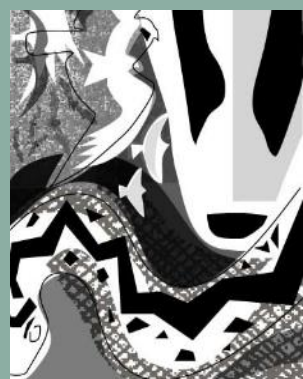




MKA
ECOLOGY

North East Cambridge
A Biodiversity Assessment
June 2020

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Author(s)	Gabrielle Wilbur GradCIEEM Will O'Connor CEcol MCIEEM
Surveyor(s)	Gabrielle Wilbur GradCIEEM
Contact	MKA Ecology Limited 01763 262211 info@mkaecology.co.uk

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1. Introduction

1.1. Aims and objectives

In May 2019 MKA Ecology Ltd was commissioned to undertake an ecological appraisal of North East Cambridge (NEC). The purpose of this assessment was to provide ecological and biodiversity information to support a developing Area Action Plan (AAP). This report represents the finds of the assessments which were conducted during 2019 through desktop studies and field visits, and which comprised;

- A Preliminary Ecological Appraisal of the North East Cambridge Area
- Production of constraints and opportunities maps for the North East Cambridge Area

The overall aim of the assessment is to provide a biodiversity vision for NEC that can be incorporated into the developing AAP. The biodiversity vision recognises the existing ecological features that are present and it draws on the surrounding landscape to propose new features which will ultimately create a coherent biodiverse environment in which people can live and work.

The principle of development at NEC has been established in the recent local plans for Cambridge City Council and South Cambridgeshire District Council. The location has been identified as one that can support change, and has the capacity to do so. This development will be guided by the AAP, which will be a statutory development plan with equivalent status to a local plan.

The vision of the AAP is *'North East Cambridge – A socially and economically inclusive, thriving and low-carbon place for innovative living and working; inherently walkable where everything is on your doorstep.'* Biodiversity can play a critical role in achieving this vision as it performs a valuable role in any sustainable development providing inherent interest, as well as a wide range of benefits such as water management, well-being and place making.

1.2. Site description and context

The focus area location is shown on the map in Figure 1. It comprises land on the north eastern fringe of Cambridge city and is defined as the land encompassed by the A14 road to the north, the guided busway to the south and the Cambridge to Ely rail line to the east. It is bisected by Milton Road, which continues north as the A10 to Ely and Kings Lynn (Figure 2). NEC is approximately 3km from Cambridge City Centre.

The area is characterised by multiple land uses, including industry, science and business. The science and business centres, including Cambridge Science Park, St Johns Innovation Park and Cambridge Business Park, play an important economic role in the area. Other businesses are present at the two industrial estates. Cambridge Waste Water Treatment Plant and recycling facilities are also present, with the former covering a large area to the east. NEC contains a range of habitats, some of which are of ecological value. Of note is the First Public Drain and woodland. The presence of brown field sites, with their variety of habitats, is also of ecological importance. Other habitats such as scrub, grassland, waterbodies, and to a lesser extent ornamental planting and trees, make contributions to the local biodiversity.

North East Cambridge has undergone significant development over time and there are few existing habitats which provide any clues to former land use. The exception, and perhaps the only long standing habitat, is the Milton Road Hedgerows which run alongside Cowley Road. A review of the 1888-1913 Ordnance Survey maps and historical mapping shows the development from an open area of arable farmland to the science parks and associated infrastructure over time. The Cambridge Waste Water Treatment Plant is shown on this historical mapping, right through to the present day, although considerably changed in form over time. Likewise the railway sidings have been present in some form since the early 1888-1913 Ordnance Survey maps, where they are marked as ballast pits.

North East Cambridge reflects little of the surrounding rural and fen landscape to the north and east, which provides immense opportunity for the proposed development to draw in and connect with surrounding green spaces. Consideration must be given to the existing features of biodiversity value and environs to ensure sustainable interventions are delivered which are in keeping with the natural environment. Where biodiversity interventions sit harmoniously

within their natural environment these are more likely to be sustainable in the long-term with achievable establishment and management requirements.

1.3. Legislation and policy

The relevant national legislation considered within the scope of this document includes the following:

- The Wildlife and Countryside Act 1981 (as amended);
- The Conservation of Habitats and Species Regulations 2010 (as amended);
- Natural Environment and Rural Communities (NERC) Act 2006;
- The Countryside and Rights of Way (CROW) Act 2000;
- Protection of Badgers Act 1992; and
- Wild Mammals (Protection) Act 1996.

Further information is provided in Appendix 1, including levels of protection granted to the protected species which are discussed as constraints and opportunities within this document.

In addition to national legislations there is a raft of national and local policies relating to biodiversity. These can be helpful in determining appropriate biodiversity interventions which help to deliver policy targets at a local and national level. A selection of relevant policies and documents include:

- UK Post-2010 Biodiversity Framework;
- Biodiversity 2020: A strategy for England's wildlife and ecosystem services;
- The Cambridge City Local Plan;
- The South Cambridgeshire District Council Local Plan;
- Cambridge City Nature Conservation Strategy;
- Cambridgeshire & Peterborough Biodiversity Action Plan;
- Biodiversity Partnership 50 Year Wildlife Vision for Cambridgeshire & People; and
- Cambridgeshire Green Infrastructure Strategy.

These documents set out priority habitats and species at a national and local level and actions and preventative measures which can be enacted to ensure they are conserved and enhanced. Some of these documents refer directly to the focus area and immediate surrounding environment specifically recommending green links (such as the Cam Corridor) through the city to promote biodiversity, favourable management of existing designated areas within Cambridge and enhanced biodiversity management of public areas.

Figure 1: Location of NEC

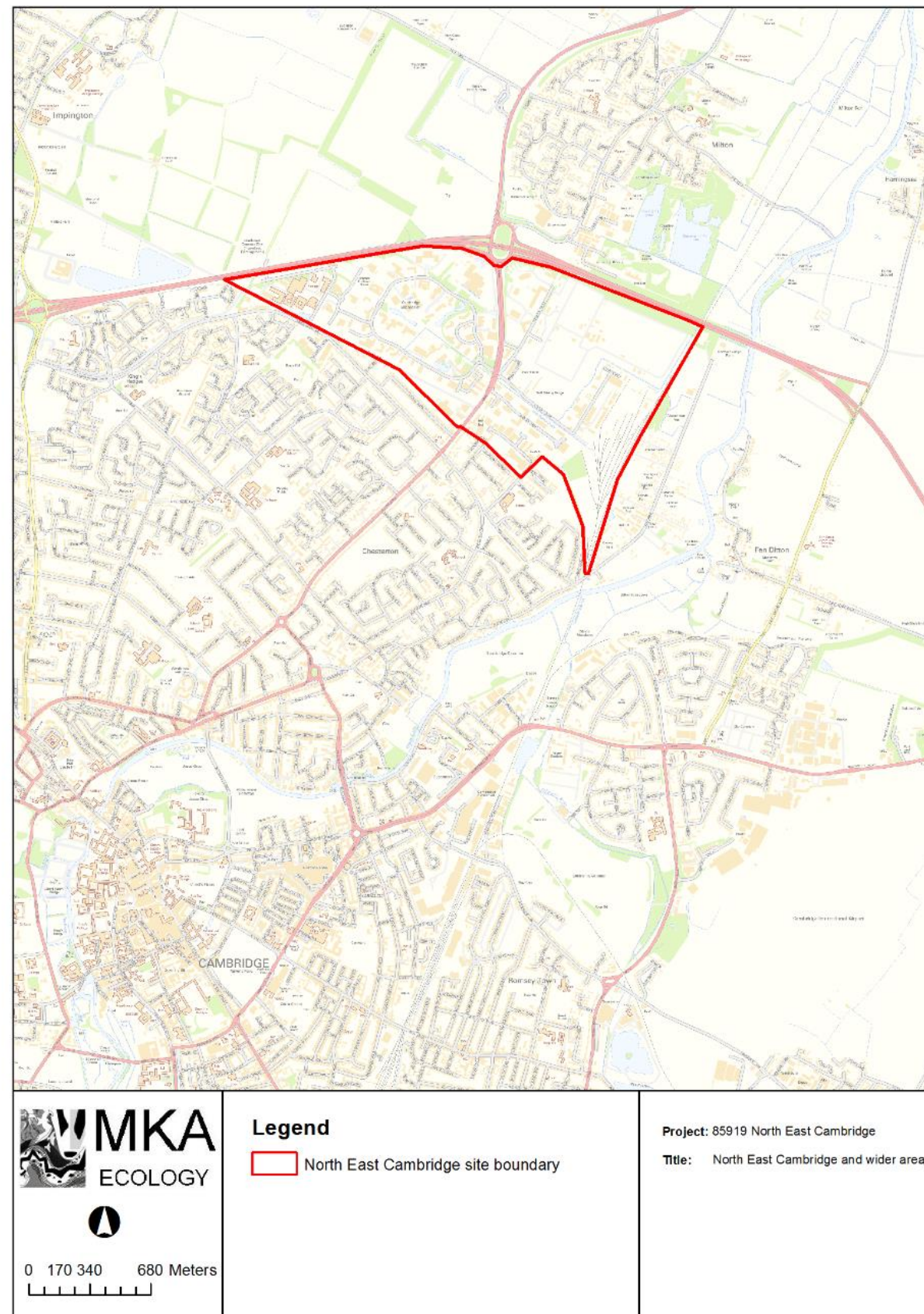


Figure 2: NEC boundary



2. North East Cambridge

2.1. The geological setting

The surface geology of the area is influenced by the presence of historic river corridors. Alluvial sedimentary deposits comprise sand and gravel. The underlying bedrock geology within the wider area consists of mudstone, sandstone, limestone and chalk.

2.2. The ecological setting

In the absence of widespread mature and established habitats within NEC we can review the habitats in the wider landscape, and in doing so it is possible to develop an impression of the naturalised habitats which are typical for this setting and location. This can provide some indication of target habitats upon which to focus biodiversity interventions.

The desktop study identified a range of sites designated for their nature conservation value in the landscape around NEC. Table 1 provides a summary of these designated areas and includes those which fall within the NEC focus area, those that are directly adjacent and those that can be said to form part of the same ecological network. Figure 3 shows the location of these areas. Present are statutorily designated sites such as Local Nature Reserves (LNR) and the non-statutorily designated City Wildlife Sites (CiWS) and County Wildlife Sites (CoWS).

Table 1: Areas designated for their nature conservation value associated with NEC

Site name	Distance and direction	Reasons for selection
Milton Road Hedgerows CiWS	On site	Supports woody species, with at least part of the hedge allowed to flower and fruit. This is a potential CiWS as it falls just short of the qualifying criteria.
Bramblefields LNR	Immediately adjacent to the south east	A mosaic of habitats in an urban area which supports important population of song thrushes and other bird species, as well as amphibians and invertebrates.

Site name	Distance and direction	Reasons for selection
King's Hedges Hedgerow CiWS	Immediately adjacent to the west	Supports woody species, with at least part of the hedge allowed to flower and fruit.
River Cam CWS	50m south (at closest point)	A major river (together with adjacent semi-natural habitat) that has not been grossly modified. Additionally it has areas with concentrations of mature pollard willows.
Stourbridge Common LNR and CiWS	50m south	Area of undeveloped floodplain directly associated with the River Cam County Wildlife Site.
Ditton Meadows CiWS	100m south	Lies within the flood plain of the River Cam. Central drain is a species rich linear water body with NVC S6 Greater Pond-sedge swamp also present.
Barnwell Junction Disused Railway CiWS	250m south	Hedgerow with woody species and also areas of calcareous and neutral grassland.
Barnwell Junction Pastures CiWS	500m south	Neutral grassland with strong indicator species in frequent numbers.
Coldham's Common LNR and CoWS	1km south	Unimproved grassland and mosaic habitat supporting neutral grassland indicator species.
Barnwell Pit CiWS	1km south	Calcareous grassland with indicator species in frequent numbers.
Coldham's Brook CiWS	1.2km south	Chalk stream together with adjacent semi-natural habitat that has not been grossly modified.
St Andrew's, Chesterton CiWS	1.3km south-west	Supports grassland with neutral grassland indicator species. This is a potential CiWS as it falls just short of the qualifying criteria.
Logan's Meadow LNR and CiWS	1.4km south-west	An area of undeveloped floodplain directly associated with the River Cam County Wildlife Site.
Midsummer Common CiWS	1.8km south-west	Area of undeveloped floodplain directly associated with the River Cam County Wildlife Site.

Site name	Distance and direction	Reasons for selection
Low Fen Drove Way Grasslands and Hedges CoWS	2km east	Supports more than 0.05ha of the NVC CG3 upright brome <i>Bromopsis erecta</i> grassland community.
Barnwell East LNR and CiWS	2km south	A mosaic of habitats in an urban fringe environment. Supports reptiles, amphibians, invertebrates and birds. Supports calcareous grassland indicators in frequent numbers.
Barnwell West LNR and CiWS	2km south	Scrub over 0.5ha in area with woody species.

The key ecological features present within these areas are as follows;

Water ways: The presence of the River Cam is a key ecological feature within Cambridge City. It is not specifically only the river that is valued but it is the combination of the river and its surrounding naturalised habitats forming a cohesive ecological network that are of importance. These surrounding habitats include the floodplain meadows and importantly the ditches and streams which form the tributaries to the river and their concomitant bankside habitats. Whilst not listed as a designated site Milton Country Park is situated to the north of the A14 which contains open water and woodland habitats which are of significant biodiversity value.

Grasslands: The floodplain meadows and other commons provide areas of both neutral and calcareous grasslands in the area. Neutral grasslands are focussed closer to the river, with more calcareous grasslands to the south and east.

Pollarded willows: A white willow *Salix alba* population that extends through the city and up to Waterbeach in the north. These are valued because of an important invertebrate community associated with the dead and living wood that has developed over a long period of time. The pollarding of these willows is an ancient tradition in Cambridge and they are also of heritage value.

Hedgerows and scrub: There are two hedgerow features on, and directly adjacent to, NEC which have been designated for their nature conservation value. The first is the Milton Road Hedgerows CiWS which is along Cowley Road. The second is King's Hedges Hedgerow CiWS which is situated at the western tip of NEC close to Cambridge Regional College. This is a relic of a former hedgerow system which gives its name to this part of Cambridge. Both are remnants of the former farming landscape of the area. Areas of scrub are valued within the context of the city as they provide refuges for wildlife in otherwise urban areas.

These sites represent the better quality habitats within the surrounding area and give some indication of the landscape character. Most notable are the waterways and associated naturalised habitats such as the meadows and commons. These are typical of the wider landscape around NEC, and particularly to the north where fenland habitats begin. This fenland is dominated by arable farmland but the associated wet ditches provide havens for biodiversity, as do small pockets of woodland. To the north-east (10km) is Wicken Fen, a biodiversity hotspot. The 100 Year Wicken Vision is an ambitious restoration project that aims to create a diverse landscape for wildlife and people that stretches all the way to the north east edge of Cambridge. Directly to the south of NEC is Cambridge City, which is dominant with its urban habitats, but further afield to the east and south are the chalk lands of South Cambridgeshire with their characteristic grasslands.

The area lies on the intersection of three National Character Areas which are the Bedfordshire and Cambridgeshire Claylands, East Anglian Chalk and The Fens (Natural England, 2019a). The elements of each of these character areas are demonstrated to a certain extent by the locally protected areas listed above.

Figure 3: Location of designated areas in relation to NEC

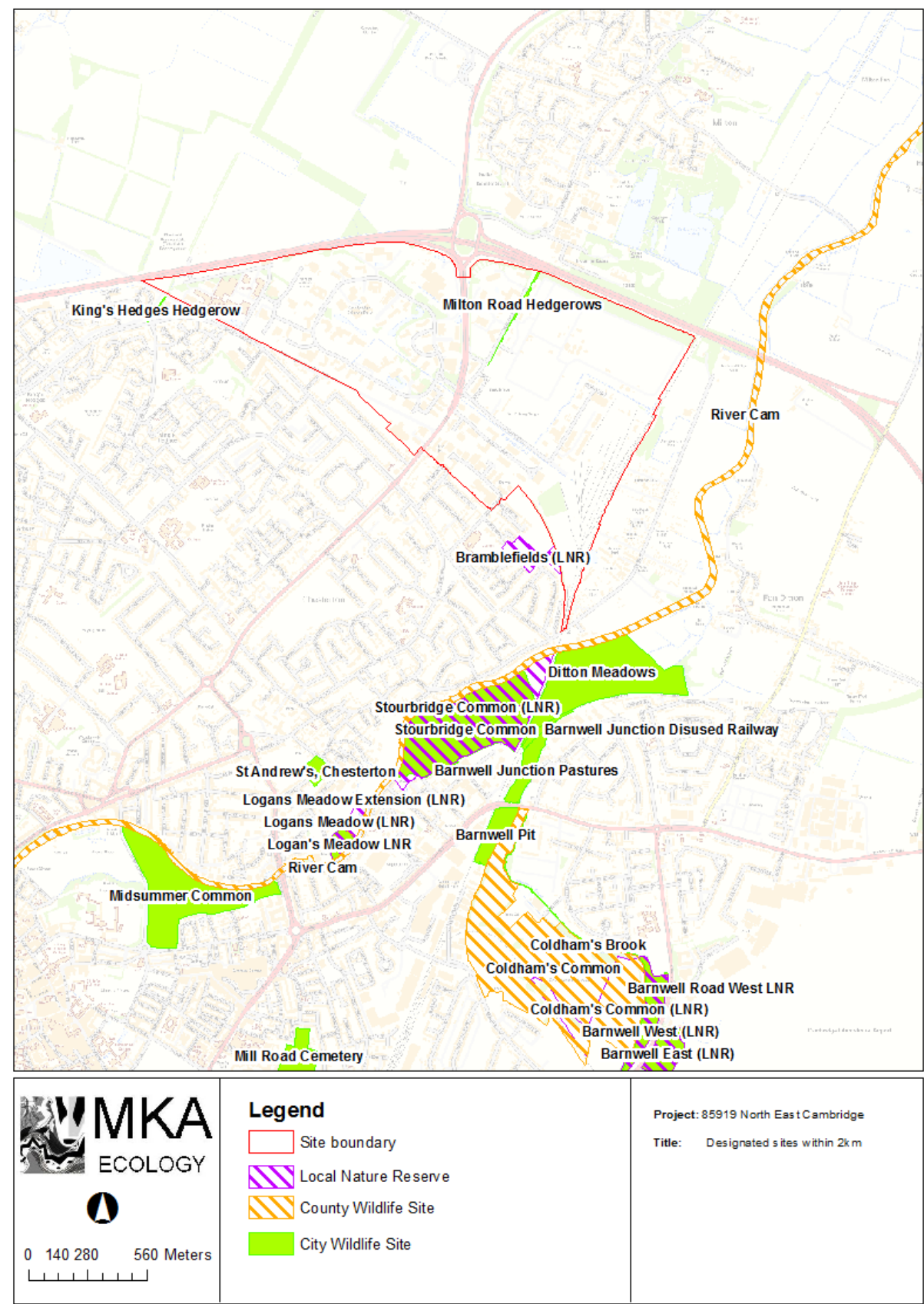
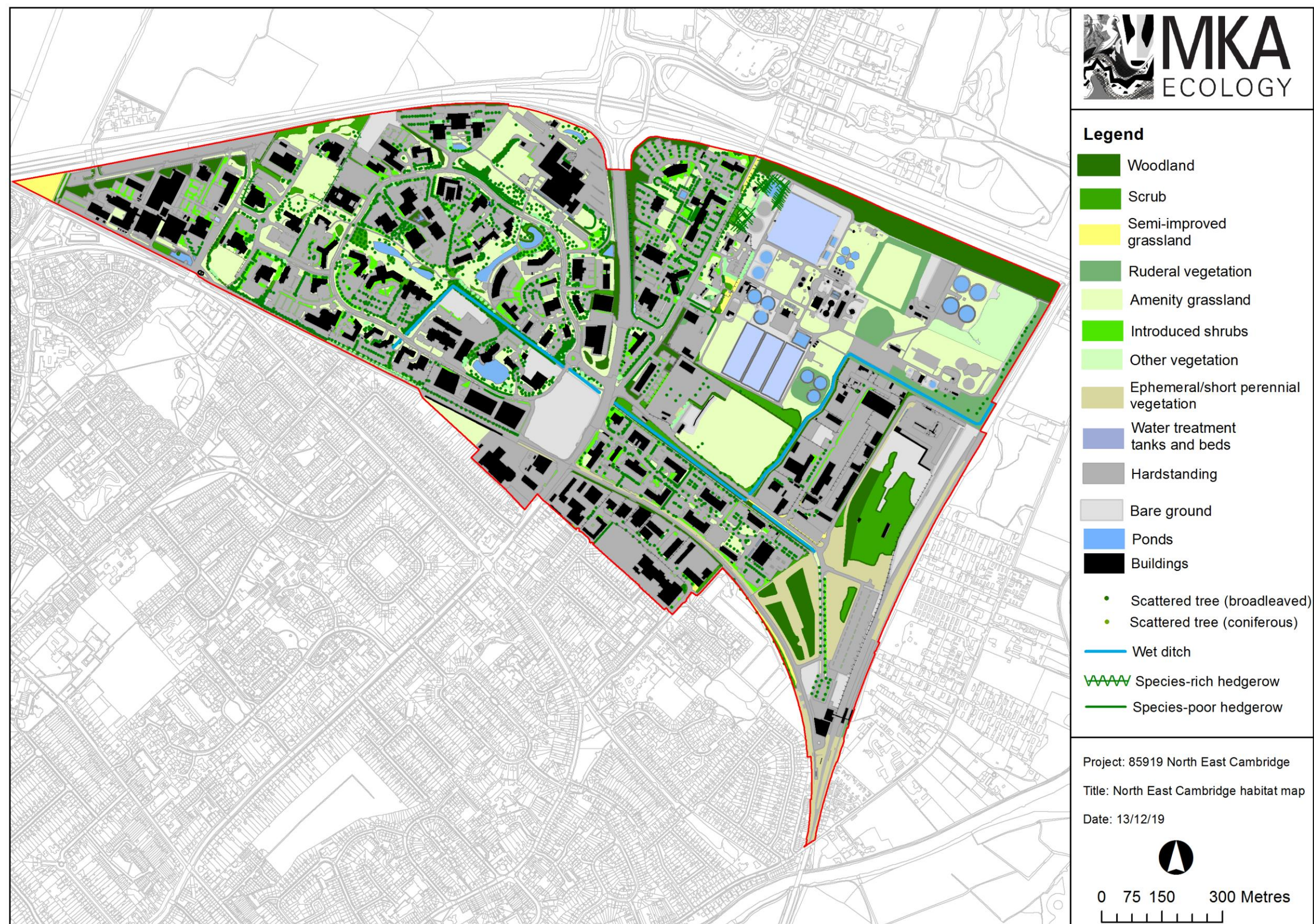


Figure 4: Habitat map for NEC



2.3. The focus area

The habitat map for NEC is shown in Figure 4. A habitat map using the UK Habitat classification mapping (UK Habitat Classification Working Group, 2018) is shown in Appendix 2.

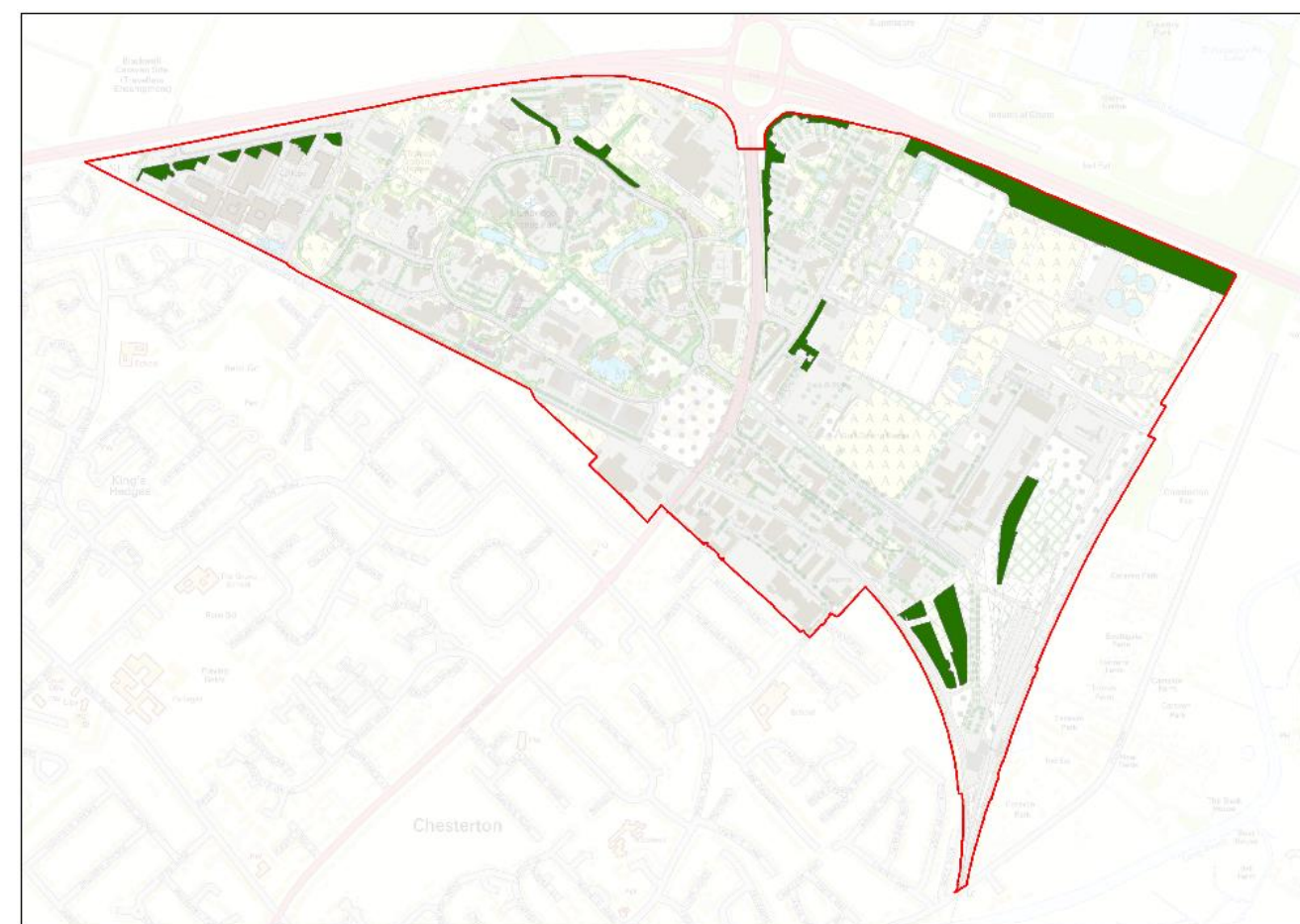
Habitats

The following sections describe the existing habitat types present within the focus area. Information concerning botanical species has also been included within these sections. Within this report, the focus has been placed on important habitats which should be retained within the development or those which should be re-created within the development. Habitats such as amenity grassland, hardstanding and buildings have not been described in great detail. Some areas were inaccessible for survey, or were surveyed remotely, these areas are shown on the constraints plan in Figure 5. Remote surveying took place using satellite imagery at high resolution.

Woodland

Several woodlands are present throughout NEC comprised of planted or semi-natural woodlands. They are present near the railway sidings, the Cambridge Waste Water Treatment Plant, the A14 margins and St Johns Innovation Park. The semi-natural woodland on the railway sidings is likely to have developed from unmanaged scrub, with the other woodland types being planted within the last 30 years (approximately). These woodland areas are largely unmanaged, with understory vegetation developing but not extensive.

The planted woodlands, have a surprisingly naturalistic composition, where several native species are present such as alder *Alnus glutinosa*, dogwood *Cornus sanguinea*, field maple *Acer campestre*, ash *Fraxinus excelsior*, pedunculate oak *Quercus robur*, wayfaring-tree *Viburnum lantana* and hawthorn *Crataegus monogyna*. Non-native species have also been planted such as ornamental cherry *Prunus sp.* and Turkey oak *Quercus cerris*. The semi-natural woodland that has developed by natural successional actions is dominated by silver birch *Betula pendula* with some scrub species also present.



Woodland distribution

The woodlands are likely to provide foraging and refuge habitats for many faunal species, such as birds, bats and, within the semi-natural woodland in particular, invertebrates.

Lowland mixed deciduous woodlands are listed as Habitats of Principal Importance under the NERC Act (2006). Woodlands are classified as a priority habitat in Cambridgeshire and Peterborough and have a local habitat action plan (Cambridgeshire and Peterborough Biodiversity Partnership, 2009).



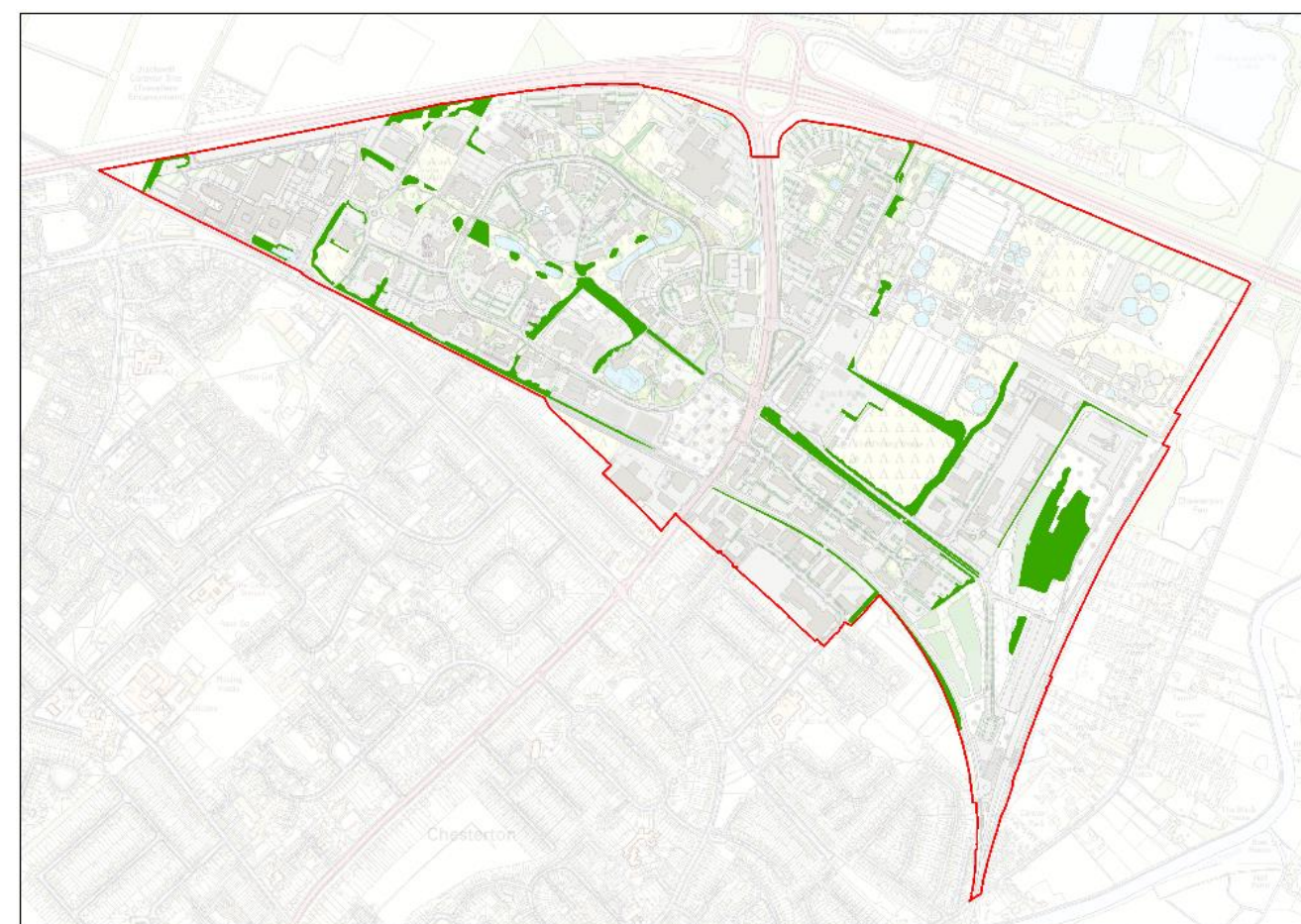
Developing semi-natural woodland at the sidings

Scattered trees

Scattered trees are present throughout NEC and are of varying ages with most of the trees are planted as landscaping for the science and business parks. These comprise a large number of native and non-native species including small-leaved lime *Tilia cordata*, alder, ash, pedunculate oak, junberry *Amelanchier lamarckii*, cedar *Cedrus sp.* Rowan *Sorbus aucuparia*, false acacia *Robinia pseudoacacia*, wayfaring-tree, scots pine *Pinus sylvestris* and maidenhair tree *Ginkgo biloba*.

Individual mature trees such as the Huntingdon elm *Ulmus glabra x minor* and the hybrid black poplar *Populus x Canadensis*, both situated on the Cambridge Waste Water Treatment Plant, are of value for biodiversity, providing habitat for nesting, roosting or shelter and also as navigational corridors for species such as bats.

Scrub



Scrub distribution

Areas of scrub are present throughout NEC. The scrub contains typical species such as bramble *Rubus fruticosus agg.*, rose *Rosa sp.*, dogwood, elder *Sambucus nigra*, hazel *Corylus avellana*, hawthorn *Crataegus monogyna* and willows *Salix sp.*. Some non-native species such as buddleia *Buddleia davidii* and firethorn *Pyracantha coccinea* were recorded in the scrub. Sea buckthorn *Hippophae rhamnoides*, was also recorded in the scrub and this is a Nationally Scarce species which is typically coastal although is planted elsewhere and now fairly widespread inland. It may have naturally colonised from seed dispersal along the rail track.

The dense scrub bordering the First Public Drain strengthens its value as a wildlife corridor, proving a foraging and route for wildlife through the site. Smaller patches of scrub throughout also provide 'stepping-stones' of habitat, which also enable movement of wildlife and provide refuge in an otherwise urban environment.

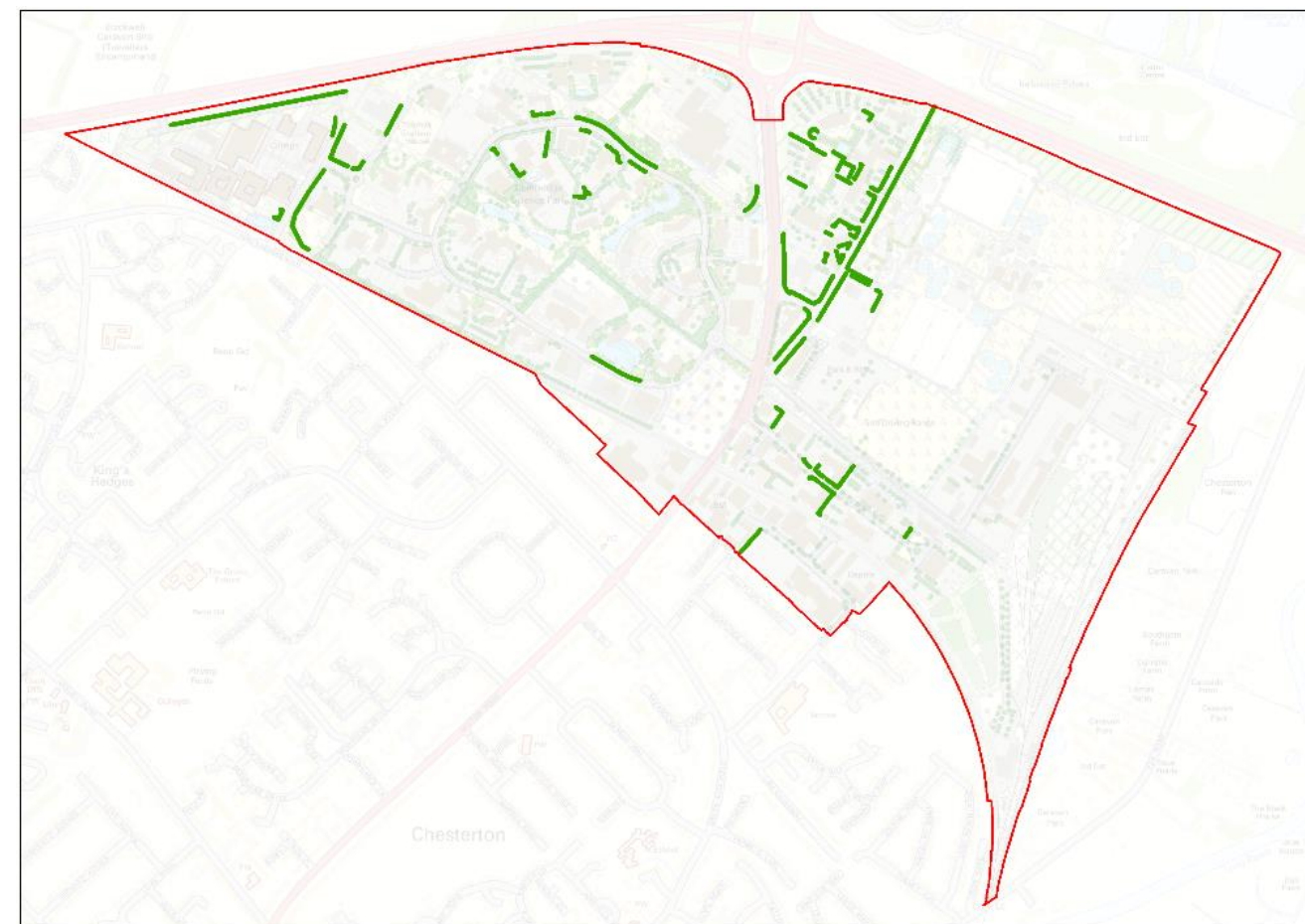


Mature scrub habitats at Bramblefields LNR

Hedgerows

Hedgerows with varying degrees of ecological value occur throughout NEC. The species rich hedgerow along Cowley Road is currently classified as a potential CiWS (Milton Road Hedgerows). Woody species recorded within this hedgerow include English elm *Ulmus procera*, hawthorn, wild privet *Ligustrum vulgare*, Elder, Dogwood, Sycamore *Acer pseudoplatanus* and Horse-chestnut *Aesculus hippocastanum*. It may be sufficiently diverse to now qualify as a CiWS (and is considered as such in this assessment). Other species-poor hedgerows are present and these are regularly managed and are usually part of more formal landscaping schemes. Species include hawthorn, beech *Fagus sylvatica*, yew *Taxus baccata* and non-native species such as firethorn.

The hedgerows at NEC form important foraging and refuge habitats, particularly the mature hedgerows of Milton Road Hedgerows CiWS. Hedgerows also provide connectivity and opportunities for species dispersal.



Hedgerow distribution

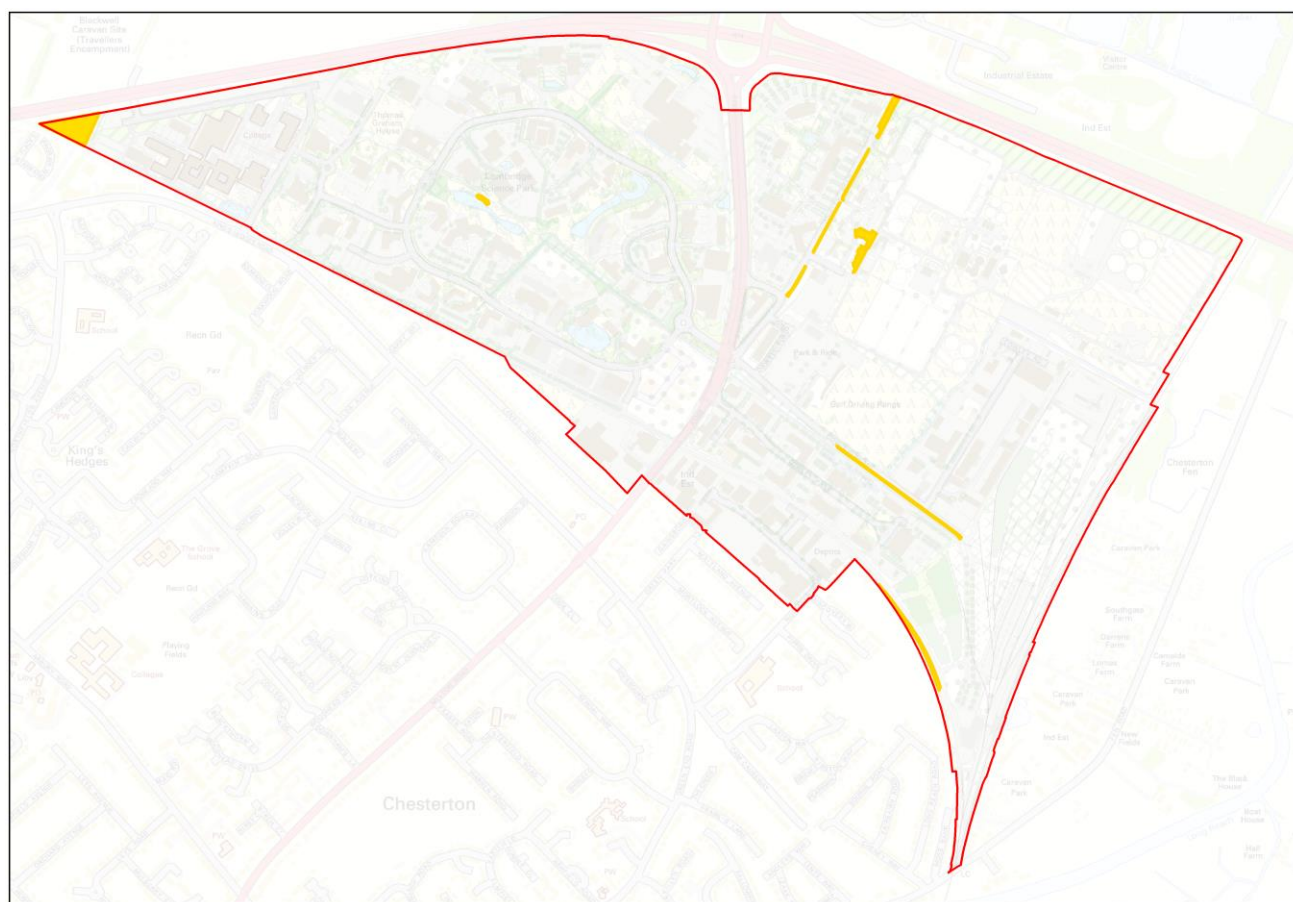
Hedgerows are listed as a Habitat of Principal Importance under the NERC Act (2006). Hedgerows are classified as a priority habitat in Cambridgeshire and Peterborough and have a local habitat action plan (Cambridgeshire and Peterborough Biodiversity Partnership, 2009).

Poor semi-improved grassland

Areas of grassland with a higher species diversity were present across NEC, with most developing through a lack of intensive management (for example along the guided busway). Weak neutral and weak calcareous indicator species were present, reflecting the underlying soil conditions. These indicator species included restharrow *Ononis repens*, lady's bedstraw *Galium verum*, perforate St. John's-wort *Hypericum perforatum* and common bird's-foot-trefoil *Lotus corniculatus*. These do not occur in significant numbers to allow determination of any particular grassland type; as such, the grassland has been classified as species-poor semi-

improved. Very occasional strong calcareous indicators were recorded such as wild marjoram *Origanum vulgare* but again with very low frequency.

A larger area of poor semi-improved grassland is present to the west of the Cambridge Regional College. It is also present along Cowley Road as road side verges, and along the guided busway. Small areas are also present within the Cambridge Waste Water Treatment Plant and the Cambridge Science Park.

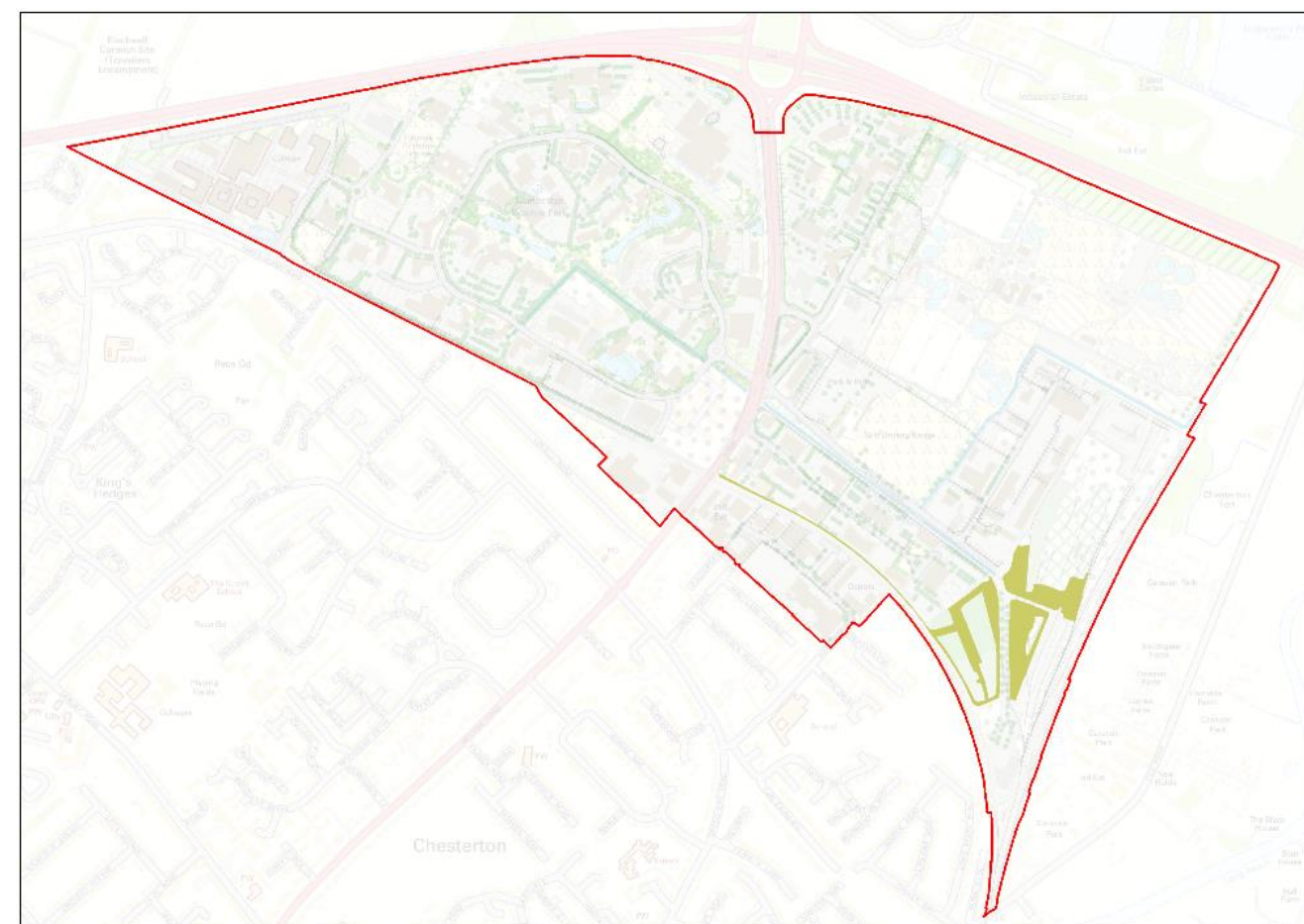


Poor semi-improved grassland distribution

Ephemeral/short perennial vegetation

Areas of ephemeral/short perennial vegetation are concentrated on the railway sidings and also the Cambridge Waste Water Treatment Plant. This is a successional vegetation type resulting from species colonising bare or disturbed ground. It typically contains a wide diversity of species, none of which are dominant. These consist of a mixture of low-growing plants including some strong calcareous indicators such as yellow-wort *Blackstonia perfoliata* and

wild marjoram. Other species recorded include common toadflax *Linaria vulgaris*, perforate St. John's-wort *Hypericum perforatum*, scarlet pimpernel *Anagallis arvensis*, bristly ox-tongue *Picris echioides*, hop trefoil *Trifolium campestre*, common bird's-foot-trefoil *Lotus corniculatus*, white campion *Silene latifolia* and mugwort *Artemisia vulgaris*.



Ephemeral vegetation distribution/open mosaic habitat

Several of the notable species identified in the desktop study have the potential to occur in this habitat type and have historically been recorded in the NEC boundary. These include Nationally Scarce dittander *Lepidium latifolium* which has been recorded in the sidings and occurs in wasteland. Also Nationally Scarce hoary mullien *Verbascum pulverulentum* which occurs on chalky substrates and has been recorded in the sidings. Corn cleavers *Galium tricornutum* is Nationally Rare and a Species of Principal Importance which will also grow in such habitats on a chalky substrate. It has been historically recorded at the Cambridge Waste Water Treatment Plant, although these records date from 1977.

This type of ephemeral habitat forms an important component of open mosaic habitats which are classified as a Habitat of Principal Importance in the NERC Act (2006). Brownfield sites are also a priority habitat for in Cambridgeshire and Peterborough and have a local habitat action plan (Cambridgeshire and Peterborough Biodiversity Partnership, 2009). It is important to note that these areas are created by a mosaic of habitats including grasslands and scrub too. However the sparsely vegetated bare ground with a mixture of substrates form a particularly important component. These areas can provide many habitats for invertebrates and other species such as reptiles and notable plant species which can thrive in the absence of other dominant plants.



Ephemeral vegetation at the sidings

Wet ditches (First Public Drain)

The First Public Drain is a key ecological feature at NEC with inherent ecological value, in addition to providing an important ecological corridor. It is also an important drainage feature and

provides essential surface water management for a wide catchment area. The First Public Drain runs through the centre of the Site, initially through Cambridge Science Park, then south east along Cowley Road and under the former railway sidings, and north-west along the Cambridge Waste Water Treatment Plant, before exiting at the eastern corner to eventually drain into the River Cam.

Along large stretches of the drain, overhanging unmanaged scrub shades the water way and banks, which has resulted in very sparse marginal and emergent vegetation. However, along some stretches scrub is not overhanging and here light is allowed to reach the ditch and marginal vegetation can thrive. Scrub and bankside species included rosebay willowherb *Chamerion angustifolium*, great willowherb *Epilobium hirsutum*, hogweed *Heracleum sphondylium*, hedge bindweed *Calystegia sepium*, yarrow *Achillea millefolium*, goldenrod *Solidago virgaurea*, teasel *Dipsacus fullonum*, tansy *Tanacetum vulgare* and burdock *Arctium* sp. In the heavily shaded areas, where the drain cuts deep below the surrounding ground level, hart's-tongue fern *Phyllitis scolopendrium* grows with other species such as pendulous sedge *Carex pendula*. Emergent vegetation within areas with greater light levels largely comprised fool's water-cress *Apium nodiflorum*. The photographs below show the variation in vegetation depending on the levels of light.



Higher light levels

Low light levels

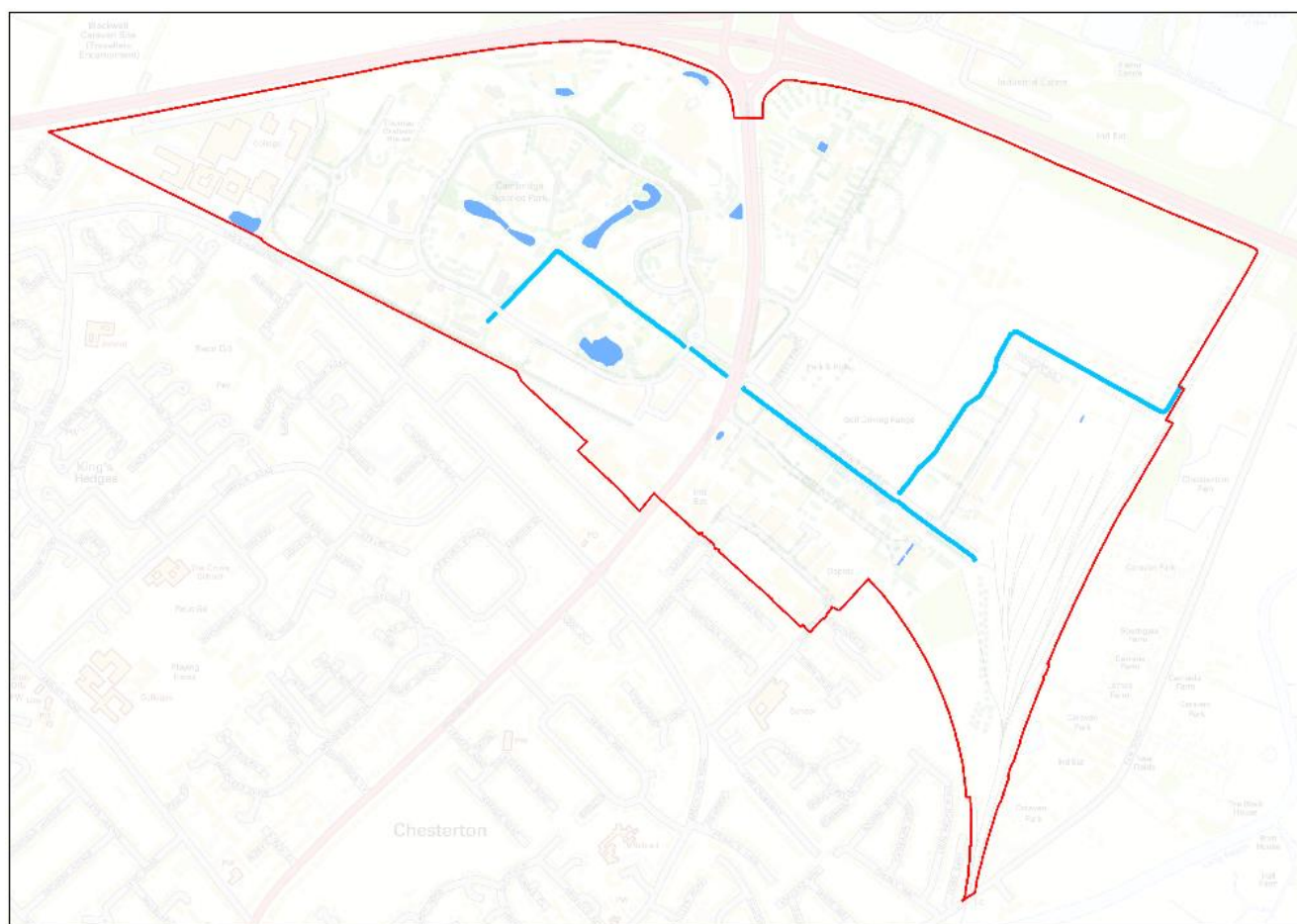
The First Public Drain is an important habitat for several species and notably water vole *Arvicola amphibious* which is a Species of Principal Importance and a priority species and

Cambridgeshire. Other mammals such as bats are likely to use the corridor created by the drain to move through the landscape.

Ponds

Ornamental ponds are present within the focus area and these are situated in the science and business parks. These contain emergent vegetation including water figwort *Scrophularia auriculata* and yellow iris *Iris pseudacorus*. Some ponds offer few opportunities for biodiversity with concrete vertical sides and no planting. Other ponds are more naturalised, such as those in the Science Park which are surrounded by vegetated habitats.

Ponds are listed as a Habitat of Principal Importance under the NERC Act (2006). Ponds are also classified as a priority habitat in Cambridgeshire and Peterborough and have a local habitat action plan (Cambridgeshire and Peterborough Biodiversity Partnership, 2009).



Wet ditches and ponds distribution

Other habitats

Buildings dominate the NEC area and these are of a wide variety of ages and designs. The majority of buildings within Cambridge Science Park, Cambridge Business Park and St John's Innovation Park were of relatively modern construction and others were of older construction, for example at the Cambridge Waste Water Treatment Plant. Whilst these built structures are generally of lower ecological value they do have the potential to support protected and notable species such as roosting bats and nesting birds.

Amenity grassland is present throughout and these are typically species poor being dominated by common grasses such as annual meadow grass *Poa annua*. Whilst generally species poor they can provide some ecological value, for example they provide a good foraging resource for bird species such as starling *Sternus vulgaris* which is a Species of Principal Importance.

Occasionally notable plant species are recorded in such areas and bur medic *Medicago minima* has been recorded in the mown grassland at Cambridge Science Park. Further habitats such as introduced shrubs could provide some foraging and shelter opportunities but those such as concrete hardstanding have no ecological value.

Species

Invertebrates

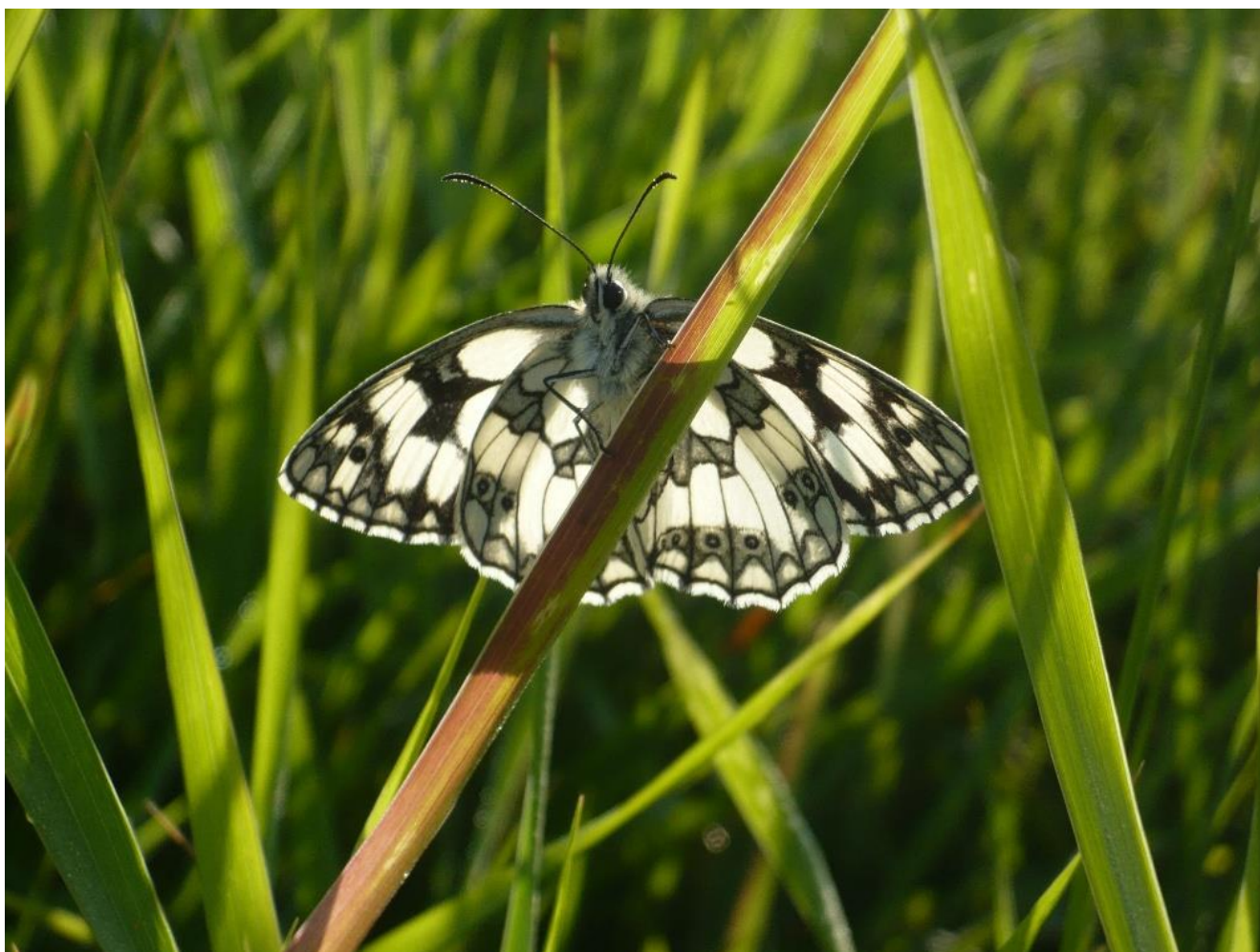
The desktop study for the surrounding area revealed myriad protected and notable beetles *Coleoptera*, bugs *Hemiptera*, damselflies *Odonata*, flies *Diptera* and moths and butterflies *Lepidoptera*.

These include species such as the scarce cobweb beetle *Ctesias serra* which requires habitat below old bark, such as that found on old willow trees. This species is so called because the larvae scavenge their food from spiders' webs. Similarly, the notable musk beetle *Aromia moschata* larval stages depend on the old wood within willow trees and the adults the leaves and flowers. This large longhorn beetle, up to 34mm, produces a distinct smell and produces an audible sound when handled.

The variable damselfly *Coenagrion pulchellum* has been recorded recently close to NEC and this species frequents well-vegetated water bodies such as ditches, ponds and canals.

Invertebrate surveys were undertaken to inform the new station development and these found important assemblages associated with grassland and scrub mosaic, particularly around the old sidings areas. Notable species were recorded, such as the five-banded digger wasp *Cerceris quinquefasciata*. This species preys on weevils in open sunny habitats and it nests in areas of exposed sand. Consequently specific habitat provisions were made in the design scheme for the station with areas of exposed sand.

A significant number of moths and butterflies were identified in the data search, including small heath *Coenonympha pamphilus* which has been recorded within the NEC area.



Marbled white butterfly

The habitats which are present within NEC provide a range of opportunities for invertebrates, and it is this diversity of habitats which can create good conditions for significant invertebrate assemblages. This is notably the case for the former sidings where a mosaic of habitats such as open ground, scrub and grasslands have enabled a diverse invertebrate fauna to develop. Similar mosaic habitats are present in the Cambridge Waste Water Treatment Plant although no assessment of the invertebrate fauna has been conducted here. The Milton Road and King's Hedges CiWSs, comprising mature hedgerows and trees, may also support important invertebrate assemblages, particularly saprophytes associated with deadwood.

Amphibians



Common frog

Aquatic habitats within NEC and the immediate environment are limited. There are several ornamental ponds through the science and business parks. These are limited in their suitability for amphibians with some having steep concrete sites and lacking in vegetation. The larger more naturalised lakes within the science park have been stocked with fish making them less suitable for amphibian species.

Terrestrial habitats, which adult amphibians will use for a large part of the year, are more widespread within NEC. These include hedgerows, woodlands, scrub and grasslands which all provide excellent opportunities for foraging and over-wintering amphibians.

Records of great crested newt *Triturus cristatus*, common frog *Rana temporaria* and common toad *Bufo bufo* were returned within the search area. Smooth Newt *Lissotriton vulgaris* has been recorded in pond at Bramblefields LNR, although this pond was dry during the field visits

for this assessment. The records of great crested newt, a species of conservation significance receiving high levels of protection, are focussed in Chesterton approximately 750m to the south-west. Environmental DNA surveys, conducted as part of the Cambridge North Station development, did not record presence of this species in the surrounding ponds.

Reptiles

Suitable habitat for common reptile species is present at NEC including grassland, scrub and woodland for foraging, basking and hibernating. The linear features of the railway line, guided busway, and to a lesser extent the verges of the A14, are likely to provide good dispersal links for reptile populations.

Records of common lizard *Zootoca vivipara*, grass snake *Natrix helvetica helvetica* and slow-worm *Anguis fragilis* were returned within the search area. Numerous record for common lizard were from within, or close to, the NEC boundary, including Bramblefields LNR (records from 2007 and 2012), Chesterton railway sidings (records from 2012 and 2015), Cambridge Science Park (records from 2006), the disused railway (now guided busway) (records from 2003) and Orchard Park where an extant population is monitored by a local conservation group.

Grass snake records are less common but equally widespread, including within the NEC boundary. This is a wide ranging species that will occupy a range of habitat types including aquatic features where it preys on amphibians.



Common lizard

Slow-worms occur less frequently in the city and records are sparse and scattered. This species inhabits grasslands, woodland and scrub edges, gardens and ruderal habitats. It would seem unlikely that slow-worm is present within NEC, although there is some limited potential for a relic population to occur. However, this is an easily observed species and if present some recorded observations would be expected.

Birds

The desktop study identified a large number of protected and notable species which have been recorded in the area. The habitats within the focus area provide opportunities for breeding and foraging for some of these species and these are detailed in Table 2. Several of these species were recorded during the field visits, including dunnock, house sparrow, starling and swift.



Dunnock

Table 2: Bird species identified in the desktop study with potential to occur at NEC

Species	Systematic Name	Status	Breeding and foraging opportunities
Bullfinch	<i>Pyrrhula pyrrhula</i>	SPI ³ Amber list ² Cambridge ⁴	Nesting opportunities in scrub and hedgerows
Dunnock	<i>Prunella modularis</i>	SPI Amber list	Nesting opportunities in scrub, hedgerows and tall ruderal
Fieldfare	<i>Turdus pilaris</i>	Schedule 1 ¹ Red list	Potential winter visitor for foraging, particularly on berry-rich vegetation
Grey Wagtail	<i>Motacilla cinerea</i>	Red list	Nesting opportunities in holes and crevices in walls by water ways
Hobby	<i>Falco subbuteo</i>	Schedule 1	Foraging aerial invertebrates and small birds and nesting opportunities in old corvid nests
House Sparrow	<i>Passer domesticus</i>	SPI Red list Cambridge	Nesting opportunities in cavities in buildings
Kingfisher	<i>Alcedo atthis</i>	Schedule 1 Annex1 Amber list	Potential nesting opportunities in old pipes and tree holes near the Cam and drains, potential foraging in water bodies
Linnet	<i>Linaria cannabina</i>	SPI Red list Cambridge	Nesting opportunities in scrub habitats
Peregrine	<i>Falco peregrinus</i>	Schedule 1 Annex 1	Foraging opportunities over focus area
Redwing	<i>Turdus iliacus</i>	Schedule 1 Red list	Potential winter visitor for foraging, particularly on berry-rich vegetation
Song Thrush	<i>Turdus philomelos</i>	SPI Red List	Nesting opportunities in scrub and woodland

Species	Systematic Name	Status	Breeding and foraging opportunities
Spotted Flycatcher	<i>Muscicapa striata</i>	SPI Red list	Nesting opportunities at woodland edges and gardens
Starling	<i>Sternus vulgaris</i>	SPI Red list	Nesting opportunities in building and mature trees
Swift	<i>Apus apus</i>	SPI Amber list	Nesting opportunities in buildings

¹ Schedule 1 of The Wildlife and Countryside Act 1981 (see Appendix 1)

² Birds of Conservation Concern (see Appendix 1)

³ Section 41 (NERC Act 2006) 'Species of Principal Importance' (see Appendix 1)

⁴ Local Priority Species in Cambridgeshire

Breeding habitats are widespread throughout NEC including all vegetated habitats which could support common species, and also less common and notable species such as song thrush, linnet and starling. The presence of breeding birds in built structures should not be overlooked, particularly swift and house sparrow which are both notable species occurring in the area. Other notable species could interact with specific habitats at NEC and this includes grey wagtail which may nest in cracks and crevices close to the First Public Drain or Cambridge Waste Water Treatment Plant. Important species such as kingfisher may use the waterways for foraging although it is unlikely that this species breeds within NEC.

The vegetated habitats at NEC will provide wintering cover and foraging opportunities for bird species, including redwing and fieldfare. The buildings within the area may also provide some winter roosts for species such as pied wagtail *Motacilla alba* which will regularly gather in numbers to roost in urban areas in the winter months.

Bats

The desktop study identified a number of bat species which have been recorded in the area. These species are shown in Table 3.



Roosting brown long-eared bat

Table 3: Bat species recorded within the desktop study for NEC

Species	Systematic Name	Rarity ¹	Foraging and roosting opportunities
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	Common	Roosting opportunities in crevices in a wide range of structures such as trees and buildings, including modern buildings. A generalist forager which will make use of most open greenspace.
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	Common	Roosting opportunities in crevices in a wide range of structures such as trees and buildings, including modern buildings. A generalist forager which will make use of most open greenspace, particularly those with aquatic habitats.
Nathusius's pipistrelle	<i>Pipistrellus nathusii</i>	Rarer (not listed on Wray)	Roosting opportunities in crevices in trees and buildings. A generalist forager with a preference for large open water bodies.
Daubenton's bat	<i>Myotis daubentonii</i>	Rarer	Roosting opportunities in crevices in trees and buildings. Foraging habitats closely associated with rivers, lakes and ponds.
Noctule	<i>Nyctalus noctula</i>	Rarer	Roosting opportunities in holes in mature trees. Foraging in open environments over water, woodlands and grasslands.
Serotine	<i>Eptesicus serotinus</i>	Rarer	Roosting opportunities in crevices in buildings, including modern buildings. Foraging in open environments over water, woodlands and grasslands.
Parti-coloured bat	<i>Vespertilio murinus</i>	Rare (not listed on Wray)	A rare vagrant and unlikely to occur with any frequency.

Species	Systematic Name	Rarity ¹	Foraging and roosting opportunities
Brown long-eared bat	<i>Plecotus auritus</i>	Common	Roosting opportunities in open attic spaces and trees. A generalist foraging species but typically close to vegetated habitats and away from artificial light.

¹ Based on Wray *et al* (2010)

Of the species recorded in the desktop study most are likely to occur within the habitats at NEC. The exception being Daubenton's bat as the existing drains and water bodies are probably not of sufficient size for the species which foraging almost exclusively over water.

Roosts of soprano pipistrelle and common pipistrelle have been recorded frequently at the Cambridge Science Park and these have been found in impacts assessment prior to development work. These roosts demonstrate that both species will readily inhabit modern structures that would not naturally be assumed to house roosting bats.

Foraging bats are likely to use the greenspaces throughout NEC and green corridors, such as the First Public Drain, are likely to facilitate movement of bats. Cambridge Waste Water Treatment Plant, and their associated invertebrate fauna are known to attract high densities of foraging bats.

Badgers

Whilst typically associated with open countryside badgers will often live within urban environments, including a significant population within Cambridge. Several records of badger were returned within the search area, with three in close proximity to the site on the A14 (likely to be road traffic accidents). Suitable foraging and sett-building habitat is available throughout NEC including the woodland and scrub habitats. A disused badger set was found within the Bramblefields LNR close to the site boundary.

Water voles

The data search returned numerous records of this species within the search area, many of which were located onsite within the First Public Drain, within the Cambridge Science Park and the Cambridge Waste Water Treatment Plant. This species is typical of the waterways in Cambridge and the wider countryside, particularly in the fens to the north.



Water vole

Other mammals

Otter is recorded occasionally along the River Cam, and in other aquatic habitats around the area, such as Milton Country Park. The habitats within NEC are less likely to support this species due to a lack of suitable foraging habitat and prey. Hedgehog is also recorded frequently in the residential areas to the south of NEC. This species is likely to occur in the scrub, woodland and grassland habitats throughout the NEC. There are two records of polecat from the area (associated with Fen Ditton). This species occupies a broad range of habitats

and typically foraging on rabbits. Given the urbanised nature of much of NEC it appears unlikely that polecat is present.

Fish

No fish records were returned in the data search and it appears less likely that native fish species are present. The water flow through the First Public Drain is potentially too variable to support any significant populations for long periods of time. Non-native carp have been added to the lake at Cambridge Science Park.



Otter

3. Constraints

Some of the ecological features present in the focus area are protected and notable. Proposed actions within the focus area may result in impacts on these features, which in some circumstances may be considered unlawful. Therefore any proposals must take into account these habitats and species. The following section provides a summary of the main constraints identified within the focus area. It should be noted that where there is a risk of impacts on a protected or notable habitat or species detailed survey effort and impact assessment will be required. The constraints are mapped on Figure 5 at the end of this section. For details of legislation and policy relating to individual species and habitats please see Appendix 1.

Designated sites

A single designated site is present within NEC, Milton Road Hedges City Wildlife Site. This is currently designated as a potential City Wildlife Site for its hedgerow habitats. Given the context of this well-established hedgerow in an otherwise largely urban area it should be treated as a City Wildlife Site and protected accordingly. Survey data from this assessment suggests the site would now qualify although this did not represent a thorough assessment of the habitat.

Habitats of Principal Importance

The following Habitats of Principal Importance, as listed on the NERC Act (2006) are present within the focus area;

- Ponds;
- Lowland mixed deciduous woodland;
- Hedgerows; and
- Open mosaic habitat.

The following Priority habitats within Cambridgeshire and Peterborough are present within the focus area;

- Ponds;
- Woodland;
- Hedgerows; and
- Brownfield habitats.

Whilst these are not specifically protected habitats any impacts upon them should be avoided as it is likely to lead to a net loss in biodiversity. The NERC Act (2006) places a duty on decision makers to protect such habitats. Proposals should seek to avoid impacts and where this is not possible the impacts should be minimised and off-set with alternative habitat provisions. It is important to note that not all features within the NEC area that fall within these categories should be considered important habitats. For example the ornamental concrete ponds are unlikely to qualify as a Habitat of Principal Importance, likewise a hedgerow with low species-diversity and non-native species. These habitats should be considered on a case by case basis for each development area and they should be thoroughly assessed by an ecologist.

Plants

One protected plant species (Jersey cudweed *Gnaphalium luteoalbum*) has been identified in the desktop study as being present at NEC, and several others which are notable within the UK. A full botanical survey has not been undertaken and several habitats present on site have the potential to support protected or rare botanical species. In particular, the former railway sidings (consisting of woodland, scrub and ephemeral/short perennial vegetation) the semi-improved grassland and the relatively undisturbed habitats of the Cambridge Waste Water Treatment Plant have potential to support protected or notable plant species. Given this risk, an in-depth botanical survey should be undertaken where necessary.

Reptiles

Both common lizard and grass snake are present within the NEC boundary with numerous recent records of both species. Common reptile species are protected under Schedule 5 of the Wildlife & Countryside Act (1981), and are listed as Species of Principal Importance under the

NERC Act (2006). Suitable habitat to support reptiles include the woodland, scrub and grasslands, and to a lesser extent the ephemeral habitats. Ponds may provide further habitat for grass snake. These species should be considered in any suitable habitats across the area.

Additionally, it is known that a population of terrapin (species unconfirmed) are present in a pond in the Cambridge Science Park.

Birds

All wild birds, their active nests and eggs are protected under The Wildlife and Countryside Act (1981), which makes it an offence deliberately, or recklessly, to kill or injure any wild bird or damage or destroy any active birds' nest or eggs. Nesting bird habitat is widespread throughout NEC and includes almost all of the vegetated habitats, with the exception of amenity grasslands. The presence of nesting birds in built structures must not be overlooked and these areas can support notable species including house sparrow and swift.

Bats

There is a risk of roosting bats within buildings and mature trees at NEC. Bat roosts are protected from damage, modification and obstruction (even when bats are absent). Bats themselves are protected from disturbance, injury or killing. Proposed works which impact (directly or indirectly) on such features may result in impacts on roosting bats, which would be considered an offence.

The foraging and commuting habitat within the focus area is of significant quality and any impacts on these features should be avoided. This would include areas of woodland, tree lines, and the First Public Drain. The Cambridge Waste Water Treatment Plant may also provide critical foraging habitat for bat species due to the availability of aerial prey in such locations. Careful consideration should also be given to lighting proposals which may have a significant impact on bat activity.

Badger

No setts were identified on site during the field visits, although not all areas were accessible. The risk of badger using the site to forage or build sets is considered to be low however badger activity can change relatively quickly and therefore there is some risk that new setts may be excavated. Active badger setts are protected by law. Therefore the presence or badger setts should be considered in any suitable habitat which includes woodland, scrub and hedgerows.

Water vole

Water Vole are protected from killing and injuring and their burrows are protected from damage, obstruction and destruction. Water vole have been recorded in the First Public Drain and their presence should be considered likely in all the bankside habitat of the drain. Impacts should be considered for any works within 10m of this feature.

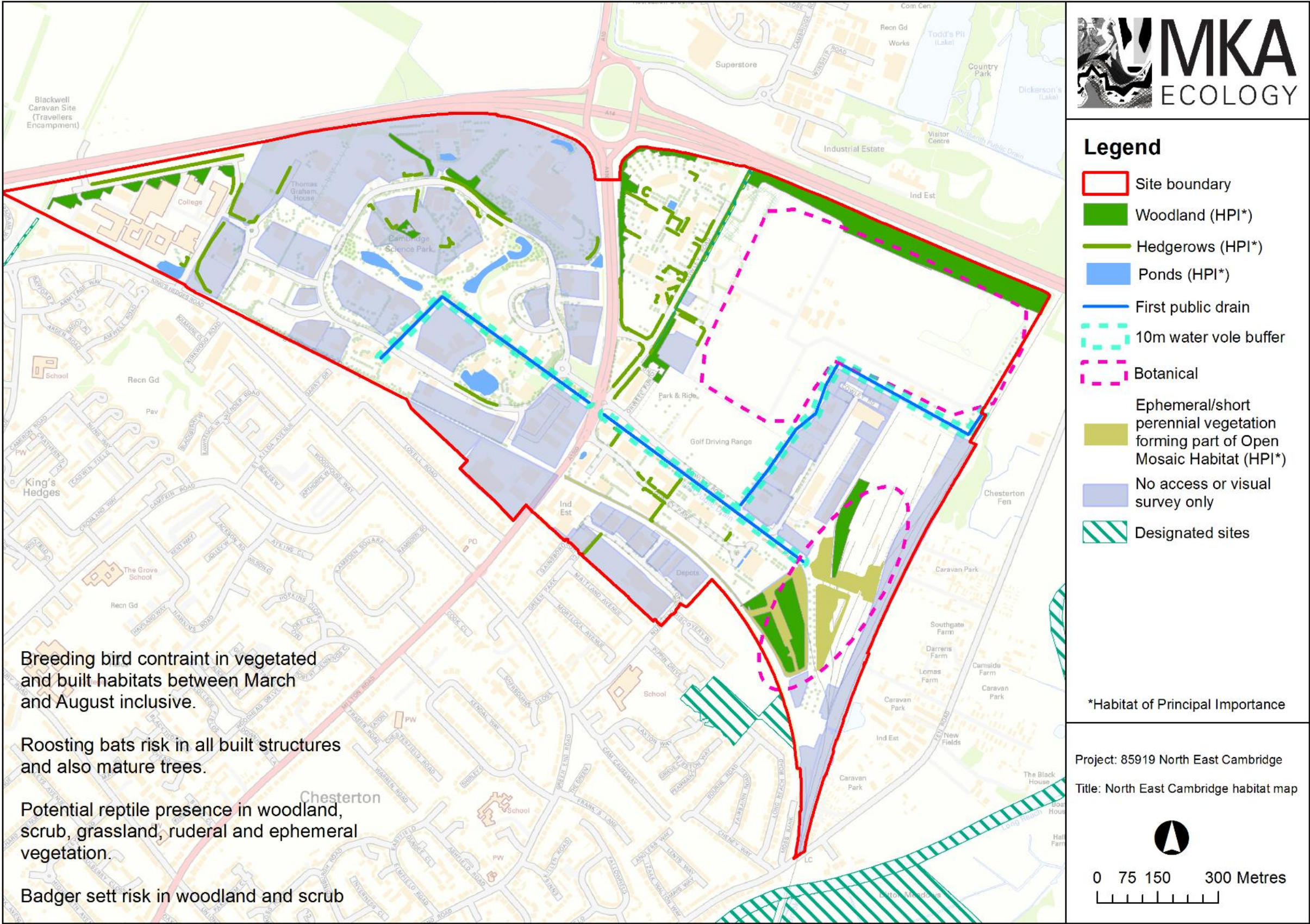
Invertebrates

There is some potential for important invertebrate assemblages to occur in the mature vegetated habitats, such as Milton Road Hedgerow CiWS and the varied opportunities available in the early successional open mosaic habitats of the railway sidings and the Cambridge Waste Water Treatment Plant. Development projects should consider invertebrates where impacts are predicted on these habitats.

Invasive species

A number of species listed on Schedule 9 of the Wildlife and Countryside Act (1981) were recorded during the site visit, including wall cotoneaster *Cotoneaster horizontalis* and Japanese rose *Rosa rugosa*. These are invasive non-native plant species. Japanese knotweed *Reynoutria japonica* has also been recorded at NEC in the past. It is an offence to plant or cause these plants to spread in the wild and all waste containing these plants come under the control of Part II of the Environmental Protection Act 1990. The presence of invasive species should be considered in all development areas of NEC.

Figure 5: Constraints map for NEC



4. Opportunities and recommendations

4.1. Biodiversity vision

The aim should be for a multi-functional network, which is contextual, policy-responsive, climate-resilient and future-proof. For species and habitats this should mean bigger and better, more joined up, locally relevant, nature-rich ecological networks. The green infrastructure should also secure health and well-being benefits and should therefore be accessible, inclusive, locally relevant and distinctive. This will help to achieve the key aims of local and national policy relating to biodiversity.

How this network will be structured should take inspiration from locally important habitats. These should be more sustainable to create and maintain, as well as being the most relevant both ecologically and socially. Such habitats include fenland drainage ditches, pollarded willows, hedgerows, grasslands and woodlands. Other areas such as the open mosaic habitats should also be considered due to their presence within the boundary of the focus area.

A blue and green grid with narrower links connecting the broader green corridors could be achieved. This could be developed with vegetated channels and ditches, which could perform other functions such as sustainable drainage. More formal greenspace with native planting could provide biodiverse areas for public amenity use, with street trees which can provide the added benefits of urban cooling. These greenspaces should reflect those which are characteristic of Cambridge, such as Sheep's Green and Coe Fen, which provide biodiverse hotspots and amenity space for people to enjoy. Opening up the areas around the First Public Drain provides an obvious location for such a space.

These habitats should be connected coherently within NEC and also to corridors stretching beyond the boundary of this focus area. This may require innovative measures to bridge major barriers such as Milton Road. NEC is in a unique position within Cambridge with significant connectivity to projects such as the Fen Rivers Way long distance walk, or the Chisholm Trail cycle route. This offers opportunities for people to connect to wider greenspaces, and also

connectivity for wildlife too. Situated on the edge of the city NEC also has the opportunity to provide a green gateway to Cambridge along such routes, or from areas such as the National Trust Wicken Vision, or the wider Fen Biosphere/Water Works project area.



Biodiverse habitats in Cambridge with distinct local character

It is recognised that the higher density approach to the built environment at NEC will make the provision of widespread greenspace challenging. The built environment must therefore be made more permeable to nature with integrated bird and bat boxes on new structures, and extensive areas of living roofs. Even with such measures it is unlikely that the necessary measurable biodiversity gains can be delivered within NEC and therefore options to make provisions for biodiversity offsite must be developed. However, this offsite biodiversity provision should not mean that all biodiversity is excluded from the built environment as greenspace is critical for softening the hard edges of urban areas.

Some key biodiversity themes to draw into the vision for NEC include the following;

- Vegetated drains and waterways to establish elements of the fenland habitats. With a strong focus on opening the First Public Drain as a major biodiversity feature running through the area to add distinctive character and continuity.
- Pollarded willows for invertebrate interest, to establish tree lined corridors and to reflect the local character.
- Invertebrate habitats to replace the brownfield characteristics that currently exist through the area. These are difficult to recreate in a dense area or development and therefore a substantial network of living roofs should be created.
- Offsite habitat provisions to ensure the appropriate and measurable delivery of biodiversity net gain.

The sections below detail the opportunities for positive biodiversity interventions as well as recommendations to ensure that existing biodiversity features are retained and protected. These measures should be considered for adoption within the AAP.

4.2. Sensitive development activities

Proposals coming forwards within NEC must have due regard for promotion of biodiversity and ecological constraints.

Development proposals should recognise the mitigation hierarchy, which has been adopted by the NPPF. The mitigation hierarchy should underpin all design decisions relating to ecology. The key components of the hierarchy are given below:

- **Avoidance:** Avoiding adverse effects through good design should be the primary objective of any proposal. This may be achieved through the selection of alternative designs, alterations to site layout, or by selecting an alternative site where no harm to biodiversity would occur.

- **Mitigation:** Adverse effects that cannot be avoided should be adequately mitigated. Mitigation measures minimise the negative impact of a plan or project, during or after its completion.
- **Compensation:** The protection of biodiversity assets should be achieved through avoidance and mitigation wherever possible. Compensation should only be used in exceptional circumstances and as a last resort, after all options for avoidance and mitigation have been fully considered.
- **Enhancement:** Almost all development proposals provide opportunities to enhance or create new benefits for wildlife, which should be explored alongside the application of the hierarchy of measures to resolve potential adverse effects.

Sufficient data should be available to inform project planning to ensure that ecological constraints and opportunities are established at an early stage, allowing time for a thorough assessment, and full integration of biodiversity interventions into the design scheme. Biodiversity interventions which are integrated fully into a design will allow for a more coherent and sustainable approach.

Recommendation 1: Always follow the mitigation hierarchy and ensure decisions are based on sound and current ecological data.

Where temporary impacts to habitats are predicted, or where areas of bare ground may occur as part of other works, interim measures to promote biodiversity should be considered. Nectar rich seed mixes have been recently used throughout the city to great effect at Jesus Green and Parker's Piece in Cambridge. These were developed for the Olympic Park and, whilst not solely containing native species, are designed to have a prolonged flowering period. Mixes such as these could be applied to last for one or two seasons to provide colour and nectar. These can also have significant aesthetic appeal and can be used on stockpiles. Other interim measures could include nectar rich planters positioned during construction.

Recommendation 2: Opportunities for positive biodiversity interventions should be explored at each stage of the development process, including interim provisions.



A nectar rich seed mix on Jesus Green

Construction activities should be guided by a construction environmental management plan (CEMP) to ensure that adverse environmental effects are prevented or mitigated. These should be based on the guidelines set out in the British Standard 42020:2013 'Biodiversity, Code of practice for planning and development' (British Standard Institution, 2013). The biodiversity elements of the CEMP should be based on the following considerations:

- Risk assessment of potentially damaging construction-type activities.
- Identification of "biodiversity protection zones" and areas where invasive species have been identified.
- Inclusion of or reference to details for implementation of method statements required to achieve specific biodiversity outcomes, and particularly mitigation measures.
- Identification of practical measures, both physical measures and sensitive working practices to avoid impacts during development, for protecting biodiversity through the control or regulation of construction-type activities.
- The location and timing of sensitive works to avoid harm to biodiversity features.

- The times during construction or development implementation when particular specialists need to be present on site to oversee works.
- Responsible persons and lines of communication.
- Defining and communicating the role and responsibilities on site of an ecological clerk of works, or appointed ecologist(s) responsible for managing biodiversity issues on site, and times and activities during construction or development implementation when they need to be present to oversee works.
- Use of exclusion fences, protective barriers and warning signs.

Recommendation 3: All developments and projects should be guided by a Construction Environmental Management Plan.

4.3. Biodiversity net gain

Delivering a biodiversity net gain means development that leaves biodiversity in a better state than it was before. This principle must be established for all development works and proposals at NEC.

The delivery of biodiversity net gain is set out in both national and local planning policies, and also in emerging government policies. The NPPF states that policies should '*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*'. Policy 70 of the Cambridge City Local Plan states that '*Proposals that harm or disturb populations and habitats should... secure achievable mitigation and/or compensatory measures, resulting in either no net loss or a net gain of priority habitat and local populations of priority species*'. Policy NH/4 in the South Cambridgeshire Local Plan says '*Opportunities should be taken to achieve positive net gain through the form and design of development*'. The need for biodiversity net gain is also recognised in the Cambridge City Nature Conservation Strategy.

The use of biodiversity metrics provides a methodology with which to measure the changes that could occur in biodiversity value during the development process. The Biodiversity Metric 2.0, as published by Natural England (2019), is the most recent version, although future

updates should be utilised when available. Care should be taken when applying metric values to biodiversity. Some habitats, such as ancient woodland, are irreplaceable. Furthermore caution should be applied if combining all habitats together to give a single overall biodiversity value. Efforts should always be made to replace like with like to ensure continuity of habitat types.

The biodiversity metric values of the baseline habitats have been made to establish baseline biodiversity units for NEC. Further detailed information is provided in Appendix 3, including the principles and rules of net gain assessments and the rationale for condition scores which have been allocated. Biodiversity values attributed to each proposed development parcel are shown in Appendix 3, with the open mosaic habitats of the railway sidings and woodland contributing to the highest values.

Whilst the existing policies do not set out any requirements for net gain targets it is recommended that a target for a net gain of 10% is applied for all developments within NEC. A target of 10% gain is detailed in recent national consultations, and will likely be forthcoming in imminent legislation. Where this is not achievable within the site boundary then offsite measures should be provisioned and the opportunities for these are described in greater detail below.

Recommendation 4: All developments and projects should deliver a measurable biodiversity net gain with a target of 10% gain.

4.4. Offsite opportunities

It is recognised that the anticipated density of development at NEC will make the provision of greenspace and biodiversity enhancements challenging to achieve in some circumstances. However, a biodiversity net gain must be delivered and therefore opportunities for offsite habitat enhancement measures should be made available. These will ensure an overall biodiversity net gain is delivered and that there will be biodiverse and interesting habitats for people and wildlife in close proximity to NEC.

The development of Chesterton Fen was identified as an opportunity for creating a space for people and nature in the Cambridge City Nature Conservation Strategy. The development of NEC should be a driving force to ensure that this target is realised. The urban density of the proposed development is such that it is unlikely a biodiversity net gain will be delivered solely through onsite measures. Biodiversity contributions should be secured from developments to enhance Chesterton Fen for its biodiversity value. A habitat creation and management scheme should be established and fully costed, the funding of which should then be secured through the development of NEC.

The Chesterton Fen area is shown on Figure 6. This area is currently open grassland situated between NEC and the River Cam. The vision for this area should be to create a new Local Nature Reserve with wetland characteristics and fenland habitats such as open water, wet grassland, reedbeds and the restoration of drainage ditches. This will provide the opportunity to create several national and local priority habitats that could support a wide range of species. Some provision of amenity open space must also be considered to encourage dog walking and games away from wildlife areas.

Appendix 3 provides some indication as to the potential biodiversity units that could be created at Chesterton Fen. These biodiversity units could be used to offset any losses that occur within NEC.

A habitat creation project within Chesterton Fen would create a significant green link from NEC into the wider countryside. This will also serve to develop the River Cam corridor which is recognised in the Cambridge City Nature Conservation Strategy. Such a scheme could help to develop a gateway feature connecting the city to the wider countryside, a theme which is developed and promoted in the Cambridgeshire Green Infrastructure Strategy. This gateway could, for example, connect the City of Cambridge to the developing Wicken Vision Area and build connectivity through the landscape to the north-east for people and wildlife.



Green sandpiper, a migrant species of aquatic habitats

The creation of these wetland habitats will also perform a range of further ecosystem services such as riparian flood attenuation to alleviate problems associated with a changing climate in the future. By creating large habitat provisions which are well connected through established routes into the wider countryside there is the potential for encouraging more healthy lifestyles by providing attractive and biodiverse places for people to use. Some sections of this area may also provide suitable sites for translocation of species from development footprints, such as reptiles.

Recommendation 5: Develop a habitat creation project at Chesterton Fen that provides significant opportunities for biodiversity and people. This should be funded by developments within NEC.



River Cam wildlife corridor

4.5. Biodiversity enhancement plans

Appropriate biodiversity management plans should be put in place for each development and project and these should follow guidelines set out in the British Standard 42020:2013 'Biodiversity, Code of practice for planning and development' (British Standard Institution, 2013). The purpose of these Landscape and Ecological Management Plan (LEMP) should be to clearly set out how ecological features will be developed and managed in the long term.

The content of each LEMP should consider the following:

- Description and evaluation of features to be established and managed.
- Ecological trends and constraints on site that might influence management.
- Aims and objectives of management.
- Appropriate management options for achieving aims and objectives.
- Prescriptions for management actions.

- Preparation of a work schedule (including an annual work plan capable of being rolled forward over a five-year period).
- Details of the body or organisation responsible for implementation of the plan.
- Ongoing monitoring and remedial measures.

Recommendation 6: All developments and projects should be guided by a Landscape and Ecological Management Plan.

4.6. Green corridors

Wildlife corridors are critical for the maintenance of ecological processes including allowing for the movement of animals and the continuation of viable populations of species within and between the City of Cambridge and surrounding countryside. The development of a coherent ecological network is important at the early planning stages and these corridors should be clearly defined in the AAP. The key corridors proposed at NEC are set out below.

First Public Drain: incorporating the science park landscaping. This is the critical ecological corridor at NEC running in a broadly east to west direction. A further spur running south could follow the route of the Chisholm Trial providing a green corridor for people to use, potentially as part of a green loop.

Milton Road Hedgerows which are positioned in a north to south direction linking with the A14 woodland buffer which is a well vegetated buffer serving as an ecological corridor but with multiple functions such as noise buffering.

Both of these corridors connect to the River Cam corridor which is recognised in the Cambridgeshire Green Infrastructure Strategy. This connectivity will be strengthened by the habitat enhancement scheme at Chesterton Fen. These key routes could be connected further through smaller additional green streets, or even simple rows of street trees. Biodiversity rich drains planted with vegetation could serve as corridors alongside streets and bankside vegetation and this would contribute to the green/blue grid.

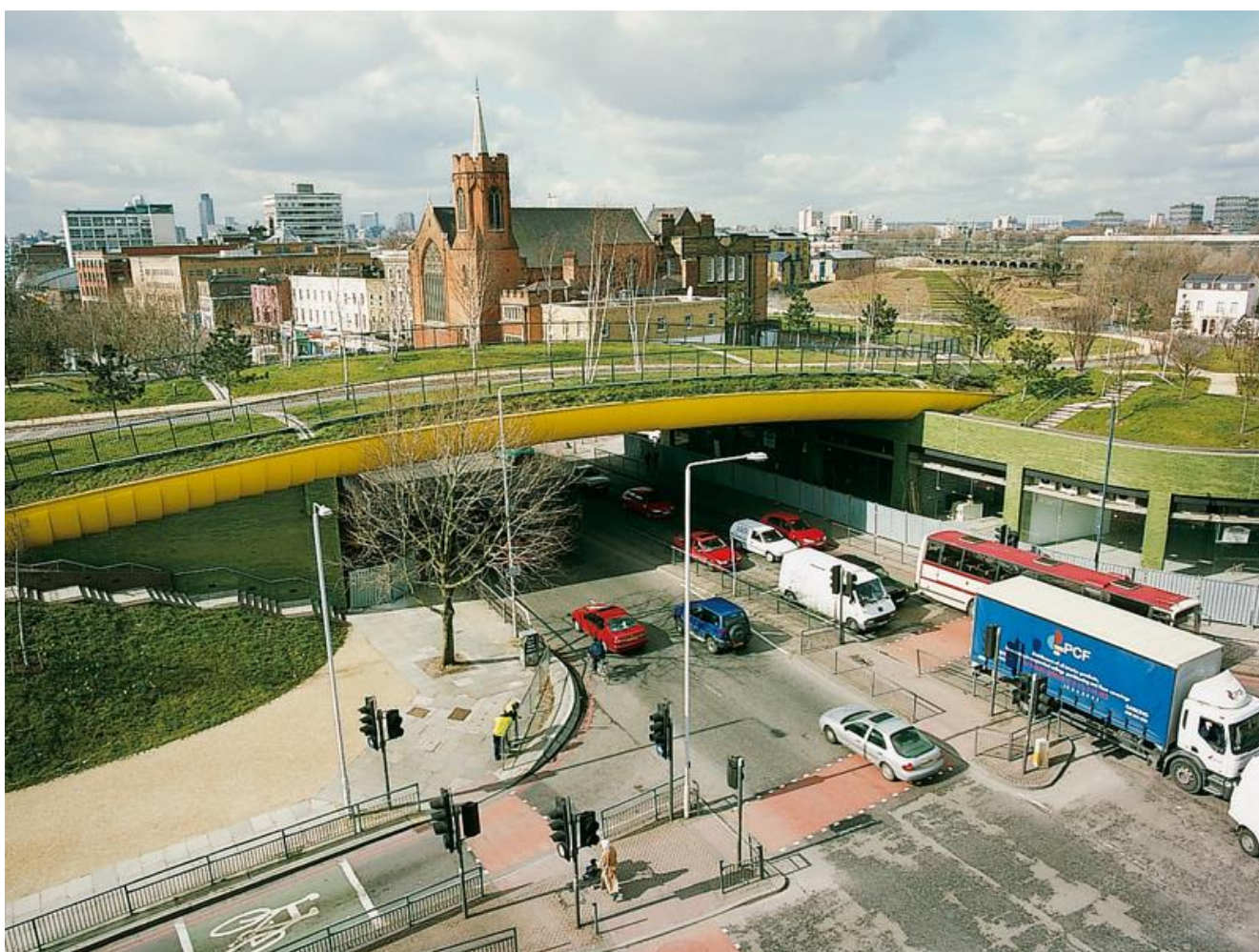
Milton Road is a dominant feature bisecting NEC which is almost devoid of biodiversity value and forms a barrier for most wildlife. Opportunities for developing green crossings over Milton

Road should be explored to enhance biodiversity connectivity, and to provide attractive routes for people. Examples of high quality crossings could include Mile End Road green bridge in London, or the Vancouver Land Bridge. Whilst these would provide excellent linkages for wildlife and people the cost implications are significant. The cost and benefits for biodiversity should be appropriately considered and resources are likely to be better spent on other projects such as Chesterton Fen habitat enhancements.



Vancouver land bridge

Recommendation 7: Maintain and develop key green corridors through NEC, and develop smaller connections where feasible.



Mile End Road green bridge, London

Recommendation 8: Explore opportunities to minimise the barrier effect of Milton Road for wildlife.

Where such bridges are not feasible then other measures should be considered to enhance these corridors. These could include bringing vegetated corridors as close as possible to new bridges or underpasses and minimising the gaps for wildlife to bridge. Stepping stones of vegetation could encourage movement of species and these could include planting or street trees.

4.7. Lighting

Nocturnal wildlife, and notably bats, can be significantly affected by artificial lighting. For any development or project at NEC the potential impacts of obtrusive light on wildlife should be a

routine consideration. Some locations are particularly sensitive to obtrusive light and lighting schemes in these areas should be carefully planned. The green corridors should be treated particularly sensitively and lighting strategies close to these should be developed with ecologists.

Recent guidance has been developed by the Bat Conservation Trust and the Institute for Lighting Professionals (BCT, 2018). Whilst focused on the bats the principles set out in this guidance would benefit a range of other nocturnal wildlife. Developments and projects at NEC should have regard for these guidelines. It is important that the impacts of artificial lighting are considered during the construction and operational phase of any development and project.

Recommendation 9: Sensitive lighting strategies should be developed to minimise the impacts of artificial light, particularly in sensitive locations close to key ecological features such as the green corridors.

4.8. Glazing and bird collision risk

There is increasing evidence that tall, glazed, or illuminated, structures pose a risk to migratory bird species. The glazed surfaces disorientate birds, or they are lured towards lights during nocturnal migratory flights. As a result the risk of collision with buildings is greatly increased, resulting in higher rates of mortality. Evidence suggests that these collisions may be responsible for a significant number of bird mortalities (Loss *et al.*, 2014), although largely recorded in the Americas. Contrary to expectations the majority of collisions occur on the lower storeys of the buildings. The location of NEC on the River Cam which is a potential migratory corridor for bird species raises the risk of such collisions with the development of buildings which may be well-lit, of considerable height, and with significant levels of glazing. Developments at NEC should therefore have regard to this issue and there are number of measures that have been developed to reduce the risk of collision (American Bird Conservancy, 2019). These measures include the following;

- Minimising night time lighting by turning off lights in tall structures and using dimmer lighting systems;
- Patterned glazing;

- Low reflection glazing;
- Purpose built 'bird protection glass' with UV reflection that is visible to birds; and
- Shading panels of over glazing which can create more sustainable buildings, and reduce the risk of bird collision.

Recommendation 10: New buildings at NEC should have design features to minimise bird collision.

4.9. Amphibian-friendly drainage

The current design of most mainstream drainage grates poses a risk of entrapment and death to amphibians due to their design which prohibits escape. By incorporating several simple design measures into the design of drains and curbs, the risk of entrapment for amphibians can be greatly reduced. Gully pot ladders (designed for amphibians to crawl up to escape gully pots) and wildlife kerbs (designed to allow amphibians to bypass gully grating) should be incorporated into the drainage design scheme.

Recommendation 11: Incorporate amphibian-friendly drainage solutions.

4.10. Public health and well-being

The health and well-being benefits of contact with wildlife and biodiversity are well documented. Accessible greenspace can encourage health lifestyles and the proposed green corridors can also serve as routes for the public to enjoy, and potentially for sustainable transport links such as cycle ways. The provision of green loops are recommended to encourage healthy activities and engagement with nature. Potential routes are shown on Figure 6 and these link with wider ecological features such as Milton Country Park and the River Cam. These would also connect with other projects such as the Wicken Vision or the Fen Rivers Way.

The green loops could be enhanced with interpretation based on local biodiversity features and historical interest, for example the pollarding of willows along the River Cam, or facilitating the understanding of traditional fenland industries.

The provision of a new nature reserve offers the opportunity for further engagement with nature. Work parties or management groups could be developed to facilitate management of the Chesterton Fen area. Such enterprises may also serve to foster a greater ownership of the natural environment around NEC.

Recommendation 12: Develop green loops to encourage engagement and contact with nature to promote well-being and to deliver health benefits.

4.11. Habitats

Space is clearly limited within the NEC area due to proposed urban density and therefore habitats provisions within developments should be selected carefully. However, there are good examples of where even small sections of habitat can be extremely effective, for example the wildflower swales at Eddington in Cambridge. Target habitats for creation and enhancement within NEC are described below.

Woodland

Cambridgeshire is the least wooded county in England and lowland mixed deciduous woodlands are a priority habitat within the UK and the Cambridgeshire. Opportunities should be sought to develop new areas of woodland where feasible although it is recognised this is challenging when taking into consideration the proposed density of development. Areas of woodland along the First Public Drain could be considered, and areas of wet woodland could be developed on the edges of the Chesterton Fen area.

A wide diversity of species should be considered within new planting as this will help to reduce the impacts of potential future diseases. Consideration should be given to removal of non-native tree species within existing woodland, and replacement with native varieties.

Street trees should be considered where space is limited. These can enhance biodiversity value and they can make a meaningful contribution to urban cooling which will become increasingly important as our climate changes.

Scrub

Scrub is considered to be a valuable ecological component in creating a habitat mosaic within a landscape, providing a key transitional habitat which is of significant value to invertebrates. It also provides habitat for nesting birds and other notable species such as hedgehog.

Scrub planting should be varied and native species should be selected. These species should serve a range of purposes such as providing nectar (hawthorn) or berries (Guelder rose). In order to provide maximum benefit scrub should be managed to create a variety of structures. The scrub should be of various heights and densities and edges should be scalloped. This can ensure that a wide variety of microclimates can be created for invertebrate species.

Opportunities to develop new areas of scrub should be explored. These can be particularly effective in urban areas where they can provide oases of cover in otherwise difficult environments for wildlife. This is particularly the case for house sparrow which is a local and national priority species. The combination of ground level scrub, living roofs and integrated bird boxes has potential to be particularly effective in encouraging thriving bird populations in the built environment.

Hedgerows

Native species-rich hedgerows are listed as a Habitat of Principal Importance under the NERC Act (2006) and are also a Cambridgeshire priority habitat. Planting of native species hedgerows, or enhancing existing hedgerows by planting native species, will improve the ecological value at NEC.

The existing Milton Road Hedges is a mature hedgerow that should be protected, enhanced and expanded. It is a potential City Wildlife Site (CiWS) but the recent site visit indicates that it would now qualify as a CiWS. A detailed assessment should be undertaken to determine whether this is the case.

Due to the low species richness of many existing hedgerows, there is significant scope for improvements. Enrichment planting will help to increase diversity to offer a greater range of

food plants for invertebrates, or berry crops for wintering birds. Many existing hedgerows are closely managed and uniform in structure. Improving the structural diversity of hedgerows will also promote diversity of invertebrates and provide more habitat for nesting birds and ground foraging areas for amphibians and mammals such as Hedgehog. This can be achieved through the implementation of LEMPs.

Potential locations of new hedgerows would be of greatest value where they serve to create connections to existing or new habitats, to increase the network of green infrastructure across the site. The structure of hedgerows are such that there is ample opportunities to incorporate them into the built environment.

Recommendation 13: Undertake an assessment of Milton Road Hedgerows to assess against CiWS criteria.

Drainage ditches

The First Public Drain offers opportunities to create a landscape feature that can add significant character to NEC and enable connectivity and continuity throughout the area. There is significant scope to add to the biodiversity value of this feature and this should be the focus of biodiversity enhancements within the boundary of the NEC.

The First Public Drain has the potential to perform multiple roles such as biodiversity provision (with habitats and connectivity) and also amenity value. However, the original purpose of the drain must be considered within any proposals as it performs a critical flood alleviation function for this area of Cambridge. It is recommended that a single enhancement and maintenance plan is developed for the First Public Drain with the involvement of several disciplines including ecology, drainage and landscape specialists.

In order to enhance the biodiversity value of the First Public Drain it would be necessary to open up the area to more light. Creating variable flows and microhabitats will benefit a wide range of aquatic fauna. The gradient along the First Public Drain is low and therefore it would be challenging to develop areas of very fast flow. Therefore opportunities to develop a variety of other niches should be explored such as boggy backwaters or vegetated shelves.

Developing a more sinuous shape to the drain will serve to provide a more natural feature for the public open space. For much of its length the water level sits significantly lower than the surrounding ground. Therefore drawing back the banks will serve to make the drain more visibly accessible and light. Provision of shelves will provide habitat for emergent plant species and water vole. Naturalised habitats along the drain should be developed and along the banks of the First Public Drain there is an opportunity to extend the availability of the bankside willow pollards that give the River Cam in this location such a distinctive character and biodiversity value. These features, which are so typical of the Cambridge greenspaces, could be drawn right through NEC to add considerable value for people and wildlife.



Vegetated drainage ditch in Cambridge

In order to facilitate the green and blue grid through NEC new drains and waterways should be introduced to promote biodiversity and to perform sustainable drainage functions. This network of drains will provide habitat for a number of species and notably water vole. This species already occurs in NEC but has undergone significant declines throughout the UK. The provision of a network of suitable habitats at NEC offers a unique opportunity to develop a stronghold for this species in Cambridge.

Recommendation 14: Develop an enhancement and management plan for the First Public Drain to promote biodiversity and place making, whilst recognising its important function as a drainage feature.



Developing willow pollards in Cambridge

Ponds

Ponds have seen an overall trend of decline during the 20th century, not only within Cambridgeshire but also nationally, due to land use changes. Ponds are present throughout NEC, although several of these have very little value for wildlife. A number of small lakes are present at Cambridge Science Park, and these form part of the existing green corridor which extends through the site to the north-west. Other natural ponds are present in the adjacent Bramblefields LNR.

The retained ponds should be enhanced for their nature conservation value. Appropriate native planting should be used to enhance ponds for wildlife. Where feasible non-native fish and terrapin turtles should be removed from ponds as these can have a considerable detrimental effect on pond life and biodiversity value. This would be appropriate for the ponds at the Cambridge Science Park. Initially, a survey to establish the breeding status of the terrapin population should be undertaken as this will inform any mitigation measures required.

Creation of ponds within the design scheme should be considered as these are a Habitat of Principal Importance on the NERC Act (2006) and they are priority habitats in Cambridgeshire. New ponds should be enhanced with emergent and marginal native planting and these should ideally be sited strategically along proposed green corridors to further increase uptake by local wildlife such as amphibians.

Grasslands

Lowland meadows and lowland calcareous grassland are both listed as a Habitat of Principal Importance under the NERC Act (2006). Lowland chalk grassland and neutral grassland are both classified as a priority habitat in Cambridgeshire. Developing these habitats further through the focus area will help to increase species diversity and notably botanical and invertebrate diversity.

Areas of species-rich grassland should be created in conjunction with other landscape features to enable structural diversity; neutral grassland alongside hedgerows and the First Public Drain would strengthen their value as green corridors through the site. This would also serve to create character areas which are familiar in Cambridge, such as Coe Fen.

There will clearly be a requirement for more formal open space and amenity grassland. It is recommended that these are enhanced to provide bee lawns. These are traditional lawns which incorporate low growing flowering perennials, such as selfheal or bird's foot trefoil, which will withstand mowing and trampling. These species will still flower even after mowing and therefore can provide an important nectar resource for invertebrates. The bee lawns should be specified for all areas of amenity grassland.

Recommendation 15: All amenity grasslands within NEC should be enhanced to create bee lawns.



Calcareous grassland in South Cambridgeshire

Living roofs

The requirements for green and brown roofs are established in Policy 31 of the Cambridge City Local Plan which states that development will be permitted provided that 'any flat roof is a green or brown roof, provided that it is acceptable in terms of its context in the historic environment of Cambridge' and it goes on to say that 'green or brown roofs should be widely used in large-scale new communities'. These features are critical for Cambridge's climate

change adaptation policy offering multiple benefits for relatively little additional cost. They can form part of a sustainable drainage system and improve a building's energy balance thereby reducing carbon emissions. They can also reduce the negative thermal reflective properties of conventional roof types.

The provision of extensive areas of living roofs are seen as the only option to replace the existing open mosaic habitats which are of significant value within the current NEC area, particularly around the sidings and at the Cambridge Waste Water Treatment Plant. These roofs can also provide vital greening in more dense urban areas. The AAP provides the opportunity to create a coordinated approach to the provision of these roof types.

Living roofs can come in a variety of forms but it is recommended that biodiverse extensive green roofs are the focus at NEC to provide maximum biodiversity gains. These should be created instead of sedum mats as there are greater opportunities to create locally relevant conditions for biodiversity. These roofs may offer opportunities for habitat creation for notable invertebrate species and plants which are present within habitats at NEC. Colonies of plant species could be encouraged on these roofs through seed gathering and translocation programmes. The living roofs should incorporate features which provide a wide range of microclimates to promote diversity, these could include deadwood, sand lenses, non-porous areas to hold small amounts of water and slightly undulating surfaces.

The Green Roof Code (Groundwork Sheffield, 2014) provide guidance and further information on the creation of these features. In some circumstances a combination of living roof and solar panels can be used to create bio-solar roofs. There is some evidence to suggest that the cooling effects of the living roof can increase efficiency in PV panels.

Recommendation 16: A network of living roofs should be created through the urban areas of NEC. These roofs should take the form of extensive biodiverse roofs to maximise biodiversity gains and provide compensatory habitat for the loss of the open mosaic habitats in the sidings and Cambridge Waste Water Treatment Plant.

Recommendation 17: Encourage the provision of priority habitats within NEC including woodland, ponds, drains, grasslands, hedgerows and living roofs. Emphasis should be placed on delivering a mosaic of habitats to ensure diversity in opportunities for the species using them.

4.12. Species

The following recommendations are species specific measures to provide enhanced habitats for priority species. Many priority species such as water voles, amphibians and invertebrates will benefit specifically from the habitat enhancement measures proposed above. However, it was considered appropriate to make the following recommendations for these additional species.

Invasive species

A number of invasive species have already been identified within the NEC boundary. It is an offence to plant or cause invasive non-native species to spread in the wild and all waste containing these plants is considered controlled waste. The invasive species present are largely present within the landscaping of the science and business parks, and include wall cotoneaster and Japanese rose.

The nature of the First Public Drain as an aquatic habitat makes it particularly susceptible to invasive species issues due to the constant movement of water and its role as a corridor for mobile species. The drain appears to be free from invasive aquatic species. Extreme care must be taken to ensure non-native invasive species are not introduced when undertaking biodiversity enhancements. Especially aggressive species which may have serious management implications include *Azolla* spp., *Crassula helmsii*, *Hydrocotyle ranunculoides* and *Myriophyllum aquaticum*.

It is recommended that LEMPs contain measures to monitor for, and deal with, the presence of any non-native invasive species.

Recommendation 18: LEMPs should contain measures to monitor for and remove any non-native invasive species.

Hedgehogs

Hedgehogs were identified regularly in the desktop study and widespread habitat is available for them throughout NEC. It is anticipated that the areas of lower urban density and higher levels of greenspace within NEC will continue to provide habitat for the species over time. However, there is a risk that boundary features could restrict movement of the species. Therefore it is recommended that hedgehog highways are developed and each fence, if reaching the ground, should have at least one 13cm by 13cm hole to facilitate movement of the species.

Areas of new habitat creation can take time to mature and provide sufficient cover for hedgehogs to nest and overwinter in. Therefore it is recommended that hedgehog domes are considered in hedgerows and scrub habitats in the areas of lower urban density to provide habitat for the species.

Recommendation 19: Develop hedgehog highways to allow connectivity of habitats for the species, and provide hedgehog domes in recently created habitats to provide instant cover for them.

Bats

Bat roosting locations can be provided through the provision of bat boxes. These simple features can provide significant biodiversity gains as without these bat roosts are unlikely to occur in new development zones. There should be a preference for integrated bat boxes as these provide long-term solutions which are more secure. Integrated boxes also have better thermal properties for bats, often holding more heat over time. The location of integrated bat boxes should be agreed at the design stages to ensure they are appropriately sited.

A wide variety of boxes are available to suit a range of species. This type of intervention is appropriate throughout NEC. Ideal locations for boxes would be close to high value foraging areas such as the drains, woodlands or tree lines. Appendix J of the Cambridge City Local Plan sets out the requirement for integrated bat features within new buildings and these are endorsed here. However, for NEC we propose a higher density of integrated boxes for crevice roosting bats of a minimum of one in every two buildings. For bats which require roof voids and

internal flight areas a slightly lower density is recommended as these species are less likely to occur in the more urban habitats of NEC. We recommend one feature is included in every 25 buildings. These void roosting bat features should only be created in buildings neighbouring unlit open space on the edge of urban areas, or those adjacent to the green corridors.

Recommendation 20: Integrated bat features for crevice dwelling bats should be installed at a density of at least one for every two buildings. Features for bats which roost in roof voids, or require internal flight areas, should be installed at one for every 25 buildings.



Bat boxes can be mounted on a variety of structures, including mature trees

Birds

Integrated features for nesting bird should also be considered throughout NEC. The location of integrated bird boxes should be agreed at the design stages to ensure they are appropriately sited. Appendix J of the Cambridge City Local plan also sets out requirements for nesting bird provisions and these are also endorsed. For NEC it is proposed that the emphasis on some target bird species are adjusted for box schemes are these are set out below:

- House sparrow/swift: These species have broadly similar requirements in terms of nesting location, and the fact that both nest in colonies. Therefore it is proposed that a minimum of one swift box in every building is installed at NEC to provide for both species. These should be integrated boxes and they should be installed in groups. The provision of swift boxes should be considered on a variety of structures. For example integrated boxes could be considered on green bridges that cross Milton Road.
- Starling: Mounted on trees or buildings close to areas of grassland for foraging. Can nest in close colonies. A minimum of one box in every 10 buildings. These should be sited close to areas of open grassland, including amenity grassland.
- Black redstart: The provision of an extensive area of living roofs provides habitat opportunities for this species that are otherwise infrequent. It is therefore recommended that one box in every ten buildings is installed. These should all be situated on or close to the living roof habitats.
- Grey wagtail: Suitable boxes should be positioned around the waterways. Ideally these should be positioned in a sheltered place, such as the underside of culverts or bridges. At least five boxes should be sited at NEC.
- Peregrine falcon: In the areas of higher urban density there may be opportunities for peregrine ledges. These should be installed at a minimum of 20m and should be considered if buildings of this height are constructed at NEC.

Boxes should also be included for other species as listed in Appendix J of the Cambridge Local Plan.

Recommendation 21: Integrated features for nesting birds should be installed at appropriate densities in appropriate locations.

Landscape planting

Native species planting should be used wherever possible throughout landscaping of formal and informal areas. It is recognised that this may be harder to achieve in formal landscaping environments. However, where non-native species are used these should have some clear benefit to biodiversity, for example as a good nectar source or provision of dense vegetation for cover. Other simple measures to promote biodiversity in planting should be considered, such as the inclusion of a variety of flower structures to encourage a diversity of invertebrates. Different species of invertebrates will forage nectar from different plant structures, such as open flowered daisy species to tubed shaped figwort flowers. Each will support different invertebrate species and their inclusion in planting schemes will help to promote invertebrate diversity.

Recommendation 22: Use native species wherever possible within plantings scheme to promote biodiversity. Where non-native species are used these should have demonstrable biodiversity value.



Well vegetated bank side habitats of high biodiversity value



Swift over Cambridge, a local priority species



Well-vegetated drainage ditch in Cambridgeshire

Figure 6: Biodiversity opportunities at NEC with surrounding green infrastructure



5. Summary of recommendations

The table below provides a summary of all opportunities presented for each college and Cambridge City Council. For guidance the scale of cost and level of impact is also estimated. These scales are also shown below.

Key	Cost	Impact
Blue	Requirement for all proposals regardless of scale or cost	n/a
Red	High cost	n/a
Orange	Moderate cost	Low impact
Pale orange	Low cost	Moderate impact
Green	Very low cost	High impact

Recommendation	Cost	Impact	Location and notes
Recommendation 1: Always follow the mitigation hierarchy and ensure decisions are based on sound and current ecological data.	Blue	Blue	All development areas
Recommendation 2: Opportunities for positive biodiversity interventions should be explored at each stage of the development process, including interim provisions.	Blue	Blue	All development areas
Recommendation 3: All developments and projects should be guided by a Construction Environmental Management Plan.	Blue	Blue	All development areas
Recommendation 4: All developments and projects should deliver a measurable biodiversity net gain with a target of 10% gain.	Blue	Blue	All development areas
Recommendation 5: Develop a habitat creation project at Chesterton Fen that provides significant opportunities for biodiversity and people. This should be funded by developments within NEC.	Pale orange	Green	Offsite at Chesterton Fen

Recommendation	Cost	Impact	Location and notes
Recommendation 6: All developments and projects should be guided by a Landscape and Ecological Management Plan.	Blue	Blue	All development areas
Recommendation 7: Maintain and develop key green corridors through NEC, and develop smaller connections where feasible.	Pale orange	Green	Throughout NEC
Recommendation 8: Explore opportunities to minimise the barrier effect of Milton Road for wildlife.	Red	Pale orange	Milton Road
Recommendation 9: Sensitive lighting strategies should be developed to minimise the impacts of artificial light, particularly in sensitive locations close to key ecological features such as the green corridors.	Pale orange	Pale orange	Throughout NEC
Recommendation 10: New buildings at NEC should have design features to minimise bird collision.	Green	Pale orange	Throughout NEC
Recommendation 11: Incorporate amphibian-friendly drainage.	Green	Pale orange	Throughout NEC
Recommendation 12: Develop green loops to encourage engagement and contact with nature to promote well-being and to deliver health benefits.	Green	Pale orange	Throughout NEC
Recommendation 13: Undertake an assessment of Milton Road Hedgerows to assess against CiWS criteria.	Green	Pale orange	Milton Road Hedgerows CiWS
Recommendation 14: Develop an enhancement and management plan for the First Public Drain to promote biodiversity and place making, whilst recognising its important function as a drainage feature.	Orange	Green	First Public Drain
Recommendation 15: All amenity grasslands within NEC should be enhanced to create bee lawns.	Green	Pale orange	All development areas

Recommendation	Cost	Impact	Location and notes
Recommendation 16: A network of living roofs should be created through the urban areas of NEC. These roofs should take the form of extensive biodiverse roofs to maximise biodiversity gains and provide compensatory habitat for the loss of the open mosaic habitats in the sidings and Cambridge Waste Water Treatment Plant.	Orange	Green	Development areas with higher urban density
Recommendation 17: Encourage the provision of priority habitats within NEC including woodland, ponds, drains, grasslands, hedgerows and living roofs. Emphasis should be placed on delivering a mosaic of habitats to ensure diversity in opportunities for the species using them.	Blue	Blue	Throughout NEC
Recommendation 18: LEMPs should contain measures to monitor for and remove any non-native invasive species.	Blue	Blue	All development areas
Recommendation 19: Develop hedgehog highways to allow connectivity of habitats for the species, and provide hedgehog domes in recently created habitats to provide instant cover for them.	Green	Pale orange	All development areas
Recommendation 20: Integrated bat features for crevice dwelling bats should be installed at a density of at least one for every two buildings. Features for bats which roost in roof voids, or require internal flight areas, should be installed at one for every 25 buildings.	Blue	Blue	All development areas
Recommendation 21: Integrated features for nesting birds should be installed at the prescribed densities, in appropriate locations.	Blue	Blue	All development areas
Recommendation 22: Use native species wherever possible within plantings scheme to promote biodiversity. Where non-native species are used these should have demonstrable biodiversity value.	Green	Green	All development areas

6. Conclusions

The NEC focus area has already been widely developed for a variety of purposes such as science, business and industrial facilities. With the exception of Milton Road Hedgerows CiWS there is little by way of mature and well developed habitats. The key features and habitats which were identified on the site and in the surrounding landscape were as follows;

Water ways: The presence of the River Cam, and associated bankside habitats, are a key ecological feature within Cambridge City. Within NEC the First Public Drain provides habitat for priority species such as water vole as well as providing an important green corridor through the area.

Grasslands: The floodplain meadows and other commons provide areas of both neutral and calcareous grasslands in the area. Neutral grasslands are focussed closer to the river, with more calcareous grasslands to the south and east.

Pollarded willows: A white willow population that extends through the city and surrounding areas which are valued because of an important invertebrate community also for their heritage value and local character.

Hedgerows, scrub and woodland: These features are all present within NEC and provide some of the most diverse habitats present within the focus area. They include the Milton Road Hedgerows which are designated as a CiWS. These areas of hedgerow, scrub and woodland are particularly valued within the urban context in which they are set.

Brownfield or open mosaic habitats: These diverse habitats are present in the siding and water treatment works and are less common in Cambridge. They are distinctive for their range of habitats and species that provide multiple opportunities for wildlife to thrive.

Protected and notable species: There is considerable evidence and scope for protected and notable species through NEC including water vole, roosting bats, reptile populations and notable plant and invertebrate species.

The existing ecological features within the focus area will present constraints upon some development activities. Key habitats should be conserved and enhanced wherever possible and any impacts reviewed and offset if they cannot be avoided. Careful consideration of protected species is required if impacts are predicted on certain habitat types. Where this is anticipated mitigation measures should be established and enacted.

This assessment provides recommendations for biodiversity interventions that can be incorporated into policies for the AAP. Recommendations are firstly made to ensure sensitive construction activities within all development and projects in the area. Subsequent recommendations are made for the creation of habitats and features that are appropriate for this context that will also provide distinct character for place making, and serve to deliver both local and national biodiversity policies. A blue and green grid is proposed of priority habitats such as grasslands and wooded features combined with vegetated drainage ditches. This fulfils functions as a biodiversity network whilst also providing sustainable drainage options. This would be created with narrow links which connect broader and more substantial green corridors through NEC that are focussed on the existing green infrastructure. These proposed recommendations will make contributions for climate change measures including carbon storage and flood storage.

The aim of the policies at NEC should be to deliver a net gain in biodiversity. It is recommended that a gain of at least 10% should be the target for each development and project. The proposed density of urban development makes this an ambitious target that will require careful planning and consideration of biodiversity from the beginning of the design stages. Design led integration of biodiversity interventions into the urban realm will help to achieve these goals. An extensive provision of living roofs through this location will provide critical habitat to replace brownfield areas which will be lost as part of the development process.

It is recognised that it will be difficult to achieve these biodiversity net gain targets within the NEC area if the appropriate density of development is also to be achieved. Therefore it is proposed that offsite opportunities for biodiversity gains are provided. The development of NEC provides a unique opportunity to create a new biodiversity hotspot at Chesterton Fen which can deliver a suite of priority habitats and species that reflect the local landscape. This feature would also serve as a green gateway on the edge of the city which connects to wider schemes such as the National Trust Wicken Vision and the River Cam green corridor. This offers greater opportunities for public engagement with nature, and the subsequent health and well-being benefits that this brings.

It is anticipated that these measures in combination should serve to protect and enhance the most important biodiversity features which are already present at NEC, whilst also enabling sustainable development of the area. The provision of greenspaces such as Chesterton Fen and the First Public Drain green corridor will create new features for Cambridge City that recognise and develop on the character of the city and its existing greenspaces. The combination of biodiversity design solutions for the urban environment, and the naturalised greenspaces surrounding them, will serve to provide Cambridge with a thriving new environment for both people and wildlife.



Starling, a target species for NEC

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8. Appendices

Appendix 1: Relevant wildlife legislation and planning policy

Please note that the following is not an exhaustive list, and is solely intended to cover the most relevant legislation pertaining to species commonly encountered.

Subject	Legislation (England)	Relevant prohibited actions
<i>Amphibians</i>	-	-
Great Crested Newt <i>Triturus cristatus</i> Natterjack Toad <i>Epidalea calamita</i>	Schedule 2 of Conservation of Habitats and Species Regulations 2017 (as amended); and Schedule 5 of The Wildlife and Countryside Act 1981 (as amended)	- Intentionally or deliberately capture or kill, or intentionally injure; - Deliberately disturb or intentionally or recklessly disturb them in a place used for shelter or protection; - Damage or destroy a breeding site or resting place; - Intentionally or recklessly damage, destroy or obstruct access to a place used for shelter or protection; and - Possess an individual, or any part of it, unless acquired lawfully.
<i>Reptiles</i>	-	-

Subject	Legislation (England)	Relevant prohibited actions
Common Lizard <i>Zootoca vivipara</i> Adder <i>Vipera berus</i> Slow-worm <i>Anguis fragilis</i> Grass Snake <i>Natrix natrix</i>	Part of Sub-section 9(1) of Schedule 5 of The Wildlife and Countryside Act 1981 (as amended)	Intentionally kill or injure individuals of these species (Section 9(1)).
Sand Lizard <i>Lacerta agilis</i> Smooth Snake <i>Coronella austriaca</i>	Full protection under Section 9 of Schedule 5 of The Wildlife and Countryside Act 1981 (as amended)	- Deliberately or intentionally kill, capture (take) or intentionally injure; - Deliberately disturb; - Deliberately take or destroy eggs; - Damage or destroy a breeding site or resting place or intentionally damage a place used for shelter; or - Intentionally obstruct access to a place used for shelter.
<i>Birds</i>	-	-
All wild birds	Wildlife and Countryside Act 1981 (as amended)	Intentionally kill, injure, or take any wild bird or their eggs or nests.
'Schedule 1' Birds	Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)	- Disturb any wild bird listed on Schedule 1 whilst it is building a nest or is in, on, or near a nest containing eggs or young; or - Disturb the dependent young of any wild bird listed on Schedule 1.
<i>Mammals</i>	-	-

Subject	Legislation (England)	Relevant prohibited actions
Bats (all UK species)	Schedule 2 of Conservation of Habitats and Species Regulations 2017 (as amended); and Schedule 5 of Wildlife and Countryside Act 1981 (as amended)	- Deliberately capture, injure or kill a bat; - Deliberately disturb a bat (disturbance is defined as an action which is likely to: (i) Impair their ability to survive, to breed or reproduce, or to rear or nurture their young; (ii) Impair their ability to hibernate or migrate; or (iii) Affect significantly the local distribution or abundance of the species); - Damage or destroy a bat roost; - Intentionally or recklessly disturb a bat at a roost; or - Intentionally or recklessly obstruct access to a roost. In this interpretation, a bat roost is "any structure or place which any wild [bat]...uses for shelter or protection". Legal opinion is that the roost is protected whether or not the bats are present at the time.

Subject	Legislation (England)	Relevant prohibited actions
Badger <i>Meles meles</i>	Protection of Badgers Act 1992	Under Section 3 of the Act: - Damage a sett or any part of it; - Destroy a sett; - Obstruct access to, or any entrance of, a sett; or - Disturb a Badger when it is occupying a sett. A sett is defined legally as any structure or place which displays signs indicating current use by a Badger (Natural England 2007).
Hazel Dormouse <i>Corylus avellana</i>	Schedule 2 of Conservation of Habitats and Species Regulations 2017 (as amended); and Schedule 5 of Wildlife and Countryside Act 1981 (as amended)	- Intentionally or deliberately capture or kill, or intentionally injure; - Deliberately disturb or intentionally or recklessly disturb them in a place used for shelter or protection; - Damage or destroy a breeding site or resting place; - Intentionally or recklessly damage, destroy or obstruct access to a place used for shelter or protection; and - Possess an individual, or any part of it, unless acquired lawfully.

Subject	Legislation (England)	Relevant prohibited actions
Otter <i>Lutra lutra</i>	Schedule 2 of Conservation of Habitats and Species Regulations 2017 (as amended); and Section 9(4)(b) and (c) of Schedule 5 of Wildlife and Countryside Act 1981 (as amended)	- Deliberately capture, injure or kill an Otter; - Deliberately disturb an Otter in such a way as to be likely to significantly affect the local distribution or abundance of otters or the ability of any significant group of otters to survive, breed, rear or nurture their young; - Intentionally or recklessly disturb any Otter whilst it is occupying a holt; - Damage or destroy or intentionally or recklessly obstruct access to an Otter holt.
Water Vole <i>Arvicola amphibius</i>	Section 9 of Schedule 5 of Wildlife and Countryside Act 1981 (as amended)	- Intentionally kill, injure or take Water Voles; - Possess or control live or dead Water Voles or derivatives; - Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection; or - Intentionally or recklessly disturb Water Voles whilst occupying a structure or place used for that purpose.
Crustaceans	-	-

Subject	Legislation (England)	Relevant prohibited actions
White-clawed Crayfish <i>Austropotamobius pallipes</i>	Section 9(1) of Schedule 5 of Wildlife and Countryside Act 1981 (as amended)	Intentionally kill, injure or take White-clawed Crayfish by any method.

Conservation of Habitats and Species Regulations 2017 (as amended)

Full legislation text available at:

<http://www.legislation.gov.uk/uksi/2010/490/regulation/61/made>

The Wildlife and Countryside Act 1981 (as amended)

Full legislation text available at: <http://www.legislation.gov.uk/ukpga/1981/69/contents>.

Countryside and Rights of Way Act 2000

Full legislation text available at: <http://www.legislation.gov.uk/ukpga/2000/37/contents>

Protection of Badgers Act 1992

Full legislation text available at: <http://www.legislation.gov.uk/ukpga/1992/51/contents>

Section 41 of Natural Environments and Rural Communities (NERC) Act 2006

Full legislation text available at: <http://www.legislation.gov.uk/ukpga/2006/16/section/41>

Many of the species above, along with a host of others not afforded additional protection, are listed on Section 41 of the NERC Act 2006.

Section 41 (S41) of the Natural Environment and Rural Communities (NERC Act 2006) requires the Secretary of State to publish a list of habitats and species that are of principal importance for the conservation of biodiversity in England. The list (including 56 habitats and 943 species) has been drawn up in consultation with Natural England and draws upon the UK Biodiversity Action Plan (BAP) List of Priority Species and Habitats.

The S41 list should be used to guide decision-makers such as local and regional authorities to have regard to the conservation of biodiversity in the exercise of their normal functions – as required under Section 40 of the NERC Act 2006. The duty applies to all local authorities and extends beyond just conserving what is already there, to carrying out, supporting and requiring actions that may also restore or enhance biodiversity.

Schedule 9 of Wildlife and Countryside Act 1981 (as amended)

In addition to affording protection to some species, The Wildlife and Countryside Act 1981 (as amended) also names species which are considered invasive and require control. Section 14 of the Act prohibits the introduction into the wild of any animal of a kind which is not ordinarily resident in, and is not a regular visitor to, Great Britain in a wild state, or any species of animal or plant listed in Schedule 9 to the Act. In the main, Schedule 9 lists non-native species that are already established in the wild, but which continue to pose a conservation threat to native biodiversity and habitats, such that further releases should be regulated.

Wild Mammals (Protection) Act 1996

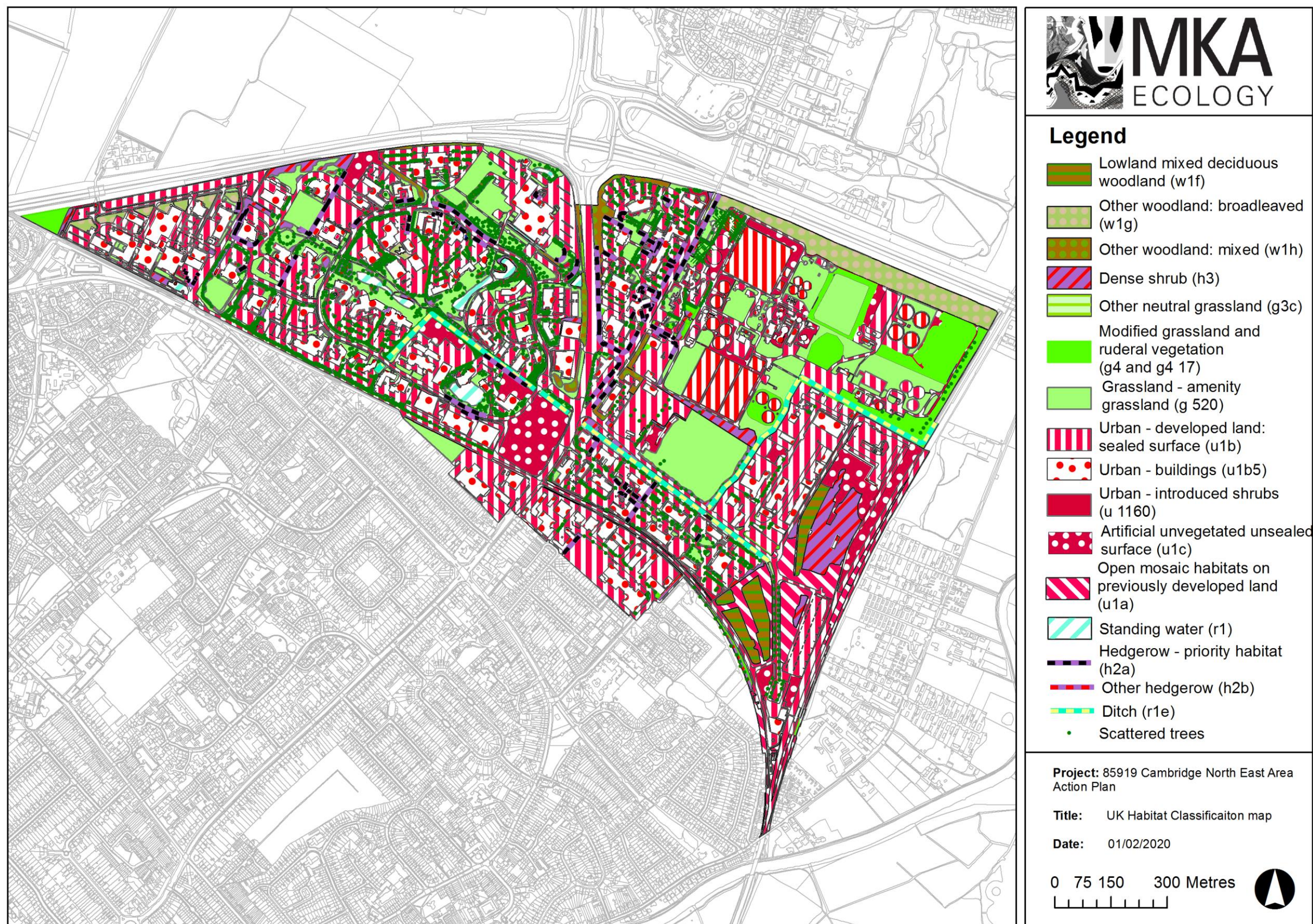
Full legislation text is available at: <http://www.legislation.gov.uk/ukpga/1996/3/contents>

Under this legislation it is an offence to cause unnecessary suffering to wild mammals, including by crushing and asphyxiation. It largely deals with issues of animal welfare, and covers all non-domestic mammals including commonly encountered mammals on development sites such as rabbits, foxes and field voles.

Birds of Conservation Concern (BoCC)

This is a quantitative assessment of the status of populations of bird species which regularly occur in the UK, undertaken by the UK's leading bird conservation organisations. It assesses a total of 246 species against a set of objective criteria to place each on one of three lists – Green, Amber and Red – indicating an increasing level of conservation concern. There are currently 52 species on the Red list, 126 on the Amber list and 68 on the Green list. The classifications described have no statutory implications, and are used merely as a tool for assessing scarcity and conservation value of a given species.

Appendix 2: UKHabs classification map for North East Cambridge



Appendix 3: Biodiversity Net Gain calculations

The process of achieving and assessing Biodiversity Net Gain should follow the following principles and rules, as set out within *Biodiversity Net Gain, Good Practice Principles for Development* (Baker, 2016) and listed in Table 2 and **Table 3**.

Table 2: The UK's good practice principles for biodiversity net gain (after Baker, 2016; Baker et al., 2019)

Principle	In practice
1. Apply the mitigation hierarchy	Do everything possible to first avoid and then minimise impacts on biodiversity. Only as a last resort, and in agreement with external decision makers where possible, compensate for losses that cannot be avoided. If compensating for losses within the development footprint is not possible or does not generate the most benefits for nature conservation, then offset biodiversity losses by gains elsewhere.
2. Avoid losing biodiversity that cannot be offset elsewhere	Avoid impacts on irreplaceable biodiversity – these impacts cannot be offset to achieve NNL/net gain.
3. Be inclusive and equitable	Engage stakeholders early, and involve them in designing, implementing, monitoring and evaluating the approach to net gain. Achieve net gain in partnership with stakeholders where possible.
4. Address risk	Mitigate difficulty, uncertainty and other risks to achieving net gain. Apply well-accepted ways to add contingency when calculating biodiversity losses and gains in order to account for any remaining risks, as well as to compensate for the time between losses occurring and gains being fully realised.
5. Make a measurable net gain contribution	Achieve a measurable, overall gain ¹ for biodiversity and the services ecosystems provide while directly contributing towards nature conservation priorities
6. Achieve the best outcomes for biodiversity	Achieve the best outcomes for biodiversity by using robust, credible evidence and local knowledge to make clearly-justified choices when: • Delivering compensation that is ecologically equivalent in type, amount and condition, and that accounts for the location and timing of biodiversity losses • Compensating for losses of one type of biodiversity by providing a different type that delivers greater benefits for nature conservation • Achieving Net Gain locally to the development while also contributing towards nature conservation priorities at local, regional and national levels • Enhancing existing or creating new habitat • Enhancing ecological connectivity by creating more, bigger, better and joined areas for biodiversity
7. Be additional	Achieve nature conservation outcomes that demonstrably exceed existing obligations (in other words, do not deliver something that would occur anyway).

Principle	In practice
8. Create a Net Gain legacy	Ensure Net Gain generates long-term benefits by: - Engaging stakeholders and jointly agreeing practical solutions that secure Net Gain in perpetuity - Planning for adaptive management and securing dedicated funding for long-term management - Designing Net Gain for biodiversity to be resilient to external factors, especially climate change - Mitigating risks from other land uses - Avoiding displacing harmful activities from one location to another and - Supporting local-level management
9. Optimise sustainability	Prioritise Biodiversity Net Gain and, where possible, optimise the wider environmental benefits for a sustainable society and economy.
10. Be transparent	Communicate all Net Gain activities in a transparent and timely manner, sharing the learning with all stakeholders.

Table 3: Biodiversity net gain rules (Crosher *et al.*, 2019b)

Rule	In practice
1	Where the metric is used to measure change in biodiversity unit values need to be calculated prior to the intervention and post-intervention for all parcels of land/linear features affected
2	Compensation for habitat losses can be provided by creating new habitat, by restoring or enhancing existing habitats, or by accelerating successional processes. Measures to improve existing habitats must provide a significant and demonstrable uplift in distinctiveness and/or condition to record additional biodiversity units
3	‘trading down’ must be avoided. Losses of habitat are to be compensated for on a “like for like” or “like for better” basis, new or restored habitats should aim to achieve a higher distinctiveness and /or condition than habitats lost.
4	Biodiversity unit values generated by biodiversity metric 2.0 are unique to this metric and cannot be compared to unit outputs from the original DEFRA metric or any other biodiversity metric. Furthermore, the units generated by each module of biodiversity metric 2.0 (for area, hedgerow and river habitats) are unique and cannot be summed.
5	It is not the area of habitat that determines whether the ecological equivalence or better has been achieved but the net change in biodiversity units. Risks associated with enhancing or creating habitats mean that it may be necessary to enhance or create a larger area of habitat than lost to fully compensate for impacts on biodiversity
6	Deviations from the published method of biodiversity metric 2.0 need to be ecologically justified. While the methodology is expected to be suitable in the majority of circumstances it is recognised that there may be exceptions. Any local or project-specific adaptation of the metric must be transparent and fully justified.

To establish whether the proposed development will contribute positively to biodiversity we use the Defra Biodiversity Metric 2.0 (Crosher *et al.*, 2019). This method uses habitat as a proxy for biodiversity and its primary application is to provide planners and developers with a method of establishing how much and what type of habitats should be created or enhanced in order to ensure that the impacts of a development do not result in a net loss of biodiversity. Habitats are assigned the following scores:

- Distinctiveness: A measure of the type and importance of a habitat.
- Condition: A measure of the present or predicted condition of a habitat type.
- Connectivity: How well a habitat is connected within the landscape.

- Strategic significance: How a habitat is regarded within Local Planning Policy.

For proposed habitats, where there is an attempt to predict the habitat type following establishment additional handicaps or risk scores are imposed representing the following factors:

- Difficulty: More difficult habitats incur a greater risk.
- Time to condition: In general, it takes longer for habitats to reach a better condition, plus certain habitats by their very nature take longer to create or restore.
- If habitats are created off-site, an additional risk score is applied.

A detailed list of explanations justifying the assignment of the different current and proposed habitats to their various Distinctiveness and Condition scores is provided below. Hedgerows are considered separately to other habitat types within the Defra metric. The metrics calculated for hedgerows will therefore be calculated and presented separately. In most cases, the Connectivity and Strategic significance scores are 'Low'. Only habitats of High or Very-High distinctiveness warrant a connectivity greater than low. Due to the scale and diversity of habitats on site habitat types have been grouped together for the condition assessment. However, where habitats were identified that were clearly of a different condition, such as scrub and grasslands, this was taken into account in the assessment. Furthermore, as detailed in the constraints section it was not feasible to inspect all habitats closely and some assessments were made remotely.

Table 3: Rationale for condition criteria for current habitats on-site

Habitat and area	Condition assessment	Rationale	Biodiversity units
Urban – developed land; sealed surface (101.70 ha)	n/a other	Automatically assigned a condition score of 0	0
Urban - Vacant/derelict land/ bare ground (11.64 ha)	Poor	Little biodiversity value as these areas are largely construction sites or gravel	23.28
Urban – Introduced shrubs (6.20 ha)	Poor	No assessment required – automatically allocated a score of 1	12.4
Urban - Amenity grassland (31.32 ha)	Poor	Dominated by <i>Lolium sp.</i> and most condition criteria being failed	62.6
Urban – Open mosaic habitat on previously developed land (4.74 ha)	Good	Meets all condition criteria	93.86
Grassland - Modified grassland (0.76 ha)	Moderate	Fails at least one of the condition criteria	3.06
Grassland – Other neutral grassland (0.22ha)	Moderate	Recognisable as being of neutral in nature but not a good example of this habitat type	1.96
Grassland - Ruderal/ephemeral (5.52 ha)	Poor	Has low biodiversity value	11.05
Heathland and shrub - Mixed scrub (0.42 ha)	Moderate	Age range is missing some size classes	3.90
Heathland and shrub - Mixed scrub (8.81 ha)	Good	Meets all 5 criteria with only minor variation	121.68
Heathland and shrub – Bramble scrub (0.02ha)	Poor	Fails several of the condition assessment criteria	1.96
Woodland and Forest – Other woodland; broadleaved (4.72 ha)	Moderate	Plantation woodland which fails at least two of the condition assessment criteria	41.59
Woodland and Forest – Other woodland; mixed (3.14 ha)	Moderate	Plantation woodland which fails at least two of the condition assessment criteria	28.90
Woodland and forest - Lowland mixed deciduous woodland (2.16 ha)	Moderate	Fails at least two of the condition assessment criteria. Naturally established woodland	29.83
Lakes - Ponds (non-priority habitat) (1.45 ha)	Good	Meets almost all criteria.	28.86

Habitat and area	Condition assessment	Rationale	Biodiversity units
Lakes - Temporary lakes, ponds and pools (0.02ha)	Poor	Fails three condition assessment criteria (1, 2 and 3)	0.02
Urban – Artificial lake or pond (0.14 ha)	Moderate	Fails several condition assessment criteria	1.19
Cropland - Horticulture (0.03ha)	Poor	No assessment required – allocated score of 1	0.07
Hedgerow and length	Condition assessment	Rationale	Biodiversity metres
Hedgerow (priority habitat) (Milton Road hedges potential CiWS) (253 linear metres)	Good	No more than two failures in total and no more than 1 in any functional group (passes all favourable condition attributes)	3.04
Hedgerow (priority habitat) (4227 linear metres)	Moderate	No more than four failures in total and fails both attributes in a maximum of one functional group (likely fails A1, A2 and C1)	16.9

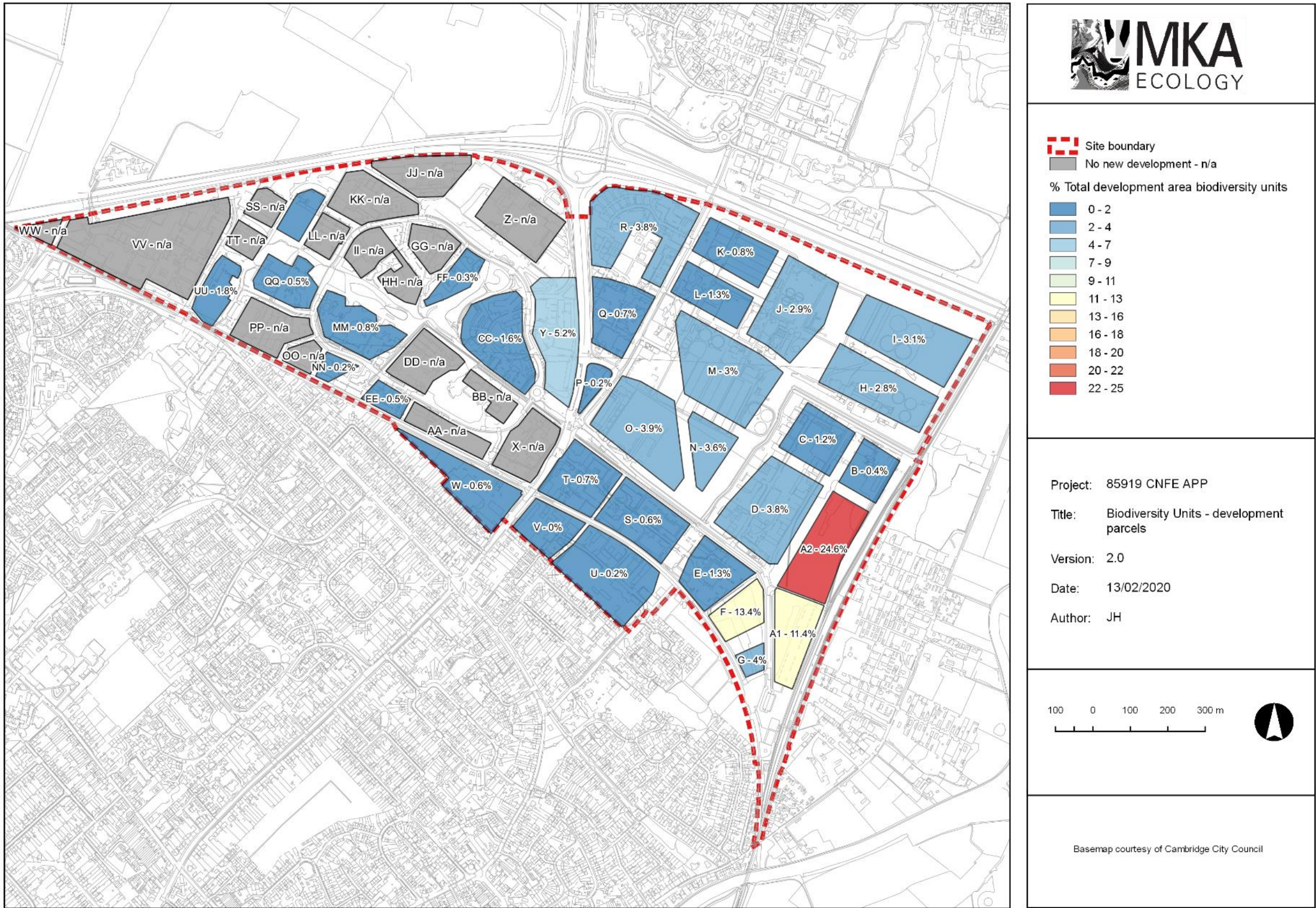
Table 4: Biodiversity units applicable to each development parcel

Development parcel	To be re-developed or not developed	Area of parcel (ha)	Biodiversity units	Percentage of total developable area
A1	Yes – re-developed	2.277	19.59	11.4
A2	Yes – re-developed	3.317	42.36	24.6
B	Yes – re-developed	1.498	0.75	0.4
C	Yes – re-developed	2.132	2.13	1.2
D	Yes – re-developed	4.480	6.56	3.8
E	Yes – re-developed	2.119	2.25	1.3
F	Yes – re-developed	1.395	23.02	13.4
G	Yes – re-developed	0.446	6.86	4.0
H	Yes – re-developed	3.386	4.74	2.8
I	Yes – re-developed	4.046	5.30	3.1
J	Yes – re-developed	3.820	5.02	2.9
K	Yes – re-developed	2.163	1.43	0.8
L	Yes – re-developed	1.893	2.19	1.3
M	Yes – re-developed	4.977	5.20	3.0
N	Yes – re-developed	1.502	6.18	3.6
O	Yes – re-developed	4.285	6.70	3.9
P	Yes – re-developed	0.550	0.32	0.2
Q	Yes – re-developed	2.404	1.21	0.7

Development parcel	To be re-developed or not developed	Area of parcel (ha)	Biodiversity units	Percentage of total developable area
R	Yes – re-developed	4.373	6.56	3.8
S	Yes – re-developed	2.818	1.07	0.6
T	Yes – re-developed	2.492	1.13	0.7
U	Yes – re-developed	4.043	0.37	0.2
V	Yes – re-developed	1.635	0.07	0.0 (0.04)
W	Yes – re-developed	2.631	1.06	0.6
X	No – not developed	1.978	0	0
Y	Yes – re-developed	3.377	8.90	5.2
Z	No – not developed	2.735	0	0
AA	No – not developed	1.222	0	0
BB	No – not developed	0.765	0	0
CC	Yes – re-developed	3.400	2.80	1.6
DD	No – not developed	1.827	0	0
EE	Yes – re-developed	0.684	0.78	0.5
FF	Yes – re-developed	0.972	0.59	0.3
GG	No – not developed	0.847	0	0
HH	No – not developed	1.166	0	0
II	No – not developed	2.020	0	0
JJ	No – not developed	2.144	0	0
KK	No – not developed	0.817	0	0
LL	No – not developed	1.048	0	0
MM	Yes – re-developed	2.288	1.42	0.8
NN	Yes – re-developed	0.470	0.26	0.2
OO	No – not developed	0.556	0	0
PP	No – not developed	1.902	0	0
QQ	Yes – re-developed	1.645	0.86	0.5
RR	Yes – re-developed	0.914	1.32	0.76

Development parcel	To be re-developed or not developed	Area of parcel (ha)	Biodiversity units	Percentage of total developable area
SS	No – not developed	0.704	0	0
TT	No – not developed	0.636	0	0
UU	Yes – re-developed	1.270	3.18	1.84
VV	To be confirmed	7.411	0	0
WW	No – not developed	0.403	0	0

Plan showing proportion of biodiversity units applicable to each development parcel



The creation of new habitats at Chesterton Fen presents the opportunity to offset some of the biodiversity units which are likely to be lost as a result of development schemes within North East Cambridge. The tables below present the metrics for the offsite habitat creation at Chesterton Fen. Table 4 shows the current metric values and Table 5 shows estimated metric values based on an enhancement scheme incorporating reedbeds, pools, mixed scrub, wet woodland and enhancing the grassland to a lowland meadow. Some assumptions were made for these calculations, including the assessment of the exiting grassland as poor condition. The assessment was conducted in the winter months which is not the optimal time to undertake grassland assessment, however this is considered to be a fair representation of the habitats on the site. These calculations are based on the area shown in the figure at the end of this section. This scenario shows that it is feasible to deliver an additional 30.84 units through the creation of these habitats at Chesterton Fen.

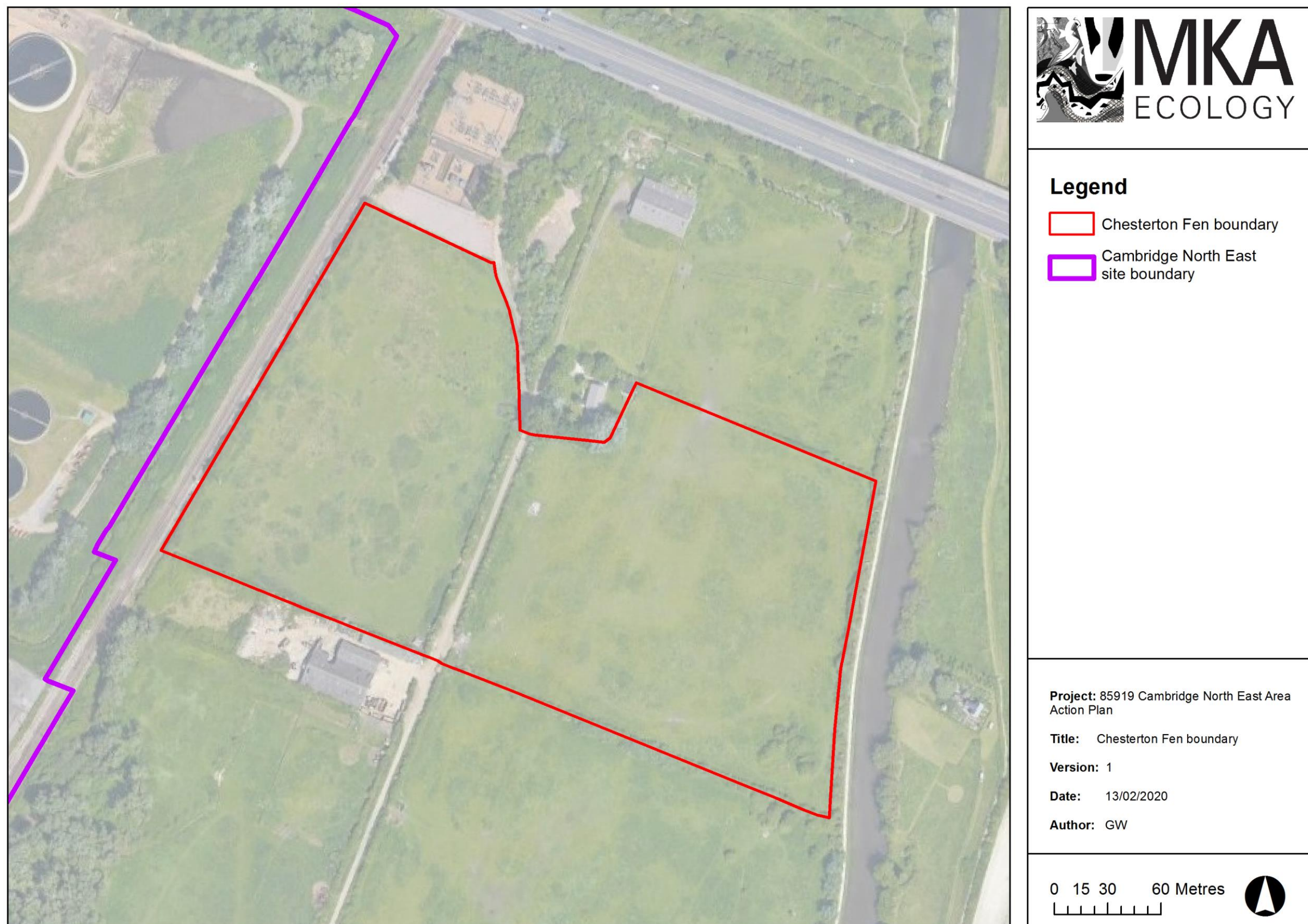
Table 4: Rationale for condition assessment for current habitats off site (Chesterton Fen)

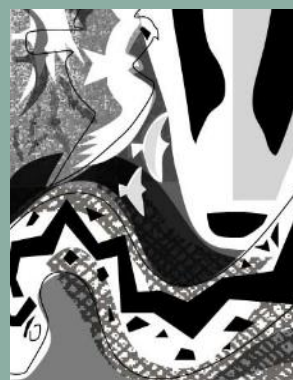
Habitat and area or length	Condition assessment	Rationale	Area (ha)	Biodiversity units
Grassland - other neutral grassland (6.5 ha)	Poor	Fails most condition assessment criteria	6.5	32.89
Heathland and scrub – mixed scrub (0.09)	Moderate	Fails condition assessment criteria number 4 – cover of <i>Urtica dioica</i> is 5-20%	0.09	0.87
Hedgerow and length	Condition assessment	Rationale	Length	Biodiversity metres
Hedgerow (priority habitat) (1336 linear metres)	Good	No more than two failures in total and no more than one in any functional group	1336m	16.03

Table 5: proposed habitats at Chesterton Fen

Habitat and area or length	Condition assessment	Rationale	Area	Biodiversity units
Grassland – lowland meadows (existing grassland enhanced)	Moderate	Recognisable as being a lowland meadow but not a good example of this habitat type as unlikely to reach optimal condition due to recreation pressures	2.5	30.46
Wetland - reedbeds	Moderate	Likely to meet lost condition assessment criteria but hydrology may need to be artificially managed - some artificial drainage may be needed	2	22.01
Lakes – ponds created as part of wetland	Good	Likely to meet all condition criteria with only minor variation	1.09	11.64
Heathland and scrub – mixed scrub	Good	Likely to meet all condition criteria with only minor variation	0.8	0.87
Woodland and forest – wet woodland	Good	Could achieve good condition with appropriate management, although may not achieve condition 3 (diverse age range /height structure) or condition 6 (standing and fallen deadwood over 20cm diameter).	0.2	0.98
Hedegrows (retained)	Good	No more than two failures in total and no more than one in any functional group	1336m	16.03

Plan showing area of Chesterton Fen considered within the biodiversity net gain assessment





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MKA Ecology Limited, 29 Station Road, Shepreth, Hertfordshire, SG8 G6B | 01763 262 211 | info@mkaecology.co.uk | www.mkaecology.co.uk

Company registration no 5858121 | VAT no. 825137440