Norfolk County Council

Local Nature Recovery Strategy Mapping: Technical Methodology

Glossary

ACB: Areas that could become of particular importance for biodiversity – those areas identified to be of strategic significance and present opportunities for nature recovery.

APIB: Areas of particular importance for biodiversity - the locations of the important and diverse habitats that make up the ecological network across the county.

Ancient woodland: Woodland that has existed continuously since 1600 or before in England and Wales.

Attenuation: The process of reducing the speed, volume, or impact of water flow, often through natural or engineered features to manage flooding.

Biodiversity Net Gain (BNG): An approach to development that leaves biodiversity in a better state than before. Developers and local Planning Authorities must deliver a BNG of 10%. The LNRS plays a role in BNG by determining the 'strategic significance' multiplier within the biodiversity metric. This mechanism means that there is an incentive for developers to align with the LNRS in their area when choosing the location of off-site BNG units.

Biodiversity Net Gain (BNG) Distinctiveness Score: A measure of how important or rare a habitat type is, based on its ecological and conservation value.

Buffer: A zone around a geographic feature, such as a point, line, or polygon, created to represent a specified distance for analysis, protection, or influence.

Dashboards: Configurable web applications that display maps, data, and location-based analytics on a single screen, enabling users to monitor events, make decisions, inform others, and see trends.

Environment Agency (EA): A UK government body responsible for protecting and improving the environment, including water, flood risk, and pollution control.

Flood mitigation: The strategies and measures implemented to reduce the ACB impact of flooding on communities and the environment. It includes techniques such as enhancing drainage systems, restoring natural floodplains and constructing levees and flood walls. This aims to prevent flood damage and improve resilience against flood events.

Floodplain: Low-lying land adjacent to a river or stream that is subject to periodic flooding.

Flow Accumulation Area: Cumulative area from which water would drain to a specific location along an overland flow pathway, assuming no infiltration occurs.

Greenspaces: Areas of vegetation in urban or rural settings, such as parks, gardens, or natural open spaces, that provide ecological, recreational, and aesthetic benefits.

Ground Truthing: The process of verifying remote sensing or GIS data by collecting observations directly on-site to ensure accuracy and reliability.

Habitat: The natural home or environment of an animal, plant, or other organism.

Habitat creation: The process of establishing new areas suitable for wildlife to live and thrive.

Habitat mosaic: Area where multiple habitat types occur together in a patchwork, creating diverse ecological conditions that support a range of species and ecological functions.

Habitat restoration: The process of repairing or reinstating degraded, damaged, or lost habitats to bring them back to a healthy, functioning ecological state.

Invasive non-native species: Plants or animals that have been introduced to an area where they do not naturally occur and cause harm to the environment.

Irreplaceable Habitat: Habitats of very high conservation value that cannot be recreated or restored if lost, such as ancient woodlands.

Landscape character: A distinct, recognisable and consistent pattern of elements in a landscape that makes one landscape different from another.

Landscape recovery schemes: Large scale projects to support long-term environmental changes.

Living England Map: A satellite-derived national habitat map produced by Natural England that shows the extent and distribution of broad habitats across England aligned to the UKBAP (UK Biodiversity Action Plan) classification.

Loam: A soil type composed of mostly sand, with some silt and clay.

Local authorities: Administrative bodies responsible for providing local government services and facilities within a specific area, such as counties, districts, or boroughs. They oversee various functions including planning, education, housing, transport and environmental management, playing a crucial role in implementing policies and initiatives that impact their communities.

Local Nature Recovery Strategies (LNRS): Plans developed by local authorities in England to map and improve nature in their areas.

Local Wildlife Sites: Non-statutory sites identified for their local biodiversity importance, supporting priority species or habitats.

National Character Areas (NCAs): England has 159 National Character Areas, each representing an area of distinct and recognisable character at the national scale. Their

boundaries follow natural lines in the landscape, not county or district boundaries.

Natural flood management (NFM): The use of natural processes to reduce the risk of flooding and coastal erosion.

National Forest Inventory (NFI): An ongoing programme from Forest Research monitoring woodland and trees within Great Britain.

Nature recovery: The process of helping nature and wildlife return to areas where they have declined.

National site network: A network of protected sites across the UK that are important for conserving various species and habitats. This aims to ensure the conservation of habitats and species that are of European significance, contributing to the overall conservation objective of the UK.

Nature-based solutions (NbS): Actions to protect, manage, and restore ecosystems that address societal challenges.

Open Mosaic Habitat (OMH): A mix of bare ground, pioneer communities and more established grassland and scrub.

Ordnance Survey (OS): The national mapping agency for Great Britain, providing detailed geographic data, maps, and spatial products, including **OS MasterMap,** a high-precision, large-scale digital mapping dataset used for detailed analysis and planning.

Overland Flow Pathway: The route taken by surface water as it flows over land, typically during rainfall events, contributing to drainage, runoff, and potential flooding.

Peat: A soil type rich in organic matter formed typically waterlogged and carbon-rich.

Potential measures: The practical actions which, if taken, would contribute towards delivering nature-recovery priorities..

Priorities: The outcomes which the strategy aims to achieve to benefit biodiversity.

Priority Habitats: Habitats identified as being the most threatened and requiring conservation action.

Riparian: Area between land and a river or stream, often supporting distinctive vegetation and wildlife.

Rural Payments Agency: A UK government agency that administers agricultural and environmental payments to farmers and land managers.

Sandy: A soil type dominated by sand particles, characterized by good drainage and low nutrient retention.

SHINE (Selected Heritage Inventory for Natural England): A national dataset of non-designated historic and archaeological features across England.

Shoreline Management Plans: Strategic documents that outline how to manage coastal areas to reduce risks from flooding and erosion.

Sites of Special Scientific Interest (SSSI): SSSIs are protected areas which contain specific features - either biological or geological - of particular interest to science. These features of interest can range from specific species all the way to whole landscapes of national importance. Natural England are the responsible authority for designating and

monitoring SSSIs, which are protected under the Wildlife and Countryside Act 1981.

Special Areas of Conservation (SAC): SACs are protected areas of habitats and species listed within international conventions to which the UK Government is a signatory. They provide protection for types of species and habitat most in need of conservation at an international scale.

StoryMaps: A web-based application that allows users to create interactive narratives by combining maps, multimedia content, and text to communicate stories in a visually engaging way.

Successional or transition zones: The areas that serve as a boundary between two different regions or ecosystems, where characteristics of each intermingle as the process of species within a community change over time.

The Department for Environment, Food and Rural Affairs (Defra): The UK Government department responsible for environmental protection, food production and standards, agriculture, fisheries and rural communities.

UK Habitat Classification (UKHabs): A standardized system for classifying and describing habitats across the UK.

Urban and Built-up Areas: Areas dominated by buildings, roads, and other manmade infrastructure. Includes villages, towns, cities and industrial areas.

Waterbodies: A significant accumulation of water on the surface of the planet e.g. oceans, lakes and ponds.

Water Resources East (WRE): A regional partnership in eastern England that plans and coordinates sustainable water management across multiple sectors and catchments.

Working With Nature Process (WWNP): A project that maps areas and interventions where natural processes are used to deliver environmental benefits, supporting nature-based solutions.

Introduction

This report provides further details of the technical methodology used to create the Local Habitat Map data layers for the Norfolk and Suffolk Local Nature Recovery Strategies (LNRSs). It is aimed at those with some familiarity of spatial analysis, or those with an interest in the technical processes used to create the LNRS mapping. For a broader, less technical overview of this information, please refer to Appendix 4 in the Norfolk and Suffolk LNRS strategy documents.

The steps to be followed in preparing an LNRS are set out in the statutory guidance from The Department for Environment, Food and Rural Affairs (Defra), and includes three main mapping requirements, the combination of which make up the 'Local Habitat Map' (see **Figure 1**). Step 2 of the process, to review where action for nature recovery has taken place, will apply to the second iteration of the strategy onwards. However, steps 1 and 5 are the key spatial outputs for this iteration.

This report provides the methods used to create the two statutory data layers for the Local Habitat Map: **the 'Areas of Particular Importance to Biodiversity'** layer **(APIB)**, and the **'Areas that Could Become of Particular Importance to Biodiversity'** data layer **(ACB)**. As well as the two main mapping outputs, other intermediary layers were created to support the development of the LNRS mapping, and so the methodology for these is also presented here.

The process for creating the LNRS Local Habitat Map was as follows:

- Compiling APIB sites based on Defra definitions (1st statutory output for the LNRS mapping).
- Development of a habitat baseline to estimate the current extents and classes of habitats across the strategy areas.
- Identification of strategic areas based on stakeholder input and focus on the Lawton principles, originally outlined in the 2010 'Making Space for Nature' report (see the section 'Strategic Areas' below for more information).
- Assessment of suitable nature recovery measures to map within strategic areas, with the areas identified making up the ACB (2nd statutory output for the LNRS mapping).
- ACB map revisions following review by stakeholders and feedback from public consultation.
- Development of outputs to allow for dissemination of the data, including a mapping 'toolkit' and map images and statistics for use within the strategy document.

Defra's process for the development and revision of LNRSs is as follows (also see Figure 1):

- Step 1: Map areas that are of particular importance for biodiversity including national conservation sites, local nature reserves, local wildlife sites and irreplaceable habitats

- Step 2: Map areas where action for nature recovery has been taken when LNRSs are reviewed and republished
- Step 3: Describe the strategy area and its biodiversity and opportunities for recovery
- Step 4: Agree LNRS priorities and identify potential measures
    - This creates the statement of biodiversity priorities
- Step 5: Map areas that could become of particular importance
    - This creates the local habitat map
    - The statement of biodiversity priorities and local habitat map make up the LNRS.

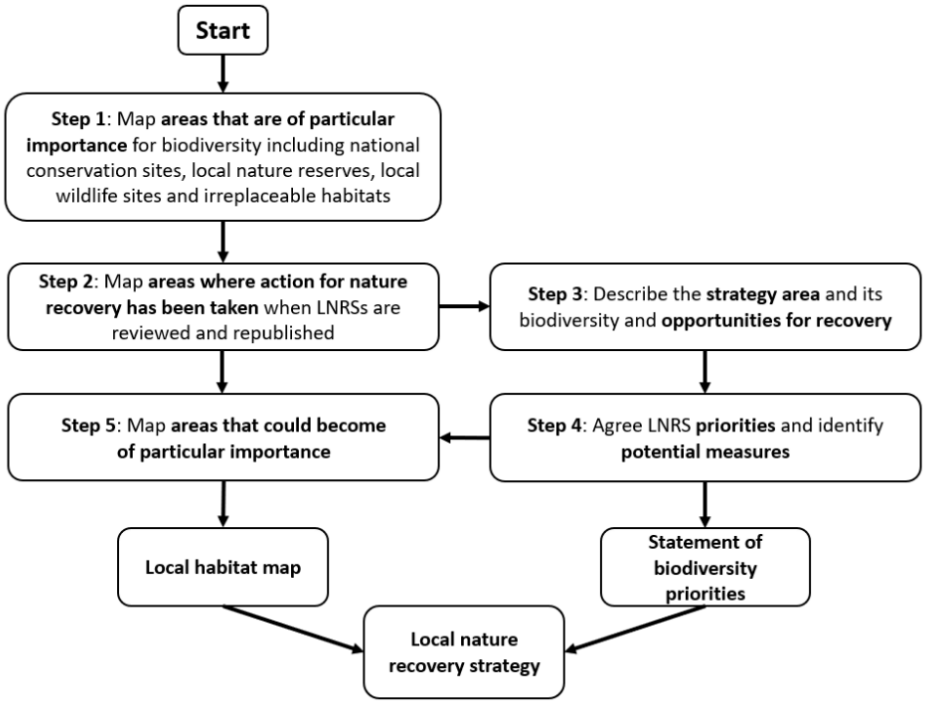

Figure 1. Order of steps to be followed in preparing contents of a local nature recovery strategy, taken from Defra's LNRS Statutory Guidance, 2023.

Local Habitat Map Caveats

Potential Sources of Error

The LNRS mapping is based on geospatial analysis of existing datasets, and it has not been possible to ground-truth any of the outputs within the development of the LNRS. Therefore, whilst every effort has been made to ensure the accuracy of the mapping, there is potential for errors to be present in the outputs.

Limitations of Methodology

The methods used to create the Local Habitat Map were guided by input from expert stakeholders from a variety of fields, however there are further factors that may influence the suitability of the proposed measures that the methodology has not been able to account for. It is therefore recommended that further site-specific assessment of any proposed measures is conducted before any of the actions detailed in the LNRS are carried out.

One of the requirements for the LNRS mapping is to provide measures mapped to a consistent set of land parcel boundaries, and therefore the majority of measures within the Local Habitat Map have been assigned to OS MasterMap geometry. In some cases, it is recognised that a mapped measure may not be suitable across the whole extent of an individual land parcel.

Limitations of Species Mapping

The habitat measures which have been assigned a relevant species code are indicative only, and in most cases are limited to identifying locations where there is already a species presence, rather than identifying new areas for expanding and connecting species ranges. The measures assigned a species code do not represent a comprehensive map of every location where a species may be present or may benefit from nature recovery actions, and should not be used in place of more detailed suitability modelling. The species data used to identify existing populations is likely to contain some outdated records, and in some areas records may be absent due to a lack of recorder effort, rather than confirmed species absence. For locations where each species is present, the most relevant existing habitat measures have been identified in the LNRS mapping to provide contextual information to link habitat measures to the key and flagship species within the LNRS. However, the species information within the LNRS mapping does not represent a model of suitability for any particular species, and it is advised that further habitat suitability modelling is carried out for all actions looking to target particular species, as a range of other site-specific factors will impact the suitability of particular measures.

The species data used has a 1km resolution, meaning the measures identified are accurate to a maximum of 1km. Some areas identified may therefore not accurately represent actual species locations. Additionally, in some cases the likely dispersal distance from a species will be greater than 1km, meaning measures outside of the mapped areas may also be applicable. For some

species, translocation to new suitable sites may also be preferable, and information on this can be found within the LNRS strategy document. It has not been possible to map new suitable areas for translocation within the LNRS, and so these measures remain unmapped.

Limitations of Input Datasets

The inputs into the Local Habitat Map include a variety of national and local datasets (a full list of which is available at the end of this document). Whilst the most recently updated versions of these datasets have been used wherever possible, in some cases the best available data may be outdated, low resolution, or otherwise inaccurate.

Natural England Deep Peat Mapping

While the *England Peat Map (NERR149)* presents the most accurate picture of England peat resources to date, it is acknowledged in the report that there remain uncertainties and limitations in the models. Some areas of peat will have been missed, and there will be places where the map predicts peat where it may not actually occur. In addition, predictions for extent and depth are weaker in lowland areas due to limited survey data availability and there is an aim to address this in future updates.

As a predictive model, the England Peat Map should not be used as a stand-alone justification for action at a given site. This does not mean that the outputs should be disregarded for specific sites, or in lowland environments, but instead viewed as indicative at this scale (as should the corresponding LNRS mapped measures). Site surveys are therefore recommended at the project-level where there are uncertainties about the status of the peaty soils and where peat is thought to be a consideration. This will be especially important in the Broads where the situation is complex, with buried peat often layered under other soil types. See the *TIN226 England Peat Map User Guide* for further information.

Natural England Priority Habitats Inventory (PHI)

This dataset has been used as the main source of information on the presence of priority habitats as it offers complete coverage of the strategy area. Errors from the Priority Habitats Inventory consist of misclassification of habitats or incorrect mapping of habitat extent boundaries. Other datasets have been used to supplement the PHI and improve accuracy of baseline habitat classification where possible within the LNRS mapping, which is discussed in more detail in the section ‘Habitat Basemap: Existing Habitat Classification’ below. Whilst the habitat basemap classification aims to provide a consistent baseline of habitat types across the Norfolk and Suffolk, it is recommended that on-the-ground surveys are undertaken where relevant to provide a more detailed assessment of individual sites.

Conflicting Land-uses

The LNRS does not impose any restrictions on current or future land-uses. It is ultimately at the discretion of individual landowners whether a mapped potential measure is considered feasible or desirable. A decision has been made to retain potential measures which may conflict with existing or planned land-uses, as the measures provide opportunities that could be adapted or applied should the land-use be altered in future. Where possible, measures on areas with conflicting land-uses have been caveated within the output datasets. Examples of this include:

- Greenspaces such as allotments, sports fields and cemeteries: Measures which require permanent change (e.g. woodland creation) have been excluded from these sites, however other measures such as grassland restoration are mapped. Measures may be suitable for parts of these sites (for example creation of margins) even if existing land-uses are retained.
- Local Plan sites allocated for development: Measures have been mapped to these sites as they may provide opportunities to enhance green infrastructure and provide wider environmental benefits. It is acknowledged that potential measures in these sites should be carefully considered alongside existing plans, and so these have been highlighted with caveats in the data.

Impacts on Historic Sites

Any planned nature-recovery actions should take account of historic features in order to mitigate against potential negative impacts. Within the Local Habitat Map, sites such as registered parks and gardens and scheduled monuments have had caveats applied. Deciduous woodland measures have not been applied to these areas as these were deemed to have the greatest potential to negatively impact historic features. There are many other historic sites as detailed in the SHINE inventory which may be impacted by proposed measures, but which it was not possible to map. For this reason, it is recommended that the relevant Historic Environment Record Centre is contacted for further advice.

Landscape Character

Before carrying out any of the actions proposed in the LNRS, land managers should consider whether the proposals align with the landscape character of the area. The LNRS considers landscape character at a broad level, making use of the Natural England National Character Areas dataset to constrain measures that do not align with the priorities in certain key landscapes such as the Brecks and the Broads. However, a more detailed assessment using localised landscape typology assessments is highly recommended.

Mapping Areas of Particular Importance for Biodiversity (APIB)

The APIB map indicates areas that are currently recognised as important for biodiversity through various local, national and international designations. Some APIB sites were deemed out of scope for mapping measures within the LNRS due to the designations having detailed management plans already in place. Locally designated sites and irreplaceable habitats however were included as in-scope locations for LNRS mapping.

The definition and components included in the 'Areas of Particular Importance for Biodiversity' map is based on statutory requirements set out by Defra for the LNRS. The purpose of these guidelines is to ensure that the APIB mapping is consistent across all LNRS areas, and so additional sites and other priority habitat areas could not be included in this element of the mapping. The types of sites and designations within the APIB map are described in Table below.

The definition of irreplaceable habitat is based on National Planning Policy Framework guidance adapted for use in Biodiversity Net Gain assessments. Direct translations were made between habitat classifications in the Priority Habitat / Ancient Woodland Inventories and those described in the Irreplaceable Habitat guidance, except for the two listed saltmarsh habitats. Spartina saltmarsh swards and Mediterranean saltmarsh scrub were translated to associated upper and mid saltmarsh zone habitats based on JNCC definitions, and mapped using Environment Agency Saltmarsh Extents and Zonation data.

At time of publication, additional data with updates to the County Wildlife Site and Ancient Woodland Inventories was available and incorporated for Suffolk, however the corresponding data updates for Norfolk were unavailable for this iteration of the strategy.

Table 1. Areas of Particular Importance For Biodiversity (APIB) components by designation type.

Designation Type	Name
International	Special Protection Areas
International	Special Areas of Conservation
International	Ramsar Sites
National	Sites of Special Scientific Interest
National	Marine Conservation Zones*
National	National Nature Reserves

Designation Type	Name
Local	Local Nature Reserves
Local	County Wildlife Sites
Irreplaceable Habitat	Ancient Woodland
Irreplaceable Habitat	Coastal Sand-dunes
Irreplaceable Habitat	Lowland Fen
Irreplaceable Habitat	Spartina saltmarsh swards and Mediterranean saltmarsh scrub
Irreplaceable Habitat	Veteran and Ancient Trees

*Marine Conservation Zones fall outside of the strategy area but are included for reference.

Habitat Basemap: Existing Habitat Classification

The habitat basemap layer represents the best estimate of current habitat extents across the strategy area based on nationally and locally available data sources. Classification of existing habitat areas formed a vital underpinning step of the LNRS mapping, by revealing where habitats may be fragmented or best suited to nature recovery.

Due to the large two-county wide scale of the LNRS, it was not feasible to dedicate resources towards additional surveying of habitats across Norfolk and Suffolk. Therefore, to ensure a consistent approach to producing a baseline habitat map for the two counties, national datasets combining the best available remote-sensing and survey information were compiled. A review of available data was conducted in order to assess the accuracy of each input. This revealed large variations in the way habitats were classified within different datasets, and so the habitat basemap was created using a ‘top-trumps’ approach to ensure the most accurate data was used wherever possible.

A full list of input datasets used to create the habitat basemap can be found at the end of this document. The datasets were overlaid in a ‘top-trumps’ approach, to ensure that the most accurate data for each habitat type was used to replace less accurate datasets. For instance, OS MasterMap data is refreshed continuously, and so offers the most accurate representation of urban and built-up areas, as well as recent developments. OS MasterMap was therefore used to obtain the extents of buildings and other

manmade surfaces. Where datasets were coarser or less precise (e.g. Living England Habitat Map), the habitat classification was transferred onto OS MasterMap geometry where there was a significant overlap (>85%)

Table 2. Order of precedence used to compare landcover datasets to assign habitat basemap classification to land parcels. The component with the highest precedence for each location is used to assign habitat class.

Order of Precedence	Component	Description	Reason
1	**Urban and Built-up Areas**	OS MasterMap ‘manmade’ and ‘multiple’ ‘make’ components.	Built structures are clearly defined, permanent features. OS MasterMap is the most accurate and up-to-date source for these features. The OS ‘Multiple’ component represents the most accurate available data on private residential garden boundaries.
2	**Priority Habitat**	NE Priority Habitat Inventory Data	National dataset for Priority Habitats, updated every six months with full coverage of the strategy area (data is outdated or has inaccurate geometry in some areas, and so OS MasterMap manmade and multiple features take precedence to ensure accurate mapping of built environment).
3	**Woodland**	Mapped using National Forest Inventory (NFI) 2023 data for woodland areas, combined with some deciduous woodland data from Priority Habitat Inventory (where source is not National Forest Inventory)	Industry standard used by forestry professionals with standardized methodology. Covers all woodland over 0.5 hectare with 20% canopy cover, including new planting and clearfell areas. Most current (2023) comprehensive woodland mapping.

Order of Precedence	Component	Description	Reason
4	**Natural and Semi-natural Habitat**	Uses the habitat ‘Descriptive Terms’ from OS MasterMap (e.g. Inland Water, Marsh, Scrub, Rough Grassland, Heath) for classification	Uses consistent national standards and integrates with other OS products for boundary alignment. Habitat classes tend to be generalised, and so more detailed habitat data takes precedence where available.
5	**Agricultural**	Combines Rural Payment Agency (RPA) data with agricultural classifications from Crop Map of England.	RPA data represents official records based on farmer declarations. This dataset provides an accurate distinction between cropland and grassland specifically.
6	**Unclassified**	Catches remaining unclassified areas using OS Greenspace and Living England data. Also applies context-based rules (e.g., narrow strips near roads become "road verges", small areas in urban zones become "built up areas and gardens")	Uses OS Greenspace (incorporating local authority data) and contextual intelligence (e.g. built up areas and road verges). Living England Habitat mapping data has been used where no other data sources are available.

UKHabs Classification

UKHabs offers an industry standard habitat classification scheme, and so all parcels within the habitat basemap were translated to UKHabs classification codes. For some habitat types, including the majority of priority habitats, a direct link between priority habitat code and UKHabs classification could be made. For other areas such as those classified using OS data, the nearest UKHabs classification was used based on available habitat descriptions and documentation, as well as input from ecological experts within NCC. Where a classification had a high level of uncertainty, a cautious approach was used, and the UKHabs code broadened to a level with greater certainty to avoid misclassification (e.g. woodlands which could not accurately be determined to be deciduous were coded as ‘w: woodland and forest’ rather than the more precise ‘w1: Broadleaved mixed and yew woodland).

After public consultation, the habitat basemap was reviewed to ensure accuracy wherever possible, and to incorporate additional land-use information through UKHabs secondary codes. This allowed for identification of greenspaces such as allotments and parks.

Strategic Areas

The strategic areas data layer shows the broad ‘in-scope’ areas for the LNRS mapping to be focussed on. These areas were identified through a variety of stakeholder engagement and literature reviews.

To create the strategic areas, a variety of strategic habitat and biodiversity-related spatial layers were merged and dissolved to remove internal boundaries, then had the additional ‘out-of-scope' APIB sites removed.

The strategic areas were then overlaid onto the habitat basemap, and all suitable land parcels with at least 33% of their area within the strategic area extracted.

Table 3. Summary of components that make up the strategic areas data layer. *250m buffer is expanded to 500m where doing so would create additional connections between areas. **Most priority habitats are buffered in the Natural England Habitat Expansion Zone 1 dataset.

Strategic Area	Buffer	Justification
APIB	250m*	Aligns with the Lawton Principles of ‘expand’ and ‘join’
RNR	250m*	Aligns with the Lawton Principles of ‘expand’ and ‘join’
Main Rivers	50m	A 50m buffer represents the estimated riparian zone, and aligns with watercourse buffer sizes recommended by the Forestry Commission (2024) and Defra WWNP (2025).
Deep Peat Soils	No buffer	An important focus for carbon sequestration
Churchyards	250m*	Areas that often have semi-natural habitat within otherwise arable landscapes, providing ‘stepping stones’ for connectivity.
Priority Habitat Inventory	No buffer**	To allow for restoration of existing priority habitats
Chalk Rivers	50m	See ‘Main Rivers’.

Strategic Area	Buffer	Justification
Natural England Habitat Network Expansion Zone 1	No buffer	Aligns with the Lawton principles of ‘expand’ and ‘join’ for priority habitats that are currently undesignated.

Incorporating the Lawton Principles

Through initial stakeholder discussions and the Mapping themed working group, it was clear that the LNRS mapping should be underpinned by the Lawton Principles of ‘bigger, better, more, and more joined’ which originate from the ‘Making Space For Nature’ report (2010) . These principles were translated into the mapping as follows:

- **Bigger**: 250m buffers around APIB were included so as to show where existing important sites for nature could be expanded. Priority habitat outside of these designated areas was also buffered in the same way using the Natural England Habitat Networks Zone 1 dataset.
- **Better**: In-scope APIB (irreplaceable habitat, CWS and LNRs) were included in the strategic areas alongside other undesignated priority habitats, to allow restoration measures to be applied to these areas.
- **More**: The strategic areas cover large areas that are currently low-value habitats for nature such as cropland and modified grassland. These habitat types were the focus for many of the measures applied in order to show where new habitat could be created.
- **More joined**: The 250m buffer around all APIB was expanded to 500m in locations where doing so would create additional connections between fragments of habitat. This same methodology is also present in the Habitat Networks Zone 1 dataset. Additionally, buffers around rivers were included as these offer important connectivity opportunities.

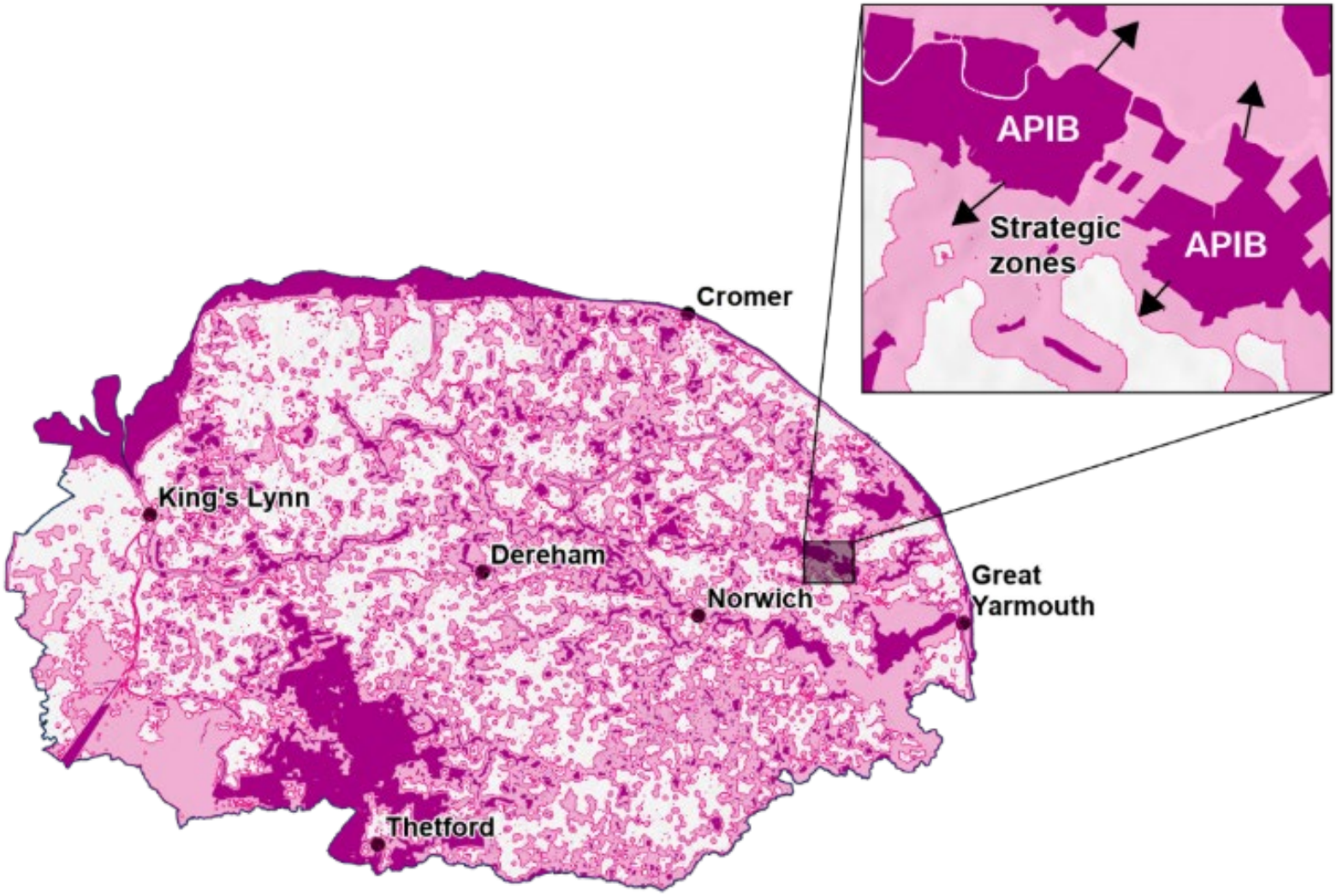

Figure 2. Map showing Areas of Particular Importance for Biodiversity (APIB, dark pink), and strategic areas (light pink). The detail map shows the approach used of buffering APIB sites.

Areas that Could Become of Particular Importance to Biodiversity (ACB): Mapping Nature Recovery Measures

Two types of measures were mapped in the Local Habitat Map:

- Habitat restoration measures
- Habitat creation (including expansion and connection) measures

Additional information was also then applied to the habitat measures to link these to other measures and benefits identified in the strategy document:

- Indicative species information, relating to key and flagship species measures within the strategy document
- Nature-based Services information, relating to measures with associated wider environmental benefits.

Existing Habitat Restoration Measures

These measures were applied to existing areas of the habitat types identified as a priority for the LNRS. Habitat classification was based on the previously assembled habitat basemap. This dataset was queried based on the criteria below (Table 4), and measures applied to relevant land parcels.

Table 4. Measures to restore existing habitats were applied to relevant land parcels from the habitat basemap, as shown by the criteria below.

Measure ID	Habitat	Criteria to determine land parcels to apply to
PM02	Woodland	• Woodland identified as Broadleaved or Mixed from NFI source • Woodland identified as Conifer from NFI source
PM04	Wet Woodland	Features described as ‘Wet woodland’ in PHI
PM06	Wood pasture and Parkland	Wood pasture and parkland from NE Wood Pasture and Parkland source

Measure ID	Habitat	Criteria to determine land parcels to apply to
PM08	Scrub	All parcels identified as ‘Scrub’ from any habitat basemap inputs apart from NE Living England map
PM14	Traditional Orchards	Main or additional habitat classification of ‘Traditional Orchards’ in PHI
PM16	Heathland	Main habitat classification of ‘Lowland Heath’ in PHI
PM18	Acid grassland	Main habitat classification of ‘Lowland Dry Acid Grassland’ in PHI
PM20	Other Neutral grassland	Other Neutral grassland (including greenspace as identified by OS Greenspace layer, Roadside Nature Reserves, and ‘Good quality semi-natural grassland in PHI)
PM22	Chalk grassland	Main habitat classification of ‘Lowland Calcareous Grassland’ from PHI
PM24	Lowland Meadows	Main habitat classification of ‘Lowland Meadows’ from PHI
PM26	Wet grassland and pastures	• Main habitat classification of ‘Purple moor grass and rush-pasture’ from PHI • Main habitat classification of ‘Coastal and floodplain grazing marsh’ from PHI
PM28	Open Mosaic	Open Mosaic dataset from NE
PM29	Rivers and streams	• DescTerm as ‘Watercourse’ or ‘Tidal Water’ on OS MasterMap • Refined to pull out polygons that are within NE Chalk Rivers polyline dataset as specific ‘chalk rivers’ measure
PM32	Still Water	‘Static Inland Water’ on OS MasterMap
PM34	Fen	Main habitat classification of ‘Lowland Fen’ from PHI

Measure ID	Habitat	Criteria to determine land parcels to apply to
PM36	Reedbeds	Main habitat classification of ‘Reedbeds’ from PHI
PM38*	Saltmarsh	Main habitat classification of ‘Coastal Saltmarsh’ from PHI
PM40*	Mudflats	Main habitat classification of ‘Mudflats’ from PHI
PM42	Coastal Sand Dune	Main habitat classification of ‘Sand Dunes’ from PHI
PM44	Coastal Vegetated Shingle	Main habitat classification of ‘Coastal Vegetated Shingle’ from PHI
PM46*	Saline Lagoons	Main habitat classification of ‘Saline Lagoons’ from PHI
PM48	Maritime cliffs and slopes	Main habitat classification of ‘Maritime cliffs and slopes’ from PHI
PM50	Veteran Trees	Applied a 30m buffer areas around veteran trees point data supplied by NCC, SCC and the Woodland Trust

*Mudflats, saltmarsh and saline lagoons are entirely contained within APIB areas within Norfolk and Suffolk, however under advice from Natural England these intertidal habitats were mapped even within APIB which would deem other habitats ‘out-of-scope' for the LNRS.

Habitat Creation Measures

These measures were mapped to areas deemed potentially suitable for creating new habitats. In most cases these measures were focused on cropland and non-priority grassland parcels, with conversion of existing priority habitats to other types being avoided where possible. An exception to this is the inclusion of pond creation measures within parcels of other existing priority habitats, and the mapping of saltmarsh creation opportunities to wet grassland which may anyway be lost to coastal retreat in the future.

The suitability analysis to determine opportunities for habitat creation was structured as a two-step assessment.

The first step involved ideal suitability mapping, to identify areas with optimum conditions which could support each habitat type. Optimum conditions were defined based on preferred soil characteristics such as appropriate pH range, drainage properties, nutrient levels, and soil texture, as well as proximity to existing habitat patches within suitable dispersal distances that facilitate

natural colonisation. It's important to recognize that proximity to existing habitat may not always coincide with ideal soil conditions, as established populations might persist in suboptimal locations due to historical factors or landscape constraints.

The second step applied constraints to refine the suitable areas further, by filtering out locations where other factors would make establishment of new habitats unfeasible or undesirable. Examples of constraints considered for some habitats include unsuitable soil characteristics (presence of peat, pH), proximity to the floodplain and likelihood of flooding, landscape character type, and unsuitable land-uses.

In some cases, external datasets which can offer a more detailed assessment of habitat suitability were used. For example, the MMO Saltmarsh Potential layer was used to define suitable areas for saltmarsh creation, as this dataset makes use of detailed modelling that was unfeasible to carry out as part of the LNRS development.

A summary of suitability criteria and constraints applied to identify areas suitable for creation of different habitats is displayed below (Table 5).

Table 5. Summary of suitability criteria and exclusion criteria used to identify locations to map habitat expansion measures.

Measure ID	Habitat	Suitable	Constraints
PM01	Deciduous Woodland	• 250m buffer around Ancient Woodland. • Applied to cropland and non-priority grassland	• Exclude deep peat soils • Exclude the Brecks NCA • Exclude the Broads National Park area • Exclude greenspace land-uses defined by OS Open greenspace data, scheduled monuments and registered parks. • Exclude 3km coastal predator shadow buffer around mouth of Great Ouse.

Measure ID	Habitat	Suitable	Constraints
PM03	Wet Woodland	• 25m buffer around deciduous woodland that are within naturally wet soils. • Applied to cropland, non-priority grassland and conifer woodland parcels.	• Exclude Brecks NCA • Exclude the Broads National Park area • Exclude greenspace land-uses defined by OS Open greenspace data, scheduled monuments and registered parks. • Exclude outside EA Flood Zone 2/3 • Exclude outside naturally wet soils • Exclude peat soils • Exclude 3km coastal predator shadow buffer around mouth of Great Ouse.
PM05	Wood pasture and Parkland	• 250m buffer around existing habitat • Applied to cropland and non-priority grassland	• Exclude greenspace land-uses defined by OS Open greenspace data
PM07	Scrub	• 25m buffer around existing scrub • 25m buffer around deciduous woodland within APIB • Applied to cropland, non-priority grassland and low-density woodland.	• Exclude greenspace land-uses defined by OS Open greenspace data, scheduled monuments and registered parks.

Measure ID	Habitat	Suitable	Constraints
PM13	Traditional Orchards	• 25m buffer of existing habitat. • Applied to cropland and non-priority grassland	Exclude greenspace land-uses defined by OS Open greenspace data, scheduled monuments and registered parks.
PM15	Lowland Heathland	• 250m buffer around existing habitat. • low fertile soils on 'freely draining', 'sandy' substrate (dry heath) or 'seasonally wet', 'peaty' substrate (wet heath)[3] • Applied to cropland, non-priority grassland and non-priority heathland and scrub	Exclude EA Flood Zone 3
PM17	Acid grassland	• 250m buffer around existing habitat. • 250m buffer around APIB (containing grassland and woodland) within: 'freely draining', low fertile soils overlaying 'sandy' substrate[4] • Applied to cropland and non-priority grassland habitat	Exclude EA Flood Zone 3
PM19	Other Neutral Grassland	250m buffer around APIB (containing grassland and woodland) within neutral, base rich soils[5]	Not applicable

Measure ID	Habitat	Suitable	Constraints
PM21	Chalk grassland	• 250m buffer around existing habitat. • 250m buffer around APIB within: 'freely draining' and 'lime rich' soils on chalk bedrock[6] • Applied to cropland and non-priority grassland habitat	Exclude EA Flood Zone 3
PM23	Lowland Meadows and pastures	• 250m buffer around existing habitat. • Applied to cropland and non-priority grassland habitat	• Exclude greenspace land-uses defined by OS Open greenspace data – not suitable for pastures. • Exclude EA Flood Zone 3
PM25	Wet grassland and pastures	• 250m buffer around existing habitat. • The Broads Authority boundary • 250m buffer around APIB within 'naturally wet soils' • Applied to cropland, non-priority grassland and non-priority wetland habitat	• Exclude outside naturally wet soils' • Exclude greenspace land-uses defined by OS Open greenspace data

Measure ID	Habitat	Suitable	Constraints
PM30	Rivers and Riparian Habitat	• Riparian, Floodplain Reconnection and Floodplain layer (WRE and EA WWNP). • 50m buffer around Chalk Rivers and Internal Drainage Board (IDB). • Applied to cropland, non-priority grassland and non-priority wetland habitat	Exclude 'The Fens' National Character area for measures derived from Floodplain and Floodplain Reconnection layers (WRE and EA WWNP).[1]
PM31	Still Water	• Ghost Ponds Dataset (based on historic OS mapping) • Depression Density Data supplied from UCL used to identify cropland in high density depression areas which are considered suitable for Pingo creation.	Exclude Ghost ponds that are within urban environment (i.e. built-up surface)
PM33	Lowland Fen	• 250m buffer around existing habitat. • Applied to cropland, non-priority grassland and non-priority wetland habitat	• Exclude outside naturally wet soils • Exclude outside EA Flood Zone 3

[1] Very flat areas with highly modified drainage systems (e.g. fenlands of East Anglia and Somerset Levels) make traditional waterflow modelling less representative of actual flood risk (https://www.data.gov.uk/dataset/c9dd994d-9649-4041-96d4-cdc0f1a53152/overland-flow-pathways)

Measure ID	Habitat	Suitable	Constraints
PM35	Reedbeds	• 250m buffer around existing habitat. • Applied to cropland, non-priority grassland and non-priority wetland habitat	• Exclude outside 'naturally wet soils' • Exclude outside EA Flood Zone 3
PM37	Saltmarsh	• 250m buffer around existing habitat • Applied to cropland, non-priority grassland and non-priority wetland habitat	Exclude outside Saltmarsh Potential MMO layer
PM39	Mudflats	• 250m buffer around existing habitat • Applied to cropland, non-priority grassland and non-priority wetland habitat	Exclude outside Saltmarsh Potential MMO layer
PM41	Coastal Sand dunes	• 250m buffer around existing habitat • Within Coastal sand-dunes soilscape type • Applied to cropland and non-priority grassland	Exclude greenspace land-uses defined by OS Open greenspace data
PM43	Coastal Vegetated Shingle	• 250m buffer around existing habitat • Applied to cropland, non-priority grassland and littoral sediment	Exclude greenspace land-uses defined by OS Open greenspace data

Measure ID	Habitat	Suitable	Constraints
PM45	Saline Lagoons	• 250m buffer around existing habitat. • Applied to cropland, non-priority grassland and non-priority wetland habitat	Exclude outside Saltmarsh Potential MMO layer
PM09	Arable Margins	24m[2] buffer of cropland field boundary that are within/adjacent to Waterbodies, Overland Flow Pathways.	• Includes overland flow pathways filtered to those with a maximum flow accumulation area greater than 100,000 Ha [3] • Includes overland flow pathways within WRE Catchment Storage and Runoff Attenuation layers.

Notes on decision-making to determine criteria

Suitability criteria were determined through expert stakeholder input, review of relevant literature, and feedback from the public consultation. Identification of suitable soils was based on habitat information from the JNCC and guidance from English Nature (Bradley et al. 2006). An additional constraint based on intersection with EA Flood Zone data was suggested during public consultation in order to better separate suitable floodplain and non-floodplain areas.

The focus of the LNRS mapping was on expanding areas of existing habitats with the same habitat type. For this reason, most suitable areas were constrained to locations in close proximity (250m) to existing areas. In some cases however, soil type or other

[2]Thus size threshold is based on the area advised in the Sustainable Farming Incentive (BFS1: 12m to 24m watercourse buffer strip on cultivated land - GOV.UK)

[3] This size threshold is used to reflect the size of a large catchment (1000km2 or 100,000ha) (Natural Flood Management evidence - GOV.UK)

factors make it unsuitable to expand like-for-like habitats, and so alternative habitat types like grassland were considered around APIB, to ensure that in such a case there would still remain a ‘buffer’ of transitional habitat.

Deciduous woodland had additional constraints applied based on landscape character and land-use. Through input from supporting authorities is was determined that woodland planting is not in line with the priorities for nature recovery in the Brecks or the Broads, where there are strategies and management plans already in place. Woodland measures in these areas were therefore replaced with alternative suitable grassland measures. Land-uses such as sports fields and allotments were also determined to be unsuitable for permanent change through woodland planting, however other measures were determined to be more suitable for coexisting with these types of land-uses.

The decision to constrain conifer woodland measures to enhancement of existing sites only was based on discussions within the steering group, themed working groups, and comments from public consultation. Creation of new conifer woodland sites is not considered to be in-line with the priorities for nature recovery in Norfolk and Suffolk.

Unmapped Habitat Measures

Not all measures or habitats identified within the strategy document have been mapped. There is not always complete data about where habitats are or could be, meaning suitable locations for some measures could not accurately be determined. Overall, it was possible to map focused locations for the majority of measures, although it is possible for all the measures in the local habitat map and wider strategy to be delivered across a variety of locations beyond what is shown.

Urban unmapped measures

Measures which target urban, built-up areas and private gardens are unmapped. This is because there is a high level of complexity in urban areas, and many nature-recovery opportunities will be widely applicable and small-scale. For example wildlife-friendly gardening or installation of green roofs could be applicable across a range of areas, and feasibility of such actions are largely determined by other factors such as public engagement with nature recovery.

Unmapped hedgerow measures

Hedgerow creation and restoration has also been included in the LNRS as an unmapped measure. This is due to feedback from the public consultation which highlighted issues with the classification of hedgerow gaps in the first draft of the mapping. Consultation responses also emphasised that many people were interested in opportunities for increasing connectivity through hedgerow creation outside of what was feasible to map, and so an unmapped measure was deemed most suitable due to the broad applicability of the opportunities.

Habitat Mosaics

Where multiple habitat measures were applied to the same land parcels, an assessment was made as to whether the options presented could exist alongside each other as a habitat mosaic. In many cases a mosaic approach to habitat management is beneficial to biodiversity as a combination of different elements can provide for a wider range of species needs (read more about Natural England's mosaic approach guidance here). In areas where deciduous woodland expansion is mapped (around existing woodland), a mosaic of grassland and scrub is mapped wherever possible in order to provide options for transitional habitats that align with natural succession.

The following habitat combinations were identified as having potential for a habitat mosaic where the occur on the same ACB land parcels:

- **Heathland and Acid Grassland Mosaic:**
  - Must include acid grassland and lowland heathland
  - Can also include any of scrub and mixed deciduous woodland
- **Calcareous Grassland Mosaic:**
  - Must include calcareous grassland
  - Can also include any of scrub and mixed deciduous woodland
- **Neutral Grassland Mosaic:**
  - Must include neutral grassland
  - Can also include scrub and mixed deciduous woodland
- **Wetland Mosaic:**
  - Must include wet grassland, lowland fen and reedbeds
  - Can also include any of wet woodland, scrub, mixed deciduous woodland
- **Breckland Grassland Mosaic:**
  - Must include calcareous grassland and acid grassland

    - Can also include scrub
- **Intertidal Habitats Mosaic:**
    - Must include Saltmarsh and mudflats
    - Can also include saline lagoons and scrub

Proportion Contributions of Habitats Within Mosaics

Suggestions for typical percentage contributions of each habitat type are presented in order to assist with application of the LNRS mapping to Biodiversity Net Gain assessments. These proportions are not intended to be prescriptive, and should not replace individual site assessments in determining the combination of habitats which is most suitable for a particular location. It is anticipated that the proportion of each habitat within a mosaic may also change over time.

To determine the suggested percentage contribution of each habitat within a mosaic for BNG, a weighting score was assigned based on its BNG distinctiveness category. The scores were equally distributed across categories and allocated as follows: High = 0.75, Medium = 0.5, and Low = 0.25. The percentage contribution of each habitat within the mosaic was then calculated by dividing the score of the individual habitat by the total score for the entire mosaic combination, and multiplying the result by 100.

Habitat measures linked to key and flagship species

The ‘Related species’ column in the potential measures dataset provides information on the species related to the proposed actions. Locations with this additional species information within the Local Habitat Map represent a subset of the habitat measures which have been identified as having the most potential to benefit to key or flagship species (as identified within the strategy document). The method for applying the indicative species information was as follows:

1. A list of relevant habitat measures for each species was identified based on input from specialist stakeholders and Natural England, and review of relevant literature.
2. Species records for each taxa were obtained from SBIS/NBIS to map the suitable areas for measures based on proximity to existing populations.

3. Where available, external datasets were also incorporated to show other suitable areas for measures to support particular species.
4. Relevant habitat measures were assigned an additional species code where they intersected existing populations or other suitable areas.

Table 6. List of species codes related to habitat measures included in the LNRS ACB layer, with any other factors used to identify suitability.

Species Code	Common Name	Scientific Name	Relevant Habitats	Other Suitability Models
SPM1	Bark-sulphur firedot	*Caloplaca flavorubescens*	Unmapped	Not Applicable
SPM2	Basil-thyme case-bearer	*Coleophora tricolor*	calcareous grassland	Distribution of foodplant Basil Thyme (*Clinopodium arvensis*)
SPM3	Crested buckler fern	*Dryopteris cristata*	fen, reedbed, wet woodland	Not Applicable
SPM4	Crested cowwheat	*Melampyrum cristatum*	deciduous woodland, arable margins, grassland	Not Applicable
SPM5	Dwarf eelgrass	*Zostera (Zosterella) noltei*	saline lagoons, saltmarsh, mudflats	MMO Seagrass Potential Data Layer
SPM6	Eurasian curlew	*Numenius arquata*	wet grassland, heathland, acid grassland	Not Applicable
SPM7	European eel	*Anguilla anguilla*	Rivers, riparian/floodplain, saltmarsh, saline lagoons	EA River Obstacles Data Layer
SPM8	Fen raft spider	*Dolomedes plantarius*	wet grassland, fen, riparian/floodplain, still water, rivers	Not Applicable

Species Code	Common Name	Scientific Name	Relevant Habitats	Other Suitability Models
SPM9	Hazel dormouse	*Muscardinus avellanarius*	deciduous woodland, hedgerows	Not Applicable
SPM10	Holly-leaved naiad	*Najas marina*	still water	Not Applicable
SPM11	Kittiwake	*Rissa tridactyla*	Urban (unmapped)	Not Applicable
SPM12	Lapwing	*Vanellus vanellus*	wet grassland	Not Applicable
SPM13	Lesser water measurer	*Hydrometra gracilenta*	fen	Not Applicable
SPM14	Little Whirlpool Ramshorn Snail	*Anisus (Disculifer) vorticulus*	rivers, wet grassland, fen, still water, reedbed	Not Applicable
SPM15	Narrow-mouthed whorl snail	*Vertigo (Vertilla) angustior*	wet grassland, fen, saltmarsh	Not Applicable
SPM16	Natterjack	*Epidalea calamita*	saltmarsh, heathland, coastal sand dunes	Not Applicable
SPM17	Northern pool frog	*Pelophylax lessonae*	still water, wet grassland, fen, reedbed	Not Applicable
SPM18	One-grooved Diving Beetle	*Bidessus unistriatus*	still water	Not Applicable
SPM19	Orange-Fruited Elm-lichen	*Caloplaca luteoalba*	veteran trees	Not Applicable
SPM20	Rosser's Sac-spider	*Clubiona rosserae*	fen	Not Applicable

Species Code	Common Name	Scientific Name	Relevant Habitats	Other Suitability Models
SPM21	Scarce vapourer	*Orgyia recens*	deciduous woodland, wet woodland, hedgerows, heathland, acid grassland, grassland, calcareous grassland, lowland meadows and pastures, fen, wet grassland	Not Applicable
SPM22	Serotine	*Eptesicus serotinus*	deciduous woodland, hedgerows, wood pasture and parkland, rivers, riparian/floodplain, scrub, grassland, arable field margins, lowland meadows and pastures	Not Applicable
SPM23	Starlet sea anemone	*Nematostella vectensis*	saltmarsh, mudflats, saline lagoons	Not Applicable
SPM24	Suffolk lungwort	*Pulmonaria obscura*	deciduous woodland	Not Applicable
SPM25	Tassel stonewort	*Tolypella intricata*	still water	Not Applicable
SPM26	Water vole	*Arvicola amphibius*	rivers, still water, fen, reedbed	NE Water vole risk zones data layer (Red and Amber zones)
SPM27	White clawed crayfish	*Austropotamobius pallipes*	rivers, still water	Not Applicable

Species Code	Common Name	Scientific Name	Relevant Habitats	Other Suitability Models
SPM28	Witham orb mussel	*Sphaerium solidum*	Rivers, riparian/floodplain, fen	Not Applicable
SPM29	Little tern	*Sternula albifrons*	coastal shingle and coastal sand dunes	Not Applicable
SPM30	Redshank	*Tringa totanus*	saltmarsh, mudflats and saline lagoons	Not Applicable
SPM31	Bittern	*Botaurus stellaris*	Reedbeds, fens	Not Applicable
SPM32	Turtle dove	*Streptopelia turtur*	hedgerows, scrub, grassland, lowland meadows and pastures, arable field margins	Not Applicable
SPM33	Green-winged orchid	*Anacamptis morio*	Lowland meadow	Not Applicable
SPM34	Barbastelle bat	*Barbastella barbastellus*	woodland, hedgerows, veteran trees	Barbastelle roost site & foraging areas data layer (6 km buffers around roost sites)
SPM35	Nightingale	*Luscinia megarhynchos*	Scrub, hedgerows, wet woodland	Not Applicable
SPM36	Great crested newt	*Triturus cristatus*	still water	NE GCN opportunity core areas
SPM37	Kingfisher	*Alcedo atthis*	Rivers, fens, reedbeds, wet grassland, wet woodland, riparian/floodplain	Not Applicable
SPM38	Fen orchid	*Liparis loeselii*	fen	Not Applicable

Species Code	Common Name	Scientific Name	Relevant Habitats	Other Suitability Models
SPM39	Common rock-rose	*Helianthemum nummularium*	Calcareous grassland	Not Applicable
SPM40	Stone-curlew	*Burhinus oedicnemus*	heathland, arable field margins, grassland	Not Applicable
SPM41	Nightjar	*Caprimulgus europaeus*	heathland, acid grassland	Not Applicable
SPM42	Intermediate Stonewort	*Chara intermedia*	Still water, riparian/floodplain	Not Applicable

Measures for Nature-based Solutions and Wider Environmental Benefit

Where the mapped habitat measures have the potential to offer wider environmental benefits, this was indicated by a 'Nature-based Solutions' (NbS) column in the dataset.

Potential measures that could provide benefits for water quality and flood mitigation (e.g. riparian,wet woodland, lowland fen), were identified if they coincided Nbs opportunity layers obtained from Water Resources East (WRE) and the Environment Agency Working With Natural Processes (WWNP) datasets. Specifically, the Riparian Zone, Floodplain, Floodplain Reconnection, Catchment Storage and Runoff Attenuation layers. As WRE data was only available for certain catchments, it was substituted with the corresponding Working With Natural Processes (WWNP) datasets from the Environment Agency in areas where WRE coverage was absent. Potential measures that could provide pollination benefits (e.g. neutral and calcareous grassland) were also identified where they were within a Buglife b-line corridor, which form a national network of pollinator "highways."

Additional Measures Suggested by Stakeholders

Throughout the development of the strategy, additional sites and nature recovery measures were proposed by stakeholders. Comments were received through a number of channels, including direct input onto LNRS mapping tools, sharing of external datasets, and through submissions via the public consultation survey or by email. A triage process was developed in order to assess the suitability of including these suggestions within the mapping. In many cases, map comments which focussed on a

particular site were found to have broader applicability to the methods used across the strategy area, and so these cases were dealt with within the rules-based approach. Where a comment suggested an action which would only be applicable to an individual site, the following decision-making process was used (also see Figure 3):

1. Suggestion made by stakeholders
2. Does the measure suggestion align with an existing measure description?
    a. If yes, continue to 3
    b. If no, the suggestion is not suitable for inclusion
3. Is accurate spatial data available?
    a. If yes, continue to 4
    b. If no, is it a mapped comment?
        i. If yes, continue to 4
        ii. If no, can an exact location be identified?
            1. If yes, continue to 4
            2. If no, the suggestion is not suitable for inclusion
4. Is the suggestion within strategic areas?
    a. If yes, check if it has been covered by map updates, otherwise add specific land parcels that have been identified
    b. If no, is there robust ecological justification available to support the suggestion?
        i. If yes, add the specific land parcels that have been identified
        ii. If no, the suggestion is not suitable for inclusion

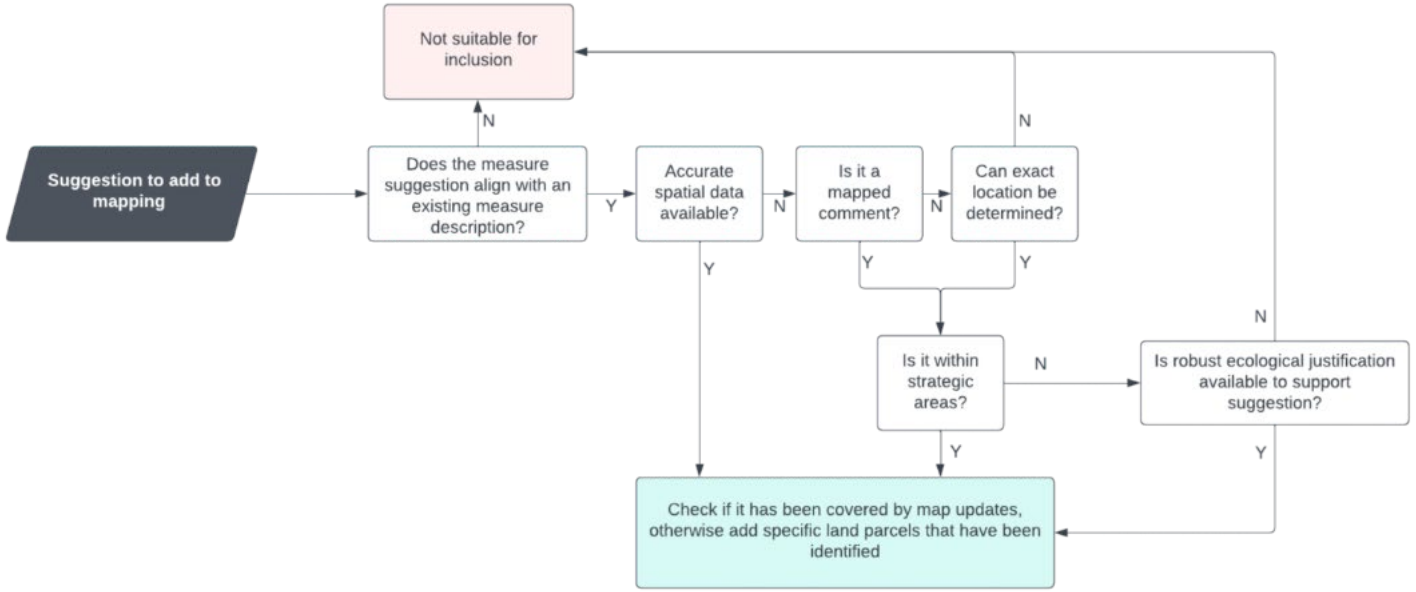

Figure 3. Process diagram showing triage approach for considering stakeholder suggestions for inclusion in the ACB map.

This approach meant that large-scale nature recovery projects, including landscape recovery projects (where data was available), were included within ACB areas regardless of whether they fell wholly within the strategic zones. For these projects, ongoing discussions and collaboration with organisations involved meant that detailed data could be shared, and actions mapped to precise land parcel boundaries.

Most other additions to the mapping came from comments placed as points directly onto the Local Habitat Map app during public consultation. Each of these comments was assessed to see if a clear habitat measure could be identified. Broad requests for the inclusion of a site which did not specify a suitable habitat measure were deemed unsuitable for inclusion. Suggestions for sites outside of the strategic areas were added based on ecological feasibility by comparing against habitat suitability criteria. Land parcels containing suitable measure suggestions were then extracted and added to the ACB map.

Further suggestions for additions to the map were received via email and the public consultation survey. In many cases these comments duplicated those added to the LHM. Comments that suggested a particular measure in a specific location were triaged in the same way as mapped comments, however in many cases it was impossible to determine the exact location referenced by a particular comment, and so these instances were not possible to map. Where comments were not submitted anonymously, efforts were made to contact the relevant parties and obtain locational data.

Overall the contribution of stakeholder site-specific measures was additional measures spanning approximately 6,500 Ha and >3,000 additional land parcels within Norfolk and Suffolk.

Mapping Outputs

The statutory mapping outputs required by Defra consist of the APIB data layer, and the ACB data layer. To help different audiences to disseminate and make use of the mapping, a variety of different outputs were also created. This included a Local Habitat Map 'toolkit', which contained a variety of dashboards, user guides and simplified versions of the mapping, which was informed by public consultation feedback from a variety of users who found the draft mapping inaccessible.

Public consultation feedback included:

- Issues with loading times and performance due to dataset size
- Issues on specific devices or operating systems (particularly IOS)
- Problems navigating the different map layers / too many map layers to navigate
- Many users prefer to access the mapping on mobile
- Some users found there to be too much technical detail, and would prefer a generalised overview (other commenters found it to be too broad-brush)
- Desire for clearer links between the document and mapping, and more clarity on the wording of measures.

Map layer optimisation was carried out to reduce file size and improve response times for users viewing the data by simplifying the dataset and removing duplicate geometry. A variety of different tools tailored to different audiences were then developed, including:

- Interactive guides (ESRI 'StoryMaps') focussed on providing an introduction and broad overview of the mapping, targeting a non-specialist audience

- Statistical dashboards providing data summarised to parishes, catchments, districts etc, aimed at supporting policy-makers and planners at local scales.
- Tools to see an overview of measures in an area of interest, targeting landowners and managers who wish to explore opportunities most relevant to their land.
- Maps filterable by species, habitat type or wider environmental benefit, aimed at highlighting specific opportunity areas for organisations wishing to target a specific aspect of nature-recovery.

Complete List of Input Datasets

The following is a complete list of datasets which have inputted into the LNRS Local Habitat Map.

Inputs into Habitat Basemap

Table 7. Habitat Basemap Input Data

Dataset Name	Data Acknowledgements
OS MasterMap	© Crown Copyright and Database rights 2025 Ordnance Survey AC0000851272
OS Open Greenspaces	© Crown Copyright and Database rights 2025 Ordnance Survey AC0000851272 . Available under the Open Government Licence v3.0
NE Living England (phase 4)	© Natural England 2025. Available under the Open Government Licence v3.0
NE Wood Pasture Parkland Inventory	© Natural England 2025. Available under the Open Government Licence v3.0
NE Ancient Woodland Inventory	© Natural England 2025. Available under the Open Government Licence v3.0
OS Open Built Up Areas	© Crown Copyright and Database rights 2025 Ordnance Survey AC0000851272 Available under the Open Government Licence v3.0
RPA Crop Map of England	© Rural Payments Agency 2025. Available under the Open Government Licence v3.0. Includes Ordnance Survey data © Crown copyright and database rights 2024 Ordnance Survey. Supplied under the PSGA End User Licence.
OS Addressbase Plus	© Crown Copyright and Database rights 2025 Ordnance Survey AC0000851272

Dataset Name	Data Acknowledgements
FC National Forest Inventory	© Forestry Commission 2025. Available under the Open Government Licence v3.0
NE Priority Habitats Inventory	© Natural England 2025. Available under the Open Government Licence v3.0
RPA Landcover	Contains information provided by the Rural Payments Agency (RPA). Includes Ordnance Survey data © Crown copyright and database rights 2024 Ordnance Survey. Supplied under the PSGA End User Licence.
OS Local Functional Sites	© Crown Copyright and Database rights 2025 Ordnance Survey AC0000851272 . Available under the Open Government Licence v3.0

Inputs into Areas of Particular Importance for Biodiversity (APIB)

Table 8. APIB Input Data

Dataset Name	Data Acknowledgements
NE Ancient Woodland Inventory	© Natural England 2025. Available under the Open Government Licence v3.0
Suffolk County Council Ancient Woodland Inventory Update	© Suffolk County Council 2025.
NE Local Nature Reserves	© Natural England 2025. Available under the Open Government Licence v3.0
NE Special Protection Areas	© Natural England 2025. Available under the Open Government Licence v3.0

Dataset Name	Data Acknowledgements
NE Special Areas of Conservation	© Natural England 2025. Available under the Open Government Licence v3.0
NE Marine Conservation Zones	© Natural England 2025. Available under the Open Government Licence v3.0
NE National Nature Reserves	© Natural England 2025. Available under the Open Government Licence v3.0
NE Sites of Special Scientific Interest	© Natural England 2025. Available under the Open Government Licence v3.0
NE Ramsar	© Natural England 2025. Available under the Open Government Licence v3.0
NBIS Norfolk County Wildlife Sites	Data provided by Norfolk Biodiversity Information Service (NBIS) © Crown copyright and database rights 2025 OS 100019340
SCC Suffolk County Wildlife Sites	© Suffolk County Council 2025
WT Ancient Tree Inventory	Data reproduced with the permission of The Woodland Trust for use for LNRS purposes only. The data is subject to the conditions of their non-commercial licence. For any other uses contact ancienttreeinventory@woodlandtrust.org.uk
NCC Veteran Trees	© Norfolk County Council 2024
SCC Ancient Veteran Notable Trees	© Suffolk County Council 2024
NE Priority Habitats Inventory	© Natural England 2025. Available under the Open Government Licence v3.0
EA Saltmarsh Extent and Zonation	© Environment Agency copyright and/or database right 2025. All rights reserved.

Inputs into Strategic Areas

Table 9. Strategic Areas Input Data

Dataset Name	Data Acknowledgements
APIB: previously detailed	N/A
Churchyards (based on OS Greenspace)	© Crown Copyright and Database rights 2025 Ordnance Survey AC0000851272 . Available under the Open Government Licence v3.0
Roadside Nature Reserves Norfolk	Data provided by Norfolk Biodiversity Information Service (NBIS) © Crown copyright and database rights 2025 OS 100019340
NE Habitat Networks Zone 1	© Natural England 2025. Available under the Open Government Licence v3.0
Wendling Beck project boundaries	© Wendling Beck 2025. Used with permission.
NE Peat Map Peaty Soil Depth	© Natural England 2025. Available under the Open Government Licence v3.0
EA Statutory Main Rivers	© Environment Agency copyright and/or database right 2023. All rights reserved.
NE Chalk Rivers	© Natural England 2025. Available under the Open Government Licence v3.0
NE Priority River Habitat	© Natural England 2025. Available under the Open Government Licence v3.0
NE Priority Ponds	© Natural England 2025. Available under the Open Government Licence v3.0
NE Priority Lakes	© Natural England 2025. Available under the Open Government Licence v3.0
NE Wood Pasture Parkland Inventory	© Natural England 2025. Available under the Open Government Licence v3.0
NE Priority Habitats Inventory	© Natural England 2025. Available under the Open Government Licence v3.0

Inputs into Areas that Could Become of Particular Importance to Biodiversity (ACBs)

Includes all inputs detailed above, plus the following:

Table 10. ACB Input Data

Dataset Name	Data Acknowledgements
Habitat Basemap: Previously detailed	N/A
Strategic Areas: Previously detailed	N/A
APIB: Previously detailed	N/A
UK Soil Observatory Soilscapes	Soils data © Cranfield University (NSRI) used with permission
NE National Character Areas	© Natural England 2025. Available under the Open Government Licence v3.0
NCC Vegetation Model (based on EA National LIDAR Programme data)	© Norfolk County Council 2025. Based on LIDAR data from © Environment Agency 2025. Available under the Open Government Licence v3.0
NE National Park Boundaries	© Natural England 2025. Available under the Open Government Licence v3.0
NE Open Mosaic on Previously Developed Land	© Natural England 2025. Available under the Open Government Licence v3.0
Suffolk Ghost Ponds (from National Library of Scotland mapping of OS 1st Ed.)	© Norfolk County Council 2025. Uses data from National Library of Scotland 2025.
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UCL depression density (pingos)	© University College London 2024. Used with permission
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Crown Estate ownership boundaries	© The Crown Estate 2025. Publicly available under Crown Estate License terms v1.1.

Species-related inputs

Table 11. Datasets used to assign relevant species codes

Dataset Name	Data Acknowledgements
SBIS Species Records	Biological records provided by Suffolk Biodiversity Information Service (SBIS), acting on behalf of the contributing biological recorders, whom whose rights are recognised
NBIS Species Records	Biological records provided by Norfolk Biodiversity Information Service (NBIS), acting on behalf of the contributing biological recorders, whom whose rights are recognised

Dataset Name	Data Acknowledgements
EA River Obstacles	© Environment Agency 2025. Available under the Open Government Licence v3.0
MMO Seagrass Potential	© Marine Management Organisation 2024. Available under the Open Government Licence v3.0
NCC Barbastelle Roost and foraging buffers	© Norfolk County Council 2024
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Landscape Recovery Project and Stakeholder Project Areas data

Table 12. Data received from stakeholder organisations (additional data inputted during public consultation).

Dataset Name	Data Acknowledgements
WaLOR project details and boundaries	© Suffolk Wildlife Trust 2025.
Wendling Beck project details and boundaries	© Wendling Beck 2024.
SWT Reserve boundaries	© Suffolk Wildlife Trust 2025.
RSPB Reserve boundaries	© RSPB 2025.
Ouse Washes project details and boundaries	© RSPB 2025. © Albanwise 2025.
NWT Habitat Survey data	© Norfolk Wildlife Trust 2024.
Langley Abbey project details and boundaries	© Langley Abbey 2024.
CCGC project details and boundaries	© Suffolk Wildlife Trust 2025.
EB project details and boundaries	© Environment Bank 2025.

Wider Environmental Benefits Inputs

Table 13. Data used to assign wider environmental benefits

Dataset Name	Data Acknowledgements
EA Probable Overland Flow Pathways	© Environment Agency 2025. Available under the Open Government Licence v3.0
WRE Runoff Attenuation Features	© Water Resources East 2025. Uses EA data provided under an EA Conditional Licence.
WRE Mid-upper Catchment Storage	© Water Resources East 2025. Uses EA data provided under an EA Conditional Licence.

Dataset Name	Data Acknowledgements
WRE Mid-Upper Catchment Riparian buffers	© Water Resources East 2025. Uses EA data provided under an EA Conditional Licence.
WRE Lower Catchment Floodplain reconnection	© Water Resources East 2025. Uses EA data provided under an EA Conditional Licence.
WRE Lower Catchment Floodplain zones	© Water Resources East 2025. Uses EA data provided under an EA Conditional Licence.
EA WWNP Runoff Attenuation Features 1%AEP	© Environment Agency 2025. Available under the Open Government Licence v3.0
EA WWNP Runoff Attenuation Features 3.3%AEP	© Environment Agency 2025. Available under the Open Government Licence v3.0
EA WWNP Riparian Woodland Zone	© Environment Agency 2025. Available under the Open Government Licence v3.0
EA WWNP Floodplain Woodland Zone	© Environment Agency 2025. Available under the Open Government Licence v3.0
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