APPENDIX 9.1 BASELINE ECOLOGY REPORTS

A19 / A184 Testos Junction Improvement and Downhill Lane Junction Improvement

Extended Phase 1 Habitat Survey Report

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EXECUTIVE SUMMARY

This technical report presents the findings of an extended Phase 1 habitat survey undertaken by Jacobs UK Ltd. (Jacobs) on behalf of Highways England. The aim of the survey was to record the habitats found within the survey area while noting habitats of ecological importance, and to determine the presence or likelihood of protected flora and fauna which may pose constraints upon the proposed A19 Testos and Downhill Lane Junctions Improvement. This report will inform an Environmental Impact Assessment (EIA) for the proposed A19 Testos and Downhill Lane Junctions Improvement.

The aim of the report is to present the extended Phase 1 habitat survey information from the survey undertaken in June 2016 whilst building on results from previous surveys undertaken by Jacobs (UK) Ltd for the Highways England in 2006, 2014 and 2016.

The survey included a desk study of online resources, data search with the local records centre and on-site surveys by professional ecologists. The survey area was surveyed on foot between the 20th and 23rd of June 2016 (inclusive), by two experienced Jacobs' ecologists. All habitats were mapped according to the Handbook for Phase 1 Habitat Survey (JNCC, 2010). Floristic nomenclature follows that of Stace (Stace, 2010). Any points of interest were identified and recorded as numbered target notes, which are shown in the Phase 1 survey Figures; 8.2 – 8.8 and in the Appendix A of this report. Figure 2.1 provides an overview of where the aforementioned Phase 1 survey figures lie in relation to the scheme.

Five Sites of Special Scientific Interest (SSSI) were identified during the desk study. These are: West Farm Meadow SSSI, South Hylton Pasture SSSI, Wear River Bank SSSI, Claxheugh Rock & Ford Limestone Quarry SSSI and Hylton Castle Cutting SSSI. Four statutory sites designated as Local Nature Reserves (LNR) were also recorded during the desk study. The LNRs are known as Hylton Dene, Barmston Pond, Station Burn, and Primrose. Additionally, 30 non-statutory designated nature conservation sites were recorded during the desk study within 2 km of the proposals. Of these, four are Local Wildlife Sites (LWS) that are located directly adjacent to the A19 or the proposals; Boldon Lake LWS, Mount Pleasant Marsh LWS, the River Don LWS and Make Me Rich Meadow LWS.

The survey area is dominated by a mixture of arable farmland and improved grassland with associated field boundaries including ditches and hedgerows. Five Priority Habitats (in accordance with the Natural Environment and Rural Communities (Section 41. NERC Act, 2006) were present within the survey area: arable field margins, rivers, ponds, lowland mixed deciduous woodlands and hedgerows. The dominant habitats that have most potential to be impacted by the scheme are arable farmland, improved grassland, hedgerows, broadleaved plantation woodland and mixed plantation woodland. However, these are all relatively floristically poor habitats.

1 INTRODUCTION

1.1 Overview

1.1.1 Jacobs was commissioned by Highways England to undertake an extended Phase 1 Habitat Survey at the location of proposed improvements for the Testos and Downhill Lane Junctions. The junctions were located along the A19 in South Tyneside at respective approximate Ordnance Survey Grid References (OSGRs) NZ 33808 60913 and NZ 34151 59862.

1.1.2 Testos Junction connected the A19 and the A184, at approximately 4.2 km south of the Tyne Tunnel. Downhill Lane Junction was located approximately 1.1 km south of the Testos Junction and linked the A19 to the A1290.

1.1.3 The surveys were required to inform the ecology chapter of the Environmental Impact Assessment (EIA), to support the Development Consent Order.

1.2 Report Rationale

1.2.1 A desk study and a Phase 1 Habitat survey were undertaken by Jacobs ecologists in 2006 and 2014 to inform a previous A19 Testos Junction Improvements project.

1.2.2 The aim of this report is

- To update the desk study results in order to include the Downhill Lane Junction new proposed scheme and to build on results of previous surveys undertaken by Jacobs (UK) Ltd;
- To provide up to date extended Phase 1 habitat survey information from surveys undertaken in June 2016 to inform future planned operations and mitigation strategies.

1.3 Other Baseline Information

1.3.1 Species specific surveys have been undertaken throughout 2016 as of part of the baseline data collection for the A19 Testos and Downhill lane Junction Improvements.

1.3.2 The baseline data relevant to this report are contained in the following documents:

- Great Crested Newt Environmental DNA and Habitat Suitability Index Survey Report (Report No. B0140301/OD/196, Jacobs 2017);
- Badger Report 2016 (Report No. B0140301/OD/192. Jacobs 2017);
- Barn Owl Report (Report No. B0140301/OD/197, Jacobs 2017);
- Bat Roost Potential and Activity Report (Report No. B0140301/OD/191, Jacobs 2017);
- Water Vole and Otter Report 2016 (Report No. B0140301/OD/199, Jacobs 2017);
- Breeding Bird Update 2016 (Report No. B0140301/OD/200, Jacobs 2017);
- Wintering Bird Update 2016 ((Report No. B0140301/OD/201, Jacobs 2017).

1.4 Definitions

1.4.1 The proposals refer to the footprint of the proposed development (scheme boundary).

1.4.2 The study area refers to a 2 km buffer around the proposals for which a desk study has been undertaken this is shown on Figure 1.

1.4.3 The survey area refers to a 500 m buffer around the proposed scheme in which the surveys have taken place this is shown on Figure 2.1.

1.5 Legislative and Regulatory Context

1.5.1 An assessment of the legislative and regulatory framework covering protected species in the UK has been undertaken. The following statutory instruments and policy frameworks were considered in this report:

- Council Directive 92/43/EEC (Habitats Directive, 1992) on the Conservation of natural habitats and of wild fauna and flora;
- Directive 2009/147/EC(Birds Directive, 2009) on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended);
- Conservation of Habitats and Species Regulations 2010 (as amended);
- Wildlife and Countryside Act 1981(as amended);
- Natural Environment and Rural Communities (NERC) Act 2006 (Habitats and Species of Principal Importance on Section 41 List);
- Protection of Badgers Act 1992;
- Countryside and Rights of Way Act 2000;
- The Hedgerows Regulations 1997;
- The Environment Act 1995;
- Wild Mammals (Protection) Act 1996; and,
- Biodiversity Action Plans (Durham LBAP).

2 METHODOLOGY

2.1 Objective

2.1.1 The purpose of the extended Phase 1 habitat surveys were:

- to record the habitats within the survey area;
- note habitats of ecological importance; and,
- to determine the presence or likelihood of protected flora and fauna which may pose constraints upon the proposed junction improvements.

2.2 Desk Study

2.2.1 A search of online resources was undertaken to obtain ecological information about the survey area and surrounding landscape. The following websites were researched:

- Multi-Agency Geographic Information for the Countryside (MAGIC); and,
- Durham Biodiversity Action Plan.

2.2.2 A desk study was conducted in 2016 to obtain records of designated statutory and non-statutory sites and protected or notable species within a 2 km buffer of the proposals. Only recent records (2006 to 2016) were included in the desk study. The search included statutory sites; Sites of Special Scientific Interest (SSSI), and Local Nature Reserves (LNR), as well as non-statutory Local Wildlife Sites (LWS).

2.2.3 In addition to online resources, data was requested from the following sources:

- the Environmental Records Information Centre North East (ERIC North East);
- Durham Bat Group; and,
- Durham County Badger Group.

2.2.4 The aim of the data search was to locate records of the presence of legally protected species or habitats within 2 km of the scheme (bat data from the Durham Bat Group were obtained for a 5 km radius).

2.3 Field Survey

2.3.1 The survey area was surveyed on foot between the 20th and 23rd June 2016 by two experienced Jacobs' ecologists. All of the habitats were mapped according to the Handbook for Phase 1 Habitat Survey (JNCC 2010). Floristic nomenclature follows that of Stace (Stace 2010). Any points of interest were identified and recorded as numbered Target Notes (TNs), as shown in the habitat maps in Figures 2.2 to 2.8. A full description of each Target Note can be found in Appendix A. A species list for the survey area can be found in Appendix B.

2.3.2 The "extended" element of this survey is in accordance with the Guidance for Baseline Ecological Assessment (Institute of Environmental Assessment 1995), which enhances the standard methodology by looking for evidence of any protected species (or identifying habitats which may be capable of supporting particular protected species including badger (*Meles meles*), bats, water vole (*Arvicola amphibius*), breeding birds, great crested newts (*Triturus cristatus*) (GCN) and reptile species. For the purposes of this report protected and notable species are those considered to comprise plant and animal species afforded legal protection. These include animals and plants protected by relevant Schedules of the Wildlife and Countryside Act 1981 (as amended), the Habitat Regulations 2010 (as

amended), the Badgers Act 1992 and species and habitats listed on Section 41 of the NERC Act 2006.

2.4 Limitations

2.4.1 A small developed area was located to the west of the A19 and south of the A184 (West Pastures), within the survey area (Grid reference: NZ 331607). This area was not included as part of the surveyed area to avoid conflict with the occupants of the travellers' site. The handbook for Phase 1 habitat surveys would likely classify this un-surveyed area as a caravan site which indicates that it would be of minimal ecological value to the area (JNCC 2010) and therefore not a significant limitation to the survey.

2.4.2 The surveys were undertaken at an appropriate time of year so the results are considered appropriately robust. However, it should be noted that site conditions can change over time with the inward and outward movement of species so an absence of a species record should not be taken as an indication of an absence of that species from the survey area. Therefore, this report reflects the site conditions up to the 23rd June 2016. The behaviour of wildlife is seasonable and highly unpredictable and as such it is considered good practice for wildlife surveys to be repeated should development be deferred for over 12 months from the date of the initial survey.

2.4.3 The findings of this report represent the professional opinion of qualified ecologists and do not constitute professional legal advice. The client may wish to seek professional legal interpretation of the relevant wildlife legislation cited in this document. Should there be a delay in the proposed construction programme, it is considered prudent that the survey findings be reviewed and updated as required for subsequent planning application(s) to ensure that the assessment of ecological impacts is undertaken against an accurate baseline.

3 BASELINE

3.1 Data Search

Designated Sites

Internationally/European Designated Sites

3.1.1 There are no international or European designated sites within 2 km of the proposals.

Nationally Designated Sites

3.1.2 Five Sites of Special Scientific Interest (SSSIs) are located within 2 km of the scheme. The sites comprise West Farm Meadow (NZ358621), which is 1.9 km away, and Hylton Castle Cutting (NZ360588) which is 1.3 km away, Wear River Bank (NZ359577), which is 1.5 km away, South Hylton Pasture (NZ357568) which is 2 km distant and Claxheugh Rock and Ford Limestone Quarry (NZ363574) which lies 2 km from the proposals. West Farm Meadow is classified SSSI and was designated for its species rich semi-natural hay meadow which is now very rare due to extensive urbanisation and agricultural intensification. Hylton Castle Cutting SSSI has been designated for the rich fossil marine fauna found within the magnesian limestone. Wear River Bank SSSI has been designated for the diverse fossil fauna and flora from the Westphalian C age. Claxheugh Rock and Ford Limestone Quarry SSSI has been designated for the exposures of magnesian limestone, which is restricted to a narrow belt between Nottingham and Durham. South Hylton Pasture SSSI has been designated for its unimproved neutral grassland, with associated wet flushes whose traditional management for hay and winter grazing has maintained a herb-rich sward.

3.1.3 There are four Local Nature Reserves (LNR) located within a 2 km radius of the scheme footprint which are Hylton Dene LNR (& LWS), Barmston Pond LNR (& LWS), Station Burn LNR and Primrose. Hylton Dene (NZ356592) is located 350 m from the scheme and qualifies as a LNR for the ancient woodland habitat found within the site. Barmston Pond (NZ328572) is located 2 km from the scheme and qualifies as an urban fringe habitat with pond that supports migrating waders. Station Burn (NZ342626) is located 300 m from the scheme and qualifies as a LNR for its mixture of ancient river valley landscapes and industrial history. Primrose (NZ333638) is located 1.4 km from the scheme and qualifies as a LNR for its mosaic of marsh and open water habitats.

Locally Designated Sites

3.1.4 As shown in Table 1 there are a total of 30 Local Wildlife Sites (LWS) located within a 2km radius of the proposals that spans across two local authorities (South Tyneside Council and Sunderland City Council). Four of these sites lie directly adjacent to the A19 or the proposed works:

- Boldon Lake, north-east of Testos Junction adjacent to the A184;
- Mount Pleasant Marsh, south-east of Testos Junction adjacent to the A184;
- Elliscope Farm East/Hylton Bridge adjacent to the A19 which includes the linking section of the River Don, leading east from Hylton Bridge Farm; and,
- Make-Me-Rich Meadow, north-east of Downhill Lane Junction.

Table 1: Local Wildlife Sites

Site Name	Description / Reason for Designation	Distance From the Proposals
Barmston Pond	This is an urban fringe site. The pond is especially important for birds, notably in autumn when waders frequently stop to feed on their migration south.	2000 m
Black Plantation	Black Plantation is a small, rectangular, area of mature even-aged, broadleaved plantation woodland lying to the south of West Boldon. The canopy is dominated by sycamore, whilst other trees present include wych elm, beech, ash and hybrid poplar. The ground flora has no ancient woodland indicators, being dominated by plants such as bramble, stinging nettle, false oat-grass and umbellifers. A diverse bird life includes jays and breeding great spotted woodpecker, whilst barn owls have been recorded using the wider area.	1850 m
Boldon Colliery Former Railway Line	A length of disused railway embankment which supports unimproved neutral grassland mature scrub, scattered trees and wet ditch communities. The site is also an important area for wintering long-eared owls.	1600m
Boldon Lake	The site comprises a man-made lake (the largest body of open water in the borough) adjacent to the Quadrus building in West Boldon, together with species-rich damp grassland alongside. The lake was created in 1986 and has developed substantial areas of marginal vegetation including large stands of reedmace and common reed, and an area dominated by hard rush.	0 m
Calf Close Burn	Calf Close Burn is a linear site following the course of a small burn as it flows north across agricultural land towards the Fellgate Estate. The stream sides have abundant great hairy willowherb and there is a stand of common reed which extends into the channel of the burn.	350 m
Downhill Meadows	The site incorporates large areas of calcareous grassland with areas of tree planting, rank neutral grassland and small amounts of scattered scrub.	700 m
Downhill Old Quarry	Downhill is a magnesian limestone ‘outlier’ which forms a prominent domed hill overlooking the low lying, open land north of the Nissan manufacturing site. The former quarry base and paddock has a range of species-rich grassland types grading from magnesian limestone grassland communities through to more neutral grasslands.	570 m
Elliscope Farm East/ Hylton Bridge	The site consists of two small woodlands and the linking section of the River Don, leading east from Hylton Bridge Farm. Elliscope Farm East is a linear, mature broadleaf plantation dominated by sycamore, with ash and elder. Hylton Bridge is a small mature broadleaf plantation with a varied canopy of sycamore, ash and beech,	50 m
Follingsby Pond/River Don Stream Bank	Pond and stream habitats of particular botanical interest exhibit luxuriant flora associated with steep clay river banks and overhanging crack willow.	2000 m
Hedworth Dene	The site comprises a bowl-shaped area of land bounded by the A19 and railway line. On either side of the River Don there are semi-natural neutral grasslands ranging from species rich to species poor.	850 m

Site Name	Description / Reason for Designation	Distance From the Proposals
Hylton Castle Grassland	Hylton Castle Grassland displays magnesian limestone grassland and scrub adjacent to geological exposures of Ford Formation (reef fascias) at Hylton Castle Cutting SSSI.	1000 m
Hylton Dene	The site comprises calcareous grassland dominated by quaking grass and a beech, sycamore and ash woodland providing habitat for numerous bird species including treecreeper. A marsh at the valley bottom supports lesser pond sedge and a hybrid swarm or northern marsh orchids.	350 m
Hylton Plantation	A mixed plantation dominated by coniferous trees with scattered broad-leaved trees. Trees and scrub provide shelter for a thriving woodland bird community.	1150 m
Inverness Road, Jarrow	Inverness Road is a bowl-shaped section of the River Don Valley bounded by the A19, to the west, and the railway line to the south. Much of the site consists of grassland dominated by tall plants such as false oat-grass, hogweed and creeping thistle. Locally, the grassland becomes much more species rich, with herbs such as meadow cranesbill and great burnet.	850 m
Lakeside Inn Fellgate	The site centres on two small lakes created for angling purposes during the 1990s. Development of aquatic and marginal vegetation is controlled to provide optimum conditions for angling. Nevertheless, a wide variety of species are present such as broad leaved pondweed, Canadian waterweed, curly pondweed, yellow iris and branched bur-reed.	1600 m
Make Me Rich Meadow	The site is made up of an area of species-rich, damp, unimproved grassland together with a section of the River Don between the A19 and the A184. The meadow was formerly grazed, but has not been intensively managed for some years. In the absence of grazing, large areas have become dominated by tall stands of meadowsweet, great willowherb and tufted hairgrass.	0 m
Monkton Pond and Wood	This is a small pond, together with woodland adjacent to the Metro line. The pond was created in approximately 1998 in association with the construction of Monkton Business Park. It acts as a 'balancing pond' in the management of the surface water drainage from the business park.	1700 m
Mount Pleasant Marsh	Located southeast of Testos Junction, comprising open water, reedbeds, marshy grassland, scrub and woodland habitat (also hosting West Boldon Environmental Education Centre).	0 m
Newton Garths	Newton Garths includes several fields heavily grazed by horses, comprising species-rich, neutral, ridge and furrow pasture sloping down to the River Don.	1600 m
Peepy Plantation	A mature plantation with interesting woodland flora and fauna, notable for its invertebrate assemblage and woodland birds.	1500 m
River Don East House	The site consists of a section of the River Don between East House Farm and Hylton Bridge Farm. This stretch of the River Don has mostly unmodified riverbank with features such as meanders, eroding earth cliffs, riffles and pools, and dead wood.	640 m
River Don New Road	The site consists of a section of the River Don leading north from New Road. In this stretch, the River Don has mostly unmodified riverbank with features such as meanders, eroding earth cliffs, riffles and pools, and dead wood. Substrates vary from coarse silts to gravel, cobbles and the occasional boulder.	1700 m

Site Name	Description / Reason for Designation	Distance From the Proposals
River Don North Road	The site consists of a section of the River Don between North Road and Newcastle Road. In this stretch, the River Don has mostly unmodified riverbank with features such as meanders, eroding earth cliffs, riffles and pools, and dead wood.	50 m
River Don West Boldon	This is a linear site and covers the banks of the River Don as it flows through West Boldon between North Road and New Road. At this location, the River Don has mostly unmodified riverbank with features such as meanders, eroding earth cliffs, riffles and pools, and dead wood.	640 m
Primrose Nature Reserve	Primrose is a mosaic of wetland habitats created on flood-prone former amenity grassland along the River Don in 1991. At its heart is a 0.7ha reedbed, the largest in South Tyneside. There are also associated marshy areas with reed canary-grass, reedmace and greater pond-sedge.	1800 m
Station Burn, Boldon Colliery	The site, which is also designated as a Local Nature Reserve, is a section of the River Don valley north of Boldon Colliery. The majority of the site comprises grassland ranging from tall neutral grassland to finer more species-rich grassland.	800 m
Strother House Farm	The site is situated to the north of Strother House Farm. It comprises an area of marshy ground approximately 0.3ha in extent, bounded by a ditch to the south and east.	850 m
Tilesheds	A varied site with a wooded area, wetlands and an area of open magnesian limestone grassland. Covers part of the same area as Hylton Dene LNR.	500 m
Turner's Hill	Turner's Hill is an area of grassland on a small circular hillock within Boldon Golf Course, south east of Boldon Cemetery.	1500 m
Wardley Colliery	This is a former colliery site mostly comprising a large raised area of colliery spoil. It is the largest 'early' successional "brown field" site in South Tyneside and its nature and size mean that it is considered to be the most valuable example of its type in South Tyneside.	1500 m

3.1.5 The location of statutory and non-statutory sites in relation to the survey area can be seen in Figure 1.

EPS Licenses within 2 km from the Proposals

3.1.6 A search on MAGIC identified that there are no European Protected Species (EPS) licenses for GCN or bats within 2 km of the proposed scheme.

3.2 Priority Habitats and Species

3.2.1 Habitats relevant to the survey area that qualify as 'Habitats of Principal Importance' under Section 41 of the NERC Act 2006 are:

- Arable field margins;
- Hedgerows;
- Lowland mixed deciduous woodlands;
- Ponds; and,
- Rivers.

Protected or Notable Species

3.2.2 The Environmental Records Information Centre North East (ERIC North East) provided protected and notable species records from their database within a 2 km buffer of the proposals.

Amphibians

3.2.3 The desk study returned no historical data of GCN within 2 km of the proposed scheme. However, there were recent records of smooth newts *Lissotriton vulgaris*, palmate newts *Lissotriton helveticus*, common frogs *Rana temporaria* and common toads *Bufo bufo*.

3.2.4 ***Badger (Meles meles)***

3.2.5 ERIC North East returned nine records of badgers within 2 km of the proposals. The Durham County Badger Group returned no badger sett data for the study area.

Bats

3.2.6 The desk study revealed 246 records of bats within the last ten years, i.e. 2006 to 2016. The data included 65 records of bat roosts, comprising: common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, unidentified *Pipistrellus* species, Natterer's bat *Myotis nattereri*, whiskered bat *Myotis mystacinus* / Brandt's bat *Myotis brandti* and unknown bat species. None of the roost records were within the 500 m survey area

Birds

3.2.7 The desk study identified a total of 105 bird species within 2 km of the proposed scheme. Table 2 below shows how the number of species within this total that are listed by the British Trust for Ornithology (BTO) as birds of conservation concern (BOCC) or species that are listed under UK legislation.

3.2.8 Table 2: Desk study results: bird species

UK Conservation Status	Number of species recorded within study area
Red List (NERC)	25
Amber List (BOCC)	36
Section 41 of the NERC Act (2006), Species of Principal Importance	18
Species on Schedule 1 of the WCA 1981 (as amended)	10

Barn Owl (Tyto alba)

3.2.9 The desk study results identified that barn owl are present in the survey area. Barn owl data are considered confidential and therefore will not be presented in this report in detail.

Otter (Lutra lutra) and Water Voles (Arvicola amphibius)

3.2.10 Numerous desk study records for water vole and otter were received from the local records centre. Records from the study area were concentrated on the River Don.

Reptiles

3.2.11 There were no records of reptiles identified within 2 km of the proposals.

Invertebrates

3.2.12 There were 24 records of invertebrates listed on the IUCN Red List of Threatened Species provided by ERIC North East identified within 2 km of the proposals. These included one record for the emperor dragonfly (*Anax imperator*), three records for the emerald damselfly (*Lestes sponsa*), six records for the common darter (*Sympetrum striolatum*), seven records for the common blue damselfly (*Enallagma cyathigerum*) and seven records for the blue-tailed damselfly (*Ischnura elegans*). These species were recorded at two locations; Fellgate (OS Grid Ref: NZ322622) and Mount Pleasant Marsh (OS Grid Ref: NZ341610). Fellgate is located approximately 1.1 km north and Mount Pleasant Marsh is located adjacent to the north east of the scheme proposal. Mount Pleasant Marsh is designated as an LWS sited within an electricity substation mainly comprising of ponds, lowland fen habitats and lowland meadow/pasture. The site margins consist of amenity grassland, broad-leaved plantation woodland and tall ruderal vegetation which are adjacent to the A19 highways boundary.

3.3 Field Survey

3.3.1 There were 25 habitats recorded within the survey area which comprised (JNCC alphanumeric reference codes in parenthesis):

- Arable (J1.1);
- Amenity grassland (J1.2);
- Bare ground (J4);
- Broad-leaved semi-natural woodland (A1.1);
- Broad-leaved plantation woodland (A1.1.2);
- Dense/continuous scrub (A2.1);
- Dry ditch (J2.6);
- Fence (J2.4);
- Improved Grassland (B.4);
- Introduced shrub (J1.4);
- Marshy grassland (B5);
- Mixed plantation woodland (A1.3.2);
- Native species-poor intact hedge (J2.1.2);
- Native species-rich intact hedge (J2.1.1);
- Natural inland cliff (I1.1);
- Neutral semi-improved grassland (B2.2);
- Poor semi-improved grassland (B6);
- Running water (G2);
- Scattered broad-leaved trees (A3.1);
- Scattered scrub (A2.2);
- Species-poor defunct hedge (J2.2.2);
- Species-poor hedge and trees (J2.3.2);
- Standing water (G1);
- Swamp (F1); and,
- Tall ruderal (C3.1).

3.3.2 Habitat maps of the survey area can be found in Figures 8.2 – 8.8 and detailed Target Notes in Appendix A. A general species list for the survey area can be found in Appendix B. The habitats found within the survey area are summarised below.

Arable (J1.1)

3.3.3 This habitat type was the most abundant within the survey area. The arable fields were enclosed for the most part by native species-poor hedgerows with some boundaries comprising species-poor hedgerows and associated dry ditches. Crops within the fields were predominantly wheat (*Triticum sp*.) barley (*Hordeum sp.*) and brassicas (*Brassica rapa ssp rapa, B napobrassica*), with the margins being of limited botanical interest, mainly dominated by a narrow strip of semi-improved grassland or tall ruderal vegetation.

Amenity Grassland (J1.2)

3.3.4 This type of grassland is mostly associated with open spaces found next to residential developments, road verges and traffic islands. In the survey area, this habitat type is dominant to the north of the site adjacent to the residential properties and running along the A19 in the central reservation and the road verges. The sward in this habitat type is generally species-poor and highly managed by a mixture of mowing and nutrient enhancement.

Bare Ground (J4)

3.3.5 An area of bare ground was located to the west of the A19 in the field directly south of TN23.

Broad-leaved Semi-natural Woodland (A1.1)

3.3.6 There were two areas of broad-leaved semi-natural woodland recorded in the survey area, with both being found west of the A19. The two woods are bordered by the River Don before it passes through the A19 culvert and comprise part of the Elliscope Farm East/Hylton Bridge LWS.

Broad-leaved Plantation Woodland (A1.1.2) / Scattered broad-leaved trees (A3.1)

3.3.7 This habitat type is common throughout the survey area notably on the road verge to the west of the A19 as well as numerous minor roads. There were two major sections of this woodland found by Boldon Lake LWS and Mount Pleasant Marsh LWS. The canopy species included sycamore (*Acer pseudoplatanus*), Norway maple (*Acer platanoides*), willow (*Salix spp*.), alder (*Alnus glutinosa*), elm (*Ulmus sp*.), silver birch (*Betula pendula*), elder, wych elm (*Ulmus glabra*), pedunculate oak (*Quercus robur*) field maple (*Acer campestre*), ash (*Fraxinus excelsior*), rowan (*Sorbus aucuparia*), aspen (*Populus tremula*) and white poplar (*Populus alba*).

3.3.8 The scattered broad-leaved trees found throughout the survey area have been planted for amenity purposes, typically in areas next to residential developments. The trees planted were predominantly willow and silver birch.

Dense/continuous scrub (A 2.1) and Scattered scrub (A2.2)

3.3.9 This habitat type was present throughout the survey area in localised areas. However, at Downhill Lane Junction, which is to the south of the site, it was the dominant habitat type on the slip road verges leading off the A19. The typical species recorded were hawthorn (*Crataegus monogyna*), elder (*Sambucus nigra*), bramble (*Rubus fruticosus agg*.) and dog rose (*R. canina agg*).

Dry Ditch (J2.6)

3.3.10 This habitat type was only recorded a small number of times during the surveys, always on arable field boundaries. The majority of this habitat was found to the west of the A19, south of the A184.

Improved Grassland (B.4)

3.3.11 Improved grassland in the survey area was species-poor and dominated by grass species suitable for fodder or hay. The typical species found were annual meadow grass (*Poa annua*), meadow fescue (*Festuca pratensis*), timothy (*Phleum pratense*) Italian ryegrass (*Lolium multiflorum*) and perennial rye grass (*Lolium perenne*). Occasional daisy (*Bellis perennis*), creeping buttercup (*Ranunculus repens*) and vetches (*Vicia cracca, V sativa*) were also present. Grazed fields commonly exhibited signs of local enrichment from manure by the presence of scattered thistles (*Cirsium sp.*) and docks (*Rumex sp.*).

3.3.12 The improved grassland habitats found in the survey area are more abundant in the land to the west of the A19, south of the A184 due to the preponderance of housing and associated infrastructure. The habitat was typically enclosed by defunct or species-poor hedgerows.

Introduced Shrub (J1.4)

3.3.13 This habitat type was found in localised areas such as car park boundaries and road verges around the various businesses located within the survey area. It is the dominant habitat type within the industrial estate to the north east of the site and is typified by species such as cotoneaster (*Cotoneaster horizontalis*), barberry (*Berberis julianae*),

pyracantha (*Pyracantha coccinea*), dogwood (*Cornus sanguinea, C. alba*), mahonia (*Mahonia spp*), hebe (*Hebe spp*) and ceanothus (*Ceanothus spp*.).

Marshy Grassland (B5)

3.3.14 This habitat type is present within the Local Wildlife Site Mount Pleasant Marsh, which was dominated by soft rush (*Juncus effusus*) and common reed (*Phragmites australis*). Throughout the rest of the survey area it was restricted to four small areas, two of which can be found in the field occupied by the pond described in Appendix A (TN28). The other two areas were recorded within arable land to the very south boundary of the survey area and within a field dominated by improved grassland to the west of the A19.

Mixed Plantation Woodland (A1.3.2)

3.3.15 This habitat type was found occasionally within the survey area. It was recorded as a small strip running adjacent to the A19 from the northern boundary of the survey area to the A19 roundabout (TN24). It was also found in small localised areas around the industrial estate to the north east of the site. There was a strand of woodland found to the south eastern boundary of the survey area bordering the housing estate.

3.3.16 The plantations were dominated by species including cherry (*Prunus sp*.), alder, ash, scots pine (*Pinus sylvestris*), sycamore, hawthorn, Norway maple, whitebeam (*Sorbus aria*), white poplar, willow and blackthorn (*Prunus spinosa*).

Native Species-poor Intact Hedge (J2.1.2) / Species-poor Defunct Hedge (J2.2.2) / Species-poor Hedge and Trees (J2.3.2)

3.3.17 These habitat types were present throughout the survey area. Species-poor hedgerows denote field boundaries within the majority of areas except the industrial estate to the north east of the site. The hedgerows were typically dominated by hawthorn, with some dominated by elder.

3.3.18 Species-poor defunct hedges were a notable feature of the north-west of the site compared to the rest of the survey area. Hedgerows were typically dominated by hawthorn with a depauperate understorey.

3.3.19 A single species-poor hedge with trees dominated by ash was recorded to the east of the A19, the border of the field containing semi-improved neutral grassland.

Native species-rich Intact Hedge (J2.1.1)

3.3.20 There were six hedgerows noted as species-rich during the surveys. Four of the six were located in a cluster to the south-west of the survey area bordering arable land off the A1290 at West Moor Farm (TNs 56, 58, 59 & 60). Species within this set of hedges comprised hawthorn, gorse (*Ulex europaeus*), ash, blackthorn, dog rose, guelder rose (*Viburnum opulus*), wild cherry (*Prunus avium*), elder, holly (*Ilex aquifolium*), field maple and crab apple (*Malus sylvestris*), wych elm, oak, willow (*Salix sp*.) and common lime (*Tilia x europaea*). The hedgerow described by TN 58 was notably rich with nine woody species. Two species-rich hedgerows were noted to the south and north of the A84 respectively with a more modest six and five species respectively. These hedges contained willow, guelder rose, oak, hawthorn, hazel (*Coryllus avellana*), elder, and common privet (*Ligustrum vulgare*), willow and sycamore.

3.3.21 Currently none of these are thought to meet the criteria of an “ecologically important” hedgerow under the Hedgerows Regulations 1997.

Natural Inland Cliff (I1.1)

3.3.22 Two rock faces comprised of sandstone were located to the western edge of the survey area within an area of dense semi-natural plantation woodland (TN48) below Boldon Hills. The upper rock face and site of a disused quarry, was extensively worn and presented myriad voids and crevices potentially suitable for birds and roosting bats.

Neutral Semi-improved Grassland

3.3.23 There were several areas of semi-improved neutral grassland throughout the survey area with the three largest being TN17, TN21 and TN27. The area of grassland denoted by TN17 was found to the south of the power station, east of the A19. The grassland was dominated by false oat grass (*Arrhenatherum elatius*), cock's-foot (*Dactylis glomerata*), timothy (*Phleum pratense*) and meadow foxtail (*Alopecurus pratensis*).

3.3.24 The area of grassland denoted by TN21 is located by the housing estate to the southeast of the survey area. The species found in the grassland included false oat grass, cock's-foot, perennial ryegrass, Yorkshire fog (*Holcus lanatus*), reed canary grass (*Phalaris arundinacea*), crested dog's-tail (*Cynosurus cristatus*), red fescue (*Festuca rubra*) and common bent (*Agrostis capillaris*).

3.3.25 TN27 denotes an area of semi-improved grassland that was dominated by Yorkshire fog, rye (*Secale cereale*), timothy and crested dog's tail.

3.3.26 There were a number of smaller fields dominated by semi-improved grassland species with the majority being found to the west of the A19. Small areas of this habitat were found in the A19 and A184 carriageway verges and within Mount Pleasant Marsh.

Species Poor Semi-improved Grassland (B6)

3.3.27 This habitat type was present at various locations in the survey area. Large areas of the habitat can be found at the Make-Me-Rich Farm and by the River Don, east of the A19, with both areas being grazed by horses. The remainder of this habitat type was found in small parcels on farmland and was likely to have been extensively grazed or had fertiliser added in the recent past. The species found on this grassland type included rye grass, tufted hair-grass (*Deschampsia cespitosa*), false oat-grass and sweet vernal grass (*Anthoxanthum odoratum*).

Running Water (G2)

3.3.28 The River Don flows through the survey area from Elliscope Farm, west of the A19, to the A19 culvert. Once the river has emerged on the other side of the A19 it flows in a northern direction through the survey area until it leaves the survey area near West House Farm. Bankside vegetation was dominated by tall grasses and ruderal vegetation including false oat-grass, cock's-foot, common nettle (*Urtica dioica*), cleavers (*Galium aparine*), rosebay willowherb (*Chamerion angustifolium*), oil-seed rape (*Brassica napus ssp. oleifera*) and stands of Himalayan balsam (*Impatiens glandulifera*). Scattered trees were present along the banks including hawthorn, sycamore and ash. Habitats beyond the watercourse are dominated by improved and semi-improved grassland, arable land and mixed plantation woodland. Other habitats included tall ruderal, dense scrub and broad-leaved semi-natural woodland. Three small ditches were also present within the scheme described by Target Notes 32, 33 and 62.

Standing Water (G1)

3.3.29 There were a total of ten standing waterbodies located within the survey area. A brief description of these waterbodies is provided in the Target Notes in Appendix A (TNs 11,

14, 28, 34, 59, 63, 64, 65, 66). The Pond noted at TN59 was dry at the time of the Phase 1 Habitat survey.

Swamp (F1)

3.3.30 There was one area of swamp habitat within the survey area and this was located within Mount Pleasant Marsh (TN13). The species found in this habitat included; sharp rush (*Juncus acutus*), hard rush (*Juncus inflexus*), common reed, lesser bulrush (*Typha angustifolia*) and pendulous sedge (*Carex pendula*).

Tall Ruderal (C3.1)

3.3.31 This habitat type was dominant around sections of the survey area including areas of Boldon Lake and Mount Pleasant Marsh (TN16). A number of unmanaged arable fields had become fully colonised by tall ruderals. The species that were typically dominant in this habitat type included creeping thistle (*Cirsium arvense*), marsh thistle (*Cirsium palustre*), meadowsweet (*Filipendula ulmaria*), curled dock (*Rumex crispus*), common nettle, soft rush and rosebay willowherb.

Invasive Species

3.3.32 A number of invasive plant species is listed on Schedule 9 of the WCA 1981 (as amended) have been identified in the survey area. These species are summarised below with an indication of location given with reference to Figures and Target Notes (TN). Species recorded in the survey area are described in the following paragraphs:

3.3.33 Japanese Knotweed (*Fallopia japonica*) – knotweed stands are located on the embankments of a B28 footbridge that crosses the A19, north of the A19 roundabout (Figure 2.2 and 2.5, TNs 23, 25 and 26). These stands are likely to be directly affected by the proposals.

3.3.34 Himalayan balsam was noted along the banks of the stretch of River Don that flows north from the A19 culvert until it leaves the survey area by Glebe Farm. However, these stands were sufficiently distance from the proposals not to be considered a constraint.

3.3.35 Japanese rose (*Rosa rugosa*) – Japanese rose was noted (Figure 2.3, TN8) within an amenity grass verge bordering Abingdon Way towards the north-eastern extent of the survey buffer. However, this stand was sufficiently distance from the proposals that it is unlikely to pose a constraint.

3.3.36 Cotoneaster was noted within an amenity planted border along Abingdon Way (Figure xx, TN9) and within an area of plantation woodland that borders the Quality Hotel to the rear of Boldon Lake (Figure 2.5, TN10). However, these stands are sufficiently distant, or separated from the development by barriers such as roads and waterbodies not to be considered a constraint on proposed works

3.3.37 All these invasive species are listed on Schedule 9 of the WCA 1981 which makes it an offence to actively plant or otherwise cause the species to grow in the wild.

4 DISCUSSION

Statutory and Non-Statutory Designated Sites

4.1.1 Five nationally designated sites are located within 2 km of the scheme. The sites comprise: West Farm Meadow SSSI (NZ358621), which is 1.9 km away, Hylton Castle Cutting SSSI (NZ360588) which is 1.3 km away, Wear River Bank SSSI (NZ359577), which is 1.5 km away, South Hylton Pasture SSSI (NZ357568) which is 2 km distant and Claxheugh Rock and Ford Limestone Quarry SSSI (NZ363574) which lies 2 km from the proposals.

4.1.2 Twenty-nine non-statutory designated sites were identified during the desk study. There are 4 LWS sites that are located within 500 m of the scheme. Boldon Lake LWS and Mount Pleasant Marsh LWS are likely to be directly affected by the proposals. Elliscope Farm East / Hylton Bridge LWS and Make Me Rich Meadow LWS should not be affected by the direct impacts of the proposals as they are further away from the scheme. The remaining 24 non-statutory designated sites are a minimum of 500 m from the junction improvements, therefore impacts associated with the works are unlikely to result in adverse effects on these sites.

4.2 Habitats

4.2.1 Twenty-five different habitat types were recorded during the field survey. The survey area was dominated by a mixture of arable farmland and improved grassland with associated field boundaries including ditches and hedgerows.

4.2.2 Four Habitats of Principal Importance (HOPI); (NERC Act 2006), arable field margins, rivers, ponds and hedgerows are present within the survey area. These habitats are categorised as: hedgerows, standing water and running water during the extended Phase 1 habitat survey.

4.2.3 Arable, improved grassland, hedgerows, broadleaved plantation woodland and mixed plantation woodland were the dominant habitats that are to be most affected by the scheme. Floristically, these were relatively poor habitats.

4.3 Invasive Species

4.3.1 There was a large concentration of currently small Japanese knotweed stands on the embankments for the footbridge that crosses the A19. The knotweed was located close enough to the developments to cause a constraint on the proposed works as the footbridge is proposed to be removed as part of the improvements.

4.3.2 The Himalayan balsam that is found along the banks of the River Don between the A19 culvert and north of Boldon Bridge is not considered to be a constraint to the proposed works, due to its distance from the scheme.

4.3.3 Two other plant species listed on Schedule 9 of the WCA 1981 (as amended) were noted on site; Japanese rose and Cotoneaster. In neither case were these species considered a constraint on the proposed junction improvements due to their distance or separation from the scheme by barriers such as roads and waterbodies.

4.4 Protected and Notable Species

Amphibians

4.4.1 Amphibian surveys undertaken for an earlier stage of the A19 Testos Junction project in 2014 indicated that GCN are absent from the survey area (500 m buffer from the Testos Junction footprint).

4.4.2 The eDNA surveys for GCN were conducted in April 2016 by Jacobs ecologists for the proposed scheme returned negative results.

4.4.3 The desk study results indicated that they survey areas has potential to support other amphibian species, such as common frog, common toad, smooth and palmate newt. Of note is the common toad, which is a Species of Principal Importance (SoPI) (S41. NERC Act 2006).

4.4.4 These results are discussed further in the following Jacobs report: Great Crested Newt Environmental DNA and Habitat Suitability Index Survey Report (Report No. B0140301/OD/196, Jacobs 2017).

Badgers

4.4.5 The results from the 2016 desk based searches and field surveys undertaken in 2016 indicated that badgers were likely to be absent within the survey area although suitable foraging habitat was identified. Consequently, no mitigation measures will be required in respect of badger. Badger survey results are discussed in detail in the following confidential Jacobs report: Badger Report 2016 (Report No. B0140301/OD/192. Jacobs 2017)

Bats

4.4.6 The desk study revealed 246 records of bats within the last ten years, i.e. 2006 to 2016. The data included 65 records of bat roosts none of the roost records were within the 500 m survey area.

4.4.7 In general during the baseline surveys undertaken by Jacobs in 2016 the habitat quality and bat activity within the survey area were low. In addition the habitats in the survey area was generally of low value bats.

4.4.8 No bat roosts were found within the survey area and few bats were observed crossing the road, therefore the proposed improvements are unlikely to significantly impact bat activity.

4.4.9 Bat survey results are discussed in detail in the following Jacobs reports: Bat Roost Potential and Activity Report (Report No. B0140301/OD/191).

Birds

4.4.10 The areas of woodland, hedgerows and dense and scattered scrub in the survey area provide suitable nesting habitat for numerous species of birds such as robin (*Erithacus rubecula*), goldfinch (*Carduelis carduelis*) and whitethroat (*Sylvia communis*).

4.4.11 Species including carrion crow (*Corvus corone corone*), magpie (*Pica pica*), greenfinch (*Carduelis chloris*), great tit (*Parus major*), wood pigeon (*Columba palumbus*) and pheasant (*Phasianus colchicus*) were observed during the survey. The arable fields within the survey area are likely to provide nesting and feeding resources for ground nesting birds such as lapwing (*Vanellus vanellus*) which has been recorded previously within 2 km of the proposals and during the extended Phase 1 Habitat Survey. The wetland features found in the survey area such as Boldon Lake and Mount Pleasant Marsh may offer an important foraging/roosting/nesting resource for waterfowl and waders.

4.4.12 During the extended Phase 1 habitat survey, there were three species of waterfowl recorded; mallard (*Anas platyrhynchos*), mute swan (*Cygnus olor*) and coot (*Fulica atra*). Urban locations and other buildings within the survey area have the potential to provide nest sites for species such as house sparrow (*Passer domesticus*), swallow (Hirundo rustica) and barn owl with widespread foraging opportunities over adjacent arable land. The improved grasslands within the survey area are likely to provide nesting and feeding resources for ground nesting birds such as lapwing and skylark (*Alauda arvensis*).

4.4.13 Breeding and wintering bird data are discussed in detail in the following Jacobs reports: Breeding Bird Update 2016 (Report No. B0140301/OD/200, Jacobs 2017) and Wintering Bird Update 2016 (Report No. B0140301/OD/201, Jacobs 2017).

Water Vole/Otter

4.4.14 The desktop study found recent records of water vole and otter within the study area. Water vole and otter surveys conducted in 2016 indicated that in general, definitive water vole field signs (i.e. footprints and latrines) were concentrated on the River Don downstream of the A19, indicating that the carriageway may act as a barrier for colonisation further upstream. No definitive otter field signs were identified

4.4.15 Water vole and otter survey results are discussed in detail in the following Jacobs report: Water Vole and Otter Report 2016 (Report No. B0140301/OD/199, Jacobs 2017).

Reptiles

4.4.16 The extended Phase 1 habitat survey identified that the dominant habitat type within the survey area was arable/pastoral land with hedgerows (often neglected and typically species-poor) that lacked associated features such as embankments, dense diverse ground flora or suitable field margins and tussocky grass. Thin strips of tall ruderal vegetation, rank grass and associated scrub were present in some locations such as adjacent to the River Don but these were considered to offer limited habitat potential given the adjacent habitat structure of arable land and urban development. Therefore, no further for reptiles surveys are required.

Invertebrates

4.4.17 Twenty-four records of invertebrates listed on the IUCN Red List of Threatened Species were provided by ERIC North East for Mount Pleasant Marsh Felgate LWS's. These were records for species of dragonfly (*Odonata*) focused at each of these sites.

4.4.18 The ponds, lowland fen habitats and lowland meadow/pasture habitats present within Mount Pleasant Marsh LWS provide suitable habitats for these invertebrate species. The habitats affected by the proposals are mainly arable, grasslands, scrub and broad leaved plantation woodland. Therefore it is considered unlikely the proposal will have a significant effect on invertebrates of conservation concern located within this site.

4.4.19 ERIC North East also provided invertebrate records at Fellgate LWS, located approximately 1.1 km north of the scheme extents. The proposals will not affect this site and it is considered highly unlikely that there will be any detrimental impacts to invertebrates located at this location.

4.4.20 The range of invertebrates listed in Appendix C contains mainly common and widespread species. Therefore it is considered unlikely the proposals will have a significant effect on invertebrates of conservation concern located within the wider study area.

Barn Owl

4.4.21 Barn owl have been observed using agricultural buildings within the survey area. Barn owl survey results are discussed in the following confidential Jacobs report: Barn Owl Report (Report No. B0140301/OD/197, Jacobs 2017).

5 REFERENCES

All legislation can be found at:
www.legislation.co.uk

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FIGURES

Figure 1: Designated sites

Figures 2.1 – 2.2: Phase 1 Habitat Figures

APPENDIX A: TARGET NOTE DESCRIPTIONS

Target Note (TN)	Grid Reference	Description of Target Note
1	NZ 34195 61185	Small area of broad-leaved plantation woodland with amenity shrubs planted. Species included ash (*Fraxinus excelsior*), field maple (*Acer campestre*), willow (*Salix spp*.), cherry (*Prunus avium*), silver birch (*Betula pendula*) and pine (*Pinus spp*.).
2	NZ 34206 61431	Area of poor semi-improved grassland which has seen extensive amenity planting. The tree and shrub species included aspen (*Populus tremula*), white poplar (*Populus alba*), hazel (*Corylus avellana*), hawthorn (*Crataegus monogyna*), dogwood (*Cornus sanguinea*) and bramble (*Rubus fruticosus agg*.). Species within the ground flora include tufted hair-grass (*Deschampsia cespitosa subsp. cespitosa*), timothy (*Phleum pratense*), common bent (*Agrostis capillaris*), false oat-grass (*Arrhenatherum elatius*), sweet vernal-grass (*Anthoxanthum odoratum*), red fescue (*Festuca rubra*), cock's-foot (*Dactylis glomerata*), knotgrass (*Polygonum aviculare*), creeping thistle (Cirsi*um arvense*), soft rush (*Juncus effusus*), curled dock (*Rumex crispus*), mare's tail (*Hippurus vulgaris*), creeping cinquefoil (*Potentilla reptans*), tufted vetch (*Vicia cracca*), meadow vetchling (*Lathyrus pratensis*), mugwort (*Artemisia vulgaris*), creeping buttercup (*Ranunculus repens*), meadow buttercup (*Ranunculus acris*), self-heal (*Prunella vulgaris*), common ragwort (*Senecio jacobaea*) and ribwort plantain (*Plantago lanceolata*).
3	NZ 34193 61534	The invasive species giant hogweed (*Heracleum mantegazzianum*) was previously noted at this location which is next to a public highway. No trace of the plant was in evidence during the second Phase 1 survey carried out in June 2016.
4	NZ 33974 61526	Small section of swale habitat with some standing water. There were no signs of amphibians and lesser bulrush (*Typha angustifolia*) was the only plant species recorded.
5	NZ 33846 61879	A large area of broad-leaved plantation woodland which contained the canopy species white poplar, grey willow (*Salix cinerea*), whitebeam (*Sorbus aria*), wych elm (*Ulmus glabra*), alder (*Alnus glutinosa*), ash, cherry, Norway maple (*Acer platanoides*) and pedunculate oak (*Quercus robur*).The shrub layer contained bramble (*Rubus fruticosus*) and hawthorn (*Crataegus monogyna*).
6	NZ 33818 61979	Small area of poor semi-improved grassland dominated by perennial rye grass (*Lolium perenne*) which was fringed by mixed plantation woodland that includes sycamore (*Acer pseudoplatanus*), rowan (*Sorbus aucuparia*), larch (*Larix decidua*), white poplar, bramble and hawthorn.

Target Note (TN)	Grid Reference	Description of Target Note
7	NZ 33907 62047	A small amenity hedge with species including hazel, dog rose (*Rosa canina*), common privet (*Ligustrum vulgare*) and damson (*Prunus domestica*).
8	NZ 33872 62047	A small stand of Japanese rose (*Rosa rugosa*) planted as an amenity shrub within amenity grass verge adjacent to Abingdon Way.
9	NZ 34098 61675	A section of amenity shrub planted next to the housing estate, adjacent to Abingdon Way. Species included white dogwood and guelder rose (*Viburnum opulus*) whilst cotoneaster (*Cotoneaster horizontalis*), honeysuckle (*Lonicera pericyclamen*) and dogwood (*Cornus alba*) were noted.
10	NZ 34173 61033	A large area of broadleaf plantation woodland with no bat roost potential due to the young age of the plantation. The canopy species included sycamore, Norway maple, grey willow, alder, silver birch, elder (*Sambucus nigra*), wych elm (*Ulmus glabra*), English oak, field maple, ash, rowan, wild cherry, aspen and white poplar. There was an abundance of bramble in the shrub layer. The ground flora consisted of the common nettle (*Urtica dioica*), rosebay willowherb (*Chamerion angustifolium*), common sorrel (*Rumex acetosa*), dog rose (*Rosa canina*), cleavers (*Galium aparine*), common hogweed (*Heracleum sphondylium*), herb robert (*Geranium robertianum*), wood avens (*Geum urbanum*), curled dock and ground ivy (*Glechoma hederacea*) whilst cotoneaster (*Cotoneaster horizontalis*) and cherry laurel (*Prunus laurocerasus*) were noted.
11	NZ 34049 61037	Boldon Lake (LWS) – large pond (c.350m by c.60m at the widest part) which has been stocked for fish historically. Floral species noted included water mint (*Mentha aquatica*), common spike-rush (*Eleocharis palustris*), soft rush, hard rush (*Juncus inflexus*), yellow flag (*Iris pseudacorus*), white waterlily (*Nymphaea alba*), lesser bulrush (*Typha angustifolia*), meadowsweet (*Filipendula ulmaria*), cow parsley (*Anthriscus sylvestris*) and reed sweet-grass (*Glyceria maxima*). There were a number of bird species present including coot (*Fulica atra*), mallard (*Anas platyrhynchos*), reed bunting (*Emberiza schoeniclus*), reed warbler (Acrocephalus scirpaceus) and common gull (Larus canus). A pair of mute swan (*Cygnus olor*) was observed to be rearing six cygnets within the lake and on the adjacent land.
12	NZ 34125 60956	Tall ruderal vegetation bordering Boldon Lake. There were no dominant ruderal species which included marsh thistle (*Cirsium palustre*), meadowsweet, soft rush and rosebay willowherb. The

Target Note (TN)	Grid Reference	Description of Target Note
		species found by the water's edge include lesser bulrush, pendulous sedge (*Carex pendula*), branched bur-reed (*Sparganium erectum*), common reed (*Phragmites australis*), water figwort (*Scrophularia auriculata*) and water dropwort (*Oenanthe crocata*).
13	NZ 34141 60868	Area of swamp in Mount Pleasant Marsh (LWS). Species include meadowsweet, sharp rush (*Juncus acutus*), hard rush, common reed, lesser bulrush, pendulous sedge, common spotted orchid (*Dactylorhiza fuchsii*), marsh thistle, yellow flag, branched bur-reed and celery-leaved buttercup (*Ranunculus sceleratus*).
14	NZ 34013 60822	Two artificial ponds created for Mount Pleasant Marsh which were surrounded by tall ruderal vegetation. Species included common knapweed (*Centaurea nigra*), common spotted orchid, yellow flag, ragged robin (*Lychnis flos-cuculi*), mugwort, hedge bindweed (*Calystegia sepium*), dock, bloody cranesbill (*Geranium sanguineum*), teasel (*Dipsacus fullonum*), ox-eye daisy (*Leucanthemum vulgare*) and black horehound (*Ballota nigra*). There was yellow flag found around the edge of the ponds as well as small strands of soft rush.
15	NZ 33867 60707	The remains of a hedgerow within an area of plantation woodland which is believed to be of some antiquity. The hedgerow was found in broadleaved plantation woodland which has encompassed an old hedge line. The Groundwork Trust staff which run the West Boldon Lodge Environmental Education centre previously confirmed that the hedgerow appears on historical maps of the area enabling its identification.
16	NZ 34124 60613	Tall ruderal vegetation with species including marsh thistle, common nettle, mugwort, common hogweed, dock, and ox-eye daisy.
17	NZ 34038 60349	Semi-improved neutral grassland found adjacent to a section of the A19. The species recorded included the grasses false oat, cock's-foot, timothy and meadow foxtail (*Alopecurus pratensis*).
18	NZ 34269 59799	Broad-leaved plantation woodland which is young and very dense. Species included field maple, sycamore, ash, mature hawthorn, hazel, silver birch, and elm.
19	NZ 33919 59588	A drain which appeared to be dry at the time of visit. The drain was bordered by large amounts of tall ruderal species such as meadowsweet, rosebay willowherb and marsh thistle.
20	NZ 33780 59593	A small copse dominated by ash and oak covered in ivy with a low Bat Roost Potential.

Target Note (TN)	Grid Reference	Description of Target Note
21	NZ 34579 59731	Semi-improved neutral grassland with a dry ditch bordering the site. Grass species recorded included false oat, cock's-foot, perennial ryegrass, Yorkshire fog (*Holcus lanatus*), reed canary-grass (*Phalaris arundinacea*), crested dog's-tail (*Cynosurus cristatus*), red fescue and common bent. Scrub species recorded were grey willow and hawthorn. Other species recorded were creeping thistle, mugwort, meadow buttercup, meadowsweet, creeping buttercup, spear thistle (*Cirsium vulgare*), common ragwort, meadow vetchling, dandelion, common spotted orchid, common centaury (*Centaurium erythraea*), red clover (*Trifolium pratense*), white clover (*Trifolium repens*), mare's tail (*Equisetum vulgare*), coltsfoot (Tussilago farfara) and common fumitory (*Fumaria officinalis*).
22	NZ 34133 62130	A scrapyard and allotments found to the north-east of the scheme.
23	NZ 33802 61214	Small stands of the invasive species Japanese knotweed (Fallopia japonica) were found on both sides of the bridge, on the western side of the A19.
24	NZ 33871 61101	Mixed plantation woodland containing species such as cherry , alder, ash, scots pine (*Pinus sylvestris*), sycamore, hawthorn, Norway maple, whitebeam, white poplar, willow and blackthorn (*Prunus spinosa*).
25	NZ 33896 61221	In 2014, numerous stands of the invasive species Japanese knotweed (*Fallopia japonica*) were found on both sides of the bridge, on the eastern side of the A19. In In June 2016 the species was still present in previously noted locations. The stands are not dense at present but are likely to continue spreading if unchecked.
26	NZ 33861 56086	A small stand of Japanese knotweed approximately $2m^2$ on the on the road verge adjacent to Mount Pleasant Marsh LWS. Not noted in previous surveys.
27	NZ 33306 60872	Semi-improved neutral grassland with species including Yorkshire fog, rye, timothy grass, crested dog's-tail, sweet vernal grass, bent grass (*Agrostis spp*.), cock's-foot, false oat grass, red fescue, tufted hair- grass and blackthorn). The western edge of the field contained a dense stand of common reed (*Phragmites australis*), which obscures a small section of Calfclose Burn. The burn runs in a northerly direction bisecting the far western edge of the scheme north of the A184. The watercourse was shallow and densely vegetated by hawthorn and willow scrub.

Target Note (TN)	Grid Reference	Description of Target Note
28	NZ 33093 60872	This shallow pond was found in the middle of a semi-improved field which was being grazed by horses. There were no aquatic plant species found within the pond margins. The pond margins were heavily poached by the horses. A wet ditch runs at the edge of the two fields.
29	NZ 33979 59652	A small stand of hemlock (*Conium maculatum*).
30	NZ 33835 59916	There were two sections of broad-leaved semi-natural Woodland which were located on the boundary of the River Don from Elliscope Farm to Make Me Rich Farm.
31	NZ 34329 60678	The River Don flows through the survey area from Elliscope Farm to the west of the A19 to the culvert that passes under the A19. The river then remerges to the East of the A19 and flows north adjacent to the electricity substation and out of the survey area under Boldon Bridge.
32	NZ 34220 60893	This is a small shallow ditch which runs along the road that enters the West Boldon substation. The ditch flows in a northerly direction and is heavily shaded by willow trees. The only aquatic plant recorded during the survey was yellow flag iris.
33	NZ 34027 60836	This is a small shallow ditch which runs in a northerly direction within the Mount Pleasant Marsh LWS. It is well shaded from the western side by hawthorn while a path runs adjacent to the eastern side. There are strands of yellow flag found along the eastern side of the ditch and there is soft rush found to the north. There were no floating or submerged species recorded.
34	NZ 34045 60860	This is a large body of water that makes up part of the Mount Pleasant Marsh LWS. There were a number of emergent plant species found in this pond which included yellow flag, hard rush, common reed, water mint and lesser bulrush. There were no floating or submerged species recorded.
35	NZ 33307 61898	Semi-improved neutral grassland dominated by Yorkshire fog, meadow fescue (*Festuca pratensis*), cocksfoot, crested dogs-tail, false oat grass, red clover, meadow vetchling and creeping buttercup.
36	NZ 33359 61906	Japanese rose within amenity planted hedgerow.
37	NZ 33053 61334	Semi-improved grassland. Dominant species included perennial rye-grass, timothy grass, meadow fox-tail, sweet vernal grass, tufted hair-grass, crested dogs-tail, Yorkshire fog, hairy brome (*Bromopsis ramosa*), cocksfoot, cuckoo flower (*Cardamine*

Target Note (TN)	Grid Reference	Description of Target Note
		pratensis).
38	NZ 32806 61113	Species-rich hedgerow with trees; hawthorn, willow, elder, wych elm and sycamore.
39	NZ 434188 61610	Japanese rose present as part of border planting.
40	NZ 34155 61518	Amenity shrub border containing Japanese rose
41	NZ 34400 61415	Broadleaf plantation woodland; oak, sycamore, ash, elder, rowan, sycamore, elm, field maple, holly (*Ilex aquifolium*), hawthorn, white poplar, Norway maple. Ground flora consists of hemlock, garlic mustard (*Alliaria petiolata*) and nettle. Area full of fly-tipped rubbish.
42	NZ 34509 61273	Immature broadleaf plantation; cherry, silver birch, holly, ash, grey willow and dogwood. Dense bramble understorey with hogweed. The 2014 survey noted the presence of northern marsh orchid (*Dactylorhiza purpurella*) however this was not noted during the 2016 survey.
43	NZ 34586 61015	Poor, semi-improved grazed grassland. Dominant species are meadow fescue, Yorkshire fog, false oat, but overwhelmed by tall ruderals; spear thistle, creeping thistle, garlic mustard, creeping buttercup, bedstraw, oxeye daisy, angelica, cow parsley, curled dock, ragwort.
44	NZ 34790 60291	Broad-leaved woodland. Dominant species include sycamore, beech, ash, hawthorn, oak, elm with rarely occurring fir (*Abies sp.*).
45	NZ 34645 60283	Mature ash with several south and south-east facing snag-ends, one or two downward pointing features that may lead to voids. Assessed as having low bat roosting potential.
46	NZ 34815 60356	Sycamore and ash dominated semi-natural plantation with some veteran trees but the majority were self-set. Occasional hawthorn, elm, elder and field maple present. The understorey was poor with species dominated by common nettle, hogweed, cow parsley and bramble with occasional flowering currant (*Ribes sanguineum*). The area was bisected by an area of apparently mown improved grassland and bridges the gap between two rock faces. The upper rock face is extensively worn and presents myriad voids and crevices suitable for birds and roosting bats.
47	NZ 33465	Semi-mature ash within hedgerow, containing north-east facing

Target Note (TN)	Grid Reference	Description of Target Note
	59499	rot pocket. Assessed as being of low bat roosting potential.
48	NZ 33881 59532	Field of semi-improved grassland containing Yorkshire fog, cock's foot, tufted hair-grass, marsh foxtail, creeping buttercup, hop trefoil, perennial ryegrass, daisy, ragwort, white clover, crested dog's tail, common sorrel (*Rumex acetosa*), red fescue, timothy grass, hard rush, meadow buttercup and common spotted orchid.
49	NZ 34813 60127	Immature mixed plantation comprising alder, oak, ash, Scot's pine, white poplar, wild cherry and hawthorn.
50	NZ 33697 59303	Pair of ash trees, one mature and one veteran with some snagged ends of branches. Dense ivy covering which may obscure bat roost potential.
51	NZ 33995 59151	Horse grazed meadow dominated by hawthorn scrub, cocksfoot grass, Yorkshire fog, common millet (*Panicum miliacium*), hogweed, creeping thistle, curled dock, common sorrel, meadow and creeping buttercup and black horehound.
52	NZ 33517 59089	Dense woodland comprising ash, hawthorn, sycamore, whitebeam and willow. Dense inner section of woodland appeared to be damp, probably fed by the dry ditch (at time of survey) in wet weather and was vegetated predominantly by goat willow (*Salix caprea*).
53	NZ 33546 59038	Relatively diverse patch of semi-improved neutral grassland comprising cock's-foot, Yorkshire fog, perennial ryegrass, sweet vernal grass, black bent (*Agrostis gigantea*), rough meadow grass (*Poa trivialis*). Other species present included false fox sedge (*Carex otrubae*), glaucous sedge (*Carex flacca*), creeping thistle, creeping buttercup and hairy vetch (*Vicia villosa*).
54	NZ 33668 59007	Species-rich hedge and associated dry ditch comprising hawthorn, gorse (Ulex europaeus), blackthorn (Prunus spinosa), dog rose (Rosa canina), wild cherry (Prunus avium) and elder.
55	NZ 33853 58947	Line of trees dominated by cherry and field maple.
56	NZ 33420 58817	Species-rich hedgerow with trees comprising hawthorn, ash, blackthorn, dog rose, elm, field maple, elder, oak, guelder rose (*Viburnum opulus*) and honeysuckle. Ground flora relatively diverse including hemlock water dropwort (*Oenanthe crocata*), betony (*Stachys officinalis*), enchanter's nightshade (*Cicaea lutetiana*), cleavers and common nettle.
57	NZ 33807	Wide, species-rich hedge comprising hazel, dog rose,

Target Note (TN)	Grid Reference	Description of Target Note
	58889	blackthorn, holly, field maple and apple (*Malus sp*.).
58	NZ 33758 58811	Species-rich hedge comprising hawthorn, dog rose, field maple, wild cherry, wych elm, oak, willow and common lime (*Tilia x europaea*).
59	NZ 33878 58806	Damp planted copse with bulrush, alder, field maple, white poplar, hawthorn, dog rose and willow.
60	NZ 33766 58733	Broadleaf plantation which extends to the edge of the survey area. Diverse ground flora noted. Tree species included wych elm, blackthorn, field maple, elder, grey willow, sycamore, poplar ssp., alder, cherry. Ground flora species included silverweed (*Potentilla anserina*), tufted vetch, yellow corydalis (*Corydalis solida*), meadow vetchling, hop trefoil, false brome (*Brachypodium sylvaticum*), creeping cinquefoil (*Potentilla reptans*), cranesbill, mugwort, colt's foot, creeping buttercup, herb robert, hogweed, nettle, common comfrey (*Symphytum officinale*), Russian comfrey (*Symphytum x uplandicum*), red dead-nettle (*Lamium purpureum*), scentless mayweed (*Tripleurospermum inodorum*), orpine (*Hylotelephium telephium*), great willowherb (*Epilobium hirsutum*), curled dock, hoary mustard (*Hirschfeldia incana*), hemlock, weld (*Reseda luteola*), stitchwort (*Stellaria holostea*), mare's tail, oxeye daisy (*Leucanthemum vulgare*), field rose (*Rosa arvenis*), hedge bindweed (*Calystegia sepium*), white campion (*Silene latifolia*) and southern marsh orchid (*Dactylorhiza praetermissa*).
61	NZ 33652 58661	Tall ruderal community dominated by rosebay willowherb and curled dock. Also meadow and marsh species such as meadow buttercup, salad burnet (*Sanguisorba minor*), ragged robin, and common spotted orchid, oxeye daisy, red campion (*Silene dioica*), yellow archangel (*Lamiastrum galeobdolon*) and common ramping fumitory.
62	NZ 34960 58736	Semi-natural, dense, broadleaf woodland plantation. Species present were turkey oak (*Quercus cerris*), ash, sycamore, hawthorn, elm, rowan, oak, apple, cherry, silver birch. Area is fenced off so surveyors were unable to assess the watercourse in the centre of the plantation which re-emerges to the south below Hepburn Grove. The watercourse which flows southwards comprised an aesthetically polluted ditch with a barely discernible flow.
63	NZ 34479 59095	A moderately-sized, shaded, very ephemeral pond located in the south-eastern corner of an arable field, close to the A19 south of Downhill Lane junction. Young grey willows were growing within the inundated margins. Litter was present.

Target Note (TN)	Grid Reference	Description of Target Note
64	NZ 34005 60826	Small, ephemeral pond with unshaded margins located within Mount Pleasant Marsh LWS, part of a cluster of five ponds.

APPENDIX B: SPECIES LIST

Common Name	Scientific Name
Alder	*Alnus glutinosa*
Apple	*Malus sp.*
Ash	*Fraxinus excelsior*
Barren brome	*Anisantha sterilis*
Bastard balm	*Melittis melissophyllum*
Bedstraw	*Rubiaceae sp.*
Beech	*Fagus sylvatica*
Bird cherry	*Prunus padus*
Bird's-foot trefoil	*Lotus corniculatus*
Bittersweet	*Solanum dulcamara*
Black bent	*Agrostis gigantea*
Black knapweed	*Centaurea nigra*
Black horehound	*Ballota nigra*
Black medick	*Medicago lupulina*
Blackthorn	*Prunus spinosa*
Bramble	*Rubus fruticosus agg.*
Bristly ox tongue	*Picris echioides*
Broad-leaved willowherb	*Epilobium montanum*
Bulrush	*Typha latifolia*
Butterfly bush	*Buddleja davidii*
Cherry laurel	*Prunus laurocerasus*
Chickweed	*Stellaria media*
Carnation sedge	*Carex panicea*
Cleavers	*Galium aparine*
Cock's-foot	*Dactylis glomerata*

Common Name	Scientific Name
Colt's-foot	*Tussilago farfara*
Common bent	*Agrostis capillaris*
Common bistort	*Persicaria bistorta*
Common comfrey	*Symphytum officinale*
Common cudweed	*Filago vulgaris*
Common dog violet	*Viola riviniana*
Common evening primrose	*Oenothera biennis*
Common field speedwell	*Veronica persica*
Common figwort	*Scrophularia nodosa*
Common fumitory	*Fumaria officinalis*
Common hawkbit	*Leontodon hispidus*
Common millet	*Panicum miliaceum*
Common mouse-ear	*Cerastium fontanum*
Common nettle	*Urtica dioica*
Common privet	*Ligustrum vulgare*
Common ragwort	*Senecio jacobaea*
Common ramping fumitory	*Fumaria muralis*
Common reed	*Phragmites australis*
Common sorrel	*Rumex acetosa*
Common spiked rush	*Eleocharis palustris*
Common spotted orchid	*Dactylorhiza fuchsii*
Common vetch	*Vicia sativa*
Copper beech	*Fagus sylvatica*
Cotoneaster	*Cotoneaster horizontalis*
Cotton thistle	*Onopordum acanthium*
Cow parsley	*Anthriscus sylvestris*

Common Name	Scientific Name
Cowslip	*Primula veris*
Crab apple	*Malus sylvestris*
Crack willow	*Salix fragilis*
Crane's-bill	*Geranium sp.*
Creeping bent	*Agrostis stolonifera*
Creeping buttercup	*Ranunculus repens*
Creeping cinquefoil	*Potentilla reptans*
Crested dog's tail	*Cynosurus cristatus*
Cuckooflower	*Cardamine pratensis*
Curled dock	*Rumex crispus*
Cut-leaved cranesbill	*Geranium dissectum*
Daisy	*Bellis perennis*
Dock	*Rumex sp.*
Dog rose	*Rosa canina*
Dogwood	*Cornus sanguinea*
Dogwood	*Cornus alba*
Dove's-foot crane's-bill	*Geranium molle*
Downy birch	*Betula pubescens*
Elder	*Sambucus nigra*
False brome	*Brachypodium sylvaticum*
False fox sedge	*Carex otrubae*
False oat-grass	*Arrhenatherum elatius*
Field bindweed	*Convolvulus arvensis*
Field forget-me-not	*Myosotis arvensis*
Field horsetail	*Equisetum arvense*
Field maple	*Acer campestre*

Common Name	Scientific Name
Field mouse-ear	*Cerastium arvense*
Field rose	*Rosa arvensis*
Flowering currant	*Ribes sanguineum*
Fool's water-cress	*Apium nodiflorum*
Garlic mustard	*Alliaria petiolata*
Glaucus sedge	*Carex flacca*
Goat willow	*Salix caprea*
Gorse	*Ulex europaeus*
Good King Henry	*Chenopodium bonus-henricus*
Great willowherb	*Epilobium hirsutum*
Greater burdock	*Arctium lappa*
Grey willow	*Salix cinerea*
Groundsel	*Senecio vulgaris*
Ground ivy	*Glechoma hederacea*
Guelder rose	*Viburnum opulus*
Gypsywort	*Lycopus europaeus*
Hairy Brome	*Bromopsis ramosa*
Hairy sedge	*Carex hirta*
Hard rush	*Juncus inflexus*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Hedge bindweed	*Calystegia sepium*
Hedge woundwort	*Stachys sylvatica*
Hemlock	*Conium maculatum*
Herb robert	*Geranium robertianum*
Himalayan balsam	*Impatiens glandulifera*

Common Name	Scientific Name
Hoary plantain	*Plantago media*
Hogweed	*Heracleum sphondylium*
Holly	*Ilex aquifolium*
Honeysuckle	*Lonicera spp.*
Hop trefoil	*Trifolium campestre*
Horse chestnut	*Aesculus hippocastanum*
Ivy-leaved toadflax	*Cymbalaria muralis*
Japanese knotweed	*Fallopia japonica*
Japanese Rose	*Rosa rugosa*
Knotgrass	*Polygonum aviculare*
Lesser burdock	*Arctium minus*
Lesser pond sedge	*Carex acutiformis*
Lesser trefoil	*Trifolium dubium*
Mare's tail	*Hippurus vulgaris*
Marsh foxtail	*Alopecurus pratensis*
Marsh marigold	*Caltha palustris*
Marsh thistle	*Cirsium palustre*
Musk mallow	*Malva moschata*
Meadow buttercup	*Ranunculus acris*
Meadow fescue	*Festuca pratensis*
Meadow foxtail	*Alopecurus pratensis*
Meadowsweet	*Filipendula ulmaria*
Meadow vetchling	*Lathyrus pratensis*
Mugwort	*Artemisia vulgaris*
Orpine	*Sedum telephium*
Osier	*Salix viminalis*

Common Name	Scientific Name
Oxeye daisy	*Leucanthemum vulgare*
Pedunculate oak	*Quercus robur*
Perennial rye-grass	*Lolium perenne*
Pineappleweed	*Matricaria discoidea*
Prickly sow thistle	*Sonchus asper*
Ramping fumitory	*Fumaria muralis*
Red campion	*Silene dioica*
Red clover	*Trifolium pratense*
Red fescue	*Festuca rubra*
Reed canary grass	*Phalaris arundinacea*
Reed sweet grass	*Glyceria maxima*
Ribwort plantain	*Plantago lanceolata*
Rosebay willowherb	*Chamerion angustifolium*
Rough meadow grass	*Poa trivialis*
Rowan	*Sorbus aucuparia*
Salad burnet	*Sanguisorba minor ssp. minor*
Sanfoin	*Onobrychis vicifolia*
Scarlet pimpernel	*Anagallis arvensis*
Scented mayweed	*Matricaria recutita*
Scentless mayweed	*Tripleurospermum inodorum*
Scot's Pine	*Pinus sylvestris*
Selfheal	*Prunella vulgaris*
Sharp rush	*Juncus acutus*
Sheep's fescue	*Festuca ovina*
Sheep's sorrel	*Rumex acetosella*
Silver birch	*Betula pendula*

Common Name	Scientific Name
Silverweed	*Potentilla anserina*
Smooth hawk's beard	*Crepis capillaris*
Soft rush	*Juncus effusus*
Spear thistle	*Cirsium vulgare*
Starwort	*Callitriche sp.*
Sweet chestnut	*Castanea sativa*
Sweet vernal grass	*Anthoxanthum odoratum*
Sycamore	*Acer pseudoplatanus*
Teasel	*Dipsacus fullonum*
Timothy	*Phleum pratense*
Tufted hair grass	*Deschampsia cespitosa*
Tufted vetch	*Vicia cracca*
Turkey oak	*Quercus cerris*
Wavy hair grass	*Deschampsia flexuosa*
Water-cress	*Rorippa nasturtium-aquaticum*
Water figwort	*Scrophularia auriculata*
Water mint	*Mentha aquatica*
Weld	*Reseda lutea*
White bryony	*Bryonia dioica*
White campion	*Silene latifolia*
White clover	*Trifolium repens*
White comfrey	*Symphytum orientale*
White poplar	*Populus alba*
White willow	*Salix alba*
Wild angelica	*Angelica sylvestris*
Wild cherry	*Prunus avium*

Common Name	Scientific Name
Wood avens	*Geum urbanum*
Wood millet	*Milium effusum*
Wych elm	*Ulmus glabra*
Yarrow	*Achillea millefolium*
Yellow archangel	*Lamiastrum galeobdolon*
Yellow corydalis	*Pseudofumaria lutea*
Yellow Iris	*Iris pseudacorus*
Yorkshire fog	*Holcus lanatus*

APPENDIX C: DESK STUDY RESULTS

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
Birds				
A				
Arctic Tern	*Sterna paradisaea*	BoCC4 Amber list	2011	No counts
Avocet	*Recurvirostra avosetta*	BoCC4 Amber list Schedule 1 WCA	2013	7+4 counts of chicks
B				
Barn Owl	*Tyto alba*	Schedule 1 WCA	2010	2
Bar-tailed Godwit	*Limosa lapponica*	BoCC4 Amber list	2011	1
Barnacle Goose	*Branta leucopsis*	BoCC4 Amber list	2013	No counts
Bittern	*Botaurus stellaris*	BoCC4 Amber list / Schedule 1 WCA	2010	No counts
Black-Backed Gull	*Larus fuscus subsp. intermedius*	BoCC4 Amber list	2013	No counts
Blackbird	*Turdus merula*	-	2013	No counts
Black-headed Gull	*Chroicocephalus ridibundus*	BoCC4 Amber list	2015	No counts
Black-tailed Godwit	*Limosa limosa*	BoCC4 Red list	2013	4
Blue Tit	*Cyanistes caeruleus*	-	2013	No counts
Brambling	*Fringilla montifringilla*	Schedule 1 WCA	2011	No counts
Bullfinch	*Pyrrhula pyrrhula*	BoCC4 Amber list / Section 41 NERC Act 2006 / LBAP	2014	1
Buzzard	*Buteo buteo*	-	2010	4
C				
Canada Goose	*Branta canadensis*	-	2013	50+
Carrion Crow	*Corvus corone*	-	2013	No counts
Coal Tit	*Periparus ater*	-	2013	No counts
Collared Dove	*Streptopelia decaocto*	-	2007	No counts
Common Gull	*Larus canus*	BoCC4 Amber list	2013	No counts
Common Tern	*Sterna hirundo*	BoCC4 Amber list	2012	No counts
Coot	*Fulica atra*	-	2013	2
Cormorant	*Phalacrocorax carbo*	-	2013	2
Curlew	*Numenius arquata*	BoCC4 Red list / Section 41 NERC Act 2006	2013	30
D				

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
Dunnock	*Prunella modularis*	BoCC4 Amber list / Section 41 NERC Act 2006	2013	No counts
F				
Fieldfare	*Turdus pilaris*	BoCC4 Red list / Schedule 1 WCA	2007	No counts
G				
Gadwall	*Anas strepera*	BoCC4 Amber list	2011	No counts
Gilbert	*Hirundo rustica*	-	2013	10
Goldcrest	*Regulus regulus*	-	2012	No counts
Goldeneye	*Bucephala clangula*	BoCC4 Amber list	2013	No counts
Goldfinch Greenfinch	*Carduelis carduelis Carduelis chloris*	-	2013	10
Goosander	*Mergus merganser*	-	2013	4
Grasshopper Warbler	*Locustella naevia*	BoCC4 Red list	2010	No counts
Great Spotted Woodpecker	*Dendrocopos major*	-	2013	2
Great Tit	*Parus major*	-	2016	2
Greenshank	*Tringa nebularia*	BoCC4 Amber list / Schedule 1 WCA	2013	No counts
Grey Heron	*Ardea cinerea*	-	2013	15+
Grey Partridge	*Perdix perdix*	BoCC4 Red list / Section 41 NERC Act 2006	2011	31
Grey Wagtail	*Motacilla cinerea*	BoCC4 Red list	2013	No counts
Greylag Goose	*Anser anser*	BoCC4 Amber list	2013	4
H				
Herring Gull	*Larus argentatus*	BoCC4 Red list / Section 41 NERC Act 2006	2013	No counts
House Martin	*Delichon urbicum*	BoCC4 Amber list	2011	No counts
House Sparrow	*Passer domesticus*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2014	25
J				
Jackdaw	*Corvus monedula*	-	2016	1
Jay	*Garrulus glandarius*	-	2014	3
K				
Kestrel	*Falco tinnunculus*	BoCC4 Amber list	2014	2

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
Kingfisher	*Alcedo atthis*	BoCC4 Amber list / Schedule 1 WCA	2013	1
L				
Lapwing	*Vanellus vanellus*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2013	20
Lesser Black-backed Gull	*Larus fuscus*	BoCC4 Amber list	2013	No counts
Lesser Spotted Woodpecker	*Dendrocopos minor*	BoCC4 Red list	2012	No counts
Linnet	*Linaria cannabina*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2010	12
Little Bittern	*Ixobrychus minutus*	-	2013	No counts
Little Owl	*Athene noctua*	-	2013	6
Little Ringed Plover	*Charadrius dubius*	-	2011	No counts
M				
Magpie	*Pica pica*	-	2014	10
Mallard	*Anas platyrhynchos*	BoCC4 Amber list / Section 41 NERC Act 2006	2013	20+
Marsh Tit	*Poecile palustris*	BoCC4 Red list / Section 41 NERC Act 2006	2007	No counts
Meadow Pipit	*Anthus pratensis*	BoCC4 Amber list	2011	12
Mediterranean Gull	*Larus melanocephalus*	BoCC4 Amber list / Schedule 1 WCA	2015	No counts
Mistle Thrush	*Turdus viscivorus*	BoCC4 Red list	2007	No counts
Moorhen	*Gallinula chloropus*	-	2013	4
Mute Swan	*Cygnus olor*	BoCC4 Amber list	2013	2
N				
Nuthatch	*Sitta europaea*	-	2014	2
O				
Oystercatcher	*Haematopus ostralegus*	BoCC4 Amber list / LBAP	2013	4
P				
Peregrine	*Falco peregrinus*	Schedule 1 WCA	2010	No counts
Pheasant	*Phasianus colchicus*	-	2013	10
Pied Wagtail	*Motacilla alba*	-	2017	No counts
Pink-footed	*Anser*	BoCC4 Amber list	2012	No counts

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
Goose	*brachyrhynchus*			
Pochard	*Aythya ferina*	BoCC4 Red list	2011	No counts
R				
Redshank	*Tringa totanus*	BoCC4 Amber list	2013	50
Redwing	*Turdus iliacus*	BoCC4 Red list / Schedule 1 WCA	2007	No counts
Reed Bunting	*Emberiza schoeniclus*	BoCC4 Amber list / Section 41 NERC Act 2006 / Local BAP	2012	2
Ringed Plover	*Charadrius hiaticula*	BoCC4 Red list	2011	No counts
Robin	*Erithacus rubecula*	-	2013	3
Rook	*Corvus frugilegus*	-	2012	No counts
S				
Sand Martin	*Riparia riparia*		2013	10+
Shelduck	*Tadorna tadorna*	BoCC4 Amber list	2013	20+
Short-eared Owl	*Asio flammeus*	BoCC4 Amber list	2011	1
Shoveler	*Anas clypeata*	BoCC4 Amber list	2012	2
Siskin	*Spinus spinus*	-	2013	No counts
Skylark	*Alauda arvensis*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2011	10
Snipe	*Gallinago gallinago*	BoCC4 Amber list / LBAP	2012	6
Song Thrush	*Turdus philomelos*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2014	1
Sparrowhawk	*Accipiter nisus*	WCA	2013	3
Spotted Flycatcher	*Muscicapa striata*	BoCC4 Red list / Section 41 NERC Act 2006	2007	No counts
Starling	*Sturnus vulgaris*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2011	15
Swift	*Apus apus*	BoCC4 Amber list	2011	11
T				
Tawny Owl	*Strix aluco*	BoCC4 Amber list	2012	4 counts of chicks
Teal	*Anas crecca*	BoCC4 Amber list	2013	26+
Tree Sparrow	*Passer montanus*	BoCC4 Red list / Section 41 NERC Act 2006	2011	No counts

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
Troglodytes troglodytes subsp. troglodytes	*Troglodytes troglodytes subsp. troglodytes*	-	2010	No counts
Treecreeper	*Certhia familiaris*	-	2013	No counts
Tufted Duck	*Aythya fuligula*	-	2013	6
Twite	*Linaria flavirostris*	BoCC4 Red list	2010	No counts
W				
Water Rail	*Rallus aquaticus*	-	2015	No counts
Waxwing	*Bombycilla garrulus*	-	2013	No counts
Wheatear	*Oenanthe oenanthe*	-	2011	1
Whitethroat	*Sylvia communis*	-	2011	11
Wigeon	*Anas penelope*	BoCC4 Amber list	2011	No counts
Willow Tit	*Poecile montana*	BoCC4 Red list / Section 41 NERC Act 2006	2012	No counts
Willow Warbler	*Phylloscopus trochilus*	BoCC4 Amber list	2012	4
Woodcock	*Scolopax rusticola*	BoCC4 Red list	2011	No counts
Woodpigeon	*Columba palumbus*	-	2016	500+
Wren	*Troglodytes troglodytes*	-	2016	No counts
Y				
Yellowhammer	*Emberiza citrinella*	BoCC4 Red list / Section 41 NERC Act 2006	2011	20+
Amphibians				
Common Frog	*Rana temporaria*	WCA	2012	8
Common Toad	*Bufo bufo*	WCA	2012	30
Palmate Newt	*Lissotriton helveticus*	WCA	2012	7
Smooth Newt	*Lissotriton vulgaris*	WCA	2012	11
Terrestrial mammals				
Common Pipistrelle	*Pipistrellus pipistrellus*	Cons of Hab & Spe Reg, WCA	2014	6
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Cons of Hab & Spe Reg, WCA	2015	1
Noctule Bat	*Nyctalus noctula*	Cons of Hab & Spe Reg, WCA	2008	No counts
Myotis		Cons of Hab & Spe Reg, WCA	208	1

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
Eurasian Badger	*Meles meles*	The Badgers Act	2014	No counts
European Otter	*Lutra lutra*	Habitat Regulations	2016	1
Brown Hare	*Lepus europaeus*	Section 41 NERC Act 2006	2015	3
European Water Vole	*Arvicola amphibius*	Section 41 NERC Act 2006, WCA Sch5	2016	3

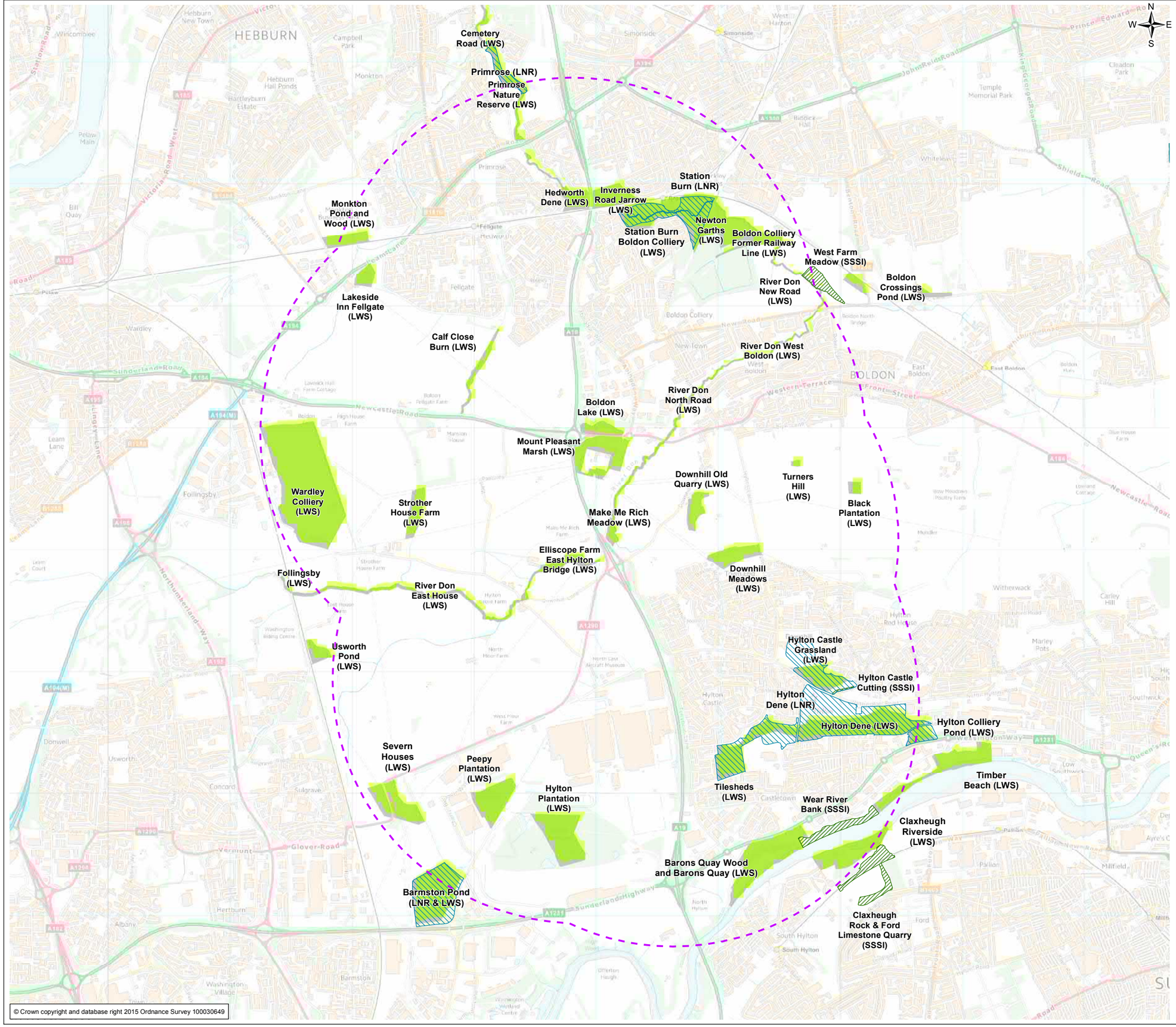

FIGURE 1

Legend

- Local Wildlife Site (LWS)
- Site of Special Scientific Interest (SSSI)
- Local Nature Reserve (LNR)
- 2km Buffer (combined options)

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Drawing Status:

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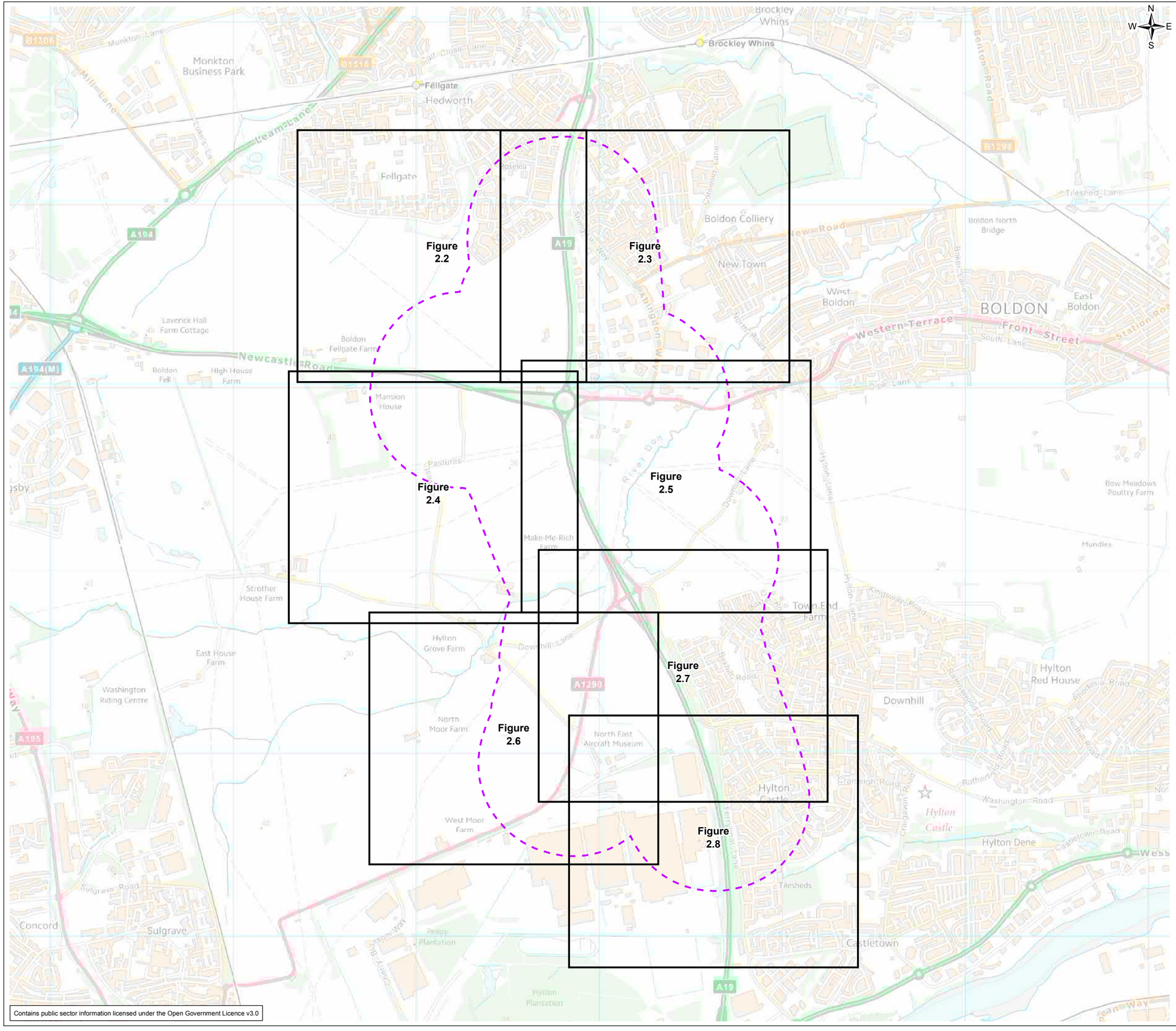

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FIGURE 2.1

Legend

- 500m Buffer (combined options)

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FIGURE 2.2

Legend

- 500m Buffer (combined options)
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub
- Native species-rich Intact Hedge
- Fence
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- A — Amenity Grassland
- A — Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Dense/Continuous Scrub
- I — Improved Grassland
- Introduced Shrub
- Marshy Grassland
- Mixed Plantation Woodland
- SI — Poor Semi-improved Grassland
- SI — Semi-improved Neutral Grassland
- Standing Water
- Swamp
- Tall Ruderal

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Drawing Status:

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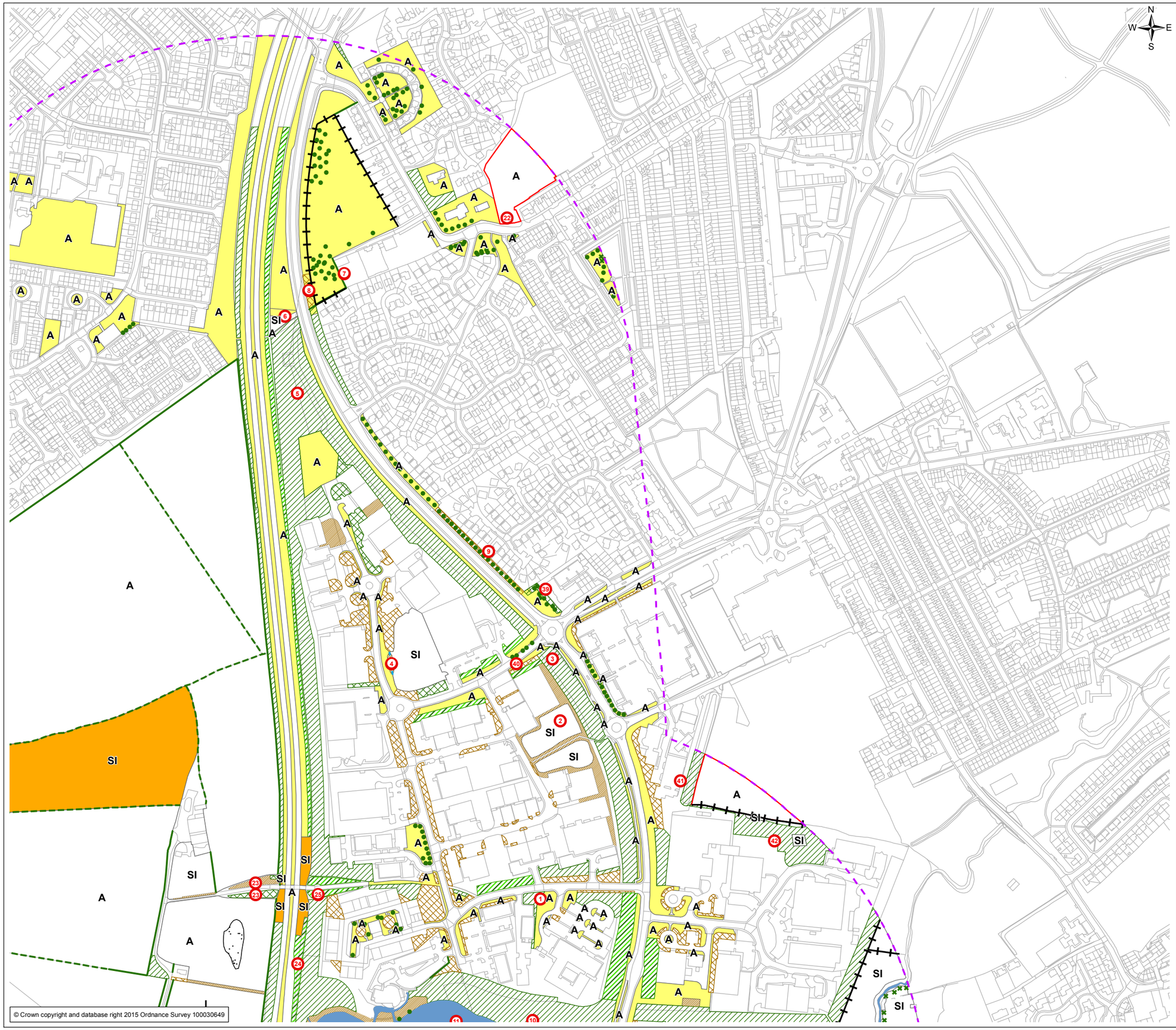
FIGURE 2.3



Legend

- 500m Buffer (combined options)
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub
- Native species-rich Intact Hedge
- Fence
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- A — Allotment
- A — Amenity Grassland
- A — Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Dense/Continuous Scrub
- I — Improved Grassland
- Introduced Shrub
- Marshy Grassland
- Mixed Plantation Woodland
- SI — Poor Semi-improved Grassland
- SI — Semi-improved Neutral Grassland
- Standing Water
- Swamp
- Tall Ruderal

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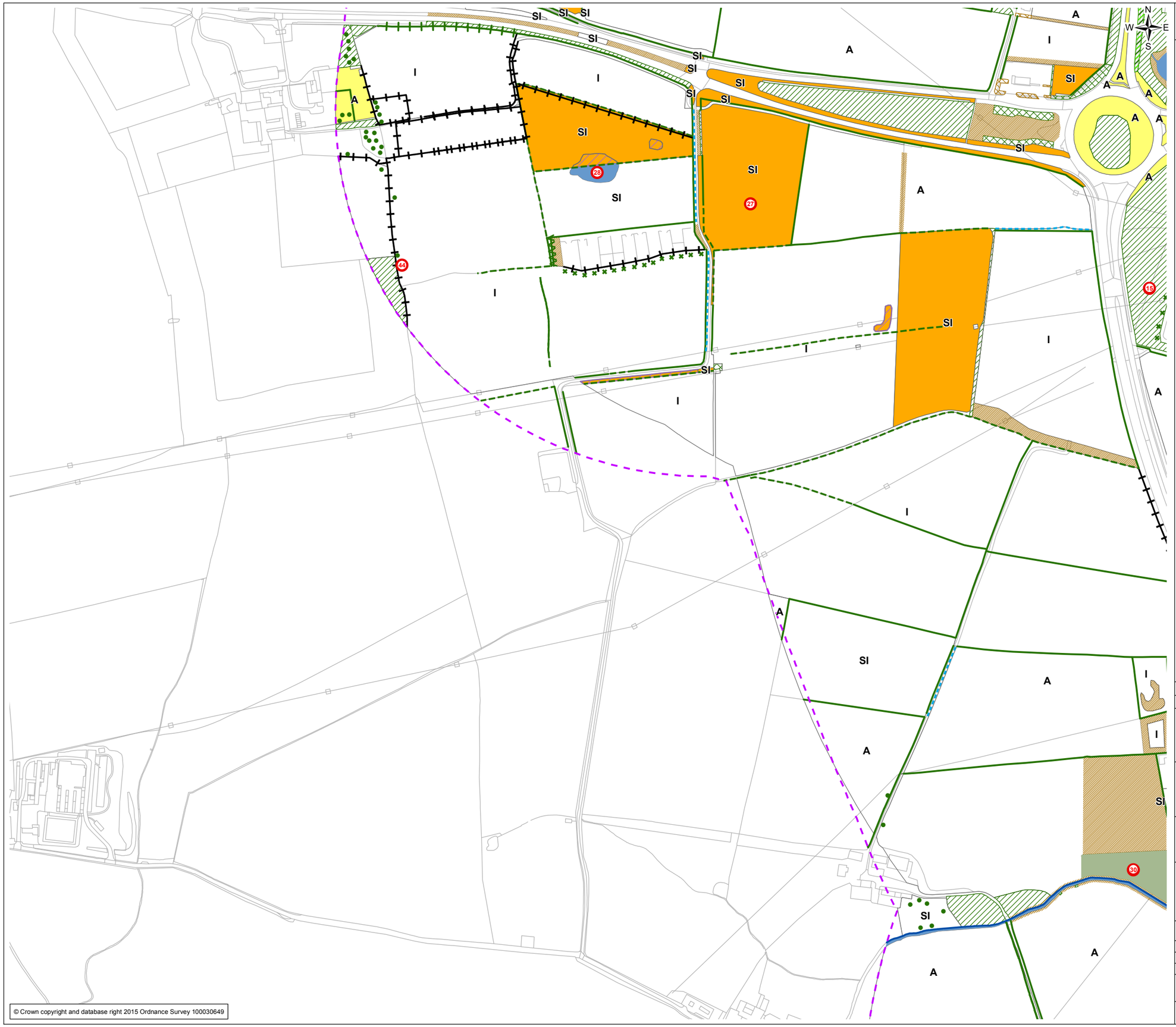
FIGURE 2.4



Legend

- 500m Buffer (combined options)
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub
- Native species-rich Intact Hedge
- Fence
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- A — Amenity Grassland
- A — Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Dense/Continuous Scrub
- I — Improved Grassland
- Introduced Shrub
- Marshy Grassland
- Mixed Plantation Woodland
- SI — Poor Semi-improved Grassland
- SI — Semi-improved Neutral Grassland
- Standing Water
- Swamp
- Tall Ruderal

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FIGURE 2.5

Legend

- 500m Buffer (combined options)
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub
- Natural Inland Cliff
- Native species-rich Intact Hedge
- Fence
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- Amenity Grassland
- Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Dense/Continuous Scrub
- Improved Grassland
- Introduced Shrub
- Marshy Grassland
- Mixed Plantation Woodland
- Poor Semi-improved Grassland
- Semi-improved Neutral Grassland
- Standing Water
- Swamp
- Tall Ruderal

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Client No.		

Drawing No.: B0140301_EC_PH1_0205

FIGURE 2.6

Legend

- 500m Buffer (combined options)
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub
- Native species-rich Intact Hedge
- Fence
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- A — Amenity Grassland
- A — Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Dense/Continuous Scrub
- I — Improved Grassland
- Introduced Shrub
- Marshy Grassland
- Mixed Plantation Woodland
- SI — Poor Semi-improved Grassland
- SI — Semi-improved Neutral Grassland
- Standing Water
- Swamp
- Tall Ruderal

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Client No.		

Drawing No.: B0140301_EC_PH1_0206

FIGURE 2.7

Legend

- 500m Buffer (combined options)
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub
- Native species-rich Intact Hedge
- Fence
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- A — Amenity Grassland
- A — Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Dense/Continuous Scrub
- I — Improved Grassland
- Introduced Shrub
- Marshy Grassland
- Mixed Plantation Woodland
- SI — Poor Semi-improved Grassland
- SI — Semi-improved Neutral Grassland
- Standing Water
- Swamp
- Tall Ruderal

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Client No.		
Drawing No.	B0140301_EC_PH1_0207	

FIGURE 2.8

Legend

- 500m Buffer (combined options)
- Target Note
- Broad-leaved Scattered Tree
- Scattered Scrub
- Native species-rich Intact Hedge
- Fence
- Species-poor Defunct Hedge
- Species-poor Hedge and Trees
- Species-poor Intact Hedge
- Running Water
- Dry Ditch
- A — Amenity Grassland
- A — Arable
- Bare Ground
- Broad-leaved Plantation Woodland
- Broad-leaved Semi-natural Woodland
- Dense/Continuous Scrub
- I — Improved Grassland
- Introduced Shrub
- Marshy Grassland
- Mixed Plantation Woodland
- SI — Poor Semi-improved Grassland
- SI — Semi-improved Neutral Grassland
- Standing Water
- Swamp
- Tall Ruderal

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Drawing Status:

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Client No.		

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A19 / A184 Testos Junction Improvement and Downhill Lane Junction Improvement

Great Crested Newt Environmental DNA and Habitat Suitability Index Survey Report

Version 0

Document reference: B0140301/OD/196

Date: April 2017

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CONTENTS

EXECUTIVE SUMMARY

This report presents the findings of amphibian surveys undertaken by Jacobs UK Ltd. (Jacobs) on behalf of Highways England. The purpose of the survey was to establish an ecological baseline for amphibians to inform an Environmental Impact Assessment (EIA) for the proposed A19 Testos and Downhill Lane Junctions Improvement.

The amphibian surveys comprised a desk study, Habitat Suitability Index (HSI) assessments and eDNA sampling for great crested newt *Triturus Cristatus* (GCN) presence/absence of ten ponds between April and June 2016.

GCN surveys have previously been conducted by Jacobs in 2007 and 2014; no GCN were recorded during either of these surveys.

One designated site, Severn Houses LWS, was designated for GCN and was located approximately 2 km south-west of the proposals. The desk study did not reveal any records of GCN within 2 km study area, although there were 11 records of other amphibian species, comprising: common frog *Rana temporaria*, common toad *Bufo bufo*, smooth newt *Lissotriton vulgaris* and palmate newt *Lissotriton helveticus*.

The habitat suitability index of the ponds ranged from good to poor. Three ponds each had good, average and below average suitabilities, and one pond, Boldon Lake, had poor habitat suitability. All three of the ponds that had good habitat suitability for GCN were located within Mount Pleasant LWS in the north-eastern part of the survey area.

The eDNA results from the sampling undertaken in April 2016 showed that GCN were absent from nine out of the ten ponds. A positive result was obtained from Pond 6, Boldon Lake. However, this was suspected to be a false-positive result given the suitability of the habitat and the presence of waterfowl and fish. The eDNA test was repeated on Pond 6 in June, which led to a negative result. Based on the results of surveys from previous years it is considered that GCN are absent from Pond 6.

Although GCN were absent from the ponds, it is likely that other amphibian species were present, such as common frog, common toad, smooth newt and palmate newt. Of note is the likely presence of common toad, which is a Species of Principal Importance under the NERC Act 2006.

1 INTRODUCTION

1.1 Overview

1.1.1 Jacobs was commissioned by Highways England to undertake amphibian surveys at the location of proposed improvements for the Testos and Downhill Lane Junctions. The junctions are located along the A19 in South Tyneside at respective approximate Ordnance Survey Grid References (OSGRs) NZ 33808 60913 and NZ 34151 59862.

1.1.2 Testos Junction connects the A19 and the A184, and is approximately 4.2 km south of the Tyne Tunnel. Downhill Lane Junction is approximately 1.1 km south of the Testos Junction and links the A19 to the A1290.

1.1.3 The surveys were required to inform the ecology chapter of the Environmental Impact Assessment (EIA) to support the Development Consent Order (DCO) application.

1.1.4 This report provides an update to the amphibian surveys undertaken by Jacobs in 2014 (B0140300/OD/121 January 2015, A19/A184 Testos Junction Improvement: Amphibian Survey Report 2014, Revision 1). This has been supplemented by information from surveys were undertaken by White Young Green (WYG) in 2014 and 2015 on behalf of Sunderland City Council in relation to the proposed International Advanced Manufacturing Park (IAMP) development where the survey areas overlap.[1].

1.2 Definitions

1.2.1 The proposals refer to the footprint of the proposed development (scheme boundary).

1.2.2 The study area refers to a 2 km buffer around the proposals for which a desk study has been undertaken to identify amphibian records.

1.2.3 The survey area refers to a 500 m buffer around the proposals in which the surveys have taken place.

1.3 Survey Area

1.3.1 The survey area is shown on Figure 1. A large portion of the survey area to the west of the A19 featured arable land and pasture, with scattered farm buildings. An industrial district containing the Nissan Motor Manufacturing UK (NMUK) car plant was located at the southern end of the survey area. A residential area, part of the settlements Town End Farm and Castletown, covered the south-eastern section of the survey area, and another industrial area, Boldon Business Park, was located to the north-east of the Testos Junction. The land to the east of the A19 between the industrial and residential areas featured arable and pastoral fields and a National Grid substation immediately to the south-east of the Testos Junction. The northern end of the survey area contained the residential settlements of Hedworth and Boldon Colliery.

1.4 Objectives

1.4.1 The great crested newt (*Triturus cristatus*)(GCN) surveys comprised Habitat Suitability Index (HSI) assessments and environmental DNA (eDNA) sampling of waterbodies within a 500 m survey area surrounding the proposals. These surveys aimed to update amphibian surveys undertaken by Jacobs in 2014.

[1] WYG (2015) Land North of Nissan, Final Report, November 2015.

1.5 Legislation and Planning

1.5.1 Wildlife and countryside legislation and planning policy is referred to in this report; this comprises the following articles:

- Wildlife and Countryside Act 1981 (as amended) (WCA);
- EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive 1992) as amended (92/43/EEC);
- Conservation of Habitats and Species Regulations 2010 (as amended); and
- Natural Environment and Rural Communities Act 2006 (NERC 2006)
- Local Biodiversity Action Plan (Durham LBAP).

1.5.2 There are seven species of amphibian native to the UK. Three of these species are European Protected Species and receive full legal protection; great crested newts (GCN) (*Triturus cristatus*), natterjack toad (*Epidalea calamita*) and pool frog (*Pelophylax lessonae*). The geographical ranges of natterjack toad and pool frog are very restricted and do not include the survey area of this report. However, the known GCN population range does include the survey area; therefore GCN will be the focus of this report.

1.5.3 A summary of the legislation protecting amphibians native to the UK and the ecology of GCN can be found in Appendices A and B.

2 METHODOLOGY

2.1 Previous Surveys

Jacobs 2014

2.1.1 Amphibian surveys were undertaken by Jacobs in 2014 in relation to the A19 Testos Junction Improvement project. The 2014 surveys comprised a desk study within a 3 km buffer of the proposals to account for permanent and any proposed temporary landtake. Field surveys of seven ponds within a 500 m buffer of the proposals were undertaken. The field surveys involved bottle trapping, torching, egg searches and netting to determine the presence or absence of GCN.

IAMP Surveys

2.1.2 GCN surveys were conducted in 2014/2015 within a 500 m buffer of the proposals where accessible. However no ponds east of the A19 were included in this survey (i.e. Mount Pleasant Marsh Local Wildlife Site (LWS) or Boldon Lake LWS).

2.2 Updated Desk Study

2.2.1 A desk study was conducted in October 2016 to obtain records of designated statutory and non-statutory sites and amphibian species within a 2 km buffer of the proposed scheme. Only records from the last ten years (2006 to 2016) were included in the desk study. Records were sourced from the Environmental Records Information Centre (ERIC) North East.

2.3 Field Survey

HSI Assessments

2.3.1 HSI assessments for GCN were undertaken for waterbodies within a 500 m buffer of the proposals. The surveys were conducted on the 18th and 19th April 2016 by two suitably qualified ecologists. Ponds included in the HSI assessment are shown on Figure 1.

2.3.2 The HSI assessments were conducted in line with best practice guidance[2]. This involved recording ten habitat parameters that influence the suitability of a pond to support GCN. The overall index score obtained gave an indication of a ponds suitability to support GCN as per Table 1 below. The detailed results and calculations of the HSI surveys are provided in Appendix C of this report.

Table 1. HSI scoring.

HSI score	Habitat suitability category
<0.5	Poor
0.5 – 0.59	Below average

[2] Oldham, R. S., Keeble, J., Swan, M. J., and Jeffcote, M. (2000). *Evaluating the Suitability of Habitats for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal, 10: 143 – 155.

HSI score	Habitat suitability category
0.6 – 0.69	Average
0.7 – 0.79	Good
>0.8	Excellent

eDNA Sampling

2.3.3 Each waterbody was assessed for GCN presence or absence using eDNA sampling. The sampling was designed to identify GCN eDNA from water samples taken from a waterbody. The samples were taken on the 18th and 19th April during the same visit as the HSI assessments.

2.3.4 Ponds 2 and 3 were sampled together as one waterbody as, at the time of the survey, they were connected via inundated wet margins.

2.3.5 Pond 6 was resampled on the 23rd June 2016 to confirm whether the positive result received from the April sample was correct.

2.3.6 The eDNA field sampling techniques and laboratory analysis followed standard protocols published by FERA (Biggs, J. et al. 2014)[3]. The lab report for eDNA sampling is provided in Appendix D of this report.

2.4 Limitations

2.4.1 The HSI score is a measure of habitat suitability and is not a substitute for GCN surveys. A high score, i.e. greater than 0.7, can suggest a higher probability of GCN presence, but does not serve as evidence of the presence or absence of GCN.

2.4.2 The eDNA methodology has inherent limitations due to the nature of DNA. Depending on environmental conditions eDNA only persists in aquatic environments for 7 to 21 days[4]. However, as the samples were taken during the GCN breeding season (mid-April to the end of June) when GCN reside within waterbodies, this was not consideration a limitation of this report.

2.4.3 Although best practice minimises the risk of contamination between samples in the field and the lab, there is an unavoidable contamination risk from inflows and aquatic animals moving between ponds.

2.4.4 False-negative results can occur for the following reasons. Low numbers of newts within a waterbody may mean that the concentration of eDNA is too low to be detected. Additionally, when sampling wide and shallow waterbodies the likelihood of collecting samples from areas where GCN are not active is increased. Also, eDNA is less likely to be detected if samples are taken from areas of dense vegetation. False-positive results can occur through contamination of kits in the field or during DNA amplification in the lab.

[3] Biggs, J. et al. 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.

However, the risk of false-negative and false-positive results can be minimised by following good field survey and lab practice.

2.4.5 However given the extensive survey effort expended in the survey area in previous years in relation to these proposals the results reported on herein are considered sufficiently robust to inform the assessment.

2.4.6 The results within this report reflect the condition of waterbodies at the time of survey. GCN can disperse large distances overland to colonise new aquatic and terrestrial habitats. Therefore, colonisation of new areas is possible within a relatively short timescale. Consequently, if the construction of the proposed development is delayed for an extended period of time, the survey results would be less reliable and the surveys may need to be repeated.

2.4.7 The findings of this report represent the professional opinion of qualified ecologists and do not constitute professional legal advice. The client may wish to seek professional legal interpretation of the relevant wildlife legislation cited in this document.

3 BASELINE

3.1 Previous Surveys and Desk Study

Jacobs 2014

3.1.1 The previous desk study conducted in 2014 revealed a total of 15 GCN records within a 3 km buffer of the A19 Testos Junction Improvement proposals between 1960 and 2012. Only seven of these records originated from within the previous ten years (2004 to 2014). None of the records were located within a 500 m buffer of the proposals.

3.1.2 The desk study also provided records of additional native amphibian species comprising common frog (*Rana temporaria*), common toad (*Bufo bufo*), smooth newt (*Lissotriton vulgaris*) and palmate newt (*Lissotriton helveticus*). Records of a non-native species, the alpine newt (*Ichthyosaura alpestris*), were also present within the study area.

3.1.3 A total of seven ponds were surveyed in 2014 by Jacobs. No GCN were recorded during the 2014 surveys conducted by Jacobs.

3.1.4 Other amphibian species comprising common frog, common toad and smooth newt were found during the surveys conducted by Jacobs in 2014. The HSI scores and survey results from 2014 are shown in Table 2 below.

Table 2. HSI scores and survey results for Ponds 1 to 7 in 2014.

Pond (2014)*	HSI score	HSI suitability	GCN recorded	Other species
1	0.70	Good	No	Smooth newt, common toad, common frog
2	0.68	Average	No	Smooth newt, common toad, common frog
3	0.68	Average	No	Common frog
4	0.53	Below average	No	Common toad, common frog
5	0.53	Below average	No	Smooth newt
6**	0.37	Poor	No	Common toad, common frog
7**	0.77	Good	No	N/A

*Pond 1 from 2014 report refers to Pond 1a in 2016 report. All other pond numbers remain the same.

**Pond 6 was torched only. Pond 7 was not surveyed due to unsafe conditions.

IAMP

3.1.5 WYG surveyed a total of nine ponds over 2014 and 2015; a small population of GCN was recorded in one pond located approximately 2.5 km to the west of Downhill Lane Junction (OSGR: NZ 31692 59151).

3.2 Desk Study 2016

3.2.1 The desk study revealed one site within the 2 km buffer of the proposed scheme that has been designated due to the presence of GCN. This was Severn Houses Local Wildlife Site

(LWS) (OSGR NZ 324579), which was located approximately 2 km south-west of the proposals. The citation of this site is shown in Appendix E.

3.2.2 The desk study conducted in 2016 did not reveal any records of GCN within a 2 km buffer of the proposed scheme from the last ten years (2006 to 2016). It did however include 11 records of common toad, common frog, palmate newt and smooth newt, seven of which were located within 500 m of the proposed scheme. A summary of the desk study results are shown in Table 3 below, and the records are mapped on Figure 2.

Table 3. Desk study results from 2 km study area from 2006 to 2016.

Species	Grid Reference	Year	Approximate Distance From Proposals Scheme (km)
Common toad	NZ340608	2008	0.15
	NZ3313360374	2011	0.6
	NZ341606	2012	0.25
Common frog	NZ3356	2012	2.8
	NZ339608	2012	0.07
	NZ3356	2012	2.8
	NZ3462	2009	0.3
	NZ3313360374	2011	0.6
Palmate newt	NZ339608	2012	0.07
Smooth newt	NZ339608	2012	0.07
	NZ341606	2012	0.25

3.3 HSI Survey Results

3.3.1 In total ten ponds were surveyed in 2016; seven ponds (Ponds 1a, 2-7) were those surveyed in 2014, and three additional ponds were surveyed (Ponds 1b, 8 and 9). The locations of the ponds are shown in Figure 1, The HSI forms are provided in Appendix C and photos of the ponds can be found in Appendix F.

3.3.2 A summary of the HSI results are shown in Table 4 below.

Table 4. HSI results for Ponds 1 to 9.

Pond (2016)	HSI Score	Habitat Suitability	Pond Description	Grid Reference
1a	0.73	Good	Small, permanent pond with un-shaded margins located within Mount Pleasant Marsh LWS, part of a cluster of five ponds (Ponds 1a to 4). The macrophyte cover was approximately 80%,	NZ 34033 60813

Pond (2016)	HSI Score	Habitat Suitability	Pond Description	Grid Reference
			dominated by bulrush (*Typha latifolia*), and the surrounding terrestrial habitat was good quality for GCN. There was a minor fish population and waterfowl were absent at the time of survey. The water quality appeared to be good.	
1b	0.78	Good	Small, ephemeral pond with un-shaded margins located within Mount Pleasant Marsh LWS, part of a cluster of five ponds (Ponds 1a to 4). The pond was very vegetated, and the surrounding terrestrial habitat was good quality for GCN. Presence of fish was possible and the waterfowl presence was minor. The water quality appeared to be moderate. Marginal vegetation was inundated at the time of the survey, which would likely dry out during the summer.	NZ 34074 60815
2	0.66	Average	Small, ephemeral pond with unshaded margins located within Mount Pleasant Marsh LWS, part of a cluster of five ponds (Ponds 1a to 4). The macrophyte cover was approximately 70%, dominated by bulrush and blanket weed (*Spirogyra sp.*), and the surrounding terrestrial habitat was good quality for GCN. There was a minor fish population and waterfowl were absent at the time of survey. The water quality appeared to be moderate. This pond was connected to Pond 3 via approximately 10 m of wet ground.	NZ 34005 60826
3	0.72	Good	Small, ephemeral pond with partially-shaded margins located within Mount Pleasant Marsh LWS, part of a cluster of five ponds (Ponds 1a to 4). The macrophyte cover was approximately 60% and the surrounding terrestrial habitat was good quality for GCN. The presence of fish was possible and waterfowl were absent at the time of survey. The water quality appeared to be moderate. This pond was connected to Pond 2 via approximately 10 m of wet ground.	NZ 34026 60834
4	0.50	Below average	Large, permanent pond with majorly shaded margins located within Mount Pleasant Marsh LWS, part of a cluster of five ponds (Ponds 1a to 4). The	NZ 34044 60884

Pond (2016)	HSI Score	Habitat Suitability	Pond Description	Grid Reference
			macrophyte cover was approximately 80%, dominated by bulrush and blanket weed, and the surrounding terrestrial habitat was good quality for GCN. There were minor populations of fish and waterfowl. The water quality appeared to be moderate. The margins of the pond were flooded; 30% were inaccessible. The pond was surrounded by marsh and woodland.	
5	0.67	Average	Shaded, ephemeral ditch along the eastern edge of Mount Pleasant Marsh LWS, approximately 150 m in length and 1.5 m wide. The macrophyte cover was approximately 30% and the surrounding terrestrial habitat was good quality for GCN. The presence of fish was possible and waterfowl were absent at the time of survey. The water quality appeared to be moderate. The substrate was covered by leaf litter but some clear areas were present. The ditch was bordered by woodland to the east.	NZ 34207 60863
6	0.30	Poor	Bolden Lake LWS, a large, permanent pond with partially-shaded margins located across the A184 to the north of Mount Pleasant Marsh LWS. The macrophyte cover was low but was dominated by bulrush, and the surrounding terrestrial habitat was moderate quality for GCN. The fish population was minor and the waterfowl population major; large waterfowl including swans and cormorants were noted during the survey. The water quality appeared to be moderate. Some parts of the margin were inaccessible at the time of the survey.	NZ 34168 60977
7	0.57	Below average	A mostly un-shaded, very ephemeral ditch along an arable field boundary to the west of the Testos Junction. At the time of the survey the ditch had inundated part of the field. The macrophyte cover was approximately 50% and the surrounding terrestrial habitat was poor quality for GCN. The presence of fish was possible and waterfowl were absent at the time of survey. The water quality appeared to be moderate. A defunct hedge lined the	NZ 33092 60868

Pond (2016)	HSI Score	Habitat Suitability	Pond Description	Grid Reference
			northern side of the ditch.	
8	0.55	Below average	A small, shaded, very ephemeral pond located in the southern corner of an improved grassland field to the south-west of Downhill Lane Junction. The macrophyte cover was approximately 60% and the surrounding terrestrial habitat was moderate quality for GCN. Fish and waterfowl were absent at the time of survey. The water quality appeared to be poor. The pond was likely to dry to a small pool with damp margins during the summer.	NZ 33876 58809
9	0.60	Average	A moderately-sized, shaded, very ephemeral pond located in the south-eastern corner of an arable field, close to the A19 south of Downhill Lane Junction. The macrophyte cover was approximately 15% and the surrounding terrestrial habitat was moderate quality for GCN. Fish and waterfowl were absent at the time of survey. The water quality appeared to be moderate. Young grey willows were growing within the inundated margins.	NZ 34479 59095

3.4 eDNA Survey Results

3.4.1 The eDNA results were received from Nature Metrics on 16th May 2016. One pond tested positive for GCN; Pond 6. All other ponds received a negative result. A summary of the results is shown in Table 5 below. The full results are shown in Appendix D.

Table 5. Summary of the eDNA results from the samples collected in April 2016.

Pond (2016)	GCN status	Number of replicates with positive result
1a	Negative	0/12
1b	Negative	0/12
2 and 3 combined	Negative	0/12
4	Negative	0/12
5	Negative	0/12
6	**Positive**	**1/12**
7	Negative	0/12

Pond (2016)	GCN status	Number of replicates with positive result
8	Negative	0/12
9	Negative	0/12

3.4.2 Pond 6 was re-sampled in June to confirm whether the GCN status was truly positive or if it was a false-positive. The results were received from FERA on 8th July 2016. This produced a negative result for Boldon Lake LWS.

4 DISCUSSION AND CONCLUSIONS

4.1.1 The desk study did not reveal any records of GCN within the 2 km study area, although there were records of other amphibian species; common frog, common toad, smooth newt and palmate newt.

4.1.2 Severn Houses LWS was designated for the presence of a GCN population and was located approximately 2 km south-west of the proposals. However there are no records of GCN from the previous ten years, and the citation of Severn Houses was last updated in 1995.

4.1.3 The habitat suitability for GCN of the ten ponds surveyed in 2016 ranged between good and poor. Three ponds each had good, average and below average suitability, and one pond, Pond 6, had poor habitat suitability. All three of the ponds that had good habitat suitability for GCN were located within Mount Pleasant LWS in the north-eastern part of the survey area.

4.1.4 The eDNA results from the surveys in April 2016 showed GCN were absent from nine out of the ten ponds. A positive result was obtained from Pond 6, Boldon Lake LWS. However, this was suspected to be a false-positive result for the following reasons. Firstly, in 2014 and 2016 the habitat suitability for GCN of Pond 6 was poor, due to its large size and presence of wildfowl and fish which predate GCN. Secondly, there are no records of GCN within 2 km of the proposed scheme, and no GCN have been recorded within the ponds in past surveys in 2014, which suggests that GCN were absent from the survey area. The eDNA test was repeated on Pond 6 in June, which led to a negative result.

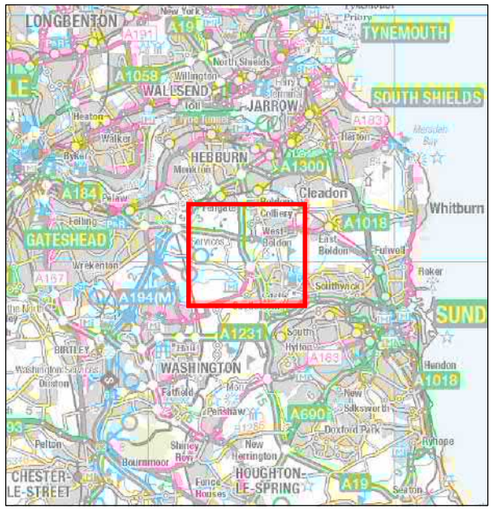
4.1.5 Although GCN were absent from the ponds, it is likely that other amphibian species were present, as common frog, common toad and smooth newt were recorded in 2014. Additionally, records of these three species and palmate newt were revealed by the desk study. Of note is the common toad, which is a Species of Principal Importance under the NERC Act 2006. Smooth newt, palmate newt, common frog and common toad are also partially protected under the WCA 1981; it is an offence to sell or possess these species.

FIGURES

FIGURE 1

Legend

- 500m Buffer
- eDNA Ponds



0	DEC 16	Initial Issue	IM	AP	AM	GW
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Project

A19 TESTOS & DOWNHILL LANE
JUNCTIONS IMPROVEMENT

Drawing Title

GREAT CRESTED NEWTS
SURVEYED PONDS

Drawing Status

Scale @ A3	1:15,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		

Drawing No.

B0140301_EC_GCN_01

FIGURE 2

Legend

2km Buffer

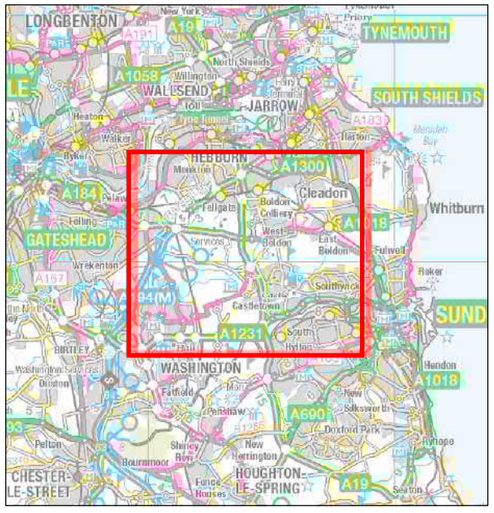
Species Records

- Common Frog
- Common Toad
- Palmate Newt
- Smooth Newt

1 Palmate Newt
1 Smooth Newt

1 Palmate Newt
1 Smooth Newt

1 Palmate Newt
1 Smooth Newt



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Project: A19 TESTOS & DOWNHILL LANE JUNCTIONS IMPROVEMENT

Drawing Title: SPECIES RECORDS AMPHIBIANS

Drawing Status:

Scale @ A3	1:30,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		

Drawing No.: B0140301_EC_GCN_02

APPENDIX A: LEGISLATION

Legislation relating to great crested newts

Great crested newt (*Triturus cristatus*) (GCN) is afforded strict protection under the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010. The Conservation of Habitats and Species Regulations 2010 implements the European Union's 'Habitats Directive' (Council Directive 92/43/EEC (a) on the Conservation of Natural Habitats and of Wild Fauna and Flora) in England and Wales. The relevant sections of this legislation make it an offence to:

- intentionally kill, injure or capture or take a GCN;
- possess or control (live or dead animal, part or derivative);
- deliberately (intentionally) or recklessly damage, destroy or obstruct access to a breeding site or any structure or place used for shelter or protection by a GCN;
- deliberately (intentionally) or recklessly disturb a GCN whilst it is occupying such a structure or place, and
- sell, offer for sale, possess or transport for the purpose of sale (live or dead animal, part or derivative).

The above legislation applies to all life stages of a GCN, including eggs, juveniles and adults. Impacts upon each individual GCN as the result of an illegal act constitute a separate offence under the above legislation.

Legislation relating to other amphibians

Under the Wildlife and Countryside Act 1981 (as amended) the five widespread amphibian species, great crested newt, smooth newt (*Triturus vulgaris*), palmate newt (*Triturus helveticus*), common toad (*Bufo bufo*) and common frog (*Rana temporaria*) receive limited protection through section 9(5) only which makes selling, offering for sale, possessing or transporting for the purpose of sale (live or dead animal, part or derivative) an offence.

Common toad is a species of principal importance under the Natural Environment and Rural Communities Act 2006 (NERC 2006). The NERC act states that "*it is important that public authorities seek not only to protect important habitats and species, but actively seek opportunities to enhance biodiversity through development proposals, where appropriate. Incorporating enhancement opportunities into projects may help applicants to achieve planning permission.*"

APPENDIX B: SUMMARY OF AMPHIBIAN ECOLOGY

There are seven species of amphibian native to Britain, these are:

- Common frog (*Rana temporaria*);
- Common toad (*Bufo bufo*);
- Natterjack toad (*Epidalea calamita*);
- Pool frog (*Pelophylax lessonae*);
- Smooth newt (*Lissotriton vulgaris*);
- Palmate newt (*Lissotriton helveticus*); and
- Great crested newt (*Triturus cristatus*).

In addition, there are several non-native introductions including the midwife toad, marsh frog and North American bullfrog.

Natterjack toad and pool frog have very restricted geographical ranges making it extremely unlikely that they would occur in the study area covered by this report.

All amphibians native to Britain must return to water to breed. This usually commences in early spring when night temperatures are consistently above 5˚C. Eggs are usually laid in still fresh water and hatch in to free swimming larvae that develop rapidly. Full metamorphosis is achieved over the summer and they emerge from the pond as immature adults.

Adults leave the pond from late May to June onwards, returning to the surrounding terrestrial habitat where they will feed until October when they seek out suitable places for hibernation. Adults will leave hibernation in early spring and begin their migration back to their breeding ponds.

Amphibians spend a large portion of their lives out of water; therefore quality of the surrounding terrestrial habitat is very important in maintaining a viable population.

APPENDIX C: HABITAT SUITABILITY ASSESSMENTS

Great Crested Newt Survey — 1. Pond Details

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a

Pond number/reference	**Pond 1a**
OS Grid reference	NZ 34033 60813
Location details	Near West Boldon Substation to north-eastern part of survey area. Approximately 180 m east-south-east of Testos Junction.
Access permission	n/a
Access instructions	n/a

Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	rectangle	
		length (m)	12	
		width (m)	6.00	
		OR estimate (m^2) if irregular		
		area (m²) =	72	0.14
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	never	0.90
SI4.	Water quality	**good/moderate/poor/bad**	good	1.00
SI5.	Shade	% of margin shaded 1m from bank	5	1.00
SI6.	Waterfowl	**absent/major/minor**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	minor	0.33
SI8.	Pond density	number of ponds within 1km	7	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10.	Macrophyte cover	%	80	1.00

HSI =	**0.73**
provisional HSI =	0.70
Category	good
Date undertaken	19/04/16

Use provisional HSI value if above 0.75

Notes/comments

Vegetation suitable for great crested newts to lay eggs is present.

% of shoreline accessible for torching/bottle trapping	100

Pond population size class assessment

Six visits undertaken?	No
Highest number of adult *Triturus cristatus* recorded in a single survey visit	**n/a**
Pond population size class*	**n/a**
Visit recorded	n/a

**NB. add counts for all ponds within 250m for total population size class assessment*

Great Crested Newt Survey — 1. Pond Details

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a

Pond number/reference	**Pond 1b**
OS Grid reference	NZ 34074 60815
Location details	Near West Boldon Substation in north-eastern part of survey area. Approximately 240 m east-south-east of Testos Junction.
Access permission	n/a
Access instructions	n/a

Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	ellipse	
		length (m)	8	
		width (m)	6.50	
		OR estimate (m^2) if irregular		
		area (m^2) =	163.362818	0.33
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	rarely	1.00
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	5	1.00
SI6.	Waterfowl	**absent/major/minor**	minor	0.67
SI7.	Fish population	**absent/possible/minor/major**	possible	0.67
SI8.	Pond density	number of ponds within 1km	7	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10.	Macrophyte cover	%	97	0.83

HSI =	**0.78**
Use provisional HSI value if above 0.75 provisional HSI =	0.76
Category	good
Date undertaken	19/04/16

Notes/comments

Recent heavy rain led to marginal inundation at the time of the survey. Likely that encroaching willow dries out during the summer.

% of shoreline accessible for torching/bottle trapping

Pond population size class assessment

Six visits undertaken?	No
Highest number of adult *Triturus cristatus* recorded in a single survey visit	**n/a**
Pond population size class*	**n/a**
Visit recorded	n/a

N.B. add counts for all ponds within 250m for total population size class assessment

Great Crested Newt Survey — 1. Pond Details

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a

Pond number/reference	**Pond 2**
OS Grid reference	NZ 34005 60826
Location details	Near West Boldon Substation in north-eastern part of survey area. Approximately 145 m east-south-east of Testos Junction.
Access permission	n/a
Access instructions	n/a

Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	rectangle	
		length (m)	15	
		width (m)	5.00	
		OR estimate (m^2) if irregular		
		area (m^2) =	75	0.15
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	sometimes	0.50
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	15	1.00
SI6.	Waterfowl	**absent/major/minor**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	minor	0.33
SI8.	Pond density	number of ponds within 1km	7	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10.	Macrophyte cover	%	70	1.00

HSI =	**0.66**
provisional HSI =	0.63
Category	average
Date undertaken	19/04/16

Use provisional HSI value if above 0.75

Notes/comments

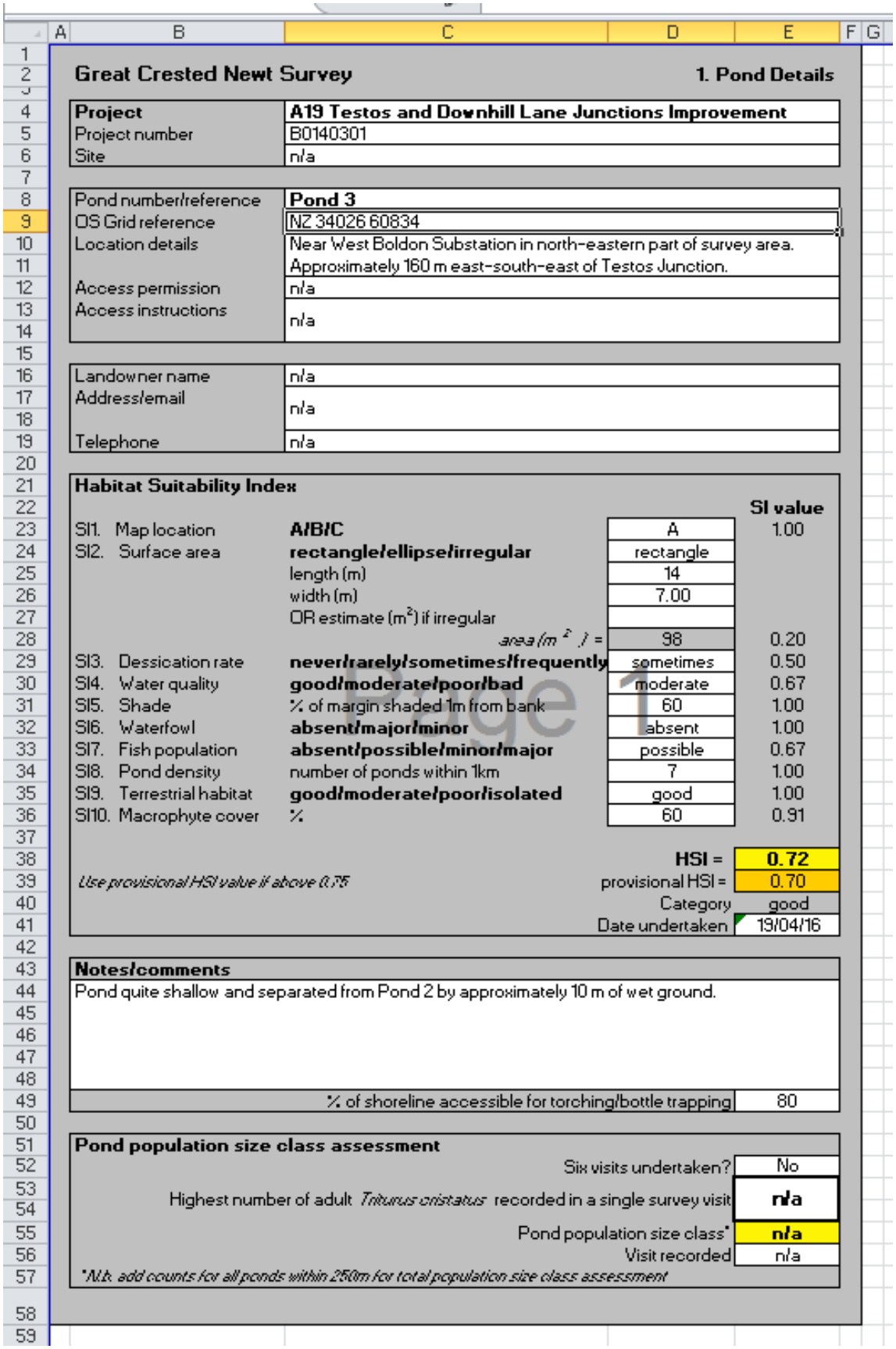
Blanket weed was present. Pond was very close to Pond 3; separated by approximately 10 m of wet ground.

% of shoreline accessible for torching/bottle trapping:

Pond population size class assessment

Six visits undertaken?	No
Highest number of adult *Triturus cristatus* recorded in a single survey visit	**n/a**
Pond population size class*	**n/a**
Visit recorded	n/a

**N.b. add counts for all ponds within 250m for total population size class assessment*



Great Crested Newt Survey — 1. Pond Details

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a
Pond number/reference	**Pond 3**
OS Grid reference	NZ 34026 60834
Location details	Near West Boldon Substation in north-eastern part of survey area. Approximately 160 m east-south-east of Testos Junction.
Access permission	n/a
Access instructions	n/a
Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	rectangle	
		length (m)	14	
		width (m)	7.00	
		OR estimate (m^2) if irregular		
		area (m²) =	98	0.20
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	sometimes	0.50
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	60	1.00
SI6.	Waterfowl	**absent/major/minor**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	possible	0.67
SI8.	Pond density	number of ponds within 1km	7	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10.	Macrophyte cover	%	60	0.91

HSI =	**0.72**
Use provisional HSI value if above 0.75 provisional HSI =	0.70
Category	good
Date undertaken	19/04/16

Notes/comments

Pond quite shallow and separated from Pond 2 by approximately 10 m of wet ground.

% of shoreline accessible for torching/bottle trapping	80

Pond population size class assessment

Six visits undertaken?	No
Highest number of adult *Triturus cristatus* recorded in a single survey visit	**n/a**
Pond population size class*	**n/a**
Visit recorded	n/a

**N.b. add counts for all ponds within 250m for total population size class assessment*

Great Crested Newt Survey — 1. Pond Details

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a

Pond number/reference	**Pond 4**
OS Grid reference	NZ 34044 60884
Location details	Near West Boldon Substation in north-eastern part of survey area. Approximately 150 m east-south-east of Testos Junction.
Access permission	n/a
Access instructions	n/a

Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

			SI value
SI1. Map location	**A/B/C**	A	1.00
SI2. Surface area	**rectangle/ellipse/irregular**	ellipse	
	length (m)	90	
	width (m)	35.00	
	OR estimate (m^2) if irregular		
	area (m^2) =	9896.01686	0.01
SI3. Dessication rate	**never/rarely/sometimes/frequently**	never	0.90
SI4. Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5. Shade	% of margin shaded 1m from bank	70	0.80
SI6. Waterfowl	**absent/major/minor**	minor	0.67
SI7. Fish population	**absent/possible/minor/major**	minor	0.33
SI8. Pond density	number of ponds within 1km	7	1.00
SI9. Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10. Macrophyte cover	%	80	1.00

HSI =	**0.50**
Use provisional HSI value if above 0.75 provisional HSI =	0.47
Category	below average
Date undertaken	19/04/16

Notes/comments

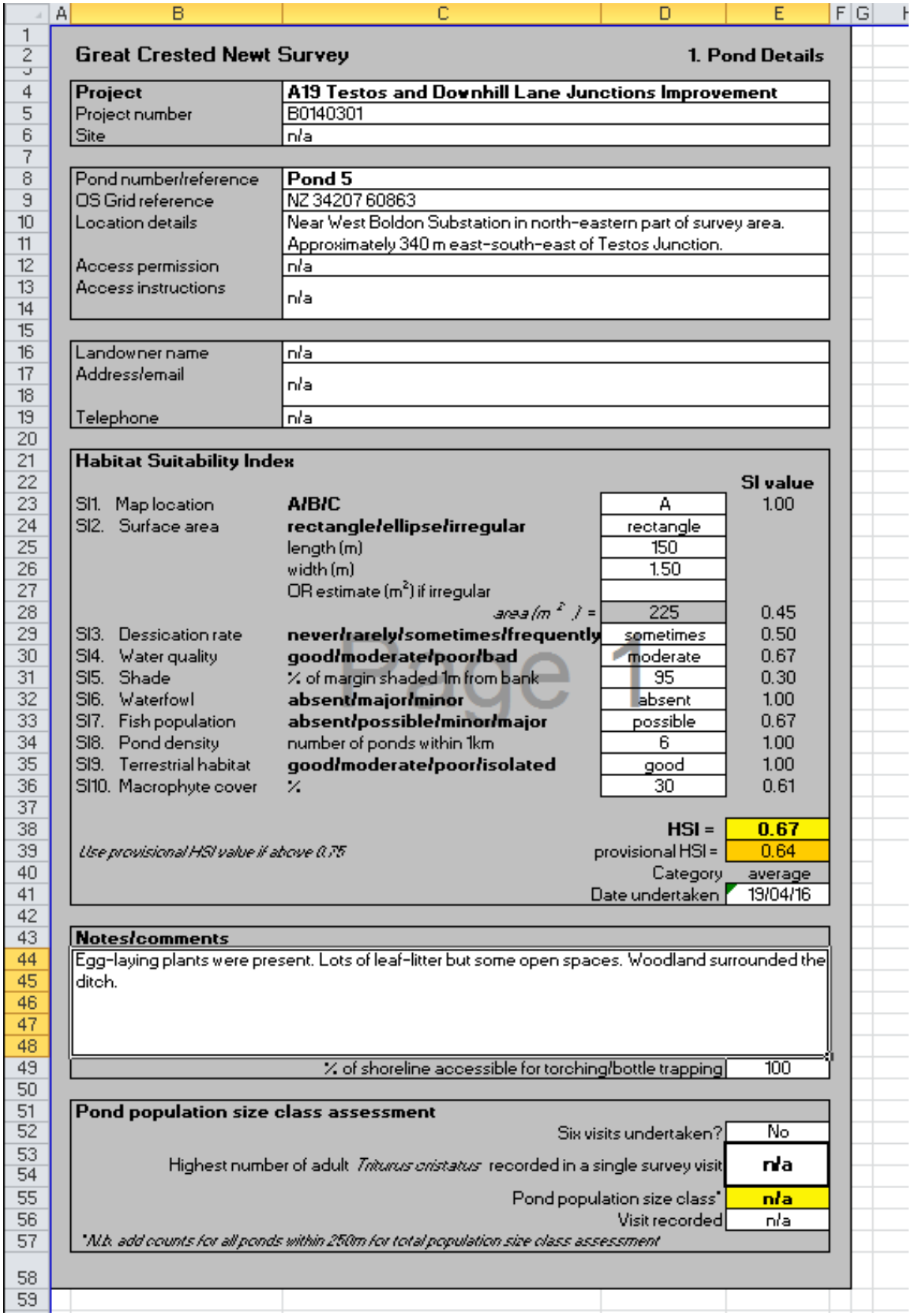
Flooded margins, 30% inaccessible. Potential egg-laying plants present, surrounded my marsh and woodland.

% of shoreline accessible for torching/bottle trapping	

Pond population size class assessment

Six visits undertaken?	No
Highest number of adult *Triturus cristatus* recorded in a single survey visit	**n/a**
Pond population size class*	**n/a**
Visit recorded	n/a

N.b. add counts for all ponds within 250m for total population size class assessment



Great Crested Newt Survey — **1. Pond Details**

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a

Pond number/reference	**Pond 5**
OS Grid reference	NZ 34207 60863
Location details	Near West Boldon Substation in north-eastern part of survey area. Approximately 340 m east-south-east of Testos Junction.
Access permission	n/a
Access instructions	n/a

Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	rectangle	
		length (m)	150	
		width (m)	1.50	
		OR estimate (m^2) if irregular		
		area (m^2) =	225	0.45
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	sometimes	0.50
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	95	0.30
SI6.	Waterfowl	**absent/major/minor**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	possible	0.67
SI8.	Pond density	number of ponds within 1km	6	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	good	1.00
SI10.	Macrophyte cover	%	30	0.61

HSI =	**0.67**
provisional HSI =	0.64
Category	average
Date undertaken	19/04/16

Use provisional HSI value if above 0.75

Notes/comments

Egg-laying plants were present. Lots of leaf-litter but some open spaces. Woodland surrounded the ditch.

% of shoreline accessible for torching/bottle trapping	100

Pond population size class assessment

Six visits undertaken?	No
Highest number of adult *Triturus cristatus* recorded in a single survey visit	**n/a**
Pond population size class*	**n/a**
Visit recorded	n/a

**N.b. add counts for all ponds within 250m for total population size class assessment*

Great Crested Newt Survey — 1. Pond Details

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a

Pond number/reference	**Pond 6**
OS Grid reference	NZ 34168 60977
Location details	North of West Boldon Substation in north-eastern part of survey area. Approximately 315 m east-north-east of Testos Junction.
Access permission	n/a
Access instructions	n/a

Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	ellipse	
		length (m)	350	
		width (m)	50.00	
		OR estimate (m^2) if irregular		
		area (m^2) =	54977.87145	0.01
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	never	0.90
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	35	1.00
SI6.	Waterfowl	**absent/major/minor**	major	0.01
SI7.	Fish population	**absent/possible/minor/major**	minor	0.33
SI8.	Pond density	number of ponds within 1km	7	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	moderate	0.67
SI10.	Macrophyte cover	%	15	0.46

HSI = **0.30**

Use provisional HSI value if above 0.75

provisional HSI = 0.26

Category poor

Date undertaken 19/04/16

Notes/comments

Fairly isolated pond with good marginal vegetation. Swan's nest present, some parts inaccessible without waders at the time of the survey. Litter present, such as cans and fishing line.

% of shoreline accessible for torching/bottle trapping

Pond population size class assessment

Six visits undertaken? No

Highest number of adult *Triturus cristatus* recorded in a single survey visit **n/a**

Pond population size class* **n/a**

Visit recorded n/a

N.b. add counts for all ponds within 250m for total population size class assessment

Great Crested Newt Survey — 1. Pond Details

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a

Pond number/reference	**Pond 7**
OS Grid reference	NZ 33092 60868
Location details	In the north-western part of the survey area. Approximately 650 m west-south-west of the Testos Junction.
Access permission	n/a
Access instructions	n/a

Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	irregular	
		length (m)		
		width (m)		
		OR estimate (m^2) if irregular	150	
		area (m^2) =	150	0.30
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	frequently	0.10
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	10	1.00
SI6.	Waterfowl	**absent/major/minor**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	possible	0.67
SI8.	Pond density	number of ponds within 1km	6	1.00
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	poor	0.33
SI10.	Macrophyte cover	%	50	0.81

HSI = 0.57

Use provisional HSI value if above 0.75

provisional HSI = 0.54

Category below average

Date undertaken 18/04/16

Notes/comments

Ditch with irregular area- had flooded some parts of the field at the time of the survey. Water mostly shallow. Hedge lined the ditch.

% of shoreline accessible for torching/bottle trapping: 100

Pond population size class assessment

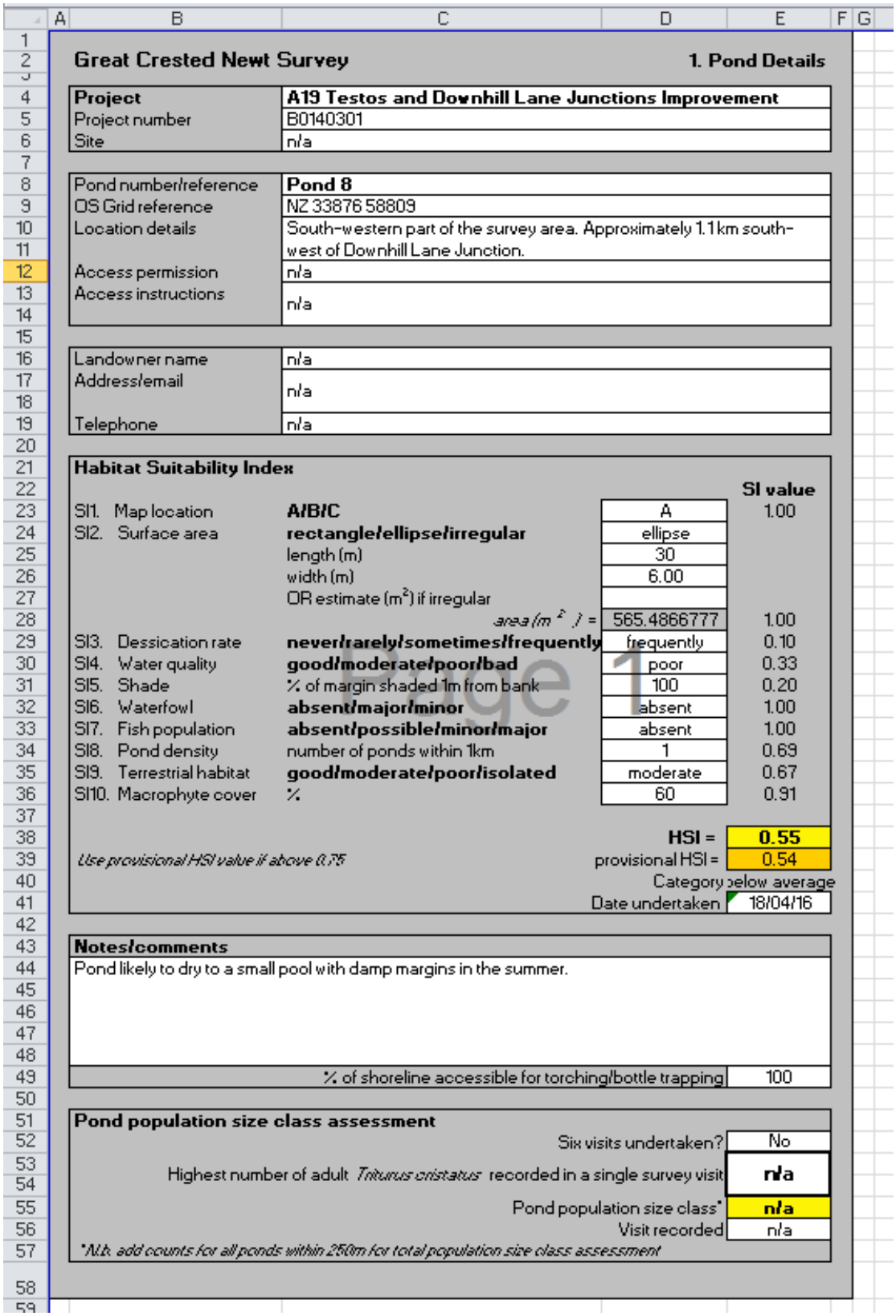
Six visits undertaken? No

Highest number of adult *Triturus cristatus* recorded in a single survey visit: **n/a**

Pond population size class*: **n/a**

Visit recorded: n/a

**N.b. add counts for all ponds within 250m for total population size class assessment*



Great Crested Newt Survey — 1. Pond Details

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a

Pond number/reference	**Pond 8**
OS Grid reference	NZ 33876 58809
Location details	South-western part of the survey area. Approximately 1.1km south-west of Downhill Lane Junction.
Access permission	n/a
Access instructions	n/a

Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	ellipse	
		length (m)	30	
		width (m)	6.00	
		OR estimate (m^2) if irregular		
		area (m^2) =	565.4866777	1.00
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	frequently	0.10
SI4.	Water quality	**good/moderate/poor/bad**	poor	0.33
SI5.	Shade	% of margin shaded 1m from bank	100	0.20
SI6.	Waterfowl	**absent/major/minor**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	absent	1.00
SI8.	Pond density	number of ponds within 1km	1	0.69
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	moderate	0.67
SI10.	Macrophyte cover	%	60	0.91

HSI = 0.55

Use provisional HSI value if above 0.75

provisional HSI = 0.54

Category below average

Date undertaken 18/04/16

Notes/comments

Pond likely to dry to a small pool with damp margins in the summer.

% of shoreline accessible for torching/bottle trapping: 100

Pond population size class assessment

Six visits undertaken? No

Highest number of adult *Triturus cristatus* recorded in a single survey visit: **n/a**

Pond population size class*: **n/a**

Visit recorded: n/a

N.b. add counts for all ponds within 250m for total population size class assessment

Great Crested Newt Survey — 1. Pond Details

Project	**A19 Testos and Downhill Lane Junctions Improvement**
Project number	B0140301
Site	n/a

Pond number/reference	**Pond 9**
OS Grid reference	NZ 34479 59095
Location details	South-western part of the survey area. Approximately 810 m south of Downhill Lane Junction.
Access permission	n/a
Access instructions	n/a

Landowner name	n/a
Address/email	n/a
Telephone	n/a

Habitat Suitability Index

				SI value
SI1.	Map location	**A/B/C**	A	1.00
SI2.	Surface area	**rectangle/ellipse/irregular**	ellipse	
		length (m)	20	
		width (m)	30.00	
		OR estimate (m^2) if irregular		
		area (m^2) =	1884.955592	0.81
SI3.	Dessication rate	**never/rarely/sometimes/frequently**	frequently	0.10
SI4.	Water quality	**good/moderate/poor/bad**	moderate	0.67
SI5.	Shade	% of margin shaded 1m from bank	85	0.50
SI6.	Waterfowl	**absent/major/minor**	absent	1.00
SI7.	Fish population	**absent/possible/minor/major**	absent	1.00
SI8.	Pond density	number of ponds within 1km	1	0.69
SI9.	Terrestrial habitat	**good/moderate/poor/isolated**	moderate	0.67
SI10.	Macrophyte cover	%	15	0.46

HSI =	**0.60**
provisional HSI =	0.59
Category	average
Date undertaken	18/04/16

Use provisional HSI value if above 0.75

Notes/comments

Young grey willows were present. Recent heavy rain had inundated surrounding area. Litter present. Pond located near pedestrian bridge.

% of shoreline accessible for torching/bottle trapping	100

Pond population size class assessment

Six visits undertaken?	No
Highest number of adult *Triturus cristatus* recorded in a single survey visit	**n/a**
Pond population size class*	**n/a**
Visit recorded	n/a

**N.b. add counts for all ponds within 250m for total population size class assessment*

APPENDIX D: EDNA LAB RESULTS

NatureMetrics
DNA based monitoring

Report: 16039-Jac27AM-1

Great Crested Newt eDNA Results

Company:	Jacobs UK
Address:	1 City Walk, Leeds, LS11 9DX
Contact:	Andy McIlwraith
Project No:	B0140301
Date of Report:	16th May 2016
Number of samples:	9

Thank you for sending your samples for analysis by NatureMetrics. Your samples have been processed in accordance with the protocol set out in Appendix 5 of Biggs *et al.* (2014).

DNA was precipitated via centrifugation at 14,000g and then extracted using Qiagen Blood and Tissue extraction kits.

qPCR amplification was carried out in 12 replicates per sample using the primers and probe described by Biggs *et al.* (2014) in the presence of both positive and negative controls.

Results indicate GCN presence in 1 pond (GCN000859 – Pond 6) and GCN absence in all other ponds. No DNA degradation or PCR inhibition was detected in any sample, and all controls performed as expected.

Note that a negative result does not preclude the presence of Great Crested Newts at a level below the limits of detection.

NatureMetrics
DNA based monitoring

Sample	Pond ID	Date arrived	GCN Status	eDNA Score	Inhibition	Degradation
GCN000863	Pond 1A	21/04/2016	Negative	0/12	No	No
GCN000828	Pond 1B	21/04/2016	Negative	0/12	No	No
GCN000837	Pond 2 & Pond 3	21/04/2016	Negative	0/12	No	No
GCN000836	Pond 4	21/04/2016	Negative	0/12	No	No
GCN000862	Pond 5	21/04/2016	Negative	0/12	No	No
GCN000859	Pond 6	21/04/2016	Positive	1/12	No	No
GCN000829	Pond 7	21/04/2016	Negative	0/12	No	No
GCN000835	Pond 8	21/04/2016	Negative	0/12	No	No
GCN000832	Pond 9	21/04/2016	Negative	0/12	No	No

DNA Analysis Report - Commercial in Confidence

Customer:	Jacobs UK Ltd
Address:	1 City Walk Leeds West Yorkshire LS11 9DX
Contact:	Matthew Robson
Email:	matthew.robson@jacobs.com
Tel:	0113 3891768
Report date:	08-Jul-2016
Order Number:	GCN16-0220
Samples:	Pond Water
Analysis requested:	Detection of Great Crested Newt eDNA from pond water.

Thank you for submitting your samples for analysis with the Fera eDNA testing service. The details of the analysis are as follows:

Method:
The method detects pond occupancy from great crested newts (GCN) using traces of DNA shed into the pond environment (eDNA). The detection of GCN eDNA is carried out using real time PCR to amplify part of the cytochrome 1 gene found in mitochondrial DNA. The method followed is detailed in Biggs J., et al, (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.

The limits of this method are as follows: 1) the results are based on analyses of the samples supplied by the client and as received by the laboratory, 2) any variation between the characteristics of this sample and a batch will depend on the sampling procedure used. 3) the method is qualitative and therefore the levels given in the score are for information only, they do not constitute the quantification of GCN DNA against a calibration curve, 4) a 'not detected' result does not exclude presence at levels below the limit of detection.

The results are defined as follows:

Positive:	DNA from the species was detected.
eDNA Score:	Number of positive replicates from a series of twelve.
Negative:	DNA from the species was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.
Inconclusive:	Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided.

DNA Analysis Report - Commercial in Confidence

CustomerReference	Fera Reference	GCN Detection	GCN Score	Inhibition	Degradation
-	S16-012722	Negative	0	No	No

The results indicate that eDNA for great crested newts was not detected in the sample submitted. Analysis was conducted in the presence of the following controls: 1) Extraction blank, 2) appropriate positive and negative PCR controls for each of the TaqMan assays (GCN, Inhibition, and Degradation). All controls performed as expected.

This test procedure was developed using research funded by the Department of Environment, Food and Rural Affairs, and was performed under the conditions of licensing arrangements with Applied Biosystems and patent rights owned by F. Hoffman-La Roche Ltd.

Issuing officer: Steven Bryce
Tel: 01904 462 324
Email: e-dna@fera.co.uk

APPENDIX E: SEVEN HOUSES POND LWS CITATION

LOCAL WILDLIFE SITE

SITE NAME	SEVERN HOUSES
DISTRICT	Sunderland
AREA	5.08 ha
SITE NUMBER	54
GRID REFERENCE	NZ 324579
DWT REF	3.42
STATUS	Site of Nature Conservation Importance
TYPE	Botanical / Amphibian
FIRST NOTIFIED	1985
DATE OF REVISION	1991
LAND USE	Pond
LOCAL PLAN	Unitary Development Plan Deposit Version (UDP)
DEVELOPMENT PLAN	White Land

SUMMARY OF NATURAL INTEREST

The site includes an elongated subsidence pond located within old ridge and furrow pasture which is locally dominated by gorse scrub and is particularly notable for a large population of great crested newt which is present together with other amphibians.

PLANNING CONTEXT

Deposit UDP (1995): this seeks to protect the site from most forms of development (CN16, CN19). On land to the west of the road the UDP will encourage and undertake a programme of intense planting of tree belts and woodland using mainly locally native species (WA23). The area is highlighted as lying within a strategic wildlife corridor which provides the site with additional protection (CN20). The SNCI also lies within the Great North Forest boundary (CN13). The possible realignment of the A1290 will be expected to respect the revised boundaries of the SNCI (WA31).

DESCRIPTION

The pond is semi permanent and is well vegetated supporting flote grass, water crowfoot, reedsweet grass, spike rush, water plantain, jointed rush, lesser spearwort, branched bur-reed, water forget-me-not, broad-leaved pond weed, reed mace, great willow herb, lady's smock, marsh bedstraw, meadowsweet, floating sweet-grass, compact rush and cuckooflower with meadow foxtail, tufted hairgrass and bittersweet. Emerald, azure and common blue damselflies and other aquatic insects including water scorpion are plentiful. Breeding birds include snipe, moorhen and reed bunting.

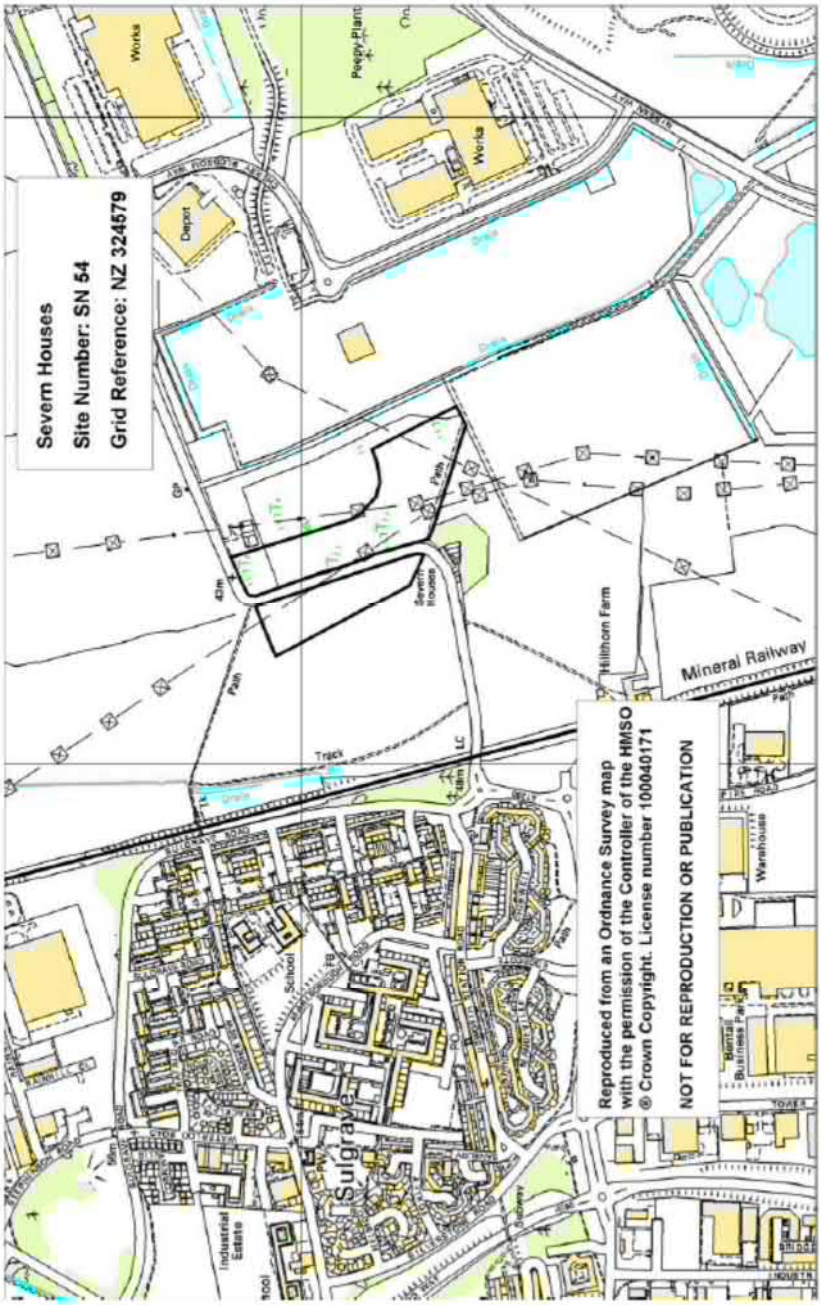
Of particular note is a small population of great crested newt which is present with other species of amphibians such as smooth newt and frog. Gorse/hawthorn scrub adjacent, supports willow warbler,whitethroat, linnet and ^yellowhammer.

LOCAL WILDLIFE SITE

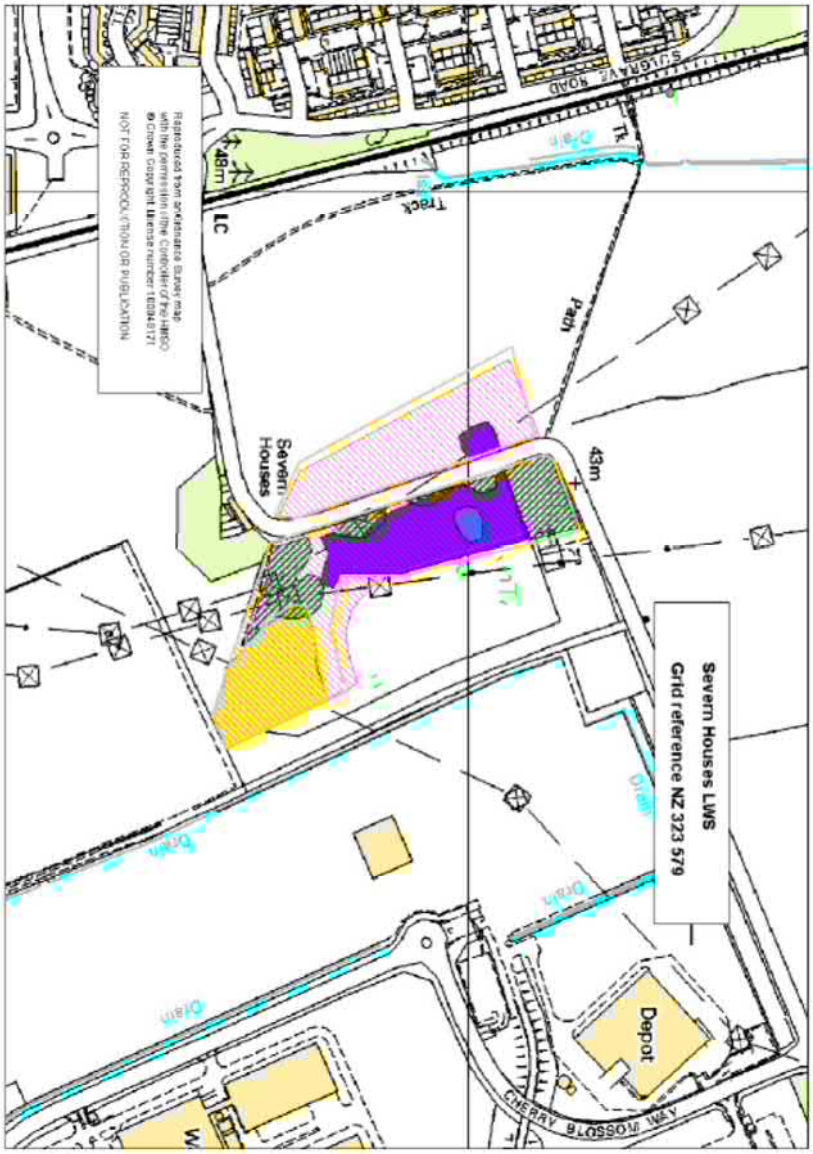
Herb-rich meadow to the south of the site occupies old ridge and furrow pasture and supports a large population of orchids; namely northern marsh and common spotted and their hybrids. Other notable species present include carnation sedge, field woodrush, quaking grass, pepper saxifrage, pignut and lady's smock. The meadow also supports nesting populations of skylark, meadow pipit and lapwing. Short eared owls also occur in winter.

Updated July 1995

LOCAL WILDLIFE SITE



LOCAL WILDLIFE SITE



APPENDIX F: POND PHOTOS

Photo 1. Pond 1a.

Photo 2. Pond 1b.

Photo 3. Pond 2.

Photo 4. Pond 3

Photo 5. Pond 4

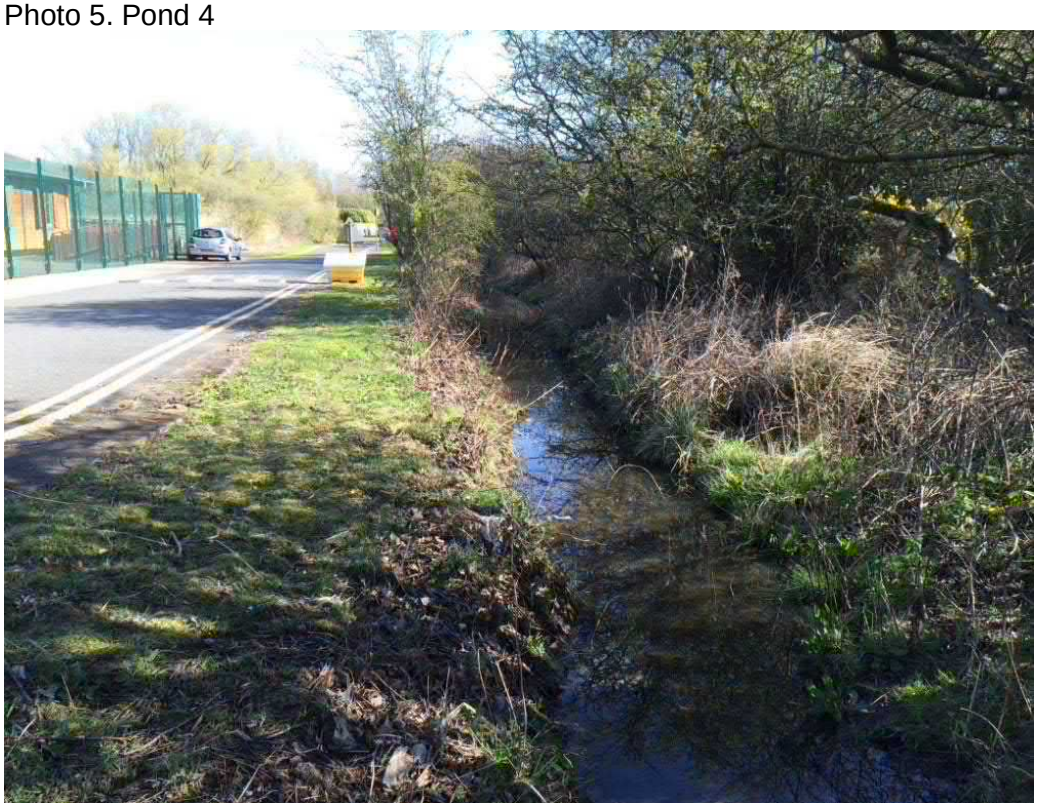


Photo 6. Pond 5.

Photo 7. Pond 6.

Photo 8. Pond 7.

Photo 9. Pond 8.

Photo 10. Pond 9.

A19 / A184 Testos Junction Improvement and Downhill Lane Junction Improvement Breeding Bird Report

Version 0

Document reference: B0140301/OD/200

Date: April 2017

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CONTENTS

EXECUTIVE SUMMARY

A desk study and breeding bird surveys were undertaken by Jacobs UK Ltd (Jacobs) on behalf of Highways England.

The purpose of this report was to establish an ecological baseline for breeding birds to inform an Environmental Impact Assessment (EIA) for the proposed A19 Testos and Downhill Lane Junctions Improvement.

A desk study exercise was carried out in October 2016 to obtain records of breeding birds up to 2 km from the scheme as well as Statutory and non-Statutory designated Sites with value for birds.

The desk study found a total of 105 species within 2 km of the site. Results of the desk study found 62 species which were at on at least one of the following: Birds of Conservation Concern 4 (2015)[1] (BOCC4) Red List (25), BOCC4 Amber List (36), NERC Priority Species (18), Species on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) (10) (see Appendix B for the detailed list).

The 2014 breeding bird surveys undertaken by Jacobs identified the following species of consev-ation interest:

- 2 species listed under Schedule 1 (Part 1) of the WCA (as amended); barn owl and kingfisher;
- 11 “Species of Principal Importance”, Section 41, NERC Act 2006; Bullfinch, dunnock (*Prunella modularis*), grey partridge, herring gull (*Larus argentatus*), house sparrow (*Passer domesticus*), lapwing (*Vanellus vanellus*), mallard, reed bunting, skylark, song thrush, and yellowhammer.
- 8 species on the Red List of Birds of Conservation Concern 4 2015; Grey partridge, herring gull, house sparrow, lapwing, skylark, song thrush, starling (*Sturnus vulgaris*) and yellowhammer.
- 11 species on the Amber List of the Birds of Conservation Concern 4 2015; bullfinch, dunnock, great spotted woodpecker, kestrel, kingfisher, mallard, meadow pipit, mute swan (*Cygnus olor)*, reed bunting, swift (*Apus apus)* and willow warbler.

As part of EIA process, specific consideration will be given to bird species of conservation concern. The EIA process also considers the potential to deliver enhancements. Proposed mitigation and enhancement measures will be presented within the ‘ecology and nature conservation’ chapter of the forthcoming Environmental Statement Introduction

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

1 INTRODUCTION

1.1 Overview

1.1.1 Jacobs was commissioned by Highways England to establish a baseline for breeding birds at the location of proposed improvements for the Testos and Downhill Lane Junctions. The junctions were located along the A19 in South Tyneside at respective approximate Ordnance Survey Grid References (OSGRs): NZ 33808 60913 and NZ 34151 59862.

1.1.2 Testos Junction connected to the A19 and the A184, at approximately 4.2 km south of the Tyne Tunnel. Downhill Lane Junction was located approximately 1.1 km south of the Testos Junction and linked the A19 to the A1290.

1.1.3 The surveys were required to inform the ecology chapter of the Environmental Impact Assessment (EIA), to support the Development Consent Order.

1.2 Report Rationale

1.2.1 A desktop study and a breeding bird survey were last undertaken by Jacobs ecologists in 2014 to inform works at the proposed A19 Testos Junction improvements.

1.2.2 As the footprint of the works has now been extended to include Downhill Lane Junction the aim of this report is:

- To update the desk study results.
- To provide up to date baseline information regarding breeding birds' nature conservation status based on the Birds of Conservation Concern List 4[1].
- To inform future planned operations and mitigation strategies.

1.2.3 Updated baseline information in relation to breeding birds will be based on surveys undertaken by Jacobs in 2014 supplemented by breeding bird survey information provided by Sunderland City Council in relation to the proposed International Advanced Manufacturing Park (IAMP) development in 2014[2] and 2015[3].

1.3 Definitions

1.3.1 The proposals refer to the footprint of the proposed development (scheme boundary).

1.3.2 The study area refers to a 2 km buffer around the proposals for which a desk study has been undertaken to identify breeding bird records.

1.3.3 The survey area refers to a 500 m buffer around the proposals in which the breeding bird surveys have taken place.

1.4 Legislation and Regulatory Context

1.4.1 An assessment of the legislative and regulatory framework covering breeding birds in the UK has been undertaken. Due consideration has been given to the following statutory instruments and regulatory frameworks in the preparation of this report:

- Directive 2009/147/EC(Birds Directive, 2009) on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended)[4];

2. White Young Green (WYG) (2015), Sunderland City Council Land North of Nissan Final Report 2015.

3.ARUP (2016), IAMP Ornithological Data Analysis – Supporting Notes – Version 2.

[4] http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

- Conservation of Habitats and Species Regulations 2010 (as amended)[5];
- Wildlife and Countryside Act 1981 (as amended)[6] (WCA);
- Natural Environment and Rural Communities Act 2006[7] (NERC), and;
- National Planning Policy Framework, and;
- Durham Local Biodiversity Action Plan (Durham LBAP)[8].

1.4.2 Appendix A provides an overview of the above in relation to birds.

[5] http://www.legislation.gov.uk/uksi/2010/490/pdfs/uksi_20100490_en.pdf

[6] http://www.legislation.gov.uk/ukpga/1981/69

[7] http://www.legislation.gov.uk/ukpga/2006/16/pdfs/ukpga_20060016_en.pdf

[8] http://www.durhambiodiversity.org.uk/biodiversity-action-plan/priority-species/ (Accessed June 2014)

2 METHODOLOGY

2.1 Desk study

2.1.1 A desk study was conducted in November 2016 to obtain records of designated statutory and non-statutory sites and bird species within a 2 km buffer of the proposals scheme. Only recent records (2006 to 2016) were included in the desk study.

2.1.2 The following consultees and web resources were used or contacted to determine any historical records of birds within the study area.

- Environment Records Information Centre for the North East (ERIC North East);
- Bird Track (htto://blx1.bto.org/birdtrack/main/data-home.jsp) accessed for bird records on 3rd December 2014;
- Durham Biodiversity Action Plan (BAP);
- Durham Local RSPB Group and Durham Bird Club (Not responded);
- Joint Nature Conservation Committee (JNCC) and Natural England for statutory sites data, and;
- Multi Agency Geographic Information for the Countryside (MAGIC).

2.1.3 Although the data provided by the consultees and web based search is the most complete set of species data available, the absence of records should not be taken as an indication of absence of species.

2.2 Previous Survey Information

Jacobs Breeding Bird Surveys

2.2.1 Previous breeding bird surveys were undertaken by Jacobs for the A19 Testos Junction Improvement project between March and April 2007. Update surveys for breeding birds were undertaken between April and June 2014 by Jacobs Ecologists. Due to the size of the survey area it was separated into four transects to sample the range of habitats present. Surveys in 2014 were undertaken 21- 24 April, 13 - 15 May and 10 - 12 June. Table 1 below provides a brief description of each transect and the habitats they encompassed.

Table 1: Breeding Bird Transects, undertaken April-June 2014; Habitat Descriptions

Transect	Habitat Description
1	Arable farmland with species poor hedgerows north west of Testos Junction.
2	Industrial estate with landscape planting east of the A19. In addition, the study area incorporates Boldon Lake LWS which comprises a large open water body with associated marginal and grassland habitats.
3	Arable farmland with species poor hedgerows south west of Testos Junction and a small area of semi natural broad-leaved woodland adjacent to Elliscope Farm. This part of the study area also incorporates a section of the River Don.

Transect	Habitat Description
4	This area comprises a mosaic of habitats types south east of Testos Junction including: Mount Pleasant Marsh Local Wildlife Site (LWS), Make-me-Rich Meadow LWS, arable farmland with species poor hedgerows, broad-leaved woodland and a section of the River Don. The LWSs encompass areas of open water, dense scrub, plantation woodland and grassland habitats.

2.2.2 The survey methodology was based on the breeding bird survey (BBS) methodology devised jointly by British Trust for Ornithology (BTO), the Royal Society for the Protection of Birds (RSPB) and the Joint Nature Conservancy Council (JNCC) (Gilbert et al 1998).

2.2.3 Particular attention was paid to open farmland, hedgerows, woodland, scrub and open/running water features, as these habitats are significant in the ecology of breeding birds (i.e. providing suitable foraging resources and nesting opportunities).

2.2.4 For the purposes of this report breeding bird survey results from Jacobs surveys undertaken in 2014 are presented on Figures 1 to 4, and are listed in Appendix D. Birds of conservation concern have been updated in line with the lists Birds of Conservation Concern published in 2015[1].

IAMP Breeding Bird Surveys 2014

2.2.5 WYG were commissioned by Sunderland City Council in April 2014 to undertake a range of ecological surveys including breeding bird surveys at an area of land north of the Nissan car manufacturing plant, in Sunderland. The survey area for this project overlapped in some areas with the survey area for the Testos and Downhill Lane Junction Improvement Scheme.

3 BASELINE

3.1 Desk Study

Statutory and non-Statutory Designated Sites

3.1.1 Statutory and non-Statutory Designated Sites (with relevance to birds) found within a 2 km radius of the scheme are listed in Table 2 below:

Table 2: Statutory and Non-Statutory Designated Sites with Relevance to Birds within 2 Km of the Proposed Scheme.

Site Name	Distance from the Proposals	Value for Birds
Statutory		
Primrose (Nature Reserve)	1580 m	The LNR forms part of the River Don corridor and has been known to support birds including reed bunting *Emberiza schoeniclus*, mallard *Anas platyrhynchos*, moorhen *Gallinula chloropus* and coot *Fulica atra*.
Non-Statutory		
Mount Pleasant Marsh (LWS)	0 m	The ponds play host to grey heron *Ardea cinerea*, kingfisher *Alcedo atthis* and breeding mallard, moorhen, coot and reed bunting. Elsewhere the site is used by a wide range of birds such as bullfinch *Pyrrhula pyrrhula*, willow tit *Poecile montanus*, great spotted woodpecker *Dendrocopos major* and a good density of commoner woodland species.
Downhill Old Quarry (LWS)	310 m	Bullfinch and song thrush *Turdus philomelos* use the site, whilst barn owl *Tyto alba* was regularly present until around 2003.
Downhill Meadows (LWS)	530 m	Small areas of rank grassland probably attract birds of prey, such as kestrel *Falco tinnunculus* to the site.
Station Burn (LWS)	830 m	Birds such as moorhen, mallard, grey wagtail *Motacilla cinerea* and kingfisher regularly use the river. The scrub is favoured by breeding birds such as whitethroat *Sylvia communis* and yellowhammer *Emberiza citrinella*, whilst willow tit winter at the site.
Hilton Castle Grassland (LWS)	950 m	Ground nesting birds include skylark *Alauda arvensis* and meadow pipit *Anthus pratensis*. Scattered areas of scrub provide a habitat for several other bird species such as linnet *Linaria cannabina*, yellowhammer and whitethroat.
Peepy Plantation (LWS)	960 m	A mature plantation notable for woodland birds. Many willows fringe the pond which provides breeding habitats for birds such as

Site Name	Distance from the Proposals	Value for Birds
		moorhen, sedge warbler *Acrocepgalus schoenobaenus*, yellowhammer, redpoll *Acanthis flammea*, garden warbler *Sylvia borin* and grasshopper warbler *Locustella naevia*, spotted flycatcher *Muscicapa striata*, great spotted woodpecker and tawny owl *Strix aluco*. In winter brambling and mixed flocks of thrushes roost here. Long-eared owls *Asio otus* have recently been reported as a breeding species.
Hylton Dene (LWS)	1030 m	Woodland birds include whitethroat, willow warbler *Phylloscopus trochilus*, blackcap *Sylvia atricapilla*, garden warbler, yellowhammer, linnet, bullfinch, goldfinch *Carduelis carduelis* and long-tailed tit *Aegithalos caudatus*.
Hylton Plantation (LWS)	1120 m	Communities of breeding birds include yellowhammer, linnet, redpoll, blackcap, whitethroat, willow warbler, titmice *Paridae*, great spotted woodpecker and tawny owls.
Newton Garths (LWS)	1260 m	Breeding farmland birds include yellowhammer and grey partridge *Perdix perdix*.
Barons Quay Wood and Barons Quay (LWS)	1330 m	Breeding birds include lesser whitethroat *Sylvia curruca*, willow warbler, garden warbler and bullfinch.
Boldon Colliery Former Railway Line (LWS)	1340 m	It is a length of disused railway embankment which supports winter migrants in the form of fieldfare *Turdus pilaris*, redwing *Turdus iliacus* and long-eared owls.
River Don East House(LWS)	1430 m	The site has previously supported large numbers of fieldfare and redwing during winter.
Lakeside Inn, Felling (LWS)	1660 m	Bird species present include reed bunting, white throat and willow warbler.
Severn Houses (LWS)	1700 m	Breeding birds include snipe *Gallinago gallinago*, moorhen and reed bunting.
Timber Beach (LWS)	1800 m	The site offers feeding grounds for seasonal migrating birds. The areas of saltmarsh and intertidal mud also include feeding ground for small numbers of redshank *Tringa totanus* and dunlin *Calidris alpina* as well as other wading birds on passage migration, whilst adjacent hawthorn scrub is an important source of food and shelter for large numbers of fieldfares and redwings during the winter months of the year.
Claxheugh Riverside (LWS)	1830 m	Offers feeding grounds for migrant wading birds

Site Name	Distance from the Proposals	Value for Birds
Barmston Pond (LWS)	1890 m	Planting to the east has provided extra cover for many nesting and wintering birds. The pond is noted for attracting migrant wading birds. Breeding birds include moorhen, coot, mallard, gadwall *Anas strepera* and snipe. Large numbers of wintering and passage migrant birds visit the area. Low water levels in autumn attract a wide variety of migrant wading birds including regular greenshank *Tringa nebularia*, spotted redshank *Tringa erythropus*, ruff *Philomachus pugnax*, black-tailed godwit *Limosa limosa* and wood sandpiper *Tringa glareola*. Wintering birds include mute *Cygnus olor* and whooper swans *Cygnus cygnus*, coot, mallard, wigeon *Mareca* and pochard *Aythya farina* whilst spoonbill *Platalea leucorodia*, garganey *Anas querquedula*, Bewick's swan *Cygnus columbianus*, short-eared owl *Asio flammeus*, barn owl, merlin *Falco columbarius* and black tern *Chlidonias niger* have visited the site in recent years.
Hylton Colliery pond (LWS)	1970 m	The pond is invertebrate rich and attracting breeding birds such as moorhen and mallard. Birds found here include willow warbler, blackcap, lesser whitethroat, whitethroat, garden warbler, bullfinch and long tailed tit.
Follingsby (LWS)	2000 m	Notable bird species utilising the area during the winter period includes long-eared and short-eared owls while breeding species include grey partridge, sedge warbler and reed bunting.

Desk Study Species Results

3.1.2 The desk study undertaken November 2016 identified a total of 105 species within 2 km of the site. A review of these records identified 62 species of conservation interest as follows:

- 10 species listed under Schedule 1 (Part 1) of the WCA (as amended) – barn owl and kingfisher;
- 18 “Species of Principal Importance”, Section 41, NERC Act 2006;
- 25 species on the Red List of Birds of Conservation Concern 4 2015; and
- 36 species on the Amber list of the Birds of Conservation Concern 4 2015.

3.1.3 Appendix B provides details of the species of conservation concern listed above.

3.2 Survey Results Review

Jacobs Breeding Birds Survey 2014

3.2.1 The 2014 breeding bird surveys undertaken by Jacobs identified the following species of conservation interest:

- 2 species listed under Schedule 1 (Part 1) of the WCA (as amended); barn owl and kingfisher;
- 11 "Species of Principal Importance", Section 41, NERC Act 2006; Bullfinch, dunnock (*Prunella modularis*), grey partridge, herring gull (*Larus argentatus*), house sparrow (*Passer domesticus*), lapwing (*Vanellus vanellus*), mallard, reed bunting, skylark, song thrush, and yellowhammer.
- 8 species on the Red List of Birds of Conservation Concern 4 2015; Grey partridge, herring gull, house sparrow, lapwing, skylark, song thrush, starling (*Sturnus vulgaris*) and yellowhammer.
- 11 species on the Amber List of the Birds of Conservation Concern 4 2015; bullfinch, dunnock, great spotted woodpecker, kestrel, kingfisher, mallard, meadow pipit, mute swan (*Cygnus olor)*, reed bunting, swift (*Apus apus)* and willow warbler.

3.2.2 Three species classified in the Amber list during the 2014 breeding bird surveys were moved from Amber to Green listed according to the Birds of Conservation Concern 4 (2015)[1]. Specifically these were: Barn owl, Swallow (*Hirundo rustica)* and Whitethroat.

IAMP Breeding Birds Survey 2014

3.2.3 The 2014 breeding bird surveys undertaken by IAMP in 2014 identified the following species of conservation interest:

- 5 species listed under Schedule 1 (Part 1) of the WCA (as amended) - barn owl, fieldfare, hen harrier (*Circus cyaneus)*, peregrine falcon *(Falco peregrinus)* and kingfisher;
- 29 notable bird species (Red or Amber list Birds of Conservation Concern) were recorded breeding within the study area. Of these, grey partridge, lapwing, linnet, meadow pipit, reed bunting, skylark, tree sparrow (*Passer montanus)*, yellow wagtail (*Motacilla flava)* and yellowhammer were recorded in good numbers and these species are considered to be typical representatives of a farmland bird assemblage.

4 DISCUSSION AND CONCLUSIONS

4.1.1 The desk study found a total of 105 species within 2 km of the site. Results of the desk study found 62 species which were at on at least one of the following: Red List (25), Amber UK (36), NERC Priority Species (18), Species on Schedule 1 of the WCA 1981 (as amended) (10) (see Appendix B for the detailed list).

4.1.2 The majority of the birds recorded with in the survey area are farmland species and this reflects the prevailing habitat type across the study area of open arable farmland, grassland and hedgerows.

4.1.3 The majority of wildfowl recorded during the survey were located at Bolden Lake LWS and Mount Pleasant Marsh LWS. Coot and moorhen were both confirmed breeders; with two pairs of coot and four and five young respectively observed at Bolden Lake LWS and a single moorhen with two young observed at Mount Pleasant Marsh LWS. Mallard were also considered to be possible breeders with one female and a number of males being observed during the surveys.

4.1.4 Active barn owl nest boxes have been identified within the survey area. Further barn owl surveys have been conducted in summer 2016 and a separate barn owl report will present the result of these surveys.

4.1.5 Pied wagtails were confirmed breeders with two adults with one juvenile observed at Mount Pleasant Marsh LWS on the second site visit. Breeding yellowhammer were also confirmed, at the western half of Transect 4, with adults being seen with food for young. skylark, goldfinch and reed bunting were probable breeders and were observed frequently across the entire study area. Goldfinch and reed bunting were present in boundary features such as hedgerows associated with ditches along many of the field margins in the study area. Skylark were recorded in many of the arable fields surveyed, with a significant number of individuals noted in the arable fields of Transect 1.

4.1.1 Many of the arable fields (which make up the majority of the land expected to be impacted by the development) are bordered by hedgerows, which as well as being a priority habitat on the Durham LBAP, support a variety of bird species.

4.1.2 As part of the environmental impact assessment (EIA) process, specific consideration will be given to bird species of conservation concern, including barn owl and ground nesting birds such as skylarks and lapwing. The EIA process also considers the potential to deliver enhancements. Proposed mitigation and enhancement measures will be presented within the ‘ecology and nature conservation’ chapter of the forthcoming ES.

5 REFERENCES

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FIGURES

A key for the BTO codes shown on each figure can be found in Appendix C

FIGURE 1

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

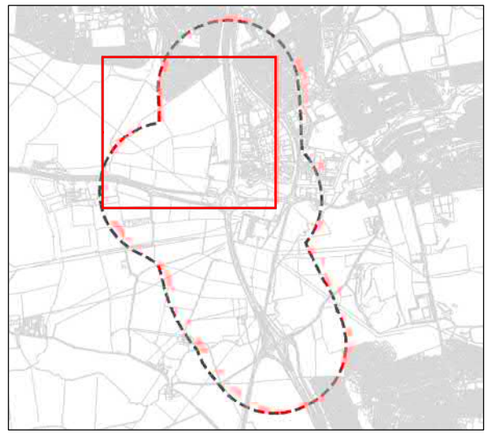

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FIGURE 2

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

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FIGURE 3

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

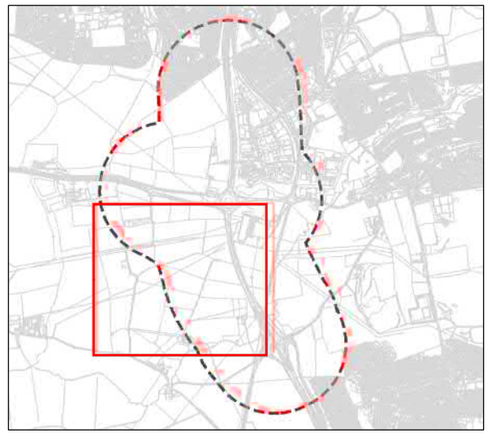

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FIGURE 4

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

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FIGURE 5

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

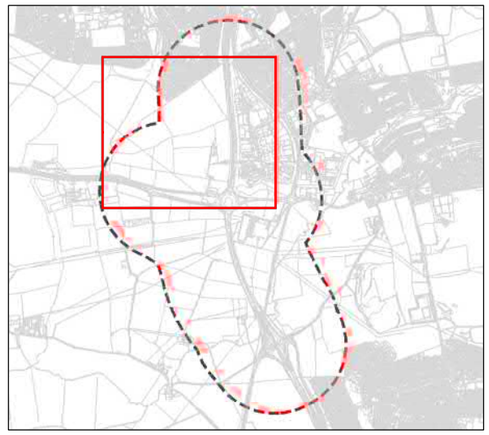

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FIGURE 6

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

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Drawing Status:

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FIGURE 7

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

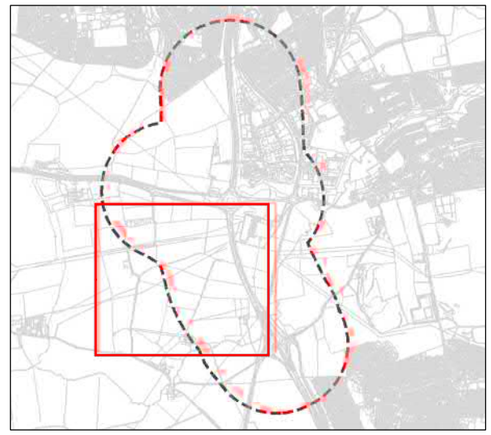

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FIGURE 8

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

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FIGURE 9

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
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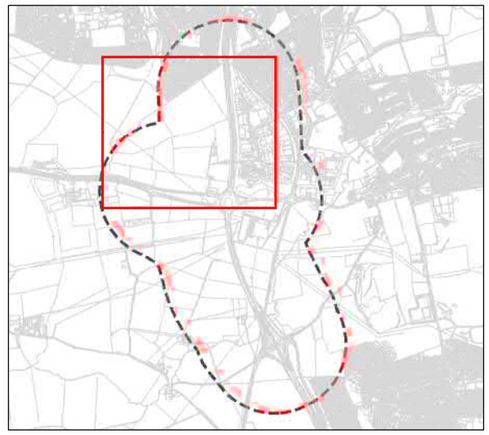

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FIGURE 10

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

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Drawing Status:

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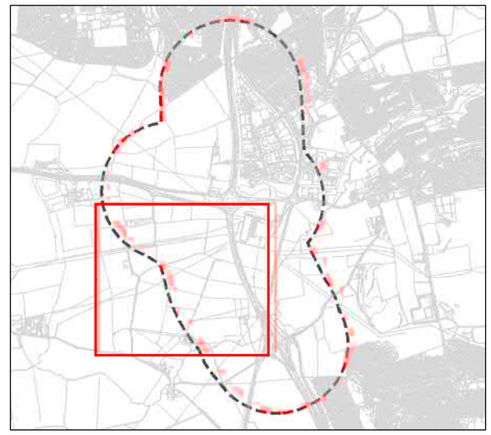
FIGURE 11

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen



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Drawing Status:

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Jacobs No.	B0140301	
Client No.		

Drawing No.: B0140301_EC_BB_Survey3

FIGURE 12

Legend

- A19 Design 500m Buffer
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- XX Red List Species (high conservation concern)
- XX Amber List Species (medium conservation concern)
- XX Green List Species (low conservation concern)
- (XX) Song
- (XX) Alarm Call
- XX Call
- XX Seen

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
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Drawing Status

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Client No.		

Drawing No.: B0140301_EC_BB_Survey3

APPENDIX A: LEGISLATION AND POLICY BACKGROUND

European Wild Birds Directive

The Wild Birds Directive (WBD) first came into force in April 1979 (EC Directive on the conservation of wild birds (79/409/EEC) and was updated in 2009 (Directive 2009/147/EC on the conservation of wild birds). It covers the protection, management and conservation of all species of naturally occurring wild birds in the European territory of member states. In particular it requires Member States to identify and give special protection to areas for the rare or vulnerable species listed in Annex 1 of the Directive and for regularly occurring migratory species.

A Special Protection Area (SPA) is an area of land, water or sea which has been identified as being of international importance for the breeding, feeding, wintering or the migration of rare and vulnerable species of birds found within the European Union. SPAs are European designated sites, classified under the European Wild Birds Directive which affords them enhanced protection.

The Conservation of Habitats and Species Regulations 2010 (as amended)

The Conservation of Habitats and Species Regulations 2010 consolidate all the various amendments made to the Conservation (Natural Habitats, &c.) Regulations 1994 in respect of England and Wales. The 1994 Regulations transposed Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law.

The 2010 Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European sites.

The Regulations place a duty on the Secretary of State to propose a list of sites which are important for either habitats or species (listed in Annexes I and II of the Habitats Directive respectively) to the European Commission. Once the Commission and EU Member States have agreed that the sites submitted are worthy of designation, they are identified as Sites of Community Importance (SCIs). The EU Member States must then designate these sites as Special Areas of Conservation (SACs) within six years. The Regulations also require the compilation and maintenance of a register of European sites, to include SACs and Special Protection Areas (SPAs) classified under Council Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive). These sites form a network termed Natura 2000.

Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act (WCA) states that all wild birds are protected. Under the WCA, it is an offence to kill, injure or take any wild bird, take, damage or destroy the nest of any wild bird, or take or destroy the egg of any wild bird. A special penalty is levied to any of the above offences being committed in conjunction with a bird listed on Schedule 1 of the WCA. It is also an offence if a person disturbs any bird listed on Schedule 1 while it is building a nest, on or near a nest containing young, or disturbs dependent young of such a bird. The Countryside and Rights of Way Act 2000, has subsequently made it an offence to intentionally and recklessly disturb a Schedule 1 species as above.

Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006- Habitats and Species of Principal Importance in England

The England Biodiversity List has been developed to meet the requirements of Section 41 (S41) of the Natural Environment and Rural Communities Act (2006). This legislation requires the Secretary of State to publish a list of species of flora and fauna and habitats considered to be of principal importance for the purpose of conserving biodiversity.

The S41 list will be used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006 "to have regard" to the conservation of biodiversity in England, when carrying out their normal functions. In particular:

Regional Planning Bodies and Local Planning Authorities will use it to identify the species and habitats that should be afforded priority when applying the requirements of the National Planning Policy Framework (NPPF) to maintain, restore and enhance species and habitats.

Local Planning Authorities will use it to identify the species and habitats that require specific consideration in dealing with planning and development control, recognising that under NPPF the aim of planning decisions should be to avoid harm to all biodiversity.

All public bodies will use it to identify species or habitats that should be given priority when implementing the NERC Section 40 duty.

Durham Biodiversity Action Plan

The Durham Biodiversity Action Plan (BAP) is relevant to the study area. Accordingly, a number of habitats and species described in these plans are relevant to future impact assessments detailed in the Environmental Statement. Of relevance to this study is the SAP for Birds, which identifies lapwing (*Vanellus vanellus*), yellow wagtail (*Motacilla flava*), skylark (*Alauda arvensis*), corn bunting (*Emberiza calandra*), linnet (*Carduelis cannabina*), reed bunting (*Emberiza schoeniclus*), bullfinch (*Pyrrhula pyrrhula*), starling (*Sturnus vulgaris*), tree sparrow (*Passer montanus*), redshank (*Tringa tetanus*), nightjar (*Caprimulgus europaeus*), snipe (*Gallinago gallinago*), spotted flycatcher (*Muscicapa striata*), black grouse (*Tetrao tetrix*), dunlin (*Calidris alpina*), hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*), peregrine (*Falco peregrinus*), raven (*Corvus corax*), ring ouzel (*Turdus torquatus*), house sparrow (*Passer domesticus*), song thrush (*Turdus philomelos*) and curlew (*Numenius arquata*) as Priority Species.

Nature Conservation Status

Birds of Conservation Concern (BOCC) 4 has placed more species onto the Red list than ever before. The UK's leading bird conservation organisations have worked together to review the status of birds in the UK, Channel Islands and Isle of Man.

The bird species that breed or overwinter were assessed against a set of objective criteria to be placed on the Green, Amber or Red list – indicating an increasing level of conservation concern.

The review used up-to-date information on the status of birds in the UK and elsewhere in their ranges, drawing on data collated through the UK's bird monitoring schemes.

APPENDIX B: SPECIES DESK STUDY RESULTS

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
A				
Arctic Tern	Sterna paradisaea	BoCC4 Amber list	2011	No counts
Avocet	Recurvirostra avosetta	BoCC4 Amber list Schedule 1 WCA	2013	7+4 counts of chicks
B				
Barn Owl	*Tyto alba*	Schedule 1 WCA	2010	2
Bar-tailed Godwit	*Limosa lapponica*	BoCC4 Amber list	2011	1
Barnacle Goose	*Branta leucopsis*	BoCC4 Amber list	2013	No counts
Bittern	*Botaurus stellaris*	BoCC4 Amber list / Schedule 1 WCA	2010	No counts
Black-Backed Gull	*Larus fuscus subsp. intermedius*	BoCC4 Amber list	2013	No counts
Blackbird	*Turdus merula*	-	2013	No counts
Black-headed Gull	*Chroicocephalus ridibundus*	BoCC4 Amber list	2015	No counts
Black-tailed Godwit	*Limosa limosa*	BoCC4 Red list	2013	4
Blue Tit	*Cyanistes caeruleus*	-	2013	No counts
Brambling	*Fringilla montifringilla*	Schedule 1 WCA	2011	No counts
Bullfinch	*Pyrrhula pyrrhula*	BoCC4 Amber list / Section 41 NERC Act 2006 / LBAP	2014	1
Buzzard	*Buteo buteo*	-	2010	4
C				
Canada Goose	*Branta canadensis*	-	2013	50+
Carrion Crow	*Corvus corone*	-	2013	No counts
Coal Tit	*Periparus ater*	-	2013	No counts
Collared Dove	*Streptopelia decaocto*	-	2007	No counts
Common Gull	*Larus canus*	BoCC4 Amber list	2013	No counts
Common Tern	*Sterna hirundo*	BoCC4 Amber list	2012	No counts
Coot	*Fulica atra*	-	2013	2
Cormorant	*Phalacrocorax carbo*	-	2013	2
Curlew	*Numenius arquata*	BoCC4 Red list / Section 41 NERC Act 2006	2013	30

D				
Dunnock	*Prunella modularis*	BoCC4 Amber list / Section 41 NERC Act 2006	2013	No counts
F				
Fieldfare	*Turdus pilaris*	BoCC4 Red list / Schedule 1 WCA	2007	No counts
G				
Gadwall	*Anas strepera*	BoCC4 Amber list	2011	No counts
Gilbert	*Hirundo rustica*	-	2013	10
Goldcrest	*Regulus regulus*	-	2012	No counts
Goldeneye	*Bucephala clangula*	BoCC4 Amber list	2013	No counts
Goldfinch Greenfinch	*Carduelis carduelis Carduelis chloris*	-	2013	10
Goosander	*Mergus merganser*	-	2013	4
Grasshopper Warbler	*Locustella naevia*	BoCC4 Red list	2010	No counts
Great Spotted Woodpecker	*Dendrocopos major*	-	2013	2
Great Tit	*Parus major*	-	2016	2
Greenshank	*Tringa nebularia*	BoCC4 Amber list / Schedule 1 WCA	2013	No counts
Grey Heron	*Ardea cinerea*	-	2013	15+
Grey Partridge	*Perdix perdix*	BoCC4 Red list / Section 41 NERC Act 2006	2011	31
Grey Wagtail	*Motacilla cinerea*	BoCC4 Red list	2013	No counts
Greylag Goose	*Anser anser*	BoCC4 Amber list	2013	4
H				
Herring Gull	*Larus argentatus*	BoCC4 Red list / Section 41 NERC Act 2006	2013	No counts
House Martin	*Delichon urbicum*	BoCC4 Amber list	2011	No counts
House Sparrow	*Passer domesticus*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2014	25
J				
Jackdaw	*Corvus monedula*	-	2016	1
Jay	*Garrulus glandarius*	-	2014	3
K				
Kestrel	*Falco tinnunculus*	BoCC4 Amber list	2014	2
Kingfisher	*Alcedo atthis*	BoCC4 Amber list / Schedule 1 WCA	2013	1

L				
Lapwing	*Vanellus vanellus*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2013	20
Lesser Black-backed Gull	*Larus fuscus*	BoCC4 Amber list	2013	No counts
Lesser Spotted Woodpecker	*Dendrocopos minor*	BoCC4 Red list	2012	No counts
Linnet	*Linaria cannabina*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2010	12
Little Bittern	*Ixobrychus minutus*	-	2013	No counts
Little Owl	*Athene noctua*	-	2013	6
Little Ringed Plover	*Charadrius dubius*	-	2011	No counts
M				
Magpie	*Pica pica*	-	2014	10
Mallard	*Anas platyrhynchos*	BoCC4 Amber list / Section 41 NERC Act 2006	2013	20+
Marsh Tit	*Poecile palustris*	BoCC4 Red list / Section 41 NERC Act 2006	2007	No counts
Meadow Pipit	*Anthus pratensis*	BoCC4 Amber list	2011	12
Mediterranean GulL	*Larus melanocephalus*	BoCC4 Amber list / Schedule 1 WCA	2015	No counts
Mistle Thrush	*Turdus viscivorus*	BoCC4 Red list	2007	No counts
Moorhen	*Gallinula chloropus*	-	2013	4
Mute Swan	*Cygnus olor*	BoCC4 Amber list	2013	2
N				
Nuthatch	*Sitta europaea*	-	2014	2
O				
Oystercatcher	*Haematopus ostralegus*	BoCC4 Amber list / LBAP	2013	4
P				
Peregrine	*Falco peregrinus*	Schedule 1 WCA	2010	No counts
Pheasant	*Phasianus colchicus*	-	2013	10
Pica pica subsp. pica	*Pica pica subsp. pica*	-	2013	No counts
Pied Wagtail	*Motacilla alba*	-	2017	No counts
Pink-footed Goose	*Anser brachyrhynchus*	BoCC4 Amber list	2012	No counts
Pochard	*Aythya ferina*	BoCC4 Red list	2011	No counts

R				
Redshank	*Tringa totanus*	BoCC4 Amber list	2013	50
Redwing	*Turdus iliacus*	BoCC4 Red list / Schedule 1 WCA	2007	No counts
Reed Bunting	*Emberiza schoeniclus*	BoCC4 Amber list / Section 41 NERC Act 2006 / Local BAP	2012	2
Ringed Plover	*Charadrius hiaticula*	BoCC4 Red list	2011	No counts
Robin	*Erithacus rubecula*	-	2013	3
Rook	*Corvus frugilegus*	-	2012	No counts
S				
Sand Martin	*Riparia riparia*		2013	10+
ShelducK	*Tadorna tadorna*	BoCC4 Amber list	2013	20+
Short-eared Owl	*Asio flammeus*	BoCC4 Amber list	2011	1
Shoveler	*Anas clypeata*	BoCC4 Amber list	2012	2
Siskin	*Spinus spinus*	-	2013	No counts
Skylark	*Alauda arvensis*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2011	10
Snipe	*Gallinago gallinago*	BoCC4 Amber list / LBAP	2012	6
Song Thrush	*Turdus philomelos*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2014	1
Sparrowhawk	*Accipiter nisus*	WCA	2013	3
Spotted Flycatcher	*Muscicapa striata*	BoCC4 Red list / Section 41 NERC Act 2006	2007	No counts
Starling	*Sturnus vulgaris*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2011	15
Swift	*Apus apus*	BoCC4 Amber list	2011	11
T				
Tawny Owl	*Strix aluco*	BoCC4 Amber list	2012	4 counts of chicks
Teal	*Anas crecca*	BoCC4 Amber list	2013	26+
Tree Sparrow	*Passer montanus*	BoCC4 Red list / Section 41 NERC Act 2006	2011	No counts
Troglodytes troglodytes subsp. troglodytes	*Troglodytes troglodytes subsp. troglodytes*	-	2010	No counts
Treecreeper	*Certhia familiaris*	-	2013	No counts

Tufted Duck	*Aythya fuligula*	-	2013	6
Twite	*Linaria flavirostris*	BoCC4 Red list	2010	No counts
W				
Water Rail	*Rallus aquaticus*	-	2015	No counts
Waxwing	*Bombycilla garrulus*	-	2013	No counts
Wheatear	*Oenanthe oenanthe*	-	2011	1
Whitethroat	*Sylvia communis*	-	2011	11
Wigeon	*Anas penelope*	BoCC4 Amber list	2011	No counts
Willow Tit	*Poecile montana*	BoCC4 Red list / Section 41 NERC Act 2006	2012	No counts
Willow Warbler	*Phylloscopus trochilus*	BoCC4 Amber list	2012	4
Woodcock	*Scolopax rusticola*	BoCC4 Red list	2011	No counts
Woodpigeon	*Columba palumbus*	-	2016	500+
Wren	*Troglodytes troglodytes*	-	2016	No counts
Y				
Yellowhammer	*Emberiza citrinella*	BoCC4 Red list / Section 41 NERC Act 2006	2011	20+

APPENDIX C: BRITISH TRUST FOR ORNITHOLOGY (BTO) CODES

Code	Species	Code	Species	Code	Species
AC	Arctic Skua	G	Green Woodpecker	NK	Red-necked Phalarope
AE	Arctic Tern	GR	Greenfinch	RH	Red-throated Diver
AV	Avocet	GK	Greenshank	LR	Redpoll
BY	Barnacle Goose	H.	Grey Heron	RK	Redshank
BO	Barn Owl	GJ	Greylag Goose	RT	Redstart
BA	Bar-tailed Godwit	P.	Grey Partridge	RE	Redwing
BR	Bearded Tit	GV	Grey Plover	RB	Reed Bunting
BS	Berwick's Swan	GL	Grey Wagtail	RW	Reed Warbler
BI	Battens	GU	Guillemot	RZ	Ring Ousel
BK	Black Grouse	HF	Hawfinch	RI	Ring-necked Parakeet
BH	Black-headed Gull	HH	Hen Harrier	RP	Ringed Plover
BW	Slack-tailed Godwit	HG	Herring Gull	R.	Robin
DV	Black-throated Diver	HY	Hobby	DV	Rock Dove
BX	Black Redstart	HZ	Honey Buzzard	RC	Rock Pipit
B.	Blackbird	HC	Hooded Crow	RO	Rook
BC	Blackcap	HP	Hoopoe	RS	Roseate Tern
TY	Black Guillemot	HM	House Martin	RY	Ruddy Duck
BN	Black-necked Grebe	HS	House Sparrow	RU	Ruff
BJ	Slack Tern	JD	Jackdaw	SM	Sand Martin
BU	Bluethroat	J.	Jay	SS	Sanderling
BT	Blue Tit	K.	Kestrel	TE	Sandwich Tern
BL	Brambling	KF	Kingfisher	VI	Savi's Warbler
BG	Brent Goose	KI	Kittiwake	SQ	Scarlet Rosefinch
BF	Bullfinch	KN	Knot	SP	Scaup
BZ	Buzzard	LM	Lady Amherst's Pheasant	CY	Scottish Crossbill
C.	Carrion Crow	LA	Lapland Bunting	SW	Sedge Warbler
CG	Canada Goose	L	Lapwing	NS	Serin
CP	Capercaillie	TL	Leach's Petrel	SA	Shag
CW	Cetti's Warbler	LB	Lesser B.b. Gull	SU	Shelduck
CH	Chaffinch	IS	Lesser Sp. Woodpecker	SX	Shorelark
CC	Chiffchaff	LW	Lesser Whitethroat	SF	Short-eared Owl
Cl	Chough	LI	Linnet	SV	Shoveler
CL	Cirl Bunting	ET	Little Egret	SK	Siskin
CT	Coat Tit	LG	Little Grebe	S.	Skylark
CD	Collared Dove	LU	Little Gull	SZ	Slavonlan Grebe
CM	Common Gull	LO	Little Owl	SN	Snipe
CS	Common Sandpiper	LP	Little Ringed Plover	SB	Snow Bunting
CX	Common Scoter	AF	Little Tern	ST	Song Thrush
CN	Common Tern	LE	Long-cared Owl	SH	Sparrowhawk
CE	Corncrake	IT	Long-tailed Tit	AK	Spotted Crake
CO	Coot	MG	Magpie	SF	Spotted Flycatcher

Code	Species	Code	Species	Code	Species
CA	Cormorant	MA	Mallard	SG	Starting
CB	Corn Bunting	MN	Mandarin	SD	Stock Dove
CT	Crested Tit	MX	Manx Shearwater	SC	Stonechat
CR	Crossbill	MR	Marsh Harrier	TN	Stone-curfew
CK	Cuckoo	MT	Marsh Tit	TM	Storm Petrel
CU	Curlew	MW	Marsh Warbler	SL	Swallow
DW	Dartford Warbler	MP	Meadow Pipit	SI	Swift
DI	Dipper	MU	Mediterranean Gull	TO	Tawny Owl
DO	Dotterel	ML	Marlin	T.	Teal
DN	Dunlin	M.	Mistle Thrush	TK	Temminck's Stint
D.	Dunnock	MH	Moorhen	TP	Tree Pipit
EG	Egyptian Goose	MO	Montagu's Harrier	TS	Tree Sparrow
E.	Eider	MS	Mute Swan	TC	Treecreeper
FP	Feral Pigeon	N.	Nightingale	TU	Tufted Duck
FF	Fieldfare	NJ	Nightjar	TT	Turnstone
FC	Firecrest	NH	Nuthatch	TD	Turtle Dove
F.	Fulmar	OP	Osprey	TW	Twite
GA	Gadwall	OC	Oystercatcher	WA	Water Rail
GX	Gannet	PE	Peregrine	W.	Wheatear
GW	Garden Warbler	PH	Pheasant	WM	Whimbrel
GY	Garganey	PF	Pied Flycatcher	WC	Whinchat
GC	Goldcrest	Par	Pled Wagtail	WO	White-fronted Goose
EA	Golden Eagle	PT	Pintail	WH	Whitethroat
OL	Golden Oriole	PO	Pochard	WS	Whooper Swan
GF	Golden Pheasant	PG	Pink-footed Goose	WN	Wigeon
GP	Golden Plover	PM	Ptarmigan	WT	Willow Tit
GN	Goldeneye	PU	Puffin	WW	Willow Warbler
GO	Goldfinch	PS	Purple Sandpiper	WO	Wood Warbler
GD	Goosander	Q.	Quail	WK	Woodcock
GI	Goshawk	RN	Raven	WL	Woodlark
GH	Grasshopper Warbler	RA	Razorbill	WP	Woodpigeon
GB	Great B.b. Gull	RG	Red Grouse	OD	Wood Sandpiper
GG	Great Crested Grebe	ED	Red-backed Shrike	WR	Wren
ND	Great Northern Diver	RM	Red-breasted Merganser	WY	Wryneck
GS	Great Spotted Woodpecker	RQ	Red-crested Pochard	YW	Yellow Wagtail
NX	Great Skua	FV	Red-footed Falcon	Y.	Yellowhammer
GT	Great Tit	KT	Red Kite		
GE	Green Sandpiper	RL	Red-legged Partridge		

APPENDIX D: BREEDING BIRD SURVEY RESULTS 2014

* Birds of conservation concern have been updated in line with the lists Birds of Conservation Concern published in 2015[Error! Bookmark not defined.].

Species	Latin Name	Conservation Status*
Barn owl	*Tyto alba*	WCA Sch.1.
Blackbird	*Turdus merula*	-
Blackcap	*Sylvia atricapilla*	-
Blue Tit	*Parus caeruleus*	-
Bullfinch	*Pyrrhula pyrrhula*	BOCC Amber List and Section 41 NERC Act.
Carrion Crow	*Corvus corone corone*	-
Chaffinch	*Fringilla coelebs*	-
Chiffchaff	*Phylloscopus collybita*	-
Coal Tit	*Periparus ater*	-
Collared Dove	*Streptopelia decaocto*	-
Coot	*Fulica atra*	-
Dunnock	*Prunella modularis*	BOCC Amber List and Section 41 NERC Act.
Goldfinch	*Carduelis carduelis*	-
Great black backed gull	*Larus marinus*	BOCC Amber List
Great spotted woodpecker	*Dendrocopos major*	-
Great Tit	*Parus major*	-
Grey Heron	*Ardea cinerea*	-
Grey Partridge	*Perdix perdix*	BOCC Red List and NERC Act Section 41.
Herring Gull	*Larus argentatus*	BOCC Red List and NERC Act Section 41.
House Sparrow	*Passer domesticus*	BOCC Red List and NERC Act Section 41. Durham LBAP.
Jackdaw	*Corvus monedula*	-
Jay	*Garrulus glandarius*	-
Lapwing	*Vanellus vanellus*	BOCC Red List and NERC Act Section 41. Durham LBAP.

Species	Latin Name	Conservation Status*
Kestrel	*Falco tinnunculus*	BOCC Amber List
Lesser Whitethroat	*Sylvia curruca*	-
Kingfisher	*Alcedo atthis*	WCA Sch.1, BOCC Amber List.
Magpie	*Pica pica*	-
Mallard	*Anas platyrhynchos*	BOCC Amber List
Meadow Pipit	*Anthus pratensis*	BOCC Amber List
Moorhen	*Gallinula chloropus*	-
Mute Swan	*Cygnus olor*	BOCC Amber List
Nuthatch	*Sitta europaea*	-
Pheasant	*Phasianus colchicus*	-
Pied Wagtail	*Motacilla alba*	-
Reed Bunting	*Emberiza schoeniclus*	BOCC Amber List and NERC Act Section 41. Durham LBAP.
Reed Warbler	*Acrocephalus scirpaceus*	-
Robin	*Erithacus rubecula*	-
Skylark	*Alauda arvensis*	BOCC Red List and NERC Act Section 41. Durham LBAP.
Song Thrush	*Turdus philomelos*	BOCC Red List and NERC Act Section 41. Durham LBAP.
Starling	*Sturnus vulgaris*	BOCC Red List and NERC Act Section 41. Durham LBAP.
Swallow	*Hirundo rustica*	-
Swift	*Apus apus*	BOCC Amber List.
Whitethroat	*Sylvia communis*	
Willow Warbler	*Phylloscopus trochilus*	BOCC Amber List.
Woodpigeon	*Columba palumbus*	-
Wren	*Troglodytes troglodytes*	-
Yellowhammer	*Emberiza citrinella*	BOCC Red List and NERC Act Section 41.

A19 / A184 Testos Junction Improvement and Downhill Lane Junction Improvement

Wintering Bird Report

Version 0

Document reference: B0140301/OD/201

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CONTENTS

EXECUTIVE SUMMARY

A desk study and wintering bird surveys were undertaken by Jacobs UK Ltd (Jacobs) on behalf of Highways England.

The purpose of this report was to establish an ecological baseline for wintering birds to inform an Environmental Impact Assessment (EIA) for the proposed A19 Testos and Downhill Lane Junctions Improvement.

A desk study exercise was carried out in October 2016 to obtain records of wintering birds up to 2 km from the scheme as well as Statutory and non-Statutory Designated sites with value for wintering birds.

The desk study found a total of 105 species within 2 km of the site. Results of the desk study found 62 species which were at on at least one of the following: Red List (25), Amber UK (36), NERC Priority Species (18), Species on Schedule 1 of the WCA 1981 (as amended) (10) (see Appendix B for the detailed list).

The 2014 wintering bird surveys undertaken by Jacobs identified the following species of conservation interest:

- 2 species listed on Schedule 1 (Part 1) of the WCA (as amended); fieldfare and redwing
- 11 'Species of Principal Importance', Section 41, NERC Act 2006; bullfinch, dunnock (*Prunella modularis),* grey partridge, herring gull (*Larus argentatus*), house sparrow (*Passer domesticus*), lapwing (*Vanellus vanellus*), linnet, marsh tit (*Poecile palustris*), skylark, song thrush and starling
- 13 species on the Red List of Birds of Conservation Concern 4 2015; fieldfare, grey partridge, grey wagtail, herring gull, house sparrow, lapwing, linnet, marsh tit, redwing, skylark, song thrush, starling (*Sturnus vulgaris*), woodcock (*Scolopax rusticola*).
- 11 species on the Amber List of the Birds of Conservation Concern 4 2015; black-headed gull (*Chroicocephalus ridibundus*), bullfinch, common gull (*Larus canus*), dunnock, kestrel, lesser black-backed gull (*Larus fuscus),* mallard, meadow pipit, mute swan and snipe.
- 8 Durham Biodiversity Action Plan Species; and
- 22 common undesignated species.

1 INTRODUCTION

1.1 Overview

1.1.1 Jacobs was commissioned by Highways England to establish a baseline for wintering birds at the location of proposed improvements for the Testos and Downhill Lane Junctions. The junctions were located along the A19 in South Tyneside at respective approximate Ordnance Survey Grid References (OSGRs): NZ 33808 60913 and NZ 34151 59862.

1.1.2 Testos Junction connected to the A19 and the A184, at approximately 4.2 km south of the Tyne Tunnel. Downhill Lane Junction was located approximately 1.1 km south of the Testos Junction and linked the A19 to the A1290.

1.1.3 The surveys were required to inform the ecology chapter of the Environmental Impact Assessment (EIA), to support the Development Consent Order.

1.2 Report rationale

1.2.1 A desktop study and a wintering bird survey were last undertaken by Jacobs ecologists in 2014 to inform works at the proposed A19 Testos Junction Improvements.

1.2.2 As the footprint of the works has now been extended to include Downhill Lane Junction the aim of this report is:

- To update the desk study results
- To provide up to date baseline information regarding wintering birds' nature conservation status based on the Birds of Conservation Concern List 4[1].
- To inform future planned operations and mitigation strategies.

1.2.3 Updated baseline information in relation to wintering birds will be based on surveys undertaken by Jacobs in 2014 supplemented by wintering bird survey information provided by Sunderland City Council in relation to the proposed International Advanced Manufacturing Park (IAMP) development in 2014[2] and 2015[3].

1.3 Definitions

1.3.1 The proposals refer to the footprint of the proposed development (scheme boundary).

1.3.2 The study area refers to a 2 km buffer around the proposals for which a desk study has been undertaken to identify wintering bird records.

1.3.3 The survey area refers to a 500 m buffer around the proposals in which the wintering bird surveys have taken place.

1.4 Legislation and Regulatory Context

1.4.1 An assessment of the legislative and regulatory framework covering breeding birds in the UK has been undertaken. Due consideration has been given to the following statutory instruments and regulatory frameworks in the preparation of this report:

[1] Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Concervation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. *British Birds* 108, 708-746.
[2] White Young Green (WYG) (2015) Sunderland City Council Land North of Nissan Final Report 2015.
[3] ARUP (2016) IAMP Ornithological Data Analysis – Supporting Notes – Version 2.

- Directive 2009/147/EC(Birds Directive, 2009) on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended)[4];
- Conservation of Habitats and Species Regulations 2010 (as amended)[5];
- Wildlife and Countryside Act 1981 (as amended)[6] (WCA);
- Natural Environment and Rural Communities Act 2006[7] (NERC), and;
- National Planning Policy Framework, and;
- Durham Local Biodiversity Action Plan (Durham LBAP)[8].

1.4.2 Appendix A provides an overview of the above in relation to birds.

[4] http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

[5] http://www.legislation.gov.uk/uksi/2010/490/pdfs/uksi_20100490_en.pdf

[6] http://www.legislation.gov.uk/ukpga/1981/69

[7] http://www.legislation.gov.uk/ukpga/2006/16/pdfs/ukpga_20060016_en.pdf

[8] http://www.durhambiodiversity.org.uk/biodiversity-action-plan/priority-species/ (Accessed June 2014)

2 METHODOLOGY

2.1 Desk study

2.1.1 A desk study was conducted in November 2016 to obtain records of designated statutory and non-statutory sites and bird species within a 2 km buffer of the proposals scheme. Only recent records (2006 to 2016) were included in the desk study.

2.1.2 The following consultees and web resources were used or contacted to determine any historical records of birds within the study area.

- Environment Records Information Centre for the North East (ERIC North East);
- Bird Track (htto://blx1.bto.org/birdtrack/main/data-home.jsp) accessed for bird records on 3rd December 2014;
- Durham Biodiversity Action Plan (BAP);
- Durham Local RSPB Group and Durham Bird Club (Not responded);
- Joint Nature Conservation Committee (JNCC) and Natural England for statutory sites data, and;
- Multi Agency Geographic Information for the Countryside (MAGIC).

2.1.3 Although the data provided by the consultees and web based search is the most complete set of species data available, the absence of records should not be taken as an indication of absence of species.

2.2 Previous Survey Information

Jacobs Wintering Bird Surveys

2.2.1 Previous wintering bird surveys were undertaken by Jacobs for the A19 Testos Junction Improvement project in 2007. Update surveys for wintering birds were undertaken over four survey visits on 28, 29 and 30 October 2014, 24, 25 and 26 November 2014, 8 and 9 December 2014 and 8 and 9 January 2015 by Jacobs Ecologists. Due to the size the study area it was separated into four transects to sample the range of habitats present. Table 1 below provides a brief description of each transect and the habitats they encompassed.

Table 1: Wintering Bird Transects, undertaken between October 2014 and January 2015; Habitat Descriptions

Transect	Habitat Description
1	Arable farmland with species poor hedgerows north west of Testos Junction.
2	Industrial estate with landscape planting east of the A19. In addition, the study area incorporates Boldon Lake LWS which comprises a large open water body with associated marginal and grassland habitats.
3	Arable farmland with species poor hedgerows south west of Testos Junction and a small area of semi natural broad-leaved woodland adjacent to Elliscope Farm. This part of the study area also incorporates a section of the River Don.

Transect	Habitat Description
4	This area comprises a mosaic of habitats types south east of Testos Junction including: Mount Pleasant Marsh Local Wildlife Site (LWS), Make-me-Rich Meadow LWS, arable farmland with species poor hedgerows, broad-leaved woodland and a section of the River Don. The LWSs encompass areas of open water, dense scrub, plantation woodland and grassland habitats.

2.2.2 The survey methodology was based on the British Trust for Ornithology's (BTO) Wintering Farmland Bird Survey methodology and generic wintering bird monitoring methods (Gilbert et al 1998).

2.2.3 For the purposes of this report wintering bird survey results from Jacobs surveys undertaken in 2014 are presented on Figures 1 to 15, and a summary is listed in Appendix D. Birds of conservation concern have been updated in line with the lists Birds of Conservation Concern published in 2015[9].

IAMP Wintering Bird Surveys 2014

2.2.4 WYG were commissioned by Sunderland City Council in April 2014 to undertake a range of ecological surveys including wintering bird surveys at an area of land north of the Nissan car manufacturing plant, in Sunderland. The survey area for this project overlapped in some areas with the survey area for the Testos and Downhill Lane Junction Improvement Scheme.

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

3 BASELINE

3.1 Desk Study

Statutory and non-Statutory Designated Sites

3.1.1 Statutory and non-Statutory Designated Sites (with relevance to birds) found within a 2km radius of the proposals are listed in Table 2 below.

Table 2: Statutory and non-Statutory Designated Sites with Relevance to Birds within 2 km of the Proposed Scheme.

Site Name	Distance from the Proposals	Value for birds
Statutory		
Primrose (Nature Reserve)	1580 m	The LNR forms part of the River Don corridor and has been known to support birds including reed bunting *Emberiza schoeniclus*, mallard *Anas platyrhynchos*, moorhen *Gallinula chloropus* and coot *Fulica atra*.
Non-Statutory		
Mount Pleasant Marsh (LWS)	0 m	The ponds play host to grey heron *Ardea cinerea*, kingfisher *Alcedo atthis* and breeding mallard, moorhen, coot and reed bunting. Elsewhere the site is used by a wide range of birds such as bullfinch *Pyrrhula pyrrhula*, willow tit *Poecile montanus*, great spotted woodpecker *Dendrocopos major* and a good density of commoner woodland species.
Downhill Old Quarry (LWS)	310 m	Bullfinch and song thrush *Turdus philomelos* use the site, whilst barn owl *Tyto alba* was regularly present until around 2003.
Downhill Meadows (LWS)	530 m	Small areas of rank grassland probably attract birds of prey, such as kestrel *Falco tinnunculus* to the site.
Station Burn (LWS)	830 m	Birds such as moorhen, mallard, grey wagtail *Motacilla cinerea* and kingfisher regularly use the river. The scrub is favoured by breeding birds such as whitethroat *Sylvia communis* and yellowhammer *Emberiza citrinella*, whilst willow tit winter at the site.
Hilton Castle Grassland (LWS)	950 m	Ground nesting birds include skylark *Alauda arvensis* and meadow pipit *Anthus pratensis*. Scattered areas of scrub provide a habitat for several other bird species such as linnet *Linaria cannabina*, yellowhammer and whitethroat.
Peepy Plantation (LWS)	960 m	A mature plantation notable for woodland birds. Many willows fringe the pond which provides breeding habitats for birds such as moorhen, sedge warbler *Acrocepgalus schoenobaenus*, yellowhammer, redpoll *Acanthis flammea*, garden warbler *Sylvia borin* and grasshopper warbler *Locustella naevia*, spotted flycatcher *Muscicapa striata*, great spotted woodpecker and tawny owl *Strix aluco*. In winter brambling *Fringilla montifringilla* and mixed flocks of thrushes roost here. Long-eared owls *Asio otus* have recently been reported as a breeding species.
Hylton Dene (LWS)	1030 m	Woodland birds include whitethroat, willow warbler *Phylloscopus trochilus*, blackcap *Sylvia atricapilla*, garden warbler, yellowhammer, linnet, bullfinch, goldfinch *Carduelis carduelis* and long-tailed tit *Aegithalos caudatus*.

Site Name	Distance from the Proposals	Value for birds
Hylton Plantation (LWS)	1120 m	Communities of breeding birds include yellowhammer, linnet, redpoll, blackcap, whitethroat, willow warbler, titmice *Paridae*, great spotted woodpecker and tawny owls.
Newton Garths (LWS)	1260 m	Breeding farmland birds include yellowhammer and grey partridge *Perdix perdix*.
Barons Quay Wood and Barons Quay (LWS)	1330 m	Breeding birds include lesser whitethroat *Sylvia curruca*, willow warbler, garden warbler and bullfinch.
Boldon Colliery Former Railway Line (LWS)	1340 m	It is a length of disused railway embankment which supports winter migrants in the form of fieldfare *Turdus pilaris*, redwing *Turdus iliacus* and long-eared owls.
River Don East House(LWS)	1430 m	The site has previously supported large numbers of fieldfare and redwing during winter.
Lakeside Inn, Felling (LWS)	1660 m	Bird species present include reed bunting, white throat and willow warbler.
Severn Houses (LWS)	1700 m	Breeding birds include snipe *Gallinago gallinago*, moorhen and reed bunting.
Timber Beach (LWS)	1800 m	The site offers feeding grounds for seasonal migrating birds. The areas of saltmarsh and intertidal mud also include feeding ground for small numbers of redshank *Tringa totanus* and dunlin *Calidris alpina* as well as other wading birds on passage migration, whilst adjacent hawthorn scrub is an important source of food and shelter for large numbers of fieldfares and redwings during the winter months of the year.
Claxheugh Riverside (LWS)	1830 m	Offers feeding grounds for migrant wading birds.
Barmston Pond (LWS)	1890 m	Planting to the east has provided extra cover for many nesting and wintering birds. The pond is noted for attracting migrant wading birds. Breeding birds include moorhen, coot, mallard, gadwall *Anas strepera* and snipe. Large numbers of wintering and passage migrant birds visit the area. Low water levels in autumn attract a wide variety of migrant wading birds including regular greenshank *Tringa nebularia*, spotted redshank *Tringa erythropus*, ruff *Philomachus pugnax*, black-tailed godwit *Limosa limosa* and wood sandpiper *Tringa glareola*. Wintering birds include mute swan *Cygnus olor* and whooper swans *Cygnus cygnus*, coot, mallard, wigeon *Mareca* and pochard *Aythya farina* whilst spoonbill *Platalea leucorodia*, garganey *Anas querquedula*, Bewick's swan *Cygnus columbianus*, short-eared owl *Asio flammeus*, barn owl, merlin *Falco columbarius* and black tern *Chlidonias niger* have visited the site in recent years.

Site Name	Distance from the Proposals	Value for birds
Hylton Colliery pond (LWS)	1970 m	The pond is invertebrate rich and attracting breeding birds such as moorhen and mallard. Birds found here include willow warbler, blackcap, lesser whitethroat, whitethroat, garden warbler, bullfinch and long tailed tit.
Follingsby (LWS)	2000 m	Notable bird species utilising the area during the winter period includes long-eared and short-eared owls.

Desk Study Species Results

3.1.2 The desk study undertaken in November 2016 found a total of 105 species within 2 km of the site. A review of these records identified 62 species of conservation interest as follows:

- 10 species listed under Schedule 1 (Part 1) of the WCA (as amended);
- 18 'Species of Principal Importance', Section 41, NERC Act 2006;
- 25 species on the Red List of Birds of Conservation Concern; and
- 36 species on the Amber list of the Birds of Conservation Concern.

3.1.3 Appendix B provides details of the species of conservation concern listed above.

3.2 Survey Results Review

Jacobs Wintering Birds Survey 2014

3.2.1 The 2014 wintering bird surveys undertaken by Jacobs identified the following species of conservation interest:

- 2 species listed on Schedule 1 (Part 1) of the WCA (as amended); fieldfare and redwing
- 11 'Species of Principal Importance', Section 41, NERC Act 2006; bullfinch, dunnock (*Prunella modularis),* grey partridge, herring gull (*Larus argentatus*), house sparrow (*Passer domesticus*), lapwing (*Vanellus vanellus*), linnet, marsh tit (*Poecile palustris*), skylark, song thrush and starling
- 13 species on the Red List of Birds of Conservation Concern 4 2015; fieldfare, grey partridge, grey wagtail, herring gull, house sparrow, lapwing, linnet, marsh tit, redwing, skylark, song thrush, starling (*Sturnus vulgaris*), woodcock (*Scolopax rusticola*).
- 11 species on the Amber List of the Birds of Conservation Concern 4 2015; black-headed gull (*Chroicocephalus ridibundus*), bullfinch, common gull (*Larus canus*), dunnock, kestrel, lesser black-backed gull (*Larus fuscus),* mallard, meadow pipit, mute swan and snipe.
- 8 Durham Biodiversity Action Plan Species; and
- 22 common undesignated species.

3.2.2 Two of the Amber species identified during the wintering bird surveys 2015 moved from Amber to Red – grey wagtail and woodcock and one species moved from Green to Amber – mute swan, according to the BoCC4 (2015).

3.2.3 Figures 1-15 show the results of 2014 wintering bird surveys by Jacobs. Appendix C provides a key of the BTO codes shown on these figures. Appendix D lists all species recorded during the surveys and their conservation status.

IAMP Wintering Birds Survey 2014

3.2.4 The 2014 wintering bird survey undertaken by IAMP in 2014 identified the following species of conservation interest:

- 6 species listed under Schedule 1 (Part 1) of the WCA (as amended) - fieldfare, kingfisher, Mediterranean gull (*Larus melanocephalus*), merlin, peregrine (*Falco peregrinus)* and redwing. The fieldfare, kingfisher, merlin, peregrine and redwing are all considered to be resident within the survey area during the winter period, whilst the Mediterranean gull being recorded on only a single occasion is considered to relate to a bird passing through the site.
- 13 species on the Red List of Birds of Conservation Concern 4 2015 - grey partridge, herring gull, house sparrow, lapwing, lesser redpoll (*Carduelis cabaret*), linnet, skylark, song thrush, starling, tree sparrow, willow tit, yellow wagtail and yellowhammer; and
- 23 species on the Amber List of Birds of Conservation Concern 4 2015 - black-headed gull, bullfinch, common gull, dunnock, great black-backed gull, greylag goose (*Anser anser*), kestrel, lesser black-backed gull, mallard, meadow pipit, pink-footed goose (*Anser brachyrhynchus*), redshank, reed bunting, short-eared owl, snipe, stock dove (*Columba oenas*), curlew (*Numenius arquata*), grey wagtail, mistle thrush (*Turdus viscivorus*), woodcock, teal (*Anas crecca*), green woodpecker (*Picus viridis*) and jack snipe (*Lymnocryptes minimus*).

3.2.5 According to the BoCC4 (2015), curlew, grey wagtail, mistle thrush and woodcock have now moved to the Red list while green woodpecker and jack snipe previously recorded as Amber species have now moved to the Green list.

4 DISCUSSION AND CONCLUSIONS

4.1.1 The desk study found a total of 105 species within 2 km of the site. Results of the desk study found 62 species which were at on at least one of the following: Red List (25), Amber UK (36), NERC Priority Species (18), Species on Schedule 1 of the WCA 1981 (as amended) (10) (see Appendix B for the detailed list).

4.1.2 The results of the surveys conducted in 2014 are discussed in family groupings in the following paragraphs

4.1.3 **Passerines (perching species) -** red listed species of conservation significance in the form of linnet, skylark, starling, house sparrow, song thrush and marsh tit were recorded within the study area.

4.1.4 Over-wintering migratory fieldfare and redwing were widespread in the study area and their occurrence was predominantly related to less intensively managed hedgerows, with berry producing scrub present as a food resource. Both species are listed under Schedule 1 (Part 1) of the WCA 1981.

4.1.1 **Waders and wildfowl -** large flocks of between 80 to 100 lapwings (were identified in flight, and observed utilising recently cultivated farmland in the northwest of the study area. In addition lapwing was observed in significant numbers within the confines of West House Farm land holdings.

4.1.2 **Gulls -** black-headed gull were recorded using the open water habitats of Boldon Lake LWS. The common gull was widespread in the study area, with abundant individuals/small groups noted during each survey visit. Occasional sightings of lesser black-backed gull and herring gull were also recorded. Notably, red listed herring gulls were recorded foraging within the grassland habitats present within the Boldon Industrial Estate.

4.1.3 **Raptors (birds of prey)** - a number of Amber listed kestrels were recorded during each survey; individuals were observed using the rough grassland habitats present within the study area, to hunt prey.

4.1.4 The majority of bird species recorded during the surveys are general inhabitants of arable/pastoral farmland/hedgerows and are widespread constituents of the British avian fauna. The bird assemblage recorded reflects the semi-natural vegetation present within the study area, including semi-improved grassland and hedgerows. However, a number of birds of conservation concern were encountered during the course of the surveys and are therefore considered relevant to consider during the ongoing design proposals.

4.1.5 As part of the environmental impact assessment (EIA) process, specific consideration will be given to bird species of conservation concern. The EIA process also considers the potential to deliver enhancements. Proposed mitigation and enhancement measures will be presented within the 'Ecology and Nature Conservation' chapter of the forthcoming Environmental Statement.

5 REFERENCES

Durham Biodiversity Action Plan (2014). *Priority Species*. Available from: http://www.durhambiodiversity.org.uk/biodiversity-action-plan/priority-species/

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

Gilbert G, Gibbons DW, Evans J (1998) Bird Monitoring Methods. RSPB.

Figures

A key for the BTO codes shown on each figure can be found in Appendix C

FIGURE 1

Legend

- A19 Design 500m Buffer

Walked Transects Route

- Transect 1
- Transect 2
- Transect 3
- Transect 4

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	JUL 14	Initial Issue	IM	LY	AM	GW

JACOBS
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Client: highways england

Project: A19 / A184 TESTOS JUNCTION IMPROVEMENT

Drawing Title: WINTERING BIRDS SURVEY
WALKED TRANSECT ROUTES

Drawing Status:

Scale @ A3	1:12,500	DO NOT SCALE
Jacobs No.	B0140301	
Client No.		

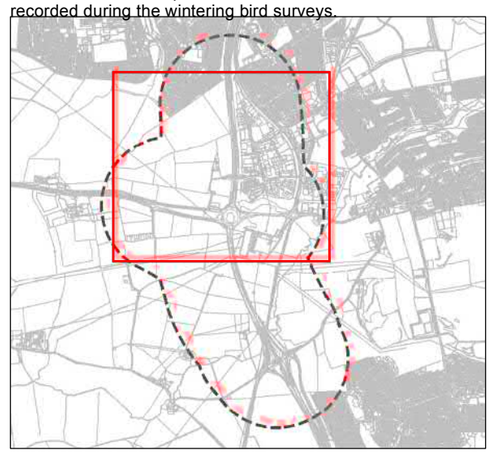
Drawing No.: B0140301_EC_WB_01

FIGURE 2

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.



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0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	DEC 14	Initial Issue	IM	LY	AM	AM

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Project: A19 / A184 TESTOS JUNCTION IMPROVEMENT

Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 1
FIGURE 1 of 2

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
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Client No.		

Drawing No.: B0140301_EC_WB_02

FIGURE 3

Legend

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- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	DEC 14	Initial Issue	IM	LY	AM	AM

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Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 1
FIGURE 2 of 2

Drawing Status	FINAL	
Scale @ A3	1:5,000	DO NOT SCALE
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Client No.		
Drawing No.	B0140301_EC_WB_03	

FIGURE 4

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	DEC 14	Initial Issue	IM	LY	AM	AM

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Drawing Title: WINTERING BIRDS SURVEY RESULTS SURVEY 2 FIGURE 1 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140301	
Client No.		

Drawing No.: B0140301_EC_WB_04

FIGURE 5

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
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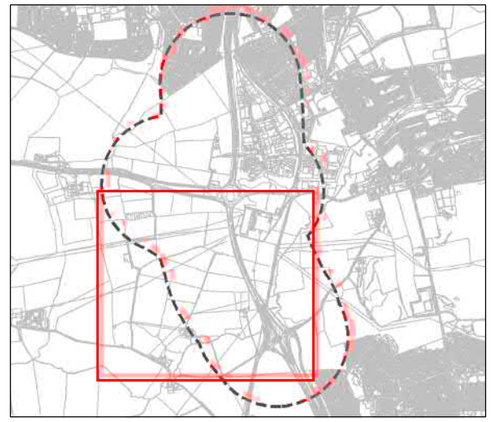
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.



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0	DEC 14	Initial Issue	IM	LY	AM	AM

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Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 2
FIGURE 2 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		

Drawing No.: B0140300_EC_WB_05

FIGURE 6

Legend

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- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	DEC 14	Initial Issue	IM	LY	AM	AM

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Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 2
FIGURE 3 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
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Client No.		

Drawing No.: B0140300_EC_WB_06

FIGURE 7

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	DEC 14	Initial Issue	IM	LY	AM	AM

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Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 2
FIGURE 4 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
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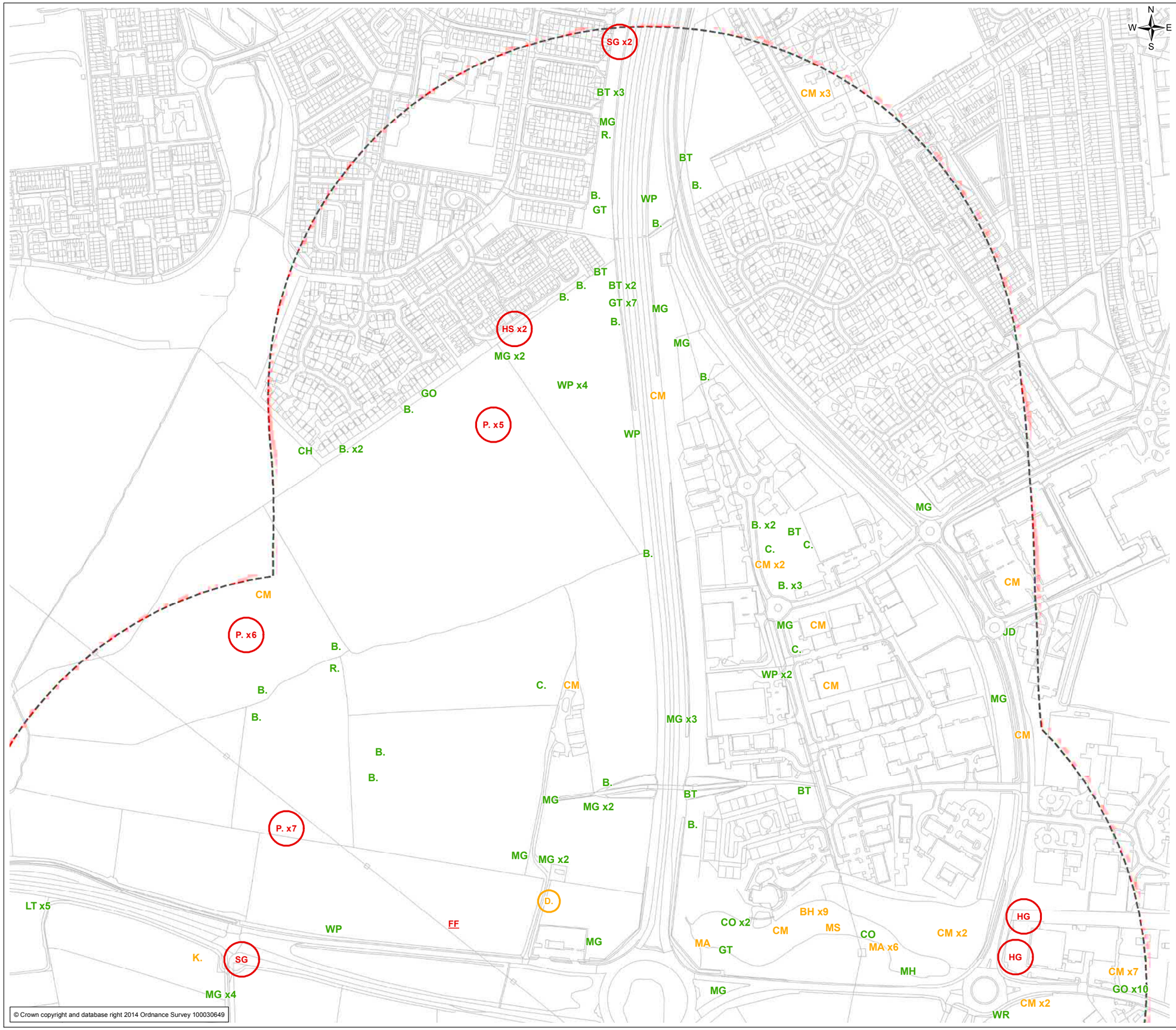
Client No.		

Drawing No.: B0140300_EC_WB_07

FIGURE 8



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- A19 Design 500m Buffer
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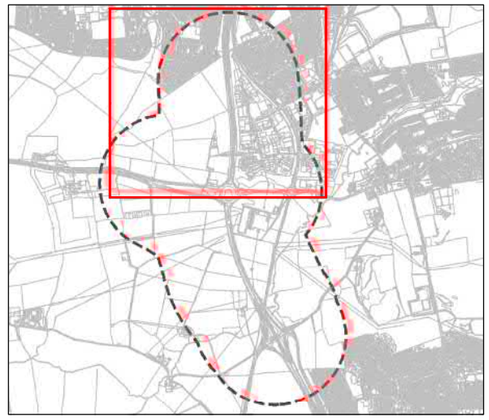
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.



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Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 3
FIGURE 1 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		
Drawing No.	B0140300_EC_WB_08	

FIGURE 9

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	DEC 14	Initial Issue	IM	MR	AM	AM

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Client: highways england

Project: A19 / A184 TESTOS JUNCTION IMPROVEMENT

Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 3
FIGURE 2 of 4

Drawing Status	FINAL	
Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		
Drawing No.	B0140300_EC_WB_09	

FIGURE 10

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	DEC 14	Initial Issue	IM	MR	AM	AM

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Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 3
FIGURE 3 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		

Drawing No.: B0140300_EC_WB_10

FIGURE 11

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	DEC 14	Initial Issue	IM	MR	AM	AM

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Project: A19 / A184 TESTOS JUNCTION IMPROVEMENT

Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 3
FIGURE 4 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		

Drawing No.: B0140300_EC_WB_11

FIGURE 12

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	JAN 15	Initial Issue	IM	MR	AM	AM

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Client: highways england

Project: A19 / A184 TESTOS JUNCTION IMPROVEMENT

Drawing Title: WINTERING BIRDS SURVEY RESULTS SURVEY 4 FIGURE 1 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		

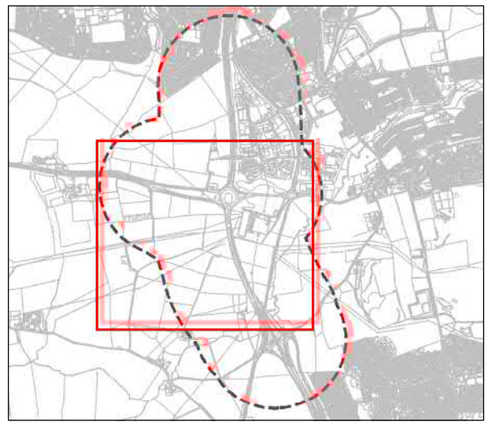
Drawing No.: B0140300_EC_WB_12

FIGURE 13

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	JAN 15	Initial Issue	IM	MR	AM	AM

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Client: highways england

Project: A19 / A184 TESTOS JUNCTION IMPROVEMENT

Drawing Title: WINTERING BIRDS SURVEY RESULTS SURVEY 4 FIGURE 2 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		

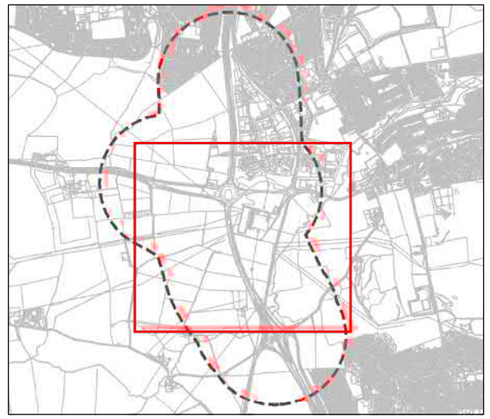
Drawing No.: B0140300_EC_WB_13

FIGURE 14

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	JAN 15	Initial Issue	IM	MR	AM	AM

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Client: highways england

Project: A19 / A184 TESTOS JUNCTION IMPROVEMENT

Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 4
FIGURE 3 of 4

Drawing Status: FINAL

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		

Drawing No.: B0140300_EC_WB_14

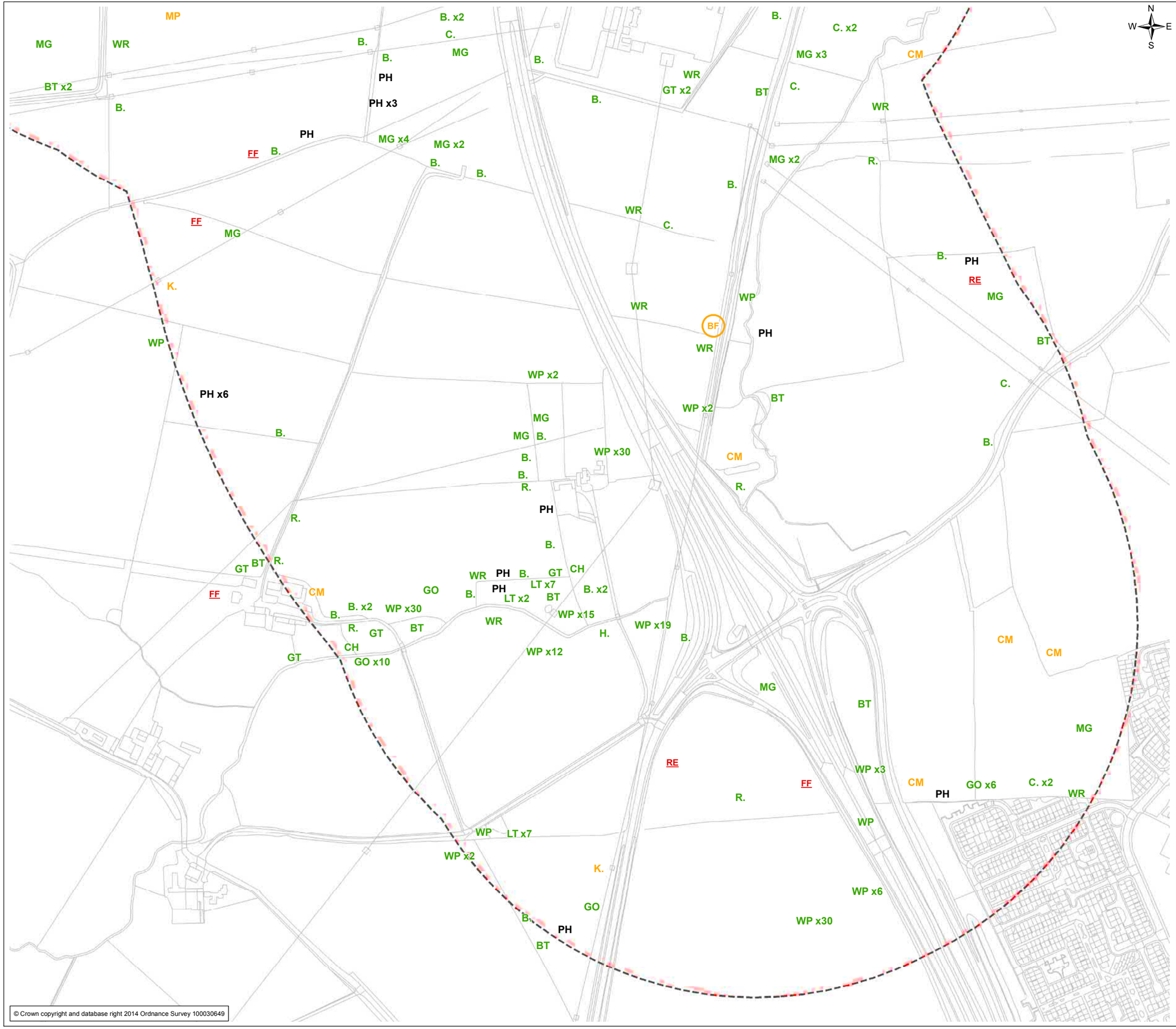

FIGURE 15

Legend

- A19 Design 500m Buffer
- XX No Conservation Status,
- XX Green List Species (low conservation concern),
- XX Amber List Species (medium conservation concern),
- XX Amber List Species (medium conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern),
- XX Red List Species (high conservation concern), Natural Environment and Rural Communities Act 2006 Species of Principal Importance
- XX Red List Species (high conservation concern), Species listed on Schedule 1 of Wildlife and Countryside Act 1981

N.B. No schedule 1 species that are also Amber listed were recorded during the wintering bird surveys.

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	MAR 17	Update BTO Code	IM	AT	AM	GW
0	JAN 15	Initial Issue	IM	MR	AM	AM

JACOBS
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Tel: +44(0)113 242 6771 Fax:+44(0)113 389 1389
www.jacobs.com

Client: highways england

Project: A19 / A184 TESTOS JUNCTION IMPROVEMENT

Drawing Title: WINTERING BIRDS SURVEY RESULTS
SURVEY 4
FIGURE 4 of 4

Drawing Status	FINAL	
Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		
Drawing No.	B0140300_EC_WB_15	

APPENDIX A LEGISLATION AND POLICY BACKGROUND

European Wild Birds Directive

The Wild Birds Directive (WBD) first came into force in April 1979 (EC Directive on the conservation of wild birds (79/409/EEC) and was updated in 2009 (Directive 2009/147/EC on the conservation of wild birds). It covers the protection, management and conservation of all species of naturally occurring wild birds in the European territory of member states. In particular it requires Member States to identify and give special protection to areas for the rare or vulnerable species listed in Annex 1 of the Directive and for regularly occurring migratory species.

A Special Protection Area (SPA) is an area of land, water or sea which has been identified as being of international importance for the breeding, feeding, wintering or the migration of rare and vulnerable species of birds found within the European Union. SPAs are European designated sites, classified under the European Wild Birds Directive which affords them enhanced protection.

The Conservation of Habitats and Species Regulations 2010

The Conservation of Habitats and Species Regulations 2010 consolidate all the various amendments made to the Conservation (Natural Habitats, &c.) Regulations 1994 in respect of England and Wales. The 1994 Regulations transposed Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law.

The 2010 Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European sites.

The Regulations place a duty on the Secretary of State to propose a list of sites which are important for either habitats or species (listed in Annexes I and II of the Habitats Directive respectively) to the European Commission. Once the Commission and EU Member States have agreed that the sites submitted are worthy of designation, they are identified as Sites of Community Importance (SCIs). The EU Member States must then designate these sites as Special Areas of Conservation (SACs) within six years. The Regulations also require the compilation and maintenance of a register of European sites, to include SACs and Special Protection Areas (SPAs) classified under Council Directive 79/409/EEC on the Conservation of Wild Birds (the Birds Directive). These sites form a network termed Natura 2000.

Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act (WCA) states that all wild birds are protected. Under the WCA, it is an offence to kill, injure or take any wild bird, take, damage or destroy the nest of any wild bird, or take or destroy the egg of any wild bird. A special penalty is levied to any of the above offences being committed in conjunction with a bird listed on Schedule 1 of the WCA. It is also an offence if a person disturbs any bird listed on Schedule 1 while it is building a nest, on or near a nest containing young, or disturbs dependent young of such a bird. The Countryside and Rights of Way Act 2000, has subsequently made it an offence to intentionally and recklessly disturb a Schedule 1 species as above.

Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006- Habitats and Species of Principal Importance in England

The England Biodiversity List has been developed to meet the requirements of Section 41 (S41) of the Natural Environment and Rural Communities Act (2006). This legislation requires the Secretary of State to publish a list of species of flora and fauna and habitats considered to be of principal importance for the purpose of conserving biodiversity.

The S41 list will be used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006 “to have regard” to the conservation of biodiversity in England, when carrying out their normal functions. In particular:

Regional Planning Bodies and Local Planning Authorities will use it to identify the species and habitats that should be afforded priority when applying the requirements of the National Planning Policy Framework (NPPF) to maintain, restore and enhance species and habitats.

Local Planning Authorities will use it to identify the species and habitats that require specific consideration in dealing with planning and development control, recognising that under NPPF the aim of planning decisions should be to avoid harm to all biodiversity.

All public bodies will use it to identify species or habitats that should be given priority when implementing the NERC Section 40 duty.

Durham Biodiversity Action Plan

The Durham BAP is relevant to the study area. Accordingly, a number of habitats and species described in these plans are relevant to future impact assessments detailed in the Environmental Statement. Of relevance to this study is the SAP for Birds, which identifies lapwing (*Vanellus vanellus*), yellow wagtail (*Motacilla flava*), skylark (*Alauda arvensis*), corn bunting (*Emberiza calandra*), linnet (*Carduelis cannabina*), reed bunting (*Emberiza schoeniclus*), bullfinch (*Pyrrhula pyrrhula*), starling (*Sturnus vulgaris*), tree sparrow (*Passer montanus*), redshank (*Tringa tetanus*), nightjar (*Caprimulgus europaeus*), snipe (*Gallinago gallinago*), spotted flycatcher (*Muscicapa striata*), black grouse (*Tetrao tetrix*), dunlin (*Calidris alpina*), hen harrier (*Circus cyaneus*), merlin (*Falco columbarius*), peregrine (*Falco peregrinus*), raven (*Corvus corax*), ring ouzel (*Turdus torquatus*), house sparrow (*Passer domesticus*), song thrush (*Turdus philomelos*) and curlew (*Numenius arquata*) as Priority Species.

Nature Conservation Status

Birds of Conservation Concern 4 has placed more species onto the Red list than ever before. The UK’s leading bird conservation organisations have worked together to review the status of birds in the UK, Channel Islands and Isle of Man.

The bird species that breed or overwinter were assessed against a set of objective criteria to be placed on the Green, Amber or Red list – indicating an increasing level of conservation concern.

The review used up-to-date information on the status of birds in the UK and elsewhere in their ranges, drawing on data collated through the UK’s bird monitoring schemes.

APPENDIX B SPECIES DESK STUDY RESULTS

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
A				
Arctic Tern	*Sterna paradisaea*	BoCC4 Amber list	2011	No counts
Avocet	*Recurvirostra avosetta*	BoCC4 Amber list Schedule 1 WCA	2013	7+4 counts of chicks
B				
Barn Owl	*Tyto alba*	Schedule 1 WCA	2010	2
Bar-tailed Godwit	*Limosa lapponica*	BoCC4 Amber list	2011	1
Barnacle Goose	*Branta leucopsis*	BoCC4 Amber list	2013	No counts
Bittern	*Botaurus stellaris*	BoCC4 Amber list / Schedule 1 WCA	2010	No counts
Black-Backed Gull	*Larus fuscus subsp. intermedius*	BoCC4 Amber list	2013	No counts
Blackbird	*Turdus merula*	-	2013	No counts
Black-headed Gull	*Chroicocephalus ridibundus*	BoCC4 Amber list	2015	No counts
Black-tailed Godwit	*Limosa limosa*	BoCC4 Red list	2013	4
Blue Tit	*Cyanistes caeruleus*	-	2013	No counts
Brambling	*Fringilla montifringilla*	Schedule 1 WCA	2011	No counts
Bullfinch	*Pyrrhula pyrrhula*	BoCC4 Amber list / Section 41 NERC Act 2006 / LBAP	2014	1
Buzzard	*Buteo buteo*	-	2010	4
C				
Canada Goose	*Branta canadensis*	-	2013	50+
Carrion Crow	*Corvus corone*	-	2013	No counts
Coal Tit	*Periparus ater*	-	2013	No counts
Collared Dove	*Streptopelia decaocto*	-	2007	No counts
Common Gull	*Larus canus*	BoCC4 Amber list	2013	No counts
Common Tern	*Sterna hirundo*	BoCC4 Amber list	2012	No counts
Coot	*Fulica atra*	-	2013	2
Cormorant	*Phalacrocorax carbo*	-	2013	2
Curlew	*Numenius arquata*	BoCC4 Red list / Section 41 NERC Act 2006	2013	30

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
D				
Dunnock	Prunella *modularis*	BoCC4 Amber list / Section 41 NERC Act 2006	2013	No counts
F				
Fieldfare	*Turdus pilaris*	BoCC4 Red list / Schedule 1 WCA	2007	No counts
G				
Gadwall	*Anas strepera*	BoCC4 Amber list	2011	No counts
Gilbert	*Hirundo rustica*	-	2013	10
Goldcrest	*Regulus regulus*	-	2012	No counts
Goldeneye	*Bucephala clangula*	BoCC4 Amber list	2013	No counts
Goldfinch Greenfinch	*Carduelis carduelis Carduelis chloris*	-	2013	10
Goosander	*Mergus merganser*	-	2013	4
Grasshopper Warbler	*Locustella naevia*	BoCC4 Red list	2010	No counts
Great Spotted Woodpecker	*Dendrocopos major*	-	2013	2
Great Tit	*Parus major*	-	2016	2
Greenshank	*Tringa nebularia*	BoCC4 Amber list / Schedule 1 WCA	2013	No counts
Grey Heron	*Ardea cinerea*	-	2013	15+
Grey Partridge	*Perdix perdix*	BoCC4 Red list / Section 41 NERC Act 2006	2011	31
Grey Wagtail	*Motacilla cinerea*	BoCC4 Red list	2013	No counts
Greylag Goose	*Anser anser*	BoCC4 Amber list	2013	4
H				
Herring Gull	*Larus argentatus*	BoCC4 Red list / Section 41 NERC Act 2006	2013	No counts
House Martin	*Delichon urbicum*	BoCC4 Amber list	2011	No counts
House Sparrow	*Passer domesticus*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2014	25
J				
Jackdaw	*Corvus monedula*	-	2016	1
Jay	*Garrulus glandarius*	-	2014	3
K				

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
Kestrel	*Falco tinnunculus*	BoCC4 Amber list	2014	2
Kingfisher	*Alcedo atthis*	BoCC4 Amber list / Schedule 1 WCA	2013	1
L				
Lapwing	*Vanellus vanellus*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2013	20
Lesser Black-backed Gull	*Larus fuscus*	BoCC4 Amber list	2013	No counts
Lesser Spotted Woodpecker	*Dendrocopos minor*	BoCC4 Red list	2012	No counts
Linnet	*Linaria cannabina*	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2010	12
Little Bittern	*Ixobrychus minutus*	-	2013	No counts
Little Owl	*Athene noctua*	-	2013	6
Little Ringed Plover	*Charadrius dubius*	-	2011	No counts
M				
Magpie	*Pica pica*	-	2014	10
Mallard	*Anas platyrhynchos*	BoCC4 Amber list / Section 41 NERC Act 2006	2013	20+
Marsh Tit	*Poecile palustris*	BoCC4 Red list / Section 41 NERC Act 2006	2007	No counts
Meadow Pipit	*Anthus pratensis*	BoCC4 Amber list	2011	12
Mediterranean Gull	*Larus melanocephalus*	BoCC4 Amber list / Schedule 1 WCA	2015	No counts
Mistle Thrush	*Turdus viscivorus*	BoCC4 Red list	2007	No counts
Moorhen	*Gallinula chloropus*	-	2013	4
Mute Swan	*Cygnus olor*	BoCC4 Amber list	2013	2
N				
Nuthatch	*Sitta europaea*	-	2014	2
O				
Oystercatcher	*Haematopus ostralegus*	BoCC4 Amber list / LBAP	2013	4
P				
Peregrine	*Falco peregrinus*	Schedule 1 WCA	2010	No counts

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
Pheasant	*Phasianus colchicus*	-	2013	10
Pied Wagtail	*Motacilla alba*	-	2017	No counts
Pink-footed Goose	Anser brachyrhynchus	BoCC4 Amber list	2012	No counts
Pochard	Aythya ferina	BoCC4 Red list	2011	No counts
R				
Redshank	Tringa totanus	BoCC4 Amber list	2013	50
Redwing	Turdus iliacus	BoCC4 Red list / Schedule 1 WCA	2007	No counts
Reed Bunting	Emberiza schoeniclus	BoCC4 Amber list / Section 41 NERC Act 2006 / Local BAP	2012	2
Ringed Plover	Charadrius hiaticula	BoCC4 Red list	2011	No counts
Robin	Erithacus rubecula	-	2013	3
Rook	Corvus frugilegus	-	2012	No counts
S				
Sand Martin	Riparia riparia		2013	10+
Shel duck	Tadorna tadorna	BoCC4 Amber list	2013	20+
Short-eared Owl	Asio flammeus	BoCC4 Amber list	2011	1
Shoveler	Anas clypeata	BoCC4 Amber list	2012	2
Siskin	Spinus spinus	-	2013	No counts
Skylark	Alauda arvensis	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2011	10
Snipe	Gallinago gallinago	BoCC4 Amber list / LBAP	2012	6
Song Thrush	Turdus philomelos	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2014	1
Sparrowhawk	Accipiter nisus	WCA	2013	3
Spotted Flycatcher	Muscicapa striata	BoCC4 Red list / Section 41 NERC Act 2006	2007	No counts
Starling	Sturnus vulgaris	BoCC4 Red list / Section 41 NERC Act 2006 / LBAP	2011	15
Swift	Apus apus	BoCC4 Amber list	2011	11
T				

Common name	Species name	Conservation Status	Most recent recording date	Max count (after 2006)
Tawny Owl	Strix aluco	BoCC4 Amber list	2012	4 counts of chicks
Teal	Anas crecca	BoCC4 Amber list	2013	26+
Tree Sparrow	Passer montanus	BoCC4 Red list / Section 41 NERC Act 2006	2011	No counts
Troglodytes troglodytes subsp. troglodytes	Troglodytes troglodytes subsp. troglodytes	-	2010	No counts
Treecreeper	Certhia familiaris	-	2013	No counts
Tufted Duck	Aythya fuligula	-	2013	6
Twite	Linaria flavirostris	BoCC4 Red list	2010	No counts
W				
Water Rail	Rallus aquaticus	-	2015	No counts
Waxwing	Bombycilla garrulus	-	2013	No counts
Wheatear	Oenanthe oenanthe	-	2011	1
Whitethroat	Sylvia communis	-	2011	11
Wigeon	Anas penelope	BoCC4 Amber list	2011	No counts
Willow Tit	Poecile montana	BoCC4 Red list / Section 41 NERC Act 2006	2012	No counts
Willow Warbler	Phylloscopus trochilus	BoCC4 Amber list	2012	4
Woodcock	Scolopax rusticola	BoCC4 Red list	2011	No counts
Woodpigeon	Columba palumbus	-	2016	500+
Wren	Troglodytes troglodytes	-	2016	No counts
Y				
Yellowhammer	Emberiza citrinella	BoCC4 Red list / Section 41 NERC Act 2006	2011	20+

APPENDIX C: BRITISH TRUST FOR ORNITHOLOGY (BTO) CODES

Code	Species	Code	Species	Code	Species
AC	Arctic Skua	G	Green Woodpecker	NK	Red-necked Phalarope
AE	Arctic Tern	GR	Greenfinch	RH	Red-throated Diver
AV	Avocet	GK	Greenshank	LR	Redpoll
BY	Barnacle Goose	H.	Grey Heron	RK	Redshank
BO	Barn Owl	GJ	Greylag Goose	RT	Redstart
BA	Bar-tailed Godwit	P.	Grey Partridge	RE	Redwing
BR	Bearded Tit	GV	Grey Plover	RB	Reed Bunting
BS	Berwick's Swan	GL	Grey Wagtail	RW	Reed Warbler
BI	Battens	GU	Guillemot	RZ	Ring Ousel
BK	Black Grouse	HF	Hawfinch	RI	Ring-necked Parakeet
BH	Black-headed Gull	HH	Hen Harrier	RP	Ringed Plover
BW	Slack-tailed Godwit	HG	Herring Gull	R.	Robin
DV	Black-throated Diver	HY	Hobby	DV	Rock Dove
BX	Black Redstart	HZ	Honey Buzzard	RC	Rock Pipit
B.	Blackbird	HC	Hooded Crow	RO	Rook
BC	Blackcap	HP	Hoopoe	RS	Roseate Tern
TY	Black Guillemot	HM	House Martin	RY	Ruddy Duck
BN	Black-necked Grebe	HS	House Sparrow	RU	Ruff
BJ	Slack Tern	JD	Jackdaw	SM	Sand Martin
BU	Bluethroat	J.	Jay	SS	Sanderling
BT	Blue Tit	K.	Kestrel	TE	Sandwich Tern
BL	Brambling	KF	Kingfisher	VI	Savi's Warbler
BG	Brent Goose	KI	Kittiwake	SQ	Scarlet Rosefinch
BF	Bullfinch	KN	Knot	SP	Scaup
BZ	Buzzard	LM	Lady Amherst's Pheasant	CY	Scottish Crossbill
C.	Carrion Crow	LA	Lapland Bunting	SW	Sedge Warbler
CG	Canada Goose	L	Lapwing	NS	Serin
CP	Capercaillie	TL	Leach's Petrel	SA	Shag
CW	Cetti's Warbler	LB	Lesser B.b. Gull	SU	Shelduck
CH	Chaffinch	IS	Lesser Sp. Woodpecker	SX	Shorelark
CC	Chiffchaff	LW	Lesser Whitethroat	SF	Short-eared Owl
Cl	Chough	LI	Linnet	SV	Shoveler
CL	Cirl Bunting	ET	Little Egret	SK	Siskin
CT	Coat Tit	LG	Little Grebe	S.	Skylark
CD	Collared Dove	LU	Little Gull	SZ	Slavonlan Grebe
CM	Common Gull	LO	Little Owl	SN	Snipe
CS	Common Sandpiper	LP	Little Ringed Plover	SB	Snow Bunting
CX	Common Scoter	AF	Little Tern	ST	Song Thrush
CN	Common Tern	LE	Long-cared Owl	SH	Sparrowhawk
CE	Corncrake	IT	Long-tailed Tit	AK	Spotted Crake
CO	Coot	MG	Magpie	SF	Spotted Flycatcher

Code	Species	Code	Species	Code	Species
CA	Cormorant	MA	Mallard	SG	Starting
CB	Corn Bunting	MN	Mandarin	SD	Stock Dove
CT	Crested Tit	MX	Manx Shearwater	SC	Stonechat
CR	Crossbill	MR	Marsh Harrier	TN	Stone-curfew
CK	Cuckoo	MT	Marsh Tit	TM	Storm Petrel
CU	Curlew	MW	Marsh Warbler	SL	Swallow
DW	Dartford Warbler	MP	Meadow Pipit	SI	Swift
DI	Dipper	MU	Mediterranean Gull	TO	Tawny Owl
DO	Dotterel	ML	Marlin	T.	Teal
DN	Dunlin	M.	Mistle Thrush	TK	Temminck's Stint
D.	Dunnock	MH	Moorhen	TP	Tree Pipit
EG	Egyptian Goose	MO	Montagu's Harrier	TS	Tree Sparrow
E.	Eider	MS	Mute Swan	TC	Treecreeper
FP	Feral Pigeon	N.	Nightingale	TU	Tufted Duck
FF	Fieldfare	NJ	Nightjar	TT	Turnstone
FC	Firecrest	NH	Nuthatch	TD	Turtle Dove
F.	Fulmar	OP	Osprey	TW	Twite
GA	Gadwall	OC	Oystercatcher	WA	Water Rail
GX	Gannet	PE	Peregrine	W.	Wheatear
GW	Garden Warbler	PH	Pheasant	WM	Whimbrel
GY	Garganey	PF	Pied Flycatcher	WC	Whinchat
GC	Goldcrest	Par	Pled Wagtail	WO	White-fronted Goose
EA	Golden Eagle	PT	Pintail	WH	Whitethroat
OL	Golden Oriole	PO	Pochard	WS	Whooper Swan
GF	Golden Pheasant	PG	Pink-footed Goose	WN	Wigeon
GP	Golden Plover	PM	Ptarmigan	WT	Willow Tit
GN	Goldeneye	PU	Puffin	WW	Willow Warbler
GO	Goldfinch	PS	Purple Sandpiper	WO	Wood Warbler
GD	Goosander	Q.	Quail	WK	Woodcock
GI	Goshawk	RN	Raven	WL	Woodlark
GH	Grasshopper Warbler	RA	Razorbill	WP	Woodpigeon
GB	Great B.b. Gull	RG	Red Grouse	OD	Wood Sandpiper
GG	Great Crested Grebe	ED	Red-backed Shrike	WR	Wren
ND	Great Northern Diver	RM	Red-breasted Merganser	WY	Wryneck
GS	Great Spotted Woodpecker	RQ	Red-crested Pochard	YW	Yellow Wagtail
NX	Great Skua	FV	Red-footed Falcon	Y.	Yellowhammer
GT	Great Tit	KT	Red Kite		
GE	Green Sandpiper	RL	Red-legged Partridge		

APPENDIX D: WINTERING BIRD SURVEY RESULTS FROM 2014/2015

* Birds of conservation concern have been updated in line with the lists Birds of Conservation Concern published in 2015[Error! Bookmark not defined.].

English Name	Latin Name	Conservation Status*
Blackbird	*Turdus merula*	-
Black-headed gull	*Larus ridibundus*	BOCC4 Amber List
Blue tit	*Cyanistes caeruleus*	-
Bullfinch	*Pyrrhula pyrrhula*	BOCC4 Amber List, Section 41 NERC Act and Durham LBAP.
Buzzard	*Buteo buteo*	-
Chaffinch	*Fringilla coelebs*	-
Carrion crow	*Corvus corone corone*	-
Collared dove	*Streptopelia decaocto*	-
Common gull	*Larus canus*	BOCC4 Amber List
Coot	*Fulica atra*	-
Dunnock	*Prunella modularis*	BOCC4 Amber List and Section 41 NERC Act
Fieldfare	*Turdus pilaris*	WCA Sch.1 and BOCC Red List.
Goldcrest	*Requlus requlus*	-
Goldfinch	*Carduelis carduelis*	-
Great spotted woodpecker	*Dendrocopus major*	-
Great tit	*Parus major*	-
Grey partridge	*Perdix perdix*	BOCC4 Red List and Section 41 NERC Act
Grey wagtail	*Motacilla cinerea*	BOCC4 Red List
Grey heron	*Ardea cinerea*	-
Herring gull	*Larus argentatus*	BOCC4 Red List and Section 41 NERC Act
House sparrow	*Passer domesticus*	BOCC4 Red List, Section 41 NERC Act and Durham LBAP.
Jackdaw	*Corvus monedula*	-
Jay	*Garrulus glandarius*	-
Kestrel	*Falco tinnunculus*	BOCC4 Amber List
Lapwing	*Vanellus vanellus*	BOCC4 Red List, Section 41 NERC Act and Durham LBAP.
Lesser black backed gull	*Larus fuscus*	BOCC4 Amber List
Linnet	*Carduelis cannabina*	BOCC4 Red List and Section 41 NERC Act
Long-tailed tit	*Aeqithalos caudatus*	-
Magpie	*Pica pica*	-
Mallard	*Anas platyrhynchos*	BOCC4 Amber List

English Name	Latin Name	Conservation Status*
Marsh tit	*Poecile palustris*	BOCC4 Red List and Section 41 NERC Act
Meadow pipit	*Anthus pratensis*	BOCC4 Amber List
Moorhen	*Gallinula chloropus*	-
Mute swan	*Cygnus olor*	BOCC4 Amber List
Pheasant	*Phasianus colchicus*	-
Pied wagtail	*Motacilla alba yarrellii*	-
Redwing	*Turdus iliacus*	WCA Sch.1, BOCC4 Red List.
Robin	*Erithacus rubecula*	-
Skylark	*Alauda arvensis*	BOCC4 Red List, Section 41 NERC Act and Durham LBAP
Snipe	*Gallinago gallinago*	BOCC4 Amber List
Song thrush	*Turdus philomelos*	BOCC4 Red List, Section 41 NERC Act and Durham LBAP
Starling	*Sturnus vulgaris*	BOCC4 Red List, Section 41 NERC Act and Durham LBAP
Woodcock	*Scolopax rusticola*	BOCC4 Red List
Woodpigeon	*Columba palumbus*	-
Wren	*Troglodytes troglodytes*	-

A19 / A184 Testos Junction Improvement and Downhill Lane Junction Improvement

Bat Roost Potential and Activity Report

Version 0

Document number: B0140301/OD/191
Date: April 2017

highways england

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CONTENTS

EXECUTIVE SUMMARY

Jacobs was commissioned by Highways England to undertake bat roost potential and bat activity surveys at the location of proposed improvements for the Testos and Downhill Lane Junctions. This technical report is to inform an Environmental Impact Assessment (EIA) for the proposed A19 Testos and Downhill Lane Junctions Improvement.

There were no designated sites within 5 km of the proposals that were of importance for bats. The desk study revealed 246 records of bats within 5 km of the proposals, 65 of which were records of roosts. The results of the surveys are summarised in Table 1 below.

Table 1: Summary of Survey Results

Survey type	Results summary
Bat roost potential surveys of trees and buildings within 100 m buffer survey area.	These surveys discovered 23 buildings with low potential to support roosting bats and five buildings with moderate potential. Ten trees were deemed to have low potential.
Dusk emergence and dawn re-entry surveys at Make-Me-Rich Farm.	No roosts were recorded, and bat activity was generally low.
Bat activity forward-tracking surveys in the industrial and residential areas to the east of the A19.	No roosts were found within these areas. Bat activity was low, edge habitat species were recorded, comprising common pipistrelles only.
Bat activity transect surveys within a 500 m survey area.	No roosts were found during these surveys. Edge and cluttered habitat species were recorded; mostly common pipistrelles and very small numbers of soprano pipistrelles and *Myotis* species. Bat activity was generally low, although relatively higher activity was recorded at point counts along the River Don to the west of Downhill Lane Junction.
Static automated detector surveys within a 500 m survey area at four locations.	Open, edge and cluttered habitat species were recorded, comprising common pipistrelle, soprano pipistrelle, *Myotis* species and noctule. Activity was generally low; most activity was recorded at the culvert to the north of Downhill Lane Junction and along a field boundary to the south-west of the Testos Junction.
Bat activity crossing point surveys at three points along the A19; two pedestrian footbridges and one culvert.	Common pipistrelles were recorded crossing the A19 at the two footbridges, and were incidentally recorded crossing Downhill Lane to the east of the junction. Bats crossed between 6 and 8 m above the road surface.

In general the habitat quality and bat activity within the survey area were low. The 500 m surrounding the proposals was of local value to edge habitat species, and of less than local value to open and cluttered habitat species.

No roosts were found within the survey area and few bats were observed crossing the road.

1 INTRODUCTION

1.1 Overview

1.1.1 Jacobs was commissioned by Highways England to undertake bat surveys at the location of proposed improvements for the Testos and Downhill Lane Junctions. The junctions were located along the A19 in South Tyneside at respective approximate Ordnance Survey Grid References (OSGRs) NZ 33808 60913 and NZ 34151 59862.

1.1.2 Testos Junction connected the A19 and the A184, at approximately 4.2 km south of the Tyne Tunnel. Downhill Lane Junction was located approximately 1.1 km south of the Testos Junction and linked the A19 to the A1290.

1.1.3 The surveys were required to inform the ecology chapter of the Environmental Impact Assessment (EIA), to support the Development Consent Order.

1.1.4 This report provides an update to the bat surveys undertaken by Jacobs in 2014 (B0140300/OD/127 January 2015, A19/A184 Testos Junction Improvement: Bat Survey Report 2014).

1.2 Survey Area

1.2.1 The survey area is shown on Figure 1. A large portion of the survey area to the west of the A19 featured arable land and pasture, with scattered farm buildings. An industrial district containing the Nissan Motor Manufacturing UK car plant was located at the southern end of the survey area. A residential area, part of the settlements Town End Farm and Castletown, covered the south-eastern section of the survey area. Another industrial area, Boldon Business Park, was located to the north-east of the Testos Junction. The land to the east of the A19 between the industrial and residential areas featured arable and pastoral fields and a National Grid substation immediately to the south-east of the Testos Junction. The northern end of the survey area contained the residential settlements of Hedworth and Boldon Colliery.

1.3 Objectives

1.3.1 The surveys conducted for this report and brief descriptions of each are shown in Table 2 below.

Table 2: Surveys Undertaken And Their Objectives.

Survey	Objective
Bat roost potential surveys	Bat roost potential surveys were conducted to assess the potential for buildings and trees, within a 100 m buffer of the proposals, to support roosting bats.
Dusk emergence and dawn re-entry surveys	Emergence and re-entry surveys were conducted on isolated buildings and trees with confirmed roosts or high bat roost potential within 100 m of the proposals, to identify the presence, and assess the status, of any bat roosts.
Bat activity forward-tracking surveys	Forward-tracking surveys were conducted on groups of buildings within 50 m of the proposals to identify the presence, and assess the status of any large roosts.
Bat activity transect surveys	Transect surveys were conducted to assess the importance of habitat types for foraging and commuting bats, and to identify the

Survey	Objective
	composition of species, within a 500 m buffer of the proposals.
Static automated detector surveys	Static automated detector surveys were conducted to provide a larger sample of full night data which could be used to identify any seasonal change in bat activity levels.
Bat activity crossing point surveys	Crossing point surveys were conducted to evaluate the frequency and height at which bats were crossing the existing carriageway in key locations.

1.4 Legislation and Planning

1.4.1 Wildlife and countryside legislation and planning policy is referred to in this report; this comprises the following articles:

- Wildlife and Countryside Act 1981 (as amended) (WCA);
- EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive 1992) as amended (92/43/EEC);
- Conservation of Habitats and Species Regulations 2010 (as amended); and
- Natural Environment and Rural Communities Act 2006 (NERC 2006)
- Local Biodiversity Action Plan (Durham LBAP).

1.4.2 The legislation is summarised in Appendix A and can be obtained from: www.legislation.gov.uk.

2 METHODOLOGY

2.1 Overview

2.1.1 A habitat quality assessment for bats was conducted in April 2016. It was determined that the habitat composition within the survey area was low quality for bats, based on the parameters set by the Bat Conservation Trust (BCT) guidelines[1]. Even though the survey area contained some features of moderate quality, such as woodland, rivers, and tree-lined ditches, the landscape surrounding the survey area was predominantly industrial and urban, which reduced the overall quality of the area. The parameters used to assess the habitat quality are summarised in the Bat Habitat Quality Wheel in Appendix B. A summary of the habitat quality assessment is shown in Table 3 below.

Table 3: Habitat Quality Assessment For The Survey Area, With Reference To The Bat Habitat Quality Wheel In Appendix B.

Roosting Potential	Foraging Potential	Commuting Potential	Habitat Quality Level
Generally low quality: Few buildings and trees with significant potential to support roosting bats.	**Generally low quality:** Some features were present which were likely to be used by relatively low numbers of foraging bats, such as the River Don, small areas of plantation woodland and ponds. The extent of the foraging habitat available to bats within the wider area was limited by the surrounding urban conurbations of Sunderland, Washington, Gateshead and Jarrow.	**Generally low quality:** Although connective habitat within the survey area was of reasonable quality with hedgerows and the River Don present, the surrounding urban conurbations isolated the survey area within the wider landscape.	**Low**

2.1.2 For the analysis and discussion of the results the species were grouped into three categories: open habitat, edge habitat and cluttered habitat species[2]. This is because the road development may impact species differently depending on how they behave. The species with known geographic ranges which encompass the survey area are shown, split into these categories in Table 4 overleaf. The behaviours and characteristics which define these categories are also identified in the table.

[1] Collins J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition)*. The Bat Conservation Trust, London.

[2] The habitat type and therefore mode of foraging predominantly determines the behaviour of bat species. From: Denzinger A. and Schnitzler H-U. (2013) Bat guilds, a concept to classify the highly diverse foraging and echolocation behaviours of microchiropteran bats. *Frontiers in Physiology, 4,* 164.

Table 4: Species Behavioural Groups (detailing the species relevant to the survey area).

Behavioural Group	Species	Characteristics
Open habitat species	Noctule (*Nyctalus noctula*)	Generally fly high (above 10 m) over open habitat[3]. Tolerant to light: frequently forage insects attracted to lights[4].
	Leisler's bat (*Nyctalus leisleri*)	
Edge habitat species	Common pipistrelle (*Pipistrellus pipistrellus*)	Generally fly below 10 m from the ground or linear features. Capable of crossing small to medium gaps in suitable habitat[3]. Pipistrelle species are tolerant to light and frequently forage insects attracted to light[4].
	Soprano pipistrelle (*Pipistrellus pygmaeus*)	
	Nathusius pipistrelle (*Pipistrellus nathusii*)	
Cluttered habitat species	Brown long-eared bat (*Plecotus auritus*)	Generally fly close to the ground along linear features. Rarely cross open gaps[3], and are least light-tolerant species group[4].
	Daubenton's bat (*Myotis daubentonii*)	
	Natterer's bat (*M. nattereri*)	
	Whiskered bat (*M. mystacinus*)	
	Brandt's bat (*M. brandtii*)	

2.2 Previous Surveys and Desk Study

2.2.1 Previous bat surveys were undertaken by Jacobs in 2014 in relation to a previous stage of the A19 Testos Junction project. In addition bat surveys were undertaken by White Young Green (WYG) in 2014 and 2015 on behalf of Sunderland City Council in relation to the proposed International Advanced Manufacturing Park (IAMP) development. These comprised the following surveys listed in Table 5 below.

Table 5: Previous Surveys Undertaken and Results.

Survey Type	Company	Year undertaken
Tree and building bat roost potential surveys	Jacobs	2014
	WYG	2014 - 2015

[3] Berthinussen A. and Altringham J. (2012) The effect of a major road on bat activity and diversity. *Journal of Applied Ecology,* **49**, 82-89.
[4] Stone E.L., et al. (2015) Impacts of artificial lighting on bats: a review of challenges and solutions. *Mammalian Biology.*

Survey Type	Company	Year undertaken
Dusk emergence and dawn re-entry surveys	WYG	2014 - 2015
Bat activity transect surveys	Jacobs	2014
	WYG	2014 - 2015
Static automated detector surveys	Jacobs	2014
	WYG	2014 - 2015

2.2.2 The results of these surveys were reviewed and a summary of the results are shown in Section 3.2 of this report.

2.3 Updated Desk Study

2.3.1 A desk study was conducted in October 2016 to obtain records of designated statutory and non-statutory sites and bat species within a 5 km buffer of the proposals. The study area is shown on Figure 2. Only recent records (2006 to 2016) were included in the desk study. The resources used to obtain the data are shown in Table 6 below.

Table 6: Sources Used For Desk Study.

Data Source	Date Of Request
Environmental Records Information Centre (ERIC) North East	05/10/2016
Durham Bat Group	05/10/2016

2.3.2 It should be noted that data received from the Durham Bat Group may contain records from outside the 5 km study area, as the search included all records from the 1 km grid squares within, or partially within the study area.

2.4 Bat Roost Potential Surveys

2.4.1 Bat roost potential surveys were undertaken in April 2016 to re-assess the suitability of buildings and trees within 100 m of the proposals to support roosting bats. The survey area is shown on Figure 3.

2.4.2 Trees were inspected from the ground by experienced ecologists using binoculars and high-powered torches. Features such as woodpecker holes, rot holes, crevices, cracks and thick ivy were identified and used to categorise each tree as having negligible, low, moderate or high potential to support roosting bats[7].

2.4.3 External inspections were performed on buildings by experienced ecologists using binoculars and high-powered torches; no internal roof void inspections were conducted. Features with potential to support roosting bats or to allow bats to access voids, or crevices were identified and used to categorise the building as having negligible, low, moderate or high potential[7]. These categories are described in Table 7 overleaf.

Table 7: Descriptions Of Bat Roost Potential Categories For Buildings And Trees[5].

Bat Roost Potential Category	Description
Negligible	Negligible features likely to be used by roosting bats.
Low	Features suitable for occasional individual roosting bats. Not suitable for larger, regular roosts, i.e. unlikely to support maternity or hibernation roosts.
Moderate	One or more potential roosting features suitable to support a larger number of bats, but unlikely to support roosts of high conservation status.
High	One or more potential roosting features capable of supporting large numbers of bats on a regular basis and for longer periods.

2.5 Dusk Emergence and Dawn Re-entry Surveys

2.5.1 Dusk emergence and dawn re-entry surveys were conducted on isolated[6] buildings with high potential to support roosting bats, and confirmed roosts within 100 m of the proposals. This required the survey of one building which had previously been identified as a confirmed roost.

2.5.2 Dusk surveys commenced 30 minutes before sunset and ended two hours after sunset. Dawn surveys commenced two hours before sunrise and ended 15 minutes after sunrise[7]. Each survey was undertaken by four surveyors to allow full coverage of the building. Bat activity was recorded at each survey position using an Echo Meter Touch recording unit connected to an iPad Air 2 or iPad Mini 2 via the Echo Meter Touch Bat Detector software[8]. The detectors were set to record all bat activity sampled throughout each survey, in WAC format. Weather conditions, comprising air temperature, wind speed, cloud cover, precipitation level and moon phase, were recorded at the start and end of each survey, and if significant changes were observed at any point. The recorded weather data is shown in Table A.1 in Appendix C.

2.5.3 The survey dates and timings are shown in Table 8 below.

Table 8: Details Of Dusk Emergence And Dawn Re-Entry Surveys Undertaken At Make-Me-Rich Farm (B34).

Building	Date Of Survey	Sunset / Sunrise Time	Start Time	End Time
Building 34 (Make-Me-Rich	09/08/2016	20:51	20:21	22:51
	10/08/2016	05:32	03:32	05:47

[5] As described in Collins J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition)*. The Bat Conservation Trust, London.
[6] Groups of buildings were subject to forward tracking surveys (see Section 2.6).
[7] In accordance with Collins J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition)*. The Bat Conservation Trust, London.
[8] https://itunes.apple.com/gb/app/echo-meter-touch-bat-detector/id693958125?mt=8

Building	Date Of Survey	Sunset / Sunrise Time	Start Time	End Time
Farm)	14/09/2016	19:24	18:54	21:24
	15/09/2016	06:39	04:39	06:54

2.6 Bat Activity Forward-tracking Surveys

2.6.1 Following the bat roost potential surveys, areas with a high density of buildings which would not be directly affected by the construction of the proposals, but with the potential to support roosts which could be impacted by the construction or operation of the proposals were identified. These areas were subject to forward-tracking surveys in order to identify the presence of any large roosts. The forward-tracking surveys were completed in all areas with likely roosts within 50 m of the proposals.

2.6.2 The surveys were undertaken from two hours before, to 15 minutes after, sunrise. Each survey area was covered by a pair of surveyors, comprising at least one experienced ecologist and one assistant. The surveyors patrolled the roads methodically. Any commuting bats observed were recorded along with the time and direction of flight (where possible). The bat was followed as far as possible to determine if it was returning to a roost within the survey area. Bat activity was recorded throughout the surveys using the equipment detailed in Paragraph 2.5.2 above. Weather conditions, as described in Paragraph 2.5.2 above, were recorded at the start and end of each survey and if any significant changes occurred. The recorded weather data is shown in Table A.2 in Appendix C.

2.6.3 Three survey visits were undertaken for areas with high potential to support roosting bats; two surveys of areas with moderate potential, and a single survey for areas in which the trees and buildings had low potential to support roosting bats. The details are shown on Figure 4, and in Table 9 below.

Table 9: Details Of Dawn Forward-Tracking Surveys.

Area Surveyed	Date Of Survey	Sunrise Time	Start Time	End Time
Area 2, and 3	05/05/2016	05:17	03:17	05:32
Area 2, and 3	06/07/2016	04:35	02:35	04:50
Area 1,2, and 3	14/09/2016	06:37	04:37	06:52

2.7 Bat Activity Transect Surveys

2.7.1 Bat activity transect surveys were undertaken along one circular route that covered all representative habitat types within the survey area. The survey was conducted by two survey teams simultaneously; each team surveyed one half of the transect route. The total length of the route was approximately 11 km, and the route included 27 point count locations; the surveyors stopped at each point count to record the number of passes[9] from

[9] A bat pass was taken to be a series of echolocation calls from a single bat lasting for no more than ten seconds. For example a single bat recorded for an entire five minute stop at a point count would represent 300 seconds of bat activity, or 30 bat passes. This would equate to six passes per minute (ppm). If two bats were recorded at the point count for half the time the same number of bat passes was noted and the same

each bat species for five minutes. Bat activity was recorded throughout the surveys using the equipment detailed in Paragraph 2.5.2 above. The transect route and locations of the point counts are shown on Figure 5.

2.7.2 Three surveys were undertaken; one in May, one in July, and one in September. This survey schedule was designed to capture any difference in bat activity in spring, summer, and autumn. The start locations for each team were varied on each repetition to reduce the bias associated with habitat located closer to roosts or in areas that may be used by late-emerging bat species. The start and end location and time, sunset time, and survey date are shown in Table 10 below. In line with current best practice guidance[10], transect surveys commenced 15 minutes before sunset. Weather conditions, as described in Paragraph 2.5.2 above, were recorded at the start and end of each survey. The recorded weather data is shown in Table A.3 in Appendix C.

Table 10: Details Of Transect Surveys.

Date Of Survey	Sunset Time	Start And End Point Count Locations	Start Time	End Time
03/05/2016	20:45	1 to 14	20:36*	23:10
		15 to 27	20:30	23:52
04/07/2016	21:45	5 to 19	21:30	00:09
		20 to 4	21:30	23:45
12/09/2016	19:30	10 to 22	19:15	22:15
		23 to 9	19:15	22:22

*should have started at 20:30, but this was not a limitation to the survey or analysis of the results (as stated in Paragraph 2.12.3 in the Limitations section).

2.8 Static Automated Detector Surveys

2.8.1 Static automated detector surveys were conducted at four locations throughout the survey area. The locations were chosen to encompass the different habitat types present within the survey area. The surveys were conducted for five nights each month, for five months from May to September 2016. The detectors used were Song Meter 2[11] units which were set to record all bat activity from 30 minutes before sunset to 30 minutes after sunrise. A description of each location and dates of the surveys are shown in Tables 11 and 12 overleaf. A map of the detector locations is shown in Figure 6.

2.8.2 The weather data comprising air temperature, rainfall level, and wind speed was obtained after the surveys using online records from local weather stations[12]. One of the closest weather stations to the survey area was located in Ouston, approximately 10 km to the south-west. Where available data was sourced from this station. Most data was available from the Ouston weather station. Missing data was obtained from a weather station at

number of passes per minute given although (where possible to detect) the number of bats was also noted on the survey form.

[10] Collins J. (ed.) (2016) *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition)*. The Bat Conservation Trust, London.

[11] Wildlife Acoustics Inc., Maynard, Massachusetts, USA.

[12] http://wow.metoffice.gov.uk/

Cullercoats, approximately 10 km north-east of the survey area. The Ouston weather station was chosen as the primary data source as it was located inland, whereas the Cullercoats station was close to the coast where the weather may have differed significantly to the weather in the survey area. The weather data used for analysis is shown in Table A.4 in Appendix C.

Table 11: Descriptions Of Static Detector Locations.

Static detector	Location description	Grid reference
1	Underneath a hawthorn tree adjacent to the north-western corner of National Grid substation compound. To the south-east of the Testos junction. The surrounding habitat comprised broadleaved plantation woodland, ponds, and reedbeds.	NZ 33918 60835
2	At the bottom of a fencepost on the southern side of the hedgerow, along a field boundary to the south-west of the Testos junction. The surrounding habitat comprised arable fields, improved and semi-improved grassland.	NZ 33555 60542
3	On top of the western side of a culvert that ran beneath the A19, to the north of Downhill Lane Junction. The surrounding habitat comprised running water, scrub, tall ruderal vegetation, and semi-improved grassland.	NZ 34028 59914
4	Underneath an ash tree halfway along a defunct hedgerow which formed a field boundary to the south-west of Downhill Lane Junction. The surrounding habitat comprised arable fields.	NZ 34159 59615

Table 12: Static detector survey dates.

Month	Dates
May	4 – 8
June	16 - 20
July	5 - 9
August	10 – 14
September	14 – 18

2.9 Bat Activity Crossing Point Surveys

2.9.1 Bat activity crossing point surveys were conducted at three locations along the A19, within the proposals. The locations were chosen using the aerial photography and streetview information available on Google Earth Pro, and previously recorded Phase 1 Habitat Survey data. The locations were identified as the three most likely crossing points along the proposals by a suitably qualified and experienced bat ecologist.

2.9.2 The aim of the crossing point surveys was to determine the height and frequency at which bats were crossing the A19 at the potential crossing points. The crossing point locations comprised of two pedestrian bridges over the A19 and a culvert which served as a potential underpass for bats. The locations of the crossing points are shown on Figure 7. The crossing points were surveyed simultaneously by three survey teams on three occasions. The surveys were conducted at dusk and commenced 30 minutes before sunset, ending between 90 minutes and two hours after sunset. The dates and timings of the surveys are shown in Table 13 below.

2.9.3 During each survey one surveyor was located at road level and the other at crossing point level (i.e. on and below the bridges, and at the entrance of the culvert and at the top of the embankment). Each surveyor recorded details of the crossing point structure and made a sketch detailing road width and height and distance of vegetation from the road. Bat activity was recorded in terms of whether the bat crossed the road or not, the height at which it crossed relative to the road surface, and the direction from which it travelled. Surveyors recorded all activity of bats which crossed the road, partially crossed and attempted to cross but turned back. General foraging activity was not recorded, except for noting the first bat of each species. Bat activity was recorded throughout the surveys using the equipment detailed in Paragraph 2.5.2 above. Weather conditions, as described in Paragraph 2.5.2 above, were recorded at the start and end of each survey. The recorded weather data is shown in Table A.5 in Appendix C.

Table 13: Dates and timings of the crossing point surveys.

Date of survey	Sunset time	Start time	End time
04/05/2016	20:47	20:17	22:17
05/07/2016	21:44	21:14	23:44
13/09/2016	19:27	18:57	21:27

2.10 Data Analysis

2.10.1 After the surveys all recorded WAC files were converted to WAV and ZCA format using Kaleidoscope version 3.1.1[13]. Following conversion, all .zca files were analysed by an ecologist experienced in sound analysis using Analook W[14] sound analysis software. The field identification of each species was verified against the outputs of the sound analysis and, if required, amended on the original field survey recording sheet.

2.10.2 The transect and static detector survey data was tabulated in Excel to produce pie charts and bar graphs to display the results of bat activity across the survey area.

[13] http://www.wildlifeacoustics.com/products/kaleidoscope-software-ultrasonic
[14] http://www.titley-scientific.com/us/index.php/downloads-support/firmware-software

2.10.3 Rainfall per hour was converted into categories of rainfall intensity, comprising 'heavy', 'moderate', 'light' and 'no rain'. The parameters of these categories are shown in Table 14 below.

2.10.4 A scale from one to ten was created to score the suitability of a night for bat activity in terms of the intensity of rainfall during the first hour after sunset and then over the rest of the night. The scoring system is shown in Table 15. A score of '1' was the poorest rainfall conditions for bat activity and '10' was the optimal rainfall conditions.

Table 14: Parameters Of Rainfall (mm/hour) To Determine Categories Of Rainfall Intensity[15].

Rainfall intensity	Rainfall (mm/hour)
No rain	0.00 – 0.25
Light rain	0.26 – 1.00
Moderate rain	1.01 – 4.00
Heavy rain	>4.01

Table 15: Scoring System For Rainfall Intensity And Suitability For Bat Activity.

Rainfall Score	Rainfall Within First Hour After Sunset	Rainfall Throughout Rest Of The Night (mode)
1	Heavy	Moderate / heavy
2	Heavy	No rain / light
3	Moderate	Moderate / heavy
4	Moderate	No rain / light
5	Light	Moderate / heavy
6	Light	Light
7	No rain	Moderate / heavy
8	Light	No rain
9	No rain	Light
10	No rain	No rain

2.10.5 The weather data associated with the static detector surveys was used to assess the relationship between rainfall (mm/hour), air temperature (˚C), and bat activity. These variables were plotted against bat activity to determine if correlations were present.

[15] Conversion of rainfall (mm/hour) to rainfall intensity categories obtained from the Sandysoft Cumulus Weather Station software information website: http://wiki.sandaysoft.com/a/Rain_measurement

2.11 Site Evaluation

2.11.1 An evaluation of the bat activity within the survey area was carried out to determine the importance of the site to bats. A hierarchical geographic framework is used for Ecological Impact Assessment (EcIA) to describe the value of ecological features. The assessment was based on how an ecological feature contributes to the conservation of that feature on a certain geographic scale. In this case, how the number of bats within the survey area were likely to contribute to the distribution of bats at a particular geographical scale.

2.11.2 Current best practice guidance for resource valuation in EcIA was designed to be compatible with the Highways Agency's IAN 130/10[16] and the Guidelines for Ecological Impact Assessment in the United Kingdom issued by the Chartered Institute of Ecology and Environmental Management (CIEEM)[17]. The frame of reference used to assess the value of bats within the survey area is shown in Table 16 below.

Table 16: Frame Of Reference Used To Assess The Value Of Bats.

Geographical scale	Value description
International	Very high importance and rarity on an international scale, very low potential for substitution. Regular populations of a bat species, large enough in number to be valuable on an international level.
National	High importance and rarity on a national scale, low potential for substitution. Resident or regular populations of a bat species, of a size to be valuable on a national level.
County	Resident or regular populations of a bat species, of a size to be valuable on a county level.
Local	Populations of bat species that enrich biodiversity on a local level, and populations of species that are not rare or threatened within the county.
Less than local	Low or moderate numbers of bat species that are common and widespread.

2.12 Limitations

2.12.1 It should be noted that an absence of records within the desk study does not identify an absence of a particular species, as the records provided are dependent on the level of data recording within the survey area. Because these records are designed to inform and support the field survey this is not considered a significant limitation.

2.12.2 During the dusk emergence and dawn re-entry surveys at Make-Me-Rich Farm access into the field to the north of the building was restricted due to the presence of horses in the

[16] Highways Agency (2010) Highways Agency Interim Advice Note 130/10 Ecology and Nature Conservation: Criteria for Impact Assessment. HMSO: London.
[17] CIEEM (2016) Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

field. However, this was not a significant limitation to the surveys as the surveyors had a sufficient view of bat activity on the northern side of the building from the western and eastern positions to identify any bats coming from or returning to the northern edge of the property.

2.12.3 The dusk emergence and dawn re-entry surveys conducted at Make-Me-Rich Farm were conducted in the latter half of the survey season (August and September), and as the four surveys were conducted over two nights they must be regarded at two surveys under current guidance[1]. However, as the surveys were a repeat of previously conducted emergence / re-entry surveys they were considered sufficient to provide an understanding of the use of the building by bats and its importance within the context of the survey area.

2.12.4 The start time of one of the survey teams conducting the first transect survey (03/05/2016; Point Counts 1-14) was delayed by six minutes. The survey should have begun at 20:30, 15 minutes before sunset, whereas the start time was recorded at 20:36. This was not a limitation to the analysis of the survey results as it is unlikely that bats were active in the first six minutes as the first recorded bat was not until 21:19.

2.12.5 During the first static detector visit two units recorded for less than five nights. During the fourth visit one unit recorded less than five nights. This is shown in Table 17 below. The data from all units was analysed on a passes per night basis. The lack of data for the nights identified in Table 2.14 has been taken into account in the analysis. A reduction of 8 % of the data for Automated Static Detector Location SD1 and SD2 Static Detector Location, and reduction of 12 % for Static Detector Location SD4 is not considered a significant limitation to the understanding of the use of the survey area by bats.

Table 17: Number of Nights Which Were Recorded By Each Static During Each Deployment.

	May	June	July	August	September
SD1	3	5	5	5	5
SD2	3	5	5	5	5
SD3	5	5	5	5	5
SD4	5	5	5	2	5

2.12.6 During analysis *Myotis* species were grouped as it is difficult to identify individual *Myotis* species using echolocation calls alone, and this can lead to inaccurate identification. This is not a significant limitation as species within the *Myotis* genus exhibit similar ecology and flight behaviour, so any mitigation required to reduce the impact of the proposals is likely to be similar for all *Myotis* species.

2.12.7 The findings of this report represent the professional opinion of qualified ecologists and do not constitute professional legal advice. The client may wish to seek professional legal interpretation of the relevant wildlife legislation cited in this document. Should more than a year elapse after completion of these surveys it is considered prudent that the survey findings be reviewed and updated as required for subsequent planning application(s) to ensure that the assessment of ecological impacts is undertaken against an accurate baseline.

2.12.8 At the time of writing this report no further bat survey data had been received in relation to the adjacent proposed IAMP development. This is not considered a significant limitation as the information contained herein is considered sufficiently robust to identify accurate

baseline conditions and form the basis of the subsequent impact assessment in the Environmental Impact Assessment (EIA), to support the Development Consent Order.

3 RESULTS

3.1 Summary

3.1.1 In summary, four species or groups of bat were recorded within the survey area throughout the suite of surveys. These comprised common pipistrelle, soprano pipistrelle, noctule and at least one species from the *Myotis* genus.

3.1.2 No roosts were found within the survey area. The activity level throughout the survey area was generally low, although activity hotspots were identified.

3.2 Previous Desk Study and Surveys

3.2.1 The desk study conducted in 2014 revealed records of two bat species within 2 km of the proposals; common pipistrelle and brown long-eared bat. Only records of common pipistrelle were present within 500 m of the proposals.

3.2.2 The surveys conducted in 2014 comprised bat roost potential surveys, bat activity transect surveys, and static automated detector surveys. A summary of the results of these surveys are shown in Table 18 below.

Table 18: Summary Of The Results of The Previous Surveys Undertaken In 2014 And 2015.

Survey	Year Undertaken	Results
Tree and building bat roost potential surveys	2014	Two areas of trees within 50 m of the proposals were assessed as having moderate potential (Category 1[18]) to support roosting bats; these comprised Elliscope Farm Local Wildlife Site, and a copse south of Downhill Lane. All buildings within 50 m of the proposals were assessed to have low potential to support roosting bats.
	2014 - 2015	Within a survey area of 300 ha the survey identified five, 15 and six buildings of respectively low, low to moderate and high bat roost potential. Additionally, eight low to moderate and six high potential trees were recorded.
Dusk emergence and dawn re-entry surveys	2014 - 2015	Small common pipistrelle roosts were confirmed in three buildings at Elliscope Farm and one building at Make-Me-Rich Farm, approximately 650 m west and 300 m north-west respectively of Downhill Lane Junction. A lone soprano pipistrelle roost was confirmed in one tree located approximately 750 m to the west of Downhill Lane Junction.
Bat activity transect surveys	2014	Three bat species were recorded during the transect surveys. These comprised: common pipistrelle, soprano pipistrelle, and noctule. Foraging and

[18] Categories defined in Hundt L. (2012) *Bat Surveys Good Practice Guidance, 2nd edition*. Bat Conservation Trust.

Survey	Year Undertaken	Results
		commuting activity was observed along hedgerows and woodland edges. No roosts were found.
	2014 - 2015	Within a survey area of 900 ha five bat species or groups were recorded; common pipistrelle, soprano pipistrelle, *Myotis* species, noctule and brown long-eared bat. The majority of recorded calls comprised common and soprano pipistrelles.
Static automated detector surveys	2014	The static detectors recorded at least four species, comprising common pipistrelle, soprano pipistrelle, noctule, and bats from the *Myotis* genus which could have comprised a single species, or more.
	2014 - 2015	Within a survey area of 900 ha six bat species or groups were recorded at eight static detector locations; common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, *Myotis* species, noctule and brown long-eared bat. The majority of recorded calls comprised common and soprano pipistrelles.

3.2.3 Two small common pipistrelle roosts were recorded at the farm house building at Make-Me-Rich Farm in 2015 by White Young Green on behalf of Sunderland City Council in relation to the proposed International Advanced Manufacturing Park (IAMP) development. Make-Me-Rich Farm was located approximately 100 m west of the A19, approximately 300 m north-west of the existing Downhill Lane Junction, at OSGR NZ 33916 60071. A summary of the details provided in the survey report[19] are shown in Table 19 below.

Table 19: Roosts Recorded At Make-Me-Rich Farm In 2015.

Date of survey	Roost location	Species	Number of bats
18/08/2015	Between roof and wall tops, behind barge board on eastern elevation of building.	Common pipistrelle	1
10/09/2015	Behind barge board at eastern end of southern elevation of building.		2

3.3 Desk Study

3.3.1 The desk study did not reveal any designated sites of importance to bats within a 5 km buffer of the proposals.

3.3.2 The desk study revealed 246 records of bats within the last ten years, i.e. 2006 to 2016. A summary of the records are shown in Table 20 below.

[19] WYG. Land North of Nissan, Final Report, November 2015.

Table 20: Summary Of Bat Records Received From ERIC And The Durham Bat Group From 2006 To 2016.

Bat Species	Number Of Records From ERIC	Number Of Records From Durham Bat Group	Total Number Of Records
Common pipistrelle	30	120	150
Soprano pipistrelle	1	18	19
Unidentified *Pipistrellus* species	11	9	20
Noctule	2	4	6
Whiskered bat / Brandt's bat	1	3	4
Daubenton's bat	0	3	3
Natterer's bat	0	1	1
Unidentified *Myotis* species	0	2	2
Unidentified bat species	4	37	41

The data included 65 records of bat roosts, comprising: common pipistrelle, soprano pipistrelle, unidentified *Pipistrellus* species, Natterer's bat, whiskered bat / Brandt's bat and unknown bat species. None of the roost records were within the 500 m survey area as shown on Figure 2.

3.4 Bat Roost Potential Surveys

3.4.1 Buildings and trees within a 100 m buffer of the proposals were assessed for their potential to support roosting bats. Of the 62 buildings assessed, 23 were deemed to have low potential to support roosting bats, and five were recorded as having moderate potential. The remaining 34 buildings had negligible potential. A summary of the building results are shown in Table 21 below. The building locations are shown in Figure 3, and the full bat roost potential building survey results are shown in Appendix D.

Table 21: Bat roost potential building survey results within the survey area.

Bat Roost Potential Category	Building Number
High	None
Moderate	B27, B32, B33, B34, B54
Low	B26, B29, B30, B36, B37, B38, B39, B40, B41, B42, B43, B44, B45, B46, B47, B48, B49, B50, B55, B57, B59, B60, B61

Bat Roost Potential Category	Building Number
Negligible	B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, B11, B12, B13, B14, B15, B16, B17, B18, B19, B20, B21, B22, B23, B24, B25, B28, B31, B35, B51, B52, B53, B56, B58, B62

3.4.2 The assessment included buildings within the industrial and residential areas to the east of the A19. Only two of the 14 industrial buildings had low potential to support roosting bats; the remaining 12 buildings were identified as negligible. The cumulative number of potential bat roost features present increased the likelihood that a roost would be located in the area, but due to the low number of buildings with identified potential present (two), the area as a whole was also deemed to have low potential to support roosting bats.

3.4.3 Within the residential area 19 buildings were assessed as having low bat roost potential. The cumulative number of potential bat roost features present increased the likelihood that a roost was located in the area and as such the area as a whole was deemed to have high potential to support roosting bats.

3.4.4 In total ten trees were deemed to have low potential to support roosting bats. The full bat roost potential results of trees are shown in Appendix E. All other trees within the survey area had negligible potential to support a roost. Three of the ten trees with low potential were located approximately 20 m to 100 m outside of the survey area. However, the survey area was extended in this location due to the good connective habitat between this area and the survey area. A summary of the tree results are shown in Table 22 below, and the locations of the trees are shown in Figure 3. Trees with negligible bat roost potential were not mapped.

Table 22: Bat Roost Potential Results Of The Trees Within The Survey Area.

Bat Roost Potential Category	Tree Number
High	None
Moderate	None
Low	T1 to T10
Negligible	The remaining trees within the survey area (not numbered)

3.5 Dusk Emergence and Dawn Re-entry Surveys

3.5.1 Two dusk emergence and dawn re-entry surveys were conducted at Building B34 (Make-Me-Rich Farm). No emergence or re-entry of bats was observed.

3.5.2 Moderate foraging activity of common pipistrelles was observed around the building during the first visit at dusk. However, activity of common pipistrelles lessened to brief foraging and occasional commuting passes at dawn and during the second visit. Noctule activity was very low; only one commuting pass was recorded during the first dusk survey.

3.6 Bat Activity Forward-tracking Surveys

3.6.1 Forward-tracking surveys were undertaken in three areas (as shown on Figure 4); two comprised residential dwellings (Area 2, and 3) with overall high bat roost potential, and one which comprised industrial buildings (Area 1) which was deemed to be of low bat

roost potential. Three survey visits were conducted in Areas 2 and 3 and a single survey was undertaken in Area 1.

3.6.2 No bat roosts, and very few bats were observed. The bat species recorded comprised the edge habitat species common pipistrelle only. No open or cluttered habitat species were noted. Low levels of foraging activity were observed in Survey Area 2, along the northern and western edges of this area, during the first and second visits. No activity was observed in the other survey areas, or within Area 2 during the third visit.

3.7 Bat Activity Transect Surveys

3.7.1 Three surveys were conducted along the transect route to sample bat activity in spring, summer and autumn. No bat roosts, or indicative bat roost locations were observed during the transect surveys. The bat species recorded at the point counts comprised common pipistrelle, soprano pipistrelle and *Myotis* species. No additional species were recorded between the point counts. The species and habitat group compositions observed through the surveys at all point counts combined is shown in Chart 1 overleaf.

Open Habitat Species

3.7.2 No open habitat species were identified during the transect surveys.

Edge Habitat Species

3.7.3 Common pipistrelle activity comprised 98 % of the bat activity recorded; a total of 113 passes. Soprano pipistrelle activity made up a further 1 %, meaning that the edge habitat species activity comprised 99 % of all bat activity within the survey area. The soprano pipistrelle activity comprised a single pass, recorded in May.

3.7.4 Common pipistrelles were recorded at all 17 point counts in varying numbers. The highest level of common pipistrelle activity was observed at Point Counts 21 and 22 (an average of 8 and 7.3 bat passes per five minutes respectively). These point counts were located approximately 400 m and 700 m respectively to the west of Downhill Lane Junction, as shown on Figure 5. Point Count 21 was located on a farm track spanning the River Don, on the edge of broadleaved woodland. Point Count 22 was located along Downhill Lane, adjacent to arable fields and broadleaved woodland.

3.7.5 Relatively high common pipistrelle activity was also observed at Point Counts 13, 17, 5 and 8, where an average of 4, 3.7, 3.3 and 2.7 passes were recorded respectively. Point Count 13 was located approximately 250 m to the east of Downhill Lane Junction along a boundary between arable and semi-improved grassland. Point Count 17 was located on the pedestrian road bridge that spans the A19 at the southern end of the survey area. Point Counts 5 and 8 were situated along the cycle path which ran between the Testos Junction and Downhill Lane Junction on the eastern side of the A19.

3.7.6 Activity of common pipistrelles at the remaining 11 point counts was low; average passes ranged between 0.3 and 1.7.

3.7.7 The soprano pipistrelle was recorded at Point Count 21. The location of Point Count 21 is described in Paragraph 3.7.4 above.

Cluttered Habitat Species

3.7.8 *Myotis* bat species comprised the final 1 % of the bat activity recorded. The Myotis bat activity comprised a single pass recorded in September.

3.7.9 The *Myotis* species were recorded at Point Count 10. Point Count 10 was situated at the southern end of the cycle path to the east of Downhill Lane Junction.

3.7.10 In terms of habitat groups, edge habitat species comprised 99 % of all bats recorded, and cluttered habitat species comprised 1 %. This is shown in Chart 1 below.

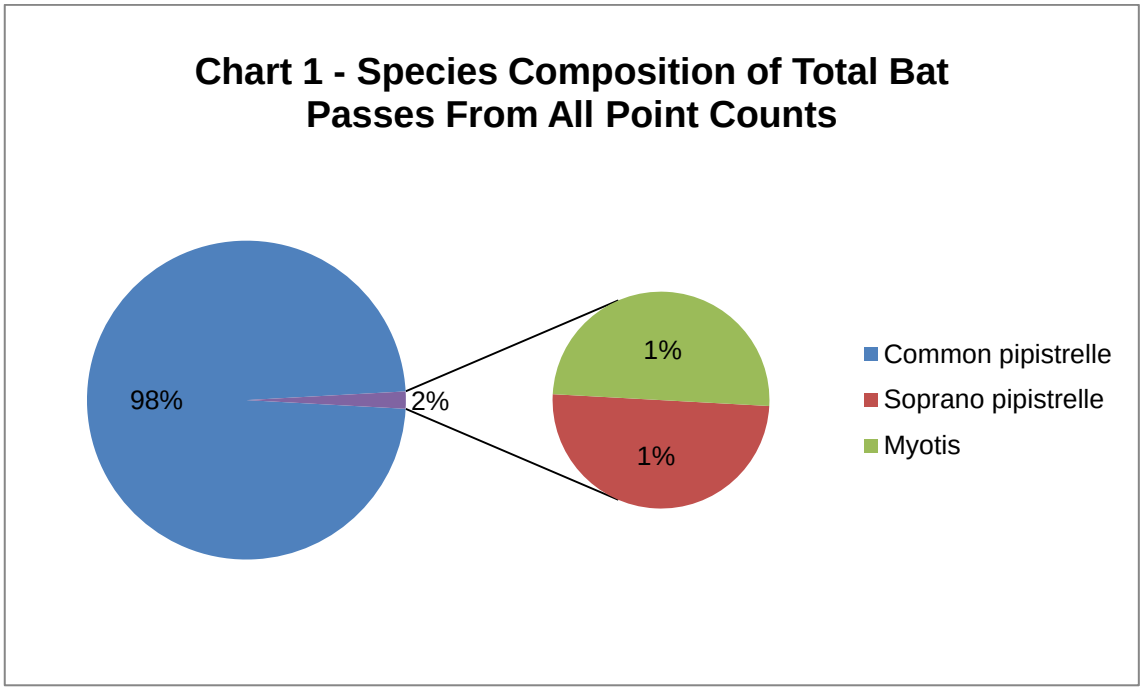


Chart 1: The Composition Of Bat Species Recorded At Point Counts During All Transect Surveys.

3.7.11 Chart 2 below shows the number of bat passes recorded at each point count, averaged across all three survey visits. Bat activity was recorded at 17 point counts; no bats were observed at seven of the point counts.

3.7.12 As shown in Chart 2 below, edge habitat species were recorded at 17 point counts, but cluttered habitat species were only recorded at Point Count 21. No open habitat species were observed.

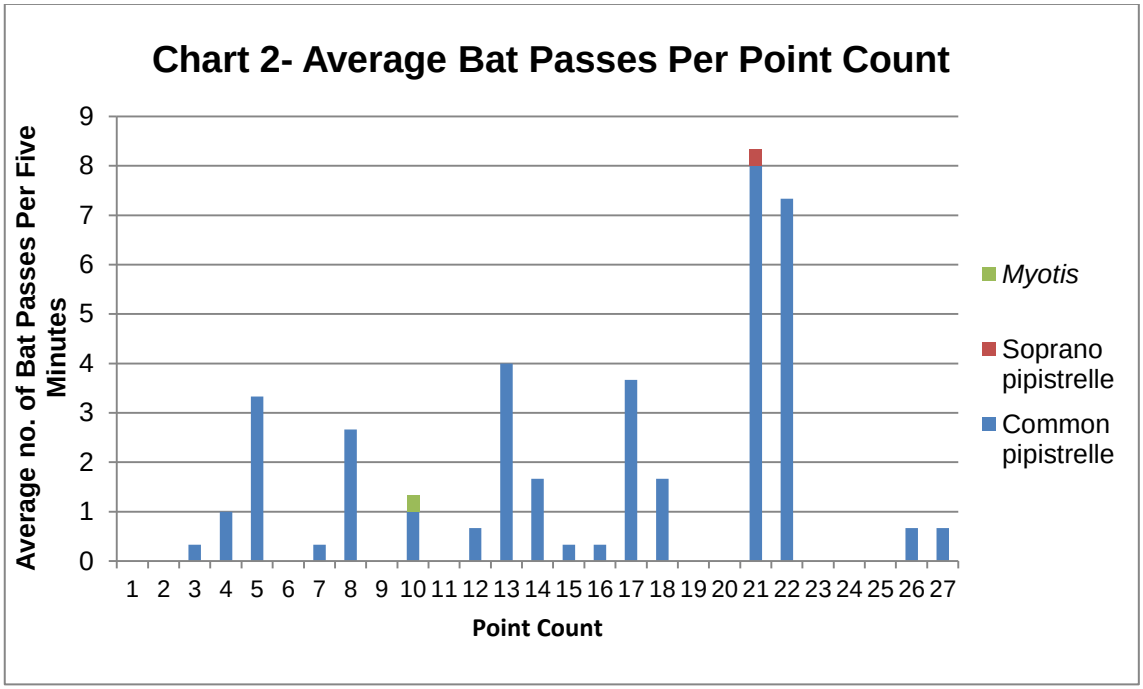


Chart 2: The Number Of Bat Passes Per Five Minutes Of Each Species At Each Point Count, Averaged Across All Three Survey Visits.

3.8 Static Automated Detector Surveys

3.8.1 Static detectors were set out in four locations within the survey area, with the aim of recording bat activity for five nights each month from May to September. The static detectors recorded three species of bat, and one bat genus which could not be determined to species level: common pipistrelle, soprano pipistrelle, noctule, and at least one *Myotis* species. These species represented all three habitat type groups; open, edge and cluttered habitat. Chart 3 below shows the compositions of species and habitat groups recorded by all four detectors from May to September.

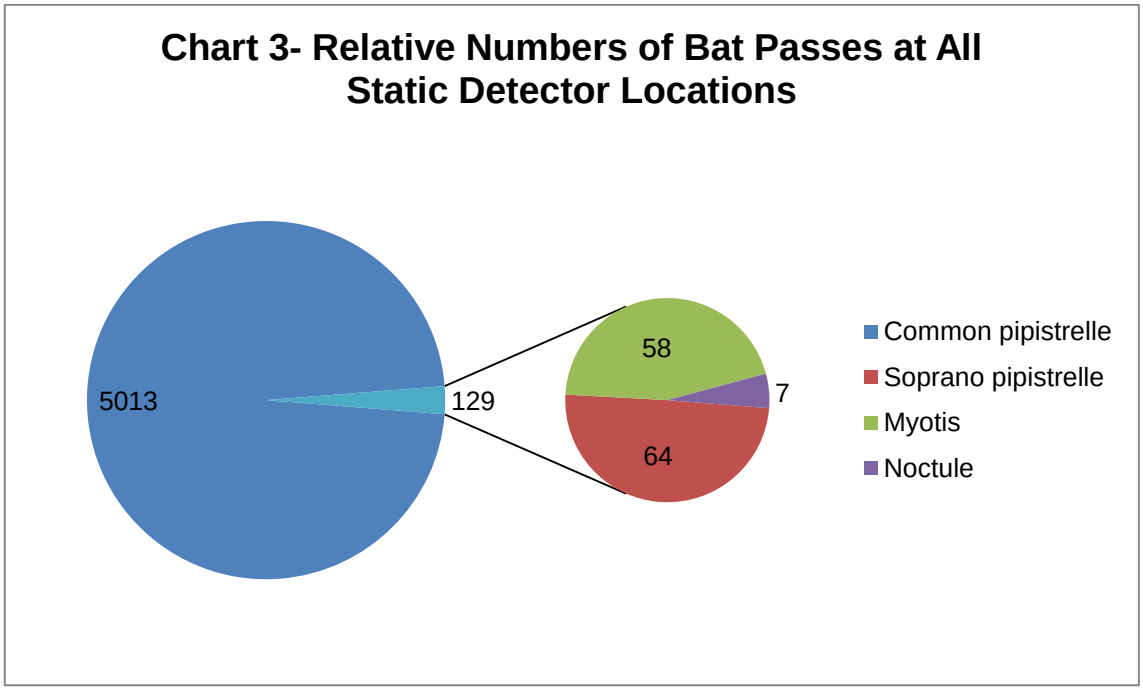


Chart 3. The Composition Of Bat Species Recorded By The Static Detectors At All Locations.

3.8.2 Open habitat species contributed to a relatively small proportion of the bat activity across the site; just seven noctule passes were recorded in total. Edge habitat species (common pipistrelle and soprano pipistrelle) comprised 99 % of bat activity; 5,013 common pipistrelle passes and 64 soprano pipistrelle passes were recorded in total. Cluttered habitat species comprised approximately 1 % of bat activity; 58 *Myotis* species passes were recorded.

3.8.3 Overall the bat activity recorded by the static detectors across the survey area was relatively low. The level of bat activity at each static detector location varied, as is shown in Chart 4 and Chart 5 below. The highest activity levels were recorded by Static Detector (SD) 2 and SD3. Both locations exhibited higher levels of activity; an average of 86 and 79 passes per night were recorded by SD2 and SD3 respectively.

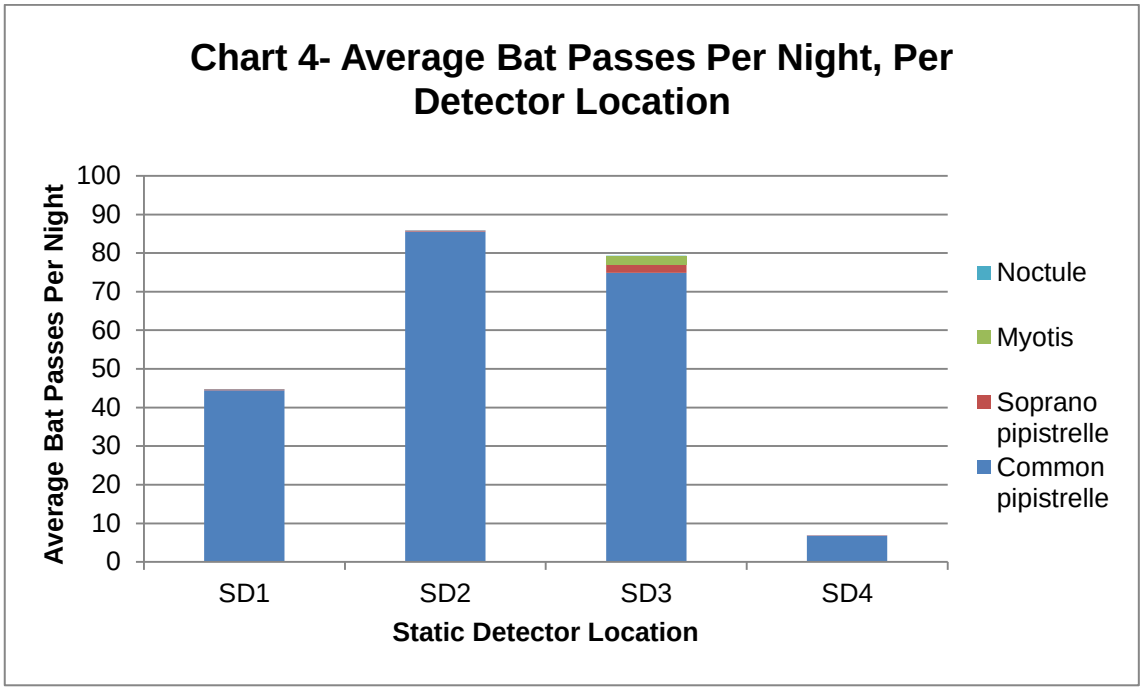


Chart 4. The Average Number Of Bat Passes Per Night Recorded By Each Static Detector.

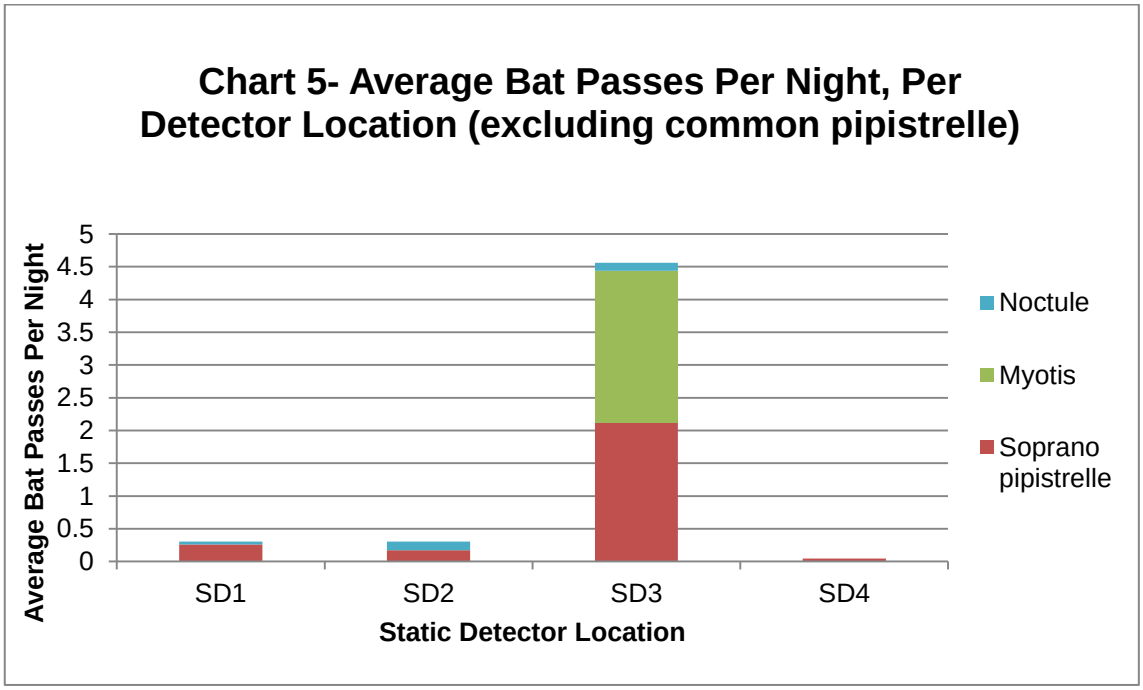


Chart 5. The Average Number Of Bat Passes Per Night (excluding common pipistrelle) Recorded By Each Static Detector. Note That The Maximum Value On The Y Axis Has Been Amended To Five Passes Per Night.

Open Habitat Species

3.8.4 The only open habitat species recorded was noctule. As shown in Chart 5 above, noctule activity was recorded in very low proportions at all locations except SD4 where no noctule activity was recorded. The average level of noctule activity ranged between 0.10 % and 0.15 % of the average total nightly bat activity.

Edge Habitat Species

3.8.5 Edge habitat species activity was lower at the location of SD1. The detector located at SD1 recorded an average of 45 passes from edge habitat species per night. Again common pipistrelles represented the majority of the edge species recorded by this detector; soprano pipistrelles only comprised 0.6 % of the average number of edge species passes per night.

3.8.6 Both common pipistrelle and soprano pipistrelle were recorded on each of the static detectors. The lowest bat activity was recorded by SD4. Only edge habitat species were recorded at this location. At SD4, there were on average six common pipistrelle passes per night, and less than one soprano pipistrelle pass per night.

Cluttered Habitat Species

3.8.7 Cluttered habitat species were only recorded at SD3, where they comprised 3 % of the average number of bat passes per night.

Seasonality

3.8.8 The level of bat activity varied between the months from May to September, as is shown in Chart 6 below. Total bat activity peaked in August at an average of 96 passes per night, and was lowest in May at an average of 36 passes per night.

3.8.9 As shown in Chart 7, open habitat species activity remained low throughout the season, although was slightly higher during July and August, averaging at approximately 0.1 pass per night during the summer months and approximately 0.05 passes per night during May, June and September.

3.8.10 As Chart 6 shows, edge habitat species common pipistrelle were the most prevalent species each month with lower than expected levels of activity in July (relative to June and August). Soprano pipistrelle activity peaked in June before tailing off later in the year.

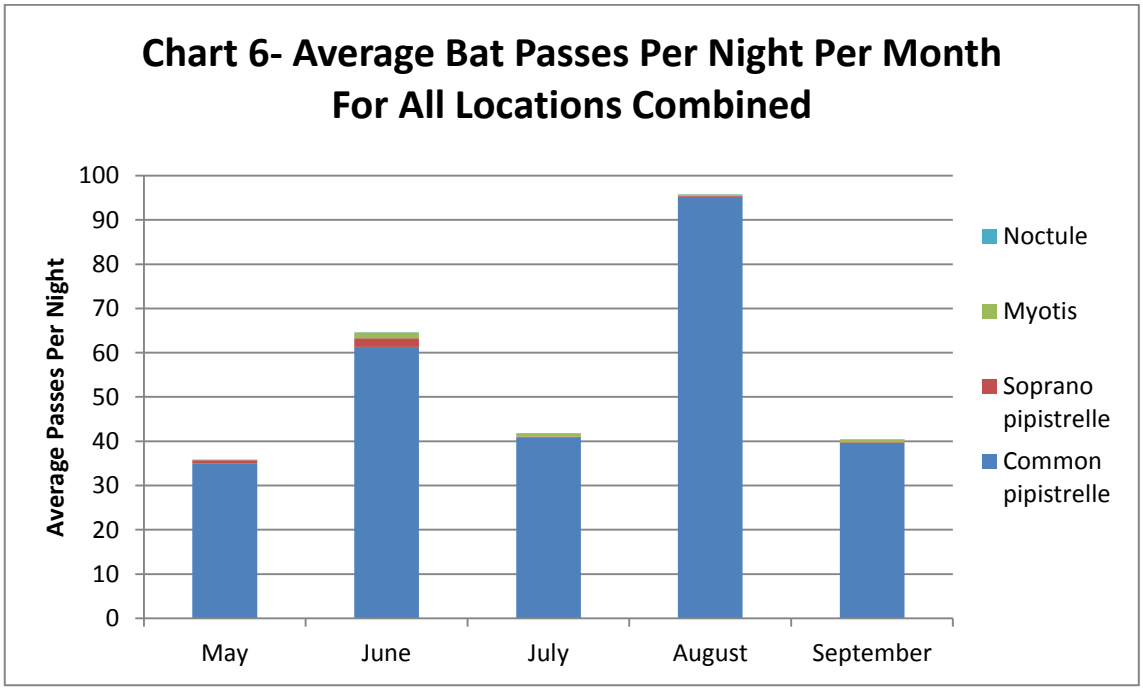


Chart 6. The Average Number Of Bat Passes Per Night Per Month For All Locations Combined.

3.8.11 The cluttered habitat species (*Myotis* species) activity was low throughout the season, as shown in Chart 7. *Myotis* species activity ranged between 0.06 and 1.3 passes per night, and as with the soprano pipistrelle, activity peaked in June.

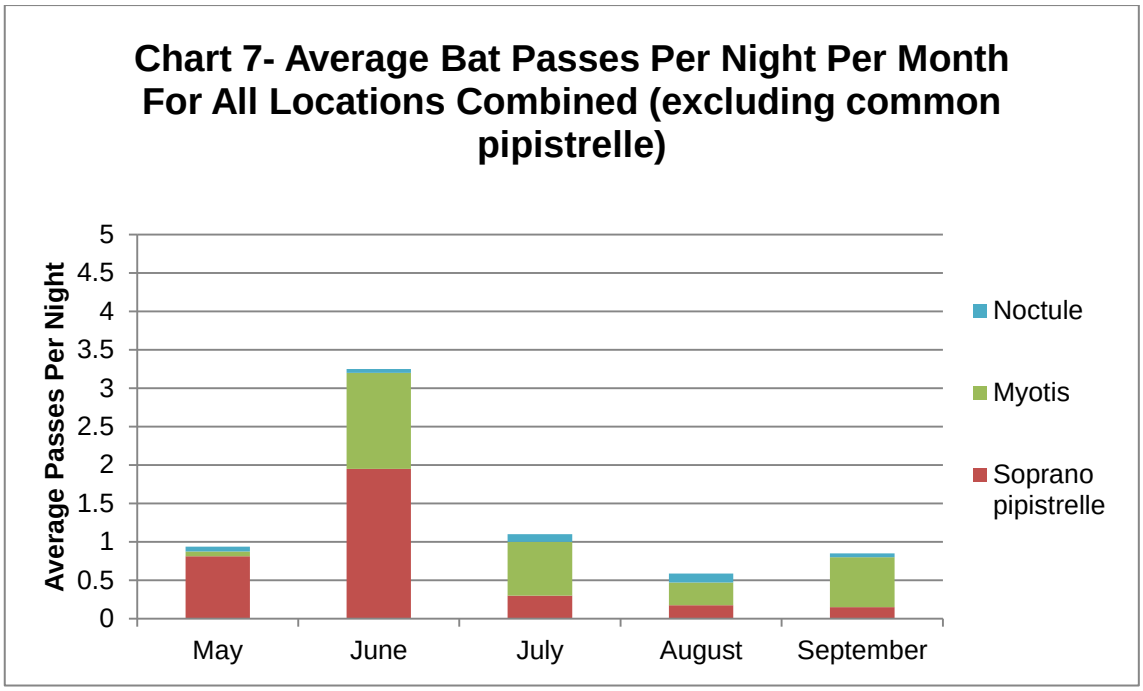


Chart 7. The Average Number Of Bat Passes Per Night Per Month For All Locations Combined (excluding common pipistrelles). Note That The Maximum Value On The Y Axis Has Been Amended To Five Passes Per Night.

3.8.12 Charts 8 to 11 below show the nightly number of bat passes each month for each location, and also plot the rain score and minimum air temperature per night. The rainfall score deviated from the optimal score of 10 on six nights out of the total 25 nights. The minimum nightly temperature varied greatly between 0 and 15.9˚C, averaging at 10.7˚C across the seasons. The temperature dropped below 7˚C on four nights out of the total 25 nights.

Weather Conditions

3.8.13 At SD1 bats were most active in June and August, as shown in Chart 8 below. Bat activity peaked on the second night of the June survey when the rainfall score was low (4; moderate rainfall in the first hour after sunset, no rain to light rain over the rest of the night) but the temperature was relatively high at 9.7˚C. Bat activity peaked again on the second night of the August survey when there was no rain and the minimum overnight temperature was 15.9˚C. During the following nights in August bat activity dropped as the minimum nightly temperature decreased.

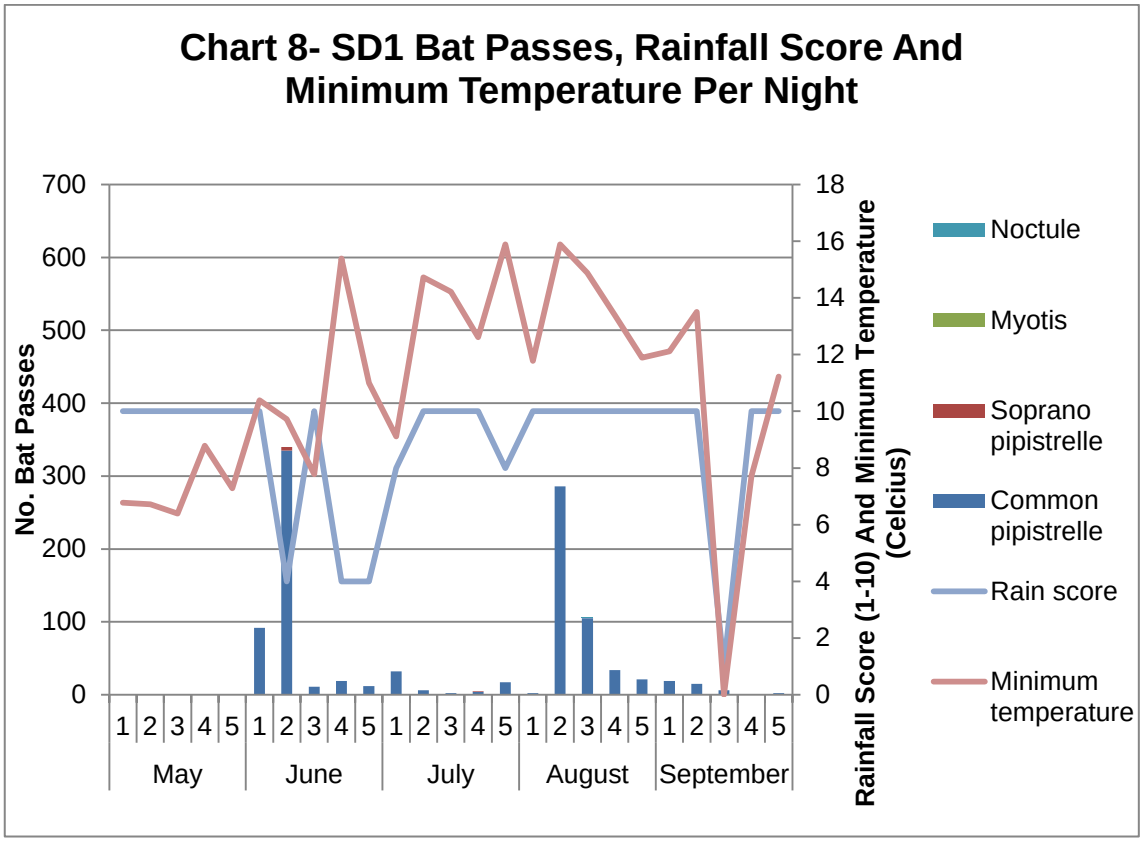


Chart 8. Nightly Number Of Bat Passes At SD1 For Each Month, Showing The Rainfall Score And Minimum Temperature For Each Night.

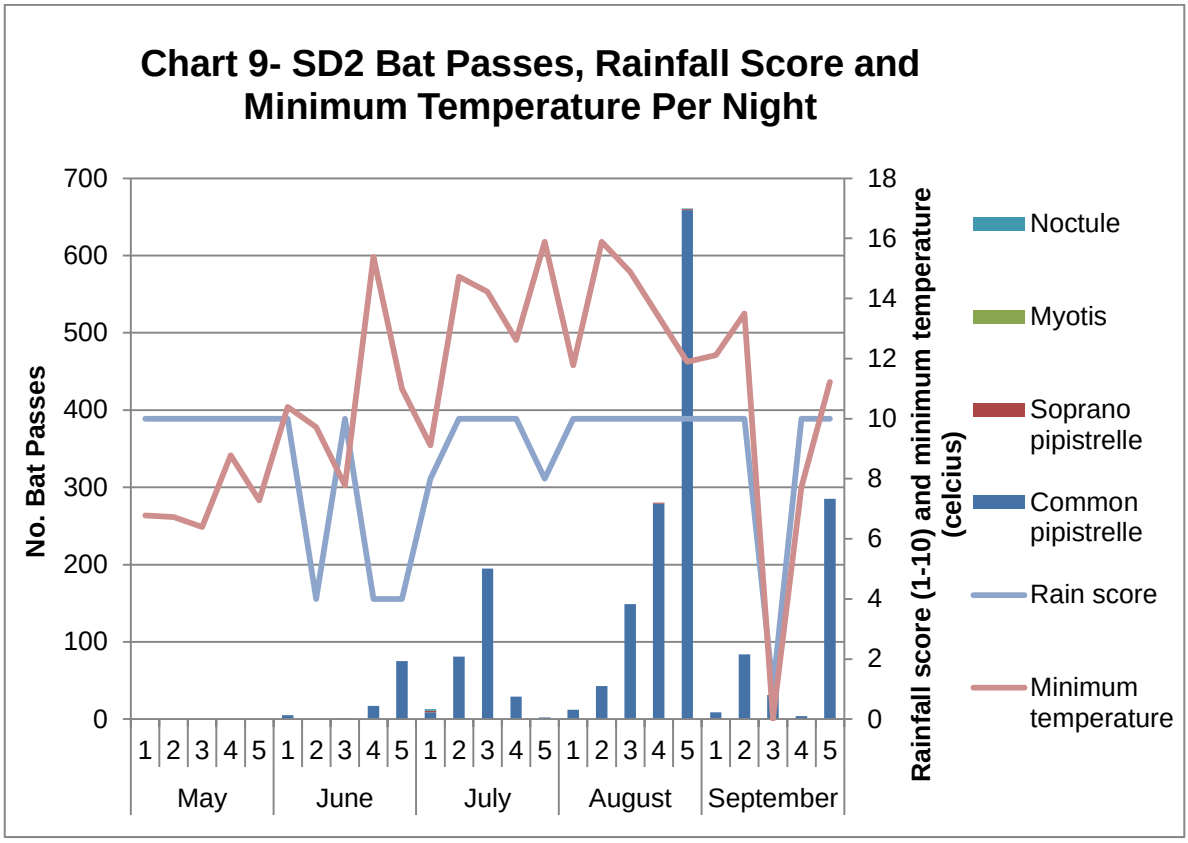


Chart 9. Nightly Number Of Bat Passes At SD2 For Each Month, Showing The Rainfall Score And Minimum Temperature For Each Night.

3.8.14 At SD2 bats were most active from July to September, as shown by Chart 9 above. Bat activity peaked on the fifth night of the August survey, when a total of 661 bat passes were recorded. During this night the minimum temperature was 11.9 and there was no rain.

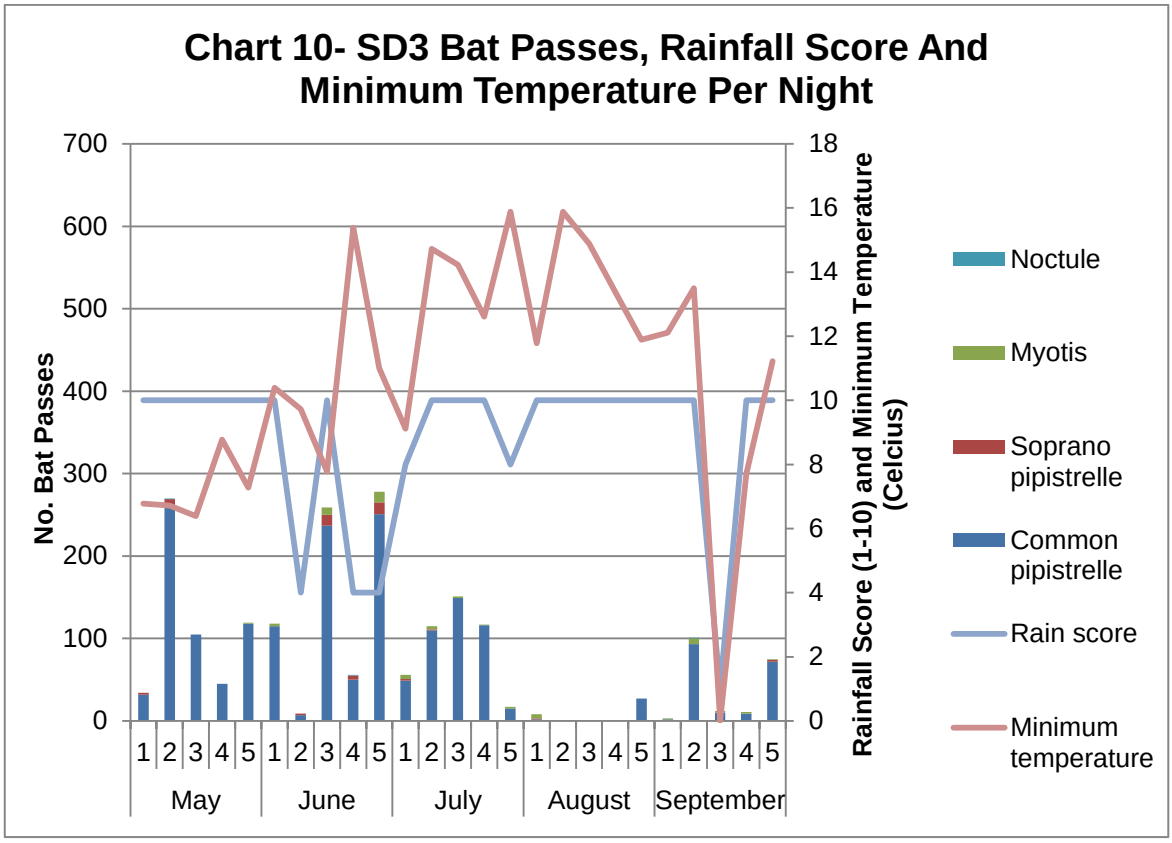


Chart 10. Nightly number of bat passes at SD3 for each month, showing the rainfall score and minimum temperature for each night.

3.8.15 At SD3 bats were most active from May to July, as shown by Chart 10 above. Both the rainfall score and bat activity decreased on the second night of the June survey, and both increased again on the following night. Both decreased again on the fourth night of the June survey, and although the rainfall score remained low on the following night, bat activity increased on the fifth night. Over the five recorded nights in August the weather conditions remained consistently good. However, there was very little bat activity at SD3 during these nights.

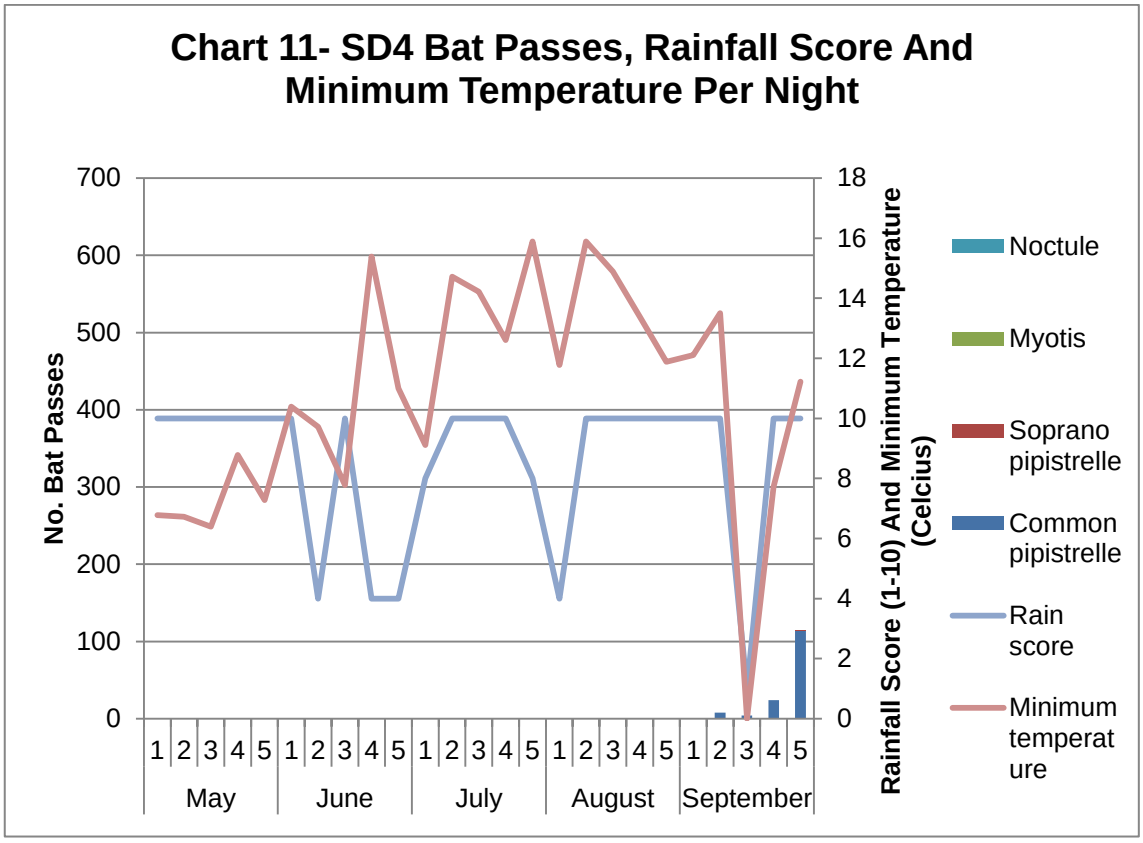


Chart 11. Nightly Number Of Bat Passes At SD4 For Each Month, Showing The Rainfall Score And Minimum Temperature For Each Night.

3.8.16 At SD4 bat activity was only recorded during the September survey, as shown in Chart 11 above. Bat activity peaked on the fifth night of the survey when the rainfall score and minimum temperature had returned to optimal conditions from a drop to 0˚C and minimum rain score on the third night.

3.9 Bat Activity Crossing Point Surveys

3.9.1 Crossing point surveys were undertaken at three locations along the A19 over three visits. Overall bat activity at all locations was low. The species recorded comprised common pipistrelle and soprano pipistrelle, although only common pipistrelles were observed crossing the road. No open habitat or cluttered habitat species were recorded.

3.9.2 The results of the crossing point surveys are shown in Table 23 overleaf. In total three bats were observed crossing the road, all of which crossed the entire width of the road and did not turn back. Two common pipistrelles crossed the road at heights of 6 and 8 m at the northern pedestrian bridge during the second survey in July, and one common pipistrelle crossed the road at 8 m the southern pedestrian bridge during the first survey in May. No bats were observed crossing over or under the road at the culvert location.

3.9.3 An incidental crossing record was obtained during the second transect survey in July. At Point Count 12 two common pipistrelles were observed crossing Downhill Lane at heights of 6 and 8 m, approximately 500 m to the east of the A19. The bats crossed the road once from the south-east to the north-west. The road was bordered by arable fields, defunct hedgerows and tall ruderal vegetation on both sides. The vegetation adjacent to either side of the road ranged between 1 and 16 m in height.

Table 23: Results Of Crossing Point Surveys and Incidental Sighting (The Crossing Point Locations Are Shown In Figure 7).

Crossing Point	Species Recorded	No. Bats Crossed	Height Of Crossing (M)
CP1. Northern pedestrian bridge (west of A19)	Common pipistrelle	2	6 and 8
	Soprano pipistrelle	0	-
CP2. Culvert (east of A19)	Common pipistrelle	0	-
	Soprano pipistrelle	0	-
CP3. Southern pedestrian bridge (west of A19)	Common pipistrelle	1	8
Transect survey Point Count 12 (incidental sighting)	Common pipistrelle	2	6 and 8

4 DISCUSSION AND CONCLUSIONS

4.1 Roosts

4.1.1 No bat roosts were recorded within the 100 m survey area. The two previously recorded roosts at Make-Me-Rich Farm were not being used by bats during the emergence and re-entry activity surveys undertaken in 2016 in this suite of surveys, and no evidence of bats was observed during the bat roost potential survey.

4.1.2 The bat roost potential surveys identified 23 buildings with low potential and five with moderate potential, including Make-Me-Rich Farm (although previous survey data identified that this was a confirmed roost). Additionally, ten trees were deemed to have low potential to support roosting bats.

4.2 Foraging and Commuting Activity

General

4.2.1 Overall the survey area featured habitats of low quality for bat roosting and activity. The bat activity recorded throughout the surveys was generally low.

4.2.2 The majority of bat activity within the survey area comprised edge habitat species, predominantly common pipistrelles. Substantially fewer open and cluttered habitat species were recorded. The activity of common pipistrelles peaked in August, whereas activity of soprano pipistrelles and *Myotis* species declined after peaking in June. This could indicate that there were fewer or no maternity roosts near the survey area.

4.2.3 The data collected from the static detectors suggested that rainfall and low night temperature appeared to be limiting factors to the level of bat activity at all static detector locations, but did not consistently dictate the level of activity. Nightly air temperature below 7 ˚C and any level of rain is considered to form suboptimal conditions for bat activity. In general bat activity was lower on nights with rain and lower temperature. However, on some occasions bat activity was relatively high during nights when it rained during the first hour after sunset but was dry for the rest of the night. On the second night in June there was moderate rain during the first hour after sunset and no rain to light rain for the rest of the night. Although the weather conditions were suboptimal, the bat activity was relatively high at SD1; 335 common pipistrelle and 5 soprano pipistrelle passes were recorded. This was the highest night of activity recorded at this location and could indicate that the site was more suitable than other areas during sub-optimal weather conditions but less suitable when conditions were ideal.

4.2.4 When the weather was unsuitable over two nights bat activity was generally low on the first night but sometimes increased on the next night. This was shown at SD3 over the fourth and fifth nights in June. This indicates that there were factors additional to weather that dictated the level of activity, such as the need to forage after a night of inactivity.

4.2.5 Although weather conditions were consistently optimal over the five nights surveyed in August, seasonal bat activity at SD3 was lowest during August. This suggests that in optimal weather conditions bats favour other areas.

Open Habitat Species

4.2.6 The activity of open habitat species within the survey area was very low. The only open habitat species recorded within the survey area was noctule. This species was only recorded during the static detector surveys at the western side of the culvert and along a boundary amongst the arable fields to the south-west of the Testos junction. The lack of activity suggests that there were few or no open habitat species roosts near the survey area.

4.2.7 No open habitat species activity was recorded during the forward-tracking surveys of built-up areas. Open habitat species are more tolerant of light so the absence of these species in these areas may indicate the absence of nearby roosts. Additionally, noctules generally roost in trees[20], so the absence of suitable trees within the forward-tracking survey areas may explain the absence of noctule activity.

Edge Habitat Species

4.2.8 The majority of bat activity within the survey area comprised edge habitat species (common pipistrelle and soprano pipistrelle), predominantly common pipistrelles. The habitat within the survey area featured mainly fields and linear field boundaries and therefore the species composition recorded was not a surprise.

4.2.9 Only common pipistrelles (edge habitat species) were recorded during the forward-tracking surveys within the industrial and residential areas to the east of the A19. These areas were well-lit by street lighting so were unlikely to be suitable foraging habitat for cluttered habitat species such as *Myotis* species. Additionally, as only small numbers of edge habitat species were observed in these areas, it is unlikely that any large roosts were located nearby.

4.2.10 During the transect surveys the highest edge habitat bat species activity was recorded along the River Don to the west of Downhill Lane Junction. Only edge habitat species (common pipistrelles and soprano pipistrelles) were recorded in that location. Higher activity levels were recorded at two points along the River Don that were approximately 800 m apart, which suggests that the edge habitat species present were using the river and adjacent trees as a foraging and commuting resource. The lack of activity at the culvert during the crossing point surveys suggested that bats were not frequently using this linear feature to cross the road, and were remaining on the western side of the A19.

4.2.11 Common pipistrelles were observed crossing the A19, and Downhill Lane to the east of the junction, between 6 and 8 m above the road surface. In general this is high enough to minimise the risk of traffic collisions as the maximum recommended vehicle height is 4.95 m[21], and generally there is a correlation between the height of verge vegetation and the height at which bats cross the road[22]. At the two crossing points where bats were observed crossing the road, vegetation height ranged between 8 and 16 m. It can be inferred that where the verge vegetation height exceeds the maximum vehicle height the mortality rate of bats via vehicle collisions will be lower. If the height of vegetation adjacent to the road is negatively impacted by the proposals, the height at which bats cross the road may be affected[23], therefore increasing the risk of bat traffic collisions.

Cluttered Habitat Species

4.2.12 The activity of cluttered habitat species was very low within the survey area. *Myotis* species were recorded during the transect surveys near the eastern side of the culvert to the north of Downhill Lane Junction, and during the static detector surveys at the western side of the culvert. This suggests a relationship between cluttered habitat species and the river and the culvert, although no bats were observed flying through the culvert or crossing the road above. However, the majority of *Myotis* species activity was recorded by the static automated detector in June whereas the crossing point surveys at the culvert were conducted in May, July and September. Therefore it is possible that the culvert was used

[20] Altringham J.D. (2003) *British Bats*. Collins New Naturalist Library, Volume 93. Harper Collins, London.
[21] In accordance with The Road Vehicles (Construction and Use) Regulations 1986 (as amended)
[22] Berthinussen A. and Altringham J. (2012) Do bat gantries and underpasses help bats cross roads safely? *PLoS ONE*, **7**(6).
[23] Russell A. L., Butchkoski C. M., Saidak L., & McCracken G. F. (2009) *Road-killed bats, highway design, and commuting ecology of bats.* Endangered Species Research. Vol. 8 49-60.

as a crossing point by cluttered habitat species but this activity was unobserved by the surveys. Alternatively it is possible that cluttered habitat species were foraging along the River Don and amongst the wooded banks on either side of the road, but the road may have been a barrier to these species.

4.3 Site Evaluation

4.3.1 The site evaluation determined that the survey area was of **local value** for edge habitat species. Although no roosts were recorded during the surveys conducted in 2016, there were previous records of common pipistrelle roosts within the survey area from 2015. The general bat activity within the survey area was low, but predominantly comprised common pipistrelles; up to 659 passes were recorded by a static detector over one night. Compared to the surrounding landscape, the survey area featured a relatively large area of green space, comprising farmland and woodland. Therefore it is possible that the habitat within the survey area was a valuable resource for bats within the local area.

4.3.2 The survey area was of less than local value for open and cluttered habitat species. The activity of these species was very low. The survey results were reflected by the desk study records, which showed very few records of open and cluttered habitat species within 5 km of the proposals. At such low numbers the maintenance of the populations of bats within the survey area may be integral to the maintenance of the local populations.

4.4 Conclusions

4.4.1 No roosts were found within the survey area so the risk of the proposals to roosting bats is low. Some trees and buildings with low and moderate potential to support roosting bats were located within 100 m of the proposals. If any of these trees or buildings are impacted by the proposals there is potential to negatively impact roosts within these structures.

4.4.2 The 500 m surrounding the proposals is of local value to edge habitat species, and of less than local value to open and cluttered habitat species. The overall habitat quality and bat activity within the 500 m buffer of the proposals was low. A low number of bats were observed crossing the road.

FIGURES

APPENDIX A: LEGISLATION

A.1 International and national legislation

A.1.1 EC Habitats Directive

In 1992 the then European Community adopted Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, known as the Habitats Directive. The main aim of the EC Habitats Directive is to promote the maintenance of biodiversity by requiring member states to introduce protection for these habitats and species of European importance. The mechanism for protection is through designation of Special Areas of Conservation (SACs), both for habitats and for certain species listed within Annex II. There are a number of species listed within Annex II of the Habitats Directive that are present within the UK, these include: four lower plant species; nine higher plant species; six species of molluscs; six species of arthropods; eight species of fish; two species of amphibian; and nine species of mammal.

A.1.2 Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act 1981 (as amended) is the principle mechanism for the legislative protection of wildlife in Great Britain. However it does not extend to Northern Ireland, the Channel Islands or the Isle of Man. This legislation is the means by which the Convention on the Conservation of European Wildlife and Natural Habitats (the 'Bern Convention') and the European Union Directives on the Conservation of Wild Birds (79/409/EEC) and Natural Habitats and Wild Fauna and Flora (92/43/FFC) are implemented in Great Britain.

A.1.3 Conservation of Habitats and Species Regulations 2010 (as amended)

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

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

A.1.4 Natural Environment and Rural Communities Act 2006

Section 40 of the Act concerns biodiversity and states: ”Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.”

Section 41 of the NERC Act sates that: “The Secretary of State must, as respects England, publish a list of the living organisms and types of habitat which in the Secretary of State’s opinion are of principal importance for the purpose of conserving biodiversity”. All species of bat have been listed as ‘Species of Principal Importance’ under the NERC Act 2006.

Currently the following bat species are listed Species of Principal Importance’ under the NERC Act

2006:

- Barbastelle Bat (*Barbastella barbastellus*);
- Bechstein's Bat (*Myotis bechsteinii*);
- Noctule (Nyctalus noctula);
- Soprano Pipistrelle (*Pipistrellus pygmaeus*);
- Brown Long-eared Bat (*Plecotus auritus*)
- Greater Horseshoe Bat (*Rhinolophus ferrumequinum*), and;
- Lesser Horseshoe Bat (*Rhinolophus hipposideros*).

A.1.5 Other legislation

A.1.5.1 Wild Mammals (Protection) Act 1996

The Act protects wild mammals from malicious or intentional harm.

A.2 Bat specific legislation

All native UK bat species are fully protected by UK law under Schedule 5 (in respect of section 9(4)(b) and (c) and (5) only) and Schedule 6 of the Wildlife and Countryside Act (1981, as amended), and under Schedule 2 of the Conservation of Habitats and Species Regulations 2010. It is illegal to deliberately capture, injure or kill a bat or to intentionally or recklessly disturb bats. It is also illegal to damage, destroy or intentionally or recklessly obstruct access to a breeding or resting place used by a bat.

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

A.3 Local Biodiversity Action Plan (Durham LBAP)

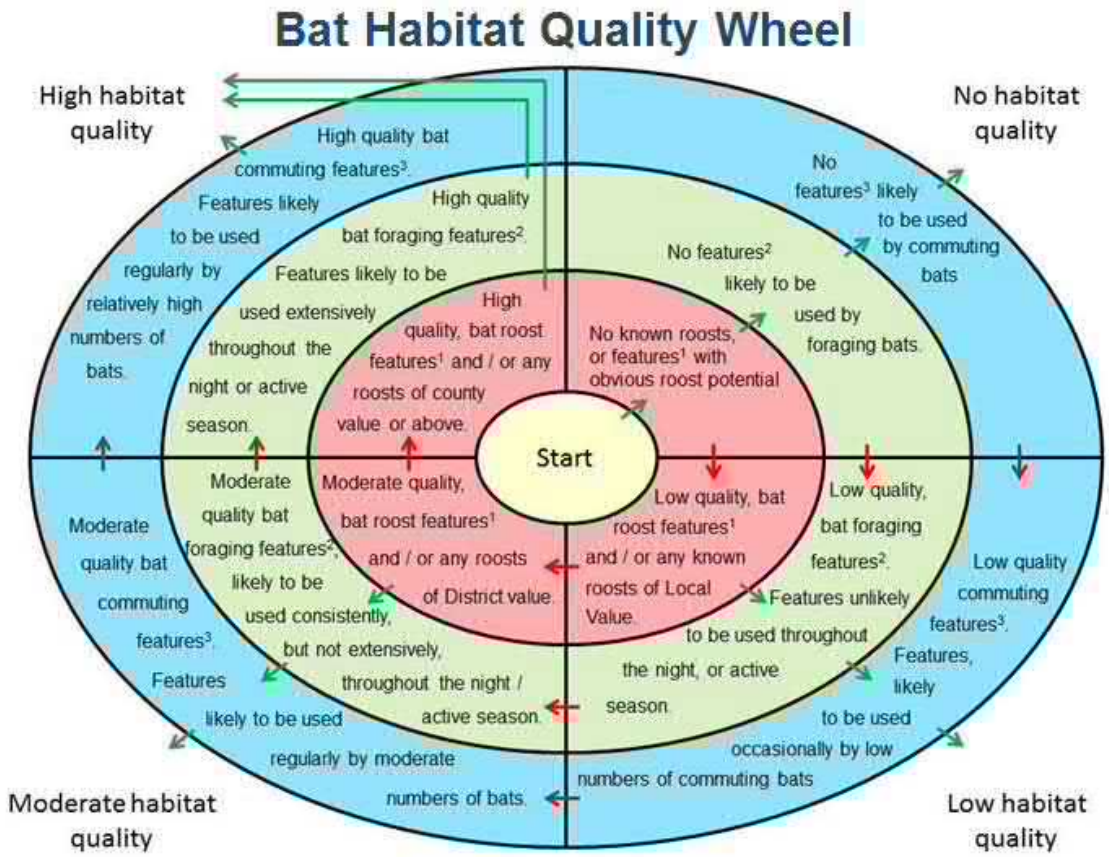
There are eighteen species of bats known to be a resident of the British Isles, seventeen of which are known to be breeding in the UK (Hundt 2012). Eleven of these species have been recorded within the area covered by the Durham Biodiversity Action Plan although only nine of the species have been confirmed to be breeding within this area.

The species found to be breeding in the area are the;

- Brandt's bat (*Myotis brandtii*);
- Brown Long-eared bat;
- Common Pipistrelle (*Pipistrellus pipistrellus*);
- Daubentons bat (*Myotis daubentonii*);
- Natterer's bat (*Myotis nattereri*);
- Noctule;
- Nathusius' Pipistrelle (*Pipistrellus nathusii);*
- Soprano Pipistrelle; and
- Whiskered bat (*Myotis mystacinu*).

The two non-breeding bat species are noted as having been recorded in the region covered by the Durham BAP are Leisler's bat (*Nyctalus leisleri*), and the Serotine bat (*Eptesicus serotinus*).

APPENDIX B: BAT HABITAT QUALITY WHEEL



Feature Quality Definitions

Habitat Quality	[1]Bat roost feature quality	[2]Bat foraging feature quality	[3]Bat commuting feature quality
None	No trees or structures present, or structures and / or trees, obviously unsuitable to support a roost.	No features likely to be used by foraging bats.	No features likely to be used by commuting bats.
Low	Few buildings or trees with potential to support a roost. Buildings / trees that are young or in exposed locations.	Features such as ditches or urban parkland, likely to be used occasionally by low numbers of foraging bats.	Features such as low hedgerows in arable farmland, fences, and ditches. Include hedgerows and planting belts next to major roads or well lit, built up areas. Not features connecting high quality roosting or foraging habitat (within or beyond the survey area).
Moderate	Some older buildings or trees likely to be present and within suitable (although not necessarily optimal) habitat.	Features such as hedgerows in arable farmland, or small woods, ponds and ditches. Moderate quality features are likely to suffer from some light pollution although generally not directly lit.	Relatively dark features such as tall hedgerows, hedges with associated ditches or tree lines. This could include linear features adjacent to minor roads.
High	High density of older buildings / mature trees likely to have high potential to support roosting bats.	Extensive mosaic of dark features such as tree lined rivers, ponds, rivers, broadleaved woodland and mature parkland.	Features such as double hedgerows, linear belts of broadleaved woodland, larger rivers, and tree lined watercourses. Likely to be dark. Include linear habitat connecting areas of moderate or high quality foraging or roosting habitat (within or beyond the survey area).

Directions

Starting at the centre of the wheel, roosting habitat, foraging habitat, and commuting habitat are considered in turn.

If the text matches the habitat present within the survey area is as described (or worse) follow the green arrow out towards the edge of the wheel. If the habitat within the survey area is of higher quality, follow the red arrow around in a clockwise direction. Repeat until the outside edge of the wheel, has been reached.

Note the green arrows must be followed in a clockwise direction. If the habitat quality on site is worse than that described, use the red arrow to proceed to the next level out straight away.

All statements in the wheel have been based on *Hundt L. (2011) Bat Surveys – Good Practice Guidelines 2nd Edition, Surveying for onshore wind farms. Bat Conservation Trust.*

APPENDIX C: WEATHER CONDITIONS

Dusk Emergence and Dawn Re-entry Surveys

Table A.1 Weather recorded during dusk emergence and dawn re-entry surveys.

Visit No.	Date	Dusk / Dawn	Rainfall Intensity	Wind Speed	Cloud Cover (%)	Start Temp. (˚C)	End Temp. (˚C)	Moon Phase (%)
1	09/08/2016	Dusk	Dry	Calm	100	11	9	34
	10/08/2016	Dawn	Dry	Calm	20	9	7	50
2	14/09/2016	Dusk	Light	Light	100	15	14	90
	15/09/2016	Dawn	Light	Light	100	15	14	96

Bat Activity Forward-tracking Surveys

Table A.2 Weather recorded during forward-tracking surveys. An asterisk * indicates data that was obtained from online data from Ouston weather station post-survey.

Visit No.	Date	Dusk / Dawn	Rainfall Intensity	Wind Speed	Cloud Cover (%)	Start Temp. (˚C)	End Temp. (˚C)	Moon Phase (%)
1	05/05/2016	Dawn	Dry	Calm	25	10	8	5
2	06/07/2016	Dawn	Dry	Calm	12	12	10.5*	1
3	14/09/2016	Dawn	Light	Light	100	16	13.7*	90

Bat Activity Transect Surveys

Table A.3 Weather recorded during transect surveys. An asterisk * indicates data that was obtained from online data from Ouston weather station post-survey.

Visit No.	Date	Dusk / Dawn	Rainfall Intensity	Wind Speed	Cloud Cover (%)	Start Temp. (˚C)	End Temp. (˚C)	Moon Phase (%)
1	03/05/2016	Dusk	Dry	Calm	20	8	8.4*	20
2	04/07/2016	Dusk	Light	Calm	100	14	12.8*	2
3	12/09/2016	Dusk	Light	Light	90	23	23	74

Static Automated Detector Surveys

Table A.4 Weather obtained from weather stations for static detector surveys. The background colour of the date column indicates which weather station the data was obtained: green indicates Ouston, orange indicates Cullercoats, and purple indicates that data from both stations was used to obtain a complete data set for the night.

Visit 1- May					
Date	**Rainfall / hour (mm)**	**Rainfall at sunset (mm)**	**Rainfall Score**	**Wind speed (m/s)**	**Air temperate (˚C)**
04/05/2016	0.00	0.00	10	1.34	6.78
05/05/2016	0.00	0.00	10	0.05	6.72
06/05/2016	0.00	0.00	10	2.42	6.39
07/05/2016	0.00	0.00	10	2.37	8.78
08/05/2016	0.25	0.25	10	0.51	7.28
Visit 2- June					
Date	**Rainfall / hour (mm)**	**Rainfall at sunset (mm)**	**Rainfall Score**	**Wind speed (m/s)**	**Air temperate (˚C)**
16/06/2016	1.52	1.52	10	2.98	10.39
17/06/2016	3.05	3.05	4	3.70	9.72
18/06/2016	0.25	0.25	10	0.62	7.78
19/06/2016	3.05	3.05	4	4.37	15.39
20/06/2016	1.27	1.27	4	0.87	11
Visit 3- July					
Date	**Rainfall / hour (mm)**	**Rainfall at sunset (mm)**	**Rainfall Score**	**Wind speed (m/s)**	**Air temperate (˚C)**
05/07/2016	0.51	0.51	8	2.06	9.11
06/07/2016	0.00	0.00	10	2.73	14.72
07/07/2016	0.00	0.00	10	2.11	14.22
08/07/2016	0.00	0.00	10	1.39	12.61
09/07/2016	0.51	0.51	8	4.27	15.89

Visit 4- August					
Date	**Rainfall / hour (mm)**	**Rainfall at sunset (mm)**	**Rainfall Score**	**Wind speed (m/s)**	**Air temperate (˚C)**
10/08/2016	0.00	0.00	10	3.09	11.78
11/08/2016	0.00	0.00	10	3.96	15.89
12/08/2016	0.00	0.00	10	4.27	14.89
13/08/2016	0.00	0.00	10	1.59	13.39
14/08/2016	0.00	0.00	10	0.57	11.89
Visit 5- September					
Date	**Rainfall / hour (mm)**	**Rainfall at sunset (mm)**	**Rainfall Score**	**Wind speed (m/s)**	**Air temperate (˚C)**
14/09/2016	0.25	0.00	10	3.09	12.11
15/09/2016	7.87	0.00	10	3.09	13.50
16/09/2016	14.73	14.73	1	5.40	0.00
17/09/2016	0.00	0.00	10	0.00	7.72
18/09/2016	0.51	0.00	10	0.46	11.22

Bat Activity Crossing Point Surveys

Table A.5 Weather recorded during crossing point surveys. An asterisk * indicates data that was obtained from online data from Ouston weather station post-survey.

Visit No.	Date	Dusk / Dawn	Rainfall Intensity	Wind Speed	Cloud Cover (%)	Start Temp. (˚C)	End Temp. (˚C)	Moon Phase (%)
1	04/05/2016	Dusk	Dry	Light	-	14	10.9*	12
2	05/07/2016	Dusk	Dry	Light	-	13	12.2*	1
3	13/09/2016	Dusk	Dry	Light	-	23	18.1*	83

APPENDIX D: BUILDING BAT ROOST POTENTIAL SURVEY RESULTS

Building Reference	Grid Reference	Date of Survey	Survey constraints
B1	NZ 33705 61910	12/04/2016	No

Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box, UPVC windows, wall cavity likely present.
Current Use	Terraced dwelling.
External Roof description	Two-pitched hipped roof with pan tile-effect tiles and flash band.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Housing and farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B2	NZ 33702 61916	12/04/2016	No

(indicative of building style)

Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box, UPVC windows, wall cavity likely present.
Current Use	Terraced dwelling.
External Roof description	Two-pitched hipped roof with pan tile-effect tiles and flash band.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Housing and farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B3	NZ 33699 61920	12/04/2016	No

(indicative of building style)

Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box, UPVC windows, wall cavity likely present.
Current Use	Terraced dwelling.
External Roof description	Two-pitched hipped roof with pan tile-effect tiles and flash band.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Housing and farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B4	NZ 33742 61924	12/04/2016	No

Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box and barge boards, UPVC windows, wall cavity likely present.
Current Use	Terraced dwelling.
External Roof description	Two-pitched roof with pan tile-effect tiles, lead flashing on extension.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Housing and farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B5	NZ 33740 61928	12/04/2016	No
			
Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box and barge boards, UPVC windows, wall cavity likely present.		
Current Use	Terraced dwelling.		
External Roof description	Two-pitched roof with pan tile-effect tiles, lead flashing on extension.		
Location and description of any potential bat access points	None recorded.		
Habitats within 100m and habitat connectivity	Housing and farmland.		
Further Assessment needed?	No		
Overall category of Bat Potential	Negligible		

Building Reference	Grid Reference	Date of Survey	Survey constraints
B6	NZ 33737 61932	12/04/2016	No

(indicative building style)

Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box and barge boards, UPVC windows, wall cavity likely present.
Current Use	Terraced dwelling.
External Roof description	Two-pitched roof with pan tile-effect tiles, lead flashing on extension.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Housing and farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B7	NZ 33735 61935	12/04/2016	No

(indicative building style)

Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box and barge boards, UPVC windows, wall cavity likely present.
Current Use	Terraced dwelling.
External Roof description	Two-pitched roof with pan tile-effect tiles, lead flashing on extension.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Housing and farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B8	NZ 33731 61940	12/04/2016	No

(indicative building style)

Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box and barge boards, UPVC windows, wall cavity likely present.
Current Use	Terraced dwelling.
External Roof description	Two-pitched roof with pan tile-effect tiles, lead flashing above porch.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Housing and farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B9	NZ 33727 61947	12/04/2016	No

(indicative building style)

Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box and barge boards, UPVC windows, wall cavity likely present.
Current Use	Terraced dwelling.
External Roof description	Two-pitched roof with pan tile-effect tiles, lead flashing above porch.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Housing and farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B10	NZ 33724 61952	12/04/2016	No

(indicative building style)

Type and description of Building	Two-storey brick building, 6 m high and approximately 25 years old. Soffit box and barge boards, UPVC windows, wall cavity likely present.
Current Use	Terraced dwelling.
External Roof description	Two-pitched roof with pan tile-effect tiles, lead flashing above porch.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Housing and farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B11	NZ 33866 61692	11/04/2016	No

Type and description of Building	One-storey brick building, 5 m high and approximately 10 years old. Steel formwork and sheet cladding on walls, wall cavity present. No windows present.
Current Use	Warehouse for light industrial use.
External Roof description	Two-pitched hipped roof of corrugated sheeting with pipe vents.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B12	NZ 33875 61635	11/04/2016	No

(photo taken from Google Earth Pro)

Type and description of Building	One-storey brick building, 5 m high and approximately 10 years old. Steel formwork and partial steel cladding on walls, wall cavity present. Metal framed windows.
Current Use	Warehouse for light industrial use.
External Roof description	Two-pitched hipped roof of corrugated sheeting with pipe vents.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B13	NZ 33888 61586	11/04/2016	No

Type and description of Building	One-storey brick building, 5 m high and approximately 10 years old. Steel formwork and corrugated sheet cladding on walls, wall cavity likely present. Metal framed windows present.
Current Use	Warehouse for light industrial use.
External Roof description	Two-pitched hipped roof of corrugated sheeting with small vents.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B14	NZ 33902 61521	11/04/2016	No

(photo taken from Google Earth Pro)

Type and description of Building	One-storey brick building, 7-8 m high and approximately 10 years old. Steel formwork gutter and partial corrugated sheet cladding on walls. Metal framed windows present.
Current Use	Warehouse for light industrial use.
External Roof description	Two-pitched roof of corrugated sheeting with pipe vents.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B15	NZ 33911 61435	11/04/2016	No

Type and description of Building	One-storey brick and corrugated metal building, 8 m high and approximately 10 years old. Steel formwork gutter and corrugated sheet cladding on walls, wall cavity likely present. Metal framed windows present.
Current Use	Detached offices.
External Roof description	Two-pitched roof of corrugated sheeting.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B16	NZ 33718 61322	12/04/2016	No
			
Type and description of Building	One-storey building constructed from wood with wooden cladding. Approximately 4 m high and approximately 60 years old. 15 m in length and 6 m wide. Fascia boards and barge boards, no wall cavity or windows.		
Current Use	Detached barn.		
External Roof description	Two-pitched roof with wooden tiles. Internal- 100% accessible. No roof membrane, king post, light inside. Eaves assessable for bats.		
Location and description of any potential bat access points	None recorded.		
Habitats within 100m and habitat connectivity	Farmland		
Further Assessment needed?	No		
Overall category of Bat Potential	Negligible		

Building Reference	Grid Reference	Date of Survey	Survey constraints
B17	NZ 33711 61296	12/04/2016	No
			
Type and description of Building	One-storey building, metal frame construction with wood and metal cladding. 6 m high and approximately 30 years old. Barge boards and lapped tiles, no wall cavity or windows.		
Current Use	Detached barn.		
External Roof description	Two-pitched corrugated metal roof.		
Location and description of any potential bat access points	None recorded.		
Habitats within 100m and habitat connectivity	Farmland		
Further Assessment needed?	No		
Overall category of Bat Potential	Negligible		

Building Reference	Grid Reference	Date of Survey	Survey constraints
B18	NZ 33717 61277	12/04/2016	No

Type and description of Building	One-storey building, metal frame construction with wooden cladding. Approximately 8 m high and 20 years old. No wall cavity or windows, but roof-light present.
Current Use	Detached storage barn.
External Roof description	Two-pitched corrugated roof.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Farmland
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B19	NZ 33687 61258	12/04/2016	No

Type and description of Building	One-storey building clad in corrugated asbestos-cement, 3 m high and approximately 70 years old. No wall cavity present, boarded up windows with gaps at the top.
Current Use	Shed (not in use).
External Roof description	Two-pitched roof covered with corrugated asbestos-cement.
Location and description of any potential bat access points	Gaps under end corrugation and where overlaps. Many gaps in walls and roof.
Habitats within 100m and habitat connectivity	Farmland
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B20	NZ 33941 61328	11/04/2016	No

(photo taken from Google Earth Pro)

Type and description of Building	Two-storey brick and glass building, approximately 10 m high and 10 years old. Steel formwork and corrugated cladding on walls to two thirds the height of the building. Wall cavity likely present. Metal framed windows present.
Current Use	Warehouse for light industrial use and office.
External Roof description	Two-pitched roof covered with corrugated sheeting (air vents present).
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B21	NZ 33903 61261	11/04/2016	No

Type and description of Building	Two-storey building clad with corrugated metal. Approximately 6 m high and 10 years old. Wall cavity and metal framed windows present.
Current Use	Detached offices.
External Roof description	Single-pitched roof covered with corrugated sheeting.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Business park, A19 and woodland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B22	NZ 33940 61272	11/04/2016	No

(photo taken from Google Earth Pro)

Type and description of Building	Two-storey concrete and glass building, clad with corrugated metal, wall cavity present. Approximately 7 m high and 10 years old. Steel formwork around gutter. Metal framed windows present.
Current Use	Warehouse for light industrial use.
External Roof description	Single-pitched roof of corrugated sheeting with vents.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B23	NZ 33925 61185	11/04/2016	No

(indicative building type)

Type and description of Building	Single-storey brick building, 5 m high and approximately 10 years old. Fascia boards and soffit box present, wall cavity likely. Metal framed windows.
Current Use	Detached offices.
External Roof description	Two-pitched hipped roof with a mini-gable of slate-effect tiles, ridge vents.
Location and description of any potential bat access points	Lead flashing under mini-gables, raised at western end.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B24	NZ 33963 61196	11/04/2016	No

Type and description of Building	Single-storey brick building, 5 m high and approximately 15 years old. Soffit box present with, hanging tiles at the gable. Presence of wall cavity unknown. Metal framed windows present.
Current Use	Detached offices.
External Roof description	Two-pitched hipped roof with a mini-gable of slate-effect tiles.
Location and description of any potential bat access points	Gap in brickwork to rear of building. Missing, slipped and raised roof tiles and raised ridge tiles. Gap under ridge at gable.
Habitats within 100m and habitat connectivity	Business park, A19 and woodland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B25	NZ 33959 61161	11/04/2016	No

Type and description of Building	Two-storey brick building, 6 m high and approximately 15 years old. Soffit box, trellis but no climbing plants. Metal framed windows present.
Current Use	Detached offices.
External Roof description	Two-pitched hipped roof in mansard style with slate-effect tiles.
Location and description of any potential bat access points	Raised roof tiles on eastern side, missing ridge tiles on hip replaced with lead flashing.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B26	NZ 33899 61139	11/04/2016	No

(indicative building type)

Type and description of Building	Single-storey brick building, 5 m high and approximately 10 years old. Fascia boards and soffit box present, wall cavity likely. Metal framed windows.
Current Use	Detached offices.
External Roof description	Two-pitched hipped roof with mini-gable and slate-effect tiles. Ridge vents and gable end caps.
Location and description of any potential bat access points	Raised roof tile at southern gable, lead flashing.
Habitats within 100m and habitat connectivity	Business park.
Further Assessment needed?	Yes – forward-tracking survey.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B27	NZ 33691 61097	12/04/2016	No
			
Type and description of Building	Two-storey brick building, 6 m high and approximately 75 years old. Soffit box, wall cavity / vapour gap likely present. Wooden framed windows.		
Current Use	Detached dwelling.		
External Roof description	Two-pitched roof with pan tile-effect tiles. Lead flashing around chimney and extensions.		
Location and description of any potential bat access points	Rotten window frames, missing mortar under ridge tile. Mortar missing from north-facing gable.		
Habitats within 100m and habitat connectivity	Farmland with limited connectivity (hedgerows low and defunct).		
Further Assessment needed?	No – over 50 m from proposed scheme.		
Overall category of Bat Potential	Moderate		

Building Reference	Grid Reference	Date of Survey	Survey constraints
B28	NZ 33923 61097	11/04/2016	No access to south side

Type and description of Building	Single-storey brick building, 4 m high and approximately 15 years old. Soffit box and hanging tiles present. Metal framed windows.
Current Use	Detached offices.
External Roof description	Two-pitched hipped roof with mini-gable and slate-effect tiles.
Location and description of any potential bat access points	Raised roof tile at southern gable, lead flashing.
Habitats within 100m and habitat connectivity	Business park and woodland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B29	NZ 33976 61055	11/04/2016	No

(overview photo taken from Google Earth)

Type and description of Building	Six-storey building, constructed from steel or concrete. 16-18 m high and approximately 15 years old. Fascia boards and wooden cladding with rendered ground floor. Metal framed windows present with window boxes.
Current Use	Offices
External Roof description	Flat roof.
Location and description of any potential bat access points	Small gaps between wooden cladding (in use by nesting birds at the time of survey).
Habitats within 100m and habitat connectivity	Business park and lake.
Further Assessment needed?	Yes – forward-tracking survey.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints

B30	NZ 33693 61000	12/04/2016	No

Type and description of Building	Two-storey steel-framed building with wooden cladding, 8 m high and approximately 20 years old. Metal framed windows present, wall cavity unlikely.
Current Use	Detached office.
External Roof description	Flat roof.
Location and description of any potential bat access points	A few slightly raised wooden slats with gaps up to 0.5 inches in diameter. Possible void behind east-facing 'Enterprise' sign which had lifted away from the wall slightly. Circular holes from previous fixings may lead to small voids up to 1 inch.
Habitats within 100m and habitat connectivity	Car parking with arable fields and roads beyond.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible due to poor connectivity, external lighting and likely disturbance from adjacent A194.

Building Reference	Grid Reference	Date of Survey	Survey constraints
B31	NZ 33973 60688	11/04/2016	No

Type and description of Building	Single-storey building constructed from breeze blocks. Approximately 6 m high and 10 years old. Sheet cladding and no windows present.
Current Use	Detached storage unit within the electrical substation compound.
External Roof description	Two-pitched corrugated roof.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	National Grid transformer substation.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B32	NZ 33889 60072	12/04/2016	No

Type and description of Building	Single-storey stone building, 4 m high and approximately 100 years old (recently renovated). Barge boards and wooden framed windows, likely no wall cavity present.
Current Use	Bungalow dwelling.
External Roof description	Two-pitched roof covered with pan tiles. Lead flashing in roof valleys and mesh at the eaves as a barrier to birds and insects.
Location and description of any potential bat access points	Slipped and raised roof tiles, missing mortar from ridge and damaged mesh at the eaves.
Habitats within 100m and habitat connectivity	Farmland.
Further Assessment needed?	No – over 50 m from proposed scheme.
Overall category of Bat Potential	Moderate

Building Reference	Grid Reference	Date of Survey	Survey constraints
B33	NZ 33908 60067	12/04/2016	No

Type and description of Building	Single-storey stone building, 3 m high and approximately 100 years old. 7 m in length and 3 m wide. Wooden cladding, fascia boards, soffit box and barge boards. No windows and no wall cavity present.
Current Use	Detached garage.
External Roof description	Two-pitched roof with pan tiles.
Location and description of any potential bat access points	Cracks in stonework and missing mortar. Slipped and raised roof tiles. Garage door appears to be kept open. Internal- 10% accessed. Plastic roof membrane and king post, eaves accessible for bats. Light present. Not internally inspected for bat evidence.
Habitats within 100m and habitat connectivity	Farmland.
Further Assessment needed?	No – over 50 m from proposed scheme.
Overall category of Bat Potential	Moderate

Building Reference	Grid Reference	Date of Survey	Survey constraints
B34	NZ 33916 60074	12/04/2016	No

Type and description of Building	Two-storey stone building, 7 m high and approximately 100 years old. Fascia boards and barge boards, UPVC windows, likely no wall cavity present.
Current Use	Detached dwelling.
External Roof description	Two-pitched, with large hipped extension and additional two-pitched extension with dormers present. Roof covered with pan tiles. Lead flashing in the roof valleys.
Location and description of any potential bat access points	Slipped and raised roof tiles to rear of building, and raised ridge tiles. Occasional mortar missing in walls but no voids.
Habitats within 100m and habitat connectivity	Farmland.
Further Assessment needed?	Yes – emergence / re-entry surveys.
Overall category of Bat Potential	Moderate (previously confirmed roost)

Building Reference	Grid Reference	Date of Survey	Survey constraints
B35	NZ 33939 60091	12/04/2016	No

Type and description of Building	One-storey breeze block and corrugated metal building, 3 m high and approximately 15 years old. Metal cladding and fascia boards. Wooden windows, open/unglazed. No wall cavity present.
Current Use	Detached stables.
External Roof description	Single-pitched flat roof of corrugated metal.
Location and description of any potential bat access points	Windows unglazed. Internal - tiles on tilling batten, no roofing membrane. Flat posts and access for bats at eaves. Not internally inspected for bat evidence.
Habitats within 100m and habitat connectivity	Farmland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B36	NZ 34443 59564	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Hole in gable mortar approximately 3 x 0.5 inches wide.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B37	NZ 34451 59569	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Hole in gable mortar at bottom of western facing pitch approximately 2 x 1 inches wide.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B38	NZ 34459 59573	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Holes and missing mortar from porch tiles, gaps approximately 1 x1 inches wide.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B39	NZ 34484 59552	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Holes above front porches.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B40	NZ 34499 59517	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Slipped tiles on south-facing roof pitch.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B41	NZ 34505 59491	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Missing mortar under gable end tiles.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B42	NZ 34524 59500	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Missing mortar under gable end tiles.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B43	NZ 34541 59466	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. At rear of building large gap where mortar had dropped out from under bottom three gable end tiles.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B44	NZ 34528 59433	11/04/2016	No


(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Slipped tiles and missing mortar to rear of house at bottom of western gable end. Raised flashing around chimney.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B45	NZ 34566 59348	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Missing tile from west-facing pitch of porch roof.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B46	NZ 34553 59342	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Slipped hanging tile at apex of porch.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B47	NZ 34558 59335	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Three slipped tiles on west-facing porch roof.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B48	NZ 34589 59261	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Raised hanging tiles at bottom of front cladding, appeared to have been pushed back.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B49	NZ 34630 59174	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Missing tile on porch below apex tile.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B50	NZ 34638 59177	11/04/2016	No

(indicative building type shown)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 45 years old. Hanging tiles and cladding, soffit box and barge boards. Presence of wall cavity likely, UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched with some gambrels and pan tile-effect tiles.
Location and description of any potential bat access points	Lead flashing and slipped hanging tiles, some cracks brick/missing mortar but not much. Missing tile on porch below apex tile.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Low

Building Reference	Grid Reference	Date of Survey	Survey constraints
B51	NZ 33951 59077	12/04/2016	No

(Photo taken from Google Earth)

Type and description of Building	One-storey building constructed from board and render. 4 m high and approximately 30 years old. Fascia boards and wood edging below UPVC windows, no wall cavity.
Current Use	Mobile home.
External Roof description	Two-pitched felt roof.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Pasture and residential.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B52	NZ 33964 59071	12/04/2016	No
			
Type and description of Building	One-storey brick building, 3 m high and approximately 30 years old. Tight fascia boards and UPVC windows present, no wall cavity.		
Current Use	Storage building / bungalow dwelling.		
External Roof description	Flat bitumen roof.		
Location and description of any potential bat access points	None recorded.		
Habitats within 100m and habitat connectivity	Gardens		
Further Assessment needed?	No		
Overall category of Bat Potential	Negligible		

Building Reference	Grid Reference	Date of Survey	Survey constraints
B53	NZ 33961 59060	12/04/2016	No
			
Type and description of Building	One-storey prefabricated concrete building, 2 m high and approximately 20 years old. 10 m long and 5 m wide. Tight fascia boards, no windows present, no wall cavity.		
Current Use	Detached garage.		
External Roof description	Flat corrugated asbestos roof.		
Location and description of any potential bat access points	Very small cracks in walls.		
Habitats within 100m and habitat connectivity	Gardens		
Further Assessment needed?	No		
Overall category of Bat Potential	Negligible		

Building Reference	Grid Reference	Date of Survey	Survey constraints
B54	NZ 33967 59015	12/04/2016	No
			
Type and description of Building	Two-storey rendered brick building, 6 m high and approximately 75 years old. Hanging tiles and cladding present on dormers, UPVC and metal-framed windows. Presence of wall cavity likely.		
Current Use	Terraced dwelling.		
External Roof description	Two-pitched hipped roof with slate tiles. Lead flashing around dormers.		
Location and description of any potential bat access points	Low numbers of missing, slipped and raised roof tiles.		
Habitats within 100m and habitat connectivity	Gardens and amenity.		
Further Assessment needed?	No – over 50 m from proposed scheme.		
Overall category of Bat Potential	Moderate		

Building Reference	Grid Reference	Date of Survey	Survey constraints
B55	NZ 33984 58997	12/04/2016	No
			
Type and description of Building	Two-storey rendered building, 7 m high and approximately 80 years old. UPVC windows, no wall cavity. Small dormer at front.		
Current Use	Detached garage with rooms.		
External Roof description	Two-pitched hipped roof with slate tiles.		
Location and description of any potential bat access points	Raised tiles to rear of building.		
Habitats within 100m and habitat connectivity	Amenity grassland and residential.		
Further Assessment needed?	No – over 50 m from proposed scheme.		
Overall category of Bat Potential	Low		

Building Reference	Grid Reference	Date of Survey	Survey constraints
B56	NZ 34476 59025	12/04/2016	No

(aerial photo taken from Google Earth Pro), similar adjacent building photographed as building not visible from adjacent public right of way.

Type and description of Building	Single-storey corrugated metal building located within the Nissan car factory boundary, approximately 15.5 m long and 6.5 m wide.
Current Use	Part of an electrical substation.
External Roof description	Single-pitched corrugated metal.
Location and description of any potential bat access points	None seen and none considered likely (based on photographs).
Habitats within 100m and habitat connectivity	Industrial units and broadleaved plantation woodland.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible (considered view based on photographs).

Building Reference	Grid Reference	Date of Survey	Survey constraints
B57	NZ 34664 59037	11/04/2016	No

(indicative building type)

Type and description of Building	One-storey brick and render building, 4 m high and approximately 65 years old. Fascia boards and barge boards. Wall cavity and UPVC windows present.
Current Use	Bungalow dwelling.
External Roof description	Two-pitched roof with pan tiles, lead flashing around chimney.
Location and description of any potential bat access points	Some cracks brick/missing mortar but not much. Missing mortar from west-facing ridge tiles.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B58	NZ 34491 58880	12/04/2016	No

Type and description of Building	Sheet metal building, number of storeys unknown. 14 m high and 15-20 years old. Metal formwork, no windows. Wall cavity unlikely.
Current Use	Detached industrial building.
External Roof description	Convex curved corrugated sheet roof.
Location and description of any potential bat access points	None recorded.
Habitats within 100m and habitat connectivity	Industrial units.
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B59	NZ 34700 58872	11/04/2016	No

(indicative building type)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 65 years old. Barge boards, wall cavity and UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched roof with corrugated tile, lead flashing around chimney.
Location and description of any potential bat access points	Missing mortar from gable end below end tile.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey constraints
B60	NZ 34700 58828	11/04/2016	No

(indicative building type)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 65 years old. Barge boards, wall cavity and UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched roof with corrugated tile, lead flashing around chimney.
Location and description of any potential bat access points	Missing mortar from north-facing gable forming three gaps.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey Constraints
B61	NZ 34701 58793	11/04/2016	No

(indicative building type)

Type and description of Building	Two-storey brick and render building, 6 m high and approximately 65 years old. Barge boards, wall cavity and UPVC windows present.
Current Use	Semi-detached dwelling.
External Roof description	Two-pitched roof with corrugated tile, lead flashing around chimney.
Location and description of any potential bat access points	Missing mortar from north-facing gable.
Habitats within 100m and habitat connectivity	Housing
Further Assessment needed?	Yes – forward-tracking surveys.
Overall category of Bat Potential	Negligible

Building Reference	Grid Reference	Date of Survey	Survey Constraints
B62	NZ 34558 58691	12/04/2016	No

(image taken from Google Earth Pro)

Type and description of Building	Building not assessed as located within the Nissan car factory boundary and not visible from public rights of way.
Current Use	Unknown
External Roof description	Two-pitched roof covered by corrugated metal.
Location and description of any potential bat access points	Unknown
Habitats within 100m and habitat connectivity	Industrial units
Further Assessment needed?	No
Overall category of Bat Potential	Negligible

APPENDIX E: TREE BAT ROOST POTENTIAL SURVEY RESULTS

Tree no.	Tree species / Photo	Tree Age	Diameter at Breast Height (DBH) (m)	Tree height (m)	Location of Tree / Approx. Grid Reference	Potential Roost Features (PRF)	BRP of tree	Aerial Inspection (Yes/No)	Emergence /pre-dawn re-entry Survey (Yes/No)
T1	Crack willow 	Mature	0.5	16	In copse of trees to west of track to West Bolden lodge and substation. NZ 34201 60895	Callus roll and dead branches. Group of seven trees- ground conditions too wet to get near.	Low	Yes	Yes

Tree no.	Tree species / Photo	Tree Age	Diameter at Breast Height (DBH) (m)	Tree height (m)	Location of Tree / Approx. Grid Reference	Potential Roost Features (PRF)	BRP of tree	Aerial Inspection (Yes/No)	Emergence /pre-dawn re-entry Survey (Yes/No)
T2	Poplar 	Semi-mature	0.4	16	In woodland to north-east of substation. NZ 33898 60886	Duel stems which had rubbed together.	Low	Yes	Yes
T3	White poplar No Photo	Semi-mature	0.2	15	In woodland to east of substation. NZ 33858 60825	Frost crack vertically up trunk.	Low	No- can be inspected using endoscope from ground.	Yes

Tree no.	Tree species / Photo	Tree Age	Diameter at Breast Height (DBH) (m)	Tree height (m)	Location of Tree / Approx. Grid Reference	Potential Roost Features (PRF)	BRP of tree	Aerial Inspection (Yes/No)	Emergence /pre-dawn re-entry Survey (Yes/No)
T4	Willow species No Photo	Semi-mature	0.3	10	In woodland to east of substation. NZ 33837 60756	West-facing lifted bark exposing crack.	Low	No- can be inspected using endoscope from ground.	Yes
T5	Dead 	Dead	0.4	12	On edge of woodland to east of substation. NZ 33892 60750	Hollow formed due to rubbing.	Low	No- can be inspected using endoscope from ground.	Yes

Tree no.	Tree species / Photo	Tree Age	Diameter at Breast Height (DBH) (m)	Tree height (m)	Location of Tree / Approx. Grid Reference	Potential Roost Features (PRF)	BRP of tree	Aerial Inspection (Yes/No)	Emergence /pre-dawn re-entry Survey (Yes/No)
T6	Willow species No Photo	Semi-mature	0.7	15	In woodland to west of Downhill Lane Junction (approx. 100 m outside survey area). NZ 33859 59900	Rot pocket / woodpecker hole at 7 m.	Low	No	Yes
T7	Willow species 	Mature	0.5	14	In woodland to west of Downhill Lane Junction (approx. 30 m outside survey area). NZ 33889 59859	Tear out, lifted bark, dead/rotten core.	Low	No	Yes

Tree no.	Tree species / Photo	Tree Age	Diameter at Breast Height (DBH) (m)	Tree height (m)	Location of Tree / Approx. Grid Reference	Potential Roost Features (PRF)	BRP of tree	Aerial Inspection (Yes/No)	Emergence /pre-dawn re-entry Survey (Yes/No)
T8	Beech 	Young	0.25	10	In woodland to west of Downhill Lane Junction (approx. 20 m outside survey area). NZ 33898 59871	Tear out on northern side.	Low	No- can be inspected using endoscope from ground.	Yes

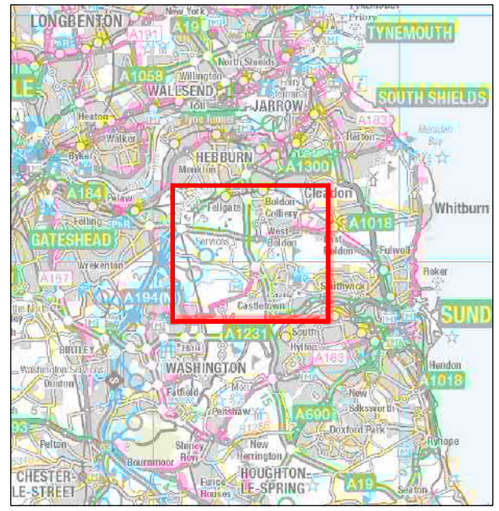
Tree no.	Tree species / Photo	Tree Age	Diameter at Breast Height (DBH) (m)	Tree height (m)	Location of Tree / Approx. Grid Reference	Potential Roost Features (PRF)	BRP of tree	Aerial Inspection (Yes/No)	Emergence /pre-dawn re-entry Survey (Yes/No)
T9	Willow species 	Semi-mature	0.4	12	In scattered woodland to north-east of Downhill Lane Junction. NZ 34144 60066	Torn and split trunk.	Low	No- can be inspected using endoscope from ground.	Yes

Tree no.	Tree species / Photo	Tree Age	Diameter at Breast Height (DBH) (m)	Tree height (m)	Location of Tree / Approx. Grid Reference	Potential Roost Features (PRF)	BRP of tree	Aerial Inspection (Yes/No)	Emergence /pre-dawn re-entry Survey (Yes/No)
T10	Willow species 	Semi-mature	1.0	12	In scattered woodland to north-east of Downhill Lane Junction. NZ 34172 60081	Lifted bark on eastern side.	Low	No	Yes

FIGURE 1

Legend

- 100m Bat Roost Potential Survey Area
- 500m Bat Activity Survey



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Drawing Title: BAT SURVEY AREAS

Drawing Status:

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Jacobs No.	B0140300	
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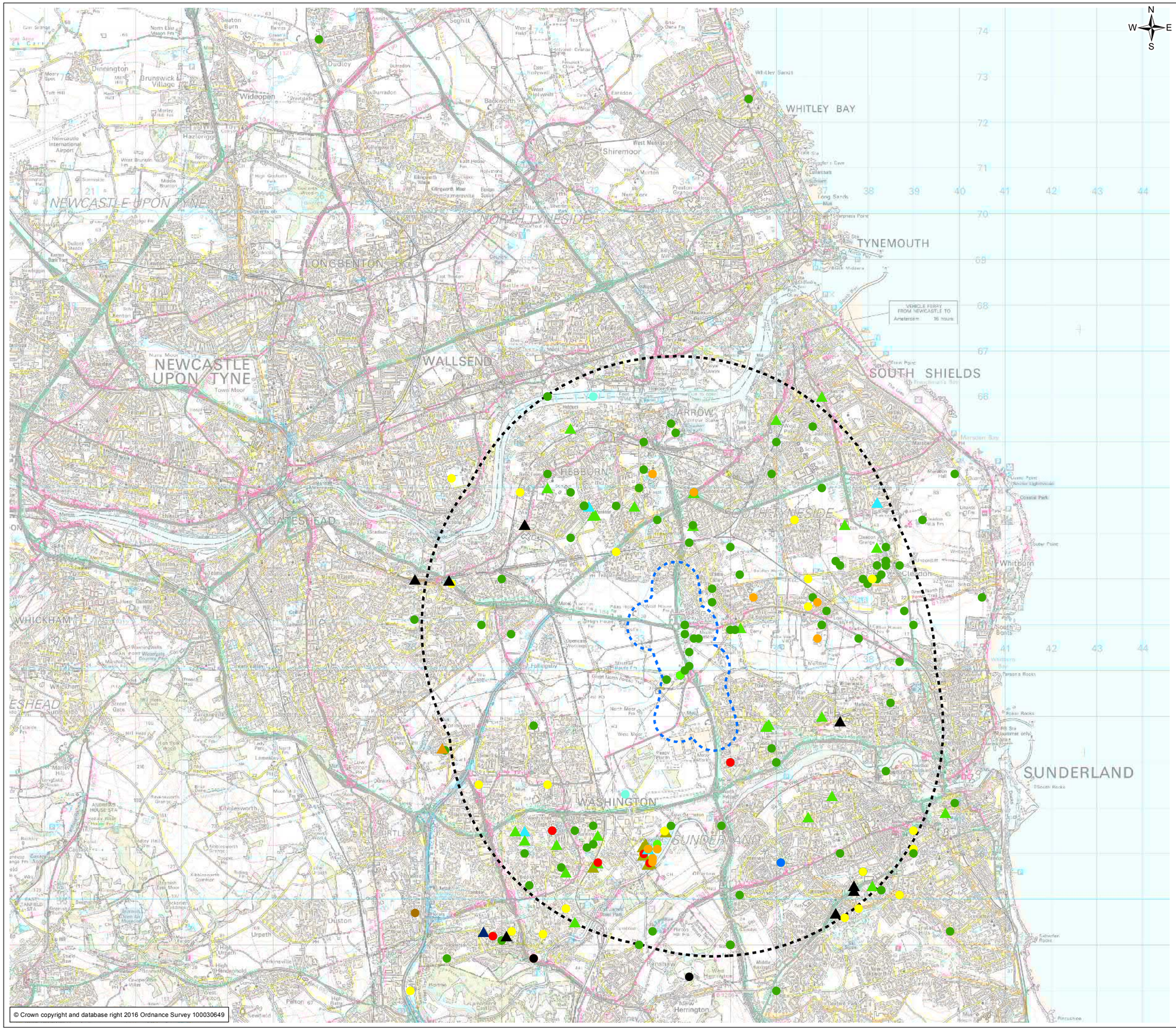

FIGURE 2

Legend

500m Buffer

5km Buffer

Desk Study Results

- Record Away from Roost, Daubenton's
- Record Away from Roost, Common pipistrelle
- Record Away from Roost, Pipistrelle species
- Record Away from Roost, Bat species
- Record Away from Roost, Soprano Pipistrelle
- Record Away from Roost, Myotis species
- Record Away from Roost, Whiskered/Brandt's
- Record Away from Roost, Noctule
- Record Away from Roost, Common Pipistrelle
- Roost, Bat species
- Roost, Common Pipistrelle
- Roost, Common pipistrelle
- Roost, Natterer's
- Roost, Pipistrelle species
- Roost, Soprano Pipistrelle
- Roost, Whiskered/Brandt's

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Drawing Title: DESK STUDY RESULTS

Drawing Status:

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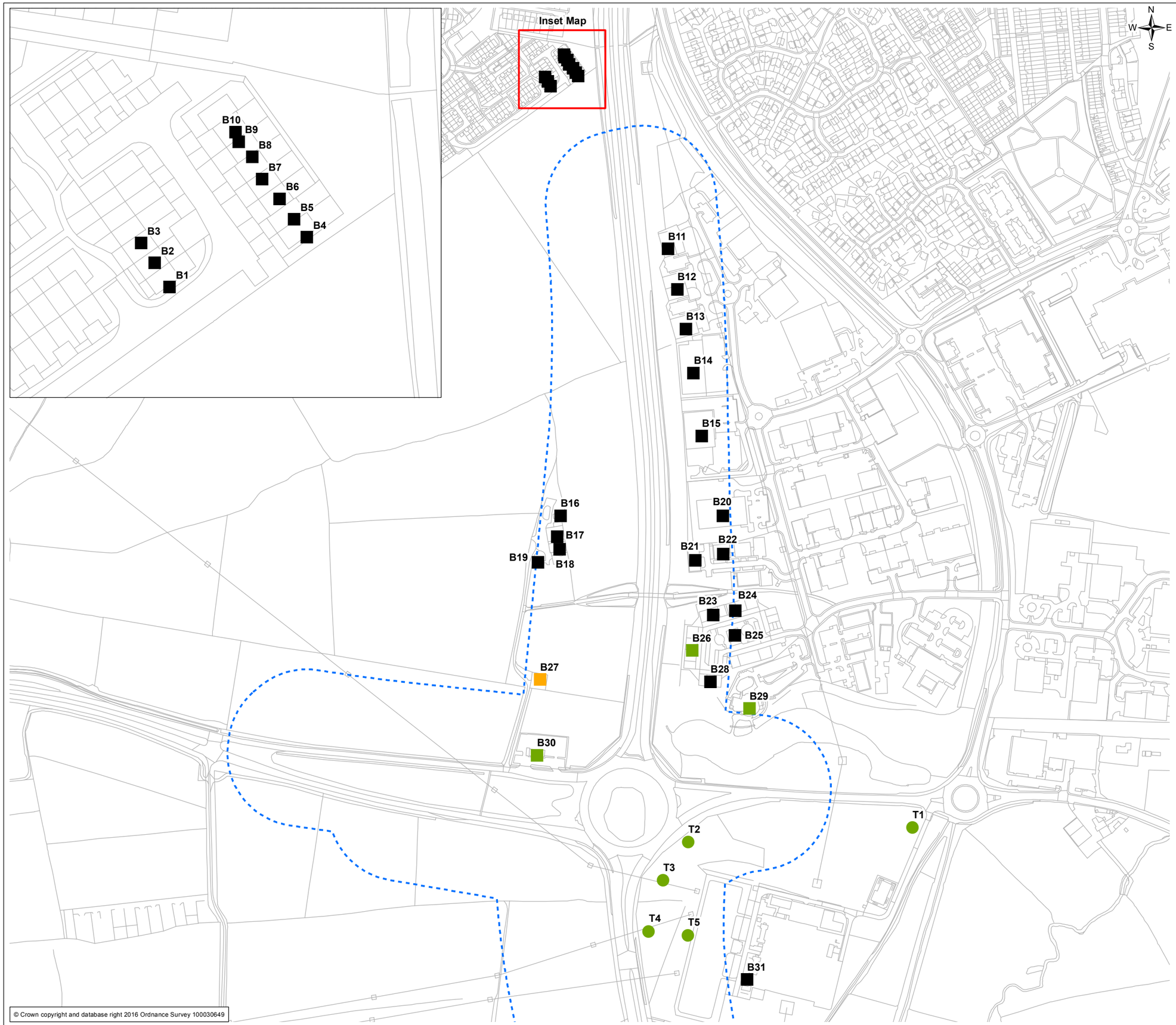
Drawing No. B0140301_BRP_02

FIGURE 3A



Legend

100m Buffer

Bat Roost Potential Buildings

- Low
- Moderate
- Negligible

Bat Roost Potential Trees

- Low

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Drawing Title: BAT ROOST POTENTIAL SURVEY RESULTS

Drawing Status:

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Jacobs No.	B0140300	
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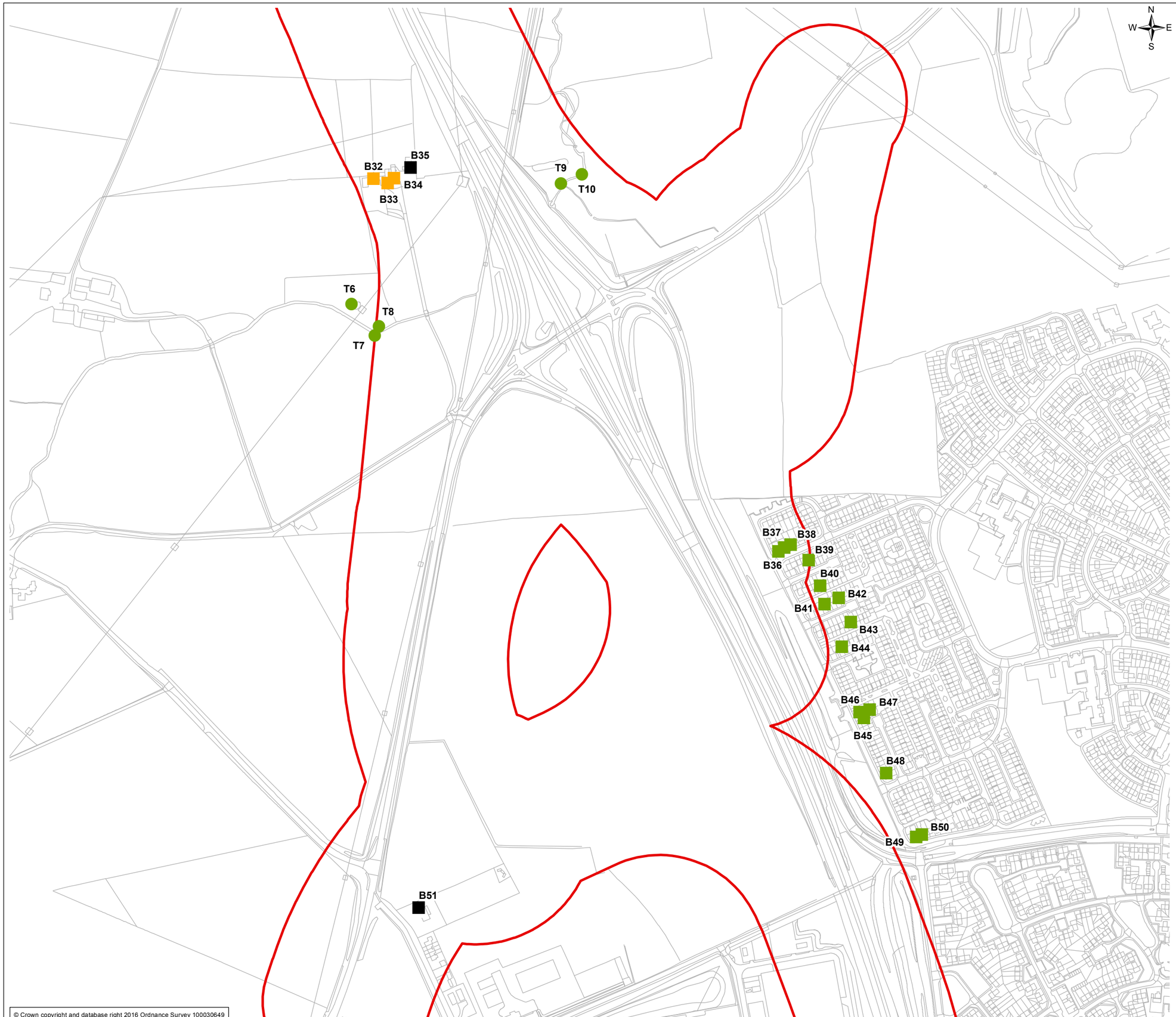

FIGURE 3B

Legend

- 100m Buffer

Bat Roost Potential Buildings

- Low
- Moderate
- Negligible

Bat Roost Potential Trees

- Low

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Drawing Title: BAT ROOST POTENTIAL SURVEY RESULTS

Drawing Status:

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Client No.		

Drawing No.: B0140301_BRP_03B

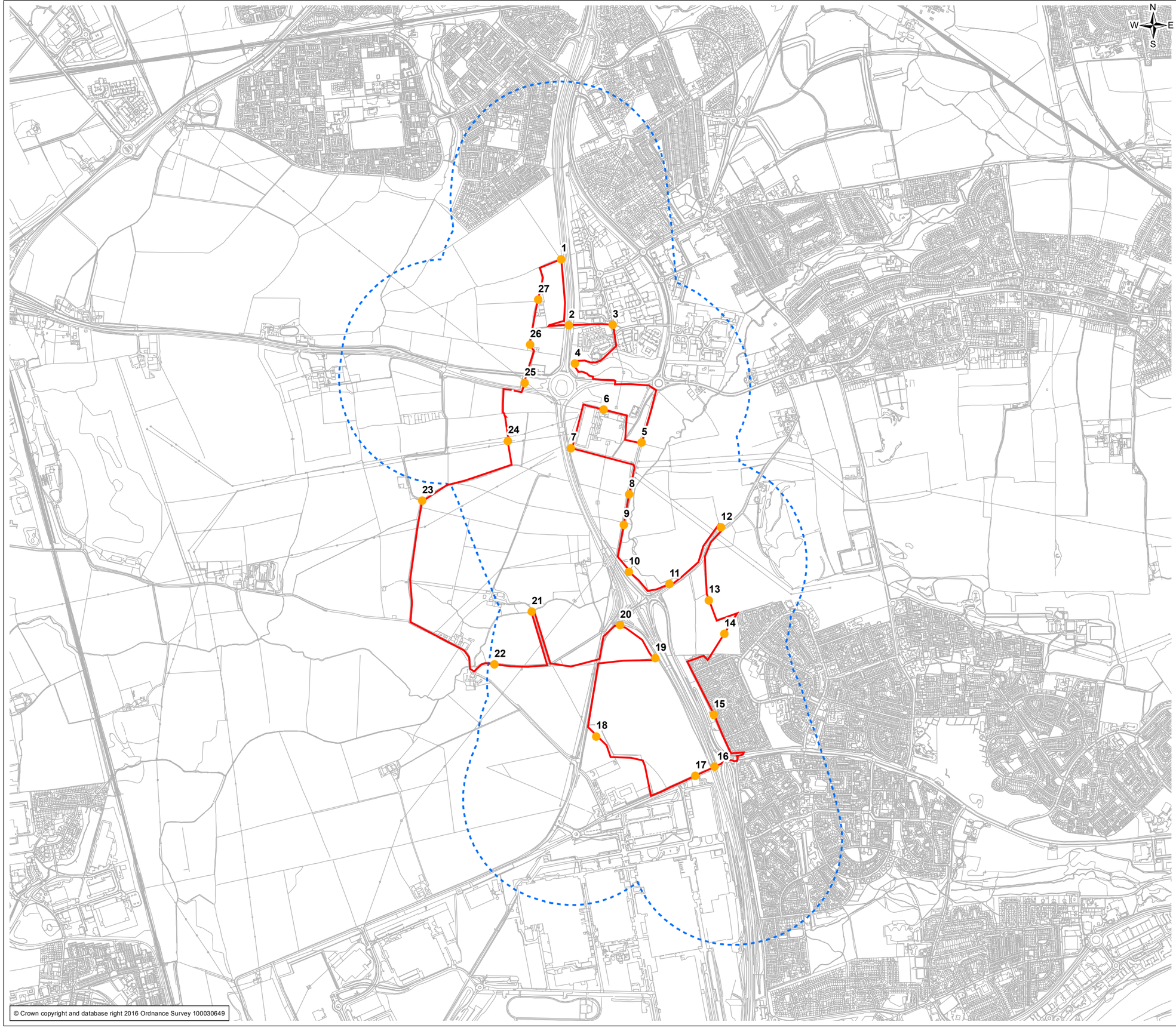

FIGURE 4

Legend

- Point Counts
- Transect Route
- 500m buffer

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Drawing Title: TRANSECT ROUTE AND POINT COUNTS

Drawing Status:

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Jacobs No.	B0140300	
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Drawing No.: B0140301_BRP_04

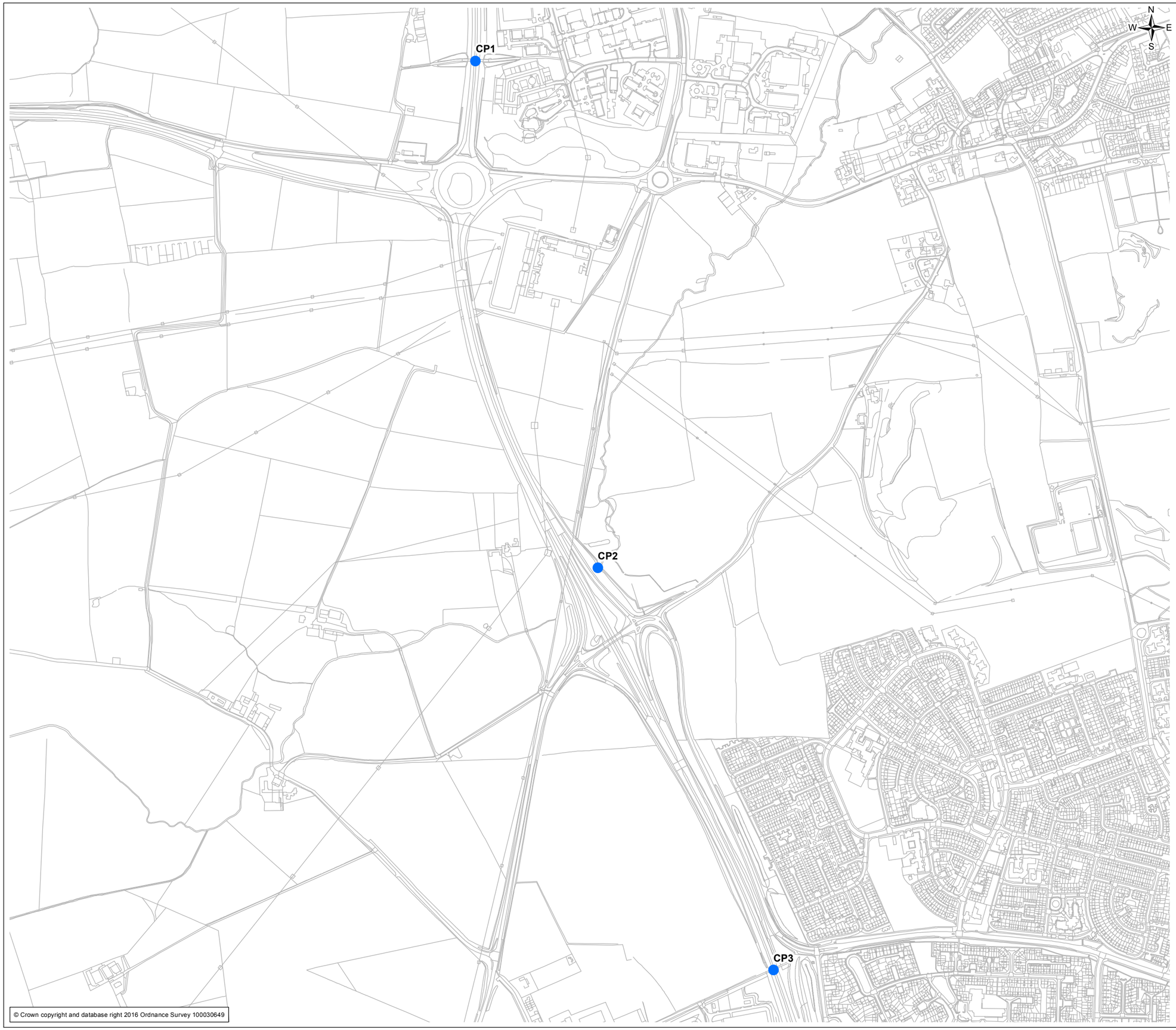

FIGURE 5

Legend

- Crossing Points

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Drawing Title: CROSSING POINT SURVEY LOCATIONS

Drawing Status:

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Jacobs No.	B0140300	
Client No.		

Drawing No.: B0140301_BRP_05

FIGURE 6

Legend

- 100m buffer
- Moderate Potential
- Low Potential
- High Potential

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Drawing Title: EMERGENCE AND RETURN SURVEYS

Drawing Status:

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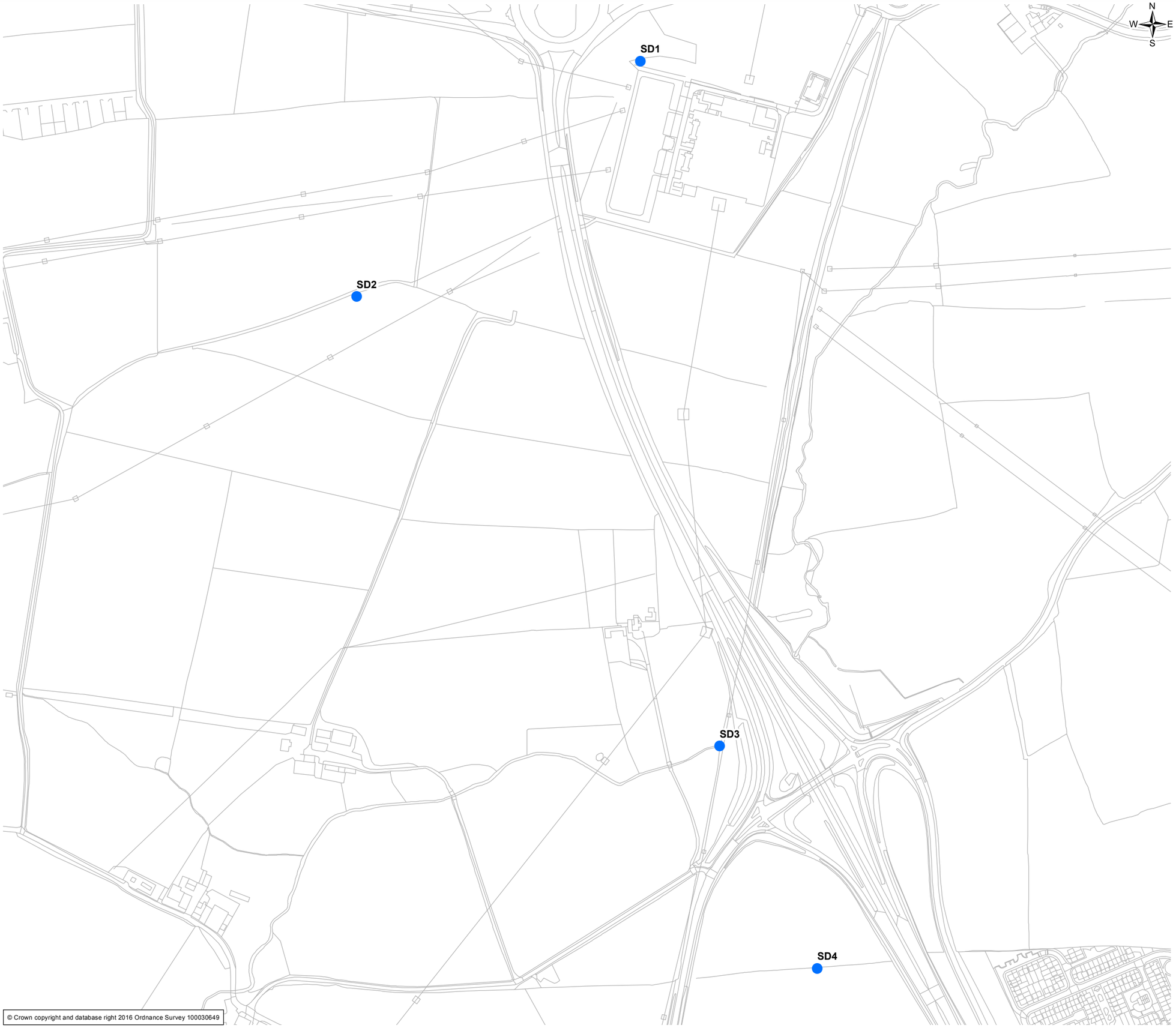

FIGURE 7

Legend

- Automated Static Detector Locations

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Drawing Title

AUTOMATED STATIC DETECTOR LOCATOR MAP

Drawing Status

Scale @ A3	1:5,000	DO NOT SCALE
Jacobs No.	B0140300	
Client No.		

Drawing No.

B0140301_BRP_07

A19 / A184 Testos Junction Improvement and Downhill Lane Junction Improvement

Water Vole and Otter Survey Report

Version 0

Document reference: B0140301/OD/199

Date: April 2017

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CONTENTS

EXECUTIVE SUMMARY

This report presents the findings of water vole and otter surveys undertaken by Jacobs UK Ltd. (Jacobs) on behalf of Highways England. The report provides a summary of ecological information obtained from a desk study as well as the baseline information from water vole and otter surveys undertaken between the 30th and 31st August 2016.

The study area refers to a 2 km buffer around the proposals for which a desk study has been undertaken to identify water vole and otter records.

The survey area refers to a 500 m buffer around the proposals in which the surveys have taken place.

Desk study records for water vole and otter were received from the local records centre (ERIC North East), South Tyneside Council and the Wildlife Trust. Records from the study area were mainly concentrated on the River Don.

The 2016 field surveys in the survey area focused on suitable water vole and otter habitat in the survey area and centred on the River Don, both upstream and downstream of the A19. Other specific locations such as:

- Monkton Burn tributary;
- Boldon Lake Local Wildlife Site (LWS); and,
- Mount Pleasant Marsh LWS.

The 2016 survey found definitive water vole field signs (e.g. latrines, prints) on the River Don both upstream and downstream of the A19. However, no water vole field signs were found within other surveyed watercourses. However the comparatively low habitat suitability for water vole within these watercourses may be a factor in the lack of colonisation.

No otter field signs were noted in any of the watercourses surveyed in 2016. However, previous survey data collated by Jacobs and for the IAMP development indicate that otter are present on the River Don throughout the study area but not regularly using the River Don or traversing the existing culvert under the A19.

The results within the report reflect the site conditions up to 31st August 2016. As the behaviour of wildlife is seasonable and highly unpredictable, it is therefore considered good practice that the surveys for water voles and otters should be repeated if the development is deferred for over 12 months from the date of the initial survey.

1 INTRODUCTION

1.1 Overview

1.1.1 Jacobs was commissioned by Highways England to undertake water vole *Arvicola amphibius* and otter *Lutra lutra* surveys at the location of proposed improvements for the Testos and Downhill Lane Junctions. The junctions were located along the A19 in South Tyneside at respective approximate Ordnance Survey Grid References (OSGRs) NZ 33808 60913 and NZ 34151 59862.

1.1.2 Testos Junction connected the A19 and the A184, at approximately 4.2 km south of the Tyne Tunnel. Downhill Lane Junction was located approximately 1.1 km south of the Testos Junction and linked the A19 to the A1290.

1.1.3 The surveys were required to inform the ecology chapter of the Environmental Impact Assessment (EIA), to support the Development Consent Order.

1.2 Report Rationale

1.2.1 A desk study and a water vole *Arvicola amphibius* and otter *Lutra lutra* survey were undertaken by Jacobs ecologists in 2014 to inform the proposals for the A19 Testos Junction Improvements.

1.2.2 As the proposals have been extended to include Downhill Lane Junction the aim of this report is:

- To update the desk study results.
- to present water vole and otter information from a survey undertaken in August 2016 and build on the results from previous surveys undertaken by Jacobs (UK) Ltd since 2007 and by another consultancy for Sunderland City Council (WYG 2015).
- To inform future planned operations and mitigation strategies.

1.3 Definitions

1.3.1 The proposals refer to the footprint of the proposed development (scheme boundary).

1.3.2 The study area refers to a 2 km buffer from the scheme in which species records for water vole and otter have been requested.

1.3.3 The survey area refers to a 500 m buffer around the proposed scheme in which the surveys have taken place. A 500 m buffer zone is considered an appropriate survey area as both species are highly mobile and control large territories.

1.3.4 This survey area was extended for otter surveys where suitable features occurred beyond the 500 m buffer. These features include bridges and culverts where otter field signs may be more concentrated or more apparent.

1.4 Nature Conservation Status

1.4.1 A summary of the ecology and habitat requirements for water vole and otters are provided in Appendix A.

1.5 Legislative and Regulatory Context

1.5.1 The following statutory instruments and policy frameworks have been given due consideration in this report, after an assessment was conducted of the legislative and regulatory framework covering water voles in the UK:

- The Conservation of Habitats and Species Regulations 2010;
- Wildlife and Countryside Act 1981 (as amended) (WCA);
- Natural Environment and Rural Communities Act 2006 (NERC 2006); and
- Local Biodiversity Action Plans (LBAP) (Species Action Plans for water vole and otter Durham LBAP (2016a) and 2016b)).

1.5.2 Appendix B of this report provides a brief synopsis of how the above regulatory frameworks relate to the protection of water vole and otter within the UK.

2 METHODOLOGY

2.1 Objectives

2.1.1 The objectives of the water vole and otter surveys were to:

- identify any water vole or otter populations within the survey area;
- inform the assessment of potential impacts on water voles and otters associated with the scheme; and,
- Provide sufficient field data for the development of appropriate mitigation if required.

2.2 Desk Study

2.2.1 A search of online resources was undertaken to obtain ecological information about the Study Area and surrounding landscape. The following websites were researched:

- Multi-Agency Geographic Information for the Countryside (MAGIC) and,
- Durham Biodiversity Action Plan.

2.2.2 In addition to online resources, consultation was undertaken during 2016 with the Environmental Records Information Centre North East (ERIC North East). Species records were requested from within 2 km of the site.

2.3 Previous Survey Information

Jacobs Field Surveys 2014

2.3.1 Previous surveys for water voles and otters were undertaken by Jacobs for the Testos Junction only in 2006 and 2014.

International Advanced Manufacturing Park (IAMP) Development

2.3.2 White Young Green (WYG) were commissioned by Sunderland City Council in April 2014 to undertake a range of ecological surveys, including water vole and otter surveys, in relation to the proposed International Advanced Manufacturing Park (IAMP) development[1]. The survey area for this project overlapped in some areas with the survey area for the Testos and Downhill Lane Junction Improvement proposals. Therefore this data was reviewed for any relevant records.

2.4 Field Surveys

Survey Area

2.4.1 The field surveys were undertaken on the 30th and 31st August, 2016 by two experienced Jacobs ecologists. The areas surveyed for field signs centred on the River Don. The River Don was surveyed between Glebe Farm off the A184 (at grid reference NZ 34684 61084) located to the north-east of the site and Elliscope farm (upstream of the A19 culvert) which is located to the west of the A19, in the southwest of the site (upstream to grid reference NZ 33500 59809). The River Don was also surveyed at Hylton Bridge just which is just beyond the survey area –at NZ 33370 59579 where the river passes under Follingsby Lane for signs of otter; notably along the bridge shelf.

[1]. White Young Green (WYG) (2015) Sunderland City Council Land North of Nissan Final Report 2015.

2.4.2 Additional watercourses that contained suitable habitat for water vole or otter included in the survey were Calfclose Burn, to the west of the scheme between NZ 32908 61180 and NZ 32995 61447; a distance of 260 m and a ditch to the south-west of the scheme within West Moor Farm, centred on NZ 33651 59142.

2.4.3 Surveys were also undertaken at Boldon Lake LWS centred on NZ 340 610 and Mount Pleasant Marsh LWS (NZ 340 608).

2.4.4 In addition to the field surveys a trail cam were placed at the upstream end of the A19 River Don culvert to establish use by otter and water vole for traversing the A19 carriageway. This camera was active and monitored over a period of two weeks in June 2016.

Water Vole Survey

2.4.5 Water vole surveys were conducted using standard methodologies (Strachan et al, 2011 and Dean et al, 2016) which involved surveying for indicative signs of water vole, including:

- droppings and latrines;
- burrows;
- feeding stations;
- runs through vegetation;
- prints; and,
- sightings.

2.4.6 Definitive water vole field signs include droppings or latrines, water vole prints and sightings as they can only be attributed to water vole. Field signs such as burrows, runs through vegetation and feeding remains may be attributed to but not limited to brown rat *Rattus norvegicus*, field vole *Microtus agrestis* and rabbit *Oryctolagus cuniculus*.

2.4.7 Any signs of American mink *Neovison vison* were also sought as they are a major predator of water vole, so their presence within a section of river will greatly reduce its suitability for water voles.

2.4.8 The surveys were conducted from within the river/stream channels wherever possible to maximise the chances of detecting evidence of water vole presence.

2.4.9 The optimum time for water vole surveys is during the breeding season when the species is most active; typically between late March and October in the north of England. Consequently, the surveys were undertaken during the optimal survey period (August).

Otter Survey

2.4.10 Otter surveys were conducted using methodologies adapted from Volume 10 of the Design Manual for Roads and Bridges (DMRB – Vol.10, Section 4, Part 4, HA88/91 - Nature Conservation Advice In Relation To Otters) and the National Rivers Authority 1993. This involved surveying for indicative signs of otters, including:

- spraint;
- footprints;
- feeding remains;
- sightings; and,
- actual or potential resting sites.

2.5 Limitations

2.5.1 The interior of the culvert where the River Don passes under the A19 was not surveyed due to the potential hazards presented by confined spaces although both entrances to the culvert were checked for field signs.

2.5.2 Calfclose Burn was densely vegetated with willow Salix sp., hawthorn *Crataegus monogyna*, bramble *Rubus fruticosus* and common reed *Phragmites australis* preventing safe access to the majority of the watercourse that passes through the scheme buffer. Areas that were accessible were inspected for field signs. However, the watercourse is located to the far west of the survey area and is considered unlikely to pose a constraint on the proposed works.

2.5.3 At the time of writing this report no further water vole or otter survey data had been received in relation to the adjacent proposed IAMP development. This is not considered a significant limitation as the information contained herein is considered sufficiently robust to identify accurate baseline conditions and form the basis of the subsequent impact assessment in the Environmental Impact Assessment (EIA), to support the Development Consent Order (DCO).

2.5.4 The findings of this report represent the professional opinion of qualified ecologists and do not constitute professional legal advice. The client may wish to seek professional legal interpretation of the relevant wildlife legislation cited in this document. Should there be a delay in the proposed construction programme, it is considered prudent that the survey findings be reviewed and updated as required for subsequent planning application(s) to ensure that the assessment of ecological impacts is undertaken against an accurate baseline.

3 BASELINE

3.1 Data Search

3.1.1 Data provided by ERIC North East were filtered to show records submitted in the last 10 years (2006 – 2016). These records are shown in Figure 1.1 and 1.2.

Water vole

3.1.2 There were 100 records for water vole found within 2 km of the proposals.

Otter

3.1.3 There were 28 records for otter within 2 km of the proposals. The majority of the records were located at different locations along the River Don.Previous Baseline Jacobs 2014

3.1.4 The results from the otter and water vole surveys conducted by Jacobs in 2006 were submitted to ERIC, so are included in the ERIC desk study records. These records and the 2014 survey results are shown on Figures 1.1 and 1.2.

Water Vole

3.1.5 Survey undertaken by Jacobs in 2014 at a previous stage of the A19 Testos Junction Improvements project recorded definitive water vole field signs (e.g. latrines) concentrated on the River Don upstream of the A19. This suggested that the A19 culvert acted as a barrier for colonisation further downstream. No water vole field signs were recorded within Boldon Lake LWS or Mount Pleasant Marsh LWS which mirrored the findings from previous surveys undertaken on behalf of South Tyneside Council in 2013 (Durkin, 2013).

Otter

3.1.6 The 2014 field survey results for otter were limited to the identification of footprints on the River Don upstream and downstream of the A19 carriageway and a bankside run/slide on the downstream side of the A19. Clay mats emplaced at either end of the A19 culvert during autumn 2014 revealed no evidence of otter activity.

3.1.7 Similarly the mammal ledge incorporated within the Boldon Bridge beneath the A184 to afford safe passage for mammals, was also devoid of otter field signs. However, the results of the field survey and the widespread desk study records appeared to indicate that otter were utilising the entire study area. There were no otter field signs recorded within Boldon Lake LWS or Mount Pleasant Marsh LWS.

3.2 IAMP Field Survey Results

Water Vole

3.2.1 During surveys undertaken in 2014 the watercourses within the IAMP survey area were assessed as providing suitable habitat for water vole throughout much of their length with a sandy substrate aiding the potential formation of burrows. The banks of the watercourses were rich in grasses and herbs which also provided potential food resource for water vole. Surveys confirmed the presence of water voles within the survey area for the IAMP proposals.

Otter

3.2.2 No field signs to indicate the presence of otter within the survey area was identified during the surveys undertaken in 2014. However an incidental otter sighting and otter print were identified during early spring 2015. No further evidence of otter was recorded during the surveys and no further obvious features within riparian habitats were identified that were considered likely to be used by otter for notable refuge or shelter.

3.3 Field Survey Results 2016

Water vole

3.3.1 The survey results for both water vole and otter are presented in Figures 1.4 to 1.7. Table 1 below gives an indication of the surveyed areas with habitat descriptions and water vole evidence recorded.

Table 1: Water Vole Field Survey Results

Area Surveyed	General Habitat Description	Water Vole Evidence
River Don upstream of A19 *carriageway.* From Glebe Farm (NZ 34684 61084) to A19 Culvert (NZ 34132 60036)	The section of the River Don is a natural meandering channel with fairly steep earth banks. The substrate varies as the river flows south through the study area. The northern extent is a mixture of boulders/cobles and sand/silt whereas the southern extent of this section is predominately sand/silt. Bankside vegetation is characterised mainly by tall grasses and ruderal vegetation with scattered broad-leaved trees frequent along this section.	Numerous definitive signs of the water vole including footprints and latrines. Burrows and runs through vegetation were also noted. No signs of American mink were recorded on this section of the River Don.
River Don downstream of A19 carriageway, From A19 Culvert (NZ 34044 59975) to Elliscope farm (NZ 33500 59809)	The section of the River Don has a less natural appearance (i.e. less meanders, steeper banks and reduced diversity of bank side vegetation) than the section up stream of the A19 culvert. This may indicate a level of modification to the channel in the past. Bankside vegetation in this section generally consisted of tall ruderal vegetation with some scattered scrub and trees. Further west a section of the River Don passes through broad-leaved woodland known as Elliscope Farm East/ Hylton Bridge LWS.	Numerous definitive signs of the water vole including footprints and latrines. Burrows were also noted. No signs of American mink were recorded on this section of the River Don.
Mount Pleasant marsh LWS (NZ 340608).	Located southeast of Testos Junction, comprising open water, reedbeds, marshy grassland, scrub and woodland habitat (also hosting West Boldon Environmental Education Centre).	No water vole field signs were recorded in this area during the 2016 surveys. No signs of American mink were recorded.
Boldon Lake LWS (NZ 340610).	The site comprises a man-made lake (the largest body of open water in the borough). The lake was created in 1986 and has developed substantial areas of	No water vole field signs were recorded in this area during the 2016 surveys. No signs of American mink were recorded.

Area Surveyed	General Habitat Description	Water Vole Evidence
	marginal vegetation including large stands of reedmace and common reed, and an area dominated by hard rush. It was noted that while the habitats within the site appeared to be suitable for water vole with a mixture of reed beds and open water the surrounding area the lake appeared to be highly disturbed by human activities such as dog walking, drinking and fishing.	
Calfclose Burn from NZ 32908 61180 to NZ 32995 61447.	Located 840 m to the west of Testos roundabout. The burn is densely vegetated with common reed, willow, hawthorn and bramble. Flow within accessible sections was noted to be shallow (< 10 cm) with negligible flow rate.	No water vole field signs were recorded in this area and no signs of American mink were recorded.
Drainage ditch, West Moor Farm from NZ 33796 59173 to NZ 33522 59114.	Located to the south-west of the scheme adjacent to the A1290, the ditch runs parallel to a hedgerow that connects with a small copse to the west. The ditch was noted to be damp at the time of survey but with no visible standing or running water.	No water vole field signs were recorded in this area and no signs of American mink were recorded.

3.3.2 No water voles were recorded by the trail cam located at the upstream end of the A19 culvert.

Otter

3.3.3 Notably, as shown on Figures 1.4 to 1.7 no otter field signs were recorded in the any of the watercourses. In addition no signs of otter activity were recorded at Boldon Lake LWS or Mount Pleasant Marsh LWS

3.3.4 No otters were recorded by the trail camera located at the upstream end of the A19 culvert.

4 DISCUSSION

4.1 General

4.1.1 The surveys were undertaken at an appropriate time of year so the results are considered appropriately robust. However, it should be noted that site conditions can change over time with the inward and outward movement of species so an absence of a species record should not be taken as an indication of an absence of that species from the survey area. Therefore, this report reflects the site conditions up to the 31st August 2016. The behaviour of wildlife is seasonable and highly unpredictable and as such, it is considered good practice for wildlife surveys to be repeated should development be deferred for over 12 months from the date of the initial survey.

4.2 Water vole

4.2.1 The desktop study identified recent records of water vole field signs within the study area. ERIC North East provided 100 water vole records from within 2km of the site.

4.2.2 The 2014 survey found definitive water vole field signs (i.e. latrines) concentrated on the River Don upstream of the A19 indicating that the carriageway may act as a barrier for colonisation further downstream. However the 2016 survey results indicate that water voles are now similarly widespread south of the A19. Nonetheless, there was a reduction in the number of potential burrows observed in 2016 from that in 2014.

4.2.3 No signs of American mink were identified in the survey area therefore this species is assumed to be absent as a major predator of water vole.

4.2.4 No water vole field signs were recorded at the following locations: Mount Pheasant Marsh LWS, Boldon Lake LWS, Calfclose Burn and the drainage ditch at West Moor Farm. These results mirror those from the Jacobs survey undertaken in 2014 which found no water vole field signs in these areas. The comparatively low habitat suitability for water vole within these watercourses may be a factor in the lack of colonisation

4.2.5 Any mitigation measures required in relation to potential impacts upon water vole will be presented within the relevant Environmental Statement for the project.

4.3 Otter

4.3.1 The desk study found recent records of otter field signs within the study area. The most recent records dated from 2013 within the River Don.

4.3.2 The 2014 field survey results for otter were limited to the identification of footprints on the River Don upstream and downstream of the A19 carriageway and a bankside run/slide on the downstream side of the A19. The 2016 survey however, found no field signs attributable to otter in any of the watercourses surveyed.

4.3.3 An incidental sighting of an otter and footprints were recorded during wintering bird surveys conducted by WYG in 2015.

4.3.4 There were no otter field signs recorded within Boldon Lake LWS or Mount Pleasant Marsh LWS.

4.3.5 Taking in to consideration survey data collated by Jacobs and for the IAMP development indicate that otter are present on the River Don throughout the study area but not regularly using the River Don or traversing the existing culvert under the A19.

4.3.6 Reasons for the absence of otter field signs within the scheme are not clear. Their widespread distribution, based on records, and their reappearance in the Rivers Wear and Tyne makes it seem unlikely that the survey results reflect a permanent change in their

status locally. Any mitigation measures required in relation to potential impacts upon otter will be presented within the relevant Environmental Statement chapter for the project.

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FIGURES

APPENDIX A: WATER VOLE /OTTER ECOLOGY & HABITAT REQUIREMENTS

Water Vole

The main source of information within this section is the Water vole Conservation Handbook Third Edition (Strachan et al, 2011).

The water vole is a member of the rodent family and is the largest of the British voles with adults weighing between 140-350g. Water voles are associated with riparian habitats such as the edge of streams, rivers, drainage ditches, as well as other wetland habitats including ponds, canals and marshland. They have a preference for slow flowing watercourses with dense bank side vegetation. They tend to build their burrows in soft earth within 2m of the channel edge. They are generally herbivorous showing a preference for grasses, rushes, sedges and herbs in summer and fruits in autumn and winter.

Breeding female water voles are very territorial unlike their male counterparts. The typical water vole home range varies between 30m and 150m for females and 60m to 300m for males. Territories are marked out using piles of droppings in areas known as latrines. The water vole breeding season occurs between March and October. A female can have between two and five litters per season with between five and eight young per litter. They do not hibernate during winter, instead, they become less active above ground often co-habiting with other members of the colony.

Water voles are often mistaken for brown rats (*Rattus norvegicus*) but have been native to Britain since the end of the last ice age; the brown rat was introduced relatively recently in the 17th or 18th century.

The Ideal water vole habitat preference includes;

- static or slow flowing watercourses;
- a water depth of greater than 1 metre;
- stands of emergent vegetation or tall grasses to feed on; heavily shaded or wooded areas are unsuitable as they lack such feeding habitat;
- a number of areas of dense vegetation which provide protection from predators such as mink (Non-linear habitat can increase the availability of refuges);
- banks consisting of soft earth so water voles can excavate their burrows (Bare, rocky or lined channel banks are avoided), and;
- an absence of mink.

Otter

The information within this section was extracted from two sources; Otters: ecology and conservation (Mason and Macdonald 1986) and Otters: ecology, behaviour and conservation (Kruuk 2008).

Otters are a member of the Mustelidae family which also includes weasel, stoat, badger, polecat, pine marten and mink. There are 13 species of otter worldwide although only the Eurasian otter is native to Britain (Mason and Macdonald 1986). Otters can live up to 16 years in the wild but the average is closer to four years.

Otters are known to breed throughout the year although in some areas such as mainland Scotland there is a bias towards winter births. The mean litter size is estimated to be between two and three cubs with the cubs becoming self-sufficient and beginning to disperse at around one year old (Mason and Macdonald 1986).

Otters have been recorded exploiting a variety of different types of waterways and wetlands in Britain. In England and Wales they are mainly restricted to fresh water habitats (i.e. lakes, ponds, canals, streams, rivers and ditches) but in Scotland they have been recorded in coastal habitats. Otters will cross land away from waterways using features such as dry ditches with good vegetation cover.

Otters use resting sites usually termed ‘holts’ or ‘couches’ in which to sleep. These may be holes or covered areas (holts) found under roots of bank side trees or within log or stone piles. The word couch is used where they use an above-ground nest- like structure in reeds or other vegetation (Kruuk 2008).

Otter diets consist largely of fish (80% of an otter’s diet), crayfish and amphibians and occasionally mammals, birds and reptiles. This means the suitability to support fish and the water quality of the watercourse is important in assessing the habitat suitability for otters. However, otters may also use other linear features such as streams and ditches to lie up or to cross country between rivers.

Otters are relatively rare and elusive animals and so research on population densities is difficult to undertake. Otter presence is generally determined by recording spraint (faeces), which is usually deposited in prominent places such as under bridges and on rocks in or along a watercourse. The density of otters in England has been calculated as one individual per 16.7 miles (27km) of water (Harris et al 1995) whereas in northeast Scotland the density has been calculated as one individual per 1.8-18 miles (3-50km) of stream with the mean being calculated as one otter per 9 miles (15km) (Kruuk et al 1993).

APPENDIX B: LEGISLATION AND POLICY BACKGROUND

Water vole

The Wildlife and Countryside Act 1981 (as amended)

The water vole is protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). The Act and Regulations make it illegal to:

- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection;
- Intentionally or recklessly disturb water voles whilst occupying a structure or place used for that purpose;
- Intentionally kill, injure or take water voles;
- Possess or control live or dead water voles or derivatives;
- Sell, barter, exchange or transport for sale, a water vole, or parts of a water vole; and,
- Publish or cause to be published any advertisement which conveys the buying or selling of water voles.

Natural Environment and Rural Communities Act 2006 (NERC 2006)

Section 40 of the Act concerns biodiversity and states: ”Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.”

Section 41 of the NERC Act sates that: “The Secretary of State must, as respects England, publish a list of the living organisms and types of habitat which in the Secretary of State’s opinion are of principal importance for the purpose of conserving biodiversity”. Water vole have been listed as ’Species of Principal Importance’ under the NERC Act. The list of species can be downloaded from the Natural England website at

http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/habsandspeciesimportance.aspx

The Act also stresses that “it is important that public authorities seek not only to protect important habitats and species, but actively seek opportunities to enhance biodiversity through development proposals, where appropriate. Incorporating enhancement opportunities into projects may help applicants to achieve planning permission.”

Biodiversity Action Plans (Durham LBAP)

Otter Water vole is a Priority Species and is included in the Species Action Plans (SAPs) on the Durham LBAP.

The Conservation of Habitats and Species Regulations 2010

The otter is protected under the Conservation of Habitats and Species Regulations 2010 (as amended). The regulations make it an offence to:

- Deliberately capture, injure or kill an otter;
- Damage or destroy an otters breeding site or resting place;
- Deliberately disturb an otter in such a way to be likely, and;
- To impair their ability:
    - to survive, to breed or reproduce, or to rear or nurture their young; or

- to affect significantly the local distribution or abundance of the otter.

The Wildlife and Countryside Act 1981 (as amended)

The otter is fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended). The Act and Regulations make it illegal to:

- Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection;
- Intentionally or recklessly disturb otters whilst occupying a structure or place used for that purpose;
- Intentionally kill, injure or take otters;
- Possess or control live or dead otters or derivatives;
- Sell, barter, exchange or transport for sale, an otter, or parts of an otter, and;
- Publish or cause to be published any advertisement which conveys the buying or selling of otters.

The otter receives extra protection in Schedule 6 of this Act which makes it illegal to:

- Use traps, snares, nets, gas, any electrical device, any poisonous, poisoned, or stupefying substance for killing or stunning otters, and;
- Use any automatic or semi-automatic weapon, any sighting device, or illuminating or dazzling device for the purpose of night shooting.

Natural Environment and Rural Communities Act 2006 (NERC 2006)

Section 40 of the Act concerns biodiversity and states: ”Every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity.”

Section 41 of the NERC Act sates that: “The Secretary of State must, as respects England, publish a list of the living organisms and types of habitat which in the Secretary of State’s opinion are of principal importance for the purpose of conserving biodiversity”. Water vole have been listed as ’Species of Principal Importance’ under the NERC Act. The list of species can be downloaded from the Natural England website at

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The Act also stresses that “it is important that public authorities seek not only to protect important habitats and species, but actively seek opportunities to enhance biodiversity through development proposals, where appropriate. Incorporating enhancement opportunities into projects may help applicants to achieve planning permission.”

Biodiversity Action Plans (Durham LBAP)

Otter are a Priority Species and included in the Species Action Plans (SAPs) on the Durham LBAP.

FIGURE 1.1

Legend

2km Buffer

Type of Record

- Unknown
- Sighting
- Footprints
- Droppings / Latrine
- Feeding station
- Burrow

Source of Data

- IAMP Data from White Young Green (WYG)
- Data from Environmental Records Information Centre (ERIC) North East
- Jacobs Otter and Water Vole Survey data from 2014

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0	MAR 17	Initial Issue	IM	EF	AM	GW

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Project: A19 TESTOS & DOWNHILL LANE JUNCTIONS IMPROVEMENT

Drawing Title: DESK STUDY RESULTS WATER VOLES

Drawing Status:

Scale @ A3	1:30,000	DO NOT SCALE
Jacobs No.	B0140301	
Client No.		

Drawing No.: B0140301_EC_WV_0101

0 1,000 m

FIGURE 1.2

Legend

2km Buffer

Type of Record

- Unknown
- Slide
- Sighting
- Footprints
- Spraint
- Couch / Lie Up / Holt

Source of Data

- IAMP Data from White Young Green
- Data from Environmental Records Information Centre (ERIC) North East
- Jacobs Otter and Water Vole Survey data from 2014

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Drawing Title: DESK STUDY RESULTS OTTERS

Drawing Status

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Jacobs No.	B0140300	
Client No.		

Drawing No.: B0140301_EC_WV_0102

0 1,000 m

FIGURE 1.3

Legend

500m Buffer (Combined All Options)

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Drawing Title: WATER VOLE AND OTTER SURVEY OVERVIEW FIGURE

Drawing Status:

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Client No.		

Drawing No.: B0140301_EC_WV_0103

FIGURE 1.4

Boldon Lake

Mount Pleasant Marsh

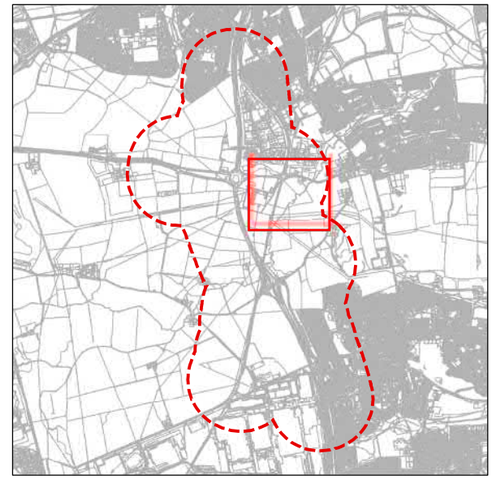
Un-named ditch

River Don

N
W E
S

Legend

- 500m Buffer (Combined All Options)
- Burrow (Water Vole)
- Footprints (Water Vole)
- Latrine (Water Vole)
- Water Vole (run)
- Running Water
- Dry Ditch
- Standing Water
- Swamp



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Drawing Title: WATER VOLES SURVEY - WATER VOLE AND OTTER FIELD SIGNS FIGURE 1 OF 4

Drawing Status:

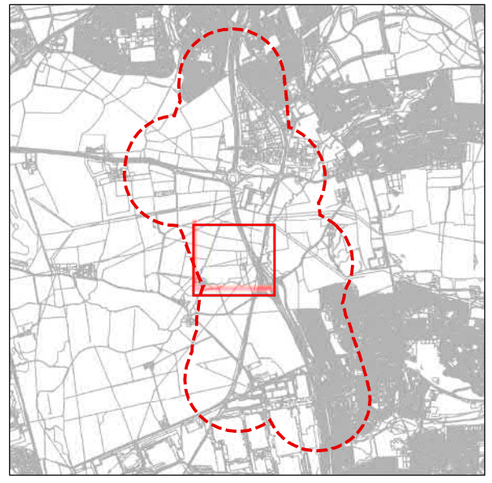
Scale @ A3	1:2,500	DO NOT SCALE
Jacobs No.	B0140301	
Client No.		

Drawing No.: B0140301_EC_WV_0104

FIGURE 1.5

Legend

- 500m Buffer (Combined All Options)
- Burrow (Water Vole)
- Footprints (Water Vole)
- Latrine (Water Vole)
- Running Water
- Dry Ditch
- Standing Water
- Swamp



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Drawing Title: WATER VOLES SURVEY - WATER VOLE AND OTTER FIELD SIGNS FIGURE 2 OF 4

Drawing Status:

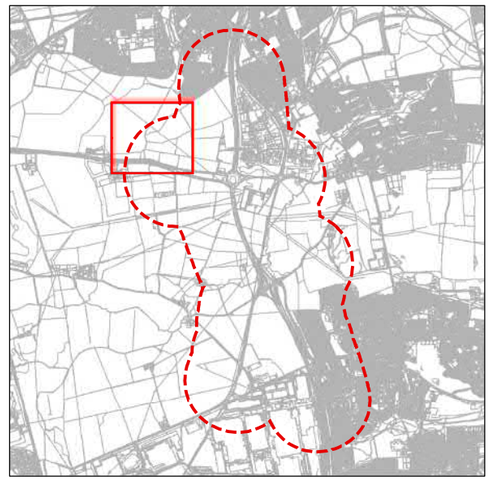
Scale @ A3	1:2,500	DO NOT SCALE
Jacobs No.	B0140301	
Client No.		

Drawing No. B0140301_EC_WV_0105

FIGURE 1.6

Legend

- 500m Buffer (Combined All Options)
- Running Water
- Dry Ditch
- Standing Water



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Drawing Title: WATER VOLES SURVEY - WATER VOLE AND OTTER FIELD SIGNS FIGURE 3 OF 4

Drawing Status

Scale @ A3	1:2,500	DO NOT SCALE
Jacobs No.	B0140301	
Client No.		

Drawing No.: B0140301_EC_WV_0106

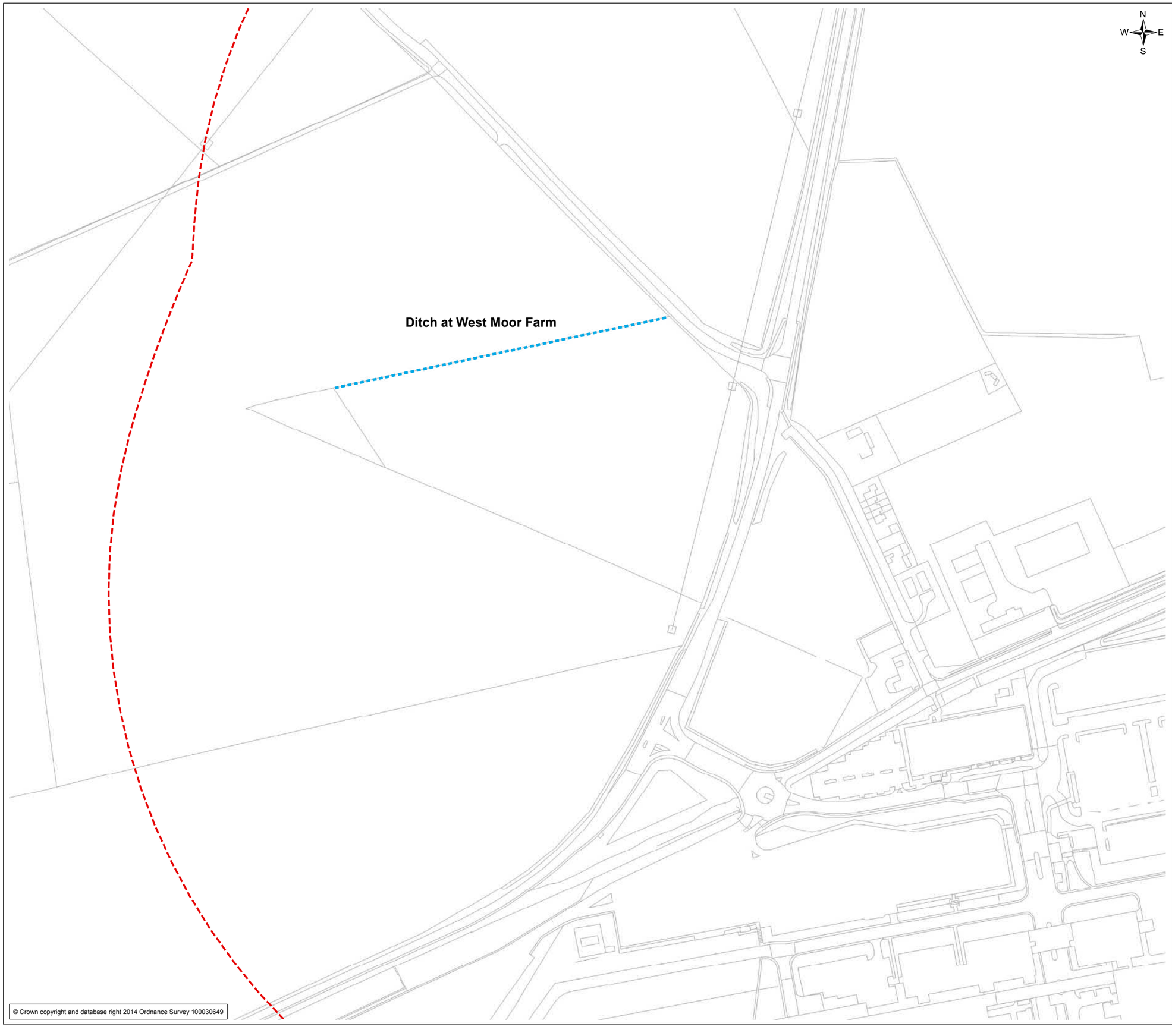
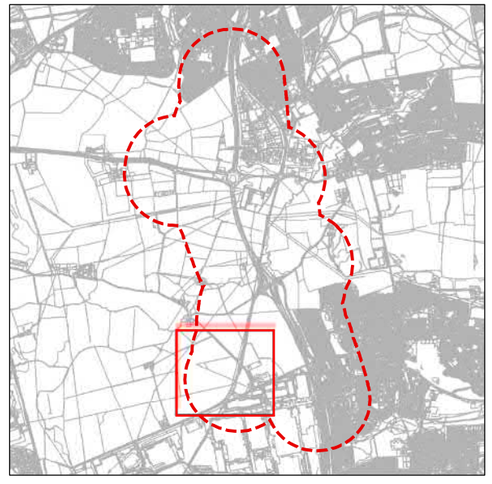


FIGURE 1.7

Legend

- 500m Buffer (Combined All Options)
- Dry Ditch



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WATER VOLES SURVEY -
WATER VOLE AND OTTER FIELD SIGNS
FIGURE 4 OF 4

Drawing Status

Scale @ A3	1:3,000	DO NOT SCALE
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APPENDIX 9.2 RELEVANT WILDLIFE LEGISLATION, SECTION 41 AND DURHAM BAP

9.2A The Conservation of Habitats and Species Regulations 2017

9.2A.1 The Conservation of Habitats and Species Regulations 2017 update and supersede The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). The 2017 Regulations are the principal means by which the European Habitats Directive is transposed in England and Wales.

9.2A.2 The Regulations provide for the designation and protection of a network of 'European Sites' termed Natura 2000, the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.

9.2A.3 The Conservation of Habitats and Species Regulations 2017 apply in the terrestrial environment and in territorial waters out to 12 nautical miles. The EU Habitats and Wild Birds Directives are transposed in UK offshore waters by separate regulations – The Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 (as amended).

9.2A.4 Regulation 41 relates to the protection of European protected species listed under Schedule 2 of the Regulations. Taken together it is an offence to undertake the following acts with regard to European Protected Species:

- deliberately capture, injure or kill any wild animal of a European Protected Species;
- deliberately disturb animals of any such species in such a way as to be likely to:
  - impair their ability to survive, breed, rear or nurture their young, hibernate or migrate, or
  - affect significantly the local distribution or abundance of the species to which they belong; or
  - deliberately take or destroy the eggs of such an animal; or
  - damage or destroy a breeding site or resting place of such an animal.

9.2A.5 The disturbance offence is generally taken to refer to a discernible effect at population level and biogeographic level, rather than simply to an individual animal. However, in certain circumstances the disturbance of one individual animal may have population level effects.

9.2A.6 The Regulations also make it an offence (subject to exceptions) to deliberately pick, collect, cut, uproot, destroy, or trade in the plants listed in Schedule 5.

9.2A.7 However, the actions listed above can be made lawful through the granting of licences (European Protected Species Licence) by the appropriate authorities (Natural England in England). Licences may be granted for a number of purposes (such as science and education, conservation, preserving public health and safety), but only after the appropriate authority has determined that the following regulations are satisfied:

- The works under the licence are being carried out for the purposes of 'preserving public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment.
- There is 'no satisfactory alternative'.
- The action 'will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status in their natural range'.

9.2A.8 To apply for a licence, the following information is required:

- the species concerned;
- the size of the population at the site (note this may require a survey to be carried out at a particular time of the year);
- the impact(s) (if any) that the development is likely to have upon the populations, and
- what measures can be conducted to mitigate for the impact(s).

9.2B Wildlife & Countryside Act 1981

9.2B.1 The Wildlife & Countryside Act 1981 (as amended) is the principal piece of UK legislation relating to the protection of wildlife. It consolidates and amends existing national legislation to implement the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and Council Directive 79/409/EEC on the Conservation of Wild Birds (Birds Directive) in Great Britain.

9.2B.2 The Act makes it an offence (with exception to species listed in Schedule 2) to intentionally kill, injure, or take any wild bird or their eggs or nests. Special penalties are available for offences related to birds listed on Schedule 1, for which there are additional offences of disturbing these birds at their nests, or their dependent young. The Secretary of State may also designate Special Protection Areas (subject to exceptions) to provide further protection to birds. The Act also prohibits certain methods of killing, injuring, or taking birds, restricts the sale and possession of captive bred birds, and sets standards for keeping birds in captivity.

9.2B.3 The Act makes it an offence (subject to exceptions) to intentionally kill, injure, or take, possess, or trade in any wild animal listed in Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. The Act also prohibits certain methods of killing, injuring, or taking wild animals listed in Schedule 6.

9.2B.4 The Act makes it an offence (subject to exceptions) to pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional uprooting of such plants.

9.2B.5 The Act contains measures for preventing the establishment of non-native species which may be detrimental to native wildlife, prohibiting the release of animals and planting of plants listed in Schedule 9. It also provides a mechanism making any of the above offences legal through the granting of licences by the appropriate authorities.

9.2C Countryside and Rights of Way Act 2000

9.2C.1 The Countryside and Rights of Way Act 2000 (the CRoW Act) was passed to provide additional levels of protection for wildlife whilst also strengthening the protection afforded to Sites of Special Scientific Interest.

9.2C.2 Schedule 12 of the Act amends the Wildlife and Countryside Act 1981, strengthening the legal protection for threatened species. The provisions make certain offences 'arrestable', create a new offence of ‘reckless’ disturbance, confer greater powers to

police and wildlife inspectors for entering premises and obtaining wildlife tissue samples for DNA analysis, and enable heavier penalties on conviction of wildlife offences.

9.2D Protection of Badgers Act 1992

9.2D.1 In the UK badgers are primarily afforded protection under the Protection of Badgers Act 1992. This makes it illegal to wilfully kill, injure, take, possess or cruelly ill-treat a badger, or to attempt to do so and to intentionally or recklessly interfere with a sett. Sett interference includes disturbing badgers whilst they are occupying a sett, as well as damaging or destroying a sett or obstructing access to it.

9.2D.2 Badgers also receive limited protection under Schedule 6 of the Wildlife & Countryside Act 1981 (as amended). This outlaws certain methods of taking or killing animals.

9.2D.3 Under Section 10 (1)(d) of the Protection of Badgers Act 1992, a licence may be granted by Natural England to interfere with a badger sett for the purpose of development, as defined by Section 55(1) of the Town & Country Planning Act 1990.

9.2D.4 Section 3 of the Protection of Badgers Act 1992 defines interference as:

- damaging a badger sett;
- destroying a badger sett;
- obstructing access to, or any entrance of, a badger sett;
- causing a dog to enter a sett; or
- disturbing a badger when it is occupying a badger sett.

9.2E Natural Environment & Rural Communities (NERC) Act 2006

9.2E.1 The Natural Environment & Rural Communities (NERC) Act 2006 is designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy.

9.2E.2 **Section 40** of the Natural Environment and Rural Communities Act 2006 places a duty of care on all public authorities in England and Wales to have regard to the purpose of conserving biodiversity. A key purpose of this duty of care is to ensure the public sector contributes to the achievement of the commitments made by Defra in its Biodiversity 2020 strategy[1].

9.2E.3 **Section 41** under the NERC Act 2006, requires the Secretary of State to publish a list of habitats and species of principal importance for the purpose of conserving biodiversity in England. Public bodies including local and regional authorities under Section 40 of NERC 2006 are required to have regard to the conservation of biodiversity in England in the exercising of their day to day duties. A total of 56 habitats and 943 species of principal important are included on the Section 41 list.

9.2E.4 The S41 list will be used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the natural Environment and Rural Communities Act 2006 “to have regard” to the conservation of biodiversity in England, when carrying out their normal functions. In particular:

- Regional Planning Bodies and Local Planning Authorities will use it to identify the species and habitats that should be afforded priority when applying the requirements of Planning Policy Statement 9 (PPS9) to maintain, restore and enhance species and habitats.
- Local Planning Authorities will use it to identify the species and habitats that require specific consideration in dealing with planning and development control, recognising that under PPS9 the aim of planning decisions should be to avoid harm to all biodiversity.
- All Public Bodies will use it to identify species or habitats that should be given priority when implementing the NERC Section 40 duty.

9.2F The Weeds Act 1959

9.2F.1 The Weeds Act specifies five injurious weeds: Common Ragwort, Spear Thistle, Creeping or Field Thistle, Broad Leaved Dock and Curled Dock. Under the Weeds Act 1959 the Secretary of State may serve an enforcement notice on the occupier of land on which injurious weeds are growing, requiring the occupier to take action to prevent their spread. Enforcement of the Weeds Act is carried out by Natural England on Defra’s behalf.

9.2G The Hedgerows Regulations 1997

9.2G.1 The Hedgerows Regulations 1997 were introduced to protect hedgerows of importance from destruction. However, the legislation does not apply to any hedgerow which is within or marking the boundary of the curtilage of a dwelling house.

9.2G.2 For the Regulations to be applicable, the hedgerow must be at least 20 metres in length or, if less than 20 metres, it must meet another hedgerow at each end. A hedgerow is deemed to be important if it is more than thirty years old and meets at least one of the criteria listed in Part II of Schedule 1 of the Regulations.

9.2G.3 If a hedgerow which qualifies under the Regulations is to be removed, the landowner must contact the Local Planning Authority in writing by submitting a hedgerow removal notice. The Local Planning Authority then has a period of 42 days to decide whether or not the hedgerow meets the importance criteria of the regulations.

9.2H Wild Mammals (Protection) Act 1996

9.2H.1 The Wild Mammals (Protection) Act 1996 makes it an offence for any person to mutilate, kick, beat, nail or otherwise impale, stab, burn, stone, crush, drown, drag or asphyxiate any wild mammal with intent to inflict unnecessary suffering.

9.2I Durham Biodiversity Action Plan (3rd Edition April 2013)

9.2I.1 Durham Biodiversity Action Plan is divided into separate workplans for priority habitats and species. These plans were developed in 2006 by a series of working groups of local experts to reflect the concerns of different wildlife organisations. Since this time there have been periodic updates to plans as priority actions have changed. A paper version of the Plan was published in 2007. This captured the Plan as it stood at that time, and

[1] Department for Communities and Local Government. (year unknown). Guidance Natural Environment. Biodiversity, ecosystems and green infrastructure. Accessed on 13 November 2014 from http://planningguidance.planningportal.gov.uk/blog/guidance/natural-environment/biodiversity-ecosystems-and-green-infrastructure/

some documents have been superseded by amendments on the North East England Nature Partnership website (http://neenp.org.uk/natural-environment/biodiversity-priorities/).

9.2I.2 Priority Habitat Action Plans (HAPs) under the Durham LBAP include:

Woodland Habitats

- Native Hedgerows;
- Veteran Trees, Parkland and Wood Pasture; and
- Woodland and Scrub (Ancient Semi-Natural Woodland including PAWS and RNWAS, Other Broadleaf Woodland, Wet Woodland, Scrub).

Wetland Habitats

- Ponds, Lakes & Reservoirs;
- Lowland Fen (Reedbed, Lowland Fen habitats); and
- Rivers & Streams (Floodplain Grazing Marsh, Exposed Riverine Sediments).

Lowland Habitats

- Brownfield Sites;
- Built Structures;
- Coastal Habitats (Maritime Grassland, Coastal Soft Cliffs and Slopes, Strandline);
- Lowland Heath (Acid Grassland);
- Lowland Meadows & Pasture;
- Magnesian Limestone Grassland (CG8 Grassland);
- Transport Corridors; and
- Waxcap Grassland.

9.2I.3 Priority Species Action Plans (SAPs) under the Durham LBAP include:

Birds

- Barn Owl;
- Coastal Birds (Sanderling, Purple Sandpiper, Little Tern, Roseate Tern);
- Farmland Birds (Corn Bunting, Linnet, Tree Sparrow, Skylark, Reed Bunting, Yellow Wagtail, Lapwing, Curlew, Snipe, Redshank, Peregrine, Cuckoo, Grasshopper Warbler, Grey Partridge, Kestrel, Mistle Thrush, Swallow, Yellowhammer);
- Nightjar;
- Spotted Flycatcher;
- Upland Birds (Black Grouse, Hen Harrier, Merlin, Yellow Wagtail, Curlew, Snipe, Redshank, Lapwing, Golden Plover); and
- Urban and Garden Wildlife (House Sparrow, Starling, Song Thrush).

Fish

- Freshwater Fish (Eel, Salmon, Wild Brown Trout).

Amphibians and Reptiles

- Grass Snake;
- Great Crested Newt; and
- Reptiles (Adder, Common Lizard, Slow Worm).

Invertebrates

- Chalk Carpet Moth;
- Cistus Forrester;
- Dark Green Fritillary;
- Dingy Skipper;
- Glow Worm;
- Grayling;
- Green Hairstreak;
- Least Minor Moth;
- Mud Snail;
- Northern Brown Argus;
- Mud Snail;
- Small Pearl-bordered Fritillary;
- White Clawed Crayfish; and
- White-letter Hairstreak.

Mammals

- Badger;
- Bats;
- Brown Hare;
- Dormouse;
- Harvest Mouse;
- Hedgehog;
- Otter;
- Pine Marten;
- Polecat;

- Red Squirrel;
- Water Vole; and
- Water Shrew.

Plants

- Black Poplar;
- Juniper;
- Pale Bristle-Moss; and
- Yellow Marsh Saxifrage.

APPENDIX 9.3 EVALUATION AND IMPACT ASSESSMENT METHODOLOGY

9.3A Approach

9.3A.1 This Appendix sets out the approach to the assessment of the potential significant impacts by the Scheme on the nature conservation features in the study area. It has been produced in line with the approach provided in the Highways Agency (2010) Interim Advice Note 130/10, and with reference to the relevant guidelines and advice in the following documents:

- DMRB (1993) Volume 11, Section 3 Part 4 'Ecology and Nature Conservation' (as supplemented by IAN 130/10);
- CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition; and
- DfT (2004) Transport Analysis Guidance.

9.3A.2 The ecological impact assessment comprises five key stages:

- description of baseline conditions;
- identification of activities that may affect ecological resources;
- resource valuation;
- characterisation of ecological impacts; and
- determination of significance of effects.

9.3B Description of the baseline conditions

9.3B.1 An accurate ecological baseline has been established and summarised from the individual field survey reports completed from 2014 to 2018. This baseline was also established from desktop study review, data gathering and from the consultation process.

9.3C Identification of activities that may affect ecological resources

9.3C.1 The approach involved the systematic identification of specific activities associated with the Scheme (i.e. impacts) that may affect ecological resources during the construction and operational phases of the Scheme, and in so doing result in adverse effects on the ecological resource.

9.3D Resource valuation

9.3D.1 Determination of value for nature conservation resources within the survey area was assessed according to the geographical framework given in Table 9.3-a below. This process requires professional judgement to be employed and consultation with the appropriate Statutory Environmental Bodies in the assignment of value.

Table 9.3-a: Valuation of the Nature Conservation Resource

Value	Examples
International or European	**Habitats** Internationally designated sites or candidate sites (i.e. Natura 2000 sites) including: Sites of Community Importance (SCIs); Special Protection Areas (SPAs), provisional SPAs (pSPA), Special Areas of Conservation (SACs), candidate SAC or possible SACs (cSACs or pSACs) and Ramsar sites. Areas which meet the published selection criteria for those sites listed above, but which are not themselves designated as such. A viable area of a habitat type listed in Annex I of the Habitats Directive, or smaller areas of such habitat that is essential to maintain the viability of a larger whole. **Species** Regularly occurring populations of an internationally important species, where: • the loss of these populations would adversely affect the conservation status; or • distribution of the species at this geographic scale; or • the population forms a critical part of a wider population at this scale; or • the species is at a critical phase of its life at this scale.
UK or National	**Habitats** Designated sites including: Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Marine Protected Areas (MPAs), Marine Conservation Zones (MCZs). Areas which meet the published selection criteria for national designation (e.g. Guidelines for Selection of Biological SSSIs (JNCC 2098)), but are not themselves designated as such. A viable area of a priority habitat identified in Section 41 of the Natural Environmental Rural Communities Act (2006) or smaller areas of such habitat that are essential to maintain the viability of a larger whole. Areas of Ancient Woodland (e.g. woodland listed within the Ancient Woodland Inventory). **Species** Resident, or regularly occurring, populations of species which may be considered at: • an International, European, UK or National level where: • the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or • the population forms a critical part of a wider population at this scale; or • the species is at a critical phase of its life cycle at this scale.
Regional (North East England)	**Habitats** Areas of habitat identified in the Natural England North East Natural Area Profile (i.e. NCA Profile: 15: Durham Magnesian Limestone Plateau (NE435)).

Value	Examples
	Sites which exceed the county-level designations, but fall short of SSSI selection criteria. **Species** Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where: • the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or • the population forms a critical part of a wider population at this scale; or • the species is at a critical phase of its life cycle at this scale.
County (South Tyneside/Sunderland)	**Habitats** Designated sites including: Local Wildlife Sites (LWSs); and Local Nature Reserves (LNRs) designated in the county or unitary authority context. Areas which meet the published selection criteria for those sites listed above, but which are not themselves designated as such. Key priority habitats as identified in the NERC Act 2006; and areas of habitat identified in the appropriate Natural Area Profile. **Species** Resident, or regularly occurring, populations of species which may be considered at an International, European, UK or National level where: • the loss of these populations would adversely affect the conservation status or distribution of the species at this scale; or • the population forms a critical part of a wider population at this scale; or • the species is at a critical phase of its life cycle at this scale.
Local	**Habitats** Designated sites including: Local Wildlife Sites (LWSs); and Local Nature Reserves (LNRs) designated in the local context. Trees that are protected by Tree Preservation Orders (TPOs). Areas of habitat considered to appreciably enrich the habitat resource (e.g. species rich hedgerows, ponds, veteran trees etc.) within the local context.
	Species Populations / assemblages of species that appreciable enrich the biodiversity resource within the local context.
Less than Local (within the footprint of the Scheme).	Habitats and/or species that are of limited ecological importance due to their size, species composition or other factors.

9.3E Characterisation of Ecological Impacts

9.3E.1 The characterisation of ecological impacts has been based on a detailed assessment of several parameters, as shown in Table 9.3b, for each ecological receptor. This is in place of a reliance on the characterisation of impact magnitude. The assessment is undertaken for the future baseline condition were the development not to take place; for example, if construction is planned for 2020, construction impacts would be assessed against the baseline conditions predicted to occur in 2020.

Table 9.3-b: Characterisation of Ecological Impacts

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Description: Nature Conservation Value[2]: Policy & Legal Context[3]: Integrity/ Conservation Status[4] Factors/ Criteria[5]	Construction Phase, Operation Phase or Decommissioning Phase Impacts			
	Biophysical Change[6]	SI: PO: CO: EC: SZ: RE: DU: TF:	Mitigation: Quantification/Measure: Mechanism for Delivery	Residual Impacts Significant/ Not Significant: (delete as appropriate) Confidence of predictions
Key SI (Sign): Positive (beneficial (+ve)) or Negative (adverse (-ve)) PO (Probability of Occurring): Certain, Probable, Unlikely				

[2] This is the value assigned to the resource using the guidance provided in the Resource Valuation table and through consultation with the SEB, as appropriate
[3] This includes the policies and legislation that are relevant to the resource
[4] These terms are defined in HD 44/09.
[5] The description of the resource may be related to relevant published evaluation criteria such as SSSI selection criteria (JNCC, 1998).
[6] These are the changes to the resource that would occur as a result of the impacts

CO (Complexity): Direct, Indirect, Cumulative
EC (Extent): Area measures and percentage of total (e.g. area of habitat/ territory lost)
SZ (Size): Description of level of severity of influence (e.g. complete loss, number of animals affected)
RE (Reversibility): Reversible or Not Reversible (can the effect be reversed, whether or not this is planned)
DU (Duration): Permanent (P) or Temporary (T) in ecological terms. Where differing timescales are determined in relation to the life-cycle of the receptor, these should be defined.
TF (Timing and frequency): Important seasonal and/or life-cycle constraints and any relationship with frequency considered.

9.3F Determination of Significance of Effects

9.3F.1 Table 9.3-c illustrates the five significance categories and examples of typical descriptors for each category. Significant effects should be qualified with reference to an appropriate geographic scale. For example, a significant effect could occur to a Site of Special Scientific Interest (SSSI), a site which is of national importance. However, the scale of significance of an effect may not be the same as the geographic context in which the feature is considered important. For example, an effect on a species which is on a national list of species of principal importance for biodiversity may not have a significant effect on its national population. Examples of other relevant scales include regional and county. It should be noted that effects may be significant at the local scale, particularly in view of policies for no net loss of biodiversity.

9.3F.2 When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation and compensation for effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which should be achieved.

9.3F.3 The application of significance category will rely on professional judgement particularly in those instances were an impact is not expected to be significant at the level at which the resource is valued, but may be significant at a lower geographic level.

Table 9.3-c: Significance of Effects

Significance Category	Typical Descriptors of Effect
Very Large	An effect on one or more receptor(s) of International, European, UK or National Value. NOTE: only adverse effects are normally assigned this level of significance. They should be considered to represent key factors in the decision-making process.
Large	An effect on one or more receptor(s) of Regional Value. NOTE: these effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	An effect on one or more receptor(s) of County Value. NOTE: these effects may be important, but are not likely to be key decision making factors.
Slight	An effect on one or more receptor(s) of Local Value or receptors within the Survey Area Zone of Influence. NOTE: these effects are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Neutral	No significant effects on key nature conservation receptors. NOTE: absence of effects, or those that are beneath levels of perception.

APPENDIX 9.4 CHARACTERISATION OF IMPACT TABLES

9.4A Construction Impacts

Non-statutory Designated sites

9.4A.1 The assessment of construction impacts on non-designated sites has been undertaken with reference to the distance of non-statutory sites from the Scheme, the presence of significant existing barriers (i.e. roads, industrial/residential development and railway lines) and the likelihood of impacts or measurable effects on these sites. Based on these criteria, non-statutory sites have been scoped out of this assessment where there is no reasonable or probable pathway for effects to occur.

9.4A.2 Therefore, this section concentrates on the potential effects on Make-me-Rich Meadow Local Wildlife Site (LWS); see Table 9.4-a.

Table 9.4-a: Characterisation of Ecological Construction Impacts on Non-statutory Designated Sites

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Make me Rich Meadow **Nature Conservation Value**: County **Policy & Legal Context**: Habitats of Principal Importance (HoPI) under Section 41. NERC Act 2006 **Integrity/ Conservation Status Factors/ Criteria:** Habitats of Principal Importance (HoPI) under Section 41. NERC Act 2006 including: wetland and riparian habitats.	**Biophysical Change:** **Disturbance**: During site clearance / construction works there would be the potential to increase disturbance through increased noise to habitats within the footprint of the Scheme and within the adjacent LWS. Disturbance is likely to be a localised significant effect during site clearance works, after which it seems highly likely that the notable species using the LWS's would habituate to the disturbance levels as the sites are currently adjacent to the busy A19.	SI: -ve PO: Unlikely CO: Indirect EC: Within permanent and temporary footprint of proposals SZ: Unknown RE: Reversible DU: Temporary TF: During construction	**Mitigation**: To reduce disturbance of key species, such as bats and otter, night-time working would be limited where possible during the construction period. **Quantification/Measure:** N/A **Mechanism for Delivery**: CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions**: High
	Biophysical Change: **Air Quality:** (see Chapter 6 for detailed assessment)	SI: -ve PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction	**Mitigation**: Adopt control measures for dust arising during construction in order to minimise any potential emissions of fugitive dust during the construction phase. **Quantification/Measure**: N/A **Mechanism for Delivery:** CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Pollution**: Discharge of pollutants into aquatic systems Accidental spillage from construction activities Increasing sedimentation through earthworks and other construction activities.	SI: -ve PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction	**Mitigation:** All fuel, oil and chemicals would be stored in accordance with the requirements of the Control of Pollution (Oil Storage) Regulations 2001. The construction plant would be refuelled in designated areas on an impermeable surface, away from drains and watercourses. If any refuelling did need to take place in other areas of the site, a prescribed safe method would be used. An emergency spill plan would be generated and spill kits would be available at appropriate locations. **Quantification/Measure**: N/A **Mechanism for Delivery**: CEMP Drainage Strategy	**Residual Effects:** Not Significant (neutral) **Confidence of predictions**: High

9.4B Habitats

9.4B.1 Figures for permanent and temporary habitat loss have been calculated using the most up to design information (available January 2018) and the most up to date details on the main site compound and soil storage areas provided by the contractor (available January 2018). Permanent and temporary habitat losses are detailed in Table 9.4-b. These figures can also be found in Table 9.5 of the ES Chapter 9.

9.4B.2 The Scheme would result in direct loss of habitat within the Scheme footprint, and short-term loss of habitat for temporary construction uses, such as the main site compound, storage areas and site access roads. Permanent and temporary losses during construction have been calculated for each habitat type (see Table 9.4-b below) measured units of area hectares (ha); see Figure 2.2 for the general Scheme footprint, including temporary land take, and the Environmental Masterplan for the full footprint of the Scheme, including environmental mitigation works.

Table 9.4-b: Summary of habitat loss

Habitat Type	Total Area (ha)	Permanent land-take (ha)	Temporary land-take (ha)
Arable	12.38	4.88	7.5
Broad-leaved Plantation Woodland	1.64	1.64	N/A
Dense/Continuous Scrub	0.9	0.81	0.09
Improved Grassland	3.42	0.28	3.14
Marshy Grassland	0.01	N/A	0.01
Mixed Plantation Woodland	0.22	0.21	0.01
Poor Semi-improved Grassland	1.1	0.96	0.14
Semi-improved Neutral Grassland	1.97	0.95	1.02
Tall Ruderal	0.19	0.06	0.13
Total	**21.83**	**9.79**	**12.03**

9.4B.3 In addition to the above, approximately 0.83 km of species poor hedgerow (including intact, defunct and species poor hedgerows with trees combined) would be lost as part of the Scheme. This would comprise 0.62 km of permanent loss and 0.21 km of temporary loss. No species rich hedgerow was anticipated to be lost as part of the Scheme.

9.4B.4 In addition to habitat loss, the Scheme may result in fragmentation / severance of terrestrial habitats, starting in the construction phase and continuing during operation. Where the A19 Downhill Lane junction is widened this could present an increased physical barrier, which would have implications for all faunal groups in the survey area primarily through reduction in resource availability and limiting population migration and colonisation. Habitats are at risk of accidental and un-mitigated pollution through spills of chemicals and other liquids such as oils and petrochemicals during construction.

9.4B.5 Where habitats of significant nature conservation value (County / Medium Value and above) are likely to be directly impacted, detailed impact tables are included in this Appendix. For the purposes of this assessment the remainder of habitat impacts are considered in detail with reference to the species they support as defined by Section 9.4 of the Ecology Chapter.

Hedgerows (not classed as Important under the Hedgerow Regulations 1997)

Table 9.4-c: Characterisation of Ecological Construction Impacts on Hedgerows

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Hedgerows **Nature Conservation Value**[7]: County (Medium Value) **Policy & Legal Context**[8]: Habitats of Principal Importance (Section 41. NERC Act 2006) **Integrity/ Conservation Status9 Factors/ Criteria**[10]: Linear habitat feature important as a wildlife commuting/foraging habitat and nesting habitat for birds.	**Biophysical Change**[11]**:** **Habitat Loss**: Permanent loss of *c.*0.62 km of species poor intact hedge and trees and species poor defunct hedgerow	SI: -ve PO: Certain CO: Direct EC: *c.*0.62 km of hedgerow SZ: N/A RE: Reversible DU: Permanent TF: During construction	**Mitigation**: *c.*1.85 km of hedgerow would be planted as part of the Scheme, as shown on the Environmental Masterplan. This would be managed for its biodiversity benefit. **Quantification/Measure**: N/A **Mechanism for Delivery**: EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions**: High
	Biophysical Change: Severance / fragmentation of hedgerows during site clearance works	SI: -ve CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction RE: Reversible DU: Temporary	**Mitigation**: *c.*1.85 km of hedgerow will be planted as part of the Scheme, as shown on the Environmental Masterplan. This hedgerow would seek to connect severed ends of hedgerows to re-establish wildlife commuting corridors. **Quantification/Measure**: N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects**: Not Significant (neutral) **Confidence of predictions**: High

[7] This is the value assigned to the resource using the guidance provided in the Resource Valuation table and through consultation with the SEB, as appropriate.
[8] This includes the policies and legislation that are relevant to the resource.
[9] These terms are defined in HD 44/09.
[10] The description of the resource may be related to relevant published evaluation criteria such as SSSI selection criteria (JNCC, 1998).
[11] These are the changes to the resource that would occur as a result of the impact.

Amphibians (Common Toad)

Table 9.4-d: Characterisation of Ecological Construction Impacts on Amphibians

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Amphibians (Common Toad) **Nature Conservation Value**[12]: Local (Low Value) **Policy & Legal Context**[13]: Species of Principal Importance under Section 41 of the NERC Act 2006. **Integrity/ Conservation Status**[14] **Factors/ Criteria**[15]**:** Breeding ponds and associated terrestrial habitat.	**Biophysical Change**[16]: **Habitat Loss:** Loss of suitable terrestrial habitat throughout study area. However, impact is likely to be localised and mainly related to the minor terrestrial habitat loss for common toad.	SI: -ve PO: Certain. CO: Direct. EC: Throughout the study area. SZ: Land take within terrestrial habitats suitable for common amphibians. RE: Reversible. DU: Permanent. TF: During construction.	**Mitigation**: Main site compound and storage areas to be located away from known Common Toad breeding pond and other aquatic habitats that may support breeding populations of amphibians. Planting for the Scheme would take into account general habitat requirements for amphibians focusing on providing a diverse mosaic of suitable terrestrial habitats. This would result in a net gain of 1.02 km of hedgerows and 0.03 ha of plantation woodland. Where possible material from site clearance works would be used to create additional refugia and/or hibernacula within to improve the suitability of terrestrial habitat within Make Me Rich meadow LWS. Therefore, although there would be some common toad terrestrial habitat loss, the landscaping would provide a net gain in the area of key habitats and the provision of additional hibernacula / refugia would mitigate the affect this impact. **Quantification/Measure**: N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects**: Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Direct Mortality** Increased risk of direct mortality through site clearance operations.	SI: -ve. PO: Unlikely. CO: Direct. EC: Throughout the study area. SZ: unknown. RE: Irreversible. DU: Permanent.	**Mitigation**: Main site compound and storage areas to be located away from known Common Toad breeding pond and other aquatic habitats that may support breeding populations of amphibians.	**Residual Effects**: Not Significant (neutral) **Confidence of predictions**: High

[12] This is the value assigned to the resource using the guidance provided in the Resource Valuation table and through consultation with the SEB, as appropriate.
[13] This includes the policies and legislation that are relevant to the resource.
[14] These terms are defined in HD 44/09.
[15] The description of the resource may be related to relevant published evaluation criteria such as SSSI selection criteria (JNCC, 1998).
[16] These are the changes to the resource that would occur as a result of the impact.

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
		TF: During construction.	Ecological clerk of works to be present during site clearance operations in sensitive habitats adjacent to known breeding ponds. **Quantification/Measure**: N/A **Mechanism for Delivery**: CEMP	
	Biophysical Change: **Severance/Fragmentation**: Increased severance / fragmentation of suitable terrestrial habitats and breeding ponds. However, it should be noted that habitats in the study area are already significantly fragmented and severed through existing infrastructure, industrial development and residential areas.	SI: –ve. PO: Unlikely. CO: Indirect. EC: Throughout the study area. SZ: Unknown. RE: Reversible. DU: Temporary. TF: During construction	**Mitigation:** Planting for the Scheme would take into account general habitat requirements for amphibians and seek to replace severed linkages / commuting corridors, such as hedgerows. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects**: Not Significant (neutral) **Confidence of predictions**: High
	Biophysical Change: **Pollution** Discharge of pollutants into aquatic systems. Accidental spillage from construction activities. Increasing sedimentation through earthworks and other construction activities	SI: -ve PO: Unlikely. CO: Indirect. EC: Throughout the study area. SZ: Unknown. RE: Reversible. DU: Temporary. TF: During construction.	**Mitigation**: All fuel, oil and chemicals would be stored in accordance with the requirements of the Control of Pollution (Oil Storage) Regulations 2001. The construction plant would be re-fuelled in designated areas on an impermeable surface, away from drains and watercourses. If any re-fuelling did need to take place in other areas of the site, a prescribed safe method would be used. An emergency spill plan would be generated and spill kits would be available at appropriate locations. **Quantification/Measure**: N/A **Mechanism for Delivery:** CEMP Drainage Strategy	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

Key
SI (Sign): Positive (beneficial (+ve)) or Negative (adverse (-ve))
PO (Probability of Occurring): Certain, Probable, Unlikely
CO (Complexity): Direct, Indirect, Cumulative
EC (Extent): Area measures and percentage of total (e.g. area of habitat/ territory lost)
SZ (Size): Description of level of severity of influence (e.g. complete loss, number of animals affected)
RE (Reversibility): Reversible or Not Reversible (can the effect be reversed, whether or not this is planned)
DU (Duration): Permanent (P) or Temporary (T) in ecological terms. Where differing timescales are determined in relation to the life-cycle of the receptor, these should be defined.
TF (Timing and frequency): Important seasonal and/or life-cycle constraints and any relationship with frequency considered

Breeding/Wintering Birds

Table 9.4-e: Characterisation of Ecological Construction Impacts on Breeding/Wintering Birds

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Breeding/Wintering Birds **Nature Conservation Value**: County (Medium Value) **Policy & Legal Context**: Wildlife and Countryside Act 1981 (as amended) **Integrity/ Conservation Status Factors/ Criteria:** Species of Principal Importance (SoPI) under Section 41 of the NERC Act 2006. Durham Local BAP, JNCC Red and JNCC Amber list species.	**Biophysical Change:** **Habitat Loss:** Loss of breeding/foraging habitat for ground nesting birds common to arable/pastoral landscapes such as skylarks and lapwing. Loss of overwintering habitat (arable, grassland and set aside) used by WCA Schedule 1 overwintering bird species (redwing and fieldfare). Loss of hedgerow habitat important for nesting and overwintering birds.	SI: -ve PO: Certain CO: Direct EC: c.9.79 ha of permanent loss and c.12.03 ha of temporary loss of habitat. In addition to the permanent loss of *c*.0.62 km of hedgerow. SZ: Partial loss of the total available resource in the wider landscape. RE: Reversible. DU: Permanent and Temporary Loss. TF: During construction.	**Mitigation**: All habitat clearance, where possible, would take place outside the bird breeding season – bird breeding season generally accepted to be from March to August (inclusive). If works during the breeding season are unavoidable, the potential presence of bird nests would be taken into consideration when planning habitat clearance (in particular clear-felling of trees or hedgerows) – e.g. preconstruction checks. Predicted impact is minimal due to amount of available suitable habitat within the wider study area. Landscape planting and habitat creation would provide foraging and nesting areas for breeding birds, plus foraging areas for wintering birds. Subject to 3rd party agreement nest boxes would be provided in suitable locations (in woodland and on mature trees), such as suitable habitats within Make Me Rich Meadow LWS as part of the Scheme enhancements. **Quantification/Measure:** N/A **Mechanism for Delivery**: EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Direct Mortality:** During site clearance operations (i.e. vegetation removal) there is an increased risk of bird mortality if these operations occur within the bird breeding season.	SI: -ve PO: Unlikely. CO: Direct. EC: Throughout the construction area. SZ: Unknown. RE: Irreversible. DU: Temporary.	**Mitigation**: All habitat clearance, where possible, would take place outside the bird breeding season – bird breeding season generally accepted to be from March to August.	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
	In addition, there would be a reduction in the amount of available vegetation cover which could increase the chance of predation.	TF: During construction.	Working limits to be clearly defined to avoid encroachment especially adjacent to sensitive habitats. Main site compound and storage areas to be located away from sensitive habitat receptors, such as Make Me Rich meadow LWS. **Quantification/Measure**: N/A **Mechanism for Delivery**: CEMP	
	Biophysical Change: **Severance/ Fragmentation:** Site clearance works would result in severance of habitats into smaller, more fragmented parcels of habitat which are more vulnerable to negative effects through stochastic events.	SI: –ve, however habitats in the study area are already fragmented and severed through existing infrastructure, industrial development and residential areas. PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction	**Mitigation**: While construction would fragment existing habitats, the impacts are unlikely to be significant in terms of fragmentation or severance of bird populations given the presence of existing infrastructure and surrounding industrial / residential development. **Quantification/Measure**: N/A **Mechanism for Delivery**: N/A	**Residual Effects**: Not Significant (neutral) **Confidence of predictions**: High
	Biophysical Change: **Disturbance:** During site clearance /construction works there is the potential to disturb birds breeding or overwintering in habitats within the footprint of the Scheme and within adjacent habitats. Habitats of particular sensitivity that could be affected are those associated with Make Me Rich meadow LWS	SI: -ve PO: Likely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction	**Mitigation**: Disturbance is only likely to be a localised significant effect during site clearance works after which it seems highly likely that the birds would habituate to the likely disturbance levels as those present already will have habituated to the noisy A19 and A182. To further reduce disturbance night time working would be limited during the construction period. In terms of noise and vibration, no mitigation would be required as the predicted level of change is not anticipated to be a significant increase from the current baseline level given the presence of existing infrastructure and surrounding industrial / residential development. **Quantification/Measure:** N/A **Mechanism for Delivery**: EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

Barn Owl

Table 9.4-f: Characterisation of Ecological Construction Impacts on Barn Owls

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Barn Owl **Nature Conservation Value:** County (Medium Value) **Policy & Legal Context:** Wildlife and Countryside Act 1981 (as amended) Species of Principal Importance under Section 41 of the NERC Act 2006. Durham Local BAP **Integrity/ Conservation Status Factors/ Criteria**: Known roost/nesting sites west of the A19. Key resources include: arable field margins and rough grassland suitable for foraging/hunting. Hedgerows used for commuting and foraging corridors.	**Biophysical Change:** **Habitat Loss:** No direct impact on known roost/nesting sites (approximately 1.8km west of existing A19). Permanent removal of c. 7.07 ha of suitable foraging habitat for barn owls (grassland and arable). Temporary removal of *c*. 11.81 ha of suitable foraging habitat for barn owls (grassland and arable), in addition to the permanent loss of *c*.0.62km of hedgerow. It should be noted that no barn owl foraging/hunting activity was observed within the vicinity of the temporary or permanent works footprint.	SI: -ve. PO: Certain. CO: Direct. EC: Combined permanent and temporary loss of suitable barn owl habitat of 19.73ha. SZ: Partial loss of the total available resource in the wider landscape. RE: Irreversible. DU: Permanent and Temporary Loss. TF: During construction.	**Mitigation**: Land take for the Scheme would result in the loss of a minor proportion of the total available foraging resource for barn owls in the study area and wider landscape. Where possible planting for the Scheme would take in to account general habitat requirements for barn owl and seek to install tall hedges or lines of closely spaced trees to act as commuting corridors. In addition, *c*.1.85 km of hedgerow would be planted as part of the Scheme, as shown on the Environmental Masterplan, and seek to connect severed ends of hedgerows to re-establish wildlife commuting corridors. **Quantification/Measure:** N/A **Mechanism for Delivery**: EMP & CEMP	**Residual Effects**: Not Significant (neutral) **Confidence of predictions**: High
	Biophysical Change: **Direct Mortality**: During construction of the Scheme the likely cause of direct mortality would be destruction/damage to a roost or breeding site. No such sites have been identified within the temporary or permanent footprint of the Scheme. For the purposes of this assessment it is assumed that night-time working would be limited. Therefore, no impact is likely due to construction vehicle strike.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation**: No Mitigation Required **Quantification/Measure**: N/A **Mechanism for Delivery:** N/A	**Residual Effects**: Not Significant (neutral) **Confidence of predictions**: High
	Biophysical Change: **Severance/Fragmentation:** Site clearance works would remove areas of arable, grassland and hedgerow habitat that barn owl could be using for foraging/hunting or roosting.	SI: –ve PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown - habitats in the study area are already fragmented and severed through existing infrastructure, industrial development and residential areas.	**Mitigation:** While construction would fragment existing habitats, the impacts are unlikely to be significant in terms of fragmentation or severance of barn owl population/habitats given the effects from existing infrastructure, industrial development and residential areas in the surrounding area.	**Residual Effects:** Not Significant (neutral) **Confidence of predictions**: High

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
	In addition, severance of habitats results in smaller, more fragmented parcels of habitat which lack connectivity.	RE: Reversible DU: Temporary TF: During construction	**Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	
	Biophysical Change: **Disturbance:** During site clearance works there would be the potential to disturb habitats within the footprint of the Scheme and within adjacent habitats. Habitats of particular sensitivity that could be affected are considered suitable barn owl foraging/hunting habitats (rough grassland, arable, field margins and hedgerows) within 2 km of the known roost sites.	SI: -ve PO: Likely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary	**Mitigation**: Disturbance is likely to be a localised significant effect during site clearance works, after which it seems highly likely that the barn owl would habituate to the disturbance levels. To reduce disturbance night-time working would be limited during the construction period. Additional lighting of the Scheme should be installed in accordance with the Lighting Engineers Guidance for the Reduction of Light Pollution (The Institution of Lighting Engineers, 2011). In brief the effect of disturbance to adjacent habitats can be minimised by the use of different types of lamp such as: low pressure sodium lamps or high pressure sodium instead of mercury or metal halide lamps. The brightness would be kept as low as possible by directing the beam downwards using hoods and limiting the height of lighting columns, where possible. **Quantification/Measure:** N/A **Mechanism for Delivery:** CEMP Drainage Strategy	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

Bats

Table 9.4-g: Characterisation of Ecological Construction Impacts on Bats

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Bats **Nature Conservation Value:** Local (Low Value). **Policy & Legal Context:** Conservation of Habitats and Species Regulations 2017 Wildlife and Countryside Act 1981 (as amended) Natural Environment and Rural Communities Act 2006 (NERC 2006) Durham LBAP Species **Integrity/ Conservation Status Factors/ Criteria:** Mix of suitable habitat present, such as woodland, grassland, scrub, hedgerows and ditches	**Biophysical Change:** **Habitat Loss** Permanent removal of *c.*4.85 ha of suitable foraging habitat (grassland, scrub and woodland habitat). Temporary removal of *c.*4.4 ha of suitable foraging habitat (grassland and scrub and woodland habitat). Permanent loss of *c.*0.62 km of species poor intact and defunct native hedgerow likely to be used as commuting corridors.	SI: -ve PO: Certain CO: Direct EC: Combined permanent and temporary loss of suitable foraging habitat of 9.21ha SZ: Partial loss of the total available resource in the wider landscape. RE: Irreversible. DU: Permanent and Temporary Loss. TF: During construction.	**Mitigation**: Land take for the Scheme would result in the loss of a minor proportion of the total available foraging resource for bats in the wider landscape. Where possible planting for the Scheme would take into account general habitat requirements for bats and seek to create rough grassland habitat and to replace severed linkages / commuting corridors, such as hedgerows through translocations and/or new planting and ditches through habitat creation. **Quantification/Measure**: Newly created habitats: • Grassland (including: species rich grassland and amenity grassland with wildflower seeding incorporated) = 5.74 ha. • Woodland (incorporating native broadleaved species) = 1.88 ha. • Scrub/tree and shrub planting = 0.14 ha. **Mechanism for Delivery**: EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Severance/Fragmentation** While construction would fragment existing habitats, the impacts are unlikely to be significant in terms of severance / fragmentation as low numbers of bats utilise existing hedgerows and ditches as commuting routes in the area. Permanent loss of 0.62km of species poor intact and defunct native hedgerow used as commuting corridors.	SI: -ve PO: Certain CO: Direct EC: Loss of suitable commuting habitat of 0.62km SZ: Partial loss of the total available resource in the wider landscape. RE: Irreversible DU: Permanent and temporary loss TF: During Construction	**Mitigation**: Land take for the Scheme would result in the loss of a minor proportion of the total available commuting resource for bats in the wider landscape. Where possible planting for the Scheme would take in to account general habitat requirements for bats and seek to replace severed linkages / commuting corridors, such as hedgerows through translocations and/or new planting and ditches through habitat creation. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change:	SI: -ve	**Mitigation**:	**Residual Effects:**

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
	Disturbance: Bats are susceptible to disturbance from lighting. External lighting used during the construction phase and permanent lighting installed and utilised during the operational phase may discourage bats from foraging sites through illumination. No bat roost sites were recorded during the baseline surveys, so no disturbance impacts to roosting bats species are anticipated.	PO: Likely CO: Indirect EC: Restricted to areas of suitable bat habitat SZ: Unknown RE: Reversible DU: Temporary and Permanent TF: During construction/	Night-time working would be limited during the construction of the scheme. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	Not Significant (neutral) **Confidence of predictions**: High
	Biophysical Change: Direct mortality/Loss of bat roosts: No bat roosts recorded within the study area. No direct mortality or loss of bat roosts during construction is anticipated.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation:** No mitigation required, but subject to 3rd party agreement bat boxes would be provided in suitable locations (in woodland and on mature trees) such as suitable habitats within Make-Me-Rich Meadow LWS as part of the enhancements for the Scheme. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

Water Vole

Table 9.4-h: Characterisation of Ecological Construction Impacts on Water Vole

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Water Vole **Nature Conservation Value:** County (Medium Value) **Policy & Legal Context**: The Wildlife and Countryside Act 1981 (as amended). Natural Environment and Rural Communities Act 2006 (NERC 2006) Durham LBAP **Integrity/ Conservation Status Factors/ Criteria:** River Don LWS (upstream and downstream of the A19 culvert). Tall emergent vegetation on the banks of ditches providing suitable refuge and foraging resources for water voles.	**Biophysical Change:** **Disturbance** Potentially likely to occur where construction works are required in suitable habitats	SI: -ve PO: Unlikely CO: Direct EC: SZ: Unknown RE: Irreversible. DU: Permanent TF: During construction.	**Mitigation**: Works in proximity to suitable water vole habitat not required therefore potential for disturbance avoided/reduced. **Quantification/Measure**: N/A **Mechanism for Delivery:** Precautionary working method statement. EMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: Pollution Discharge of pollutants into aquatic systems. Accidental spillage from construction activities. Increasing sedimentation through earthworks and other construction activities	SI: -ve PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction	**Mitigation:** All fuel, oil and chemicals would be stored in accordance with the requirements of the Control of Pollution (Oil Storage) Regulations 2001. The construction plant would be refuelled in designated areas on an impermeable surface, away from drains and watercourses. If any refuelling did need to take place in other areas of the site, a prescribed safe method would be used. An emergency spill plan would be generated and spill kits would be available at appropriate locations. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

Otter

Table 9.4-i: Characterisation of Ecological Construction Impacts on Otter

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Otter **Nature Conservation Value:** County (Medium Value) **Policy & Legal Context:** Conservation of Habitats and Species Regulations 2017 Wildlife and Countryside Act 1981 (as amended) Natural Environment and Rural Communities Act 2006 (NERC 2006) Durham LBAP Species	**Biophysical Change:** **Direct Mortality/Disturbance** Potentially likely to occur where construction works are required in proximity to the River Don. Disturbance of the area during the construction period may have a disorientating effect on the otters and result in direct mortality through, road traffic accidents on the existing road network or construction haul roads, or through individuals becoming trapped within deep excavations. Otters are largely nocturnal in freshwater habitats (Kruuk, 1995) and likely to be lying-up during normal construction working hours. Therefore, the effect of disturbance in relation to the Scheme would likely be minimal.	SI: -ve PO: Unlikely CO: Direct EC: Likely to occur where construction works are required in proximity to the River Don. SZ: Unknown RE: Irreversible. DU: Permanent TF: During construction.	**Mitigation:** No holts have been identified in the area proposed for construction of the outfall, so no specific mitigation for loss of habitat or otter holts is required. Construction of the outfall would be done under a precautionary method of working as direct by a suitably qualified ecologist / Ecological Clerk of Works. In addition, no steep-sided, deep and/or water-filled excavations would be left unguarded overnight as otters could fall in and become trapped. Any major excavations that need to be left uncovered overnight would have their slopes battered. If it is necessary, to leave small deep, steep-sided or water-filled excavations open overnight the excavations would be protected with suitable fencing. **Quantification/Measure:** N/A **Mechanism for Delivery:** Precautionary working method statement. Environmental Masterplan.	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
Integrity/ Conservation Status Factors/ Criteria: Tall emergent vegetation on the banks of ditches providing suitable refuge and foraging resources for otter.	**Biophysical Change:** **Severance/Fragmentation** Potentially likely to occur where construction works are required in suitable habitats. The overall Scheme is unlikely to increase any habitat severance / fragmentation issue beyond the existing baseline situation given the presence of existing infrastructure (A19 and associated culverts) and the likely commuting routes in the study area (River Don).	SI: -ve PO: Unlikely CO: Indirect EC: Likely to occur where construction works are required in proximity to the River Don. SZ: Severance effects on riparian habitat present on River Don. RE: Reversible DU: Temporary effect TF: During construction.	**Mitigation:** No specific mitigation required **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: Pollution	SI: -ve PO: Unlikely	**Mitigation:** All fuel, oil and chemicals would be stored in accordance with the	**Residual Effects:**

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
	Discharge of pollutants into aquatic systems. Accidental spillage from construction activities. Increasing sedimentation through earthworks and other construction activities	CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction	requirements of the Control of Pollution (Oil Storage) Regulations 2001. The construction plant would be refuelled in designated areas on an impermeable surface, away from drains and watercourses. If any refuelling did need to take place in other areas of the site, a prescribed safe method would be used. An emergency spill plan would be generated and spill kits would be available at appropriate locations. **Quantification/Measure:** N/A **Mechanism for Delivery:** CEMP Drainage Strategy	Not Significant (neutral) **Confidence of predictions**: High

Invertebrates

Table 9.4-j: Characterisation of Ecological Construction Impacts on Aquatic and Terrestrial Invertebrates

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Invertebrates **Nature Conservation Value:** Local (Low Value) **Policy & Legal Context:** No legally protected species recorded. A number of Nationally Scarce and Notable species of invertebrate recorded. **Integrity/ Conservation Status Factors** Mix of habitat present likely to support a range of invertebrate diversity such as species rich grassland hedgerows and scrub.	**Biophysical Change:** **Habitat Loss/Direct Mortality** Clearance of the site during construction could affect the invertebrates present and cause direct mortality of individuals. Clearance of the site would also be especially destructive to sedentary species or sedentary life stages of other more mobile species.	SI: -ve. PO: Certain CO: Direct EC: Throughout study area SZ: Combined permanent and temporary loss of sensitive habitats (grassland, plantation woodland and scrub) of 9.21ha. Plus, permanent loss of *c*.0.62km of species poor intact and defunct native hedgerow RE: Irreversible DU: Permanent TF: During construction	**Mitigation**: No specific mitigation required Where possible planting for the Scheme would take into account general habitat requirements for invertebrates and seek to create rough grassland habitat and to replace severed linkages, such as hedgerows. **Quantification/Measure**: N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Pollution** Discharge of pollutants into aquatic systems. Accidental spillage from construction activities. Increasing sedimentation through earthworks and other construction activities	SI: -ve PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction	**Mitigation:** All fuel, oil and chemicals would be stored in accordance with the requirements of the Control of Pollution (Oil Storage) Regulations 2001. The construction plant would be refuelled in designated areas on an impermeable surface, away from drains and watercourses. If any refuelling did need to take place in other areas of the site, a prescribed safe method would be used. An emergency spill plan would be generated and spill kits would be available at appropriate locations. **Quantification/Measure:** N/A **Mechanism for Delivery:** CEMP Drainage Strategy	**Residual Effects:** Not Significant (neutral) **Confidence of predictions**: High

9.4C Operational Impacts

Non-statutory Designated Sites

Table 9.4-k: Characterisation of Ecological Operational Impacts on Non-statutory Designated Sites

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Make Me Rich Meadow **Nature Conservation Value:** County **Policy & Legal Context:** Habitats of Principal Importance under Section 41. NERC Act 2006 **Integrity/ Conservation Status Factors/ Criteria:** Habitats of Principal Importance under Section 41. NERC Act 2006 including: wetland and riparian habitats.	**Biophysical Change:** **Air Quality:** Predicted level of change is not anticipated to be a significant increase from the current baseline level (see Chapter 6 for detailed assessment).	SI: -ve. PO: Unlikely. CO: Indirect. EC: Throughout the study area. SZ: Unknown. RE: Reversible. DU: Permanent. TF: During operation.	**Mitigation**: No mitigation is required as the predicted level of change is not anticipated to be a significant increase from the current baseline level (see Chapter 6 for detailed air quality assessment). Adopt measures for dust arising during construction. In order to minimise any potential emissions of fugitive dust during the construction phase. **Quantification/Measure**: N/A **Mechanism for Delivery**: CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Disturbance:** Potential increase of disturbance to habitats within the footprint of the Scheme and within adjacent habitats.	SI: -ve. PO: Unlikely. CO: Indirect. EC: Habitats adjacent to the permanent footprint. SZ: Unknown. RE: Reversible. DU: Temporary (for the duration of operation). TF: During operation.	**Mitigation**: No mitigation is required as the predicted level of change is not anticipated to be a significant increase from the current baseline level (see Chapter 12 for detailed noise and vibration assessment). **Quantification/Measure:** N/A **Mechanism for Delivery:** CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Pollution** Spills from road traffic accidents potentially introducing contaminants into the watercourse, affecting physiochemical quality. Increased turbidity from heavy suspended solid loads in road runoff.	SI: -ve PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction	**Mitigation:** Interceptors would be included in the drainage design to prevent contaminated runoff reaching sensitive habitats (i.e. River Don LWS). Attenuation ponds built into drainage design to minimise contaminants and sediments reaching aquatic habitats. **Quantification/Measure:** N/A **Mechanism for Delivery**: CEMP Drainage Strategy	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

Hedgerows (not Important Hedgerows under Hedgerow Regulations 1997)

Table 9.4-l: Characterisation of Ecological Operational Impacts on Ecologically Important Hedgerows

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Hedgerows **Nature Conservation Value**[17]: Local (Low Value) or Less than Local (Negligible). **Policy & Legal Context**[18]**:** Habitats of Principal Importance (Section 41. NERC Act 2006) **Integrity/ Conservation Status**[19] **Factors/ Criteria**[20]**:** Linear habitat feature important as a wildlife commuting/foraging habitat and nesting habitat for birds.	**Biophysical Change**[21]**:** **Habitat loss:** No additional hedgerow would be lost during the operational phase of the Scheme.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation:** No Mitigation Required **Quantification/Measure:** N/A **Mechanism for Delivery:** N/A	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Severance/Fragmentation:** No additional severance of hedgerows is anticipated as part of the Scheme.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A SI: N/A	**Mitigation**: *c.*1.85 km of hedgerow would be planted as part of the proposals as shown on the Environmental Masterplan. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

[17] This is the value assigned to the resource using the guidance provided in the Resource Valuation table and through consultation with the SEB, as appropriate.
[18] This includes the policies and legislation that are relevant to the resource.
[19] These terms are defined in HD 44/09.
[20] The description of the resource may be related to relevant published evaluation criteria such as SSSI selection criteria (JNCC, 1998).
[21] These are the changes to the resource that would occur as a result of the impact.

Amphibians

Table 9.4-m: Characterisation of Ecological Operational Impacts on Amphibians

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Amphibians (Common Toad) **Nature Conservation Value**[22]: Local (Low) **Policy & Legal Context**[23]: Species of Principal Importance under Section 41 of the NERC Act 2006. **Integrity/ Conservation Status**[24] **Factors/ Criteria**[25]: Breeding ponds and associated terrestrial habitat.	**Biophysical Change**[26]**:** Habitat loss: No additional habitat would be lost during the operational phase of the Scheme.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation:** No Mitigation Required. **Quantification/Measure:** N/A **Mechanism for Delivery:** N/A	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Direct Mortality:** Unlikely to be a significant impact as current design avoids know common toad breeding ponds and associated terrestrial habitats.	SI: -ve PO: Unlikely CO: Direct EC: Length of the Scheme. SZ: Unknown RE: Not reversible DU: Permanent TF: n/a	**Mitigation:** No Mitigation Required. **Quantification/Measure:** N/A **Mechanism for Delivery:** CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Severance/Fragmentation:** Increased severance / fragmentation of suitable terrestrial habitats and breeding ponds. However, it should be noted that habitats in the study area are already significantly fragmented and severed through existing infrastructure, industrial development and residential areas.	SI: –ve PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary (for the duration of operation) TF: During construction	**Mitigation:** Planting for the Scheme would take into account general habitat requirements for amphibians and seek to replace severed linkages / commuting corridors, such as hedgerows. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Pollution** Discharge of pollutants into aquatic systems.	SI: -ve PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown	**Mitigation:** Interceptors would be included in the drainage design to prevent contaminated runoff reaching sensitive habitats (i.e. River Don LWS).	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

[22] This is the value assigned to the resource using the guidance provided in the Resource Valuation table and through consultation with the SEB, as appropriate.
[23] This includes the policies and legislation that are relevant to the resource.
[24] These terms are defined in HD 44/09.
[25] The description of the resource may be related to relevant published evaluation criteria such as SSSI selection criteria (JNCC, 1998).
[26] These are the changes to the resource that would occur as a result of the impact.

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
		RE: Reversible DU: Temporary TF: During construction	Attenuation ponds built into drainage design to minimise contaminants and sediments reaching aquatic habitats. **Quantification/Measure:** N/A **Mechanism for Delivery:** CEMP Drainage Strategy	

Key
SI (Sign): Positive (beneficial (+ve)) or Negative (adverse (-ve))
PO (Probability of Occurring): Certain, Probable, Unlikely
CO (Complexity): Direct, Indirect, Cumulative
EC (Extent): Area measures and percentage of total (e.g. area of habitat/ territory lost)
SZ (Size): Description of level of severity of influence (e.g. complete loss, number of animals affected)
RE (Reversibility): Reversible or Not Reversible (can the effect be reversed, whether or not this is planned)
DU (Duration): Permanent (P) or Temporary (T) in ecological terms. Where differing timescales are determined in relation to the life-cycle of the receptor, these should be defined.
TF (Timing and frequency): Important seasonal and/or life-cycle constraints and any relationship with frequency considered

Breeding and Wintering Birds

Table 9.4-n: Characterisation of Ecological Operational Impacts on Breeding and Wintering Birds

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Breeding/Wintering Birds **Nature Conservation Value:** County (Medium Value) **Policy & Legal Context:** Wildlife and Countryside Act 1981 (as amended) **Integrity/ Conservation Status Factors/ Criteria:** Species of Principal Importance under Section 41 of the NERC Act 2006. Durham Local BAP, JNCC Red and JNCC Amber list species.	**Biophysical Change:** **Habitat Loss** No additional habitat would be lost during the operational phase of the Scheme.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation**: No mitigation required beyond the habitat creation and planting specified in the EMP. **Quantification/Measure:** N/A **Mechanism for Delivery**: EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Direct Mortality** During operation of the Scheme there is likely to be an increase in bird vehicle strike rate.	SI: -ve PO: Probable CO: Direct EC: Length of the Scheme SZ: Unknown RE: Not reversible DU: Permanent TF: Predominantly March – August inclusive for breeding birds. Potential autumn peak for wintering birds	**Mitigation:** The prescribed landscape planting shown in the EMP would minimise risk of direct mortality. Habitat management of areas of woodland, scrub or grassland close to the Scheme would take place outside the main breeding season for birds, between March and August. **Quantification/Measure:** N/A **Mechanism for Delivery**: EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Severance/Fragmentation**	SI: –ve, however habitats in the study area are already fragmented and severed through existing infrastructure, industrial development and residential areas. PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Permanent. TF: During construction	**Mitigation**: Landscape planting would help alleviate any adverse effects. **Quantification/Measure**: N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects**: Not Significant (neutral) **Confidence of predictions**: High
	Biophysical Change: **Disturbance**	SI: -ve – it should be noted that existing habitats are already subject to a level of disturbance through existing infrastructure, industrial development and residential areas. PO: Likely	**Mitigation**: Disturbance is likely to be a localised significant effect during site clearance works, after which it seems highly likely that the birds would habituate to the disturbance levels.	

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
	During the operation of the Scheme there would be the potential to disturb breeding and wintering birds in adjacent habitats. Habitats of particular sensitivity that could be affected are those associated with Make Me Rich meadow LWS.	CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Permanent TF: During operation	The lighting design for the Scheme would aim to minimise any illumination of habitats adjacent to the Scheme. **Quantification/Measure**: N/A **Mechanism for Delivery**: CEMP & EMP	

Barn Owl

Table 9.4-o: Characterisation of Ecological Operational Impacts on Barn Owls

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Barn Owl **Nature Conservation Value**: County (Medium Value) **Policy & Legal Context**: Wildlife and Countryside Act 1981 (as amended) Species of Principal Importance under Section 41 of the NERC Act 2006. Durham Local BAP. **Integrity/ Conservation Status Factors/ Criteria:** Known roost/nesting site west of the A19. Key resources include: arable field margins and rough grassland suitable for foraging/hunting. Hedgerows used for commuting and foraging corridors.	**Biophysical Change:** **Habitat Loss** No additional habitat will be lost during the operational phase of the Scheme.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation**: No mitigation required. **Quantification/Measure**: N/A **Mechanism for Delivery**: EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Direct Mortality** Potential for direct mortality of barn owl through traffic collisions. However, no significant increase in risk of direct mortality is anticipated given the existing road network (A19 and A1290).	SI: -ve PO: unlikely CO: Direct EC: Length of the Scheme SZ: Unknown RE: Not reversible DU: Permanent TF: During operation. Year-round	**Mitigation:** The planting for the Scheme would install low-flight obstructions (tall hedges or lines of closely spaced trees to act as commuting corridors and reduce the risk of barn owl vehicle strike. The location of this planting is shown on the Environmental Masterplan. **Quantification/Measure:** Monitoring surveys to assess efficacy of mitigation and highlight any required alterations **Mechanism for Delivery**: EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Severance/Fragmentation**	SI: –ve, however habitats in the study area are already fragmented and severed through existing infrastructure, industrial development and residential areas. PO: Unlikely CO: Indirect EC: Throughout the study area SZ: Unknown RE: Reversible DU: Temporary TF: During construction	**Mitigation:** Landscape planting and subsequent management would help alleviate any adverse effects. **Quantification/Measure**: EMP & CEMP **Mechanism for Delivery**: CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Disturbance** During the operation of the Scheme there is the potential to disturb barn owl. However, it should be noted that there is a roost/nesting	SI: -ve – it should be noted that existing infrastructure and development PO: Likely CO: Indirect EC: Throughout the study area SZ: Unknown	**Mitigation**: Disturbance is only likely to be a localised significant effect during site clearance works after which it seems highly likely that the birds would habituate to the disturbance levels.	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:**

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
	site west of the A19, but no barn owl foraging/hunting activity was observed within the vicinity of the temporary or permanent works footprint.	RE: Reversible DU: Permanent (for the duration of operation) TF: During operation	The lighting design for the Scheme would aim to minimise any illumination of habitats adjacent to the Scheme. **Quantification/Measure**: N/A **Mechanism for Delivery**: CEMP & EMP	High

Bats

Table 9.4-p: Characterisation of Ecological Operational Impacts on Bats

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Bats **Nature Conservation Value:** Local (Low Value). **Policy & Legal Context:** Conservation of Habitats and Species Regulations 2017 Wildlife and Countryside Act 1981 (as amended) Natural Environment and Rural Communities Act 2006 (NERC 2006) Durham LBAP Species **Integrity/ Conservation Status Factors/ Criteria**: Mix of suitable habitat present such as woodland, grassland, scrub, hedgerows and ditches	**Biophysical Change:** **Habitat Loss** No additional habitat would be lost during the operational phase of the Scheme.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation:** Where possible planting for the Scheme would take into account general habitat requirements for bats and seek to create rough grassland habitat and to replace severed linkages / commuting corridors, such as hedgerows, through translocations and/or new planting and ditches through habitat creation. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Severance/Fragmentation** While construction would fragment existing habitats the impacts are unlikely to be significant in terms of fragmentation as low numbers of bats utilise existing hedgerows and ditches as commuting routes.	SI: -ve PO: Certain CO: Direct EC: Combined permanent and temporary loss of suitable commuting habitat of 0.83 km SZ: Partial loss of the total available resource in the wider landscape. RE: Irreversible DU: Permanent and temporary loss TF: During Construction only	**Mitigation**: The planting installed during the construction phase would increase the connectivity in the surrounding landscape and would be managed to provide commuting corridors of tall vegetation, which would link to the footbridge, north of the Scheme, which is a recognised crossing point for pipistrelle bat species. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Disturbance:** Bats are susceptible to disturbance from lighting. Permanent lighting installed and utilised during the operational phase may discourage bats from foraging sites through illumination.	SI: -ve PO: Likely CO: Indirect EC: Principally within the Scheme footprint although some light spill is anticipated. SZ: Unknown RE: Reversible DU: Temporary/ Permanent TF: During operation	**Mitigation**: The lighting design for the Scheme would aim to minimise any illumination of habitats adjacent to the Scheme. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP & CEMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Direct mortality/Loss of bat roosts:** No bat roosts were recorded within the study area. No significant increased risk of direct mortality or loss of bat roosts during operation of the Scheme is anticipated.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation:** Subject to 3rd party agreement bat boxes would be provided in suitable locations (in woodland and on mature trees) such as Make Me Rich meadow LWS. The presence of bat boxes in areas of suitable foraging habitat would reduce the need for the bats to cross the Scheme, reducing mortality due to vehicle strike. **Quantification/Measure**: N/A **Mechanism for Delivery:** EMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

Water Vole

Table 9.4-q: Characterisation of Ecological Operational Impacts on Water Vole

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Water Vole **Nature Conservation Value**: County (Medium Value) **Policy & Legal Context:** The Wildlife and Countryside Act 1981 (as amended). Natural Environment and Rural Communities Act 2006 (NERC 2006) Durham LBAP **Integrity/ Conservation Status Factors/ Criteria:** River Don LWS (upstream and downstream of the A19 culvert). All emergent vegetation	**Biophysical Change:** **Habitat Loss/ Disturbance /Severance and fragmentation** No adverse effects are from the above impacts are anticipated as part of the operational phase of the Scheme.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation:** N/A **Quantification/Measure**: N/A **Mechanism for Delivery**: N/A	**Residual Effects:** Not Significant (neutral) **Confidence of predictions**: High
	Biophysical Change: **Pollution** Spills from road traffic accidents potentially introducing contaminants into the watercourse, affecting physiochemical quality. Increased turbidity from heavy suspended solid loads in road runoff	SI: Negative PO: Unlikely CO: Indirect EC: Length of the Scheme SZ: Unknown RE: Reversible DU: Temporary TF: During operation (single or multiple event)	**Mitigation**: Interceptors would be included in the drainage design to prevent contaminated runoff reaching habitats. Attenuation ponds built into drainage design to minimise contaminants and sediments reaching aquatic habitats. **Quantification/Measure**: N/A **Mechanism for Delivery:** CEMP Drainage Strategy	**Residual Effects:** Not Significant (neutral) **Confidence of predictions**: High

Otter

Table 9.4-r: Characterisation of Ecological Operational Impacts on Otter

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Otter **Nature Conservation Value:** County (Medium Value) **Policy & Legal Context:** Conservation of Habitats and Species Regulations 2017 Wildlife and Countryside Act 1981 (as amended) Natural Environment and Rural Communities Act 2006 (NERC 2006) Durham LBAP Species **Integrity/ Conservation Status Factors/ Criteria:** River Don LWS (upstream and downstream of the A19 culvert).	**Biophysical Change:** **Habitat Loss** No additional habitat will be lost during the operational phase of the Scheme.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation**: N/A **Quantification/Measure:** N/A **Mechanism for Delivery:** N/A	**Residual Effects**: Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: **Direct Mortality** Based on the current proposals and survey data this is unlikely to be an increase to the current risk of direct mortality on the existing infrastructure (A19).	SI: -ve PO: Unlikely CO: Direct EC: River Don catchment in the study area. SZ: Unknown RE: Irreversible. DU: Permanent TF: During construction.	**Mitigation**: No mitigation required. Interceptors would be included in the drainage design to prevent contaminated runoff reaching sensitive habitats (i.e. River Don LWS). In conjunction with attenuation ponds built into drainage design this may help to reduce the likelihood of large fluctuations in water levels on the River Don. Therefore, otters would be less likely to seek alternative routes other than the existing culvert to traverse the A19. **Quantification/Measure:** N/A **Mechanism for Delivery:** EMP	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High

Terrestrial Invertebrates/Aquatic Invertebrates

Table 9.4-s: Characterisation of Ecological Operational Impacts on Invertebrates

Resource	Proposed activity, biophysical change, related to receptor structure and function	Characterisation of Impact	Mitigation proposals	Summary of characterisation
Resource Ref: Invertebrates **Nature Conservation Value**: Local (Low Value) **Policy & Legal Context:** No legally protected species recorded. A number of Nationally Scarce and Notable species of invertebrate recorded. **Integrity/ Conservation Status Factors** Mix of habitat present likely to support a range of invertebrate diversity, such as species rich grassland hedgerows and scrub.	**Biophysical Change** **Habitat Loss/Direct Mortality** No additional habitat loss or direct mortality is anticipated as part of the operational phase of the Scheme.	SI: N/A PO: N/A CO: N/A EC: N/A SZ: N/A RE: N/A DU: N/A TF: N/A	**Mitigation**: N/A **Quantification/Measure:** N/A **Mechanism for Delivery**: N/A	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High
	Biophysical Change: Pollution Spills from road traffic accidents potentially introducing contaminants into the watercourse, affecting physiochemical quality. Increased turbidity from heavy suspended solid loads in road runoff	SI: Negative PO: Unlikely CO: Indirect EC: Length of the Scheme SZ: Unknown RE: Reversible DU: Temporary TF: During operation (single or multiple event)	**Mitigation**: Interceptors would be included in the drainage design to prevent contaminated runoff reaching habitats. Attenuation ponds built into drainage design to minimise contaminants and sediments reaching aquatic habitats. **Quantification/Measure**: N/A **Mechanism for Delivery:** CEMP Drainage Strategy	**Residual Effects:** Not Significant (neutral) **Confidence of predictions:** High