

Colchester City Strategic Biodiversity Assessment



Client
Colchester City Council

Date:
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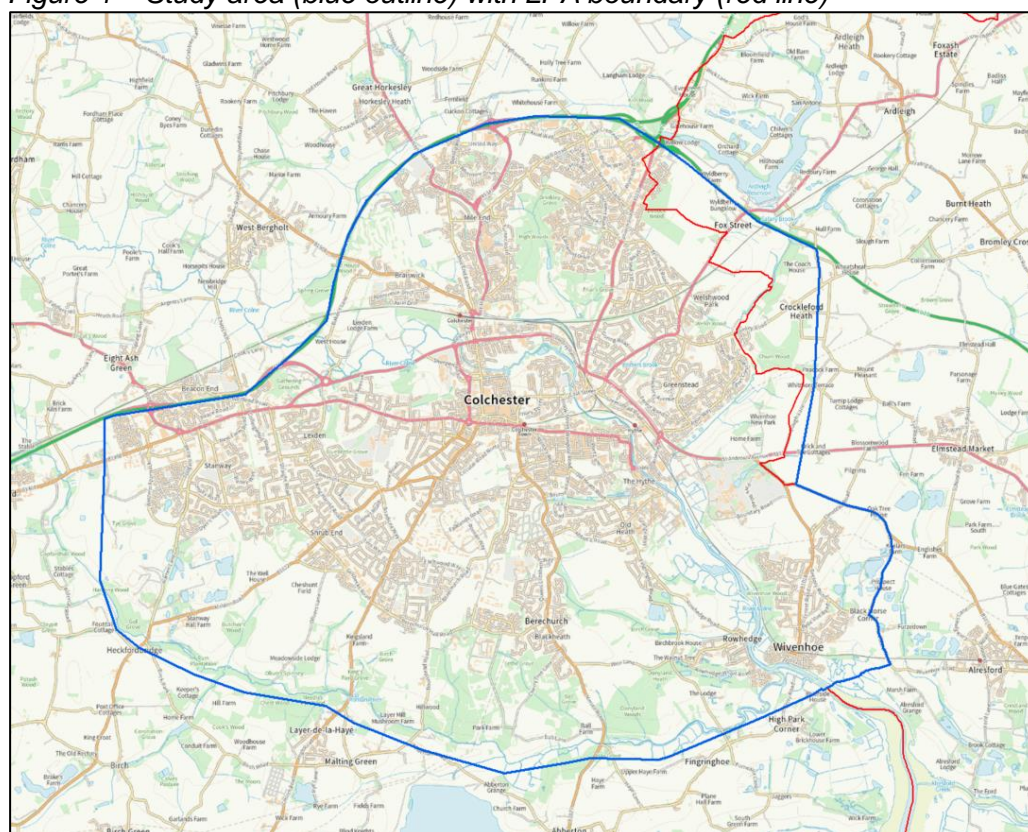
Contents

1.	INTRODUCTION	4
2.	SUMMARY OF STRATEGIC PRINCIPLES	5
3.	ENVIRONMENTAL CONDITIONS	7
	Geology and soils	7
	Hydrology	7
	History	8
	National Character Area	10
	Local Ecological Networks	10
	Sites of Special Scientific Interest (SSSI)	11
	Local Nature Reserves	12
	Local Wildlife Sites	12
	Geological Sites	13
4.	BIODIVERSITY	14
	Other Habitats	20
	Priority Species	21
5.	EXISTING GREEN AND BLUE INFRASTRUCTURE OF SIGNIFICANCE TO BIODIVERSITY	28
	Area 1. Roman River Valley	29
	Area 2. River Colne	29
	Area 3. Southeast Plateau	30
	Area 4. Friday Woods	31
	Area 5. Salary Brook	31
	Area 6. Stanway Gravel Pits	32
	Area 7. High Woods	33
	Area 8. Wivenhoe Borders	33
	Area 9. Lexden Springs and Hilly Fields	33
	Area 10. Bourne Valley	34
	Area 11. Gosbecks Archaeological Park	34
	Area 12. Grymes Dyke	35
	Area 13. Railway	35
6.	OPPORTUNITIES FOR BIODIVERSITY GAIN	36
	Opportunity Areas	36
	Habitat Enhancement	37
	Habitat Creation	38
	Biodiverse Roofs and Walls	39
	Street Trees	40
	Connectivity	41
	Spatial Prioritisation	42
	Wider Colchester	42

1. Introduction

- 1.1. Colchester City Council instructed Place Services to produce an assessment of the priorities for strategic promotion of biodiversity within the planning system focussed on the urban area of Colchester City. The intention is to highlight those areas in and around the city in which biodiversity enhancement and creation would provide the greatest benefits.
- 1.2. The document considers the principles that should underpin an approach to conserving and enhancing biodiversity. It also summarises the environmental characters of the city and describes the existing biodiversity resource in terms of habitats and species leading to some proposed priorities for the management, restoration and creation of habitats for the purpose of conserving and enhancing biodiversity. Reference is made to the wider LPA area to provide context to the study.
- 1.3. The study area is illustrated in Figure 1. The northern boundary is the A12/A120 and the southern boundary is the valley of the Roman River. To the east, the boundary follows the district boundary to the east of Wivenhoe and then runs north to join the A120 at Crockleford Heath, taking in some of the adjoining Tendring District.
- 1.4. The preparation of a Local Nature Recovery Strategy for Greater Essex is in progress at the time of writing, having passed through an initial public consultation. Where possible, this document has been written to be consistent with, and refer to, the principles and objectives set out within it, where known.

Figure 1 – Study area (blue outline) with LPA boundary (red line)



2. Summary of Strategic Principles

- 2.1. Set out below are the suggested principles that should form the core of a strategy to achieve the aim of nature recovery by conserving and enhancing biodiversity. These are derived from Government guidance and published strategies, expanded to encapsulate sound ecological practice.
- 2.2. The main focus of a biodiversity strategy should be on measures that:
- Protect and enhance the ecological network of existing sites with statutory and non-statutory nature conservation designations¹
 - Recognise and improve the connections between such sites
 - Create new habitats for biodiversity
 - Where possible, enhance the biodiversity value of land outside of recognised ecological networks
- 2.3. Although they are consultees, Local Planning Authorities have no real influence over the statutory designation of sites for nature conservation purposes. However, there is scope for them to play a leading role in the maintenance of an evidence based non-statutory network of Local Sites, by regularly reviewing the condition of the sites in line with developments in site selection criteria and by rigorously protecting them within their planning policies and their development management practice.
- 2.4. All designated sites should be protected by the application of the hierarchical approach to considering ecological impacts within planning decisions, avoiding harm wherever possible, mitigating where harm cannot be avoided, and compensating only as a last resort².
- 2.5. Habitats considered to be irreplaceable³ – by virtue of the practical difficulty of effectively re-creating them – and Priority habitats – because of their importance for the conservation of biodiversity – should always be protected from harm. Priority habitats are those that are listed under Section 41 of the Natural Environment and Rural Communities Act (2006) and should be the focus for Local Planning Authorities delivery of their statutory obligations to conserve and enhance biodiversity.
- 2.6. The development management system also provides opportunities to enhance biodiversity by guiding the ways in which on-site mitigation and compensation plans are developed along consistent lines, resulting in genuine and long-lasting benefits. This guidance should be clearly communicated to applicants, should reflect local and national conservation priorities and should require ambitious targets, albeit in proportion to the scale of the development and the impacts associated with it.
- 2.7. Off-site net gain and compensatory measures should also be guided by a hierarchical approach, with preference given where possible to securing, restoring, enhancing or maintaining sites with an existing value for biodiversity, over the creation of new habitats, with the uncertainty associated with that and the delay in achieving significant benefit.

¹ Including Habitats sites, Ramsar sites, SSSI, LNR, LoWS

² Paragraph 193a of the National Planning Policy Framework (December 2024)

³ Paragraph 193c of the National Planning Policy Framework (December 2024)

- 2.8. Sites for habitat creation should be identified on a strategic basis, to ensure that they make a valid contribution to the local ecological network and so that the environmental conditions are appropriate to maximise the biodiversity value of the habitat to be created, and to reduce the management effort necessary, ensuring longer-term sustainability of the gains achieved.
- 2.9. Similarly, all habitat creation measures should be focused on the habitats that are already present in the area, so that existing ecological resources are augmented and strengthened. Habitat design, including species mixes, should reflect that of equivalent, older sites rather than using generic specifications less characteristic of the local area. Enhancement measures should focus on retaining existing communities and species populations that have been recognised as having significance.
- 2.10. There should always be a preference for compensatory measures, or those providing net gain, to be delivered in close proximity to the site affected, provided that this is appropriate to the local ecological network. This can help ensure that wildlife and ecological resources are integrated within all landscapes and available to all communities, rather than being separate or remote. A focus on habitat creation that reduces any local deficiency in biodiversity resources, or in community access to natural habitats, is also important in addressing issues of fragmentation.
- 2.11. The value of all measures for the benefit of biodiversity should be assessed according to their contribution to the establishment and development of a coherent ecological network. With designated sites at its core, this network should also provide meaningful ecological connections between sites, both direct and in the form of stepping-stones, and where possible a buffer of compatible habitat that protects the sites from external influences. The network should provide the flexibility for species and habitats to adjust to the impacts of climate change.
- 2.12. Wherever possible, and appropriate to the biodiversity objectives, sites established or managed for the benefit of biodiversity should also be available to local communities, especially where this provides educational opportunities. Equally, all green space established within or associated with developments should be designed to benefit biodiversity alongside any other function, such as recreation or surface water management.

3. Environmental Conditions

- 3.1. This chapter provides an overview of the factors that influence biodiversity as they present within the study area, with a summary of the existing local ecological network of designated sites. This is intended to provide the context by which priorities for biodiversity protection, enhancement, restoration and creation can be identified. Consideration is given to the potential for the creation of key habitats within the city, considering factors of environment, landform and land use.

Geology and soils

- 3.2. Although sitting within a basin of London Clay, most of Colchester City sits on a plateau of higher ground formed from silts, sands and gravels deposited by a former route of the River Thames, through which the River Colne, the Roman River and Salary Brook have since cut their valleys. These deposits include a high proportion of fine sands and silts meaning that drainage can often be impeded at the surface, but the lower profiles, such as are exposed at extraction sites and on river valley slopes are generally coarser.
- 3.3. Where the London Clay is present at the surface, primarily in lower lying areas along the river and brook valleys, this results in slightly acid soils that are prone to waterlogging in the winter but dry out and crack in the summer.

Hydrology

- 3.4. The hydrology of the study area is dominated by the River Colne, which flows through the middle of the city, and its tributaries. Downstream of a sluice at East Mill, the river is tidal and its ecological character changes as a result. The sluice ensures a relatively stable water level for the freshwater section of the river.
- 3.5. The study area is bordered to the south by the valley of the Roman River, the largest tributary of the River Colne, which is also tidal in its lower reaches, joining the Colne Estuary at Rowhedge. In contrast to the banks of the Colne, the Roman River valley is largely undeveloped.
- 3.6. Salary Brook and St Botolphs Brook form much of the northern boundary of the study area, flowing in opposite directions either side of Horkesley Heath, just outside of the A12. Salary Brook flows through Ardleigh Reservoir and then down the eastern edge of the City, joining the Colne near the University. St Botolph's Brook joins the Colne outside of the study area, just upstream of the railway.
- 3.7. Birch Brook arises at Mersea Road and flows across through the military land at Middlewick and then between Old Heath and Rowhedge, before joining the Colne estuary. The nearby Bourne Brook is a short, modified water course, flowing through a series of artificial, former mill ponds from Mersea Road towards The Hythe, where it is piped into the estuary at low tide.
- 3.8. There is a small, apparently unnamed stream that flows south through High Woods Country Park and is then partially culverted before joining the Colne at Cowdray Marsh. Porters Brook

is similarly partially culverted and broadly follows Harwich Road, disappearing under St Andrews Avenue.

- 3.9. Unsurprisingly for an area dominated by sand and gravel surface geology, there are relatively few natural ponds or other bodies of water in the study area. Most of those now present have either an ornamental or industrial origin, associated with larger houses or with mills. More recently significant areas of open water have been created to the southwest of the study area following the extraction of aggregates to the depth of the water table.
- 3.10. The coastal grazing marshes along the Roman River and the River Colne downstream of the Hythe are bisected by drainage ditches, which provide waterbodies that are likely to vary from fresh to brackish.

History

- 3.11. For obvious reasons in a largely urban area, the biggest influence on biodiversity in the study area is the history of land use and development over the last 150 years. This allows us to see which older habitats have been retained through the expansion of the city and which have been created as a result of that process.
- 3.12. The best woodland and grassland sites for biodiversity are the ones with the longest and most stable management history, which provides continuity of conditions that typically leads to an accumulation of species over time. With woodlands, this is Ancient Woodland, but also some older secondary woodland, particularly where it is adjacent to an Ancient site.
- 3.13. The best grassland sites are generally those with a history that does not include any of the intensification or mechanisation of agriculture practice that took place after the Second World War, and that has created wider uniformity in structure and fertility of soils. As well as the benefits of continuity in management, these unimproved grasslands support small scale variations in environmental conditions that further encourage biodiversity.
- 3.14. In the middle of the 19th Century, the developed part of Colchester only extended a short distance south of what is currently Southway. Beyond that were the gardens of St John's Abbey and the military barracks, with dispersed large houses and farms set in agricultural land. The settlement extended east along Hythe Hill with docks and associated industrial development strung out along the west bank of the River Colne as far as what is now the university. To the east of the river, the railway line ran through an extensive area of coastal grazing marshes.
- 3.15. Much of the land to the east of the city centre between the main road and rail corridors, was devoted to orchards and horticulture. What is now the Greenstead Estate (built from 1955 onwards) was another agricultural landscape, dropping down to Salary Brook, which itself remains substantially unaltered. Only one fragment of a traditional orchard remains in the study area, just southwest of the city centre, and it is recognised with LoWS status.
- 3.16. The corridor of the Colne to the northwest of the city centre north to the railway line is largely unchanged, with most of the older field boundaries still present. This represents the oldest surviving landscape in the city area.

- 3.17. Small patches mapped as heathland, at Donyland, Blackheath, Stanway Heath and Kingsford are all now wooded, joining up with the adjacent older, large woods on the northern slope of Roman River.
- 3.18. To the north of the railway line, the small village of Mile End was isolated within an agricultural landscape that included four large woodland blocks, of which only High Woods and Bullock Wood remain almost in their entirety. The other large woods, East Wood and the Magdalen Wood complex remain only as ghost outlines of retained trees within the High Woods and St Johns housing estates.
- 3.19. Otherwise, in an agricultural landscape, there were relatively few patches of semi-natural habitat, most of which still remain as small woodlands. However, at that time all cropland and grassland would have been unaffected by chemicals and intensive management techniques, and as a result, would have been more species-rich and flowery than modern agricultural grasslands, supporting a much higher biomass of invertebrates. The loss of such grasslands and the exclusion of most wildlife from arable land is probably the most significant ecological impact on the wider countryside in the last 100 years, increasing the value of any remaining, unaffected habitat units.
- 3.20. The rate of growth of the city increased in the final quarter of the 19th Century, which started the transition of much of the study area from a rural to an urban setting.
- 3.21. In Colchester, the history of military activity has had a large impact on the preservation of habitats that otherwise may have been under pressure from development. The construction of the barracks, from 1855 onwards slowed the southward spread of the town and large land holdings – ranges and training grounds – from Middlewick south to the Roman River and around Friday Woods have been kept largely free of the impacts of intensive agriculture, although there was some post-war arable cultivation including fields either side of Weir Lane, for example.
- 3.22. Other retained habitats in the urban area include areas of the River Colne floodplain and the large wedge of land that makes up High Woods Country Park. Where open grassland remains away from the floodplain, such as at Middlewick Ranges and Hilly Fields, it is to a greater or lesser extent acidic, although much of what would have been open 100 years ago has become scrubby or wooded, either naturally or through planting.
- 3.23. Other acid grassland sites have survived operational use, the best example being Colchester Cemetery, where due to its age, the grassland present was never subjected to agricultural improvement. Although somewhat patchy, the combination of soil conditions and functional management has favoured acid grassland communities and species. The campus of the University of Essex at Wivenhoe Park is another area where acid grassland remains, interspersed with buildings and other infrastructure.
- 3.24. Within the study area, the other class of sites of higher value to biodiversity are those that have resulted from human activity, mostly in the postwar period. This primarily comprises aggregate extraction sites, more recent ones to the southwest of the city around Stanway and around Wivenhoe, and older ones to the southeast of the city around Old Heath and Rowhedge. Older sites were restored less rigorously than is the case now and so have a more varied topography, which favours biodiversity. Features such as steep banks, wet hollows, mineral soils (with very

low fertility) lead to a high diversity of plant species and provide opportunities for a wide range of invertebrate species.

3.25. Where previously developed land is cleared of its buildings, similar conditions can arise, although in many cases these are transient as such sites are favoured for re-development. At the Hythe Marshes there are more unusual manmade features in the form of lagoons created for the deposition of material dredged from the river when the port was still active. These compliment the adjacent grazing marsh habitat and the estuary.

National Character Area

3.26. The majority of the study area is within National Character Area (NCA) 111 North Thames Basin, which encompasses the area of London Clay north of the Thames from Hertfordshire and West London, right across to Harwich in the east. The NCA is diverse, taking in the suburbs of London, but also a series of old and new towns and cities set within in an agricultural landscape.

3.27. The Statements of Environmental Opportunity set out within the NCA Profile document are:

- To manage rivers to improve water quality, alleviate flooding, and to ensure their capacity in the face of climate change, while conserving the habitat in the river corridor for recreation and ecological value
- To manage the agricultural landscape for food production in a sustainable manner
- To protect and manage the historic environment
- To manage and expand woodland and wood pasture area, and increase tree cover in urban areas

3.28. A small part of the study area, covering Rowhedge and most of Wivenhoe is within NCA 81 Greater Thames Estuary, which forms a strip along the entire coast of Essex and north Kent. The NCA is a combination of expansive natural habitats of international importance and areas of dense industrial and residential development, and is vulnerable to continued pressure for development and the impacts of climate change.

3.29. The Statement of Environmental Opportunity set out within the NCA Profile document are:

- To maintain and enhance the areas of natural habitat, addressing climate change impacts
- To work with landowners to maintain food production while protecting and enhancing the environment
- To balance access and recreation with the maintenance of a remote and tranquil character
- Encourage a strategic approach to development that includes enhancement to the natural environment

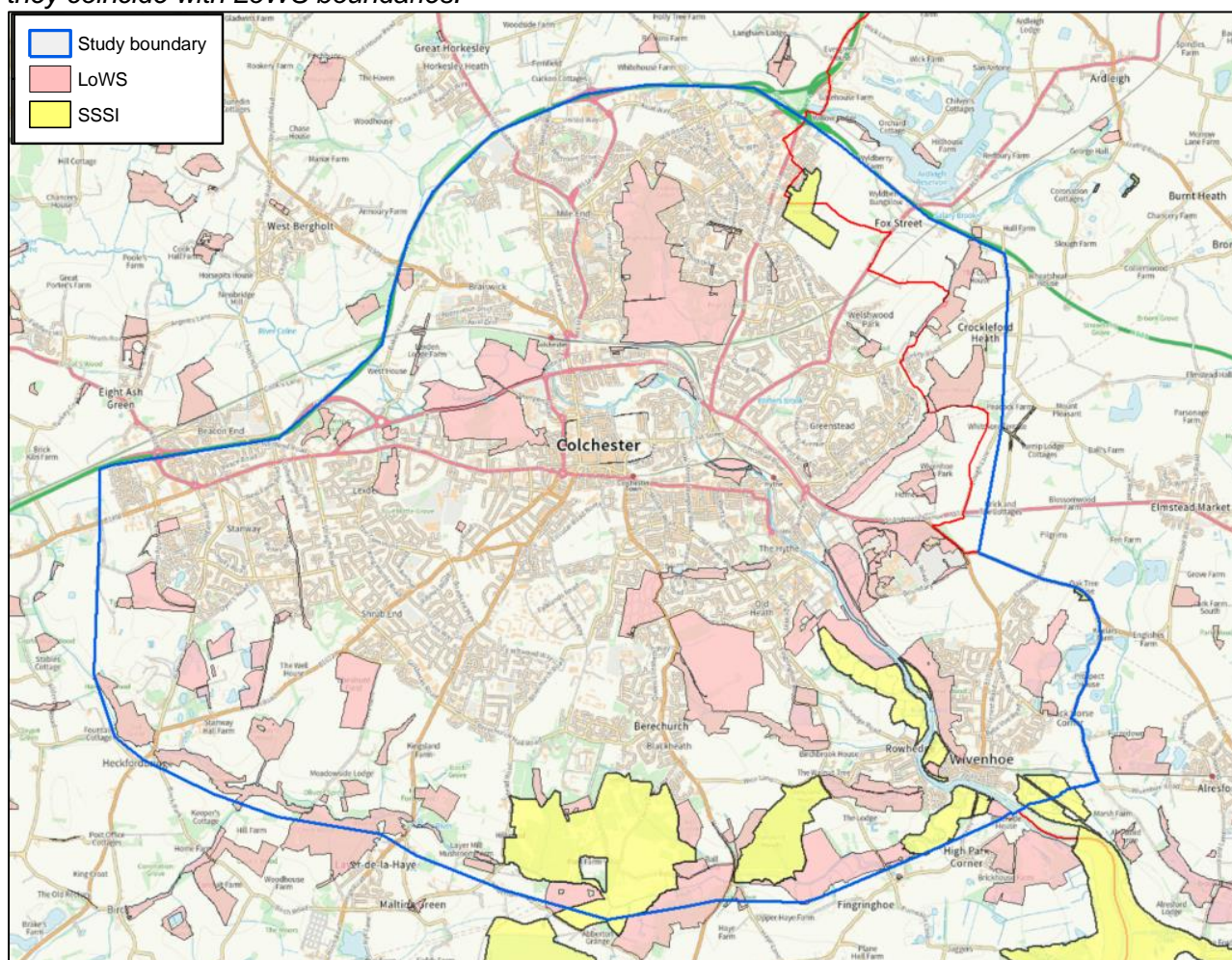
Local Ecological Networks

3.30. Figure 2 shows all of the sites designated for nature conservation and biodiversity within the study area. These sites of established biodiversity value should form the core of any strategic ecological network, providing a source for the spread of species populations into areas where new habitats are created or lower value habitats are enhanced.

Sites of Special Scientific Interest (SSSI)

- 3.31. Roman River SSSI includes the mosaic of acid grassland and woodland that makes up Friday Woods, the Ancient woodland of Donyland Woods and the more recent woodland of Donyland Heath, derived from wooded heath. The woodland community present is dry oak woodland, which is typical of woodland on more acidic soils. The SSSI also includes acid grassland on the upper valley slopes and flood plain grassland, reedbed and fen along the river itself.
- 3.32. The Upper Colne Marshes SSSI consists of saltmarsh at the mouth of the Roman River with remnant grazing marsh upstream of Rowhedge and on either side of Wivenhoe. This includes a sizable block of reedbed at Ferry Marsh.
- 3.33. Bullock Wood SSSI is also dry oak woodland but includes some particularly rare community types including plateau Alder woodland, and Sessile Oak-Hazel-Ash woodland.

Figure 2 – Designated nature conservation sites in Colchester – LNR boundaries are not shown as they coincide with LoWS boundaries.



Local Nature Reserves

3.34. Local Nature Reserve (LNR) is a statutory designation for sites that are locally important for wildlife, geology, education or enjoyment, with an underlying remit to protect their wildlife. They are designated by Local Planning Authorities and are managed either by them as landowners or by other partners. There has to be an aim to allow at least partial public access where this does not result in disturbance of wildlife.

3.35. There are six designated LNRs within the study area:

- Lexden Park is an area of open space comprising unimproved grassland and dry oak woodland that was once part of a larger expanse of old Parkland. It is also part of LoWS Co90.
- Spring Lane Meadows – also known as Lexden Springs LoWS (Co91) – is a valley slope grassland, with acidic grassland at the top grading into marshy grassland lower down where a spring emerges onto the floodplain of the River Colne.
- Hilly Fields - This site takes up most of the Hilly Fields LoWS (Co101) and is another valley slope site, once part of Sheepen Farm, and in an area previously known as The Warrens and Broom Heath. Acid grassland at the top of the slope gives way to neutral floodplain grassland at the bottom, with areas of lowland fen and willow woodland in the wettest parts. Scrub and secondary woodland have developed over parts of the site.
- Salary Brook LNR is the publicly owned bit of the LoWS of the same name (Co146) and consists of the watercourse itself together with marshy grassland and fen communities, scrub and trees in the river corridor.
- Welsh Wood is a small area of Ancient Woodland, a surviving fragment of a larger block of woodland and wood pasture lost to housing development. It is also a LoWS (Co143) and supports Pedunculate Oak-Ash-Maple woodland with a rich ground flora.
- Colne LNR includes parts of the Upper Colne Marshes SSSI with the adjacent Ancient and secondary woodland of Wivenhoe Woods and grassland at Lower Lodge Farm.

Local Wildlife Sites

3.36. Local Wildlife Sites (LoWS) are sites that have substantive nature conservation value and are considered to be of county importance in the geographic hierarchy. They are selected using a published set of criteria largely based upon the NERC Act Section 41 lists of habitats and species of principal importance for the conservation of biodiversity, also known as Priority Habitats and Species.

3.37. LoWS are identified through periodic reviews commissioned by Local Authorities, generally as part of the evidence base supporting Local Plan review and are ratified independently by an Essex Local Sites Partnership. There is no statutory protection for LoWS, although there is a presumption that they will be protected by the planning system. Many are in private ownership, which creates a vulnerability not only to development pressure, but to inappropriate management or neglect.

3.38. There are 59 LoWS within the study area, which is over a third of the total for the whole of the LPA area, with a further five that are just over the border in Tendring District. There is a particularly high concentration in the arc of land on the south side of the city.

- 3.39. Nearly half of the LoWS are woodland, split between Pedunculate Oak-Ash-Field Maple woodland, which is typical on damper and deeper soils across Essex as a whole, and the less common dry oak woodland, which occurs on more acidic, free draining soils. Most are predominantly of Ancient origin, with some areas of older secondary woodland, either alone or in a mosaic with other habitats.
- 3.40. Different habitat types occurring on river floodplains make up the next most frequent type of LoWS, including grassland, wet woodland, lowland fen and grazing marsh habitats. Although predominantly older habitats to a greater or lesser extent unchanged in modern times, there are also some less natural river corridor landscapes, such as Bourne Valley (Co121), which is a series of now disused millponds.
- 3.41. Ten of the sites wholly or partly consist of acid grassland, some of which are larger sites that have a significance that is wider than just Colchester, comprising some of the larger remaining sites and best examples of the habitat anywhere in the county.
- 3.42. Most of the 18 LoWS within the more urbanised part of the study area either represent woodland, acid grassland, or mosaics of habitat on the flood plain, and these are areas that have, for one reason or another, retained their older landscape characteristics.

Geological Sites

- 3.43. Five sites in the study area have been identified for their geological significance, including one Geological SSSI and four with a non-statutory designation of Local Geological Site (LoGS):
- Wivenhoe Gravel Pit SSSI is on the edge of the study area to the northeast of Wivenhoe and is the type locality of Wivenhoe Gravel, which provides a significant source of evidence for reconstructing the evolution of the River Thames
 - CoG2 Church Lane Gravel Cliff is an exposure of Kesgrave Sands and Gravels laid down by a former course of the River Thames. It is within the Co62 Stanway Pit LoWS
 - At Greenstead are a large puddingstone (CoG4) and a Sarsen stone (CoG5) set in place after being found during the construction of the housing estate
 - CoG6 Lexden Springs LNR contains a spring issuing between the overlying glacial gravels and the London Clay
- 3.44. There are two other sites of historical interest for their relevance to geology:
- Lexden Gathering Grounds, now an EWT nature reserve and a designated LoWS (Co82), is the location of springs that were formerly used to supply water to Colchester, first being pumped into the “Jumbo” water tower via the Sheepen Road pump house
 - St Peters Church on North Hill was damaged in an earthquake of 1692, which is noted in the church records

4. Biodiversity

- 4.1. The presence of Priority Habitat should lead to the designation of the site as a LoWS, and so these habitats should be effectively protected within the LoWS network. The Priority Habitats represented within the study area are discussed below with consideration of the associated non-Priority habitat types, to give an overview of semi-natural habitat resources and the habitat creation and enhancement measures that would therefore be most compatible. Reference is made to links with the draft Essex Local Nature Recovery Strategy, which is at public consultation stage.

Acid Grassland (Lowland Dry Acid Grassland)

- 4.2. The soils and geology across much of the study area are of a type that results in naturally occurring grassland being free-draining and acidic in character. The largest and best examples are on Co122 Middlewick Ranges, Co101 Hilly Fields, Co148 Wivenhoe Park and on the valley slope section of Co139 Roman River East. Smaller, but still significant, areas are found on the Co137 Hythe Brownfield and Co110 Berechurch Grassland LoWS. Although not a contiguous grassland in the same way, parts of Co113 Colchester Cemetery support acid grassland communities and some of the scarcer plants associated with the habitat.
- 4.3. Acid grassland is often not particularly species rich, and many of the key species are small and inconspicuous, spring and early summer annuals. This can result in a perception that it is of less value than more flowery neutral grasslands, even though it is less common across Essex as a whole. Acid grasslands also tend to be of particular value to invertebrates.
- 4.4. Although related to heathland, unless there are clear links to existing communities, the temptation to introduce heather species into acid grassland should be resisted, as the remaining heather heaths in Essex are so small and fragmented that associated species are unlikely to colonise without assistance. A small quantity of Heather (*Calluna vulgaris*) is present on Co122 Middlewick Ranges and similarly small patches may remain within the Roman River valley.
- 4.5. Conditions suitable for the creation of acid grassland are widespread in the study area away from the more urbanised area, with opportunities on most of the arable land, especially on steeper slopes that drain more freely. Aggregates sites are also highly suitable for the creation of new acid grasslands, provided that mineral soils remain exposed. It is also possible to create acidic conditions on biodiverse roofs and in other artificial situations by using an appropriate, free-draining substrate, which should be considered on sites in proximity to the natural areas of acid grassland.
- 4.6. The draft Local Nature Recovery Strategy calls for the creation of 22,000 hectares of new grassland, although no distinction is made between grassland types within this figure. Grassland actions include the better management of existing grasslands, focusing on grazing, mowing regimes and reducing chemical inputs.

Coastal and floodplain grazing marsh

- 4.7. Downstream of the industrialised banks of the River Colne on both sides, and in the lower reaches of the Roman River are sections of coastal grazing marsh including parts of the Upper Colne Marsh SSSI, Co117 Manwood Chase, Co139 Roman River East and Co140 University

Marshes. Coastal grazing marsh is found adjacent to tidal waters and was created by the reclamation of saltmarsh by enclosing it with a seawall to prevent regular tidal inundation. In most cases, these marshes are now below high tide level due to the shrinkage of soils in the intervening centuries, but all lie below the 5m above Ordnance Datum contour.

- 4.8. These marshes support a distinctive range of plant species, including some that are nationally scarce, and if their water management is right, have the potential to support breeding bird species of conservation concern such as Lapwing and Redshank. Their ditches often show a range of salinities that make them suitable for a diverse assemblage of aquatic invertebrates and plants.
- 4.9. There are no real opportunities for the creation of new coastal grazing marsh habitat in the study area, due to the specific environmental factors behind its existence. There is no significant extent of habitat at the correct altitude that could realistically be restored to grassland. However, some of the remaining areas could be enhanced by improving water level management and re-introducing appropriate grazing and/or cutting regimes aimed at nature conservation outcomes.
- 4.10. Away from the estuaries, the low-lying grassland alongside rivers is known as floodplain grazing marsh. Historically these more productive areas of land would have been managed as meadows to produce hay, but more recently management by grazing – cows or sheep – has been typical. The distinctive grass community that these marshes support is often not species rich but can occur in a mosaic with more diverse communities, including wet grassland and lowland fen. As with the coastal version, ditches and other low-ways can support a wide range of plants and invertebrates.
- 4.11. The most significant site in the study area is Co104 Cymbeline Meadows, which includes a series of pastures and meadows alongside the River Colne. The corridor of the Roman River also has some good remaining habitat, including within the Roman River SSSI and Co117 Manwood Chase. Co146 Salary Brook includes sections of grazing marsh, including less typical species rich marshy grassland.
- 4.12. As with their coastal equivalent, the main opportunities are in the enhancement of surviving floodplain grassland by focussing management on nature conservation outcomes. However, there is also some arable land in the floodplain that could be reverted to grassland.
- 4.13. The creation of new coastal grazing marsh is an action within the Coastal and Marine section of the draft Local Nature Recovery Strategy together with improved hydrological management of existing grazing marsh and predator management to improve the productivity of key bird species. River floodplain grazing marsh is considered within wider grassland creation and enhancement actions and also within the Freshwater and Wetlands section.

Fen, Marsh and Swamp (Lowland Fen)

- 4.14. These habitats are found along river valleys and often occur in a mosaic with other habitat types, often overplanted with Cricket-bat Willows, especially within the Roman River Valley. There is a partial overlap with wet woodland communities, which are considered below. The best examples are in Co100 Bounstead Bridge West, Co114 Bull Meadow, Co118 Cowdray Marsh and Co121 Bourne Valley.

- 4.15. Lowland fens typically consist of stands of tall grasses and sedges in the wetter parts, with a high diversity of other wetland plant species and high invertebrate abundance and diversity. Standing water – in the form of ponds or ditches – is common and there is very often a mosaic with drier grassland and scrub habitats.
- 4.16. In some cases, fen habitat can be recreated by removing dense scrub, or by relaxing mowing or grazing in areas where the water table is consistently at or near ground level alongside watercourses. It is also possible to create the right conditions by reducing the ground level to match the water table, simultaneously reducing soil fertility.
- 4.17. Lowland Fen habitat isn't specifically considered within the draft Local Nature Recovery Strategy, but the Freshwater and Wetlands section includes targets and measures for wetland habitat creation and water quality improvements in which these habitats will play an important part.

Lowland Meadows

- 4.18. There is very little Priority habitat neutral grassland in the study area, with most of the remaining grassland either being acidic in character or representing floodplain grazing marsh. Other areas of more diverse grassland are recent in origin, resulting from seeding. However, Co90 Lexden Park and Co116 High Woods both include Lowland Meadow habitat matching the National Vegetation Classification MG5 community typical of hay meadows in lowland England. This is characterised by diverse meadows with a number of significant species indicative of unimproved grassland.
- 4.19. Less diverse and newer grasslands can be managed to meet the requirements of the Priority Habitat description and so it is possible to create new Lowland Meadows habitat provided that soil fertility is not too high. Sites known to have lower fertility, particularly if they are on more freely draining slopes, should be the initial target for action, as they have a higher chance of success.
- 4.20. Attempts to create species-rich grassland will be constrained by soil fertility and with both habitat creation and enhancement measures, it is important to be realistic about what level of floristic diversity can be achieved in the shorter-term. Semi-natural, but non-Priority Habitat grassland is encapsulated within the 'Other neutral grassland' habitat in the UK Habitat Classification and given the scarcity of unimproved grasslands, still represents an important ecological resource.
- 4.21. As mentioned above, the draft Local Nature Recovery Strategy calls for the creation of 22,000ha of new grassland, much of which is likely to be established with the intention of achieving species-rich grasslands which replicates Lowland Meadows, and there are further actions for enhancing species diversity of existing grassland. There is a specific reference to the creation of species-rich meadows in the Farmland section.

Open Mosaic Habitat on Previously Developed Land

- 4.22. The most typical open mosaic habitat within the study area is Co170 Cowdray Brownfield, but its status is uncertain following at least partial loss to residential development. Other sites that could fall under this Priority Habitat description are all aggregates sites, including the active site of Co67 Warren Lane Pit and more recently closed examples at Co62 Warren Pit and Co161

Wivenhoe Cross Pit. Others have had longer to regenerate such that they are losing elements of the Priority Habitat, including Co135 Donyland Wetlands and Co142 Rowhedge Pits, now largely scrubbed over and wooded respectively.

- 4.23. The circumstances that led to the high biodiversity value of open mosaic habitats, namely a significant period of abandonment after demolition of redundant industrial use, seem less likely to occur in the current economic situation. However, because of its anthropogenic nature, open mosaic “brownfield” habitats can be created relatively easily anywhere with access to the right materials. The former aggregates sites could be managed to maintain or recreate the diversity of structure and vegetation more typical of the earlier stages in abandonment, where their value tends to be higher.
- 4.24. Key factors for the successful creation of open mosaic habitats include appropriate substrates, a high proportion of which must have low nutrient status and be freely draining, to provide the droughty conditions that cause flowering plants stress, which in turn leads to greater production of flowers. A mosaic of habitat structures and types providing flower forage, nesting habitat and bare ground is the aim, preferably with some seasonal and permanent wetland features.
- 4.25. Biodiverse roofs can be considered to be a form of open mosaic habitat but would not fall under the Priority habitat description.
- 4.26. The draft Local Nature Recovery Strategy does not make direct reference to open mosaic habitats, although brownfield land is mentioned in the Urban section.

Orchard (Traditional Orchards)

- 4.27. Only a single fragment of Traditional Orchard remains within the study area, Co97 Irvine Road Orchard, part of which was recently lost to development. The important elements of a traditional orchard are large, well-spaced fruit trees – in contrast to the more recent approach of small, densely planted trees – and semi-natural herbaceous vegetation beneath the trees that is managed in an extensive manner.
- 4.28. Any new orchard creation should include the establishment of a species-rich meadow grassland in addition to planting fruit trees. The planting of fruit trees in existing grassland of lower quality, particularly modified grassland dominated by Perennial Rye-grass, is a relatively easy way to generate a biodiversity enhancement. Ideally, the grassland management regime would be adjusted at the same time to encourage a more diverse and natural sward and increased floristic diversity and abundance.
- 4.29. In the draft Local Nature Recovery Strategy, orchards are considered within the overall action of improving the structural diversity of all woodland types but are not singled out for any habitat creation targets.

Reedbeds

- 4.30. There are reedbeds in the study area within the Roman River Valley SSSI, in the Upper Colne Marshes SSSI and the adjoining Co172 Ferry Marsh, and in Co125 The Moors, where it is under tidal influence. There are other, narrow fringes of reed along watercourses and

particularly in some grazing marsh ditches, but these do not meet the definition of this Priority Habitat.

- 4.31. Although defined by the almost complete dominance of Common Reed (*Phragmites australis*), reedbeds can also include other habitat elements, including pools and channels of open water, wet grassland and scattered willow scrub. Varying wetness across a site will benefit a wider variety of species. To maximise their value for some of the characteristic reedbed species, such as Bittern, reedbed blocks should be in excess of 20ha, but smaller beds will be capable of supporting a wide diversity of reed specialist birds and invertebrates.
- 4.32. Reedbeds are relatively easy to create where the water table can be maintained at a more or less constant level through the year. They will also naturally establish as part of many wetland habitats over time where the environmental factors are appropriate – water at or above the ground surface for much of the year and down to a water depth of 1m. In practice, river valleys and gravel pits are likely to present the most suitable opportunities for larger-scale creation within the study area.
- 4.33. As with the related Lowland Fen, there is no direct reference to reedbed habitat creation or management within the draft Local Nature Recovery Strategy, although action for wetland creation and for the enhancement of river corridors are included, which would be expected to include reedbeds.

Rivers and Streams (Rivers)

- 4.34. As a Priority Habitat, the definition of rivers is quite specific and relies upon the naturalness of the geomorphology and the presence of threshold numbers of key species. As such, the water courses found within the study area are not likely to qualify, even though they support some key species such as Otter, Water Vole and European Eel.
- 4.35. Although complex, the re-naturalisation of stretches of watercourses provides an opportunity to enhance their biodiversity, and any developments involving or affecting watercourses will need to show a gain in watercourse units, in addition to any other habitat unit requirements. The condition of watercourses in the Statutory Biodiversity Metric involves a detailed methodology that reflects river geomorphology as well as habitat and species diversity.
- 4.36. Measures to protect and enhance river corridors and improve their water quality, including at a catchment level, are set out within the Freshwater and Wetlands section of the draft Local Nature Recovery Strategy.

Lowland Mixed Deciduous Woodland

- 4.37. In addition to the Bullock Wood SSSI and parts of the Roman River SSSI, sixteen of the 25 woodland LoWS in the study area are either wholly or partly Ancient Woodland, defined as sites under continuous woodland canopy since at least 1600. Others are nearly as old and exhibit some of the diversity and structure that makes these sites so important and so meet the Priority habitat definition.
- 4.38. There has been little change in the distribution of woodland in the study area over the last hundred years, with concentrations in the valleys of the Roman River and Salary Brook, and to

the north of the city from High Woods eastward. Some of these northern woodlands were lost comparatively recently to housing development, leaving only linear fragments. There is not much in the way of recent woodland in the study area

- 4.39. New woodland can be easily created by planting, or by allowing natural regeneration, although it takes a considerable length of time for the ecological benefits of woodland to become apparent, especially in planted woodland. Natural regeneration is more beneficial for wildlife, as it can support greater species diversity throughout the process of it becoming woodland, especially if it is managed to retain structural elements such as glades and rides.
- 4.40. Opportunities for new woodland planting within the study area are probably limited to the less urbanised areas around the edges, although some planting could take place in parks and other open spaces, where there is lower existing ecological value. Although they are relatively few, areas of more recent woodland could be enhanced to improve their biodiversity value by altering their species composition and managing for more structural diversity.
- 4.41. Within the city, there are some trees that would be likely to be considered as veterans if subjected to a full arboricultural assessment, and these will be derived from a mixture of pre-existing landscape features and amenity planting. This is especially true to the west of the city along Lexden Road.
- 4.42. The draft Local Nature Recovery Strategy calls for the creation of 18,000ha of new woodland, but also includes the enhancement of existing woodland habitat and improving connectivity between woodlands as priorities. It includes a focus on deer management and the inclusion of dead wood.

Wet Woodland

- 4.43. Wet Woodland occurs in several places along the Roman River, where it is likely to be long-established, with more recent habitat in Co128 Birch Brook. These communities typically consist primarily of willows and Alder, often with an understorey of swamp and fen vegetation that can have high diversity.
- 4.44. Opportunities for the creation of new wet woodland are limited due to the specific environmental conditions required, but it could form part of a strategy to re-naturalise watercourses in areas where some resource already exists.
- 4.45. Wet woodland is not treated separately within the draft Local Nature Recovery Strategy, but it could be linked to the creation of river buffer habitats in the Freshwater and Wetlands section, as well as to the actions in the Trees and Woodland section.

Hedgerows

- 4.46. The Priority habitat description for hedgerows is an inclusive one, and it is likely that within most of the study areas older remaining hedgerows would qualify, and some that are more recent. Significant hedge systems are found within Co104 Cymbeline Meadows and, to a lesser extent, within Co116 High Woods.

- 4.47. Hedgerows offer the most benefit for a wider range of biodiversity where they are accompanied by other semi-natural habitats and in particular rough, grassy margins. However, even more isolated hedgerows can provide habitat structure that enables more mobile species to move through otherwise unfavourable landscapes.
- 4.48. Hedgerow creation is straightforward, and they should form a part of any habitat creation project that is looking to create a mosaic of habitat types in order to improve connectivity. Habitat Units derived from hedgerows are accounted separately in the Biodiversity Metric, and so there may be a need for hedgerow creation to achieve 10% net gain on any site with existing hedgerows in addition to any other habitat requirements.
- 4.49. There is a section of the draft Local Nature Recovery Strategy that focuses on Hedgerows, with priorities of strengthening or extending existing hedgerows and improving their management alongside the planting of new hedgerows.

Ponds

- 4.50. Priority habitat status for ponds is largely based upon distinct vegetation communities, the presence of nationally rare or scarce plants or animals (such as Great Crested Newt), or exceptional assemblages of plants or animals. Only water bodies below two hectares in size are considered to be ponds.
- 4.51. As previously noted, there are few ponds in the study area, with those that are present typically associated with parks or gardens, or a former industrial use. The clearest example is in Co121 Bourne Valley, which consists of a series of former millponds linked by semi-natural woodland and fen vegetation. There are no LoWS for which ponds are identified as a selection criterion. Co144 Rowhedge Pits holds a number of ponds, some of which are seasonal, where the excavated pits (not subject to restoration) intersect with the water table.
- 4.52. The lower lying areas where London Clay reaches the surface are suitable for pond creation, but to provide a valuable biodiversity resource, they should be associated with appropriate semi-natural terrestrial habitats and corridors that connect them to other wetlands. Cluster of ponds are more effective at maintaining populations of aquatic species than individual ones. Not all ponds need to retain water year-round, with seasonal or ephemeral features equally valuable for different types of species.
- 4.53. The draft Local Nature Recovery Strategy has a specific action to restore “ghost” ponds, those that have been lost from the landscape due to infilling or neglect, although as noted previously, there are likely to be few of these within the study area.

Other Habitats

- 4.54. **Scrub** is not recognised as a Priority Habitat, although it is often a component part of good quality woodland and grassland habitats and can be an important resource in its own right, particularly for species such as Nightingale. At the same time, an increase in scrub over open habitats can be a sign of poor habitat condition. It is generally recognised that the diversity of newly created habitats can be maximised by aiming for a mosaic of woodland and grassland habitat, with scrub serving as a transition between the two.

- 4.55. The draft Local Nature Recovery Strategy includes a section devoted to scrub, recognising its potential contribution to the enhancement of biodiversity. Actions refer to planting scrub habitat as well as allowing it to establish by natural regeneration, and to the need for ongoing management.
- 4.56. There is relatively little **farmland** remaining in the study area and none that has particularly high biodiversity value, and so the implications for planning policy are limited. Agricultural land can include a variety of other habitats and features of importance, particularly hedgerows, and the draft Local Nature Recovery strategy has a section devoted to improving the diversity of farmland habitats, encouraging nature friendly methods that support greater biodiversity.
- 4.57. Within an **urban** context, there are habitats that are not particularly natural but that also provide opportunities for biodiversity, particularly where they are located in association with more natural habitat areas or features. This includes allotments and parks, with the degree of value depending on approaches to management, particularly of more marginal areas. These tend not to be recognised in the LoWS network unless they are part of a broader, more natural landscape feature.
- 4.58. Allotments provide a small-scale mosaic of habitat types and often include semi-natural features such as boundary hedging, rough grass margins and mature trees. They have a particular role in encouraging a diversity of species, especially invertebrates, providing stepping-stones in areas without other habitats and supporting populations that can then permeate the surrounding landscape.
- 4.59. Gardens can be very similar in function, particularly where the road layout is more traditional, which results in larger areas of gardens backing on to each other, rather than in many modern residential developments where the garden spaces are dispersed and separated. In residential areas, gardens can collectively cover a significant proportion of the land area, and so have the potential to make a notable contribution to local biodiversity.
- 4.60. Street trees have some biodiversity benefit, depending on their species and how they interact with each other and nearby semi-natural habitats, but they also provide a range of other environmental benefits that make up their overall importance.
- 4.61. Although not well represented in the study area, biodiverse roofs, taking in those with more typical *Sedum* or grass-based habitats and those offering open mosaic, “brownfield” conditions can make a significant contribution to local biodiversity and do so best when they are connected to others or if they provide an extension to connected ground base habitats.
- 4.62. Creating more natural habitat within urban areas and improving the biodiversity value of existing green infrastructure are priorities within the Urban section of the draft Local Nature Recovery Strategy. Actions include elements of the developed landscape such as sustainable drainage systems, road verge management, small scale habitat creation and green roofs and walls.

Priority Species

- 4.63. The presence of a significant population of a Priority Species should lead to the designation of the site as a LoWS and many are also legally protected by UK and European legislation. Those

of specific relevance to the study area are considered below, with reference to the Essex Local Nature Recovery Strategy, which also identifies its own priority species.

- 4.64. There is a general pattern of priority actions for all species of conservation significance, which is: to improve information about distribution (including negative survey results), protect and enhance existing populations, improve connections between populations, and then encourage the expansion of populations. The specifics of these actions depend on the species and their ecological requirements.

Amphibians

- 4.65. All of our native amphibians are Priority Species and the five commoner UK species – Common Toad, Common Frog, Smooth Newt, Palmate Newt and Great Crested Newt – are all known to be present in the study area, although our knowledge of their distribution and abundance is very incomplete. The relative lack of ponds noted previously may be a constraint on amphibian populations, and in particular may have led to isolation of individual populations within the urbanised area. Their presence in urban and sub-urban private gardens is largely unknown, although they represent some of the most likely habitat, and unrecorded pond locations.
- 4.66. Common Frog and Smooth Newt are believed to be widespread in the study area and have broad habitat tolerances that would include gardens. There are scattered records of Common Toad, with known populations in Co114 Bull Meadow, Co116 High Woods, Co118 Cowdray Marsh, Co121 Bourne Valley demonstrating their presence in the heart of the city. There is also known to be a large population centred on Co135 Donyland Wetlands and Donyland Heath to the south (part of the Roman River SSSI), where there was historically a monitored Toad Crossing.
- 4.67. Palmate Newt is under-recorded, but there are recent records to the south of Colchester in the Friday Woods area, where the acidic ground conditions that the species favours are present, and some historic records for locations more central in the city. This is probably the least common species across Essex as a whole.
- 4.68. The legally protected Great Crested Newt is known to be present in Co144 Rowhedge Pits utilising ponds resulting from historic gravel extraction and there are also records from the Stanway gravel pits area, but this does not seem to be a widespread species in the study area. Mitigation and compensation for impacts to Great Crested Newt should be dealt with through the development management process and licensing requirements.
- 4.69. Amphibians spend more time on dry land than they do in waterbodies, so habitat creation aimed at these species is needed alongside pond creation, to provide suitable opportunities for foraging, shelter and overwintering (hibernacula). Rough grassland, mixed scrub, woodland and hedgerows with a dense understorey, and log piles are all beneficial. Measures should be targeted at species known to be present in the surrounding area.

Reptiles

- 4.70. Records of Common Lizard and Slow Worm are widely scattered across the study area, with stronger populations on larger blocks of suitable habitat, such as Co122 Middlewick Ranges. Grass Snake is also widely recorded and has more of an association with wetland habitats.

- 4.71. Adder, the rarest of the Essex reptiles and identified as a priority species in the draft Local Nature Recovery Strategy, has been recorded on Co122 Middlewick Ranges in the past, although recent surveys failed to relocate it. There are also records from the Upper Colne Marshes SSSI, including between Rowhedge and Colchester Hythe, but it appears not to have been common locally in living memory. The upper slopes of the Roman River valley around Friday Woods would appear to be suitable, but no evidence of their presence is recorded.
- 4.72. Reptiles are legally protected from harm and should be considered as part of the development management process, with appropriate mitigation and compensation measures required where any impacts are identified. The appropriateness of enhancement measures or translocations should be informed by detailed surveys, but may present opportunities for strengthening connectivity, which is very important for reptiles.
- 4.73. Open rough grassland or herbaceous vegetation with plentiful invertebrate life, and places for shelter and over-wintering – such as log piles – are required by reptiles. Common Lizards are more able to adapt to previously developed land and open mosaic habitats, while Slow Worms favour established and more lush vegetation. Preventing the development of dense shade in these situations is key to maintaining populations over a wider area, particularly with linear habitats.

Bats

- 4.74. Various bat species are active within all parts of the study area, although they are likely to be less frequent in the most densely developed areas, such as the city centre itself. However, anywhere with reasonably structured vegetation is likely to be used as a foraging resource at some point. Larger and better-connected blocks of habitat will be of most importance, particularly where there is wetland habitat and other features that support flying invertebrate abundance.
- 4.75. Common Pipistrelle and Soprano Pipistrelle are the most frequently encountered species, especially in urban areas and can be found foraging in gardens, parks and other open spaces. Brown Long-eared Bat is also widespread, but less noticeable with a stronger association with mature trees and woodland.
- 4.76. Noctule and Serotine, which are larger species, have been recorded in the urban area, but are higher flying with more specific foraging requirements. Noctule is often associated with larger water bodies and can sometimes be seen early in the evening feeding with Swifts, while Serotine favours grazed areas, which support dung beetles and other larger invertebrates. Daubenton's Bat has an association with water for foraging and so has an activity distribution focussed on rivers and larger ponds and lakes.
- 4.77. Barbastelle Bat is a nationally scarce bat that roosts in woodland and feeds along river valleys and over other more open habitats and it has been identified as a priority species within the draft Local Nature Recovery Strategy. Known populations in the study area use habitat along Co146 Salary Brook and the associated woodlands to the east, on Co122 Middlewick Ranges, and along the various sites in the Roman River valley.

- 4.78. There is much less information available about the distribution of roost locations, which can be in manmade structures or in trees, depending on the individual species requirements. Veteran and mature trees in parks, gardens and open spaces are likely to be very important for species such as Noctule, but the provision of large bat boxes in areas lacking in suitable natural features could provide a significant benefit.
- 4.79. For pipistrelles and other species that roost in buildings, protection through the development management system is essential to the maintenance of populations at a favourable conservation status. This will involve adequate and appropriate mitigation for any adverse impacts to roosts, alongside enhancement to provide new roosting opportunities where they will have the most benefit, particularly where there are good connections to suitable habitats for commuting and foraging. Integrated bat boxes and bespoke roost spaces should always be preferred to external boxes as they provide a more sustainable and long-lasting benefit.
- 4.80. In addition to roost locations, bat populations require good quality semi-natural habitats to provide foraging opportunities and connectivity through the landscape so that these can be accessed. In addition to maintaining and enhancing foraging habitat and habitat connections, the management of artificial light is crucial, as it is well-established that light can serve as a barrier to the movement of bats, some more than others. Artificial light can also draw flying insects away from the habitats in which the bats forage.

Other Mammals

- 4.81. There is little available information on the status of Hedgehog populations at a local level, although it is clear that there has been widespread decline, and local extinctions, across the UK. Hedgehog is also included in the draft Local Nature Recovery Strategy as a priority species. Evidence suggests that it is rural populations that have declined the most, with urban areas offering something of a refuge. The general impoverishment of the wider countryside as agricultural production has intensified is likely to be the underpinning factor, although deaths on roads as traffic levels increase is known to be contributory.
- 4.82. Available records would suggest that more Hedgehogs remain in north Colchester than to the south, which may in part reflect densities of Badgers, which predate them and can have a negative impact in combination with other factors. Establishing the presence of Hedgehogs across the city would be an important first step to identifying key areas and then working to conserve and enhance the habitat features that they require.
- 4.83. Water Voles were formerly widespread on the river catchments of Essex but suffered a massive decline as a result of predation by the non-native American Mink towards the end of the 20th Century. The current status of the species in the study area is unclear. Coastal grazing marshes and other water bodies without connections to the main rivers served as something of a refuge and there are now measures in place to control the mink, which should allow a recovery of the population and recolonisation across the river catchments. The draft Local Nature Recovery Strategy includes Water Vole as a priority species.
- 4.84. Although their full distribution across the study area is probably still unknown, there are known Hazel Dormouse populations along Salary Brook and in the Roman River Valley. As well as old, managed woodlands, the species is increasingly being discovered in scrub and hedgerow habitats. As a less mobile species, their distribution is limited by connectivity to core habitat,

which makes them vulnerable to fragmentation. Hazel Dormouse is included in the draft Local Nature Recovery Strategy as a priority species.

Birds

- 4.85. Urban areas can provide habitat for a number of species of national conservation concern, including Swift, House Sparrow, Dunnock, Starling, Mistle Thrush and Song Thrush. The populations of all these species could be supported by the inclusion of high quality, semi-natural green space within new developments and the inclusion of nesting opportunities within new buildings. The use of integrated nest boxes provides a sustainable and long-lasting benefit to these species, in contrast to the use of external boxes, which rapidly deteriorate. Although not an Opportunity Species, House Martin populations are also declining rapidly, and it is another species that could easily be accommodated within new developments.
- 4.86. The southern part of the survey area is of national significance for its population of Nightingale, which occupies woodland and scrub along the Roman River valley. The distribution of territories reflects the suitability of the habitats, but they stretch into the centre of Colchester as far as Co128 Birch Brook.
- 4.87. Skylark breed on the remaining open grassland and agricultural land within the study area including notable populations at Co174 Gosbeck's Park and Co122 Middlewick Ranges, as well as in the lower reaches of the Roman River valley.
- 4.88. Grazing marsh in the Upper Colne Marshes SSSI, Co95 Roman River East, and Co117 Manwood Chase support breeding Redshank and Lapwing when water level management is appropriate, while the Co142 Hythe Lagoons site supports noteworthy breeding species including Lapwing, Avocet and Little Ringed Plover, although their numbers and success varies from year to year.
- 4.89. Swift, Nightingale and Lapwing are all identified as priority species within the draft Local Nature Recovery Strategy.

Invertebrates

- 4.90. The Colchester area has been known as a hotspot of invertebrate diversity since at least the end of the 19th Century. This is primarily as a result of the combination of coastal influences, acid grassland, river corridor and woodland habitats, each of which have associations with distinct assemblages of species. The widespread extraction of aggregates, with variable approaches to restoration over the years, has ensured that this importance has continued despite the impact of development and agriculture on semi-natural habitats and the wider countryside.
- 4.91. The selection criteria behind the identification of LoWS Co62 Stanway Pits, Co67 Warren Lane Pits, Co78 Gryme's Dyke, Co101 Hilly Fields, Co122 Middlewick Ranges, Co137 Hythe Brownfield and Co161 Wivenhoe Cross Pit all included one of the invertebrate criteria. The focus has tended to be on more readily studied groups such as bees, ants and wasps (Hymenoptera), but survey data also reveal importance for butterflies and moths (Lepidoptera), beetles (Coleoptera) and flies (Diptera) amongst others. The nationally rare digger wasp species *Cerceris quadricincta*, which is included as a priority species in the draft Local Nature

Recovery Strategy, has a particular association with Colchester, with most of the recent Essex and UK records coming from the city area.

- 4.92. Aggregates sites – old and new – and areas where an older landscape has been preserved will be the most significant to invertebrate assemblages, but even relatively small areas of open mosaic habitat, on biodiverse roofs or at ground level, can effectively support invertebrate diversity, particularly where they serve as a stepping stone or connection between areas of better habitat.
- 4.93. With the right conditions, and in an appropriate location, good open mosaic habitat can be created for invertebrates and be populated by good assemblages of rare and scarce species in a relatively short period of time. This is because of the dispersive tendencies of many invertebrates, as a result of which they require networks of suitable sites at the landscape scale in order to maintain thriving populations.
- 4.94. An important population of Stag Beetle – the most significant in Essex – is known to be present in the heart of the city and the surrounding area, extending north into Suffolk. This large beetle, which is included in the draft Local Nature Recovery Strategy as a priority species, is reliant on the availability of dead wood, particularly the stumps of larger trees, in which the larvae develop over seven years. The retention of such features is crucial to their survival, and this resource can be mimicked by burying sections of log upright in a pyramid formation. A good and varied dead wood resource is beneficial for a wide variety of invertebrates and so measures to achieve this should not be limited to sites known to support Stag Beetles.
- 4.95. Glow Worm is another draft Local Nature Recovery Strategy priority species that is present in the study area, with populations along the Roman River, including on the Co117 Manwood Chase and Co171 Manwood Road Verge Local Wildlife Sites. It relies on open grassland habitats with large populations of snails, which the larvae predate, and is a species with low mobility, meaning that protecting and buffering known sites are the most important actions.
- 4.96. It should be noted that populations of Honey Bees in hives are not a biodiversity benefit, as the large numbers of individuals involved will be in competition with the many species of solitary bees and other pollinating insects that are native to the area. They should particularly be avoided in any locations known to support rare or scarce pollen-feeding species, or significant assemblages of invertebrates.

Plants

- 4.97. Older habitats, particularly those remaining unimproved grasslands and Ancient woodlands support a wide variety of locally rare plant species that combine to demonstrate the value of the communities present.
- 4.98. Of wider significance are those species for which the study area forms part of a more restricted UK range that is limited by environmental factors.
- 4.99. Lesser Calamint (*Clinopodium calamintha*) is nationally rare and considered “Vulnerable”, with a scattered population largely centred on Essex, Suffolk and north Kent, and is included as a priority species in the draft Local Nature Recovery Strategy. Although originally a plant of pastures, it is now largely restricted to road verges, churchyards and other remnants of older

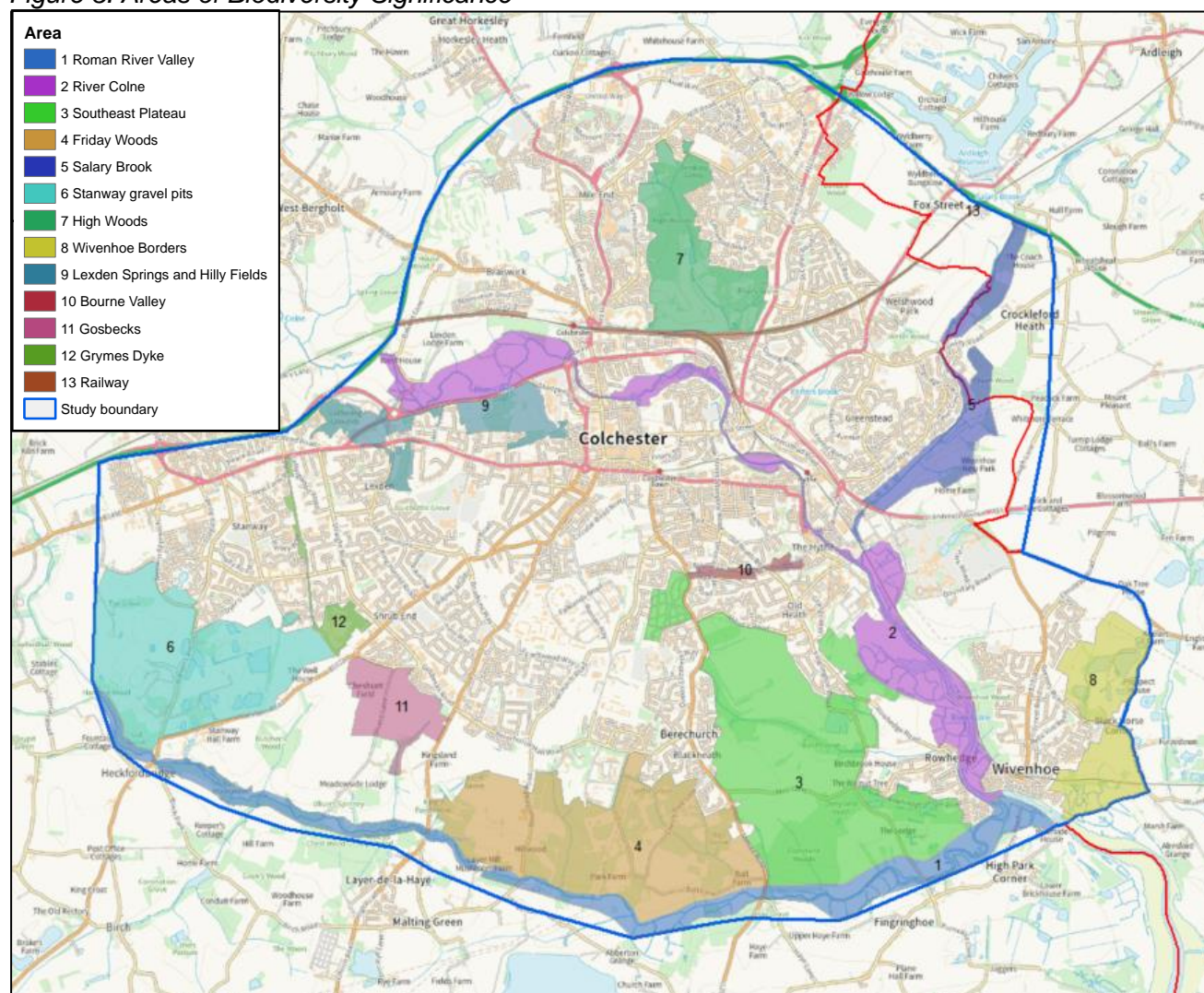
grassland. Within the study area there are strong populations on the edge of Co122 Middlewick Ranges and on Co171 Manwood Road Verge. Smaller amounts are present Co120 Ball Grove (very close to Co171) on Co109 Colchester Roman Wall and in Co136 St Andrews Churchyard, Greenstead.

- 4.100. Dittander (*Lepidium latifolium*) is a coastal species with a population that is also centred on Essex, north Kent and Suffolk. It can appear quite widely as a result of disturbance, but there is a particularly strong population in the tidal reaches of the Colne and the Roman River valleys.
- 4.101. Divided Sedge (*Carex divisa*) is a nationally scarce and 'Vulnerable' species associated with coastal grazing marsh, primarily on the south and east coast of England. It's scarcity results from the loss of this Priority Habitat as a result of development, agricultural improvement and sea level rise. Populations are present in the Upper Colne Marshes SSSI and on Co140 University Marshes.
- 4.102. Although most are not nationally rare or scarce, it is worth noting that Co109 Colchester Roman Walls was selected on the strength of its assemblage of more locally uncommon plant species, in the absence of any unifying natural habitat.

5. Existing Green and Blue Infrastructure of significance to biodiversity

- 5.1. The presence of clusters of designated sites and, in some cases, older landscapes that aren't designated but that have the potential to make a significant contribution to biodiversity, has been used to identify parts of the study area that are of most significance for the conservation of biodiversity. These areas also present the best opportunities for habitat creation and enhancement aimed at improving biodiversity, which is mentioned here, but considered in more depth in the next chapter.
- 5.2. Figure 3 illustrates these areas, which attempt to link sites with related or complimentary habitats or other ecological features. Some of them have existing, recognisable names, but others have been named in a way that is intended to be descriptive of their position and character. Efforts have been made to map the boundaries of these areas in a reasonably accurate way that makes sense in relation to ecological and built environment features, but the boundaries should be seen as indicative and not definitive.

Figure 3. Areas of Biodiversity Significance



- 5.3. Although not a precise approach, the areas are ordered here in some form of priority, starting with larger, more significant sites and ending with those with more localised importance.

Area 1. Roman River Valley

- 5.4. This area forms the entire southern border of the study area, from the tidal River Colne in the east to Stanway Gravel Pits in the west and comprises the floodplain and associated low-lying parts of the river valley. A large part of this area is designated, either as SSSI or as LoWS, and it has been well studied from a natural history point of view, including a 10-year survey carried out by Colchester Natural History Society and published by Essex Wildlife Trust in 2019⁴. It was the focus of a countryside project in the 1980s and 1990s, when it was known as the Roman River Valley Conservation Zone.
- 5.5. As well as supporting some high-quality habitat and species populations in itself, it is a highly significant corridor for ecological connectivity and is intimately linked with some of the other identified areas, specifically Friday Woods (Area 4), the Southeast Plateau (Area 3), the River Colne (Area 2) and Stanway Gravel Pits (Area 6).
- 5.6. The tidal limit of the Roman River lies just to the west of Mersea Road, at Manwood, and below this the river valley is characterised by floodplain grazing marsh, reedbed, saltmarsh and some intertidal mudflats in the Upper Colne Marshes and Roman River SSSIs, and the Co171 Manwood Chase, Co139 Roman River East and Co158 Barrage Marsh LoWS. Further upstream, there is wet woodland and lowland fen, with several areas of commercial Cricket Bat Willow plantation, in eight further LoWS.
- 5.7. Although to a large extent the valley represents an old landscape that has retained many of its older habitats, they are not necessarily managed for nature conservation outcomes and so there are opportunities for habitat condition to be enhanced. This equally applies to the small parts of the area that are not already within designated sites and so habitat creation would not be a focus.
- 5.8. Although the A12 and mainline railway corridor forms something of an ecological barrier, the ecological value of the Roman River Valley continues beyond the study area to its origin in Great Tey, passing through flood plain grasslands and woodland Priority habitat. That section has been proposed as a nature recovery area by the Parish Councils of Aldham, Marks Tey and Great Tey.

Area 2. River Colne

- 5.9. The corridor of the River Colne stretches from the A12 in the northwest of the study area through the middle of Colchester to the southeast corner. It directly connects with the Roman River and Southeast Plateau areas. As a main river, the catchment of which includes the whole study area, the ecological importance of this feature is clear, but its significance extends much wider, downstream to the internationally designated Colne Estuary and upstream as far as Steeple Bumpstead in the northwest of Braintree District.

⁴ [Roman River Report | CNHS](#)

- 5.10. In addition to the river itself, this area includes the remaining undeveloped floodplain above the tidal limit at Middle Mill, as well as surviving parcels of coastal grazing marsh below it. The largest section of floodplain is in Co104 Cymbeline Meadows LoWS, with Co114 Bull Meadow and Co118 Cowdray Marsh just downstream. Between, the river flows through Castle Park and so has a more formal setting.
- 5.11. Between Colchester and Rowhedge, Hythe Marshes to the west of the river includes some of the best coastal grazing marsh habitat remaining in the upper Colne, partly unaffected by modern agriculture and with a characteristic floral community. Much of it is designated as part of the Upper Colne Marshes SSSI. The northern edge of the Hythe Marshes also includes valuable post-industrial habitats on the edge of the city, including a series of lagoons previously used to receive material dredged from the river. This and other sections of habitat adjoining the river are designated as Co137 Hythe Brownfield and Co142 Hythe Lagoons.
- 5.12. Due to the character of this area, there is little opportunity for habitat creation, but there is significant potential to improve existing management with a focus on habitat enhancement. This includes Co104 Cymbeline Meadows, where it is understood that plans are already in place, and Co140 University Marshes, where the largely unmanaged grazing marsh habitat could be restored with appropriate grazing and water level control.
- 5.13. Other issues affecting the biodiversity of this area, most notably water quality in the River itself, are beyond the scope of this report and require broader landscape solutions.

Area 3. Southeast Plateau

- 5.14. This is the largest remaining section of semi-natural habitat on the Colchester plateau, free from large-scale development or aggregate extraction because of its history of military ownership. It comprises a broad wedge of land reaching from the Roman River in the south most of the way to the city centre. The southern section slopes down towards the river, but most of this area is broadly level, bisected by the narrow valley of Birch Brook. This area is closely linked to the Roman River Valley (Area 1), River Colne (Area 2) and Friday Woods (Area 4), with which it shares a nationally important population of Nightingale. The Bourne Valley (Area 10) is just to the north.
- 5.15. The habitat is predominantly acid, or acidic neutral, grassland, some of which has been cultivated in the past and much of which is now managed agriculturally. The grasslands within the Co122 Middlewick Ranges are unimproved, and those on the valley slopes at the southern end of the area have a long history of grazing. Middlewick Ranges is known to support diverse grassland habitat with a significant diversity of invertebrates, including many that are nationally rare. The grasslands on either side of Weir Lane sit within the strongest hedgerow network still present within the study area.
- 5.16. Although slightly separate, Colchester Cemetery has been included in this area as it supports similar acid grassland habitat to that on the ranges, being derived from the same plateau sand and gravel deposits and having no history of agricultural improvement.
- 5.17. There is an extensive area of dry oak Ancient Woodland to the south within Donyland Woods, part of the Roman River SSSI, and some more recent woodland derived from wooded heath

and small-scale gravel workings at Donyland Heath, also within the SSSI. The woodland in the Birch Brook corridor is mostly recent, including wet woodland, but Birch Grove at its eastern edge may be Ancient or derived from Ancient features.

- 5.18. This area also includes Donyland Pits, a disused aggregate site to the south of Rowhedge that was left to recover naturally, which although increasingly wooded, supports locally significant species, including a species of *Sphagnum* bog moss. The area includes another former extraction site at Place Farm, with associated acidic grassland fields sloping down to the Colne valley in the east.
- 5.19. Agriculturally managed grassland areas could be enhanced by shifting the regime to one that is more focused on nature conservation outcomes and there is opportunity for the creation or restoration of acid grassland where soil conditions are favourable, or where nutrient status can be reduced. The part of the site that was used most intensively by the military also requires a new, conservation minded approach to management. A coherent pattern of scrub and hedgerow management, to go with existing woodland management, could maintain and increase the Nightingale population.

Area 4. Friday Woods

- 5.20. This area, which has benefited from its history of military ownership and use, includes an extensive mosaic of acidic grassland and woodland, some of it Ancient, which slopes down at its southern edge to the Roman River. It has a close connection with Roman River Valley (Area 1) and Southeast Plateau (Area 3) – from which it is only separated by Mersea Road – with a potential connection to Gosbecks (Area 11) to the northwest.
- 5.21. The majority of the site is designated as part of the Roman River SSSI, with adjoining areas of LoWS – Co96, Co106, Co110, Co117 and Co120 – supporting a similar mix of habitats. The grassland is varied, with some very open swards maintained by the activity of larger military vehicles, which has had a largely positive effect on biodiversity. The natural woodland is of a dry oak type, although there is a history of plantation, with blocks of conifers still remaining.
- 5.22. As noted above, it supports an important population of Nightingale, with links to other populations hotspots to the south, outside of the study area. A wide range of other locally and nationally important species are known to be present in an area that has been well-studied.
- 5.23. Although BNG cannot be delivered on the SSSI, there are opportunities to enhance some of the adjoining LoWS and other land with more of a focus on nature conservation outcomes, maintaining and restoring the extent of open acid grassland, and encouraging the diversification of species and structure in the more heavily managed areas. One of these areas of more agriculturally managed grassland is to the west of the SSSI, and parts of this have a small field and hedgerow layout reflecting an older landscape pattern.

Area 5. Salary Brook

- 5.24. Salary Brook emerges from Ardleigh Reservoir just north of the A120, crossing beneath it and then joining the City's boundary for a short distance before running along the eastern edge of

the Greenstead estate to the east of Colchester. At its downstream end, it connects with the tidal River Colne (Area 2) through Co140 University Marshes.

- 5.25. Alongside the brook itself, there are areas of scrub, lowland fen and marshy grassland in the lower sections, and a corridor of scrub and woodland lining the riverbanks further north. The area has been extended to include a landscape of small fields and Ancient woodlands on the eastern valley slope extending across the border into Tendring District, which is known to support important populations of species including Dormouse and Barbastelle bat.
- 5.26. The older woods are predominantly dry oak woodland, with elements of wet woodland along the brook itself. In general, the woodland is well-managed. Although mostly subject to agricultural management, the grassland on the eastern valley slopes is acidic in character sharing a common substrate with the nearby Co148 Wivenhoe Park acid grasslands, and so could be managed to improve diversity.
- 5.27. Parts of the area are publicly owned and heavily used by the local community, with management not entirely beneficial to biodiversity, leading to a spread of scrub over what was open grassland. There is the potential for enhancement of these areas by introducing management focused on nature conservation outcomes.

Area 6. Stanway Gravel Pits

- 5.28. This area consists primarily of land that has been, or still is, subject to aggregate extraction with some adjoining arable land sharing the same soil and geology. The exposure of underlying nutrient poor, free-draining substrates, very often within a complex mosaic of landforms and early successional vegetation communities, provides ideal conditions for a range of scarce plants and invertebrates, in assemblages that are regionally or even nationally significant.
- 5.29. Included are the closed landfill at Bellhouse Pit, now managed for public access with nature conservation grazing, and the undeveloped sections of the former Stanway Pit (Co62), some of which has been landscaped for public access.
- 5.30. The active landfill site to the west of Warren Lane and the large, active aggregates complex to the east of Warren Lane (including Co67 Warren Lane Pit) are also included. Less active areas of these two sites have lakes, scrub, open grassland and young woodland, while there is continual disturbance in other parts.
- 5.31. All of this land, effectively post-industrial, has the potential to be restored and managed to provide diverse mosaics of open mosaic habitats, integrated with older or more structured new scrub and woodland habitats. This will help to ensure the continuity of conditions that have resulted in the existing biodiverse communities.
- 5.32. The upper slopes of the Co58 Gol Grove and Hanging Wood LoWS are included, parts of which are considered Ancient, and serves as a link between this area and the Roman River Valley (Area 1). Another small, old woodland adjacent to the former Stanway Pit, Co59 Tye Grove, is also included. At the eastern end, parts of the Co78 Grymes Dyke LoWS are included, including Stanway Green, an area of old acid grassland. There is a strong connection to the remainder of Grymes Dyke (Area 12), and Gosbecks (Area 11) is a short distance to the east.

Area 7. High Woods

- 5.33. This area consists only of High Woods Country Park, which is also designated as a LoWS (Co116) on the basis of the habitats present and the importance of the site as accessible greenspace for the surrounding community. Although somewhat isolated by the surrounding, predominantly residential development that came along in the latter half of the 20th Century, the site adjoins the railway corridor, and there is a culverted stream connection with the River Colne (Area 2).
- 5.34. The park is centred on a large extent of Ancient Woodland together with some more recent woodland and a series of small meadows divided by old hedgerows. Some of the meadows are flower-rich and managed for nature conservation outcomes with livestock.
- 5.35. Although largely surrounded and constrained by development, and as it is already under management with a nature conservation focus, opportunities for enhancement or habitat creation may be limited, but it is nonetheless a strategically important reservoir for biodiversity that can permeate into adjoining residential areas and from which the local community can benefit.

Area 8. Wivenhoe Borders

- 5.36. Between the eastern edge of Wivenhoe and the City border is a buffer of land with existing or potential value for biodiversity. At the southern end, to the south of the railway line, is part of a large block of coastal grazing marsh within the Upper Colne Marshes SSSI, which provides a link to the Roman River Valley (Area 1) and the River Colne (Area 2).
- 5.37. Between the railway line and Alresford Road the valley slope of the Colne estuary is currently under arable cultivation, but sits on a superficial deposit of Kesgrave sands and gravels that would make it particularly suitable for habitat creation measures aimed at acid grassland or open mosaic habitats.
- 5.38. North of Alresford Road is Wivenhoe Pit, from which the same Kesgrave deposits (and others underlying them) have been extracted. This area is now a varied landscape of woodland, grassland scrub, lakes and open mosaic habitat with considerable biodiversity value. The older part of the site is designated as Co161, but most is not currently managed with nature conservation in mind and so there is opportunity to enhance the distinctiveness and condition of some of the habitats.

Area 9. Lexden Springs and Hilly Fields

- 5.39. To the west of the city, adjoining the A12, is a series of sites on the southern valley slope of the River Colne (Area 2). The intersection of the sand and gravel plateau and the underlying London Clay exposed along the river valley edge gives rise to a series of springs that formerly provided a water source for the city. The largest block of land is Hilly Fields (LoWS Co101), which shares the same characteristics but also extends further onto the top of the plateau, with more extensive acid grassland habitat.
- 5.40. Sitting largely within an urban context, these sites do not all have extensive ecological connections to each other, but they are close enough and similar enough to be considered a

shared resource. Although there is a hydrological connection to the River Colne (Area 2), the sites are separated from it by the Avenue of Remembrance.

- 5.41. The habitats include parkland – with mature trees – planted and semi-natural woodland, scrub and grassland. There are areas of damp grassland and lowland fen at the bottom of the slope, grading into acid grassland higher up, most extensively on Hilly Fields. Although variable, in places this grassland is species-rich, supporting a characteristic suite of plant species.
- 5.42. There is a core of dry oak Ancient woodland within the Lexden Gathering Grounds nature reserve (Co82) within a more extensive area of woodland planted in the 1980s. Other blocks of woodland of various ages are present on Hilly Fields and along the edge of the Avenue of Remembrance, most notably within an old quarry.
- 5.43. Most of the sites are managed for public amenity, which maintains their overall character, but the condition of many habitat blocks could be enhanced with more focussed management with specific outcomes in mind. On Hilly Fields, restoring the balance between open habitats and scrub and woodland component is a particular priority in order to maintain the site's biodiversity value. There is little opportunity for habitat creation due to the constraints of the surrounding urban development.

Area 10. Bourne Valley

- 5.44. Bourne Brook is a short watercourse that was modified by early industrial uses in a way that has ultimately led to its protection and to it becoming a more valuable biodiversity resource than otherwise would have been the case in such an urban environment, as demonstrated by the disappearance of the channel to the west of Mersea Road. The Brook takes an underground route at its downstream end to emerge through a flap valve into the tidal River Colne (Area 2). Although there is no effective ecological link – physically or in the way of habitat types – this area is very close to the Southeast Plateau (Area 3).
- 5.45. The habitats present are primarily lowland fen and wet woodland around the pond margins and along the brook, with some Ancient dry oak woodland at the western end and some plantation woodland associated with Kendall Primary School that includes some significant mature trees. The valley is an important biodiversity hotspot in an otherwise urban environment, from which species can spread into gardens and other pockets of semi-natural habitat. The ponds support a population of Common Toad, a Priority Species that is generally scarce in the study area.
- 5.46. Although it receives some positive conservation management, there are large areas – including the habitat fringing Distillery Pond – the condition of which could be enhanced by a more active programme of management. There could also be potential flood management benefits through increasing capacity and regulating flows along the valley.

Area 11. Gosbecks Archaeological Park

- 5.47. This area primarily consists of a large expanse of public open space grassland established at the end of the 20th Century, which includes important archaeological features. Although of

relatively recent creation the grassland constitutes one of the biggest areas of neutral grassland in the City area and supports key grassland species, including the Priority Species Skylark.

5.48. The Gosbecks grasslands are situated between Friday Woods (Area 4), Stanway Gravel Pits (Area 6) and Grymes Dyke (Area 12), with the Roman River Valley (Area 1) a short distance to the south. The Co89 Sodom Wood LoWS is included in the area, consisting of a core of likely Ancient dry oak woodland along a tributary of the Roman River that supports some wet woodland features.

5.49. Although there is limited potential for habitat creation or enhancement within the area itself, with conservation management already in place, there are opportunities to expand the area to the west, east and south to improve connectivity with other areas.

Area 12. Grymes Dyke

5.50. Grymes Dyke is an important heritage feature, constituting a historical defensive line to the west of the City. It now forms a linear corridor of predominantly wooded habitat between Lexden and Stanway, north to south. The habitat is important for connectivity through a predominantly developed landscape, acting as a core resource from which species can permeate into adjacent gardens and other green spaces.

5.51. This area largely coincides with the northern section of the Co78 Grymes Dyke LoWS, together with Westlands Park, created on a closed landfill site at the turn of the 21st Century. Stanway Gravel Pits (Area 6) is immediately adjacent to the southern end and includes the southern section of the Grymes Dyke LoWS. Gosbecks Archaeological Park (Area 11) is a very short distance to the southeast.

5.52. In addition to the dominant woodland habitat, which is likely to include sections that are effectively Ancient, are a number of notable veteran trees, and some more open areas of scrub and acidic grassland.

5.53. There are opportunities to enhance the condition of woodland habitat along the dyke and also to restore some areas of open grassland that have been invaded by scrub. It may also be possible to manage some of the adjoining public open spaces to encourage biodiversity.

Area 13. Railway

5.54. The land bordering the railway forms an almost complete corridor of habitat from west to east through the study area, although it is generally low quality in biodiversity terms. Most of the trackside is lined with scrub and trees, with some open sections of rough grassland or small-scale open mosaic habitat.

5.55. The main ecological function of this Area is connectivity, with direct links to High Woods (Area 7) and, to a lesser extent, the River Colne (Area 2). The operational nature of the land is likely to prevent any meaningful enhancement of the habitats present.

6. Opportunities for Biodiversity Gain

Opportunity Areas

- 6.1. Identifying areas that should be considered as priorities for net gain measures, or other mechanisms aimed at nature recovery, should be based upon the Lawtonian principles first expressed in *Making Space for Nature*⁵. This was an independent review of England's wildlife sites published by the Government in 2010 that has gone on to underpin much of the thinking on the protection and recovery of nature.
- 6.2. Under the aim of enhancing the resilience and coherence of the ecological network, the principles are simply expressed as '*more, bigger, better and joined*':
 - More – creating new sites of ecological value
 - Bigger – increasing the size of existing wildlife sites by buffering or extending them
 - Better – improving the management of existing wildlife sites
 - Joined – enhancing the ecological connections between sites, either by joining them up or creating stepping-stones
- 6.3. The emerging Greater Essex LNRS will identify opportunity areas across the whole county on a strategic basis, which will influence the calculation of BNG unit values in the statutory metric calculation spreadsheet. These areas will be based on models with a focus on connectivity and will represent the locations considered to provide the best opportunities to have the greatest benefit for nature recovery taking the county as a whole. Opportunity areas will also include all existing non-statutory designated sites, where the potential for enhancement measures will be assumed. Areas identified in this way within the LNRS will receive a 15% uplift in BNG unit values compared to those that are not.
- 6.4. The previous chapter identified discrete parts of the study area where there are concentrations of existing sites providing notable biodiversity resource. These can also be seen as priority areas for making enhancements to the ecological network at a more local level, but any measures should still in accordance with the Lawton principles.
- 6.5. A wide range of approaches and mechanisms could be applied to make improvements to the ecological network but biodiversity net gain is the primary approach within the planning system. Approaches to achieving net gain can essentially be broken down into habitat creation and habitat enhancement, which are each considered below.
- 6.6. Biodiversity net gain cannot be delivered on SSSI sites, as there is already an obligation for them to be managed in an effective way that delivers favourable condition. Sites that are in Countryside Stewardship, or other agri-environment schemes, cannot be used to deliver biodiversity net gain, unless derived from an enhancement that is clearly over and above what is required within the stewardship agreement.

⁵ [‘Making space for nature’: a review of England's wildlife sites published today - GOV.UK](#)

Habitat Enhancement

- 6.7. Sites designated as LoWS provide the best opportunities for habitat enhancement in ecological terms, as there is already some baseline of ecological significance. Ownership and existing uses will provide constraints in some cases.
- 6.8. More detailed surveys and assessment would be needed to confirm the current condition of the habitats on the LoWS against the criteria set out in the statutory biodiversity metric condition assessment methodology. The specific measures that could result in habitat enhancement would then have to be planned, while also considering the impact on species or habitats for which the site has been designated. Habitat Units are generated where there is an improvement in habitat condition category, or where the distinctiveness of the habitat is raised.
- 6.9. Habitat condition is assessed differently for different habitat types, with only a few pass or fail criteria applied to grasslands, but a more complex scoring system against 13 criteria for woodland. In general terms, higher condition scores are achieved for habitats that more closely resemble the typical habitat description associated with their classification, and have more structural diversity, a higher diversity of plant species, and an absence of negative indicators or non-native species.
- 6.10. Typical actions to improve condition for grassland habitats include improving species diversity by better management, aiming to reduce the dominance of more competitive grasses, or by introducing additional species, by seeding, for example. Condition assessment criteria for species diversity, based upon the number of species per metre squared, are relatively challenging in many circumstances.
- 6.11. Cutting grasslands in spring and autumn and removing the cuttings leads to a gradual reduction in soil fertility and reduces the competitive advantage of coarser, faster growing grasses, which in turn provides more opportunities for other species to establish. This can mean changing the frequency, timing and method of cutting, for grasslands that are not in conservation management, or reducing the frequency of cutting for grasslands that have been managed for tidiness or public amenity.
- 6.12. Grazing is in many ways a preferable approach to managing grassland for nature conservation, but there are challenges in achieving the correct timing and stocking density, particularly if third part graziers are used. In some more public locations, grazing may not be an appropriate option.
- 6.13. Preventing excessive scrub growth and creating a variety of sward heights is also necessary to achieve higher condition categories in grasslands.
- 6.14. With woodland habitats, achieving a higher category of condition means passing criteria that involve management actions, but also some that relate to the maturity of the woodland. Higher scores are given where there is a higher diversity of native species across the canopy, where there is evidence of natural regeneration, where invasive species are absent, where there is temporary open space created by management, where there is good vertical structure in the canopy and understorey and where there is a good dead wood resource, all of which can be achieved by management actions.

- 6.15. Other scoring criteria can't be influenced in the same way, including the presence of veteran trees, a varied age distribution in the tree stock and the presence of ancient woodland indicator species. The absence of browsing damage, primarily associated with the presence of deer, and good tree health are also important.
- 6.16. Improvements in habitat quality or condition could be realised by the Council on its own sites, or in partnership with other landowners, whether the sites are already designated or not. Biodiversity net gain is a possible way of funding such enhancements, for 30 years at least, where the Biodiversity Metric Units that the enhancements generate can be matched to a development's off-site requirements. It should be noted that the Council cannot direct developers to undertake such offsets on Council land in preference to other local opportunities.

Habitat Creation

- 6.17. The identification of sites for habitat creation involves two main strands: identifying locations that will buffer or extend existing designated sites; and identifying locations that are most suitable for the creation of new biodiverse habitat. In some cases, these two strands will overlap, where the best place to create some new habitat is adjacent to an existing designated site, or to put it the other way around, where the land needed to buffer an existing designated site has all the characteristics that allow for top quality habitat to be created.
- 6.18. The ecological features of a LoWS, or other sites of nature conservation significance, could benefit from the presence of buffer land for the reasons set out below.
- Sensitivity; where the habitat present would be improved by protection from external factors
 - Structural diversity; where the boundaries of the habitat present do not represent a semi-natural transition to the adjoining habitat and where such a transition would enhance the designated habitat, or
 - Scale; where the quality and condition of the designated habitat would be functionally improved by an increase in the size of the habitat block
- 6.19. In more developed parts of the study area, opportunities for buffering existing designated sites are constrained by the lack of open, undeveloped land. Elsewhere, ownership and existing land uses – including potential for future development – may make suitable buffering land unavailable. Where development is proposed adjacent to, or including, a LoWS, creating new habitat to buffer it should be an absolute priority of master planning.
- 6.20. Grassland creation has more potential to provide higher quality and more easily sustainable habitats on the sand and gravel soils, either where exposed by aggregate extraction or on the southern edge of the plateau where it slopes down to the Roman River. Even there, some action may be required to return the ground to a more mineral soil structure following decades of nutrient enrichment from agriculture.
- 6.21. This could mean stripping existing vegetation and topsoil in order to create the desired habitats and conditions required to promote structural and species diversity, removing any competitive, generalist species that would otherwise continue to dominate for many years. It could also

mean landscaping works to recreate a more diverse topography, which will benefit the small-scale variation that promotes biodiversity, with warm banks and damp hollows.

6.22. Woodland creation is best achieved by allowing natural regeneration, preferably adjacent to an existing mature woodland, rather than planting trees. Using this method, scrub and then trees naturally colonise the site over time, which creates a transitional habitat of higher biodiversity value, and allows the introduction of structural diversity with limited intervention. Tree planting is costly and has a higher environmental cost in terms of the process of sourcing and planting trees, protection measures and subsequent thinning operations.

6.23. Natural regeneration results in a locally appropriate mix of species in response to environmental conditions and source populations, but if tree planting is carried out, the species mix used should reflect that present in older woodlands in the surrounding area. These will then be more likely to survive than a standard mix brought in from somewhere else and will create a habitat that more quickly supports the existing species populations in the area.

Biodiverse Roofs and Walls

6.24. Although not a commonly used approach in the study area – in comparison to some more urbanised locations – opportunities for incorporating biodiversity habitat within the built environment should be considered, particularly where they are sympathetic to existing biodiversity in the surrounding area, or where there are constraints over the availability of land for more natural habitats.

6.25. From the original use of the term green roofs, the names used to describe natural features on the tops of buildings have varied depending on what is identified as the main purpose. A useful classification of these is provided below:

- Intensive green roof – landscaped and managed to provide formal garden or park habitat, or for food production, with little biodiversity potential
- Extensive green roof – biodiverse roofs designed to replicate natural habitats, with a low-nutrient substrate to create open mosaic and/or meadow habitat. Sedum roofs fall in this category, but their biodiversity potential is limited. Brown roofs are those biodiverse roofs replicating post-industrial habitats with limited vegetation cover
- Blue-green roof – designed to manage and store water, but also with biodiverse features
- Biosolar roof – designed to provide a combination of renewable energy generation and biodiversity value

6.26. The term living roof can be used to encompass all types of green roof and biodiverse roof and is best used to describe those specifically aimed at biodiversity.

6.27. Living roofs can be particularly effective in providing habitat for invertebrates if designed to provide a combination of features typical of open mosaic habitats – exposed and diverse substrates, varied topography, and an abundance of flowering plants. This can help to replace habitat on developed “brownfield” land, or provide a rooftop extension to areas of open mosaic habitat at ground level.

Street Trees

- 6.28. There is clear policy direction at every level for the planting of more trees and increases in canopy cover, for a multitude of environmental benefits of which biodiversity is a relatively minor consideration. In the face of numerous pest and pathogen threats to native tree species, it is often non-native species that are preferred for planting in urban situations, which have far less value in biodiversity terms. There is well-established guidance for tree species selection in urban areas, and it is not the purpose of this study to challenge that. Beyond their value as food plants, trees also play a part in the provision of shelter and as structural support to the movement of mobile species, which can equally be provided by non-native species.
- 6.29. In addition to ambitions to increase the amount of tree cover in urban areas by planting more trees, the retention of existing trees is also of great importance. Any loss of trees through development will need to be compensated with an appropriate ratio of new to old to take account of the delay in reaching maturity.
- 6.30. As with the creation of habitats, it is likely to be the availability of suitable spaces that limits the planting of street trees in the future. Trees need sufficient space for their roots and canopy to reach maturity and realise their potential without creating management requirements and liabilities. Bespoke planting systems are available to provide the trees with the root space and access to water they need in urban areas where there is no open ground, but these can be costly.
- 6.31. Street trees, and any trees over 7cm diameter at breast height that do not contribute to another classified habitat that includes trees, are recognised within the Biodiversity Metric as Individual Trees. This does not apply to woodlands or orchards, for example, or any habitat that includes trees in its definition, but it does apply to trees in grassland or other open habitats, and to groups of trees in such circumstances.
- 6.32. The calculation methodology in the Metric is based upon converting the size of the tree into an area measurement. Standard area figures are applied to each of four size classes, based upon the diameter of the trunk at breast height:
- Small – more than 7cm and less than or equal to 30cm
 - Medium – more than 30cm and less than or equal to 60cm
 - Large – more than 60cm and less than or equal to 90cm
 - Very Large – More than 90cm
- 6.33. Groups of Individual Trees are valued more highly by calculating the area based on each of the trees present, even where their canopies overlap. There is also a specific condition assessment for urban trees, based upon whether or not it is native, mature and provides habitat features for animals. Other criteria include whether or not its canopy is at least partly above other vegetation and whether or not it is damaged or in management that restricts its expected canopy size. It is thought likely that most urban street trees are only ever likely to achieve 'Poor' condition, with only the oldest, native species in parks capable of getting to 'Good'.
- 6.34. The same calculation methodology applies to trees within a development site's baseline as for trees that are part of post-intervention landscape design, or for individual street tree planting. For planted trees, the size should always be recorded as 'Small', as growth rates over the 30

years of the net gain project are unlikely to result in anything larger, unless very large trees are planted. This delay in reaching maturity means that trees, and woodland habitats, provide fewer Habitat Units than other habitats.

- 6.35. To illustrate the potential for using biodiversity net gain offsetting for the delivery of street trees, planting one tree in an urban location, using the 'Small' size class would generate 0.01 Habitat Units, which is likely to be the equivalent of about £200 to £250 if sold to a developer as an offsite gain⁶. This is unlikely to cover the cost of planting and aftercare for the tree. While developers will get some net gain benefit from including street trees within their landscape designs, there are numerous drivers for them to do so already and biodiversity net gain is unlikely to become the most important.
- 6.36. Where trading rules require the planting of new street trees or there are other imperatives that apply, it will be important to ensure that any Habitat Unit cost paid by the developer reflects the establishment and management requirements likely over the 30-year period.
- 6.37. Biodiversity net gain will provide a favourable outcome where trees are affected by a development proposal. A developer looking to remove one urban street tree of 'Medium' size in 'Poor' condition would have to plant 16 'Small' trees to offset the loss of Habitat Units. Even 'Small' trees in 'Poor' condition would have to be replaced by two equivalent trees.

Connectivity

- 6.38. Each of the strategic areas identified earlier in the document has an inherent degree of coherence and connectivity, which has been considered when drawing boundaries. Connections between Areas have also been highlighted in the individual Area descriptions.
- 6.39. Enhancing ecological connections as a priority is aimed at improving the robustness of species populations by increasing gene flow between nearby populations, allowing colonisation of new sites, and facilitating re-colonisation of sites where populations may be lost by adverse impacts. With climate change impacting on environmental conditions in a profound way, these connections also offer a chance for species to find somewhere better suited to their needs if necessary.
- 6.40. Such connections also serve to improve the general ecological condition of the wider landscape, serving as a reservoir of biodiversity that can then permeate the whole landscape, including those areas of residential development to which they are connected.
- 6.41. As well as seeking their protection through planning policies, it would be desirable to strengthen and enhance connecting habitats to improve their contribution to the biodiversity network. Ideally this would involve broadening the connections and improving the condition of the habitats along them, as well as creating more links with nearby LoWS and other green infrastructure.
- 6.42. Opportunity for the creation and enhancement of these corridors may occur through the design of green infrastructure and mitigation habitats within development sites as well as through

⁶ Based on current estimates of Habitat Unit prices, although this is likely to vary regionally depending on demand and availability

compensation measures and biodiversity net gain in the wider landscape. Any opportunity that arises should be assessed and designed to provide the maximum benefit to biodiversity, in line with the City Council's priorities.

Spatial Prioritisation

- 6.43. As applications for development on the Local Plan's allocated sites come forward, proposers should be encouraged to explore the best opportunities in the immediate proximity as a first option for achieving biodiversity net gain, or any other environmental obligations. Depending on the location, that might be creating new green infrastructure, buffering an adjacent LoWS, enhancing a nearby LoWS or green space, planting street trees, or incorporating biodiverse roofs or other onsite measures. Consideration should be given to where the best gains can be achieved in each case and what measures would provide the most added value to the existing biodiversity resource of the area around the site.
- 6.44. Up to date information on the condition of habitats on LoWS and other green spaces suitable for biodiversity enhancement will be important in guiding the prioritisation of biodiversity net gain measures. It may be preferable to favour sites that are currently in the poorest condition as a means of raising the standard of semi-natural habitats, or alternatively it may be better to improve the management of LoWS, which already have a recognised interest. Whatever site is selected, the measures proposed should be appropriate to the environmental factors that apply to the site – particularly soils and geology – and the habitat and species priorities expressed in this document.
- 6.45. This and other preferences for the prioritisation of biodiversity net gain delivery will need to be reflected within the local policy framework for them to effectively guide what developers do on their sites, although some degree of consensus may be achievable through the pre-application process. Biodiversity net gain planning guidance encourages Local Planning Authorities to use local policy documents to set out the parameters for the balance between onsite and offsite measures and links to the forthcoming Local Nature Recovery Strategy and other strategic priorities.

Wider Colchester

- 6.46. Although this study is focused on the city itself, it is appropriate to view this within the context of the whole LPA area. Set out below are the main ecological features, which coincide with clusters of designated sites, with consideration of associated environmental conditions.
- 6.47. The most significant ecological feature is the coastal strip, most of which is internationally designated as part of the Mid-Essex Coast Special Protection Area and the Essex Estuaries Special Area of Conservation, which are based on the Colne Estuary and Blackwater Estuary SSSIs. This includes intertidal mudflats and extensive saltmarsh together with coastal grazing marsh and vegetated shingle. Several LoWS take in adjacent habitat blocks not included within the statutory designations, but that provide complimentary ecological resources.
- 6.48. The other internationally designated site is Abberton Reservoir, a Special Protection Area and SSSI for the nationally and internationally important waterfowl that it supports, predominantly over the autumn and winter. The reservoir sits just to the south of the study area and is directly

connected by Layer Brook, which takes the reservoir outflow and joins the Roman River within the Roman River Valley SSSI.

- 6.49. The other biological SSSI in Colchester is Tiptree Heath, on the border with Maldon District and one of the few remaining fragments of what was once a much larger expanse of heathland and acid grassland on a ridge of sand and gravel soils that extends between Colchester and Maldon. Within this area are several large woodland sites to the east of Tiptree.
- 6.50. Between the sand and gravel ridge and the coast, is a lower lying area of London Clay, within which Abberton Reservoir is situated. There is little habitat of biodiversity importance in this area, which has generally been devoted to agriculture.
- 6.51. The northern boundary of the LPA area is formed by the River Stour, from its tidal limits at Flatford in the east as far west as Bures where it crosses into Braintree. The lower stretches of the river valley support extensive floodplain grassland habitat, much of which is in LoWS, and there are a number of other grassland and woodland LoWS all along the southern slopes.
- 6.52. Other LoWS are somewhat dispersed and are mostly smaller patches of woodland, but there is some association with water courses: Blackbrook and some smaller, unnamed streams flowing north into the Stour, the River Colne and its shorter tributaries, the upper reaches of the Roman River and its tributary Birch Brook, and Domsey Brook, which flows west to join the River Blackwater.
- 6.53. Either side of the valley of the river Colne, to the west of the city, are pockets of chalky boulder clay, in contrast to the superficial deposits of sands and gravels that characterise most of the LPA area. This is a material formed at the base of an ice sheet that crossed north Essex during the Anglian glaciation, the one that extended furthest south in Britain. It consists of a mixture of clay and chalk with outwash materials that include a lot of flint. The resulting soils are calcareous in character and result in different grassland and woodland ground flora communities than more neutral or acidic soils. This is revealed in some of the few LoWS in this area, particularly Co14 Little Tey churchyard, which supports a distinctive suite of chalk boulder clay grassland species.
- 6.54. With reference to this wider picture, some of the Areas identified within the City study area remain of higher significance as coherent features of importance to biodiversity. Although the international designations set the coastal strip and Abberton Reservoir apart, Area 1 Roman River Valley is probably the feature of highest ecological significance, particularly if considered together with the adjacent Area 4 Friday Woods and Area 3 Southeast Plateau. Area 2 River Colne connects to and extends the coastal area of significance and Area 5 Salary Brook also forms a particularly strong corridor.

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