widespread	Infrequently found. Has been difficult to separate from closely related species. It could well be more widespread than previously thought. Cleptoparasitic on *Lasioglossum* sp..
Sphecodes ephippius	1	0	1		Southern Widespread	Commonly found. Cleptoparasitic on *Lasioglossum* sp..
Sphecodes geoffrellus	0	1	0		Universal	Commonly found. Cleptoparasitic on *Lasioglossum* sp..
Sphecodes monilicornis	0	1	0		Universal	Commonly found. Cleptoparasitic on *Lasioglossum* and *Halictus* sp..
Sphecodes pellucidus	0	1	0		Universal.	Commonly found in sandy situations where its host, *Andrena barbilabris,* occurs.
Sphecodes puncticeps	0	1	0		Southern Widespread.	Infrequently found. Cleptoparasitic on *Lasioglossum* sp..
Sphecodes reticulatus	1	0	0	Nationally Scarce a	Southern Restricted.	Locally frequently found. Associated with grasslands on light soils. The host species are not clear, as it is found where its recorded host, *Lasioglosssum prasinum,* does not occur.
Sphecodes rubicundus	1	0	0	Nationally Scarce a	Southern Restricted	Infrequently found. A cleptoparasite of *Andrena labialis*, a bee of old meadowland; it may also cleptoparasitise *Andrena flavipes*.

Species	N	S	W	Status	Distribution	Notes
Megachilidae (Leafcutter and Mason Bees)						
Anthidium manicatum	1	0	0		Southern Widespread	Locally frequent, particularly in gardens. Polylectic. Cavity nesting.
Coelioxys conoidea	1	0	1		Southern Restricted.	Locally frequently found. Cleptoparasite of *Megachile maritima*.
Hoplitis claviventris	0	0	1		Southern Widespread	Infrequently found. Uses dead bramble stems in which to make its nest. Polylectic.
Megachile centuncularis	1	0	0		Universal	Locally frequently found. A species which has apparently declined greatly in the last hundred years. Polylectic. Cavity nesting.
Megachile leachella	1	1	1	Nationally Scarce b	Southern Widespread	Locally very common. Associated with duneland sites, but also known inland on the Brecks. Ground nesting. Polylectic.
Megachile versicolor	0	0	1		Universal	Commonly found. One of the leafcutter bees from the way it lines its nest chamber with sections of cut leaf. Any leaf will do, provided that it is supple. The sides are made from oval pieces, the ends from round ones. Cavity nesting. Polylectic.
Megachile willughbiella	0	0	1		Universal	Commonly found. Cavity and ground nesting. Polylectic.
Osmia caerulescens	0	0	1		Southern Widespread	Locally commonly found. Cavity nesting. Polylectic.
Osmia bicornis (rufa)	1	0	0		Universal	Locally common. Cavity nesting. Polylectic.
Osmia spinulosa	1	1	1		Southern Restricted	Locally frequently found on southern calcareous grasslands. Nest in snail-shells. Oligolectic on Asteraceae.Formerly known as *Hoplitis spinulosa*.
Stelis punctulatissima	1	0	0		Southern Widespread	Infrequently found. Often in gardens where it is as a cleptoparasite of *Anthidium manicatum*.
Melittidae (Bees)						
Melitta leporina	0	0	1	Nationally Scarce b	Southern Widespread	Infrequently found. Associated with legumes, especially White Clover, *Trifolium repens*. Ground nesting.

Species	N	S	W	Status	Distribution	Notes
Melitta tricincta	1	0	1	Nationally Scarce b	Southern Restricted	Locally commonly found. Oligolectic. Very strongly associated with Red Bartsia, *Odontites verna*, which provides the pollen with which the female stocks her nest. Ground nesting.
Pompilidae (Spider-hunting Wasps)						
Agenioidus cinctellus	1	0	0		Southern Restricted	Infrequently found. A species of cracks and crevices, such as upturned root-plates. Cavity nesting.
Anoplius infuscatus	0	1	0		Southern Widespread	Locally common on damp heaths and dunes. Preys on wolf spiders (Lycosidae). Ground nesting.
Priocnemis cordivalvata	1	0	0	Nationally Scarce b	Southern Widespread	A species of rides in mature broadleaf woodland, occasionally coppice. Ground nesting.
Sphecidae (Solitary Wasps)						
Ammophila sabulosa	1	0	1		Southern Widespread	Commonly found. Associated with sandy, and many coastal, localities. Hunts caterpillars. Ground nesting.
Tiphiidae (Solitary Wasps)						
Tiphia femorata	1	0	1		Southern Restricted.	Locally commonly found. Sandy places. Parasitises larvae of scarabaeid beetles.
Vespidae (Social and Potter Wasps)						
Ancistrocerus gazella	1	0	0		Southern Widespread	Commonly found. Nests in a variety of cavities. Provisions its nest with small caterpillars.
Ancistrocerus parietum	1	0	0		Universal	Infrequently found. Preys on lepidopteran larvae.
Dolichovespula sylvestris	0	0	1		Universal	Commonly found. Aerial nesting.
Odynerus melanocephalus	1	0	1	Nationally Scarce a. UK BA	Southern Restricted	Locally frequent. BAP species. Preys on weevil larvae, *Hypera*. Ground nesting.

Species	N	S	W	Status	Distribution	Notes
Odynerus spinipes	1	1	0		Southern Widespread	Erratic but can be commonly found in a locality. Can apparently suddenly appear after many years' absence- and then disappear. Makes large colonies on exposed banks. Each nest entrance is formed in the shape of a long chimney curving away from the bank. Preys on weevil larvae, *Hypera*.
Symmorphus bifasciatus	1	0	0		Southern Widespread	Locally frequently found in damp places. Nests in aerial cavities and dead wood. Provisions nest with larvae of leaf betles (Chrysomelidae).

APPENDIX B
Conservation Status Categories, Distribution and Abundance Terminology for Insects

Conservation status categories

RDB (Red Data Book) categories are based upon the most modern work, usually one of the English Nature Research and Survey in Nature Conservation reviews. Where these do not exist the category given in Shirt, D.B., 1987 The British Red Data Books: 2 is given. These categories may require revision in the light of new information but a new Red Data Book has yet to be compiled. Such revisions are indicated as p(rovisional). The new Red Data Book categories will be based on threat, of which distribution is only one part. This is likely to lead to a far more meaningful conservation assessment, as the number of squares recorded for any one species is highly susceptible to recorder effort, especially as data accumulates over time.

RDB 1. Endangered. Species currently (post 1970) known to exist in five or fewer ten-kilometre squares.

RDB 2. Vulnerable. Species in severely declining or vulnerable habitats, or of low known populations. Known to exist (post 1970) in ten, or fewer, ten-kilometre squares.

RDB 3. Rare. Species with small populations, not at present Endangered or Vulnerable, but which are felt to be at risk. Species currently known to exist (post 1970) in fifteen, or fewer, ten-kilometre squares.

RDB K. Species of undoubted RDB rank, but with insufficient information for accurate placement; includes possible recent arrivals.

Nationally Scarce. Species currently (post 1970) known to exist in one hundred, or fewer, ten-kilometre squares.

In some groups these are further sub-divided into:-

Nationally Scarce a. Species currently (post 1970) known to exist in thirty, or fewer, ten-kilometre squares.

Nationally Scarce b. Species currently known to exist in thirty-one to one hundred ten-kilometre squares.

Distribution categories

Distribution refers solely to the geographical extent of a species in the British Isles. Considerable confusion has been caused in the past by the varying meanings given to many assessments of species where geographic distribution has been confused with local abundance.

Distribution comments are based upon national status as far as is known (e.g. published distribution maps or the most recent taxonomic/ecological work giving distribution information). This may be supplemented by personal knowledge of the species.

A distribution classification, based on the known distribution range, is being developed. Where possible a provisional national distribution range status under this system is given. The basic system has been to divide the British Isles into thirds, largely ignoring the influence of altitude. The lines delineating these thirds run approximately:

i). Along a line from the Wash to the Severn and including South Wales.

ii) Along a line running through the Scottish Borders.

Universal. Distributed throughout England and Wales, with at least some extension into central and northern Scotland.

Widespread. Distributed in about three-quarters of England and Wales, perhaps with a few records in southern Scotland, but not significantly found in the northern third (Southern Widespread) or southern third (Northern Widespread) of the British Isles. (NB Northern Widespread species are found in Scotland as well.)

Restricted. Distributed in the southern (Southern Restricted) or northern (Northern Restricted) third of the British Isles only.

Abundance Comments

These often form the first part of the 'Notes' in the species information. An attempt has been made to make something akin to the well-established DAFOR system for botanical abundance recording, but with just four categories. These rate the expectation of finding the species, if all its life-cycle resource requirements and temperature and humidity regimes are apparently met on a site.

i) **Commonly found.** An experienced observer would expect to find the species 90% or more of the time where all its requirements are met.

ii) **Frequently found.** An experienced observer would expect to find the species 60% or more of the time where all its requirements are met.

iii) **Infrequently found.** An experienced observer would expect to find the species 10% or more of the time where all its requirements are met.

iv) **Rarely found.** An experienced observer would expect to find the species less than 10% of the time where all its requirements are met.

Abundance comments are much more subjective than distribution comments, being dependent upon the precise timing of survey visits and the timing of emergence of the insect species, as well as the experience of the observer. The method of recording, e.g. by sight or hand-netting, sweeping, beating, malaise trap, pan trap, may also affect the observed abundance. It is assumed that recording takes place under favourable conditions of habitat, weather and season. Often a species appears to be rarely found, until the particular way of looking for it is discovered, when it proves to be much more prevalent than previously thought.

Some species, however, seem to exist in low numbers at all times in all suitable places. This may reflect the species' position in its particular ecological pyramid. The abundance may have no connection with the distribution status; some Red Data Book species are numerous in their particular locations: some Universal species may only ever be found as singletons. Comments under this heading rely heavily upon the observer's accumulated experience as the rating given is a measure of the expectation of finding the species in a suitable habitat. Species living towards the edge of their range are often less frequent than they are in the middle of their range.

Specialist Terms for Ants, Bees and Wasps

Cleptoparasitic: A species taking over the stored provisions of another species to feed its young. This usually involves the cleptoparasite laying an egg in the nest of the host, but may involve oviposition on prey being transported by the host.

Socially Parasitic: The queens of some social aculeates do not initiate their own nests from scratch, but take over established nests of other species. Sometimes this results in the gradual replacement of the workers of one species by another. In other cases the parasite does not produce its own workers and the nest just produces males and females of the invading parasite before it dies out. In some ant species the chain of socially parasitic species may have several links.

Nesting situations: Bees and wasps may construct their nesting chambers in the ground (ground nesting) or in aerial situations (aerial nesting). Such aerial nests may be constructed in dead wood (dead-wood nesting), dead bramble stems or similar pith-filled stems (stem nesting) or in a variety of cavities (cavity nesting).

Nest provisioning terms: These relate (in bees) to the preferred sources of pollen for provisioning the

nest. Such resources may be very specific for some species. Nectar sources are not so clearly defined, although bees with longer tongues can forage at flowers with longer nectaries. Such flowers often have more concentrated nectar. The structure of the anthers and stigma is often related to the length of the tongue of the preferred pollinating insect.

Oligolectic: Bees which confine their pollen gathering activities to one species of plant, or a closely-related group of plants.

Polylectic: Bees which forage for pollen at a variety of different plants and show no particular preference.

Social organisation: The majority of bee and wasp species are **solitary**. One female provisions the nest and lays her eggs on the provisions. A number of solitary nesting insects may use the same small area when they are said to nest **colonially**. **Eusocial** species have a founding female who lays all the eggs, but the first insects to hatch (females) stay and help run the nest. At the end of the season males and females are produced. These mate and the newly mated females start their own nests. Usually only mated females overwinter. Some ant colonies have several mated females (queens).

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Annex EDP 28
Invertebrate Survey and Assessment of the London Paramount Entertainment Resort 2015 (Edwards Ecological Services, 2015)

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Invertebrate Survey and Assessment of the London Paramount Entertainment Resort

2015

Chris Blandford Associates

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Invertebrate Survey and Assessment of the London Paramount Entertainment Resort 2015

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1. INTRODUCTION

1. 1. Background

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 Invertebrate Survey was undertaken by Edwards Ecological Services Ltd and Arachne Ltd on behalf of CBA. This report details the methodology, results and evaluation of the London Paramount survey undertaken between March and September 2015. It also incorporates the findings of an earlier survey (2012) by Edwards Ecological Services.

1.2 Scope of Survey

1.2.1 The scope of the survey encompassed:

Primary targets, with co-ordinating recorder: Isopoda (Woodlice); Diplopoda (Millipedes); Chilopoda (Centipedes); Aranae (Spiders); Opilones (Harvestmen): Paul Lee (P.L.); Odonata (Dragonflies and Damselflies): Jovita Kuanang (J.K.); Orthoptera (Grasshoppers and Crickets): Mike Edwards (M.E.); Hemiptera (Bugs) Peter Hodge (P.H.); Lepidoptera (Butterflies and Moths) Graham Collins; Coleoptera (Beetles) Peter Hodge; Diptera (Flies, not all groups) Mike Edwards; aculeate Hymenoptera (Ants bees and wasps): Mike Edwards.

As seen, but not targeted for survey: Mollusca (snails); Trichoptera (Caddis flies); ; Neuroptera and allies (Lacewings, Scorpionflies); Dermaptera (Earwigs); Hymenoptera Symphyta (Sawflies). All surveyors contributed records to all insect groups.

1.2.2 Survey was primarily by direct searches using hand-netting, beating and direct observation. Some sampling with a suction-sampler was employed, particularly on areas of short, warm vegetation. Runs of Malaise traps and pitfall traps were also employed. The Malaise traps were set in, or as close to as possible, the main wetland areas on the primary site (not Botany Marshes East). The pitfall traps sampled both wet and dry habitats.

1.2.3 Data from an earlier survey (2012) which targeted Isopoda (Woodlice); Diplopoda (Millipedes); Chilopoda (Centipedes); Aranae (Spiders); Opilones (Harvestmen); Orthoptera (Grasshoppers and Crickets); Hemiptera (Bugs); Coleoptera (Beetles); Diptera (Flies, not all groups); aculeate Hymenoptera (Ants bees and wasps,) has been included with this report as it provides better coverage of a wider area than just that covered during 2015.

1.2.4 The survey ran for 7 months between March and September, with three or four visits to the site made by most team members in each month, depending on the target groups.

1.3 Survey Limitations.

1.3.1 These mostly relate to the availability of days without rain and which were warm for the time of year. Invertebrates are most readily found under dry, mild conditions with at least some sunshine. All survey days had at least half the time with such conditions, most were dry and fine throughout.

1.3.2 These direct searches were backed by two sets of Malaise traps and runs of pitfall traps. Neither trapping system is as closely dependent on extended weather conditions as they operate over a full 24 hrs. However, being static they depend greatly upon informed siting.

1.3.3 No attempt was made to provide population numbers for any invertebrate sampled.

1.3.4 The red-line area was large and increased sampling effort would, inevitably, have produced more records for more of the component areas. However, it must be stated that this survey ranks very highly in terms of survey effort compared with all the others we have been involved with.

1.4 Key findings.

1.4. 1 The entire site should be considered as 2 different ecological systems:

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

b) A wetland habitat, with greater or lesser water flow through individual areas. This is represented mostly north of Manor Way, although there are small examples to the south.

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

1.4.3 The dry habitat to the north of Manor Way largely reflects the use made of the former grazing marsh as a dump for waste materials from the local cement industry. In this context it is an extension of the dry habitat present before the extensive quarrying associated with the cement industry and which is present in remnant form along the upper walls of the quarries. The dumping of material from quarrying activities including overburden, within the quarries themselves and adjacent areas has also contributed to the modern available habitat.

1.4.4 The only sample area north of Manor Way with a good, reliable supply of clean water is the CTRL wetlands and this has the highest value wetland insect fauna. It also has a low level of influence from leachate, partly because the direction of flow of the water carries leachate away from the area, not into it.

1.4.5 Black Duck Marsh has a very variable water regime and is considerably affected by leachate along its eastern margin. Consequently the fauna associated with this area is of lower value.

1.4.6 The line of seepages along the edge of the CTRL car parks in area 18 has a small, but significant wetland interest. The winter flow from these also influences the grassland towards the railway line.

1.4.7 The narrow fringing area of saltmarsh and brackish ditches between along the Thames itself - and between the western sea-walls - has its own high-value fauna.

2. THE SAMPLE AREAS

2.1 Overview

2.1.1 These were chosen to provide good a coverage of all areas and habitat types which were likely to be impacted within the red line. Unless noted otherwise, all areas were visited by all surveyors. Three of the areas had been the targets for an earlier (2012) survey and these were not re-visited by three of the surveyors during 2015, except for some specific sites for spiders. This allowed greater concentration by these surveyors (3) on the unknown sites. Two surveyors, covering groups not covered by the first three, had a wider geographic brief, but consequently spent less time on some of the other areas. Unless noted otherwise, all areas were visited by all surveyors. We consider that this approach provided the best, extensive coverage, both in terms of geographic spread and taxonomic coverage, within the resources available.

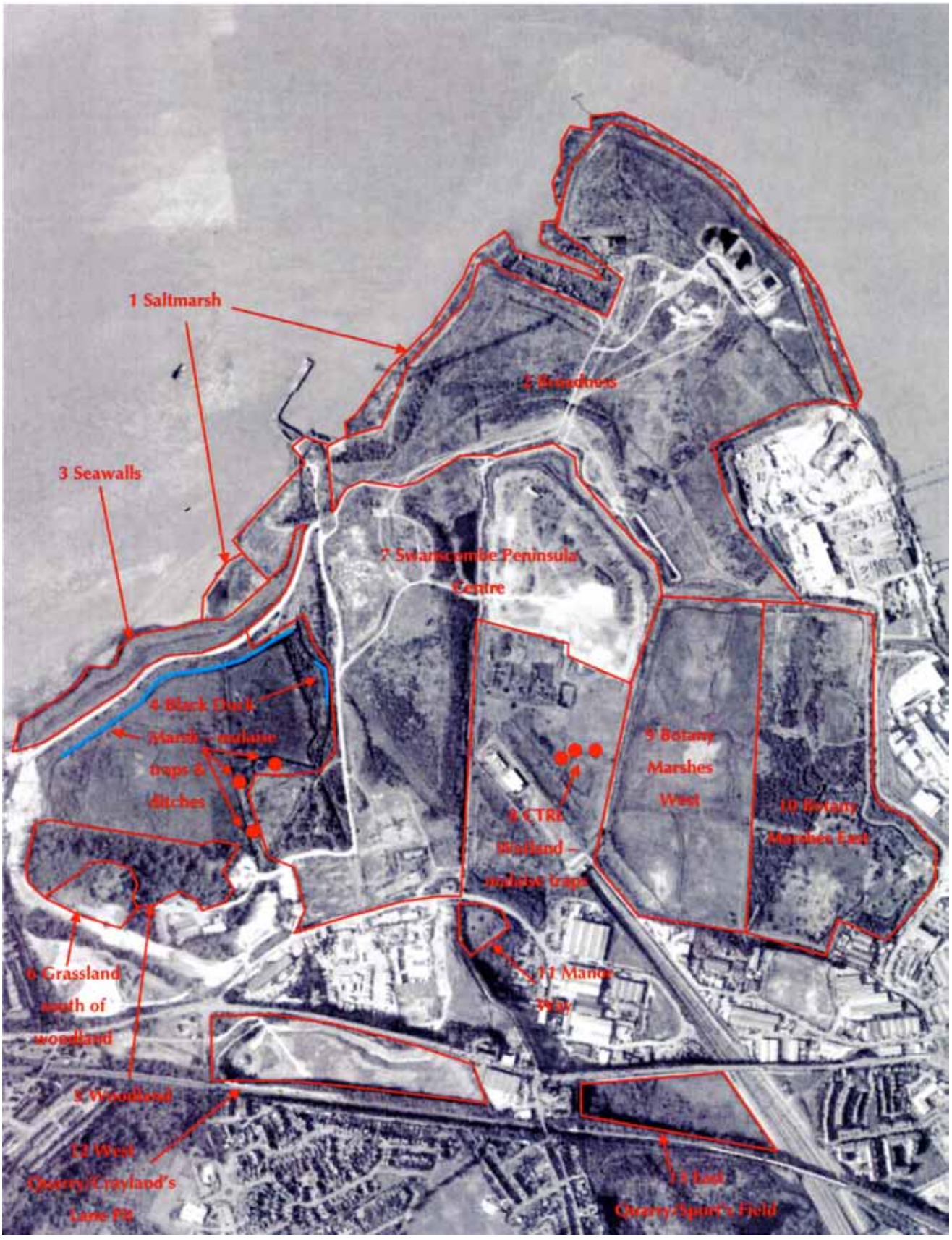
2.1.2 Field surveying during 2015 was complemented by two sets of Malaise traps and 9 runs of Pitfall traps. The locations of these are noted in the following discussion of individual areas.

2.1.3 The brief habitat sketches below include information on a selection of the insects associated with the areas. These are meant to serve as an indication of the conditions present, not an exhaustive list of species. For this see Appendix 1.

2.2 Please refer to Maps 1, 2, 3 throughout this discussion.

2.3 Saltmarsh (area 1).

2.3.1 This area was not re-surveyed in 2015 by M.E. and P. H.. It was re-surveyed by P.L and for the first time by G.C. and JK.. The brackish salt marsh, notably around the small creek, also had a number of specialist insects associated with it, despite its small area and the poor quality of parts of it,



Map 1. Survey areas 1 to 13.

probably due to seepage from the tipping. These included:

i) The Section 41 mining bee *Colletes halophilus* which collects its pollen exclusively from the flowers of Sea Aster *Aster tripolium* and is only found along the coasts of the English Channel in the whole world. This bee nests in small areas of dry bare ground close to its food plant.

ii) The large soldier fly *Stratiomys singularior* whose larva live in the wet mud and small pools of the saltmarsh and associated ditches.

iii) The small money-spider *Praestigia duffeyi* (Section 41), restricted in the UK to the salt marshes of the south-eastern seaboard and the larger wolf-spider *Arctosa fulvolineata*, also Section 41 and restricted to a similar geographic area.

2.4 Broadness (area 2).

2.4.1 This area was not re-surveyed in 2015 by M.E. and P. H.. It was re-surveyed by P.L by the eastern Pylon only and for the first time overall by G.C. and JK.. Small areas where soil had been moved about and/or where gentle disturbance due to walkers forming paths were of high significance for both aculeate Hymenoptera and phytophagous Coleoptera. This was due to both the creation of areas of bare and re-vegetating ground as a physical feature, and to the presence of a diverse flora associated with these areas.

2.4.2 During the 2012 survey the Section 41 jumping spider *Sitticus distinguenus* was caught in a pitfall trap close to the eastern Pylon, consequently further searches were made in this location during the 2015 survey. No further specimens of this spider were found in 2015.

2.4.3 The area generally had a high number of conservation-significant species present. These included :

i) The Section 41 bumblebee *Bombus humilis* which required large areas of flower-rich (especially legume-rich) habitat for foraging, with stands of open, medium height grassland for nesting purposes.

ii) The Section 41 potter wasp *Odynerus melanocephalus*, which preys on *Hypera* (Coleoptera: Cuculionidae) larvae associated with leguminous plants and requires areas of open, sun-warmed soil for nesting.

iii) The Section 41 ground beetle *Anisodactylus poeciloides* which is associated with coastal marshes in southern and south-eastern England.

iv) The Weevil *Coelositona cinerascens* (RDBK), thought to have become extinct, but with a few recent records. However, these may reflect a modern re-colonisation, rather than an undiscovered population.

v) The Tachinid fly *Cistogaster globosa,* RDB 1. This small fly, the larvae of which parasitise the Bishop's Mitre shield-bug is very restricted in distribution, requiring hot micro-climates and sparsely vegetated grasslands.

vi) The fly *Dorycera graminum,* Section 41 and RDB 1, which is associated with warm, open-structured grasslands. This fly has proved to be rather more widely distributed than previously thought and is particularly well represented in the dry grasslands associated with the Thames corridor.

2.4.4 The above selection of species illustrates the importance of this area and the diversity of habitats it contains.

2.5 The sea-walls (area 3).

2.5.1 This area was not re-surveyed in 2015 by M.E. P.L. and P. H.. It was surveyed in 2015 for the first time by G.C. and JK..

2.5.2 The old sea-wall had been left after the re-building of the new wall and a low-lying area of occasionally inundated grassland and incipient reed bed now lies between the two walls. Both this area and the grasslands of the re-profiled sea wall were being managed on a cyclical cutting basis. The outcome of this has been an overall good continuity of forage resources for associated insects and a varied plant community. Many of the insects associated with the grasslands on all the sample sites were recorded on these grasslands too.

2.5.3 As well as *Bombus humilis* being plentiful on the flowers of the widespread legumes of this area, it also produced a record of the RDB 2 Hoverfly *Lejops vittatus.* The larvae of this species develop in the damp soil and vegetable matter around stands of Sea Club-rush *Bulboschoenus* (*Scirpus*) *maritimus* and hence the fly is most likely associated with the ephemeral ditches between the two sea walls. This ephemeral habitat is also that associated with the Scarce Emerald Damselfly *Lestes dryas*, at the nearby Cliff Pools RSPB reserve, but the survey failed to record this species.

2.6 Black Duck Marsh (area 4).

2.6.1 Access to the centre of this area was not possible due to high water-levels in the surrounding ditches and dense stands of Common Reed making any progress through the marsh proper highly dangerous, due to hidden internal ditches. Survey was therefore limited to searches of the edges of the northern ditches (P.L, G.C. and J.K), set of pitfall traps along the northern ditch and a set of three malaise traps set along the outer margins of the surrounding ditches on the southern margin (Map 1).

2.6.2 The samples from these traps inevitably contained a mixture of species associated with the wetland and adjacent dry-land habitats. For the purposes of analysis and association with Black Duck Marsh, these were filtered for species with known dependencies on wet or humid habitats. All species recorded are listed under Area 4 Black Duck Marsh in the species tables (Appendix 1).

2.6.3 The damp woodland to the south which fringed the edge of the marsh was surveyed, with an emphasis on Craneflies (Diptera: Tipulidae). This area is accorded its own listing (area 5 below).

2.6.4 Significant species associated with this area include:

i) The water-beetle *Enochrus halophilus* (Nationally Scarce), associated with brackish ditches and very infrequently found, although widespread in coastal marshes..

ii) The predatory water-beetle *Rhanus frontalis* (Nationally Scarce) which lives in freshwater ditches.

iii) The rove beetle *Aleochara brevipennis* (Nationally Scarce). This beetle preys on fly larvae at the margins of ditches and ponds.

iv) The soldierflies *Odontomyia tigrina, Vanoyia tenuicornis* and *Oxycera morrisii* (all Nationally Scarce). The larvae of these flies live in the wet mud and moss at the sides of ditches and ponds. Interestingly the *Oxycera* is associated with calcareous situations and it is possible that the dumping of highly alkaline material here has increased the available habitat, which would have been formerly much more closely associated with the springs coming out of the chalk closer to Swanscombe itself.

v) The hoverfly *Parhelophilus consimilis* (RDB 2). The larvae of this fly live in decaying vegetable material at the edges of ditches and ponds.

2.7 Wet woodland to the south of Black Duck Marsh (area 5)

2.7.1 This is clearly a modern woodland, composed largely of Sycamore, often growing on piles of flints which were by-products of the Cement industry quarrying. The ground flora was predominately Ivy *Hedera helix*, but there were a few patches of other species, notably a large stand of Hemlock Water Dropwort *Oenanthe crocata*, which attracted a good range of insect species. Although this species is often found where woodland has overwhelmed previously open wetland habitat, it is not primarily a woodland one.

2.7.2 The major target group for this woodland were the Craneflies (Diptera: Tipulidae), because of the rather wet ground layer towards the junction with Black-Duck Marsh. Although there were indeed plentiful insects of this group present, especially in the May and June samples, just one was of any significance, *Limonia masoni* (RDB 3). This species is associated with calcareous seepages on the edges of woodland and, like the Stratiomyid fly *Oxycera morrisii,* the use of the area as a dumping ground for highly calcareous material may well have increased the available habitat.

2.7.3 A set of pitfall traps was used in this woodland.

2.7.4 This area also produced a record for the Nationally Scarce millipede, which is possibly an ancient introduction, *Stocatea italica*. This millipede is largely confined to Kent. It was also found in Bamber Pit.

2.8 Dry grassland south of Black Duck Marsh (area 6)

2.8.1 This area appeared to have a very similar history as much of the central area of the Peninsula, with a shallow soil over a pan of set concrete. Consequently the scrub element was in discrete patches, with little sign of expansion, apart from the brambles which were able to send long runners across the hostile areas of hard pan. It was a very hot area as soon as the sun came out.

2.8.2 Development works to the immediate south had produced a more recently disturbed soil, with a greater variety of plants. It would appear from the plentiful large butts piled in heaps that much of this newly disturbed area had previously been well-developed woodland with rather deeper soil.

2.8.3 Significant records include:

i) The Section 41 species *Bombus humilis* and *Dorycera graminum,* plus *Euplagia quadripuncta,* the Jersey Tiger-moth, all of these are species of dry grasslands.

ii) The moth *Bembecia ichneumoniformis* the 6-Belted Clearwing, (Nationally Scarce) a species of dry grasslands where the caterpillar lives in the roots of legumes. This moth was quite widespread over all the site.

iii) The Tachinid flies *Cistogaster globosa* and *Gymnosoma nitens* (both RDB 1). These flies parasitise shield bugs living in hot, dry grasslands and were found in several different sample areas.

iv) The mining bee *Lasioglossum pauperatum* (RDB 3), although it is quite frequent in the Thames corridor it is infrequently found outside this area.

Photo 1. Looking across typical grasslands of area 7 towards the eastern pylon in area 2

Photo 2. The large cement waste dump on the eastern boundary of area 7 was extensively disturbed during remedial action in 2014-15. This disturbed habitat was already being well colonised by dry-ground insects during the 2015 survey. A line of pitfall traps was placed across this area.

Photo 3. The area of grassland in the south-western section of area 7 which adjoined the boundary ditch of Black Duck Marsh. Three Malaise traps were set around the western and northern margins alongside the ditches and a set of pitfall traps ran across the grassland.

2.9 Swanscombe Peninsula centre (area 7)

2.9.1 A large area with three principal habitat components:

a) Dry skeletal grasslands, similar to those described in 2.8.

b) Recently disturbed, well-drained substrates, usually developed from dumped waste from the cement industry, which had a very open vegetation structure. The area around the old jetty was included here in this component.

c) Established, closed grasslands, but with a high level of leguminous plants present.

2.9.2 Small areas of scrub, often including Broom *Cytisus scoparius,* Hawthorn *Crataegus monogyna* and Bramble *Rubus* sp. were dotted about all components to a greater or lesser degree (Photo 1).

2.9.3 Pitfall traps were used across the old tipping site in the north-east of this area (Photo 2.). Another set was used in the grasslands in the south-western corner, against Black Duck Marsh, near the Malaise traps (Photo 3).

2.9.4 Most of the significant species associated with dry grasslands were present in this sample area, additions to those already listed in earlier sections include:

i) The jumping spider *Sibianor aurocinctus* (Nationally scarce), associated with dry, sparsely-vegetated grasslands.

ii) The ground Beetle *Panagaeus bipustulatus* (Nationally scarce), associated with hot, dry grasslands.

iii) The weevil *Hypera meles* (Nationally scarce). Both adult and larva fed on the flowers and seeds of a range of legumes.

iv) The conopid fly *Ziodon cinereum* (Nationally scarce). This fly lays its eggs in the abdomens of solitary bees, pouncing on the bee as it visits a flower. The larva develops inside the host, eventually killing it. A high bee population is needed to maintain the parasite.

v) The fly *Thereva plebeja* (Nationally scarce). The larvae of this fly live underground in dry soils, where they actively hunt other invertebrates.

vi) The picture-wing fly *Meliera picta* (Nationally scarce). The larvae probably live in stems of grasses. It is largely restricted to coastal grasslands in the Thames corridor.

vii) The mining bee *Andrena nigrospina*. This large, black mining bee has only just been convincingly shown (by new DNA analysis - using specimens found during the survey in part) to be a separate species to the almost identical *Andrena pillipes*, also present on site. In the re-classification of the conservation statuses of the aculeate Hymenoptera (G. Powney , M. Edwards, N. Isaacs in prep.) this species is likely to be rated as IUCN Vulnerable or Endangered. During the present survey this species was found to be exclusively collecting pollen from flowers of the Brassicaceae, most notably the introduced Hoary Mustard *Hirschfeldia incana*. This plant, and other Brassicaceae, is part of the very important 'occasional disturbance flora' of the area.

viii) During the 2012 survey an immature spider, thought to be most probably *Sitticus distinguenus,* was found by the old jetty. Despite further searches in 2015, no further confirmatory material was taken.

2.10 The CTRL wetlands (area 8)

2.10.1 These wetlands (Photo 4) were largely developed after the establishment of the CTRL tunnel entrance in the site. Prior to this event Bill Wadsworth informs me that the stream running out from the cliff was clear and full of aquatic vegetation. The tunnel, and possibly mitigation action for this, led to the development of bodies of open water adjacent to the northern edge of the tunnel. Those nearest the tunnel are fresh, becoming more brackish northward. These water bodies have a good aquatic flora, a very different state to those further north which have been heavily modified by the leachate from the tips and are almost devoid of aquatic vegetation.

Photo 4. Looking over the CTRL wetlands from the spoil heap in photo 2 towards the quarry edge by Manor Way. The Malaise and pitfall traps were set in the reed-bed of the middle ground.

2.10.2 The presence of reed is long-established over the entire area, so the development of a reed-dominated wetland is to be expected once any grazing pressure is removed through change of use. However, we were able to cut a track into the middle of the reedbed and establish a set of Malaise traps approaching the water bodies (Map 1). This run in was also used for a set of pitfall traps

2.10.3 The records from these Malaise traps and pitfall traps are presented as one sample. They included a surprising number of dry-land associated insect species despite being well into the reed-bed, an illustration of how insects will use different parts of the overall habitat for different purposes, many of the bees and wasps recorded could not have been maintaining soil-based nests here, for instance. For further analysis of wetland species the records were filtered for species with known dependencies on wet or humid habitats. All species recorded are listed under Area 8 CTRL wetlands in the species tables (Appendix 1).

2.10.4 All 3 of the Section 41 species recorded are dry-land species. However, the RDB species include three species closely associated with good-quality water-bodies:

i) The cranefly *Dicranomyia danica* (RDB 3). The larvae live in wet mud in mildly brackish conditions.

ii) The weevil *Bagous argillaceus* (RDB 2). This weevil is largely restricted to brackish marshes in the Thames corridor and probably feeds on grasses.

iii) The sphecid wasp *Passaloecus clypealis* (RDB 3). This small wasp is a true wetland specialist, using the old, dry stems of Common Reed for nesting in and provisioning these with aphids from the reed beds. It has never been found away from this association with Common Reed. It is largely an East Anglian species, with the Thames corridor the most southerly area known in the UK. However, it may well be more widely distributed within this area than known, due to the difficulty in surveying for it.

2.10.5 The Nationally scarce species also include a number of good-quality wetland species, these include:

i) The money-spider *Hypomma fulvum* (Nationally scarce) which has a very strong association with reedbeds.

ii) The ground beetles *Bembidion fumigatum* and *Pterosticus gracilis* (both Nationally scarce) are strongly associated with wetlands, the former species being largely restricted to eastern England.

iii) The Ladybird *Scymnus limbatus* (Nationally scarce) feeding on aphids on *Salix* species in wetlands.

iv) The weevil *Gymnetron villosulum* (Nationally scarce) which feeds on Water-speedwells *Veronica* species.

v) The hoverfly *Neoascia interrupta* (Nationally scarce). It is thought that the larvae develop in the leaf-litter associated with beds of Reed Mace *Typha* species.

2.10. 6 Of the three wetland areas surveyed during 2015, this area had by far the most important wetland fauna. Partly this may be due to the ability to deploy Malaise traps fully within the area, but the species recorded themselves also point to a relict fauna drawn from those which were present before the use of the area as a tip for cement waste, or the establishment of the tunnel entrance.

2.11 Botany marshes west (area 9)

2.11.1 This field is in active grazing management, it also has a few recently created scrapes aimed at wading birds. As the cattle were present, and there were potentially breeding lapwing on the field we were unable to enter for survey until 17/07/205.

2.11.2 This visit confirmed what scanning with binoculars had suggested: that there was little habitat of potential importance for invertebrates present. The ditches were by this point dry, as were the scrapes. There was low diversity of plant species, with consequent implications for phytophagous insects and the structural diversity in the vegetation was low (Photo 5).

2.11.3 After a two-hour sampling period we agreed that this site would not be visited again within the 2015 programme.

Photo 5. View across area 9, towards area 10. This was a remnant area of low quality grazing marsh.

2.12 Botany Marshes east (area 10)

2.12.1 This extensive wetland area is under active natural environment management by the owners, with a dedicated manager in place. It is not within the proposed development footprint. It was surveyed, with the owner's consent, to provide some comparison data for the sites within the footprint.

2.12.2 The two dominant habitat types are largely dry reedbed and occasionally inundated mature Hawthorn scrub. These have clearly arisen as the former grazed area has fallen out of agricultural use. There are a number of wet, and not so wet ditches throughout the site and a newly excavated larger area of water towards the eastern margin.

2.12.3 The extreme eastern margin is a dry bank of largely made-up material supporting the road. This bank and the occasionally mown edges of the adjacent wet ditch provided most of the records presented here. Whilst a circular walk round the site was undertaken on most visits, much of the Hawthorn scrub and dry reedbed was singularly uninteresting, the exception being the area of intermittently cut dry reedbed and grassland in the north-west corner.

2.12.4 No Malaise trap samples were taken here, but a line of pitfall traps were set in the north-western grassland.

2.12.5 The bumblebee *Bombus humilis* was found here, an illustration of the wide-ranging nature of these bees, which require areas in the range of $10Km^2$ to maintain populations. The mining bee *Andrena nigrospina* was also found here in the middle of the dry reedbed, but on a small stand of Hoary Mustard flowers in an area which had been disturbed during the creation of the site access path.

2.12.6 Other conservation significant species included:

i) The plant-hopper *Oliarus panzeri* (Nationally scarce). This insect feeds on the roots of plants in wetland. It was quite widespread in the overall survey area.

ii) The flea beetle *Longitarsus ballotae* (Nationally scarce), associated with Black Hoarhound, of which there were considerable stands along the eastern boundary.

iii) The hoverfly *Neoascia geniculata* (Nationally Scarce). It is thought that the larvae develop in the leaf-litter associated with beds of Sweet Grass *Glyceria* species, in wet places.

2.12.7 It is noticeable that the wetland component here is much less significant than that at the CTRL wetlands (2.10). It was very apparent that water-levels were not maintained over much of the season on most of the site, in comparison with the CTRL wetlands. Contamination of the water by effluent from the tips is not likely to be high.

2.13 Manor Way (area 11)

2.13.1 This small pit had been part filled with a very dry material, largely old road planings, which made a rather coarse substrate. It was, however sheltered and very warm even in generally cool conditions.

2.13.2 The ground flora was restricted, being dominated by Buddleia *Buddleja davidii*, Bramble and Ivy, but occasional patches of Lucerne *Medicago sativa* were very attractive to a range of insects when in flower. There were exposures of sandy material at the top of the quarry cliff. However, these largely faced North and were not likely to be as significant as those in other pits surveyed where they faced south.

2.13.3 The many old, hollow stems obviously provided ample nesting sites for our only carpenter bee, *Ceratina cyanea* (RDB 3), I don't think I have ever sen it as commonly as here. This species, which was distinctly rare and restricted, has undergone considerable expansion in the past 20 years and would not now merit its RDB 3 rating. However, it remains dependent upon warm sheltered sites in order to get its two generations a year completed.

2.13.4 Other conservation significant species recorded here include:

i) The harvestman *Trachyzelotes pedestris* (Nationally scarce), typical of hot, dry, well-drained sites.

ii) The ground beetle *Brachinus crepitans* (Nationally Scarce). This beetle is strongly associated with shingle and other stony areas, the filling with road-planings obviously suited it here.

2.14 Craylands Lane pit (area 12)

2.14.1 This large pit (and Bamber Pit (12.16)) were the most diverse of all the pits recorded in this survey. It had clearly been part-filled with calcareous material - possibly from the CTRL tunnel excavation - and this had been sown with a varied mix, including a good representation of chalk

grassland species. This grassland had also been re-disturbed after the original filling and was open-structured and warm (Photo 6).

2.14.2 Added to this was a substantial band of sands running above the chalk, with a long south-facing section. The extensive development of Budleia and Italian Alder *Alnus cordata* (an all-too frequent component of many pit restoration schemes) along this southern edge had recently been cut back severely, exposing the slopes to the warmth of the sun once again.

2.14.3 Although little of the above management had been done with environmental enhancement in mind (after the original sowing) the current situation serves as an excellent example of the sort of ongoing management required to keep the conservation interest of the area present.

Photo 6. Looking across area 12, the older and more recently disturbed grasslands can be sen in the foreground. The band of Thanet Sands on top of the chalk show up well. A line of pitfall traps ran across this area.

2.14.4 A line of pitfall traps was set out over the flat central grassland area.

2.14.5 Conservation significant species recorded here included:

i) The earwig *Apterygidia media* (Nationally scarce).This warmth-loving earwig is extremely restricted in range to the south-eastern part of England.

ii) The bug *Bathysolen nubius* (Nationally scarce) which is associated with Medicks *Medicago* species growing on re-vegetating ground.

iii) The Chalk Carpet moth *Scotopteryx bipunctaria* (Section 41). The caterpillar of this moth feeds on a range of leguminous plants growing in warm situations.

iv) The weevil *Hypera fuscocinerea* (Nationally scarce), which feeds on Medicks *Medicago* species growing in dry, re vegetating areas.

v) The sphecid wasp *Cerceris quinquefasciata* (Section 41). This wasp preys on weevils living on herbaceous plants and nests in warm sandy areas.

vi) The pompilid wasp *Aporus unicolor* (Nationally scarce). This spider-hunting wasp is a specialist predator of the trap-door spider *Atypus affinis*, which lives in warm, dry grasslands. Despite finding several individuals of the wasp, searches of the slope towards the old tunnel entrance at the western end of the pit failed to find the host spider - it must be present however!

2.15 Sports Field pit (area 13)

2.15.1 Access to this pit was not possible until quite late on (July) and only 3 visits were made. Geographically it is essentially an extension to Craylands Pit and has the same south-facing exposure of sandy material at the top of the quarry cliff. The floor of the quarry, however, has a much ranker grassland, with Wild Parsnip *Pastinaca sativa* and Stinging Nettle *Urtica dioica* frequent and an extensive dense cover of brambles at the western end. The previous use as a sports field has obviously left its mark, but we suspect that rather more nutrient-rich material has been dumped here in the past too. The flora closer to the cliff was generally more diverse and less nutrient-dependent (Photo 7).

2.15.2 A set of pitfall traps were placed in this more diverse grassland, once access had been granted.

Photo 7. The ranker grassland in area 13 is clearly seen, as is the important band of sand above the chalk.

2.15.3 Despite this much less favourable environment several of the important species from Craylands Pit were present here too. As well as *Bombus humilis* and *Cerceris quinquefasciata* these included:

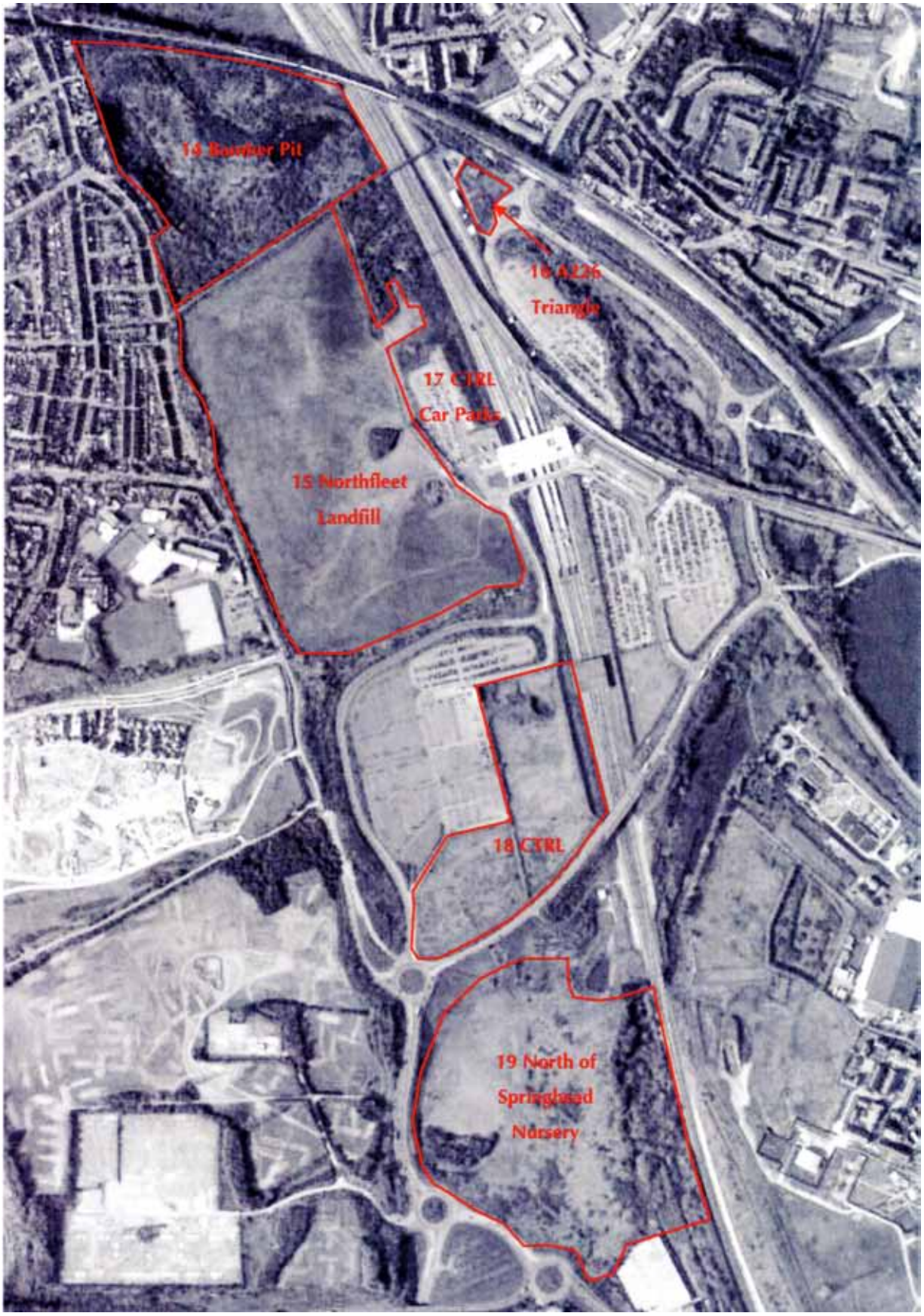
i) The ladybird beetle *Platynaspis luteorubra* (Nationally scarce) which is a predator of subterranean aphids. The beetle has a close relationship with ant nests.

ii) The bee *Hylaeus signatus* (Nationally scarce), associated with the flowers of *Reseda* species, plants which rely on intermittent disturbance to establish from seed.

2.16 Bamber Pit (area 14)

2.16.1 Lying directly to the south of Sportsfield Pit with just the railway line between them it would be expected that this area would have a very similar fauna to both Sports Field and Craylands pit, and this was indeed so. The band of sandy material at the top of the cliff was generally obscured by subsequent piling of other, largely sandy, landfill against this face and this was extensively covered by dense stands of Hemlock *Conium maculatum* and Brambles (Photo 8).

2.16.2 The north-facing side had similarly had fill piled up against it, but this was of a more chalky nature and supported a more diverse flora, including many legumes. Dense stands of Bramble and Hawthorn were, however present as well.



Map 2. Survey areas 14 to 19.

Photo 8. Spoil had been piled up against the sides of area 14. On the south-facing side this had become heavily grown over with rank vegetation. Considerable areas of the floor were, however, quite open, with skeletal soils often present.

2.16.3 A set of pitfall traps was set in the floor of the pit.

2.16.4 The floor of the pit had both sandy and chalky areas and much of this was fairly open, with parts clearly drought-stresses and having large stands of Viper's Bugloss *Echium vulgare*. Despite searches, neither of the two beetles which specialise on this plant were found. However the only record of the bee *Anthophora quadrimaculata* (Nationally scarce) during the entire survey was from its flowers here.

2.16.5 As in many other places both *Bombus humilis* and *Dorycera graminum* were present, among conservation significant species which were not found in both the Sports Field and Craylands Pits were:

i) The Harvestman *Trachyzelotes pedestris* (Nationally scarce) associated with both sandy and calcareous grasslands.

ii) The ground beetle *Ophonus azureus* (Nationally scarce). This beetle is associated with bare ground on calcareous soils.

iii) The leaf-rolling moth *Pammene agnotana* (RDB 1). The larva lives under the bark of old Hawthorns.

iv) The sphecid wasp *Pemphredon rugifera* (RDB 3). This group of wasps prey on aphids and nest in beetle galleries in old wood. It is infrequently found, but widely distributed in the UK.

v) The cuckoo bee *Sphecodes longulus* (Nationally scarce). This bee is a cleptoparasite of the very small mining bee *Lasioglossum minutissimum*, itself not frequently found. There was a good colony of both the *Lasioglossum* and the *Sphecodes* at the south-western corner of the pit.

2.17 Northfleet Landfill (area 15)

2.17.1 Undoubtedly the main feature of importance here were the exposures of Thanet Sands which had been retained as Geological SSSI when the pit was land-filled (Photo 9). These had extensive south-facing sides and had, in part, been recently exposed by removal of the surrounding bramble and Hawthorn scrub, making ideal nesting sites for a large range of bees and wasps. The landfill itself was rather species-poor, except in the eastern section where the flora was more legume-rich. Unfortunately the entire landfill is cut over in July to control the risk from fire (it is still being de-gassed). This makes the habitat for later-flying insects rather less valuable than it might otherwise be.

Photo 9. The exposures of Thanet Sands on the Geological SSSI were extremely important nesting sites for a wide range of solitary bees and wasps. The entrance holes can be clearly seen in this photo.

2.17.2 A good range of conservation significant species was recorded, including the three Section 41 species noted on many other parts of the survey: *Bombus humilis, Odynerus melanocephalus* and *Cerceris quinquefasciata.*

2.17.3 Other conservation-significant species recorded included:

i) The Earwig *Forficula lesnei* (Nationally scarce), associated with scrub and taller grasslands in the south-east of England.

ii) The bug *Lygus pratensis* (RDB 3). There has been considerable taxonomic confusion around this species in the past. It is associated with a range of habitats and is probably most affected by warmth. It has been increasing recently and was recorded on many of the sites in the survey.

iii) The hoverfly *Cheilosia cyanocephala* (Nationally scarce). The larvae of this fly bore into the roots of thistles in warm environments.

iv) The hoverfly *Chrysotoxum elegans* (RDB 3). This hoverfly is associated with ant nests, where the larvae prey on aphids within the nest.

v) The hoverfly *Pipizella maculipennis* (RDB 3). The larvae of this hoverfly feed on aphids on the roots of plants growing in well-drained, warm grasslands.

2.18 A226 Triangle (area 16)

2.18.1 This rather nondescript little area between the A226, the CTRL railway station and the local South-eastern railway line with a cycle-path, a pylon and a lot of semi-failed landscape planting of shrubs, produced a surprisingly large list of species, including some conservation-significant ones. Most of these were found in many of the other survey sites, underlining the landscape-level nature of the faunal assemblage as much as anything. However, one bee, the small *Hylaeus pictipes* (Nationally scarce), which nests in old beetle burrows in dead wood, was only recorded from this area.

2.19 CTRL Staff Car Park (area 17)

2.19.1 Initially selected during a winter visit as being of potential interest for a fauna associated with short, droughted grassland, it soon became apparent that the short nature of the sward was an outcome of incredibly frequent cutting, not drought-stress/poor nutrient levels. One weevil typical of this short grassland was recorded here, *Orthochaetes setiger* (Nationally scarce). This beetle has larvae which mine the leaves of a variety of plants and was also found in several other areas.

2.19.2 A bund between the car park and the railway line itself, which had rather longer, infrequently cut grass and together with shrubs produced rather more records but the site does not score well relatively at all.

2.20 CTRL east of main car parks (site 18)

2.20.1 This large area divided into three main habitats:

i) The large bund providing screening from the railway line itself. The area was flower-rich in the first part of the year, but was cut towards the end of June, so took some time to re-establish the flowers. However, this cutting regime, carried out on a steep slope so that the cuttings tended to fall to the bottom of the slope and did not form a mulch, was probably responsible for the maintenance of the early-year floral resource, especially large stands of Ox-eye Daisy *Leucanthemum vulgare*. This was a very good area for the early part of the survey, both because of the plentiful flowers and the relative shelter giving a warm microclimate.

ii) The seasonally inundated grassland immediately to the south of this bund, going half-way toward the minor road into Swanscombe. The seasonal wetness provided ideal conditions for the growth of large areas of Narrow-leaved Bird's foot Trefoil *Lotus tenuis,* well frequented by queens and workers of *Bombus humilis*, although there were other legumes present as well. At the southern boundary of this section, especially where it abutted the edge of the car park, had a small line of active seepages, supporting a more wetland flora and fauna. On the western side of this area is a bund of recently dumped soil, with large stands of Hoary Mustard present.

iii) The southernmost section was clearly over-topped by another layer of dumped soil, of a different, but unquantified, nature to the lower area. This supported a different flora, one which did not support as wide a variety of insect species despite the presence of abundant flowers, especially later in the year.

2.20.2 The area as a whole supported a good range of species including:

i) The spider *Clubiona juvensis* (RDB 2) associated with the reedbed of the seepages.

ii) The stilt-bug *Berytinus hirticornis* (Nationally scarce). This bug is associated with dry, sparsely-vegetated areas.

iii) The buprestid beetle *Trachys scrobiulatus* (Nationally scarce). This beetle mines the leaves of the widespread plant Ground Ivy *Glechoma hederacea* and is very difficult to find without the use of a suction sampler.

iv) The weevil *Zacladus exiguus* (Nationally scarce) which fees on the leaves of Cranesbills *Geranium* species.

v) The hoverfly *Pipizella virens* (Nationally scarce), the larvae of this fly are thought to feed on aphids on the roots of Apiaceae.

vi) The mining bee *Andrena niveata* (RDB 2). This species only collects its pollen from the flowers of Brassicaceae and, like *Andrena nigrospina*, is completely dependent on the soil conditions in which good populations of Brassicaceae can grow - this means occasional ground disturbance.

2.21 North of Springhead Nurseries (area 19)

2.21.1 This area has been largely dumped on with sandy material, possibly overburden from quarrying activity. The small valley on the southern edge beside the new roundabout on the A2260 is a remnant of its previous self, which is also just visible beside the stream in the north. The few large oaks present here suggest the area might well have been more wooded in the past, having potential affinities with the entomologically well-known Darenth Wood area further west.

2.21.2 The woodland fringing the stream is, with a few exceptional large oaks, largely a result of planting for screening. There is evidence of built-up land right in under much of this area. There is a concrete pipeline -probably a sewer - running along the edge of the stream for some way and the flora here is dominated by stinging nettles. Despite several forays into this wet margin no significant wetland insects were recorded here.

2.21.2 A set of pitfall traps ran from the woodland by the stream out into the dry grassland towards the south.

2.21.3 In contrast to the wet woodland, the dry grassland had considerable interest, many of the species recorded were found elsewhere during the survey, although there were a few more typical of older woodland towards the southern edge. These included:

i) The buprestid beetle *Agrillus laticornis* (Nationally scarce). The larvae live in oak twigs.

ii) The weevil *Polydrusus formosus* (Nationally scarce). This weevil feeds on the leaves of broadleaved trees

iii) The weevil *Lasiorhynchites olivaceus* (Nationally scarce). The larvae of this weevil bore into young twigs of Oak *Quercus* species.

iv) The snail-shell nesting bee *Osmia bicolor* (Nationally scarce) was only recorded at this sample.

v) The mining bee *Lasioglossum xanthopus* (Nationally scarce) was recorded here, among many of the samples during the survey.

2.22 The A2 corridor (area 20)

2.22.1 Access for this part of the survey was not obtained until July. The presence of a cycle path running westward from the interchange roundabout to the A296 slip road provided an opportunity to have an exploratory visit.. The dominance of the heavy passing traffic was absolute, with constant slip-stream winds present. Although a range of insects typical of the rest of the survey were recorded on this first visit, nothing suggested that the area would be anything other than a poor version of 'more of the same', so the decision not to make subsequent visits was made, the effort being better spent in other parts of the overall area.

3. INTERPRETATION OF THE SURVEY

3.1 A total of 1,992 species was recorded over the 2012 and 2015 surveys. In the following analysis the older system of Conservation statuses has been used. This is because:

a) Not all groups have new, IUCN-based threat-based assessments, most notably the aculeate Hymenoptera (ants, bees and wasps) which are an important part of the fauna of the site.

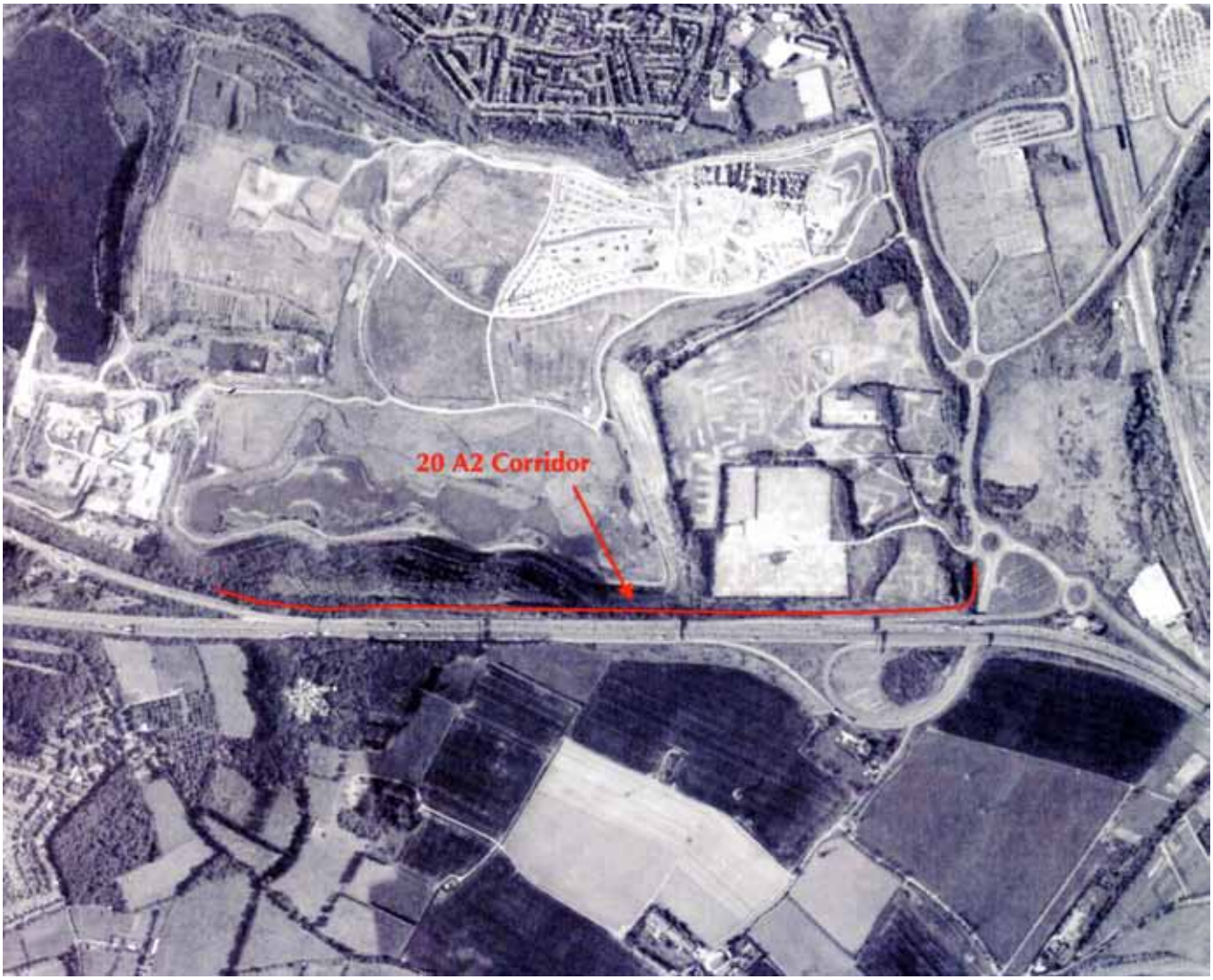
b) Comparisons with other sites in the Thames Corridor are made. These were all graded under the old system.

3.2 These grades are :

RDB 1. Endangered. Species currently (post 1970) known to exist in five or fewer ten-kilometre squares.

RDB 2. Vulnerable. Species in severely declining or vulnerable habitats, or of low known populations. Known to exist (post 1970) in ten, or fewer, ten-kilometre squares.

RDB 3. Rare. Species with small populations, not at present Endangered or Vulnerable, but which are felt to be at risk. Species currently known to exist (post 1970) in fifteen, or fewer, ten-kilometre squares.



Map 3. Survey area 20.

RDB K. Species of undoubted RDB rank, but with insufficient information for accurate placement; includes possible recent arrivals.

Nationally Scarce. Species currently (post 1970) known to exist in one hundred, or fewer, ten-kilometre squares.

To this list should be added the **Section 41** species, a more modern category listing species previously considered as Biodiversity Action Plan species (BAP). These species have been drawn from the wider pool. They are considered to be species which have declined, or under serious threat of decline, in the recent past. They may or may not have been listed under the earlier system.

3.3 With any system based on numbers of grid squares from which a species is known there is an inevitable increase in the number of known squares relating to any increase in:

a) The time period during which records are accumulated.

b) The amount of recorder effort and popularity of the organism in question.

There is no accepted way of modifying the system for these effects and statuses are taken as being a snapshot of the situation at the time the statuses were set.

3.4 There will also be changes due to habitat and climatic conditions, some species which were genuinely scarce when the lists were made have become far more widespread and commonly found. This report provides 'adjusted' statuses for a number of such species where such a situation is known to me and where these were recorded at Swanscombe LPER (Table 1). There will be additional species where I do not currently have such information. Totals using the raw and adjusted statuses are both given.

Order	Family	Species	Previous status	Adjusted status
HEMIPTERA-HETEROPTERA (Bugs)	Coreidae (Squashbugs)	Gonocerus acuteangulatus	RDB 1	Nationally Scarce
DIPTERA (Flies)	Tachinidae (Parasite Flies)	Gymnosoma rotundatum	RDB 3	Nationally Scarce
DIPTERA (Flies)	Tephritidae (Picture-wing Flies)	Myopites inulaedyssentericae	RDB 3	Nationally Scarce
DIPTERA (Flies)	Ulidiidae	Dorycera graminum	RDB 3. A UK BAP species	Nationally Scarce
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Apidae (Bees)	Nomada hirtipes	RDB 3	Nationally Scarce
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Crabronidae (Solitary Wasps)	Gorytes laticinctus	RDB 3	Nationally Scarce
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Formicidae (Ants)	Myrmica specioides	RDB 3	Nationally Scarce
ARANEAE (Spiders)	Araneidae	Argiope bruennichi	Nationally Scarce a	None
ARANEAE (Spiders)	Lycosidae (Wolf Spiders)	Pardosa agrestis	Nationally Scarce b	None
ODONATA (Damsel and Dragonflies)	Libellulidae (Darter Dragonflies)	Sympetrum sanguineum	Nationally Scarce b	None
ORTHOPTERA (Crickets and Grasshoppers)	Tettigoniidae (Bush Crickets)	Conocephalus fuscus	Nationally Scarce a	None
ORTHOPTERA (Crickets and Grasshoppers)	Tettigoniidae (Bush Crickets)	Metrioptera roeselii	Nationally Scarce b	None
COLEOPTERA (Beetles)	Carabidae (Ground Beetles)	Demetrias imperialis	Nationally Scarce b	None
COLEOPTERA (Beetles)	Cerambycidae (Long-horn Beetles)	Agapanthia villosoviridescens	Nationally Scarce b	None
COLEOPTERA (Beetles)	Cerambycidae (Long-horn Beetles)	Phytoecia cylindrica	Nationally Scarce b	None
COLEOPTERA (Beetles)	Chrysomelidae (Leaf Beetles)	Longitarsus parvulus	Nationally Scarce a	None
COLEOPTERA (Beetles)	Coccinellidae (Ladybird Beetles)	Hippodamia variegata	Nationally Scarce b	None
COLEOPTERA (Beetles)	Curculionidae (Weevils)	Pselactus spadix	Nationally Scarce b	None
COLEOPTERA (Beetles)	Elateridae (Click Beetles)	Athous campyloides	Nationally Scarce b	None
DIPTERA (Flies)	Tephritidae (Picture-wing Flies)	Merzomyia westermanni	Nationally scarce	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Andrenidae (Mining Bees)	Andrena florea	RDB 3	None

ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Apidae (Bees)	Bombus rupestris	Nationally Scarce b	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Apidae (Bees)	Ceratina cyanea	RDB 3.	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Apidae (Bees)	Nomada fucata	Nationally Scarce a	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Colletidae (Bees)	Hylaeus cornutus	Nationally Scarce a	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Colletidae (Bees)	Hylaeus signatus	Nationally Scarce b	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Crabronidae (Solitary Wasps)	Crossocerus distinguendus	RDB 3	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Crabronidae (Solitary Wasps)	Mimumesa unicolor	Nationally Scarce a	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Formicidae (Ants)	Lasius brunneus	Nationally Scarce b	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Halicitidae (Mining Bees)	Lasioglossum malachurum	Nationally Scarce a	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Halicitidae (Mining Bees)	Lasioglossum pauxillum	Nationally Scarce a	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Halictidae (Mining Bees)	Sphecodes crassus	Nationally Scarce b	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Halictidae (Mining Bees)	Sphecodes niger	RDB 3	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Pompilidae (Spider-hunting Wasps)	Auplopus carbonarius	Nationally Scarce b	None
ACULEATE HYMENOPTERA (Ants, Bees and Wasps)	Vespidae (Social and Potter Wasps)	Dolichovespula saxonica	RDB K	None

Table 1. The 'adjusted' statuses used in the analysis.

3.5 The IUCN system (summarised at the bottom of Appendix 2) seeks to address these issues, but also asks that statuses reflect the degree of threat to the species continued survival in a large geographic area. How this should be done for all insect groups is not yet fully resolved.

3.6 Appendix 1 provides a full listing of all 1992 species recorded during the survey, together with notes for each. Totals of 50 RDB and 203 Nationally scarce species (unadjusted) with 16 Section 41 species were recorded over the entire 2012 and 2015 survey. The adjusted totals were 38 RDB and 187 Nationally scarce species.

3.7 Full tables sorting the species by various categories are provided in Appendix 2

i) Table 1 provides of numbers of RDB and Nationally scarce species, by area using original statuses.

ii) Table 2 provides of numbers of RDB and Nationally scarce species, by area using adjusted statuses.

iii) Table 3 provides of numbers of RDB and Nationally scarce species associated with wet or humid habitats for area 4, Black Duck Marsh and area 8, CTRL wetland, using original statuses.

iv) Table 4 provides of numbers of RDB and Nationally scarce species associated with wet or humid habitats for area 4 Black Duck Marsh and area 8 CTRL wetland, using adjusted statuses.

v) Table 5 provides comparisons of numbers of species unique to the 10 areas with the highest numbers of species recorded, using original statuses.. This is graphed in figure 1.

vi) Table 6 provides comparisons of numbers of species unique to the 10 areas with the highest numbers of species recorded, using adjusted statuses. This is graphed in figure 2.

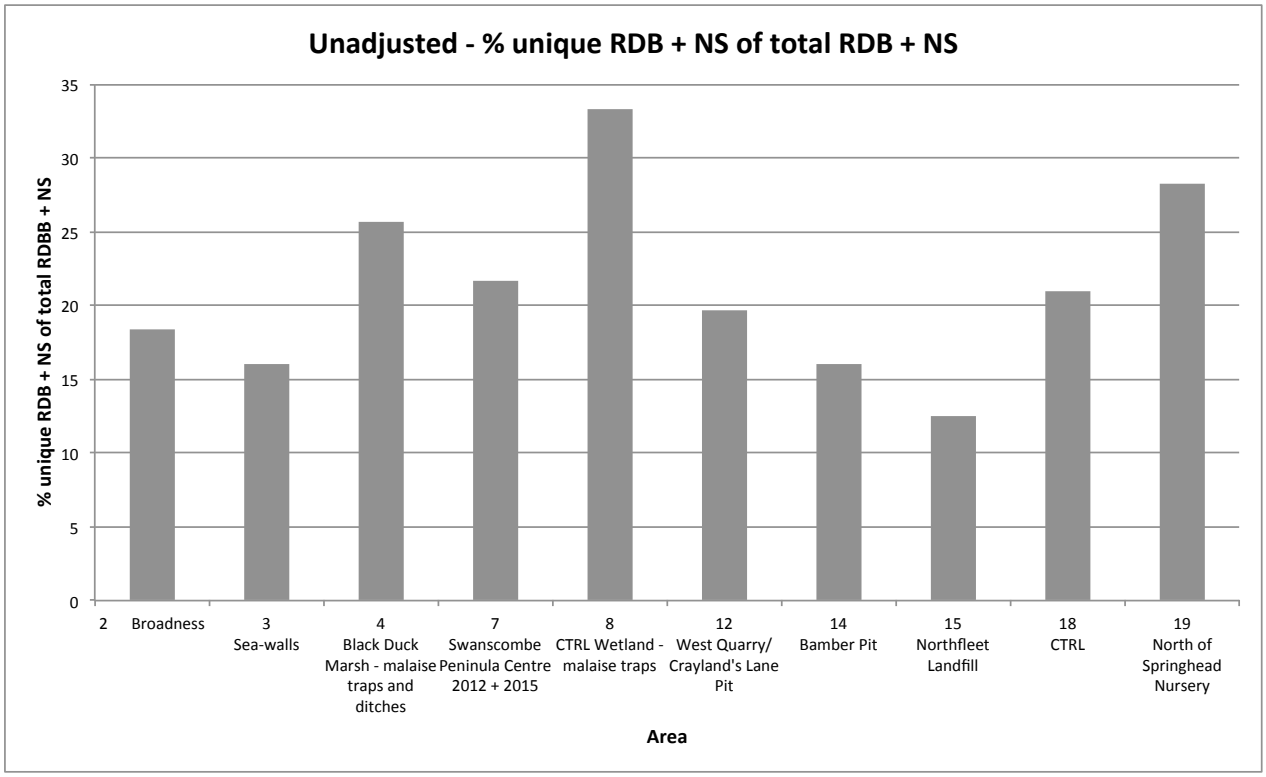


Figure 1. Comparison of number of RDB and Nationally Scarce species (original) unique to an area for the ten sites with the highest species totals.