

6. Ecology

6.1 Introduction

6.1.1 This Chapter of the ES has been prepared by Paul Howden-Leach MCIEEM of Skyline Ecology to assess the effects of the proposed development on the ecology of the site and surrounding areas. Specialist surveys for breeding birds were undertaken by Baker Consultants (Appendix 6.4)

6.1.2 The chapter is supported by five technical appendices which are listed in Table 6.1.

Table 6.1: Table of Technical Appendices

Appendix number	Title
6.1	Phase 1 Habitat Survey
6.2	Bat Activity and Emergence Survey
6.3	Great Crested Newt Survey
6.4	Breeding Bird Survey
6.5	Biodiversity Net Gain Calculator

6.2 Assessment Approach

Previous Assessment

6.2.1 There have been a number of previous assessments undertaken in relation to the site. The previous reports are listed below and form part of the baseline for this assessment.

- Applied Ecological Services Ltd (September 2013) Bat Survey. Report to Hargreaves (UK) Services Ltd
- Applied Ecological Services Ltd (September 2013) Survey and Assessment for Great Crested Newt (*Triturus cristatus*) and other Amphibian species. Report to Hargreaves (UK) Services Ltd
- Applied Ecological Services Ltd (September 2016) Phase 1 Habitat Survey. Report to Monckton Power Ltd
- Applied Ecological Services Ltd (September 2013) Phase 1 Habitat Survey. Report to Hargreaves (UK) Services Ltd
- Applied Ecological Services Ltd (September 2013) Reptile Survey. Report to Hargreaves (UK) Services Ltd.

Legislation

6.2.2 This section of the study identifies key legislation and planning policy relating to ecology. Legislation for the protection of wildlife in the United Kingdom includes:

- The Wildlife and Countryside Act, 1981 (as amended).
- The Countryside and Rights of Way Act, 2000 (as amended).
- Natural Environment and Rural Communities Act. 2006.
- The Conservation of Habitats and Species Regulations, 2017 (as amended).
- The Hedgerow Regulations, 1997.
- The Protection of Badgers Act, 1992.

6.2.3 Discussion of this legislation is provided in relation to particular ecological features and fauna in the accompanying technical appendices.

National Planning Policy Framework

6.2.4 The National Planning Policy Framework (NPPF) came into effect in March 2012. It states that the planning system should seek to contribute to and enhance the natural and local environment by minimising impacts on biodiversity and provide net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity.

6.2.5 The Government launched new Planning Practice Guidance to support the NPPF in March 2014. The new Guidance on the Natural Environment (ID:8) states that information on biodiversity impacts and opportunities should inform all stages of development; it refers to guidance given in the Government Circular 06/2005 (ODPM, 2005) with regards to advice on protected species. Paragraph 99 of the Circular states "It is essential that the presence or otherwise of protected species, and the extent that they may be affected by the proposed development, is established before the planning permission is granted, otherwise all relevant material considerations may not have been addressed in making the decision."

6.2.6 The new Planning Practice Guidance reiterates section 40 of the NERC Act 2006, which places a duty on all public authorities in England and Wales to have regard, in the exercise of their functions, to the purpose of conserving biodiversity. Paragraph 117 of the NPPF also states that local authorities should seek to promote the preservation, restoration and re-creation of priority habitats and recovery of priority species populations, linked to national and local targets, through planning policies. Priority habitats and species referred to in the NPPF relate to species and habitats of principle importance listed in accordance with section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

Local Planning Policy**Barnsley District Local Plan**

6.2.7 The Barnsley District Local Plan was adopted in January 2019 and provides planning policy for Barnsley and surrounding areas including Royston from 2019 to 2033.

Policy GI1 Green Infrastructure

6.2.8 This Policy has relevance to the proposed project and partially to this ecology chapter. However, it is predominantly concerned with the landscape and visual elements of this document and has therefore also been addressed in other sections of this report. Policy GI1 is as follows:

We will protect, maintain, enhance and create an integrated network of connected and multifunctional Green Infrastructure assets that:

- *Provides attractive environments where people want to live, work, learn, play, visit and invest;*
- *Meets the environmental, social and economic needs of communities across the borough and the wider City Regions;*
- *Enhances the quality of life for present and future residents and visitors;*
- *Helps to meet the challenge of climate change;*
- *Enhances biodiversity and landscape character;*
- *Improves opportunities for recreation and tourism;*
- *Respects local distinctiveness and historical and cultural heritage;*
- *Maximises potential economic and social benefits; and*
- *Secures and improves linkages between green and blue spaces.*

At a strategic level Barnsley's Green Infrastructure network includes the following corridors which are shown on the Green Infrastructure Diagram:

- River Dearne Valley Corridor.
- River Dove Valley Corridor.
- River Don Valley Corridor.
- Dearne Valley Green Heart Corridor.
- Historic Landscape Corridor.

The network of Green Infrastructure will be secured by protecting open space, creating new open spaces as part of new development, and by using developer contributions to create and improve Green Infrastructure.

We have produced a Green Infrastructure Strategy for Barnsley which is informed by the Leeds City Region and South Yorkshire Green Infrastructure Strategies.

Policy GS1 Green Space

6.2.9 This Policy has relevance to the proposed project and partially to this ecology chapter. However, it is predominantly concerned with the recreation provision and has therefore also been addressed in other sections of the EIA. Policy GS1 is as follows:

We will work with partners to improve existing green space to meet the standards in our Green Space Strategy.

Green Spaces are green open areas which are valuable for amenity, recreation, wildlife or biodiversity and include types such as village greens, local open spaces, country parks, formal gardens, cemeteries, allotments, woodlands, recreation grounds, sports pitches and parks.

Proposals that result in the loss of green space, or land that was last used as green space, will not normally be allowed unless:

- An assessment shows that there is too much of that particular type of green space in the area which it serves and its loss would not affect the existing and potential green space needs of the borough; or*
- The proposal is for small scale facilities needed to support or improve the proper function of the green space; or*
- An appropriate replacement green space of equivalent or improved quality, quantity and accessibility is provided which would outweigh the loss.*

In order to improve the quantity, quality and value of green space provision we will require qualifying new residential developments to provide or contribute towards green space in line with the standards set out in the Green Space Strategy and in accordance with the requirements of the Infrastructure and Planning Obligations Policy. The Supplementary Planning Document 'Open Space Provision on New Housing Developments' offers guidance to developers on what will be expected in terms of open space provision in order to achieve those standards.

Where there is a requirement to provide new green space an assessment will be carried out to determine the most appropriate provision, taking into account site characteristics and constraints. In cases where it is deemed unsuitable to make provision for open space within or adjacent to a development site, suitable off-site open space facilities may be acceptable either as new facilities or improvements to those existing. Where appropriate new green space should secure access to adjacent areas of countryside.

Policy BIO1 Biodiversity and Geodiversity

6.2.10 Policy BIO1 States:

Development will be expected to conserve and enhance the biodiversity and geological features of the borough by:

- *Protecting and improving habitats, species, sites of ecological value and sites of geological value with particular regard to designated wildlife and geological sites of international, national and local significance, ancient woodland and species and habitats of principal importance identified via Section 41 of the Natural Environment & Rural Communities Act 2006 (for list of the species and habitats of principal importance) and in the Barnsley Biodiversity Action Plan.*
- *Maximising biodiversity and geodiversity opportunities in and around new developments.*
- *Conserving and enhancing the form, local character and distinctiveness of the boroughs natural assets such as the river corridors of the Don, the Dearne and Dove as natural flood plains and important strategic wildlife corridors.*
- *Proposals will be expected to have followed the national mitigation hierarchy (avoid, mitigate, compensate) which is used to evaluate the impacts of a development on biodiversity interest.*
- *Protecting ancient and veteran trees where identified.*
- *Encouraging provision of biodiversity enhancements.*

Development which may harm a biodiversity or geological feature or habitat, including ancient woodland and aged or veteran trees found outside ancient woodland, will not be permitted unless effective mitigation and/or compensatory measures can be ensured.

Development which adversely effects a European Site will not be permitted unless there is no alternative option and there are imperative reasons of overriding public interest (IROPI).

Biodiversity Action Plan (BAP) priority habitats & species

6.2.11 UK Biodiversity Action Plan (BAP) priority habitats and species are those that have been identified as being the most threatened and hence require conservation action under the UK BAP. The 'UK Post-2010 Biodiversity Framework' superseded the UK BAP in July 2012, however the lists of priority habitats and species are still in place.

6.2.12 Three UK BAP Priority habitats are relevant to this site. These include Ponds, Hedgerows and Open mosaic habitats on previously developed land. Table 6.2

Table 6.2: Relevant UK BAP Priority Habitats and Species

Species	Habitats
Noctule Bat Soprano Pipistrelle Bat Brown Long-eared Bat Brown Hare Slow Worm Common Toad Grass Snake Great Crested Newt Common Lizard House Sparrow	Ponds Hedgerows Open mosaic habitats on previously developed land

6.2.13 Barnsley Biodiversity Trust has developed Local Biodiversity Action Plans (LBAPs) which identify habitats and species of principal importance which are present in their region and which need to have specific conservation objectives and actions prepared, in line with the UK Post-2010 Biodiversity Framework (JNCC and DEFRA, 2012/25). These LBAPs for habitats and species are referred to where relevant in this assessment to assist with determining the level of importance/ evaluation of ecological features.

6.2.14 Table 6.3 lists the species and habitats included on the Barnsley Biodiversity Action Plan 2008-2012 (including revised sections as of 2018 updates available).

Table 6.1: Relevant LBAP Priority Habitats and Species

Species	Habitats
Bats (all species) Brown hare Hedgehog Kestrel Barn owl Great crested newt	Ponds Hedgerows Open mosaic habitats on previously developed land

Methodology

The methodology utilised for the survey works for the site have been split into three main areas: desktop study, habitat surveys and detailed faunal surveys. The methodologies for these surveys have been summarised below.

Desktop Study

6.2.15 Existing ecological information for the site and its surrounding area was requested from the Sheffield Biological Records Centre (SBRC), West Yorkshire Ecology (WYE) and South Yorkshire Bat Group (SYBG). Information relating to statutory and non-statutory designated sites, protected species and species of conservation importance was requested for the site and land up to 2 km from the site boundary. In this case, species of conservation importance were defined as species listed in accordance with Section 41 of the Natural Environment and Rural Communities (NERC) Act (2006). In addition, on-line resources including the Multi Agency Geographic Information for the Countryside (MAGIC) website (<http://magic.defra.gov.uk/>) and aerial photography of the area were also reviewed.

Habitat Surveys

6.2.16 An extended Phase 1 Ecological Survey was undertaken on 5th November 2019. However, as this is a suboptimal time for this survey type follow up surveys were undertaken throughout 2020. The site was walked and habitats were described and mapped using the Phase 1 Habitat Survey methodology. Target notes were also prepared on features of particular ecological interest and an assessment was made of the site's potential to support protected and notable species.

Faunal Surveys

6.2.17 Specific faunal surveys were carried out with specific focus on bats, great crested newts and birds. Table 6.4 below sets out the details on all survey methodologies and the associated report covering these works.

Table 6.4: Survey Methodologies

Survey	Survey Methodology	Date of Survey	Guidance
Bats (Building survey)	An assessment of the site's potential to support roosting bats was carried out by licenced bat ecologist Paul Howden-Leach MCIEEM. Buildings were inspected internally (where safe to do so) and externally for evidence indicating the presence of roosting bats or for features with the potential to provide bat roost habitats. Evidence indicating the presence of bats would normally include droppings, characteristic staining, scratch-marks or the presence of live or dead bats.	November 2019	Collins J (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3 rd edn). The Bat Conservation Trust, London. Hundt, L (2012) Bat Surveys: Good Practice Guidelines, 2 nd Edition, Bat Conservation Trust. JNCC (2004) Bat Workers Manual. Mitchell-Jones, A J (2004) Bat mitigation Guidelines. English Nature.
Bats (Activity Survey)	A series of dusk activity surveys were undertaken across the site, to gather information on the use of the site by foraging and commuting bats. These involved surveyors walking a predetermined transect route and recording all bat activity. The transect route was designed to cover all the habitat types within the survey area. Listening Points (LPs) were incorporated into the transect where surveyors paused along the route for five minutes. In addition, static detectors were deployed around the site to assess activity levels.	Transects April to July 2020, one survey per month Static detectors: April to July 2020, five nights per month at two locations	Collins J (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3 rd edn). The Bat Conservation Trust, London. Hundt, L (2012) Bat Surveys: Good Practice Guidelines, 2 nd Edition, Bat Conservation Trust. JNCC (2004) Bat Workers Manual. Mitchell-Jones, A J (2004) Bat mitigation Guidelines. English Nature.
Badger	The entire survey area was surveyed for evidence of Badger setts and activity, including presence of well-worn paths, push-throughs, snagged hair, footprints, latrines and foraging signs.	November 2019 to July 2020	Natural England Standing Advice: Badger
Great Crested Newt	Accessible waterbodies within 500m of the site were assessed for their potential to support Great Crested Newts using the Habitat Suitability Index methodology. Following this, eight waterbodies were subject to presence/absence survey in accordance with guidance. Where Great Crested Newt were recorded,	March to June 2020	Oldham RS, Keeble J, Swan MJS & Jeffcote M (2000) 'Evaluating the suitability of habitat for the Great Crested Newt (<i>Triturus cristatus</i>)'. Herpetological Journal 10 (4), 143-155 'Great Crested Newt Mitigation Guidelines' English Nature (2001)

Survey	Survey Methodology	Date of Survey	Guidance
	further survey was undertaken on three ponds to assess the size of the population.		
Breeding Bird Survey	Three breeding bird surveys were carried out across the site in suitable weather conditions. The surveys broadly followed the 'Common Bird Census' method and involve walking the Site during the bird breeding season, while watching and listening for birds. The location and behavior of every bird recorded during each survey was mapped using a standardised system of notation. The surveyor assessed all habitats on the Site for evidence of breeding birds, including specific features such as buildings which may be used by species such as barn owl. The visits were made early morning when birds are most active.	April to June 2020	Marchant, J.H. (1983). Common Bird Census Instructions. British Trust for Ornithology, Tring.

Assessment Criteria

6.2.18 The approach taken in this report is based on that described by the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Impact Assessment (2018).

6.2.19 Baseline conditions will be described, including a summary of legislation/ policy relevant to the baseline conditions, and subsequently the assessment will include avoidance and mitigation measures that are embedded within the design, or in inherent construction methods.

6.2.20 Features of ecological value within or near the site that may be impacted by the proposed development will be identified based on the results of the baseline surveys. The values of the identified ecological receptors will be assessed and classified according to the following scale:

- International
- United Kingdom (UK)
- National (i.e., England/Northern Ireland/Scotland/Wales)
- Regional
- County
- District (or Unitary Authority, City or Borough)
- Local (or Parish)
- Site (within immediate zone of influence only)

6.2.21 Where possible, formal criteria will be used to set features of conservation importance within this geographical hierarchy. For example, the Guidelines for the Selection of Biological Sites of Special Scientific Interest (SSSIs) (Nature Conservancy Council, 1989) will be used where appropriate to assess features at the national level.

6.2.22 In order to assess the impact significance of the proposed development on the identified receptors, the characteristics of each identified impact at the construction and operational stages will be described using the following:

- Direction (positive, negative or neutral impact);
- Magnitude (the amount or level of impact);
- Extent (area in hectares, linear metres);
- Duration (in time or related to species life-cycles);
- Reversibility (permanent or temporary impact);
- Timing and frequency (e.g. related to breeding seasons); and
- Cumulative impacts (from a number of different sources).

6.2.23 CIEEM guidance states that impacts should be determined as being significant when they have an adverse or positive effect *"on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area"*. The integrity of a site or ecosystem is defined as *"the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified"*.

6.2.24 The concept of 'conservation status' is used to determine the significance of ecological impacts on a habitat or species. Conservation status is determined by the sum of the influences acting on the habitat and/or species that may affect its long-term distribution, structure, abundance and functions within a given geographical area. Identified impacts may be significant at the level of importance defined for the receptor, or at a lesser geographical scale. For example, limited impacts on woodland of County value might be assessed as being significant at a District level.

6.2.25 Using this information together with professional judgment, it will be determined whether the effects will be significant or not for the integrity (of site/ecosystems) or conservation status (of habitats/species) of each ecological feature.

6.2.26 The impact significance will be determined at the appropriate geographical scale. Neutral impacts have no level of significance applied to them. In summary, therefore, impacts are assigned to one of three possible significance 'options':

- Adverse impact, significant at [geographical, e.g. SITE] level
- Neutral impact, not significant
- Positive impact, significant at [geographical, e.g. SITE] level

Scoping and Consultation Responses

Barnsley Biodiversity Officer

6.2.27 Prior to any faunal surveys the Barnsley Biodiversity officer was consulted regarding potential survey requirements and broad habitat retention and enhancement.

It was agreed that the following surveys should be completed in order to inform this document:

- Consultation with Barnsley Bird Study Group
- Breeding bird survey
- Bat activity survey
- Great crested newt survey

6.2.28 Due to the high disturbance of the site through on going activities, it was agreed that reptile surveys of the site were not necessary, but that some reptile use of the site should be assumed, with the main focus of reptiles being within habitats surrounding the study site.

6.2.29 Areas which the LPA would like to see enhanced were also discussed. In brief, areas which could be retained or enhanced as part of the biodiversity scheme include:

- The woodland belt to the north of the site;
- All external boundaries;
- The area of scrub to the north east which connects directly with Rabbit Ings Country Park; and
- The area around the water treatment works to the south of the site.

6.2.30 Other discussions included appropriate mitigation for species including birds, with specific reference to willow tit and barn owl, although general enhancement of nesting provision for birds was also discussed. Further to this, the provision of wetland habitat in the form of ponds to replace any existing habitat loss within the site and to provide connectivity throughout the site, was discussed.

Barnsley Bird Study Group

6.2.31 Baker Consultants Ltd consulted with Geoff Carr of Barnsley Bird Study Group in May 2020. The discussions focussed on notable birds within the local area. No specific records or recent sightings of notable birds were known within the proposed development site. A large amount of information was provided regarding notable bird's species within Rabbit Ings Country Park, this included barn owl nesting locations and recent trends in willow tit breeding territories.

Limitations of the assessment

Great crested newts

6.2.32 Due to the impacts of Covid-19 a number of survey methods could not be completed to current standards. These methodologies refer to the undertaking of bottle trapping on ponds in and around the site as ecologists could not safely complete these tasks and return the following morning safely. This constraint is not thought to be significant as ponds associated with the Country Park could not be bottle trapped as these are located in public open space and therefore may be tampered with resulting in death or injury to great crested newts. Further to this, the lagoons located on site could not be trapped as these are concrete lined.

6.2.33 In order to compensate for this, data for an adjacent development was shared and used to back up data collected during the survey undertaken by Skyline Ecology.

Bat activity survey

6.2.34 At the time of writing only four out of the six activity surveys have been completed for the site. The results of surveys to date have been considered, further surveys will be on-going until September 2020, therefore the assessment for bats have been based on the four transect surveys and static detector deployments to date. Based on data recorded on site to date, a definite pattern of low bat usage has been recorded. As this level of bat usage cannot be confirmed until all surveys have been completed a precautionary approach to the assessment and mitigation has been employed to remove this limitation to the assessment.

6.3 Baseline Conditions

Ecological Designations

6.3.1 Ecological designations that occur within the local area are described in details within tables 6.5 and 6.6.

Table 6.5: National Designated sites within 5km

Site Name	Designation	Description	Distance	Direction
Seckar Wood	SSSI	Broadleaved, mixed and Yew woodland - Lowland	4.1km	North-west
Carlton Main Brickworks	SSSI	An operational clay pit, designated for its unique geological interest	5km	South-east

Table 6.6: Other designated sites within 2km

Site Name	Designation	Description	Distance	Direction
Barnsley Canal	LWS SSI	The site is narrow but diverse mix of species (134 vascular plants) and habitats including hedgerows, swamp, open water, and reedbeds. The site is an important connective feature in the landscape providing a natural corridor.	50m	West
Carlton Marsh	LWS LNR	The site is important for its mosaic of wetland areas, grassland and scrub/wood habitat. Water voles as well as a number of wintering birds including bittern are present within the marsh. Ancient woodland indicator plant species have also been recorded within the site.	1.5km	South
Bush Wood	LWS	The site is designated for its mixed habitat including unimproved neutral and dry acid grasslands open swamp	1.0km	North-east

Site Name	Designation	Description	Distance	Direction
		and semi-natural woodland as well as bare ground communities		
Chevet Branch Line	LWS LNR	A disused railway line which has developed a mix of acid and wet woodland.	1.3km	North-west
Ellis Laithe	LWS	A former open cast quarry subject to a restoration scheme. The site has been designated for its areas of open grassland and areas of mature oak and wet woodland. In addition, adders tongue fern <i>Ophioglossum vulgatum</i> has been recorded within the site.	Adjoining	East
Wintersett and Cold Hiendley Reservoirs and Barnsley Canal	LWS	The site is an area of open reservoirs, ponds and former canal. The area is wooded with areas of open grassland and fen communities. The site supports nine species of bats as well as a wide range of breeding birds.	2km	North

Habitats

6.3.2 The site contains a number of habitats which reflect the sites current and historic use. A full description of each habitat type can be found in Appendix 6.1 and a summary has been listed in Table 6.7 below.

Table 6.7: Habitats recorded within the study site

Phase 1 Habitat type	Description
Broad-leaved woodland	The majority of the broadleaved woodland is located around the perimeter of the study site and is generally young birch dominated woodland which has recently succeeded from a scrub habitat. To the north west of the site is a long strip of woodland which is dominated by silver birch, other species include dog rose <i>Rosa canina</i>, bramble <i>Rubus fruticosus</i> agg., broad-leaved willowherb <i>Epilobium montanum</i>, cocksfoot <i>Dactylis glomerata</i>, oak <i>Quercus robur</i>, willow <i>Salix</i> Sp., hawthorn <i>Crataegus monogyna</i>, hazel <i>Corylus avellana</i>, field maple <i>Acer campestre</i>, Yorkshire fog <i>Holcus lanatus</i> and young pine <i>Pinus</i> sp. This part of the site links directly with the rail corridor and the neighbouring former canal. This appears to be the most mature woodland within the study site. The woodland located on the northern boundary and north eastern corner of the main coke works is similar in make up to the woodland above. The woodland is again dominated by silver birch with white poplar <i>Populus alba</i> being present in the north, which is more akin to a planting buffer, and willow becoming more prevalent to the east, where the site appears to be wetter. Other species associated

Phase 1 Habitat type	Description
	with these wet areas include pendulous sedge <i>Carex pendula</i> and hard rush <i>Juncus inflexus</i>. Also, within the eastern section of the woodland there are species within the ground flora which suggest that this part of the site has recently succeeded from grassland habitat with species such as cow parsley <i>Anthriscus sylvestris</i> and Yarrow <i>Achillea millefolium</i> being present within the understory. Other species recorded include bramble, hawthorn, nettle, cocksfoot, dog rose and ivy <i>Hedera helix</i>. To the south of the study site located close to the water treatment works is an area of plantation woodland. The woodland was planted approximately 25 years ago and has been done so for wildlife purposes rather than commercial timber. As such there is a wide mix of tree species within the plantation. Species recorded include Alder <i>Alnus gomerata</i>, silver birch, pine, European larch <i>Larix decidua</i>, willow, blackthorn <i>Prunus spinose</i> and dog rose. Much of this part of the site is densely vegetated and therefore access into all areas of the site could not be fully gained.
Scrub	Throughout the areas of rubble are a number of areas of scattered scrub, these are predominantly dominated by buddleia <i>Buddleja davidii</i>. The main area of scrub is located within a steep valley to the south of the site, to the north west of the water treatment works and is mainly dominated by hawthorn and blackthorn. Along the western boundary of the site is a line of stacked tyres which appear to have been used as planters. The tyres continue for a length of approximately 150 metres and have been vegetated by a scrub/ hedgerow type of feature, which is mainly dominated by silver birch, hawthorn and blackthorn.
Tall Ruderals	In the north eastern corner of the site is a grassland area which is succeeding into tall ruderal and scrub. This area is probably the most botanically diverse part of the site because of the mix of habitats. Species recorded in this area include black knapweed <i>Centaurea nigra</i>, yarrow, ribwort plantain <i>Plantago lanceolate</i>, creeping thistle <i>Cirsium arvense</i>, creeping buttercup <i>Ranunculus repens</i>, weld <i>Reseda luteola</i>, daisy <i>Bellis perennis</i>, selfheal <i>Prunella vulgaris</i>, St John's wort, False oat grass <i>Arrhenatherum elatius</i>, canary reed grass <i>Phalaris arundinacea</i>, ragwort <i>Senecio jacobaea</i> and teasel <i>Dipsacus fullonum</i>. To the south of the bare ground and coke works is a bank dominated by tall ruderals. This is located adjacent to the plantation woodland to the south of the site. Species recorded include cocksfoot, creeping thistle, broad-leaved dock <i>Rumex obtusifolius</i>, teasel, nettle, rosebay willowherb <i>Chamerion angustifolium</i>, coltsfoot <i>Tussilago farfara</i> and ribwort plantain. Towards the west of the site, close to the mobile phone mast is a mosaic of tall ruderal and scatter scrub. Species recorded in this area include tansy <i>Tanacetum vulgare</i>, broad-leaved dock, mugwort <i>Artemisia vulgaris</i>, daisy, silverweed <i>Argentina anserine</i>, bramble,

Phase 1 Habitat type	Description
	nettle, silver birch and cocksfoot.
Semi-improved and Marshy grassland	Grassland is limited within the study site, this is likely due to lack of management on site and as such the majority of grassland is currently succeeding into tall ruderal or scrub habitat. The north east corner of the site has small patches of marshy grassland which is succeeding into tall ruderals and scrub. To the east of the site what would have once been formal amenity grassland have now become rank grasslands. These two small patches of grass are made up of cocksfoot, false oat grass <i>Arrhenatherum elatius</i>, spear thistle, cat's ear <i>Hypochaeris</i> sp., yarrow, great mullein, mugwort, creeping buttercup and ragwort <i>Senecio jacobaea</i>. At the south western corner of the study site (separated by the railway track), is an area of semi-improved grassland. It appears that this is part of a former tip and has been capped. The grassland appears to have been grazed as the sward is extremely short, making identification of species difficult. Species recorded in this area include selfheal <i>prunella vulgaris</i>, ribwort plantain, white clover, bent grass <i>Agrostis</i> sp., Yorkshire fog, spear thistle, ragwort, creeping buttercup and oxeye daisy <i>Leucanthemum vulgare</i>.
Open water	Within the study site there are five waterbodies identified within the boundary of the study site, after the initial phase 1 habitat survey two of these ponds became dry and did not hold water during follow up surveys in 2020. The remaining three waterbodies consists of two settling lagoons located to the north of the site and an area of marsh grassland in the north eastern corner. The lagoons have steep sided brick walls and are fenced on all sides. Vegetation within the ponds was limited to broad-leaved pondweed <i>Potamogeton natans</i>, Around the pond are areas of tall grassland/ruderals, and scattered scrub, with a number of rubble piles and associated debris. The area of marshy grassland to the north east of the site has an area of open water within beneath young willow scrub. The pond is very shallow and became dry during May 2020.
Bare Ground	Much of the site is dominated by bare ground which is of limited ecological interest. The bare ground is a result of storage areas within the former coke works or of previously demolished buildings. The only plants recorded within these areas are great mullein and buddleia scrub.
Buildings	The buildings on site are of limited ecological interest. Details on the building survey can be found within the fauna section of this report

Vascular Plants

6.3.3 There were no plant species of conservation interest recorded on site during the 2019 Phase 1 habitat survey, and none were recorded during subsequent visits in 2019.

6.3.4 It has been noted however that Ellis Laithe LWS contains abundant adder's tongue fern *Ophioglossum vulgatum* which is a regionally uncommon plant, and is located adjacent to the most northern tip of the study site. Adder's tongue fern, nor any other Schedule 8 plant (Wildlife and Countryside Act, 1981, as amended) have been recorded within the study site.

Invasive non-native species

6.3.5 A single stand of Japanese knotweed *Fallopia japonica* which is a Schedule 9 (Wildlife and Countryside Act, 1981, as amended) plant was recorded close to the south west boundary of the site, within an area of garages. Although the plant was recorded outside of the study site, its location is such that it should be considered as part of this report.

SpeciesBats

6.3.6 SYBG provided a total of 71 bat records for the search area. A large proportion of these are for records associated with Carlton Marsh and were for Pipistrelle species *Pipistrellus* Sp. and noctule bats *Nyctalus noctule*. The largest roost within the search area is for 57 bats located approximately 200 metres to the east of the study site. Species recorded within the search area include Leisler's bat *Nyctalus leisleri*, common pipistrelle bat *Pipistrellus pipistrellus*, Whiskered/Brant's bat *Myotis mystacinus/Brandtii*, Daubenton's bat *Myotis daubentonii* and brown long-eared bat *Plecotus auritus*.

6.3.7 SBRC provided 140 records of bat within the search area. The majority of these are for Carlton Marsh LNR located approximately 1.5km to the south of the site, Rabbit Ings Country Park located 150 metres to the east of the site and Cudworth, approximately 240 metres to the east. A number of roosts were recorded within the search area. Only three roosts were recorded by SBRC, the closest of which is for a single unknown bat species 600 metres to the west of the study site.

6.3.8 West Yorkshire Bat Group (WYBG) provided eight records for the search area the closest of which is for a common pipistrelle maternity roost located approximately 750 metres south of the study site. Only *Pipistrellus* and *vespertilionidae* species were identified within the data search.

Bats (Roosting potential)

6.3.9 Bat roost assessments were undertaken in 2019 of all buildings within the study site. The majority of these buildings offered negligible bat roosting potential. This was due to a number of factors: either the buildings were well sealed and of modern construction so that no bats could access the building; or the building was in such a state of disrepair (e.g. roof missing) that they offered no roosting opportunities.

6.3.10 The assessment of the buildings identified Building 1 as having low potential to support roosting. Feature identified were areas of lifted roofing felt around the edge of the building which during the daytime inspection may have the potential to support small number of crevice-dwelling bats. An emergence survey was completed in June 2020 and no bats were observed emerging from the building.

6.3.11 Within the Bat survey prepared by Applied Ecological Services Ltd (2013) a single tree was identified as having bat roosting potential. Recommendations within the report stated that the tree was retained. The tree in question is located outside of the survey area for the proposed works and therefore has been disregarded in this assessment. A walkover of the site did not identify any trees with bat roosting potential. Many of the trees within the survey area are young and have not developed natural cavities or fissures for support roosting bats.

Bats Activity - Transects

6.3.12 Bat transects recorded a species assemblage of three species using the site, common pipistrelle, bat, noctule bat and Daubenton's bat, with the majority of the calls being attributed to noctule and then common pipistrelle bat. The transects in general were found to have low bat activity, with large areas on the site containing no bat passes at all.

6.3.13 The majority of the bat transect activity is concentrated around the lagoons and woodland to the north, where noctule bats were recorded feeding in this area, above the tree line. Common pipistrelle bats were also recorded here, feeding over the lagoons as well as close to the water treatment works to the south of the site.

6.3.14 Currently the average number of bat passes per transect equated to 14.75 bat passes per night which is classed as being low level activity.

Bat Activity – Static Detectors

6.3.15 The two static detectors which were placed within a number of locations within the site showed low levels of bat activity, seven species were recorded during the current deployments in 2020. Species recorded were common pipistrelle, soprano pipistrelle (small numbers only), Noctule bat, Leisler's bat, brown long-eared bat (low numbers only), Nathusius pipistrelle (only two calls recorded on one night) and *Myotis* species. The average number of bat passes per night was 43 which is considered to be low. In general, static bat detectors were placed in areas which were predicted to have the highest levels of bat activity. These were generally along areas of dense vegetation, linear features such as green boundaries and potential feeding areas.

Badgers

6.3.16 SBRC provided two records of badger *Meles meles* for the search area, the closest of which is associated with Rabbit Ings Country Park. An exact grid reference has not been provided for these records.

6.3.17 No evidence of badger was recorded during the survey.

Amphibians

6.3.18 SBRC provided 100 records of amphibians for the search area, of these 47 are for common toad *Bufo bufo*, and seven are for great crested newts *Triturus cristatus* the closest of which appears to be 50 metres to the east of the site at Rabbit Ings Country Park.

6.3.19 WYE provided 61 records of amphibian for the search area which include common toad, common frog, smooth newt and great crested newts. All of these records have been recorded over 1km from the study site.

6.3.20 An amphibian survey of the site and surrounding areas identified three ponds within the area which supported great crested newts. All of these ponds are located

within Rabbit Ings Country Park. The closest pond to the study site lies 40 metres from the eastern boundary and has direct connectivity to the site via an underpass. The population of great crested newts within the survey area was thought to be a medium meta population.

6.3.21 Within the study site, five ponds were identified, of these two were completely dry throughout the duration of the site surveys (March to June) and another pond gradually dried as the surveys were being conducted. The two water bodies which remained are former settling lagoons. The larger of the two lagoons contained large numbers (over 150) of smooth newts and a single toad was found beneath rubble, close to the lagoons. No great crested newts were found on site.

6.3.22 The location of the ponds and surrounding terrestrial habitat provides good habitat for amphibians. Even though great crested newts were not found on site during these most recent surveys, they have been recorded in the past and are likely to be using some of the terrestrial habitat within and around the site.

Reptiles

6.3.23 SBRC provided 32 records of reptile for the search area, all of which are for grass snake, the majority of these are for Carlton Marsh LWS located approximately 1.5KM to the south of the study site. The closest records are for Rabbit Ings Country Park located 150 metres to the east and a single record for Barnsley Canal located approximately 900 metres to the south. It should be noted that the former Barnsley Canal is located approximately 50 metres from the western boundary of the study site, and it is likely that reptiles would use the length of both the rail and canal corridor.

6.3.24 WYE did not provide any records of reptile for the survey area.

6.3.25 Previous surveys carried out on the site by AES Ltd. recorded a single grass snake in the north eastern corner of the site, where there is an area of marshy grassland present. No other reptile records were noted as part of the survey. It should be noted that the area where the grass snake was found links directly with Rabbit Ings Country Park, where a number of grass snakes have been recorded in the past.

6.3.26 The site provides ideal habitat for reptiles. Much of the southern part of the existing coke works has numerous rubble piles as a result of buildings being demolished, this provides excellent refugia and basking opportunities. Ponds which are located to the north of the coke works also have rubble piles adjacent, these features also link directly to the rail corridor, broad-leaved woodland and Barnsley Canal (where records of grass snake have been previously recorded).

6.3.27 Further to the refugia recorded on site, some of the rubble piles have been mixed with soil and are now becoming vegetated. These piles make ideal hibernacula for reptiles. The majority of these are located within the areas of bare ground.

6.3.28 Although the site does provide habitat for reptiles the majority of the site is active and therefore subject to high levels of disturbance. Reptiles are likely therefore, to be confined within areas less subjected to these large disturbances, such as the western boundary and the northern and southern parts of the site, where there is direct connectivity with other habitats associated with reptiles such as wetland, grassland and wooded areas.

Breeding Birds

6.3.29 The desk study returned a substantial number of records covering 131 bird species (a total of 7690 records dated 1975 to 2018) within the 2km study area. None of

the records were from within or immediately adjacent to the Site, and there is limited suitable breeding habitat for a large number of these species on Site. The vast majority of records are from Carlton Marsh Reserve which is located 1.8km south of the Site and Rabbit Ing Country Park which is located directly east of the Site.

6.3.30 The most relevant nearby notable records, given the available habitats on Site, includes barn owl *Tyto alba* (the most recent being 2017), little ringed plover *Charadrius dubius* (2003), peregrine falcon *Falco peregrinus* (2015), and willow tit *Poecile montanus* (2018).

6.3.31 A total of 35 species of birds were recorded during the site surveys, of which 1 species (feral pigeon *Columba livia domestica*) was confirmed to be breeding, 14 probably breeding and 9 possibly breeding. 12 species were considered to be non-breeding visitors.

6.3.32 The Birds of Conservation Concern initiative (Eaton et al., 2015) publishes lists of Red and Amber species. Birds on the Red list are of high conservation concern within the UK, while those on the Amber list are of medium conservation concern. Of the confirmed and probable breeding species, bullfinch *Pyrrhula pyrrhula*, dunnoek *Prunella modularis*, kestrel *Falco tinnunculus* and willow warbler *Phylloscopus trochilus* are amber-listed and song thrush *Turdus philomelos* is red-listed.

6.3.33 Barn owl was recorded on site during the first two surveys. On both occasions a single bird emerged from a fairly modern prefabricated building located within the north western part of the site. The building is well used by barn owl with over 100 pellets of various ages recorded on the ground throughout the structure. A thorough survey of the building found no suitable barn owl nesting features and it was concluded that the building is a roost site to barn owl only.

6.3.34 In general, the mix of species and numbers of birds is typical of that found in scrub, woodland and post-industrial wasteland in England.

6.3.35 Those habitats with the greatest value to breeding birds within the application area are the woodland to the north and the boundary scrub habitats, particularly those connecting to woodland in the north and the railway embankment to the west. These habitats support confirmed and probable breeding birds of higher conservation concern but are also considered to serve as important connective habitat linking to the wider landscape.

6.3.36 To assess the overall breeding bird assemblage, a published method for assessing the ornithological interest of sites has been used, whereby the importance of a site is defined by the number of breeding species present. These have been adapted to fit the geographical levels used by CIEEM, and also to reflect ongoing declines in bird populations. It is these adapted criteria that are shown in Table 6.8 below.

Table 6.8: Geographical assessment of breeding bird assemblage

Number of breeding bird species	Site importance
<13	Site
13-25	Local
25 – 49	District
50 – 69	County
70 – 84	Regional
>85	National

6.3.37 A total of 15 species have been assessed as either confirmed or probably breeding on the site, with a further 9 possibly breeding. Using the adapted version of

Fuller's criteria, the site is therefore considered to be of Local importance. Weight is added to this evaluation by the fact that of those species possibly, probably or confirmed to be breeding on the site three of are red-listed species of high conservation concern and a further five are amber-listed species of moderate conservation concern. In addition, Barn owl which is listed as a Schedule 1 species under the WCA has been found to roost on site.

Evaluation and selection of Key Ecological Receptors

6.3.38 The impact assessment of likely significant effects (Section 6.4) will focus on the designated sites, habitats and species which have either been confirmed as being present or where the study site falls within their zone of influence. These have been termed as 'ecological receptors'.

6.3.39 In some cases a number of these features can be scoped out from further assessment due to unlikely impact or lack of significant effects. Table 6.9 below sets out why these ecological receptors have been excluded from this study.

Table 6.9: Sites, Habitats and Species Scoped out of this Assessment

Feature to be scoped from assessment	Location (on/off site)	Justification
Seckar Wood SSSI	4.1km NW of site	The site has no direct ecological connectivity to the study site. In addition, habitats found within the SSSI (Broadleaved, mixed and Yew woodland – Lowland) are not represented within the study site.
Carlton Main Brickworks SSSI	5km SE of site	The site has no direct ecological connectivity with the site nor is the site designated for its ecology but rather for its unique geological interest.
Bush Wood LWS	1km NE of site	Limited ecological connectivity due to distance from site and connectivity (Opposite side of B6428)
Wintersett and Cold Hiendley Reservoirs and Barnsley Canal LWS	2km N of site	Limited ecological connectivity due to distance.
Dense and scattered scrub	On site	Not a habitat of intrinsic interest but will be assessed in relation to species it supports e.g birds.
Tall ruderals	On site	Not a habitat of intrinsic interest but will be assessed in relation to species it supports e.g birds.
Hard standing	On site	Not a habitat of ecological interest.
Badgers	N/A	No evidence of badgers has been found on or around the study site.

6.3.40 Table 6.10 shows ecological receptors which have been assessed as part of this report. The designated sites, habitats and species within Table xxx have been taken forward to the impact assessment section of this report

Table 6.10: Evaluation of Key Ecological Receptors

Receptor	Reason for assessment	Evaluation
Barnsley Canal LWS & SSI	The designation of this site as an LWS recognises it as local value	Local
Carlton Marsh LWS & LNR	The designation of this site as an LWS recognises it as local value	Local
Chevet Branch Line LWS	The designation of this site as an LWS recognises it as local value	Local
Ellis Laithe LWS	The designation of this site as an LWS recognises it as local value	Local
Mixed broad-leaved woodland and trees	The woodlands on site are either plantation or secondary woodland. The finger of woodland to the north has been identified on the Barnsley MBC LBAP habitat map.	Local
Open water	Water bodies are restricted within the site but are prevalent within the local area. The water bodies on site do not support more than two amphibian species and a limited plant diversity but are part of the UKBAP and LBAP priority habitats.	Local
Grassland	The majority of grassland on site is common with limited species diversity. The most diverse grasslands within the site is a small area of wet grassland which has almost been lost due to scrub and tall ruderal encroachment. None of the grassland on site fall within a priority habitat or qualify for LWS site selection criteria.	Less than local
Bats	Fully protected as a European Protected Species under the Habitat Regulations and all bat species are listed under the UKBAP and LBAP. No roosts found on site, and activity levels for bats were classed as low, with a small concentration of activity around the woodland to the north and lagoons.	Local
Amphibians	Great crested newt found adjacent to the site which are fully protected under the Habitat Regulation and are listed under the UKBAP and LPBAP. Other species found on site such as common toad protected under the WCA, whereas smooth newts are afforded limited protection under the WCA.	Local

Receptor	Reason for assessment	Evaluation
	As well as smooth newts being found in the lagoon and toads being recorded terrestrially. There is the potential for great crested newts to also use some of the terrestrial features within the study site.	
Reptiles	Afforded limited protection under the WCA and likely restricted to the fringes of the proposed development site. More likely to occur on adjacent land.	Local
Birds	A total of 35 species of birds was recorded during the site surveys. Of the confirmed and probable breeding species, dunnock, bullfinch, kestrel, willow warbler are amber-listed and song thrush is red-listed under the Birds of Conservation Concern initiative. Barn owl is schedule 1 species under WCA, and although not confirmed breeding, is regularly roosting within a building on site. The habitats within the site, particularly in the northern and western boundary, provide good cover, nesting locations and foraging opportunities for a range of bird species, and the site is considered to be of local interest for its breeding bird assemblage.	Local
Invasive plants	Japanese knotweed was recorded close to the site and is listed under Schedule 9 of the WCA.	Less than local

Inherent Design Mitigation

6.3.41 An overarching principle of the masterplan design for the proposed development has been the application of the mitigation hierarchy. Impacts have been avoided in the first instance through the retention of habitats where possible. Key areas such as the woodland to the north of the site, located between two LWS, the southern wooded areas and habitats along the railway line have been retained. Where avoidance could not be achieved the impacts to these areas have been minimised through careful site design.

6.3.42 The woodland to the north and areas of scrub and woodland along the southern and western boundaries will be retained for biodiversity.

6.3.43 The retention of habitats on site and creation of new habitats have achieved a 10.19% net habitat biodiversity gain across the site. This figure does not include the increase of 5.53 hedgerow units which cannot be calculated as a percentage increase as there are currently no hedgerows on site. However, by taking all habitat units together there is an overall increase of 12.03% biodiversity net gain. Details of this can be found in Appendix 6.5.

6.3.44 The impact assessment in section 6.4 is undertaken on the basis that good practice construction methods will be employed. This will include (but is not limited to) best practice measure for the prevention of pollution of watercourses/waterbodies, fencing of areas not subject to practical works in order to protect habitats or species,

daytime working only, covering of excavations and /or provision of ramps to avoid wildlife from being trapped and no use of lighting near sensitive habitat features.

6.3.45 Emphasis within the site design has been placed on siting the development in areas of the site which have industrial history. Therefore, the majority (but not the entirety) of the development is based around the bare ground associated with the former coke works. Habitat losses outside of these areas are largely limited to areas where works are unavoidable from an engineering perspective.

6.4 Assessment of Likely Significant Effects

Designated Sites

Barnsley Canal LWS & SSI

6.4.1 **Construction effects:** Barnsley Canal is located within 50 metres of the western boundary of the study site. Therefore, without mitigation there is potential for construction activities to affect the LWS, including noise, dust deposition onto vegetation and a risk of contaminants entering the site from water run-off. These impacts are likely to be **significant** at a **site** level.

6.4.2 **Operational effects** would be limited to an increase in recreation pressure from new residents accessing the area for informal activities such as walking/running, dog walking and fishing. All of these pressures are associated with the current public right of way and canal tow path. In addition, there may be an impact on local birds, reptiles and small mammals through increased cat predation. These impacts are likely to be **significant** at a **site** level.

Carlton Marsh LWS & LNR

6.4.3 **Construction effects** associated with Carlton Marsh (such as dust deposition) are likely to be limited due to the distance the site is from the study site. It is unclear if any of the water run off would affect Carlton Marsh, however a precautionary assessment should be undertaken, especially with the water bird assemblage associated with the LWS.

6.4.4 **Operational effects** may lead to an increase in recreation pressure from new residents which may result in added disturbance to the faunal assemblage on the site. It is likely however that due to the size of the site and the current management by Yorkshire Wildlife Trust these impacts are likely to be **not significant**.

Chevet Branch Line LWS

6.4.5 **Construction effects:** Due to the distance from the study site it is unlikely that there will be any effects on Chevet Branch Line LWS during the construction phase of the works.

6.4.6 **Operational effects** may lead to an increase in recreation pressure from new residents. It should be noted that whilst there is connectivity between the study site and Chevet Branch Line LWS the closest proposed house to the site will be approximately 2.3km to the closest point of the reserve. Therefore, any additional recreational impacts are likely to be **not significant**.

Ellis Laithe LWS

6.4.7 **Construction effects:** Ellis Laithe LWS is located adjacent to the northern boundary of the study site and runs adjacent to the woodland belt to the north. Therefore, without mitigation there is potential for construction activities to affect the LWS, including noise and dust deposition onto vegetation. These risks are likely to be **significant** at a **site** level.

6.4.8 **Operational effects** would be limited to an increase in recreation pressure from new residents accessing the area for informal activities such as walking/running and dog walking. All of these pressures are associated with the current access through the south and west boundaries of Ellis Laithe. In addition, there may be an impact on local birds, reptiles and small mammals through increased cat predation. These risks are likely to be **significant** at a **site** level

Habitats

6.4.9 The majority of impacts to habitats will be through construction effects due to the removal of habitat for development. Operational effects will be highlighted if a specific habitat will be affected by this.

Mixed broad-leaved woodland and trees

6.4.10 The site clearance and need to regulate site levels will result in a loss of a small area of woodland within the north east corner of the site. This area of woodland is more akin to overgrown scrub which is succeeding into young woodland. This woodland block is probably of more interest to the bird assemblage it supports rather than the specific ecological interest within the woodland itself. Therefore, the intrinsic loss and replacement elsewhere on site as part of a more sustainable open space scheme is considered to provide alternative habitat with greater longevity and structure. Thus the effect of the loss is considered to be **not significant**. The remaining areas of woodland including the strip to the north of the site and the area to the south will be retained as part of the development, with any small loss being replaced with greenspace and/or additional planting.

Open water

6.4.11 During the final assessment of the site only two bodies of water exist on the site. These form the lagoons within the northern corner of the coke works site. A third body of water is located in the area of scrub and woodland to the north east of the site but was very shallow during the initial assessment and had dried completely when undertaking the great crested newt surveys in 2020. All three water bodies will be lost as a result of the proposed development. The loss of these waterbodies must be seen as important within the wider landscape and the connectivity of the site with other waterbodies such as the Barnsley Canal and water bodies associated with Rabbit Ings Country Park.

6.4.12 As part of the site design there is the intention to create a SUDS scheme which will incorporate waterbodies, however these waterbodies are not intended as specific wildlife environments and cannot replace features such as ponds which have either been specifically created for nature conservation or have naturally developed over time. Therefore, without further mitigation it is considered that there will be a **significant** effect at a **local** level.

Grassland

6.4.13 The majority of grassland within the development site is of low quality and is at a point of succession. There will however be a small loss of marshy grassland to the north east of the site as well as a small area of semi-improved grassland close to Building 1. The marshy grassland is currently succeeding into willow scrub and tall ruderals and

without active management will be lost. The majority of grassland on site will be retained however and therefore the impact to grassland habitat is considered to be **not significant**.

Species

Roosting Bats

6.4.14 No evidence of roosting bats has been recorded on site. Of the buildings to be demolished only one building has any potential to support roosting bats. The resulting emergence surveys suggest that no roosts are currently on site. As such effects on roosting bats are **not significant**.

Foraging and commuting bats

6.4.15 **Construction effects:** In general, the study site has extremely low number of bats using the site, with only three species recorded during the activity and static surveys. The only concentration of bats recorded is located towards the north of the works, close to the settling lagoons. This area seemed to provide a feeding ground for noctule and common pipistrelle bats and may even be part of a commuting route for these species. It appears that there is a direct link between the lagoons, and woodland edge and a feeding area. The temporary loss of the lagoons (which are to be replaced by a SUDS scheme in this area) during the construction phase may result in a **significant** effect at a **site** level. As bats were not recorded feeding over this area during every transect, the area does not appear to be a sole feeding location for these species and therefore this construction effect may be temporary.

6.4.16 **Operational effects:** The majority of potential commuting routes through the site are likely to be retained as part of the site and indeed these features are likely to be enhanced as part of the proposed scheme. Features such as the boundaries along the western side of the site will not be lost as these form part of the rail corridor. Therefore, there will be no severance of habitat as part of the proposed development.

6.4.17 The development does have the potential to affect bats through lighting within the development, especially within the feeding area to the north of the site. Although bat activity is low within the site additional lighting may discourage bats further. At worst effects on foraging and commuting bats will be **significant** at a **site** level.

Amphibians (great crested newts and toads)

6.4.18 **Construction effects:** The northern most lagoon within the study site contains large number of smooth newts, in addition, common toad was also found terrestrially within the site. Although no legal protection is associated with smooth newts, common toads are a UK BAP species and a priority species under the NERC Act, (2006) they therefore should be considered as part of this assessment. It is likely that the majority of toads will be associated with the surrounding woodland habitat as well as the lagoons, however the rubble piles close to the pond may be colonised by amphibians. In addition to the presence of toads, great crested newts have been found within three ponds to the east of the study site. The closest pond is located approximately 40 metres from the eastern boundary with direct access for amphibians to colonise the site. As such the site clearance such as the removal of vegetation and rubble from the north east part of the site may result in injury or death to individual great crested newts, as well as the removal of terrestrial habitat. This therefore will have a **significant** effect at a **local** level.

6.4.19 **Operational effects:** Intensive drainage design may result in amphibians becoming trapped in gully pots leading to mortality. Without mitigation, effects on great crested newts will be **significant** at a site level.

Reptiles

6.4.20 **Construction effects:** Should small numbers of reptile species be present within the site there would be a risk of killing or injuring individuals during construction. There is likely also to be some element of habitat loss within the site although this likely to be confined to the boundaries of the site and the lagoon areas. Some of these habitats will be replaced as part of the development scheme, however there is likely to be a **significant** effect at a **site** level.

6.4.21 **Operational effects:** during the operational phase there may be some impact to reptiles with the introduction of pets, specifically cats within domestic households. This impact will be most prevalent for areas outside of the study boundary such as Rabbit Ings Country Park, Barnsley Canal LWS, Ellis Laithe LWS and the rail corridor, all of which either have confirmed records for reptiles or have suitable habitat. This impact is thought to be **not significant** however, due to the scale of the surrounding habitat and the known range of domestic cats.

Birds

6.4.22 **Construction effects:** There will be the permanent loss of some existing bird habitat, through demolition, land-take and construction of building plots and access roads. This will include the loss of a barn owl roost site. Temporary disturbance to breeding birds will also be possible within retained areas of habitat during the construction process, from lighting and noise impacts. The timing of site clearance and stripping is important. If this activity were to take place during the spring and early summer, there could be temporary direct adverse effects on breeding birds through mortality and nest destruction. These impacts are likely to be **significant** at a **local** level.

6.4.23 **Operational effects:** Disturbance by people and pets from the new housing area will have a potential adverse impact on nesting birds. In addition, lighting from streetlights, houses, footpaths or security lighting, together with noise from homes and roads can have adverse effects on birds, affecting normal diurnal rhythms and communication. This can impact on factors such as feeding/territorial behaviour and bird breeding success. These impacts are likely to be **significant** at a **site** level

Invasive plants

6.4.24 **Construction effects:** Although the single stand of Japanese knotweed is situated outside of the boundary of the site, there is the potential for this plant species to be disturbed during any works within this area. As the plant is on third party land, and the area in question is not planned to undergo formal development it is thought to be **not significant** throughout the construction phase.

6.4.25 **Operational effects:** there is the potential for this stand of Japanese knotweed to spread onto the study site and as such there is the potential for the plant to spread throughout the western part of the site. Without a precautionary approach or awareness of the plants ecology or identification there is the potential for a **significant** effect at a **site** level

6.5 Mitigation and Enhancement

6.5.1 In addition to the mitigation measure inherent in proposed development this section sets out additional mitigation, compensation and/or enhancement measures for ecological receptors where a significant effect has been identified or where measures are required as good practice.

6.5.2 As part of these good practice measure a Landscape and Ecological Management Plan (LEMP) will be created to include all site enhancements and to provide long-term ecological benefits for the site after development. Reference to this proposed document will be made throughout the mitigation and enhancement sections below. The implementation of the LEMP should form part of a 106 agreement as part of the planning conditions for development of the site.

Designated sites

Barnsley Canal LWS & SSI

6.5.3 In order to minimise potential effects to Barnsley Canal LWS & SSI during construction, general mitigation measures should be implemented as standard. Measures relevant to ecology include:

- Dampening down potential sources of dust;
- Adhering to EA pollution prevention guidelines; and
- Implementing noise reduction measure where required, such as turning off running plant and machinery when not required and not siting static machinery such as generators close to the north western boundary.

6.5.4 No direct mitigation can be installed within the scheme to prevent cat predation however as the western boundary of the site is located on the top of a railway embankment it is proposed that fencing as well as a hedgerow is incorporated along this boundary to act as a barrier to the canal area.

6.5.5 **Residual effects:** It is considered that with the implementation of the mitigation measures above that **no significant** effects on the Barnsley Canal LWS & SSI will occur as a result of the proposals.

Carlton Marsh LWS & LNR

6.5.6 In order to minimise potential effects to Carlton Marsh LWS & LNR during construction, general mitigation measures should be implemented as standard. Measures relevant to ecology include adhering to EA pollution prevention guidelines to prevent pollutants entering any adjoining water courses which may run onto the LWS.

6.5.7 **Residual effects:** It is considered that with the implementation of the mitigation measures above that **no significant** effects on the Carlton Marsh LWS & LNR will occur as a result of the proposals.

Ellis Laithe LWS

6.5.8 In order to minimise potential effects to Ellis Laithe LWS during construction, general mitigation measures should be implemented as standard. Measure relevant to ecology include:

- Dampening down potential sources of dust;

- Adhering to EA pollution prevention guidelines; and
- Implementing noise reduction measure where required, such as turning off running plant and machinery when not required and not siting static machinery such as generators close to the north western boundary.

6.5.9 No direct mitigation can be installed within the scheme to prevent cat predation. However, at the northern boundary of the site a solid buffer zone in the form of a woodland belt or dense hedge line should be incorporated within this part of the scheme.

6.5.10 To reduce the impact on the LWS no direct access should be implemented between the LWS and the study site. This will encourage usage of the Barnsley Canal tow path and Rabbit Ings Country Park. Although access can be gained to Ellis Laith LWS from the north east corner of the site, the likely impact to this reserve from additional recreational use is likely to be minimal.

6.5.11 **Residual effects:** It is considered that with the implementation of the mitigation measures above, **no significant** effects on Ellis Laith LWS will occur as a result of the proposals.

Habitats

6.5.12 For the purposes of this assessment effects of individual habitats have been mitigated, however an overall assessment on how these habitats fit within the wider landscape should also be considered. Therefore, even though a **not significant** assessment has been given on both woodland and grassland habitats, additional mitigation measures have been put in place to ensure a positive biodiversity outcome. These additional measures have been included below.

Woodland

6.5.13 The majority of the woodland within the study site is to be retained. The woodland strip to the north of the site and the embankment of trees to the south of the site will both be incorporated within the existing scheme. As such both of these habitats will be included within the LEMP and brought into formal management. The woodland to the north will be managed sympathetically with the Ellis Laith and Barnsley Canal LWSs located adjacent to this woodland strip, to enhance the green corridor. The woodland to the south of the site will need specific management such as thinning to allow for a native understory to develop and maintain a green corridor through the site from links through the Barnsley Canal LWS, Rabbit Ings Country Park and Carlton Marsh.

Open Water

6.5.14 Open water within and around the site will be replaced with a SUDS scheme, however this habitat does not replace naturalised open water habitat. It is proposed that a pond is created close to where the lagoons are currently located which is designed and managed specifically for wildlife. The pond will be created to focus on supporting amphibians and invertebrates and could also be used as an educational resource within the local community. The pond will need to be incorporated within a formal management plan (LEMP) for the site to ensure its longevity as a biodiversity resource.

6.5.15 **Residual effects:** Although the current lagoons may provide a large area of open water for the site, the suitability for wildlife is limited, therefore the replacement of the lagoons with a pond dedicated to wildlife conservation which is managed and maintained will ensure that the effects are **not significant**.

Grassland

6.5.16 Around the areas of open space proposed to the north south and centre of the study site, new species rich grassland will be created. The area of poor plantation woodland will be replaced in part with a wildflower area with individual trees. This will significantly increase the biodiversity interest of these specific areas of the study site. It may be necessary to plant these areas prior to formal management (LEMP) as the current diversity of these parts of the site is poor.

6.5.17 Other areas of grassland will be created as part of the landscaping scheme, of which some will be managed to allow for grasses and herbs to flower resulting in an overall increase in grass habitat within the study site.

Species

Bats

6.5.18 Whilst the site design should retain any identified commuting activity, a precautionary approach should be taken, especially with regard habitat enhancement. The majority of activity is associated with the site is located around the lagoons and strip of woodland to the north of the site. Although the lagoons are to be removed a replacement waterbody is proposed for this area as a wildlife resource, chiefly focusing around amphibians. The replacement therefore with another water body will keep a feeding resource for bats within the same location.

6.5.19 To ensure that commuting routes are maintained and or enhanced, a planting scheme to include additional planting along the western boundary should be incorporated within the scheme, this will enhance this green corridor and will provide protection from light pollution onto the railway cutting, creating a dark corridor. In addition, shrub/hedgerow planting should also be incorporated along the northern boundary of the site, and where possible along the road boundary to the east.

6.5.20 A lighting scheme during the operation phase should focus on reducing lights around public open spaces and the boundaries of the site. At this stage a detailed lighting plan has not been produced and therefore any lighting scheme produced should consider bats within its design. This is to ensure that dark corridors through the site are either created or, in the case of the northern and western boundaries, maintained.

6.5.21 To enhance the site for bats and to provide additional roosting opportunities within the scheme, integral bat boxes should be incorporated to houses along the northern, western and southern boundaries. The bat boxes should be built into the fabric of the building to provide long term biodiversity enhancements.

6.5.22 **Residual effects:** with the above mitigation in place it is likely that the site and surrounding areas will create additional feeding areas and habitat for bats resulting in a positive impact. It is therefore considered that the resulting development will have a **Positive** impact on bats and that any effects identified will be **not significant**.

Amphibians

6.5.23 To reduce the impact on amphibians and in particular toads and great crested newts a Licence will need to be secured from Natural England, after planning permission has been obtained, and before works begin on site. Within the licence methodology there will be details on how the site will be trapped out to remove any risk to great crested newts. This is usually in the form of temporary or permanent amphibian fencing with pitfall traps which are checked on a daily basis for a 60 day period. Any amphibians will be placed in a receptor site outside of the development footprint. This could be as part of

a wildlife scheme within the development or located within Rabbit Ings Country Park.

6.5.24 As a precautionary approach both of the lagoons should be drained under the supervision of a licenced ecologist and any amphibians found should be relocated to a suitable receptor site.

6.5.25 During construction staff will receive a toolbox talk as to procedures to follow if amphibians are discovered during works. This element will also form part of the EPSL from Natural England

6.5.26 To ensure that there is suitable habitat within the study site a wildlife pond will be created on the north west of the site within a designated greenspace. Although there will be water features within the site, these will be focusing on a SUDS scheme and not necessarily designed solely for wildlife. Other features such as habitat piles will be placed within these areas to encourage amphibians. The location of the pond within this area will link directly with both the woodland strip to the north (which is to be retained and brought into active management), and Barnsley Canal LWS and the Ellis Laithe LWS, both of which have wetland areas and both have suitable terrestrial habitat for amphibians.

6.5.27 Potential effects during operation can be avoided through the design of a sensitive drainage system at the detailed design stage This should focus on areas to the north and east of the site where amphibians are more likely to be encountered. The installation of amphibian friendly gully pots and amphibian underpasses should also be used in areas of the site where amphibians may be encountered.

6.5.28 **Residual effects:** It is considered that with the implementation of the mitigation measures it is likely that the existing ecological interest for amphibians is maintained and therefore the effects are **not significant**.

Reptiles

6.5.29 During the removal of great crested newts from the development, as part of the mitigation, the site will need to be trapped using temporary and permanent amphibian fencing, pitfall traps and refuge mats. Reptiles can be trapped using the same methods and therefore any reptiles caught during these works can be relocated outside of the development boundary. As such refugia should be placed within the woodland strip to the north of the site as a relocation point. In addition, consultation with Rabbit Ings Country Park should be undertaken to establish if the park can be used as an additional receptor site to relocate reptiles found close to the connecting habitat.

6.5.30 The inclusion of a wildlife pond (and surrounds) as well as the introduction of habitat piles within the woodland to the north will provide additional habitats for these species.

6.5.31 **Residual effects:** It is considered that with the implementation of the mitigation measures it is likely that the existing ecological interest for reptiles is maintained and therefore the effects are **not significant**.

Birds

6.5.32 Mitigation for breeding birds will rely on conducting site clearance works outside of the bird nesting season.

6.5.33 It is a legal requirement to avoid impacts on nesting birds. As a result, site clearance will be undertaken in the October to February period. Where works must take place between March and September, they will only be carried out immediately following

an on-site check for nesting birds by an experienced ecologist. If nesting birds are found, works will be delayed within a suitable buffer area until the young have fledged and left the nest.

6.5.34 Potential construction lighting impacts will be avoided/reduced to an acceptable level by careful placement to avoid illuminating hedges and trees. Where this cannot be avoided completely, limits on night working in these areas will be incorporated into the CEMP.

6.5.35 The design of the proposed scheme will ensure that habitats such as woodland and scrub are subject to the lowest levels of illumination possible. Any impact upon the breeding bird assemblage from artificial lighting will therefore be minimised.

6.5.36 Retained and new areas of woodland, scrub and hedgerows within the site will be managed under the LEMP to increase their structural diversity and enhance their value for breeding birds.

6.5.37 The provision of a barn owl nest box within housing (most preferred) or on a pole within the north east corner of the Site will offset the loss of a barn owl roost. The retention and buffering of the northern boundary will also maintain existing linkages for barn owl to foraging and breeding habitat within Rabbit Ings Country Park to the east.

6.5.38 To enhance bird-breeding habitat, nest boxes will be provided on buildings and retained trees. Additional species-specific habitat enhancement for willow tits will also be provided within appropriate habitat on site and managed under the LEMP.

6.5.39 **Residual effects:** It is considered that with the implementation of the mitigation measures it is likely that the existing ecological interest for birds is maintained and therefore the effects are **not significant**.

Invasive plants

6.5.40 Although the stand of Japanese knotweed identified is located outside of the site boundary there is the potential for this plant to spread onto the site. As such the stand of Japanese knotweed should be monitored on an annual basis. Should the plant begin to spread onto the development site then a suitably qualified contractor should be appointed to remove this. This should form part of the Landscape Management Plan for the site.

6.5.41 **Residual effects:** If the precautions highlighted above are placed into the Landscape Management Plan then the effects of Japanese knotweed are **not significant**

6.6 Summary

6.6.1 The construction and operational effects of the proposed residential scheme have been considered in the context of the Important Ecological Features (IEF) on or within the vicinity of the site. The proposed development has been designed by applying the mitigation hierarchy to avoid effects where possible.

6.6.2 With only the inherent mitigation in place, potentially significant effects were predicted on Barnsley Canal LWS, Ellis Laithe LWS, Carlton Marsh LWS, waterbodies, bats, amphibians, reptiles, birds and invasive plants. The proposed mitigation measures to address these potential effects, as well as the further enhancement of the biodiversity within the site, serve to reduce potential effects to an acceptable level with no significant effects remaining. These have been summarised in Table 6.11.

Table 6.11: Summary of Effects

Receptor	Impact	Significance	Mitigation and legal instrument	Residual impact
Seckar Wood SSSI	None anticipated	None	N/A	None
Carlton Main Brickworks SSSI	None anticipated	None	N/A	None
Barnsley Canal LWS, SSI	Impacts from potential for construction activities including noise, dust deposition onto vegetation and a risk of contaminants entering the site from water run-off. Increased cat predation during the operational phase.	Significant	Dampening down potential sources of dust, adhering to EA pollution prevention guidelines and implementing noise reduction measure where required. Fencing as well as a hedgerow to be incorporated along the western boundary of the study site boundary to act as a barrier to the canal area. To form part of the LEMP to be conditioned under a 106 agreement.	Not Significant
Carlton Marsh LWS, LNR	Potential for pollutants to enter the water course	Significant	Adhering to EA pollution prevention guidelines to prevent pollutants entering any adjoining water courses which may run onto the LWS	Not Significant
Bush Wood LWS	None anticipated	None	N/A	None
Chevet Branch Line LWS	None anticipated	None	N/A	None
Ellis Laithe LWS	Impacts from potential for construction activities including noise, dust deposition onto vegetation and a risk of	Significant	Dampening down potential sources of dust, adhering to EA pollution prevention guidelines and implementing noise reduction measure where required. Fencing as well as a hedgerow/ woodland buffer to be incorporated along the northern boundary of the	Not Significant

Receptor	Impact	Significance	Mitigation and legal instrument	Residual impact
	contaminants entering the site from water run-off. Increased cat predation during the operational phase. Increased informal public use		study site to act as a barrier to the LWS. To form part of the LEMP to be conditioned under a 106 agreement. No direct access s between the LWS and the study site.	
Winterset and Cold Hiendley Reservoirs and Barnsley Canal LWS	None anticipated	None	N/A	None
Dense and scattered scrub	None anticipated	None	N/A	None
Tall ruderals	None anticipated	None	N/A	None
Mixed broad-leaved woodland and trees	Loss of small area of woodland to the east of the site.	Not Significant	Management of areas of existing woodland for nature conservation. To form part of the LEMP to be conditioned under a 106 agreement.	Not Significant
Open water	Loss of two settling lagoons with some limited ecological interest.	Significant	Creation of a new water body specifically for nature conservation and managed as part of a Habitat Management Plan. To form part of the LEMP to be conditioned under a 106 agreement.	Not significant
Grassland	None anticipated	Not significant	Enhancement of area of grassland for nature conservation located to the north, centre and south of the site. To form part of the LEMP to be conditioned under a 106 agreement. General increase in grassland within the study site to form part of the LEMP to be	Not significant

Receptor	Impact	Significance	Mitigation and legal instrument	Residual impact
			conditioned under a 106 agreement.	
Hard standing	Not assessed	None	N/A	None
Badgers	None anticipated	None	N/A	None
Bats	Minor habitat loss during construction and operational phase.	Significant	Creation of a new water body specifically for nature conservation close to existing lagoons to maintain feeding area for bats. To form part of the LEMP to be conditioned under a 106 agreement. To reinforce boundaries with planting to encourage commuting routes. To form part of the LEMP to be conditioned under a 106 agreement. Recommend a sympathetic lighting scheme to avoid light pollution on potential commuting routes and feeding areas. To form part of a formal planning condition. To install integral bat boxes within dwelling along boundaries of the site. To form part of a formal planning condition.	Not Significant
Amphibians (GCN)	Potential death and injury to GCN and Toads through site clearance works during operational phase. Permanent loss of wetland and terrestrial	Significant	To secure EPSL prior to any development taking place. As part of this a trapping and relocation will be required. A legal requirement (Wildlife and Countryside Act) to be obtained prior to ANY development. Further mitigation in the form of a new pond solely for wildlife conservation will be created as well as additional terrestrial habitat in the form of refugia and/or hibernacula	Not Significant

Receptor	Impact	Significance	Mitigation and legal instrument	Residual impact
	habitat during the operational phase. Newts may become trapped within gully pots during the operational phase		within connecting land to the north. To form part of the LEMP to be conditioned under a 106 agreement. Installation of wildlife friendly gully pots within the site to stop animals becoming trapped. To form part of the LEMP to be conditioned under a 106 agreement.	
Reptiles	Should small numbers of reptile species be present within the site there would be a risk of killing or injuring individuals during construction. There is likely also to be some element of habitat loss during this phase of the works	Significant	Reptiles should be trapped from the site using the same methods as for GCN. Reptiles can then be relocated outside of the construction zone within the woodland strip to the north of the site. In addition, consultation with Rabbit Ings Country Park should be undertaken to establish if the park can be used as an additional receptor site to relocate reptiles found close to the connecting habitat. The inclusion of a wildlife pond (and surrounds) as well as the introduction of habitat piles within the woodland to the north will provide additional habitats for these species. To form part of the LEMP to be conditioned under a 106 agreement.	Not Significant
Birds	Minor habitat loss and disturbance during construction and operational phase	Significant	Carry out site clearance between October and February. To form part of a formal planning condition. CEMP to provide details to minimise disturbance from lighting and noise during construction. To form part of a formal planning condition. Recommend a sympathetic lighting scheme to avoid light pollution on bird nesting habitats.	Not Significant

Receptor	Impact	Significance	Mitigation and legal instrument	Residual impact
			Retained and created habitats managed under a LEMP to be conditioned under a 106 agreement. Provision of bird nest boxes within buildings and retained trees. To form part of a formal planning condition. Provision of a barn owl nest box within the north east of the site. To form part of a formal planning condition. Habitat enhancement for willow tit, to be managed under LEMP to be conditioned under a 106 agreement.	
Invasive plants	Potential to colonise the site	Significant	The stand of Japanese knotweed should be monitored on an annual basis. Should the plant begin to spread onto the development site then a suitably qualified contactor should be appointed to remove this.	Not Significant

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