



Land Logical Limited

**Land at Mill Hill, Barton in Fabis**

**Chapter 8: ECOLOGICAL IMPACT ASSESSMENT**

February 2024

*This report may contain sensitive ecological information, it is the responsibility of the Local Authority to determine if this should be made publicly available.*

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Rev	Issue Status	Prepared / Date	Approved / Date
-	Draft	VF / 27.07.23	SMM/ 08.08.23
	Draft Rev A	VF / 22.08.23	SMM/25.10.23
	Draft Rev B	VF & SMM/09.01.24	-
	Final	VF & SMM/15.01.24	SMM/16.01.24
	Final	VF & SMM/ 29.01.24	SMM 30.01.24
	Final A	SMM/ 31.01.24	SMM/ 31.01.24
	Final B	SMM/ 01.02.24	SMM/01.02.24

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## **1.0 INTRODUCTION**

- 1.1 The following report has been prepared by FPCR Environment and Design Ltd. (FPCR) on behalf of Land Logical Limited and provides details of an Ecological Impact Assessment (EclA) on land off Mill Hill, Barton-in-Fabis, Nottingham (hereafter referred to as the 'Site'). The Site measures approximately 85.15 ha and is centred on ordnance survey grid reference SK527337.
- 1.2 The Nottinghamshire Minerals Local Plan (MLP), adopted March 2021, has allocated the land at Mill Hill near Barton in Fabis as a new sand and gravel quarry. However, the present planning application seeks to extract aggregates over a smaller footprint to that which is proposed MLP while, at the same time, extracting aggregates from land within the administrative area of Nottingham City.
- 1.3 Following consultation responses received during the consideration of the application the revised scheme excludes land parcels of higher ecological and archaeological value, including the areas identified as ridge and furrow on the accompanying plans.

### **Site Location and Context**

- 1.4 The Site is located on the eastern bank of the River Trent and is, at its closest point, approximately 230 metres (m) to the north of the village of Barton in Fabis and approximately 220 m to the nearest dwelling at Lark Hill Retirement Village with Clifton beyond that. The Site lies approximately 6.75 kilometres (km) to the southwest of Nottingham City Centre.
- 1.5 The Site itself encompasses arable field parcels and a mix of grassland types. There are areas of wet grassland, fen and scrub habitats, waterbodies, and woodland patches.

### **Development Proposals**

- 1.6 The Site is being put forward for a planning application to allow for the extraction, processing, sale and distribution of sand and gravel, and subsequent restoration together with the necessary associated infrastructure and access improvements at Land of Green Street, Mill Hill, and land at Barton in Fabis off Chestnut Lane.

### **Scope of EclA**

- 1.7 This Ecological Impact Assessment (EclA) describes the current ecological interest within and around the Site, which has been identified through standard desk and field-based investigations. It then considers the potential ecological impacts of the proposals and opportunities for ecological enhancement based on the restoration plan in the context of relevant legislation and planning policy. Finally, it identifies the necessary additional measures to avoid, mitigate or provide compensation for potential impacts, and the mechanisms for securing such measures.
- 1.8 Baseline data was collected from the Site for an Ecological Impact Assessment produced in 2017 by Pleydell Smithyman for a previous application. This was reviewed and updated by FPCR, following consultation in 2022 and 2023. The combined information provides a good level of survey evidence obtained over several years.

- 1.9 The remainder of this report is structured as follows:
- Section 2 considers the relevant legislation, policy guidance and standards;
  - Section 3 summarises the methodology employed in determining the baseline ecological conditions (with further details provided on Plans where appropriate);
  - Section 4 summarises the baseline ecological conditions (with further details also provided on Plans where appropriate) and identifies and evaluates any Important Ecological Features (IEFs);
  - Section 5 summarises the impacts of the proposals on the IEFs identified and mitigation;
  - Section 6 discussed cumulative impacts with other applications in the vicinity; and
  - Section 7 are the conclusions.

## **2.0 LEGISLATION, POLICY, GUIDANCE AND STANDARDS**

- 2.1 Existing planning policy and guidance, international commitments, and legislation most relevant to the protection, conservation and enhancement of nature conservation interests associated with the Site are listed below.
- 2.2 This EclA for the Proposed Development follows the latest 2018 Updated April 2022 published guidance by the Chartered Institute of Ecology and Environmental Management (CIEEM).

### **Legislation**

#### **Wildlife and Countryside Act**

- 2.3 Represents the primary legislation covering endangered species in England (Wildlife and Countryside Act, 1981 (as amended)), setting out the framework for the designation of Sites of Special Scientific Interest (SSSIs). Differing levels of protection are conferred on species, their habitats, or both, depending on their conservation status. Species offered protection by the Act are listed in a series of schedules. These Schedules are subject to a rolling review on a five-yearly basis. Protected species are listed under Section 1 (birds), Schedule 5 (animals other than birds and invertebrates) and Schedule 8 (plants).

#### **Natural Environment and Rural Communities Act**

- 2.4 The UK Government, as signatory to the Rio Convention on Biological Diversity, is committed to conserving and enhancing biodiversity. This commitment is further enforced in the Natural Environment and Rural Communities Act (NERC) 2006 and the Natural Environment White Paper (June 2011). DEFRA's 25 Year Environment Plan (2018) seeks to embed a 'net environmental gain' principle for development to deliver environmental improvements locally and nationally. Current policy is that the planning system should provide biodiversity net gains where possible.

#### **Countryside of Habitats and Species Regulations**

- 2.5 The Habitats Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna provides legal protection for habitats and species of European importance. This Directive was transposed into UK law by the Conservation of Habitats and Species Regulations 2017 and has since been amended in relation to the UK leaving the EU via the Conservation of Habitats and

Species (Amendment) (EU Exit) Regulations 2019 (Conservation of Habitats and Species Amendment (EU Exit) Regulations, 2019). The Regulations for the protection of European Protected Species (EPS) have been amended and consolidated with key changes. This comprises the removal of most of the defences from regulation 40 and regulation 43, including the removal of the ‘incidental result of an otherwise lawful operation’ defence, and the increase in the threshold for the offence of deliberately disturbing an EPS. Proposals that will affect EPS may require a licence from Natural England to allow an otherwise unlawful act. In 2009 a new offence of ‘breaching condition of an EPS licence’ was added to the regulations. The licensing process is separate from the planning process.

### **Environment Act**

- 2.6 Following the Environment Bill receiving Royal Assent in November 2021 mandatory biodiversity net gain will be required under the Environment Act. Part 6 of the Environment Act 2021 is entitled ‘Nature and Biodiversity’. Within this part is section 98, entitled ‘Biodiversity gain as condition of planning permission’. It says that ‘Schedule 14 makes provision for biodiversity gain to be a condition of planning permission in England’. Part 1 of Schedule 14 contains the requirement for biodiversity net gain including the use of a biodiversity metric and the need for 10% BNG. Section 147(3)(s) highlights that Part 6 of the Environment Act 2021 only comes into force ‘on such day as the Secretary of State may by regulations appoint’. Thus, it is not until further secondary legislation is made by the Secretary of State does Part 6 of the Environment Act (where the 10% requirement exists) come into play. In the absence of secondary legislation coming forward making the requirements of the Environment Act mandatory, the term “measurable net gain” is not defined within the NPPF. Additionally, this term currently has no agreed definition in local or UK policy. Whilst a figure of 10% is widely viewed as best practice, it currently has no adopted policy support at either a local or national level, and is therefore considered an aspirational target, and not a mandatory requirement. NPPF (2021) seeks to ensure that the planning system contributes to and enhances the natural and local environment, protect, and enhance biodiversity and geodiversity by: ‘174. d) Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures; 179. b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.’

### **Protection of Badgers Act (PBA) 1992**

- 2.7 Protects Badgers and their setts (tunnels and chambers where they live) by law. Activities that can affect badgers include destroying or damaging their setts, noise, additional lighting or vibration, excavation, tree felling, and construction.

### **Hedgerow Regulations 1997**

- 2.8 The Hedgerow Regulations (1997) make provision for the protection of important hedgerow in England and Wales (The Hedgerow Regulations, 1997).

### **National Policy**

- 2.9 The revised National Planning Policy Framework (NPPF) was revised in December 2023 and sets out the government's planning policies for England and how these are expected to be applied.
- 2.10 The NPPF provides a framework within which locally prepared plans for housing and other development can be produced. Planning law requires that applications for planning permission be determined in accordance with the development plan unless material considerations indicate otherwise. The National Planning Policy Framework must be considered in preparing the development plan and is a material consideration in planning decisions. Planning policies and decisions must also reflect relevant international obligations and statutory requirements.

### **Local Policy**

#### **Nottinghamshire Minerals Local Plan Adopted March 2021**

- 2.11 The Nottinghamshire Minerals Local Plan forms the land use planning strategy for mineral development within the County up to 2036. It provides the basis for the determination of mineral planning applications within the County promoting sustainable development and achieving the highest quality restoration possible. The NMLP acknowledges the need to balance the economic benefits and need for minerals against the social and environmental disruption and harm that their extraction can cause. Long term environmental gains can be achieved, for example, by creating wildlife habitats out of worked out quarries.
- 2.12 Under Policy SP2 restoration schemes that seek to maximise biodiversity gains and achieve a net gain in biodiversity, in accordance with the targets and opportunities identified within the Nottinghamshire Local Biodiversity Action Plan, will be supported.

#### **Broxtowe Borough; Gedling Borough; Nottingham City Aligned Core Strategies Part 1 Local Plan Adopted September 2014**

- 2.13 The strategy is not a formal Joint Core Strategy, so decisions relating to it have been made separately by each Council, hence the document is known as the Greater Nottingham Broxtowe, Gedling, and Nottingham City Aligned Core Strategies. Rushcliffe Borough Council is taking a different approach and as a result they have produced their own Core Strategy. At the same time, all the Councils have continued to work together to ensure that planning policies of the Core Strategies are consistent across Greater Nottingham.

#### Policy 17 Biodiversity

- 2.14 Biodiversity will be increased over the plan period by several objectives. By:
- a) Protecting, restoring, expanding, and enhancing existing areas of biodiversity interest, including areas and networks of habitats and species listed in the UK and Nottinghamshire Biodiversity Action Plans.
  - b) Ensuring that fragmentation of the Green Infrastructure network is avoided and improvements to the network benefit biodiversity, including at a landscape scale, through the incorporation of existing habitats and the creation of new habitats.
  - c) Seeking to ensure new development provides new biodiversity features whilst improving existing biodiversity features wherever appropriate.

- d) Supporting the need for management and maintenance of existing and created habitats using planning conditions, planning obligations and management agreements; and
- e) Ensuring that where harm to biodiversity is unavoidable, and it has been demonstrated that no alternative sites or scheme designs are suitable, development should as a minimum firstly mitigate and if not possible, compensate at a level equivalent to the biodiversity value of the habitat lost.

#### **Nottingham City Land and Planning Policies Development Plan Document Local Plan Part 2 Adopted January 2020**

- 2.15 In addition to **Policy 17 Biodiversity** (above) **Policy EN6 Biodiversity** of the Local Plan Part 2 sets out that development should avoid adversely affecting national and local designated nature conservation sites, Priority Habitats and Priority Species, by using alternative sites or layout designs. Where avoidance is not possible, and the need for and benefit derived from development outweighs the nature conservation value of the site, habitat or species, the impact upon the wildlife sites, habitat or species should be adequately mitigated.
- 2.16 Development will only be permitted where significant harmful ecological impacts are avoided. Where harmful impacts cannot be avoided, they are to be mitigated through the design, layout and detailing of the development, or as a last resort compensated for, which may include off-site measures.
- 2.17 Where there is suitable habitat present or a reasonable likelihood of a notable species being present, surveys to determine presence or absence should be conducted by a suitably qualified or experienced ecologist. Surveys for protected species, mitigation measures to protect species and habitats, and ecological enhancement measures on development sites should be implemented in line with current national standards and published guidance, The City Council has adopted design guides and position statements. The City Council's Biodiversity Checklist and Planning Application Validation Checklist sets out the information that applicants must include when submitting planning applications for developments. The Council also has its own Biodiversity Position Statement 2011-2020 and guidance on sustainable development and urban design, which can be referred to when considering nature conservation and ecological enhancement measures on development sites.

#### **Rushcliffe Local Plan Part 1: Core Strategy Adopted December 2014**

- 2.18 References **Policy 17 Biodiversity** consistent with the aims and objectives outlined above for Policy 17 in the Broxtowe Borough; Gedling Borough; Nottingham City Aligned Core Strategies Part 1 Local Plan Adopted September 2014. Objectives for designated national and local sites of biological or geological importance for nature conservation will also be protected in line with the established national hierarchy of designations and the designation of further protected sites will be pursued. Similarly, development on or affecting other, non-designated sites or wildlife corridors with biodiversity value will only be permitted where it can be demonstrated that there is an overriding need for the development and that adequate mitigation measures are put in place.

#### **Rushcliffe Local Plan Part 2: Land and Planning Policies Adopted October 2019**

- 2.19 Section 12 Green Infrastructure and Natural Environment acknowledges the Local Plan Part 1: Core Strategy Policy 17 that outlines Rushcliffe Council's broad approach towards the protection and enhancement of biodiversity within the Borough. Improvements to the Green Infrastructure



network will be achieved through the incorporation of features that protect and enhance biodiversity within new development, the use of planning conditions or Section 106 agreements and the avoidance, mitigation, or as a last resort, compensation for any loss.

- 2.20 Designated sites will be protected in line with the national hierarchy of sites and development which adversely affects non designated sites or wildlife corridors will only be permitted where there is overriding need. Again, only a small proportion of the Borough's important habitats and species are located within nationally protected Sites of Special Scientific Interests (SSSIs) and that many important sites (Local Wildlife Sites or priority habitats) have no legal protection. Local Wildlife Sites and priority habitats are material considerations when considering planning applications.
- 2.21 Relevant Local Plan policies are:
- Policy 36: Designated Nature Conservation Sites
  - Policy 37: Trees and Woodlands
  - Policy 38: Non-Designated Biodiversity Assets and the wider Ecological Network
- 2.22 **Policies 36, 37 and 38** below build on **Core Strategy Policy 17**, setting out the Borough's detailed approach to the creation, protection, and enhancement of the wider ecological network and the protection that individual ecological assets are given, according to their importance (at a national or local level) and their sensitivity to development.
- 2.23 All planning applications should consider the impact of development on the natural environment. and, where appropriate, contain evidence that the development will not affect protected or priority habitats or species (information can be obtained from the Nottinghamshire Biological and Geological Records Centre, with further supporting information available from MAGIC mapping, local authority ecologist or local wildlife organisations). The Nottinghamshire Biodiversity Action Plan and Rushcliffe Biodiversity Opportunity Mapping Report should be used to help identify locally important habitats, species, and sites.
- 2.24 Large schemes may require an Ecological Impact Assessment. All surveys should be carried out prior to determination by a suitably experienced and qualified ecologist and comply with the Biodiversity Code of Practice for Planning and Development.

### **Nottinghamshire's Local Biodiversity Action Plan (LBAP) 1998**

- 2.25 The UK government created identified species and habitats of global and national importance in 1993 under a document referred to as "Biodiversity: the UK Action Plan". Each of these species or habitats was given a respective action plan, with aims and objectives set out to help in their conservation. For the plan to be successful, action needed to be taken at a local level to ensure the entirety of the UK was working collectively to protect biodiversity. Local Biodiversity Action Plans were created that were specific to each county.
- 2.26 The goal of the Nottinghamshire Local Biodiversity Action Plan is to conserve and enhance the County's unique variety of wild species and natural habitats, and hence to contribute to the conservation of both UK and global biodiversity.
- 2.27 The Nottinghamshire Biodiversity Action Plan was adopted by the City Council, to encourage and guide nature conservation work. In 2011 the City Council produced its Biodiversity Position Statement: *Ambitious for Wildlife*, further setting out biodiversity commitments and targets. The City Council will consult with Natural England or other appropriate wildlife organisations on any

applications that affect protected or notable species or habitats. It is the responsibility of developers to ensure that they do not contravene the regulations that aim to protect the species.

### 3.0 METHODOLOGY

#### Desktop Study

- 3.1 A Desk Study is an important element of undertaking an initial ecological appraisal of a site proposed for development, enabling the initial collation and review of contextual information, such as designated sites, together with known records of protected and priority species.
- 3.2 The Desk Study involved collating biodiversity information from the following sources:
- Nottinghamshire Biological and Geological Records Centre (NBGRC); and
  - Multi-Agency Geographic Information for the Countryside (MAGIC) website<sup>1</sup>.
- 3.3 The search areas were related to the significance of sites and their potential Zones of Influence (ZoI)<sup>2</sup>, as follows:
- 15 km around the Site for sites of International Importance (e.g. Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites);
  - 2 km around the Site for sites of National or Regional Importance (e.g. Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs)); and
  - 2 km around the Site for non-statutory sites of Local or County Importance or statutory sites such as Local Nature Reserves (LNRs) and species records (e.g. protected, or Section 41 NERC species of principal importance and notable species).
- 3.4 Further inspection, using colour 1:25,000 OS base maps ([www.ordnancesurvey.co.uk](http://www.ordnancesurvey.co.uk)) and aerial photographs from Google Earth ([www.maps.google.co.uk](http://www.maps.google.co.uk)), was also undertaken in order to provide additional context and identify any features of potential importance for nature conservation in the wider countryside.
- 3.5 Results are displayed on **Figures 1a to 1d**.

#### Field Survey

##### Survey Conditions and Personnel

- 3.6 All ecology surveys were undertaken during favourable weather conditions by experienced ecologists. Full details of survey conditions are contained within the appended reports.

##### Extended Phase 1 Survey Habitats

- 3.7 An Extended Phase 1 Habitat Survey was undertaken which involved classification of the broad habitat types present using the system published by the UK Joint Nature Conservation Committee<sup>3</sup>, with additional information collected beyond that required to determine the Phase 1 Habitat type, with the scale of recording of habitat parcels adjusted to provide more detail where necessary. The survey comprised a walkover of the Site, mapping the principal habitat types present and identifying a representative species list for each habitat. The abundance of species was recorded using the DAFOR scale, ranging from Dominant to Abundant, through Frequent and Occasional to Rare. A

<sup>1</sup> [www.magic.gov.uk](http://www.magic.gov.uk).

<sup>2</sup> Zone of Influence - the areas and resources that may be affected by the proposed development

<sup>3</sup> JNCC, (2010), Handbook for Phase 1 habitat survey - a technique for environmental audit, ISBN 0 86139 636 7

brief habitat description of the habitat was made, and representative photographs taken. Where possible and appropriate, the habitat types recorded were also given a classification using the National Vegetation Classification (NVC)<sup>4</sup>, based on surveyor experience. The Extended Phase 1 Habitat Survey of the Site was undertaken on 9<sup>th</sup> June 2022 by H.E. Hurst (Principal Ecologist – BSBI Field Identification Skills Certificate Level 4). Further detailed botanical survey of the grassland was undertaken on 14<sup>th</sup> June and 11<sup>th</sup> July 2022.

- 3.8 Nomenclature follows Stace 2019<sup>5</sup>. Mapping is shown on **Figure 2**.
- 3.9 Throughout the walkover survey consideration was additionally given to the actual or potential presence of protected species, such as, although not limited to those protected under the Wildlife and Countryside Act 1981 (*as amended*), the Protection of Badgers Act 1992<sup>6</sup> and the Conservation of Habitat and Species Regulations 2017 (*as amended*).

### Hedgerow Survey

- 3.10 During the Extended Phase 1 Surveys, hedgerows were surveyed individually using the Hedgerow Evaluation and Grading System (HEGS) to enable identification and evaluation of hedgerows of nature conservation importance within the Site. Hedgerows were graded on a scale of 1-4, within which grades 1 and 2 are generally considered to be of nature conservation priority as shown in **Table 1**.

**Table 1: Conservation Value of Hedgerows**

Grade	Value of Hedgerow
-1, 1, 1+	High to Very High
-2, 2, 2+	Moderately High to High
-3, 3, 3+	Moderate
-4, 4, 4+	Low

- 3.11 Hedgerows were also assessed against the Wildlife criteria provided in Part II of Schedule 1 of the Hedgerows Regulations 1997. Qualifying as an ‘important’ hedgerow requires the hedgerow assessed to be greater than 30 years of age and contain species listed in Schedule 5 (animals) and 8 (plants) of the Wildlife and Countryside Act 1981 (*as amended*), birds categorised as declining breeders (Category 3) within the ‘Red Data Birds in Britain’ (Batten 1990), or any species categorised as ‘endangered’, ‘extinct’, ‘rare’ or ‘vulnerable’ by any of the British Red Data Books.
- 3.12 Hedgerows are also considered important should they satisfy any of the following criteria:
- That the hedgerow is referred to in a record held by a biological records centre as containing protected plants (within 10 years) or birds and animals (within five years); or
  - That the hedgerow contains one of the following criteria per average 30m section surveyed:
    - seven Schedule 3 species; or

<sup>4</sup> Rodwell, J.S. (Ed.) (1991 et seq.). British Plant Communities. 5 volumes: Vol. 1 (1991) - Woodlands and Scrub; Vol. 2 (1991) - Mires and Heaths; Vol. 3 (1992) - Grasslands and montane communities; Vol. 4 (1995) - Aquatic communities, swamps and tall-herb fens; Vol. 5 (2000) - Maritime Cliffs, Sand Dunes, Saltmarshes and Other Vegetation. Cambridge University Press, Cambridge.

<sup>5</sup> Stace, C.A. (2019). *New Flora of the British Isles*. (4<sup>th</sup> Ed.). C&M Floristics

<sup>6</sup> *The Protection of Badgers Act 1992 (as amended)*. [Online]. London: HMSO Available from: <http://www.legislation.gov.uk/ukpga/1992/51/contents>

- six Schedule 3 species and three listed features (see below); or
  - six Schedule 3 species, including one of the following: black poplar, large-leaved lime, small-leaved lime or wild service-tree; or
  - five Schedule 3 species and four listed features; or
  - four Schedule 3 species, two listed features and lying adjacent to a bridleway or footpath.
- Listed features to include:
    - A bank or wall which supports the hedgerow along at least half of its length;
    - Gaps which together do not exceed 10% of the length of the hedgerow;
    - At least one standard tree per 50 m of hedge;
    - At least three Schedule 2 woodland species within the hedgerow;
    - A ditch along at least one half of the length of the hedgerow;
    - Connections scoring 4 points or more (1 point per connection of the hedgerow with another, two points per connection of the hedgerow to a pond or broad-leaved woodland; and
    - A parallel hedge within 15 m of the hedgerow.

## Fauna

- 3.13 Further detailed surveys were undertaken to confirm the presence of species protected under the Wildlife and Countryside Act 1981 (as amended), the Protection of Badgers Act 1992 and the Conservation of Habitats & Species Regulations 2021 (as amended). Faunal surveys were completed during the appropriate seasons and followed all methodologies followed the published guidelines as accepted by statutory and non-statutory agencies, including Natural England. Detailed methodologies are provided in the relevant supporting technical reports provided in Appendices.
- 3.14 Detailed surveys have been undertaken for the following species /groups:
- Great crested Newt Survey (within the body of this report) & eDNA results (Appendix B)
  - Bird Report (considering breeding and wintering assemblages, Appendix C)
  - Barn Owl Report (Appendix D)
  - Bird Strike Risk Assessment (Appendix E)
  - Bat Report detailing activity & transect surveys (Appendix F),
  - Badger survey (Appendix G);
  - Water Vole and Otter Survey (presented in this report):
  - Reptile surveys (presented in this report)
  - Invertebrate Survey (Appendix H)
  - Toad Surveys (presented in this report)
  - Harvest Mouse Surveys (presented in this report)

**Great Crested Newt**

- 3.15 As part of the Phase 1 habitat survey any waterbodies within a 500 m radius were identified using OS maps and aerial satellite imagery.
- 3.16 There were four waterbodies within the Site boundary (P1 to P4), and an additional pond adjacent to the northeast (P5). Waterbody locations are shown in **Figure 3**.

eDNA Surveys

- 3.17 Environmental DNA (eDNA) sampling was undertaken of P5 in 2020 and of P1 to P4 in 2022 to determine the presence/absence of GCN in accordance with the Technical Advice Note for field and laboratory sampling of GCN eDNA (WC1067)<sup>7</sup>.
- 3.18 Sampling was undertaken by appropriately licenced ecologists who collected a sample of water from each pond (during suitable weather conditions avoiding heavy rain). Sampling was undertaken using kits obtained from ADAS. The methodology comprised taking samples of agitated water from 20 locations around each pond and mixing thoroughly. 15ml of this water was then placed into each of the six sterile sample tubes containing preservative, precipitates and a DNA sequence that was used for degradation control. All samples were stored in accordance with the protocols provided by the laboratory. The samples were then transported under suitable conditions for analysis. Following analysis, results provided by the laboratory could have one of three outcomes described in **Table 2** below.

**Table 2: Description of Possible Results of eDNA Analysis**

Result	Description
Positive	A positive result means that eDNA from GCN was detected and they have been present within the water in the 20 days preceding sampling. An eDNA score would be provided indicating the number of positive replicates from a series of twelve.
Negative	DNA from GCN was not detected; in the case of negative samples the DNA extract is further tested for PCR inhibitors and degradation of the sample.
Inconclusive	Controls indicate degradation or inhibition of the sample, therefore the lack of detection of GCN DNA is not conclusive evidence for determining the absence of the species in the sample provided. Degradation can occur through poor storage of the samples or kits and inhibition can occur through unexpected chemicals in the sample.

**Birds: Breeding, Overwintering Birds, Barn Owl Surveys and Bird Strike Risk Assessment**

- 3.19 Multiple surveys have been conducted at the Site including wintering bird surveys, breeding bird surveys, barn owl *Tyto alba* surveys and an outline bird strike risk assessment. Full details are provided within separate reports produced for the Site<sup>8</sup> and contained within Appendices C, D, & E of this report.

**Bats**

- 3.20 Several surveys for bat activity were undertaken. These included monthly walked transect routes, and monthly static bat detector surveys.

<sup>7</sup> Biggs J, Ewald N, Valentini A, Gaboriaud C, Griffiths RA, Foster J, Wilkinson J, Arnett A, Williams P and Dunn F 2014. Analytical and methodological development for improved surveillance of the Great Crested Newt. Appendix 5. *Technical advice note for field and laboratory sampling of great crested newt (Triturus cristatus) environmental DNA*. Freshwater Habitats Trust, Oxford.

- 3.21 Ground level inspections of trees for bat roost potential, followed by aerial inspection of trees with roost potential to be removed were also undertaken. Following aerial inspection, those trees with moderate roost potential or higher were then subject to emergence surveys.
- 3.22 There are no buildings within the Site.
- 3.23 Full details of the survey methodologies for bats can be found in the Bat Report produced for the Site and contained within **Appendix F** of this report.

### Badger

- 3.24 All hedgerows and other suitable habitats within the Site were searched for evidence of badger *Meles meles* activity. Methodology employed followed that outlined by Harris and Creswell and Jefferies<sup>9</sup>.
- 3.25 Full details of the badger survey methodology can be found in the Badger Report Produced for the Site and contained within **Appendix G** of this report.

### Water Vole Survey

- 3.26 There are several wet ditches within the Site that have wider cross sections as shown on **Figure 2**. These were assessed for their suitability to support water vole.
- 3.27 Suitable Habitat for water voles includes:
- Water more than 50 cm deep and relatively stable;
  - Muddy bottom;
  - Static or slow flowing water;
  - Earth banks of >45° (for burrowing);
  - Dense vegetation cover on the banks of a good mix of grasses and herbs for summer food and cover and some berry bearing bushes, tubers and trees for autumn and winter food;
  - Emergent, in-channel vegetation; and
  - 1-2m wide.
- 3.28 A water vole survey was carried out on these areas on 15<sup>th</sup> June and 6<sup>th</sup> September 2022 which involved searching the banks of each ditch for evidence of water voles as per best practice guidelines<sup>10</sup>. Areas surveyed for water vole are shown on **Figure 4**. The ditches were searched from within the channel and entire lengths were covered.
- 3.29 Evidence for the presence of water voles includes:
- Feeding signs (neat piles of short pieces of vegetation cut at a 45° angle),
  - Latrines (piles of droppings),
  - Burrows;

<sup>9</sup> Harris, S., Cresswell, P. & Jefferies, D. 1989. *Surveying for Badgers*. Occasional Publication of the Mammal Society No.9. Mammal Society, Bristol.

<sup>10</sup> Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016), Water Vole Mitigation Handbook (Mammal Society Mitigation Guidance Series). Eds Fiona Matthews and Paul Channin. Mammal Society, London.

- Footprints and pathways; and
- Actual sightings

#### Limitations

- 3.30 Only approximately 40% of the banks of pond P1 was accessible to search for water vole field signs however, as waterbodies are a less favoured habitat than linear water courses, it is not thought that any sign was missed. It is considered that an appropriate level of survey to justify a robust conclusion was conducted.

#### Harvest Mouse Survey

- 3.31 Nest searches are a widely accepted method for indicating harvest mouse presence<sup>11</sup>. Therefore, a nest search was conducted in all areas of suitable harvest mouse habitat. This includes:
- Undisturbed grassland;
  - Tall ruderal and herb vegetation;
  - Reed and reedmace vegetation in ponds; and
  - Field margins.
- 3.32 Surveys were conducted in November 2022 and 8<sup>th</sup> February 2023 by two surveyors walking the areas in parallel transect lines. The surveys were conducted in late autumn and winter when vegetation has started to die back. This can make nests easier to detect. Areas searched for harvest mouse nests are shown on **Figure 5**.

#### Otter Survey

- 3.33 The banks of the River Trent were surveyed to determine the suitability for the presence of otter *Lutra lutra* sheltering or resting areas. This survey occurred on 15<sup>th</sup> June and 16<sup>th</sup> September 2022.
- 3.34 Otter have been known to exploit virtually any aquatic habitat and no specific variables have been found to be preferred by otter, thus suitable habitat is a loose term<sup>12</sup>.
- 3.35 Evidence of Otter includes<sup>13</sup>:
- Dung (spraints);
  - Tracks (footprints);
  - Feeding remains;
  - Otter slides (into water);
  - Holts (underground dens); and
  - Couches (above ground sites where otters rest during the day).

<sup>11</sup> The Mammal Society 2021, The National Harvest Mouse Survey Protocols – Version 1.1

<sup>12</sup> Chanin P (2003). Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

<sup>13</sup> <https://www.gov.uk/guidance/otters-protection-surveys-and-licences#survey-methods>



3.36 The areas searched for otter sign are shown on **Figure 6**.

### Reptiles

3.37 Habitats present within the Site were considered for their potential suitability to support reptile populations, including the presence of features which provide opportunities for reptiles to bask, forage and/or hibernate, and areas of varied vegetation structure in sheltered locations with sunny aspects and connectivity to other suitable reptile habitats. This assessment was based on the methodology detailed in the Herpetofauna Workers Manual<sup>14</sup> and the Froglife Advice Sheet<sup>15</sup>.

3.38 A reptile presence/absence survey was then undertaken across all areas of the Site identified as offering potential suitable habitat to reptiles.

3.39 The survey was undertaken based on current best practice guidelines as detailed within the Herpetofauna Workers Manual and Froglife Advice Sheet. Methods involved a search for basking reptiles on/under naturally occurring and strategically positioned artificial refugia placed in locations that offered the most suitable habitat for common reptiles. i.e., structurally diverse habitats, with variable vegetation heights, tangled or thorny areas, mosaics, bare patches or ecotones. Locations of the refugia are shown in **Figure 7**.

3.40 Surveys were undertaken in between May and September 2022 by suitability experienced ecologists. The prevailing weather conditions, including relative wind speed, cloud cover, ambient temperatures, and any other notable weather, are provided in **Table 3**.

3.41 Guidelines recommend that surveys are undertaken during the following periods:

- At temperatures of between 9°C & 18°C;
- On sunny/cloudy days with little or no wind;
- Between 07:00 & 11:00 hrs ('AM survey') or between 16:00 & 19:00 hrs ('PM survey') (note: if temperature conditions are suitable the surveys can be undertaken outside of these periods).

3.42 In addition, guidelines also recommend:

- Using regularly spaced felt (0.5 m<sup>2</sup>) as artificial refugia, with a black upper side;
- Approaching refugia from a downwind direction, casting no shadow and making sure not to disturb basking animals when checking;
- That lifting and replacing tins, to check for the presence of reptiles, underneath, is undertaken with care to avoid potential harm to any animals underneath;
- That the location and number of tins are mapped to aid survey and avoid the possibility of leaving tins in situ upon completion of the survey.

**Table 3: Data and Weather Conditions during Reptile Survey**

Survey	Date	Start Time	Temp. °C	Weather	Rain
1	23.05.22	09:00	14	Wind: 1, Cloud %: 60-70	0
2	30.05.22	09:40	10	Wind: 1, Cloud %: 80-90	0

<sup>14</sup> Gent, A.H. & Gibson, S.D., eds., 1998. *Herpetofauna Workers' Manual*. Peterborough, Joint Nature Conservation Committee.

<sup>15</sup> Froglife, 1999. Reptile survey: an introduction to planning, conducting and interpreting surveys for snake and lizard conservation. *Froglife Advice Sheet 10*. Froglife, Halesworth.

Survey	Date	Start Time	Temp. °C	Weather	Rain
3	14.06.22	08:00	18	Wind: 1/2, Cloud %: 0-10	0
4	29.06.22	08:30	20	Wind: 0, Cloud %: 20	0
5	01.09.22	09:25	17	Wind: 3, Cloud %: 30-40	0
6	05.09.22	09:30	17	Wind:1/2, Cloud %: 30-40	0
7	14.09.22	09:15	14	Wind:1/2, Cloud %: 70	0

### Population Assessment

- 3.43 Where reptile populations are identified, the populations are assessed in accordance with the population level criteria as stated in the Key Reptile Site Register (HGBI, 1998)<sup>16</sup>. This system classifies populations of individual reptile species into three population categories assessing the importance of the population (**Table 4**). These categories are based on the total number of adult animals observed during individual survey occasions.

**Table 4: Key Reptile Site Survey Assessment Categories (HGBI, 1998) \***

Species	Low Population (No. of Individuals)	Good Population (No. of Individuals)	Exceptional Population (No. of Individuals)
Adder	<5	5 – 10	>10
Common lizard	<5	5 – 20	>20
Grass snake	<5	5 – 10	>10
Slow worm	<5	5 – 20	>20

\*Figures in the table refer to the maximum number of adults seen by observation and/or under tins (placed at a density of up to 10 per hectare, by one person in one day)

### **Toad Surveys**

- 3.44 Terrestrial searches for toad *Bufo bufo* were conducted at the Site from late February to early April 2023. This involved placement of refugia – a mixture of carpet tiles and roofing felt in suitable terrestrial habitat and leaving them in place for a week prior to the first survey.
- 3.45 A total of six surveys were then conducted after dark by torch light. All suitable terrestrial habitat (blue areas) and placed refugia (black squares) were searched at a slow and steady pace following the protocol from the Amphibian and Reptile Conservation National Amphibian survey<sup>17</sup>. Survey areas are shown on **Figure 8**.
- 3.46 Numbers of toad were counted, and individuals were sexed where possible. Toad spawn was also searched for and recorded if found.
- 3.47 Mats were deployed on 8<sup>th</sup> February 2023 and surveys were conducted on:
- 16<sup>th</sup> February;
  - 22<sup>nd</sup> February;
  - 1<sup>st</sup> March;
  - 13<sup>th</sup> March;

<sup>16</sup> Herpetofauna Groups of Britain and Ireland. 1998. Evaluating local mitigation/translocation programmes: maintaining best practice and lawful standards.

<sup>17</sup> <https://amphibian-survey.arc-trust.org/>

- 21<sup>st</sup> March;
- 4<sup>th</sup> April.

### Invertebrate Surveys

- 3.48 A full invertebrate survey was undertaken at the Site and a species-specific survey of necklace ground beetle *Carabus monilis* was undertaken. This is discussed in a separate report contained within **Appendix H**.

### Evaluation and Assessment Methodology

- 3.49 The assessment of significant ecological effects was undertaken in accordance with CIEEM EclA guidelines (*CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*). In summary the assessment of significant ecological effects involves:
- 3.50 **Establish Baseline** – this is based on desk study and field surveys which describes the existing and potential Important Ecological Features (IEFs) within the zones of influence specified.
- 3.51 **Determine the Scale of Importance of Ecological Features** - importance is determined using geographical frames of reference: Site, Local, Country, Regional, National, and International. This assessment is based on a variety of factors, including statutory protection, statutory designation, conservation status, abundance, and rarity.
- 3.52 **Assess Significant Ecological Effects** – this is based on the importance of the ecological feature, magnitude of the effect and sensitive of the features considered. This is description-based rather than applying a matrix and considers construction and operation effects only where relevant. The assessment assumes the proposed layout, intrinsic mitigation, and routine ecological mitigation normally conditioned have been actioned and these are outlined clearly.
- 3.53 **Mitigation** – This will be based on the mitigation hierarchy – avoidance, mitigation, compensation, and enhancement. Any further mitigation measures required will be outlined to ensure residual effects are lowered to a level considered acceptable. Enhancements will seek biodiversity net gain in line with the NPPF. Monitoring will be considered where applicable.
- 3.54 **Future Baseline and Residual Effects** – final conclusionary statements for the short-, medium- and long-term effects.

### Biodiversity Net Gain

- 3.55 Natural England’s published biodiversity net gain metric is an MS Excel spreadsheet that is used to quantify the predicted net-change in biodiversity value (“biodiversity units”) of a proposed development Site before and after development. It treats the “habitats” and linear features “hedgerows” separately, and is based on pre-determined values, along with published written guidance, set by a Natural England-led team of experts. The DEFRA metric 4.0, has been used for this assessment (Further details are in **Appendix I**)
- 3.56 The Site has been mapped and digitised using the Biodiversity Metric 4.0 QGIS Template, with the existing habitats identified and areas automatically generated. In accordance with the 4.0 Metric User Guide, habitats have been defined under UK Habitat Classification. The indicative

landscaping/development proposals for the Site were then uploaded into the QGIS template, and the proposed habitats mapped and digitised to generate areas for each of the habitats proposed for creation.

- 3.57 During a typical assessment the pre- and post-development habitats are inputted into the Metric Calculation tool and habitats are grouped into their habitat type and condition based on the results of the UKHab and condition assessment surveys, while post-developments were classified into their UKHab type as identified through the classification of proposed habitats within landscape/restoration plans into appropriate UKHab types and their target condition scores. The metric then provides a habitat distinctiveness score for each of the baseline and proposed habitats which are pre-assigned scores based on the habitat type.

### **Limitations**

- 3.58 This assessment aims to provide baseline ecological data for the Site and as such presents an overview of the habitats and important ecological features present during the specific surveys completed. Due to the transient and complex nature of ecosystems, no investigation can provide a complete representation or prediction of the natural environment present, however every effort has been made to ensure an accurate description of the Site is presented, by following best practice guidance, experience, and professional judgement.
- 3.59 The phase 1 habitat map has been reproduced from detailed field notes and informed by aerial imagery, OS mapping and site maps provided by the client. The accuracy of this figure is ultimately guided by the accuracy of these sources and can only be relied upon to a certain degree of resolution.
- 3.60 Data provided by third party sources collated during the desktop study is generally made up from a wide range of sources including (but not limited to) those submitted by ecological consultancies, wildlife conservation organisations and volunteers. As such, this data is typically focused on areas of known nature conservation, is reliant upon formal surveys having been undertaken within an area or the presence of an expert within the locality (particularly for invertebrate records) and as such this data can never be fully relied upon as a complete ecological dataset for any given area. Rather, this data is used as a guide to likely presence of notable ecological features and can never be relied upon for likely absence.
- 3.61 Hedgerows surveyed against the Hedgerow Regulations 1997 have not been assessed under the Archaeology and History criteria, as this is outside the scope of ecology surveys.

## 4.0 RESULTS – ECOLOGICAL BASELINE

### Desk Study

#### Statutory Sites of Nature Conservation Interest

- 4.1 There are no internationally designated sites of ecological value within the potential Zol of the Site (15 km). Two national designations and three County designations lie within 2 km as shown in **Table 5** and on **Figure 1a**.

**Table 5: Statutory Designations within 2 km of the Site**

Site Name	Interest Feature(s)
Attenborough Gravel Pit SSSI	Attenborough Gravel Pits SSSI is a nationally important site for its lowland eutrophic open waters with emergent vegetation, wet floodplain woodland, unimproved floodplain grassland, a rich assemblage of breeding birds associated with lowland open waters and their margins, and wintering shoveler <i>Anas clypeata</i> and bittern <i>Botaurus stellaris</i> .
Holme Pit SSSI	The site contains some of the best remaining areas of marsh, reed swamp and open water habitat in Nottinghamshire and is of Regional Importance.
Glapton Wood LNR	A mixed urban woodland which covers almost 4 hectares. The site provides valuable habitat for wildlife and offers nearby residents an opportunity to experience nature right on their doorstep.
Trent Meadows LNR	An area of rough stubble and fields between the railway line and gravel workings.
Clifton Grove, Clifton Wood and Holme Pit Pond LNR	Together they make up part of the River Trent Wildlife Corridor

#### Non-Statutory Sites of Nature Conservation Interest

- 4.2 Non-statutory designations are also commonly referred to in planning policies as ‘Local sites’, although these designations are typically considered to be important at a county level. In Nottinghamshire, such designations are named Local Wildlife Sites (LWS). Additional designated sites which should be considered at this level include Ancient Semi-natural Woodland (ASNW) where this is not covered by other designations.
- 4.3 There are six non-statutory designations within the Site, five adjacent to the boundary and a further six within 1km. These are shown on **Figure 1b** and summarised in **Table 6**.

**Table 6: Local Wildlife Sites within 2 km of the Site**

Site Name	Interest Feature(s)
<b>Within the Site</b>	
Barton in Fabis Pond and Drain LWS	This site comprises a stretch of small ponds and drains near the River Trent which possibly originated as an ox-bow lake. The emergent aquatic communities include Mare's-tail <i>Hippuris vulgaris</i> , Amphibious Bistort <i>Persicaria amphibia</i> , Brooklime <i>Veronica beccabunga</i> and Fine-leaved Water-dropwort <i>Oenanthe aquatica</i> with stands of Reed Sweet-grass <i>Glyceria maxima</i> , Yellow Iris <i>Iris pseudacorus</i> and Branched Bur-reed <i>Sparganium erectum</i> .
Borrow Pits LWS	A long narrow pond dissected by a tall flood bank, originally used for angling, but now heavily overgrown. The bank side scrub now hides much of the pond margins on the north section but there is still a rich emergent and marginal vegetation.

Site Name	Interest Feature(s)
Brandshill Marsh LWS	A narrow strip of rough marshy grassland and tall herb vegetation between Brandshill Wood and a field drain.
Barton Flash	This site lies adjacent to the River Trent on alluvial soils and comprises a seasonally flooded flash in a depression with a depth of up to 1.5 m from the level of the surrounding land. The flash supports much Creeping Bent <i>Agrostis stolonifera</i> , with Silverweed <i>Potentilla anserina</i> , Reed Sweet-grass <i>Glyceria maxima</i> , Trifid Bur-marigold <i>Bidens tripartita</i> and Purple-loosestrife <i>Lythrum salicaria</i> . The surrounding grassland is improved and contains mostly Perennial Ryegrass <i>Lolium perenne</i> .
Brandshill Grassland	An exceptionally rich neutral grassland on a steep northwest facing slope of Mill Hill overlooking the Trent floodplain. An area impacted by motorcycle scrambling in the past has been re-seeded, but this had little effect on site quality. The whole site is periodically cattle-grazed and there are several mature trees and relict hedges.
River Trent near Barton-in-Fabis LWS	This short stretch of riverbank near Barton-in-Fabis is backed by cattle-grazed pasture. The cows have access to the river creating poached beaches with the disturbed conditions providing habitat for Trent side annual plants.
<b>Adjacent</b>	
Attenborough Nature Reserve LWS	This large site, adjacent to the River Trent, is managed by the Nottinghamshire Wildlife Trust. It comprises a series of flooded gravel pits with islands and connecting causeways that have been colonised by vegetation over many years producing a mosaic of habitats. The site is very important for both resident and breeding bird populations and for wildfowl in winter. A diverse fauna has been recorded including a wide range of fish, invertebrates, and amphibians.
Barton Ferry Wetland LWS	No citation given.
Brandshill Wood ASNW and LWS	This mixed plantation woodland is situated on the steep west-facing slope of Brands Hill overlooking the Trent floodplain. The ground flora supports some ancient woodland indicator species including patches of Dog's Mercury <i>Mercurialis perennis</i> , with also Ramsons <i>Allium ursinum</i> , Bluebell <i>Hyacinthoides non-scripta</i> and Yellow Archangel <i>Lamiastrum galeobdolon</i> .
Burrows Farm Grassland LWS	An unimproved neutral grassland, seasonally wet from groundwater which is bounded by an excavated drain to the northeast and a fenced off bridleway to the southeast. There is a seasonally flooded pond in the northwest corner. The grassland is mown for hay.
Clifton Wood ASNW and LWS	This mixed semi-natural woodland has been partly replanted due to Dutch Elm Disease. It is situated on a steep northwest facing slope overlooking the Trent floodplain. A section on the flat hilltop contains many exotic species from Clifton Hall.
<b>Within 1km</b>	
Clifton Fox Covert LWS	This is a small mixed plantation woodland which is fairly even-aged throughout. The field layer is dominated by Bramble <i>Rubus fruticosus</i> agg. with areas of Bluebell <i>Hyacinthoides non-scripta</i> , Bracken <i>Pteridium aquilinum</i> and other woodland herbs such as Hairy Brome <i>Bromopsis ramosa</i> , Giant Fescue <i>Festuca gigantea</i> and Dog's Mercury <i>Mercurialis perennis</i> suggesting possible ancient woodland. The site comprises a diverse area with a varied flora which provides good habitat for woodland birds and mammals.

Site Name	Interest Feature(s)
Barton in Fabis Fishing Pools LWS	Two shallow ponds, possibly fairly recent borrow pits for a nearby flood bank and a section of field drain, which although running between the two ponds is not connected to either. This drain does however provide a corridor for wildlife through farmland linking the two ponds. The northern pond, used for angling, has more open water and an island. The southern pond has extensive reed swamp and mature scrub which completely shades the margins.
Trent Carr LWS	A notable wet broadleaved woodland on seasonally river-flooded ground close to the River Trent with a diversity of native and planted trees. The site includes willow <i>Salix</i> scrub to the east of the track and the outflow stream from Holme Pit SSSI. There is also a shaded pond.
Beeston Wier river deposits LWS	This site comprises an area of unmanaged ruderal grassland and developing scrub on river deposits, along with natural river features which comprise river gravels, sand, shingle, and silt in the River Trent below Beeston Weir. Much of the site is regularly flooded and scoured by fast flowing water.
Holme Pit LWS	This exceptional site comprises a small lake, used by a local angling club, extensive reed swamp which is gradually encroaching onto open water and mature Carr woodland. Marshy areas open to cattle grazing in the adjacent pasture are also part of this Local Wildlife Site.
Clifton Grove LWS	A deciduous woodland on a steep northwest facing river cliff overlooking the River Trent, now with many open areas caused by the ravages of Dutch Elm Disease. There is a narrow strip of flatter ground alongside the river, with a fringe of willow ( <i>Salix</i> ) species.

### Field Survey – Habitats

- 4.4 Habitat descriptions are provided below. The locations of habitats described are indicated on **Figure 2: Phase I Habitat Plan**. A full botanical species list is provided within **Appendix A**.

#### Arable

- 4.5 Six fields within the Site were under arable cultivation at the time of the survey which was more than previously recorded. The south-eastern compartment had been recently sown with a brassica sp. crop, the northern most field compartment has been seeded as a temporary Italian rye-grass *Lolium multiflorum* ley, the field to the east of hedgerow three had a barley *Hordeum vulgare* crop and the remainder had been recently ploughed. Floristic diversity was low as species within the field margins had not encroached into the field compartments and there was a clear separation from the crops where the ground had been previously ploughed.
- 4.6 Field margins were generally narrow (<0.5 m in width) and predominantly unmanaged comprising species poor semi-improved grassland characterised by locally frequent false oatgrass *Arrhenatherum elatius*, occasional cock's-foot *Dactylis glomerata* and perennial rye-grass *Lolium perenne* with forbs included rare occurrence of hedge mustard *Sisymbrium officinale*, common field speedwell *Veronica persica* and fat hen *Chenopodium album*.
- 4.7 Arable habitat is of **less than Local** value.



## Grassland

### Unimproved Neutral Grassland (Brandshill Grassland LWS)

- 4.8 Brandshill Grassland LWS, featured an unimproved neutral grassland community strongly representative of NVC community MG5 - *Cynosurus cristatus* - *Centaurea nigra* grassland, on an undulating north-west facing slope. The field was cattle grazed and had a varied topography, with remnant ridge and furrow evident on the southern slope.
- 4.9 Two distinct communities were apparent within the field, reflective of the varying topography and intensity of management and nutrient input. Firstly, on the steeper ground, a short species-rich sward was evident, characterised by an abundance of the fine leaved grasses which included common bent *Agrostis capillaris*, crested dog's-tail *Cynosurus cristatus*, red fescue *Festuca rubra* agg. and sweet vernal-grass *Anthoxanthum odoratum*. This community featured a high proportion of herbs, most notably locally frequent cat's ear *Hypochaeris radicata*, red clover *Trifolium pratense*, and ribwort plantain *Plantago lanceolata*, common sorrel *Rumex acetosa*, common bird's-foot-trefoil *Lotus corniculatus*, lesser trefoil *Trifolium dubium* and salad burnet *Poterium sanguisorba* with occasional autumn hawkbit *Scorzoneroides autumnalis*, and common knapweed *Centaurea nigra*. The high frequency of the latter, together with the presence of lady's bedstraw *Galium verum* and agrimony *Agrimonia eupatoria* are preferential towards MG5b, the *Galium verum* sub-community, indicative of a calcareous influence. Other rarely recorded species indicative of a calcareous influence included quaking grass *Briza media*, harebell *Campanula rotundifolia*, mouse-ear hawkweed *Pilosella officinarum* and cowslip *Primula veris*. On average this area recorded 15 species per metre squared.
- 4.10 Elsewhere, particularly on the shallower aspects and around the old wooden livestock pen (TN1, **Figure 2**), broadleaved grasses, particularly Yorkshire-fog *Holcus lanatus* and soft brome *Bromus hordeaceus*, as well as higher abundances of perennial rye-grass, play a more prominent role and while the sward remains diverse, herbs are present at much lower frequencies, with a notable increase in ruderal species such as common nettle *Urtica dioica* and creeping thistle *Cirsium arvense*. Although other abiotic factors, such as topography, may influence this variation in community composition, inappropriate management could be contributing to a shift towards communities more typically associated with neutral permanent pasture, typically NVC community MG6: *Lolium perenne* - *Cynosurus cristatus* grassland. It was noted that the cattle spend much of their time on the plateau of the slope in the centre of the field and there was a heavily poached area around an English oak *Quercus robur* adjacent to the field access gate along the northern boundary (TN2, **Figure 2**).





**Photograph 1: Brandshill Grassland LWS looking south**

- 4.11 A few notable species mentioned on the LWS citation were noted within the sward albeit rarely, which included downy oat-grass *Helictotrichon pratense* and meadow oat-grass *H.purbescens*. However, the sizes of the populations of some of the indicator species such as common knapweed and cowslip were notably smaller.
- 4.12 The boundaries of the two distinct communities within the field were mapped and are displayed on **Figure 2**. However, given the timing of the survey, this is an estimation of the extent of these habitats and, they co-existed in a much finer mosaic. However, fundamentally, it is considered that the introduction of long-term favourable management to this grassland, as secured through proposals, would benefit the community as a whole.
- 4.13 As this area is designated as a LWS, it is of **County value**.

#### Semi-improved Neutral Grassland – South-west – Ridge and Furrow

- 4.14 The south-west section of the Site, featured a poor semi-improved grassland community, bisected by a farm track. The community to the east of the track, prominently featured remnant ridge and furrow. At the time of the initial survey, the field was cattle grazed and on subsequent visits was sheep grazed and featured a relatively short sward characterised by Yorkshire-fog, common bent and perennial ryegrass, and locally occasional patches of creeping bent *Agrostis stolonifera* in damper areas. Patches of tall thistle growth was a prominent feature, with creeping thistle the most frequently recorded, but also musk thistle *Carduus nutans* and spear thistle *Cirsium vulgare* well represented. Other herbaceous vegetation was poorly represented, limited to occasional yarrow *Achillea millefolium* and white clover *Trifolium repens*, lady's bedstraw, autumn hawkbit and common mouse-ear *Cerastium fontanum* recorded rarely. Silverweed *Potentilla anserina* was locally frequent on the western side of the track (TN3, **Figure 2**).
- 4.15 This area has been previously identified as Floodplain Grazing Marsh, a Habitat of Principal Importance under the NERC act. This community is defined by features other than vegetation type, principally: periodically inundated pasture with ditches which maintain the water levels. The example seen in this area lacks the ditches with permanent standing water. Previous surveys had recorded evidence of temporary shallow pools; however, none were noted during the 2022 survey period. Despite this community being demonstrably poor semi-improved grassland, it has been

classified as semi-improved neutral grassland. This decision was taken to truly reflect that habitats classification as a habitat of principal importance and the value it provides to its faunal associates.

- 4.16 This habitat is of **Local** value.



**Photograph 2: Ridge and furrow grassland looking south-east.**

Semi-improved Neutral Grassland – MG1 grassland (South)

- 4.17 To the south of the Site, an area of unmanaged neutral grassland, which had broad affinities with NVC community MG1: *Arrhenatherum elatius* grassland, was recorded in a mosaic with several crack willow dominated copses. Common couch was an abundant component of the tall sward, together with false oatgrass, Yorkshire-fog and creeping bent. An abundance of tall herbaceous vegetation was a feature of this community with hoary willowherb *Epilobium parviflorum* and common nettle forming extensive patches, bristly oxtongue *Helminthotheca echioides*, clustered dock *Rumex conglomeratus*, meadowsweet *Filipendula ulmaria* and creeping thistle recorded occasionally. Further east, this community graded into an area of marshy grassland associated with Brandshill Marsh LWS, described below.

- 4.18 This area is assessed of **less than Local** value.

Semi-improved Neutral Grassland – MG1 grassland (East)

- 4.19 To the east of the Site, adjacent to the farm track off Green Street was a strip of unmanaged grassland. Yorkshire-fog and common bent were the most frequently recorded species within the sward, with false oatgrass, tufted hairgrass *Deschampsia caespitosa* and crested dog's-tail occasional. Lesser trefoil, ribwort plantain and hoary ragwort *Jacobaea aquatica* were occasional throughout and a northern marsh orchid *Dactylorhiza purpurella* was recorded at TN4.

- 4.20 Due to the small size of this area, it is assessed of **less than Local** value.

Marshy Grassland – MG9 Brandshill Marsh LWS – North

- 4.21 The central section of Brandshill Marsh LWS featured a damp moderately species rich neutral grassland community, broadly analogous with NVC community MG9: *Holcus lanatus* -

*Deschampsia cespitosa* grassland. Large tussocks of tufted hairgrass characterised the community, together with an abundance of common knapweed with other areas dominated by false oatgrass. Meadowsweet was a notable feature of the community, recorded frequently throughout, although not achieving the level of cover seen elsewhere within Brandshill Marsh LWS. Several species indicative of good quality neutral grassland was noted including oxeye daisy *Leucanthemum vulgare*, meadow vetchling *Lathyrus pratensis*, meadow crane's-bill *Geranium pratense*, common sorrel and lady's bedstraw. However, the overall character of the community and Brandshill Marsh LWS, was one of neglect, with much of the former extent of the LWS being lost to the adjacent grey willow scrub and with extensive patches of brambles now encroaching into the remaining grassland habitats from the south-east and along the footpath. A number of ant hills were also noted throughout the sward which was also rabbit grazed.

#### Marshy Grassland – MG9 – Brandshill Marsh LWS – South

- 4.22 A similar community to the one described above was recorded at the southern extent of Brandshill Marsh LWS, extending further south between Borrow pits, Barton LWS, and the arable habitat to the west. Tufted hairgrass was increasingly prominent within this community, but with meadowsweet and common knapweed maintaining a high cover. Neutral grassland indicators, such as meadow crane's-bill, meadow buttercup *Ranunculus acris* and lady's bedstraw were also present but at much lower frequency. The additional incidence of species such as wild angelica *Angelica sylvestris*, false-fox sedge *Carex otrubae* and bittersweet *Solanum dulcamara*, are perhaps indicative of a higher water table.

#### Marshy Grassland – M27 (Brandshill Marsh LWS)

- 4.23 The most extensive community recorded in the open areas of Brandshill Marsh LWS would be broadly described as NVC community M27: *Filipendula ulmaria* - *Angelica sylvestris* mire. Meadowsweet was dominant throughout, forming a tall canopy interspersed with frequent common knapweed, occasional wild angelica and more locally bramble. Below this dense canopy of tall herbs, species such as gypsywort *Lycopus europaeus*, male fern *Dryopteris filix-mas* and meadow vetchling were recorded at low frequencies.
- 4.24 All habitat areas within Brandshill Marsh LWS are considered to be of **County** value.



**Photograph 3: Brandshill Marsh LWS looking south-west**



Species-Poor Semi-improved Neutral Grassland – MG1 grassland (North)

- 4.25 Within the northern extent of the Site, within the boundary of Barton Flash LWS was an area of species-poor semi-improved grassland, the eastern half of which was intensively sheep grazed at the time of the survey (Photograph 4). The sward was very short to less than 3 cm and was characterised by abundant cock's-foot with locally frequent patches of false oatgrass and locally occasional patches of red fescue and meadow foxtail with Yorkshire-fog and reed canary-grass infrequent associates. Forbs did not play a prominent role in the community composition, being limited to common nettle, common hogweed, and silverweed, all recorded as rarities.



**Photograph 4: Sheep-grazed species-poor semi-improved grassland**

- 4.26 The western half was unmanaged at the time of the survey with a homogenous sward approximately 20-50 cm in height and was characterised by the same composition with additional species including lesser trefoil, common mouse-ear and amphibious bistort all recorded as rarities.
- 4.27 An additional field compartment to the west of hedgerow H6 was characterized by abundant Yorkshire fog with locally occasional patches of false-oat grass, creeping bent, perennial ryegrass and rare occurrence of rough meadow-grass and timothy. Forbs was restricted to rough chervil and patches of hogweed. The sward was unmanaged at the time of the survey, uniform between 70-90cm and likely cut for hay.
- 4.28 This habitat is of low botanical value which would normally consider it of less than local but due to its designation as a LWS, it is assigned **Local** value.

### Scrub

#### Dense Scrub – Grey Willow Scrub (East)

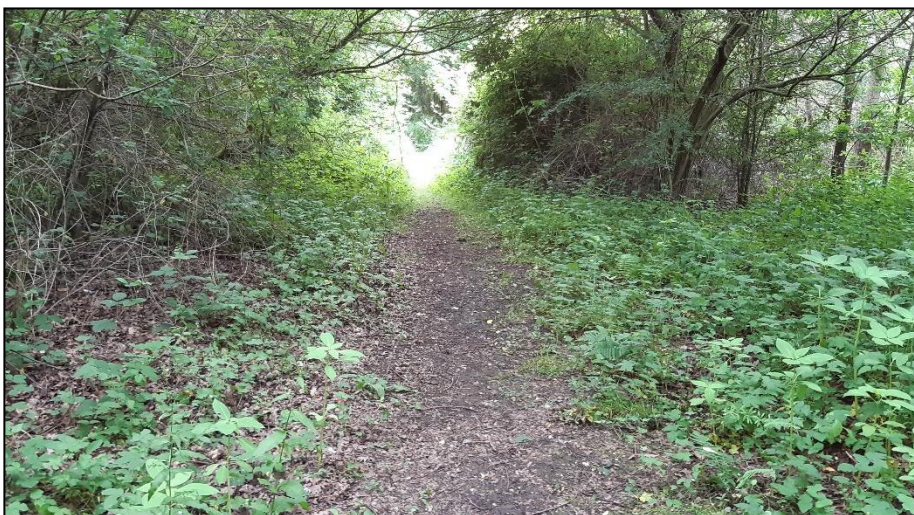
- 4.29 To the east of the Site, adjacent to the farm track off Green Street was an area of self-sown grey willow *Salix cinerea* scrub (Photograph 5). Even-aged grey willow formed the canopy with younger regeneration of hawthorn *Crataegus monogyna*, osier and ash *Fraxinus excelsior* noted at low frequencies. The ground flora was typical of recently established secondary growth, being largely grass dominated broadly consistent with the adjacent grassland community. Grasses were lower in abundance where the canopy was more established, and a single patch of pendulous sedge *Carex pendula* was recorded at TN5 (**Figure 2**).
- 4.30 This is assessed as being **less than Local** value.



**Photograph 5: Grey willow scrub looking south**

Dense Scrub – Grey Willow Scrub Brandshill Marsh LWS

- 4.31 Self-seeded grey willow scrub had encroached around the margins of the wetland habitats of Brandshill Marsh LWS, forming a closed canopy area of continuous scrub. Grey willow was abundant with goat willow *Salix caprea*, pedunculate oak *Quercus robur* and silver birch *Betula pendula*, ash, and Turkey oak *Quercus cerris* noted as rarities. The ground flora featured several species found within the neighbouring marshy-grassland, such as meadowsweet and reed canary-grass *Phalaris arundinacea*, but these were at much lower frequencies and the ground flora was characterised by an abundance of self-set bramble scrub.
- 4.32 A well walked track (Photograph 6) runs along the northwestern edge of the scrub with a notable increase in herbs present within more open areas of the canopy. A large stand of Himalayan balsam *Impatiens glandulifera* measuring approximately 5 x 5 m was noted at TN6 and a stand of 15 common spotted orchids *Dactylorhiza fuchsia* were recorded at TN7 at the edge of the marshy grassland.
- 4.33 Due to its inclusion in Brandshill Marsh LWS, this is of **County** value.



**Photograph 6: Informal track through area of willow scrub**



Scattered Scrub – Eastern boundary

- 4.34 On the eastern boundary to the north of Brandshill Marsh LWS, is an area of scattered scrub that was once managed as a hedgerow. The Arboricultural survey has mapped this area as a hedgerow (H7) but it is no longer managed as such and consequently is now scattered scrub habitat. Bramble dominated with some willow, elder and hawthorn on the banks of a dry drainage ditch.
- 4.35 This habitat is of **less than Local** value.

**Semi-Natural Broadleaved Woodland**Wet Woodland – Barton in Fabis Pond and Drain LWS

- 4.36 A narrow band of wet woodland, which had broad affinities with NVC community W6 - *Alnus glutinosa* - *Urtica dioica* woodland, was recorded along a drainage ditch, with a pond at the western extent (Photograph 7). At the time of survey, the pond held a shallow amount of water whilst the ditch was largely dry along its length. The canopy was dominated by large over-mature crack willow *Salix x fragilis*, with occasional goat willow and rare occurrence of alder *Alnus glutinosa*. A scattered understorey of grey willow and crack willow was present, together with bramble, which formed locally frequent patches on the drier banks. The ground flora was characterised by Himalayan balsam, which was occasional to locally abundant throughout, with common nettle locally frequent on the softer margins of the drain, bittersweet and marsh woundwort *Stachys palustris* were rare associates.
- 4.37 Due to its inclusion within a LWS, this habitat is assigned **County** value.
- 4.38 A pheasant rearing pen was located on the northern side of the ditch where the riparian woodland was at its widest point (TN8, **Figure 2**).

**Photograph 7: Wet Woodland – Barton in Fabis Pond and Drain LWS**Wet Woodland – Edge of Barton Flash LWS and River Trent margins

- 4.39 A similar woodland community to that described above was recorded bordering two depressions within Barton Flash LWS to the north of the Site, extending along in a narrow band along the boundary of the River Trent (Photograph 8). As above the canopy was dominated by crack willow, with the additional occurrence of osier and goat willow. Common nettle was dominant within the

ground flora with locally occasional patches of Himalayan balsam, with the tall grasses which included false oatgrass and cock's-foot increasing in abundance at the margins of the habitat.

- 4.40 As with the other habitats within the badly degraded Barton Flash LWS, this is assigned **Local** value.



**Photos 8: Wet Woodland – Edge of Barton Flash LWS and River Trent margins**

Other woodland – Small copses to south

- 4.41 Several small copses featuring frequent crack willow were recorded to the south of the Site, within an area of unmanaged neutral grassland. Goat willow, hawthorn and osier were all noted as rarities within the scattered canopy. The ground flora was dominated by common nettle and great willowherb *Epilobium hirsutum* alongside tall grasses which comprised common couch and false oatgrass.
- 4.42 A small block adjacent to the River Trent towards the south of the Site (Photograph 9) comprised a mix of occasional ash *Fraxinus excelsior* with rare occurrence of aspen *Populus tremula* and a small number of non-native species which included copper beech *Fagus sylvatica f. purpurea*, Lombardy poplar *Populus nigra 'Pyramidalis'* and horse-chestnut *Aesculus hippocastanum*. The understorey was sparse with rare occurrence of hawthorn and elder *Sambucus nigra* with locally frequent cleavers *Galium aparine* and frequent common nettle and hogweed within the ground flora. A small wooden shed with boarded windows and a flat felt roof was present in the western extent of the copse.
- 4.43 The small sizes of these habitats and abundance of designated woodland in the local area means these small copses in isolation are of **less than Local** value.



**Photograph 9: Woodland copse adjacent to the River Trent**

### Hedgerows

- 4.44 A total of 13 hedgerows were recorded within and bordering the Site as summarised in **Table 7**. The hedgerows generally displayed low species diversity, in terms of woody species present, with all but hedgerow H11 having on average less than five species per 30m sample section. The hedgerow network also lacked significant mature tree standards. Under the HEGS assessment ten hedgerows (H6, H7, H9, H10 & H11) have moderately high to high conservation value (Grade -2 or above) and therefore a priority for nature conservation. These four hedgerows were unmanaged with tall and wide structures with the hedgerows elsewhere on Site managed through regular cutting.
- 4.45 Of the remaining hedgerows four had moderate conservation value (Grade 3) with two having low conservation value (Grade 4). No hedgerows qualified as 'Important Hedgerows' under the Hedgerow Regulations 1997.
- 4.46 Hawthorn was the prominent component of all the hedges but with an elm species being locally frequent in six of the hedgerows. Several woody species were also recorded with elder, dog-rose *Rosa canina* and ash being occasional associates. The hedge bottom flora generally consisted of unmanaged grassland characterised by common couch and cock's-foot. Ruderal species was scattered throughout with species such as common nettle, cleavers and creeping thistle becoming frequent in places. The invasive species Himalayan Balsam was noted as being frequent within hedgerows H5, H6 and H7.
- 4.47 Hedgerows are a Priority Habitat and there is not a wide network in the Trent Valley. Therefore, the hedgerows on the Site are of **Local** value.

**Table 7: Hedgerow Survey Results**

Ref.	Canopy Sp.	Height	Width	Length (m)	Sp. per Av. 30m	Notes	HEGS Grade	Import HR
H1	<i>Cm, Rc, Sn, U sp.</i>	2-4	2-3	631	2.33	30-10% gaps, 1 end connection, hawthorn dominated	-3	No



Ref.	Canopy Sp.	Height	Width	Length (m)	Sp. per Av. 30m	Notes	HEGS Grade	Import HR
H2	<i>Cm, Rc, U sp.</i>	1-2	1-2	112	2	>30% gaps, 2 end connections, hawthorn dominated	-3	No
H3	<i>Cm, Fe, Rc, U sp.</i>	2-4	2-3	328	2.64	30-10% gaps, <1 mature standard/100m, 2 end connections	3	No
H4	<i>Cm, Cs, Rf</i>	0-1	0-1	67	3	>30% gaps, 1 end connection, defunct hedgerow	-4	No
H5	<i>Cm, U sp.</i>	2-4	0-1	23	2	10-0% gaps, 2 end connections, hawthorn dominated	3	No
H6	<i>Cm, Fe, Sf, Sn, U sp.</i>	2-4	>3	195	4	10-0% gaps, >5 mature standard s/100m, 4 end connections, wet ditch	2+	No
H7	<i>Cm, Fe, Ms, Rc, Sf, Sn, U sp.</i>	>4	>3	155	3.5	30-10% gaps, 3≤5 mature t standards/100m, wet ditch	2	No
H8	<i>Cm, Ps, Rc, U sp.</i>	1-2	0-1	160	2.3	30-10% gaps, no end connections, hawthorn dominated	-4	No
H9	<i>Ap, Cm, Qr, Rc, Sn, U sp.</i>	2-4	2-3	265	3.5	10-0% gaps, >5 mature standard s/100m, 3 end connections, unimproved grass verge	2+	No
H10	<i>Cm, Rc, Sn, U sp.</i>	2-4	2-3	58	3	No gaps, >5 mature standards/100m, 3 end connections, unimproved grass verge	2+	No
H11	<i>Ac, Ap, Ca, Ia, Ps Rc, Lv</i>	1-2	1-2	249	5.5	10-0% gaps, ≤1 mature standard/100m, 1 end connection	-2	No
H12	<i>Cm, Rf, Ap</i>	3-4	1-2	47	2	30-10% gaps, ≤1 semi mature standard/100m, 2 end connections, unimproved grass verge	-3	No
H13	<i>Cm, rf, Sn, Ap, Rc</i>	3-4	2-3	93	2	10-0% gaps, ≤1 semi mature standard/100m, 2 end connections, unimproved grass verge	3	No

**Key to hedgerow species:** *Ap Acer pseudoplatanus* - sycamore, *Ac Acer campestre* – field maple, *Ca Corylus avellana* – hazel, *Cm Crataegus monogyna* - hawthorn, *Cs Cornus sanguinea* – dogwood, *Fe Fraxinus excelsior* – ash, *Ia Ilex aquifolium* – holly, *Lv Ligustrum vulgare* – wild privet, *Ms Malus sylvestris* – crab apple, *Ps Prunus spinosa* – blackthorn, *Qr Quercus robur* – English rose, *Rc Rosa canina* – dog-rose, *Sf Salix x fragilis* – crack willow, *Sn Sambucus nigra* – elder, *U sp. Ulmus sp.* – an elm

### Inundation vegetation

- 4.48 During the previous survey in 2020 a damp hollow featuring an inundation community with broad similarities to NVC community OV30: *Bidens tripartita* - *Polygonum amphibium*, was recorded to the north of the Site, within Barton Flash LWS.

- 4.49 Although dry at the time of surveys, the Barton Flash LWS citation suggests this area is subject to frequent winter flooding and the vegetation recorded was consistent with seasonal fluctuations in water levels. However, at the time of the survey the vegetation had been cut and was also heavily grazed and therefore any regrowth limited or browsed (Photograph 10). Signs of previous species and remnant stands of reed canary grass were noted alongside an abundance of Himalayan balsam seedlings.
- 4.50 The decline in this LWS habitat and presence of invasive species means this habitat, along with the others within Barton Flash LWS, are assigned **Local** value.



**Photograph 10: Previous area of inundation vegetation**

### **Standing Water**

#### Standing water (Barton in Fabis Pond and Drain LWS)

- 4.51 An area of standing water was recorded on the north-western boundary of the Site, with an associated ditch running south from this waterbody along the margin of Brandshill Marsh LWS. At the time of survey, the pond held a shallow amount of water whilst the ditch was dry. Reed sweet-grass *Glyceria maxima* was abundant at the pond margins, with lesser reed-mace *Typha angustifolia* being occasional. Reed sweet-grass continued to grow in abundance within the channel of the ditch to the south, with fool's-water-cress *Helosciadium nodiflorum* recorded as a rarity. The banks of the ditch featured frequent reed canary-grass *Phalaris arundinacea* and occasional tufted hairgrass. The invasive species Himalayan balsam was occasional at the eastern extent of the ditch and around the pond and at the western extent along the northern bank.

#### Standing water (Borrow Pits, Barton LWS)

- 4.52 The northern pond of Borrow Pits, Barton LWS, falls within the boundary of the Site to the south. The banks of the waterbody featured frequent grey willow, with scattered stands of English oak, alder *Alnus glutinosa*, and sycamore *Acer pseudoplatanus*. The margins featured occasional reed sweet-grass and reed-mace *Typha latifolia*, with marsh woundwort *Stachys palustris* and gypsywort noted as rarities. Aquatic vegetation, at the time of survey was limited to water plantain *Alisma plantago*, although it should be noted that historical aerial photography of the Site suggests the cover of floating aquatic vegetation fluctuates widely. This is consistent with the population dynamics of water fern *Azolla filiculoides*, which has been recorded previously within the pond.

Care will need to be taken not to accidentally introduce *Azolla* into any adjoining water bodies upon restoration.



**Photograph 11: Southern edge of pond P2**

#### Standing water (Brandshill Marsh LWS)

- 4.53 An area of standing water was recorded on the north-western boundary of the Site, with an associated ditch running south from this waterbody along the margin of Brandshill Marsh LWS. At the time of survey both the pond and ditch held a shallow amount of water, though the pond was notably drying out at the edges. Within the pond lesser reed-mace was frequent with reed sweet grass and yellow flag iris *Iris pseudacorus* being occasional. Marsh marigold *Caltha palustris* and amphibious bistort were recorded as rarities. Reed canary grass continued to grow in abundance within the channel of the ditch to the south, with rare occurrence of fool's-watercress. The banks of the ditch featured abundant reed canary-grass and occasional meadowsweet and rare occurrence of reedmace.
- 4.54 As all ponds are within LWSs, they are assigned **County** value despite the presence of invasive species.



**Photograph 12: Pond P3 looking north**



### Changes to Baseline

- 4.55 The Extended Phase 1 Habitat Survey identified several differences in the habitat classifications in comparison to the previous survey undertaken on the Site in 2014 & 2020. These are summarised below:
- Barton Flash LWS: The grassland habitats within the LWS were previously mapped as unimproved neutral grassland, which because of the updated survey have been re-classified as poor semi-improved and semi-improved neutral grassland. The citation for Barton Flash LWS states that habitats outside of the shallow depressions consisted of improved grassland at the time of survey. As such, it is considered that the grassland habitats were previously mis-categorised as unimproved neutral grassland. Nevertheless, most of this habitat is to be retained within the scheme.
  - Semi-improved neutral grassland: Two areas previously mapped as semi-improved neutral have been reclassified. The first is located to the south of Barton Flash LWS, which appears to have been subsequently re-seeded with perennial ryegrass. The second area located to the centre of the Site and is now under arable production.
  - Brandshill Marsh LWS: There has been a reduction in marshy grassland mapped in association with Brandshill Marsh LWS, with the previous survey indicating that this community extended outside the LWS boundary to the north-west of the ditch. Historical aerial imagery for the site suggests that habitats to the north-west of the LWS ditch have been managed as agricultural grassland from at least September 2013 and so the previous extent of the grassland is attributed to a mapping error.
  - Since the survey in 2020 three of the previously mapped improved grassland fields in the centre of the Site have been harvested and returned to arable crop production.

### Fauna

#### Great Crested Newt

- 4.56 No specific records for great crested newt were returned during the desk study.
- 4.57 The Site supports suitable terrestrial habitat for GCN, particularly in the wet ditches, scrub, woodland, ponds, neutral grassland, and fen vegetation.

#### eDNA

- 4.58 The eDNA results from all ponds were returned negative and can be found in **Appendix B**.
- 4.59 Great crested newt has been determined to be absent from the Site and are not considered further in this report.

#### Breeding Birds

- 4.60 Of the 70 species recorded as present during breeding bird surveys conducted on the Site (combined information from four years of available survey data), 12 were confirmed as breeding within the Site of which three are notable: greylag goose *Anser anser*, lapwing *Vanellus vanellus*, and whitethroat *Curruca communis*. The other nine confirmed breeding species are all low conservation concern i.e., BoCC Green-listed.

- 4.61 Twelve species were considered probable breeders which included a further nine notable species: teal *Anas crecca*, grey partridge *Perdix perdix*, barn owl *Tyto alba*, skylark *Alauda arvensis*, willow warbler *Phylloscopus trochilus*, wren *Troglodytes troglodytes*, song thrush *Turdus philomelos*, greenfinch *Chloris chloris*, and linnet *Linaria cannabina*. The other three probable breeding species were both BoCC Green-listed and therefore of low conservation concern.
- 4.62 The remaining 46 species recorded were considered possible breeders (21) or non-breeders (25) at the Site.

#### Significance of Breeding Assemblages

- 4.63 Arable parcels and field margins provided suitable foraging and breeding habitat for several farmland species including low numbers of grey partridge, stock dove *Columba oenas*, woodpigeon *Columba palumbus*, skylark, kestrel *Falco tinnunculus*, whitethroat, wren, dunnock *Prunella modularis*, linnet, and yellowhammer *Emberiza citrinella*. However, there is an abundance of similar suitable agricultural habitat, including both cropland and grazing pasture, in the local landscape.
- 4.64 The Site is of no more than **Local** importance for its breeding farmland bird assemblage.
- 4.65 Hedgerows, scrub, trees, and woodland areas on Site provided good breeding and/or foraging habitat for a variety of common and widespread generalist species. The assemblage recorded is typical of such habitat in the region and whilst the assemblage did include several notable species, all occurred in low numbers, and none are of conservation priority in Nottinghamshire as all are deemed Fairly Common to Abundant in the county. These included stock dove, woodpigeon, whitethroat, wren, starling *Sturnus vulgaris*, song thrush, dunnock, bullfinch *Pyrrhula pyrrhula*, and greenfinch. There are also several larger areas of similar scrub and woodland habitats in the surrounding landscape at Attenborough Nature reserve.
- 4.66 Therefore, the Site is considered of **Local** importance for the scrub and woodland assemblage.
- 4.67 The improved, poor semi-improved and marshy grassland and associated margins, along with the grassy banks along the River Trent, provided foraging opportunities for a variety of notable species including moderate numbers of greylag goose, woodpigeon and small numbers of mallard *Anas platyrhynchos*, grey partridge, stock dove, skylark, house martin *Delichon urbicum*, oystercatcher *Haematopus ostralegus*, starling, green sandpiper *Tringa ochropus*, song thrush and mistle thrush. Schedule 1 species, hobby *Falco subbuteo* was also recorded utilising these habitats for hunting. These habitats also provided nesting opportunities for reed bunting and lapwing, whilst the grassy riverbanks provided nesting opportunities for kingfisher *Alcedo atthis*, of which the latter two were confirmed to be breeding.
- 4.68 The Site is of **Local** importance for this grassland assemblage.
- 4.69 The area of standing water supported a small number of mallard and nesting opportunities for reed bunting within the associated margins. However, there is more optimal habitat in the surrounding area.
- 4.70 The Site is of **less than Local** importance for the open water assemblage.

#### **Wintering Birds**

- 4.71 A total of 65 species were recorded within the Site. Of these 65 species, 30 meet the criteria and are considered notable species.

- 4.72 The arable compartments and their associated margins were used by several notable species including grey partridge, stock dove, woodpigeon, lapwing, snipe *Gallinago gallinago*, skylark *Alauda arvensis*, starling, redwing *Turdus iliacus*, meadow pipit *Anthus pratensis* and linnet. The field margins also provided hunting opportunities for the notable kestrel.
- 4.73 The hedgerows, scrub, and areas of woodland were of value to wintering birds. These habitats hosted several common and widespread generalist foragers including corvids, tits, thrushes, and finches as well as several notable species. The notable species included resting flocks of stock dove, woodpigeon, redwing, and fieldfare *Turdus pilaris* that fed in the arable and grassland compartments, as well as woodcock *Scolopax rusticola*, wren, song thrush, mistle thrush *Turdus viscivorus*, and dunnoek *Prunella modularis*. These habitats also provide shelter and roosting opportunities for many of the other species recorded.
- 4.74 The parcels of improved and poor semi-improved grassland supported a variety of common corvid species, in addition to notable species such as greylag goose, teal *Anas crecca*, lapwing, grey partridge, stock dove, wood pigeon, black-headed gull *Chroicocephalus ridibundus*, meadow pipit, linnet and yellowhammer. The area of marshy grassland supported notable species such as song thrush and reed bunting *Emberiza schoeniclus*.
- 4.75 The neutral grassland was of high value to wintering birds particularly the notable oystercatcher and wintering thrushes, redwing, fieldfare, and linnet. These habitats supported other notable species, including sparrowhawk *Accipiter nisus* and Schedule 1 species, barn owl *Tyto alba*, which were both recorded utilising these areas for hunting.
- 4.76 Notable species greylag goose and mallard were recorded using the area of standing water in the south of the Site in 2022, however, these species were not recorded using this habitat in the 2022-23 winter bird surveys. The associated margins hosted several common species all low conservation concern, in addition to the notable reed bunting.
- 4.77 A further five notable species were recorded overflying the Site only, comprising: herring gull *Larus argentatus*, cormorant *Phalacrocorax carbo*, rook *Corvus frugilegus* and two Schedule 1 species, red kite *Milvus milvus*, and brambling *Fringilla montifringilla* – the latter is an uncommon winter visitor in Nottinghamshire.

#### Wintering Assemblages

- 4.78 Arable parcels and their associated margins supported a range of wintering bird species including grey partridge and skylark – a specialist of such habitats – plus moderate flocks of stock dove, woodpigeon, black-headed gull, redwing, fieldfare and a small number of lapwing and snipe. However, there is similar arable habitat to the north, east and south of the Site.
- 4.79 The number of notable species within the wintering bird assemblage associated with the arable parcels is of **Local** conservation importance.
- 4.80 The hedgerows, scrub, trees, and area of woodland within the Site provided good shelter and foraging opportunities for a variety of common and widespread generalist species. The assemblage recorded in association with these habitats is typical of similar habitats in the region and, whilst the assemblage did include several notable species, most occurred in low to moderate numbers. These included stock dove, woodpigeon, wren, song thrush, mistle thrush, redwing, fieldfare, dunnoek, and yellowhammer.

- 4.81 The number of notable species within the wintering bird assemblage associated with the hedgerows, scrub, and trees is of **Local** conservation importance.
- 4.82 The improved, poor semi-improved grassland and marshy grassland habitats supported several notable species through the provision of foraging resources. The assemblage included several notable species, such as greylag goose, oystercatcher, and meadow pipit, though in small numbers.
- 4.83 The wintering assemblage associated with these grassland habitats is therefore considered to be of **Local** conservation importance.
- 4.84 The neutral grassland was of value to wintering birds and included species such as wood pigeon, flocks of wintering thrushes including redwing and fieldfare, and linnet. These habitats provided hunting opportunities for sparrowhawk *Accipiter nisus* and schedule 1 species, barn owl *Tyto alba*.
- 4.85 The wintering assemblage associated with these habitats is of **Local** conservation importance.
- 4.86 The area of standing water supported greylag goose, shoveler, gadwall *Mareca strepera*, and mallard during winter, though these species were recorded in very low numbers, with shoveler and gadwall only being recorded on one survey occasion.
- 4.87 The wintering assemblage associated with the aquatic habitats is of **less than Local** level conservation importance.

#### **Barn Owl**

- 4.88 A habitat suitability assessment was completed on the Site prior to surveys which identified two areas that were of good potential, three areas of moderate potential and three areas of low potential habitat. The remainder of the Site was considered unsuitable foraging habitat for barn owl.
- 4.89 The areas with good potential included two adjacent un-grazed semi-improved grassland fields within the north-eastern portion of the Site, the moderate potential areas were grassland fields which were grazed periodically, and the low potential areas contained well managed grassland, some of which contained encroaching scrub.
- 4.90 The unsuitable areas consisted of either woodland/dense scrub or agricultural land which were periodically used for crops. These fields generally had little to no margins which would provide barn owl foraging habitat.
- 4.91 As well as the breeding and wintering bird surveys, targeted barn owl surveys were carried out on the 12th of July 2023, during which barn owls were recorded on two of the three transects. Incidental recordings of barn owl were also made during a bat tree inspection on 26<sup>th</sup> May 2023, when an owl was flushed from a tree in the northeast of the site.
- 4.92 During targeted surveys, two barn owls were recorded foraging within the northern extent of the Site in a field adjacent to the River Trent. These owls were considered likely to represent a breeding pair and were observed in association with an ash *Fraxinus excelsior* tree which was a confirmed nest site. Breeding was confirmed due to the observation of the pair close to the tree, followed by agitated calls. This field in which foraging was observed was of low quality for barn owl during the habitat suitability assessment.
- 4.93 A single barn owl was also observed during the southern transect. This owl was considered likely to be a different individual to the abovementioned pair as it was not observed moving in that

direction at any point during the survey. This owl was seen foraging off-site and was later heard in some trees within the south of the Site. The trees within the vicinity of where the owl was heard where not noted during the bat tree assessment to contain significant cavities and have not therefore been considered to provide suitable barn owl nesting habitat.

- 4.94 The single barn owl nest locations give the Site a **Local** importance for nesting barn owl.
- 4.95 The areas of high and moderate suitability habitat for barn owl foraging in proximity to known nest sites gives the Site a **Local** level value for foraging barn owl.

### **Bird Strike Risk Assessment**

- 4.96 An outline bird strike risk assessment has been prepared in response to the site's proximity to East Midlands Airport. Details of which are given in **Appendix E**.
- 4.97 This report provides recommendations to safeguard East Midlands Airport (EMA) in respect of the potential increase in the risk of bird-strike resulting from the proposals to restore the Site to a mix of nature conservation and agriculture with public access. This document provides an outline of the principles in which to manage the attractiveness of these additional water bodies to bird species that might create a potential hazard to aviation such as Canada geese, and in turn, ensure any potential bird strike risk is minimised.

### **Bats**

- 4.98 The desk study returned records of eleven bat species distributed across the search area (**Figure 1c**). Concentrations of records were, unsurprisingly from Attenborough Nature Reserve. Records were also returned from within the Site boundary, likely due to survey data completed for the previous application.

### Foraging and Commuting

- 4.99 The Site provides good quality foraging habitat for bats, particularly:
- Along the perimeter hedgerows;
  - Along woodland edges (Brandshill Wood LWS, Barton Flash LWS and Mill Hill Spinney);
  - Along the River Trent;
  - Along the onsite ditches/standing water (Barton-in-Fabis Pond and Drain LWS and Barrow Pits, Barton LWS);
  - On the edge of the fen areas (Brandshill Marsh LWS);
  - Around the species rich grassland (Brandshill Grassland LWS); and
  - Around the scrub areas.
- 4.100 The high-quality foraging habitat and the assemblage detected of at least eight species means that the assemblage of bats using the Site for foraging and commuting is of **Local** level importance.





**Otter**

- 4.117 Many records of otter were returned from the River Trent and Attenborough Nature Reserve.
- 4.118 The otter survey of the River Trent found that much of the River Bank support suitable habitat for otter resting and sheltering. The dense willow trees and overhanging roots provided many sheltering areas. Neither survey recorded any evidence of otter use in these areas. No footprints, spraints or feeding remains were recorded.
- 4.119 The adjacent banks of the River Trent towards the south of the Site were much less suitable. These areas comprised exposed vertical cliffs with no tree cover and thus offered no places of rest or shelter for otter.
- 4.120 The banks of the River Trent have potential to support otter as part of a much wider territory and it is assumed that otter use some of the shelter or resting places provided by these banks on an occasional basis.
- 4.121 Due to the abundance of habitat provided by the rest of the River Trent and by Attenborough Nature Reserve, the banks adjacent to the Site are only likely to be of **Local level** importance to otter.

**Reptiles**

- 4.122 No reptile records were returned during the desk study.
- 4.123 The Site does support high quality habitat for grass snake *Natrix natrix* especially around the ponds and wet ditches.
- 4.124 No reptiles were recorded during the reptile surveys. It is still considered possible that very small numbers of grass snake are present within the Site due to the habitat suitability.
- 4.125 This potential small population is considered to be of **less than Local** value.

**Toads**

- 4.126 Records of toads were returned during the desk study from both within the Site and on the opposite side of the River Trent in Attenborough Nature Reserve.
- 4.127 The Site supports suitable breeding habitat in the four water bodies and wet ditches on the Site and suitable terrestrial habitat surrounding these water bodies in the scrub, fen, woodland, and neutral grassland habitats. The woodland areas are likely to support hibernating individuals.
- 4.128 A maximum count of 22 toads was recorded during the toad surveys. These were mostly located around ponds P1 and the public right of way between the Site and Brandshill Wood adjacent to the Site. It is likely that toad hibernate within Brandshill Wood and were migrating to P1 to breed.
- 4.129 This population is of **Local** value.

**Invertebrates**

- 4.130 The invertebrate surveys (**Appendix H**) identified a wetland assemblage of **Regional** value in Barton Flash LWS and Borrow Pits LWS (P1).
- 4.131 Necklace ground beetle *Carabus monilis* appears to have undergone a decline on the Site and is thus now considered to be of **less than Local** value on the Site with only one individual recorded.

## Important Ecological Features

- 4.132 Based on the results of the detailed baseline investigations, several Important Ecological Features (IEFs) have been identified. Those features of Local level value or greater that will require full consideration by the Environmental Impact Assessment (EIA) are summarised in **Table 8**.

**Table 8: Important Ecological Features of Local Value or Above**

IEF	Summary	Value
<b>Statutory Sites</b>		
Attenborough Gravel Pit SSSI	A nationally important site for its lowland eutrophic open waters with emergent vegetation, wet floodplain woodland, unimproved floodplain grassland, a rich assemblage of breeding birds associated with lowland open waters and their margins, and wintering shoveler <i>Anas clypeata</i> and bittern <i>Botaurus stellaris</i> .	National
Holme Pit SSSI	The site contains some of the best remaining areas of marsh, reed swamp and open water in Nottinghamshire and is of regional importance.	Regional
Glapton Wood LNR	A mixed urban woodland which covers almost 4 hectares. The site provides valuable habitat for wildlife and offers local residents an opportunity to experience nature.	County
Trent Meadows LNR	An area of rough stubble and fields between the railway line and gravel workings.	County
Clifton Grove, Clifton Wood and Holme Pit Pond LNR	Together they make up part of the River Trent Wildlife Corridor.	County
<b>Non-Statutory Sites</b>		
Barton in Fabis Pond and drain LWS	County designation within the Site.	County
Borrow Pits LWS	County designation within the Site.	County
Brandshill Marsh	County designation within the Site.	County
Barton Flash	County designation within the Site.	County
Brandshill Grassland	County designation within the Site.	County
River Trent near Barton-in-Fabis LWS	County designation within the Site.	County
Attenboroudegh Nature Reserve LWS	County designation adjacent to the Site. Also, a national designation (SSSI).	County
Brandshill Wood ASNW and LWS	County designation adjacent to the Site.	County
Clifton Wood ASNW and LWS	County designation adjacent to the Site.	County
Burrows Farm Grassland LWS	County designation adjacent to the Site.	County
Barton Ferry Wetland LWS	County designation adjacent to the Site.	County
Clifton Fox Covert LWS	County designation within 1km of the Site.	County
Barton in Fabis Fishing Pools LWS	County designation within 1km of the Site.	County
Trent Carr LWS	County designation within 1km of the Site.	County
Holme Pit LWS	County designation within 1km of the Site.	County



IEF	Summary	Value
Toads	Maximum count of 22 individuals between Brandshill Wood and Pond P1.	Local
Roosting bats	Six trees with roosting potential identified. Single noctule recorded in one tree on one occasion	Less than Local
Harvest Mouse	No nests recorded but the abundance of suitable habitat and old records in the area suggest very low numbers might be present.	Less than Local
Reptiles	No reptiles recorded but the abundance of suitable habitat suggest very low numbers might be present.	Less than local
██████████	██████████	██████████ ██████████
Necklace Ground Beetle	Endangered species. Very low numbers recorded on Site in 2023 and appear to have declined.	Less than Local
Wintering birds – standing water assemblages	Assemblage of wintering birds of Less than Local value	Less than Local
Breeding birds – standing water assemblages	Assemblage of wintering birds of Less than Local value	Less than Local

### Biodiversity Net Gain and Habitat Enhancements

- 4.133 A full BNG calculation is provided within **Appendix I**. The headline results of the BNG assessment are provided within Appendix B of this separate BNG Assessment Report, whilst the full metric has been submitted separately.
- 4.134 The overall baseline value of the Site is 374.57 habitat units and 15.36 hedgerow units.
- 4.135 With the habitat retention, enhancement and creation following the final restoration, the proposed scheme would provide 504.95 habitat units and 19.03 hedgerow units. That equates to a net gain in habitat units of 130.38 (34.81%) and a net gain in hedgerow units of 3.67 (23.86%).
- 4.136 The BNG assessment undertaken clearly shows that, subject to the implementation of a detailed Biodiversity Management Plan, the proposed scheme will deliver a significant net gain in biodiversity, beyond that required under the NPPF and local policy.



## 5.0 SUMMARY OF IMPACTS AND MITIGATION

- 5.1 This section provides a summary of the potential impacts on each of the Important Ecological Features (IEFs) to be brought forward for impact assessment and the mitigation measures to be employed to mitigate for these impacts. Full details will be provided in the Ecology chapter of the Environmental Statement.
- 5.2 All measures to avoid impacts upon IEFs during operation will be detailed within the Mitigation Proposals.
- 5.3 Development of the site includes two main stages, namely the operational phase, comprising all site preparation works and mineral extraction lifespan, and the restoration phase comprising the long-term restoration of the Site.
- 5.4 A likely timescale would be:
- 1.5 years for site establishment.
  - 9 years for extraction.
  - 1 year for sale of final stocks.
  - 1 year for final reinstatement.
- 5.5 This gives an operational lifetime of 12.5 years within which the Plant Site would be established and then operated for most of this timescale. The Extraction Area would be occupied on a rolling basis for around 10 years with land going through the sequence of being farmed, then being stripped of soils and aggregates, with restoration following shortly thereafter.
- 5.6 Potential impacts from the operational phase include:
- Direct Land take;
  - Enhancement of retained existing semi natural habitats and non-statutory sites;
  - Air quality Impacts;
  - Hydrological Impacts; and
  - Noise, lighting, and other Disturbance.
- 5.7 Additionally, the IEFs impacted during the operational phases will differ between the operational phases (phases 1 through to 4). As this section is divided into IEFs, the phases relevant to the impact on individual IEF's will also be made clear.

### **General: Air Quality & Dust**

- 5.8 Several characteristics of dust are important in considering its impacts. Dust can have both a physical and a chemical impact. The most noticeable air quality impact likely to arise during minerals extraction activities is dust accumulation resulting from deposition, which can lead to the soiling of surfaces which can affect vegetation and wildlife sites in proximity to the Site. The absolute level of deposition is important. This is affected by dust emission rates, meteorology, and conditions on the leaf surface. However, the chemical effect of dust, either on soil or directly on the plant surface, may be more important than any physical effects.
- 5.9 Emissions of dust to air from minerals sites can occur during the preparation of the land, extraction, processing, handling, and transportation of extracted minerals. Emissions can vary substantially

from day to day, depending on the level of activity, the specific operations being undertaken, and the weather conditions. The scale of these impacts depends on the dust suppression and other mitigation measures applied.

- 5.10 Details of potential dust sources associated with the Proposed Development and the resulting potential for releasing dust is outlined in the Air Quality Assessment (**Chapter 6 of the ES**). This includes a description of the control and mitigation measures incorporated into the scheme (including design features, management controls (including Dust Management Plan) along with a prediction of the likely PM10 and dust deposition impacts and resulting effects at relevant sensitive receptors taking into account the likely magnitude of dust emissions (after control by measures incorporated into the scheme) along with the likely meteorological characteristics at the site and the dispersion and dilution afforded by the pathway to the receptors and the relative sensitivity of the receptors to disamenity, health and/or ecology effects; any likely cumulative interactions.
- 5.11 The air quality assessment has concluded that the overall residual air quality effect is not significant on all IEFs identified including Statutory Sites. Proposals, where appropriate, for proportionate dust monitoring and reporting to check the ongoing effectiveness of dust controls and mitigation, will ensure ongoing safeguards.

### **General: Noise**

- 5.12 Best practice techniques have been considered to minimise noise levels to the lowest practicable. The Noise Assessment provides baseline noise data for the nearest sensitive receptors including the IEFs in **Table 8** and examines existing guidance to establish appropriate and reasonable design limits for noise.
- 5.13 The assessment provides predicted noise levels at the nearest receptors, which include the following considerations: Initial soil stripping and construction of screening mounds, site operational noise during overburden removal and phased extraction of sand and gravel, soil replacement and restoration. This assessment provides predicted noise levels from the site and compares these with the proposed noise limits contained within the National Planning Policy Framework and Planning Practice Guidance for residential receptors, and guidance from Nottinghamshire County Council Conservation Team for 'ecological receptors' (IEFs).
- 5.14 Predicted noise levels achieve the suggested noise limits set by relevant guidance and standards and would not exceed the maximum noise limit or the aim of background noise for the site lifetime. This would be secured by condition.
- 5.15 The most sensitive receptor with regards to noise impacts comprises Attenborough Nature Reserve.
- 5.16 Whilst some of the species recorded are known to be sensitive to increases in noise disturbance above levels to which they are habituated namely, lapwing, oystercatcher, kingfisher, and hobby, the standoffs to be implemented alongside the River Trent are considered sufficient to avoid significant increases in volume in the riparian zone that would impact on kingfisher. Furthermore, breeding waders will frequently nest on restored wetlands within active quarry sites despite apparently significant levels of noise disturbance and as breeding pairs of both lapwing and oystercatcher are likely to be displaced from their current locations to allow for quarrying operations it is expected that these pairs will relocate to suitable habitat within the restored area in which they can habituate to novel, higher levels of noise disturbance. Hobby was not recorded as a breeding

species, and it is not considered likely that an increase in noise disturbance would detrimentally affect the foraging success of this species at the Site. Therefore, no bird species have been recorded that would be regarded as particularly at risk from additional noise generated during construction or operational phases that would require additional mitigation measures other than maintaining the minimum standoffs identified to retained and adjacent habitats and sites.

### **General: Lighting**

- 5.17 An increase in lighting has been shown to have an adverse effect on wildlife, particularly those species that have evolved to be active during the hours of darkness. Development for which lighting is required during operational hours needs to carefully consider what lighting is necessary and reduce any unnecessary lighting, both temporally and spatially.
- 5.18 Artificial light can disrupt natural patterns of light and dark, disturbing invertebrate feeding, breeding, and movement in invertebrates. Lighting can affect bird behaviour in different ways. Some UK bird species are known to be particularly sensitive to artificial lighting such as long-eared owls, black-tailed godwit, and stone curlew, if present locally. Several British mammals are nocturnal and have lifestyles adapted to be active in the dark to avoid predators. Artificial illumination of the areas in which these mammals are active can lead to changes in foraging behaviour and attractiveness of foraging sites.
- 5.19 The effect of artificial lighting can be most clearly observed in bats. Artificial lighting can affect roost usage. Light falling on a bat roost exit point can delay bats from emerging which can affect feeding. In addition, to the potential to disturb bats at the roost, artificial lighting can also affect the feeding behaviour of bats and their use of commuting routes. Lighting can be particularly impactful if it illuminates important foraging habitats such as river corridors, woodland edges and hedgerows used by bats.
- 5.20 The site itself requires fixed lighting within the plant site and along the conveyor route. No lighting is proposed within the excavation area.
- 5.21 The areas considered within the baseline assessment include the site and immediate surrounds. The baseline assessment has identified sensitive locations. The lighting assessment (**Chapter 7 of the ES**) has followed the ILP Guidance requiring site day and night-time assessments to accurately measure existing light spill and sky glow.
- 5.22 Overall, the results of the baseline assessment indicate low levels of light surrounding the proposed working area.
- 5.23 Based on the results of the assessment, the impact of the proposed site is insignificant on the surrounding area and potentially sensitive IEFs as very minimal light spill should occur because of the scheme and as such is acceptable in terms of lighting the site.
- 5.24 A lighting scheme has been developed for the proposed development. The proposed lighting scheme has been designed so as not to intrude or impact on any IEFs and wildlife using the site and immediate surrounds. Further consideration is given below under effects of lighting on specific fauna/ faunal groups where relevant.

### General: Hydrogeology and Hydrology

- 5.25 Mineral extraction of any scale has the potential to change the surface water regime in and around a site during the operational phase and following restoration. Effective management of surface water in and around a site to prevent adverse effects on ground water flows, water quality or an increase in flood risk is a key element of the design process. Imaginative restoration design can be planned around wetland habitats and surface water features with the potential for significant positive effects on biodiversity.
- 5.26 An assessment has been completed to understand the nature of and interactions between the ground water and surface water systems operating in an around the site along with the potential for changes in water quality. Potential primary impacts of mineral extraction operations on groundwater and surface water flows, water quality and flood risk have been identified along with appropriate mitigation and have been relied on to assess the effect on IEFs, including habitats and fauna.
- 5.27 The Hydrological Impact Assessment and Flood Risk Assessment; (**Chapter 2 of the ES**) details the likely effects of proposed mineral extraction operations and the mitigation to be applied to manage ground water, water quality and flood risk along with minimising detrimental effect on ecological receptors.

### Restoration

- 5.28 Potential impacts from the restoration phase include:
- Enhancement of existing habitats and non-statutory sites;
  - Removal of agricultural land by replacing with more extensive areas of habitat creation and implications arising from the reduction in nutrients including reduction in stocking, fertilizer inputs and pesticides entering watercourses
  - Creation of new ecologically valuable habitats to expand the network of existing valuable habitats;
  - Loss of terrestrial foraging habitats (where lakes are created); and
  - Creation of new and enhanced opportunities for local wildlife and protected and notable species.

### Statutory Designations

#### Operational Impacts

##### Direct Land Take

- 5.29 There will be no direct land take of any of the statutory designations because of the Proposed Development.

##### Air Quality, Hydrogeological and Hydrological, Lighting, and Noise Impacts

- 5.30 The Air quality, Hydrogeological and Hydrological Impact Assessment, Flood Risk Assessment, lighting and noise; (to be found in **Chapters 6, 2, 7 and 5 of the ES**, respectively) consider likely impacts and detail the mitigation that will be implemented to ensure that potential impacts resulting

from air quality, lighting, noise and hydrogeology and hydrology are not significant on any of the statutory designations listed in **Table 8**. Extracts of the assessments are provided below.

#### Air Quality and Dust

- 5.31 The air quality assessment has concluded that the overall residual air quality effect is **not significant** on all IEFs identified including Statutory Sites.
- 5.32 Proposals, where appropriate, for proportionate dust monitoring and reporting to check the ongoing effectiveness of dust controls and mitigation, compliance with agreed limits will ensure ongoing safeguards.

#### Noise

- 5.33 The potential effects of noise on statutory sites would be in relation to specific faunal species and species groups for which each site is valued for or which utilise the sites habitats. Effects of noise regarding fauna are considered by species or group of species after habitats (below in this section).
- 5.34 The noise surveys completed in July and August 2023 for IEFs has determined average baseline sound level ranges between 37 (36 to 38) dB  $L_{A90, T}$  and 45 (43 to 47)  $L_{Aeq, T}$  at Attenborough Gravel Pits (Nature Reserve) SSSI. The site noise levels affecting IEFs are considered in Chapter 10 of the noise assessment with SoundPLAN noise contour plots presented in noise appendix O.
- 5.35 A review of the site noise levels indicates that the ecological receptors will not be subject to levels above 55 dB  $L_{Aeq, 1-hour free field}$ . In addition, the highest calculated site noise levels at the ecological receptors are those in the area just to the north of the plant site where calculated site noise levels are very close or reaching 55 dB  $L_{Aeq, 1-hour free field}$  in the extreme south-east corner of that area close to Mill Hill Spinney. The Spinney is not recognised under any designation and predicted operational site sound levels do not exceed the average baseline noise levels measured for this location).
- 5.36 For the far west of the site and within the part of the Attenborough Gravel Pits SSSI closest to the site boundary, predicted noise levels do not exceed 528  $L_{Aeq 1-hour free field}$ . Predicted noise levels at this location are not expected to impact the SSSI as the suggested limit of 55 dB  $L_{Aeq, 1h (freefield)}$  is not exceeded.

#### Lighting

- 5.37 The site requires fixed lighting within the plant site and along the conveyor route, no lighting is proposed within the excavation area. The results of the baseline assessment (**ES Chapter 7**) also indicate low levels of light surrounding the proposed working area. No statutory site would experience intrusion or light spill, furthermore a lighting scheme developed for the proposed development has been designed so as not to intrude or impact on any IEFs.
- 5.38 The impact to statutory sites of the proposed site with regards to lighting is therefore **insignificant** on the surrounding area and potentially sensitive IEFs as very minimal light spill would occur because of the scheme and as such is acceptable in terms of lighting the site.



Hydrogeological and HydrologicalGroundwater

- 5.39 The Hydrogeological and Hydrological Assessment (**BCL Hydro Report Chapter 2 of ES**) states that owing to the prominence of the River Trent (channel depth, width and flow), the water features on the opposite/west bank of the river (and offsite), specifically the Attenborough Gravel Pits SSSI, are considered to be hydrologically separate from the drainage of land in and around the Application Area.
- 5.40 The most sensitive hydrological receptor identified by the above hydrological assessment during the scoping process was the pond at Holme Pit SSSI, (to the north or down-gradient side of the Site). There is also a smaller waterbody (Clifton Wood Pond) lying halfway between the Site and the SSSI.
- 5.41 The East Drain leading to Holme Pit SSSI was found to be supported by groundwater flowing northwards through the eastern half of the proposed extraction area, estimated to take 25% of the groundwater flow path leads towards Clifton Wood Pond and Holme Pit SSSI beneath the course of the East Drain. Barton Pond (leading into West Drain and Holme Pit SSSI) is supported by groundwater that passes northwards through the economic mineral in the western half of the proposed extraction area and it is estimated that 40% of the groundwater flow path leads towards Holme Pit SSSI beneath the course of the West Drain. Approximately 25-30% of the groundwater flow path is shown to veer westwards, contributing baseflow to the River Trent.
- 5.42 The groundwater flow direction is from south to north.
- 5.43 A temporary clay liner/barrier will be installed at the southern end of Phase 1 to minimise the pumping requirement in the first phase of extraction.
- 5.44 Prior to commencement of dewatering at Phase 2, a cutting with clay barrier (“Sub-Surface Retaining”) will be excavated upon the southern (up-gradient) boundary of Phase 2.  
As Phase 2 is approaching completion, a similar cutting (“Sub-Surface Retaining”) will be installed at the southern end of Phase 3.
- 5.45 During mineral extraction, the water table will be drawn down behind the proposed clay barrier, with the resultant groundwater collected for silt settlement in a 2-stage silt lagoon system. After settlement, the water will enter a recharge trench excavated on the northern (down-gradient) boundary of the Site. The southern face of the recharge trench will be clay-lined to minimise recirculation into the working area. When the recharge trench is at full capacity or when it is desirable to do so, surplus water will be discharged to the East Drain and West Drain (leading to Holme Pit SSSI).
- 5.46 The Applicant proposes to excavate the clay lined recharge trench on the Site boundary. The trench lies on the groundwater flow path for Holme Pit SSSI; therefore; its primary focus is the mitigation of flow impacts at this IEF/ receptor.
- 5.47 There is a commitment to site maintenance measures at the Proposed Development to ensure that the base of the recharge trench is not compromised by regular de-silting and scraping.
- 5.48 When the recharge trench is at full capacity, surplus water will be discharged to the East Drain and West Drain (leading to Holme Pit SSSI) and onwards to the River Trent in this way, the trench and overflow mechanism will minimise the risk of impact on the flow regime at Holme Pit SSSI. Before

being discharged into the ditch system, the water will be passed through settling lagoons where necessary to remove suspended solids, such that water quality impacts associated with the dewatering operation will have no unacceptable impact on water quality.

- 5.49 As it is intended that most of the water will be returned to ground using the recharge trench, with surplus discharged back to the river (via Holme Pit and the East Drain), the actual impacts have been assessed as likely to be insignificant (refer to Hydrology Assessment **Chapter 2 of ES** for details).
- 5.50 The estimated change in flow in the River Trent as a result of dewatering has therefore been assessed as **negligible**.
- 5.51 It is expected that, when the mitigation systems (including the cutting with clay barrier and recharge trench) are fully operational, there will be negligible impact on the depth of water at Holme Pit SSSI.

#### *Surface Water*

- 5.52 The key water quality parameters at the SSSI, as identified by Natural England (Refer BCL Hydro Report **Chapter 2 of ES** section 3.7.2, are Total Phosphorus (TP) and Nitrates as N. NE have been approached for comments in relation to ground water and water quality impacts to the Holme Pit SSSI by BCL Hydro. Comments made by NE to the previous application include concerns relating to ground water and surface water impacts relating to the potential for detrimental changes in flow regimes and water quality that might affect the SSSI. NE wish to observe an improvement to the current situation.
- 5.53 In addition, assessment of surface water quality (and ground water) for the scheme and likely effects on the baseline situation have been informed by the Penny Anderson Associates Limited (PAA) botanical and hydrological report prepared for Natural England for Holme Pit SSSI (PAA report: “Natural England: Holme Pit SSSI Survey and Restoration Options”, PAA, May 2013, Ref. No. 130144). See BCL Hydro Report.
- 5.54 As also referenced by the BCL Hydro the Common Standards Monitoring (CSM) Guidance for Standing Waters (JNCC 2005) provided Total Phosphorus (TP) targets for lake types of the UK WFD typology, defined by the geology of the catchment, alkalinity data and mean lake depth. The CSM guidance for eutrophic waterbodies like Holme Pit is 0.05mg/l TP. The site-specific WFD targets for Holme Pit are 0.035mg/l TP for the ‘High/Good’ boundary and 0.0449mg/l TP for the ‘Good/Moderate’ boundary (UK TAG 2008). BCL Hydro report that there is no site-designated nitrogen standard for Holme Pit.
- 5.55 The two water samples from Holme Pit record 0.936 mg/l Total P and 0.102 mg/l TP respectively. These are higher than the site-specific guidance for Holme Pit SSSI of 0.035-0.05 mg/l TP. Levels of TP in the feeder streams are generally considerably higher than Holme Pit.
- 5.56 The excessively high levels of TP are associated with the feeder stream (East Drain) that flows from the south following the base of the Clifton escarpment. In regard to Nitrates, the feeder channel samples were about 0.5 mg/l TN. The values are therefore low and satisfy the criteria of all the guidance.
- 5.57 Floodwater from the River Trent also reaches Holme Pit. The quality of the water arriving at the Pit from the River Trent is therefore important. Until 2009, rivers were monitored as part of the general quality assessment (GQA) scheme to assess river water quality in terms of chemistry, biology and nutrients but was replaced by the WFD sampling regime, based on a wider range of assessments

- than the GQA classification. However, the GQA provides a longer data set. High concentrations of P & N respectively are classed as greater than 0.1 mg/l for orthophosphate P and 30 mg/l for nitrate.
- 5.58 The levels of orthophosphate P are reported in the BCL Hydro report as ‘Very High’ during 2006-2009. WFD status for P for the River Trent upstream of Nottingham was noted as ‘poor–very certain’ and at the time of the PAA report, predicted status for 2015 was ‘poor’ (EA 2009). The levels of Nitrate N were classed as ‘Very High’ with an average value over four years noted as considerably higher than the upper classification of 9.0 mg/l Nitrate N. The BCL Hydro Report notes that over the period of monitoring, there have been improvements with a trend of falling levels of ammonia and rising dissolved oxygen, but high orthophosphate P and Nitrate N appear to remain persistent.
- 5.59 Levels of Total Phosphorus (TP) are reported by BCL Hydro as broadly following a consistent trend across the surface water network, typically in the range of 0.5-1.5 mg/l TP (equivalent to 500-1,500 µg/l). The Eastern Drain was generally of the poorest quality in 2022 whilst sampling was completed, with an outlier of 6.6 mg/l. The Western Drain had spikes up to 2.1 mg/l in 2023; and HPN1 (an un-named field ditch feeding Holme Pit) spiked at 2.8 mg/l (Refer to **Chapter 2 of the ES** and relevant Appendices’)
- 5.60 The levels of Nitrate as N were found to be elevated in the River Trent at 5.5-11.5 mg/l throughout 2022 and 2023 sampling periods. Contrastingly, Nitrate readings were generally below 1 mg/l in the East Drain, West Drain and Holme Pit during the second half of 2022. However, Nitrate levels in the East Drain and West Drain were found to be markedly higher in the first half of 2023 and was considered to be as a result of the River Trent encroaching on to this section of floodplain in the mid-winter. The worst readings were recorded on 25th January 2023 at the upstream sampling points of the East Drain (9.77 mg/l) and West Drain (14.5 mg/l), improving at the downstream points on East Drain (6 mg/l) and West Drain (3 mg/l); and further improving at Holme Pit (2.57 mg/l).
- 5.61 The most likely source of the elevated N & P levels as sampled and reported by NE/Penny Anderson Associates in the Holme Pit SSSI is the regular use of fertilisers and pesticides/herbicides applied to local sandy soils of the intensively managed agricultural land surrounding the SSSI, together with periodic inundation by floodwater from the River Trent. With the cessation of intensive agriculture on the site replaced by working of sand and gravel, the above issues with surface water quality are anticipated to improve during the operational life of the scheme and following restoration and can be expected to improve water quality entering the SSSI from the site.
- 5.62 An overall improvement through a reduction in nutrient pollution (specifically nitrogen or phosphorous) will be achieved at Holme Pit SSSI because of the change in land use from intensive agriculture with an emphasis on the creation of significantly more natural habitats including wetland systems. The effect will be positive in the mid to long term.
- 5.63 Discharges will be agreed with the Environment Agency (EA) and the EA will provide a specified discharge consent which will ensure acceptable water quality. (Application for such permits is an absolute requirement of the Proposed Development, governed by separate legislation to planning (precluding need for any planning control in this regard)
- 5.64 It is considered that following Final Restoration, water from the Site will be of a higher quality than during the arable use of the Site with resultant reduction in site-based contributions of nitrates and

phosphates. Furthermore, the proposed restoration which includes wetlands that have the potential to reduce nutrient contributions further through adsorption and absorption by wetland plants and their associated ecosystems. This in turn will improve the resilience of the SSSI into the future and its habitats and associated species.

- 5.65 The noise assessment, air quality & dust assessment, lighting and Hydrogeological and Hydrological Impact Assessment and Flood Risk Assessment; (to be found in **Chapters 5, 6, 7 and 2 of the ES**, respectively) details the mitigation that will be implemented to ensure that these potential impacts are not significant on any of the statutory designations listed in **Table 8**.

### Restoration Impacts

- 5.66 It is considered that the Concept Restoration Plan for the Proposed Development will result in beneficial impacts on these Sites in the long term by increasing the number of similar types of habitats in the local area which, in turn, will increase the resilience of these habitats.
- 5.67 Habitat to be created include:
- Lakes;
  - Reedbeds;
  - Ponds;
  - Hedgerows;
  - Species rich neutral grassland; and
  - Fens.
- 5.68 It will also provide additional habitat for the protected species that these statutory sites are designated for, particularly the bird species at Attenborough Gravel Pits SSSI, and so would increase the resilience of these species' populations.
- 5.69 Creation of new reedbeds and complementary wetland and terrestrial habitats on site provide alternative habitats for species found within the Attenborough Gravel Pits SSSI (and Holme Pit SSSI). Additionally, the creation of new habitats including wetlands would be expected to improve the quality of the land through the cessation of intensive agriculture and its replacement, along with the anticipated resultant improvements in water quality in site run-off entering wetlands. The result could be expected to be positive in supporting more diverse species assemblages and ultimately species diversity, attractive species from both statutory sites such as Attenborough Gravel Pits, and Holme Pits SSSIs and LWSs and new species from further afield.
- 5.70 These impacts are expected to be **Moderate permanent and beneficial**.

### Non-Statutory Designations

#### Operational Impacts

##### Direct Land-Take

- 5.71 Direct impacts on any of the non-statutory designations listed in **Table 8** are limited. There is a mineral conveyor and haul route that lies over part of Brandshill Grassland LWS and Brandshill Marsh LWS. This will result in a temporary loss of a small amount of these LWSs. Dependant on

the nature of this conveyor route, loss is only likely to be small and limited to the footprint of the route. This will be a **Minor temporary** impact.

- 5.72 A permissive path is proposed through the Brandshill Grassland LWS to connect routes within the site for public enjoyment. The materials used in the construction of the footpath would be appropriate to the local soil conditions and will be informal in appearance. Signage informing the public as to the value of the site and to adhere to the footpath will also be provided at the start of the footpath closest to the proposed community car park. . There will be a **Minor local** impact.
- 5.73 There will be no direct land take on any other LWSs in **Table 8**.

#### Enhancement of Existing Semi Natural Habitat and Non-Statutory Sites

- 5.74 A majority of the semi natural habitats within the Site that are retained as part of phased operations will continue to be agriculturally managed. Brandshill Grassland LWS which will be managed with nature conservation in mind under a management plan during the initial works phase. The area of Barton Flash LWS contained in the 45 m standoff along the river Trent would be enhanced.
- 5.75 Brandshill Marsh LWS, Barton in Fabis Pond and drain LWS and Borrow Pits LWS will also undergo habitat works to enhance them, but they are currently classed as retained and not enhanced in the metric as the enhancement potential would not be enough to increase the condition by an entire category. There will be no loss.
- 5.76 There will be **Minor beneficial** impacts on Brandshill Grassland LWS and Barton Flash LWS. Effects on other retained habitats including adjacent LWS's during the operational phase will be neutral. Monitoring of habitat condition in terms of the potential effects of excessive drying as a resultant of minerals extraction would ensure seasonal wet habitats are not affected by extremes of drying beyond what would be considered normal fluctuations.

#### Air Quality, Noise, Lighting and Hydrological Impacts

- 5.77 Other potential Impacts during the operational phase of the Proposed Development to non-statutory sites are the same as identified for statutory sites above, these being potential changes in air quality from dust emissions, disturbance from changes to background noise levels during operation, lighting, and changes in water quality, and are considered below:

##### *Air Quality & Dust*

- 5.78 In reviewing the air quality assessment, it has been concluded that the overall residual air quality effect is **not significant** on all IEFs identified including all non-statutory sites.
- 5.79 Proposals, where appropriate, for proportionate dust monitoring and reporting to check the ongoing effectiveness of dust controls and mitigation are set out in the Assessment (**ES Chapter 6**)

##### *Noise*

- 5.80 The noise surveys completed in July and August 2023 (**ES Chapter 5**) for IEFs has determined average baseline sound level ranges:
- 5.81 **Table 9** (below) summarises the baseline average sound levels gathered at locations representative of the ecological receptors (extracts taken from the Noise Assessment Report prepared by WBM Acoustic Consultants):



Table 9. Measured (Baseline) Noise Levels Around the Site

Ecological Receptor	Average Baseline Sound Levels (Range)	
	dB LA90, T	dB LAeq, T
Attenborough Nature Reserve	37	45
Clifton Woods	39	43
Brandshill Woods North	35	39
Brandshill Woods South	43	46
Mill Hill Spinney (undesignated)	49	56

- 5.82 The potential effects of noise disturbance on non-statutory sites would also be in relation to responses by specific faunal species and species groups for which each site is valued or which utilise the sites habitats as part of their ranges. Effects of noise to fauna are considered further by species or group of species (below in this section under fauna). The most sensitive fauna to noise disturbance would comprise birds, bats, and otter. These are considered individually in more detail below on the sections considering fauna.
- 5.83 A review of the noise plots indicates that the ecological receptors will not be subject to levels above 55 dB LAeq, 1-hour free field. In addition, the highest calculated site noise levels at the ecological receptors are those in the area just to the north of the plant site where calculated site noise levels are very close or reaching 55 dB LAeq, 1-hour free field in the extreme south-east corner of that area close to Mill Hill Spinney. For Mill Hill Spinney the predicted highest modelled site sound levels are within the upper range currently experienced and are not considered significant as wildlife present, chiefly, birds are considered likely to be habituated to similar sound levels.
- 5.84 For Brandshill Woods North, the site noise levels are predicted to be below 55 dB LAeq 1-hour free field for the habitat closest to the extraction and working area.
- 5.85 Nighttime noise levels are predicted to be lower overall than those generated during the daytime with the highest noise levels being recorded with the voids themselves. Predicted night-time site noise levels do not exceed the typical overall night-time ambient levels (measured at Burrows Farm and assumed to be representative of rural locations in the vicinity). This is significant when considering responses by bats, barn owls and otter (see below).
- 5.86 Modelling of sound levels indicate that all other non-statutory sites would **not be significantly impacted** by noise generated at the Plant Site and Extraction Areas.
- 5.87 The SoundPLAN noise modelling of the site completed by WBM Ltd, and the proposals have been advanced, and the indication is that there should be no requirement for additional mitigation measures for the nearest ecological (or residential) receptors to the site.

#### *Lighting*

- 5.88 The site requires fixed lighting within the plant site and conveyor route; no lighting is proposed within the excavation area. The results of the baseline assessment (**ES Chapter 7**) also indicate low levels of light surrounding the proposed working area. No non-statutory site would experience significant intrusion or light spill, furthermore a lighting scheme developed for the proposed development has been designed so as not to intrude or impact on any IEFs.

- 5.89 The impact to non-statutory sites of the proposed site with regards to lighting is therefore **insignificant** on the surrounding area and potentially sensitive IEFs as very minimal light spill would occur because of the scheme and as such is acceptable in terms of lighting the site.

*Hydrogeological and Hydrological*

- 5.90 Borrow Pit (South) and Barton Ferry Wetland are on the up-gradient (south) side of the Site as reported within the Hydrogeological and Hydrological and Flood Risk Assessment (**Chapter 2 of the ES**) and are primarily fed by groundwater seepage coming from the section of an aquifer beneath Barton in Fabis. This baseflow is supplemented by the surface water drainage ditches at the edge of the village. The upstream reach of the East Drain is a feeder ditch for Borrow Pit (South), which is outside the Site boundary; and Borrow Pit (North), which is tucked into the southeast corner of the Site. The catchment area for Borrow Pit (South), including the feeder stretch of the East Drain, equates to circa 0.35 km<sup>2</sup>. At this location, the East Drain is generally around 2 m in width, with 200-300 mm depth of standing water on 8th February 2023 during the survey conducted by BCL Hydro with no visible flow. Dewatering drawdown at the southern end of the Site has been determined to have the greatest potential impact on the Borrow Pits – Brands Hill Marsh, because the entirety of the East Drain upstream catchment area overlaps with the radius of influence of dewatering drawdown.
- 5.91 As indicated above and within the BCL Hydro Report, dewatering drawdown at the southern end of the Site would have the greatest impact on the Borrow Pits - Brandshill Marsh, as the entirety of the East Drain upstream catchment area overlaps with the radius of influence of dewatering drawdown. In contrast, approximately 20% of the catchment area of Barton Ferry Wetland would overlap with the radius of influence of dewatering drawdown. The mitigation measures described in the Hydrology Report are not only aimed at minimising flow impacts, but also drawdown impacts.
- 5.92 The clay barrier as proposed would minimise the risk of dewatering drawdown in the aquifer on the southern side of the Site, which would protect flows in the feeder ditches in the direction of the Borrow Pits and Barton Ferry Wetland. The water table would be drawn down behind the clay barrier with the resultant groundwater collected for silt settlement. The water would be directed to a 2-stage silt lagoon system for settlement of suspended solids and can be targeted to the northern Borrow Pit and/or the upstream end of East Drain (at the southeast corner of the Site) to mitigate any drawdown at these features.
- 5.93 For Barton Ferry Wetland, the incoming drainage ditch comes from two catchment areas (circa 3 km<sup>2</sup>): Cottages Flash and Barton-in-Fabis Fishing Pools. The former ditch (closest to the Site) passes beneath the raised flood defences between the river and the village. There was 50 cm depth of water in the incoming ditch on 8th February 2023; and 20 cm depth of water entering the pipe from the southern side with no visible flow. Approximately 20% of the catchment area of Barton Ferry Wetland has been assessed by BCL Hydro as overlapping with the radius of influence of dewatering drawdown.
- 5.94 Barton in Fabis Pond (leading into West Drain and Holme Pit SSSI) is supported by groundwater that passes northwards through the economic mineral in the western half of the proposed extraction area. Beyond the northern boundary of the Site, the West Drain channel narrows to 1-2 m in width and its base is 0.5-1 m below the level of the surrounding fields. During the survey by BCL Hydro on 8th February 2023, there was less than 10 cm depth of water in the ditch and no visible flow.

- 5.95 Barton Pond is at the source of the West Drain, upstream from the recharge trench. The BCL Hydro Report has commented that if, subject to the findings of the EclA, it is judged that mitigation is required at Barton Pond and if confirmed as being ecologically appropriate, this would be delivered by targeted discharge of water to be pumped across from the recharge trench as and when required. Whilst Barton Pond is seasonal and ephemeral and is likely to have developed an ecology reflecting this, it is necessary to ensure that flows to Holme Pit SSSI (and the West Drain) are not compromised and could benefit from targeted discharge in more prolonged dry spells. This would require monitoring.
- 5.96 Barton Flash is assessed as being a seasonal & ephemeral feature dependent on localised mounding during periods of relatively high-water table. The hydrology assessment estimated that 5-10% of the groundwater flow path led towards Barton Flash.
- 5.97 The proposed mitigation (recharge trench and overflow to the drainage ditches) will not protect the groundwater flow path at Barton Flash during Phase 4, where mineral extraction is expected to be completed over a period of 2.5 years.
- 5.98 Barton Flash is a shallow depression, flooded during the winter. It consists of bare mud for much of the year providing habitat for invertebrates and birds. Due to its proximity to the river, the seasonal flooding is not only groundwater-related, but can also come from the river.
- 5.99 The ephemeral / seasonal nature of Barton Flash would suggest that no continuous mitigation is required during the at-risk period for the groundwater flow path, because this feature has experienced sustained periods of dry conditions in the baseline setting and can be periodically inundated by the river, which would be anticipated to partly compensate for any reduction in groundwater seepage. However, Barton Flash should be monitored to ensure that dewatering does not lead to greater drying in periods where inundations by the River do not help to sustain the communities present during the life of the scheme. This does seem unlikely given the nature of rainfall recently. As indicated by the BCL Hydro Report this could be delivered by targeted discharge of water to be pumped across from the recharge trench during winter months. If determined to be needed following monitoring.
- 5.100 As reported in the BCL Hydrology Report when the mitigation systems (including the cutting with clay barrier and recharge trench) are fully operational there will be negligible impact on the depth of water at Barton Ferry Wetland LWS, Borrow Pit (South), Clifton Wood Pond (and Holme Pit SSSI).
- 5.101 The option for targeted augmentation to Barton Pond and Barton Flash would protect against drawdown impacts at these features. Similar mitigation measures (involving targeted discharge to the northern Borrow Pit and/or the upstream end of East Drain (i.e., at the southeast corner of the Site) will reduce the risk of drawdown at Borrow Pit North and the southern half of Brands Hill Marsh.
- 5.102 The northern half of Brandshill Marsh falls within the radius of influence of the dewatering operation of Phase 1; but at this stage, it will be mitigated by water flowing from the East Drain upper catchment area and the Borrow Pits.
- 5.103 In terms of water quality, discharges will be agreed with the Environment Agency (EA) and the EA will provide a discharge consent which will ensure acceptable water quality.

- 5.104 It is considered that following Final Restoration, water from the Site will be of a higher quality that during the arable use of the Site.
- 5.105 The noise assessment, lighting, air quality assessment and Hydrogeological and Hydrological Impact Assessment and Flood Risk Assessment; (to be found in **Chapters 5, 7, 6 and 2 of the ES**, respectively) details the mitigation that will be implemented to ensure that these potential impacts are not significant on any of the non-statutory designations listed in **Table 8**.

### Restoration Impacts

- 5.106 It is considered that the Concept Restoration Plan for the Proposed Development will result in beneficial impacts on these Sites in the long term by increasing the number of similar types of habitats in the local area which, in turn, will increase the resilience of these habitats.
- 5.107 Habitat to be created include:
- Lakes, associated Wetland & Open Water.
  - Reedbeds;
  - Ponds;
  - Hedgerows & Trees.
  - Species rich neutral grassland; and
  - Fens.
- 5.108 A detailed management plan for the Site will be devised to ensure that the semi natural habitats within the Site are managed appropriately and that measures to monitor and control any invasive species are in place.
- 5.109 This should mean a **Moderate beneficial** impact on the LWSs within the Site following restoration.

### Habitats

#### Operational Impacts

##### Direct Land Take

- 5.110 Each phase of the scheme will be buffered from adjacent semi-natural habitats by the inclusion of an appropriate buffer zone from works.
- 5.111 In addition, a management plan will be devised to ensure that all existing semi natural habitats are managed throughout the operation phase to enhance their condition. This will include (but not limited to) measures such as:
- Appropriate cutting and grazing regime for the unimproved grassland and semi-improved grasslands.
  - Scrub management within fen habitat; and
  - Invasive species management within aquatic habitats.
- 5.112 Direct habitat losses are limited to:
- 37.5 ha arable land;

- 5.4 ha other neutral grassland;
- 2.9 ha of modified grassland;
- 0.2 ha woodland;
- 0.3 ha scrub;
- 0.01 ha reed bed;
- 6.9 ha temporary grass ley; and
- 0.01 ha bare ground.

#### Air Quality, Hydrogeological, Hydrological, lighting and Noise Impacts

- 5.113 Mitigation measures discussed above with regards to air, water quality lighting and noise will also ensure there are no impacts from these factors on the existing semi natural habitats within the Site.
- 5.114 Therefore, there is unlikely to be any significant impacts long term on any of the semi natural habitats of local value within **Table 8**. Any specific effects of air quality, dust, water quality, lighting and noise on individual faunal species and species groups are given below:

#### **Restoration Impacts**

- 5.115 Following this, the Concept Restoration Plan will create habitats of equal or higher value than the existing habitats on the Site. There will be additional ponds, lakes, associated wetland, species rich grassland, fen and hedgerows created. This will enhance the existing habitats by creating links between them and generally increasing the biodiversity within the Site. The restoration will create:
- 10.2 ha Arable land;
  - 7.3 ha Fen;
  - 0.2 ha Hardstanding;
  - 1.8 ha Lowland meadow;
  - 14.0 ha Other neutral grassland
  - 3.1 ha Reedbed/marshy grassland
  - 0.6 ha Mixed scrub;
  - 0.13 ha Pond; and
  - 14.7 ha lake.
- 5.116 There will also be a detailed long term management plan for the habitats created on the Site post development to ensure their maintenance in the long term.
- 5.117 Therefore, long term the overall impacts on all habitats within and adjacent to the Site is expected to be **Major beneficial**.

#### **Fauna: Invertebrates**

- 5.118 There is an invertebrate assemblage of regional importance in the aquatic habitats of Barton Flash LWS and Borrow Pits LWS within the Site.



## Operational Impacts

### Direct Land Take (Habitat Loss)

- 5.119 As discussed previously, there will be no direct land take of these habitats associated with Barton flash and Borrow Pits LWS's and thus no impact from this on the invertebrate assemblage within them.

### Enhancement and maintenance of existing semi natural habitat, and existing plant species assemblages and non-statutory sites which have been identified as being of significance for invertebrate species recorded.

- 5.120 The invertebrate surveys indicated that wetland features are the most important invertebrate habitats present, in which soils are either partially or continuously inundated for much of the year. These habitats are represented by both Barton Flash and pond P1, which in combination supported nine species of conservation significance.
- 5.121 As discussed previously, all retained semi-natural habitats will be managed along with Barton Flash LWS (comprising the 45 m standoff only with the remaining area maintained in agricultural usage) and Borrow Pits LWS and will be subject management appropriate to the habitat type and the broad requirements of the individual groups of invertebrate species recorded. A management plan would be prepared to include on site enhancements and management during the operational phase to cover all working phases of the scheme.
- 5.122 Mowing and cutting will be implemented where necessary to create as much structural diversity as possible and maintain or improve the proportion of flowering herbs and flowering woody species present to benefit invertebrates relying on nectar sources across the wider site currently under agricultural management.
- 5.123 For Barton Flash and Borrow Pits, management would need to be more nuanced with a view to largely maintaining existing habitat structure or enhancing structural diversity and variation wherever feasible in existing ecotones (a region of transition between two biological communities, ecotones between two habitats are often richer in species than either habitats). A proportion of nationally rare and scarce species recorded are noted as reliant on edge habitats within the retained LWS's, which included drier margins around damp areas. By ensuring that the proportion of habitats currently recorded does not change detrimentally through succession to preclude the species recorded during the working life of the scheme, species assemblages will be maintained and would be in good shape at the point of restoration where additional habitat would be created and or allowed to develop.
- 5.124 This results in a **Minor beneficial impact** at a Regional Level.

### Air Quality, Hydrogeological and Hydrological Impacts, Lighting and Noise Impacts

- 5.125 As discussed previously, impacts from water and air pollution will be mitigated accordingly to ensure no impacts occur on the habitats they are found in.
- 5.126 With regard to assemblages of invertebrates associated with Barton Flash and Borrow Pits LWS's, seasonal drying of habitats and the maintenance of wetland features are necessary to maintain the most important invertebrate habitats present, created as soils are either partially or continuously inundated for much of the year.

- 5.127 Targeted augmentation to the above LWSs considered at risk of dewatering would protect against drawdown impacts at these features (refer to BCL Hydrology Report and above).
- 5.128 Therefore, there will be **No impact** at a Regional level.

#### Water quality

- 5.129 As indicated the Quarry Operator will need to apply for an Environmental Permit (Discharge Consent) seeking authorisation for this scheme. The discharge process will need to comply with the water quality constraints specified by the Permit. Therefore, during operation, there is unlikely to be a significant impact on important invertebrate assemblages associated with wetland habitats because of changes in water quality.
- 5.130 Therefore, there will be **No impact** at a Regional level.

#### **Restoration Impacts**

- 5.131 The Final Restoration Plan has the potential to be highly beneficial to this invertebrate assemblage (and the wider site assemblages) due to the creation of significant areas of aquatic habitat in the form of fens, ponds, lakes, marshy grassland, and reed bed as well as botanically rich grassland habitats.
- 5.132 This will result in a **Moderate beneficial impact** at a Regional Level.

#### **Fauna: Breeding & Overwintering Birds**

- 5.133 The potential impact of the loss or change of habitat upon breeding and wintering bird species arising from the effects of development is based upon an understanding of each species' ecological requirements, the type of development, number of birds recorded within the survey area, their nature conservation criteria based on legislation and current guidance, their county status according to the county bird report and professional judgement. The following potential impacts to the recorded bird populations and assemblage may result from the proposals:
- Direct loss/change of habitat, including habitat fragmentation; and/or
  - Disturbance during construction and/or operation.

#### **Operational Impacts**

##### Direct Land Take (Habitat Loss)

- 5.134 The individual species recorded on site that are arguably the most vulnerable to impacts from the habitat loss or changes associated with this proposed development include the 40 species considered to be of at least **Local** importance. These are notable species that are either specially protected, appear on the BoCC Red or Amber lists and/or are listed as a NERC priority species and were recorded in at least locally important numbers.

##### Phase one, two and four

- 5.135 During phase one, two and four, the winning of minerals from areas currently under improved and semi-improved grassland will lead to a loss of skylark as both a probable breeding and wintering species since this species requires expansive open areas with long lines of sight which would not

be present during extraction. However, there is grassland being retained in the south where singing skylark were recorded along with existing surrounding arable habitat. It is therefore likely skylark will be displaced into the surrounding area of suitable habitat. There is opportunity to provide mitigation for this species through the creation of skylark plots in the species rich grassland or agricultural fields to the south. Given the overall numbers present in both seasons, and the surrounding arable habitat, this loss of habitat during phase one is anticipated to represent a **Minor adverse impact** on this species at the local level.

- 5.136 The loss of the area of grassland will also reduce the overall availability of foraging resources for other bird species that frequent open habitats for foraging such as grey partridge, greylag goose, black-headed gull, red kite, common gull *Larus canus*, oystercatcher, stock dove, woodpigeon, sparrowhawk, kestrel, rook, lapwing, flocks of wintering redwing and fieldfare, meadow pipit, yellowhammer plus other common and widespread corvids, and gamebirds. Given the low numbers of these species breeding on Site, their abundance in the county, and the availability of similar habitat immediately adjacent to the Site boundary phase one of the development is anticipated to have a **Minor adverse impact** on these species.

#### Phase three

- 5.137 Phase three will have the greatest impact on the notable species recorded and would result in the loss of breeding lapwing within the improved grassland compartment. There is opportunity to mitigate the loss of breeding lapwing during the restoration of previous phases to include lapwing plots in the arable field in the south of the Site.
- 5.138 The loss of grassland habitat within phase three will result in several notable species losing a foraging resource including greylag goose – a WCA Schedule 1 species – black-headed gull, stock dove, wood pigeon, house martin, yellow wagtail *Motacilla flava*, and linnet. These species will likely be displaced into the surrounding grassland; therefore, the proposals are considered to have a **Minor adverse impact** on these species.

#### Operational Phase: Enhancement of Existing Semi Natural Habitat and Non-Statutory Sites

##### All Phases

- 5.139 The application of and maintenance of land & habitat management will enable bird species that are displaced during operations to continue to use other phases which remain unworked. As restoration will be progressive, some habitats would become available as land is restored.

##### Air Quality, Hydrogeology and Hydrology, Lighting and Noise

- 5.140 For local bird populations, the most significant issues relating to this scheme during the operational phase aside from land-take and potential direct loss of habitat, are the potential effects of lighting and noise.

##### Lighting

- 5.141 As already indicated the site requires fixed lighting within the plant site and along the conveyor route and no lighting is proposed within the excavation area. The results of the baseline assessment also indicated low levels of light surrounding the proposed working area. No retained habitats within the working areas and those adjacent including wildlife sites would experience

significant intrusion or light spill. None of the bird species recorded using the site would therefore experience any disturbance because of light spill.

- 5.142 The plant site, stocking area and conveyor route would need to be lit during working times during the winter however, the lighting scheme developed for the proposed development has been designed so as not to intrude or impact on any adjacent IEFs nor any other habitats for which bird surveys have identified as being utilized or of value for birds.
- 5.143 Some species are known to be particularly sensitive to artificial lighting such as long-eared owls if present locally. This species was not recorded.
- 5.144 Based on the results of the assessment, the impact of the proposed site in relation to potential lighting effects on overwintering and breeding birds is **insignificant** on the surrounding area and potentially sensitive IEFs as very minimal light spill should occur because of the scheme and as such is acceptable in terms of lighting the site.

#### Noise

- 5.145 There are no thresholds published by the UK statutory conservation agencies for the assessment of masking noises on birds. In the USA guidance prepared for the California Department of Transportation by Dooling and Popper (2007) was that to avoid the potential effects of masking of bird calls by average sound levels from construction operations and highway noise that a threshold in the range of 50-60 dB(A) be set.
- 5.146 The IECS 2009 Report (Cutts et al., 2009) defines disturbance in the general context as discrete events that disrupt ecosystems, communities, or population structures or in some way alter resource levels i.e. food and space. Noise may also influence the survival of individual birds and reduce the function of the site either for roosting or feeding. Noise disturbance varies in its magnitude, frequency, predictability, spatial distribution and duration, and species vary greatly in their susceptibility to disturbance and this susceptibility is likely to vary with age, season, weather, and the degree of previous exposure. The links between visual and audible stimuli are evident throughout the report and noise by itself is indicated as not necessarily a cause for disturbance if not accompanied by a perceived visual threat. In its literature review the IECS report cites a Dutch study (Smit & Visser 1993: Wader Study Group Bulletin) that found that reactions to noise from shooting ranges are stronger if sounds are combined with visual disturbance. The importance of visual stimuli to aircraft noise disturbance is also cited in a report by Brown 1990 (Environmental International, 16, pp587-592).
- 5.147 The IECS report also cites its author's personal observation of a remote-controlled model aircraft in the vicinity of wildfowl having the greatest disturbance effect once the engine had cut, with the remote-controlled aircraft becoming silent whilst still in the air. This immediately led to vigorous alarm calling and movement of individuals into cover, with presumably the loss of noise causing the aircraft to be perceived as a raptor.
- 5.148 The IECS report reviews a 1999 study (also by IECS) into the disturbance of birds in response to flood defence works at Saltend on the Humber estuary. In a series of reports by IECS for the Saltend Cogeneration Company into the effects of piling noise on estuarine birds, the monitoring of noise related disturbance was carried out. Noise levels were predicted across the site and ranged between 55 – 84 dBA (*no indication is given initially in the report of the noise index used*

*but in subsequent paragraphs, use is made of the LAmax parameter, with the time response factor not identified but it is presumed that the F time response is inferred).*

5.149 Effects on the bird population were observed via observations of flight responses and or behavioural changes. The following response descriptors are given with respect to specific noise levels:

- Noise below 50 dB – low
- Regular noise 50 – 70 dB – low to moderate
- Irregular noise 50 – 70 dB – moderate
- Regular piling noise below 70 dB – moderate
- Irregular piling noise above 70 dB – moderate to high.

5.150 In this report noise levels of 70 dB LAmax were above the level that would initiate a behavioural response and below the level that initiates flight responses in most cases.

#### *Noise Effects on Wintering Birds*

5.151 The hedgerows, scrub, and areas of woodland were of value to wintering birds. These habitats hosted several common and widespread generalist foragers including corvids, tits, thrushes, and finches as well as a few notable species. The hedgerows, scrub, trees, and areas of woodland hosted several resident and migratory breeding species including the low concern species, and confirmed breeder, great spotted woodpecker *Dendrocopos major*, blackbird *Turdus merula*, robin *Erithacus rubecula*, corvids including jay *Garrulus garrulus* alongside common tit, warbler, and finch species. Notable species including woodpigeon, whitethroat, wren, starling, song thrush, bullfinch, greenfinch, and dunnock were all noted to be using on-site scrub and hedgerow/woodland linear features. Of these notable species, whitethroat and dunnock were confirmed to be breeding within these habitats.

5.152 No bird species have been recorded or listed above that would be regarded as particularly at risk from additional noise generated during construction or operational phases that would require additional mitigation measures. Therefore, the noise impact to wintering birds will be **Negligible**.

#### *Noise Disturbance: Breeding Birds: All Phases*

5.153 Extraction operations have the potential to disturb birds using the mineral site for roosting, foraging, and breeding. Noise generated during the operational phases could be likely to disturb breeding birds. During the breeding season disturbance may lead to nest desertion or the avoidance of the area and reduce the suitability of retained nesting areas. Whilst there is some potential for breeding success to be reduced, this is expected to have a **Minor adverse to Moderate adverse** impact on the local conservation status of most of the bird species using the survey area for breeding given that there is currently low level of access by the public that would habituate the resident birds to a certain level of disturbance.

5.154 The area of woodland, scrub, and marshy grassland to the east and northwest are to be retained under the proposals, though there will be impacts from the level of noise disturbance during the active phase these habitats are in abundance in the adjoining Attenborough Nature Reserve. As such, it is anticipated that the proposals will have a **Minor adverse** impact on the species utilising these habitats during the active phase of the development, namely teal, moorhen *Gallinula*



*chloropus*, swift *Apus apus*, woodcock, whitethroat, wren, song thrush, mistle thrush, redwing, fieldfare, dunnoek, greenfinch, bullfinch, linnet, and reed bunting.

- 5.155 The existing areas of standing water would be retained, this habitat supported wintering shoveler and gadwall in addition to greylag goose and mallard. Though, these species have varying levels of noise disturbance tolerance, and it is possible they could be displaced. However, these species were recorded in very low numbers, with shoveler and gadwall only being recorded on one survey occasion. It is thought that the impacts of the proposals will therefore have a **Negligible** impact on these species.

### Phase 3

- 5.156 Phase three also has the potential to disturb and displace confirmed breeder kingfisher and possible breeder Cetti's warbler *Cettia cetti*. Kingfisher was confirmed to be nesting along the river margin and Cetti's warbler was recorded singing from riverside vegetation. However, the proposed standoff along the riverbank will likely be sufficient to avoid displacement. The proposals are considered to have a **Minor adverse** impact on these species.

### Restoration Impacts

- 5.157 Improving existing areas and the quality of new ditches, wetland, hedges, grassland, and other associated habitats would improve habitat connectivity and resilience, ensuring habitats are in good health for birds and allow other fauna to continue using them for foraging, shelter, and nesting.
- 5.158 Allowing wider headlands to develop which are not as intensively grazed could help vole/small mammal populations for barn owl and raptors. Allowing more flowering & fruiting of herbs and retained woody species, along with the anticipated cessation of intensive land management would be expected to improve invertebrate biomass which would provide more foraging opportunities for insectivorous bird species.
- 5.159 Restoration proposals would result in wildlife-friendly enhancements to further improve the sites habitats including numerous wetland features that would provide further habitat, plus good nesting opportunities for many species including ones that are not currently present on Site but that will readily colonise newly available habitat. These recommendations would lead to an anticipated **Minor beneficial** to **Moderate beneficial** impact on the assemblage of birds.

### **Barn Owls**

- 5.160 Impacts upon foraging and nesting barn owl are discussed in detail in the separate report within (Appendix D).

### **Operational Impacts**

#### Direct Land take (Habitat Loss)

- 5.161 Most of the land which is to be lost to the proposals includes land considered as unsuitable barn owl foraging habitat, such as the arable fields.
- 5.162 The proposals will also require the loss of most of the areas assessed as supporting good value barn owl habitat, though only small portions of the areas assessed as supporting moderate value barn owl habitat will be lost under the proposals.

- 5.163 Low value habitat will be mostly retained. Retained areas of low value habitat include the areas in which most of the barn owl foraging activity was recorded during the targeted barn owl survey.
- 5.164 Whilst most of the good value habitat is to be lost to facilitate Phase 4 of the extraction. A continuous buffer of 45 m will be retained between Phase 4 and the River Trent throughout the course of the extraction. This buffer would also include part of the Barton Flash LWS habitat. This will provide a permanent, continuous foraging/commuting route for barn owl within the Site to disperse along the river to areas east and west of the Site, and to foraging areas over the river, such as Attenborough Nature Reserve.
- 5.165 Whilst barn owl was not recorded within the good value habitat during the survey, there is a high likelihood that these areas will be used somewhat regularly. Therefore, in the absence of mitigation the partial loss of these areas will result in a **Minor adverse** impact on barn owl due to the loss of foraging habitat. However, due to the total retention of the field in which most barn owl activity was recorded, and because of the retained 45 m buffer of good quality habitat that will continue to provide a foraging resource, this adverse impact is not considered to be significant and will be unlikely to have a long-term detrimental impact on the local conservation status of this species.

#### Enhancements during operational phases

- 5.166 Whilst undergoing each phase of extraction areas, of retained habitats will continue to receive agricultural management to retain the proportions of habitats unchanged or where feasible would be managed to improve structure to maximise value to prey populations. In the case of voles and small mammals for barn owl this would need to include areas of ranker grassland along headlands, verges and tracks and any marginal habitats.

#### Lighting

- 5.167 An increase in lighting could have an adverse effect on those species which have evolved to be active at dusk & during the hours of darkness.
- 5.168 Lighting can affect bird behaviour in different ways. Lighting can be particularly impactful if it illuminates important foraging habitats such as river corridors, woodland edges, and hedgerows.
- 5.169 The lighting scheme has been developed for the proposed development. The proposed lighting scheme has been designed so as not to intrude or impact on any IEFs and wildlife using the site and immediate surrounds. Overall, the results of the baseline lighting assessment indicate low levels of light surrounding the proposed working area. The site itself only requires fixed lighting within the plant site and along the conveyor route and there is to be no lighting is proposed within the excavation area. Anticipated effects of light spill on barn owl are **Negligible**.

#### Noise & General Disturbance Resulting from Extraction Activities – Roosting Barn Owl.

- 5.170 The tree in which barn owl were confirmed to be nesting lies within a tree line/field boundary which abuts Phase 4 of the development. This tree is retained. Whilst there is limited potential that barn owl may continue to use this nest site during Phase 4, the assumption is made that this nesting location will become unsuitable due to prolonged day time disturbance (mostly from extraction activities) and that barn owl will cease to nest within this location, at least for the duration of Phase 4 works. However, there remains potential for this nest site to continue to be used throughout the course of the proposals and following cessation of works.

- 5.171 Furthermore, as barn owl is listed under Schedule 1 of the WCA, Phase 4 works near the breeding location have the potential to disturb nesting attempts, thereby causing an offence due to noise/visual disturbance. The commencement of any works within 100 m of this tree, should take place outside the peak barn owl breeding season, which is between March and August, inclusive. Therefore, initial Phase 4 works within 100 m of the tree should take place between September and February. A licensed barn owl surveyor should also inspect the tree prior to any works within 100m to ensure that no nesting attempt is in progress as this species has been known to nest year-round.
- 5.172 Despite the sensitive working methods mentioned above, Phase 4 works may still cause barn owl to cease using the Site to breed and may result in the loss of barn owl from Site. However, due to the clear presence of a healthy barn owl population within the local area (e.g., the breeding evidence within the nearby village of Barton-in-Fabis and at other nearby locations - see Desk Study Section within **Appendix D**), this impact is not expected to be significant. Mitigation for the potential loss of the confirmed nesting site is detailed below.
- 5.173 The infrequently used barn owl roost recorded 250 m east of the confirmed nest location also abuts Phase 4 of the development. Due to its irregular use and the fact that it is located within a group of retained trees, disturbance because of works would not be expected to significantly impact the use of this roost or the use of the site by barn owl. Disturbance to this roost feature is therefore expected to cause a **Negligible** impact to barn owl at a local scale.

*Noise – Foraging barn owl*

- 5.174 The hours of operation of the Site will be as follows:
- 07:00 to 18:00 Monday to Friday
  - 07:00 to 13:00 Saturdays
  - No operations shall take place on Sundays or Bank/Public Holidays.
- 5.175 Owls are widespread nocturnal top predators and use prey rustling sounds for localizing prey when hunting. Compromised foraging efficiency in acoustic predators such as owls and bats, is among the main considerations when determining impacts of novel acoustic environments. This may result in changes in foraging efficiency by altering behaviour and reducing habitat suitability. Owls' ability to detect prey has been reported to be impacted at the lowest level of Traffic Noise (40dB[A]) *Traffic noise reduces foraging efficiency in wild owls Masayuki Senzaki, Yuichi Yamaura, Clinton D. Francis & Futoshi Nakamura www.nature.com/scientificreports.*
- 5.176 Recorded ambient noise levels in the vicinity are low (around 39-46 dB  $L_{Aeq,T}$  during the day and 41 dB  $L_{Aeq,8h}$  overall at night). Predicted night-time noise levels within the site in operation do not exceed the highest levels recorded during the baseline surveys. This is significant when considered responses by barn owls. The proposed operations will not be active at night save for dewatering pumps. However, the calculations show that at all nearby ecological receptors (within the identified ZoI, Brandshill Wood, Clifton Wood, Mill Hill Spinney, and Attenborough Nature Reserve) nighttime site noise levels remain quite low and do not exceed 34 dB  $L_{Aeq,1h}$  (freefield). For temporary operations site noise levels do not exceed 52 dB  $L_{Aeq,1h}$  (freefield) at Attenborough Nature Reserve, and below this level at Brandshill Wood, Clifton Wood and Mill Hill Spinney (46,46 and 38 dB  $L_{Aeq,1h}$  (freefield) respectively).

- 5.177 Whilst temporary operations generate noise levels up to 52 dB  $L_{Aeq,1h}$  (free field) =these are temporary in nature, and most are likely to be generated during the daytime. Noise impacts on foraging barn owl which are active at nighttime are therefore anticipated to be negligible.
- 5.178 Furthermore, the Noise Assessment included within the ES (Chapter 5 of the ES) demonstrates that with the embedded mitigation measures any new noise levels would be within acceptable thresholds and thus there will be no unacceptable noise impacts on foraging barn owls.

### Restoration Impacts

- 5.179 It should be noted that following restoration, an abundance of optimal barn owl foraging habitat will be provided in the form of species rich grassland and grass/marginal aquatic vegetation fringes which will border the proposed waterbodies and wetlands, with a **Moderate beneficial** impact on barn owl.

### Bats - Roosting

- 5.180 Impacts upon foraging and commuting bats are discussed in the separate bat report within (Appendix F).

### Operational Impacts (Phase 4)

#### *Direct Land Take (Habitat Loss)*

- 5.181 All the trees lie within or close to extraction phase 4 of the Proposed Development and thus will not be impacted until approximately seven years from the beginning of operation. Only T4, T5 and T6 fall within an excavation area and so are to be removed to facilitate the development.
- 5.182 If any of these trees are recorded as a roost in update surveys prior to the commencement of extraction on phase 4, a licence from Natural England will be obtained if appropriate prior to tree works commencing. This will ensure alternative roosts are provided within the Site so there will be no net loss of roosting opportunities.
- 5.183 If no roosts are recorded in these trees, then a licence will not be required and three trees with roost potential will be lost. This would be a **Minor permanent adverse** effect at a Less than Local Scale.

#### *Noise*

- 5.184 It should be noted that church bell tower and bridge-roosting are anecdotal evidence for the ability of bats to cope with considerable background noise in non-foraging situations.
- 5.185 Whilst only T4, T5 and T6 fall within an excavation area and so are to be removed to facilitate the development, the remaining trees (T1, T2 and T3) are on the edge of development phases and could be susceptible to noise disturbance from the quarrying activities if a roost is found, though this is considered less likely given the maximum predicted noise calculated (less than or equal to 52 dB  $L_{Aeq,1h}$  (free field) for daytime/routine activities).
- 5.186 If T2 is still used as a roost when extraction of Phase 4 commences, a licence from Natural England will be obtained if appropriate prior to tree works commencing. This will ensure alternative roosts are provided within the Site so there will be no net loss of roosting opportunities. If no roosts are

recorded in these trees, then a licence will not be required, and any potential noise disturbance would not arise nor need to be considered.

- 5.187 There is potential for these trees to be less attractive as roosting sites for the duration of Phase 4. However, as alternative roosts would be provided, then the potential for noise disturbance would be avoided. This would be a **Minor temporary adverse** effect.

### Restoration Impacts

- 5.188 The Final Restoration Plan will enhance the habitats surrounding the retained trees with roost potential, enhancing their suitability as bat roosts further. Management of habitats would improve their structure and along with an improvement in habitat diversity and quality, a **Minor beneficial** impact is anticipated.

### Bats – Foraging and Commuting

#### Operational Impacts

##### *Direct Land Take (Habitat Loss)*

- 5.189 A majority of the higher quality foraging habitat is designated within LWSs and will be retained as part of the Proposed Development. Habitat losses are limited largely to arable land and poor semi-improved grassland.
- 5.190 Habitat loss impacts are reduced through the phasing of the development with a single phase at a time being brought forwards and the restoration of the previous phase occurring in tandem with the excavation of the current phase. The Extraction Area would be occupied on a rolling basis for around 10 years with land going through the sequence of being farmed, then being stripped of soils and aggregates, with restoration following shortly thereafter.
- 5.191 The impact of habitat loss on foraging bats is of a **Minor temporary adverse** nature.

##### *Enhancement of existing semi natural habitat and non-statutory Sites*

- 5.192 Most of the retained areas (those not to be retained for agriculture) are to be in management from the beginning for nature conservation and thus have the potential to be enhanced for foraging bats. Improving habitats and habitat structure for invertebrates would provide more foraging opportunities across the site.
- 5.193 This is expected to be a **Minor beneficial impact**.

##### *Noise Disturbance*

- 5.194 It is proposed that the hours of operation of the Site will be as follows:
- 07:00 to 18:00 Monday to Friday
  - 07:00 to 13:00 Saturdays
  - No operations shall take place on Sundays or Bank/Public Holidays.
- 5.195 The proposed operations will not be active at night save for dewatering pumps. The calculations show that at all nearby ecological receptors (within the identified ZoI, Brandshill Wood, Clifton Wood, Mill Hill Spinney, and Attenborough Nature Reserve), nighttime levels do not exceed 34 dB  $L_{Aeq,1h}$  (freefield). These represent relatively low levels of predicted noise which are unlikely to affect foraging or commuting bats.



- 5.196 Bats are widespread nocturnal top predators and use echolocation for localizing prey when hunting. Compromised foraging efficiency in acoustic predators such as bats, is among the main considerations when determining impacts of novel acoustic environments. This may result in changes in foraging efficiency by altering behaviour and reducing habitat suitability.
- 5.197 However, recorded ambient baseline nighttime noise levels in the vicinity are low (41 dB  $L_{Aeq,8h}$  overall). Predicted noise levels within the site in operation do not exceed the highest levels recorded during baseline assessments. This is significant when considered responses by bats. The proposed operations will not be active at night save for dewatering pumps. However, the calculations show that at all nearby ecological receptors (within the identified Zol, Brandshill Wood, Clifton Wood, Mill Hill Spinney, and Attenborough Nature Reserve) nighttime levels remain quite low and do not exceed 34 dB  $L_{Aeq,1h}$  (freefield). For temporary operations noise levels do not exceed 52 dB  $L_{Aeq,1h}$  (freefield) at Attenborough Nature Reserve, and below this level at Brandshill Wood, Clifton Wood and Mill Hill Spinney (46,46 and 38 dB  $L_{Aeq,1h}$  (freefield) respectively.
- 5.198 Whilst temporary operations generate noise levels up to 52 dB  $L_{Aeq,1h}$  (free field) these are temporary in nature, and most are likely to be generated during the daytime. Noise impacts on foraging bats which are active at nighttime are therefore anticipated to be negligible.
- 5.199 Furthermore, the Noise Assessment included within the ES (**Chapter 5**) demonstrates that with the embedded mitigation measures any new noise levels would be within acceptable thresholds and thus there will be **No significant noise impacts** on foraging bats.

#### *Light Pollution*

- 5.200 The hours of operation stated above will also limit potential light impacts on bats. There will be no artificial lighting during bat activity periods overnight. Planning conditions could be agreed to ensure that no lighting over 1 Lux falls onto any feature identified as being used by bats for foraging commuting or roosting.
- 5.201 As also confirmed in the TetraTech Lighting Report (**Chapter 7 of the ES**) Bat emergence requires light levels below 1 lux for late emerging species, and up to 14 lux for those that emerge earlier such as Noctule and Pipistrelle. Lighting levels of 1 lux are required to ensure that bat commuting and foraging routes are not directly impacted and that dark corridors beyond the limits of the site are maintained.
- 5.202 While some bat species, such as pipistrelle are known to be more tolerant to light levels above this criterion, this reflects worst-case assumptions concerning the sensitivity of those species recorded on site to background illuminance levels. The assessment made represents a worst-case in terms of impacts on emergence, commuting and foraging. When determining the likely impacts of lighting associated with the proposed development on important ecological receptors, the assessment has considered the effect of lighting without mitigation. Impacts were considered potentially significant where predicted illuminance exceeded 1 lux at ecological receptors. If this was the case, further consideration was given to mitigation measures.
- 5.203 The modelled lighting arrangements for the ecological receptors surrounding the site vicinity and within the site were assessed.
- 5.204 Light trespass associated with the proposed development does not exceed 1 lux at any of the modelled ecological receptor locations adjacent to the site boundary and within the proposed site, with the maximum predicted model illuminance of 0.02 lux at E1 and E5. There will be a need for

lighting to be installed within the plant site area and along the conveyor route to ensure safe movement of vehicles and pedestrians. However, the lighting Assessment included within the ES (Chapter 7) demonstrates that with appropriate mitigation measures any light levels would be within acceptable thresholds and thus there will be **No significant light impacts** on bats because of the Proposed Development.

**Restoration Impacts**

5.205 The Final Restoration Plan will provide additional and enhanced habitats for foraging bats in the form of species rich grassland, hedgerows, lakes, ponds, fen, reedbed and scrub. Many of these habitats will replace the low-quality arable habitat that was previously there. This is a **Minor-moderate beneficial impact**.

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## Otter

### Operational Impacts

#### Direct Land Take (Habitat Loss)

- 5.230 Otters are considered likely to use the River Trent adjacent to the Site as part of a large foraging territory and there are opportunities for resting and sheltering along this stretch also.
- 5.231 The Proposed Development has included a large 45 m standoff from the river. There is **no habitat loss impact**.

#### Noise

- 5.232 It is proposed that the hours of operation of the Site will be as follows:
- 07:00 to 18:00 Monday to Friday
  - 07:00 to 13:00 Saturdays
  - No operations shall take place on Sundays or Bank/Public Holidays.
- 5.233 The proposed operations will not be active at night (save for dewatering pumps) but noise levels are predicted to be quite low (below 32 dB[A]) near to the River Trent and therefore impacts on foraging otter will be negligible. Furthermore, the 45 m standoff along the River Trent is considered sufficient to ensure **Negligible noise impacts** could occur on sheltering or resting otter including from temporary works.

#### Lighting

- 5.234 The hours of operation stated above will also limit potential light impacts on foraging otter. There will be no artificial lighting overnight when otters are likely to be foraging. The 45m standoff along the River Trent is considered sufficient to ensure **no lighting impacts** could occur on sheltering or resting otter.

#### Water Quality

- 5.235 Mitigation measures discussed above with regards to water quality will also ensure there are **no water quality impacts** on otter.

### Restoration Impacts

- 5.236 The Final Restoration Plan has the potential to be highly beneficial to otter due to the creation of a large new lake linked to the River Trent and Attenborough Gravel Pits SSSI. This will provide a large swathe of new foraging habitat. This will be a **Moderate beneficial** impact.

## Toads

### Operational Impacts

Direct Land Take (Habitat Loss)

- 5.237 There is a population of toads of Local value within the Site. They appear to breed in P1 (Borrow Pits LWS) and use Brandshill Woodland LWS as hibernation habitat. It is assumed that the terrestrial habitat surrounding P1 (Borrow Pits LWS and Brandshill Marsh LWS) is used by toads in their active terrestrial phase. There will be **No direct loss of these habitats** or any other habitats suitable for toad.

Harm to Individuals moving Across Operational Areas

- 5.238 It is recommended that once the final crop is harvested on the arable land prior to commencement of extraction, that this land is maintained in a clear state free from vegetation to deter any toads (or other species) from entering. If this is not possible, then a phase clearance of any vegetation to be removed will be conducted. Here, the vegetation to be cleared will be searched by an experienced ecologist for any toads and any found will be moved to the retained habitat. The vegetation will then be cleared section by section towards the retained suitable habitat (Borrow Pits LWS and Brandshill Marsh LWS) to give the toads time to move back to this habitat.
- 5.239 Following these measures (which will be detailed within the Mitigation Proposals & CEMP), there is likely to be **No direct harm to individual toads** because of the Proposed Development.

**Restoration Impacts**

- 5.240 The Final Restoration Plan has the potential to be highly beneficial to toads due to the creation of large amounts of aquatic habitat in the form of fens, ponds, lakes, marshy grassland, and reed bed as well as new high quality terrestrial habitat in the form of scrub and species rich grassland. This will replace the low-quality arable habitats. This will be a **Moderate beneficial** impact.

**Harvest Mouse****Operational Impacts**Direct Land take (Habitat Loss)

- 5.241 There is potentially a small population of harvest mouse of less than Local value within the Site. They are a NERC S.41 species meaning that Local Authorities have a duty of care to these species.
- 5.242 The only habitat to be lost to the Proposed Development is the arable land which is highly unlikely to support harvest mouse. All suitable habitats will be retained. Thus, there will be **No direct habitat loss**.

Harm to Individuals moving Across Operational Areas

- 5.243 It is recommended that once the final crop is harvested on the arable land prior to commencement of extraction, that this land is maintained in a clear state free from vegetation to deter harvest mouse (or other species) from entering. If this is not possible, then a check of all vegetation on the arable land for harvest mouse nests will be completed by an experienced surveyor prior to any clearance. If nests are found, these will be moved by hand to the retained habitat.
- 5.244 Following these measures (which will be detailed within the Mitigation Proposals & CEMP), there is likely to be **No direct harm to individual harvest mice** because of the Proposed Development.



### Restoration Impacts

- 5.245 The Final Restoration Plan has the potential to be highly beneficial to harvest mouse due to the creation of large amounts of habitat in the form of fens, marshy grassland, and reed bed. This will replace the low-quality arable habitats. This will be a **Moderate beneficial** impact.

### Reptiles

#### Operational Impacts

##### Direct Land take (Habitat Loss)

- 5.246 There is potentially a small population of Less than Local value within the Site. They are a NERC S.41 species meaning that Local Authorities have a duty of care to these species and their protection under the Wildlife and Countryside Act prevents harm to individuals.
- 5.247 The only habitat to be lost to the Proposed Development is the arable land which is highly unlikely to support reptiles. All suitable habitats will be retained. Thus, there will be **No direct habitat loss**.

##### Harm to Individuals moving Across Operational Areas

- 5.248 The clearance methods detailed above for toads will also prevent harm to reptiles.
- 5.249 Following these measures (which will be detailed within the Mitigation Proposals & CEMP), there is likely to be **No direct harm to individual reptiles** because of the Proposed Development.

### Restoration Impacts

- 5.250 The Final Restoration Plan has the potential to be highly beneficial to reptiles, especially grass snake, due to the creation of large amounts of aquatic habitat in the form of fens, ponds, lakes, marshy grassland, and reed bed as well as new high quality terrestrial habitat for other common and widespread reptile species in the form of scrub and species rich grassland. This will replace the low-quality arable habitats. This will be a **Moderate beneficial** impact.

### Invasive Species

- 5.251 Invasive species have no ecological value themselves, but The Wildlife and Countryside Act provides for the control and management and offences in respect of invasive non-native species.
- 5.252 There is Himalayan balsam along hedgerow H5, 6 and 7 and within Barton in Fabis Pond and Drain, Barton Flash, Brandshill Marsh and the River Trent LWSs. There is *Azolla* (Mosquito fern) within Barrow Pits LWS (P1).
- 5.253 These habitats are to be retained within the Proposed Development and thus accidental spread during operation is unlikely.
- 5.254 As part of the detailed management plan for the existing habitats during operation, a treatment programme for the *Azolla* and Himalayan balsam will be devised with advice sought from relevant control companies to remove the species from the Site.
- 5.255 A continued management and monitoring programme will be included in the Management Plan Produced for the creation and maintenance of the habitats within the Site post development. This

will ensure the continued absence of these species on the Site and thus ensure there is no accidental spread of these species once the Site is open to public access.

## 6.0 CUMULATIVE IMPACTS

- 6.1 As requested in the submitted scoping request an assessment is required to determine the potential for cumulative impacts resulting from the following developments in conjunction with the current scheme:
- Planning Reference 18/00056/POUT. Clifton West Site. Currently at Reserve Matter Stage. This site lies immediately to the back of Clifton Woods.
  - Application reference 23/00674/PRES4. Site is referred to as Land Northern Parcel Between Clifton Wood and Clifton Phase 4 Development Yew Tree Lane, Nottingham. This is a revised scheme and comprises an application for the approval of reserved matters (site layout, scale, appearance, and landscaping) of outline planning application 18/00056/POUT (above) for 265 dwellings with associated internal road layout, car parking, drainage, and landscaping.
  - Planning Reference 14/01417/OUT Nottingham Gateway, Fairham Pastures development, Land East, and West of Nottingham Road South of Clifton. This was an outline application for the development of a sustainable urban extension comprising residential development up to a maximum of 3000 dwellings, employment development incorporating a maximum of 100,000sqm of B1, B2 & B8 floorspace, retail development (A1 to A5) up to a maximum of 2500sqm of floorspace, community buildings, leisure uses, schools, gypsy & traveller pitches, access to the site, new roads, footpaths & cycleways, green infrastructure including new community park, ancillary infrastructure & groundworks.
- 6.2 The Scoping decision and further correspondence from the planning officer, has also indicated a requirement to consider the following two additional developments located at Ratcliffe Power Station:
- Application reference 22/01339/LDO - Proposed development at Ratcliffe on Soar Power Station, Ratcliffe on Soar, Nottingham, NG11 0EE.
  - Application Reference SC/4569 Land Adjoining Ratcliffe Power Station Project –Prior extraction of gypsum within the Ratcliffe-on-Soar Local Development Order (LDO) area.
- 6.3 Regarding the latter two applications located at Ratcliffe Power station these are physically remote from the site and no cumulative effects are considered likely even on mobile faunal species.
- 6.4 The remaining sites lie in closer proximity. Concerns were originally raised for the Clifton West Site regarding recreational impacts on Clifton Woods Ancient Woodland and LNR and Clifton Fox Covert LWS. Concerns also appear to have related to bats involving loss of habitat and lighting effects. The potential for any significant in combination effects is unlikely given that the current scheme is at the planning stage and is phased with enhancements beyond that required for mitigation of impacts in the longer term. This last point is more relevant to the possible recreational impacts from adjacent housing attracting more local users of available open space, a consideration also relevant for the nearby Fairham Meadows development. The current scheme restoration plan provides more resilient connected habitats which would be expected to offset impacts from any increase in recreation. Whilst more access is provided as part of the restoration proposals the extent of the area and habitats provided would be expected to absorb any possible disturbance effects.
- 6.5 The Nottingham Gateway / Fairham site is currently under construction with several of the large business park buildings already built. There is an overlap between the current application in relation

to statutory and non-statutory nature conservation sites lying within 2 km, including Attenborough Nature Reserve, Brandshill Wood, Brandshill Grassland, Clifton Woods, Barton in Fabis Pond and Drain, Borrow Pits. All these sites have no direct pathways connected them to the Fairham site as these sites are isolated from the development by existing areas of open countryside and the urban environment.

- 6.6 Due to the two sites being physically separate possible in combination effects would be more likely to arise from mobile species reliant on the same habitats where habitat disturbance or loss coincides with the nearby development. Given the likely timings for approval of the current scheme and the Fairham development in construction with the nearby business park currently in construction fewer in combination effects would be considered likely to mobile species that might be displaced. Furthermore, both schemes are phased which would suggest that again any likely in combination effects would be significantly less likely.
- 6.7 As with the current scheme, features of importance (albeit limited in the case of Fairham Meadows) such as woodland hedgerows and wetland features are largely retained within the Fairham Meadows Application and impacts from direct habitat loss for birds and bats are not considered to lead to any significant impact on local populations. It is unlikely that any significant or measurable displacement would occur that could result in an in-combination effect as a result of habitat loss.
- 6.8 The farmland habitats at the Fairham site were found to support a range of overwintering bird species, the assemblage present being highly related to the agricultural regime operational within the site and could be expected to vary with crop rotation and the quantity and quality of set-a-side and the nature of the preceding crop. This is like the situation for the current scheme. The phased nature of both schemes allows some adjustment and utilisation of undeveloped areas which would minimise impacts to overwintering birds. Furthermore, the populations of overwintering birds within each development appear to be largely separate.
- 6.9 [REDACTED]
- 6.10 No significant in combination effects are identified.

### Summary Impact Assessment

- 6.11 Table 10: Summary Impacts

IEF	Value	Potential effect	Mitigation measures	Residual effect
<b>Operational Phase</b>				
<b>All Statutory Designations</b>  Attenborough Gravel Pit SSSI Holme Pit SSSI Glapton Wood LNR Trent Meadows LNR Clifton Grove, Clifton Wood and Holme Pit Pond LNR	National to County	Air Quality – dust deposition	Dust management Plan detailed in Chapter 6	Negligible
		Hydrological Changes - ground water changes	Mitigation measures including a recharge trench and clay barriers detailed in Chapter 2	Negligible
		Hydrological changes – changes in surface water quality	Discharges will be agreed with the Environment Agency to ensure acceptable water quality	Negligible
			An overall improvement through reduction in nutrient pollution because of the change from intensive agriculture	Minor beneficial
		Lighting of plant site and conveyor route	Proposed lighting scheme designed so as not to intrude or impact on any IEFs and wildlife using the site and immediate surrounds. Detailed in Chapter 7	None
		Noise Impacts	N/A - Predicted noise levels achieve the required noise limits set by relevant guidance and standards and would not exceed the maximum noise limit. Detailed in Chapter 5	None
Barton in Fabis Pond and drain LWS and Brandshill Marsh LWS	County	Direct Land take	Loss of small areas of habitat for conveyor route	Minor Temporary
<b>LWSs on or adjacent - County</b> Barton in Fabis Pond and drain Brandshill Marsh Borrow Pits Barton Flash Brandshill Grassland River Trent near Barton in Fabis Attenborough Nature Reserve Brandshill Wood Clifton Wood Burrows Farm Grassland Barton Ferry Wetland Holme Pit		Air Quality – dust deposition	As above	Negligible
		Hydrological Changes - ground water changes	As above	Negligible
		Hydrological changes – changes in surface water quality	As above	Negligible
			As above	Minor beneficial
		Lighting of plant site and conveyor route	As above	None
		Noise Impacts	As above	None
<b>Other LWSs – County</b> Clifton Fox Covert Barton in Fabis Fishing Pools Trent Carr Beeston Wier river deposits Clifton Grove		None	N/A	N/A

IEF	Value	Potential effect	Mitigation measures	Residual effect
Invasive Species	N/A	Operations causing spread and breach of legislation	Invasive Species Management Plan to be conditioned	None
Unimproved neutral grassland	County	As above for Brandshill Grassland LWS		
Ponds	County	As above for Brandshill Marsh LWS and Barton in Fabis Pond and Drain LWS		
Marshy grassland	County	As above for Brandshill Marsh LWS		
Wet woodland	County	As above for Brandshill Marsh LWS		
Wet woodland	Local	As above for Barton Flash LWS		
Semi improved neutral grassland	Local	No direct loss, No other hydrological or air quality impacts due to measures discussed above for statutory sites.		
Inundation vegetation	Local	As above for Barton Flash LWS		
Hedgerows	Local	94m Lost	N/A	Moderate adverse
		No other hydrological or air quality impacts due to measures discussed above for statutory sites.		
Invertebrates – wetland assemblage	Regional	No impacts on Borrow Pits LWS or Barton Flash LWS		None
Barn owl - roosting	Local	Noise disturbance in phase 4	General noise reduction measures as discussed above for statutory sites	Negligible
Barn owl - foraging	Local	Partial habitat loss	Enhancement of existing semi natural habitat	Minor adverse
		Lighting of plant area and conveyor route	As discussed above for statutory sites	Negligible
		Noise disturbance	As discussed above for statutory sites	Negligible
Breeding birds - arable, woodland and grassland assemblages	Local	Loss of arable habitat Partial loss of grassland	Enhancement of existing semi natural habitat	Minor adverse
		Noise disturbance	As above for statutory sites	Minor adverse temporary
		No lighting impacts as discussed above for statutory sites		None
Wintering birds – arable, woodland and grassland assemblages	Local	Loss of arable habitat Partial loss of grassland	Enhancement of existing semi natural habitat	Minor adverse temporary
		Noise disturbance	As above for statutory sites	Negligible
		No lighting or noise disturbance impacts as discussed above for statutory sites		None
Foraging and commuting bats	Local	Minor habitat loss	Enhancement of existing semi natural habitat	Negligible
		Lighting impacts	As above for statutory sites	None



IEF	Value	Potential effect	Mitigation measures	Residual effect
		Noise impacts	As above for statutory sites	None
Roosting Bats	Less than Local legislation consideration	Noise disturbance - breach of legislation – T1, 2 and 3	Update surveys to confirm if roosts are present – mitigation devised accordingly	None
		Removal of potential roosts – breach of legislation T4, 5 and 6	Update surveys to confirm if roosts are present – mitigation devised accordingly	None
Onsite outlier setts	Less than Local	Total loss – breach of legislation	License obtained from NE to close setts (except S6)	None
Otter	Local	Habitat loss	45m stand off from River Trent	None
		Noise or Lighting disturbance	As discussed above for Statutory sites	Negligible
Toads	Local	Habitat Loss	Retention of all semi-natural suitable habitat in design	None
		Harm to individuals from operations	Best practice measures in a CEMP applied	Negligible
<b>Restoration Phase</b>				
All Statutory and non-statutory Sites	National-County	Expansion of ecologically valuable habitats	Creation of extensive areas of Semi Natural Habitats including lakes, reedbeds, ponds, hedgerows, species rich neutral grassland and fens.	Moderate permanent beneficial
		Reduction in nutrient run off to surrounding water courses	N/A	Moderate permanent beneficial
		Increased resilience of habitats and species within the designations	Though creation of additional habitats	Moderate permanent beneficial
Invasive Species	N/A legislation	Breach in legislation	Ongoing management as part of the restoration to remove/control spread	None
All Habitats	County Local to	Expansion of ecologically valuable habitats	Creation of extensive areas of habitat including lakes, reedbeds, ponds, hedgerows, species rich neutral grassland and fens.	Major permanent beneficial

IEF	Value	Potential effect	Mitigation measures	Residual effect
		Reduction in nutrient run off to surrounding water courses	N/A	Major permanent beneficial
		Increased resilience of habitats and species within the designations	Though creation of additional habitats	Major permanent beneficial
Invertebrates – wetland assemblage	Regional	Expansion of valuable invertebrate habitats	Creation of lakes, reedbeds, ponds, species rich neutral grassland and fens.	Moderate permanent beneficial
		Reduction in nutrient run off to surrounding water courses	N/A	Moderate permanent beneficial
All Species	Local	Creation of extensive areas of habitats suitable for sheltering, breeding, and foraging	Including lakes, reedbeds, ponds, hedgerows species rich neutral grassland and fens.	Minor to Moderate permanent beneficial
		Increased resilience of species	Though creation of additional habitats	Moderate permanent beneficial
		Increase in recreational disturbance	Recreation to be managed through creation of footpaths, and signage and specific recreation areas	Negligible
		Loss of net terrestrial habitat (through creation of lakes)	Enhancement of remaining terrestrial habitat	Negligible

## 7.0 CONCLUSIONS

- 7.1 The suite of ecology surveys identified a range of important ecological features on Site and within its Zol. The impacts on these were assessed against the proposals for the extraction of sand and gravel at on land off Mill Hill, Barton-in-Fabis, Nottingham.
- 7.2 There are no internationally designated sites of ecological value within the potential Zol of the Site (15 km). Two national designations and three County designations lie within 2 km.
- 7.3 There are six non-statutory designations within the Site, five adjacent to the boundary and a further six within 1 km.
- 7.4 Habitats were categorised with enough information recorded to convert to UKHab habitat types. The principal habitat types present were mapped, and representative species lists compiled for each habitat. Surveys have confirmed that most of the site is under agricultural management. Six fields within the Site were under arable cultivation. Arable habitat was of less than Local value. Habitats of greater intrinsic value were largely contained within existing local wildlife sites.
- 7.5 The Site supports suitable terrestrial habitat for GCN, particularly in the wet ditches, scrub, woodland, ponds, neutral grassland, and fen vegetation. Results from eDNA surveys from all ponds were returned as negative. Great crested newt is considered likely to be absent from the Site and are not considered a constraint to development.
- 7.6 The Site is of no more than Local importance for its breeding farmland bird assemblage. Hedgerows, scrub, trees, and woodland areas on Site provided good breeding and foraging habitat for a variety of common and widespread generalist species. The assemblage recorded is typical of such habitat in the region and whilst the assemblage did include several notable species, all occurred in low numbers, and none are of conservation priority in Nottinghamshire as all are deemed Fairly Common to Abundant in the county.
- 7.7 The number of notable species within the wintering bird assemblage associated with the arable parcels is of Local conservation importance. The number of notable species within the wintering bird assemblage associated with the hedgerows, scrub, and trees is of Local conservation importance. The wintering assemblage associated with these grassland habitats is therefore considered to be of Local conservation importance.
- 7.8 The improved, poor semi-improved and marshy grassland and associated margins, along with the grassy banks along the River Trent, provided foraging opportunities for a variety of notable overwintering species though the Site was assessed as being of no more than Local importance for this grassland assemblage.
- 7.9 Areas of standing water supported a small and limited number of overwintering birds. There is substantially more optimal habitat in the surrounding area and thus the Site was assessed as being of Less than Local importance for the open water assemblage.
- 7.10 The wintering bird assemblage associated with neutral grassland habitats is of Local conservation importance.
- 7.11 The wintering bird assemblage associated with the aquatic habitats is of Less than Local level conservation importance.
- 7.12 A habitat suitability assessment was completed on the Site for barn owl prior to surveys which identified two areas that were of good potential, three areas of moderate potential and three areas

- of low potential habitat. The remainder of the Site was considered unsuitable foraging habitat for barn owl. A pair of barn owls were observed in a field in the northern extent of the site associated with an ash tree. Breeding was confirmed following closer observations. The single barn owl nest location gives the Site a Local importance for nesting barn owl. With areas of high and moderate suitability habitat for barn owl foraging in proximity to known nest sites giving the Site a Local level value for foraging barn owl.
- 7.13 The Site provides good quality foraging habitat for bats, the high-quality foraging habitat and the assemblage detected of at least eight species means that the assemblage of bats using the Site for foraging and commuting is of Local level importance.
- 7.14 There were six trees within the Site with potential to support roosting bats. Four trees are of moderate potential, with the remaining two of low potential. Aerial inspections have indicated these trees do not currently support roosts. One tree had been recorded to support a single noctule roosting. These trees are assessed as of less than Local value as bat roosts.
- 7.15 [REDACTED]
- 7.16 No evidence of water vole was recorded on either of the survey occasions. They are considered likely to be absent from the Site and are not considered further in this report.
- 7.17 No evidence of harvest mouse nests was recorded, though presence could not be entirely ruled out, if harvest mouse is present, it is in very low numbers and therefore unlikely to be a viable population. The population potentially present within the Site is likely to be of less than local value.
- 7.18 The banks of the River Trent have potential to support otter as part of a much wider territory and whilst no otter signs were recorded during survey it is assumed that otter use some of the shelter or resting places provided by the river banks on an occasional basis. Due to the abundance of habitat provided by the rest of the River Trent and by Attenborough Nature Reserve, the banks adjacent to the Site are only likely to be of Local level importance to otter.
- 7.19 The Site does support high quality habitat for grass snake especially around the ponds and wet ditches. Whilst no reptiles were recorded during the reptile surveys. It is still considered possible that very small numbers of grass snake are present within the Site due to the habitat suitability. This potential small population if present is of Less than local value.
- 7.20 The Site supports suitable breeding habitat for toads in the four water bodies and wet ditches on the Site and suitable terrestrial habitat surrounding these water bodies in the scrub, fen, woodland, and neutral grassland habitats. Woodland areas are likely to support hibernating individuals. A maximum count of 22 toads was recorded during the toad surveys. These were mostly located around a pond in the south of the Site. It is likely that toad hibernate within Brandshill Wood and were migrating to the pond to breed. This population is of Local value.
- 7.21 The invertebrate surveys identified a wetland assemblage of regional value in Barton Flash LWS and Borrow Pits LWS (P1). Necklace ground beetle *Carabus monilis* appears to have undergone a decline on the Site and is thus now considered to be of less than Local value on the Site with only one individual recorded.

- 7.22 The impact assessment has identified that certain actions could result in temporary negative impacts on identified Important Ecological Features without mitigation. Inherent avoidance, mitigation and compensation measures and the implementation of detailed mitigation proposals and an Ecology Management Plan are considered to ameliorate those impacts identified to a residual level where no significant negative effects are likely.
- 7.23 A combination of intrinsic mitigation, targeted mitigation, compensation, and enhancement detailed within this EclA and Appendices have demonstrated that the proposals will lead to minor to moderate or higher beneficial effects at local scale for habitats and faunal species.
- 7.24 There will be no direct land take of any of the statutory designations because of the Proposed Development.
- 7.25 The noise assessment, air quality & dust assessment, lighting and Hydrogeological and Hydrological Impact Assessment and Flood Risk have detailed the mitigation that will be implemented to ensure that these potential impacts are not significant on any of the statutory designations.
- 7.26 The Concept Restoration Plan for the Proposed Development will result in beneficial impacts on local statutory sites in the long term by increasing the number of similar types of habitats in the local area which, in turn, will increase the resilience of these habitats. Habitat to be created include lakes, reedbeds; ponds; hedgerows, species rich neutral grassland; and fens. Proposals will also provide additional habitat for the protected species that these statutory sites are designated for, and so can be expected to increase the resilience of these species' populations.
- 7.27 For Holme Pit SSSI, the creation of more extensive areas of new habitats primarily wetlands, and the reduction in intensive agriculture would be expected to improve water quality on the Site. New wetlands would be expected to remove nutrients from water arising from the site and immediate surrounds from entering the SSSI.
- 7.28 Direct impacts on non-statutory designations are limited. The noise assessment, air quality & dust assessment, lighting and Hydrogeological and Hydrological Impact Assessment and Flood Risk have detailed the mitigation that will be implemented to ensure that these potential impacts are not significant on any of the non- statutory designations.
- 7.29 The Concept Restoration Plan for the Proposed Development will result in beneficial impacts on adjacent non-statutory sites in the long term by increasing the number of similar types of habitats in the local area which, in turn, will increase the resilience of these habitats.
- 7.30 Minor beneficial impacts are expected for badgers because of the scheme. Minor -moderate beneficial impacts are expected for bats, and birds. Moderate benefits are expected for reptiles, otter, water vole, harvest mice, toad, and Barn owl. Restoration impacts for invertebrates are anticipated to be highly beneficial with the creation of significant wetland habitat in the form of open water habitats, and marshy grassland.
- 7.31 With the habitat retention, enhancement and creation following final restoration, the proposed scheme would provide 504.95 habitat units and 19.03 hedgerow units. That equates to a net gain in habitat units of 130.38 (34.81%) and a net gain in hedgerow units of 3.67 (23.86%).
- 7.32 The BNG assessment undertaken clearly shows that, subject to the implementation of a detailed Biodiversity Management Plan, the proposed scheme will deliver a significant net gain in biodiversity, beyond that required under the NPPF and local policy.