



10, Barnard Road, Bowthorpe, Norwich, NR5 9JB

Preliminary Ecological Appraisal

Date: December 2023 V1.1-

1. Introduction and Proposals

- 1.1. Eco-Check has been commissioned by Honeyview Investments Ltd in regard to ecological matters relating to a planning application submitted to Norwich City Council for 'Full planning application for construction of a Class E food store (Lidl) with associated access, car parking, servicing and landscaping'. The site is centred at grid reference: TG178100. The proposal includes the demolition of the 'Namco Funscape' building and construction of the new food store on a similar footprint to the existing building and hard standing. Also proposed are parking spaces, cycle spaces, EV charging bays, footpath and cycleway. A landscaping plan is included which shows additional tree, shrub and hedge planting.
- 1.2. The site already benefits from a shared access off Barnard Road to the south as shown in Figure 2. The site is bordered by shrubs and trees to the north and east and to the south is the existing car parking area which does not form part of this application. To the west are industrial units, the north boundary adjoins the A1074 Dereham Road and the south boundary is defined by Barnard Road. Eco Check Ltd were commissioned to undertake a preliminary ecological survey and appraisal of the site and bat roost assessment of the building in order to inform the proposed development, the results of which are therefore set out below.

2. Site Location and Surroundings

- 2.1. The application site is situated in the Bowthorpe industrial area approximately 5km west of Norwich City and 2km east of the Longwater Retail Park. The site is accessible from Barnard Road to the south and pedestrians can also access the site from the north off Dereham Road. The nearest main road is the A47 approximately 2.1km north-west. The application site comprises a roughly rectangular shaped parcel of land and existing access extending to approximately 10,274m² or 1.02ha.
- 2.2. The site contains a large leisure facility building extending to approximately 4,120m² bordered by tarmac and concrete hard standings. To the south is a large car parking area which does not form part of this application. To the north, east and south are areas of short managed modified grassland, scattered trees and shrubs, the majority of which will be retained. Approximately 6 early mature oak trees, 1 mature sycamore, 1 semi mature willow and 1 young ash tree along the north and north-east corner of the site will require removal.

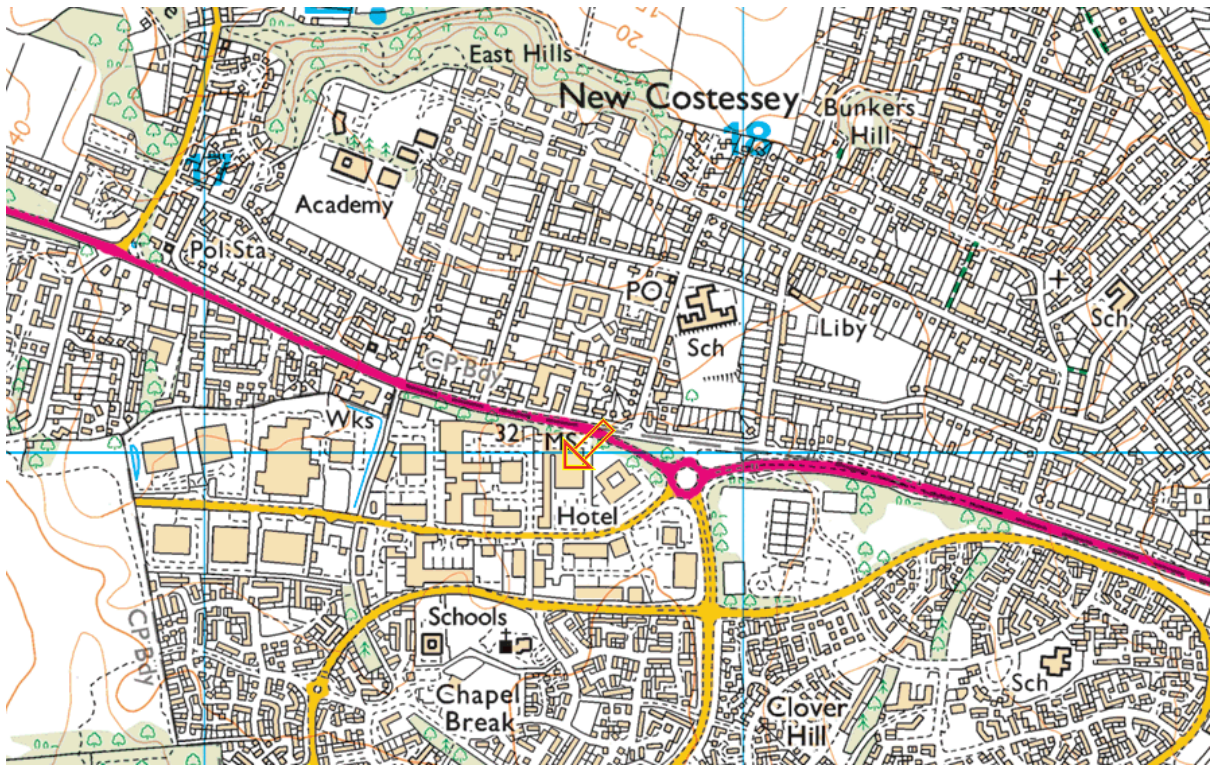


Figure 1. Site Location Map – StreetMap 2023



Figure 2. Aerial View of Site – Google Earth- July 2022

3. Methodology

Desktop Information

- 3.1. In order to compile background information on the site and its immediate surroundings, ecological information, including background records of protected, rare and notable species from the site and surrounding area have been obtained from Norfolk Biodiversity Information Service (NBIS) with data requested on the basis of a search area of 2km (Records are attached in Appendix 1).
- 3.2. Information on statutory designations was obtained from the online Multi-Agency Geographic Information for the Countryside (MAGIC) database, which utilises data provided by Natural England. In addition, the MAGIC database was searched to identify the known presence of any Priority Habitats within or adjacent the site. Relevant information is reproduced at Table 1 and Table 2 and Appendix 1, where appropriate.
- 3.3. In addition, the Woodland Trust database was searched for any records of ancient, veteran or notable trees within or adjacent to the site.

Survey Work

- 3.4. An ecological walkover survey was carried out on Wednesday 15th November 2023 by James Hodson of Eco-Check Ltd, an experienced ecological consultant with a BSc (Hons) in Environmental Sciences and MSc in Environmental Impact Assessment and licensed to undertake bat surveys and to disturb bats under Natural England Level 2 Bat Survey License 2017-30927-CLS-CLS and great crested newts 2018-36283-CLS-CLS. The site was surveyed in order to ascertain the general ecological value of the land contained within the boundaries of the site and to identify the main habitats and ecological features present.
- 3.5. The site was surveyed based on standard Phase 1 Habitat Survey methodology¹, whereby the habitat types present are identified and mapped, together with an assessment of the species composition of each habitat. This technique provides an inventory of the basic habitat types present and allows identification of areas of greater potential which require further survey. Any such areas identified can then be examined in more detail through Phase 2 surveys. This method was extended, in line with the Guidelines for Preliminary Ecological Appraisal² to record details on the actual or potential presence of any notable or protected species or habitats.
- 3.6. Using the above method, the site was classified into areas of similar botanical community types, with a representative species list compiled for each habitat identified. The nomenclature used for plant species is based on the Botanical Society for the British Isles (BSBI) Checklist.
- 3.7. General faunal activity, such as mammals or birds observed visually or by call during the course of the surveys was recorded. The potential for the site to support any protected, rare or notable faunal species was also appraised.

¹ Joint Nature Conservation Committee (2010, as amended) 'Handbook for Phase 1 habitat survey: A technique for environmental audit.'

² Chartered Institute for Ecology and Environmental Management (CIEEM) (2017) 'Guidelines for Preliminary Ecological Appraisal.'

Survey constraints/limitations

- 3.8. All of the species that occur in each habitat would not necessarily be detectable during survey work carried out at any given time of the year, since different species are apparent during different seasons. The Phase 1 habitat survey was undertaken outside the optimal season of May to September which provides a less robust assessment of botanical interest across the site, however given the habitats present, historical use and managed amenity grassland this is not considered to be a significant constraint. All the site habitats were clearly evident and relative confidence is given in the survey findings.
- 3.9. Attention was paid to the presence of any invasive species listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended). However, the detectability of such species varies due to a number of factors, e.g. time of year, site management, etc., and hence the absence of invasive species should not be assumed even if no such species were detected during the Phase 1 survey.

³ Statutory designation include Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, National Nature Reserves (NNR), Sites of Special Scientific Interest (SSSI) and Local Nature Reserves (LNR).

⁴ Non-statutory sites are designated by local authorities and protected through the planning process (e.g., County Wildlife Sites, Sites of Importance for Nature Conservation or Local Wildlife Sites).

⁵ Legally protected species include those listed in Schedules 1, 5 or 8 of the Wildlife and Countryside Act 1981; Schedule 2 of the Conservation of Species and Habitats (Amendment EU Exit) Regulations 2019; or in the Protection of Badgers Act 1992 (as amended).

⁶ Notable species include Species of Principal Importance under the Natural Environment and Rural Communities Act 2006; Local Biodiversity Action Plan (LBAP) species; Birds of Conservation Concern (Eaton et al., 2009); and/or Red Data Book/nationally notable species (JNCC, undated).

4. Survey Results, Discussion and Recommendations

4.1 Statutory Sites of Nature Conservation Significance^{1 2}:

There is only 1 statutory wildlife site within 2km (Table 1 & Figure 3). This includes SSSIs (Sites of Special Scientific Interest), Ramsar sites, SPAs (Special Protection Areas), SACs (Special Areas of Conservation), AONB (Area of Natural Beauty) and NNRs (National Nature Reserves).

Site Name and Statutory Designation(s)
1. River Wensum SSSI and SAC: 1.88km north-east

Table 1- Locally, Nationally and Internationally designated sites within 2km of the application site

1. The Wensum is a chalk-fed river in eastern England, and is an eastern example of riverine, white-clawed crayfish *Austropotamobius pallipes* populations. As with most of the remaining crayfish populations in the south and east of England, the threats from non-native crayfish species and crayfish plague are severe. Designation of the river as a SAC provides as much protection as can be afforded to such vulnerable populations.

4.2 Impact Risk Zones

The proposed development falls within the impact risk zone of the River Wensum SSSI (Table 1 & Figure 3). This impact risk zone applies to "Large infrastructure such as warehousing / industry where net additional gross internal floorspace is > 1,000m² or any development needing its own water supply." The building proposed has a footprint of 1,949m² and so Natural England will therefore require consultation on this application.

Site Name and Non-Statutory Designation(s)
1. Bowthorpe Marsh Local Nature Reserve L.N.R: 2km north-west
2. East Hills- CWS-242: 0.61km north
3. Land South of River Tud-CWS-244: 1.44km north-east
4. Disused Railway Hellesdon-CWS-1453: 1.8km north-east
5. Marlpit Paddocks-CWS-1452: 2km east
6. Twenty Acre and Bunkers Wood-CWS-2013: 1.15km south-east
7. Bowthorpe Marsh-CWS-2012: 1.27km south-east
8. Earlham and Colney Marshes-CWS-151: 1.34km south-east
9. Bowthorpe Riverside-CWS-1450: 0.68km south-west
10. Bawburgh/Colney Gravel Pits-CWS-235: 0.73km south-west

Table 2- Non-Statutory Wildlife Sites within 2km of the application site

4.3 Priority Habitat

Priority habitats within 2km include coastal and floodplain grazing marsh; lowland meadows; lowland fens; chalk rivers; deciduous woodland; and traditional orchard. None of these are present on site.

- 4.4. On the basis of the information reviewed, it is clear that the site does not contain any identified nature conservation designations. The closest identified ecological designation to the site is East Hills County Wildlife Site (CWS) approximately 0.61km north of the site. The site does not contain any priority habitats but is in proximity to broadleaved deciduous woodland, nearest parcel is 215m to the east.

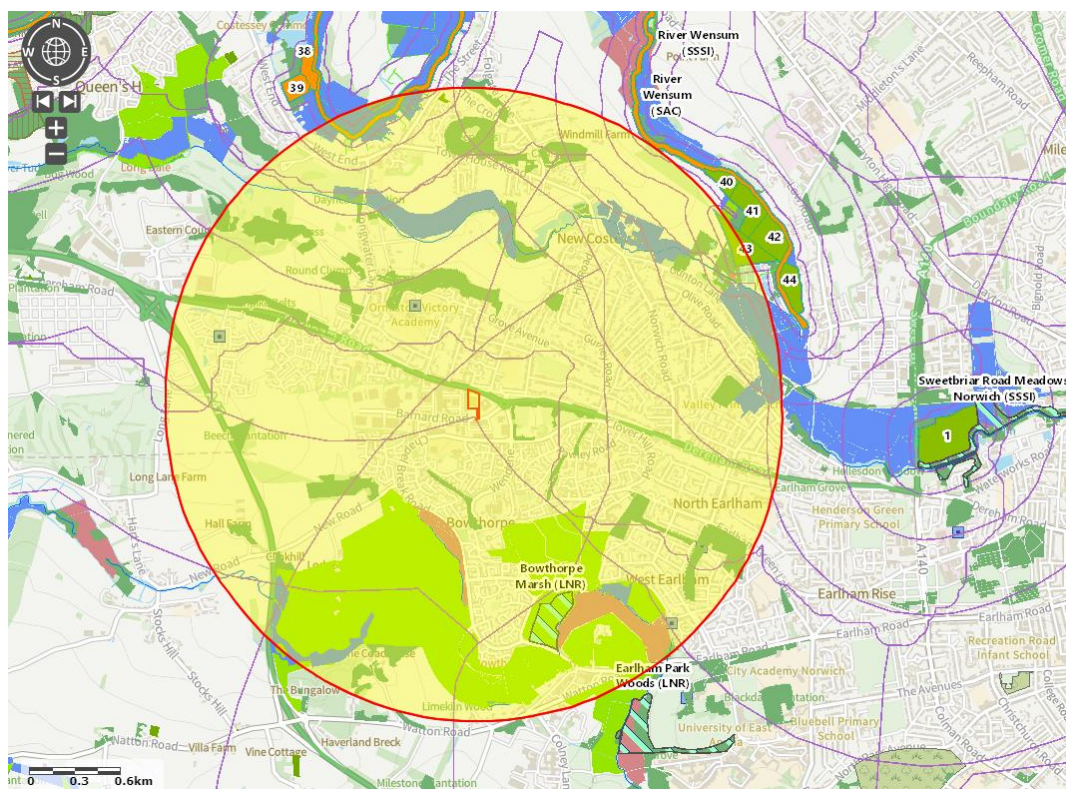


Figure 3- MAGIC Site Check- Designated Sites and Priority Habitats within 2km

- 4.5. No international level statutory ecological designations have been identified within 5km of the site, whilst information available on the MAGIC database identifies that site is included within the Impact Risk Zones (IRZs) of the River Wensum SSSI.
- 4.6. The site is within easy walking distance of a network of footpaths and cycle paths which link through to the wider countryside. Due to the proposed retail use of the site there is unlikely to be any notable increase in recreational pressure on any designated sites.
- 4.7. Overall, given the distance and separation of all identified ecological designations from the site, along with the size and scale of the proposals, the proposed development of the site is unlikely to result in any adverse significant effects on any such designations in isolation, which do not therefore appear to represent a potential constraint or require further consideration in regard to the proposed development.

Habitats and Ecological Features

- 4.8. **Survey Results.** The internal areas of the site are formed almost entirely by a large retail unit, hard standing and modified amenity grassland (see Plan 158/ECO1). Scattered trees and shrubs border the site to the north, east and south.
- 4.9. Modified grassland forms the main site habitat. The grassland is mown regularly and at the time of survey had a sward height of approximately 3cm. The amenity grassland supports a high proportion (approximately 50% or more) of Perennial Rye-grass (*Lolium perenne*), ground ivy (*Glechoma hederacea*), white clover (*Trifolium repens*), daisy (*Bellis perennis*), bristly ox-tongue (*Helminthotheca echinoides*), creeping thistle (*Cirsium arvense*), nettle (*Urtica dioica*), ribwort plantain (*Plantago lanceolata*), docks (*Rumex spp*). Flowering plants included white dead nettle (*Lamium album*), herb Robert (*Geranium robertium*), cleavers (*Galium aparine*),

buttercup (*Ranunculus repens*), purple dead nettle (*Lamium purpureum*) and Dove's foot cranesbill (*Geranium molle*).

- 4.10. Tall ruderal vegetation is occasionally present in association with the building edges and shrub planting, particularly in the north-west corner. Species included bramble (*Rubus fruticosus*), common nettle (*Urtica dioica*), spear thistle (*Cirsium vulgare*), Canadian fleabane (*Erigeron canadensis*), scentless mayweed (*Tripleurospermum inodorum*), ragwort (*Senecio jacobea*), cow parsley (*Anthriscus sylvestris*) and willowherb (*Chamerion angustifolium*).
- 4.11. Scattered trees border the site to the north, east and south and a tree constraints plan is attached in plan 158/ECO2. The trees surveyed included oak (*Qercus robur*), alder (*Alnus glutinosa*), willow (*Salix caprea*), sycamore (*Acer pseudoplatanus*), silver birch (*Betula pendula*), crab apple (*Malus sylvestris*), ash (*Fraxinus excelsior*) and beech (*Fagus sylvatica*). There trees are mostly of the same age and would appear to be approximately 30 years old and planted when the site was developed. A group of oak trees (G1), sycamore (T28), willow (T29) and ash (T30) are to be removed to facilitate the development. No potential bat roosting features were identified in any of the trees.
- 4.12 The site has matured outgrown shrubs to the east boundary and north-west corner which will be mostly retained. These included laurel (*Laurus nobilis*), berberis, cotoneaster, blackthorn (*Prunus spinosa*), Boxwood, Dogwood (*Cornus sanguinea*) and Viburnum (*Viburnum davidii*). Other habitats and features are largely limited to the field boundary hedgerows on the south, west and north boundaries. The shrubs range in height from 4-6m with the east boundary adjacent to Brook Hotel, forming a dense hedge with a wide base. Other linear features include a brick wall along the east boundary with the access and industrial units on the west boundary.
- 4.13. **Evaluation.** The main habitat within the site is bare ground (hard standing and parking), the retail building (B1) and amenity grassland. The grassland present forming the dominant internal vegetated habitat of the site was recorded to be clearly species-poor, supporting a limited range of common and widespread species, with a high proportion of Perennial Ryegrass indicating considerable improvement. The survey work was undertaken outside the optimal period for grassland survey. However, it is clear that the grassland present is typical of species-poor, amenity grassland which is regularly mown and therefore unlikely to be of any raised ecological value, nor represent a constraint on the proposals.
- 4.14. The scattered trees and shrub planting on the north and east boundaries are of some ecological value providing habitat and food source for birds, small mammals and invertebrates. The trees and shrubs are ornamental plantings containing a range of native and non-native species. Other vegetation within the internal parts of the site is limited to common ruderal and ephemeral weed species. The north boundary contains a group of early mature oak trees (G1) and in the north-east corner a mature Sycamore (T28) which are scheduled for removal to facilitate the proposed layout and combined footpath/cycleway. Where possible, it is recommended that the remaining trees are retained under any proposed development layout, with suitable protective measures (e.g. the use of temporary fencing, including in line with any relevant arboricultural recommendations and best practice, including BS5837) put in place during any construction works.

- 4.15. Due to the dense boundary shrubs which restricted access, a detailed assessment of some of the trees set within these areas was not undertaken. The proposals offer the opportunity to enhance the site with new tree, shrub and hedge planting, particularly the north and east boundaries as indicated on the soft landscaping drawing 19408-306-P-00 in Plan 158-ECO2. Some cutting back and thinning of the shrubs on the east boundary will be required to facilitate the proposed combined footpath/cycleway.

Faunal Considerations ^{5 6}

- 4.16. **Background Records.** A search for designated sites and historical species records within 2km of the site was requested from Norfolk Biodiversity Information Service (NBIS). Please note that full reproduction of the data results is not permitted within this document but a summary of the data search is provided in Appendix 1. No specific records of any fully protected, rare or notable species within the site itself, were identified based on the desktop study undertaken, whilst the nature of the habitats are such that it would appear unlikely to support certain species such as badger, great crested newt, water vole, otter, hazel dormouse and white clawed crayfish.

- 4.17. The biodiversity data search within 2km of the site returned the following records:

- 311 bat records of 10 species of bat; brown long-eared bat (*Plecotus auritus*), soprano pipistrelle (*Pipistrellus pygmaeus*), common pipistrelle (*Pipistrellus pipistrellus*), natterer's (*Myotis nattereri*), barbastelle (*Eptesicus serotinus*), serotine (*Eptesicus serotinus*), noctule (*Nyctlaux noctule*), whiskered/brandt's (*Myotis mystacinus/brandtii*) and daubenton's (*Myotis daubentonii*). There are records of 6 European Protected Species Mitigation licenses in respect of soprano pipistrelle, common pipistrelle and soprano pipistrelle. The nearest EPSM2013-6626 approximately 660m northwest in respect of common pipistrelle.
- 17 records of great crested newt *Triturus cristatus*, most recent 2012. 41 records of common toad *Bufo bufo* and 30 records of common frog *Rana temporaria*.
- 9 records of white-clawed crayfish, most recently 2012
- 77 records of hedgehog *Erinaceus europaeus* were returned, most recently 2022.
- 11 record of Badger *Meles meles*, most recently 2019.
- 24 records of grass snake *Natrix helvetica*, most recently 2023, TG188085 approximately 1.7km south-east.
- 1 record of slow worm *Anguis fragilis*, most recently 2004.
- 1 record of common lizard *Zootoca vivipara*, most recently 2004.
- 16 records of water vole *Arvicola amphibius*, most recently 2007
- 19 records of otter *Lutra lutra* was returned, most recently 2019.
- 2 records of Harvest Mouse *Micromys minutus*, most recently 2017.
- 1 record of brown hare *Lepus europaeus* most recently 2015.

- There are 11 records of badger, the nearest from Bawburgh 1,520m south-west of the site.
- A range of UK Priority and Red/Amber List Bird Species as well as SoCC (Species of Conservation Concern and Schedule 1) including barn owl, swift, yellowhammer, skylark, corn bunting, fieldfare, lesser redpoll, house sparrow, tree sparrow, starling, song thrush, lapwing.

4.18. **Badger.**

There are 11 records of badger, the nearest from Bawburgh 1,520m south-west of the site. A walkover of the site found no evidence of badgers such as latrines, tracks or diggings. Due to the urban environment, busy roads, residential areas, regular disturbance, human presence and lack of evidence for this species, it is unlikely that the site would be used by badgers, which does not, therefore appear to represent a potential constraint, nor require any further consideration in regard to the current proposals.

4.19. **Bats.**

311 bat records of 10 species of bat have been recorded within 2km. The nearest records to the site include common pipistrelle, 254m south-east, soprano pipistrelle, 309m south-east, noctule, 474m north-east, brown long-eared, 574m east and daubenton's and natterer's 574m east. The majority of these records are from acoustic monitoring undertaken during bat surveys. The site offers very limited bat roosting opportunities, a tree roost assessment did not identify any of the trees as having potential roost features such as rot holes, fissures, splits, tears and other cavities as most are too young to have developed these features. A preliminary bat roost assessment of the building to be demolished was undertaken as detailed below.

Preliminary Building Roost Assessment- B1

A preliminary bat roost assessment was made of the large industrial building on site marked as B1 on the habitat map. The building is of brick construction and the walls are all well pointed, intact and lacking any cracks, holes or other cavities that could be used by roosting bats. The outer roof comprises a pitched roof with tight fitting interlocking concrete tiles and well pointed ridge tiles. The central section of the building has a flat roof with profiled corrugated coated tin sheets supported on steel beams and softwood trusses. There is corrugated tin sheeting along the overhanging external eaves which was tight fitting to the brickwork.

An internal inspection of the roof spaces found no evidence of any roosting bats or bats themselves. No bat droppings were evident, and there are frequent extractors, air-conditioning and ventilation units in the ceilings which cause an element of noise and vibration. The building was assessed as having **Negligible** roost potential and therefore no further surveys were required.



Figure 4- View of south elevations



Figure 5- View of west elevation (left) and overhanging roof eaves (right)

The proposed development has the potential to kill, injure and disturb individual bats and has the potential to damage/ destroy bat roosts if present. The survey however confirm the absence of roosting bats with relative confidence and so demolition of the building does not represent an ecological constraint to planning. Mitigation has been proposed, including controlled lighting of the boundary trees and shrubs which have foraging opportunities. Biodiversity enhancement will be through the provision of bat boxes and/or bat bricks to be incorporated into the site during works and maintaining access points to the external fascias and weatherboards.

Due to the possibility of solitary non-breeding bats being present in the building at any time of year a precautionary approach should be adopted with regards to future works. The building will be searched for roosting bats prior to demolition works. If development has not commenced within 18 months of November 2023, it is recommended that an updated survey is undertaken, as the suitability of the site and building for bats may have changed.

It is recommended that the trees and hedging are retained, and that the new boundary planting connects with the existing tree and shrub corridors, subject to which (along with suitable protective measures and sensitive placement of new lighting to limit any light-spill onto the trees, hedges etc.), the proposals would be unlikely to result in any adverse effects on foraging and commuting bats.

Should works be required to the identified trees (e.g. to address arboricultural management requirements and/or for health and safety) a suitably qualified ecologist should first be contacted for further advice, which could include precautionary mitigation measures such as detailed inspection prior to works and/or the use of soft-felling techniques in the absence of any evidence for the presence of bats. None of the trees surveyed appeared to contain any potential roost features.

4.20. In terms of foraging and commuting bats, the internal areas of the site are less likely to be used by foraging and commuting bats and the site and bordering habitats are well illuminated which limits likely use of the site by bats. Nonetheless, the trees and shrubs provide corridors and navigational features for potential use by bats. It is recommended that new native planting and vegetation be provided within the site as part of the proposals (in particular linking with and extending the retained boundary vegetation). No further surveys or consideration would appear to be required in regard to this group in relation to the proposed development of the site.

4.21. **Great Crested Newt.**

There are 17 historical records for great crested newts from the same pond in Bowthorpe over 1.5km south-east from the site. The site falls within a green impact risk zone for this species. No waterbodies were identified within a 250m radius. Suitable habitats for commuting, foraging, sheltering and hibernating GCN is very limited and isolated with poor ecological connectivity and major barriers to dispersal such as main roads, buildings, walls etc.

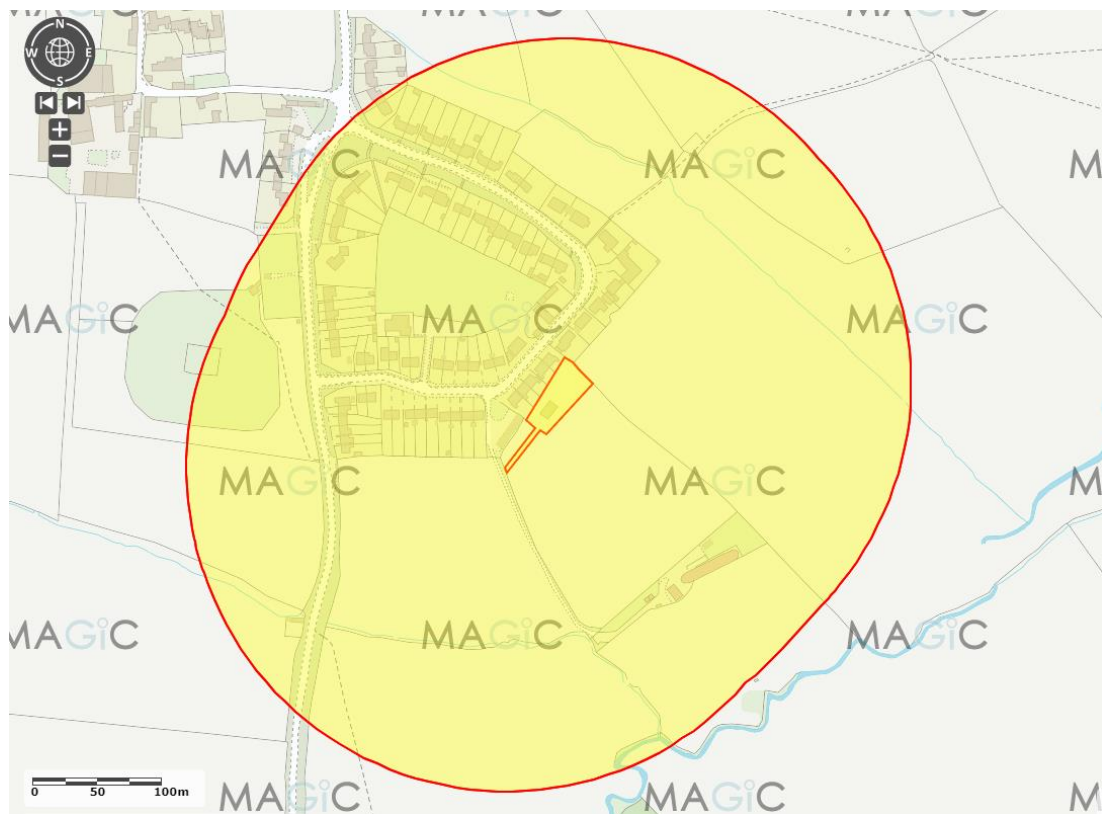


Figure 6– Pond Search Map 250m

- 4.22. No ponds or waterbodies have been identified within 250m of the site boundary and accordingly, no suitable breeding opportunities for amphibian species such as the fully protected species Great Crested Newt *Triturus cristatus* appear not to be present within the vicinity of the site.
- 4.23. On this basis, the proposals are unlikely to result in any adverse effects on fully protected amphibian species (Great Crested Newt), which do not, therefore require further consideration or survey work in regard to the current proposals.

4.24. **Reptiles.**

There are records of 24 records of grass snake *Natrix helvetica*, 1 record of slow worm *Anguis fragilis* and 1 record of common lizard *Zootoca vivipara*, most recently 2004. The nearest records are for grass snake at Bunkers Hill (south) 878m south-east of the site. The slow worm record is from Costessey and 1,450m north of the site. The common lizard record is from Three Score, Bowthorpe approximately 854m south-east of the site. The site contains short managed amenity grassland, a large building and extensive hard surfaces. The site is isolated by main roads, industrial and residential buildings, walls and other barriers to dispersal and as such it is clear that the site offers negligible potential for reptile species, which are unlikely to represent a constraint on the proposed development.

4.25. Nonetheless, the very small areas of shrubs and ruderal vegetation along the north and east boundary superficially provide suitable opportunities for individual reptiles should they be present and accordingly, it is recommended that any works affecting these areas are undertaken following initial management of vegetation (e.g. strimming or cutting in line with the existing site management) in order to render the habitats unsuitable for wandering reptiles and encourage any individual that may be present to disperse to retained/offsite habitats away from worked areas, thereby safeguarding them and avoiding any potential offence.

4.26. Subject to the implementation of this very minor consideration, it is extremely unlikely that the proposed development would result in any significant adverse effects on reptiles, such that no further consideration would appear to be required in regard to this group.

4.27. **Birds.**

The site contains trees, hedges and shrubs that would provide particular opportunities to support nesting birds. Evidence of nesting birds was found in the north-west corner and east boundary shrubs including wren (*Troglodytes troglodytes*), blackbird (*Turdus merula*) and pigeon. No evidence of any Schedule 1 bird species was recorded. No bird nests were found on the external ledges of the building, the large flat central roof section does provide nesting habitat for gulls in particular. Nonetheless, the vegetation present (in particular the boundary hedgerows and trees) provide opportunities for use by common nesting birds. The nearest bird records were for house sparrow (*Passer domesticus*) and song thrush (*Turdus philomelos*) approximately 218m north-west of the site.

4.28. Where possible under any proposals for the site, it is recommended that the existing trees, shrubs and boundary vegetation/hedgerows be retained and protected such that these continue to provide potential for use by birds.

4.29. In any event, in order to safeguard any individual birds during the proposed works and ensure compliance with the legislation in this regard, it is recommended that building demolition and any clearance of suitable nesting vegetation (in particular removal of the encroaching vegetation along the eastern boundary be undertaken outside of the bird nesting season (i.e. outside of March to August inclusive). Should this not be possible, areas due to be worked on should first be checked by a suitably qualified ecologist in order to confirm the absence of any active nests immediately-prior to removal. Any active nests identified would need to be retained and protected until the end of the nesting season or until the birds have fledged. Subject to such measures, the proposals are unlikely to result in any significant effects on bird

species, whilst the opportunity exists for enhancements in relation to this group through the provision of new bird boxes and boundary vegetation.

4.30. ***Water Vole, Otter and White-Clawed Crayfish***

There are 16 records of water vole, nearest from the River Tud, 1,208m north of the site. There are 19 otter records, nearest from Colney Pits, 1,019m south of the site. There are 9 records of white-clawed crayfish, nearest from the River Tud, 1,314m north of the site. There are no water bodies within or close to the site and so this species is not considered any further.

4.31 ***Invertebrates***

123 invertebrate species have been recorded including a range of Red List and Section 41 of the NERC Act (2006). The nearest records included Buff Ermine, Latticed Heath, Brindled Beauty, Rustic, Cinnabar, Common Dart and Lime Beetle. The short, modified grassland, shrubs and trees contained relatively little species richness and are therefore sub-optimal habitats for invertebrates, the likelihood of the Site to support significant assemblages of invertebrate species is considered to be negligible and this species group is not considered further in this report.

4.32 ***Other Species.***

Brown hare has been recorded approximately 1.9km north of the site in Drayton 2015. The site lacks any suitable habitat for this species. There are numerous records of Hedgehogs, the nearest from Costessey approximately 218m north-west of the site. The grassland and dense shrub boundary provide some suitable habitat for hedgehogs which are present within the surrounding area and so any arisings from vegetation clearance must be burnt the same day, chipped or removed from the site to prevent hedgehogs using them as refuge/hibernacula.

- 4.33. Overall, on the basis of the survey work undertaken, subject to the minor considerations, measures and safeguards set out above, the proposed development is unlikely to result in any significant harm to any protected, rare or notable species such that faunal considerations do not appear likely to represent a constraint on the proposed development, nor require further specific survey or consideration.

Ecological Feature	Scale of Value	Unmitigated Impact	Confidence Level	Residual or Long-Term Impact
Sites of International Importance	International	Neutral	Likely	Neutral
Sites of National Importance	National	Neutral	Likely	Neutral
Sites of Local Importance	District	Neutral	Likely	Neutral
Habitats	Parish	Minor Adverse-Neutral	Likely	Minor Positive
Green Infrastructure	Parish	Neutral	Likely	Minor Positive
Reptiles	Parish	Minor Adverse-Neutral	Likely	Neutral
Great Crested Newts	Site Only	Neutral	Likely	Neutral
Rare/Scarce Plant Species	Low	Neutral	Certain	Neutral
Veteran Trees	Negligible	Negligible	Certain	-
Invertebrates	Parish/District	Minor Adverse-Neutral	Likely	Neutral
Amphibians (excluding GCN)	Negligible	Negligible	Certain	Neutral
Breeding Birds	Parish	Minor Adverse	Likely	Neutral
Wintering Birds	Negligible	Negligible	Certain	-
Aquatic Mammals	Negligible	Negligible	Certain	-
Terrestrial Mammals	Parish	Minor Adverse-Neutral	Likely	Neutral
Roosting Bats	Parish	Negligible	Likely	Neutral/Minor Positive
Foraging/Commuting Bats	Parish	Minor Adverse-Neutral	Certain	Neutral

Table 3 – Summary of ecological features, unmitigated impact and residual impact with mitigation

5. Mitigation and Enhancements

The development proposals for this site have been considered in terms of the mitigation hierarchy (BSI 2013)⁷. This consists of a 4-point framework of reference as reproduced below:

Avoidance, mitigation, compensation, and enhancement measures can be secured through planning conditions or obligations.

1. Avoidance should be the primary objective of any proposal.

If protected species are discovered on site either before or during the proposed works, all works should stop a suitably qualified ecologist should be contacted for advice on mitigation before continuing. Requirements below outline how impacts to reptiles, great crested newt, birds and small mammals such as hedgehogs can be avoided.

2. Mitigation measures aim to reduce or remove impacts.

Mitigation for this site should take the form of informed landscape planting and retention of boundary habitats to maintain a corridor for wildlife around and through the site.

3. Compensation is considered to be the last step on the hierarchy

Compensation 'should only be used in exceptional circumstances and as a last resort after all options for avoidance and mitigation have been fully considered' (BSI 2013). No compensation measures are considered necessary for these proposals.

4. Enhancement measures

These aim to provide opportunities for ecological gain as part of a development proposal in line with the NPPF⁸. Suggestions for enhancement are provided below in Section 6.

⁷ BSI (2013). The British Standard BS 42020:2013 Biodiversity a Code of practice for planning and development

⁸ National Planning Policy Framework (NPPF) July 2021

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

5.1. In line with the above considerations, the following mitigation measures are recommended in relation under the proposed development, subject to which the proposals are unlikely to result in any significant adverse effects on ecological receptors at the site:

- Retention and protection of existing trees and shrubs where possible (subject to any relevant arboricultural considerations/BS5837);
- Infill native planting to provide enhanced corridors for wildlife movement;
- Sensitive design of any lighting scheme to ensure boundary corridors remain for use by nocturnal/crepuscular species such as bats;
- Precautionary approach to vegetation clearance and building demolition in relation to nesting birds. Grass to be maintained at a short height to discourage certain species;

5.2. In addition, the proposals present the opportunity to incorporate a number of ecological enhancements (in particular associated with the retained boundary features and any open space areas), including the following:

- New native planting, including hedgerows, trees, shrubs and wildflower grassland;
- Incorporation of new bat roosting and bird nesting opportunities with bird and bat boxes.

5.3 Birds – To increase nesting opportunities generally, nest boxes should be installed. Installation of the nest boxes will be supervised by ‘Eco- Check Ltd’ or an experienced ecologist to ensure the correct positioning for each species. The types of nest boxes will cover a range of species and could include;

- 2 x Eco-Roost or Schwegler tit boxes (32mm)
- 2 x Eco-Roost or Schwegler tit boxes (28mm)
- 2 x Eco-Roost or Schwegler wren roundhouse boxes
- 2 x Eco-Roost or Schwegler deep nest box for robins
- 2 x Eco-Roost or Schwegler triple chamber house sparrow box

5.4 Bats- As a biodiversity enhancement, areas for bats to roost in should be created and could include;

- 2 x Eco-Roost Kent Boxes
- 2 x Eco-Roost/Ibstock Bat Bricks

These boxes are to be installed on the new building or boundary trees, ideally one on each elevation to provide the best variation in temperature, shelter and flight lines. If only one elevation is used this should be south-east facing as this provides the most shelter and warmth. See Appendix 2 for further information.

5.5 To provide a shelter for small mammals and herpetofauna an artificial refugia/hibernaculum to be created within a quiet corner of the site adjacent to a hedgerow, such as the north-west corner. This will also serve as a receptor site in the event any wildlife needs relocating away from the working areas.

5.6 It is recommended that areas of species rich amenity wildflower grassland are created within the site such that, in combination with new native landscape planting,

opportunities for biodiversity will be maximised under the proposals. Consideration should be given to the laying of wildflower turfs, comprising locally appropriate native species, to establish wildflower grassland. This would ensure rapid establishment of these habitats and reduce the timeframe for delivering the range of ecological benefits that are proposed. Areas of bare soil and disturbed ground to be seeded with a species rich wildflower grass seed mix such as Emorsgate EM-4 or WFG20 species rich amenity grass in the garden. This would make a positive contribution towards a biodiversity net gain as the existing grassland is predominantly rye grass.

- 5.7 There are also a number of records of Hedgehog, a UK Priority Species, in the surrounding area. To maintain connectivity for this species, all boundaries should be made permeable to hedgehogs. This can be achieved by using hedgerow boundaries or gaps of 13x13cm, at ground level, in any fences and walls.
- 5.8 Insect Hotels - It is recommended that a number of insect hotels be incorporated within the proposed development thereby increasing nesting opportunities for declining populations of non-swarming solitary bee populations and other invertebrates. Ideally, these should be located on south-facing walls (where architectural design allows) or trees, located at least 1m off the ground. The hotels should be unobstructed by vegetation.
- 5.9 A landscaping drawing has been submitted as shown in Appendix 1 which shows additional trees, shrub, hedge and grassland planting. There is some loss of natural habitat at the north end of the site which included scattered trees and amenity grassland and so a BNG assessment is submitted with the application to demonstrate that a net gain can be achieved on site.
- 5.10 The summary calculations show a biodiversity net loss of approximately -22% (-0.2 habitat units). The scheme is therefore considered to be not policy compliant with the BNG net gain of 10%. The BNG hierarchy first requires a scheme to demonstrate that it cannot deliver the required net gain on site, and this has been undertaken using the soft landscaping drawing and proposed layout drawing. The second requirement of the hierarchy is to try and achieve the net gains through enhancement of any available suitable habitat off-site, there is no available off-site habitat owned by the developer. The third requirement of the hierarchy is then to purchase habitat units from a third-party OTE habitat credit scheme. The proposal will require the purchase of at least 0.2 habitat units and this to be secured through a Section 21/Unilateral Undertaking and proof provided to the LPA.

6. Summary and Conclusions

- 6.1. This report sets out the results of the preliminary ecological survey work and consideration undertaken in respect of the site during November 2023, in order to inform the proposed development of the site for commercial retail use of the site.
- 6.2. The survey work undertaken at the site has confirmed the current position in regard to habitats and potential for protected species. Overall, the habitats present within the internal areas appear to support species-poor improved grassland habitats, building, scattered trees, shrubs, hedging and ruderal and ephemeral weed species which are unlikely to support any particularly raised ecological value nor support significant populations, or use by protected, rare or notable faunal species. Nonetheless, it is recommended that, where possible initial vegetation works should be timed to avoid the bird nesting season to minimise any risk of harm to any nesting bird species that may be present (and thereby avoid any offence).
- 6.3. Based on the survey work undertaken and subject to the implementation of the measures and recommendations set out, there is no evidence to suggest there are any over-riding ecological constraints to the current proposals for the site.
- 6.4. It is advised that if a period of more than 18 months passes between the date of this survey and the commencement of demolition, clearance and construction works then a further site survey should be made in addition to the pre-works checks outlined above.

7. Ecological Conditions and Recommendations for Further Surveys

We suggest that any habitat loss associated with the proposal can be adequately mitigated through landscaping, planting and other biodiversity enhancement measures. The following advisory recommendations include:

- Destruction of in-use nests or harm to adult birds caused by demolition works or cutting trees/hedgerows/shrubs on site during the main breeding bird season (1st March to 31st August). If works commence during this period, a nesting bird survey must first be undertaken by an appointed ecological clerk of works (ECoW).
- We advise that before the commencement of construction, it is recommended that in line with the British Standard 42020:2013 Biodiversity – Code of practice for planning and development - that a **Biodiversity Enhancement Plan (BEP)** is submitted and approved. The role of the BEP is to ensure that the identified risks to biodiversity are assessed and that suitable methods are adopted on site to minimise the risks through the production of a method statement. The BEP is also to ensure that biodiversity protection zones are enforced.
- A Biodiversity Net Gain Assessment for this application has been submitted, which uses the Statutory Biodiversity Metric 4 (or any successor) and follows the Biodiversity Net Gain Report & Audit Templates (CIEEM, 2021) ⁹. This is recommended to clearly outline that the development will deliver measurable biodiversity net gains, as outlined under Paragraph 174 [d] of the National Planning

Policy Framework 2021. The Biodiversity Gain Assessment will inform the design of the soft landscape proposals, as well as any Landscape Ecological Management Plan.

- Demolition- Due to the small possibility of a bat occupying the roof space of the building at any time, it is recommended that a pre-demolition check of the roof spaces is undertaken prior to demolition.

PRIOR TO COMMENCEMENT: COMPLIANCE WITH ECOLOGICAL REPORT RECOMMENDATIONS

Prior to commencement of works above slab level, a Biodiversity Enhancement Strategy for protected and Priority species shall be submitted to and approved in writing by the local planning authority. The content of the Biodiversity Enhancement Strategy shall include the following:

- a) Purpose and conservation objectives for the proposed enhancement measures.**
- b) detailed designs to achieve stated objectives.**
- c) locations of proposed enhancement measures by appropriate maps and plans.**
- d) timetable for implementation demonstrating that works are aligned with the proposed phasing of development.**
- e) persons responsible for implementing the enhancement measures.**
- f) details of initial aftercare and long-term maintenance (where relevant). The works shall be implemented in accordance with the approved details prior to occupation and shall be retained in that manner thereafter.**

Reason: To allow the LPA to discharge its duties under the Conservation of Habitats and Species Regulations 2017 (as amended), the Wildlife & Countryside Act 1981 (as amended) and s40 of the NERC Act 2006 (Priority habitats & species), as updated by the Environmental Act 2021.

“A lighting design scheme for biodiversity shall be submitted to and approved in writing by the local planning authority. The scheme shall identify those features on site that are particularly sensitive for bats and that are likely to cause disturbance along important routes used for foraging; and show how and where external lighting will be installed so that it can be clearly demonstrated that areas to be lit will not disturb or prevent bats using their territory. All external lighting shall be installed in accordance with the specifications and locations set out in the scheme and maintained thereafter in accordance with the scheme. Under no circumstances should any other external lighting be installed without prior consent from the local planning authority.”

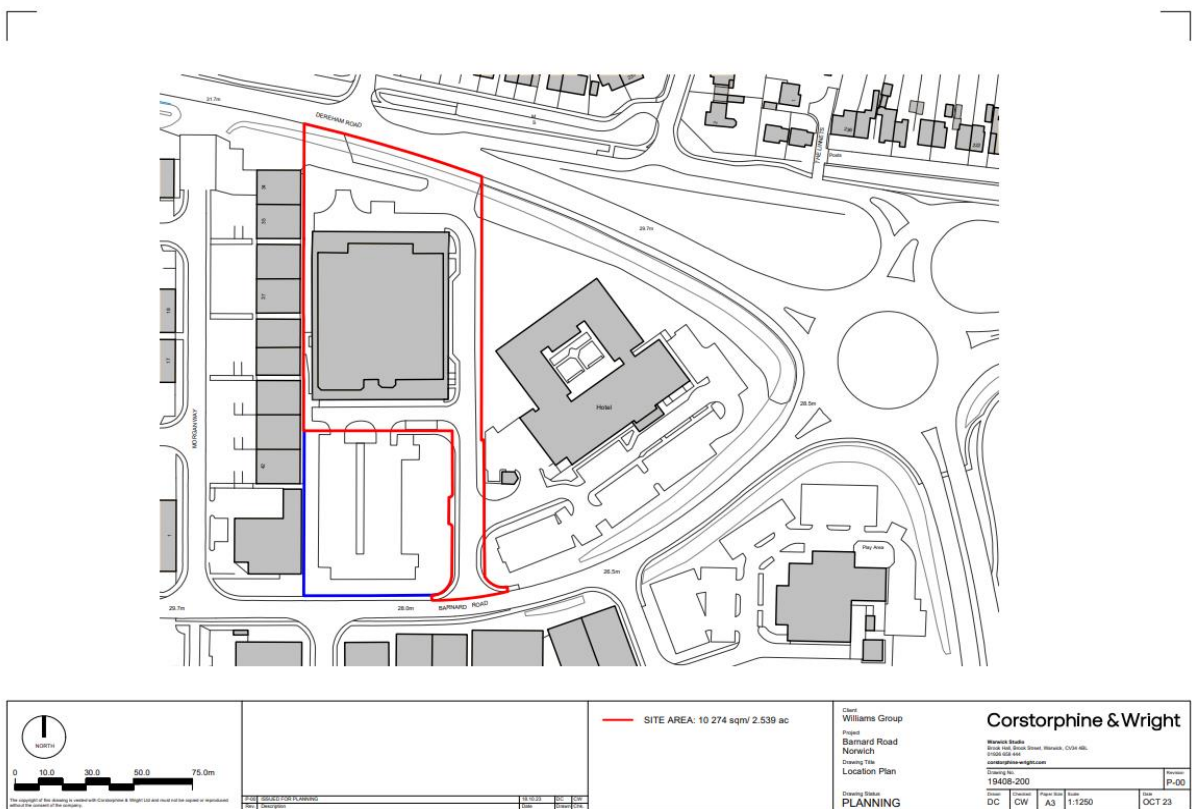
Reason: To conserve protected and Priority species and allow the LPA to discharge its duties under the Conservation of Habitats and Species Regulations 2017 (as amended), the Wildlife & Countryside Act 1981 as amended and s40 of the NERC Act 2006 (Priority habitats & species), as updated by the Environmental Act 2021.

“A ‘statement of good practice’ shall be signed upon completion by the competent ecologist, and be submitted to the LPA, confirming that the specified enhancement measures have been implemented in accordance with good practice upon which the planning consent was granted’.

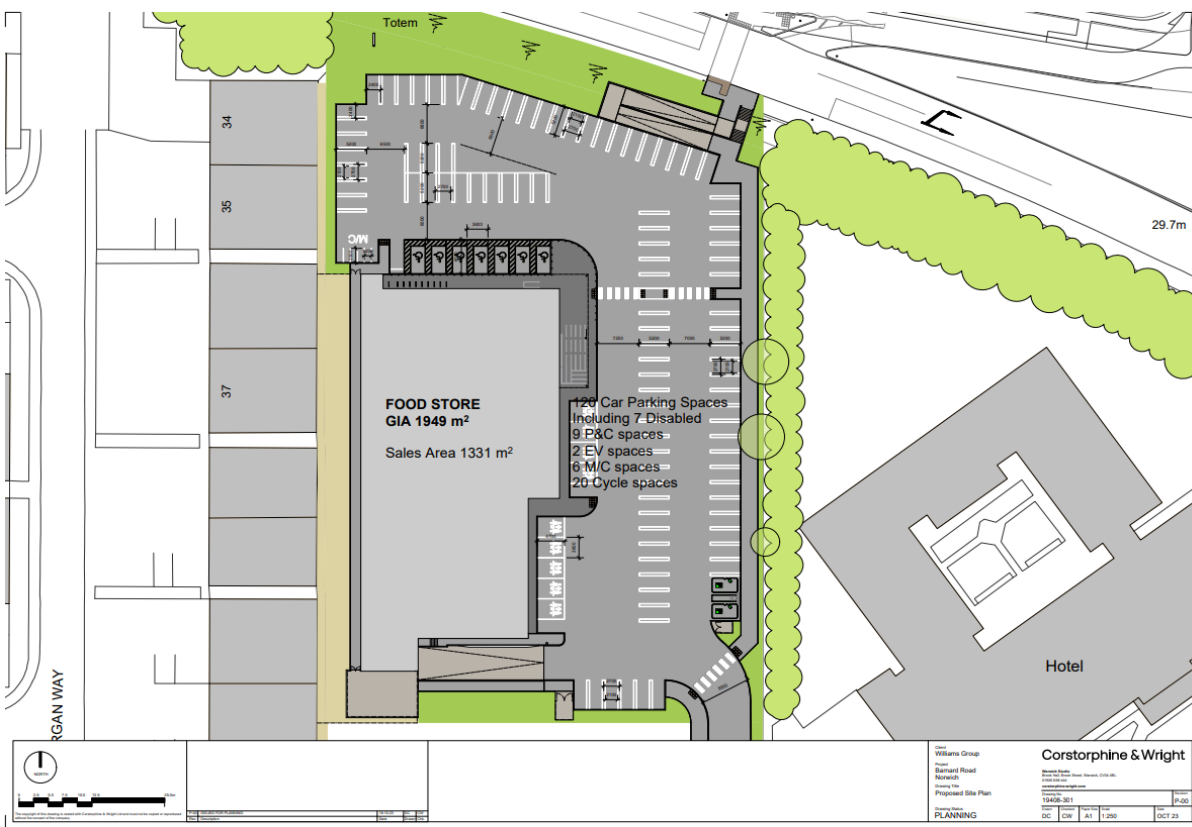
8. References

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Plan 158/ECO1

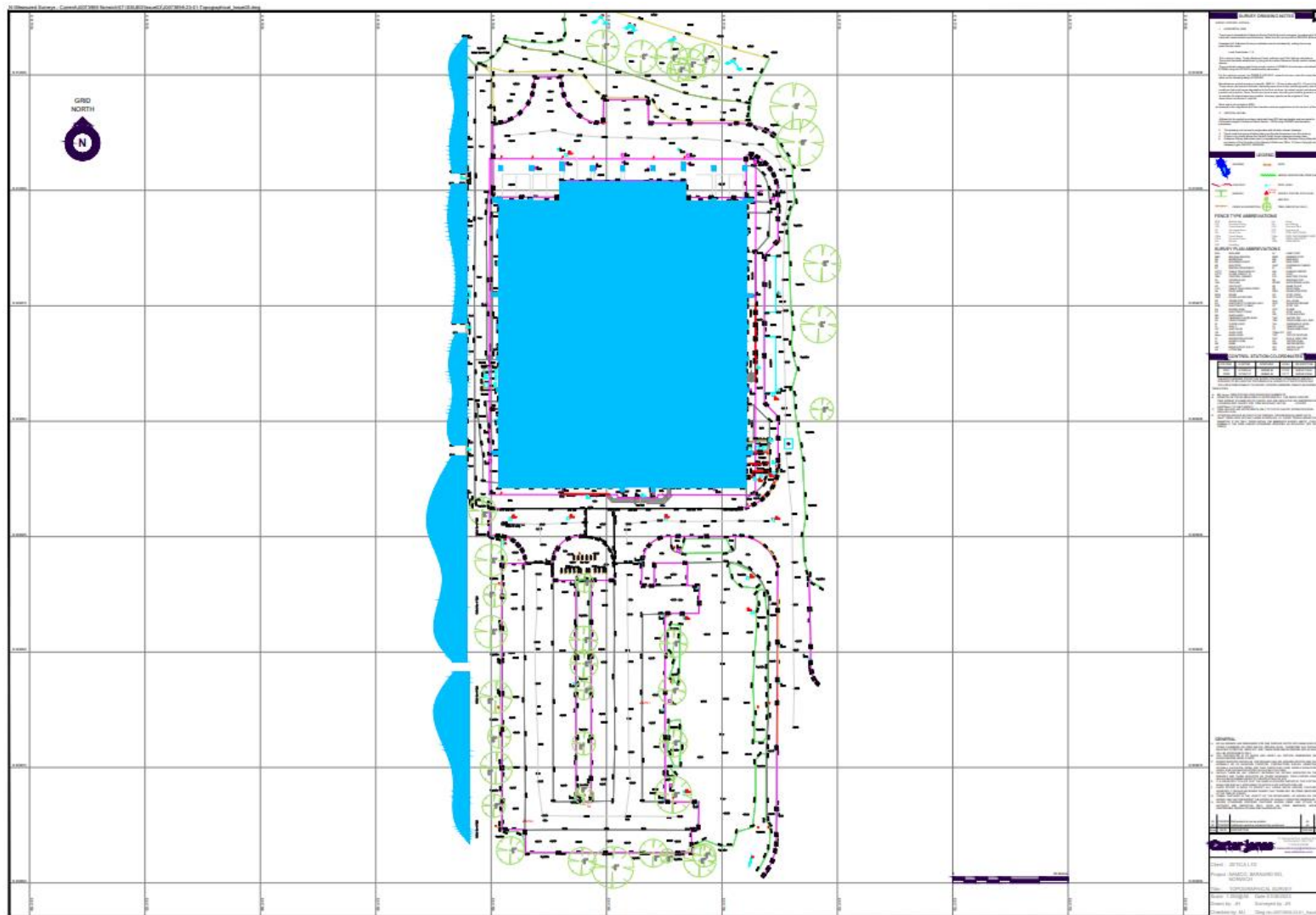


Site Location and Existing Layout

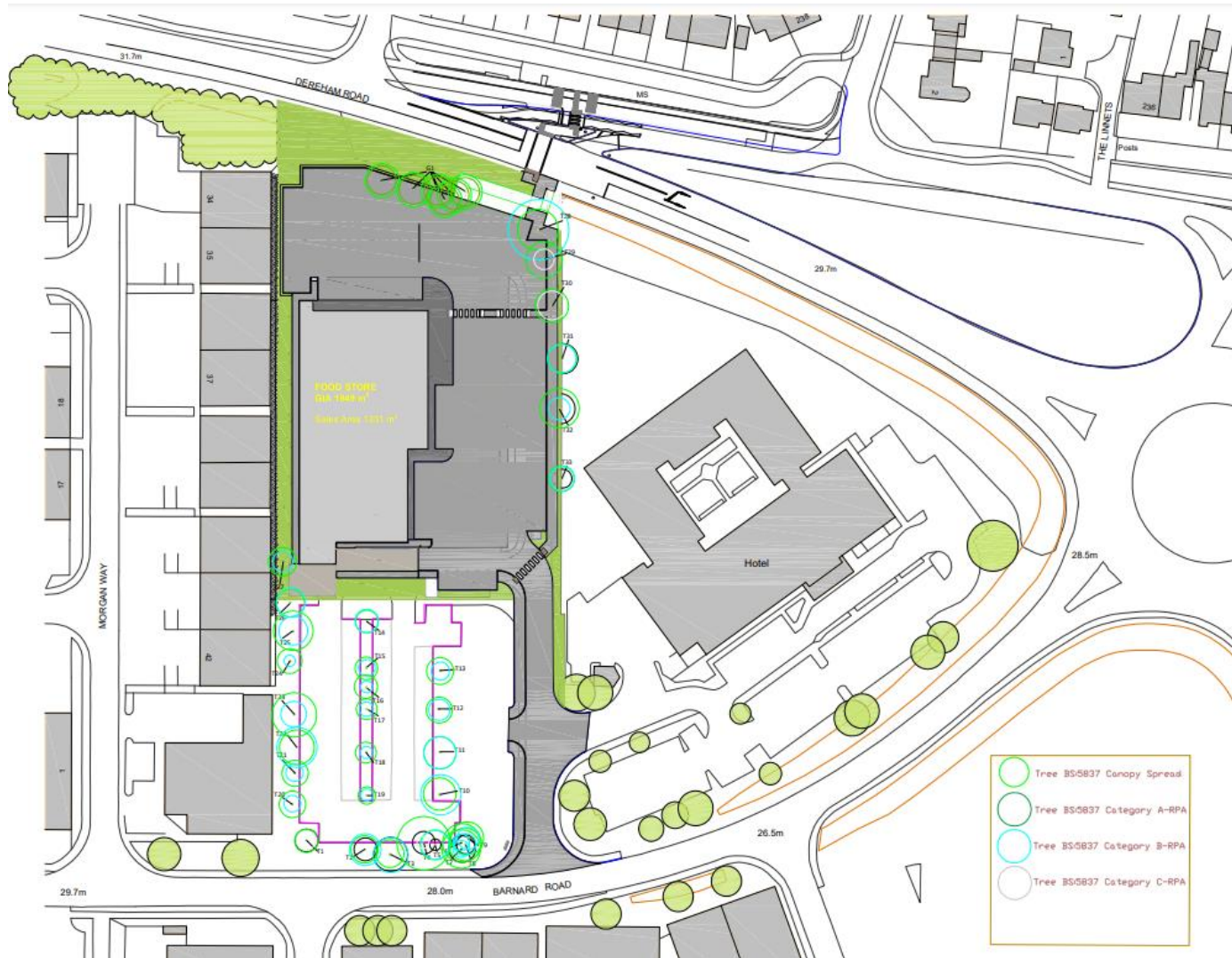


Proposed Site Layout Plan

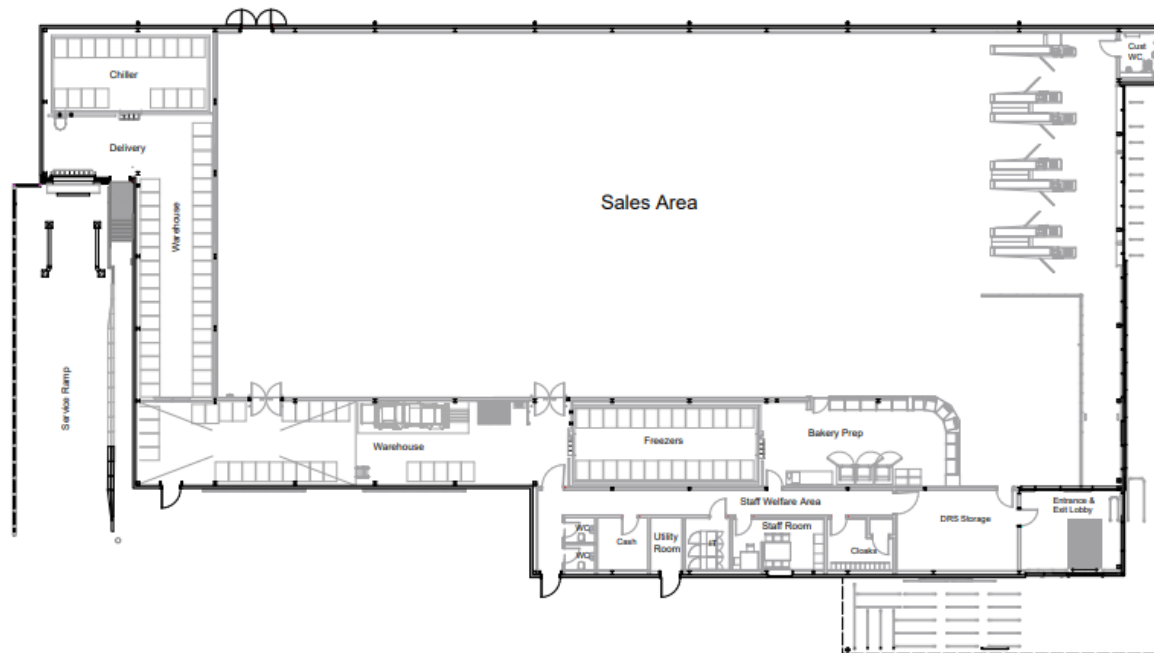
Plan 158/ECO2 –



Topographical Survey and Existing Site Layout Plan

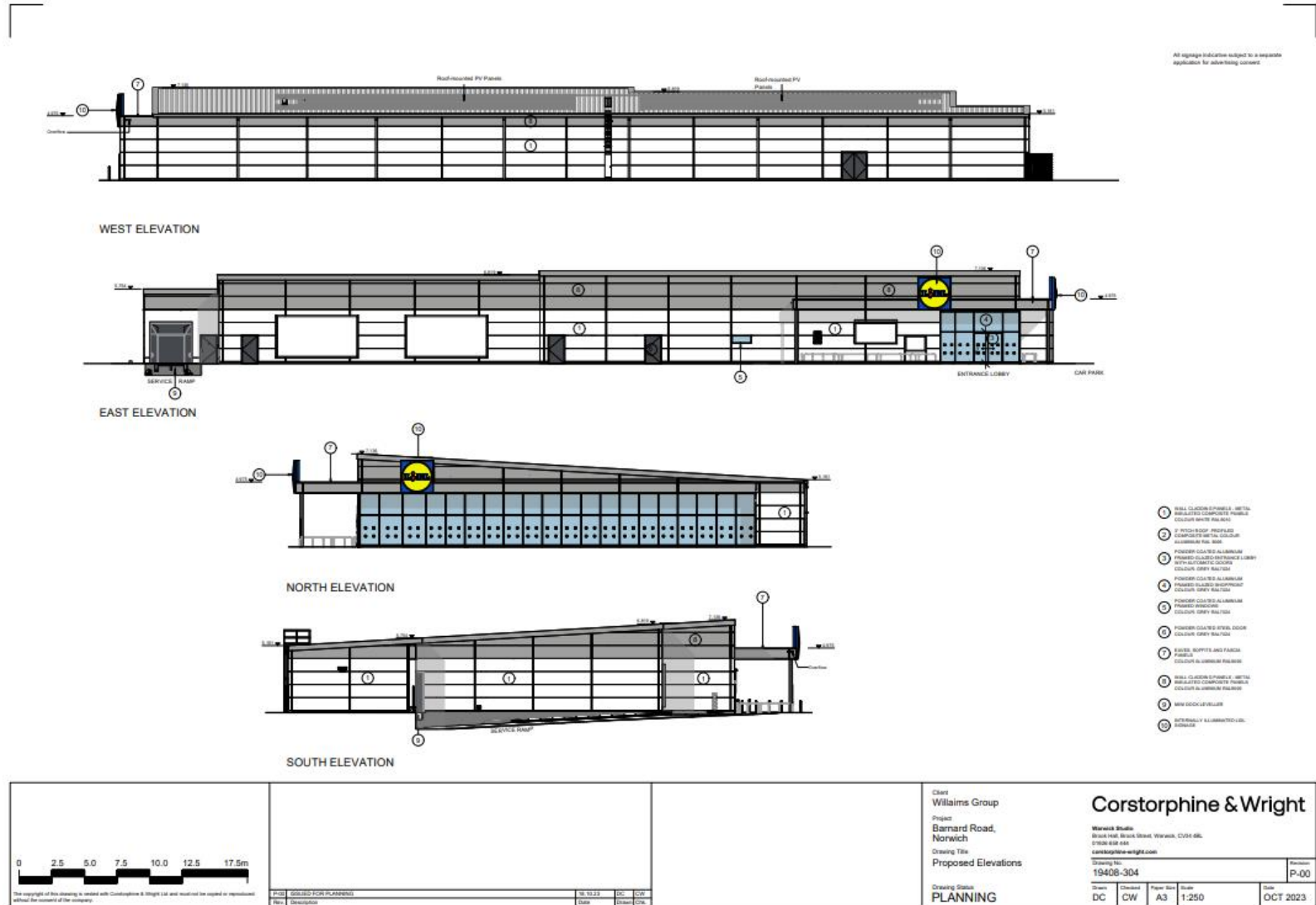


Tree Constraints Plan- Proposed Site Layout Plan



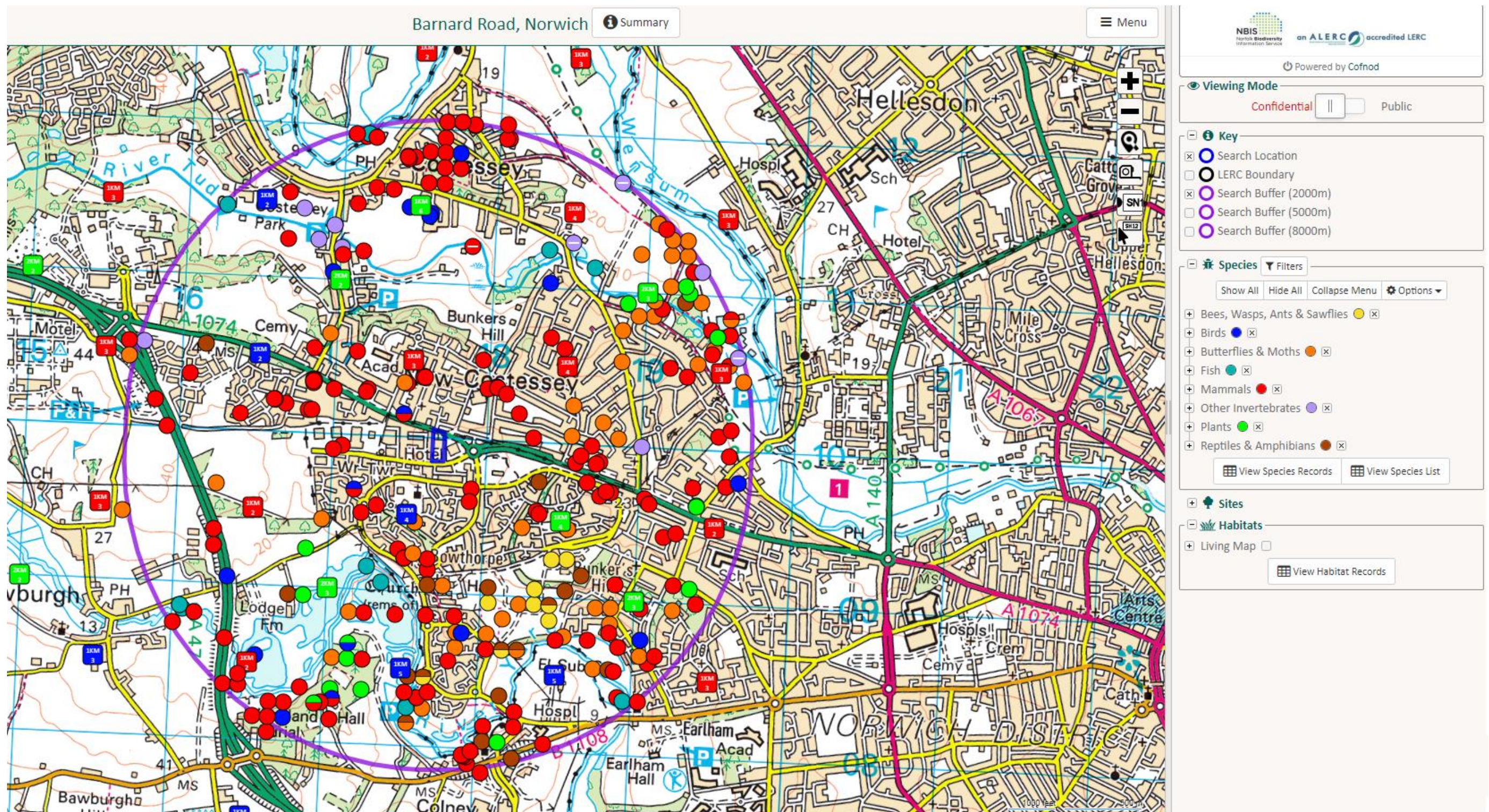
The copyright of this drawing is vested with Corstorphine & Wright Ltd and must not be copied or reproduced without the consent of the company.	19408-302 19.10.23 DC CW DC CW		Client Willaims Group Project Barnard Road, Norwich Drawing Title Proposed Ground Floor Plan Drawing Status PLANNING Corstorphine & Wright Warwick Studio Broom Hall, Broom Street, Warwick, CV34 6BL 01926 555 555 corstorphine@wright.com Drawing No. 19408-302 Revision P-00 Drawn DC Checked CW Paper Size A3 Scale 1:250 Date OCT 2023
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Proposed Floorplan



Proposed Elevations

Appendix 1 - Desktop Ecological Information



Species Group	Scientific Name	Attribute	Common Name	Earliest Year	Latest Year	Total Records	Lists
Amphibian	Bufo bufo		Common Toad	1972	2012	41	Bern3, Priority, S41, WCA5
Amphibian	Lissotriton vulgaris		Smooth Newt	1987	2012	20	Bern3, WCA5
Amphibian	Rana temporaria		Common Frog	1987	2012	30	Bern3, HDir5, WCA5
Amphibian	Triturus cristatus		Great Crested Newt	2009	2012	17	Bern2, CHS2, HDir2, HDir4, Priority, S41, WCA5
Bird	Acanthis flammea		Common (Mealy) Redpoll	2004	2016	15	Bern2, RL-CR, RL-VU, UKBR
Bird	Acanthis flammea flammea		Mealy Redpoll	2016	2016	3	Bern2, UKBR
Bird	Accipiter gentilis		Goshawk	2003	2003	1	Bonn2, CITES-A, GBNNSIP, RL-NT, WCA1.1, WCA9
Bird	Accipiter nisus		Sparrowhawk	1983	2019	282	Bonn2, CITES-A, RL-NT, UKBA
Bird	Actitis hypoleucos		Common Sandpiper	2004	2016	9	Bonn2, CMS-AEWA-2, RL-VU, UKBA
Bird	Aix galericulata		Mandarin Duck	2016	2016	1	Bonn2, GBNNSIP, WCA9
Bird	Alauda arvensis		Skylark	1980	2019	121	BDir2.2, S41, UKBR
Bird	Alcedo atthis		Kingfisher	1976	2019	168	BDir1, Bern2, WCA1.1
Bird	Alectoris rufa		Red-legged Partridge	1987	2015	37	BDir2.1, GBNNSIP
Bird	Anas acuta		Pintail	2008	2013	8	BDir2.1, Bonn2, CITES-C, CMS-AEWA-2, GBNNSIP, RL-CR, RL-EN, UKBA, WCA1.1
Bird	Anas crecca		Teal	1926	2019	49	BDir2.1, Bonn2, CITES-C, CMS-AEWA-2, UKBA
Bird	Anas platyrhynchos		Mallard	1961	2019	279	BDir2.1, Bonn2, CMS-AEWA-2, RL-NT, UKBA
Bird	Anser albifrons		White-fronted Goose	2010	2010	1	BDir2.2, Bonn2, CMS-AEWA-2, GBNNSIP, Priority, RL-CR, UKBR
Bird	Anser anser		Greylag Goose	1982	2019	97	BDir2.1, Bonn2, CMS-AEWA-2, UKBA, WCA1.2
Bird	Anser brachyrhynchus		Pink-footed Goose	2005	2018	41	BDir2.2, Bonn2, CMS-AEWA-2, GBNNSIP, UKBA
Bird	Anser fabialis/serrirostris		Bean Goose	2006	2006	1	BDir2.1, Bonn2, CMS-AEWA-2, GBNNSIP, RL-CR, UKBA
Bird	Anthus petrosus		Rock Pipit	2013	2013	1	Bern2
Bird	Anthus pratensis		Meadow Pipit	2007	2018	23	Bern2, UKBA
Bird	Anthus spinoletta		Water Pipit	2007	2007	1	Bern2, RL-VU, UKBA
Bird	Apus apus		Swift	1977	2019	249	RL-EN, UKBR
Bird	Ardea alba		Great White Egret	2012	2016	5	Bern2, CITES-A, CMS-AEWA-2, UKBA
Bird	Ardea cinerea		Grey Heron	1976	2019	201	CMS-AEWA-2, RL-NT
Bird	Asio flammeus		Short-eared Owl	2003	2006	3	BDir1, Bern2, CITES-A, RL-EN, UKBA
Bird	Asio otus		Long-eared Owl	2009	2009	1	Bern2, CITES-A
Bird	Athene noctua		Little Owl	1999	2018	34	Bern2, CITES-A, GBNNSIP
Bird	Aythya ferina		Pochard	2013	2016	8	BDir2.1, Bonn2, CMS-AEWA-2, GBNNSIP, RL-EN, UKBR
Bird	Aythya fuligula		Tufted Duck	1980	2019	64	BDir2.1, Bonn2, CMS-AEWA-2
Bird	Aythya marila		Scaup	2007	2015	5	BDir2.2, Bonn2, CMS-AEWA-2, Priority, RL-EN, S41, UKBR, WCA1.1
Bird	Bombycilla garrulus		Waxwing	1984	2018	222	Bern2
Bird	Botaurus stellaris		Bittern	1995	2016	22	BDir1, Bern2, CMS-AEWA-2, Priority, RL-NT, RL-VU, S41, UKBA, WCA1.1
Bird	Branta bernicla		Brent Goose	2016	2016	1	BDir2.2, Bonn2, CMS-AEWA-2, GBNNSIP, UKBA
Bird	Branta bernicla bernicla		Dark-bellied Brent Goose	2016	2016	1	BDir2.2, Bonn2, CMS-AEWA-2, GBNNSIP, Priority, S41, UKBA
Bird	Branta canadensis		Canada Goose	1982	2019	67	BDir2.1, Bonn2, GBNNSIP, WCA9
Bird	Branta leucopsis		Barnacle Goose	2005	2015	7	BDir1, Bern2, Bonn2, CMS-AEWA-2, GBNNSIP, UKBA, WCA9
Bird	Bucephala clangula		Goldeneye	1983	2019	16	BDir2.2, Bonn2, CMS-AEWA-2, RL-VU, UKBR, WCA1.2
Bird	Buteo buteo		Buzzard	2002	2019	125	Bonn2, CITES-A
Bird	Buteo lagopus		Rough-legged Buzzard	2013	2013	1	Bonn2, CITES-A
Bird	Calcarius lapponicus		Lapland Bunting	2010	2012	3	Bern2, RL-VU, UKBA, WCA1.1
Bird	Calidris alpina		Dunlin	2016	2018	2	Bern2, Bonn2, CMS-AEWA-2, RL-EN, RL-VU, UKBR
Bird	Calidris canutus		Knot	2016	2016	2	BDir2.2, Bonn2, CMS-AEWA-2, UKBA
Bird	Carduelis carduelis		Goldfinch	1982	2019	1016	Bern2
Bird	Cecropis daurica		Red-rumped Swallow	2012	2012	1	Bern2
Bird	Certhia familiaris		Treecreeper	1982	2019	110	Bern2

Bird	Certhia familiaris britannica		2015	2015	1	Bern2
Bird	Charadrius dubius	Little Ringed Plover	2007	2014	13	Bern2, Bonn2, CMS-AEWA-2, WCA1.1
Bird	Charadrius hiaticula	Ringed Plover	2010	2010	2	Bern2, Bonn2, CMS-AEWA-2, RL-NT, RL-VU, UKBR
Bird	Chlidonias niger	Black Tern	2002	2016	15	BDir1, Bern2, CMS-AEWA-2, RL-RE, WCA1.1
Bird	Chloris chloris	Greenfinch	1965	2019	1142	Bern2, RL-EN, UKBR
Bird	Chroicocephalus ridibundus	Black-headed Gull	1966	2019	410	BDir2.2, CMS-AEWA-2, RL-VU, UKBA
Bird	Ciconia ciconia	White Stork	2002	2003	2	BDir1, Bern2, Bonn2, CMS-AEWA-2, GBNNSIP
Bird	Circus aeruginosus	Marsh Harrier	2003	2019	16	BDir1, Bonn2, CITES-A, RL-NT, UKBA, WCA1.1
Bird	Circus cyaneus	Hen Harrier	2003	2015	5	BDir1, Bonn2, CITES-A, RL-VU, S41, UKBR, WCA1.1
Bird	Coccothraustes coccothraustes	Hawfinch	2003	2014	14	Bern2, Priority, RL-EN, S41, UKBR
Bird	Coloeus monedula	Jackdaw	1981	2019	463	BDir2.2
Bird	Coloeus monedula monedula		2011	2011	1	BDir2.2
Bird	Columba livia	Feral Pigeon/Rock Dove	2000	2019	157	BDir2.1, CITES-A, GBNNSIP
Bird	Columba oenas	Stock Dove	1983	2019	117	BDir2.2, UKBA
Bird	Columba palumbus	Woodpigeon	1980	2019	1333	BDir2.1, UKBA
Bird	Corvus corone	Carrion Crow	1983	2019	617	BDir2.2
Bird	Corvus frugilegus	Rook	1982	2019	121	BDir2.2, RL-NT, UKBA
Bird	Coturnix coturnix	Quail	2011	2011	1	BDir2.2, UKBA, WCA1.1
Bird	Cuculus canorus	Cuckoo	2002	2018	108	Priority, RL-VU, S41, UKBR
Bird	Cyanistes caeruleus	Blue Tit	1980	2019	1841	Bern2
Bird	Cygnus columbianus	Tundra Swan	1996	2013	6	BDir1, Bern2, Bonn2, CMS-AEWA-2, RL-CR, UKBR, WCA1.1
Bird	Cygnus columbianus bewickii	Bewick's Swan	2008	2016	7	BDir1, Bern2, Bonn2, CMS-AEWA-2, Priority, RL-CR, S41, UKBR, WCA1.1
Bird	Cygnus cygnus	Whooper Swan	2008	2015	10	BDir1, Bern2, Bonn2, CMS-AEWA-2, GBNNSIP, RL-EN, UKBA, WCA1.1
Bird	Cygnus olor	Mute Swan	1980	2019	240	BDir2.2, Bonn2, CMS-AEWA-2, GBNNSIP
Bird	Delichon urbicum	House Martin	1980	2019	93	Bern2, RL-VU, UKBR
Bird	Dendrocopos major	Great Spotted Woodpecker	1982	2019	385	Bern2
Bird	Dryobates minor	Lesser Spotted Woodpecker	2004	2015	5	Bern2, RL-EN, S41, UKBR
Bird	Egretta garzetta	Little Egret	2005	2019	192	BDir1, Bern2, CITES-A, CMS-AEWA-2
Bird	Emberiza calandra	Corn Bunting	2010	2010	2	RL-NT, S41, UKBR
Bird	Emberiza citrinella	Yellowhammer	1983	2016	58	Bern2, Priority, S41, UKBR
Bird	Emberiza schoeniclus	Reed Bunting	1980	2019	184	Bern2, Priority, S41, UKBA
Bird	Erithacus rubecula	Robin	1962	2019	1536	Bern2
Bird	Falco columbarius	Merlin	2003	2010	4	BDir1, Bern2, Bonn2, CITES-A, RL-EN, UKBR, WCA1.1
Bird	Falco peregrinus	Peregrine	2004	2016	12	BDir1, Bern2, Bonn2, CITES-A, WCA1.1
Bird	Falco subbuteo	Hobby	2003	2016	97	Bern2, Bonn2, CITES-A, WCA1.1
Bird	Falco tinnunculus	Kestrel	1964	2019	102	Bern2, Bonn2, CITES-A, RL-VU, UKBA
Bird	Ficedula hypoleuca	Pied Flycatcher	2010	2010	1	Bonn2, RL-VU, UKBA
Bird	Fulica atra	Coot	1980	2019	86	BDir2.1, CMS-AEWA-2, RL-NT
Bird	Gallinago gallinago	Snipe	2007	2019	36	BDir2.1, Bonn2, CMS-AEWA-2, RL-NT, UKBA
Bird	Gallinago gallinago gallinago		2010	2016	8	BDir2.1, Bonn2, CMS-AEWA-2, UKBA
Bird	Gallinula chloropus	Moorhen	1980	2019	264	BDir2.2, Bonn2, CMS-AEWA-2, RL-VU, UKBA
Bird	Garrulus glandarius	Jay	1982	2019	719	BDir2.2
Bird	Gavia immer	Great Northern Diver	2009	2009	2	BDir1, Bern2, CMS-AEWA-2, UKBA, WCA1.1
Bird	Gavia stellata	Red-throated Diver	2002	2002	2	BDir1, Bern2, Bonn2, CMS-AEWA-2, WCA1.1
Bird	Grus grus	Crane	2009	2016	12	BDir1, Bern2, Bonn2, CITES-A, CMS-AEWA-2, RL-VU, UKBA, WCA9
Bird	Gulosus aristotelis	Shag	2006	2007	3	Bern2, RL-EN, UKBR
Bird	Haematopus ostralegus	Oystercatcher	2004	2019	29	BDir2.2, CMS-AEWA-2, UKBA
Bird	Hirundo rustica	Swallow	1977	2019	136	Bern2
Bird	Hydrocoloeus minutus	Little Gull	2004	2018	15	BDir1, Bern2, CMS-AEWA-2, WCA1.1

Bird	Ichthyaetus melanocephalus	Mediterranean Gull	2003	2005	2	BDir1, Bern2, Bonn2, CMS-AEWA-2, UKBA, WCA1.1
Bird	Jynx torquilla	Wryneck	2010	2012	2	Bern2, Priority, RL-RE, WCA1.1
Bird	Lanius collurio	Red-backed Shrike	2006	2006	2	BDir1, Bern2, Priority, RL-CR, UKBR, WCA1.1
Bird	Lanius excubitor	Great Grey Shrike	2016	2016	2	Bern2
Bird	Larus argentatus	Herring Gull	1982	2019	153	BDir2.2, CMS-AEWA-2, RL-DD, RL-EN, S41, UKBR
Bird	Larus canus	Common Gull	1963	2019	192	BDir2.2, CMS-AEWA-2, UKBA
Bird	Larus canus canus		2011	2014	4	BDir2.2, CMS-AEWA-2, UKBA
Bird	Larus fuscus	Lesser Black-backed Gull	1998	2019	133	BDir2.2, CMS-AEWA-2, RL-DD, UKBA
Bird	Larus fuscus graellsii	British Lesser Black-Backed Gull	2007	2012	3	BDir2.2, CMS-AEWA-2, RL-DD, UKBA
Bird	Larus glaucoides	Iceland Gull	2008	2008	2	CMS-AEWA-2, RL-VU, UKBA
Bird	Larus marinus	Great Black-backed Gull	1986	2019	13	BDir2.2, CMS-AEWA-2, RL-EN, UKBA
Bird	Larus michahellis	Yellow-legged Gull	2005	2005	1	RL-EN, UKBA
Bird	Limosa lapponica	Bar-tailed Godwit	2007	2012	4	BDir1, BDir2.2, Bonn2, CMS-AEWA-2, UKBA
Bird	Limosa limosa	Black-tailed Godwit	2012	2012	1	BDir2.2, Bonn2, CMS-AEWA-2, RL-EN, S41, UKBR, WCA1.1
Bird	Linaria cannabina	Linnet	1980	2019	63	Bern2, RL-NT, S41, UKBR
Bird	Linaria flavirostris	Twite	2012	2012	1	Bern2, S41, UKBR
Bird	Loxia curvirostra	Crossbill	2002	2016	19	Bern2, WCA1.1
Bird	Lullula arborea	Woodlark	2010	2010	2	BDir1, BS, Priority, RL-VU, S41, WCA1.1
Bird	Luscinia megarhynchos	Nightingale	2004	2016	67	Bern2, RL-VU, UKBR
Bird	Lymnocyptes minimus	Jack Snipe	2003	2016	10	BDir2.1, Bonn2, CMS-AEWA-2
Bird	Mareca penelope	Wigeon	2005	2016	8	BDir2.1, Bonn2, CITES-C, CMS-AEWA-2, GBNNSIP, RL-NT, UKBA
Bird	Mareca strepera	Gadwall	1996	2019	32	BDir2.1, Bonn2, CMS-AEWA-2, GBNNSIP, UKBA
Bird	Mergus merganser	Goosander	1996	2019	57	BDir2.2, Bonn2, CMS-AEWA-2
Bird	Mergus merganser merganser		2013	2016	42	BDir2.2, Bonn2, CMS-AEWA-2
Bird	Milvus milvus	Red Kite	2003	2016	20	BDir1, Bonn2, CITES-A, WCA1.1, WCA9
Bird	Milvus milvus milvus		2009	2014	18	BDir1, Bonn2, CITES-A, WCA1.1, WCA9
Bird	Morus bassanus	Gannet	2014	2014	1	CMS-AEWA-2, UKBA
Bird	Motacilla alba	Pied/White Wagtail	1977	2019	139	Bern2
Bird	Motacilla alba alba	White Wagtail	2008	2008	1	Bern2
Bird	Motacilla alba yarrellii	Pied Wagtail	1982	2019	145	Bern2
Bird	Motacilla cinerea	Grey Wagtail	1983	2019	110	Bern2, RL-NT, UKBA
Bird	Motacilla flava	Yellow Wagtail	2012	2013	4	Bern2, RL-NT, S41, UKBR
Bird	Motacilla flava flava	Blue-headed Wagtail	2012	2012	1	Bern2, UKBR
Bird	Motacilla flava flavissima	Yellow Wagtail	2007	2008	2	Bern2, Priority, RL-NT, S41, UKBR
Bird	Muscicapa striata	Spotted Flycatcher	1980	2016	27	Bern2, Bonn2, Priority, S41, UKBR
Bird	Numenius arquata	Curlew	2007	2013	6	BDir2.2, Bonn2, CMS-AEWA-2, Priority, RL-EN, S41, UKBR
Bird	Numenius phaeopus	Whimbrel	2005	2016	7	BDir2.2, Bonn2, CMS-AEWA-2, RL-CR, UKBR, WCA1.1
Bird	Oenanthe oenanthe	Wheatear	1998	2013	14	Bern2, UKBA
Bird	Oxyura jamaicensis	Ruddy Duck	2002	2005	3	Bonn2, GBNNSIP, WCA9
Bird	Pandion haliaetus	Osprey	2004	2015	17	BDir1, Bonn2, CITES-A, RL-NT, UKBA, WCA1.1
Bird	Panurus biarmicus	Bearded Tit	2003	2007	2	Bern2, WCA1.1
Bird	Parus major	Great Tit	1980	2019	1691	Bern2
Bird	Passer montanus	Tree Sparrow	1985	2007	12	Priority, RL-VU, S41, UKBR
Bird	Perdix perdix	Grey Partridge	1980	2019	14	BDir2.1, GBNNSIP, Priority, RL-VU, S41, UKBR
Bird	Periparus ater	Coal Tit	1996	2019	565	Bern2
Bird	Pernis apivorus	Honey-buzzard	2008	2008	1	BDir1, Bonn2, CITES-A, RL-EN, UKBA, WCA1.1
Bird	Phalacrocorax carbo	Cormorant	1986	2019	68	CMS-AEWA-2, RL-NT
Bird	Phasianus colchicus	Pheasant	1982	2019	262	BDir2.1, GBNNSIP
Bird	Phoenicurus ochruros	Black Redstart	2002	2011	5	Bern2, RL-EN, RL-NT, UKBA, WCA1.1

Bird	Phoenicurus phoenicurus	Redstart	2013	2013	3	Bern2, UKBA
Bird	Pica pica	Magpie	1982	2019	896	BDir2.2
Bird	Picus viridis	Green Woodpecker	1998	2019	291	Bern2
Bird	Plectrophenax nivalis	Snow Bunting	2011	2011	1	Bern2, RL-EN, UKBA, WCA1.1
Bird	Pluvialis apricaria	Golden Plover	2011	2016	6	BDir1, BDir2.2, Bonn2, CMS-AEWA-2
Bird	Podiceps cristatus	Great Crested Grebe	1982	2019	88	CMS-AEWA-2, RL-VU
Bird	Podiceps grisegena	Red-necked Grebe	2005	2007	5	CMS-AEWA-2, RL-CR, UKBR
Bird	Poecile palustris	Marsh Tit	1998	2019	82	Bern2, RL-VU, S41, UKBR
Bird	Prunella modularis	Dunnock	1980	2019	1330	Bern2, S41, UKBA
Bird	Rallus aquaticus	Water Rail	2003	2015	46	BDir2.2, CMS-AEWA-2
Bird	Rallus aquaticus aquaticus		2016	2016	1	BDir2.2, CMS-AEWA-2
Bird	Regulus ignicapilla	Firecrest	2004	2007	5	Bern2, WCA1.1
Bird	Regulus regulus	Goldcrest	1996	2019	260	Bern2
Bird	Regulus regulus regulus		2016	2016	3	Bern2
Bird	Riparia riparia	Sand Martin	1970	2019	48	Bern2
Bird	Saxicola rubetra	Whinchat	2007	2008	3	Bern2, RL-NT, UKBR
Bird	Saxicola rubicola	Stonechat	2003	2017	21	Bern2
Bird	Scolopax rusticola	Woodcock	2004	2019	41	BDir2.1, Bonn2, CMS-AEWA-2, RL-VU, UKBR
Bird	Sitta europaea	Nuthatch	1982	2019	165	Bern2
Bird	Spatula clypeata	Shoveler	2010	2013	2	BDir2.1, Bonn2, CITES-C, CMS-AEWA-2, UKBA
Bird	Spatula querquedula	Garganey	2005	2012	4	BDir2.1, Bonn2, CITES-A, CMS-AEWA-2, RL-CR, UKBA, WCA1.1
Bird	Spinus spinus	Siskin	1991	2019	137	Bern2
Bird	Sterna hirundo	Common Tern	1983	2019	101	BDir1, Bern2, CMS-AEWA-2, RL-NT, UKBA
Bird	Sterna paradisaea	Arctic Tern	2003	2015	33	BDir1, Bern2, Bonn2, CMS-AEWA-2, RL-VU, UKBA
Bird	Streptopelia decaocto	Collared Dove	1984	2019	1007	BDir2.2, GBNN SIP, RL-NT
Bird	Streptopelia turtur	Turtle Dove	1985	2016	20	BDir2.2, CITES-A, Priority, RL-CR, S41, UKBR
Bird	Strix aluco	Tawny Owl	1982	2019	71	Bern2, CITES-A, RL-NT, UKBA
Bird	Sturnus vulgaris	Starling	1963	2019	1045	BDir2.2, RL-VU, S41, UKBR
Bird	Tachybaptus ruficollis	Little Grebe	2005	2019	10	CMS-AEWA-2
Bird	Tadorna tadorna	Shelduck	2008	2015	3	Bern2, Bonn2, CMS-AEWA-2, RL-EN, UKBA
Bird	Thalasseus sandvicensis	Sandwich Tern	2010	2014	2	BDir1, Bern2, CMS-AEWA-2, UKBA
Bird	Tringa erythropus	Spotted Redshank	2013	2013	2	BDir2.2, Bonn2, CMS-AEWA-2, RL-EN, UKBA
Bird	Tringa glareola	Wood Sandpiper	2004	2007	2	BDir1, Bern2, Bonn2, CMS-AEWA-2, RL-EN, UKBA, WCA1.1
Bird	Tringa nebularia	Greenshank	2005	2014	4	BDir2.2, Bonn2, CMS-AEWA-2, UKBA, WCA1.1
Bird	Tringa ochropus	Green Sandpiper	2004	2019	18	Bern2, Bonn2, CMS-AEWA-2, RL-EN, UKBA, WCA1.1
Bird	Tringa totanus	Redshank	2010	2013	2	BDir2.2, Bonn2, CMS-AEWA-2, RL-NT, RL-VU, UKBA
Bird	Troglodytes troglodytes	Wren	1980	2019	932	Bern2, UKBA
Bird	Turdus iliacus	Redwing	1975	2019	204	BDir2.2, RL-CR, UKBA, WCA1.1
Bird	Turdus merula	Blackbird	1963	2019	1865	BDir2.2
Bird	Turdus merula merula		2015	2015	2	BDir2.2
Bird	Turdus philomelos	Song Thrush	1964	2019	696	BDir2.2, S41, UKBA
Bird	Turdus pilaris	Fieldfare	1976	2018	89	BDir2.2, RL-PX, UKBR, WCA1.1
Bird	Turdus torquatus	Ring Ouzel	2006	2017	16	Bern2, Priority, RL-VU, S41, UKBR
Bird	Turdus viscivorus	Mistle Thrush	1975	2019	192	BDir2.2, RL-VU, UKBR
Bird	Tyto alba	Barn Owl	1980	2019	37	Bern2, CITES-A, WCA1.1, WCA9
Bird	Vanellus vanellus	Lapwing	1981	2019	41	BDir2.2, Bonn2, CMS-AEWA-2, Priority, RL-EN, RL-VU, S41, UKBR
Bony Fish (Actinopterygii)	Anguilla anguilla	Eel	1986	1999	20	Priority, RL-CR, S41
Bony Fish (Actinopterygii)	Cottus gobio	Bullhead	1987	2005	11	HDir2
Crustacean	Austropotamobius pallipes	White-clawed Crayfish	1976	2012	9	Bern3, HDir2, HDir5, Priority, S41, WCA5

Fern	Pilularia globulifera	Pillwort	2009	2009	1	NRPL, Priority, RAREPLANT, RDB-NS, RL-NT, RL-VU, S41
Flowering Plant	Anthemis arvensis	Corn Chamomile	1990	1990	1	GBNNSIP, NRPL, RAREPLANT, RL-EN
Flowering Plant	Anthemis cotula	Stinking Chamomile	1990	1990	1	GBNNSIP, NRPL, RL-VU
Flowering Plant	Arabis hirsuta	Hairy Rock-cress	1990	1990	2	RL-NT
Flowering Plant	Briza media	Quaking-grass	2009	2009	2	RL-NT
Flowering Plant	Buxus sempervirens	Box	1936	1990	4	RDB-NR, RL-DD
Flowering Plant	Campanula rotundifolia	Harebell	1990	1990	4	RL-NT
Flowering Plant	Carex elata	Tufted-sedge	1990	1990	1	RL-NT
Flowering Plant	Carex vesicaria	Bladder-sedge	1978	1978	1	RL-VU, SCARCEPLANT
Flowering Plant	Chenopodium bonus-henricus	Good-King-Henry	1990	1990	2	GBNNSIP, NRPL, RL-VU
Flowering Plant	Cichorium intybus	Chicory	1990	1990	3	GBNNSIP, RL-VU
Flowering Plant	Clinopodium acinos	Basil Thyme	1990	2000	2	NRPL, Priority, RL-VU, S41
Flowering Plant	Cruciata laevipes	Crosswort	2009	2009	3	RL-NT
Flowering Plant	Cynoglossum officinale	Hound's-tongue	1990	1990	1	NRPL, RL-NT
Flowering Plant	Epipactis phyllanthes	Green-flowered Helleborine	1990	1990	2	CITES-B, NRPL, RDB-NS, SCARCEPLANT
Flowering Plant	Erysimum cheiranthoides	Treacle-mustard	1990	1990	3	GBNNSIP, RL-NT
Flowering Plant	Euphorbia helioscopia	Sun Spurge	1990	1990	10	CITES-B, GBNNSIP
Flowering Plant	Euphorbia lathyris	Caper Spurge	1990	1990	4	CITES-B, GBNNSIP
Flowering Plant	Euphorbia peplus	Petty Spurge	1990	1990	10	CITES-B, GBNNSIP
Flowering Plant	Euphrasia nemorosa	Common Eyebright	1990	1990	1	RL-NT
Flowering Plant	Filago minima	Small Cudweed	1990	1990	2	RL-NT
Flowering Plant	Filago vulgaris	Common Cudweed	1990	2009	13	NRPL, RL-NT
Flowering Plant	Fragaria vesca	Wild Strawberry	1990	1990	5	RL-NT
Flowering Plant	Galanthus nivalis	Snowdrop	1990	1990	9	CITES-B, GBNNSIP
Flowering Plant	Groenlandia densa	Opposite-leaved Pondweed	2009	2009	1	NRPL, RL-VU
Flowering Plant	Hottonia palustris	Water-violet	2009	2009	2	RL-VU
Flowering Plant	Hydrocharis morsus-ranae	Frogbit	1990	1990	1	NRPL, RL-VU
Flowering Plant	Hydrocotyle vulgaris	Marsh Pennywort	1990	1990	2	RL-NT
Flowering Plant	Hypochaeris glabra	Smooth Cat's-ear	1998	1998	2	NRPL, RL-VU
Flowering Plant	Jacobaea aquatica	Marsh Ragwort	1990	1990	3	RL-NT
Flowering Plant	Knautia arvensis	Field Scabious	1990	2009	10	RL-NT
Flowering Plant	Melampyrum arvense	Field Cow-wheat	1803	1834	2	GBNNSIP, RDB-NR, RL-EN, WCA8
Flowering Plant	Mentha arvensis	Corn Mint	1990	1990	2	RL-NT
Flowering Plant	Menyanthes trifoliata	Bogbean	1940	1990	2	CITES-D
Flowering Plant	Misopates orontium	Weasel's-snout	1990	1990	1	GBNNSIP, NRPL, RL-VU
Flowering Plant	Myriophyllum verticillatum	Whorled Water-milfoil	1990	1990	1	NRPL, RL-NT, RL-VU
Flowering Plant	Onobrychis viciifolia	Sainfoin	1990	1990	1	NRPL, RL-VU
Flowering Plant	Ophrys apifera	Bee Orchid	1990	2010	6	CITES-B
Flowering Plant	Oxalis acetosella	Wood-sorrel	1990	2009	3	RL-NT
Flowering Plant	Papaver argemone	Prickly Poppy	1990	1990	2	GBNNSIP, NRPL, RL-EN, RL-VU
Flowering Plant	Plantago media	Hoary Plantain	1990	2009	3	RL-NT
Flowering Plant	Potamogeton praelongus	Long-stalked Pondweed	2009	2009	1	RL-EN, RL-NT, SCARCEPLANT
Flowering Plant	Potentilla argentea	Hoary Cinquefoil	1990	1990	1	NRPL, RL-NT
Flowering Plant	Potentilla erecta	Tormentil	1990	1990	4	RL-NT
Flowering Plant	Ranunculus flammula	Lesser Spearwort	1990	1990	2	RL-VU
Flowering Plant	Ruscus aculeatus	Butcher's-broom	1990	1990	1	HDir5
Flowering Plant	Salvia verbenaca	Wild Clary	1990	2010	4	RL-NT
Flowering Plant	Sanicula europaea	Sanicle	1990	1990	1	RL-NT
Flowering Plant	Silene flos-cuculi	Ragged-Robin	1990	2009	7	RL-NT

Flowering Plant	<i>Silene noctiflora</i>	Night-flowering Catchfly	1990	1990	2	GBNNSIP, NRPL, RL-VU
Flowering Plant	<i>Solidago virgaurea</i>	Goldenrod	1990	1990	1	NRPL, RL-NT, SCARCEPLANT
Flowering Plant	<i>Spergula arvensis</i>	Corn Spurrey	1990	1990	6	NRPL, RL-VU
Flowering Plant	<i>Stellaria palustris</i>	Marsh Stitchwort	1990	1990	1	NRPL, Priority, RL-VU, S41
Flowering Plant	<i>Succisa pratensis</i>	Devil's-bit Scabious	1990	2009	3	RL-NT
Flowering Plant	<i>Teesdalia nudicaulis</i>	Shepherd's Cress	1990	1990	2	NRPL, RL-NT
Flowering Plant	<i>Valeriana officinalis</i>	Common Valerian	1990	2009	7	RL-NT
Flowering Plant	<i>Veronica officinalis</i>	Heath Speedwell	1990	1990	2	RL-NT
Flowering Plant	<i>Veronica scutellata</i>	Marsh Speedwell	1990	1990	1	RL-NT
Flowering Plant	<i>Viola canina</i>	Heath Dog-violet	1990	1990	1	RL-NT, RL-VU
Flowering Plant	<i>Viola tricolor</i>	Wild Pansy	1990	1990	1	RL-NT
Flowering Plant	<i>Viola tricolor</i> subsp. <i>tricolor</i>		1990	1990	1	NRPL, RL-NT, SCARCEPLANT
Insect - Butterfly	<i>Coenonympha pamphilus</i>	Small Heath	1995	2006	10	Priority, RL-NT, S41
Insect - Butterfly	<i>Lasiommata megera</i>	Wall	1995	2006	5	Priority, RL-NT, S41
Insect - Butterfly	<i>Nymphalis polychloros</i>	Large Tortoiseshell	1938	1938	1	RL-RE, WCA5
Insect - Butterfly	<i>Satyrrium w-album</i>	White-letter Hairstreak	1996	1997	2	Priority, RL-EN, S41, WCA5
Insect - Dragonfly (Odonata)	<i>Sympetrum striolatum</i>	Common Darter	1985	1987	2	RL-DD
Insect - Hymenopteran	<i>Mimesa bicolor</i>	Two-coloured Mimic Wasp	2011	2012	2	RL-VU
Insect - Hymenopteran	<i>Nomada ferruginata</i>	Yellow-shouldered Nomad Bee	2011	2011	1	RL-EN
Insect - Moth	<i>Eriogaster lanestris</i>	Small Eggar	2012	2015	4	RL-VU
Insect - Moth	<i>Gagitodes sagittata</i>	Marsh Carpet	2011	2022	12	RL-VU
Insect - Moth	<i>Hecatera dysodea</i>	Small Ranunculus	2011	2022	33	RL-EX
Insect - Moth	<i>Loxostege sticticalis</i>	Diamond-spot Sable	2022	2022	1	BS, RL-EX
Insect - Moth	<i>Lymantria dispar</i>	Gypsy Moth	2021	2021	4	RL-EX
Insect - Moth	<i>Nola aerugula</i>	Scarce Black Arches	2018	2018	1	RL-EX
Insect - Moth	<i>Trachea atriplicis</i>	Orache Moth	2018	2018	1	RL-EX
Mollusc	<i>Anisus (Disculifer) vorticulus</i>	Ramshorn Snail	1981	1981	1	CHS2, HDir2, HDir4, Priority, RDB-NR, RL-VU, S41
Reptile	<i>Anguis fragilis</i>	Slow-worm	2004	2004	1	Bern3, Priority, S41, WCA5
Reptile	<i>Natrix helvetica</i>	Grass Snake	2004	2011	24	Bern3, Priority, S41, WCA5
Reptile	<i>Zootoca vivipara</i>	Common Lizard	2004	2004	1	Bern3, Priority, S41, WCA5
Terrestrial Mammal	<i>Arvicola amphibius</i>	Water Vole	1957	2007	16	Priority, RL-EN, S41, WCA5
Terrestrial Mammal	<i>Barbastella barbastellus</i>	Barbastelle	2010	2019	5	Bern2, Bonn2, CHS2, CMS-EB-1, HDir2, HDir4, Priority, RL-VU, S41, WCA5
Terrestrial Mammal	<i>Capreolus capreolus</i>	Roe Deer	1987	2020	11	Bern3
Terrestrial Mammal	<i>Cervus elaphus</i>	Red Deer	2001	2001	1	Bern3
Terrestrial Mammal	Chiroptera	Bat	1971	2000	2	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, WCA5
Terrestrial Mammal	<i>Eptesicus serotinus</i>	Serotine	2007	2019	4	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, RL-VU, WCA5
Terrestrial Mammal	<i>Erinaceus europaeus</i>	Hedgehog	1966	2022	77	Bern3, Priority, RL-VU, S41
Terrestrial Mammal	<i>Hydropotes inermis</i>	Chinese Water Deer	2003	2003	1	Bern3, GBNNSIP, WCA9
Terrestrial Mammal	<i>Lutra lutra</i>	Otter	1973	2019	19	Bern2, CHS2, CITES-A, HDir2, HDir4, Priority, S41, WCA5
Terrestrial Mammal	<i>Meles meles</i>	Badger	1938	2019	11	Bern3, PBA
Terrestrial Mammal	<i>Micromys minutus</i>	Harvest Mouse	1963	2017	11	Priority, RL-NT, S41
Terrestrial Mammal	<i>Muntiacus reevesi</i>	Muntjac	2001	2020	8	Bern3, GBNNSIP, WCA9
Terrestrial Mammal	<i>Mustela erminea</i>	Stoat	1970	2019	13	Bern3
Terrestrial Mammal	<i>Mustela nivalis</i>	Weasel	1960	2005	5	Bern3
Terrestrial Mammal	<i>Myotis</i>	Myotis Bat species	2007	2012	15	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, WCA5
Terrestrial Mammal	<i>Myotis daubentonii</i>	Daubenton's Bat	1998	2019	28	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, WCA5
Terrestrial Mammal	<i>Myotis mystacinus/brandtii</i>	Whiskered/Brandt's Bat	2017	2019	2	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, RL-DD, WCA5
Terrestrial Mammal	<i>Myotis nattereri</i>	Natterer's Bat	1962	2019	15	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, WCA5
Terrestrial Mammal	<i>Neomys fodiens</i>	Water Shrew	1966	2018	3	Bern3

Terrestrial Mammal	Nyctalus noctula		Noctule	2007	2019	52	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, Priority, S41, WCA5
Terrestrial Mammal	Pipistrellus		Pipistrelle Bat species	2019	2019	3	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, WCA5
Terrestrial Mammal	Pipistrellus nathusii		Nathusius's Pipistrelle	2012	2019	10	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, RL-NT, WCA5
		sensu					
Terrestrial Mammal	Pipistrellus pipistrellus	stricto	Common Pipistrelle	2007	2019	66	Bonn2, CHS2, CMS-EB-1, HDir4, WCA5
Terrestrial Mammal	Pipistrellus pipistrellus	sensu lato	Pipistrelle	1962	2013	14	Bern2, Bern3, Bonn2, CHS2, CMS-EB-1, HDir4, WCA5
Terrestrial Mammal	Pipistrellus pygmaeus		Soprano Pipistrelle	2007	2019	82	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, Priority, S41, WCA5
Terrestrial Mammal	Plecotus		Long-eared Bat species	2015	2015	1	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, WCA5
Terrestrial Mammal	Plecotus auritus		Brown Long-eared Bat	2001	2019	24	Bern2, Bonn2, CHS2, CMS-EB-1, HDir4, Priority, S41, WCA5
Terrestrial Mammal	Sciurus vulgaris		Red Squirrel	1971	1982	3	Bern3, Priority, RL-EN, S41, WCA5
Terrestrial Mammal	Sorex araneus		Common Shrew	1962	1980	10	Bern3
Terrestrial Mammal	Sorex minutus		Pygmy Shrew	1973	2016	4	Bern3
Bird	Acanthis cabaret		Lesser Redpoll	2004	2019	105	Priority, S41
Bird	Acrocephalus schoenobaenus		Sedge Warbler	1983	2019	154	UKBA
Bird	Cettia cetti		Cetti's Warbler	2003	2019	203	WCA1.1
Bird	Curruca communis		Whitethroat	1963	2019	186	UKBA
Bird	Fringilla montifringilla		Brambling	1983	2019	87	WCA1.1
Bird	Locustella naevia		Grasshopper Warbler	1995	2016	25	Priority, S41, UKBR
Bird	Passer domesticus		House Sparrow	1980	2019	827	Priority, S41, UKBR
Bird	Phylloscopus inornatus		Yellow-browed Warbler	2006	2016	6	UKBA
Bird	Phylloscopus trochilus		Willow Warbler	1982	2019	114	UKBA
Bird	Pyrrhula pyrrhula		Bullfinch	1978	2019	151	S41, UKBA
Bony Fish (Actinopterygii)	Salmo trutta		Brown/Sea Trout	1988	1995	2	Priority, S41
Conifer	Pinus sylvestris		Scots Pine	1990	2015	15	RDB-NS
Flowering Plant	Centaurea cyanus		Cornflower	1990	1990	1	GBNNSIP, Priority, S41
Flowering Plant	Hyacinthoides non-scripta		Bluebell	1990	2009	13	WCA8
Flowering Plant	Medicago sativa subsp. falcata		Sickle Medick	1990	2010	4	BS, NRPL, RDB-NS
Flowering Plant	Muscari neglectum		Grape-hyacinth	1990	1990	1	BS, NRPL, Priority, RDB-NR, S41, SCARCEPLANT
Flowering Plant	Nymphoides peltata		Fringed Water-lily	1990	1990	2	NRPL, RDB-NS
Flowering Plant	Polypogon monspeliensis		Annual Beard-grass	1990	1990	1	NRPL, RDB-NS
Flowering Plant	Rhinanthus angustifolius		Greater Yellow-rattle	1998	1998	1	RDB-NR, WCA8
Flowering Plant	Stratiotes aloides		Water-soldier	2009	2009	2	NRPL, RDB-NR
Flowering Plant	Tilia platyphyllos		Large-leaved Lime	1990	1990	2	RDB-NS
Flowering Plant	Verbascum pulverulentum		Hoary Mullein	1990	2010	10	NRPL, RDB-NS
Insect - Beetle (Coleoptera)	Stenostola dubia		Lime Beetle	2005	2005	1	RDB-NB, RDB-NS
Insect - Butterfly	Erynnis tages tages		Dingy Skipper	1996	1996	1	S41
Insect - Butterfly	Hipparchia semele semele		Grayling	1996	1996	1	S41
Insect - Butterfly	Papilio machaon gorganus		Continental Swallowtail	1995	1995	1	WCA5
Insect - Hymenopteran	Andrena bimaculata		Large Gorse Mining Bee	2010	2012	5	RDB-NB
Insect - Hymenopteran	Andrena humilis		Buff-tailed Mining Bee	2011	2011	1	RDB-NB
Insect - Hymenopteran	Arachnospila minutula			2011	2011	1	RDB-NB
Insect - Hymenopteran	Argogorytes fargeii			2011	2011	1	RDB-NA
Insect - Hymenopteran	Bombus rudarius		Red-shanked Carder Bee	1964	1964	1	Priority, S41
Insect - Hymenopteran	Cerceris quinquefasciata		Five-banded Weevil-wasp	2010	2012	5	BS, Priority, S41
Insect - Hymenopteran	Ectemnius sexcinctus			2012	2012	1	RDB-NB
Insect - Hymenopteran	Hylaeus cornutus		Spined Hylaeus	2010	2011	4	RDB-NA
Insect - Hymenopteran	Hylaeus signatus		Large Yellow-face Bee	2010	2012	6	RDB-NB
Insect - Hymenopteran	Nysson dimidiatus		Small Spurred Digger Wasp	2010	2010	1	RDB-NB
Insect - Moth	Acronicta psi		Grey Dagger	1981	2022	42	Priority, S41

Insect - Moth	Acronicta rumicis	Knot Grass	1981	2022	165	Priority, S41
Insect - Moth	Agrochola lychnidis	Beaded Chestnut	1984	2022	173	Priority, S41
Insect - Moth	Allophyes oxyacanthae	Green-brindled Crescent	1906	2022	174	Priority, S41
Insect - Moth	Amphipoea oculea	Ear Moth	1968	2022	34	Priority, S41
Insect - Moth	Amphipyra tragopoginis	Mouse Moth	1960	2022	178	Priority, S41
Insect - Moth	Anania verbascalis	Golden Pearl	2018	2018	1	RDB-NB
Insect - Moth	Anchoscelis helvola	Flounced Chestnut	1968	2019	3	Priority, S41
Insect - Moth	Anchoscelis litura	Brown-spot Pinion	1981	2022	73	Priority, S41
Insect - Moth	Ancylosis oblitella	Saltmarsh Knot-horn	2022	2022	1	RDB-N
Insect - Moth	Apamea anceps	Large Nutmeg	2001	2022	25	Priority, S41
Insect - Moth	Apamea remissa	Dusky Brocade	1960	2020	39	Priority, S41
Insect - Moth	Arctia caja	Garden Tiger	1965	2013	12	Priority, S41
Insect - Moth	Asteroscopus sphinx	Sprawler	2013	2022	34	Priority, S41
Insect - Moth	Atethmia centrargo	Centre-barred Sallow	1813	2022	107	Priority, S41
Insect - Moth	Brachmia inornatella	Fen Crest	2019	2022	2	RDB-NB
Insect - Moth	Calamotropha paludella	Bulrush Veneer	2000	2022	34	RDB-NB
Insect - Moth	Caradrina morpheus	Mottled Rustic	1960	2022	547	Priority, S41
Insect - Moth	Catocala sponsa	Dark Crimson Underwing	2019	2021	4	Priority, S41
Insect - Moth	Ceramica pisi	Broom Moth	1968	2001	7	Priority, S41
Insect - Moth	Chesias legatella	Streak	1981	2022	11	Priority, S41
Insect - Moth	Chiasmia clathrata	Latticed Heath	1960	2022	126	Priority, S41
Insect - Moth	Cirrhia gilvago	Dusky-lemon Sallow	1981	2020	8	Priority, S41
Insect - Moth	Cirrhia icteritia	Sallow	1981	2022	144	Priority, S41
Insect - Moth	Cossus cossus	Goat Moth	1968	1968	1	Priority, S41
Insect - Moth	Crambus hamella	Dark Grass-veneer	2013	2016	3	RDB-NB
Insect - Moth	Crambus uliginosellus	Marsh Grass-veneer	2016	2016	4	RDB-NB
Insect - Moth	Diarsia rubi	Small Square-spot	1960	2022	168	Priority, S41
Insect - Moth	Diloba caeruleocephala	Figure of Eight	1981	1981	1	Priority, S41
Insect - Moth	Ecliptopera silaceata	Small Phoenix	1913	2022	73	Priority, S41
Insect - Moth	Ennomos erosaria	September Thorn	1968	2022	8	Priority, S41
Insect - Moth	Ennomos fuscantaria	Dusky Thorn	2001	2022	247	Priority, S41
Insect - Moth	Ennomos quercinaria	August Thorn	2011	2022	107	Priority, S41
Insect - Moth	Ethmia dodecea	Dotted Ermel	2020	2020	1	RDB-NB
Insect - Moth	Ethmia quadrillella	Comfrey Ermel	2022	2022	2	RDB-NA
Insect - Moth	Eugnorisma glareosa	Autumnal Rustic	2001	2020	11	Priority, S41
Insect - Moth	Eulithis mellinata	Spinach	1960	2020	28	Priority, S41
Insect - Moth	Euxoa nigricans	Garden Dart	1965	2020	11	Priority, S41
Insect - Moth	Euxoa tritici	White-line Dart	1960	2022	182	Priority, S41
Insect - Moth	Graphiphora augur	Double Dart	1960	1981	4	Priority, S41
Insect - Moth	Helotropha leucostigma	Crescent	1965	2022	212	Priority, S41
Insect - Moth	Hemistola chrysoprasaria	Small Emerald	1960	2022	21	Priority, S41
Insect - Moth	Hepialus humuli	Ghost Moth	1960	2022	75	Priority, S41
Insect - Moth	Homoeosoma nebullella	Large Clouded Knot-horn	2001	2022	5	RDB-NB
Insect - Moth	Hoplodrina blanda	Rustic	1960	2022	246	Priority, S41
Insect - Moth	Hydraecia micacea	Rosy Rustic	1960	2022	388	Priority, S41
Insect - Moth	Leucania comma	Shoulder-striped Wainscot	1981	2022	62	Priority, S41
Insect - Moth	Lithostege griseata	Grey Carpet	2005	2005	1	BS, Priority, S41
Insect - Moth	Litoligia literosa	Rosy Minor	1960	2022	39	Priority, S41
Insect - Moth	Lycia hirtaria	Brindled Beauty	1968	2022	216	Priority, S41

Insect - Moth	Macaria wauaria	V-moth	1968	1988	7	Priority, S41
Insect - Moth	Malacosoma neustria	Lackey	1981	1981	1	Priority, S41
Insect - Moth	Melanchra persicariae	Dot Moth	1960	2022	251	Priority, S41
Insect - Moth	Melanthia procellata	Pretty Chalk Carpet	1986	2014	3	Priority, S41
Insect - Moth	Mniotype adusta	Dark Brocade	1968	2020	7	Priority, S41
Insect - Moth	Monochroa palustrellus	Wainscot Neb	2020	2020	1	RDB-NB
Insect - Moth	Nascia cilialis	Orange-rayed Pearl	2014	2018	3	RDB-NA
Insect - Moth	Nemophora fasciella	Horehound Long-horn	2015	2021	3	Priority, S41
Insect - Moth	Nephoterix angustella	Spindle Knot-horn	2016	2022	22	RDB-NB
Insect - Moth	Noctua orbona	Lunar Yellow Underwing	2007	2022	45	BS, Priority, S41
Insect - Moth	Oncocera semirubella	Rosy-striped Knot-horn	2019	2020	4	RDB-NB
Insect - Moth	Orthonama vittata	Oblique Carpet	2003	2022	8	Priority, S41
Insect - Moth	Orthosia gracilis	Powdered Quaker	1981	2022	104	Priority, S41
Insect - Moth	Oxypteryx wilkella	Painted Neb	2020	2020	3	BS, RDB-NB
Insect - Moth	Pediasia contaminella	Waste Grass-veneer	2014	2022	45	RDB-NB
Insect - Moth	Pelurga comitata	Dark Spinach	1968	2022	42	Priority, S41
Insect - Moth	Perizoma albulata	Grass Rivulet	1968	2022	47	S41
Insect - Moth	Pexicopia malvella	Hollyhock Seed Moth	2016	2022	19	RDB-NB
Insect - Moth	Platyedra subcinerea	Mallow Groundling	2022	2022	1	RDB-N
Insect - Moth	Polia bombycina	Pale Shining Brown	1968	1968	1	Priority, S41
Insect - Moth	Rheumaptera hastata	Argent & Sable	1935	1935	2	Priority, S41
Insect - Moth	Rhizedra lutosa	Large Wainscot	1960	2022	175	Priority, S41
Insect - Moth	Schoenobius gigantella	Giant Water-veneer	2002	2022	19	RDB-NB
Insect - Moth	Scopula marginepunctata	Mullein Wave	2011	2013	3	Priority, S41
Insect - Moth	Scotopteryx chenopodiata	Shaded Broad-bar	1960	2022	123	Priority, S41
Insect - Moth	Scrobipalpa ocellatella	Beet Moth	2022	2022	37	RDB-N
Insect - Moth	Sideridis reticulata	Bordered Gothic	1968	1968	1	BS, Priority, S41
Insect - Moth	Sitochroa palealis	Sulphur Pearl	2000	2013	5	RDB-N
Insect - Moth	Spilosoma lubricipeda	White Ermine	1960	2022	304	Priority, S41
Insect - Moth	Spilosoma lutea	Buff Ermine	1960	2022	502	Priority, S41
Insect - Moth	Stathmopoda pedella	Alder Signal	2013	2022	9	RDB-NB
Insect - Moth	Synaphe punctalis	Long-legged Tabby	2011	2011	1	RDB-NB
Insect - Moth	Tholera cespitis	Hedge Rustic	1968	2022	5	Priority, S41
Insect - Moth	Tholera decimalis	Feathered Gothic	1968	2022	20	Priority, S41
Insect - Moth	Timandra comae	Blood-vein	1960	2022	199	Priority, S41
Insect - Moth	Trichiura crataegi	Pale Eggar	2022	2022	1	Priority, S41
Insect - Moth	Tyria jacobaeae	Cinnabar	1965	2022	369	Priority, S41
Insect - Moth	Watsonalla binaria	Oak Hook-tip	1960	2022	99	Priority, S41
Insect - Moth	Xanthorhoe ferrugata	Dark-barred Twin-spot Carpet	1960	2022	97	Priority, S41
Insect - Moth	Xestia agathina	Heath Rustic	2005	2021	3	Priority, S41
Insect - True Bug (Hemiptera)	Megalonotus praetextatus		2019	2019	1	RDB-NB
Terrestrial Mammal	Lepus europaeus	Hare	2001	2015	4	Priority, S41
Flowering Plant	Carduus tenuiflorus	Slender Thistle	1990	1990	1	NRPL, SCARCEPLANT
Flowering Plant	Stachys officinalis	Betony	2009	2009	1	NRPL, SCARCEPLANT
Insect - Moth	Heliothis virescens	Marbled Clover	2006	2022	3	BS
Insect - Moth	Oxyptilus distans	Breckland Plume	2011	2022	42	BS
Insect - Moth	Phibalapteryx virgata	Oblique Striped	2020	2021	4	BS
Insect - Moth	Platytes cerussella	Little Grass-veneer	2013	2022	20	BS
Insect - Moth	Scopula rubiginata	Tawny Wave	2020	2020	2	BS

Bird	Aix galericulata	Mandarin Duck	2016	2016	1	Bonn2, GBNNSIP, WCA9
Bird	Alopochen aegyptiaca	Egyptian Goose	2002	2019	96	GBNNSIP, WCA9
Bird	Branta canadensis	Canada Goose	1982	2019	67	BDir2.1, Bonn2, GBNNSIP, WCA9
Bird	Cairina moschata	Muscovy Duck	2011	2011	1	GBNNSIP
Bird	Oxyura jamaicensis	Ruddy Duck	2002	2005	3	Bonn2, GBNNSIP, WCA9
Bony Fish (Actinopterygii)	Cyprinus carpio	Common Carp	2000	2000	4	GBNNSIP
Fern	Azolla filiculoides	Water Fern	1990	1990	1	GBNNSIP, WCA9
Flowering Plant	Allium triquetrum	Three-cornered Garlic	1998	1998	1	GBNNSIP, WCA9
Flowering Plant	Alnus cordata	Italian Alder	1998	2009	2	GBNNSIP
Flowering Plant	Buddleja davidii	Butterfly-bush	1990	2009	10	GBNNSIP
Flowering Plant	Crassula helmsii	New Zealand Pigmyweed	2000	2009	2	GBNNSIP, WCA9
Flowering Plant	Elodea canadensis	Canadian Waterweed	1990	2009	7	GBNNSIP, WCA9
Flowering Plant	Epilobium ciliatum	American Willowherb	1990	1990	8	GBNNSIP
Flowering Plant	Fallopia baldschuanica	Russian-vine	1990	1990	1	GBNNSIP
Flowering Plant	Fallopia japonica	Japanese Knotweed	1990	2015	9	GBNNSIP, WCA9
Flowering Plant	Heracleum mantegazzianum	Giant Hogweed	1990	1990	2	GBNNSIP, WCA9
Flowering Plant	Impatiens glandulifera	Himalayan Balsam	1990	2010	7	GBNNSIP, WCA9
Flowering Plant	Lamium galeobdolon subsp. argentatum	Variegated Yellow Archangel	1990	1990	3	GBNNSIP, WCA9
Flowering Plant	Nymphoides peltata	Fringed Water-lily	1990	1990	2	NRPL, RDB-NS
Flowering Plant	Petasites fragrans	Winter Heliotrope	1990	1990	3	GBNNSIP
Flowering Plant	Rhododendron	Rhododendron	2015	2015	1	
Flowering Plant	Rhododendron ponticum		1990	1990	3	GBNNSIP, WCA9
Flowering Plant	Solidago canadensis	Canadian Goldenrod	1990	2009	7	GBNNSIP
Flowering Plant	Solidago gigantea	Early Goldenrod	1990	1990	1	GBNNSIP
Terrestrial Mammal	Hydropotes inermis	Chinese Water Deer	2003	2003	1	Bern3, GBNNSIP, WCA9
Terrestrial Mammal	Muntiacus reevesi	Muntjac	2001	2020	8	Bern3, GBNNSIP, WCA9
Terrestrial Mammal	Neovison vison	American Mink	2001	2017	51	GBNNSIP, WCA9
Terrestrial Mammal	Sciurus carolinensis	Grey Squirrel	2001	2020	76	GBNNSIP, WCA9

Appendix 2 – Supplementary Reference Information

Examples of Bat Boxes		
It is important that the bat boxes are positioned sufficiently high above the ground to dissuade ground predators, a minimum of 4m up; and at a distance from sources of artificial lighting. The boxes should be located on the west, south and east facing sides of the trees / buildings giving bats a range of microclimates through the year and direct access to foraging and commuting habitat along site boundaries.		
Schwegler 1FF Bat Box		The 1FF bat box can be sited in trees or on buildings. Size: 43cm high x 27cm wide x 14cm deep.
Schwegler 2F Bat Box		The 2F bat box can be sited in trees or on buildings. Size: 33cm high x 16cm diameter.
1FQ Schwegler Bat Roost (For External Walls)		Suitable for a variety of crevice-dwelling bats, for larger roosts or maternity groups. Internal layout provides 3 different areas where bats can roost, offering different levels of light and temperature. Gaps ranging from 1.5cm to 3.5cm wide offering various places for bats to roost. Suitable to erect on most types of external brick, timber or concrete structures. Size: 60cm high x 35cm wide x 9cm deep.
Improved Roost-Maternity Bat Box		A large 3 crevice bat box. 3 separate crevices each with different temperature characteristics. Suitable for larger roosts or maternity groups of small crevice-dwelling species such as pipistrelle bats. Suitable to erect on buildings or trees. Size: 49cm high x 26cm wide x 13cm deep.
Timber Double Chamber Bat Box		This bat box is suitable for siting on trees in gardens or woodland and requires no annual maintenance. Should not be painted or treated with any type of preservative, as these can harm the bats. Size: 31.3cm high x 16cm wide x 16cm deep.
The Kent Bat Box		Made from untreated rough-sawn timbers ca.20mm thick. Crevices can be between 15mm and 25mm wide. Suitable to fit to walls, other flat surfaces or trees. Approximate dimensions (boxes vary in size): 24cm wide x 47.5cm high x 17cm deep.

Bird Nesting Habitat	
CedarPlus Nest Box Available with 2 entrance hole sizes: 32mm hole – suitable for great, marsh and coal tits, redstart, nuthatch, pied flycatcher, house sparrow and tree sparrows. 26mm hole – to allow access only to blue, marsh and coal tits (and possibly wrens). Height: 370mm; Width: 156mm; Depth: 175mm	
Schwegler 1B Bird Box The 1B nest box will attract a wide range of species and is available with different entrance hole sizes to prevent birds from competing with each other for the boxes. It is available in 4 colours: brown, green, white and red. The nest box can be attached to the tree or wall using an aluminium nail or by hanging over a branch and is made from Woodcrete to ensure that it is long-lasting. Entrance hole sizes: 32mm hole – will attract great, blue, marsh, coal and crested tit, redstart, nuthatch, collared and pied flycatcher, wryneck, tree and house sparrow. 26mm hole – suits blue, marsh, coal and crested tit and possibly wren. All other species are prevented from using the nest box due to the smaller entrance hole. Oval hole (29x55mm) – suits redstarts because more light enters the brood chamber. It is also suitable for all other species which nest in the 32mm boxes. Height: 23cm; Diameter: 16cm	
No. 10 Schwegler Swallow Nest The Swallow Nest No. 10 consists of a woodcrete nesting bowl which is attached to a wooden panel of formaldehyde-free chipboard. The nest should be placed inside outbuildings such as sheds, barns or stables leaving a distance of at least 35mm between the top of the nest and wall top. Ensure there is always access for the birds through an open window or skylight, or other high level access (minimum of 50mm (H) x 70mm (W) gap). Multiple nests should not be placed at less than 1m intervals. To avoid problems with droppings accumulating, a droppings board could be placed beneath each nest box to collect the droppings.	

Eco-Roost Bat Brick https://www.eco-roost.co.uk/shop?Collection=Bat+Bricks	
Eco-Roost Double Chamber Bat Box https://www.eco-roost.co.uk/product-page/kent-hibernation-rect	
Eco-Roost Double Kent Box https://www.eco-roost.co.uk/product-page/kent-style-rect-large	
Eco-Roost 28mm, 32mm and Open fronted bird boxes https://www.eco-roost.co.uk/product-page/tit-sparrow-front-fall	



Artificial lighting and wildlife

Interim Guidance: Recommendations to help minimise the impact artificial lighting

Wherever human habitation spreads, so does artificial lighting. This increase in lighting has been shown to have an adverse effect on our native wildlife, particularly on those species that have evolved to be active during the hours of darkness. Consequently, development needs to carefully consider what lighting is necessary and reduce any unnecessary lighting, both temporally and spatially. When the impacts on different species groups are reviewed, the solutions proposed have commonalities that form the basis of good practice. These are outlined in the following document.

Overview of impacts

Invertebrates

Artificial light significantly disrupts natural patterns of light and dark, disturbing invertebrate feeding, breeding and movement, which may reduce and fragment populations. Some invertebrates, such as moths, are attracted to artificial lights at night. It is estimated that as many as a third of flying insects that are attracted to external lights will die as a result of their encounter.¹ Insects can become disoriented and exhausted making them more susceptible to predation. In addition, the polarisation of light by shiny surfaces attracts insects, particularly egg laying females away from water. Reflected light has the potential to attract pollinators and impact on their populations, predators and pollination rates. Many invertebrates natural rhythms depend upon day-night and seasonal and lunar changes which can be adversely affected by artificial lighting levels.

It is not always easy to disentangle the effects of lighting on moths from other impacts of urbanisation. However, it is known that UV and green and blue light, which have short wavelengths and high frequencies, are seen by most insects and are highly attractive to them. Where a light source has a UV component, male moths in particular will be drawn to it. Most light-induced changes in physiology and behaviour are likely to be detrimental. They discern it to be 'light', so they do not fly to feed or mate.²

Birds

There are several aspects of changes to bird behaviour to take into account. The phenomenon of robins and other birds singing by the light of a street light or other external lighting installations is well known, and research has shown that singing did not have a significant effect on the bird's body mass regulation. However, it was felt that the continual lack of sleep was likely to be detrimental to the birds' survival and could disrupt the long-term circadian rhythm that dictates the onset of the breeding season³. Many species of bird migrate at night and there are well-documented cases of the mass mortality of nocturnal migrating birds as they strike tall lit buildings. Other UK bird species that are particularly sensitive to artificial lighting are long-eared owls, black-tailed godwit and stone curlew.⁴

¹ Bruce-White C and Shardlow M (2011) A Review of the Impact of Artificial Light on Invertebrates - See more at: <http://www.buglife.org.uk/advice-and-publications/publications/campaigns-and-reports/review-impact-artificial-light#sthashs7GPA1vLdpuf>

² As above

³ Pollard A. (2009) Visual constraints on bird behaviour. University of Cardiff

⁴ Rodriguez A., Garcia A.M., Cervera F. and Palacios V. (2006) Landscape and anti-predation determinants of nest site selection, nest distribution and productivity in Mediterranean population of Long-eared Owls, *Asio otus*. *Ibis*, 148(1), pp. 133-145

Mammals

A number of our British mammals are nocturnal and have adapted their lifestyle so that they are active in the dark in order to avoid predators. Artificial illumination of the areas in which these mammals are active and foraging is likely to be disturbing to their normal activities and their foraging areas could be lost in this way. It is thought that the most pronounced effect is likely to be on small mammals due to their need to avoid predators. However, this in itself has a knock-on effect on those predators.

The detrimental effect of artificial lighting is most clearly seen in bats. Our resident bat species have all suffered dramatic reductions in their numbers in the past century. Light falling on a bat roost exit point, regardless of species, will at least delay bats from emerging, which shortens the amount of time available to them for foraging. As the main peak of nocturnal insect abundance occurs at and soon after dusk, a delay in emergence means this vital time for feeding is missed. At worst, the bats may feel compelled to abandon the roost. Bats are faithful to their roosts over many years and disturbance of this sort can have a significant effect on the future of the colony. It is likely to be deemed a breach of the national and European legislation that protects British bats and their roosts.

In addition to causing disturbance to bats at the roost, artificial lighting can also affect the feeding behaviour of bats and their use of commuting routes. There are two aspects to this: one is the attraction that short wave length light (UV and blue light) has to a range of insects; the other is the presence of lit conditions.

As mentioned, many night-flying species of insect are attracted to lamps that emit short wavelength component. Studies have shown that, although noctules, serotines, pipistrelle and Leisler's bats, take advantage of the concentration of insects around white street lights as a source of prey, this behaviour is not true for all bat species. The slower flying, broad-winged species, such as long-eared bats, barbastelle, greater and lesser horseshoe bats and the *Myotis* species (which include Brandt's, whiskered, Daubenton's, Natterer's and Bechstein's bats) generally avoid external lights.

Lighting can be particularly harmful if it illuminates important foraging habitats such as river corridors, woodland edges and hedgerows used by bats. Studies have shown that continuous lighting along roads creates barriers which some bat species cannot cross⁵. It is also known that insects are attracted to lit areas from further afield. This could result in adjacent habitats supporting reduced numbers of insects, causing a further impact on the ability of light-avoiding bats to feed.

These are just a few examples of the effects of artificial lighting on British wildlife, with migratory fish, amphibians, some flowering plants, a number of bird species, glow worms and a range of other invertebrates all exhibiting changes in their behaviour as a result of this unnatural lighting.

Recommendations

Survey and Planning

The potential impacts of obtrusive light on wildlife should be a routine consideration in the Environmental Impact Assessment (EIA) process⁶. Risks should be eliminated or minimised wherever possible. Some locations are particularly sensitive to obtrusive light and lighting schemes in these areas should be carefully planned.

In August 2013, Planning Minister Nick Boles launched the new National Online Planning Guidance Resource aimed at providing clearer protection for our natural and historic environment. The guidance looks at when lighting pollution concerns should be considered and is covered within one of the on line planning practice

⁵ Stone E. L., Jones G and Harriss (2009) Street lighting disturbs commuting bats. *Current Biology*, 19, pp 1-5

⁶ See also: Institution of Lighting Professionals – Professional Lighting Guide (PLG 04) Guidance on undertaking lighting environmental impact assessments)

guides⁷. The guide provides an overview for planners with links to documents that aim to give planners an overview of the subject through the following discussion points:

1. When is obtrusive light / light pollution relevant to planning?
2. What factors should be considered when assessing whether a development proposal might have implications for obtrusive lighting / light pollution?
3. What factors are relevant when considering where light shines?
4. What factors are relevant when considering how much the light shines?
5. What factors are relevant when considering possible ecological impact?

This can help planners reach the right design through the setting of appropriate conditions relating to performance and mitigation measures at the planning stage.

The Institution of Lighting Professionals (ILP) recommends that Local Planning Authorities specify internationally recognised environmental zones for exterior lighting control within their Development Plans⁸. In instances lacking classification, it may be necessary to request a Baseline Lighting Assessment/Survey conducted by a Lighting Professional in order to inform the classification of areas, particularly for large-scale schemes and major infrastructure projects.

When assessing or commissioning projects that include the installation of lighting schemes, particularly those subject to the EIA process, the following should be considered and relayed to applicants:

- *Ecological consultants should confirm the presence of any sensitive fauna and flora, advising the lighting designers of bat routes and roosts and other areas of importance in order to ensure that reports correspond with each other.*
- *Ecological consultants should consider the need for quantitative lighting measurements. In some instances it may be necessary for further lighting measurements to be taken. For example, outside an important bat roost. These should follow best practice guidance from the ILP and would ideally be conducted by a Lighting Professional.*
- *Where appropriate, professional lighting designers should be consulted to design and model appropriate installations that achieve the task but mitigate the impacts. This should be done at the earliest opportunity. Early decisions can play a key role in mitigating the impact from lighting.*
- *Reports submitted should outline the impacts of lighting in relation to ecology, making clear reference to the ecological findings, highlighting any sensitive areas and detail proposed mitigation. Consideration should also be given to internal lighting where appropriate.*
- *Post-installation checks and sign off upon commissioning should be carried out by the lighting designer to ensure that the lighting installation has been installed in accordance with the design, that predictions were accurate and mitigation methods have been successful.*

Principles and design considerations

Do not

- *provide excessive lighting. Use only the minimum amount of light needed for the task.*
- *directly illuminate bat roosts or important areas for nesting birds*

Avoid

- *installing lighting in ecologically sensitive areas such as: near ponds, lakes, rivers, areas of high conservation value; sites supporting particularly light-sensitive species of conservation significance (e.g. glow worms, rare moths, slow-flying bats) and habitat used by protected species.*
- *using reflective surfaces under lights.*

⁷<http://planningguidance.planningportal.gov.uk/blog/guidance/light-pollution/when-is-light-pollution-relevant-to-planning/>

⁸ Institution of Lighting Professionals (2011) Guidance Notes for the Reduction of Obtrusive Light GN01:2011.

Appendix 3 – Site Photos and Habitat Map



Entrance to site from Barnard Road



Building to be demolished and access to car park



Shrubs and laurel hedging along east boundary



Scattered trees off south-west corner of building



West boundary adjoining industrial units with managed grassland



North-west corner of the site



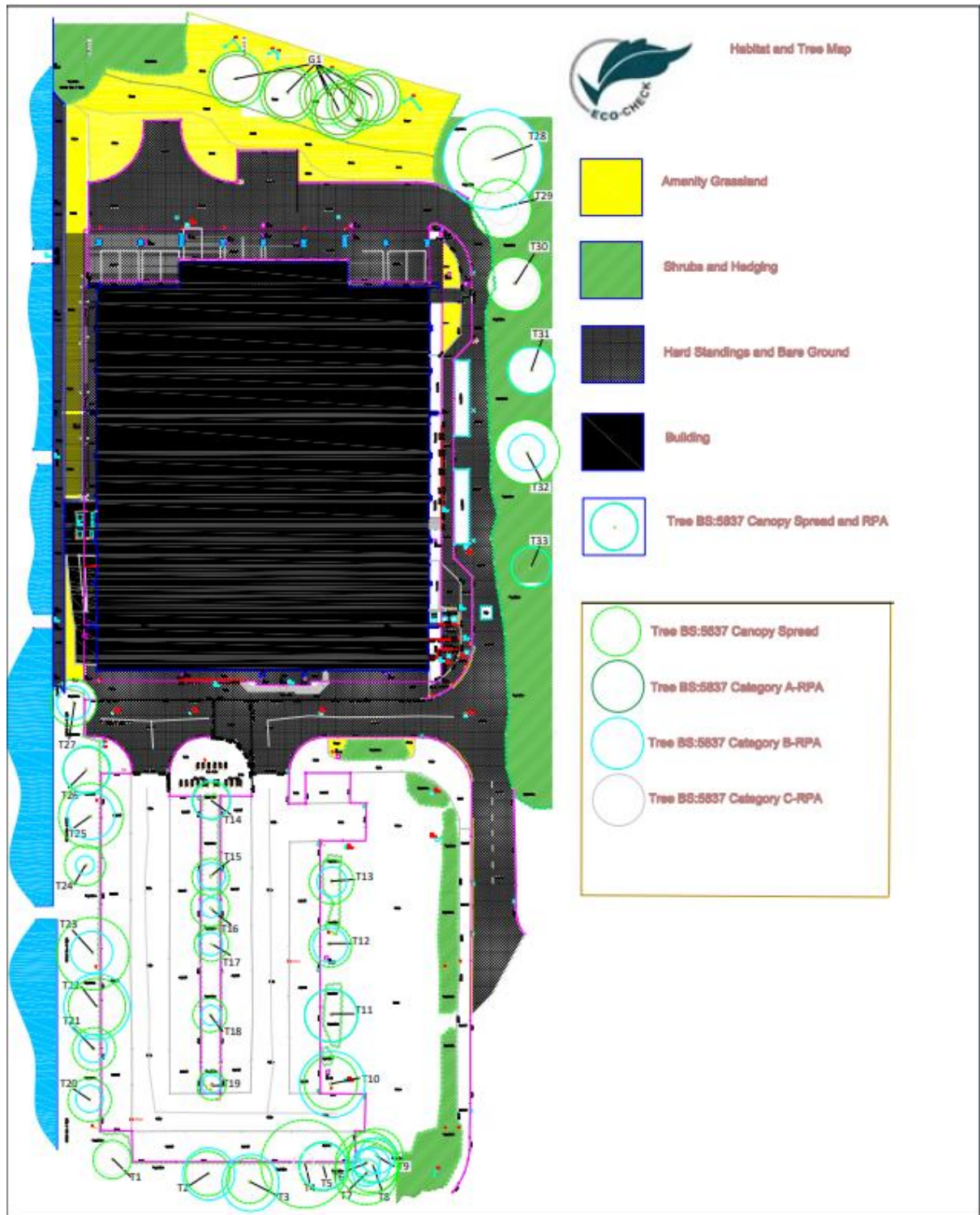
Group of oak trees (G1) and managed grassland on north boundary with Dereham Road



North-east corner and trees and shrubs along east boundary



Trees and shrubs along east boundary



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