9.0 Ecology

9.1 Introduction

9.1.1 This chapter of the ES considers the impact of the scheme on the ecology at and within the vicinity of the proposed Gedling Access Road (GAR) development.

9.1.2 Baseline survey data has been collected following desk study and field surveys which have been undertaken to determine the conservation value of the flora and fauna along the Gedling Access Road and adjacent land. Within this chapter an assessment of impacts caused by the construction and operation phase on ecological features has been carried out and recommendations for avoidance, mitigation and compensation to enhancement the existing ecological value of the application site.

9.1.3 The areas incorporated within this assessment focus on the GAR and where appropriate adjacent land within 500m of the proposed road development boundary.

9.2 Methodology and Scope

Policy Background

9.2.1 The National Planning Policy Framework (NPPF) specifies in Section 109 that planning policies and decisions should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures.

9.2.2 Under Section 114 of the NPPF it is the responsibility of the Local Planning Authorities to:

- Set distinctions between the hierarchy of international, national and locally designated sites, so that protection is commensurate with their status and gives appropriate weight to their importance; and
- Set out a strategic approach in their Local Plans, planning positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure

9.2.3 Under Section 118 of the NPPF when determining planning applications the local planning authorities aim to conserve and enhance biodiversity by:

- Avoiding, providing adequately mitigation, or, as a last resort, compensation for significant harm resulting from the development
- Avoid development on land within or outside a Site of Special Scientific Interest
- Permitting development proposal where the primary objective is to conserve or enhance biodiversity;
- Encouraging opportunities to incorporate biodiversity in and around developments;
- Refuse development resulting in the loss or deterioration of irreplaceable habitats, including ancient woodland and the loss of aged or veteran trees found outside ancient woodland.
- Give the same level of protection to wildlife sites including potential Special Protection Areas, possible Special Areas of Conservation , listed or proposed Ramsar sites as European sites

9.2.4 The "saved" policies of the Gedling Borough Replacement Local Plan, 2005 (Local Plan) no longer include Policy ENV 34 Habitat Protection and Enhancement or Policy ENV 38 Protected Species.

9.2.5 The following policies have been retained in the Gedling Borough Local Plan:

- ENV 35 National Nature Conservation Designations
- ENV 36 Local Nature Conservation Designations
- ENV 45 Ancient Woodlands
- ENV 48 Hedgerow Protection

9.2.6 The Local Plan also includes a section on Tree, Woodland and Hedgerows. The Borough Council have a duty under section 197 of the Town and Country Planning Act 1990 and the Hedgerows Regulation 1997 to protect hedgerows and to make sure a provision of planting of trees is incorporated where planning permission is granted.

9.2.7 Policy ENV 44 Gedling Colliery Park identifies Gedling Colliery, through the Greenwood Community Forest Partnership, as an option for provision of public open space and states 'it will be managed for the benefit of both wildlife and communities providing an area for extensive recreational activity.'

9.2.8 Other initiatives, plans and priorities for nature conservation at a national and local level that inform the assessment include:

- The UK Biodiversity Action Plan (UK BAP) (first published in 1994 with priority species and habitats revised in 2007).
- The Local Biodiversity Action Plan for Nottingham (Nottinghamshire Biodiversity Action Group 1998[1]). The main aims of the local BAP are to determine habitats and species of value to Nottinghamshire and to identify actions and targets to protect and enhance them.
- The State of the UK's Birds (2011)

Key Legislation

9.2.9 The assessment has been considered in the context of relevant international biodiversity and conservation International and European legislation including:

- EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC): The Conservation of Habitats and Species Regulations 2010 (as amended) which represents the UK implementation to the Habitats & Species Directive (1992) issued by the European Community (EC).
- The Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the Bern Convention) which carries an obligation to protect and conserve a wide range of flora and fauna (including their habitats).
- The EC Council Directive on the Conservation of Wild Birds (79/409/EEC), the Convention on Conservation of Wetlands of International Importance 1972 (the Ramsar Convention) and the Convention on the Conservation of Migratory Species of Wild Animals 1979 (the Bonn Convention) which requires all member states to take measures to protect wild birds.

9.2.10 The assessment also considers national legislation including:

- The National Parks and Access to the Countryside Act 1949 is the mechanism under which Areas of Outstanding Beauty, National Parks and Local Nature Reserves are designated.
- The Wildlife and Countryside Act 1981 (as amended), hereafter referred to as the 'W&CA' is the primary legislation covering endangered or threatened species in England and sets out the framework for the designation of Sites of Special Scientific Interest (SSSIs).

[1] Nottinghamshire Biodiversity Action Group. Taylor, J.K. (ed). (1998). Local Biodiversity Action Plan for Nottinghamshire. Nottinghamshire County Council

- The Conservation of Habitats and Species Regulations 2010 (as amended) which provides for the designation and protection of 'European sites', the protection of ' European protected species,' and the adaption of planning and other controls for the protection of European Sites.
- The Protection of Badgers Act 1992 brings together all the legislation that is specific to badgers, with the exception of their inclusion on Schedule 6 of the W&CA.
- The Hedgerows Regulations 1997 aims to protect hedgerows of importance from destruction. The Regulations only apply to hedgerows growing on or adjacent to certain land-use categories.
- The Countryside and Rights of Way (CRoW) Act 2000 affords a greater level of protection to SSSIs, provides better management arrangements for Areas of Outstanding Beauty and strengthens wildlife enforcement legislation. Section 74(2) of the Act requires the Secretary of State to list those habitats and species of principal importance for the conservation of biodiversity, in accordance within the United Nations Convention of Biological Diversity 1992.
- The Natural Environment and Rural Communities (NERC) Act 2006 is designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government Policy. Elements of the act most relevant to the proposed scheme include (i) extension of the CRoW biodiversity duty to public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity; and (ii) modification of the CroW Act 2000 so that species listed under section 74 are now listed under section 41 of the NERC Act 2006. The habitats and species are therefore important for priority setting within the revised UK Biodiversity Action Plan (BAP) and future revisions of the local BAP.

Scoping Assessment Stage

9.2.11 The scoping assessment stage for the ecology assessment was formally undertaken in February 2014. It was concluded that ecological features in the area have changed since the previous assessment was undertaken prior to 2008. It has therefore been necessary for the previous ecological assessment to be updated and a revised ES chapter produced.

9.2.12 Consultation was carried out with Nottinghamshire's County Ecologist in March and May 2014 to establish ecological receptors and update survey effort according to current legislation, policy and survey guidelines in order to provide an adequate assessment of the ecological features and the proposed development scheme.

9.2.13 This Ecology Chapter has therefore been produced in order to address and response to all the issues raised during the various discussions that have taken place, as well as the formal Scoping Opinion (dated 7th July 2014).

Assessment Methodology

9.2.14 The methodology for assessment of the potential impacts on nature conservation sites, habitats and species which may be affected by the proposed development is in accordance with the Institute of Ecology & Environmental Management's[2] (IEEM) guidance described within *Guidelines for Ecological Impact Assessment in the United Kingdom* (IEEM 2006), hereafter referred to as the 'IEEM guidelines'.

9.2.15 The starting point for an assessment of impacts is to determine which features should be subject to detailed assessment. Ecological receptors to be subject to more detailed assessment should be:

a) of sufficient value that impacts upon them may be significant (in terms of legislation or policy); and

b) potentially vulnerable to significant impacts arising from the development (IEEM 2006).

9.2.16 This approach is consistent with the EIA Regulations, which only require investigation of likely significant effects. A summary of the key points from the IEEM Guidelines is provided below.

Determining Nature Conservation Value

9.2.17 The IEEM guidelines recommend that the value of ecological receptors or features is determined based on a geographic frame of reference that includes the following levels:

- **International** - Special Protection Areas (SPA), Special Areas of Conservation (SAC), Ramsar sites, etc.
- **National** - Sites designated at the national level (i.e. England) e.g. Sites of Special Scientific Interest (SSSI)
- **Regional** - Habitats or populations of species of value at a regional (i.e. East Midlands) level.
- **County** - Designated sites, such as Wildlife Sites or habitats / species populations of value at a county (i.e. Nottinghamshire) level.
- **District** - Habitats or species populations of value at a District level (i.e. Gedling Borough).
- **Local** - Habitats or species populations of value in a local (i.e. <500m of the GAR) context
- **Site Level** - Habitats or species populations which are of value only within the footprint and immediate surrounds of the proposed GAR scheme.

9.2.18 The geographical scope of the ecological assessment is defined by the 'potential zone of influence' of the proposed scheme. The zone of influence may change depending on the aspect of the scheme under consideration and the ecological receptor concerned. For the Gedling Access Road scheme, the maximum geographical scope (anticipated maximum zone of influence) for the ecological investigations was initially defined as land up to 2 km from the scheme boundaries.

9.2.19 This scope was subject to review during the Scoping exercise and Consultation regarding the scheme. It was also reviewed following completion of initial investigations to determine whether the scheme could have potentially significant ecological effects at a greater or lesser distance than that. No potential effects of the scheme were identified which could significantly affect the integrity or status of ecological receptors at greater distances than 500m. Therefore the geographical scope was reduced to this distance.

Valuing Habitats

9.2.20 In accordance with the IEEM guidelines, the value of habitats is measured against published selection criteria where available. Reference is also made to UK and local Habitat Action Plans (HAPs), although as the guidelines note, the presence of a HAP reflects the fact that the habitat concerned is in a sub-optimal state (and hence that action is required) and does not necessarily imply any specific level of importance for the habitat. In accordance with the guidance, the assessor can assign certain features a greater value if there is a reasonable chance that they can be restored to a higher value in the future.

Valuing Species

9.2.21 In accordance with the IEEM guidelines, when assigning a level of value to a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Rarity is an important consideration because of its relationship with threat and vulnerability although since some species are inherently rare, it is necessary to look at rarity in the context of status. A species that is rare and declining should be assigned a higher level of importance than one that is rare but known to be stable.

[2] Now known as the Chartered Institute of Ecology & Environmental Management

9.2.22 Reference is also made to UK and local Species Action Plans (SAPs) although, as with HAPs, the presence of a BAP-listed species reflects the fact that the population is in a sub-optimal state and does not necessarily imply any specific level of importance.

Predicting and Characterising Ecological Impacts

9.2.23 In accordance with the IEEM guidelines, when describing impacts, reference is made to the following, where applicable:

- **Confidence** in predictions (levels of certainty that an effect will occur as predicted), based on the following four point scale:
  - Certain/Near Certain (≥ 95% probability)
  - Probable (50–95% probability)
  - Unlikely (5–50% probability)
  - Extremely Unlikely (≤ 5% probability).

9.2.24 The key ecological receptors identified include notable or protected species and the habitats they support. These species and habitats have different levels of sensitivity based on the potential effect on the ecological receptors. In accordance with IEEM guidelines the follow aspects need to be considered to assess the receptor sensitivity:

- **Magnitude** – if an impact is deemed to be significant then its magnitude, in quantitative terms, should be assessed.
- **Extent** – the area over which an impact occurs.
- **Duration** – the time for which an impact is expected to last.
- **Reversibility** – a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it; a temporary impact is one from which a spontaneous recovery is possible.
- **Timing and frequency** – whether impacts occur during critical life-stages or seasons.

Direct and Indirect Ecological Impacts

9.2.25 Both direct and indirect impacts are considered within this assessment. A direct impact is directly attributable to a defined action such as the physical loss of a habitat or the immediate mortality of an individual of a particular species. Indirect impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or receptor. An example of an indirect effect would be the loss of an important prey species for a predator.

Approaches for Determining Significant Impacts

9.2.26 In accordance with the IEEM guidelines, a significant impact, in ecological terms, is defined as an impact (either adverse or positive) on the integrity of a defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, including cumulative impacts.

9.2.27 In accordance with the IEEM guidelines, the approach adopted here aims to determine if an impact is significant or not on the basis of a discussion of the factors which characterise it, i.e. the ecological significance of an impact is not dependent on the value of the feature in question. The value of any feature that will be significantly affected is used to determine the geographical scale at which the impact is significant. For example, an ecologically significant impact on a feature of value at county level is regarded as a significant impact at county level. This in turn is used to determine the implications in terms of legislation, policy and/or development control.

9.2.28 As noted above, impacts are only assessed in detail for receptors of sufficient detail that impacts upon them may be significant (in terms of legislation or policy). Therefore for the purposes of this assessment, impacts are assessed in detail only for those receptors that are of at least **local value**, or are subject to some form of legal protection.

9.2.29 Any significant impacts remaining after mitigation (the residual impacts), together with an assessment of the likelihood of success in the mitigation, are the factors to be considered against legislation, policy and development control in determining the application.

Assessment of Residual Effects

9.2.30 Residual effects are the likely impacts on wildlife and habitats which remain after implementation of proposed mitigation (avoidance and reduction measures) and include an assessment of certainty or confidence in the assessment (i.e. Certain/near-certain – extremely unlikely).

Limitations of the Assessment

9.2.31 There are no significant overall limitations that are considered to compromise the validity of this EcIA. Although note that details of any qualifications or limitations that specifically relevant to a particular habitat or species surveys undertaken, may be provided in the relevant technical reposts in Appendices 9.2-9.9.

9.3 Baseline Environment

Introduction

9.3.1 In the following sections, the existing baseline ecological conditions are described for the scheme route and the study corridor to either side of the route within the expected zone of influence of the scheme. Where there is good reason to believe that the baseline conditions are likely to change prior to the anticipated period for construction of the scheme, this is stated in the following sections and predictions made regarding likely changes in the baseline conditions. Such changes may arise due to natural processes or as a result of other development or changes and trends in land management.

9.3.2 The baseline description first of all provides an overall description of habitats and land-use along the rural and urban sections of the route. Areas subject to designation due to their ecological and nature conservation interests are identified and their relationship to the proposed scheme is described. Areas supporting protected and/or notable species or assemblages of flora and fauna are also described.

Sources of Information

9.3.3 A data search was requested from the Nottinghamshire Biological and Geological Record Centre (NBGRC), the local record centre (LRC). Information on statutory sites was obtained from Natural England's web-based mapping site magic.gov.uk and non-statutory sites of nature conservation importance and protected species were requested from NBGRC in November 2013. The results of the data search are summarised in Appendix 9.1 and the nearby designated sites are shown on plans Figure 9.1 and 9.2. Records of protected and notable species were also requested from NBGRC to a distance of 500m from the proposed GAR. The results of the data search for protected and notable species are supplied in the Phase 1 Habitat Survey Report in Appendix 9.2 or where appropriate in the technical reports (Appendices 9.3 - 9.9).

9.3.4 A review was made of all previous reports relating to the GAR including the Gedling Access Road Environmental Statement 2008[3], including ecological survey information from 2004 and 2007.

9.3.5 Ecological information submitted along with the Proposed Solar Farm planning application (permission granted) at the former Gedling Colliery Site[4], where relevant has also been considered within this chapter.

9.3.6 Separate technical reports have been produced for the sensitive habitats, species or assemblages surveyed and include details of the survey methodology and results. This chapter includes the assessment of the Gedling Access Road based on the information provided in those technical reports. These are saved in Appendices 9.1 – 9.10 as follows:

- Appendix 9.1, Statutory and Non-Statutory Designated Sites
- Appendix 9.2, Gedling Access Road Extended Phase 1 Habitat Survey Report and Desk Study Results (BSG, Nov 2013)
- Appendix 9.3, NVC Survey Report (WYG, 2014)
- Appendix 9.4, Amphibian Survey Report (WYG, 2014)
- Appendix 9.5, Badger Survey Report (WYG, 2014)
- Appendix 9.6, Bat Survey Report (WYG, 2014)
- Appendix 9.7, Breeding Bird Survey Report (WYG, 2014)
- Appendix 9.8, Reptile Survey Report (WYG, 2014)
- Appendix 9.9, Butterfly Report (WYG, 2014)
- Appendix 9.10 Invertebrate surveys 2004 and 2007 (David Tydesley and Associates, 2008)

9.3.7 Plans supporting this chapter and the technical reports include:

- Figure 9.1, Statutory Designated Sites
- Figure 9.2, Non Statutory Designated Sites
- Figure 9.3, NVC Survey Area Plan
- Figure 9.4, Amphibian Survey Area Plans
- Figure 9.5, Badger Sett Locations
- Figure 9.6, Bat Result Plans
- Figure 9.7, Breeding Bird Plans
- Figure 9.8, Reptile Survey Area Plan
- Figure 9.9, Butterfly Result Plan
- Figure 9.10, Mitigation Plan

Designated Nature Conservation Sites

Statutory Designated Sites

9.3.8 Three statutory designated sites of nature conservation importance were identified within the 2 km search area from the Gedling Access Road. All three sites are designated as Local Nature Reserves (LNR) and are shown on Figure 9.1 with citations included in Appendix 9.1.

9.3.9 The proposed road scheme passes through the northern edge of Gedling House Woods LNR which is located to the west of Whitworth Drive and east of Wood Lane. The wood contains semi-natural broad-leaved woodland designated for its biodiversity and its use of recreational activities.

9.3.10 Adjacent and to the south of Gedling House Wood LNR is Gedling House Meadows LNR , which is located between the track to Gedling House on its south-east boundary and Wood Lane to the west. The meadow is an example of semi-improved meadowland and is considered to 'probably been undisturbed for several hundred years'.

9.3.11 Both Gedling House Wood LNR and Gedling House Meadows LNR, combined area of about 19ha, are owned and managed by Gedling Borough Council supported by the volunteer group Friends of Gedling House Woods and Meadow.

9.3.12 Approximately 1.9 km to the south of the eastern extent of the proposed scheme is the Netherfield Lagoons LNR. This site is situated on the Flood Plain in Nottinghamshire and is attractive to a variety of wildfowl both feeding and breeding around the lagoons.

9.3.13 All the LNR are assessed as being of **County value.**

Non-Statutory Designated Sites

9.3.14 Sixteen non-statutory designated sites of nature conservation importance were identified within the 2 km search area from the GAR. All of these sites are designated at Local Wildlife Sites (LWS) thus are considered to be of **County value**; their locations are shown on Figure 9.2.

Gedling Colliery and Dismantled Railway LWS

9.3.15 One LWS, Gedling Colliery and Dismantled Railway, is located within the road development. Gedling Colliery and Dismantled Railway LWS (Reference 5/211) is a former colliery with notable plant assemblages and includes several small settling ponds and a dismantled railway with sidings and cutting which are now well-wooded; the site is about 35 ha in size. The citation for this site is included in Appendix 9.1.

9.3.16 Further surveys were carried out within the Gedling Colliery and Dismantled Railway LWS in 2014 to confirm the status of some of these notable habitats being effected by the proposed GAR development.

9.3.17 National Vegetation Classification (NVC) surveys of two areas of woodland within the LWS (and one outside the LWS) and three areas of grassland and pioneer communities were carried out in 2014. Vegetation sampling was also carried out within four waterbodies within the LWS. The methodology and findings of these surveys are provided in Appendix 9.3 and on Figure 9.3.

9.3.18 Table 9.3.1 provides a summary of the areas surveyed and a brief description of the NVC survey findings.

[3] Gedling Access Road Environmental Statement 2008 (David Tydesley and Associates, 2008) and supporting documents.

[4] Proposed Solar Farm planning application at the Former Gedling Colliery Site, (SLR ,2013)

Table 9.3.1 Summary of the NVC Survey Results

Habitat Type	Fig. 9.3 Label	Location	NVC Classification	Habitat Description
Woodland	Area 1 (Outside the LWS)	Land south of Whitworth Drive	W8 *Fraxinus excelsior* – *Acer campestre* – *Mercurialis perennis* (Ash – Field Maple – Dog's-mercury) Woodland.	The semi-natural / secondary woodland is dominated by Ash with very little Field Maple. Dog's mercury and native bluebell (*Hyacinthoides non-scriptus*) were recorded within the woodland among other common woodland species. This area shows closest affinities to the *Hedera helix* (ivy) sub-community.
	Area 2	Woodland west of the access track to the proposed Gedling Country Park from Arnold Lane.	W16 *Quercus spp.* – *Betula spp.* – *Deschampsia flexuosa* (Oak – Birch – Wavy Hair-grass) Woodland	A relatively immature recently established silver birch (*Betula pendula*) woodland developed on restored ground within the colliery. Several indicative herbs including wild strawberry (*Fragaria vesca*) and mosses were recorded within the woodland and grassland.
	Area 3	West of the proposed Gedling Country Park around Mapperley Tunnel	W21 *Crataegus monogyna – Hedera helix* (Hawthorn – ivy) Scrub with *Hedera helix – Urtica dioica* (ivy – stinging nettle) sub-community	Hawthorn dominated woodland with scattered ash trees and a ground cover dominated by stinging nettles (*Urtica dioica*) and stands of brambles *Rubus fruticosus agg. .*
Grassland and pioneer communities within the proposed Gedling Country Park		- Land west of the access track from Arnold Lane. - Land east of the access from Arnold Lane	The pioneer communities does not fit any defined NVC community *Cynosurus cristatus* (Crested dog's-tail) – *Centaurea nigra* (Black knapweed) Grassland although it was not possible to define further to sub-community.	Taller grassland grades into the pioneer communities on slightly deeper soils and these two habitats often grow in an intimate mosaic. The most frequent grasses are *Festuca rubra*, *Cynosurus cristatus* and *Agrostis capillaries*, none dominate this habitat. Herbs characteristic of calcareous grassland, such as fairy-flax (*Linum catharticum*), yellow-wort (*Blackstonia perfoliata*), bee orchid (*Ophrys apifera*), and burnet-saxifrage (*Pimpinella saxifraga*) were also noted within the pioneer communities.
Waterbodies	P3	Southern of two lagoons	A11 *Potamogeton pectinatus* (fennel pondweed) – *Myriophyllum spicatum* (spiked water-milfoil) community	Both species were recorded in Pond 4, only spiked water-milfoil was recorded in P3. Both ponds are contain a large population of invasive species New Zealand swamp-stonecrop
	P4	Northern of two lagoons		
	P6	Fire ponds west of access track to Alkane Energy buildings	Not defined	Too sparsely vegetated to determine NVC community.
	P7			

9.3.19 Both woodland types (W16 and W21) are common and widespread across the UK and within Nottinghamshire and are relatively abundant resources both nationally and in Nottinghamshire and therefore are considered to be of low botanical value.

9.3.20 The grassland community MG5 is considered to be relatively species-poor and better represented outside the GAR development. The assemblage of herb species within this grassland is not as abundant as those in the pioneer community habitat. This habitat is considered to representative of the lowland neutral grassland found throughout the proposed Gelding Country Park in which the Gedling Colliery and Dismantled Railway LWS is located.

9.3.21 The pioneer vegetation does not fit any defined NVC community as it has developed on artificial substrates which do not appear to reflect the local geology and their distribution has depended on imported materials. These communities contain populations of common cudweed which, although being described as "locally common" by Wood (2013), it is listed in the Nottinghamshire Rare Plant Register as it is classified as "Near Threatened" under IUCN criteria. The pioneer community also supports a small population of bee orchids and yellow-wort, both of which, although not considered either rare or scarce in the county, nevertheless have restricted distributions. The pioneer vegetation is also of considerable value in supporting an invertebrate assemblage. This habitat grades into bare and previously disturbed ground, grassland and scrub vegetation forming part of an open mosaic habitat, approximately 3ha in size, located on previously developed land.

9.3.22 Ponds P6 and P7 contained insufficient vegetation to make a botanical assessment. Lagoons P3 and P4 represent a community which is widespread but of local distribution throughout the lowlands of England. P3 and P4 did not contain any locally notable plant species and the presence of a large amount of the alien and invasive New Zealand pygmy weed places a severe limitation on the ecological value of these two standing waterbodies.

9.3.23 Of all the habitats located within the Gedling Colliery and Dismantled Railway LWS the pioneer vegetation community is considered to be the most significant in botanical value for its diversity of herb species which contributes to the assemblages of botanical habitats under which the LWS is designated.

Other LWS

9.3.24 Three other LWS are located between 100m-500m of the proposed scheme.

9.3.25 The three LWS between 100m-500m of the proposed scheme include Gedling Cemetery (Reference 5/2311) located to the south of the A6211, New Plantation, Burton Joyce (Reference 1/98) located 100m north of the eastern end of the GAR separated by housing and Harveys Plantation Meadow (Reference 2/370) located 200m south of the GAR separated by arable fields. A description for each of these sites is provided in the desk study results in Appendix 9.2, Table 1.

Vegetation and Habitats

9.3.26 The vegetation and habitats survey recorded the extent and nature of habitats within and adjacent to the GAR. The recorded habitats are described and illustrated in Appendix 9.2 and on Figures 1a Mapperley Plains to Lambley Lane and Figure 1b Lambley Lane to Barton Road. The summary of the result below is divided into the west and east sections of the proposed scheme.

West Section: Mapperley Plains to Lambley Lane

9.3.27 Mapperley Plains road is bordered by a line of young and semi-mature planted trees oak *Quercus spp*, ash *Fraxinus excelsior* and field maple *Acer campestre* behind which is a small field (150m x 60m) dominated by dense scrub and tall ruderals.

9.3.28 The west of the proposed route of the GAR passes through fields of species poor semi-improved grassland grazed by horse throughout the survey season. The majority of the hedgerows around these fields are also species poor. Two species- rich hedgerows with trees are present (Target Notes 9 and 10, Appendix 9.2, Figure 1a) to the south and east of the development boundary.

9.3.29 Mapperley Tunnels runs beneath the fields at the western end and continues into secondary broad-leaved woodland located on an embankment above Mapperley Tunnel where two Pepper Pots (i.e. ventilation shaft openings) are located. A small area of amenity grassland is located between the two Pepper Pots.

9.3.30 Mature broad-leaved woodland is present along the main railway cutting, its slopes, the embankments and above Mapperley Tunnel itself. The western end of the woodland is dominated by hawthorn and ash hawthorn has a continuous canopy. There are layers of understorey throughout this section of the woodland including young trees, scrub and impoverished ground flora. The eastern end of the woodland is characterised by semi-mature broad-leaved plantation woodland dominated by ash. There is limited understorey and less ground cover in the eastern section of the woodland. Several interconnecting paths are also present throughout the woodland.

9.3.31 To the north and east of the disused railway line lies the former Gedling Colliery site which comprises a vegetated mound. The vegetated mound associated with the tip Gedling Colliery is dominated by neutral grassland with patches of scrub throughout. The former colliery is proposed to become Gedling County Park.

9.3.32 In 2014 the land around the two settling lagoons shown on Figure 9.4 as Ponds P3 and P4 (central O.S. grid reference SK 614 436), located within the development, along with the other waterbodies located throughout the former Gedling Colliery have been managed in preparation for opening the site as Gedling Country Park.

9.3.33 To the south of the spoil mound is a flatter area supporting a mosaic of herb-dominated pioneer community and neutral grassland with scattered and dense scrub.

9.3.34 The habitat adjacent to the banks of the two settling lagoons (P3 and P4) located within the proposed Gedling Country Park are vegetated with ephemeral grassland. Dense stands of bulrush *Typha latifolia* dominate the margins of both lagoons. The southern most of the two lagoons has scattered alder *Alnus glutinosa* and willow *Salix sp*. scrub on the bank. Several other waterbodies are located throughout the former colliery including two small ponds located within the GAR (Ponds P6 and P7) and a secluded waterbody (Pond P2), located adjacent and to the south of the development boundary in a cutting between the former colliery and playing fields; all are surrounded by scrub and secondary broad-leaved woodland.

9.3.35 The lagoons outflow through to a culvert below the former railway embankment dominated by secondary broadleaved woodland and scrub. This habitat extends along the land between the Lambley Lane recreation ground and the proposed GAR above the former railway cutting in the south-east.

9.3.36 The proposed route of the GAR crosses the south-east slope of the colliery mound which supports a mosaic of bare ground/ herb-dominated pioneer communities and grassland, young broadleaved plantation woodland and scrub. Two narrow ditches are located in this area, an open cut ditch from the eastern slopes of the colliery connects to the southern large lagoon and outflows partially underground through the culvert under the railway embankment to the south of the colliery.

9.3.37 The proposed GAR passes through the semi-improved pasture fields associated with Glebe Farm and through the farm buildings and yard. The farm is dominated by buildings and hardstanding with tall ruderal vegetation and a small area of semi-mature sycamore. To the north of the buildings there is a small coppice of sycamore and elder which is open to grazing. Tall species-poor hedges are located around the boundary of Glebe Farm. To the north of the farm is a belt of young broad-leaved trees and scrub which is located parallel to Lambley Lane.

East Section: Lambley Lane to Barton Road

9.3.38 To the east of Lambley Lane are a series of intensively farmed arable fields bounded by managed species-poor hedgerows. This habitat extends onto land to the north and south of the proposed development and within the GAR up towards Gedling Wood Farm, where arable land is also located to the north of the farm. The eastern most arable field has a field margin of unmanaged neutral grassland which is dominated by Bent sp. *Agrostis sp.*, red fescue *Festuca rubra*, and common knapweed *Centurea nigra*.

9.3.39 Gedling Wood's small wood (to the south) and large wood to the north are both semi-natural broad-leaved woodlands located to the north of the proposed GAR. The woodlands are connected by a corridor of mature unmanaged hedgerow with a belt of mature oak and ash trees.

9.3.40 Semi-improved neutral grassland is located in fields adjacent to the track south of Gedling Wood Farm, to the south of the GAR (where a public footpath passes through to Almond Walk) and along the south-west boundary of Gedling Wood's small wood.

9.3.41 To the east of Wood Lane the GAR passes through a 10m wide strip of tall ruderal habitat in the north and a field of semi-improved neutral grassland to the south. To the south of this field are a group of buildings known as White Gates.

9.3.42 Gedling House Woods LNR is a mature woodland broad-leaved woodland located adjacent and to the south of GAR. To the south of the woodland is Gedling House Meadows LNR. To the north of the woodland is a field which has not been managed during the survey period and is now dominated by tall ruderal vegetation; previously recorded as improved grassland. The field is bounded by tall hedges and a recently created/cleared ditch is present along its northern boundary.

9.3.43 Gedling House is set in wooded grounds, dominated by broad-leaved woodland, to the south of Gedling House Woods and Meadows. Since 2008 a tall stock-proof fence has been installed within the southern extent of the woodland and a hardstanding car park is now located within the eastern end of the houses former walled garden. The western end of the walled garden contains semi-improved neutral grassland and patches of scrub.

9.3.44 The proposed GAR crosses the amenity grassland playing fields of Carlton le Willows Primary School and Academy. The field is bordered by a species-poor hedgerow to the south-east, along Burton Road, and a line of trees with scrub including planted non-native species along the northern boundary adjacent to Whitworth Drive. Residential housing and a chicken farm are located to the north of Whitworth Drive, beyond which are semi-improved neutral grassland pasture and a broad-leaved plantation woodland known as New Plantation.

9.3.45 The eastern end of the proposed GAR connects to the A612. The hedgerows around the A612 and Burton Road junction are species-poor. Wide managed species-poor semi-improved grassland verges are located

along the A612. Amenity grassland and broad-leaved plantation trees are located between the Colwick Loop Road (former A612) and the A612.

Notable Habitats

9.3.46 The following UK and Nottinghamshire LBAP habitats are present within or adjacent to the proposed GAR scheme:

- Arable field margins (UKBAP) and farmland (LBAP), located east of Lambley Lane.
- Lowland Mixed Deciduous Woodland (UKBAP), woodland located near Mapperley tunnel.
- Lowland Neutral Grassland (LBAP) e.g. MG5 grassland, located east of lagoons in the proposed Gedling Country Park.
- Mixed ash-dominated woodland (LBAP), located off Whitworth Drive.
- Open Mosaic Habitats on Previously Developed Land (UKBAP), which includes the pioneer community, associated bare ground and scrub located south of the lagoons in the proposed Gedling Country Park.
- Ponds (LBAP), located within proposed Gedling Country Park.
- Species-rich hedgerow (UKBAP and LBAP), located in fields south of Mapperley Tunnels and the Pepper pots.
- Standing water (UKBAP and LBAP), the two lagoons in proposed Gedling Country Park.

9.3.47 The majority of the notable habitat within the proposed GAR development are located within the Gedling Colliery and Dismantled Railway LWS and have been discussed in the Non-Statutory Designated Sites section above. Other notable habitat outside of the LWS are discussed below.

Arable Field margins and farmland

Farmland is abundant to the east of Lambley Lane, most of which has no or only <1.5m wide arable field margins. Two wider field margin, one assessed as species-poor neutral grassland (BSG 2013), are located to the south-west and west of Gedling Wood Farm, these are the only noteworthy arable margins but are not species rich and are only considered to be of **Site Value**.

Lowland Mixed Deciduous Woodland

The small section of woodland located between Whitworth Drive and Gedling House Wood LNR, surveyed in 2014 (Table 9.3.1.), contains species characteristic to that of a W8 woodland (Ash – Field Maple – Dog's-mercury). Native bluebells, a notable woodland species, was identified within this woodland. Bluebells are however abundant in other woodlands within 1 km of the site (including Gedling Farm Wood) and only a few clumps are present within the area to be impacted upon. The site does not qualify under the LWS criteria and thus is only considered to be of **Local Value.**

Species-rich hedges

9.3.48 Previous surveys identified the presence of two species-rich hedges (BSG, 2013) and these are identified as TN10 and TN9 on Figure 1a, in Appendix 9.2. One is located along a section of Arnold Lane and the other is located across the pasture to the south of Mapperley Tunnel. Both are assessed as **Local Value.**

Invasive Plant Species

9.3.49 Alien invasive species New Zealand Stonecrop/ Pygmyweed *Crassula helmsii* has been recorded in both large lagoons within the proposed Gedling Country Park.

9.3.50 Surveys in 2014 recorded Japanese knotweed *Fallopia Japonica* within an area of tall ruderal vegetation and dense scrub adjacent to the Glebe Farm buildings and along the access track to Chase Farm. Previous reports (David Tydesley and Associates, 2008) also make reference to Japanese knotweed within the proposed Gedling Country Park. The majority of the Japanese knotweed appear to be located outside the development area with the exception of one stand shown on Plan 9.3.

9.3.51 Due to their nature, invasive plant species typically have no ecological value as they tend out-compete native species and rapidly develop a monoculture with very little biodiversity value. However there is a **legal** obligation to not spread any plants of these plants which are listed on schedule 9 of the Wildlife and Countryside Act 1981.

Protected and Notable Fauna

Amphibians

9.3.52 The LRC provided thirty-six records of common frog *Rana temporaria*, ten records of common toad *Bufo bufo*, and twelve records of smooth newt *Lissotriton vulgaris* within 500m of the proposed GAR.

9.3.53 Table 9.2 provides a summary of the amphibians records at Gelding Colliery collected from; the desk study in 2013 (DS); previous report to support the 2008 GAR (GAR 2008); surveys carried out for Solar Farm at Gedling Colliery in 2013 (SF 2013) and surveys carried out for the GAR in 2014 (GAR 2014).

Table 9.3.2 Summary of known amphibian survey results at waterbodies in the proposed Gedling Country Park, maximum survey count provided.

Waterbodies (See Figure 9.4)	Common toad				Smooth newt			
	DS	2008	SF 2013	GAR 2014	DS	2008	SF 2013	GAR 2014
P2	1		-			7	-	6
P3	130	55	455	63		6	8	6
P4	105	*23*	470	48	1	1	3	59
P6		24	10	0		1	1	0
P7		15	2	0		1	19	0
Other		88	560	16		3 efts	11	-

9.3.54 The record centre provided records from 2010 of over 100 clumps of frog spawn within the two large lagoons (P3 and P4), frogspawn was also recorded in during the solar farm surveys in 2013. During all the surveys very few numbers of frogs (<10 individuals) have been recorded at any one time at waterbodies throughout the proposed Gedling Country Park. Large numbers of stickleback fish have been recorded during surveys in both the large lagoons.

9.3.55 The survey results from 2013 recorded an 'exceptional' population of common toads at the proposed Gedling Country Park of which a 'good' population (925 individuals) were recorded at the two on-site lagoons (P3 and P4). Surveys carried out in 2014 confirmed a 'good population' of common toads within these lagoons and also recorded several toads on land immediately to the south, south-west and east.

9.3.56 A maximum count of fifty-nine smooth newts were recorded in one of the settling lagoons during surveys carried out in 2014. Although this is not considered to be a large population of smooth newts it does exceed the threshold for Nottinghamshire's LWS criteria (March 2014).

9.3.57 The records collected from the waterbodies at the proposed Gedling County Park and the desk study information show that common frog, common toad and smooth newt would all meet the LWS criteria for Nottinghamshire. With all three species meeting the LWS criteria and the large population of common toad (a Species of Principal Importance for the county) the site around the proposed Gedling Country Park is assessed as being of **County value** for these amphibians.

9.3.58 NBGRC and previous surveys for great crested newt carried out at Gedling Colliery (David Tydesley and Associates, 2008 and SLR ,2013) identified no great crested newts within 500m of the proposed GAR scheme or the proposed Gedling Country Park.

9.3.59 The surveys carried out for the Solar Farm at Gelding Colliery (SLR, 2013) included almost all the ponds within 500m of the proposed GAR development that are located west of Lambley Lane. The results of this survey are provided in Appendix 9.4. No great crested newts were recorded during these surveys which were carried out one year ago and thus it was considered unnecessary to update the survey information for great crested newts at the ponds west of Lambley Lane.

9.3.60 Great crested newt surveys were carried out in 2014 at ponds not previously surveyed adjacent to or to the west of Lambley Lane and on land between Lambley Lane and the A612 up to 500m from the proposed GAR scheme. A 'medium' size metapopulation of great crested newts was identified at three ponds north of Gedling Farm located between 300-550m north of the proposed GAR scheme.

9.3.61 The majority of the development at this end of the scheme is located within arable land which offers limited protective cover and foraging resource for newts and thus only considered to be sub-optimal habitat for newts. A hedge is located between the proposed GAR and the main great crested newt breeding pond however the pond is over 550m from the development.

9.3.62 Whilst the presence of great crested newt means breeding ponds and land within 250m of the breeding ponds site would potentially qualify for consideration as a LWS, the proposed GAR is located well beyond 250m from these ponds and therefore the GAR site is considered to be of **Local value**.

Badger

9.3.63 Desk study and detailed badger survey information is provided in the confidential attachments in Appendix 9.5 and Figures 9.5 a&b including the badger setts location, social group, distance and direction from the proposed development and proposed mitigation.

9.3.64 Surveys in 2004 and 2007 identified numerous badger setts within the survey area, of which several are in close proximity to the proposed scheme. The 2014 badger surveys found there to be considerable badger activity in the vicinity of the GAR – this was particularly abundant between Lambley Lane and Burton Road. In comparison to the survey work carried out in 2004 and 2007 there has been little change in the number of Main / Annex Setts. However several new outlier setts have since become established and several previously recorded outlier setts have either become disused or were not found in 2014.

9.3.65 A total of twenty active badger setts (i.e. showing evidence of current use) were identified during the survey. Of these, eight are considered to be Main badger setts and twelve are considered to be other types of badger setts. A further nine setts previously identified prior to 2008 were either not found, were recorded as inactive or were occupied by other mammals.

9.3.66 Strong badger paths, marking regular badger routes, were recorded along woodlands, through grassland and along hedgerows throughout the survey area. Woodlands, pastures and arable farmland which dominate the landscape within the GAR and on adjacent land provide important foraging habitat for badgers. Anecdotal evidence indicates that badgers are also fed by local residents and forage in adjacent residential gardens. The site is therefore to be of value for badgers at a **Local level.**

Bat

9.3.67 The desk based study carried out in 2008 and 2013 with the LRC returned fifty seven bats records within 2km, which included 16 roosts or hibernacula. Three of these roosts, Mapperley Tunnel and its' associated ventilation shafts (pepper pots) and Glebe Farm are within the proposed GAR development.

9.3.68 The remaining 41 records returned by the LRC were 'casual' records for bat activity.

9.3.69 A daytime appraisal (guided by previous survey work; BSG, 2013) was carried out to identify and assess the bat roost potential at buildings and structures to support roosting bats[5]. This was followed up with more detailed internal surveys to search for evidence of roosting bats. Consequently a suite of nocturnal activity transects, automated static recordings, dusk emergence and dawn return surveys were completed, in order to determine the level of usage of these areas. See Appendix 9.6 for full details.

Roosts

9.3.70 A series of nocturnal surveys were carried out at buildings or features with either confirmed or potential for roosting bats. Surveys were spread throughout the season and comprised a dusk survey in Spring, a dusk and dawn survey in Summer and a dusk survey in Autumn.

9.3.71 During the surveys a total of five roosts were identified on or immediately adjacent to the proposed GAR scheme which included;

- Mapperley Tunnel (brown long-eared bat, common pipistrelle, Natterer's bat);
- The Pepper Pots brick ventilation shafts (common pipistrelle);
- Glebe Farm buildings (common pipistrelle);
- Chase Farm buildings (common pipistrelle);
- Gedling Wood Farm buildings (common pipistrelle)

9.3.72 Mapperley tunnel was historically known to support low numbers of hibernating and roosting bats and surveys undertaken in 2014 have concurred with previous findings. The tunnel and the pepperpots are considered to be of **District value** for hibernating and roosting bats.

9.3.73 The other roosts identified as small roosts of a common species, none of which were identified as supporting any roost type of conservation significance (i.e. maternity; hibernation etc) are considered to be of **Local value** for roosting bats.

Activity

9.3.74 Activity surveys were carried out along four pre-determined transect routes to cover the proposed GAR development and any potentially important habitats (i.e. woodlands, hedgerows etc) which may be adjacent. These transects were carried out on monthly basis between April and September 2014.

9.3.75 During the transects at least six species of bats were identified commuting and foraging across the site; in order of abundance these were common pipistrelle, soprano pipistrelle (*Pipistrellus pygmaeus*), noctule (*Nyactalus noctula*) and a Myotis species (considered likely to include Natterer's *Myotis nattereri*; Daubenton's *Myotis daubentonii;* Whiskered bat *Myotis mystacinus;* and Brandt's bat *Myotis brandtii;*

[5] In accordance with the Bat Conservation Trusts Best Practice Guidelines (2nd Ed. 2012)

which are all usually found in Nottinghamshire); brown long eared bat (*Plecotus auritus*) and a single Nathusius pipistrelle *(Pipistellus nathusii*).

9.3.76 Although there were some small seasonal variations in activity levels, there were no discernible differences in the level bat activity between the different transects.

9.3.77 Furthermore, bat activity was predominantly found to be associated with linear edges such as field boundaries, hedgerows and woodlands which is fairly typical of most bat species; however, no habitat features on the site were identified as being of particular importance and activity appeared to be relatively widespread across the site.

Static Monitoring

9.3.78 Static monitoring collected 165 nights of data over seven locations along the proposed GAR route between April and September 2014.

9.3.79 The same six species which were recorded during the activity surveys were also recorded on static detectors. Again common pipistrelle was the most frequently recorded species.

9.3.80 The level of bat activity between locations varied significantly with the average number of passes varying between 8.4 passes per night at location 7 to 57 passes per night at location 1. In fact the average number of bat passes recorded at location 1 was over twice the number recorded at any other location.

9.3.81 As a result it is indicative that location 1, which is a mature hedgerow connecting to the secondary woodland adjacent to Mapperley tunnel is the most important habitat to bats within the proposed GAR route with at least twice as many bat passes recorded compared to any other static recording locations.

Activity Assessment

Based on the species and number of bats recorded during the bat activity surveys , foraging areas and commuting routes and the presence of nearby potential / known roosts an assessment[6] found the site to be of **County value** for foraging and commuting bats.

Breeding Birds

9.3.82 The desk-based study carried out in 2013 identified 208 bird records - many of which are from Stoke Bardolph Sewage Treatment Works, located 500m east of the eastern boundary of the GAR. Bird species supplied through the data search included species protected under Schedule 1 of the W&CA, those listed as of principal importance under the provision of the NERC Act 2006 and those listed on the UK and Nottinghamshire BAPs and Birds of Conservation Concern (BoCC) in the Country

9.3.83 A full list of bird species identified by the desk study and their status is provided in Appendix 9.7, Table 1.

Surveys for breeding birds were carried out on four occasions between April – June 2014 across the entire GAR development and immediately adjacent land. A total of 56 species were recorded during the breeding bird surveys; of this total 44 species were considered to be breeding within or adjacent to the proposed GAR.

9.3.84 Protected and notable bird species recorded from the GAR survey corridor are listed in Appendix 9.7, Table 3. Plans for the breeding birds recorded are provided in Figures 9.7.1-9.7.3 (A&B). Protected and notable birds are summarised in this ES chapter and Table 9.3.

9.3.85 Evidence of barn owl *Tyto alba* (a Schedule 1 W&CA bird species) was recorded in a barn at Gedling Wood Farm and Chase Farm during the 2014 building assessment and bat surveys. A small number of old barn owl pellets were found in the barn proposed to be demolished at Gedling Wood Farm, no evidence to suggest breeding was found in these buildings and they are considered to currently be used by barn owl for roosting only. A detailed barn owl survey was not carried of all areas of Chase Farm as the building is in a state of disrepair and access was restricted due to health & safety risks. A barn owl was recorded leaving a farm building at dusk on the 28th August 2014 (recorded during a bat survey). The building is considered to be a barn owl roost, however nesting cannot be ruled out. During the breeding bird surveys no other potential barn owl roost locations, including trees, were identified within 100m of the proposed GAR development. The site is considered to be of **Local value.**

9.3.86 During the suite of surveys in 2007 and 2014 an incidental recorded a kingfisher *Alcedo atthis* within proposed Gedling Country Park, this sighting is assessed as a casual record and the individual was considered to be foraging and was recorded outside the breeding bird surveys. No suitable breeding habitat for this species has been identified within the development.

9.3.87 Sixteen notable bird species, on the BoCC red list and birds of principal importance under the NERC Act 2006, were recorded breeding with the survey area in 2014. Of these, thirteen bird species were recorded with territories within the proposed GAR scheme. Nine of these bird species are listed on the UKBAP and on the BoCC red list, one is listed on the UKBAP and on the BoCC amber list and the other six are on the BoCC amber list.

Table 9.3.3 Summary of notable bird species recorded breeding during the bird surveys in 2014

Common Name (BTO code)	Scientific Name	No. Territories (inside GAR)
bullfinch (BF)*	*Pyrrhula pyrrhula*	7 (1)
dunnock (D.)*	*Prunella modularis*	34 (14)
green woodpecker (G.)**	*Picus viridis*	19 (4)
house sparrow (HS)*	*Passer domesticus*	4 (0)
lapwing (L.)*	*Vanellus vanellus*	2 (0)
linnet (Li)*	*Carduelis cannabina*	13 (8)
little grebe (LG)**	*Tachybaptus ruficollis*	2 (2)
meadow pipit (MP)**	*Anthus pratensis*	2 (0)
reed bunting (RB)+	*Emberiza schoeniclus*	2 (1)
skylark (S.)*	*Alauda arvensis*	14 (3)
song thrush (ST)*	*Turdus philomelos*	14 (3)
starling (SG)*	*Sturnus vulgaris*	3 (2)
stock dove (SD)**	*Columba oenas*	3 (1)

[6] Recognised method, Wray et al. (2010):Valuing Bats in Ecological Impact Assessment (CIEEM In Practice No. 70, Dec 2010)

common whitethroat (WH)**	*Sylvia communis*	10 (6)
willow warbler (WW)**	*Phylloscopus trochilus*	14 (3)
yellowhammer (Y)*	*Emberiza citrinella*	4 (1)

** Section 41 NERC Act listed on the UKBAP and a BoCC Red list species*

*** BoCC Amber list*

+Reed bunting is listed as a UKBAP and a BoCC Amber list species

9.3.88 Of the notable breeding birds recorded with territories within the GAR, individuals were predominantly recorded within the arable fields to the east of Lambley Lane and include UK farmland bird indicators lapwing, linnet, reed bunting, common whitethroat, skylark and stock dove. The other notable bird species with the GAR were recorded in hedges and trees around the A612 and the scrub and woodland areas in the east and west of the proposed Gedling Country Park. A yellow wagtail *Motacilla flava*, a BoCC Red list species and farmland bird indicator species, was also recorded not breeding in the pasture to the south of Mapperley Tunnel.

9.3.89 The Nottinghamshire LWS criteria identifies eleven notable key habitats critical for nesting, foraging, roosting or territorial use by birds. Broad-leaved woodland exists at the western end of the development near Mapperley Tunnel and post-industrial habitat includes the land within the proposed Gedling Country Park. A total of five bird species were recorded within the broad-leaved woodland (achieving a threshold score of sixteen) of which only two species are located within the development boundary (achieving a threshold score of nine). Within the proposed Gedling Country Park survey area nine species of birds were recorded (achieving a threshold score of twenty four) of which five species were recorded within the development boundary (achieving a threshold score of nineteen). The total assemblages of birds recorded within these two habitat types do not meet the minimal LWS designation threshold criteria; as a result the assemblage of birds is considered to be of **Local value**.

Brown Hare

9.3.90 The LRC returned two records of brown hare *Lepus europaeus* recorded in July 2004 on pasture east of Lambley Lane and on a bridlepath north of Spring Lane near Lambley.

9.3.91 Brown hare was also recorded on several occasions during the suite of surveys carried out in 2014. Records were collected from arable fields to the north of the proposed GAR in arable land north of Gedling Wood Farm.

9.3.92 On each occasion one individual was recorded at a distance of greater than 100m from the proposed scheme. The site is therefore considered to be of value for brown hare at the **Site Level** only.

Invertebrates

9.3.93 Detailed invertebrate surveys were carried out in 2004 and 2007 (David Tydesley and Associates, 2008) and these have been used to inform his chapter – see Appendix 9.10. Since the 2008 ES, the number of invertebrates listed as UKBAP species has been increased to 411 species. Most UK BAP species are listed under Section 41 of the NERC Act and thus receive consideration through the planning process.

9.3.94 The previous invertebrate surveys were sampled by sweep netting, direct searching on flower heads, under stones etc or the use of a portable vacuum sampling apparatus. Aquatic invertebrates were sampled at the two settlement lagoons (P3 and P4) using a pond net. In 2007 the invertebrate survey covered not only the former colliery site but also included a walkover survey of the route of the GAR with sampling in woodland near the former railway cutting to the north-east of Arnold Land and in Gedling House Wood.

9.3.95 A summary table of the notable invertebrates recorded and (where known) their preferred habitat and food source is provided in Appendix 9.9, Table 3. A total of eight Nationally Rare or Nationally Scarce species and five NERC Act 2006 species (listed on the UKBAP) were recorded from the site.

9.3.96 Over three hundred invertebrates were recorded within the proposed Gedling Country Park during the 2004 surveys. One hundred and fifty-four terrestrial invertebrate species, twenty-seven aquatic invert species and six *odonata* species were identified in 2007. The latter are all classed being of Least Concern (IUCN rating) having been recorded from more than three 10 km squares in Nottinghamshire since 2000 or are migrants to Nottinghamshire and thus do not qualify under Nottinghamshire LWS criteria.

9.3.97 The majority of the terrestrial species and all aquatic species recorded in 2007 were found within the proposed Gedling Country Park, indicating the former colliery site supports a diverse invertebrate community. This reflects the diversity of habitats present, including the large settling lagoons which would have been relatively new when the surveys were carried-out and are expected to have become more diverse over the intervening period.

9.3.98 Based on the number of invertebrate species recorded (including several notable species from within the former the proposed Gedling Country Park/ Gedling Colliery and Dismantled Railway LWS) the assemblages on invertebrates onsite is considered to be of **District value**.

9.3.99 Six-belted Clearwing moth *Bembecia ichneumoniformis* were recorded in 2004 (but was absent in 2007). Although the results of the surveys from 2004 & 2007 did not record a large assemblage of moth species, the Gedling Colliery and Dismantled Railway LWS is designated for both its botanical communities and moth assemblages and this species is considered to contribute to the overall value of the LWS**.**

9.3.100 As requested during the scoping consultation, butterfly surveys were carried out in May and July 2014 to sample the butterfly population present on land within the proposed Gedling Country Park and within and immediately adjacent to the proposed GAR scheme.

9.3.101 Sixteen species of butterfly and five species of moth were recorded during the 2014 surveys. A butterfly report is provided in Appendix 9.9 and the locations of the *Lepidoptera* recorded are mapped in Figure 9.9. Five of the species recorded are considered to be notable, these are listed below:

- Dingy skipper *Erynnis tages* (UK and LBAP*)*
- *Essex ski*pper *Thymelicus lineola* (Restricted distribution in Nottinghamshire)
- Small heath *Coenonympha pamphilus* (UK BAP, research only)
- Cinnabar moth *Tyria jacobaeae* (UK BAP)
- Latticed heath moth *Chiasmia clathrata* (UK BAP)

9.3.102 All but one of these notable species were recorded either outside the proposed GAR scheme or in habitat not considered to be a limiting factor in the distribution of the species across the former colliery.

Dingy Skipper

9.3.103 Dingy skipper was recorded on one occasion within the proposed Gedling Country Park to the west of the two settling lagoons. Another three areas of suitable habitat are present within the survey area however no other individuals were recorded. Dingy skipper is typically found on brownfield sites and is also a listed as a *Butterfly Conservation for the East Midlands* 'medium' status priority species and a Nottinghamshire 'high' status priority species. Its presence at the proposed Gedling Country Park supports the LWS designation as Dingy Skipper is a species of principal importance and meets Criteria 1 of

Nottinghamshire's LWS criteria. Dingy Skipper has been assessed as of **County Level** within the development.

Reptiles

9.3.104 Many of the habitats within the GAR footprint are suitable for common reptiles such as slow worm, common lizard and grass snake. These common reptiles are fully protected species under Schedule 5 of the W&CA.

9.3.105 One record of common lizard *Lacerta vivipara* was provided for the desk study search area by NBGRC in relation to Stoke Bardolf Sewage Works, located to the east of the A612, in 2009.

9.3.106 Previous surveys carried out in 2004 and 2007 (David Tydesley and Associates, 2008) did not locate any reptiles. Surveys carried out in associated with the Solar Farm (SLR 2013), at the northern area located at the top of the proposed Gedling Country Park, in 2013 also recorded no records of reptiles.

9.3.107 Reptile surveys undertaken by WYG in 2014 throughout areas of suitable habitat within proposed GAR development recorded no evidence of reptiles – see Appendix 9.8 for details. The lack of their presence on site is therefore assessed at **Site Level**.

Riparian species

9.3.108 The LRC provided a single record for water vole *Arvicola amphibious* from 1996 for a beck at Lambley over 1 km north of the proposed development. No other records for fish or any other protected or notable riparian species such (e.g. otter *Lutra lutra* or white-clawed crayfish *Austropotamobius pallipes*) were provided by the desk study.

9.3.109 There is limited habitat to support protected and notable riparian species. The ponds and lagoons within the proposed Gedling Country Park are considered to be sub-optimal for support these species, lacking foraging resources and bankside or riverbed features necessary for these species to seek refuge. Similarly the ditches within and adjacent to the GAR described in Vegetation and Habitat section above are not of a suitable size or depth to provide sustainable habitat for these species.

9.3.110 Surveys and any further assessment for riparian species such as those listed above were excluded during the Scoping Assessment and are not considered any further in this report.

9.4 Future baseline

9.4.1 The baseline for the habitat is not expected to change significantly between now and 2019, when this two-phased development is due to be completed. In the absence of management, the habitats within and adjacent to the GAR will develop according to natural succession process, e.g. grassland to scrub to woodland.

9.4.2 Furthermore, the change in the future baseline characteristics for the areas assessed within this report will be comparable to those located in the wider area. The proposed development is also located inland, where effects of climate change are negligible in comparison to coastal areas and along rivers. It is therefore considered unlikely that the development would change significantly during the development or the subsequent aftercare period.

9.4.3 However the baseline information for species, as a result of their mobility and their life-cycle (including badgers, common toads, bats etc.) is likely to change over time. The length of currency of the ecological baseline information varies depending on species and this is detailed in the relevant technical report.

9.5 Mitigation within the Submitted Design

Design

9.5.1 The proposed GAR scheme has been designed to avoid known existing sensitive receptors identified during consultation prior to the 2008 Environmental Statement, where practically possible; see Chapter 4. However this has not been possible for all sensitive ecological receptors where limitations for the roads alignment exist.

9.5.2 Effort has been made in the design process to narrow the width of the road in areas where sensitive receptors exists e.g. through the proposed Gedling Country Park. The result is that land take from these habitats has been minimised and adverse effects already mitigated to some extent.

9.5.3 The planting proposal, illustrated on Figure 12.7 (a-g), where possible has ameliorated the loss of the majority of the habitats found on site. Planting proposals will enhance habitat continuity along the road. A schedule of habitat losses and gains arising from the proposed GAR development and the planting proposal are summarised in Table 9.5 below.

Table 9.5 Summary of habitat losses and gains[7]

Habitat		Existing Extent	Proposed Extent	Change
Arable		9.9ha	-	Decrease of 9.9 ha
Trees, shrubs and scrub	Broad-leaved woodland	3.3ha	7.6ha	Increase 7.5ha woody habitats
	Dense Scrub	0.6ha	-	
	Shrubs	-	2.4ha	
Grassland	Amenity Grassland	2.3ha	-	Decrease in 7.1ha of grassland
	Improved grassland	0.7ha	-	
	Neutral Grassland	1.1ha	5.9ha	
	Semi-improved grassland	10ha		
	Wetland grassland	-	0.4ha	
Ponds / SUDS		0.016ha	0.6ha	Increase of >0.58ha
Mosaic of habitats on previous developed land		3.1ha	-	Decrease of 3.1ha
Species-poor hedge		1,542m	-	Decrease in 357m of

[7] Measurements estimated from Phase 1 Habitat Survey drawings (Appendix 9.2) and the Planting Proposal drawings Figures 12.7.

Species-rich hedge	30m	1,215m	overall hedgerow length, but an increase in species diversity
Total	**31.016ha**	**16.9ha**	

Construction

9.5.5 Several construction ecological mitigation measures have already been included in the proposals to uphold the developments legal obligation for the protected and notable wildlife sites, habitats and species being affected by the development. The mitigation measures provided in Chapter 3 are superseded by the 'good working practise' during construction listed below:

- The use of ecological clerk of works (ECoW) to oversee ecological mitigation and licences works;
- Ecological tool box talks are given to construction staff prior to any works commencing;
- Covering or inclusion of ramps in excavations to avoid animals becoming trapped;
- Demarcation between construction activities and sensitive ecological receptors;
- Vegetation clearance outside the breeding birds season; and,
- Appropriate planting with more diverse species mix to compensate for habitats lost.
- Restrict nighttimes working near bat sensitive areas; and,

9.5.6 Any additional mitigation, compensation or enhancement measures required to address likely significant effects are provided in Section 9.6 below.

9.5.7 To ensure the implementation of these environmental protection measures during and after construction of the proposed GAR scheme, a Construction Environmental Management Plan (CEMP) would be prepared from the mitigation information provided.

Operation

9.5.8 No specific operational mitigation for ecology is currently proposed within this application. It is anticipated that this will be driven by the outcome of the EcIA below and the additional mitigation, compensation and enhancement measures that are recommended as a result.

9.6 Likely Significant Environmental Effects of the Scheme

9.6.1 As stated in the Paragraph 9.2.28, impacts are only assessed in detail for features both of sufficient value that impacts upon them may be significant in EIA terms and also potentially vulnerable to significant impacts arising from the development. Consequently, impacts have only been assessed in detail only for those receptors that are of at least **Local value** or are subject to legal protection.

9.6.2 The detailed assessment will therefore concentrate on the likely impacts in respect to the following receptors only:

- Designated Sites – Gedling House Wood LNR and Gelding Colliery and Dismantled Railway LWS and habitats;
- Notable Habitats, including lowland mixed deciduous woodland and species-rich hedgerow;
- Invasive Species;
- Amphibians;
- Badgers;
- Bats;
- Breeding Birds;
- Barn Owl (W&CA Schedule 1 Species); and,
- Invertebrates

9.6.3 The main impacts arising during the construction and operational phases which have been considered within this assessment, can be described in the following categories:

- Habitat loss through land take;
- Direct harm (including mortality) to species;
- Severance and fragmentation between habitats and species;
- Disturbance and habitat degradation caused by increase in noise, road lighting and pollution.

Construction Impacts

Statutory Designated Sites

9.6.4 The southern site boundary of the GAR abuts the Gedling House Wood LNR with the carriageway of the GAR encroaching to within 10m of the woodland. The development may result in **direct** effects such as the loss of trees or the removal of branches (siding up) of a small number of trees located along a 40m section of the woodlands northern boundary. The loss or management is considered to be small and unlikely to affect the integrity of this approx. 4.5ha woodland. Confidence is therefore **certain/near certain**, that **no significant impact** will affect this designated site during construction.

9.6.5 No other Statutory Designate Sites are anticipated to be affected by the proposed GAR development.

Non-Statutory Designated Sites

9.6.6 Gedling Colliery and Dismantled Railway LWS is located on the lower slopes of the proposed Gedling County Park. The GAR has been designed to be sympathetic as it passes through the LWS and has been narrowed in this section. Despite the narrowing of the road in the LWS, 9ha of the LWS would be subject to **temporary** loss or damage affected by the proposed construction works. This is approximately 25% of the total 35ha LWS. Less than half the total development area within the LWS is expected to result in the **permanent** loss of the following notable habitats to the construction of the GAR carriageway:

- lowland mixed deciduous woodland and scrub (2.8ha);
- lowland neutral grassland (1ha);
- ponds / standing water (0.016ha);
- habitat characteristic of open mosaic habitats on previously developed land (3.1ha); and,
- species they support e.g. amphibians, invertebrates, breeding birds ,bats.

9.6.7 Several of these habitats are listed on the UKBAP as well as the LBAP however the site receives a **County value** based on its level of designation.

9.6.8 The GAR development will also cause fragmentation between the habitats and species Gedling Colliery and Dismantled Railway LWS. This is further discussed in operational section for habitats and specific species sections where relevant.

9.6.9 In 2014 the road was realigned to move it further away from the two settlement lagoons (P3 & P4). There are no current construction activities proposed at the two lagoons. The development plans include a Sustainable Urban Drainage Systems (SUDS) in attenuating road run off to prevent flooding of adjacent existing watercourses / waterbodies and to provide pollution control. These SUDS will be designed as permanent water bodies.

9.6.10 With the standard design amelioration measures listed above, and in Chapter 3 the runoff of sediment and other pollutants as a result of the adjacent construction activities is **probable** to have **no significant impact** on the two settling lagoons. However the species supported by the two lagoons in particular amphibians which are likely to be affected by the loss of the adjacent habitat from the construction of the GAR along the southern edge of both lagoons.

9.6.11 The loss of the fire ponds (P6 & P7) is being ameliorated through the scheme design by the creation of new SUDs designed as permanent water bodies throughout the development including a new water feature (approximately 2240m^2 in size) located in the species-poor grassland to the east of the settling lagoons; it is **probable** that with careful designing and planting of the new waterbodies as proposed within the development design in this location there would be **significant beneficial effect** as neither of the fire ponds were considered to have any notable ecological value.

9.6.12 Despite not being the best example of their woodland type (Table 9.3.1) the woodland habitats within the LWS supports an assemblage of notable or protected species including badger, breeding birds and is likely to provide suitable habitat for invertebrates including moths and those supported by deadwood. The proposed planting of 10ha of woodland and shrub contribute to the amelioration for the loss of approximately 2.8 ha of semi-natural broad-leaved woodland from the LWS is considered to be a **probable significant benefit** effect.

9.6.13 The loss of an area of species-poor neutral grassland, assessed with MG5 botanical assemblage, is considered to be **probable not significant** given it's size (1ha), the abundance of this habitat throughout the proposed County Park and the rest of the county and the compensation of grassland proposed (6.3ha) within the planting scheme.

9.6.14 The pioneer community habitat forms part of a mosaic of habitats (UKBAP) in the LWS and this habitat also supports a number of plant species of county importance including Bee orchid and yellow wort. This habitat is present within several area of the LWS and the wider area within the proposed Country Park and has been recorded to supports birds' foot trefoil, the larval food plant for dingy skipper and clearwing moth. Approximately 1ha of this habitat is located on the southern slope to the south of the two settling lagoons and extends to the west of this area to the south of the fire ponds within the development area. Whilst this habitat also exists outside the development the loss of this habitat during construction of the GAR is likely to have a **certain / near certain significant adverse impact** on the LWS, however it is considered to be **reversible** in the long term as the habitat forms on disturbed ground.

Due to the extent of the development with the GAR, despite the proposed amelioration within the planting proposal design, it is considered likely that in the absence of further mitigation measures there will be **a certain / near certain significant adverse impact** on the habitat loss within the designated LWS site.

Habitats

9.6.15 Several habitats, e.g. mature trees and improved grassland, within the GAR have been excluded from the assessment as their value is considered to be below **Local level**. Notable habitats associated with Gedling House Wood LNR and Gedling Colliery and Dismantled Railway LWS have been discussed in the designated sites section above. The partial loss and potential damage and degradation of these habitats during construction activities has been ameliorated within the design of the scheme through the creation of new habitats as detailed in the planting proposal and good site practises will be used to protect the habitats located outside the development; the effects on other habitats is considered to be not Significant certain/ near certain.

Hedges

9.6.16 Hedges are not only features in themselves but they support a number of other species and perform a function in the landscape through connectivity with other habitats. The GAR will fragment this connectivity by severing a number of hedges located throughout the development scheme, but predominately in the east of the proposed scheme. The majority of the hedges are species-poor and are assessed at site level value.

9.6.17 Two species-rich hedgerows were identified on land in the west of the site and south of Mapperley Tunnel, however only one is being impacted by the proposed GAR development. The loss of approximately 30m from the northern end of a 260m section of species-rich hedgerow is considered **certain/near certain** to be **significant and beneficial** in the **long term** as the planting scheme include planting of new species-rich hedgerows totalling of over 1,200m in length and further linear planting of woodland and shrubs is proposed within the design of the scheme.

Lowland Mixed Deciduous Woodland

9.6.18 The small section of woodland located between Whitworth Drive and Gedling House Wood LNR, characteristic to that of a W8 woodland contains native bluebells, and is used by an assemblage of notable or protected species including badger (foraging), breeding birds and is likely to provide suitable habitat for invertebrates. The site is nota large enough and does not contain a large number of bluebells, The proposed planting of 10ha of woodland and shrub contribute to the amelioration for the loss of approximately 2.8 ha of semi-natural broad-leaved woodland from the LWS is considered to be a **probable significant benefit** effect.

Invasive Species

9.6.19 It is an offence under the W&CA to cause or permit an alien invasive species to spread in the wild. Japanese Knotweed has been identified in several locations in the west of the site and New Zealand Stonecrop/Pygmyweed has been identified in the settlement lagoons in the proposed Gedling Country Park. These are aggressively growing, non-native invasive species. Japanese knotweed is spread through the transmission of root rhizome and New Zealand Stonecrop can be mat forming suppressing all other vegetation and reducing oxygen levels in waterbodies. If any vegetation clearance or ground disturbance works are carried out in this area without any mitigation in place, it is **probable** this would lead to them spreading further and therefore an offence under the legislation causing a **significant adverse effect**.

Amphibians

9.6.20 It is **certain/near certain** there will be **no direct or adverse effects** on great crested newt ponds or individuals. None of the ponds onsite recorded the presence of great crested newts. A medium population of great crested newts, considered to be of **Local value**, were identified at three ponds located at between 300-500m north of the development boundary at their closet point to the development.

9.6.21 Gedling Wood and Barron's Plantation are located near these ponds offering better connectivity and highly suitable terrestrial habitat for amphibians. However, less than 5ha of the proposed GAR is located within land between 250m – 500m from this metapopulation of great crested newts and habitat connectivity with the great crested newt ponds is poor as they are located amongst arable land.

9.6.22 Using Natural England rapid risk assessment tool the proposed Gedling Access Road is of a scale and far enough away from these ponds that it is highly unlikely any offence would be committed by the development.

9.6.23 Furthermore, the only suitable terrestrial habitat within the development boundary within 500m of these ponds is the hedgerow, adjacent tall ruderal and species-poor grassland located over 400m from the nearest pond. A hedge adjacent to one of the ponds located over 550m away runs southwards and connects with the hedgerow within the development. Given the distance and connectivity between the proposed GAR and the lack of suitable habitat within the development it is unlikely great crested newts would use the habitats within the proposed GAR development.

9.6.24 Therefore as GCN are not considered to be present on the site and unlikely to occupy the GAR development in the future the effects of the development are considered to be **probably not significant**.

9.6.25 Smooth newts and common frog were found in small numbers on the proposed Gedling Country Park and in ponds to the north of Gedling Wood Farm.

9.6.26 A 'good population' of toads has been recorded within the settling lagoons (P3 and P4) located within proposed Gedling Country Park, which increases to an 'excellent population' when you include toad counts from the other ponds within the country park.

9.6.27 Despite the close proximity of the GAR to the two lagoons within the proposed Gedling Country Park there are no anticipated direct impacts on either of these lagoons and the potential effects of pollution from runoff of water have been ameliorated in the long term by the creation of new SUD's adjacent to the lagoons. Toads were recorded in small numbers on land around the ponds in particular in the areas of hard standing to the south. In the absence of mitigation, the loss of the adjacent terrestrial habitat from the construction of the GAR along the southern edge of both lagoons is **certain/near certain** to cause **significant adverse impact** to common toads which breed within these lagoons and migrate en masse onto the land where they spend much of their time.

9.6.28 Only small numbers of toads were recorded within the fire ponds (P6 & P7). As toads are not dependant on these two waterbodies and the scheme includes the creation of new SUDS with a permanent water source the overall gain of habitat for toads has been assessed as being a **probable significant beneficial effect** if precautionary measures are taken to protect the toads from direct harm.

9.6.29 Areas of suitable damp and shaded areas used for foraging (rough grassland) and hibernation sites (often woodland and refugia piles) are located around the lagoons and on land to the south and east of the proposed GAR development. The scheme includes appropriate planting to replace foraging and potential hibernation locations for common toads in the long term and to exclude amphibians from the development during and after construction of the GAR. However in the absence of further mitigation it is **certain/near certain** toads would be killed or injured during the vegetation clearance and soil stripping within the development and would be unable to migrate between ponds and hibernation sites, resulting in a **significant adverse impact** affecting their population size**.**

9.6.30 Runoff of sediment and other pollutants as a result of the adjacent construction activities is **probable** to have **no significant effect** on the lagoons as in the short term precautionary measures will be taken (see Chapter 3) during construction to prevent the runoff of water into existing waterbodies and in the long term the runoff from the road will enter the new SUDS which are within the scheme design amelioration measures.

Badger

9.6.31 No direct effects on any main setts are anticipated as a result of the proposed GAR scheme as they are all 30m or more from proposed construction areas.

9.6.32 Of the twenty setts recorded with evidence of 'current use', two badger setts (a subsidiary and an outlier) are located onsite and four outlier setts are located within 30m of the proposed GAR development. Whilst the loss of these setts is not considered likely to be deleterious to the badger population in the locality, if any vegetation clearance or ground disturbance works are carried out within 30m of a badger sett without mitigation in place, it is **certain / near certain** this would lead to an offence under the legislation and therefore causing a **significant adverse effect**.

9.6.33 The proposed GAR scheme would predominantly result in losses of arable habitat together with smaller areas of tall ruderals, grassland, woodland and also hedgerow habitat. As the losses are spread evenly along the scheme and there is abundant similar habitat within the area, it is considered that no single locality would experience significant losses of habitat as a result of construction. Therefore the habitat losses are considered to be so small in scale relative to undisturbed habitats that they will not affect the badgers' ability to gain sufficient resources to maintain their current population and thus the loss of habitat is considered to cause **no significant** effects on badgers. The proposed planting scheme in the long term is considered **probable beneficial** as better quality of habitat will be provided, in particular in the east of the site.

Bats

<u>Damage / Loss of Roosts Onsite</u>

9.6.34 Two bat roosts have been identified on site, Mapperley Tunnels and associated Pepper Pots and Glebe Farm.

9.6.35 Mapperley Tunnel has been identified as a bat roost used throughout the year by a small number of common and widespread bats including common pipistrelle, brown long eared and a Myotid sp.; the tunnel is also used by hibernating bats. The two Pepper Pots are ventilation shafts to the Mapperly Tunnel, and despite one being partially blocked with rubbish provide ventilation to the tunnel and may be used by a low numbers of common pipistrelles as a transient roost.

9.6.36 The GAR development does not directly impact the Pepper Pots but does pass immediately adjacent to the north of the eastern Pepper Pot. To allow the Pepper Pots air vent to be maintained a reinforced earth retaining structure would be constructed. The proposed road scheme crosses over the top of Mapperley Tunnel at chainage 275-350. The tunnel was investigated prior to 2008 and options for the reinforcement above and within the tunnel were provided. The options included:

- Option 1. Do nothing
- Option 2 On going monitoring and inspection
- Option 3. Geosynthetic reinforcement at base of GAR embankment
- Option 4. Spray concrete on interior of the tunnel beneath GAR embankment

9.6.37 The first three options do not have any anticipated direct effects on the tunnel or the roosting bats, but option 2 and option 3 are likely to result in a small degree of disturbance from noise and vibration during monitoring or installation of reinforcement, the extent of which is currently unknown.

9.6.38 Option 4, in the absence of mitigation, is likely to result is **direct adverse probable significant** impacts on roosting bats within the tunnel and the cavities they use to roost within.

9.6.39 Glebe Farm and adjacent habitats (including mature trees) will be lost to the proposed development. The farm and two trees have previously (David Tydesley and Associates, 2008) been identified as common pipistrelle bat roosts. Surveys in 2014 did confirm bats roosting at this location but foraging was recorded at dusk immediately adjacent to the buildings. The loss of this roost is **probable** to cause **significant**

direct adverse effect a small number of common pipistrelle bats that are considered to use the derelict farm as a roost transiently.

In addition to the two trees at Glebe Farm previously identified as bat roosts, a further eight trees within the west of the site (TN71,72,73,78,79,81 and 82 BSG, 2013) have been assessed with bat roost potential. The loss of these trees during Phase 2 of the GAR development during vegetation clearance is **probable** to cause **significant direct adverse** effect on potential bat roosts.

Disturbance to Offsite Roosts

9.6.40 Bat roosts have been identified within buildings at Chase Farm and Gedling Wood Farm located adjacent to the GAR development; these buildings are considered to be bat sensitive areas. There will be no direct impact on these bat roosts and are unlikely to be effected by indirect effects, such as lighting or noise, as this has been ameliorated through good site practise which includes the restriction of night time working near bat sensitive areas. The potential disturbance to bats within these roosts is considered to be **certain/near certain not significant**.

Habitat Loss

9.6.41 Whilst this development will result in the loss and severance of habitats used by bats for foraging and commuting (e.g. hedges, woodland, scrub) during the construction phase the planting proposal throughout the scheme has the opportunity to actually provide benefits for the local bat population. The woodland, grassland and waterbody /SUDS creation works within the GAR scheme will create new areas of open and more diverse plant communities throughout the entire development which would have an increased foraging value, in particular within the east of the site.

9.6.42 Therefore, due to the structure and proposals already within the design amelioration, the likely effect of habitat loss on the local bat population is considered to be **probable beneficial significant** in the **long term**, in the absence of mitigation.

Breeding Birds

9.6.43 The majority of the birds recorded during the breeding bird surveys have been assessed as being of value at the site level. However barn owl, listed as Schedule 1 bird species of principal importance, and UK BAP and Nottinghamshire BAP birds species have been assed as **Local value.**

9.6.44 While suitable habitat for breeding birds is extensive across the proposed GAR it is considered **probable** that the **temporary** loss of habitats (including foraging and nesting resources) during construction is **not significant** given the abundance of similar habitat on adjacent land. Overall the proposed planting scheme will provide a **probable significant beneficial** increase in foraging habitats, invertebrate resources and nesting sites (in particular in the west of the site) for the majority of the breeding birds recorded. Furthermore the fragmentation for breeding birds during the construction phase is **probable** to be **not significant** impact as birds will continue to be able to fly over the GAR.

9.6.45 All birds are protected from disturbance when nesting or attempting to nest and therefore vegetation clearance and ground works would **certain/near certain** to result in an **legal offence** under the W&CA if carried out during the nesting season (March – September). Due to the presence of a resident breeding assemblage, in the absence of any mitigation, it is a **significant adverse** impact due to a breach of the legislation.

Barn owl

9.6.46 Factors important in maintaining the conservation status of barn owl are protection of nest sites and maintenance of suitable foraging habitat, including primarily rough grasslands and adjacent hedgerows and woodland edges. The construction of the road is considered to be an insignificant factor as the GAR is not considered to be a major road (motorways and trunk road) and along with the proposed planting scheme it is considered **probable** barn owl will cross over the road to access foraging areas on either side of the proposed road and therefore habitat fragmentation and risk of collision is **not significant** during the construction phase.

9.6.47 No effects to barn owl nest sites are anticipated as a result of the GAR construction as there are no such sites within the development. The barn which is proposed to be partially demolished to widen the driveway entrance to Gedling Wood Farm has been confirmed with old evidence from a roosting barn owl. The loss of this roost site (<2 years old) is considered to be a **significant adverse** effect on barn owl.

9.6.48 Both barn owl roosts at Chase Farm and Gedling Wood Farm are also located adjacent (within 10m) of the scheme boundaries. The construction works are therefore considered probable to cause **significant adverse short term** disturbance to any barn owl occupying the roost.

9.6.49 Construction will result in the loss of roadside grassland habitats as well as hedgerows and field boundaries within GAR. Whilst these are not assessed as being of particularly high quality for barn owl, they are likely to be used by this species and without mitigation their loss would reduce the amount of small mammal prey available in the locality. The effect of this loss is difficult to assess as, although the existing habitats provide a source of prey, the proposed planting scheme will provide **long term beneficial effect** on barn owl prey and **probable significant beneficial** effect on barn owl.

Invertebrates

9.6.50 Both the Gedling Colliery LWS and the two woodlands (Gedling House Woods and associated woodland, and the mature woodland to the north of the former railway cutting) are important for invertebrates at a **District Level**. As a whole the LWS is notable for invertebrates due to the mosaic of various habitat types influenced by the previous land use and the current management regime. As a result of the proposed development there will be partial loss of small areas of habitats, and no total loss of any habitat type within the LWS and the woodland. It should be noted that some species, such as the cinnabar moth, are not dependant on the habitat type but more dependent on the presence of particular plants, in this case ragwort their main larval food plant.

9.6.51 In the absence of further mitigation it is **probable** that during vegetation clearance and soil stripping the loss / damage to habitats during construction would be **significant adverse impact** affecting the invertebrate populations.

9.6.52 However the habitat creation proposed as part of the overall planting scheme will also result in the creation of new areas of grassland, scrub and aquatic which will be of benefit to invertebrates as well as the addition of new edge habitats and areas of bare ground within the construction area, both of which are considered be provide good opportunities for invertebrates. The loss of habitat for invertebrate is therefore considered to be **reversible** in the long term.

9.6.53 Butterfly and Moth communities have been identified as **County value** at the site. The main larval food plant for dingy skipper and six-belted clearwing moth is bird-foot trefoil and this has been identified within several patches within the GAR, include two areas inside the development. Without mitigation the loss of these larval plants is **certain/near-certain** to have a **significant adverse** effect on both species populations.

Operational Impacts

Statutory Designated Sites

9.6.54 No direct habitat losses are anticipated from Gedling Wood House LNR once the road is operational. Indirect effect arising from the increase in lighting and noise from the road which will be within 10m of the LNR are considered likely to cause disturbance to species the woodland support, in particular birds and badgers. Furthermore the pollutants caused by dust, water runoff and traffic spray are likely to affect trees and their foliage nearest the road. The effects of pollution are considered to be **certain / near certain not significant** in the long term and will be reduced once the trees/shrubs proposed in the planting scheme become established.

Non-Statutory Designated Sites

9.6.55 Once operational it is anticipated the road will cause fragmentation between habitats, effecting plant colonisation and seed dispersal, and an increase in the degradation of habitats within the Gedling Colliery and Disused Railway LWS as a result of the increase in pollutants in particular road spray and runoff, this is likely to be a **probable not significantly adverse impact** for the settlement lagoons located within the LWS.

9.6.56 By narrowing the scheme at the design stage the area affected has reduced however the impact on the site is considered probable to be **significantly adverse** for its designated features i.e. plants, habitats and Lepidoptera (butterflies and moths).

9.6.57 The increase in both noise and lighting within the LWS is likely to cause a **certain/near certain significantly adverse** effect on the wildlife it supports in particular bats, nocturnal birds, amphibians and moths.

9.6.58 The proposed planting proposal will contribute to minimising the impacts from the road through the LWS but in the absence of further mitigation and enhancement is considered **unlikely significant** to provide a **neutral** effect for the impacts completely.

Habitats

9.6.59 The new habitats created following the construction phase which includes the planting of trees, shrubs, grass seeding, amenity grassland, wetland grassland creation and water bodies including SUDS creation throughout the scheme is considered to be **certain/near certain significantly beneficial.**

9.6.60 The current development description (see Chapter 3) does not currently include any commitments for ongoing operational management of the site, other than to say this will be secured through the CEMP. It is considered that if the newly created areas are not suitably managed and maintained during the operational phase, then they could rapidly develop into rank grassland / scrub and thereby eroding the botanical value of the habitats over a short period of time. The road will cause fragmentation between habitats both terrestrial and aquatic resulting in a reduction in the overall habitat quality and the ecological functionality of the habitat. Furthermore there is likely to be an increase in pollution and disturbance caused by water runoff, traffic spray, dust and increase in public accessibility. As a result, in the absence of any further mitigation measures, it is **probable** that this would have a **significant adverse impact**.

Amphibians

9.6.61 The presence of great crested newts on land over 350m north The effect on great crested newts during the operation phase is considered to be **neutral** as they are extremely unlikely to utilise habitats within the proposed GAR scheme. Their presence within the site is therefore considered to be **probable not significant.**

9.6.62 The operational road is located adjacent to the southern edge of the two settlement lagoons (P3 & P4) where several species of amphibians recorded in large numbers, in particular common toad, have been recorded. It is considered **certain/near certain** once the road is operational and amphibians, in particular common toad, undertake their migration between their hibernation (terrestrial habitat) and breeding sites (waterbodies) they could be killed/injured as they attempt to cross the road which will fragment these habitats restricting amphibians to the south of the road accessing terrestrial and aquatic habitats to the north. This would result in a **significant adversely** impact on the population of amphibians at the Gedling Colliery and Disused Railway LWS within the proposed Gedling Country Park.

9.6.63 The effects of lighting and noise, generated by the road, on amphibians are unknown. There is an increase in lighting to areas of both terrestrial and aquatic which is relatively dark proposed

9.6.64 The extent of the works required within and adjacent to the waterbodies within the proposed Gedling Country Park are currently unknown, it is anticipated there will be some management to the new waterbodies. It is likely there would be an increase in pollutant runoff from the operational road. The design measures propose both a planting scheme between the road and the existing waterbodies and the creation of new waterbodies including SUDS to alleviate the effects this may have on existing waterbodies resulting in a **probable non significant** effect on the waterbodies and the amphibians they support.

Badger

9.6.65 Despite the fragmentation between habitats, badger setts and social groups badgers will still be able to cross the single carriageway road but the traffic movements are probable to present a hazard to badgers resulting in road kills and injury.

9.6.66 Increase mortality is considered to be the most significant effect to badgers where established badger paths cross the proposed GAR scheme. Where badgers continue to use these paths to access foraging areas within their territories there is an increased risk of collision with traffic. In the absence of mitigation it is likely that this increase in mortality would have a **significant adverse long term** effect on badgers and lead to a reduction in the size of the local population as badger social groups.

9.6.67 Badgers are relatively tolerant to noise; badger setts are known to exist beneath motorways/dual carriageways. The increase in disturbance caused by traffic noise is only anticipated to affect those badgers located within 30m of the proposed GAR development. The likely effect will be that badgers choose to relocate their setts away from the road potentially entering into another badgers territory. Where badger density in the west of the site is relatively low this is considered to be less adverse effect than in the more densely populated areas in the east of the site.

9.6.68 Within 30m of the proposed GAR development there are five outlier and one subsidiary badger setts, which are all anticipated to be lost or disturbed during the construction phase. Initial disturbance and habitat loss to the badgers as a result of the construction phase is probable to most significantly effect badgers. By the time the construction works have been completed and the road is operational, the effect on the badgers and their social group territories will be **insignificant** in comparison. However once completed the road will be significantly closer, within 50m, of a main sett placing greater pressure on the badger social group and the already constrained territory located in the east of the proposed GAR scheme and to the south of the road.

9.6.69 Overall, in the absence of mitigation the effects of habitat severance and potential mortality (from badgers attempting to cross the road) during the operational phase of the proposed GAR development, are considered to be **certain/near certain significant, adverse** and **long term** to badgers.

Bats

9.6.70 The proposed development means that new sources of lighting will be introduced in order to provide safe vehicular and pedestrian rights of way through and beyond the site.

9.6.71 Road lighting is known to affect the feeding/commuting behaviour of bat species. Pipistrelle species are attracted to and appear to benefit from white lighting that attracts insects. Myotis species on the other hand appear to be disturbed by lighting and are likely to avoid the area of the road if lit thus depriving them of familiar feeding areas.

9.6.72 Therefore, in the absence of mitigation, a poorly designed lighting strategy would have a **certain/near certain significant adverse** impact on the value of the site for foraging bats. The introduction of direct or bright lighting within or adjacent to the retained and newly created habitats corridors would have a detrimental effect on their use by foraging and commuting bats.

Barn owl

9.6.73 The operational road scheme will have no direct effects on the two known roost sites at Chase Farm and Gelding Wood Farm. The operational phase of the proposed GAR is however considered probable to cause **significant adverse long term** disturbance to barn owl which have been identified as roosting within 10m of the proposed GAR at these two farms.

9.6.74 The effects of major road schemes can result in the absence of breeding barn owls within 0.5km either side of a road primarily for the increase in mortality from collision with traffic (Ramsden, 2003[8]).

9.6.75 Areas of greater risk are in places where the road is raised significantly above the levels of surrounding land and where traffic is exposed (e.g. not screened by vegetation) to low flight routes. Risk is raised where such locations coincide with areas of above-average habitat (Ramsden, 2003) such as semi-improved grassland or woodland edges where prey levels are higher and where linear habitat features may 'lead' owls toward the carriageway.

9.6.76 The single carriageway proposed GAR is not considered to be a major road and thus the risk of mortality from collision with traffic is considered unlikely. The majority of the road is also located either at the same level or within a cutting which again reduces the risk to barn owls flying over the road.

9.6.77 In the west of the site to the east of Mapperley Plains road the GAR will be located on an embankment up to 14m in height as the land forms a valley. Barn owl, recorded at Chase Farm adjacent to the proposed GAR embankment, will be at a higher risk of mortality from the GAR located on the embankment. This is considered to be **probable significant** impact in the **short term** (<5 years) for barn owl whilst the vegetation establishment proposed within the planning scheme becomes established between 5-15 years. Once the vegetation becomes established (5-15 years) it is considered that this effect will be reduced. The proposed planting scheme includes planting of taller vegetation along the road where it is located on an embankment (to the west of the scheme) to encourage animals such as barn owl to fly over the traffic.

9.6.78 Lighting along the development, in particular through the rural areas is considered to increase light spill on habitats used by barn owl and whilst barn owl is known to forage in areas well lit by street lighting they choose to stay within dark areas. The proposed GAR is therefore considered to cause a **significant adverse long term** effect on barn owl foraging in the absence of mitigation, in particular in the east of the development.

Breeding Birds

9.6.79 The GAR will impact on a relatively small area of habitats available to birds. All the habitats impacted are commonly distributed either side of the GAR. Once operational the proposed planting scheme will provide a **probable significant beneficial** increase in foraging habitats, invertebrate resources and nesting sites (in particular in the west of the site) for the majority of the breeding birds recorded. This habitat will increase in value to birds and providing **long term** benefit as it grows and becomes more established. Fragmentation for breeding birds during the operational phase is **probable** to be an **insignificant** impact as birds will continue to be able to fly over the single carriageway road.

Invasive Species

9.6.80 There are no direct anticipate effects on invasive species during the operation phase of the GAR. Any management of habitats within the site during the operation phase should consider the presence of invasive species onsite; this is considered to be a **legal** obligation and **probable not significant** effect.

Invertebrates

9.6.81 The majority of the impacts on invertebrates will occur during the construction phase of the development. By the time the road is operational the operation phase of the scheme is **unlikely** to cause **significant** effects to the majority of invertebrates along the development.

9.6.82 The only effect considered likely is the increase of disturbance caused by lighting along the road through the Gedling Colliery and Disused Railway LWS and adjacent to Gedling House Wood LNR where surveys have recorded large numbers of invertebrates; this is partially significant for nocturnal species such as night flying moth where the effects of lighting (in particular within the LWS) are considered to **probable significantly adverse** in the absence of any mitigation**.**

9.7 Additional Mitigation, Compensation and Enhancement Measures

9.7.1 Mitigation measures will be secured through and ecological management plan within the wider CEMP.

Construction

Statutory Designated Site

9.7.2 Where practically possible the removal of the trees from Gedling House Wood LNR will be avoided. Only where essential for the purpose of access will either trees or tree branches be cut back, this is likely to involve the cutting of lower branches. Any felled woody species will be stored in piles adjacent to the working area to provide habitat for fauna such as invertebrates and amphibians.

9.7.3 To further protect the trees in the LNR , the following will be implemented where possible:

- Use a demarcated buffer up to 2-3m from the tree canopy edge to protect LNR;
- Avoid unnecessary vehicle movement, soil storage etc. which can cause soil compaction and potentially damage tree roots on land immediately adjacent to the LNR; and,
- Limit and monitor the effects of pollutants such as dust, noise and incidental damage or spillages that may affect the LNR.

Non-Statutory Designated Site

9.7.4 As compensation for the loss of the majority of the habitats throughout the development planting is proposed within the scheme design. However the scheme has been narrowed through the Gedling Colliery and Dismantled Railway LWS in order to minimise the area impacted by the development and further mitigation is required to protect and enhance the LWS habitats.

9.7.5 A management strategy, to be incorporated within an agreed CEMP, will include methods of mitigation, compensation and enhancement in order to protect the LWS habitats and species they support. The following mitigation and management will be required:

[8] Barn Owls and Major Roads: results and recommendations from a 15-year research project (Ramsden, 2003). Published by the Barn Owl Trust.

- Demarcation with permanent fencing to protect the LWS outside the development along the development boundary;
- Methods, locations and timing for the translocation of the notable habitat described as a pioneer community which forms part of the mosaic of habitats recorded within the development;
- Appropriate plant seed mixes, where different to the planting proposal;
- Appropriate design and planting of new waterbodies and management of the existing and new waterbodies to improve their ecological value;
- Method of managing or avoiding the spread of invasive species;
- Methods to protect the protected and notable species (discussed in the relevant sections below) in particular amphibians during the removal of the fireponds and during vegetation clearance; and
- Seed harvesting and larval food plant translocation methods from the existing vegetation to newly created or agreed receptor site within the proposed Gedling Country Park, see invertebrates for more details.

9.7.6 Monitoring and where necessary remedial measures for reseeding and habitat management will be required to ensure successful establishment and maintenance of habitats during the construction and operational phase.

Hedges

9.7.7 The existing species-rich hedgerow located to the south of the Mapperley Tunnel would be protected by temporary fencing during construction period. The removal of woody vegetation will be limited where possible to the northern extent of the hedge (30m) where there is an existing gap in the hedge.

9.7.8 New hedgerows to be planted with locally sourced native species will be species-rich including five or more woody species (ideally seven on average per 30m length of hedgerow). Overall there will be a net decrease of approximately 350m of hedge habitat, however almost all the hedges being lost are species poor and over 1,200m of new species-rich hedges will be created, representing a **probable** a **long term significant beneficial** gain in more diverse hedgerow habitat considered to be of benefit to local nature conservation interests.

Invasive species

9.7.9 No specific operational mitigation is proposed, as no ground or vegetative disturbance works are currently proposed within this area, as part of the proposed development operational phase.

Amphibians

Great Crested Newt

9.7.10 In areas of suitable terrestrial habitats and within 500m of the ponds where great crested have been recorded, a precautionary approach should be adopted under the advice of an ECoW to carry out the following:

- vegetation strimmed to a height of 15-20cm to deter amphibians and mammals;
- hand search of refugia to be removed e.g. rubble and log piles; and,
- a brief walkover survey prior to soil stripping to check amphibians.

9.7.11 Terrestrial habitats considered to be suitable for great crested newt within 500m of the great crested newt pond – including the hedgerow, the strip of tall ruderal vegetation and semi-improved grassland located to the south and south-east of Gedling Wood Farm.

9.7.12 The risk of encountering a great crested newt is considered to be extremely unlikely, a European Species Licence for great crested newt is not considered to be necessary for the proposed GAR development.

Other Amphibians

9.7.13 To compensate for the loss of the fire ponds (P6 & P7) new waterbodies are proposed within the layout of the GAR development as shown on the planting proposal. It is recommended the proposed SUDS / new waterbodies are created and planted, before (at least 6 months prior) the removal of the two fire ponds located within the development and the proposed Gedling Country Park. These new waterbodies, along with the settling lagoons will become receptor sites for any amphibians found during the works.

9.7.14 To mitigate against the likelihood of amphibians becoming killed/injured as they attempt to migrate between ponds and across the route of the GAR, an amphibian trapping programme will be undertaken.

9.7.15 The capture, trapping and exclusion of amphibians from the fire ponds and the development area, including the area of new waterbodies, are required prior to the commencement of the construction works. The exact timing of the works will be dependent on when Phase 2 of the development is proposed for - currently only assumed to be completed by 2019. A more detailed schedule will be provided in the CEMP and it will consider the following life cycle for amphibians, in particular common toad:

- mid-January to mid-April – migration and spawning – amphibians migrating to and breeding in waterbodies
- mid-March to October - adults and juveniles within terrestrial habitat
- mid-April to mid-July - tadpoles in ponds
- mid-June to mid-July – toadlets leave ponds
- November to mid-January - amphibians hibernating

9.7.16 A capture programme will be put in place to rescue amphibians before they cross the development area prior, and where necessary throughout, the construction of Phase 2 of the development.

9.7.17 Removal of the fire ponds will be carried out during appropriate timing to avoid the breeding season and where necessary trapping of amphibians from the fireponds and their exclusion and relocation into the new ponds.

9.7.18 In addition to the trapping of the waterbodies being lost, trapping throughout the development area around the lagoons will be required initially and then again outside the development area throughout the migration period to move amphibians to suitable habitats on either side of the road.

9.7.19 Using material removed/felled during the vegetation clearance new hibernacula will be created to compensate for the loss of vegetation and refuge sites. The new hibernation sites will be located within 100m of the existing and new waterbodies within the proposed Gedling Country Park.

Badger

9.7.20 The impact of the construction of the road on badger populations in the area is likely to be complex. Further details for badger mitigation is contained within the confidential technical report that accompanies this environmental statement (Appendix 9.5), and it is recommended that it is made available by Gedling Borough Council on a restricted basis once a planning application has been submitted.`

9.7.21 In summary mitigation measures include the closure or protection, using appropriate fencing, of all badger setts within 30m of the proposed GAR development and 'good working practise' measures that will reduce the risk badgers of badgers occupy the development area, become trapped or are at risk from construction activity.

9.7.22 A badger licence for the purpose of development will be required in order to legally close any active setts or to carryout works considered to be disturbing to badgers in close proximity to their setts. Under the conditions of a Natural England licence it is likely at least one artificial badger sett will be required to compensate for the loss of at least one subsidiary and an outlier badger sett, during Phase 2 of the development.

9.7.23 Further monitoring of badger activity at the sett is likely to be required throughout the entire GAR development (Phase 1, Phase 2 and during the aftercare period) including an update survey prior to the commencement of the development.

Bats

Mitigation

9.7.24 In order to prevent an offence occurring due to the destruction, obstruction or disturbance of a bat roost, once planning permission is granted an application will be made for a Natural England European Protected Species (EPS) licence. This will be include measures to mitigate for the proposed loss the pipistrelle roost located within Glebe Farm, any works at Mapperley Tunnel and for the loss of any trees identified as bat roosts. Due to the relatively low value of the roost at Glebe Farm and two trees at the Glebe farm and further eight trees with bat roost potential, twenty-four artificial bat boxes will be installed on trees within the retained habitats (Figure 9.10), in order to provide alternative roosting sites within the development. A range of boxes styles will be erected, however these will focused on those that providing roosting features that are suitable for the species recorded on site during activity surveys i.e. common & soprano pipistrelle, Myotid sp. and noctule.

9.7.25 The precise detail and design of this mitigation would be agreed through the Ecological Management Plan, in agreement with the relevant stakeholders. This document can then feed directly into the subsequent Natural England licensing procedure once it has the confirmed support of all relevant parties.

9.7.26 It should be noted that if commencement of construction works at Mapperley Tunnel or demolition of Glebe Farm commence after April 2016 (2 years after 2014 bat surveys) then update bat surveys will be completed to re-confirm the status of the roost.

9.7.27 Limiting construction to daylight hours would overcome disturbance to bats caused by lighting . If lighting is needed during construction it should be strictly limited to those areas where it is necessary for health and safety. Contractor's compounds are often permanently lit at night. The compound should not be sited near known areas of bat activity or bat roosts.

Mitigation Mapperley Tunnel Roost

9.7.28 The exact proposals regarding Mapperley Tunnel are not currently known, however options have been provided. Whichever option is selected to secure the bat roost in perpetuity the following mitigation measures will be undertaken:

- Closing off the tunnel to the public by restricting access at the entrance but allowing bats to continue to access the tunnels; and
- Removal of the rubbish inside the tunnel at the northern Pepperpot for continued safety of the tunnel and improvement of access for bats in and out of the tunnel;

9.7.29 Furthermore if option 4 (spraying of concrete within the tunnel) is selected a variety of artificial bat roosting facilities such as bat boxes, bat bricks and timber strips will be fixed to the tunnel walls and ceilings to provide alternative roosting locations for bats to replace those lost.

9.7.30 For all options, the removal of the rubbish, the securing of the tunnel entrance, spraying and provision of roosting (if required) facilities a EPS licence will be required from Natural England to facilitate the disturbance or loss of any bat roost or hibernacula within the construction fabric of the tunnel. This would require the approval of a detailed mitigation and compensation strategy to ensure there was no risk of harm to bats, and the favourable conservation status of the species concerned was maintained within its natural range.

9.7.31 This strategy would also need to have specific regard to the exact risks of the methods proposed to reinforce the tunnel; these methods may pose risks to bats which are hard to quantify precisely given the large size and inaccessibility of parts of the tunnel. The strategy should also account for the possibility that this tunnel offers important habitat, at least in a District context, for mating bats.

9.7.32 The preferred option to any reinforcement of the tunnel is as non-invasive as possible to minimise the effects on bats; for example by upright steel supports and / or mesh with appropriate gaps to retain bat access, rather than via injection or sprayed concrete lining, given the risks of likely entombment posed by the latter. Prior to any work to reinforce the tunnel commencing a structural engineer will be appointed to work in partnership with a consultant bat ecologist, with input welcomed from local and national bat conservation groups.

Mitigation Other Roost onsite

9.7.33 Glebe Farm is be demolished with the consequent loss of the bat roost. Before construction starts compensatory roost facilities will need to be provided, for example by the provision of bat boxes on nearby trees. Bats will need to be excluded from the bat roosts and a Natural England EPS licence will be required for this work.

9.7.34 Similarly trees considered as bat roosts or potential bat roosts will be lost during construction. Before the trees are felled, alternative bat roosts will have to be provided in the form of bat boxes nearby. These trees will require a detailed survey to inform a Natural England licence prior to their felling of the trees.

9.7.35 The provision of alternative roosting facilities will provide the opportunity to reduce adverse impacts from losing existing bat roosts to neutral. A variety of bat box types will be installed in a variety of positions, away from illumination by the road or other lighting and their uptake will be monitored throughout construction during the aftercare period.

Enhancement

9.7.36 The planning proposal includes the provision for the habitats lost during construction. Along the road boundary planting will maintain and enhance habitat continuity in the long term along commuting corridors between both roosts and foraging areas. The following aspects of the planting proposal will benefit the local bat population:

- New species-rich hedgerows (1,200m) throughout the scheme;
- All SUDS/waterbodies along the proposed scheme designed in accordance with the Design Manual for Roads and Bridges advice note HA 103/6 'Vegetative Treatment Systems' which would result in additional wildlife habitat, including promotion of invertebrate (insect) communities which would provide prey for bats;

9.7.37 The proposal also includes a number of SUDS/waterbodies which will provide further foraging resource for bats, in particular in the esast of the site where low quality foraging (arable) habitats dominate.

Barn owl

Roost

9.7.38 A pre-development survey will be needed prior the demolition of the barn at Gedling Wood Farm which will be demolished to allow the new access track to be created. Whilst evidence of barn owl was not indentified within this building it is located adjacent to another farm building where evidence of an old roost was identified. The barn recorded with previous evidence of use by barn owl will be retained and remain available to barn owls in the future.

9.7.39 Alternative provision of a barn owl roosting/nesting box will be provided for barn owls within 200m of the development at least 30 days prior to the commencement of construction works. This will be located within 150m of the two farm buildings where barn owl evidence has previously been recorded; at Gedling Wood Farm and Chase Farm. As these boxes will also be part of the mitigation for the operation phase of the development they will be located in a location where they can remain permanently and as far away from the road as possible - ideally adjacent to areas of suitable terrestrial habitat for barn owl's main prey of voles (which are commonly found in rough grasslands). This habitat is abundant to the north of the woodland adjacent to Chase Farm within the proposed Gedling Country Park. However this type of habitat is limited within the east of the site which is dominated by arable land but does exist along some arable field edges.

9.7.40 The commencement of the construction works using heavy machinery within 150m of both farm buildings should be commenced outside the nesting season or towards the end of the season. Once alternative provisions have been provided works should commence between October – February to avoid causing disturbance to any nesting barn owl.

9.7.41 To monitor the affect on barn owls, barn owl surveys will be carried out annually (between October – February) outside the nesting season to confirm continued presence of barn owl within the farm buildings and roost/nesting boxes.

Habitats

9.7.42 The planting proposal provides compensation for the loss of habitat for the site including the planting of tall vegetation screening that will also reduce the risk of barn owl cross the road at vehicle height. As the road is located in a cutting throughout most of the development this is considered to be sufficient to protect the barn owl.

9.7.43 In the west of the site where the road is to be placed on an embankment resulting in the road and traffic being at a a greater height than its existing immediate surroundings.. It is unknown what management will take place on the land south and west of Chase Farm adjacent to the development; the semi-improved grassland habitat here is considered to be of suitable foraging habitat for barn owl and is likely to be used by barn owl if left unmanaged or under low level grazing. Fencing will be installed on both sides of the road to encourage barn owl to fly over the embanked road in this section. The fencing will be approximately 2-2.5m tall, with open board/ palisade so it does not restrict visibility.

9.7.44 There is a lack of rough grassland within land east of Lambley Lane. To increase foraging areas for barn owl and to replace similar habitats lost between Gedling Wood Farm and Gedling House Wood, the grassland sowing will be done outside the road corridor (i.e. beyond the proposed tree and shrub planting) and will comprise a rough grassland seed mix. Species recommended include sweet vernal-grass *Anthoxanthum odoratum*, false oat-grass *Arrhenatherum elatius*, red fescue *Festuca rubra*, rough meadow-grass *Poa trivialis*, smooth meadow-grass, Yorkshire fog *Holcus lanatus*, false-brome *Brachypodium sylvaticum*, wood false-brome *Brachypodium sylvaticum*, upright brome *Bromus erectus* and cocksfoot *Dactylis glomerata* as recommended by the Barn Owl Trust[9].

Breeding birds

Mitigation

9.7.45 In order to prevent and offence under the W&CA, all vegetation clearance and ground disturbance works will be done outside the breeding bird season (March – September inclusive). If this is not possible, any areas that are to be cleared during this time will be checked by a suitably qualified ecologist prior to the works, in order to confirm the absence of any active nests.

9.7.46 If any active nests are found, a buffer zone will be established around the nest and it will be left in situ until the young have left the nest. Note that the size of buffer zone required is species specific therefore, it may be necessary to adjust the timing, approach and sequence of works proposed in areas adjacent to the buffer zone, until clutch have hatched and left the nest.

9.7.47 Note that the above inspections are required for both areas of scrub/trees and also any areas that are suitable for ground nesting species – e.g. skylark and meadow pipit. If any Schedule 1 species are found to be breeding on the site, a buffer zone will again have to be established around the nest. However it should be noted that dependant young are also protected from disturbance even after they leave the nest. They may typically move into areas of grassland to feed as these provide cover and security for the grounded young, until they have fledged and become independent. Therefore should a Schedule 1 species be recorded as breeding on site, it will be necessary to regularly monitor the status of these birds until the young are able to fend and feed for themselves. Consequently the buffer zone would be variable during this phase and it should be noted that it may typically take 6-8 weeks for eggs to hatch and fully fledge. Therefore regular monitoring (every 3-6 days) will allow the phasing and timing of any such disturbance works to be reviewed and adjusted, as appropriate, to prevent an offence occurring.

Enhancement

9.7.48 In order to enhance the value of this site for breeding birds during the disturbance caused by the construction, fifty bird boxes (of varying designs for a range of species) will be installed in suitable locations within the retained habitats on site. This is approximately the number of notable birds territories within the GAR, taken from Table 9.3.3.

9.7.49 Their exact locations will be agreed within the CEMP and are intended to contribute to the overall nesting opportunities on site due to those being lost as a result of to the vegetation clearance and whilst the newly planted habitats establish. Potential locations where bird and bat boxes could be installed are indicated in Figure 9.10.

Invertebrates

Mitigation

9.7.50 In order to mitigate the potential adverse impacts on the loss of habitat for dingy skipper during the construction phase, the following translocation techniques are proposed:

- Translocation of select areas of topsoil and pioneer community vegetation to be transferred to a completed section of the GAR;

[9] Barn Owl Trust (2012) Barn Owl Conservation Handbook. A comprehensive guide for ecologists, surveyors, land mangers and ornithologist.

- Plug translocation of individual plants e.g. bird's-foot trefoil species in particular (including soils containing the associated mycorrhizae) from the second area within the GAR development where this species has been identified (Figure 9.9); and,
- Seed harvest from existing areas during July/August. Arisings to then be sown in areas where translocation was not possible. However a seed reserve should be kept to allow reseeding in a second season if this is not successful first time around.

9.7.51 In line with the ongoing management at the proposed Gedling County Park, overseen by Gedling Borough Council and Friends Group of Gedling Country Park, a suitable area should be agreed for the translocation of the pioneer community. This area should ideally be within the boundaries of the existing site and could include newly created areas, such as those adjacent to the proposed waterbody/SUDs located to the east of the site. The pioneer community habitat to be lost as a result of the GAR development currently exists on a south facing slope with adjacent scrub that does not shade this habitat. Where possible the receptor area should be the same size or greater for the area lost and have the same topographical orientation.

Enhancement

9.7.52 Retention of areas of bare ground is attractive to invertebrates such as ground-burrowing bees and wasps. This habitat type can easily be created in slope with exposed earth faces.

Operation

Statutory Designated Site

9.7.53 To protect the adjacent Gedling house Woodland LNR once the road is operational, additional planting between the road and existing woodland is proposed within the design of the scheme. No further mitigation or enhancement other than the establishment of this additional planting and its future management is consider necessary as the operational effect of the GAR on the LNR are considered to be **not significant**.

Non-Statutory Designated Site

9.7.54 In order to enhance the ecological value of the newly created waterbodies, the translocated habitats and the other new habitats it is proposed that a long term management strategy is developed for them. The environmental management plan (EMP) will lay down the management and maintenance schedule for each habitat within the scheme. It will also identify the roles and responsibilities of various parties and stakeholders associated with the site along with a mechanism for regular review of the conditions of the new habitats and the appropriateness of the management taking place.

9.7.55 A sympathetic lighting scheme through the LWS will be developed and is likely to include some of the following features in order to reduce the disturbance to the nocturnal wildlife which use the site[10]:

- Use directional lighting using bafflers, direct the lighting away from sensitive ecological receptors e.g. waterbodies and wildlife corridors (e.g. badger and toad tunnels, hedge lines);
- Use narrow spectrum light sources to lower the range of species affected by lighting.
- Light sources that emit minimal ultra-violet light
- Lights should peak higher than 550 nm
- Avoid white and blue wavelengths of the light spectrum to reduce insect attraction and where white light sources are required in order to manage the blue short wave length content they should be of a warm / neutral colour temperature <4,200 kelvin.
- Limit the times that lights are on to provide some dark periods.

Other habitats

9.7.56 Once established, the new habitats proposed within the proposed planting scheme will then require regular monitoring and management in order to promote and maintain a species-rich sward. Management is likely to include the following measures:

- Management of encroaching scrub in new grassland;
- Regular cutting to promote diverse sward; and,
- Replanting or sowing of failed specimens e.g. trees, aquatic plants and specific notable plants such as bird's-foot trefoil.

9.7.57 It is proposed that the details of the above will be agreed through a long-term management plan which will include a mechanism for identifying a party/body responsible for delivering these commitments.

9.7.58 It is intended that the management plan will cover the whole of GAR and to consider the habitats management within the proposed Gedling Country Park, so that the wider value is promoted and enhanced, not just that within the newly created areas. It is considered that a coherent site-wide management plan would have a greater biodiversity benefit on the value of both the designated and retained habitats within the site.

Invasive species

9.7.59 Survey will be undertaken to monitor the presence/absence of invasive species such as Japanese knotweed and New Zealand Stonecrop/ Pygmyweed within newly created or existing habitats. Where necessary the invasive species will be managed or treated to avoid them from spreading and to maintain diverse flora and fauna within the site.

Amphibians

9.7.60 In order to mitigate for the operational effect on amphibians, in particular common toad, the following objectives will underpin the measures contained within the EMP:

- Conserve and enhance toad habitats;
- Maintain connectivity between aquatic and terrestrial habitats;
- Maintain connectivity between toad populations; and,
- Avoid killing and injuring toads.

9.7.61 To achieve these objectives five underpasses/ amphibians tunnels are proposed. These will allow amphibians to safely commute beneath the four arms of the roundabout and between the two settling lagoons located within the proposed Gedling Country Park and to the south of the GAR from the new waterbody east of the new lagoons. The tunnels will be designed to meet the standards detailed by the Amphibian and Reptile Conservation Trust (ARC, 2011)[11] which requires a rectangular cross-section tunnel

[10] In accordance with Bat Conservation Trust (June 2014). Artificial lighting and wildlife: Interim Guidance: Recommendations to help minimise the impact artificial lighting.

[11] Amphibian and Reptile Conservation , (ARC) May 2011. Common toads and roads. Guidance for planners and highways engineers in England

with good drainage and an appropriate size for the road being crossed i.e. between 1-2m width and height. The proposed located for the amphibian tunnels are provided on Figure 9.10 Mitigation plan.

9.7.62 Suitable existing terrestrial habitat for foraging and hibernation exist within land to the south and east of the proposed GAR. Further hibernation sites will be created within 100m of the existing breeding ponds and the new waterbodies located to the north of the road using vegetation cleared / felled during the early construction phase in order to provide shelter for amphibians.

9.7.63 Permanent amphibian proof fencing will be used to exclude amphibians from entering the carriageway and will be used to deflect the amphibians towards the tunnels. Further monitoring and maintenance of the tunnels will be required to make sure they do not become blocked e.g. by leaf litter and sediment. The fencing will be installed and the tunnels made accessible to amphibians before the road becomes operational to reduce amphibian mortality in during the construction phase.

9.7.64 The new waterbodies / SUDS will provide further large permanent aquatic habitats favoured by amphibians such as toads. The habitat will be managed to make sure emergent and submerged aquatic plants establish but do not become over grown. Bank side vegetation will also be managed to avoid large amounts of shading in the shallows from developing.

9.7.65 Lighting along the road will be directed away from the aquatic habitats where possible to avoid illuminating the amphibians breeding sites and immediate adjacent terrestrial habitat.

Badger

9.7.66 Appropriately located badger tunnels with planting and fencing designed to encourage badgers to cross beneath the road rather than over the road are required a several locations along the GAR. The proposed located for nine badger tunnels are provided on Figure 9.10 Mitigation Plan and detailed in Appendix 9.5. In accordance with DMRB guidelines[12] the following mitigation measures and design specifications will be installed before the road becomes operational:

- Use of appropriate gauge size mesh which is badger proof fencing is required;
- As a minimum, the fencing should extent at least 1m high above ground, with 600mm buried below ground - this being 300mm deep, with a 300mm return, angled away from the road;
- Badger tunnels should be made of 600mm diameter (equivalent or larger) concrete pipes or larger with a widening at the entrances;
- Fencing should extend to a distance of 100m along the road on either side of the tunnels to deflect badgers from crossing the road and direct them towards the tunnel;
- Appropriate planting should be use to 'soften' the crossing location encouraging badgers to use the tunnels;
- The tunnel entrances should be recessed along the fence line to guide the badgers to them (Figure 9.2 DMRB Volume 10 Section 4 Part 2); and,
- Use of cattle grids or concrete plinths beneath gates in the fencing to stop badgers climbing under the gates and onto the carriageway.

9.7.67 A total of nine badger tunnels have been positioned where the road crosses strong badger paths. Badgers using these tunnels will be able to access existing foraging habitats and newly planted areas. Feeding at the badger tunnels will encourage badgers to use the tunnels. Further monitoring and maintenance at the tunnels, the fencing and where necessary at the badger setts will take place during the aftercare period in the operational phase.

9.7.68 Appropriate directional and baffled lighting aimed at reducing light spillage on habitats used by badgers, in particular hedges and the badger tunnels, will be incorporated within the design of the scheme.

Bat

9.7.69 The new bat boxes, installed as mitigation and enhancement measures for the construction phase will be monitored and maintained throughout the construction phase and into the operational phase for a minimum of the 5 years post-construction. This will involve an annual inspection by a licensed bat worker to confirm whether any are being used and they will also be cleaned in order to prevent the build-up of decay and any diseases. Should a replacement hibernation roost also be required, this would be subject to a monitoring and maintenance regime appropriate to it's design and needs.

9.7.70 All lighting would be designed and installed so that the brightness and extent of any light spill is minimised wherever possible[13], particularly adjacent to the green corridors and ecological sensitive habitats (the LWS and LNR site) associated with the site. The location and type of any lighting around the new roosts/boxes would be confirmed through the detailed Method Statement which forms part of the Natural England licensing procedure.

9.7.71 Furthermore, the lighting within the scheme should be minimised, for example via:

- Keeping lit sections of road to a minimum during both the construction and operational phases, with dark sections or sections with reduced lighting times;
- Utilising light designs limiting the height of lighting columns with a focused down-beam to minimise light spillage into adjacent areas used by bats; and,
- Minimising excessive light spill along vegetative foraging and commuting habitat, both existing and newly created within the scheme.

9.7.72 To assess the potential impacts of the scheme upon the bat populations, post-development monitoring will be undertaken via manual (walked) transects and automated (static) detectors at appropriate intervals e.g. in year 1 and year 5.

Breeding birds

9.7.73 The newly installed bird boxes and barn owl boxes will be monitored on an annual basis during the construction and the aftercare period in order to assess the level of adoption. They will be visited and maintained yearly, so that any old nests can be cleared out (outside of the nesting season) and any damaged boxes will be repaired, re-hung or replaced, as appropriate.

9.7.74 Lighting will be directed away from habitats used by nesting birds e.g. woodlands and hedges and from habitats likely to be used by barn owl for foraging (tussock forming grassland) most of which will be located outside the road corridor.

[12] Highways Agency (2005) Design Manual for Roads and Bridges. Volume 10 Environmental Design and Management. Section 4 Nature Conservation. Part 2 HA 59/92 Mitigating Against Effects on Badgers.

[13] Bat Conservation Trust (June 2014). Artificial lighting and wildlife: Interim Guidance: Recommendations to help minimise the impact artificial lighting.

Invertebrates

9.7.75 As with the other sensitive ecological features on site, the management and maintenance of both the created and retained habitats will be key to ensuring the long-term value of the site for invertebrates. The EMP will be used to promote the regular renewal of features such as brash windrows and dead wood piles, through the reuse of material from scrub clearance and the creation of additional features of benefit for invertebrates.

9.7.76 Lighting discussed within the Designated Site section above includes guidance for lighting with low impact on biodiversity such as invertebrates which will be incorporated within the lighting scheme where safe to do so through the Gedling Colliery and Dismantled Railway LWS.

9.8 Assessment Summary and Likely Significant Residual Environmental Effects

9.8.1 Table 9.10 provides a summary of this EcIA chapter, detailing the impacts which have been assessed in detail for those ecological receptors that were considered may experience significant effects as a result of the proposed development, in the absence of mitigation.

9.8.2 All the sensitive ecological receptors, except the LWS, are predicted to have no significant residual effects. It is considered likely that the implementation of the mitigation measures proposed above will be sufficient to reduce, avoid or offset the impacts that were predicted without them in place.

9.8.3 There would be time-limited residual effects on connectivity of habitats caused by habitat loss from construction and a time lag of 5 - 15 years in growth and maturity of new habitat areas. This includes establishment of hedgerow and woodland habitats.

9.8.4 The habitat fragmentation caused by the GAR development through the Gelding Colliery and Dismantled Railway LWS will cause a significant residual effects with regard to the LWS habitats. The most valuable ecological habitats are to be avoided (the settling lagoons) or translocated (the pioneer community habitats) within the development but there will be some other habitats severance within the LWS which cannot be accommodated within the development limits. Fragmentation / severance of habitats within the LWS will occur during the construction phase and will remain present through the operation phase of the GAR development in perpetuity.

9.9 Cumulative impacts

9.9.1 Twenty-one schemes were considered in the cumulative scope and are listed in ES Chapter 2. Only two of the committed developments identified through consultation with Gedling Borough Council are considered in relation to the GAR development ecological cumulative impacts and are discussed below.

Gedling Colliery Solar Park

9.9.2 The proposed Solar Farm site lies approximately 450m to the north of the development boundary at the restored plateau on the former Gedling Colliery pit top. Full planning permission has been granted for the development which at the time of writing this chapter had not commenced construction.

9.9.3 It is understood that the proposed development includes the construction of solar panels and a temporary storage compound within the poor semi-improved grassland dominated habitat. The scheme includes the following relevant mitigation:

- Avoidance and protection of breeding birds during the nesting season ;
- Artificial refugia placed throughout the site and a pre-check survey for amphibians and reptiles prior to construction activities such as vegetation clearance utilising a destructive search method;
- Erection of three pole or building mounted boxes (two for barn owl and one for kestrel) on site;
- Good site practises e.g. not leaving trenches or holes left open overnight and storage of materials in designated areas; and,
- Post-construction monitoring.

9.9.4 Due to the limited adverse effect of the Solar Farm, the distance and the lack of any overlapping likely significant effects, it is unlikely that significant cumulative impacts will arise. There is an overlap in the mitigation for barn owl with this scheme and this will be beneficial for the species. It would also be beneficial if both the mitigation schemes could be coordinated so barn owl roost/nesting sites are appropriately located.

DA development

9.9.5 Approximately 1,120 houses, is proposed on land adjacent and to and south of the GAR between Mapperley Tunnel and Arnold Lane. The Phase 1 of the GAR development, a 5-arm roundabout, will provide access for the housing development. This development is part of the Gedling Colliery / Chase Farm redevelopment which also includes 4,500 sqm of B1 (office) use-class employment, and 18,000 sqm of B2 (light industrial) use-class employment;

9.9.6 The GAR has been designed with appropriate planting to compensate for the loss of habitats. In addition to the DA development located adjacent and to the south of the GAR it is likely there would be limited opportunity to provide any off-site mitigation for the residual impacts arising from the effects on the Gedling Colliery and Dismantled Railway LWS habitats or the species it supports.

9.9.7 The loss of the grassland habitat within the DA is considered to have an adverse effect on badgers. The proposed mitigation for the badger tunnels and any alternative provision for badger setts lost, where necessary, have assumed that the DA land will be unavailable to badgers and badger mitigation for the GAR has been designed to be away from this area where practicable.

9.9.8 There may also be combined effects of the GAR and the DA on other protected species, in particular bats. The planting proposal along the GAR maintains and enhances some habitat corridors suitable for bats to commute and forage along. Further commitment to maintain these corridors for wildlife within the CEMP would be appropriate and should be integrated with both schemes' management regimes.

9.9.9 The effects of lighting both the GAR and the DA residential areas may restrict "commuting" of certain species of bats. However other species may eventually benefit from potential new roost sites in the new houses, gardens and landscape planting.

9.9.10 However, as this green linkage is being retained and enhanced in both developments, it is considered that significant cumulative effects are unlikely.

Table 9.10 Assessment Summary and Residual Environmental Effects (Ecology)

Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
Construction							
Statutory Designated Site	Gedling House Wood LNR - Loss of habitat	County	Direct	**Not Significant** Certain / near certain	**Within scheme design:** creation of woodland planting **Mitigation**: Avoid removal of trees from the LNR where possible. Where essential only cut tree branches back i.e. side up the lower branches. Retention of felled woodland to be stored in piles.	**Within scheme design** 7.6 ha of tree planting is proposed within the planting proposal **Mitigation:** Only approximately 40m section on the northern boundary of the LNR is located on the development boundary and would be directly effect during construction. To provide habitat for fauna e.g. in particular invertebrates and amphibian.	**Not Significant** Certain / near certain
	Gedling House Wood LNR - Damage and degradation of the LNR	County	Indirect	**Not Significant** Certain / near certain	**Mitigation:** In addition to 'Good site practises' appropriate buffers with demarcation to protect the LNR.	**Mitigation:** To reduce the effects of pollution and incidental damage during construction activities.	**Not Significant** Certain / near certain
Non-Statutory Designated Site Gedling Colliery and Dismantled Railway LWS (overview considers all habitats within the LWS)	Direct loss of habitats and creation of new areas	County	Permanent Adverse	**Significant** Certain / near -certain	**Within scheme design:** Management strategy, within the CEMP, to protect and enhance the LWS, including translocation of habitats and notable plants.	**Within scheme design:** Despite being narrower in the LWS, approx.9ha, over 25%, of the 35ha LWS, habitat lost (less permanently lost to the road). Effecting both habitats and protected / notable species supported within the LWS. Following construction 2 ha of new habitat will be created within the LWS	**Not Significant** Probable
	Damage and degradation of habitats	County	Adverse Temporary Reversible	**Not Significant** Probable	**Mitigation:** In addition to 'Good site practises' appropriate buffers with demarcation to protect the LWS habitats.	**Mitigation:** To reduce the effects of pollution and incidental damage during construction activities to protect the habitats.	**Not Significant** Probable
Notable Habitats within Gedling Colliery and Dismantled Railway LWS	Settlement lagoon (P3&P4) - management	County	Unknown	**Not significant** Certain/Near Certain	**Potential Mitigation:** Management / alterations to the lagoons should be avoided. Where works are essential they should be carried out under guidance from the ECoW and works timed to avoid amphibians breeding season. **Enhancement and Legal:** Before any works take place within the lagoon the New Zealand Stonecrop/Pygmyweed should be disposed.	**Potential Mitigation:** Avoidance measures recommended in the absence of any known direct impacts to the lagoons. **Enhancement and Legal:** Removal of an alien invasive species (Schedule 9 W&CAct 1981) and to avoid contaminating other waterbodies	**Not Significant** Probable

Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
	Settlement lagoon (P3&P4) - loss of adjacent terrestrial habitat	County	Permanent Indirect	**Not Significant** Certain/Near Certain	**Mitigation**: none specifically for the pond. See Amphibians for related mitigation.	**Mitigation:** None required. Whilst the loss of the adjacent southern habitat is unlikely to have direct impact on the lagoons it will affect the fauna species they support, in particular common toad.	**Not Significant** Certain/Near Certain
	Loss of fire ponds (P6&P7) - loss of both ponds and creation of new areas	County	Direct Permanent Long term Beneficial	**Significant** Probable	**Within scheme design:** creation of new waterbodies **Mitigation**: see Amphibians	**Within scheme design:** The fire ponds are considered to be of limited ecological value. Through careful designing and planting better waterbodies are be provided within the planting proposal	**Significant Beneficial** Probable
	Pioneer Vegetation Community – loss	County	Direct Permanent Adverse	**Significant** Certain / near -certain	**Mitigation:** Demarcation of the habitat to protect it during adjacent construction activities. Translation of the habitat to either a newly created adjacent area within the GAR or a designated area within the proposed Gedling Country Park.	**Mitigation:** In order to protect and increase the mosaic of habitats in the former colliery. Also to protect notable plants including bee orchid and yellowort and the larval food plant, birds foot trefoil, for Dingy skipper and six-belted clearwing moth.	**Not Significant** Probable
	Lowland broad-leaved woodland (Area 2 and 3) - partial loss, disturbance and creation of new areas	County	Direct Permanent Neutral	**Significant** Probable	**Within scheme design:** The planting proposal includes the replacement of woodland and shrubs throughout the development. **Mitigation:** Avoid felling mature trees on the boundary of the development and provide appropriate demarcation to protect trees being retained. Retention of felled vegetation to be stored in piles.	**Within scheme design:** 10 ha of tree and shrubs within the planting proposal **Mitigation:** Protect the most valuable, the mature trees, within the woodland and to provide habitat for fauna e.g. in particular invertebrates , bats and amphibian.	**Significant Beneficial** Probable
	Neutral Grassland (MG5)	County	Direct Permanent Neutral	**Not Significant** Probable	**Within scheme design:** The planting proposal includes the replacement of grassland throughout the development.	**Within scheme design:** 1ha of neutral grassland within the LWS is being lost to the development of the GAR and a new waterbody / SUD. Grassland compensations throughout the GAR includes approximately 6.3ha of neutral and wetland grassland habitats.	**Not Significant** Probable
Other notable habitats – located outside the LWS	Partial loss and creation of new areas	Local	Direct Permanent Beneficial	**Not Significant** Certain/ near certain	**Within scheme design:** creation of new habitat provided	**Within scheme design:** to compensate for the habitat lost.	**Not Significant** Certain/ near certain
	Damage and degradation of habitats	Local	Temporary Reversible	**Not Significant** Certain/ near certain	**Mitigation:** In addition to 'Good site practises' appropriate buffers with demarcation to protect the habitats outside the development.	**Mitigation:** To reduce the effects of pollution and incidental damage during construction activities to protect the habitats.	**Not Significant** Certain/ near certain

Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
Other notable habitats	Partial loss and creation of new areas species-rich hedgerow	Local	Direct Permanent Beneficial Long-term	**Significant** Certain/ near certain	**Within scheme design:** Creation of over 1200m of species rich hedgerow. **Mitigation**: Following construction replant, where possible, with appropriate species from local providence to include at least seven species. Demarcate a buffer e.g. 5m from the hedge to protect it.	**Mitigation:** Replacement for the approximately 30m section of hedge lost with equivalent or greater number of species rich hedgerow. Reduce the likelihood of incidental damaged to the hedge caused by machinery operations on adjacent land.	**Significant Beneficial** Certain/ near certain
	Partial loss and creation of new areas lowland broad-leaved woodland (Area 1 – W8)	Local	Direct Adverse Permanent	**Significant Beneficial** Probable	**Within scheme design:** The planting proposal includes the replacement of woodland and shrubs throughout the development. **Mitigation:** Avoid felling mature trees on the boundary of the development and provide appropriate demarcation to protect trees being retained. Retention of felled vegetation to be stored in piles.	**Within scheme design:** 10 ha of tree and shrubs within the planting proposal **Mitigation:** Protect the most valuable, the mature trees, within the woodland and to provide habitat for fauna e.g. in particular invertebrates ad bats.	**Significant Beneficial** Probable
Invasive species	Potential spread	Local	Legal offence Adverse	**Significant** Probable	**Mitigation:** Update surveys prior to commencement of works for Japanese knotweed (JK). No ground disturbance works within 7m of the JK stand. Any works within this areas will adhere the Environment Agency best-practise guidance for treatment, management and disposal.	**Mitigation:** Avoid an offence under W&CAct 1981 Section 14 Part 2 Schedule 9 – spread of invasive species.	**Not Significant** Probable
Amphibians – great crested newts	Injury / killing / trapping individuals and Loss of terrestrial habitat	Local	Direct / Indirect Adverse Permanent	**Not Significant** Probable	**Precautionary Mitigation / Avoidance :** As part of the CEMP, produce and implementation a non-licence method statement for the vegetation and soil stripping in areas of suitable terrestrial habitat located 400m – 500m from the ponds **Within scheme design:** creation of new habitat provided within the planting proposal	**Mitigation:** To further reduce the likelihood of amphibians (and other small mammals) being present within the development and to advice on appropriate action to take if great crested newts are identified during construction.	**Not Significant** Probable
	Connectivity to breeding sites	Local	Indirect Adverse Permanent	**Not Significant** Probable	**Mitigation:** None required	**Mitigation:** No other ponds or breeding sites are located on the opposite side of the proposed GAR (<500m) to that where the great crested newts were recorded.	**Not Significant** Probable
Amphibians – Other (common toad, common frog and smooth newt)	Injury / killing / trapping individuals	County	Direct Adverse Permanent	**Significant** Certain/near certain	**Mitigation:** Exclusion of amphibians from the GAR development area using amphibian proof fencing.	**Mitigation:** Works located immediately adjacent to the large lagoons within Gedling Colliery (P3 and P4) recorded with a 'good population' of toad.	**Not Significant** Probable
	Loss of connectivity along migration routes between	County	Indirect Adverse Permanent	**Significant** Certain/near certain	**Mitigation:** Amphibians to be trapped and relocate to suitable habitat aquatic or terrestrial habitats during each migration period in spring and autumn. Post development monitoring to be carried out	**Mitigation:** During migration amphibians, in particular toads will commute between terrestrial habitat and breeding sites adjacent and potentially divided by the GAR.	**Not Significant** Probable

Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
	terrestrial and aquatic sites						
	Loss of terrestrial habitat and refugia / hibernation	County	Indirect Adverse Permanent	**Significant** Certain/near certain	**Mitigation:** In addition to the planting proposal, around the lagoons replacement terrestrial habitat and hibernation/refugia sites for amphibians.	**Mitigation:** Small areas of terrestrial habitats for amphibians (e.g. damp and shaded areas and refugia/hibernacula) are presence within the development	**Not Significant** Probable
	Loss of aquatic habitat	County	Direct / Indirect Beneficial Permanent	**Significant** Probable	**Within scheme design:** New ponds, appropriate for amphibians to be created, to replace those lost. **Mitigation:** Amphibians to be trapped, relocate to suitable habitat aquatic or terrestrial habitats and excluded from waterbodies lost prior to construction.	**Within scheme design:** Fire ponds P6 and P7 to be lost, small numbers of amphibians recorded within these ponds.	**Not Significant** Probable
	Degradation of aquatic habitat	County	Indirect Adverse Short-term	**Significant** Probable	**Within scheme design:** New waterbodies to collect the runoff of water. **Within scheme design/Mitigation:** In addition to 'Good site practises' appropriate buffers with demarcation to protect the aquatic habitats.	**Within scheme design:** the new water bodies / SUDS, adjacent to the large lagoons within Gedling Colliery (P3 and P4), have been designed to collect runoff of pollutants are located immediately. **Mitigation:** In the short term, before the SUDS become operational runoff into P3 and P4 during construction will be avoided	**Not Significant** Probable
Badger	Loss of badger sett Disturbance to badgers Incidental damage to sett	Local	Legal Offence Direct Adverse Short-term and long term	**Significant** Certain/near certain	**Mitigation:** Closure of badger setts under licence between July – November within and up to 30m from the development. Compensation for the loss of setts with artificial setts where appropriate. Closed board fencing erected between badger sett and development to reduce disturbance. Demarcation of buffer using fencing at least 20m from a badger sett in current use. Update survey prior to and throughout the construction phase.	**Mitigation:** Several badger setts are located within 30m of the development. Badgers activity throughout the GAR corridor and adjacent land is high.	**Not Significant** Probable
	Loss of foraging habitat and connectivity	Local	Indirect Adverse in Short-term Beneficial in long-term	**Not Significant** Probable	**Within scheme design:** A planting proposal and tunnels/culverts to provide replacement for the habitats lost and good site working practices are already proposed within the design of the scheme. **Precautionary mitigation**: Construction materials and soils to be stored away from setts to avoid badger occupying.	The GAR passes through several badger territories. Arable habitat is the majority of the habitat lost where the majority of badgers activity has been recorded; the badgers are not dependant on this arable habitat for foraging.	**Not Significant** Probable
Bats Roosting (Mapperley Tunnel and Pepper Pots)	Loss of roosting habitats Disturbance to roosts	District	Direct Adverse Legal Offence	**Significant** Probable	**Mitigation**: Detailed mitigation to be agreed once the method of reinforcement of the tunnel is selected. All works to be carried out under an EPS Licence. **Enhancement:** Restricting public access to the tunnel and removal of the rubbish inside the tunnel.	**Mitigation:** the tunnel and the associated pepper pots are used by roosting bats; all bats and bat roosts are protected under EU and UK legislation. **Enhancement:** To protect and enhance the bat roost in perpetuity.	**Not Significant** Probable

Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
Bats Roosting (Glebe Farm)	Loss of roosting habitats	Local	Direct Adverse Legal Offence	**Significant** Probable	**Mitigation:** Exclusion of bats from the bat roost under a EPS Licence. Compensation for the loss of the bat roost using artificial bat boxes placed on retained adjacent trees.	**Mitigation:** Previous bat roost identified in a farm building at Glebe Farm, all bats and bat roosts are protected under EU and UK legislation.	**Not Significant** Probable
Bats Roosting (Chase Farm and Gedling Wood Farm	Disturbance to roosts	Local	Indirect Adverse Short term	**Not significant** Certain/near certain	N/A	Within the scheme: Resections on night time working near bat roosts	**Not significant** Certain/near certain
Bats – Foraging and Commuting	Loss of foraging / commuting habitats and severance of connective habitats	County	Indirect Beneficial Long term	**Significant Beneficial** Probable	**Within scheme design:** The planting proposal includes the replacement of woodland and shrubs throughout the development. **Mitigation:** Avoid felling mature trees on the boundary of the development and provide appropriate demarcation to protect trees being retained.	**Within scheme design:** 10 ha of tree and shrubs, 1200m of hedgerows and several SUDS/waterbodies included within the planting proposal providing habitats for commuting and foraging bat. **Mitigation:** Protect the most valuable, the mature trees, within the woodland and to provide habitat for fauna e.g. in particular invertebrates ad bats.	**Significant Beneficial** Probable
Breeding birds – all Value: Local	Damage and disturbance to nesting birds e.g. during vegetation clearance	Local	**Legal offence** Adverse	**Significant** Certain/near certain	**Within scheme design:** All vegetation clearance to be done between Octobers – February outside the breeding bird season. **Mitigation:** Where vegetation clearance is essential between March – September a check by a suitable qualified ecologist will be carried out in advance to confirm the absence of active nests. If nests are found a buffer zone will be established and the nest left in situ until the young have left the nest.	**Mitigation:** Avoid an offence under W&CAct 1981; all wild birds are protected whilst nesting.	**Not Significant** Probable
	Habitat loss through vegetation	Local	Beneficial in Long term	**Significant** Probable	**Within scheme design:** creation of new habitat replacing those lost and more are provided within the planting proposal **Mitigation:** Installation of bird boxes on suitable trees or buildings for birds recorded onsite	Bird assemblages recorded on site were typical for local area and not restricted to habitats on site. Very similar habitat types in surrounding and local area to those being lost. **Mitigation:** Whilst the replacement vegetation is establishing nest boxes will compensate for the loss of nesting sites.	**Not Significant** Probable
	Fragmentation through vegetation clearance	Local	Beneficial in Long term	**Not Significant** Probable	**Within scheme design:** creation of new habitat replacing those lost and more are provided within the planting proposal	Bird assemblages recorded on site were typical for local area and not restricted to habitats on site. Very similar habitat types in surrounding and local area to those being lost.	**Not Significant** Probable

Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
Breeding birds – Barn Owl	Loss of a barn owl roost	County	Direct Adverse Long-term	**Significant** Probable	**Mitigation:** Alternative provision for roosting, e.g. a nest box, should be provided within 200m of the existing roosts but away from the road at least 3 months prior to demolition of the barn Demolition of the barn at Gedling Wood Farm to take place outside the nesting birds' season. An update barn owl survey required 2 months prior to demolish.	To maintain provision for the roost site in order to protect the resting/ roosting location of a barn owl, a schedule 1 species.	**Not Significant** Probable
	Disturbance near roosting sites	County	Indirect Adverse Short-term	**Significant** Probable	**Mitigation:** Alternative provision for roosting, e.g. a nest box, should be provided within 200m of the existing roosts but away from the road at least 3 months prior to the commencement of construction activities within 150m of the roost site.	**Mitigation:** Disturbance from construction within 10m of the roosts is unavoidable. Measures recommended protecting barn owl from noise and visual disturbance during construction.	**Not Significant** Probable
	Habitat loss and fragmentation through vegetation clearance		Direct Beneficial Long term	**Significant** Probable	**Within scheme design:** creation of new habitat replacing those lost and more are provided within the planting proposal	**Not Significant** Rationale: Small areas of thatch grassland supporting voles, barn owls primary prey, are located within the development; e.g. within Gedling Country Park, south of Chase Farm and east of Gedling Wood Farm. More suitable habitat is located in the surrounding area.	**Not significant** Probable
Invertebrates – all	Direct loss of individuals, populations and habitat	District	Direct Adverse Short-term	**Significant** Probable	**Mitigation**: Within the LWS, translocation the pioneer community vegetation and seed harvest targeted plants (e.g. larval food plants) for invertebrates from existing areas during July/August. **Enhancement:** Retention and creation of areas of bare ground	**Mitigation:** Protect the most notable habitats and planting of new habitats to provide diverse and suitable habitats for invertebrates. **Enhancement:** maintain and extend habitat for invertebrates such as ground burrowing bees and wasps.	**Not Significant** Probable
Invertebrates – butterfly and moth communities including Dingy Skipper	Habitat loss and fragmentation through vegetation clearance	County	Indirect Adverse Long term	**Significant** Certain / near certain	**Mitigation**: Plug translocation of individual plants e.g. bird foots trefoil species to suitable areas within the proposed Gedling Country Park / LWS.	**Mitigation:** Protect the primary larval foot plant, bird's-foot trefoil for Dingy skipper. Six-belted clearwing moth also relies on this larval food plant.	**Not Significant** Probable
Operation							
Statutory Designated Site - Gedling House Wood LNR	Degradation of habitats from increase in pollution	County	Indirect Adverse	**Not significant** Certain / near certain	**Within scheme design:** creation of new habitat replacing those lost and more are provided within the planting proposal	**Within scheme design:** Effects on the plants, only those adjacent to the road from pollution caused by dust, water runoff and traffic spray.	**Not Significant** Probable
	Disturbance from noise and lighting	County	Indirect Adverse Neutral in	**Not significant** Certain / near	**Within scheme design:** Planting proposal to provide a buffer between the road and the LNR	**Within scheme design:** Reduce the effects of road noise and lighting on the fauna the LNR supports, in particular birds and	**Not Significant** Probable

Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
			Long term	certain	**Mitigation:** Use directional lighting, and bafflers where necessary, to target illumination on the road.	badgers. **Mitigation:** Lighting designed to avoid unnecessary illumination of the LNR.	
Non-Statutory Designated Site - Gedling Colliery and Dismantled Railway LWS	Degradation of habitats from increase in pollution	County	Indirect Adverse	**Not significant** Probable	**Within scheme design:** creation of new habitat including waterbodies / SUDs.	**Within scheme design:** New habitats and waterbodies including SUDs are being created which will ameliorate for the increase runoff of water from the road and provide a buffer between the road and the LWS habitats.	**Not Significant** Probable
	Disturbance from noise and lighting	County	Indirect Adverse Neutral in Long term	**Significant** Certain/near certain	**Within scheme design:** Planting proposal to provide a buffer between the road and the LWS. **Mitigation:** Use directional lighting, and bafflers where necessary, to target illumination on the road.	**Within scheme design:** Reduce the effects of road noise and lighting on the fauna the LWS supports, in particular bats, invertebrates and amphibians **Mitigation:** Lighting designed to avoid unnecessary illumination of the LNR.	**Not Significant** Probable
	Fragmentation of habitats effecting plant colonisation, seed dispersal etc.	County	Indirect Adverse Neutral in Long term	**Significant** Unlikely	**Within scheme design:** Planting proposal to provide a buffer between the road and the LWS.	Despite narrowing the road design through the LWS, the road bisects the LWS dividing habitat on the north and south of the road. Further	**Significant** Probable
Notable Habitats – located outside the LWS	New habitats created	Local	Direct Beneficial in Long term	**Significant** Certain / near certain	**Within scheme design:** Planting proposal include planting of trees, shrubs, grass seeding, amenity grassland, wetland grassland creation and water bodies including SUDS throughout the scheme	**Within scheme design:** New habitats to replace those lost and provide a significant gain in quality of habitat in the long term**.**	**Not Significant** Probable
	Fragmentation and degradation of habitats as a result of increase in pollution	Local	Indirect Adverse	**Significant** Probable	**Within scheme design:** creation of new habitat will provide a buffer between the road adjacent habitats. **Mitigation:** Use directional lighting, and bafflers where necessary, to target illumination on the road. Habitat management to be agreed within the CEMP	**Not Significant** Rationale: Increase from pollution caused by dust, water runoff and traffic spray from the road located adjacent to habitats. **Mitigation:** Increase light pollution on habitats used by nocturnal fauna sensitive to light e.g. bats and badgers. Management of site required to maintain favourable habitat conditions	**Not Significant** Probable

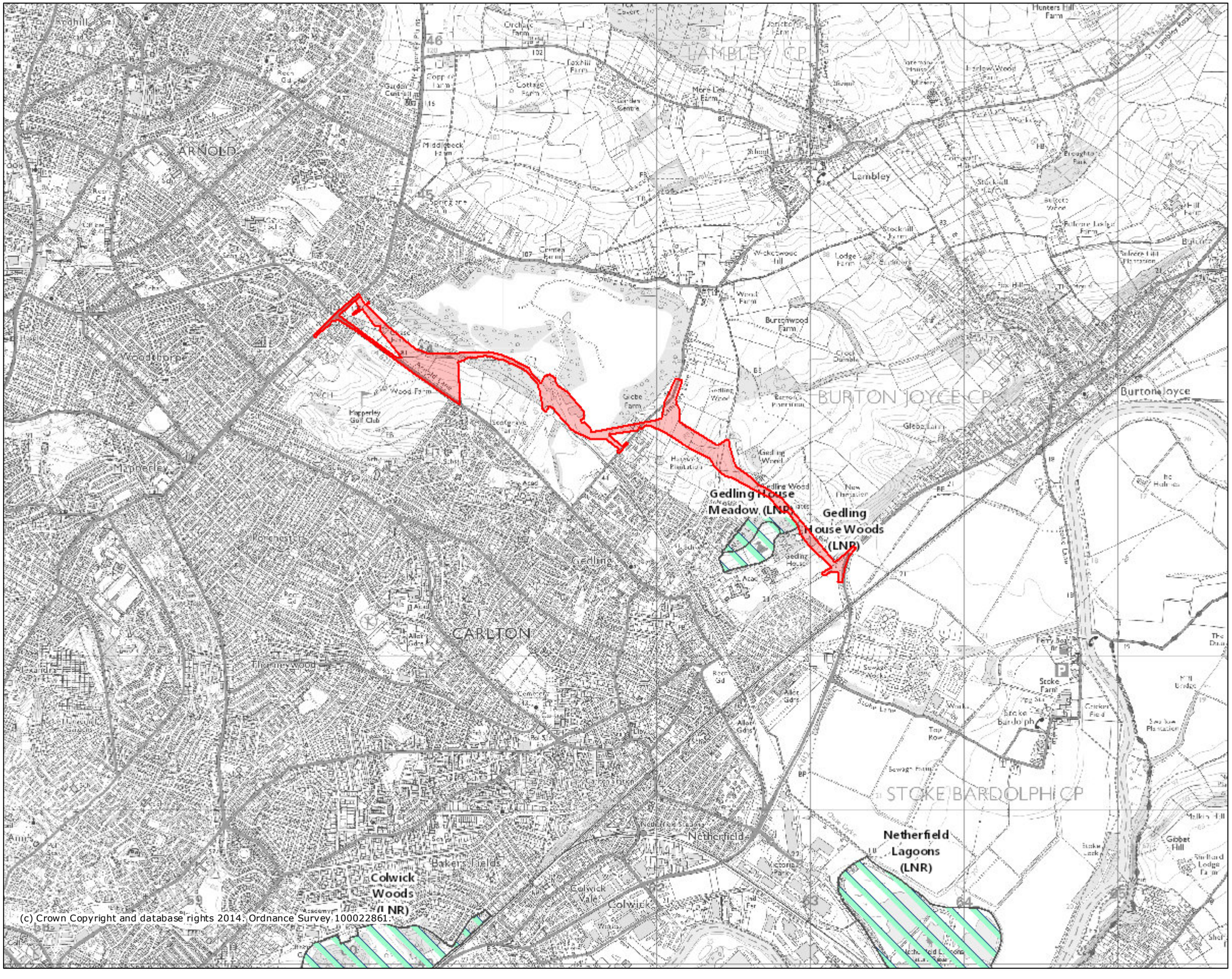
Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
Amphibians – great crested newts	Injury / killing / trapping individuals Severance of habitat Disturbance lighting	Local	Direct & indirect Neutral Long-term Legal protection	**Not Significant** Probable	Assuming great crested newts are not found closer to the scheme during any update surveys or found during construction no operational mitigation is proposed.	Great crested newts located 300m-550m from the development. The road does not sever links between known ponds used by great crested newt or hibernation sites. If they remain absent from the site there is no offence under the legislation.	**Not Significant** Probable
Amphibians – other including common toad, frog and smooth newt	Severance of habitat Injury / killing / trapping individuals	County	Direct & indirect Adverse Long term	**Significant** Certain / near certain	**Mitigation:** Incorporation of amphibian tunnels to allow amphibians to cross the road safely. Installation of permanent amphibian proof fencing along the north and south carriageway to stop amphibians accessing the road and to direct them to the tunnels. Additional planting to provide shaded areas and creation of hibernaculas on the north of the road near the two lagoons. Direct illumination or light spill away from the tunnels, waterbodies and habitat adjacent to the road.	**Mitigation:** To aid amphibians, in particular toads recorded in large number, to safely access areas of suitable habitat and potential hibernation sites to the south and east the road and maintain connectivity to their breeding sites (P3 & P4) located to the north of the road. Fencing used to avoid amphibians from becoming trapped within the road. Reduce the effects of disturbance caused by lighting.	**Not Significant** Probable
Badger	Injury / killing / trapping individuals Barrier to movement Disturbance from noise and lighting	Local	Direct & indirect Adverse Long term	**Significant** Probable	**Mitigation:** Appropriately located badger tunnels with planting and fencing designed to encourage badgers to cross beneath the road rather than over the road are required a several locations along the GAR. Appropriate directional and baffled lighting aimed at reducing light spillage on habitats used by badgers, in particular hedges, has been incorporated within the scheme design.	**Mitigation:** To allow badgers to cross the road safely, maintaining commuting routes between to forage areas and setts.	**Not Significant** Probable
Bat - all	Disturbance from noise and lighting	Local	Direct Adverse Long Term	**Significant** Probable	**Mitigation:** Sensitive design of lighting which meets the minimum safety requirement while preventing direct or significant illuminate on foraging or commuting routes Monitoring and maintenance of bat boxes installed as mitigation for the bat roosts lost during the construction phase.	**Mitigation:** To allow bats to continue to forage through the site once it is constructed and operational. Required under the terms of the EPS Licence in order to maintain and the uptake of the the alternative	**Not Significant** Probable

Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
Breeding birds – all	Disturbance from noise and lighting on protected species Better quality of foraging and nesting habitat	Local	Indirect Adverse & beneficial Long-term	**Significant** Probable	**Within scheme design:** Planting proposal provides new nesting and foraging areas. Direct illumination or light spill away from habitat adjacent to the road in particular hedges and trees/shrubs. **Mitigation:** Annual maintenance and monitoring of the new bird boxes	A small area of commonly distributed habitat available to birds will be affected. **Within scheme design:** New habitats to replace those lost and provide a significant gain in quality of habitat in the long term**.**	**Significant beneficial** Probable
	Severance of habitat		Indirect Neutral	**Not Significant** Probable	None required	Birds will be able to fly over the road and use adjacent existing or newly created habitats.	
Breeding birds – Barn Owl	Disturbance from noise and lighting on protected species Injury or killing from collision with vehicles	County	Direct and Indirect Adverse short & long term	**Significant** Probable	**Within scheme design:** The planting proposal includes suitable trees/shrubs to encourage barn owl to fly over the road, important south of Chase Farm where the road is embanked. **Mitigation:** Annual maintenance and monitoring of the new barn owl boxes. Direct illumination or light spill away from habitat adjacent to the road in particular tussock forming grassland. **Mitigation:** Installation of fencing, 2-2.5m high above ground level, along both sides of the road south of Chase Farm .	**Mitigation:** Maintain continuity of roosting sites lost and disturbed, reduce the effect of light pollution may have on the foraging behaviour of barn owl and its prey. Barn owl fly at a height of 3m above ground level, fencing is used in the short term, whilst vegetation establishes, to encourage barn owl to fly over the height of the vehicles.	**Significant beneficial** Probable
	Better quality of foraging habitat		Indirect Beneficial Long-term	**Significant** Probable	**Within scheme design:** The planting proposal includes suitable trees/shrubs to encourage barn owl to fly over the road, important south of Chase Farm where the road is embanked.	**Within scheme design:** Increase in high quality of foraging habitats arising from the planting scheme	**Significant beneficial** Probable
Invasive species	Avoid spreading invasive species during management	Local	Legal	**Not Significant** Probable	**Mitigation:** Monitor habitats, in particular water bodies, managed and created for evidence of invasive species	**Mitigation:** to confirm the invasive species has not been spread**.**	**Not Significant** Probable
Invertebrates – all	Loss / change of habitats	Local & County	Direct Neutral Long-term	**Significant** Unlikely	**Within scheme design:** The planting proposal includes suitable habitats for invertebrates. **Mitigation:** Long-term management of the retained and created habitats. Re-seed areas where initial habitat establishment failed using seed stock collected prior to construction. Creation of various additional features of benefit for invertebrates.	**Within scheme design:** Change of the habitat types present within the site will effect the community of invertebrates that use the site. **Mitigation:** Maintain and encourage the current invertebrate assemblages to continue to proposer within the proposed Gedling County Park.	**Not Significant** Probable

Ecological Receptor	Potential Impacts	Receptor Value	Nature of Impacts	Significance and Confidence	Proposed Additional Mitigation / Enhancement	Rationale	Residual Significance and Confidence of Effects
	Disturbance from light pollution	Local	Indirect Adverse Long-term	**Significant** Probable	**Mitigation:** lighting which meets the minimum safety requirement while preventing direct or significant illuminate on habitats within the LWS and adjacent to the LNR	**Mitigation:** To protect the current invertebrate assemblages in notable habitats, important for nocturnal species in particular night flying moths which form part of the LWS designation.	**Not Significant** Probable

MAGIC

Gedling Access Road - Statutory Designated Sites



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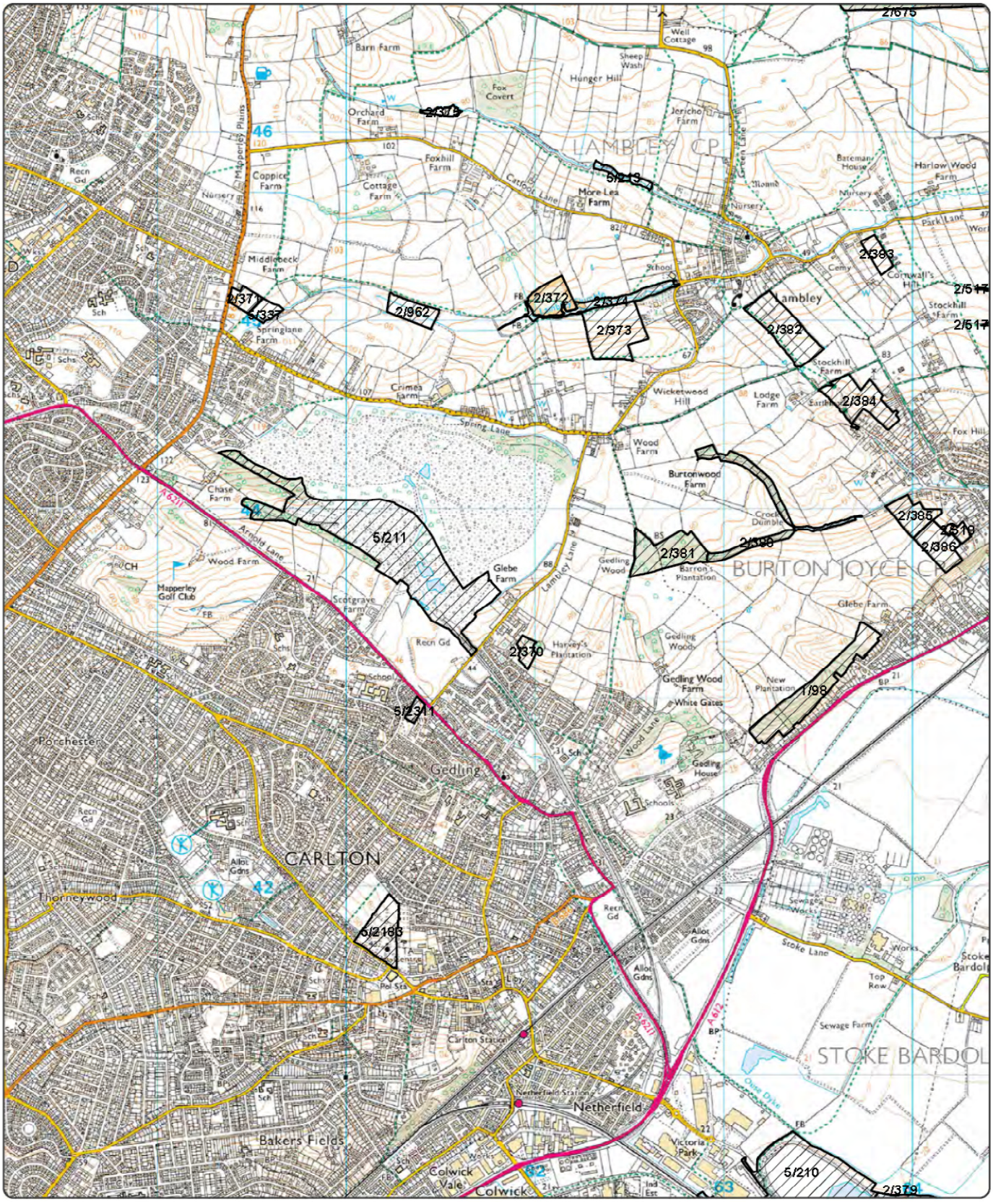
Legend

- Local Nature Reserves (England)
- National Nature Reserves (England)
- National Parks (England)
- Ramsar Sites (England)
- Sites of Special Scientific Interest (England)
- Special Areas of Conservation (England)
- Special Protection Areas (England)

Projection = OSGB36
xmin = 457200
ymin = 340900
xmax = 466300
ymax = 345300
Map produced by MAGIC on 12 September, 2014.

Gedling Access Road Area

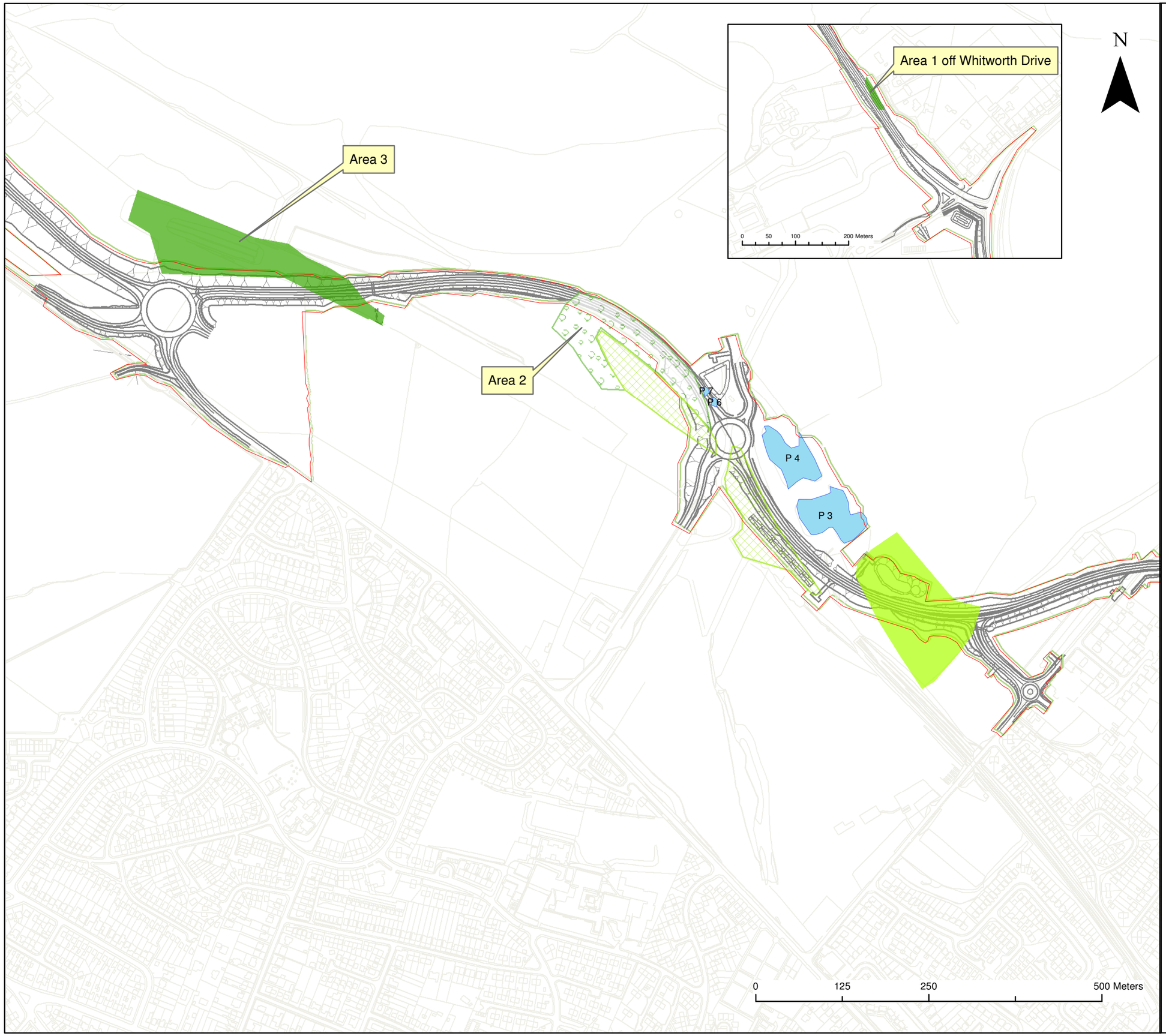


Key

Feature Mapped

Local Wildlife Site

Nottingham City Council



Legend

- Site Boundary
- ponds
- Grassland
- Pioneer Community
- Woodland/Grassland Mosaic
- Woodland

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WYG Leicester

Project

Gedling Access Road

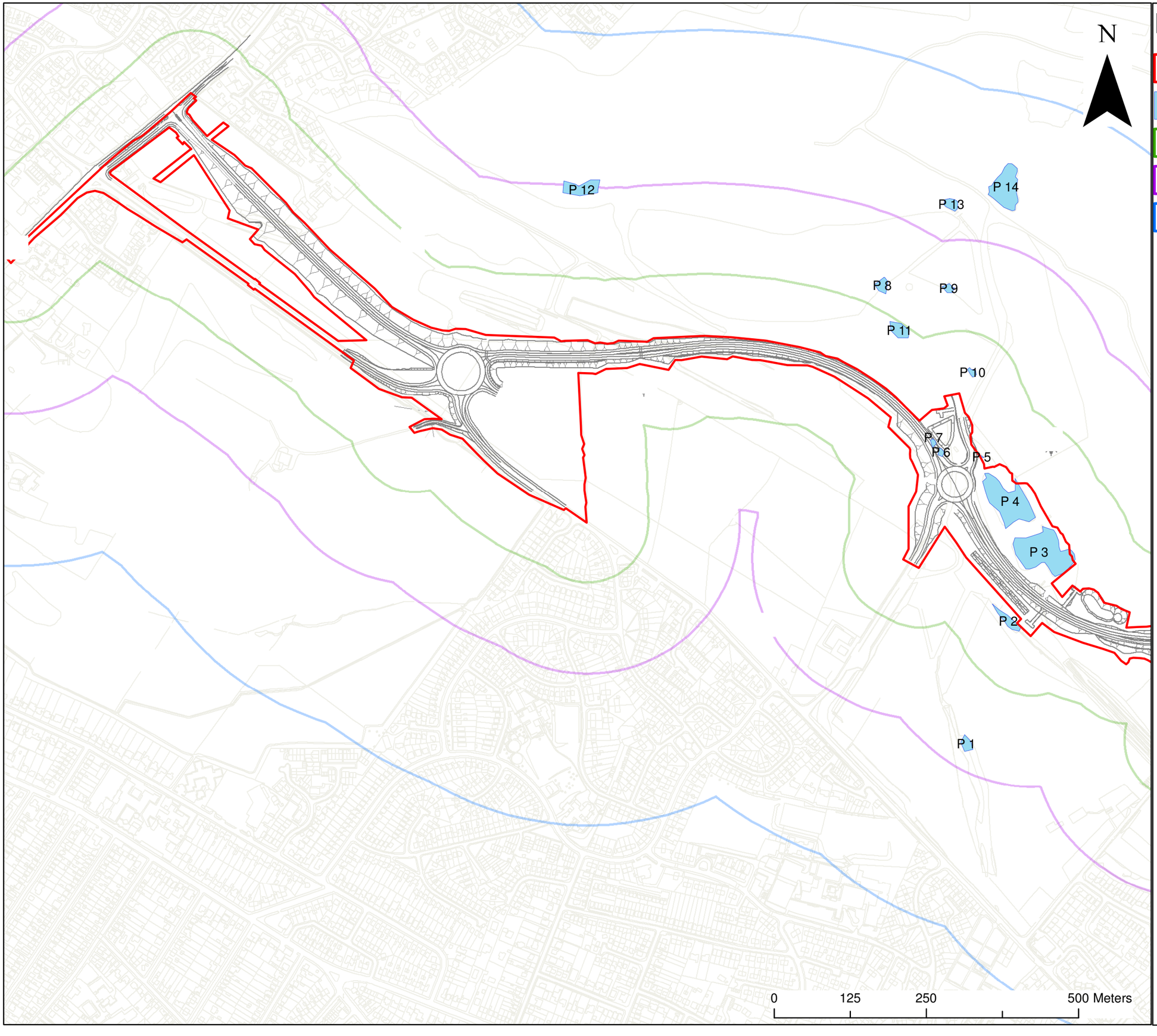
Drawing Title:

NVC Survey Areas

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	02/09/14	VT	05/09/14	DG	05/09/12

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.3	00

Base map provided by: Homes and Communities Agency



Legend

- Site Boundary
- Ponds
- 100m from GAR
- 250m from GAR
- 500m from GAR

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Project

Gedling Access Road

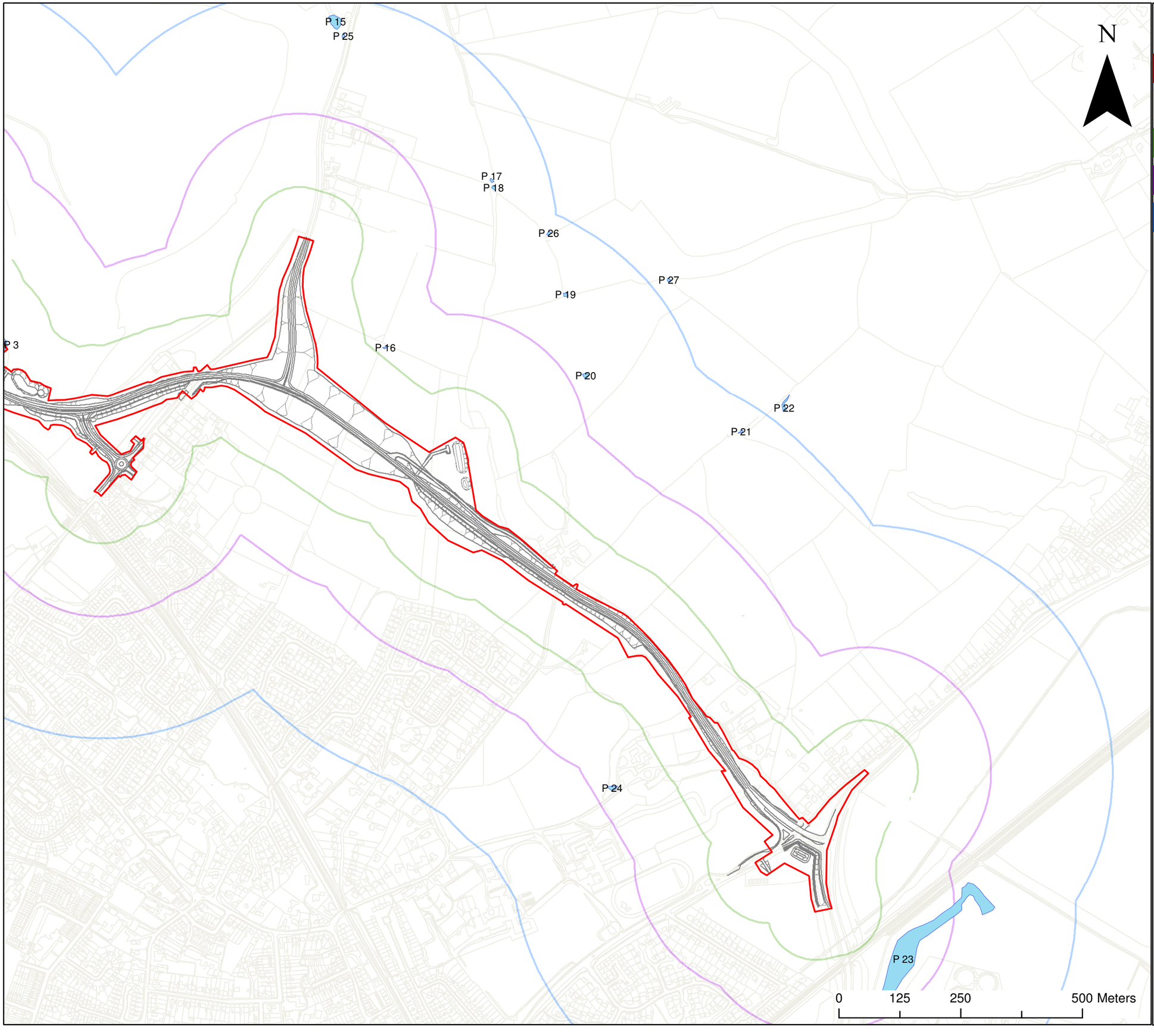
Drawing Title:

Amphibian Survey Area Plan

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	19/09/14	DG	19/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	95	Figure 9.4a	00

Base map provided by: Homes and Communities Agency



Legend

- Site Boundary
- Ponds
- 100m from GAR
- 250m from GAR
- 500m from GAR

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Project

Gedling Access Road

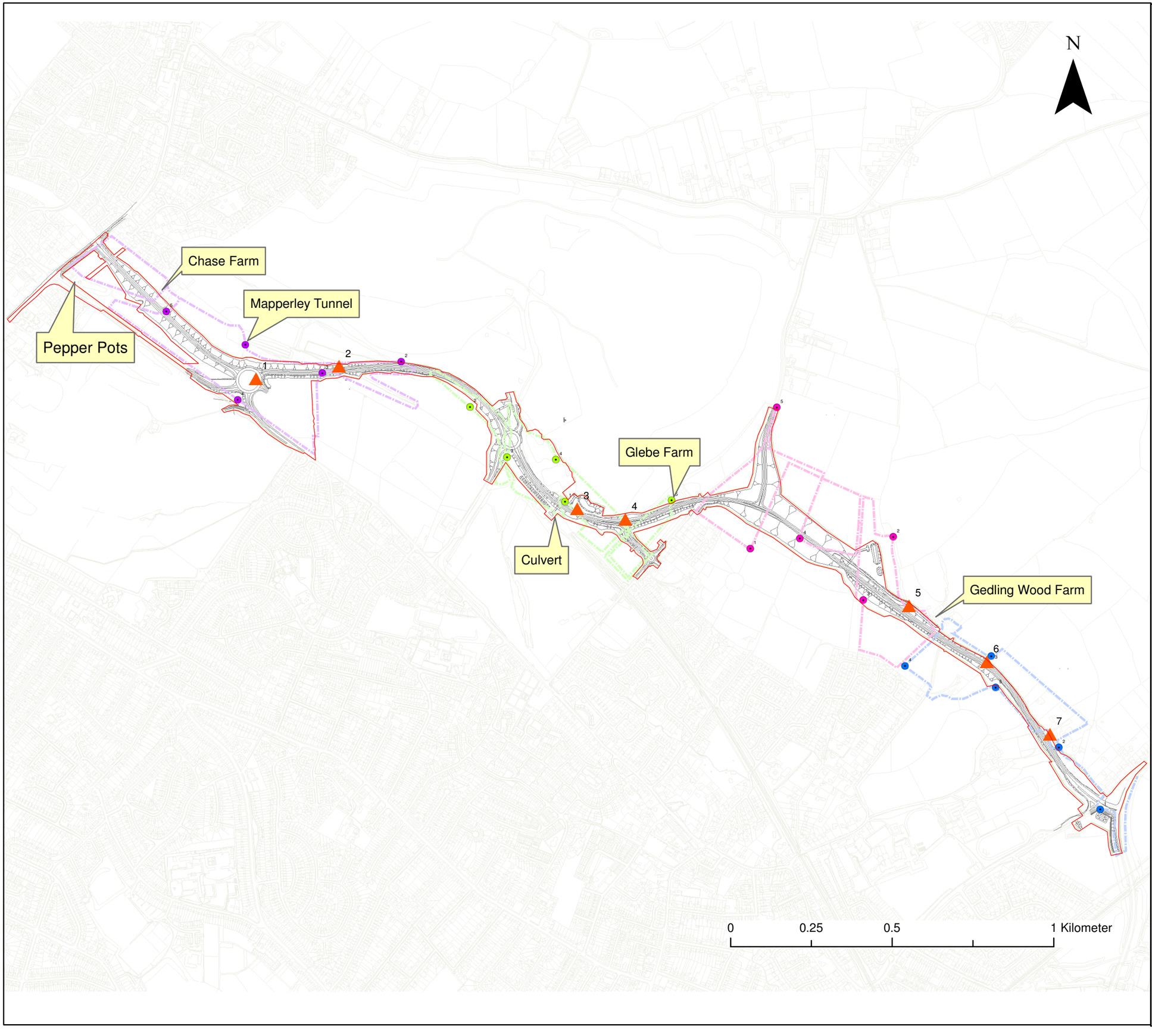
Drawing Title:

Amphibian Survey Area Plan

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	19/09/14	DG	19/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	95	Figure 9.4b	00

Base map provided by: Homes and Communities Agency



Legend

- Site Boundary
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Stopping Points (T1)
- Stopping Points (T2)
- Stopping Points (T3)
- Stopping Points (T4)
- Static Detector Locations
- Glebe Farm — Structures Surveyed

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Project

Gedling Access Road

Drawing Title:

GAR 2014 Bat Activity Surveys – Transect Routes (including Stopping Points) and Static Detector Locations, with Sensitive Receptors

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.1	00

Base map provided by: Homes and Communities Agency

N

0 50 100 200 Meters

Legend

Site Boundary

Bat Species

- Myotis/BLE
- Nyctalus sp.
- S.Pipistrelle
- C.Pipistrelle
- Bat sp

Transect 1

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Project

Gedling Access Road

Drawing Title:

GAR 2014 Bat Activity Surveys
Results of Walked (Manual) Transect 1

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.2	00

Base map provided by: Homes and Communities Agency

N

0 50 100 200 Meters

Legend

Site Boundary

Bat Species

- Myotis/BLE
- Nyctalus sp.
- S.Pipistrelle
- C.Pipistrelle
- Bat sp

Transect 2

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Project

Gedling Access Road

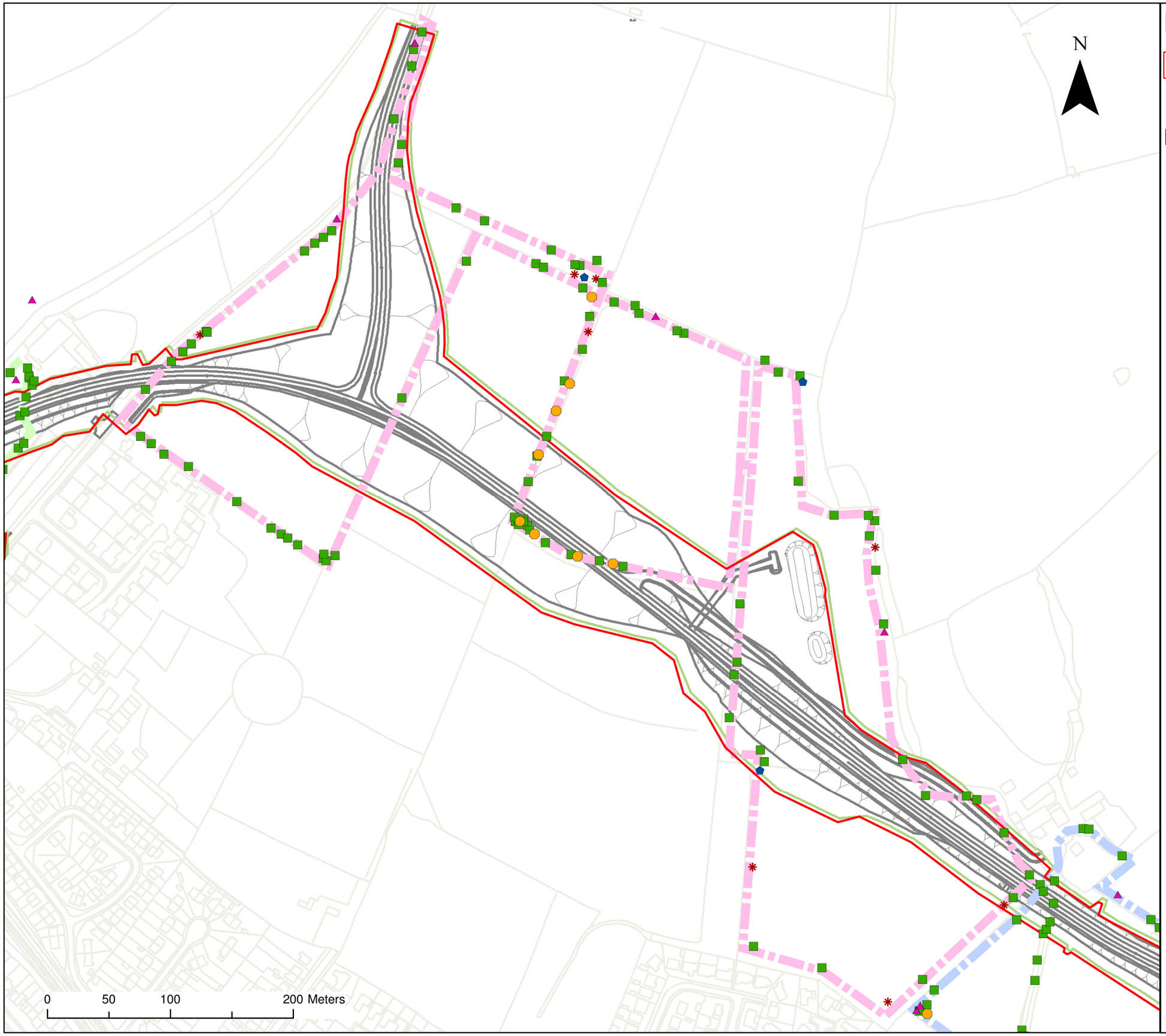
Drawing Title:

GAR 2014 Bat Activity Surveys
Results of Walked (Manual) Transect 2

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.3	00

Base map provided by: Homes and Communities Agency



Legend

Site Boundary

Bat Species

- Myotis/BLE
- Nyctalus sp.
- S.Pipistrelle
- C.Pipistrelle
- Bat sp

Transect 3

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WYG Leicester

Project

Gedling Access Road

Drawing Title:

GAR 2014 Bat Activity Surveys
Results of Walked (Manual) Transect 3

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.4	00

Base map provided by: Homes and Communities Agency

N

0 50 100 200 Meters

Legend

Site Boundary

Bat Species

- Myotis/BLE
- Nyctalus sp.
- S.Pipistrelle
- C.Pipistrelle
- Bat sp

Transect 4

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WYG Leicester

Project

Gedling Access Road

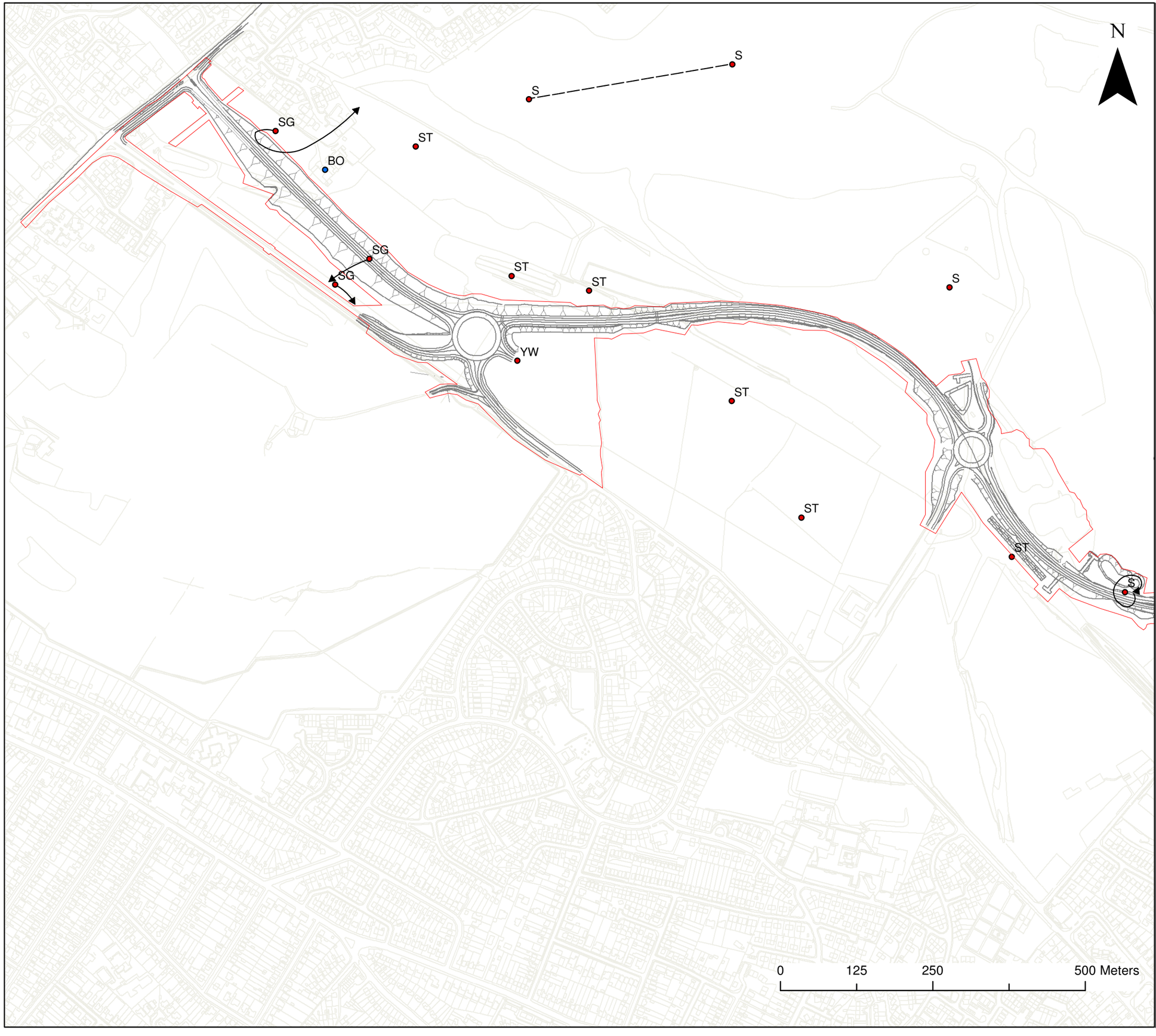
Drawing Title:

GAR 2014 Bat Activity Surveys
Results of Walked (Manual) Transect 4

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.5	00

Base map provided by: Homes and Communities Agency



Legend
Breeding Birds

Site Boundary

Status

- Sch1
- Red List BoCC
- Flightlines
- Registration Lines (Broken)
- Registration lines (Solid)

BTO Code	Common Name
BO	Barn owl
HS	House Sparrow
L	Lapwing
LI	Linnet
S	Skylark
SG	Starling
ST	Song Thrush
Y	Yellowhammer
YW	Yellow wagtail

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Project
Gedling Access Road

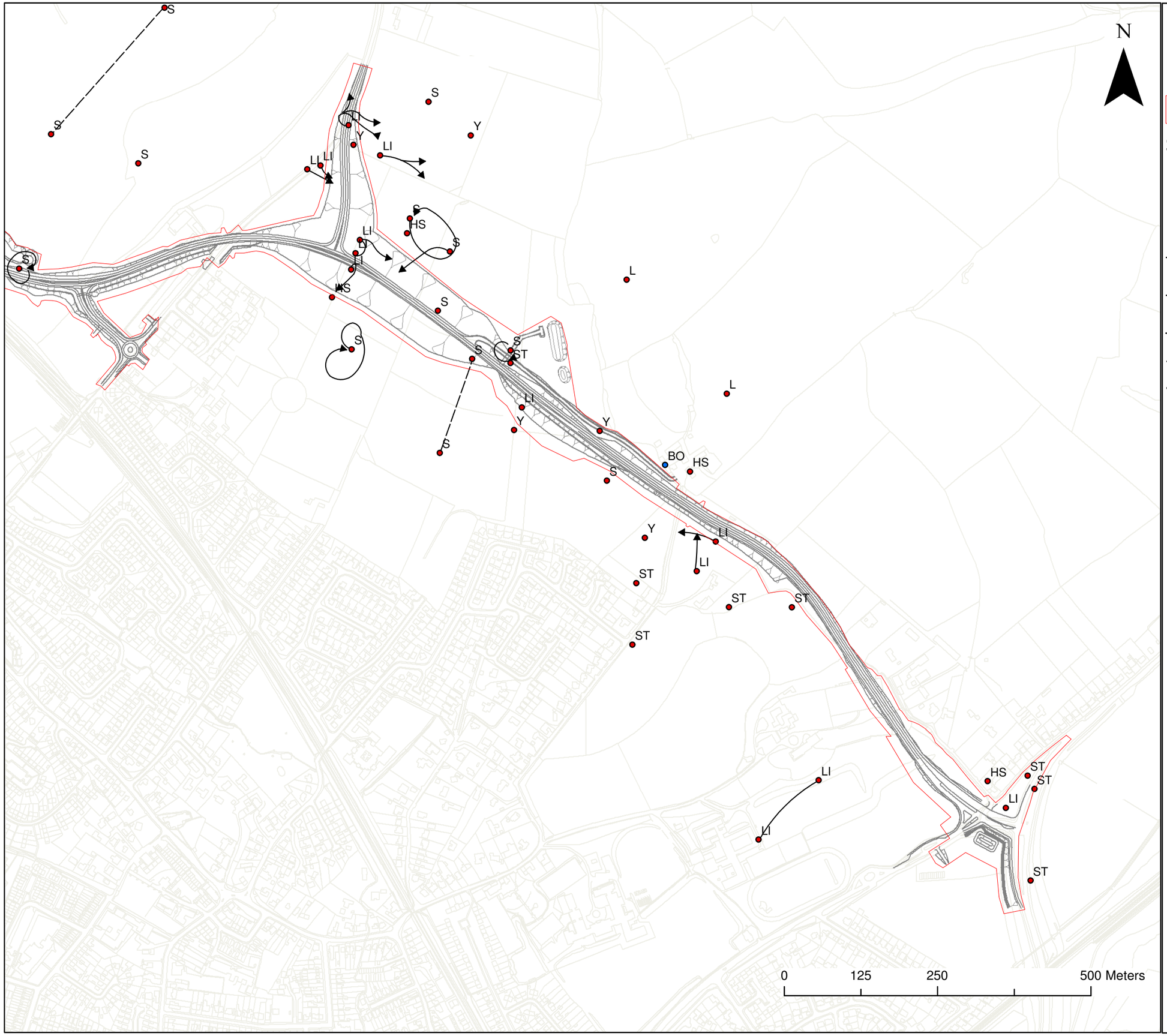
Drawing Title:

Breeding Birds Plans -
Schedule1 and BoCC Red Status Species

Drawn by: Date:	Checked By: Date:	Approved By: Date:
NG 05/09/14	DG 19/06/14	VT 23/06/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.7.1a	00

Base map provided by: Homes and Communities Agency



Legend
Breeding Birds

Site Boundary

Status

Sch1

Red List BoCC

Flightlines

Registration Lines (Broken)

Registration lines (Solid)

BTO Code	Common Name
BO	Barn owl
HS	House Sparrow
L	Lapwing
LI	Linnet
S	Skylark
SG	Starling
ST	Song Thrush
Y	Yellowhammer
YW	Yellow wagtail

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Project

Gedling Access Road

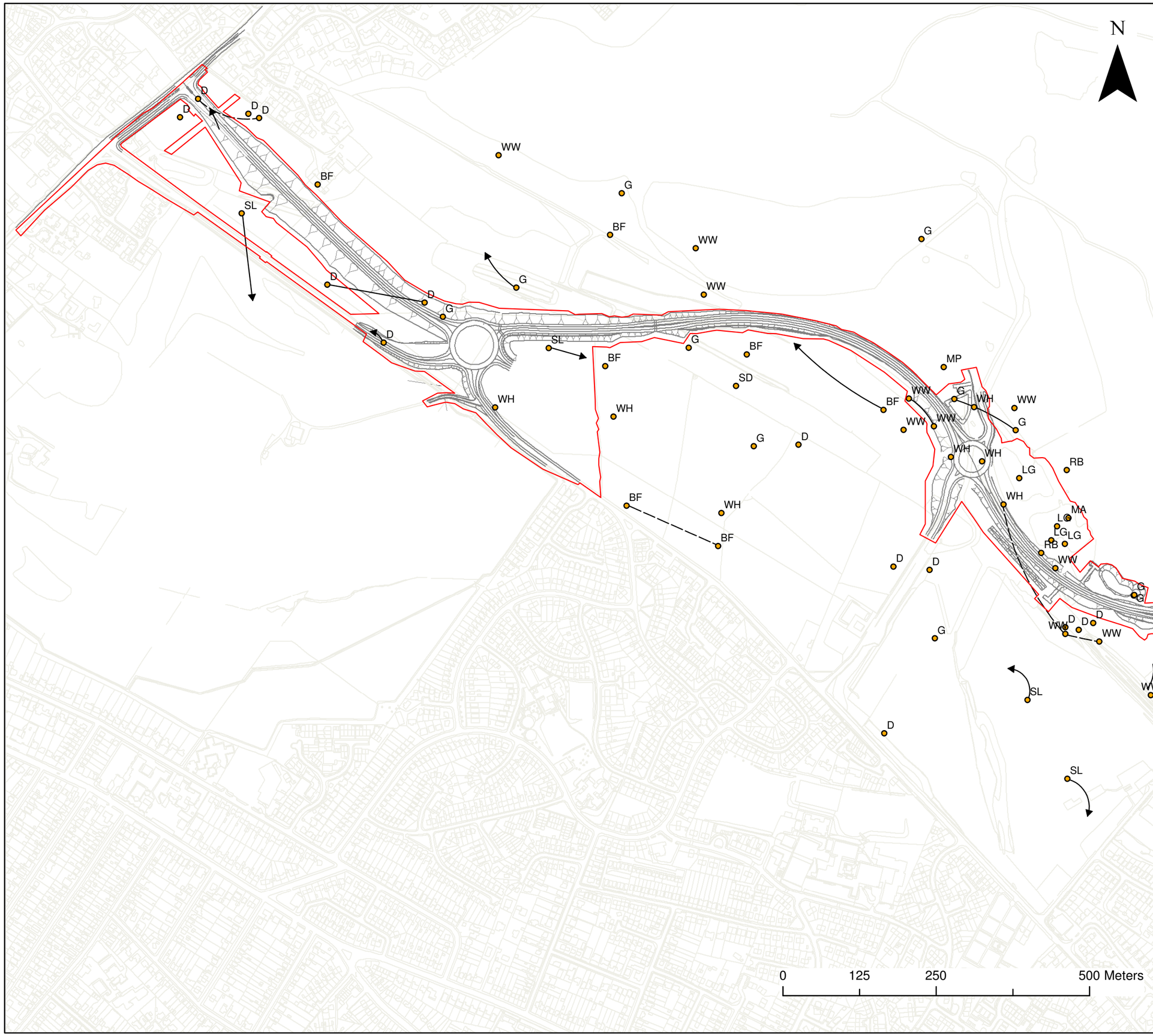
Drawing Title:

**Breeding Birds Plans -
Schedule1 and BoCC Red Status Species**

Drawn by: Date:	Checked By: Date:	Approved By: Date:
NG 05/09/14	DG 19/06/14	VT 23/06/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.7.1b	00

Base map provided by: Homes and Communities Agency



Legend
Breeding Birds

Site Boundary

Status

Amber List BoCC

Flightlines

Registration Lines (Broken)

Registration lines (Solid)

BTO Code	Common Name
BF	Bullfinch
BH	Black-headed Gull
D	Dunnock
G	Green Woodpecker
HM	House Martin
K	Kestrel
LG	Little Grebe
MA	Mallard Duck
MP	Meadow Pipit
RB	Reed Bunting
SD	Stock Dove
SI	Swift
SL	Swallow
WH	Whitethroat
WW	Willow Warbler

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Project

Gedling Access Road

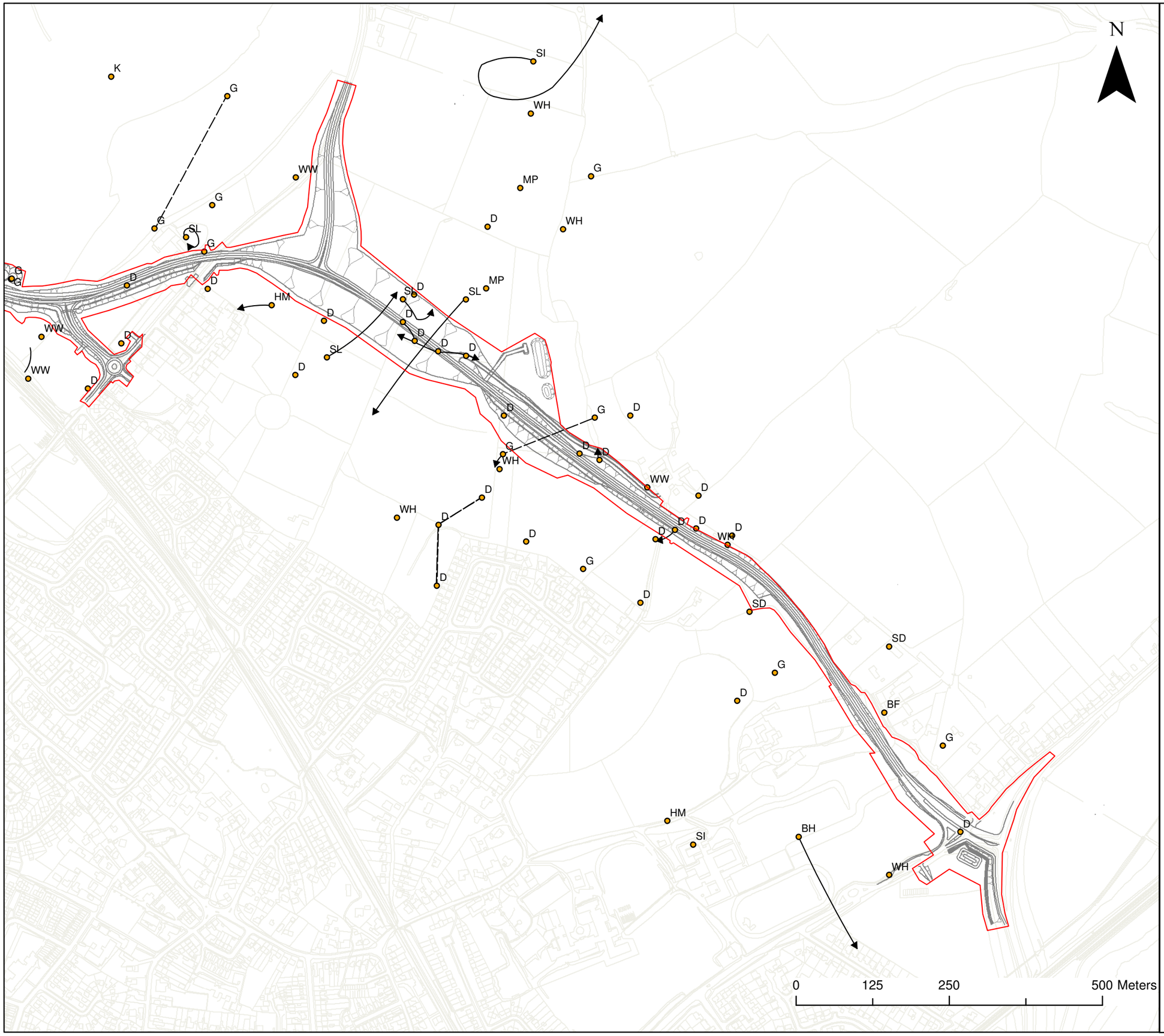
Drawing Title:

Breeding Birds Plans
BOCC Amber Status Species

Drawn by: Date:	Checked By: Date:	Approved By: Date:
NG 05/09/14	DG 19/06/2014	VT 23/06/2014

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.7.2a	00

Base map provided by: Homes and Communities Agency



Legend
Breeding Birds

Site Boundary

Status

Amber List BoCC

Flightlines

Registration Lines (Broken)

Registration lines (Solid)

BTO Code	Common Name
BF	Bullfinch
BH	Black-headed Gull
D	Dunnock
G	Green Woodpecker
HM	House Martin
K	Kestrel
LG	Little Grebe
MA	Mallard Duck
MP	Meadow Pipit
RB	Reed Bunting
SD	Stock Dove
SI	Swift
SL	Swallow
WH	Whitethroat
WW	Willow Warbler

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Project

Gedling Access Road

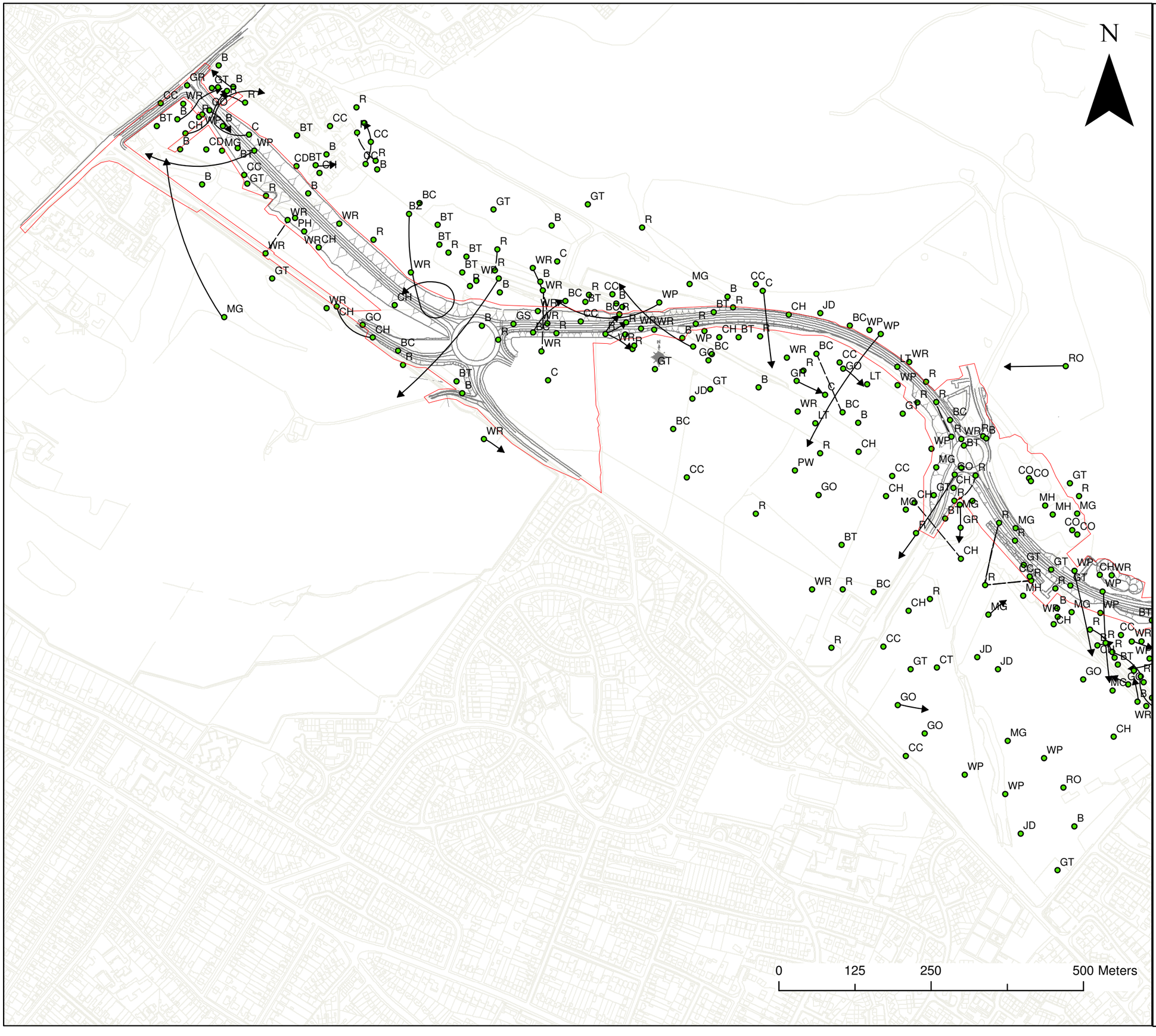
Drawing Title:

Breeding Birds Plans
BOCC Amber Status Species

Drawn by: Date:	Checked By: Date:	Approved By: Date:
NG 05/09/14	DG 19/06/2014	VT 23/06/2014

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.7.2b	00

Base map provided by: Homes and Communities Agency



Legend
Breeding Birds

Site Boundary

Status

Green List BoCC

Flightlines

Registration Lines (Broken)

Registration lines (Solid)

BTO Code	Common Name	BTO Code	Common Name
B	Blackbird	J	Jay
BC	Blackcap	JD	Jackdaw
BT	Blue Tit	LT	Long-tailed Tit
BZ	Buzzard	LW	Lesser Whitethroat
C	Carrion Crow	MG	Magpie
CC	Chiffchaff	MH	Moorhen
CD	Collard Dove	PH	Pheasant
CH	Chaffinch	PW	Pied Wagtail
CO	Coot	R	Robin
CT	Coal Tit	RL	Red-legged Partridge
GC	Goldcrest	RO	Rook
GO	Goldfinch	TC	Treecreeper
GR	Greenfinch	TO	Tawny Owl
GS	Great Spotted Woodpecker	WP	Woodpigeon
GT	Great Tit	WR	Wren
GW	Garden Warbler		

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WYG Leicester

Project

Gedling Access Road

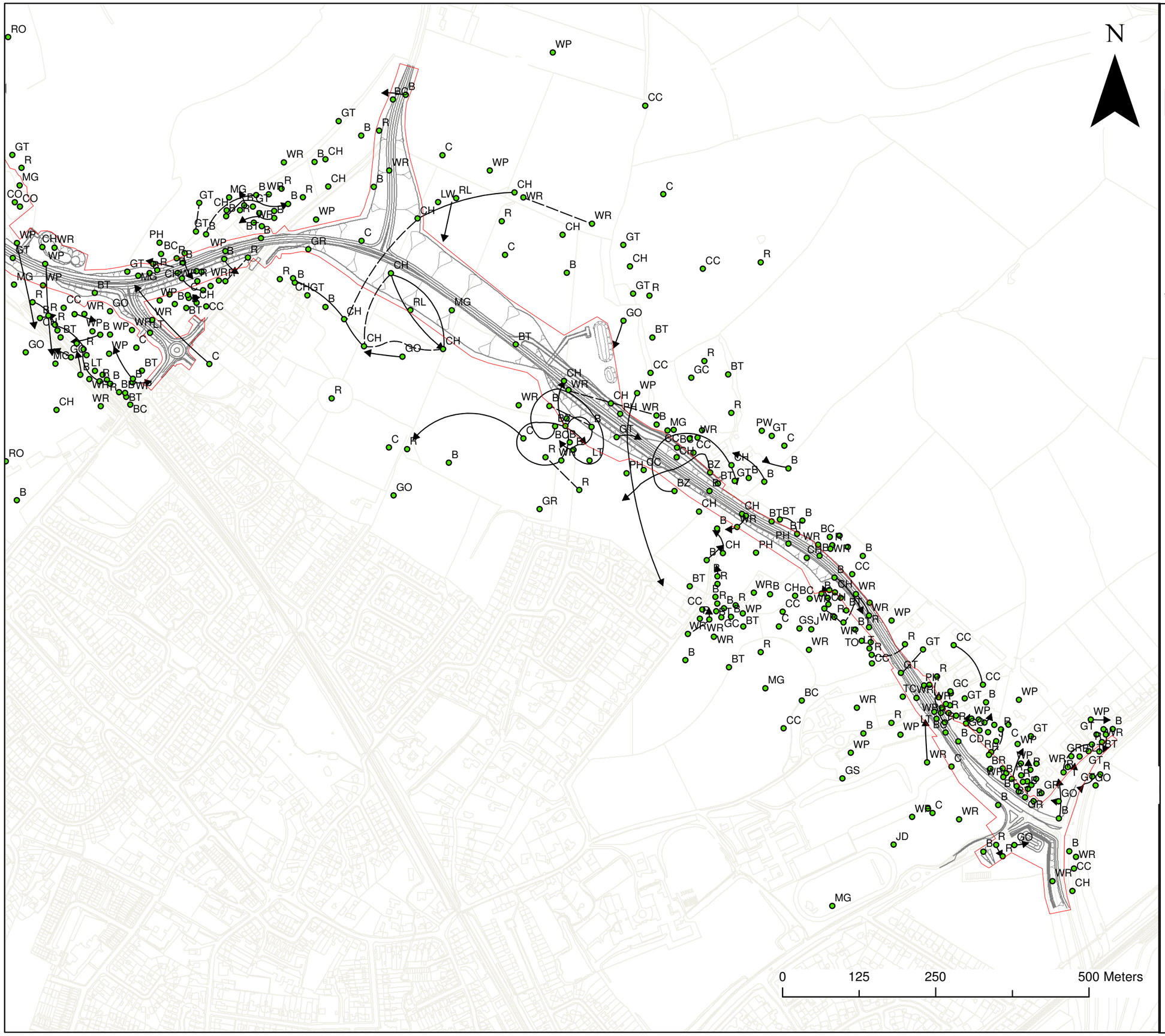
Drawing Title:

Breeding Birds Plans
BOCC Green Status Species

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
NG	05/09/14	DG	19/06/14	VT	23/06/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.7.3a	00

Base map provided by: Homes and Communities Agency



Legend
Breeding Birds

Site Boundary

Status

Green List BoCC

Flightlines

Registration Lines (Broken)

Registration lines (Solid)

BTO Code	Common Name	BTO Code	Common Name
B	Blackbird	J	Jay
BC	Blackcap	JD	Jackdaw
BT	Blue Tit	LT	Long-tailed Tit
BZ	Buzzard	LW	Lesser Whitethroat
C	Carrion Crow	MG	Magpie
CC	Chiffchaff	MH	Moorhen
CD	Collard Dove	PH	Pheasant
CH	Chaffinch	PW	Pied Wagtail
CO	Coot	R	Robin
CT	Coal Tit	RL	Red-legged Partridge
GC	Goldcrest	RO	Rook
GO	Goldfinch	TC	Treecreeper
GR	Greenfinch	TO	Tawny Owl
GS	Great Spotted Woodpecker	WP	Woodpigeon
GT	Great Tit	WR	Wren
GW	Garden Warbler		

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Project

Gedling Access Road

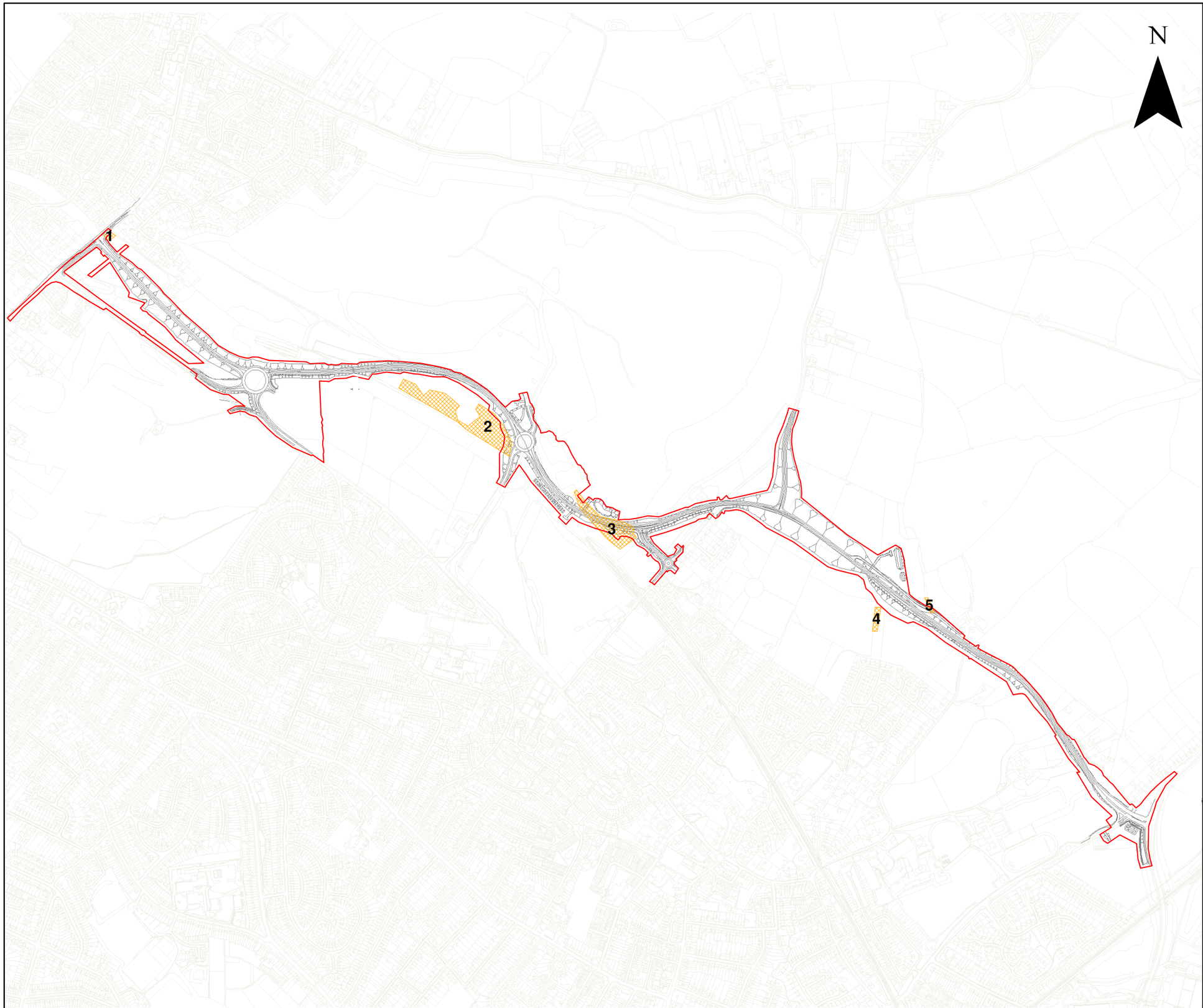
Drawing Title:

Breeding Birds Plans
BOCC Green Status Species

Drawn by: Date:	Checked By: Date:	Approved By: Date:
NG 05/09/14	DG 19/06/14	VT 23/06/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.7.3b	00

Base map provided by: Homes and Communities Agency



Legend

- Site Boundary
- Reptile Survey Areas

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Project

Gedling Access Road

Drawing Title:

Reptile Survey Areas

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
NG	09/09/14	IS	02/10/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.8	00

Base map provided by: Homes and Communities Agency

N

0 50 100 200 Meters

Legend

Site Boundary

Moths

Latticed heath

Cinnabar Moth

Butterflies

Common blue

Dingy skipper

Small copper

Essex skipper

Other butterfly species present

Meadow brown
Small white
Ringlet
Small skipper
Comma
Large white
Speckled wood
Peacock
Green-veined white
Brimstone
Orange tip

Other moth species present

Silver-Y
5-spot burnet
Mother shiptons
Fan foot sp.

Areas of birdsfoot trefoil

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Project

Gedling Access Road

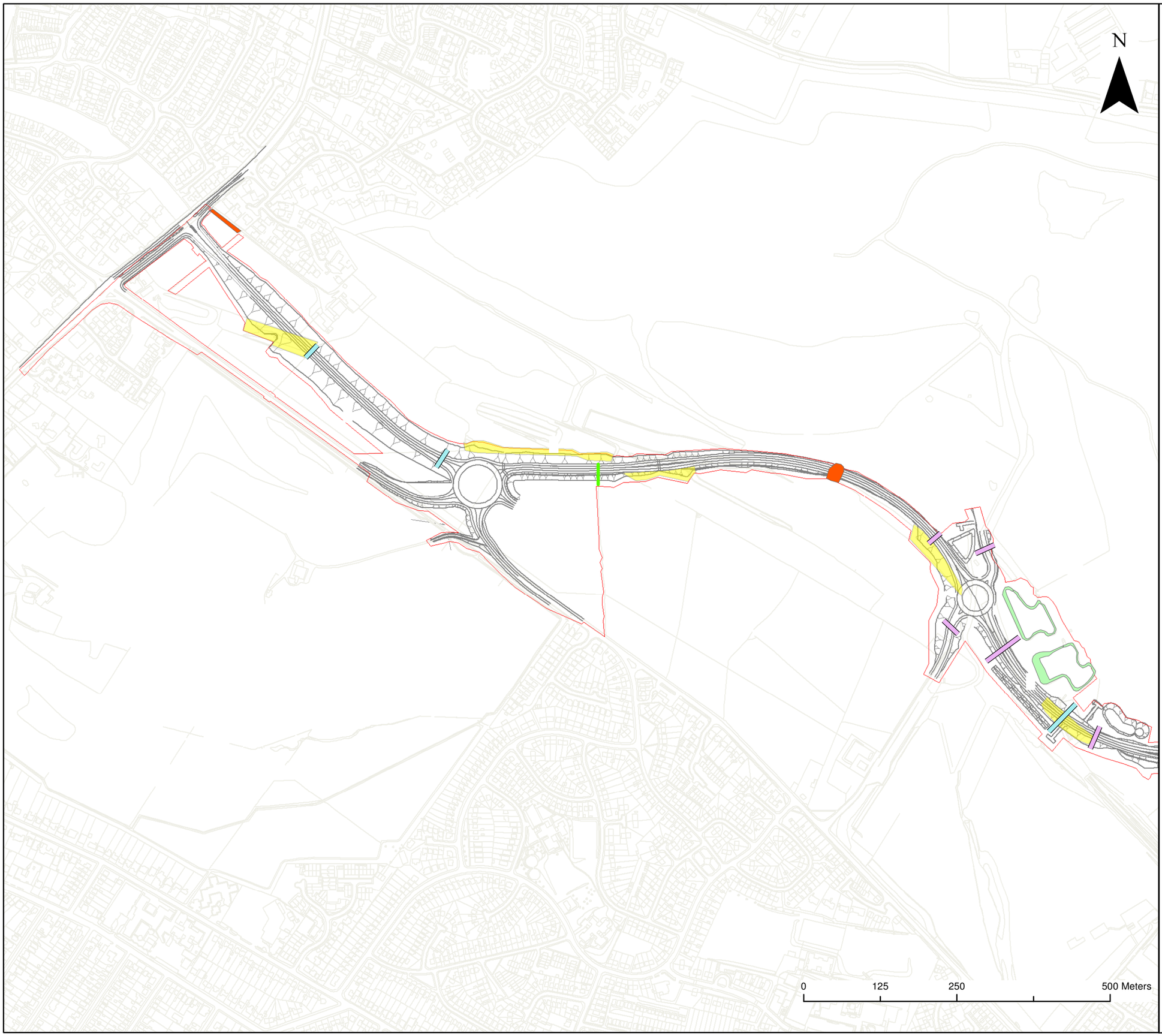
Drawing Title:

Butterfly Result

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
NG	12/09/14	VT	12/09/14	DG	12/09/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.9	00

Base map provided by: Homes and Communities Agency



Legend

- Site Boundary
- Bird and Bat Boxes
- Amphibian Tunnel
- Badger Tunnel
- Species-rich Hedge

Invasive Species

- Japanese Knotweed
- New Zealand Stonecrop

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Project

Gedling Access Road

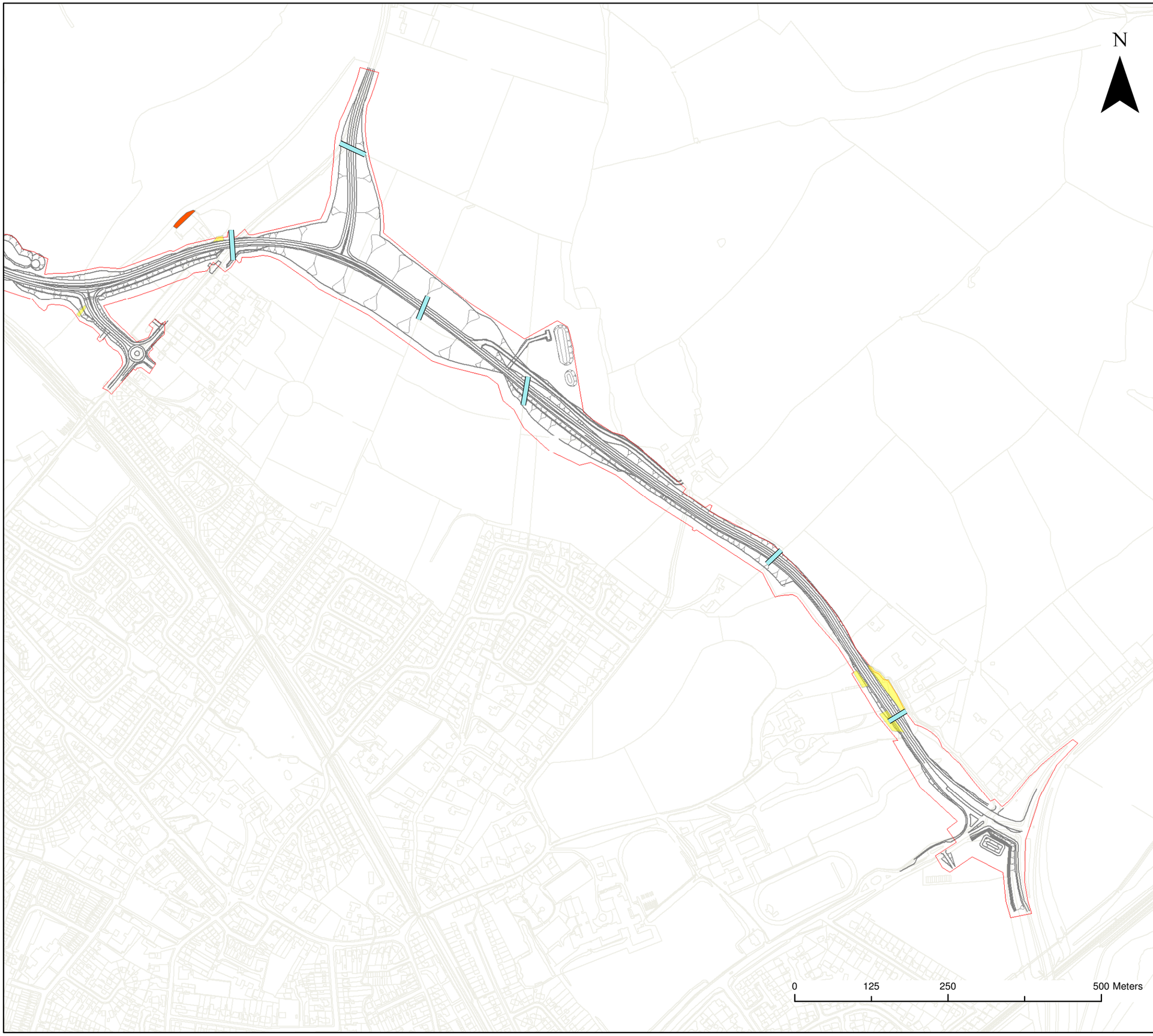
Drawing Title:

Mitigation Plan

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
NG	15/09/14	IS	02/10/14	VT	04/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.10a	00

Base map provided by: Homes and Communities Agency



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NG	15/09/14	IS	02/10/14	VT	04/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.10b	00

Base map provided by: Homes and Communities Agency

Homes and Communities Agency

Gedling Access Road

Amphibian Survey Report

September 2014

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Prepared by	Checked by	Approved By
Victoria Thomas, BSc MCIEEM **Principal Ecologist**	Gavin Ward MCIEEM, AIEMA **Associate Director**	Claire Wilmer CEnv, MCIEEM **Director of Ecology**
Description of Revision	**First Issue**	

Contents

Table of Contents

Executive Summary

Contents	Summary
Site location	Gedling Access Road connects with Mapperley Plains in Arnold (SK 600 443) in the west and to the A612 Burton Road in Burton Joyce, Nottinghamshire (SK 632 425) in the south-east.
Previous reports/surveys	• Gedling Access Road: Extended Phase 1 habitat Survey Report (BSG, November 2013) • Former Gedling Colliery Site, Arnold Lane, Nottinghamshire: Extended Phase 1 Habitat Survey (including desk study), Badger, Breeding Bird, Great Crested Newt and Reptile Survey Report for Proposed Solar Farm (SLR, June 2013). • Gedling Access Road: (GAR) Environmental Statement Volume 2. (David Tyldesley and Associates, 2008)
WYG Survey	<u>Great Crested Newt</u> • Great crested newt surveys at Gedling Access Road in Nottinghamshire was carried out between 18th April -22nd May 2013 at waterbodies within the Gedling Colliery and 12 May – 4th June 2014 other ponds not surveyed in 2013. • Survey methods used included bottle traps, netting, torch surveys and egg searches etc, Site, County: 25th March 2010 <u>Other amphibians</u> • Further amphibians surveys were also carried out using torch surveys around the settling lagoons and fire ponds within the Gedling Colliery; these surveys were carried out on the 27th March, 12th May 2014 and 18th April 2013.
Results	• Amphibian surveys at the lagoons within the Gedling Colliery in 2014 recorded the presence of 127 toads and 59 smooth newts. On the 18th April 2013, 925 common toads (a 'good' population size) were recorded at the two settling lagoons within the Gedling Colliery • Two 'small' populations of great crested newts were recorded as present in two ponds located approximately 300 and 400m north of Gedling Access Road.
Recommendations for Additional Surveys	Further surveys may be required to update the amphibian survey as great crested survey results are usually valid for a period of two years. It may be necessary to update the results to inform any changes to the development layout or prior to construction works beyond two years from the survey period.

1 Introduction

This technical report has been prepared as an appendix to the Environmental Statement for the Gedling Access Road which will accompany the planning application. Further details relating to the proposed development, assessment for the impact to amphibians that may arise from the development and appropriate mitigation is provided in the Environmental Statement Ecology Chapter 9. Figure 9.4 (a & b) provides the location of the ponds surveyed in 2014 and should be reviewed in conjunction with this report.

1.1 Background

WYG Environment was commissioned by the Homes and Communities Agency (HCA) in March 2014 to undertake great crested newt *Triturus cristatus* surveys and other amphibian surveys at Gedling Access Road (hereafter referred to as the 'Site') with the aim of identifying potential ecological constraints to the development. Detailed information relating to the location and description of the proposed development are provided in the Environmental Statement Chapters 1 and 3.

1.2 Site Description

Gedling Access Road (GAR) is proposed to connect to B684 Mapperley Plains road in Arnold (SK 600 443) in the west and to the A612 Trent Valley Way / Burton Road in Burton Joyces, Nottinghamshire (SK 632 425) in the south-east. The Site is described as 'east' and 'west' within this report with Lambley Lane (located between Spring Lane in the north and Arnold Lane in the south) bisecting the centre of the Site. The east of the Site comprises grassland pasture bounded by hedges and brownfield land with pioneer vegetation communities throughout Gedling Colliery. The west of the Site is predominate arable land with associated hedges. The road also passes through a small area of poor semi-improved grassland and woodland including a small corner of Gedling House Wood Local Nature Reserve (LNR).

1.3 Survey objectives

The aims of the survey work and the subsequent report presented herein were to:

- Determine the presence or likely absence of amphibians, in particular great crested newts, at the site;
- Determine the population size class of great crested newts if confirmed to be present;

1.4 Legislative Consideration

The great crested newt is afforded protection under the Conservation of Habitats & Species Regulations 2010 (as amended) which applies to all of its life stages.

The great crested newt is also listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) which makes it an offence to:

- Deliberately, intentionally or recklessly kill, injure or take a great crested newt;
- Deliberately, intentionally or recklessly takes or destroys the eggs;

- Posses or control any live or dead specimen or anything derived from a great crested newt;
- Deliberately, intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by a great crested newt; and
- Deliberately, intentionally or recklessly disturb a great crested newt while it is occupying a structure or place which it uses for that purpose.

This species is also protected by the Protection of Animals Act 1911, which prohibits any acts of cruelty or mistreatment.

Common toad *Bufo bufo*, as a result of its recent large population declines predominately in southern, central and eastern England, is a UK Priority Species (UK BAP:2007) and thus needs to be taken into consideration at the planning stage by the Local Planning Authority with a view to conserve biodiversity covered under Section 41 of the NERC Act (2006). To assist with the recovery of this species determining its presence during the early stages of development and providing appropriate habitat management could significantly enhance its current conservation status. Joint Nature Conservation Committee (JNCC 2010) states 'Countering the effects of habitat fragmentation at the local scale is a very high priority.'

2 Methods

2.1 Desk Based Study

The Nottinghamshire Biological and Geological Records Centre (NBGRC) were consulted by BSG in October 2013 to obtain information pertaining to protected and notable species within a 2km search radius of the Site. See Appendix 9.2 for a copy of the data they received.

2.2 Survey

In accordance with English Nature's *Great Crested Newt Mitigation Guidelines* (2001), ponds within 500m of the proposed development site were assessed for their potential to support great crested newts, including the completion of a Habitat Suitability Index (HSI) assessment and any considered suitable were subject to a presence / absence survey. In any instance when great crested newts were confirmed to be present, additional surveys would be undertaken to determine a population estimate.

2.2.1 Pond Assessment

Pond assessments were undertaken of twenty-seven waterbodies and their locations in relation to the proposed development Site are shown on Figure 9.4 and they are individually described in Table 1 in Section 3.2.1 of this report. The assessment was based on guidance within Froglife's *Great Crested Newt Conservation Handbook* (2003) and the Herpetological Conservation Trust's *National Amphibian and Reptile Recording Scheme* (NARRS) (2008).

2.2.2 Habitat Suitability Index

The Habitat Suitability Index (HSI) provides an objective method for assessing the suitability of a pond as habitat for great crested newts (Oldham et al., 2000; Herpetological Conservation Trust, 2008). The system provides an index between 0 and 1, with 0 indicating unsuitable habitat and 1 optimal habitat. Ten suitability indices are used to calculate the index score, each representing a factor considered to affect great crested newts. These factors are listed and briefly explained below:

1. *Location*: i.e. where the pond is located in the British Isles. Lowlands are generally thought to be most suitable; suitability declines with increases in altitude;

2. *Pond area*: i.e., the water surface area of a pond. Suitability peaks at approximately 800m²;

3. *Pond drying*: how often a particular pond dries out. Ponds which dry out more frequently are less suitable;

4. *Water quality*: an indication of water quality based on the invertebrate diversity present. High invertebrate diversity indicates high water quality and suitability;

5. *Shade*: an estimate of the total shaded perimeter of a pond. Shoreline shade below 60% is optimal;

6. *Fowl*: indication of impact by waterfowl. High waterfowl numbers are generally considered detrimental;

7. *Fish*: indication of fish abundance. High fish numbers are generally considered detrimental;

8. *Pond count*: based on the density of ponds occurring within 1km of a particular pond. Suitability is positively correlated with pond density;

9. *Terrestrial habitat*: based on the availability of suitable habitat in the pond vicinity, e.g. rough grassland, scrub and woodland. For this assessment, the categories provided in the NARRS Survey Pack (Herpetological Conservation Trust, 2008) were used. This differs from the assessment criteria by Oldham et al. (2000), and is based on work by Lee Brady (unpublished).

10. *Macrophytes*: based on an estimate of the percentage cover by emergent and aquatic vegetation. Suitability peaks at between 70% and 80% cover.

The results are also compared against a categorical scale developed by Lee Brady (unpublished). Results from individual waterbodies are categorised as follows:

- <0.5 = poor
- 0.5 – 0.59 = below average
- 0.6 – 0.69 = average
- 0.7 – 0.79 = good
- >0.8 = excellent

The habitat suitability index was applied to all twenty-seven ponds and this data was collected during April 2014.

2.3 Great Crested Newt

2.3.1 Presence / Absence Surveys

The aim of the initial great crested newt surveys was to determine the presence or likely absence of great crested newts in those waterbodies identified to have potential for supporting great crested newts.

The visits required for the great crested newt surveys presented in this report were undertaken between 12/05/2014 and 04/06/2014. All surveys were undertaken by suitably qualified and trained ecologists working under survey licences from Natural England. All surveys were carried out or overseen by Victoria Thomas, MCIEEM - a great crested newt class licence holder (WML – CL09).

All waterbodies were visited at least four times, in accordance with the *Great Crested Newt Mitigation Guidelines* (English Nature, 2001) requirements for presence / absence surveys. Where possible, three survey methods were performed on each survey in accordance with guidelines given in the *Great Crested Newt Mitigation Guidelines* and the *National Amphibian and Reptile Recording Scheme* (The Herpetological Conservation Trust, 2008) as described below.

Any limitations affecting this survey are discussed in Section 2.5.

2.3.1.1 Bottle Trapping

Traps were constructed from two-litre plastic bottles and were set around the margins of waterbodies approximately every 2-3m where access allowed, shortly before dusk. The traps were checked and removed the following morning between 06:00 and 10:00. All surveys were undertaken when the predicted air temperature exceeded 5ºC, when great crested newts are most active.

2.3.1.2 Torchlight Survey

This technique involves a visual search for individual newts inhabiting the perimeter of the particular waterbody after dark. High powered torches (rated at 1,000,000 candle-power) were shone into the water during a search and the perimeter of the waterbody is walked once; care is taken to count individuals once only. To maximise the reliability of this technique, all torch surveys were conducted in the evening while air temperature exceeded 5ºC, when newts are generally considered being most active.

2.3.1.3 Egg Search

Great crested newt eggs were searched for among submerged, floating and other aquatic vegetation. When laying their eggs, this species folds leaves of aquatic plants around the egg, although dead leaves and a variety of artificial materials are also known to be used. This behaviour is exploited as evidence indicative of the presence of great crested newts in a particular waterbody; eggs of great crested and smooth newts (*Lissotriton vulgaris*) are easily discerned. However, egg numbers cannot be used to estimate population size due to predation and high mortality rates. Therefore, to limit disturbance, this method is ceased as soon as the first egg has been positively identified.

2.3.1.4 Netting

A long handled dip net was used to sample the area around the pond edge. The netting as conducted during the night as better results are obtained at night when adult newts are more likely to be in open water. The perimeter of the pond was walked and 15 minutes of netting was undertaken per 20 metres of shoreline as recommended in the Great Crested Newt Mitigation Guidelines (2001). Netting is a good technique for augmenting other surveys and gauging presence/absence; this method was used when there was too much silt or vegetation in the ponds to carryout torch surveys appropriately due to poor visibility.

2.3.1.5 Refuge Search

A refuge search was undertaken on the site where suitable habitat was present: logs, bark, rocks and other debris around the ponds were lifted and checked for the presence of newts. Although refuge searches are not used in population calculations, a refuge search can help to augment the survey results.

2.3.2 Population Size Class Assessment

In accordance with guidance from Natural England, a further two targeted visits would be made where positive results were obtained during the presence / absence survey to gather information regarding the size-class of the great crested newt population. Size-classes are based on the maximum count of great crested newts achieved during any single survey using one technique at a particular waterbody – i.e. the highest count was obtained from bottle trapping or torchlight survey on a single visit. Maximum counts are classed as 'small', 'medium' or 'large'. The population size classes are defined as follows:

- 'small' is for maximum counts of up to 10 adult great crested newts;

- 'medium' for maximum counts of between 11 and 100 adults;
- 'large' for maximum counts of over 100 adults.

Any limitations affecting this survey effort are discussed in section 2.5.

2.4 Common Toad & Other Amphibians

The aim of the survey was to confirm the presence and classify the population size of common toad, as identified during the desk study, within the on-site ponds located within the former Gedling Colliery.

The population size classes for common toad are taken from Herpetofauna Workers' Manual (Gent & Gibson, 2003).

- Low: < 100 counted individual toads.
- Good: 100-1,000 counted individuals.
- Exceptional: > 1,000 counted individuals.

Two night count surveys by torchlight were carried out, one 27th March 2014 and the second 12th May 2014. The torchlight surveys were carried out using the technique described in Section 2.3.1: Torchlight Survey.

2.5 Limitations

At least three survey methods were used during the great crested newt surveys; however, the consistency of their use was variable due to the specific conditions of individual waterbodies, e.g. where water was too turbid or had dense coverings of aquatic plants such as duckweed (*Lemna* spp.) limiting the effectiveness of the torch survey, or where water was too shallow for trapping with bottles to be possible. Torchlight surveys are particularly problematic as this method is the most likely of the three to be limited by poor visibility due to factors outlined above.

During the great crested newt survey period some of the ponds became dry and aquatic surveys for great crested newts were not possible.

Despite the limitations highlighted above, the survey effort applied is considered sufficient to meet the aims of the survey and this report, in accordance with the aforementioned guidelines.

Surveys for common toad should ideally include counts for adult toads in the pond at the peak of spawning, with peak numbers being observed within the first five days from when the first paired animals are seen in the water, giving a 75% level of accuracy in the survey results compared to only 5% during peak migration counts (Gent, T. & Gibson, S. 2003). Spring 2014 was considerably warmer than in previous years, and as no breeding was recorded during the surveys it is considered likely that surveys were not carried out during peak breeding period. The 1st surveys was carried out during the spawning period when adults were in the ponds (as with survey carried out by SLR in 2013) and the 2nd survey was carried out when tadpoles would have been present.

3 Results

3.1 Desk Study

Records are used to inform field surveys about the possible presence of a species in a particular area at an early stage of the investigation. The existence of records indicates that a particular species has at least been present at a particular location; however, absence of records cannot be interpreted as a species' absence at a location of interest.

See Appendix 9.2 for the data search information obtained as part of the Gedling Access Road Extended Phase 1 habitat Survey Report (BSG, Nov 2013). Records found included thirty-six records of common frog *Rana temporaria*, ten records of common toad and twelve records of smooth newt.

One of the smooth newt record (2010) was from the northern most lagoon in Gedling Colliery (Figure 9.4, P4). Records of both common frog and common toad records (2010) were also provided for both of the lagoons in Gedling Colliery. 105 toads were recorded in the northern lagoon (Figure 9.4, P4) and 130 toads in the southern lagoon (Figure 9.4, P3).

Great crested newt presence/absence surveys in 2004 and 2007 (David Tyldesley and Associates 2008) were carried out at the two settling lagoons and a further ten ponds within the former Gedling Colliery, however some of these are no longer present. No great crested newts were located during the surveys carried out prior to 2008 (David Tyldesley and Associates 2008). This 2008 report also makes reference to a single great crested newt record for Woodthorpe located 2 km west of the Site.

3.2 Field surveys

3.2.1 Description of Waterbodies

Detailed descriptions of each waterbody surveyed are given below. The purpose of these descriptions is to assist in determining the ponds' suitability as breeding habitat for great crested newts. Therefore, information on water depth, water quality, bank profile, presence of aquatic, emergent and surrounding vegetation, as well as suitability of the surrounding terrestrial habitat has been provided. A grid reference is provided for each waterbody - refer to Figure 9.4 1 for an indication of their positions in relation to the proposed development.

Table 1 below provides a brief description of each pond identified either in the application area or within 500m of the boundary. Photographs of the ponds are provided in the Appendix A.

Table 1. Pond Descriptions

Pond Reference	OS grid Reference	Approx. Proximity to the Site	Approx. size (m^2)	Description
P1	SK 61367 43204	250m-500m, south	50	Long shallow ephemeral pond located at the bottom of the colliery slope adjacent to the playing fields; overgrown with ruderal vegetation – dried during surveys in May–June 2014.
P2	SK 61419 43479	50m, south	485	Deep settlement lagoon, located at the bottom of two slopes, with reeds

Pond Reference	OS grid Reference	Approx. Proximity to the Site	Approx. size (m^2)	Description
				growing in the centre at the deepest point.
P3	SK 61495 43580	Within , at Gedling Colliery	4300	Large Lagoons, P4 known as north lagoon and P3 as south lagoon in centre of Gedling Colliery. Fish, amphibians, wildfowl present. Aquatic vegetation present around the margins and submerged.
P4	SK 61410 43661	Within , at Gedling Colliery	3940	
P5	SK 61375 43732	Within , at Gedling Colliery	<10	Two concrete tanks created in 2014; small shallow and without vegetation.
P6	SK 61306 43760	Within , at Gedling Colliery	90	Small deep fire ponds , heavily silted and with no visible aquatic vegetation.
P7	SK 61296 43772	Within , at Gedling Colliery	70	
P8	SK 61262 44074	100m-250m, north	60	Ephemeral pond, dried out in May 2014.
P9	SK 61317 44027	100m-250m, north	90	Ephemeral pond, dried out in May 2014.
P10	SK 61392 43957	50m-100m, north	60	Ephemeral pond, dried out in May 2014.
P11	SK 61219 43969	50m-100m, north	250	Small waterbody - very little aquatic vegetation no immediate terrestrial habitat
P12	SK 60745 44175	250m, north	445	Large shallow pond with some submerged aquatic vegetation but very little protective cover in the terrestrial habitat.
P13	SK 61322 44166	250m-500m, north	235	Small waterbody choked with dense vegetation, no water visible.
P14	SK 61409 44190	250m-500m, north	2370	Large waterbody surrounded by common reed, located within Gedling Colliery.
P15	SK 62209 44244	400-500m, north	460	Large waterbody surrounded by reeds and associated with adjacent sewage pumping station.
P16	SK 62305 43588	100m-250m, north	105	Small shallow pond surrounded by arable land and partially shaded by trees. Very little water present, between surveys in May and June 2014.
P17	SK 62523 43939	250m – 500m, north	4	P17 and P18 are adjacent / joined. Small ephemeral pond, created by runoff from surrounding fields, completely shaded by trees.
P18	SK 62523 43930	250m – 500m, north	4	
P19	SK 62669 43686	250m – 500m, north	45	Shallow woodland pond with limited aquatic vegetation and heavily shaded.

Pond Reference	OS grid Reference	Approx. Proximity to the Site	Approx. size (m^2)	Description
P20	SK 62715 43522	250m – 500m, north	140	Deep pond, recently dredged and surrounded by common reed. Contains a number of submerged aquatic plants. Located in arable field with poor connectivity to surrounding habitats.
P21	SK 63038 43403	250m – 500m, north	Not found	Not found during surveys, possibly now dried up.
P22	SK 63126 43464	>500m, north	250	Well establish pond with clean water, aquatic vegetation and numerous invertebrates. Surrounded by arable land.
P23	SK 63428 42285	100m-250m east	11,400	Scoped out of surveys due to distance and barriers to movement
P24	SK 62769 42661	100m-250m south	25	Shallow pond beneath trees at Gedling House Wood, dry throughout 2014 surveys.
P25	SK 62213 44228	400-500m north	20	Small , shallow pond in wetland area in the northeast corner at the top of Gedling Colliery
P26	SK 62627 43808	250m – 500m, north	12	Ephemeral pond, almost dry during May – June 2014 surveys.
P27	SK 62886 43723	>500m north	25	Low point in woodland, receives water from runoff following heavy rainfall, dry throughout the survey period

3.2.2 Habitat Suitability Index

In 2014, twenty-six ponds were assessed against the Habitat Suitability Index (HSI) criteria for their suitability to support great crested newts as Pond P 23 was scoped out. This is due to the barriers to movement for any great crested newts that may have been present and its distance from the proposed development. The results for the Habitat Suitability Index revealed nine ponds in the 'poor' category, eight ponds in the 'below average' category, one pond in the 'average' category, seven ponds in the 'good' category and one pond in the 'excellent' category. Suitability indices for each pond surveyed are given in Table 2 below; refer to Figure 9.4 for the location of each pond in relation to Gedling Access Road.

Table 2. Habitat Suitability Index Results

Pond Reference	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
SI1 Field location	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI2 Pond area	0.10	1.00	0.80	0.80	0.05	0.20	0.05	0.10	0.10	0.10
SI3 Pond drying	0.10	0.90	0.90	0.90	0.90	0.90	0.90	0.10	0.10	0.10
SI4 Water quality	0.33	0.33	0.33	0.33	0.01	0.33	0.33	0.33	0.10 (dry)	0.33
SI5 Shade	1.00	0.40	0.20	1.00	1.00	0.20	1.00	1.00	1.00	1.00
SI6 Fowl	1.00	1.00	1.00	0.67	1.00	1.00	1.00	1.00	1.00	1.00
SI7 Fish	1.00	0.67	1.00	0.67	1.00	1.00	1.00	1.00	1.00	1.00
SI8 Ponds	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI9 Terrestrial habitat	0.67	1.00	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.33
SI10 Macrophytes	0.80	0.90	0.30	0.80	0.30	0.30	0.30	0.80	0.30	0.70
HSI SCORE	0.53	0.77	0.63	0.75	0.39	0.55	0.56	0.53	0.43	0.49
Pond Suitability	Below average	Good	Average	Good	Poor	Below average	Below average	Below average	Poor	Poor

Pond Reference	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20
SI1 Field location	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI2 Pond area	0.20	1.00	0.50	1.00	0.50	0.05	0.05	0.05	0.05	0.30
SI3 Pond drying	0.50	0.10	0.10	0.90	0.90	0.90	0.33	0.33	0.50	0.90

SI4 Water quality	0.33	0.67	0.10 (dry)	0.33	0.33	0.33	0.33	0.33	0.33	0.33
SI5 Shade	1.00	1.00	1.00	1.00	1.00	0.60	0.20	0.20	0.40	1.00
SI6 Fowl	1.00	1.00	1.00	0.67	1.00	1.00	1.00	1.00	1.00	1.00
SI7 Fish	1.00	1.00	1.00	0.67	0.67	1.00	1.00	1.00	1.00	0.67
SI8 Ponds	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SI9 Terrestrial habitat	0.01	0.67	0.67	0.67	1.00	0.33	0.67	0.67	1.00	0.01
SI10 Macrophytes	0.60	0.90	0.80	0.90	0.50	0.80	0.50	0.50	0.30	0.50
HSI SCORE	0.43	0.73	0.55	0.78	0.74	0.55	0.45	0.45	0.50	0.44
Pond Suitability	Poor	Good	Below average	Good	Good	Below average	Poor	Poor	Below average	Poor

Pond Reference	P21	P22	P24	P25	P26	P27
SI1 Field location	1.00	1.00	1.00	1.00	1.00	1.00
SI2 Pond area	0.20	0.50	1.00	0.50	0.05	0.20
SI3 Pond drying	0.01	1.00	0.90	0.90	0.90	0.10 (dry)
SI4 Water quality	0.33	1.00	0.33	0.33	0.33	0.10
SI5 Shade	1.00	1.00	1.00	1.00	0.60	0.60
SI6 Fowl	1.00	0.67	0.67	1.00	1.00	1.00
SI7 Fish	1.00	0.67	0.67	0.67	1.00	1.00
SI8 Ponds	1.00	1.00	1.00	1.00	1.00	1.00
SI9 Terrestrial habitat	0.01	0.67	0.67	1.00	0.33	1.00

Pond Reference	P21	P22	P24	P25	P26	P27
SI10 Macrophytes	0.60	0.70	0.90	0.50	0.80	0.30
HSI SCORE	0.43	0.80	0.78	0.74	0.55	0.45
Pond Suitability	Poor	Excellent	Good	Good	Below average	Poor

3.3 Great Crested Newt Surveys

All ponds located within Gedling Colliery, with the exception of P2, were surveyed by BSG in 2013. A summary of their results are provided below in Table 4a using the pond locations shown on Figure 9.4.

The remaining ponds, the majority of which are located in the east of the survey area between Lambley Lane and A612 were considered for great crested newt surveys by WYG in 2014. Great crested newt presence / likely absence surveys were carried out at Ponds P2, P15, P19, P20 and P25 on four occasions between 12th May – 22nd May 2014. All of these ponds were considered to be potentially suitable to support great crested newts, and within 500m and without a barrier to movement between their location and the Gedling Access Road development.

Two ponds (P15 and P25) located off Lambley Lane in Gedling Colliery, were surveyed in both 2013 and 2014 as it is unclear which of these ponds was surveyed in 2013. Pond P2 was also surveyed in 2014 as it was not included in the 2013 surveys. Although not included in the presence / likely absence survey effort because of its location outside the 500m survey area from the Gedling Access Road and its limited access, Pond P22 (HSI 'excellent') was surveyed on one occasion on the 19th May 2014.

Ponds P5 and P23 were excluded from the survey effort. P5 is a newly created concrete tank, constructed in May 2014. Pond P23 was considered to be a significant distance from the Gedling Access Road development with a railway line and a road between the development and the pond, restricting newts potentially accessing the proposed development.

The remaining ponds were excluded from the survey effort as they were dry throughout the survey period; all were assessed with an HSI score of either poor or below average potential to support great crested newts.

3.3.1 Survey Weather Conditions

An overview of the weather conditions during surveys carried out in 2014 are given in Table 3 below. Bottle traps were set on the evening before sunset, whilst torchlight surveys or netting were conducted after sunset. Bottle traps were then checked the following morning, when egg searches were also conducted.

Table 3. Weather conditions during the 2014 survey period.

Survey	Date	Air temp (°C)	Rain (Yes / No)	Wind Speed (Beaufort Scale)
1	12-13.05.2014	13-12	No	None
2	14-15.05.2014	13-11	No	1
3	19-20.05.2014	19-17	No	2
4	21-22.05.2014	14.5 – 12.5	No	1
5	02-03.06.2014	14.5 - 13	No	1
6	14-15.06.2014	13.5 -12.5	No	None

3.3.2 Bottle Trapping and Torchlight Surveys

Table 4b shows the results from the bottle trapping and torchlight surveys obtained during the first four visits, which were aimed at determining the presence of great crested newts. Great crested newt (hereafter abbreviated to 'GCN') results are indicated in bold and include information about male and female numbers caught. Results for smooth newts (SN) are included for comparison as they are indicative of habitat suitability.

3.3.3 Presence / Absence Survey Results

The survey results from the GCN survey carried out by SLR in 2013 are provided in Table 4a. No great crested newts were recorded in the Gedling Colliery ponds.

Table 4a. Survey results for waterbodies within Gedling Colliery (SLR 2013).

Pond number and HSI score	Visit 1 (18.4.2013)	Visit 2 (08.5.2013)	Visit 3 (14.5.2013)	Visit 4 (22.5.13)
Pond 3	455 toads	5 (f) and 1 (m) SN, tadpoles and 1 adult toad	Tadpoles and sticklebacks	6 (f) and 2 (m) SN 2 (m) palmate newts
Pond 4	470 toads and 2 SN	2 toads and 4 SN; sticklebacks	1 male SN tadpoles and sticklebacks	2 (m) and 1 (f) SN
Pond 6	2 toads	-	1 female SN	-
Pond 7	10 toads	1 SN	-	9 (m) and 10 (f) SN
Pond 11	-	-	-	3 (m) and 1 (f) SN
Pond 12	Tadpoles	Tadpoles	Tadpoles	-
Pond 13	21 toads, frogspawn	-	-	1 common frog
Pond 14	256 common toads, frogspawn	3 (f) SN tadpoles and sticklebacks	Tadpoles and sticklebacks	2 (m) and 3 (f) SN
Pond 15	3 x toads	2 x toad	-	-
(Px) refers to the original reports ponds location reference				

Table 4b. Bottle Trap Results 2014.

Pond number and HSI score	Visit 1 (13.05.2014)	Visit 2 (15.05.2014)	Visit 3 (20.05.2014)	Visit 4 (22.05.2014)	Visit 5 (02.06.2014)	Visit 6 (05.06.2014)
Pond 2	2 (m) and 1 (f) SN	1 (f) SN	1 (m) SN	5 (m) and 1 (f) SN	No survey	No survey
Pond 15	None	None	2 (m) and 2 (f) SN	1 (f) SN	No survey	No survey
Pond 19	2 (m) SN Water boatmen netted	**4 GCN (f)** **1 GCN (imm)** 2 (m) and 4 (f) SN	Too dry	Too dry	Dry	Dry
Pond 20	**7 GCN (m)** 2 (m) and 2 (f) SN	**4 GCN (m)** **2 GCN (f)** 7 (m) and 2 (f) SN	**1 GCN (m)** **2 GCN (f)** **1GCN (imm)** 7 (m) and 3 (f) SN	**2 GCN (m)** **1 GCN (f)** 4 (m) and 2 (f) SN	**1 GCN (m)** **5 GCN (f)** 4 (m) and 3 (f) SN	**1 GCN (f)** 1 (m) and 1 (f) SN
Pond 22	No survey	No survey	No access	No access	No access	No access
Pond 25	2 (m) SN	4 (m) and 2 (f) SN	Dry	Dry	Too Dry	Too Dry
(m) refers to male, (f) refers to female						

Table 4c. Torchlight Survey Results 2014.

Pond number and HSI score	Visit 1 (12.05.2014)	Visit 2 (14.05.2014)	Visit 3 (19.05.2014)	Visit 4 (21.05.2014)	Visit 5 (02.06.2014)	Visit 6 (04.06.2014)
Pond 2	None	None	Water too turbid	Water too turbid	No survey	No survey
Pond 15		None	None	1 (f) SN Tadpoles and sticklebacks	No survey	No survey
Pond 19	1 (f) SN	None	**1 GCN (m)** **1 GCN (f)** 1 (f) SN	2 (m) and 2 (f) SN	Dry	Dry
Pond 20	2 (f) SN	**1 GCN (m)**	**2 GCN (m)** 1 (m) and 1 (f) SN	**1 GCN (m)**	None	None
Pond 22	No survey	No survey	**18 GCN (m)** **8 GCN (f)** 12 (m) and 7 (f) SN	No access	No access	No access
Pond 25	4 (f) SN	1 (f) SN	Dry	Dry	None	Dry
(m) refers to male, (f) refers to female						

Following the discovery of great crested newts at ponds P19 and P20 a survey at P22 was carried out on the 19th May 2014. Despite being originally scoped out of assessments as it is located over 500m from the Gedling Access Road the pond is located 400m from pond P20 and 500m from pond P19 and was considered to be part of the same meta-population of GCN. Pond P22 was assessed against the HSI criteria and scored with 'excellent' potential to support GCN. During a torch survey 26 GCN (18 male and 8 females) and 19 smooth newts (12 male and 7 female) were recorded during the survey. Although only surveyed on one occasion due to limited access, the pond was surveyed during optimal survey period and the surveyors had good visibility to carry out a thorough torch survey effort.

Surveys in 2014 only recorded GCN eggs in Pond P22. No GCN or SN eggs were not found in any of the other ponds surveyed in 2014 either due to the lack of suitable egg laying substrate or limited access, due to deep water, to the submerged aquatic vegetation where newt eggs would have been found.

3.4 Toad Surveys

The 2013 SLR surveys recorded an 'exceptional' population of common toads with a maximum count of 1,217 adults recorded on 18.04.2013. Only one frog and some frogspawn was recorded during the surveys in 2013. Of the common toads recorded 925 were recorded at the two lagoons (P3 and P4).

The results of the two WYG toad surveys carried out at the onsite ponds in 2014 are provided in Table 5.

Table 5. Common Toad Torchlight Survey Results 2014.

Pond number	Visit 1 (27.03.2014)	Visit 2 (12.05.2014)
Pond 3	**63 common toads** 1 (f) smooth newt	2 common toads 3 (m) and 3 (f) smooth newts Sticklebacks present Tadpoles present in places
Pond 4	**48 common toads**	1 common toad 29 (m) and 30 (f) smooth newts Tadpoles present along majority of the shore
Pond 6	Water very turbid , netting recorded no toads	Water very turbid , netting recorded no toads
Pond 7	Water very turbid , netting recorded no toads	Water very turbid , netting recorded no toads
Other	**16 common toads** recorded on land between P3 & P4 and the car park to the south	
Weather conditions	11 ^{o}C, fine – no rain	10 ^{o}C, fine – no rain

A maximum count of 127 common toads were recorded during the survey carried out on the 27.03.2014, of those recorded 16 common toads were recorded on land to the south of P3 and P4 and most were recorded on areas of hardstanding.

During reptile surveys in 2014 toadlets were also recorded seeking refuge under the mats placed to the south-west and east of Ponds P3 and P4.

4 Summary

The scoring system provided in the Hertofauna manual (Gent, T. & Gibson, S. 2003) has been used to assess the amphibian population counts.

4.1 Great Crested Newt

The presence of great crest newts was confirmed in 2014 at three ponds, P19, P20 and P22 located on farmland north of Gedling Wood Farm. A low population of GCN was recorded at pond P19 (five GCN) and at pond P20 (seven GCN). A good (or medium) population of GCN was recorded at pond P22 (twenty-six GCN). A maximum population size of thirty GCN was recorded on any one survey occasion, a 'medium' size class, at the ponds P19, P20 and P22 which are used by the meta-population for GCN in recorded in these ponds.

4.2 Common Toad

An 'exceptional' population (with over 1000 adults) of common toads, 1,217 adults, were recorded within the waterbodies within Gedling Colliery in March 2013. Amphibian surveys in 2013 and 2014 confirmed that the two settling lagoons P3 and P4 contained a 'good' population (between 100-999 adults) of common toads. Common toads were also recorded on land to the south of P3 and P4 during amphibians surveys in 2014.

4.3 Other amphibians

A good population (between 10-100) of smooth newts was recorded at pond P4 and pond P22 in 2014 and at pond P7 during surveys carried out in 2013. Surveys in 2014 recorded a small populations (<10) of smooth newts in ponds P2, P3, 15, 19, 20 and 25. Surveys in 2013 recorded a small population of smooth newts in ponds 3,4, 6,7,11 and 14.

Frog spawn clumps were recorded during the 2013 amphibian surveys, the number of clumps of frog spawn is unknown. However the desk study carried out in 2013 (ES Chapter 9, Appendix 9.3) identified a good number (50-500 clumps) of frog spawn clumps confirmin there is a good population of frogs also present within the two settling lagoons P3 and P4.

5 References

Amphibian and Reptile Conservation Trust (2011) *Common toads and roads, Guidance for planners and highway engineers in England*.

English Nature (2001) *Great Crested Newt Mitigation Guidelines*, Peterborough.

Froglife (2003) *Great Crested Newt Conservation Handbook*, Froglife, Halesworth, Suffolk.

David Tyldesley and Associates (2008) *Gedling Access Road: (GAR) Environmental Statement Volume 2*.

Gent, T. & Gibson, S. (2003) *Herpetofauna Workers' Manual*. JNCC, Peterborough.

Herpetological Conservation Trust (2008) *National Amphibian and Reptile Recording Scheme.*

Joint Nature Conservation Committee (JNCC 2010) *UK Priority Species data collation Bufo bufo* v2.

Iuell, B., Nekker, GJ., Cuperus, R., Dufek, J., Fry G., Hicks, C., Hlavac, V., Keller, V., Rosell, C., Swangwine, T., Torslov, N., Wandall, B., (eds.) (2003) *COST 341 Wildlife and Traffic: A European Handbook for Identifying Conflicts Designing Solution*. Brussels.

Oldham, R.S.; Keeble, J.; Swan, M.J.S. & Jeffcote M. (2001) *Evaluating the suitability of habitat for the great crested newt* (*Triturus cristatus*), The Herpetological Journal 10 (4), 143-155.

SLR (2013) *Former Gedling Colliery Site, Arnold Lane, Nottinghamshire Extended Phase 1 Habitat Survey (including desk study), Badger, Breeding Bird, Great Crested Newt and Reptile Survey Report for Proposed Solar Farm.* Prepared for Re-Fin Solar (Gedling) Limited.

Appendices

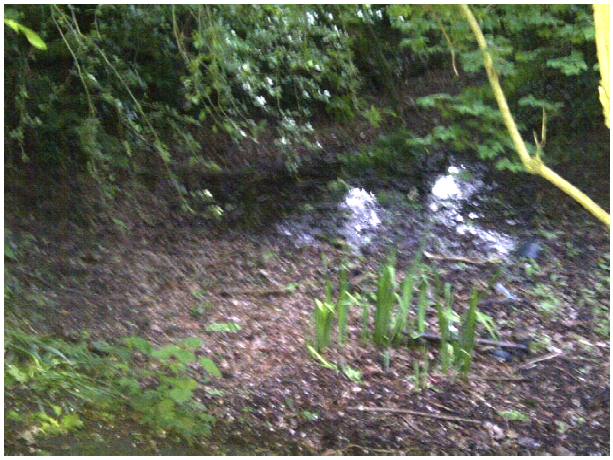
Appendix A. Photos

Photo 1 , Pond P2	Photo 2, Pond P3
	
Photo 3, Pond P4	**Photo 4, Structure containing water P5**
	

Photo 5, Pond P6	Photo 6, Pond P7
	
Photo 7, P11	**Photo 8, P14**
	

Photo 9, Pond P13	Photo 10, Pond P12
	
Photo 11, Pond P16	**Photo 12, Ponds P17&P18**
	

Photo 13 , Pond P1	Photo 14, Pond P19
	
Photo 15, Pond P22	**Photo 16, Pond P20**
	

Photo 17, Pond P27	Photo 18, Pond P24
	

Homes and Communities Agency

Gedling Access Road

Bat Survey Report

October 2014

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Table of Contents

Executive Summary

Contents	Summary
Site Location	Gedling Access Road will connect with Mapperley Plains road in Arnold (SK 600 443) in the west and to the A612 Burton Road in Burton Joyce, Nottinghamshire (SK 632 425) in the south-east.
Previous Reports / Survey(s)	• Gedling Access Road: Extended Phase 1 habitat Survey Report (BSG, November 2013); and, • Gedling Access Road: (GAR) Environmental Statement Volume 2. (David Tyldesley and Associates, 2008).
WYG Survey(s)	• Desk Study; • Daytime Bat Roost Assessments (February to May 2014); • Nocturnal Roost Surveys (April to September 2014); • Bat Activity Surveys: Walked Transects And Static Monitoring (April to September 2014); and, • Refer to Figure 9.6.1.
Results	The following buildings / structures are known or very likely to support bat roosts or hibernacula of low numbers of bats within the predicted zone of influence for the proposed scheme: • Mapperley Tunnel (brown long-eared bat, common pipistrelle, Natterer's bat); • The Pepper Pots brick ventilation shafts (common pipistrelle); • Glebe Farm buildings (common pipistrelle); • Chase Farm buildings (common pipistrelle); • Gedling Wood Farm buildings (common pipistrelle) The 2014 bat activity surveys also confirmed the following bat species traversing the site in order of abundance: • Common pipistrelle; • Soprano pipistrelle; • Noctule; • Myotis bats; • Brown long-eared bat; and, • A single Nathusius' pipistrelle pass These surveys also indicated that the secondary woodland adjacent to Mapperley Tunnel, and the hedgerow connecting to this from the south, provide the most important habitat for local bat populations within the predicted zone of influence. • Refer to Sections 4 to 6 (Results) for further information. • Also refer to Figures 9.6.1 to 9.6.5.
Assessment and Recommendations	Refer to Chapter 7 (Assessment), and Chapter 9 (Ecology) of the Environmental Statement for further information.

1 Introduction and Scope

1.1 Background

1.1.1 WYG was commissioned by the Homes and Communities Agency (HCA) in early 2014 to undertake an assessment with regard to bats (all legally protected species) for the proposed Gedling Access Road (GAR) scheme in Nottingham, hereafter referred to as 'the site'.

1.1.2 The site is as shown in Chapter 1, Figure 1.1: Site Planning Application Boundary within the Environmental Statement.

1.2 Purpose and Objective

1.2.1 The overall aim of the bat assessment was to identify any potential ecological constraints to the proposed road scheme with regard to bats, and for this factual report to inform and support an ecological impact assessment of the scheme proposals within an Environmental Statement; refer to Chapter 3 of this for detailed information on the proposed road scheme and Chapter 9 for Ecology.

1.2.2 The aims and objectives of the 2014 bat surveys undertaken by WYG were to gain an understanding of:

- The assemblage of bat species using the site;
- The relative frequency with which the site is used by different bat species;
- The spatial and temporal distribution of activity across the site for different bat species; and,
- The nature of activity for different bat species, namely roosting, hibernating, foraging, and commuting.

1.2.3 The purpose of this document is to report on the findings of the bat surveys undertaken at the site between April and September 2014. These surveys provide an update to the 2003 / 04 and 2007 bat surveys undertaken to inform the 2008 Environmental Statement for the GAR scheme compiled by David Tyldesley and Associates (hereafter referred to as the '2008 ES'), although all of these previous surveys were not necessarily within the current GAR (red line) site boundary.

1.2.4 This bat report includes:

- A description of bat assessment methodologies including survey considerations;
- An interpretation of previous bat assessments undertaken at the site in 2003 / 04 and 2007;
- The detailed results of the bat surveys undertaken by WYG in 2014; it identifies roosts, hibernacula, or foraging / commuting areas which are used by bats, and also highlights any which may have changed significantly in their usage since the previous surveys were undertaken; and,
- An assessment of the principal survey results.

1.2.5 Refer to Chapter 9 (Ecology) of the Environmental Statement for additional information. Where necessary, further recommendations are given within the Environment Statement and incorporated into the detailed overall mitigation / compensation strategy to be implemented prior, during, and after construction works on the proposed road scheme.

1.3 Site Description

1.3.1 The GAR scheme will connect with Mapperley Plains road in Arnold (SK 600 443) in the west and to the A612 Burton Road in Burton Joyce, Nottinghamshire (SK 632 425) in the south-east. The site is described as 'east' and 'west' within this report with Lambley Lane (located between Spring Lane in the north and Arnold Lane in the south) bisecting the centre of the site.

1.3.2 The west of the site comprises grassland pasture bounded by hedges and 'brownfield' land with pioneer vegetation communities throughout Gedling Colliery. The east of the site is predominately arable land with associate hedges. The road also passes through a small area of poor semi-improved grassland and woodland including a small corner of Gedling House Wood Local Nature Reserve (LNR).

1.4 Legislation Applicable to Bats

1.4.1 All European bat species are listed as protected under Annex IV of Council Directive 92/43/EEC 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora, commonly referred to as the EC or EU Habitats Directive. In addition, four European bat species found in the UK are listed in Annex II of this EC Directive; the conservation of which requires the designation of Special Areas of Conservation (SACs) under certain criteria. These four species are the greater horseshoe bat (*Rhinolophus ferrumequinum*), the lesser horseshoe bat (*Rhinolophus hipposideros*), Bechstein's bat (*Myotis bechsteinii*), and the barbastelle (*Barbastella barbastellus*).

1.4.2 In England (and Wales) the EC Habitats Directive is transposed into national law by means of the Conservation of Habitats and Species Regulations 2010 (as amended).

1.4.3 The commonly used collective term for this above legislation is the 'Habitats Regulations' and all UK bats are classified as European Protected Species (EPS).

1.4.4 All British bat species are also listed as protected under national laws via Schedule 5 of the Wildlife and Countryside (WaC) Act 1981 (as amended). Furthermore, the Countryside and Rights of Way (CRoW) Act 2000 (Schedule 12, Section 5a) has amended Section 9 (subsection 4) of the WaC Act, 1981 thereby strengthening the level of protection further to include 'reckless' offences as well as 'intentional'.

1.4.5 Ultimately, the above EU and UK legislation makes it an offence to, or to attempt to do, any of the following:

- Deliberately capture, injure or kill a bat;
- Deliberately disturb a bat, including in particular any disturbance which is likely to impair a bats ability to survive; breed or reproduce; or rear or nurture their young;
- In the case of hibernating or migratory species, to impair their ability to hibernate or migrate;
- Affect significantly the local distribution or abundance of the species to which they belong;

- Damage, destroy or obstruct a breeding site or resting place of a bat whether intentionally or recklessly; and / or,

- Possess, control, transport, exchange or sell a bat or parts of a bat, alive or dead.

1.4.6 Furthermore, where development will result in damage to, or obstruct access to, any bat roost (whether occupied or not) or risks harming or significantly disturbing bats an EPS licence is required from Natural England, the regulatory body responsible for protected species in England, to allow the development to proceed.

1.4.7 The legal interpretation of "development" in the context of EPS is not restricted to works requiring planning permission from Local Planning Authorities (LPAs) but includes permitted development and can encompass other works that do not require any formal permission.

1.4.8 Bats are also afforded more general protection in England (and Wales) within the Natural Environment and Rural Communities (NERC) Act, 2006. This imposes a duty on all public bodies, including local authorities and statutory bodies, in exercising their functions, "*to have due regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity*" [Section 40 (1)]. It notes that "*conserving biodiversity includes restoring or enhancing a population or habitat*" [Section 40 (3)]. Consequently, attention should be given to dealing with the modification or development of an area if aspects of it are deemed important to bats, such as roosts, flight corridors and foraging areas.

1.5 Biodiversity Action Plans

1.5.1 The UK Biodiversity Action Plan (UK BAP) describes the biological resources of the UK and provides detailed plans for its conservation. UK BAPs are set out at the national level to aid recovery of Priority Species and Habitats; Local BAP's (LBAPs) are set out at the county level for local conservation priorities, but usually include the UK BAP species and habitats.

1.5.2 The presence of a BAP species is a 'material consideration' for an LPA in determining a planning application.

1.5.3 Seven of the eighteen resident British bat species are currently UK BAP Priority Species: the greater horseshoe bat, the lesser horseshoe bat, Bechstein's bat, noctule (*Nyctalus noctula*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auritus*), and the barbastelle. Refer to http://jncc.defra.gov.uk/page-5170 for further information.

1.5.4 Of these seven UK BAP Priority Species, four species are currently known to have been recorded in Nottinghamshire: noctule, soprano pipistrelle, brown long-eared bat, and the barbastelle.

1.5.5 The Nottinghamshire LBAP provides a Species Action Plan for all bats.

2 Methodologies

2.1 Desk Study

2.1.1 Preliminary desk studies were previously undertaken in 2003 and 2007 to inform the 2008 ES. In addition, BSG Ecology undertook a desk study in October 2013 to inform an updated Extended Phase 1 Habitat Survey (report produced November 2013) of the current site and the surrounding area (hereafter referred to as the '2013 BSG Phase 1 Report').

2.1.2 For the initial desk study to inform the 2008 ES, bat records within a radius of 2 km of the proposed road scheme were obtained from Nottinghamshire Biological and Geological Records Centre (NBGRC). Nottinghamshire Wildlife Trust (NWT) was also consulted for additional bat records (as holders of the County Mammal Database) at this time.

2.1.3 More recent bat records within approximately 500 m of the site were also requested from NBGRC in October 2013 by BSG to inform the 2013 BSG Phase 1 Report; further information is provided in Appendix 9.2, Chapter 9 (Ecology) of the Environmental Statement. Additional bat records were not required from NWT or Nottinghamshire Bat Group (NBG) at this time as it is understood that all Nottinghamshire bat records are now held by NBGRC.

2.1.4 It was not deemed necessary to acquire any updated bat records in early 2014 to inform the field surveys to be undertaken by WYG. This was given the short timescale between the last data search for the scheme in October 2013, and April 2014 when the WYG field surveys commenced. This period is also typically when bats are least active, and records therefore less forthcoming.

2.1.5 As part of the desk studies to inform both the 2008 ES and this Environmental Statement, NBGRC was also contacted to determine the presence of any designated statutory or non-statutory sites of nature conservation interest within an approximate 2 km radius of the site. Such statutory sites include Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), and LNRs. Non-statutory sites in Nottinghamshire comprise Local Wildlife Sites (LWS).

2.2 Assessment of Known or Potential Bat Roosts

2.2.1 The initial evaluation to inform the 2014 field surveys included a review of existing bat information within the 2008 ES and the 2013 BSG Phase 1 Report. This was required to identify and assess the status of any known bat roosts on or near the site that could be directly or indirectly affected by the scheme proposals, and design an appropriate survey approach accordingly.

2.2.2 Furthermore, this initial evaluation, supported by analysis of aerial imagery and Ordnance Survey (OS) maps, identified habitats within and adjacent to the scheme boundaries that have the potential to support bat roosts, and that could also be directly or indirectly affected by the proposals.

2.2.3 Following the initial review and assessment only bat roosts or potential bat roost habitat within the predicted 'zone of influence' was considered for further assessment. This zone of influence is defined as up to 100 m from the proposed road route. This distance is in accordance with Interim Advice Note 116/08 (Department for Transport, 2008) which states that trees, structures (including culverts) likely to be affected by, or within at least 100 m of, road projects should be considered for their potential as bat roosts.

2.3 2014 Daytime Bat Roost Assessments

2.3.1 The evaluation regarding bat roosts above was also supplemented with preliminary (daytime) bat roost assessments of buildings and structures on the site. These assessments were used to determine the presence or likely absence of bats by means of an internal and external inspection of buildings (including within accessible roof voids and basements) and structures from the ground and also helped identify new structures with the potential to support bat roosts which had not previously been identified within the 2008 ES or the 2013 BSG Phase 1 Report.

2.3.2 The bat roost assessments aim to locate evidence of current or past bat roosts, hibernacula, or transient activity, typically evident by way of bats, droppings, urine or fur staining, prey (feeding) remains, marking and scratching, odour, and / or remains of bats. These assessments were undertaken by Natural England licensed persons; refer to Section 2.11 (Personnel) below for further information.

2.3.3 The bat roost assessments were undertaken from February to May 2014 and were conducted in accordance with the following guidance:

- Bat Conservation Trust (BCT) *Bat Surveys: Good Practice Guidelines, 2nd Edition* (Hundt, L., 2012), herein referred to as the BCT (2012) guidelines;
- Joint Nature Conservation Committee (JNCC) *Bat Workers' Manual, 3rd Edition* (Mitchell-Jones & McLeish, 2004); and,
- English Nature's (now Natural England) Bat Mitigation Guidelines (Mitchell-Jones, 2004).

2.3.4 During this period Mapperley Tunnel, a known bat roost and hibernacula, was also subject to a daytime inspection in both February and late April 2014 i.e. during both the typical winter hibernation period for bats (November to February, at least) and the period bats are typically active (April to September, at least).

2.3.5 Overall, and in accordance with the BCT (2012) guidelines (Chapter 8), the buildings and structures on the site were categorised by WYG ecologists in 2014 as one of the following:

- High potential / confirmed roost: Evidence of roosting bats confirmed during preliminary assessment and / or the building / structure offers a number of potentially very suitable opportunities to support roosting bats;
- Low to moderate potential: If no evidence of bats is found but the building / structure offers several potentially suitable opportunities to support roosting bats;
- Low potential: If no evidence of bats is found but the building / structure offers some potentially suitable opportunities to support roosting bats, albeit apparently limited; or,
- Negligible potential: If no evidence of bats is found during the preliminary assessment, and the building / structure provides no apparently suitable locations for roosting bats.

2.3.6 A number of trees that may be affected by the proposed scheme (as it was) were identified during surveys to inform the 2008 ES. Furthermore, thirty one mature trees were also assessed for their potential to support roosting bats to inform the 2013 BSG Phase 1 Report; refer to Appendix 9.2, Chapter 9 (Ecology) of the Environmental Statement for further information.

2.3.7 Overall, eight of these trees with the potential to support roosting bats, were identified within this proposed scheme boundary. No targeted surveys have been carried out on these trees to date. In the absence of a detailed programme of works for the scheme, and given the particularly transient nature of many bat roosts (and hibernacula) in trees, any surveys conducted may have promptly become of limited use prior to any work on the trees being undertaken.

2.4 2014 Nocturnal Roost Surveys

2.4.1 The optimum period for nocturnal bat roost surveys is typically from May to August, primarily to increase the likelihood of detecting a maternity roost as these are considered to be of highest conservation concern. However, nocturnal surveys in April and September can also identify important roosts such as pre-maternity roosts, mating sites, and those roosts of a more transient nature. The 2014 nocturnal roost surveys were therefore undertaken from April through to September to enable comprehensive assessments through the period when bats are typically most active.

2.4.2 Any buildings, structures, or group of structures identified by WYG as either confirmed roosts or deemed to have high / moderate potential to be used by roosting bats, were subject to a series of nocturnal surveys in 2014. This comprised one nocturnal survey visit per season i.e. Spring, Summer and Autumn to each building or structure. These surveys comprised a dusk emergence survey in Spring (April), a dusk emergence and pre-dawn re-entry survey within a twenty four hour period in Summer (July), and a dusk emergence survey in Autumn (September).

2.4.3 For the 2014 nocturnal surveys several surveyors were stationed around a building or structure with bat detectors to provide adequate external coverage. These surveys can provide an assessment of any actual usage via a count of emerging or returning bats, but also a general indication of bat activity and behaviour in the vicinity.

2.4.4 Emergence surveys commenced approximately fifteen minutes before sunset and continued for a minimum of ninety minutes after sunset. Predominantly, where lux levels allowed then surveys continued for a minimum of two hours after sunset.

2.4.5 Pre-dawn re-entry surveys commenced approximately two hours before dawn and continued until sunrise.

2.4.6 All nocturnal roost surveys were undertaken in suitable weather conditions conducive for bat activity; overnight temperatures were a minimum of eight degrees Celsius and surveys were not conducted in strong winds or constant and / or heavy rainfall.

2.4.7 Timings and conditions for the nocturnal roost surveys undertaken by WYG in 2014 are shown in Appendix A, Table 1.

2.5 2014 Bat Activity Surveys

2.5.1 For a project of this type, as well as a specific evaluation and assessment of potential bat roost habitat within the predicted zone of influence, it is also required that the development site be assessed by an experienced ecologist according to its general suitability to support bat populations (bat activity). The 2014 bat activity surveys undertaken by WYG at the site were in accordance with the BCT (2012) guidelines. The survey methodology including the level of survey effort to assess bat activity on the site should be proportionate to:

- Habitat types on and around the site that may be affected;

- Type and scale of the proposed development and its predicted direct / indirect impacts upon bats and bat habitat;
- Size, nature and complexity of the development site;
- Likelihood of bats being present or affected; and,
- Likely species and numbers of individuals concerned

2.5.2 In accordance with the BCT (2012) guidelines (page 45, table 7.2) the site can then be categorised as offering either low, medium, or high bat habitat quality dependent upon this assessment criteria. However, on large sites (>15 ha) with a variety of habitat types such as the GAR site, it may not be accurate to assign the entire site to a single category. In addition, it is important to consider the quality of the habitat in the context of the specifics of the proposed development.

2.5.3 This site can be described as 'east' and 'west' with Lambley Lane (located between Spring Lane in the north and Arnold Lane in the south) approximately bisecting the centre of the site; these two halves of the site also differ in their apparent value to commuting and foraging bats.

2.5.4 The western half of the site contains a mosaic of habitats including some of typical interest to bats, such as the following: broadleaved woodland with some mature trees, unmanaged hedgerows often with semi-mature / mature trees, several small to medium water bodies, and grassland pasture. This area was assessed as of medium value to bat populations.

2.5.5 However, the eastern half of the site is dominated by large areas of arable fields, mostly lacking any margins, and mostly species-poor managed hedgerows with few trees, although there is some broadleaved woodland at the eastern extent of the route. Typically, these dominant habitats in the eastern half of the site are of reduced interest to bat populations and the eastern half of the site was assessed as being of generally low value, although the more favourable wooded areas were accounted for within the survey approach.

2.6 Walked (Manual) Transects

2.6.1 Walked nocturnal transects are an established survey technique used to gain an understanding of bat activity on a given site in association with other survey methods. Several transect routes are planned to cover the majority of a site and include all main habitat types. Surveyors traverse these routes with hand-held bat detectors noting areas of recorded bat activity (e.g. passes, foraging) on site maps or via Global Positioning Satellite (GPS) devices. Most transects also incorporate stopping points where surveyors are stationary at either a fixed or random location listening for bat activity for a few minutes at each.

2.6.2 A total of four individual repeatable transect routes were pre-determined to cover the proposed route and to encompass an appropriate proportion of the habitats on the site; refer to Figure 9.6.1 for a plan showing these routes along with the locations of the stopping points.

2.6.3 In accordance with the BCT (2012) guidelines for a large site of medium habitat value, one survey per transect route was undertaken per month from April to September 2014 inclusive. All transects were undertaken in suitable weather conditions conducive for bat activity; overnight temperatures were a minimum of eight degrees Celsius and surveys were not conducted in strong winds or constant and / or heavy rainfall.

2.6.4 For the dusk activity transects, surveyors commenced walking their fixed route at a steady pace approximately fifteen minutes before sunset, and continued for approximately two hours after sunset.

2.6.5 For the pre-dawn activity transects, surveyors commenced walking their fixed route at a steady pace approximately two hours before dawn, and continued until sunrise.

2.6.6 Along each transect route five stopping points were pre-determined. The locations of these were selected following the initial assessment of the site but in advance of the first transect survey. They were pre-determined to be close to features of interest in relation to the development proposals; for example, hedgerows, woodland, trees, buildings and structures. The same approximate stopping points were used for each transect in an attempt to acquire repeat data and sample activity at these locations each month, albeit at different times and in different conditions. Surveyors would stop for a period of three minutes at each point.

2.6.7 In order to remove some possible surveyor bias different individuals walked different transects on different survey visits, wherever practical. Similarly, the four pre-determined routes were also walked in reverse on some occasions to enable an assessment of bat activity along each route at varying times, including at the selected stopping points.

2.6.8 When bat calls were detected surveyors recorded the time and location of the encounter along with the species where possible. Surveyors were appropriately experienced to identify a bat in the field, wherever typically possible i.e. it was not expected that Myotis bats could always be separated to species level, with this genus also showing similarities with Plecotus bats and to some extent also the barbastelle. Similarly, brief, distant, or untypical passes within each of the Nyctalus (*Nyctalus spp.*) and Pipistrelle (*Pipistrellus spp.*) genera of bats can also sometimes be difficult to separate to species in the field. The echolocation calls of bats encountered were recorded where required to enable more detailed analyses; refer to Section 2.10 (Bat Detecting and Sonogram Analyses) below.

2.6.9 In addition to the above and if apparent, the type of behaviour and level of activity was also recorded, particularly when in relation to any landscape features to be affected by the proposed development; for example a hedgerow or building. Typically, this may be whether the bat was passing / commuting, foraging or feeding repeatedly, and any direction of flight. Where behaviour was described by surveyors during the manual bat activity transects, it should be noted that interpretation can be subjective or somewhat imprecise given the nature of such surveys i.e. observing a highly mobile, sometimes quiet or even silent small flying animal, in low light or dark conditions and often whilst a surveyor is walking.

2.6.10 All surveyors were aware of the bat species that may occur on the site given typical habitat and geographic range associations, although not at the risk of presumptive bias.

2.6.11 Timings and conditions for the walked (manual) transects undertaken by WYG in 2014 are shown in Appendix A, Table 2.

2.6.12 The results of the walked transects are presented via four figures (Figures 9.6.2 to 9.6.5) to provide a spatial representation of bat activity (encounters) on the site. Please note that the information presented within these figures is cumulative i.e. bat activity from all six months of walked transects is shown on one map per transect. Also refer to Section 6 (Results of Bat Activity Surveys).

2.7 Static (Automated) Monitoring

2.7.1 The deployment of automated bat detectors to operate remotely in fixed locations is intended to supplement the manual transect surveys and give an indication as to whether those results are representative of bat activity on the site.

2.7.2 These automated detectors are pre-set to record from at least thirty minutes before sunset each night of deployment, until at least thirty minutes after sunrise.

2.7.3 In accordance with the BCT (2012) guidelines for a large site of medium habitat quality, automated monitoring is required at a minimum of two locations per transect route with data collected on five consecutive nights each month from April to September.

2.7.4 For a large site of low habitat quality automated monitoring is required at a minimum of one location per transect route with data collected on four consecutive nights each month from April to September.

2.7.5 As the habitat quality was determined to be of higher quality on the western half of the proposed route, two automated detectors per transect route (total of four) were deployed for five nights per month. On the eastern half where the habitat quality was determined to be of lower value, three further automated detectors were deployed for five nights per month to supplement the two transects in this area.

2.7.6 Overall, this gave a total of seven static deployment locations to supplement the walked (manual) transects from April to September 2014. Figure 9.6.1 shows the locations of the automated detectors deployed on the site and Appendix A, Table 3 shows information on the deployment conditions for the static (automated) bat detectors.

2.7.7 In addition to the automated detectors deployed at the seven static locations on the site, a period of automated monitoring was also conducted at the tunnel entrance in July 2014. A secure, automated Anabat SD1 (refer to Section 2.9, Equipment) was deployed above the brick portal of the tunnel on the southern bank of the cutting. This unit faced approximately across the entrance and was monitoring bat activity from and including the nights of 13th to 20th July, 2014. This monitoring was intended to supplement the nocturnal surveys of the tunnel; refer to Section 2.4 above.

2.7.8 Detailed and correlated weather conditions were not recorded during the deployment periods for the automated detectors each month. However, the monitoring periods were selected within windows of generally favourable prevailing weather conditions i.e. units were not deployed when the weather forecast showed particularly low overnight temperatures, strong winds, or constant and / or heavy rainfall.

2.8 Methods for Evaluating the Bat Populations Using the Site

2.8.1 In order to provide a means of evaluating the bat populations using the site in a county and district context, the results of the bat assessments have been evaluated against criteria for designating Local Wildlife Sites (LWS) for bats in Nottinghamshire; refer to Crouch (2014) *Nottinghamshire LWS Handbook – Guidelines for the selection of Local Wildlife Sites in Nottinghamshire* for further information.

2.8.2 In addition, and in the current absence of another recognised method, Wray *et al*. (2010) *Valuing Bats in Ecological Impact Assessment* (CIEEM In Practice No. 70, Dec 2010) has been used to provide a means of evaluating the bat population on the site in a wider ecological context; refer to this article for full detail.

2.8.3 For this method, where bats (species and number) are found using certain habitats (to roost, commute or forage) their population is assigned a relative ecological value. This value is partly based upon how well used a habitat is and partly upon how rare the bat

species is. The number of roosts nearby (taken here from the results of the roost surveys and the local records search) is also a factor.

2.8.4 In this method of assessment British bat species are subdivided into groups, dependent upon how common they are: common, rarer and rarest. These were further subdivided based upon the location surveyed (England), as shown in Table 2.1 below.

Table 2.1: Categorising Bats by Distribution and Rarity in England (*Wray et al.*, 2010).

Rarity in England:	Bat Species:
Rarest	The greater horseshoe bat (*Rhinolophus ferrumequinum*) Bechstein's bat (*Myotis Bechsteinii*) Alcathoe's bat (*Myotis Alcathoe*) Greater mouse-eared bat (*Myotis myotis*) The barbastelle (*Barbastella barbastellus*) Grey long-eared bat (*Plecotus austriacus*)
Rarer	The lesser horseshoe bat (*Rhinolophus hipposideros*) Whiskered bat (*Myotis mystacinus*) Brandt's bat (*Myotis brandii*) Daubenton's bat (*Myotis daubentonii*) Natterer's bat (*Myotis nattereri*) Leisler's bat (*Nyctalus leisleri*) Noctule (*Nyctalus noctula*) Nathusius' pipistrelle (*Pipistrellus nathusii*) Serotine (*Eptesicus serotinus*)
Common	Common pipistrelle (*Pipistrellus pipistrellus*) Soprano pipistrelle (*Pipistrellus pygmaeus*) Brown long-eared bat (*Plecotus auritus*)

2.8.5 To calculate the score for commuting routes or foraging areas the numerical values in Table 2.2 (commuting) are each added together to give a total for each species recorded on the site, and the same is then also done for Table 2.3 (foraging).

2.8.6 The highest value obtained for a species from both tables should then be used in the assessment. This value should be applied to the scoring system shown in Table 2.4 below to give an assessment of the importance of the site to bats within a geographic frame of reference.

Table 2.2: Valuing Commuting Routes (Wray *et al.,* 2010).

Species	No. of Bats	Roosts / Potential Roosts Nearby	Type and Complexity of Linear Features
Common (2)	Individual bats (5)	None (1)	Absence of (other) linear features (1)
-	-	Small number (3)	Unvegetated fences and large field sizes (2)
Rarer (5)	Small number of bats (10)	Moderate number / Not known (4)	Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3)
-	-	Large number of roosts or close to a SSSI (5)	Well grown and well connected hedgerows, small field sizes (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Complex network of mature well-established hedgerows, small fields and rivers/streams (5)

Table 2.3: Valuing Foraging Areas (Wray *et al.*, 2010).

Species	No. of Bats	Roosts / Potential Roosts Nearby	Foraging Habitat Characteristics
Common (2)	Individual bats (5)	None (1)	Industrial or other site without established vegetation (1)
-	-	Small number (3)	Suburban areas or intensive arable land (2)
Rarer (5)	Small number of bats (10)	Moderate number/Not known (4)	Isolated woodland patches less intensive arable and/or small towns and villages (3)
-	-	Large number of roosts or close to a SSSI (5)	Larger or connected woodland blocks, mixed agriculture and small villages/hamlets (4)
Rarest (20)	Large number of bats (20)	Close to or within a SAC for the species (20)	Mosaic of pasture, woodlands and wetland areas (5)

Table 2.4: Scoring System for Valuing Commuting and Foraging Bats (Wray *et al.*, 2010).

Geographic Frame of Reference	Score
International	>50
National	41-50
Regional	31-40
County	21-30
District, local or parish	11-20
Not important	1-10

2.9 Equipment

2.9.1 Equipment used for the preliminary bat roost assessments comprised close focusing binoculars and cameras, high powered torches (minimum 1,000,000 candlepower), and ladders where necessary. On occasion and where necessary, endoscopes were used by those persons licensed by Natural England at Class 2 level or above (only).

2.9.2 Ultrasonic bat detectors were used on all nocturnal surveys. For the roost surveys and manual transects hand-held units give a good indication of the bat species present at the time of the survey. These detectors were also used to record bat echolocation calls for later analysis using computer software. The automated units deployed remotely recorded bat activity passively, for analysis using the same software upon collection.

2.9.3 Bat detectors used for the nocturnal roost surveys and the transects use a combination of heterodyne, frequency division and time expansion technologies and were as follows: Petterssen D240x, Batbox Griffin, Wildlife Acoustics EM3, Titley Scientific Anabat SD1 and SD2 units, and Batbox Duets. Recording devices used in association with these detectors (where a recording function was not built-in) comprised Roland R-05 .wav / .mp3 units with a two second pre-record function.

2.9.4 Automated bat detectors deployed remotely for the static monitoring primarily comprised Wildlife Acoustics Song Meter SM2Bat+ and Anabat SD1's, with occasional deployments of an Anabat SD2 and an Anabat Express.

2.9.5 Night-vision recording was also utilised for the surveys of Mapperley Tunnel and Glebe Farm in August and September 2014. This equipment comprised a Canon XA10 AVCHD digital camcorder with built-in infra-red (IR) recording function. This was supported by Raytec infra-red lamps and Cluson Clu-lite CB2 high-powered torches with infra-red filters.

2.10 Bat Detecting and Sonogram Analyses

2.10.1 It should be noted that the above bat detectors record bat activity via different technologies, microphones vary in sensitivity and directionality, and thresholds for commencing and ceasing recordings also differ for automated units. Wherever practical, these variables were limited and the limitations of each unit type were taken into account during usage or deployments to optimise sampling capabilities for bat activity.

2.10.2 For the sonogram analysis it is important to note that echolocation call intensity varies between bat species and genus, and bat detectors vary in sensitivity. For example; large, typically 'loud' bats such as the Nyctalus species can often be 'over-recorded' and from further away; whereas typically 'quiet' bats such as long-eared bats can often be under-recorded even in close proximity. Therefore, inter-specific comparisons in bat activity levels from echolocation monitoring data can be biased and this has been and should be considered within data analyses and interpretation.

2.10.3 The parameters used for the analyses of recorded sonograms were as standard and as set out in *British Bat Calls, A Guide to Species Identification* (Russ, 2012).

2.10.4 Software used for sonogram analysis comprised AnalookW, Pettersson BatSound and Batbox BatScan. The Anabat SD1 and SD2 units record into Zero Crossing (ZC) format for Zero Crossing Analysis (ZCA) via Titley Scientific's AnalookW software. The SM2Bat+ units were deployed to record directly into either ZC file format, also analysed using AnalookW, or Wildlife Acoustics proprietary WAC0 file format. WAC0 is a compressed format that can be extracted for analysis either by ZCA, but also retains the Full Frequency Spectrum (FFS) of bat calls. This FFS format enabled more detailed analysis of cryptic calls where required.

2.10.5 Bat echolocation call structure and characteristics can vary between habitat types both within and between species. As a result it can be difficult to separate some species particularly of the same genus, even via sonogram analysis. Where a reasonable assessment was possible, the terms 'probable' or 'possible' are used in the results and analyses to give an indication of species. Otherwise, for the analyses of all data recorded at the site the following criteria were applied:

- Myotis bats were not specified to species level given their tendency for similar Frequency Modulated (FM) call characteristics, particularly in some 'cluttered' habitats. However, 'probable' or 'possible' speciation may be given if / where appropriate;

- Given the scarcity and typically restricted geographic range of the grey long-eared bat (usually confined to the south of England), a default assumption is made within this report that any identifiable long-eared bat calls are those of brown long-eared bats. It is also acknowledged that some long-eared bat calls show similarities with Myotis bats;

- For Nyctalus bats any calls with an end frequency below 20 khz were specified as noctule. However, where the peak frequency (of maximum energy) and / or the end frequency was above 20 khz these calls were specified as *Nyctalus spp.*. It is likely that many of these calls above 20 khz were also noctules. However, it is also possible that some Leisler's bats were recorded (with similar call characteristics) as these are also present in Nottinghamshire (albeit to a lesser extent); and,

- For the Pipistrelle bats, those calls with a peak frequency (of maximum energy) between 50 and 52 khz were allocated as Pipistrelle unless the immediately preceding or succeeding sequence of calls gave an indication as to common pipistrelle (45-46 khz) or soprano pipistrelle (approximately 55khz). For calls of a

FM-QCF (quasi-constant frequency) type with a peak frequency below 40 khz these were specified as Nathusius' pipistrelle.

2.10.6 For the analysis of the data recorded by the automated detectors, a bat 'pass' is defined as a single Zero Crossing (ZC) file recorded by or converted from either an Anabat unit or an SM2Bat+. However, these bat 'pass' files may be of varying lengths (seconds / milliseconds) or indeed include several actual passes by one or more bats. For the scope of these surveys, data analyses and reporting this definition is considered adequate to provide an index of bat activity in the absence of current standard guidance on the definition of a bat pass.

2.10.7 It should be noted that the survey methods employed for the bat activity surveys on the site are not intended to produce statistically robust data sets for detailed scientific analyses. Using standard survey methods here in accordance with the BCT (2012) guidelines it is not intended to quantify abundance or provide a population density of bats at this site. Levels of bat activity for the static (automated) monitoring are expressed as an index (average number of bat passes per species per night) which facilitates a reasonable assessment of the amount of use bats make of a given area, in relation to the proposed scheme. For the walked transects, as well as the results being shown spatially as Figures 9.6.2 to 9.6.5, the total number of bat 'encounters' per species per transect per month are represented in Section 6 (Results of 2014 Bat Activity Surveys).

2.11 Personnel

2.11.1 The preliminary bat roost assessments of Mapperley Tunnel and Gedling Wood House Farm were undertaken by Matthew Cook MCIEEM (Natural England Class licence CLS0625) with assistance from other WYG ecologists (see below) where necessary; refer to Section 2.12 (Limitations) below for access / survey constraints regarding some buildings and structures on the site.

2.11.2 The nocturnal roost assessments, walked transects, automated detector deployments and sonogram analysis were led by Natural England licensed bat ecologists Matthew Cook and / or Ross Phillips MCIEEM (Natural England Class licence CLS00797), with support from the following experienced personnel from WYG: Gavin Ward MCIEEM, Victoria Thomas MCIEEM, David Goddard MCIEEM, Andre Gardner MCIEEM, Richard Penson MCIEEM, and Ian Stephens. Additional health and safety assistance on some surveys was also provided by Peter Kneen, Laura Hammerton, Natasja Groenink, and Stuart Desjardins.

2.12 Limitations

2.12.1 For the preliminary (daytime) bat roost assessments it was not possible to access all areas of Mapperley Tunnel, the Pepper Pots, and the Culvert (near the lagoons) on the site due to the risks to health and safety posed by such underground structures. In the case of Mapperley Tunnel its large size also prevented a detailed inspection at height (above two metres), and beyond approximately 500 m within due to a build-up of hazardous debris. A reasonable assessment by a Natural England licensed bat ecologist remained possible given these constraints.

2.12.2 Of the buildings with known or potential bat roost habitat near to the scheme (refer to Section 4.2 below) a preliminary bat roost assessment was completed of all buildings externally. However, several buildings at Glebe Farm and Chase Farm were not inspected internally as access was not possible due to the health and safety risks posed by the degraded buildings. At Gedling Wood Farm all buildings were inspected internally except for the farmhouse which is occupied.

2.12.3 The first nocturnal survey of Mapperley Tunnel and the Pepper Pots on 30th April 2014 was terminated prematurely after approximately one hour due to a perceived risk to the surveyor's health and safety at the tunnel entrance.

2.12.4 Overall, the design, level of effort, and methods employed at the site for the bat surveys in 2014 are in accordance with the BCT (2012) guidelines. These guidelines make a default assumption that bats recorded roost, forage and commute within the locality of the site; it is important to note that bats are highly mobile wild animals and may colonise or change how they use a site or habitat at any time. The nature of bat activity surveys i.e. via repeat sampling cannot therefore wholly be relied upon to confirm absence of a bat species on a site, although such surveys may confirm their presence.

2.12.5 The results of the bat surveys at the site (and this report) are considered valid for a maximum of two years, in keeping with typical guidance from Natural England regarding protected species. It may be necessary to undertaken a further review of the use of the site by bats for additional phases of the scheme.

3 Results of Desk Study

3.1 Previous Desk Study Information

3.1.1 The following information has been interpreted by WYG from the 2008 ES and the 2013 BSG Phase 1 Report; refer to Appendix 9.2, Chapter 9 (Ecology) of the Environmental Statement for further information.

3.1.2 The desk study completed to inform the 2008 ES revealed records for bats on or within 2 km of the site in Gedling, Arnold, Mapperley Plains, Burton Joyce, and Carlton.

3.1.3 The data search conducted by NBGRC in October 2013 for the 2013 BSG Phase 1 Report returned fifty seven bat records dating back to 1987. This data does not appear to include any records since 2007.

3.1.4 Of these fifty seven bat records returned to BSG, sixteen were of roosts or hibernacula. This data included Mapperley Tunnel and the Pepper Pots which were identified from assessments to inform the 2008 ES. In addition, roost records were returned for nearby residential and farm buildings and a parish church. Most of the roosts in buildings were of Pipistrelle bats. There were five records of roosts of unidentified species.

3.1.5 The remaining forty one bat records returned to BSG were 'casual' records of bat activity (e.g. bat detector records) including those generated from surveys which informed the 2008 ES.

3.1.6 The desk study undertaken to inform the 2013 BSG Phase 1 Report identified two statutory sites of nature conservation interest within approximately 2 km of the site; Gedling House Woods LNR, and Gedling House Meadows LNR. There are also five non-statutory LWS within approximately 2 km of the site including one which overlaps the site; Gedling Colliery and Dismantled Railway LWS. None of these statutory or non-statutory sites are designated for their bat interest.

3.2 Previous Survey Information

3.2.1 The following information has been interpreted by WYG from the 2008 ES and the 2013 BSG Phase 1 Report; refer to Appendix 9.2, Chapter 9 (Ecology) of the Environmental Statement for further information.

3.2.2 Hibernation surveys undertaken in February 2004 identified brown long-eared bats, Natterer's bats and small numbers of unidentified bat species in Mapperley Tunnel. In addition, nocturnal bat activity surveys of the tunnel and the Pepper Pots (ventilation shafts above the tunnel) undertaken in 2004 and 2007 identified common pipistrelles, Myotis bats, and brown long-eared bats active nearby. The nocturnal surveys undertaken in 2007 considered several (approximately ten) brown long-eared bats had emerged from the tunnel, along with a possible Natterer's bat and a Nathusius' pipistrelle.

3.2.3 These 2007 surveys also considered low numbers (three to four) of common pipistrelles had emerged from one of the Pepper Pots, along with potentially up to eight brown long-eared bats and another possible Nathusius' pipistrelle.

3.2.4 Based upon the 2004 and 2007 surveys, the 2008 ES considered that Mapperley Tunnel is used by a relatively small number of bats in the summer, is unlikely to support a maternity roost, and is more likely to be used as hibernacula.

3.2.5 The 2008 ES reported surveys of trees on the site being undertaken in 2004 and / or 2007. Although a number of mature trees were identified as offering potential bat roost habitat and bat activity was associated with some trees, no bats were confirmed roosting in trees.

3.2.6 Some buildings and structures on or near the site were surveyed in 2004 and / or 2007 and were also reported in the 2008 ES. A roost of six common pipistrelles was recorded at Glebe Farm on Lambley Lane in 2004, with bat activity also in the vicinity of the farm buildings here in 2007. A survey in 2007 also considered that bats may utilise an underground culvert on the site.

3.2.7 In addition to the above, the 2008 ES reported that bat activity surveys in 2004 and 2007 recorded common pipistrelle, soprano pipistrelle, Daubenton's bat, noctule, and a possible Leisler's bat, as active over the site.

3.2.8 In addition to the assessments and surveys undertaken to inform the 2008 ES, the field surveys undertaken to inform the 2013 BSG Phase 1 Report identified three buildings at Chase Farm (within the predicted zone of influence) with high potential for roosting bats. Thirty one mature trees with potential to support roosting bats were also identified within their survey area, although only eight of these are interpreted by WYG as being within the proposed scheme boundary.

3.2.9 BSG also assessed the Scout Huts off Mapperley Plains road to the west of the site (within the predicted zone of influence) in 2013 and stated that these had "*no features [present] with any potential to support roosting bats*".

3.2.10 In 2013 BSG also considered that "*the woodland edges, lagoons, hedgerows, the linear wooded railway sidings* [on the site] *all provide a range of foraging and commuting opportunities for bats*".

4 Results of 2014 Bat Roost Assessments

4.1 Mapperley Tunnel

4.1.1 Mapperley Tunnel is approximately 1 km in length and runs approximately south-west / north-east between the former Gedling Colliery Site and Mapperley Plains road. The tunnel is most readily accessed via its south-east entrance to approximately half its length below the northern Pepper Pot. Debris here prevents safe access beyond this point. By torchlight, it is apparent that a few metres north of this Pepper Pot the tunnel is backfilled to a height of approximately one metre below the roof, presumably from the north-west entrance. The tunnel was closed in 1960.

4.1.2 The south-east entrance of the tunnel is at the end of a deep cutting surrounded by secondary woodland. The entrance comprises a brick portal with ashlar keystones and copings. The brickwork in this area is degrading and several cavities and missing bricks are apparent. The lining of the tunnel is in a poor condition and extensive spalling afflicts the brickwork further in. Short sections of sidewall have also collapsed and mortar and brickwork has generally eroded. There is a considerable amount of water penetration from above which has probably caused this, as well as removing much of the clinker. For the majority of the tunnel's length, the crown of the arch is supported by heavily degraded iron ribs inserted at the haunches, along with poling boards. There are several refuges with missing brickwork within the tunnel.

4.1.3 A single long-eared bat was found hibernating in the tunnel during the hibernation survey on 25th February 2014. This individual bat, with some features slightly obscured from view, was located approximately fifty metres inside the tunnel at a height of approximately one metre. Given the scarcity and typically restricted geographic range of the grey long-eared bat (usually confined to the south of England), it is very likely that this hibernating bat in Mapperley Tunnel was a brown long-eared bat.

4.1.4 No roosting bats were identified within the tunnel during the roost assessment on 30th April 2014.

4.1.5 Overall, the tunnel has high potential to support individuals or low numbers of hibernating and roosting bats in several of the above features, which are increasing in abundance as the tunnel degrades over time.

4.1.6 However, despite the abundance of potential hibernacula / roosting opportunities within the tunnel it is not considered likely to provide a major bat hibernation site or to support a maternity bat roost. The atmosphere within the tunnel is generally cold and wet. Preferable conditions for hibernating bats are typically stable, relatively dry, cool and humid, and favourable conditions for maternity roosts are typically warm and dry.

4.2 The Pepper Pots

4.2.1 These two 19th Century brick built ventilation shafts, in the shape of pepper pots, extend from the roof of Mapperley Tunnel below ground to several metres above ground. They are located to the north of Arnold Lane, west of Chase Farm, and east of Mapperley Plains road, behind the buildings of the 3rd Woodthorpe Scout Group. The northern Pepper Pot is surrounded by amenity grassland with scattered trees; the southern Pepper Pot is surrounded by hawthorn (*Crataegus monogyna*) scrub with some established trees.

4.2.2 These two structures provide potential opportunities for bats to exploit directly by way of small crevices and cavities within their brickwork; they provide moderate to high potential

to support individuals or low numbers of hibernating and roosting bats. However, they are not considered to provide a major bat hibernation site or likely to support a maternity bat roost.

4.2.3 These ventilation shafts also provide access to Mapperley Tunnel. It is therefore feasible that bats may access the tunnel via one or both of these Pepper Pots to roost or hibernate below ground, or use the tunnel as a subterranean commuting route.

4.3 Glebe Farm

4.3.1 Glebe Farm comprises several buildings in various states of disrepair which are centred upon a small concrete yard. Some of the single storey buildings are currently used for storage and stables to support horses on the paddocks to the south-west. The two storey former farmhouse appears to be derelict. The buildings are predominantly brick-built with welsh slate or clay pan-tiles covering timber framed pitched roofs. There are many missing slates and tiles on these roofs, gaps along the ridges, and small areas where the roof is missing. There are also many cavities in the brickwork, either by design within the gable ends, or from degradation.

4.3.2 There are several established trees near the buildings, including those bordering Lambley Lane and in the wooded area extending north-west from the corner of Glebe Farm. An established hawthorn dominated hedgerow runs approximately south-west from this wooded area along this boundary of Glebe Farm.

4.3.3 The buildings of Glebe Farm offer high potential to support roosting bats. Primarily, the potential bat roosting opportunities here are provided via cavity and crevice habitat within / beneath brickwork and roof coverings and associated construction features. The buildings of Glebe Farm therefore have high potential to support maternity roosts of those species more apt to roost in such cavities and crevices, such as Pipistrelle bat species and some Myotis bats.

4.3.4 There appears to be lower potential habitat within the buildings to support maternity roosts of bat species which may occupy open roof voids, such as brown long-eared bats and some Myotis bat species. Several of the outbuildings do not support roof voids, and the roof space of the two storey farmhouse shows significant areas of missing tiles. These missing tiles are likely to leave the void below somewhat exposed to the elements, and lacking in the required warm, dry conditions required for such bats to form maternity roosts. However, it should be noted that the buildings may still support roosts of individuals or low numbers of these bats, including night feeding perches.

4.3.5 The buildings of Glebe Farm also offer high potential to support low numbers of hibernating bats.

4.4 Chase Farm

4.4.1 Chase Farm comprises several buildings in various states of disrepair. The majority of the buildings are large brick-built 'threshing' barns although some smaller single storey buildings adjoin these. The pitched roofs comprise either ceramic Rosemary type tiles, clay pan-tiles, or corrugated sheeting resting on timber frames. Some of the buildings are currently used for storage to support horses in the nearby fields, the others appear disused. A two storey former farmhouse with a slate covered roof adjoins some of the barns to the north of this farm site. There are many missing slates and tiles on the roofs of these buildings, gaps along the ridges, and areas where the roof is missing. There are also many cavities in the brickwork and mortar.

4.4.2 There are several established trees near Chase Farm, including those in the wooded area to the north of the farm site boundary. This secondary woodland extends eastwards towards Mapperley Tunnel. The Pepper Pots are both within approximately 250 m to the north-west of this farm. There are new build dwellings to the north of Chase Farm and pasture to the south, south-east, and south-west.

4.4.3 The buildings of Chase Farm offer high potential to support roosting bats. Primarily, the potential bat roosting opportunities here are provided via cavity and crevice habitat within / beneath brickwork and roof coverings and associated construction features. The buildings of Chase Farm therefore have high potential to support maternity roosts of those species more apt to roost in cavities and crevices.

4.4.4 There is also moderate to high potential habitat within some these buildings, and the farmhouse in particular, to support maternity roosts of bat species which may occupy open roof voids.

4.4.5 Some of the less suitable buildings for maternity roosts may still support roosts of individuals or low numbers of bats, including night feeding perches.

4.4.6 The buildings of Chase Farm also offer high potential to support low numbers of hibernating bats.

4.5 The Underground Culvert

4.5.1 This is a large underground culvert that appears to drain water from the lagoons on the former Gedling Colliery Site; refer to Figure 9.6.1 for the location of this culvert. The culvert is brick lined with a thin iron grill across the entrance. This appears to result in a regular build-up of debris transported by the water. A stone lined drainage channel, recently renovated, adjoins the culvert.

4.5.2 It was not possible to undertake an internal assessment of the culvert with regard to bats; refer to Section 2.12 (Limitations) for access restrictions pertaining to this assessment.

4.5.3 Externally, the culvert appeared to offer low potential to support roosting bats. The solid engineering bricks used in the lining lacked notable crevice and cavity habitat with the potential to support roosting bats.

4.5.4 In the absence of safe internal access, this structure was categorised as offering low to moderate bat roost potential.

4.6 Trees

4.6.1 Individual trees on the site were not inspected or assessed for their potential to support roosting bats by WYG in 2014; refer to Section 2.3 (2014 Daytime Bat Roost Assessments).

4.6.2 Further recommendations with regard to the eight trees within the predicted zone of influence are made within Chapter 9 (Ecology) of the Environmental Statement.

4.7 Gedling Wood Farm

4.7.1 Gedling Wood Farm comprises several buildings of various sizes, uses, and ages surrounding a central farmyard. The farmyard is currently in use, including for livestock, and the farmhouse is occupied.

4.7.2 The buildings are of different construction types and in various states of repair. They include two open-sided cowsheds and two large storage barns. There are also several smaller outbuildings and an apparently disused pig shed. These farm buildings are predominantly brick built and most of the roof coverings comprise metal or asbestos corrugated sheeting on metal framework.

4.7.3 The farmhouse is also brick built but concrete rendered with several areas of brickwork, render, and mortar missing. The pitched roof of the farmhouse is covered with concrete interlocking tiles. Fascia boards and bargeboards, degrading in some areas, are present around the eaves of this building.

4.7.4 Although much of Gedling Wood Farm is surrounded by arable fields and species poor heavily managed hedgerows, the ancient and semi-natural woodland of Gedling Wood is a few metres north of the farmyard. There are established trees and tree lines providing connectivity to this wood from here. Furthermore, the mature deciduous trees of Gedling House Woods LNR are also approximately 200 m to the south of Gedling Wood Farm.

4.7.5 The buildings of Gedling Wood Farm offer high potential to support roosting bats. Primarily, the potential bat roosting opportunities here are provided via cavity and crevice habitat within / beneath brickwork and render, and roof coverings and associated construction features such as barge boards and fascias. The buildings of Gedling Wood Farm therefore have high potential to support maternity roosts of those species more apt to roost in cavities and crevices.

4.7.6 There is also moderate to high potential habitat within the farmhouse in particular, to support maternity roosts of bat species which may occupy open roof voids.

4.7.7 Some of the less suitable buildings for maternity roosts may still support roosts of individuals or low numbers of such bats, including night feeding perches.

4.7.8 The buildings of Gedling Wood Farm also offer high potential to support low numbers of hibernating bats.

5 Results of 2014 Nocturnal Roost Surveys

5.1 Mapperley Tunnel

5.1.1 On the first nocturnal (dusk) survey on 30th April 2014, early activity of a common pipistrelle was recorded at the tunnel entrance from approximately thirty minutes after sunset. Activity from a Myotis bat was then also recorded regularly from approximately one hour after sunset. Both of these bat species were interchangeably abundant until the survey was terminated.

5.1.2 On the second nocturnal (dusk and pre-dawn) survey on 18th / 19th August 2014, up to three individual common pipistrelles were recorded accessing a cavity in the brickwork at the apex of the tunnel arch. It is likely that this feature was being used as a mating and day roost by these bats. Common pipistrelle and brown long-eared bat activity was also recorded at the tunnel entrance, along with that of at least one Myotid bat.

5.1.3 On the third and final nocturnal (dusk) survey of the tunnel on 1st September 2014, a common pipistrelle accessed a cavity in the brickwork at the apex of the tunnel arch approximately ninety five minutes after sunset. Apparently this bat was utilising the roost in the same location as the previous survey in August.

5.1.4 In addition, a brown long-eared bat was recorded flying inside the tunnel from approximately thirty minutes after sunset. This was later joined by a second bat, probably also of this species, although both were echolocating very quietly and infrequently.

5.1.5 A soprano pipistrelle was also recorded briefly outside the tunnel entrance early during the survey, with two early passes also by a Myotis bat. From approximately twenty five minutes after sunset at least one common pipistrelle was active around the mouth of the tunnel for most of the remainder of the survey, with occasional activity from up to three other common pipistrelles simultaneously. During this period Myotis bats were also recorded relatively regularly with a brief peak of activity (two to three bats) approximately ninety minutes after sunset. In addition, infrequent brown long-eared bat passes were also identified, although this species could have been under-recorded. Most of the bat species recorded during this survey also produced social calls.

5.1.6 In addition to the above nocturnal surveys the Anabat SD1 deployed at the tunnel entrance (from 13th to 20th July 2014) recorded generally consistent but not considerable levels of bat activity, somewhat reduced during the last two nights of the monitoring period. Similar patterns of bat activity were recorded across most nights; common pipistrelle echolocation calls recorded slightly more often than brown long-eared bat and Myotis calls, with soprano pipistrelle calls recorded rarely.

5.2 The Pepper Pots

5.2.1 No bats were confirmed as roosting in either Pepper Pot during the 2014 nocturnal surveys. However, individuals or low numbers of common pipistrelles were observed in close proximity to the structures and may roost transiently within their construction fabric, or potentially commute through Mapperley Tunnel below.

5.2.2 Common pipistrelle was the only species recorded in the vicinity of both Pepper Pots during the nocturnal surveys. Some of this activity was regular and included constant periods of foraging. Some activity recorded also appeared to represent common pipistrelles commuting nearby at typical sunset emergence times for this species.

5.3 Glebe Farm

5.3.1 An active bat roost was not confirmed at Glebe Farm during the 2014 nocturnal surveys which included the use of infra-red 'night-vision' technology. However, a small bat roost of common pipistrelles was previously recorded in the buildings at this farm during the surveys to inform the 2008 ES. The results of the 2014 nocturnal surveys suggest that an individual or small numbers of common pipistrelles may still roost transiently in the derelict buildings, particularly given the early activity of this species around these buildings after sunset, although this was unconfirmed. It does not appear that a maternity roost of this species is currently present in the farm buildings.

5.3.2 Common pipistrelle was the dominant bat species recorded on this farm site. This species was recorded frequently during all nocturnal surveys including periods of constancy. In particular, individuals foraged and commuted along the northern boundary and around the established trees and scrub to the south and west of the farm site; on occasion there were up to three bats of this species apparent together.

5.3.3 Noctule passes were also recorded on the three surveys at the farm in July and September, but not in April. Activity overhead on these surveys comprised passes to the north or west of the farm shortly after sunset or shortly before sunrise. It is possible that these bats were commuting from the north / west of the site to the south / east at dusk, and vice versa before dawn. During the dusk surveys in July and September occasional short bouts of noctule foraging activity was also apparent to the north and west of the farm.

5.3.4 A brief pass by a soprano pipistrelle was recorded on the April dusk survey, with occasional passes by this species also recorded during the September survey.

5.4 Chase Farm

5.4.1 Two common pipistrelles were recorded emerging from a single location within the large southern building on this farm during the dawn survey on 16th July 2014.

5.4.2 No other bats were recorded roosting in any buildings on Chase Farm during any other nocturnal surveys.

5.4.3 Common pipistrelle was the dominant bat species recorded on this farm site. This species was recorded frequently during all nocturnal surveys including some periods of constancy. In particular, individuals foraged and commuted on and over the farm and along the tree line and hedgerow on its northern boundary. Any discernible commuting direction of bats at dusk appeared to be easterly towards the secondary woodland and Mapperley Tunnel from the south-west of the farm, and vice versa before dawn.

5.4.4 Noctule passes were also recorded during all the nocturnal surveys. Any discernible commuting pattern was approximately in a north / easterly direction within an hour after sunset, although a pattern of activity was not always apparent.

5.4.5 Passes by soprano pipistrelles were also recorded on this farm site on occasion. There were also apparently random passes by brown long-eared bats and Myotis bats recorded on some surveys over an hour after sunset.

5.5 The Underground Culvert

5.5.1 No bats were seen to emerge from or return to the culvert during the three nocturnal surveys undertaken, to indicate the possible presence of a roost.

5.5.2 Common pipistrelle was the dominant bat species recorded as active within the vicinity of the culvert during all nocturnal surveys. However, during the two dusk surveys in May and July soprano pipistrelles and Myotis bats were also recorded regularly in the cutting above the culvert, with occasional activity also apparent from a brown long-eared bat. The activity of these bats included some extended bouts of foraging; primarily this was during the May dusk survey for the Myotids.

5.6 Gedling Wood Farm

5.6.1 Two bats were recorded emerging from two separate buildings at this farm during the final nocturnal survey on 2nd September 2014. One of these bats was a common pipistrelle which emerged from a brick outbuilding located centrally within the farmyard. The other bat emerged earlier from the eaves of the farmhouse and was not echolocating as it emerged; its flight pattern and early emergence time, coupled with the immediate nearby activity of this species strongly indicated it was a common pipistrelle.

5.6.2 No other bats were recorded roosting in any buildings on Gedling Wood Farm during any other nocturnal surveys.

5.6.3 Common pipistrelle was the dominant bat species recorded on this farm site. This species was recorded frequently during all nocturnal surveys including some periods of constancy. Individuals foraged and commuted on and over the site including the garden of the farmhouse, although there were no discernible commuting patterns.

5.6.4 Noctule passes were also recorded during the surveys at the farm in April and July, but not in September. Any discernible commuting pattern was approximately in a south-westerly direction within an hour after sunset, although a pattern of activity was not always apparent.

5.6.5 Apparently random passes over the farmyard by brown long-eared bats and Myotis bats were also recorded during the dawn survey in July and the dusk survey in September. Passes by soprano pipistrelles were also recorded in September.

6 Results of 2014 Bat Activity Surveys

6.1 Walked (Manual) Transects

6.1.1 Refer to Figures 9.6.2 to Figures 9.6.5 respectively for the mapped results of the walked bat activity transects conducted on the site in each month from April to September (inclusive). All of these surveys were conducted at dusk with an additional dawn survey conducted in August.

6.1.2 Table 6.1 below shows the total number of bat encounters for each species on the four transects, for each month.

Table 6.1: Number of bat encounters for each species per transect per month.

April	Transect 1	Transect 2	Transect 3	Transect 4	Total
Common pipistrelle	6	19	20	16	**61**
Soprano pipistrelle	2	3	1	1	**7**
Noctule	0	0	0	0	**0**
Myotis bat	0	0	0	0	**0**
Unidentified bat	6	0	2	6	**14**
Sub-total	**14**	**22**	**23**	**23**	**82**
May	**Transect 1**	**Transect 2**	**Transect 3**	**Transect 4**	**Total**
Common pipistrelle	15	16	12	6	**49**
Soprano pipistrelle	3	0	0	2	**5**
Noctule	2	8	2	3	**15**
Myotis bat	0	0	0	0	**0**
Unidentified bat	0	2	0	0	**2**
Sub-total	**20**	**26**	**14**	**11**	**71**
June	**Transect 1**	**Transect 2**	**Transect 3**	**Transect 4**	**Total**
Common pipistrelle	18	22	17	13	**70**
Soprano pipistrelle	2	3	0	1	**6**
Noctule	0	2	0	0	**2**
Myotis bat	0	0	0	2	**2**
Unidentified bat	0	0	0	1	**1**
Sub-total	**20**	**27**	**17**	**17**	**81**
July	**Transect 1**	**Transect 2**	**Transect 3**	**Transect 4**	**Total**
Common pipistrelle	17	21	15	18	**71**
Soprano pipistrelle	1	0	0	10	**11**
Noctule	0	0	0	2	**2**
Myotis bat	1	1	0	2	**4**
Unidentified bat	0	2	0	0	**2**
Sub-total	**19**	**24**	**15**	**32**	**90**

August Dusk	Transect 1	Transect 2	Transect 3	Transect 4	Total
Common pipistrelle	16	30	12	20	**78**
Soprano pipistrelle	0	5	6	7	**18**
Noctule	3	3	1	2	**9**
Myotis bat	0	0	1	0	**1**
Unidentified bat	0	0	4	0	**4**
Sub-total	**19**	**38**	**24**	**29**	**110**
August Dawn	**Transect 1**	**Transect 2**	**Transect 3**	**Transect 4**	**Total**
Common pipistrelle	7	8	7	8	**30**
Soprano pipistrelle	0	1	0	3	**4**
Noctule	1	0	0	0	**1**
Myotis bat	0	1	2	0	**3**
Unidentified bat	0	0	2	0	**2**
Sub-total	**8**	**10**	**11**	**11**	**40**
September	**Transect 1**	**Transect 2**	**Transect 3**	**Transect 4**	**Total**
Common pipistrelle	12	9	6	8	**35**
Soprano pipistrelle	0	0	1	5	**6**
Noctule	0	0	1	1	**2**
Myotis bat	0	0	0	0	**0**
Unidentified bat	0	0	0	0	**0**
Sub-total	**12**	**9**	**8**	**14**	**43**
TOTAL	**112**	**156**	**112**	**137**	**517**

6.1.3 Common pipistrelle was the dominant bat species recorded on all transects in all months. Generally, soprano pipistrelle was the next most abundant species recorded except in May, when it was noctule. Myotis bats were recorded infrequently in some months and not at all in others. Of the unidentified (and unrecorded) bats it is possible that some of these were also Myotis bats, a small number of brown long-eared bats, or were Pipistrelles that could not be readily discernible to species; refer to Section 2.10 (Bat Detecting and Sonogram Analyses) for further information.

6.1.4 Overall, there were no discernible differences in bat activity between transects, including by species. Bat activity was predominantly associated with linear features such as hedgerows, tree lines, and wooded areas, as is relatively typical for many bats. From the walked activity transects, none of the habitat features on the site were identified as being of particular importance; bat activity appeared to be relatively widespread across the site.

6.1.5 As expected, dusk bat activity on the site peaked in July and August, although was not significantly lower in April, May or June; activity was only noticeably reduced at dusk in September. Bat activity across all survey visits was lowest at dawn in August.

6.2 Static (Automated) Monitoring

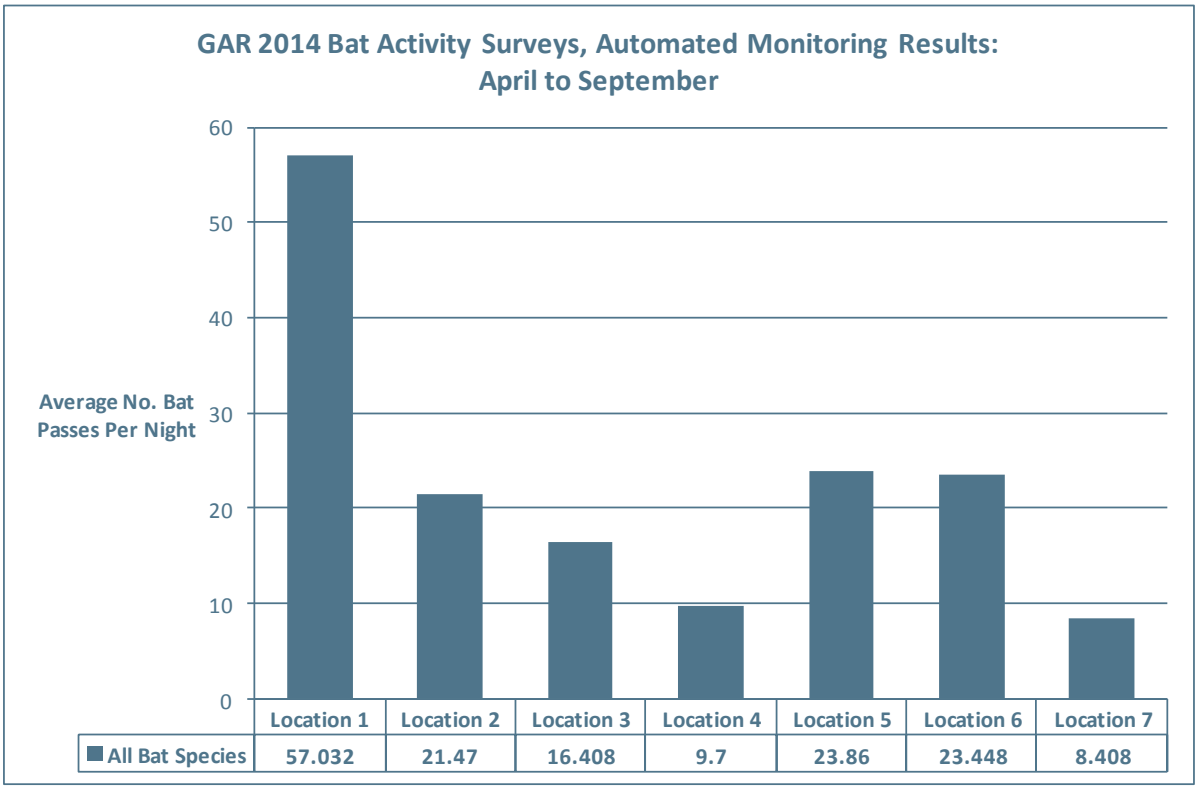
6.2.1 Figure 9.6.1 shows the seven locations where the automated detectors were deployed on the site. Refer to Appendix A, Table 3 for detailed information on the conditions for the deployment of these static (automated) bat detectors.

6.2.2 The habitat at each of the seven static bat detector locations can be described as follows:

- Location 1: Mature, unmanaged, species-poor hedgerow bordered by livestock pasture to the east and west, the secondary woodland (and Mapperley Tunnel) to the north, and the A6211 (Arnold Lane) and Mapperley Golf Course to the south;
- Location 2: Within the secondary woodland on the former Gedling Colliery site;
- Location 3: Hawthorn scrub adjacent to an immature tree line bordering the disused railway line (running south-east / north-west) on the former Gedling Colliery site;
- Location 4: Hawthorn scrub / hedgerow bordering the former Gedling Colliery site to the west, and the horse grazed paddocks of Glebe farm to the east;
- Location 5: Junction of two managed, species-poor hedgerows and an established tree line bordering arable fields, approximately 75 m south-west from Gedling Wood and 75 m west of Gedling Wood Farm;
- Location 6: Hawthorn scrub at junction of three species-poor hedgerows bordering arable fields, approximately 150 m south-east of Gedling Wood Farm and 75 m north of Gedling House Wood LNR; and,
- Location 7: Secondary woodland at top (north) of Whitworth Drive opposite the poultry farm.

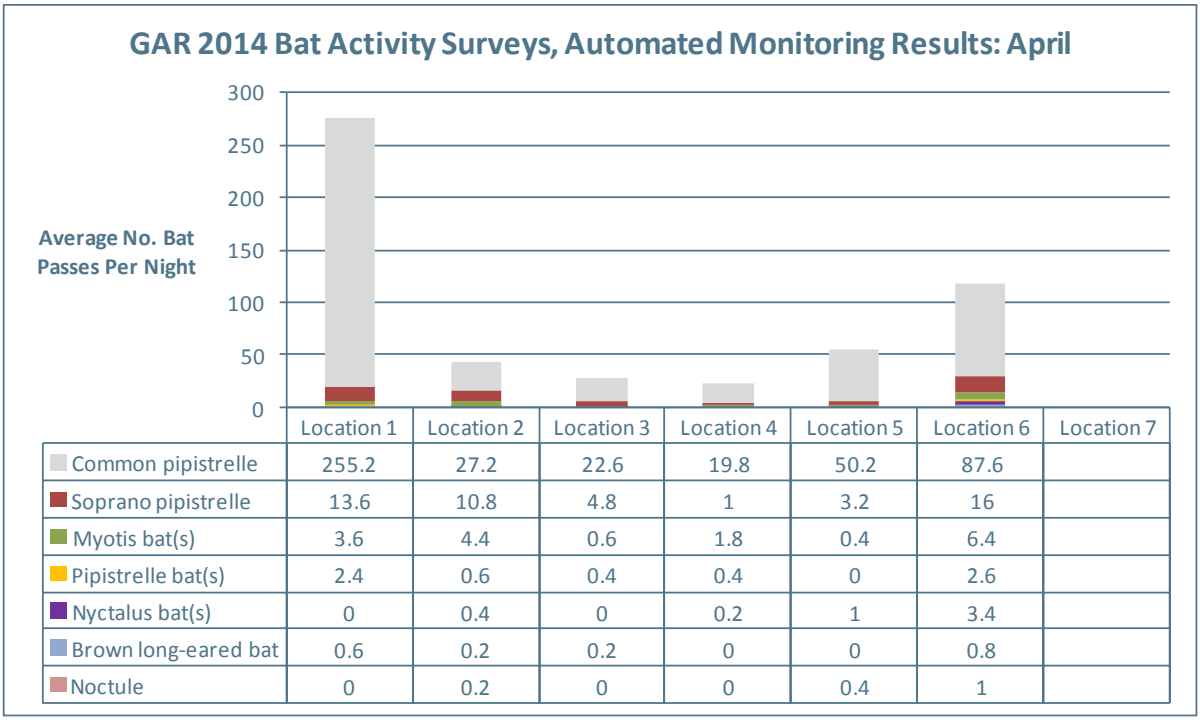
6.2.3 Figure 6.1 below shows the average number of bat passes per night, for all bats (all species) recorded at each location where automated monitoring was undertaken, combined for all months of monitoring from April to September 2014.

Figure 6.1: GAR 2014 Bat Activity Surveys, Static (Automated) Monitoring Results: Average number of bat passes (all species) for all months, shown for each location.



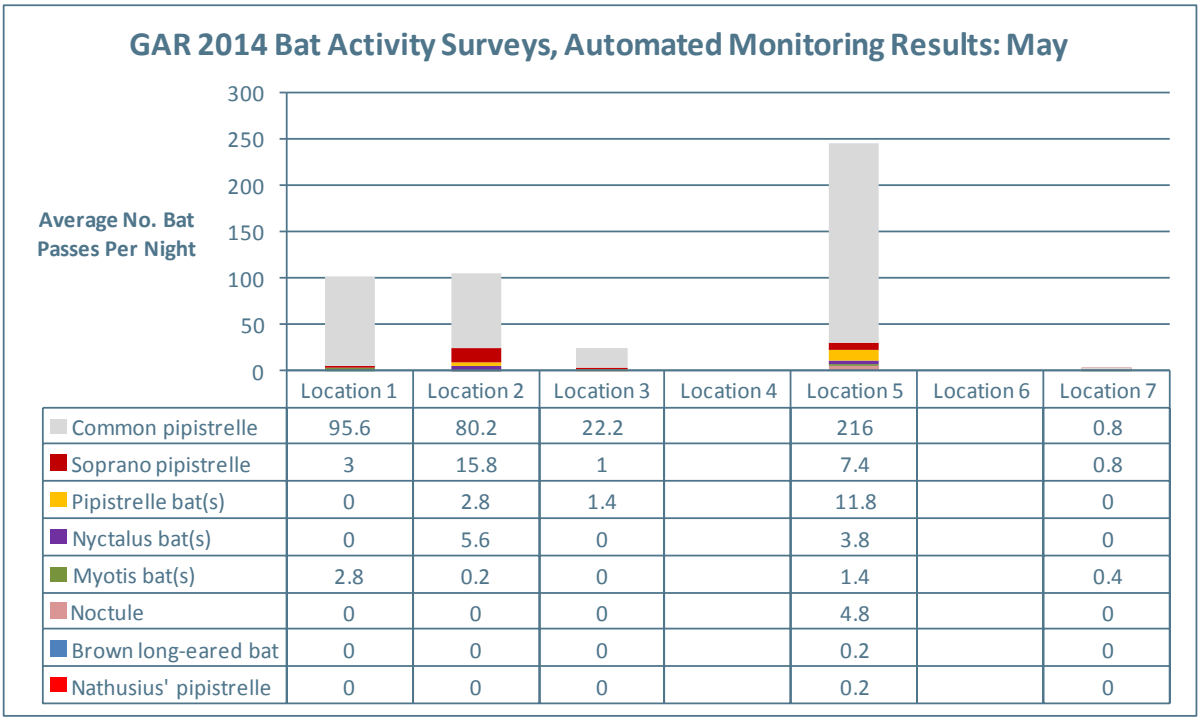
6.2.4 The six graphs in Figures 6.2 to 6.7 below show the levels of bat activity for each month (April to September) recorded at each of the seven locations where automated monitoring was undertaken on the site; this data comprises the average number of bat passes per species per night.

Figure 6.2: GAR 2014 Bat Activity Surveys, Static (Automated) Monitoring Results for April.



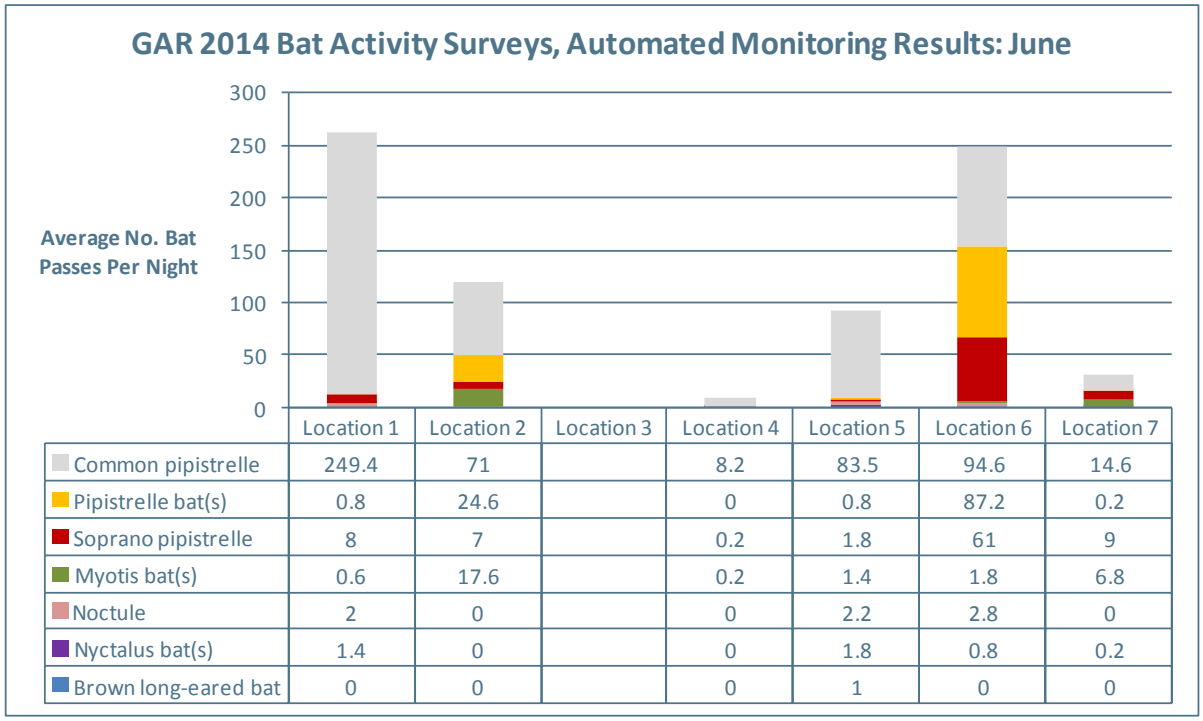
	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7
Common pipistrelle	255.2	27.2	22.6	19.8	50.2	87.6	
Soprano pipistrelle	13.6	10.8	4.8	1	3.2	16	
Myotis bat(s)	3.6	4.4	0.6	1.8	0.4	6.4	
Pipistrelle bat(s)	2.4	0.6	0.4	0.4	0	2.6	
Nyctalus bat(s)	0	0.4	0	0.2	1	3.4	
Brown long-eared bat	0.6	0.2	0.2	0	0	0.8	
Noctule	0	0.2	0	0	0.4	1	

Figure 6.3: GAR 2014 Bat Activity Surveys, Static (Automated) Monitoring Results for May.



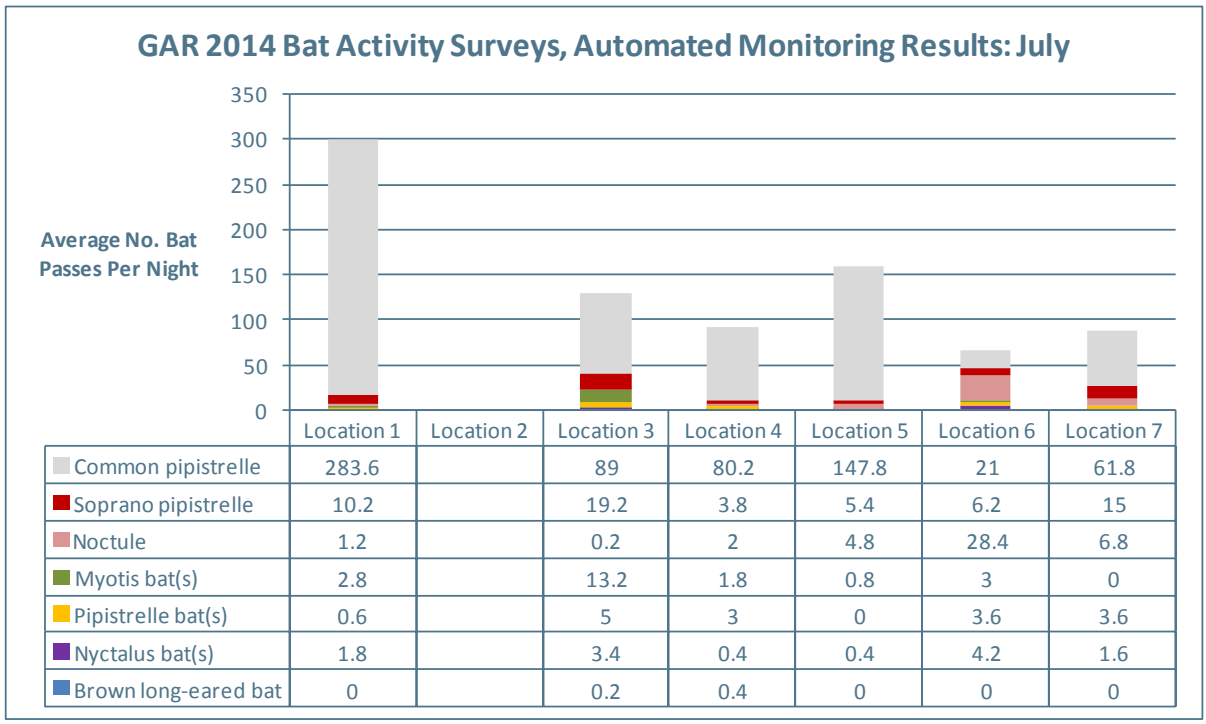
	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7
Common pipistrelle	95.6	80.2	22.2		216		0.8
Soprano pipistrelle	3	15.8	1		7.4		0.8
Pipistrelle bat(s)	0	2.8	1.4		11.8		0
Nyctalus bat(s)	0	5.6	0		3.8		0
Myotis bat(s)	2.8	0.2	0		1.4		0.4
Noctule	0	0	0		4.8		0
Brown long-eared bat	0	0	0		0.2		0
Nathusius' pipistrelle	0	0	0		0.2		0

Figure 6.4: GAR 2014 Bat Activity Surveys, Static (Automated) Monitoring Results for June.



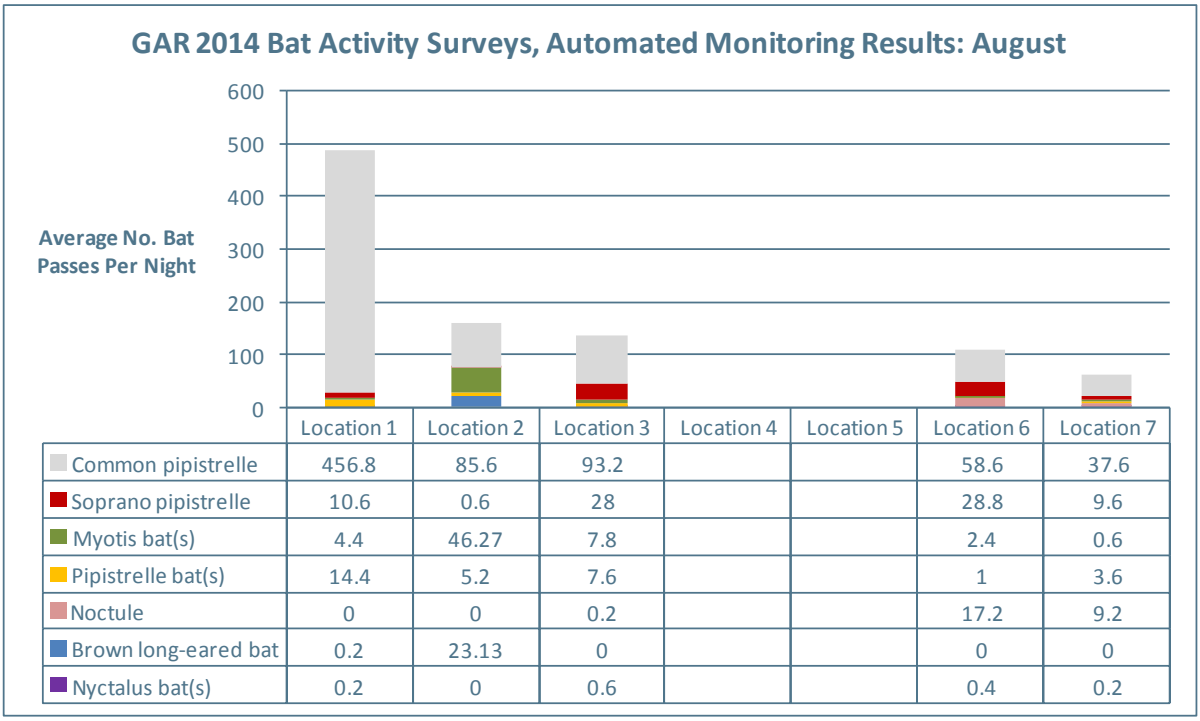
	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7
Common pipistrelle	249.4	71		8.2	83.5	94.6	14.6
Pipistrelle bat(s)	0.8	24.6		0	0.8	87.2	0.2
Soprano pipistrelle	8	7		0.2	1.8	61	9
Myotis bat(s)	0.6	17.6		0.2	1.4	1.8	6.8
Noctule	2	0		0	2.2	2.8	0
Nyctalus bat(s)	1.4	0		0	1.8	0.8	0.2
Brown long-eared bat	0	0		0	1	0	0

Figure 6.5: GAR 2014 Bat Activity Surveys, Static (Automated) Monitoring Results for July.



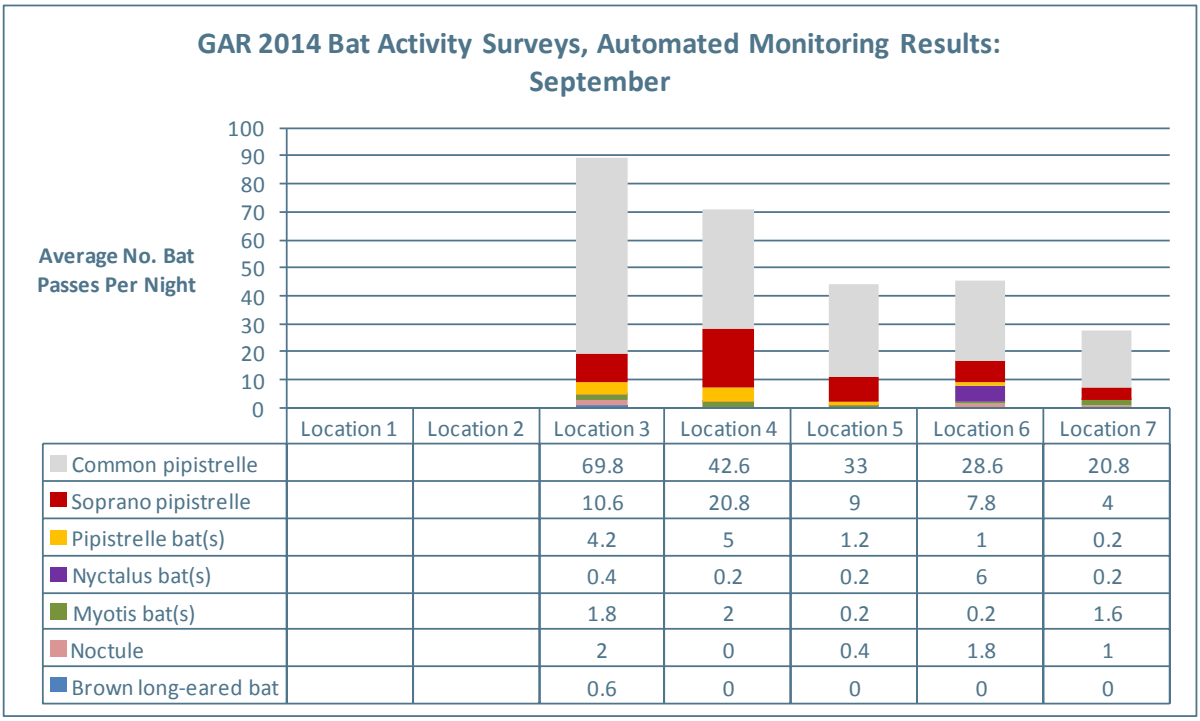
	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7
Common pipistrelle	283.6		89	80.2	147.8	21	61.8
Soprano pipistrelle	10.2		19.2	3.8	5.4	6.2	15
Noctule	1.2		0.2	2	4.8	28.4	6.8
Myotis bat(s)	2.8		13.2	1.8	0.8	3	0
Pipistrelle bat(s)	0.6		5	3	0	3.6	3.6
Nyctalus bat(s)	1.8		3.4	0.4	0.4	4.2	1.6
Brown long-eared bat	0		0.2	0.4	0	0	0

Figure 6.6: GAR 2014 Bat Activity Surveys, Static (Automated) Monitoring Results for August.



	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7
Common pipistrelle	456.8	85.6	93.2			58.6	37.6
Soprano pipistrelle	10.6	0.6	28			28.8	9.6
Myotis bat(s)	4.4	46.27	7.8			2.4	0.6
Pipistrelle bat(s)	14.4	5.2	7.6			1	3.6
Noctule	0	0	0.2			17.2	9.2
Brown long-eared bat	0.2	23.13	0			0	0
Nyctalus bat(s)	0.2	0	0.6			0.4	0.2

Figure 6.7: GAR 2014 Bat Activity Surveys, Static (Automated) Monitoring Results for September.



	Location 1	Location 2	Location 3	Location 4	Location 5	Location 6	Location 7
Common pipistrelle			69.8	42.6	33	28.6	20.8
Soprano pipistrelle			10.6	20.8	9	7.8	4
Pipistrelle bat(s)			4.2	5	1.2	1	0.2
Nyctalus bat(s)			0.4	0.2	0.2	6	0.2
Myotis bat(s)			1.8	2	0.2	0.2	1.6
Noctule			2	0	0.4	1.8	1
Brown long-eared bat			0.6	0	0	0	0

6.2.5 165 nights of automated monitoring were successfully completed at the site from April to September 2014. Of 210 nights when automated units were deployed, this equates to a 79% overall success rate for the monitoring by the automated (static) bat detectors; refer to Appendix A, Table 3 for further information.

6.2.6 Due to the failure of some automated bat detectors it was not possible to successfully monitor bat activity at all locations in all months. As shown by the blank columns in Figures 6.2 to 6.7 above, no data was acquired at the following: Location 1 in September,

Location 2 in July and September, Location 3 in June, Location 4 in May and August, Location 5 in August, Location 6 in May, and Location 7 in April.

6.2.7 However, the successful deployment of the automated units on all other occasions meant that bat activity was monitored for at least twenty five nights at five locations through the summer of 2014, and at least twenty five nights of monitoring were successfully completed in each month during this period.

6.2.8 With equipment failure recorded on no more than two occasions from six monthly deployments at any single static location, it is not considered that any monitoring datasets are inadequate.

6.2.9 Overall, the automated bat detector(s) deployed at location 1 recorded the most bat activity from April to September 2014. The level of bat activity recorded here was over twice (2.39 times) that of any other static detector location deployed on the site.

6.2.10 The bat activity at all detector locations on the site in all months was dominated by common pipistrelle passes.

6.2.11 With regard to other bat species where patterns are apparent; Myotis bats and brown long-eared bats were most abundant at location 2 in relation to the other six locations, and Nyctalus bats / noctules were most abundant at location 6 as opposed to other locations.

6.2.12 A single Nathusius' pipistrelle pass was recorded overnight on 19th / 20th May at location 5. This was recorded at 03:43 (over one hour before dawn).

6.2.13 There were no other bat species confirmed traversing the site from the static (automated) monitoring.

7 Assessment

7.1 Bat Roosts and Hibernacula

7.1.1 The following buildings / structures are known or very likely to support bat roosts or hibernacula of low numbers of bats within the predicted zone of influence for the proposed scheme:

- Mapperley Tunnel (brown long-eared bat, common pipistrelle, Natterer's bat);
- The Pepper Pots brick ventilation shafts (common pipistrelle);
- Glebe Farm buildings (common pipistrelle);
- Chase Farm buildings (common pipistrelle);
- Gedling Wood Farm buildings (common pipistrelle)

7.1.2 Mapperley Tunnel is known to support low numbers of hibernating and roosting bats in several features which have been created where the tunnel has degraded. The tunnel also provides habitat which could be used by mating bats in the late summer and autumn, particularly common pipistrelles. It is also likely that individuals or low numbers of this species roosting transiently in the associated Pepper Pots may use the tunnel and Pepper Pots interchangeably.

7.1.3 However, despite the abundance of potential hibernacula / roosting opportunities within Mapperley Tunnel it is not considered likely to provide a major bat hibernation site or to support a maternity bat roost. The atmosphere within the tunnel is generally cold and wet. Preferable conditions for hibernating bats are typically stable, relatively dry, cool and humid, and favourable conditions for maternity roosts are typically warm and dry.

7.1.4 An active bat roost was not confirmed at Glebe Farm during the 2014 nocturnal surveys undertaken by WYG. However, a small bat roost of common pipistrelles was previously recorded in the buildings at this farm (during the surveys to inform the 2008 ES) and the results of the 2014 nocturnal surveys suggest that an individual or small numbers of this species may still roost transiently in the derelict buildings.

7.1.5 There was no evidence to suggest bats roost in the underground culvert on the former Gedling Colliery site.

7.1.6 There was no evidence from the nocturnal roost surveys undertaken on the site to suggest the presence of a roost of a rare bat species for the county or region.

7.1.7 Refer to Figure 9.6.1 for the locations of these buildings / structures in relation to the proposed scheme.

7.2 Bat Activity

7.2.1 The 2014 bat activity surveys confirmed the following bat species traversing the site in order of abundance:

- Common pipistrelle;
- Soprano pipistrelle;

- Noctule;
- Myotis bats;
- Brown long-eared bat; and,
- A single Nathusius' pipistrelle pass

7.2.2 The Myotis bats recorded on the site are likely to include the four species usually found in Nottinghamshire: Daubenton's bat, Natterer's bat, whiskered bat, and Brandt's bat. It was not possible to quantify their respective abundance.

7.2.3 It is also possible that some of the calls attributed to the Nyctalus bats are the echolocation calls of Leisler's bats, although none were confirmed.

7.2.4 A single Nathusius' pipistrelle bat pass was recorded at 03:43 (over one hour before dawn) on the night of 19th / 20th May. This was recorded by an automated detector at Location 5; refer to Figure 9.6.1. This bat is likely to be an individual commuting across the site on a single occasion.

7.2.5 Of the nine possible species recorded on the site during the surveys, three are UK BAP Priority Species: noctule, soprano pipistrelle, and brown long-eared bat. All bats are listed in the Nottinghamshire LBAP; refer to Section 1.5 (Biodiversity Action Plans) for further information.

7.2.6 Crouch (2014) was used to evaluate the significance of the bat roosts within the predicted zone of influence against criteria for designating LWS for bats in Nottinghamshire. There were no maternity roosts (any species) where the 'significance' threshold (roost size) met the selection criteria for designation as a Nottinghamshire LWS for bats.

7.2.7 Crouch (2014) was also used to evaluate the contiguous areas of semi-natural habitat used by foraging bats on the site against the criteria for designating LWS for bats in Nottinghamshire. The site scored a total of nine points as follows:

- One point each for the presence of four 'more common' bat species: common pipistrelle, soprano pipistrelle, brown long-eared bat, and noctule;
- One point each for the presence of Nyctalus bats (one species) and Myotis bats (four species) where it has not been possible to assign to species;

7.2.8 The single confirmed Nathusius' pipistrelle bat detector record did not meet the qualifying criteria for rare species according to Crouch (2014).

7.2.9 If assessing the site as a whole with regard to Crouch (2014) it would therefore qualify as a Nottinghamshire LWS for foraging bats. However, it is important to note that the favourability of the bat habitat across this large site does vary quite significantly; refer to Section 2.5 (2014 Bat Activity Surveys) and below for further information.

7.2.10 It is possible that Mapperley Tunnel would also qualify as a Nottinghamshire LWS for hibernating bats under Crouch (2014).

7.2.11 Wray *et al*. (2010) was used to assess the value of the bat populations using the site in a wider context. There were none of the six 'rarest' English bats recorded during the surveys. Given the typical geographical range of four of these species (the greater horseshoe bat, Bechstein's bat, greater mouse-eared bat, and grey long-eared bat), it is very unlikely that they would be recorded at this site. It is possible that Alcathoe's bat and the barbastelle are in the wider area of the site. None of these species were recorded during the series of surveys.

7.2.12 It is very likely that five of the nine 'rarer' English bat species were recorded during the surveys at the site; the four local Myotis species (see above) and noctule; a small number of bats were recorded for each of these. Leisler's bat is a possible sixth species recorded and therefore also included within the evaluation as 'individual bats'.

7.2.13 The three 'common' UK bat species were each recorded on the site during the surveys: a large number of common pipistrelle, and a small number of soprano pipistrelle and brown long-eared bats.

7.2.14 Tables 7.2 and 7.3 below show the scores for the site in accordance with Wray *et al.* (2010).

Table 7.2: Valuing commuting routes (Wray *et al.,* 2010) for each of the bat species recorded on the site during the series of bat activity surveys.

Species	Rarity	No. of Bats	Roosts / Potential Roosts Nearby	Type and Complexity of Linear Features	Score
Common pipistrelle	Common (2)	Large no. of bats (20)	Moderate no. / Not known (4)	Walls, gappy or flailed hedgerows, isolated well grown hedgerows, and moderate field sizes (3)	29
Soprano pipistrelle		Small no. of bats (10)	Moderate no. / Not known (4)		19
Brown long-eared bat		Small no. of bats (10)	Small no. (3)		18
Noctule	Rarer (5)	Small no. of bats (10)	Small no. (3)		21
Leisler's bat		Individual bats (5)	Small no. (3)		16
Natterer's bat		Small no. of bats (10)	Small no. (3)		21
Daubenton's bat		Small no. of bats (10)	Small no. (3)		21
Brandt's bat		Small no. of bats (10)	Small no. (3)		21
Whiskered bat		Small no. of bats (10)	Small no. (3)		21

Table 7.3: Valuing foraging areas (Wray *et al.,* 2010) for each of the bat species recorded on the site during the series of bat activity surveys.

Species	Rarity	No. of Bats	Roosts / Potential Roosts Nearby	Foraging Habitat Characteristics	Score
Common pipistrelle	Common (2)	Large no. of bats (20)	Moderate number / Not known (4)	Isolated woodland patches less intensive arable and / or small towns and villages (3)	29
Soprano pipistrelle		Small no. of bats (10)	Moderate number / Not known (4)		19
Brown long-eared bat		Small no. of bats (10)	Small no. (3)		18
Noctule	Rarer (5)	Small no. of bats (10)	Small no. (3)		21

Leisler's bat		Individual bats (5)	Small no. (3)		16
Natterer's bat		Small no. of bats (10)	Small no. (3)		21
Daubenton's bat		Small no. of bats (10)	Small no. (3)		21
Brandt's bat		Small no. of bats (10)	Small no. (3)		21
Whiskered bat		Small no. of bats (10)	Small no. (3)		21

7.2.15 According to Tables 7.2 and 7.3 above (Wray *et al.*, 2010), the maximum ecological value of the site for commuting and foraging bats is 29 for common pipistrelle. When placed within the scoring system shown in Table 2.4 (Section 2.8: Methods for Evaluating the Bat Populations Using the Site), the site is therefore considered to be of county level importance for bat populations of this 'common' species. Common pipistrelle was the dominant bat species recorded throughout the predicted zone of influence.

7.2.16 Overall, the favourability of the bat habitat across this large site varies quite significantly; refer to Section 2.5 (2014 Bat Activity Surveys) for further information. The secondary woodland central to the scheme provides the most important habitat on the site for bat populations. This may be particularly important given its location within a suburban environment and with limited abundance of similar habitat types nearby. The secondary woodland also provides important commuting and foraging habitat with regard to other favourable bat habitat within the predicted zone of influence, such as the bat roosts in Mapperley Tunnel, the Pepper Pots, Chase Farm, and Glebe Farm.

7.2.17 Furthermore, this secondary woodland provides important connectivity to other nearby landscape features of typical value to bats such as hedgerows, tree lines, and scattered mature trees, as well as the lagoons on the former Gedling Colliery site here.

7.2.18 Of particular note with regard to connective habitat to the secondary woodland and beyond, is the hedgerow to the south (monitored by the static bat detector at location 1; refer to Figure 9.6.1). More bat activity was recorded here by the automated bat detector(s) than at any other location on the site, particularly common pipistrelle activity.

7.2.19 Chapter 9 (Ecology) of the Environmental Statement provides further detail on the assessment of the impacts on bats and wildlife arising from the scheme proposals as well as mitigation for the intended scheme.

8 References

Bat Conservation Trust (BCT) *Bat Surveys: Good Practice Guidelines, 2nd Edition*. (Hundt, L., 2012) Bat Conservation Trust, London.

Chartered Institute Of Ecology and Environmental Management (CIEEM, 2012) *Guidelines for Preliminary Ecological Assessmen*t. Winchester.

Crouch, N.C. (2014) *Nottinghamshire LWS Handbook - Guidelines for the Selection of Local Wildlife Sites in Nottinghamshire. Part 2A - Local Wildlife Sites Selection Criteria: Species.* Nottinghamshire Biological and Geological Records Centre, Nottingham.

Department for Communities and Local Government (DCLG) (2012) *National Planning Policy Framework (NPPF)*. DCLG, London.

English Nature *Bat Mitigation Guidelines* (Mitchell-Jones, 2004). ISBN 1 85716 781 3. English Nature, Peterborough.

Gedling Access Road: (GAR) Environmental Statement Volume 2. (David Tyldesley and Associates, 2008).

Gedling Access Road: Extended Phase 1 Habitat Survey Report (BSG, November 2013).

Highways Agency (2008) Nature Conservation Advice In Relation To Bats; Interim Advice Note 116/08.

Institute for Ecological Assessment (1995) *Guidelines For Baseline Ecological Assessment*. E & FN Spon, London.

Mitchell-Jones, A.J. & Mcleish, A.P. (Eds.) (2004) *Bat Workers Manual, 3rd Edition*. JNCC, Peterborough.

Nottinghamshire Biodiversity Action Group. Taylor, J.K. (ed.). (1998). *Local Biodiversity Action Plan for Nottinghamshire*. Nottinghamshire County Council.

Russ, J. (2012) *British Bat Calls: A Guide to Species Identification*. Pelagic Publishing, Exeter.

Wray, S., Et Al. (2010) *Valuing Bats In Ecological Impact Assessment*. Chartered Institute Of Ecology and Environmental Management (CIEEM) In Practice, No 70. Winchester.

Appendix A, Table 1: GAR 2014 Nocturnal Roost Surveys – Timings and Survey Conditions

Survey Location/Date	Survey Type	Sunrise/ Sunset	Survey Start	Survey Finish	Survey Duration	No. Surveyors	Temp (°C) Start/Finish	Cloud Cover (Approx. %)	Wind (Beaufort Scale)	Rain
Mapperley Tunnel										
30/04/2014	Dusk	20:31	20:15	21:30	1 hr 15*	1	13/6	50	1	Nil
18/08/2014	Dusk	20:25	20:15	22:30	2 hrs 15	2 (+night-vision)	13/11	75-100	1-2	Nil
19/08/2014	Dawn	05:52	03:15	05:30	2 hrs 15	2 (+night-vision)	11/10	75	1	Nil
01/09/2014	Dusk	19:54	19:30	21:30	2 hrs	2 (+night-vision)	16/13	50	1	Nil
The Pepper Pots										
30/04/2014	Dusk	20:31	20:15	21:30	1 hr 15*	2 (one each)	16/13	50	1	Nil
18/08/2014	Dusk	20:25	20:15	22:30	2 hrs 15	2 (one each)	13/11	75-100	2	Nil
19/08/2014	Dawn	05:52	03:15	05:30	2 hrs 15	2 (one each)	11/10	75	2	Nil
01/09/2014	Dusk	19:54	19:30	21:30	2 hrs	2 (one each)	17/14.5	50	1	Nil
Glebe Farm										
14/04/2014	Dusk	20:02	19:40	21:30	1 hr 50	3	10/6	25	1	Nil
08/07/2014	Dusk	21:29	21:15	23:00	1 hr 45	4	17/12	50	1	Nil
09/07/2014	Dawn	04:50	02:15	04:45	2 hrs 30	3	12.5/11	0-25	2-3	Nil
03/09/2014	Dusk	19:49	19:45	21:15	1 hr 30	5 (+night-vision)	18/17	100	1	Nil
Chase Farm										
24/04/2014	Dusk	20:20	19:45	21:45	2 hrs	4	13/10.5	75	2	Nil
16/07/2014	Dawn	04:59	03:00	05:00	2 hrs	4	15/13	0	0	Nil
16/07/2014	Dusk	21:22	21:00	23:20	2 hrs 20	4	18/16	75-100	2	Nil
28/08/2014	Dusk	20:03	19:35	21:35	2 hrs	4	21/15	0	3	Nil
Underground Culvert										
12/05/2014	Dusk	20:51	20:10	22:10	2 hrs	2	9/9	50	2	Nil
21/07/2014	Dusk	21:16	21:00	22:45	2 hrs 45	2	19/16	25-50	2	Nil
09/07/2014	Dawn	05:07	03:00	05:05	2 hrs 5	2	14/13	0	0	Nil
Gedling Wood Farm										
10/04/2014	Dusk	19:55	19:45	21:30	1 hr 45	4	13/10	100	2	Nil
21/07/2014	Dusk	21:14	20:50	22:45	1 hr 55	3	19/17	25-50	2	Nil
22/07/2014	Dawn	05:07	03:00	05:00	2 hrs	3	16/13	50-75	0	Nil
02/09/2014	Dusk	19:51	19:30	21:30	2 hrs	3	17/16	50	1	Nil

Appendix A, Table 2: GAR 2014 Bat Activity Surveys – Timings and Conditions for Walked (Manual) Transects

Survey Month/Date	Survey Type	Sunrise/ Sunset	Survey Start	Survey Finish	Survey Duration	No. Surveyors	Temp (°C) Start/Finish	Cloud Cover (Approx. %)	Wind (Beaufort Scale)	Rain
April										
14/04/14	Dusk	20:01	19:46	22:01	2 hrs 15	1 per transect	10/7	25-50	1	Nil
May										
08/05/14	Dusk	20:44	20:29	22:44	2 hrs 15	1 per transect	14/12	50-75	2	Nil
June										
04/06/14	Dusk	21:22	21:15	23:30	2 hrs 15	1 per transect	13.5/11	>95	1	V. light
July										
02/07/14	Dusk	21:32	21:15	23:30	2 hrs 15	1 per transect	18/14	>95	2	Nil
August										
04/08/14	Dusk	20:52	20:40	22:50	2 hrs 10	1 per transect	22/18	50-75	1	Nil
05/08/14	Dawn	05:32	03:50	05:30	2 hrs 10	1 per transect	12/14	0-25	1	Nil
September										
01/09/14	Dusk	19:55	19:40	21:45	2 hrs 5	1 per transect	17.5/14.5	50-75	2	Nil

Appendix A, Table 3: GAR 2014 Bat Activity Surveys – Timings and Conditions for Static (Automated) Monitoring

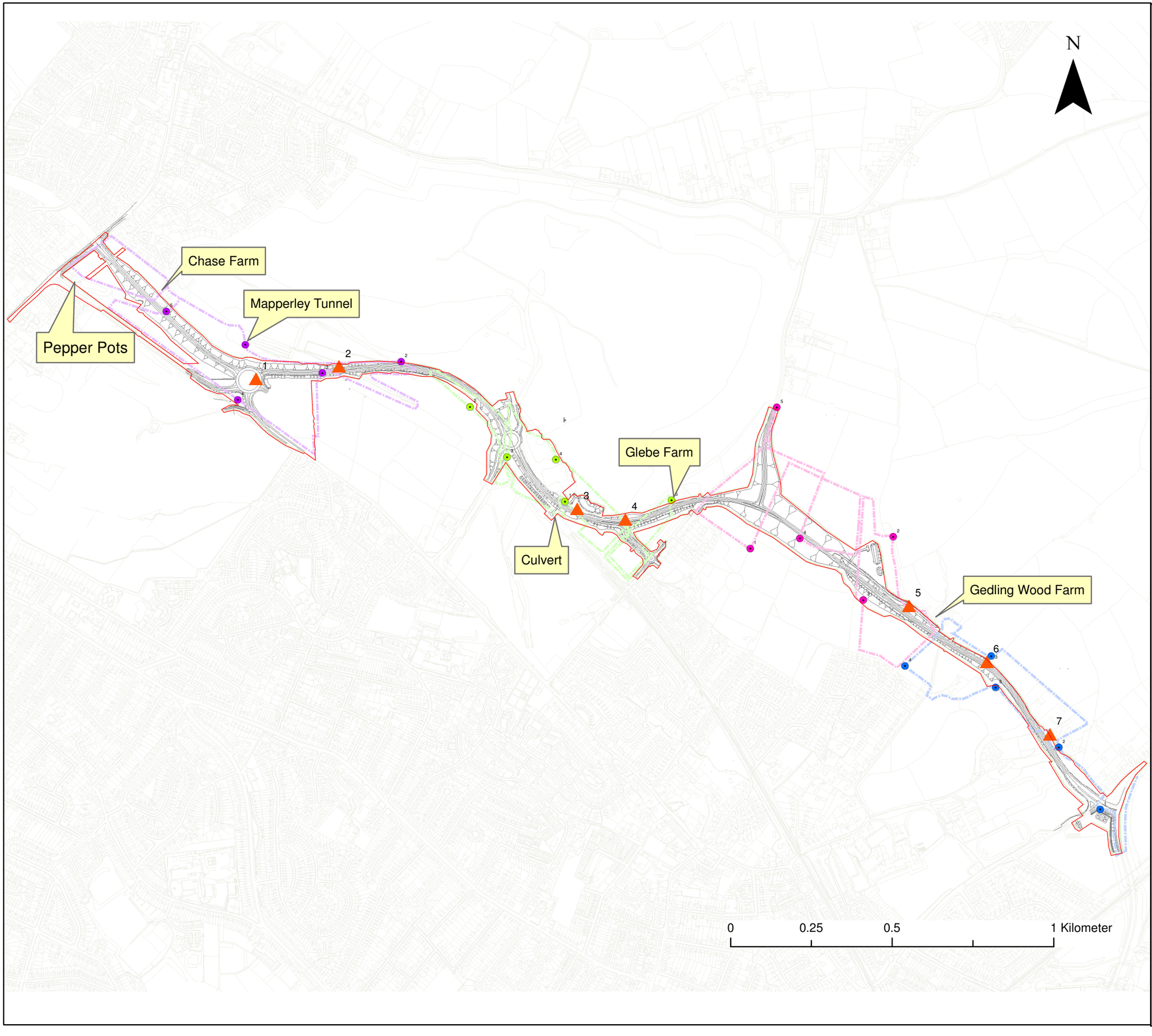
Detailed information on success / failure rates of automated bat monitoring equipment at each static location in each month during the GAR bat activity surveys in 2014.

Where shown in *italics* below, detectors were deployed over a different period due to equipment failure. Any details in BLUE denote failed deployments including following a redeployment attempt.

Automated Detector Location (refer to Appendix B, Figure 1)	Unit Deployed	Nights of Deployment (Inclusive)	No. Nights of Bat Activity Successfully Monitored on the Site
APRIL			
1	SM2Bat+	10th to 14th April	5
2	Anabat SD1	*24th to 28th April*	5
3	SM2Bat+	10th to 14th April	5
4	SM2Bat+	*2nd to 6th April*	5
5	SM2Bat+	10th to 14th April	5
6	SM2Bat+	10th to 14th April	5
7	NO DATA RECORDED		
TOTAL (No. Nights Monitoring in April):			**30**
MAY			
1	SM2Bat+	*1st to 5th May*	5
2	Anabat SD1	16th to 20th May	5
3	SM2Bat+	16th to 20th May	5
4	NO DATA RECORDED		
5	SM2Bat+	16th to 20th May	5
6	NO DATA RECORDED		
7	Anabat SD1	*1st to 5th May*	5
TOTAL (No. Nights Monitoring in May):			**25**
JUNE			
1	Anabat SD1	13th to 17th June	5
2	SM2Bat+	13th to 17th June	5
3	NO DATA RECORDED		
4	SM2Bat+	13th to 17th June	5
5	*SM2Bat+*	*30th May to 3rd June*	*5*
6	SM2Bat+	13th to 17th June	5
7	SM2Bat+	13th to 17th June	5
TOTAL (No. Nights Monitoring in June):			**30**

Automated Detector Location (refer to Appendix B, Figure 1)	Unit Deployed	Nights of Deployment (Inclusive)	No. Nights of Bat Activity Successfully Monitored on the Site
JULY			
1	SM2Bat+	2nd to 6th July	5
2	NO DATA RECORDED		
3	SM2Bat+	2nd to 6th July	5
4	SM2Bat+	2nd to 6th July	5
5	Anabat SD1	2nd to 6th July	5
6	Anabat Express	2nd to 6th July	5
7	Anabat SD1	2nd to 6th July	5
TOTAL (No. Nights Monitoring in July):			**30**
AUGUST			
1	SM2Bat+	31st July to 4th August	5
2	SM2Bat+	31st July to 4th August	5
3	SM2Bat+	31st July to 4th August	5
4	NO DATA RECORDED		
5	NO DATA RECORDED		
6	Anabat SD1	31st July to 4th August	5
7	Anabat SD1	31st July to 4th August	5
TOTAL (No. Nights Monitoring in August):			**25**
SEPTEMBER			
1	NO DATA RECORDED		
2	NO DATA RECORDED		
3	SM2Bat+	29th Aug to 2nd Sept	5
4	SM2Bat+	29th Aug to 2nd Sept	5
5	Anabat SD2	29th Aug to 2nd Sept	5
6	Anabat SD1	29th Aug to 2nd Sept	5
7	Anabat SD1	29th Aug to 2nd Sept	5
TOTAL (No. Nights Monitoring in September):			**25**
GRAND TOTAL (No. Nights): **(% Deployment Success Rate from 210 Overall Deployments):**			**165** **(79%)**

Figure 9.6.1: GAR 2014 Bat Activity Surveys – Transect Routes (including Stopping Points) and Static Detector Locations, with Sensitive Receptors (Buildings / Structures Surveyed)



Legend

- Site Boundary
- Transect 1
- Transect 2
- Transect 3
- Transect 4
- Stopping Points (T1)
- Stopping Points (T2)
- Stopping Points (T3)
- Stopping Points (T4)
- Static Detector Locations
- Glebe Farm — Structures Surveyed

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 2348000
Fax: 0116 2348002
midlands.ecology@wyg.com

WYG Leicester

Project

Gedling Access Road

Drawing Title:

GAR 2014 Bat Activity Surveys – Transect Routes (including Stopping Points) and Static Detector Locations, with Sensitive Receptors

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.1	00

Base map provided by: Homes and Communities Agency

Figures 9.6.2 to 9.6.5: GAR 2014 Bat Activity Surveys - Results of Walked (Manual) Transects

N

0 50 100 200 Meters

Legend

Site Boundary

Bat Species

- Myotis/BLE
- Nyctalus sp.
- S.Pipistrelle
- C.Pipistrelle
- Bat sp

Transect 1

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 2348000
Fax: 0116 2348002
midlands.ecology@wyg.com

WYG Leicester

Project

Gedling Access Road

Drawing Title:

GAR 2014 Bat Activity Surveys
Results of Walked (Manual) Transect 1

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.2	00

Base map provided by: Homes and Communities Agency

N

0 50 100 200 Meters

Legend

Site Boundary

Bat Species

- Myotis/BLE
- Nyctalus sp.
- S.Pipistrelle
- C.Pipistrelle
- Bat sp

Transect 2

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

Tel: 0116 2348000
Fax: 0116 2348002
midlands.ecology@wyg.com

WYG Leicester

Project

Gedling Access Road

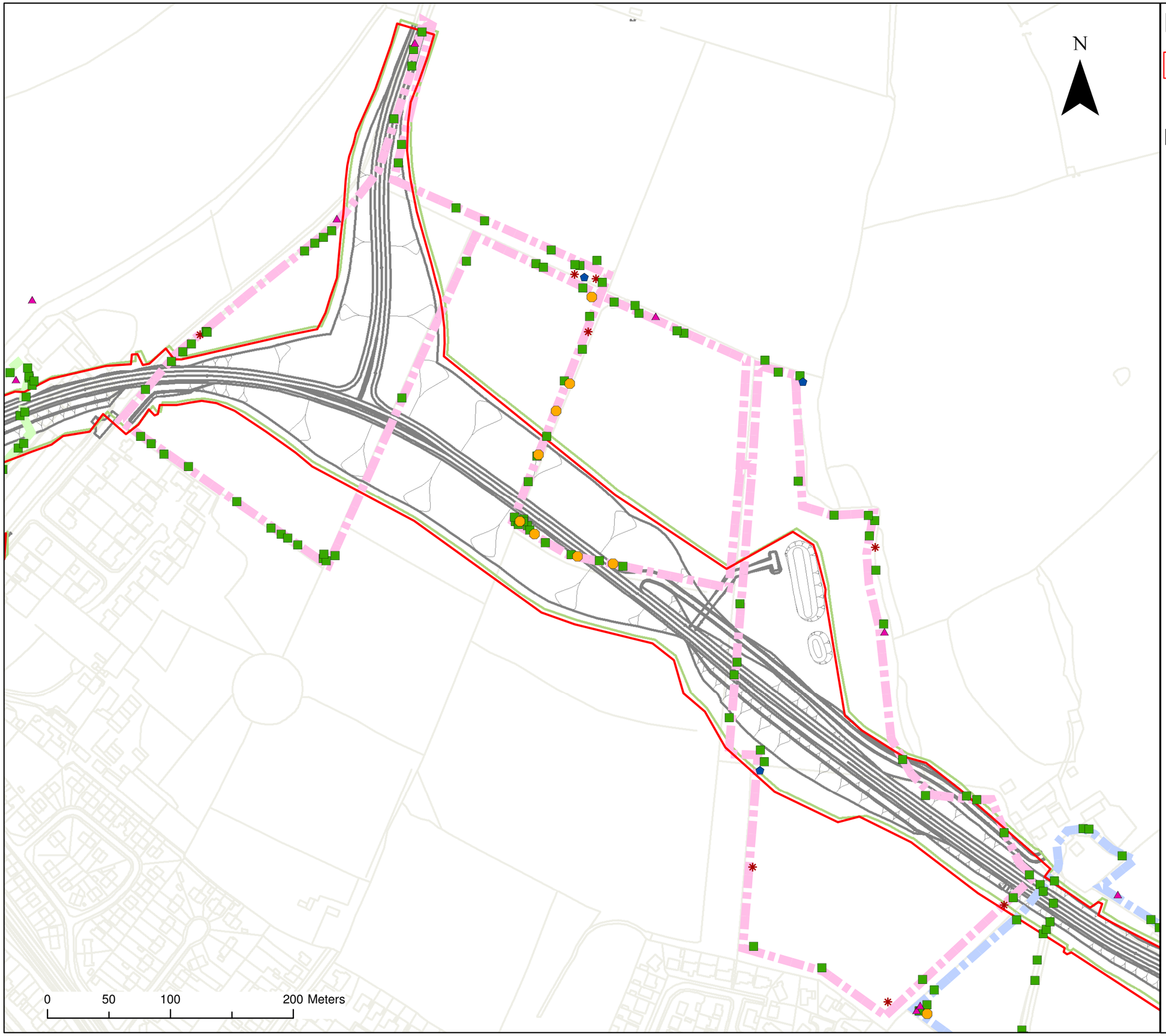
Drawing Title:

GAR 2014 Bat Activity Surveys
Results of Walked (Manual) Transect 2

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.3	00

Base map provided by: Homes and Communities Agency



Legend

Site Boundary

Bat Species

- Myotis/BLE
- Nyctalus sp.
- S.Pipistrelle
- C.Pipistrelle
- Bat sp

Transect 3

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

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midlands.ecology@wyg.com

WYG Leicester

Project

Gedling Access Road

Drawing Title:

GAR 2014 Bat Activity Surveys
Results of Walked (Manual) Transect 3

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.4	00

Base map provided by: Homes and Communities Agency

N

0 50 100 200 Meters

Legend

Site Boundary

Bat Species

- Myotis/BLE
- Nyctalus sp.
- S.Pipistrelle
- C.Pipistrelle
- Bat sp

Transect 4

Executive Park
Avalon Way
Anstey
Leicester
LE7 7GR

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WYG Leicester

Project

Gedling Access Road

Drawing Title:

GAR 2014 Bat Activity Surveys
Results of Walked (Manual) Transect 4

Drawn by:	Date:	Checked By:	Date:	Approved By:	Date:
IS	11/09/14	MC	11/09/14	VT	02/10/14

Project No:	Office	Type	Drawing No.	Revision:
A085361	45	94	Figure 9.6.5	00

Base map provided by: Homes and Communities Agency