East Devon District Council:

Nature Recovery Network Report

February 2026

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Contents

1. Summary

Ecologic Consultant Ecologists were commissioned by East Devon District Council to carry out a strategic assessment of the district's biodiversity and habitat networks. This document outlines the existing picture of the districts nature network and describes key locations where habitats may be created or enhanced to contribute to nature's recovery (the Nature Recovery Network), as well as delivering against objectives set out in national planning policy legislation and enhanced legal duties required under the Environment Act 2021[1].

Existing data, along with local, regional and national landscape designations and projects were taken into in this assessment methodology.

The methodologies developed aim to deliver against national policies and are used in conjunction with the Department for Environment Food and Rural Affairs (Defra) Statutory Biodiversity Metric to carry out a strategic broad scale district level spatial assessment of the 'quality components' described in the metric. This included:

1. Habitat distinctiveness
2. Strategic significance (of habitat areas)
3. Habitat connectivity

By using the results above and specific habitat connectivity modelling software it has been possible to define Habitat Connectivity Opportunity (HCO) areas based on habitat types. This is an important next step in identifying areas which possess existing good habitat connectivity and where there is potential for future habitat creation or restoration to contribute to a more successful nature recovery network.

The HCO areas are described in terms of their key opportunities, threats, key species and other habitats which they support along with any potential 'add-on' benefits (e.g. ecosystem services) which could be derived from having well-connected diverse habitat networks contributing to a healthy nature recovery network.

The opportunity map is not static and as physical habitats change on the ground and are subsequently mapped and monitored, the map itself will evolve with these updates. The

[1] https://www.legislation.gov.uk/ukpga/2021/30/part/6/crossheading/biodiversity-objective-and-reporting/enacted

opportunity areas themselves are where work to enhance habitats can be focussed, where the opportunity to get the greatest benefits lies.

Analysis and opportunity areas mapped within the nature recovery network completed as part of this study are to a fine scale and based around a more robust defensible methodology that can more clearly deliver against National Planning Policy Framework (2024) and Planning Policy Guidance objectives, and the Environment Act 2021 (c.30).

2. Statutory requirement for a Nature Recovery Network

Ecologic Consultant Ecologists were commissioned by East Devon District Council (EDDC) to carry out a strategic assessment of the districts biodiversity and habitat networks, to form part of an evidence base in order to ensure biodiversity is an integral part of policy development.

Based on the EDDC Nature Recovery Declaration, its duties as a Supporting Authority (SA) as part of the Local Nature Recovery Strategy (LNRS) process, its enhanced biodiversity duties required under the Environment Act, and to help inform the new Local Plan, the commission required baseline Biodiversity Net Gain (BNG) habitat survey, habitat connectivity analysis and mapping and Local Nature Recovery Mapping. Whilst these are district-level studies they will provide a complement to form an integral part of the evidence base for the new Local Plan for East Devon District (2020-2040). These elements will enable the district to address the requirements articulated within paras 187, 188 and 192 of the National Planning Policy Framework 2024 - To provide for the protection and support enhancements to the districts natural environment through the identification, mapping and safeguarding the components and enabling connectivity, interpretation and integration of the natural resources to deliver overall net gain for biodiversity.

Key stimulus in updating spatial environmental objectives were documents such as the Making Space for Nature: A review of England's wildlife sites and ecological networks report by Lawton et al. (2010), the government's 25 Year Environment Plan (2018), and most recently The Environment Act 2021 and Environmental Improvement Plan (EIP) 2023 (Defra 2023) .

The fundamental principles behind the Making Space For Nature report are for England's ecological network to be 'more, bigger, better and joined' to ensure the survival of species in the face of multiple pressures at a range of scales. The government's 25-year environment plan (Defra, 2018) puts more impetus on the statutory need to consider the conservation of biodiversity and ensure that it is effectively accounted for through the spatial planning system and the Defra Environment Bill.

The Environment Act 2021 (c.30) sets out environmental principles directed toward the restoration and enhancement of nature and plots a course for how these should be achieved through Nature Recovery Network mapping at a local level ('Local Nature Strategies') and will be a key document in driving the way that these networks are developed and delivered. Additionally, updated guidance through the National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2024) and Planning Practice Guidance (PPG) (Ministry of Housing, Communities and Local Government, 2023) have all served to put more emphasis the protection and conservation of nature and our natural resources through spatial planning, providing further justification for the need to have a Nature Recovery Network in place to create a roadmap of where these enhancements could and should go. This coupled with the emergence of mandatory biodiversity net gain provision.

The Statutory Biodiversity Metric provides a means of assessing changes in biodiversity value (losses or gains) brought about by development and changes in land use management. The metric is habitat based and gives consideration to improved ecological connectivity.

Habitat Opportunity maps are designed to be used in conjunction with the Statutory Biodiversity Metric but can also be used to both inform the metric and target the location and application of future ecological enhancements contributing to a functional nature recovery network.

3. Evidence-based desk review

3.1. Biodiversity Metric Habitat mapping via aerial photography interpretation

The objective of the work was to conduct a mapping exercise in order to identify 'the location of habitats of conservation importance through the completion of a review of the district's habitats.

Due to the size of the study area, the mapping exercise was completed via a desk-based methodology. Aerial photograph imagery was manually assessed with the Statutory Biodiversity Net Gain metric based predicted habitats from the Living England Habitat Map Phase 4 (Kilcoyne et al., 2022) with information on the Priority Habitat Inventory and local knowledge.

The Living England project, led by Natural England, is a multi-year program delivering a satellite-derived national habitat layer in support of the Environmental Land Management (ELM) System and the Natural Capital and Ecosystem Assessment (NCEA) Pilot. The project uses a machine learning approach to image classification, developed under the Defra Living Maps project (SD1705 – Kilcoyne et al., 2017). The method first clusters homogeneous areas of habitat into

segments, then assigns each segment to a defined list of habitat classes using Random Forest (a machine learning algorithm). The habitat probability map displays modelled likely broad habitat classifications, trained on field surveys and earth observation data from 2021 as well as historic data layers. The main sources layers are Sentinel-2 and Sentinel-1 satellite data from the ESA Copericus programme.

Additional datasets were incorporated into the model to aid the segmentation and classification of specific habitat classes are: Agri-Environment Higher Level Stewardship (HLS) Monitoring, British Geological Survey Bedrock Mapping 1:50k, Coastal Dune Geomatics Mapping Ground Truthing, Crop Map of England (RPA), Dark Peak Bog State Survey, Desktop Validation and Manual Points, EA Integrated Height Model 10m, EA Saltmarsh Zonation and Extent, Field Unit NEFU, Living England Collector App NEFU/EES, Long Term Monitoring Network (LTMN), Lowland Heathland Survey, National Forest Inventory (NFI), National Grassland Survey, National Plant Monitoring Scheme, NEFU Surveys, Northumberland Border Mires, OS Vector Map District , Priority Habitats Inventory (PHI) B Button, European Space Agency (ESA) Sentinel-1 and Sentinel-2, Space2 Eye Lens: Ainsdale NNR, Space2 Eye Lens: State of the Bog Bowland Survey, Space2 Eye Lens: State of the Bog Dark Peak Condition Survey, Space2 Eye Lens: State of the Bog (MMU) Mountain Hare Habitat Survey Dark Peak, Uplands Inventory, West Pennines Designation NVC Survey, Wetland Inventories, WorldClim - Global Climate Data.

Staff experienced in both on the ground and aerial interpretation habitat survey were used to complete the mapping. At this stage, no ground-truthing was carried out so accuracy and confidence of the digitised habitat data is subject to limitations (see section 3.4 for full data limitations). Future work could include ground truthing through data collected for Landscape Recovery projects, planning data, and potentially through collaboration with the local university and colleges. The completion of this mapping exercise has resulted in a complete* Biodiversity Metric habitat dataset for the local authority area. This dataset is a composite of habitat data from a range of datasets.

*There may be small gaps in habitat data arising from digitising error or difficulty of creating a seamless fit based on existing data and newly created data.

3.2 National Character Areas in East Devon

National Character Areas (NCA) defined by Natural England and are subdivisions of the country based on a combination of landscape, biodiversity, geodiversity and economic activity, these

follow natural boundaries as opposed to more conventional political boundaries. A map of the NCA areas in the district is presented in Appendix B.

The NCAs were considered in the nature recovery network mapping to ensure that priorities identified as part of the mapping were aligned to landscape national priorities identified in the respective NCA, taking into account factors such as landform, geology, soils, agriculture and key habitats and species.

Each of the NCAs has a summary and description of the natural and cultural features behind its definition along with the associated key characteristics, and environmental and opportunities related to each of the individual NCAs. Natural England have produced profile documents for each of the NCAs which can be found online at: https://nationalcharacterareas.co.uk/.

Three NCAs are located within East Deven district. NCA 147 Blackdowns covers the western third of the district with a small portion of NCA 149 The Culm in the very western extent of the district. NCA 148 Devon Redlands covering the eastern two thirds of the district.

NCA 147 Blackdowns

Statements of environmental opportunities (SEO) within the Blackdowns (NCA 147):

SEO 1: Manage the coastal and estuarine landscape with its diversity of cliffs, geology, geomorphology, palaeontology, historic features, habitats and associated wildlife, contributing to livelihoods, enjoyment and education of people.

SEO 2: Protect and manage the tranquil, enclosed valleys and the network of streams, springs and associated semi-natural habitats set within a farmed landscape, for the maintenance and enhancement of livelihoods, public enjoyment and ecosystem services.

SEO 3: Protect and manage the open, exposed character of the ridgetop plateaux and the associated rich cultural heritage. Plan for the restoration and extension of semi-natural habitats and promote and create opportunities to enhance public understanding and enjoyment.

SEO 4: Protect the relatively unsettled, rural character of this nationally important landscape, maintaining open skylines and historic settlement form. Reflect the local vernacular and geodiversity in new development and encourage provision of high-quality green infrastructure.

NCA 147 priorities that align with NRN include:

- Encouraging management and re-creation of the heathland commons, restoring prominent conifer plantations to semi-natural habitats, and resisting development of an inappropriate scale and character
- Manage nationally important coastal and estuarine habitats including the reedbeds, salt and grazing marshes, enhancing biodiversity and protecting the unsettled and unenclosed character.
- Manage and enhance the woodlands, planning for greater connectivity that is sympathetic to landscape character and protection of the 'wooded' character.
- Within the valleys, manage and extend species-rich meadows, mires and rushy pastures to enhance biodiversity richness and connectivity, support the sense of tranquillity, and assist water and soil regulation
- Manage and enhance the network of hedgerows and hedgerow trees, strengthening the strong, square field pattern with distinctive beech hedgerows and avenues
- Manage nationally important coastal and estuarine habitats including the reedbeds, salt and grazing marshes, enhancing biodiversity and protecting the unsettled and unenclosed character

NCA 148 Devon Redlands

Statements of environmental opportunities within the Devon Redlands (NCA 148):

SEO 1: Protect and manage the value and integrity of the coastal and estuarine landscape with its diversity of cliffs, geology, geomorphology, historic features, habitats and associated wildlife, contributing to the livelihoods, enjoyment and education of people.

SEO 2: Manage, enhance and where necessary protect the diversity of land use and activity which gives the Devon Redlands its distinctive character. Increase the connectivity of key habitats for the benefit of landscape, biodiversity and ecosystem services.

SEO 3: Protect and manage the distinctive character of the landscape, the natural beauty, scenic quality, historic environment and geological features. Enhance recreational resources, access to nature and heritage assets, particularly along the coast, to ensure public benefit and enjoyment.

SEO 4: Plan and manage for a strong landscape framework to support and integrate the expansion of Exeter, Exmouth, Teignmouth, Tiverton, Crediton and Cullompton, and the road and rail network throughout the area. Conserve and enhance the existing character, form and pattern of the area's historic settlement, from single farmsteads to larger villages.

NCA 148 priorities that align with NRN include:

- Enhancement and creation of woodlands, trees and hedgerows
- Management and creation of unimproved, species-rich grasslands
- Management and expand of wetland habitat along the rivers Exe, Culm, Clyst, Teign and Otter and their tributaries, and particularly flood plain grazing marsh, rush pasture and fen at the lower reaches of river valleys of flood plain and small river networksRestoration and enhancement of lowland health.

NCA 149 The Culm

A small area in the northwest portion of East District falls within The Culm NCA 149. Statements of environmental opportunities within The Culm NCA:

SEO 1: Seek to maintain, enhance and join up the distinctive and internationally important areas of Culm grassland, with their simple patterns of fields, hedgebanks, woodlands, rivers and tributaries, and their strong links to past land use and settlement. This will bring benefits in terms of reducing soil erosion, improving soil quality and water availability, regulating water flow, promoting the interpretation of the historic environment, enhancing biodiversity and supporting pastoral farming.

SEO 2: Seek to maintain, enhance and join up the distinctive and internationally important areas of Culm grassland, with their simple patterns of fields, hedgebanks, woodlands, rivers and tributaries, and their strong links to past land use and settlement. This will bring benefits in terms of reducing soil erosion, improving soil quality and water availability, regulating water flow, promoting the interpretation of the historic environment, enhancing biodiversity and supporting pastoral farming.

SEO 3: Protect open views and the simple, austere character of the landscape and seascape, enhancing access to and interpretation of the wealth of natural and heritage assets, and recreational opportunities, throughout the area – including the South West Coast Path.

NCA 148 priorities that align with NRN include:

- Maintain diversity of species and value for flora and fauna, enhancing the mosaic of culm grasslands, rush pastures, wet meadows, and broadleaf woodland
- Transition of conifer woodlands to native broadleaf woodland, heath, and rush pasture
- Restoration of hedgebanks and small woodlands

3.3 1993 to 2024: Change in County Wildlife Sites (CWSs) size and number

The change in the number of County Wildlife Sites (CWSs) and their area was compared between 1993 and 2023. Devon Biodiversity Record Centre (DBRC) provided shapefiles for CWSs for 2023 and pre-2000. The pre-2000 shapefile was compared with the East Devon Survey Sites Provisional Inventory (Devon Wildlife Trust, 1993) and edited to create a shapefile that represented East Devon CWSs in 1993. The details for each site (e.g. name, site number, area, description, status, etc) in 1993 and 2024 were combined into one database with one row for each CWS to use compare changes from 1993 to 2023. Data on Other Sites of Scientific Interest (OSWIs) were not provided by DBRC and thus not included the comparison. Sites that achieved upgraded designations (East Devon Pebblebed Heaths SAC, Hense Moor (SSSI) and Hense Moor Meadows (SSSI) were excluded from the comparisons.

3.4 Data used and limitations

It is important to determine the limitations of any datasets identified to ensure that the best possible dataset(s) are used to give the best outcomes for connectivity mapping.

A number of factors can influence whether a dataset is suitable, for example age of the data and whether the data is in a format which can easily and readily be interrogated are crucial in deciding which datasets should be used.

Following a data review the combined habitat map produced during the earlier stages of this was used as a primary baseline from which as this represented the most complete habitat dataset for the area and would easily work with the preferred methodologies to generate the desired technical outputs.

Several datasets were used in the production of the Nature Recovery Network mapping, justification on their use and relevant limitations can be found in appendix A.

4. Mapping the opportunities to enhance habitats for biodiversity

The first step in analysis to establish opportunities for nature recovery is to take the data evidence base established previously and a carry out a variety of habitat analyses to determine distinctiveness /character for use within other recognized methods (such as the biodiversity metric). The same approach used for East Devon was used by Lichfield District (Staffordshire Wildlife Trust, 2019). Similar approaches have been used by Greater Manchester, Cornwall, and the West Midlands Combined Authority.

Furthermore, using the evidence base to apply methods to identify strategic habitat areas and habitat connectivity opportunity areas in relation to creating a robust nature recovery network for the district.

By utilising the knowledge of the District habitats and species, experience of technical GIS systems and data management, coupled with the available datasets identified in the evidence base, it was possible to produce a number of outputs which are robust, challengeable and can deliver the Districts nature recovery network.

4.1 Habitat distinctiveness mapping

Habitat distinctiveness mapping is one of several elements included within the Statutory Biodiversity Metric (Defra 2024) by using habitat as a proxy for wider biodiversity value via associating and scoring different habitat types according to their relative biodiversity value. An example of this would be irreplaceable ancient woodlands scoring very highly (higher biodiversity value) whereas intensively managed amenity grassland or highly improved agricultural arable land score lower (lower relative biodiversity value).

The criteria used for the creation of the habitat distinctiveness map was based on the Statutory Biodiversity Metric (Defra 2024) which defines what habitats are included within each distinctiveness band. The metric formed the basis of the Environment Act 2021 (c.30) and represent the most comprehensive set of standards for which to base the distinctiveness mapping on (Defra, 2024).

The distinctiveness map (Figure 4.1) was produced using distinctiveness values derived from the Statutory Biodiversity Metric associating a distinctiveness value to each specific habitat type (e.g. arable land), selecting and isolating the habitats spatially into the 5 respective distinctiveness bands (Defra 2024). A spatial GIS file was produced for each distinctiveness band.

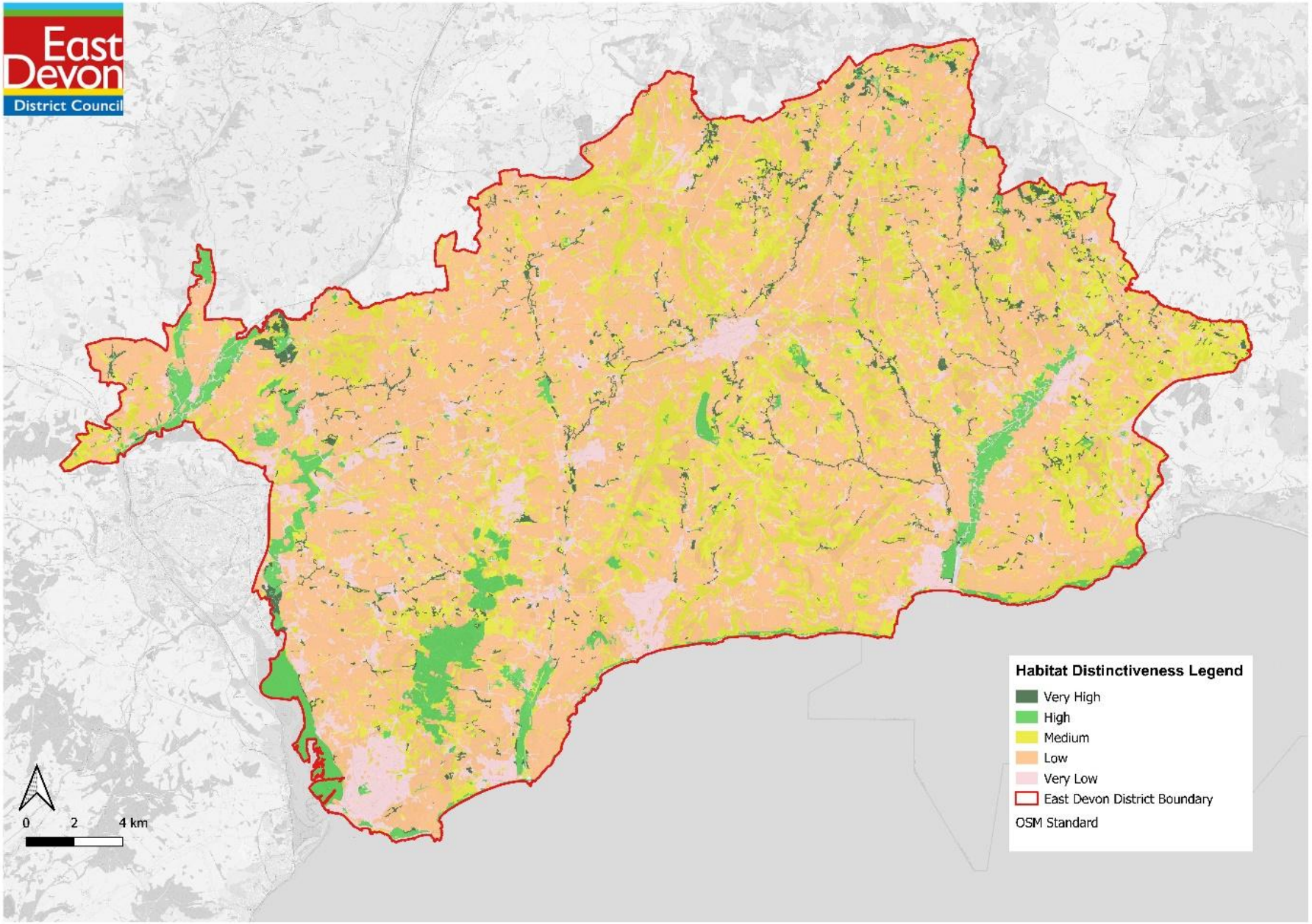

Figure 4.1. Habitat distinctiveness map for East Devon District

Habitat distinctiveness mapping provides multiple uses outside of the Biodiversity Metric, including:

1. Identifying areas of high biodiversity value which are a priority for protection and expansion within a local plan whilst working in line with biodiversity mitigation hierarchy (avoid, minimise, remediate, compensate).

2. Flagging areas that may contain medium value (semi-natural) habitat. These could be highlighted in policy as requiring a comprehensive biodiversity evaluation if they are put forward for planning purposes (based on mitigation hierarchy). Biodiversity offsetting/compensation may be required in these areas if they are developed.

3. Identifying possible wildlife corridors which can be highlighted and designated as part of a local plan/Green Infrastructure Strategy. These areas could be the target of restoration projects/funding/aspirational opportunity areas funded through development compensation (obviously the allocation of funds is based on broad scale spatial analysis as opposed to the methods of calculating the offsetting requirement of a specific site).

Planning policy supports application of the mitigation hierarchy which determines a hierarchy of actions when using the Biodiversity Metric. This may mean retaining habitats in situ or avoiding habitat damage. It is easier to achieve biodiversity net gains where habitat impacts are avoided due to the way that habitat creation and enhancement risks are accounted for.

The mitigation hierarchy is in the desirability order as follows:

- Avoid – Where possible habitat damage should be avoided
- Minimise – Where possible habitat damage and loss should be minimised
- Remediate – Where possible any damaged or lost habitat should be restored
- Compensate – As a last resort, damaged or lost habitat should be compensated for

The mitigation hierarchy corresponds with the habitat distinctiveness mapping, e.g. very high distinctiveness habitats such as irreplaceable ancient woodlands should be avoided from development, low and medium distinctiveness habitats could be restored to a higher quality habitat.

The habitat distinctiveness mapping is based on available habitat data and the designated nature conservation site boundaries for the district, including UK Biodiversity Framework (JNCC,

2024), Habitats of Principal Importance (Section 41, Natural Environment and Rural Communities (NERC) Act 2006), and priority habitat areas.

Habitat distinctiveness mapping does not include species explicitly. Instead, it uses broad habitat categories as a proxy for the biodiversity 'value' of the species communities that make up different habitats. The metric does not change existing levels of species protection, and the processes linked to protection regimes are outside the scope of the metric.

Habitats are assigned to distinctiveness bands based on an assessment of their distinguishing features including for example rarity (at local, regional, national and international scales), and the degree to which a habitat supports species rarely found in other habitats.

4.2 Habitat distinctiveness mapping limitations

The distinctiveness mapping was carried out using a desk-based methodology utilizing available habitat datasets at a landscape scale with a view of being able to quickly determine on a wider scale the likely impacts of a development, as such the landscape level distinctiveness map in some cases may not provide an accurate account of a site's full habitat distinctiveness at a finer scale (for example at site level).

Due to this, developments requiring distinctiveness mapping as part of biodiversity offsetting net gain analysis should be subject to a thorough Preliminary Ecological Assessment (PEA) to determine the full extent of in situ habitats and the expected biodiversity impact of any potential habitat loss or damage.

4.3 Statutory Biodiversity Metric

Defra's Statutory Biodiversity Metric (2024) is designed to quantify biodiversity to inform and improve planning, design, land management and decision-making. The metric can be used to both:

- Assess or audit the biodiversity unit value of an area of land and;
- to calculate the losses and gains in biodiversity unit value from changes or actions which affect biodiversity, for example building houses or a change of use in a land holding.

The statutory biodiversity metric has 4 'quality components' namely:

- **Distinctiveness** – based on the type of habitat present. For example, modified/amenity grassland is given a score of "2".

    - Distinctiveness is determined by the habitat distinctiveness mapping (see section 4.1).
- **Condition** – based on the quality of the habitat. This is determined by condition criteria set out in the technical supplement.
    - This cannot be achieved as part of this exercise due to the difficulty of determining condition from a desk-based methodology.
- **Strategic Significance** – based on whether the location of the development and or off-site work has been identified locally as significant for nature.
    - Strategic significance is determined by the individual habitat strategic areas and the combined strategic areas map (see section 5.3).
- **Connectivity** – based on the proximity of the habitat patch to similar or related habitats.
    - Connectivity is determined by combined strategic areas map & habitat connectivity opportunity maps (see sections 5.3 & 6).

The Biodiversity Gain Hierarchy and its effect for the purpose of the statutory framework for biodiversity net gain is set out in Articles 37A and 37D of the Town and Country Planning (Development Management Procedure) (England) Order 2015. This hierarchy (which does not apply to irreplaceable habitats) sets out a list of priority actions:

- onsite habitats which have a medium, high and very high distinctiveness, the avoidance of adverse effects from the development and, if they cannot be avoided, the mitigation of those effects; and,

- all onsite habitats which are adversely affected by a development, the adverse effect should be compensated by prioritising in order, where possible, the enhancement of existing onsite habitats, creation of new onsite habitats, allocation of registered offsite gains and finally the purchase of biodiversity credits.

Through the current study, three of the four quality components have been assessed and defined at a district scale. The only exception being habitat condition which cannot realistically be assessed through a desk-based methodology and would require further ground-truthing to determine actual unit values (for example through a Preliminary Ecological Appraisal (PEA)). Over the long term, it may be possible to ground-truth this exercise add in habitat condition using data available through planning submissions, County Wildlife Sites, citizen science, and local universities and colleges.

4.4 Strategic Habitat Areas

The Strategic Habitat Area methodology we have applied was developed and is currently being implemented by Warwickshire County Council (WCC) and was developed in partnership with Warwickshire Habitat Biodiversity Audit (WHBA), The University of York and Warwickshire Wildlife Trust. The methodology forms part of WWCs Sub Regional Green Infrastructure Strategy and is used in targeting areas for habitat enhancement through biodiversity offsetting compensation.

This methodology was chosen for this mapping assessment because it can be relatively easily applied with the habitat data available; it is robust having been peer reviewed during development and it is based on the fundamental principles of habitat connectivity identified in Lawton et al. (2010).

The mapping works by assessing the proportion of broad habitats e.g. woodland, grassland, heathland etc. within an area to determine whether these are 'strategic', 'good existing target habitat' or 'non-strategic' for the creation or restoration of further habitat based on the proportion of habitat already present in the area.

The strategic habitat areas were produced using the composite Biodiversity Metric habitat data identified in the desk-based review. Firstly, specific higher quality habitats were selected and isolated from the composite habitat map (e.g. heathlands or species-rich grassland). The proportion of the selected habitats that overlap individual Ordnance Survey 1 km grid squares was then calculated in a GIS package and each square subsequently classified into one of the area bands below, based on the area of habitat overlapping the 1 km square. Specific details on the strategic areas are listed in Appendix C.

The strategic habitat areas can be viewed as a hierarchy when it comes to the creation of a particular type of habitat:

1. **Strategic areas** are key areas to focus habitat creation or restoration. There is some high quality semi-natural habitat but additional high quality semi-natural habitat would improve the function of the network.

2. **Good existing target habitat areas** are the next preferred areas in terms of habitat creation – These areas already have a relatively large area of high quality semi-natural habitat but more would still be of benefit.

3. **Non-strategic areas** are where there is very little or no high quality semi-natural habitat where it would be difficult to create enough high quality semi-natural habitat for it to be functional. (This is not to say that semi-natural habitats should not be created in this area but that its lower in the overall hierarchy).

The strategic area mapping described will be crucial in delivering the fundamental principles in Lawton et al. (2010).

An overall strategic areas map was produced based on the combination of all the habitats analysed as part of the strategic mapping exercise (Figure 4.3).

The strategic areas are not static and are merely a snapshot in time, changes are an inevitable part of the mapping as available habitat data changes. To an extent the strategic areas mapping is self-fulfilling, as opportunities to enhance habitats described by the map are practically implemented on the ground, mapped through subsequent monitoring and the new habitat data being incorporated into future maps will influence future changes in the areas on the map.

All strategic areas for each of the habitat types assessed are supplied as digital GIS appendices to this report.

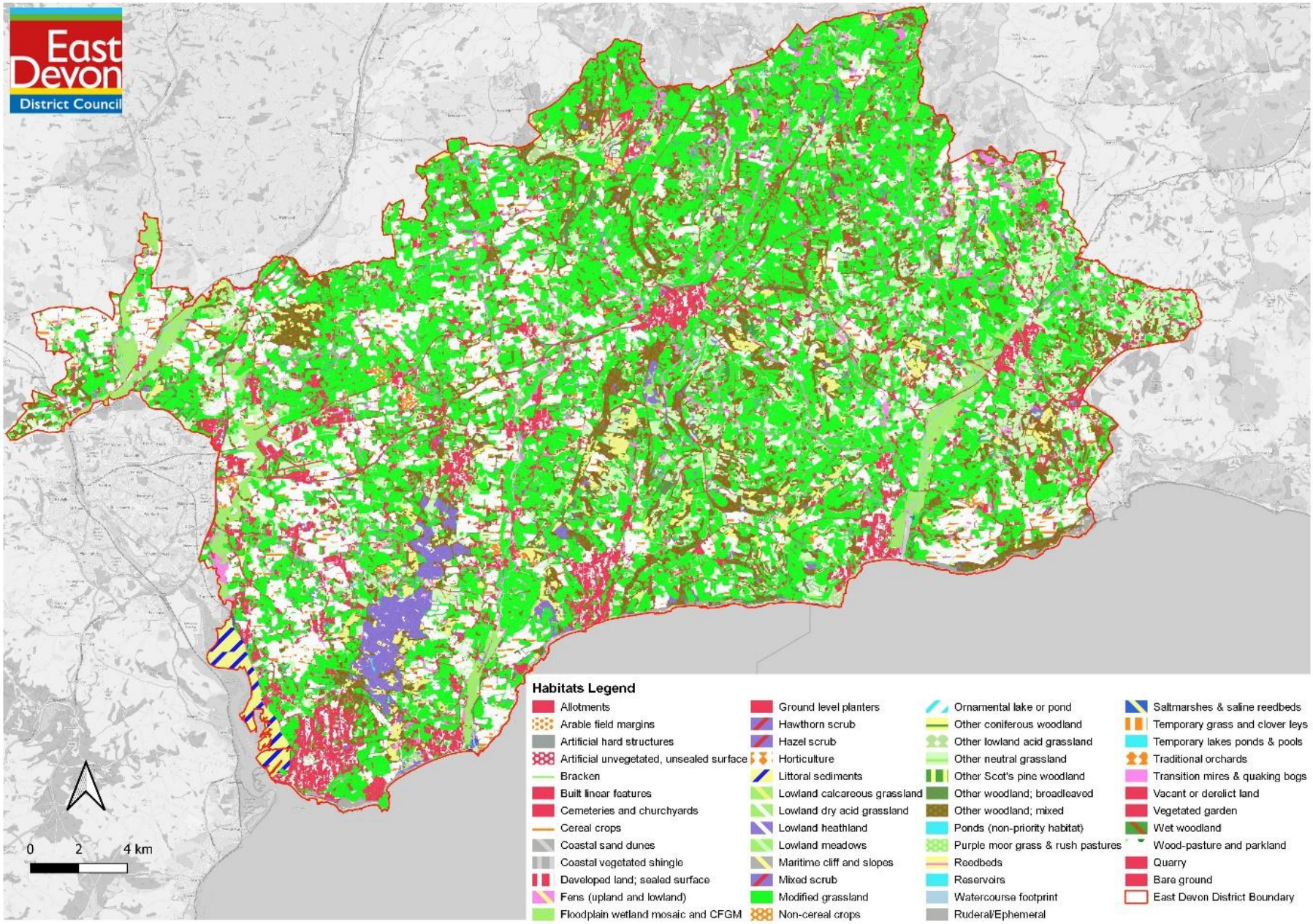

Figure 4.2. The desk study Biodiversity Metric 2024 baseline map of East Devon District adapted from the Living England Phase 4 Habitat Map

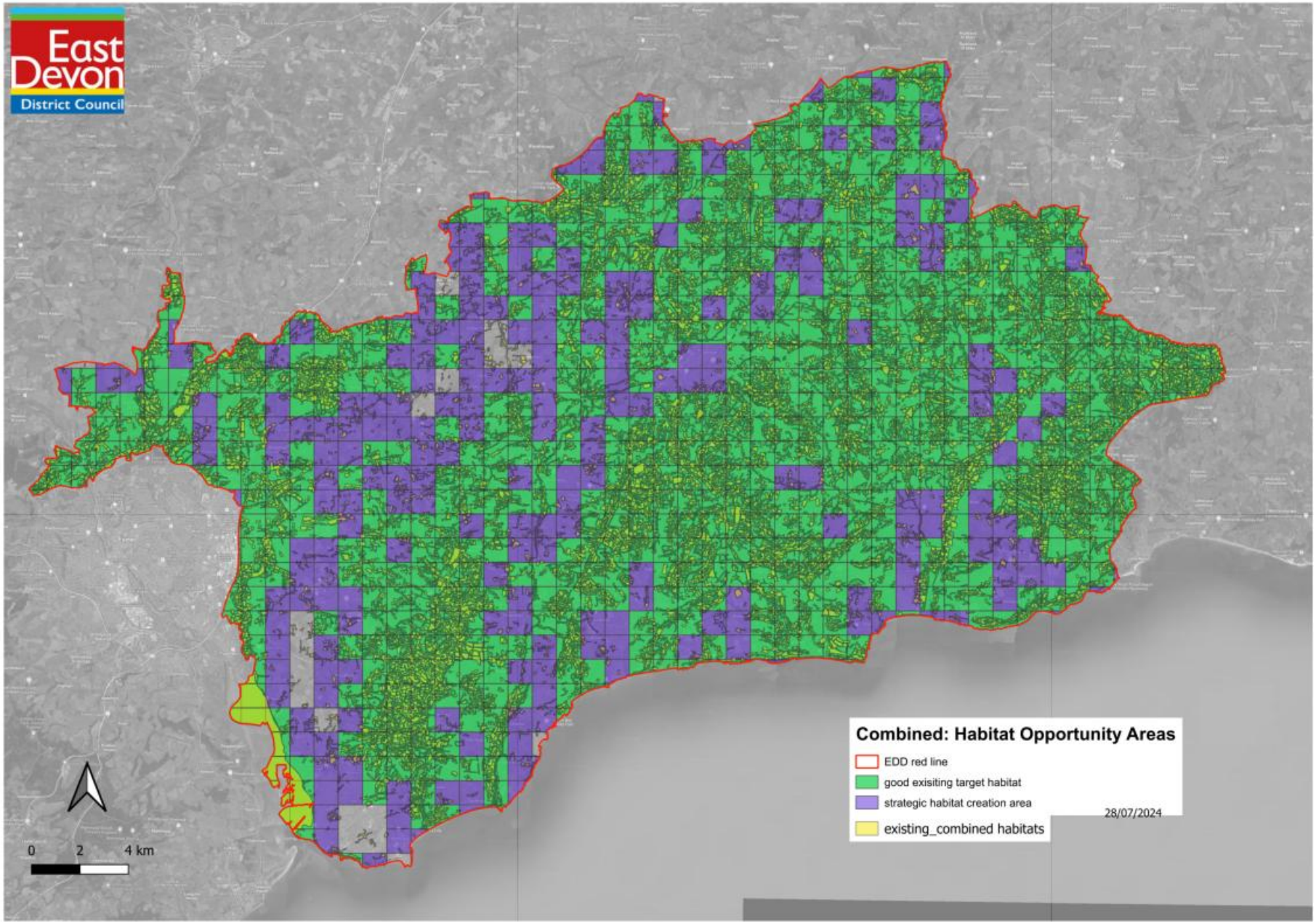

Figure 4.3. Combined Strategic Habitat Connectivity Areas for East Devon District

5. Establishing the Habitat Connectivity Opportunity Areas (HCO) for East Devon District

The strategic areas mapping described previously still leaves gaps between areas deemed to be strategic or semi-strategic for a particular habitat type, therefore the creation of habitats solely within these areas may still end up leaving isolated patches habitats which potentially do not link to one another within a landscape. In the interests of driving habitat creation in the direction of connecting these isolated spaces it is important to map an aspirational 'ideal' connected habitat network to work toward: A Nature Recovery Network.

Using local knowledge coupled with additional datasets including the Natural England's Living England Habitat Map Phase 4, Priority Habitat Inventories, along with a piece of ecological modelling software called Condatis (Wallis & Hodgson, 2012), it was possible to further scrutinise and refine the strategic areas map to define comprehensive Habitat Connectivity Opportunity (HCO) areas map for the district based on individual habitats.

The HCO areas add another dimension to the strategic areas modelling detailed previously to define where habitats are both already well connected and equally as crucially broadly identify where to direct the delivery of habitat creation or restoration to create a bigger and more joined up (Lawton et al, 2010) habitat network.

5.1 Habitat Connectivity Opportunity Areas Rationale

The decision to use Condatis to build upon the strategic mapping was in part due to the fact the software has previously been used to identify habitat connectivity in other districts such as Lichfield (Staffordshire Wildlife Trust, 2019), Greater Manchester combined authority, Cheshire Wildlife Trust, Cumbria County Council, Norfolk County Council, Northumberland Wildlife Trust (Gutierrez-Arellano et al, 2024), where it worked well at identifying rough habitat corridors. Condatis also works on a per habitat basis it is therefore possible to analyse habitat connectivity on an individual habitat basis (A full technical explanation of the Condatis software can be found in Appendix D).

Condatis has some limitations in that it only takes into account a single habitat at a time and does not account for other potential connectivity barriers, for example urban areas. It is therefore crucial that these outputs were vetted against other relevant datasets such as habitats data; ensuring that identified connectivity opportunities fall in line with the Biodiversity Action Plan areas, such as Clyst Valley Regional Park, and that crucially the connectivity

opportunity areas correspond with how local expert knowledge would expect the habitat connectivity areas to look in the district, to sense check what is produced by the models.

6. Results

6.1 Habitat Connectivity Opportunity Areas identified

A total of 6 separate Habitat Connectivity Opportunity area types have been identified and mapped covering the entirety of East Devon District:

1. Woodland

2. Grassland

3. Heathland

4. Wetland

5. Extensive Pasture and Arable Land

6. Urban Fabric

Each opportunity area is described in terms of its key habitat or habitats. This should not be taken to mean that other habitats are absent from the opportunity area, or that habitats identified as a priority in the opportunity areas should replace existing non-target high quality habitats of a different type.

The Habitat Connectivity Opportunity areas were brought together to produce a combined HCO map for the district (Figure 6.1).

Each opportunity area is described in more detail in the East Devon Local Nature Recovery Plan, along with relevant associated land uses, environmental issues, and the overarching objectives and opportunities for each zone.

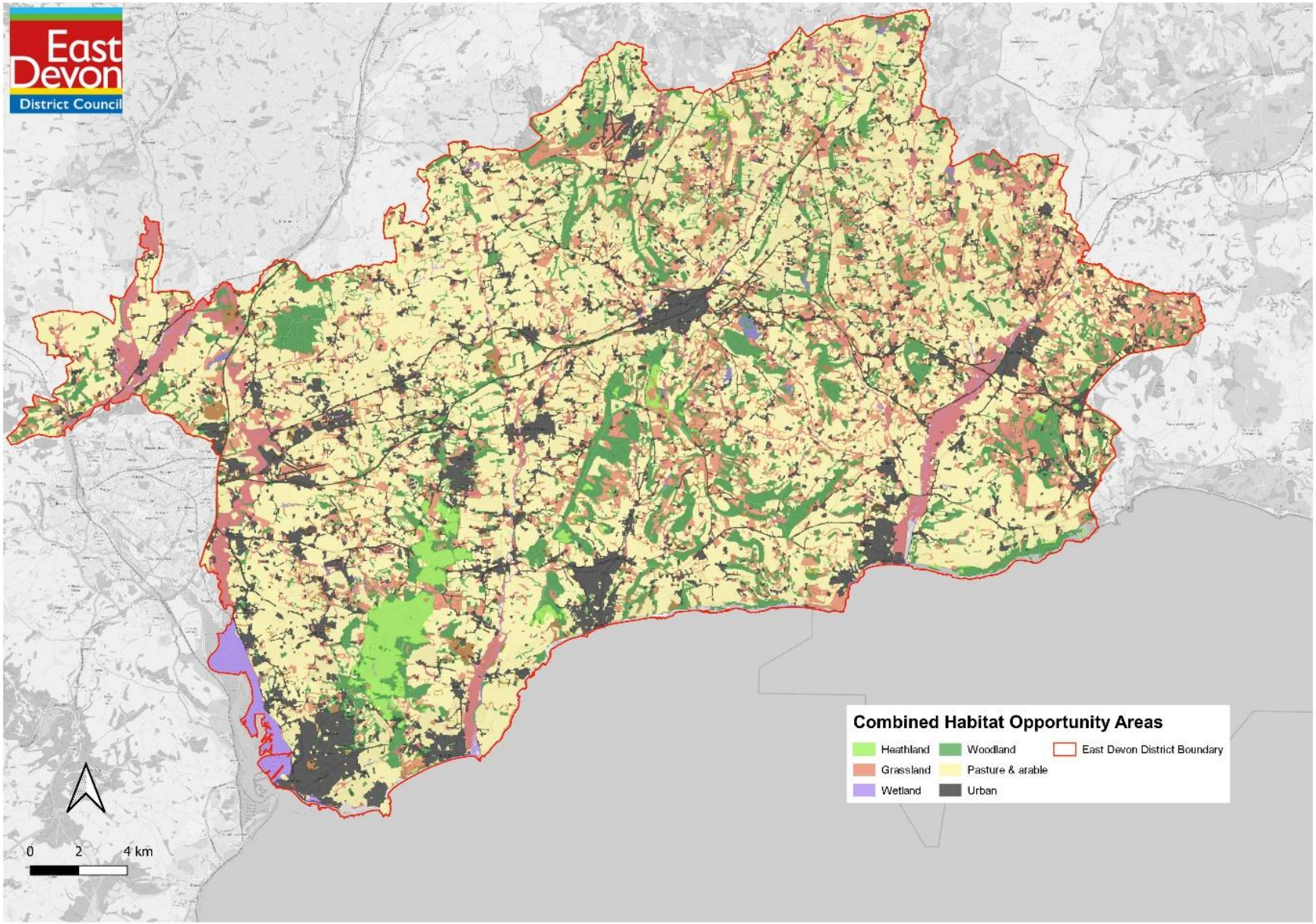

Figure 6.1. Combined habitat connectivity opportunity areas map for East Devon District (2024) NG: some of the HCO areas one another which can lead to the colouring of the map being distorted.

6.2 Country Wildlife Sites: changes from 1993 to 2023

In 1993, there were 300 County Wildlife Sites in East Devon District covering 5,183.2 ha. Over 30 years (from 1993 to 2023), 41 new CWS's (296.4 ha) were designated in East Devon District (Figure 6.3). Many of the CWS's, had no or small (<3 ha) in associated with boundary changes. There were 13 CWS sites (248.7 ha) from 1993 appear to have been lost designated status. Regardless, across all the CWS over the 30 years, the area of CWS's increased by 114.1 ha, from 5183.2 ha in 1993 to 5297.3 ha in 2023 (Figure 6.4). Regardless of year, individual CWS average 16.2 ha, ranging from 0.1 to 1,100 ha. On average, each CWS increased in area by approximately 0.61 ha from 1993 to 2023, ranging from a loss of 78 ha to a gain of 123 ha.

Overall, the number of and size of CWSs in East Devon increased over the 30 years. However, better understand changes in CWSs over time and out of the scope of this analysis, changes in individual CWS condition over time should be assessed to get a true picture of the state of CWS in East Devon District.

There are approximately 2,300 Country Wildlife Sites (CWSs) in Devon[2], extending to approximately 30,000 ha. This equates to approximately 4% of Devon and CWSs have been designated due to the presence of particular habitats and specie. Therefore, East Devon CWSs contribute approximately14% by number and 17% by area of all of Devons CWS.

[2] https://www.dbrc.org.uk/county-wildlife-sites/

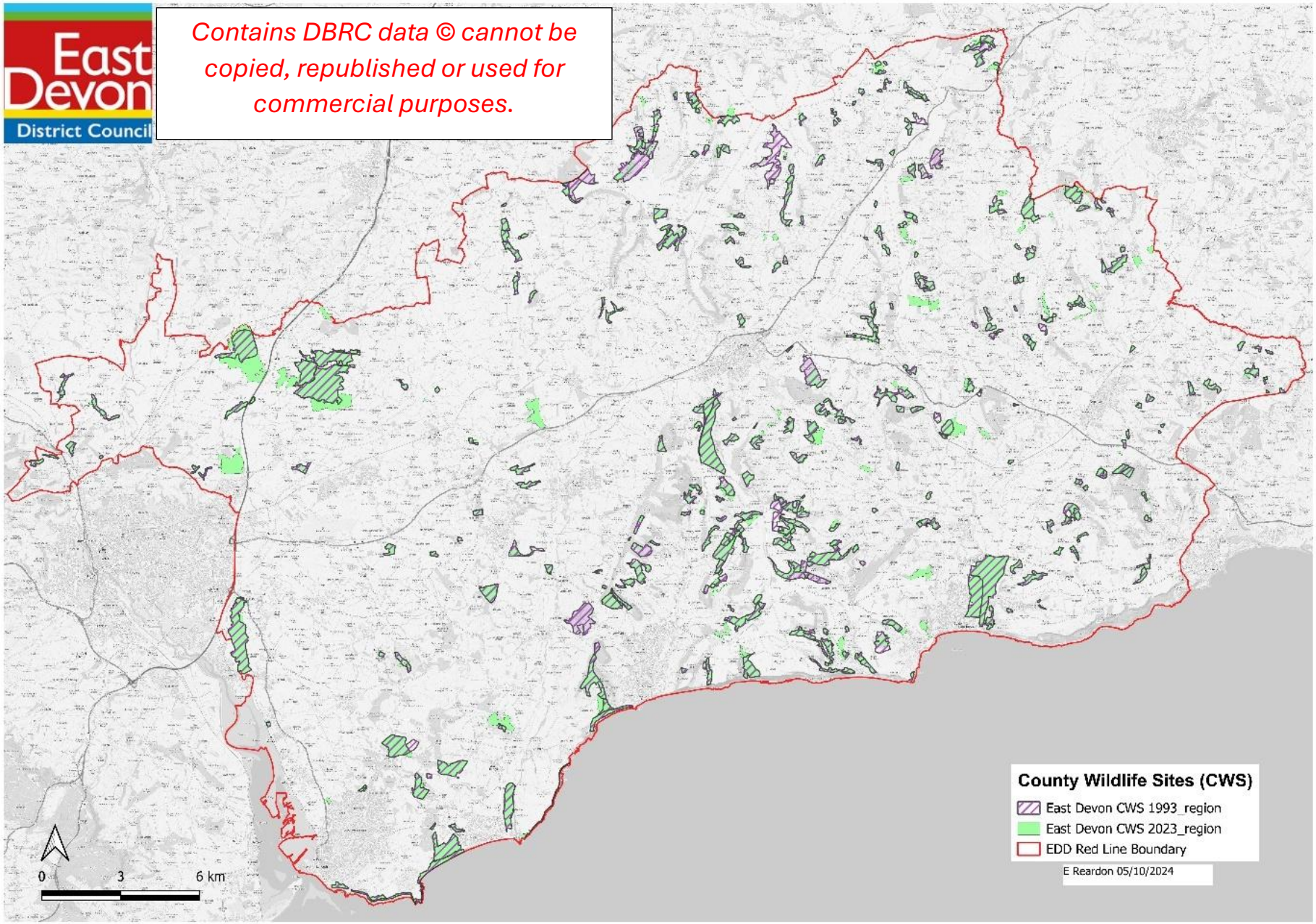

Figure 6.2. County Wildlife Sites in East Devon District in 1993 and 2023.

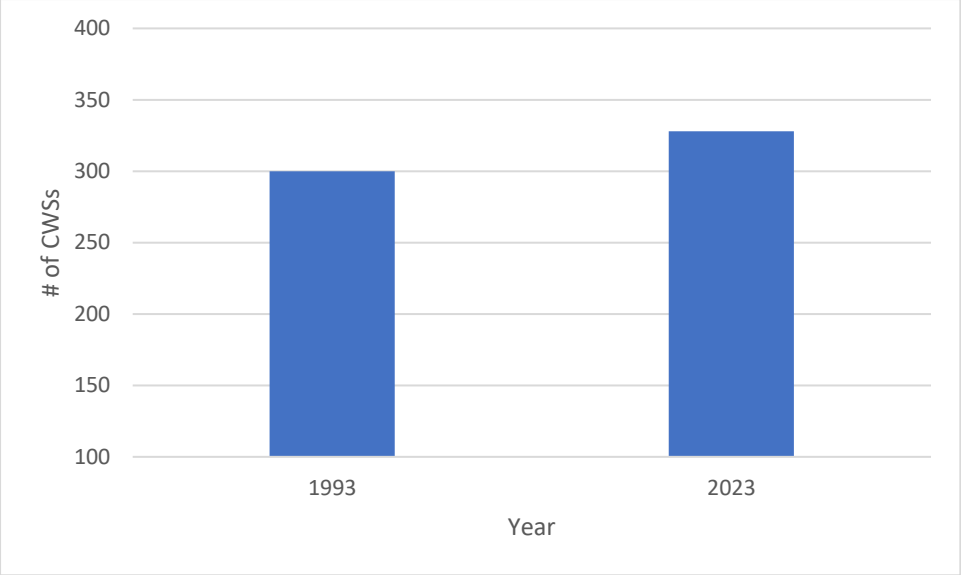

Figure 6.3. The number of County Wildlife Sites in 1993 and 2023.

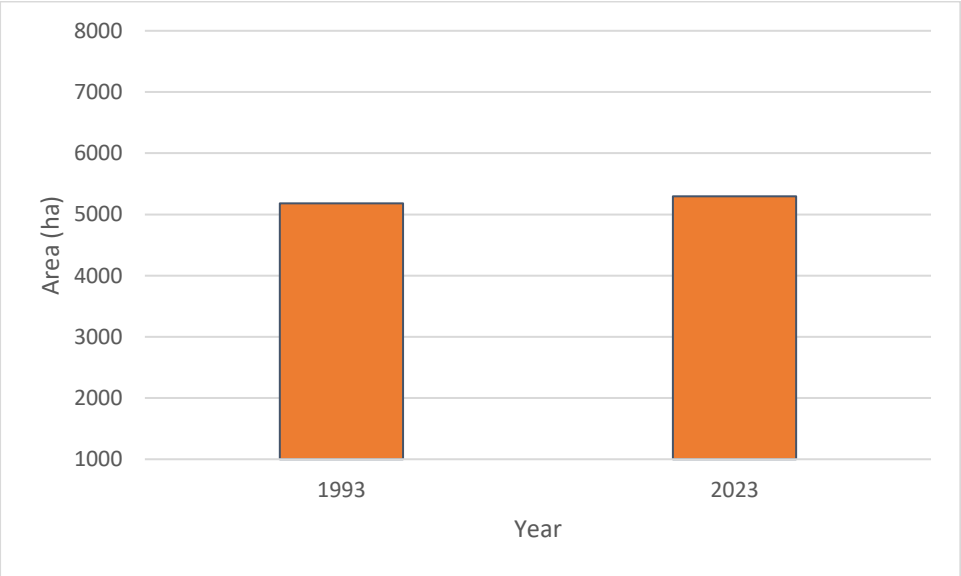

Figure 6.4. The total area (ha) of County Wildlife Sites in 1993 and 2024.

7. Cross boundary habitat connectivity

As habitats and wildlife do not adhere to political boundaries it is important to take into account habitats which exist on the other side of political boundaries to ensure that there is no 'hard edge' where for example a Habitat Connectivity Opportunity area ceases to exist at the edge of a county or district boundary despite there being suitable habitat. The combined Habitat Connectivity Opportunity area map (Figure 6.1) should be extended to include a 2 km radius buffer around the district boundary in collaboration with the neighbouring Somerset and Dorset

LNRS processes to ensure this 'hard edge' is avoided. It must be noted however that the HCO areas will not extend large distances into neighbouring authority areas with the ultimate goal that all authority areas will have a mapped Nature Recovery Network which dovetails with this NRN mapping.

8. Practical Application of the maps

The HCO maps detailed are designed to be used in conjunction with the Biodiversity Metric. However, the habitat connectivity opportunity areas and the bottleneck analysis can be used to both inform the metrics and target the location and application of future ecological enhancements contributing to a functional nature recovery network, such as for habitat banks and off-site locations.

The HCO areas are based around the principle of habitats being ecologically functional and well connected to one another within the landscape. This means that habitats are able to both support a high population and diversity of species, meaning these species have the ability to be able to move freely within the landscape, as a result of good habitat connectivity.

These areas promote the conservation, restoration and enhancement of certain priority habitats, ecological networks and contribute to the protection and recovery of associated priority species within defined geographic areas.

Crucially the habitat connectivity opportunity areas mapping has no white space as there are always opportunities for the delivery of habitat creation or enhancement anywhere in the landscape irrespective of whether it has been identified as a connectivity area for a priority habitat or not. Taking this approach ensures that the landscape as a whole can remain permeable for our flora and fauna and resistant to both local and global impacts. See Appendix E for full technical details on the principles of HCOs and mechanisms for delivery.

The habitat connectivity opportunity areas identify the key areas where the creation of new habitat is best prioritised to benefit habitat connectivity within the landscape. Targeting additional habitat creation in this way will have the greatest impact on both availability and connectivity of habitat within the landscape as it builds upon areas which already possess some good quality habitats but by increasing their size, quality, coverage and connectivity within the landscape will enable those habitats to become more functional.

Within these areas there are further opportunities to deliver environmental outcomes within existing spatially defined partnership schemes, specifically:

Blackdown Hills National Landscape (NL)

East Devon National Landscape (NL)

River Axe Special Area of Conservation (SAC) partnership

Pebblebed Heaths Special Area of Conservation, Special Protection Area, and National Nature Reserve (SAC, SPA, NNR) partnership

Beer Quarry & Caves SAC

Axmouth to Lyme Regis Undercliffs (NNR) partnership

Exe Estuary SPA and Ramsar

Devon Local Wildlife Site (LWS) Partnership

Killerton, Luppitt and Heaths to Sea (lower River Otter) Landscape Recovery projects

The way that the opportunity areas are generated means that habitat opportunities are not mutually exclusive of one another i.e. there can be overlapping areas for multiple habitat types; for instance an area defined as an opportunity for woodland enhancement may also provide a good opportunity for improving grassland and wetland habitat enhancement and connectivity. The on-site prioritisation of what habitat to create where must therefore rely upon both the opportunity areas as well as local ecological expert knowledge so as not to risk either damaging connectivity or destroying existing good quality habitats.

9. Next Steps

9.1 Habitat connectivity bottlenecks

Bottlenecks highlight the areas of habitat which have the highest 'strain' in terms of supporting connectivity within the nature recovery network. These areas are where there is a high flow of species through an area with relatively few links and over a long distance (i.e. a very concentrated flow of species movement squeezing through a very small area of habitat and being forced to jump large distances between patches of suitable habitat). Producing detailed guidance in how this can best be addressed will enable informed focused positive impacts that directly reduce strain on the habitat connectivity network.

Bottlenecks can be used to determine the optimal locations to create and restore habitats to benefit connectivity and reduce 'strain' on the habitat network. Creating, enhancing and restoring habitat in these locations will not only benefit by reducing strain on the network but

also reduces the risk or likelihood of losing what may be an important link in a habitat connectivity network which is already under pressure.

9.2 How the strategic mapping will evolve over time

As discussed previously, the opportunity map is not static. As physical habitats change on the ground and are subsequently mapped and monitored, the map itself will evolve with these updates (see Figure 9.1). It must be stressed that the opportunity areas themselves are where work to enhance habitats is focussed as this is where the opportunity to get the greatest benefits lies, the following example purely illustrates how the process of habitat improvement over time can influence changes in the map itself.

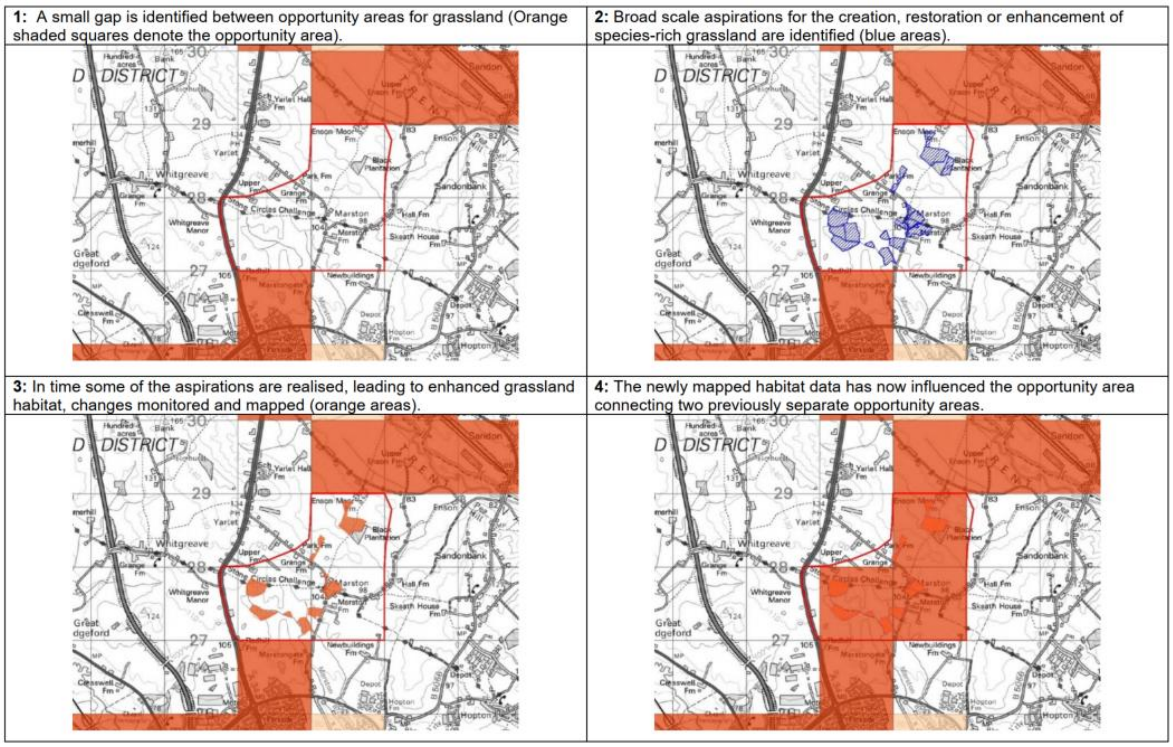

Figure 9.1. An example of change in opportunity areas over time (Staffordshire Wildlife Trust 2019)

10. Conclusion

The results of the updated Nature Recovery Network do closely reflect what was originally shown in the biodiversity opportunity assessment within the East Devon Emerging Local Plan. However, the analysis and opportunity areas mapped within the new nature recovery network are much more fine scale and are based around a more robust defensible methodology that can

more clearly deliver against NPPF and PPG objectives, as well as those in the Environment Act (c.30).

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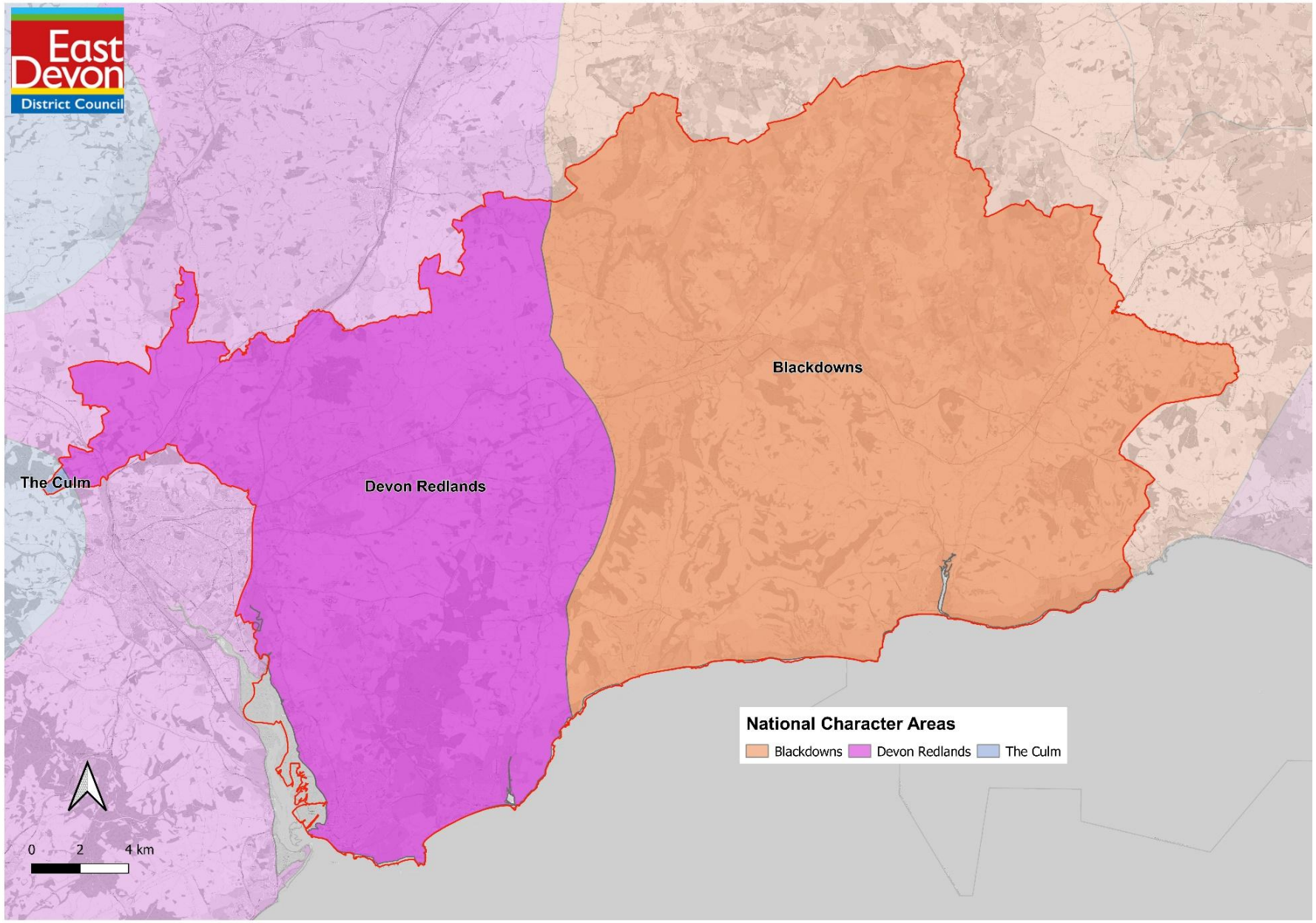
Appendix A. GIS datasets used in the generation of the NRN mapping for East Devon District

Dataset	Used-in	Justification	Limitations
Natural England's Living England Habitat Map (Phase 4)	Strategic Areas mapping, Habitat distinctiveness mapping, Habitat Connectivity Opportunity mapping	Identification of key habitat sites within the landscape to be conserved and connected, High value sites within the Habitat distinctiveness mapping.	Poor accuracy differentiating between urban/suburban features and wetlands.
Natural England's Priority Habitat Inventories	Strategic Areas mapping, Habitat distinctiveness mapping, Habitat Connectivity Opportunity mapping	Identification of key habitat sites within the landscape to be conserved and connected, High value sites within the Habitat distinctiveness mapping.	
Statutory sites maps (SSSI, SAC, RAMSAR, LNR)	Strategic Areas mapping, Habitat distinctiveness mapping, Habitat Connectivity Opportunity mapping	Identification of key habitat sites within the landscape to be conserved and connected, High value sites within the Habitat distinctiveness mapping.	
Natural England National Character Areas (NCA)	Strategic Areas mapping, Habitat distinctiveness mapping, Habitat Connectivity Opportunity mapping	To ensure that the identified network aligns with national priorities for species, habitats and landscape	

National Landscapes (NL)	Strategic Areas mapping, Habitat distinctiveness mapping, Habitat Connectivity Opportunity mapping		

Appendix B National Character Areas within East Devon District



Appendix C – Strategic Habitat Areas detailed methodology

The mapping works by assessing the proportion of broad habitats e.g. woodland, grassland, heathland etc. within an area to determine whether these are 'good existing target habitat, 'strategic habitat creation area' or 'non-strategic' Ordnance Survey 1 km grid squares were classified based on the principle that if 20 % or more of that square has, for instance woodland habitat within it then it is considered to function ecologically (species associated with that habitat are able to move freely within this square). Based on the above, classification of 1 km squares are defined as:

- Good existing target habitat: 20 % or greater specific habitat in the 1 km square. Already meets the 20 % threshold to be considered 'ecologically functional' but the creation of further habitat will strengthen ability for species to be able to exist and move through this square.
- Strategic habitat creation area: between 5-20% of the 1 km square is covered by a habitat e.g. woodland/grassland and/or adjacent to squares of 'good existing target habitat'. Priority as this requires further habitat to reach the 20% threshold to be considered 'ecologically functional' for that specific habitat.
- Non-strategic: less than 5% of the 1 km square is covered by a specific habitat making it too onerous to bring the amount of habitat to meet the 20% threshold, it is therefore not a priority area to target biodiversity compensation.

Strategic area mapping was carried out on a per habitat basis, e.g. a strategic areas map was produced for each habitat analysed: grassland, heathland, woodland, and wetland (Figures C. An overall strategic areas map has been produced based on the combination of all the habitats analysed as part of the strategic mapping exercise (Figure 4.3).

As only higher quality habitats are assessed through this analysis (e.g. species rich grassland) and lower quality habitats are not included (table C1e.g. improved grassland or poor semi-improved grassland) as they do not adequately contribute to the network as they cannot support the same level of species diversity as higher quality habitats and therefore would not be able to support this diversity. This is not to say that these habitats do not contribute to the network in some way but are not presently of a high enough biodiversity value to act as a potential source site for biodiversity or to support species typical of that habitat indefinitely.

It is important to note that updating the strategic area maps over time requires up-to-date mapping data which should be sent to the Local Environmental Records Centre (LERC) when available in a suitable format to incorporate into the Nature Recovery Network Mapping.

Table C1. Biodiversity Metric habitat types included in the assessment of the strategic habitat areas (habitats without an 'x' in a relevant column were not used in the assessment.

Biodiversity Metric Habitats	**Woodland**	**Wetland**	**Grassland**	**Heathland**
Arable field margins cultivated annually				
Arable field margins game bird mix				
Arable field margins pollen and nectar				
Arable field margins tussocky				
Cereal crops				
Winter stubble				
Horticulture				
Intensive orchards				
Non-cereal crops				
Temporary grass and clover leys				
Traditional orchards	x		x	
Bracken				
Floodplain wetland mosaic and CFGM			x	
Lowland calcareous grassland			x	
Lowland dry acid grassland			x	
Lowland meadows			x	
Modified grassland				
Other lowland acid grassland			x	

Other neutral grassland		x	
Tall herb communities (H6430)		x	
Upland acid grassland		x	
Upland calcareous grassland		x	
Upland hay meadows		x	
Blackthorn scrub	x		
Bramble scrub	x		
Gorse scrub	x		
Hawthorn scrub	x		
Hazel scrub	x		
Lowland heathland			x
Mixed scrub	x		
Mountain heaths and willow scrub	x		x
Rhododendron scrub	x		
Dunes with sea buckthorn (H2160)			x
Other sea buckthorn scrub	x		
Upland heathland			x
Willow scrub	x		
Aquifer fed naturally fluctuating water bodies		x	
Ornamental lake or pond		x	
High alkalinity lakes		x	
Low alkalinity lakes		x	
Marl lakes		x	
Moderate alkalinity lakes		x	

Peat lakes	x	
Ponds (priority habitat)	x	
Ponds (non-priority habitat)	x	
Reservoirs	x	
Temporary lakes ponds and pools (H3170)	x	
Calaminarian grasslands		x
Coastal sand dunes		
Coastal vegetated shingle		
Ruderal/Ephemeral		x
Tall forbs		x
Inland rock outcrop and scree habitats		
Limestone pavement		
Maritime cliff and slopes		
Other inland rock and scree		
Allotments		
Artificial unvegetated, unsealed surface		
Bare ground		
Bioswale		
Biodiverse green roof		
Built linear features		
Cemeteries and churchyards		
Developed land; sealed surface		
Other green roof		
Ground level planters		

Intensive green roof			
Introduced shrub			
Open mosaic habitats on previously developed land			
Rain garden			
Actively worked sand pit quarry or open cast mine			
Sustainable drainage system			
Unvegetated garden			
Vacant or derelict land			
Vegetated garden		x	
Blanket bog			
Depressions on peat substrates (H7150)			
Fens (upland and lowland)		x	x
Lowland raised bog			
Oceanic valley mire[1] (D2.1)			
Purple moor grass and rush pastures		x	x
Reedbeds		x	
Transition mires and quaking bogs (H7140)		x	
Felled			
Lowland beech and yew woodland	x		
Lowland mixed deciduous woodland	x		
Native pine woodlands	x		
Other coniferous woodland	x		
Other Scot's pine woodland	x		
Other woodland; broadleaved	x		

Other woodland; mixed	x		
Upland birchwoods	x		
Upland mixed ashwoods	x		
Upland oakwood	x		
Wet woodland	x	x	
Wood-pasture and parkland	x		x
Coastal lagoons		x	
High energy littoral rock		x	
High energy littoral rock - on peat, clay or chalk		x	
Moderate energy littoral rock		x	
Moderate energy littoral rock - on peat, clay or chalk		x	
Low energy littoral rock		x	
Low energy littoral rock - on peat, clay or chalk		x	
Features of littoral rock		x	
Features of littoral rock - on peat, clay or chalk		x	
Saltmarshes and saline reedbeds		x	
Artificial saltmarshes and saline reedbeds		x	
Littoral coarse sediment		x	
Littoral mud		x	
Littoral mixed sediments		x	
Littoral seagrass		x	
Littoral seagrass on peat, clay or chalk		x	
Littoral biogenic reefs - Mussels		x	
Littoral biogenic reefs - Sabellaria		x	

Features of littoral sediment	x
Artificial littoral coarse sediment	x
Artificial littoral mud	x
Artificial littoral sand	x
Artificial littoral muddy sand	x
Artificial littoral mixed sediments	x
Artificial littoral seagrass	x
Artificial littoral biogenic reefs	x
Littoral sand	x
Littoral muddy sand	x
Artificial hard structures	
Artificial features of hard structures	
Artificial hard structures with integrated greening of grey infrastructure (IGGI)	
Watercourse footprint	x

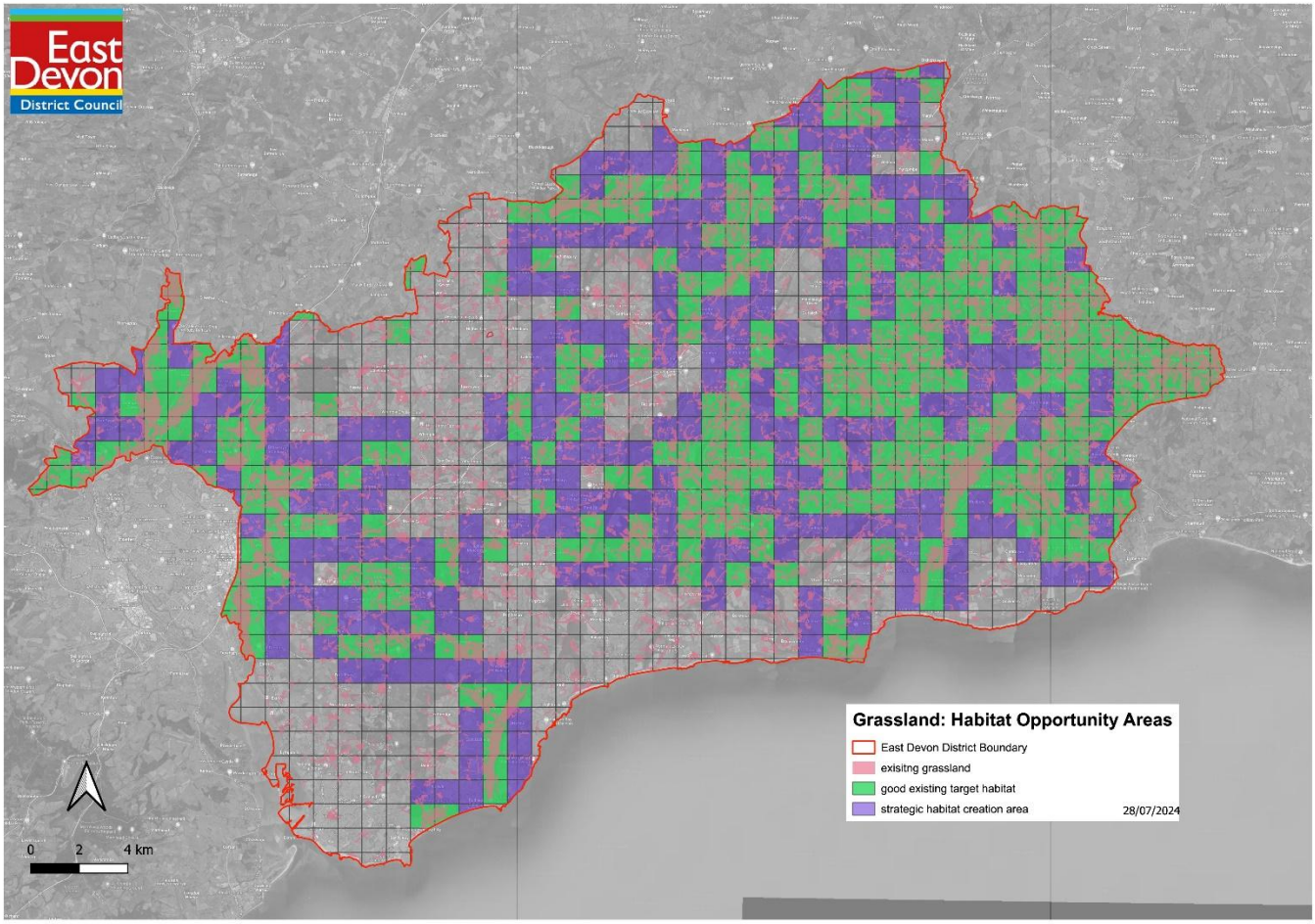


Figure C1. 1 km^2 Strategic Habitat Opportunity areas (purple) for grassland within the East Devon District.

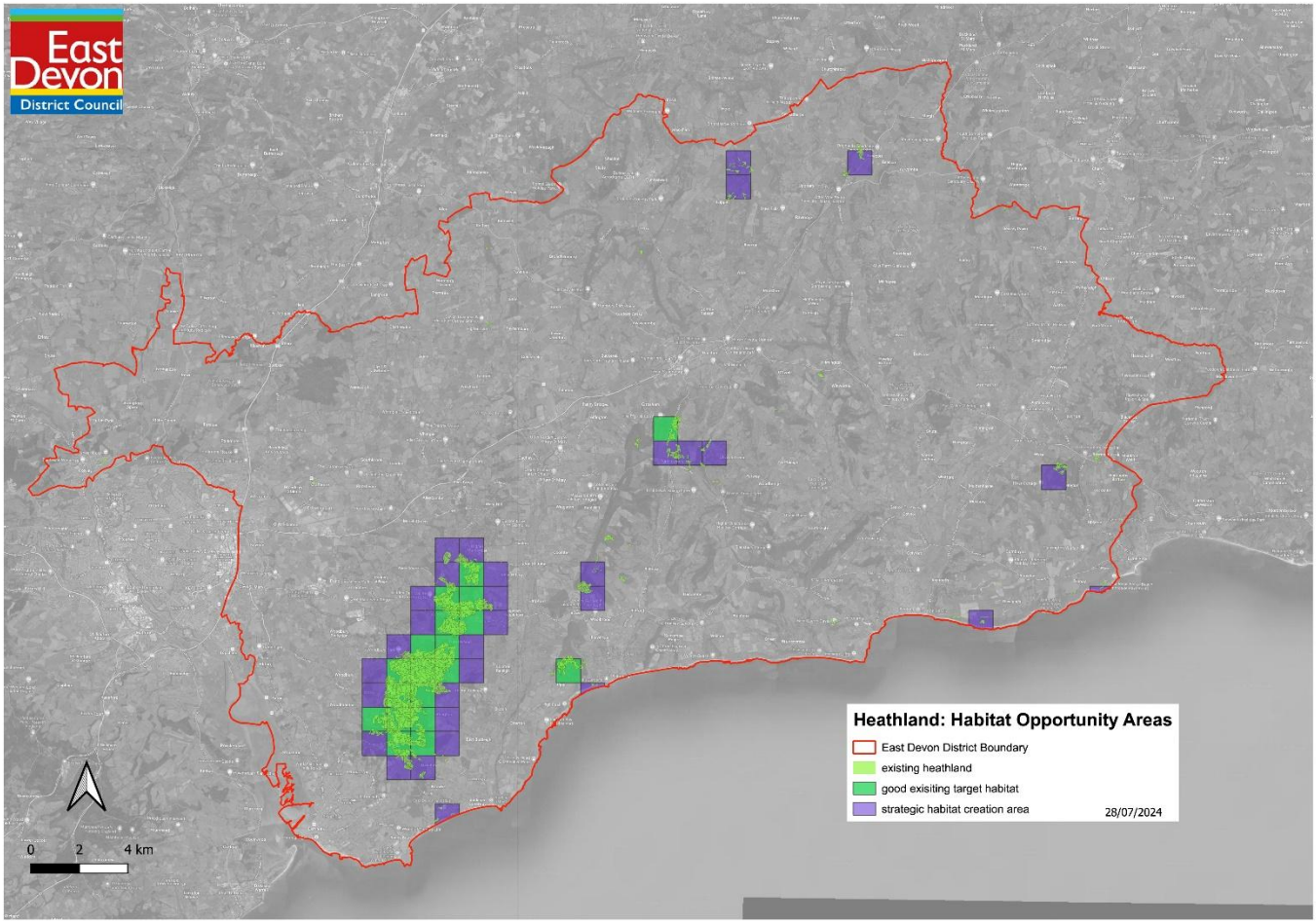


Figure C2. 1 km^2 Strategic Habitat Opportunity areas (purple) for heathland within the East Devon District.

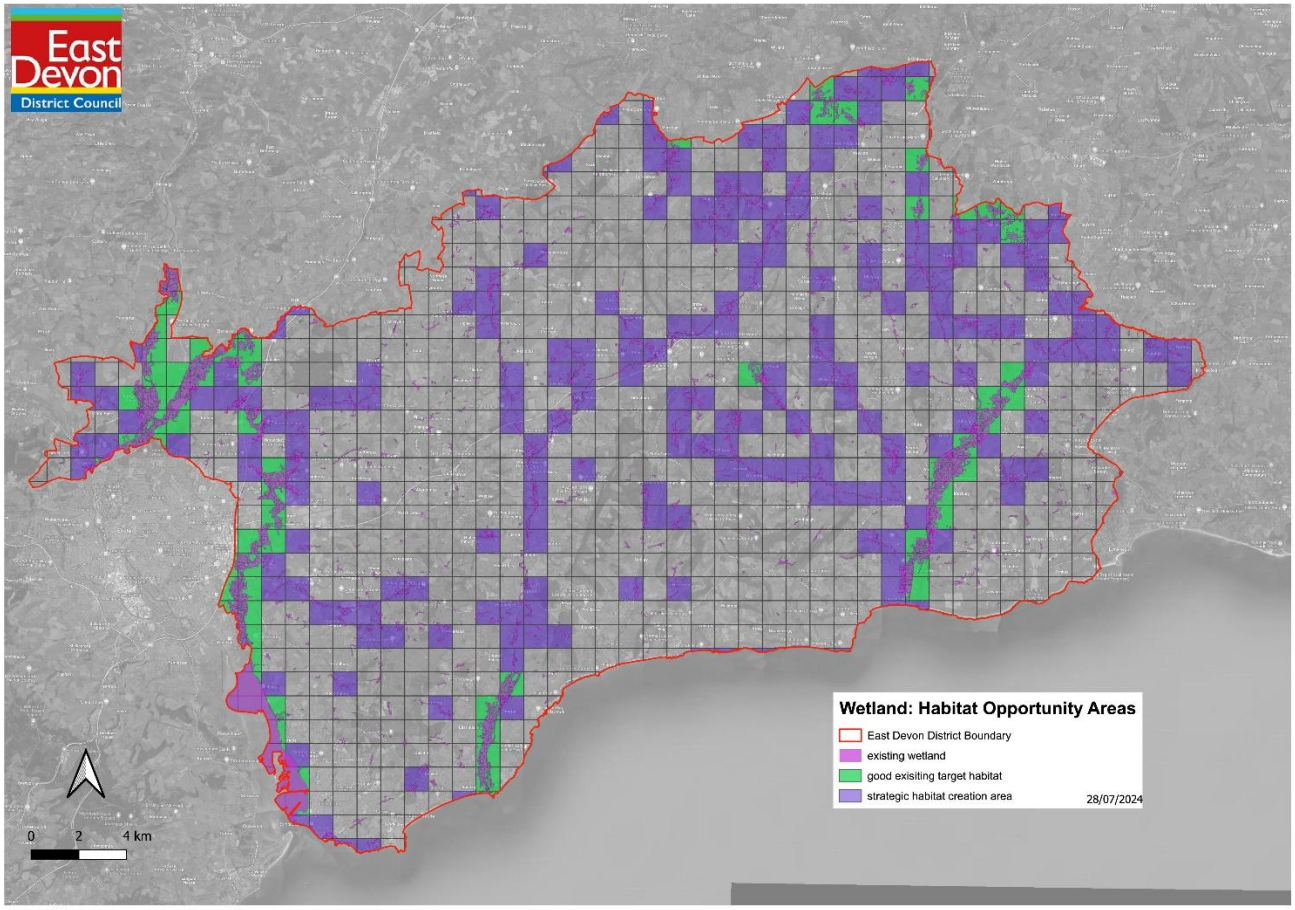


Figure C3. 1 km^2 Strategic Habitat Opportunity areas (purple) for wetland within the East Devon District.

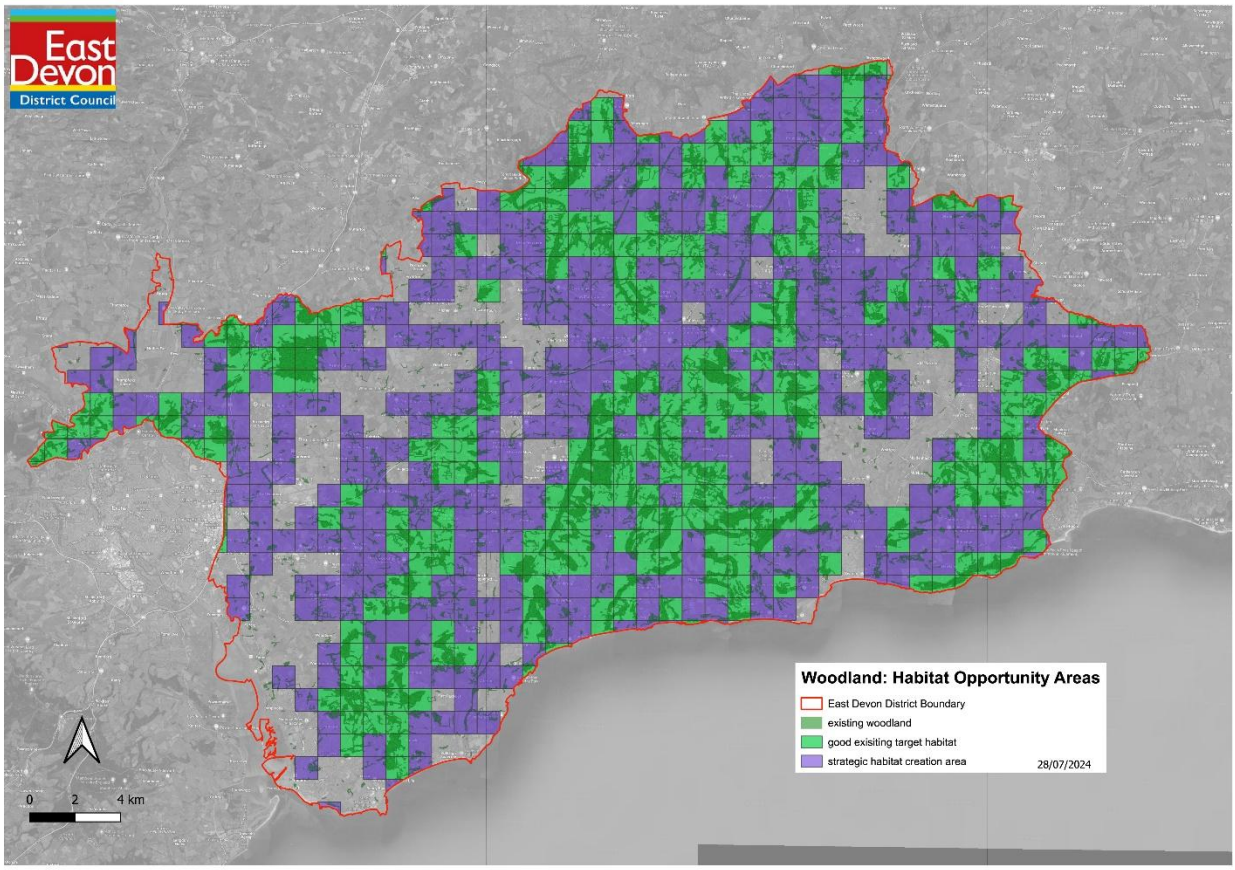


Figure C4. 1 km^2 Strategic Habitat Opportunity areas (purple) for woodland within the East Devon District.

Appendix D – Condatis software technical methodology

Condatis works by modelling a landscape of habitats as if it were an electrical circuit. A circuit board consists of a number of wires joining up resistors in combinations. When a voltage is applied to the board at one end, the current will pass through the board to the other end but the amount of current passing through each wire will vary according to the resistances it meets through each pathway. Condatis considers a landscape as analogous to a circuit board, with a source population of species being considered the voltage, the links between habitat useable by these species being the resistors, and the flow of species colonising the available habitat across those links being considered the current. Condatis is able to measure the flow of a hypothetical species across a landscape based on the availability of a distinct habitat category e.g. woodland or grassland.

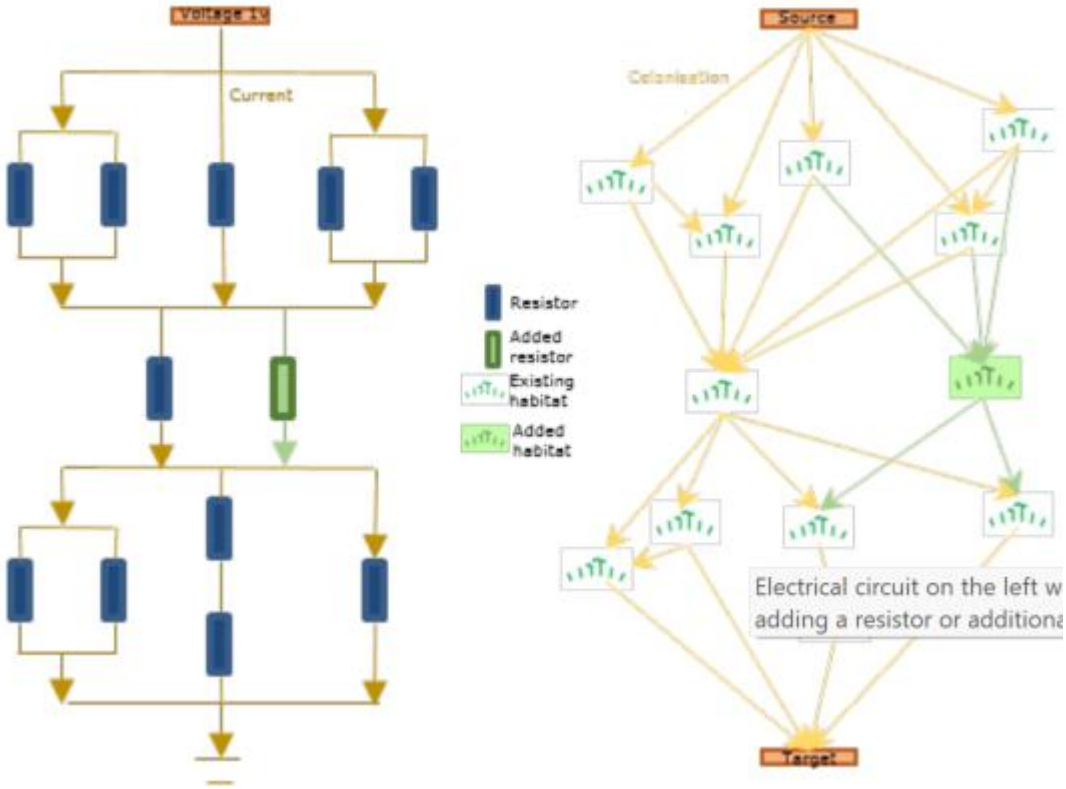


Figure D.1. Electrical circuit on the left and comparable stylised habitat map on the right. Green represents adding a resistor or additional habitat to each to increase the number of pathways available and therefore improve the flow. Image available at: http://wordpress.condatis.org.uk/

Habitat source and target locations are specified: the source either representing a nominal population of species or an actual population (in this case a nominal population was used), the target representing an area for eventual colonisation. The direction of travel is defined by the placement of source and target and will depend on the purpose of study. For instance, if looking at likely species movement due to climate change, a south to north or lowland to upland direction might be required. A South-north orientation was chosen for the source and target to reflect the likely species movement change in response to climate change. Condatis looks at how the habitat in between the source and target could contribute to the species progress over multiple generations, so it is not designed to look in detail at individual patch-to-patch movements.

By using Condatis to output the relative flow of a species through the landscape for a given habitat type it is possible to more accurately define where wildlife corridors exist and where they could be improved.

Appendix E. Habitat Connectivity Opportunity areas (HCO) technical details, principles and mechanisms for delivery.

The mapping takes into account existing local wildlife-rich habitats and existing ecological networks as well as local national and internationally designated nature conservation sites.

The aim of the HCO areas is not to replace large areas of farmed land or impede development; we must continue to rely on working with farmers and landowners to manage existing habitats and create areas of new habitat, as well as tie into the Local Plan and NPPF (2024) requirements of food production.

Developments whose primary objective is to conserve or enhance biodiversity particularly those which are aligned with the opportunity areas should be supported, and opportunities to incorporate biodiversity improvements in and around developments should be encouraged especially where this benefits overall biodiversity and habitat connectivity for example the creation of species rich grassland within the grassland opportunity area.

When delivering against the mapping, care should be taken to ensure that the best possible habitat for that area is being created; it may be tempting for example where an area is both within a connectivity zone for woodland and grassland to plant large tracts of woodlands as this is easiest and most cost effective when in fact this may in some cases may result in the loss of important habitats whereas species rich grassland enhancement would be both more beneficial and provides better outcomes for habitat connectivity.

The main aims are to ensure adequate habitats are large enough to resist harmful effects and are well-enough connected to ensure that species are able to move around and sustain populations. Harmful effects may be localised, e.g. flooding or be much more far-reaching for example climate change. The need for more, bigger, better and joined up habitats is explained in detail in Lawton et al. (2010).

Habitat creation and restoration should take into account landscape considerations, geology and the historic environment. Particular care will be required where intensive methods are required, such as topsoil stripping / deep ploughing, or where the effect, such as woodland planting is likely to be visible from settlements or rights of way.

Habitat creation or restoration may create opportunities too, for example screening unsightly features, creating geological exposures or helping conserve historic features.

Regular updates of the maps is required to reflect any changes in mapped habitats as a result of physical habitat changes on the ground.