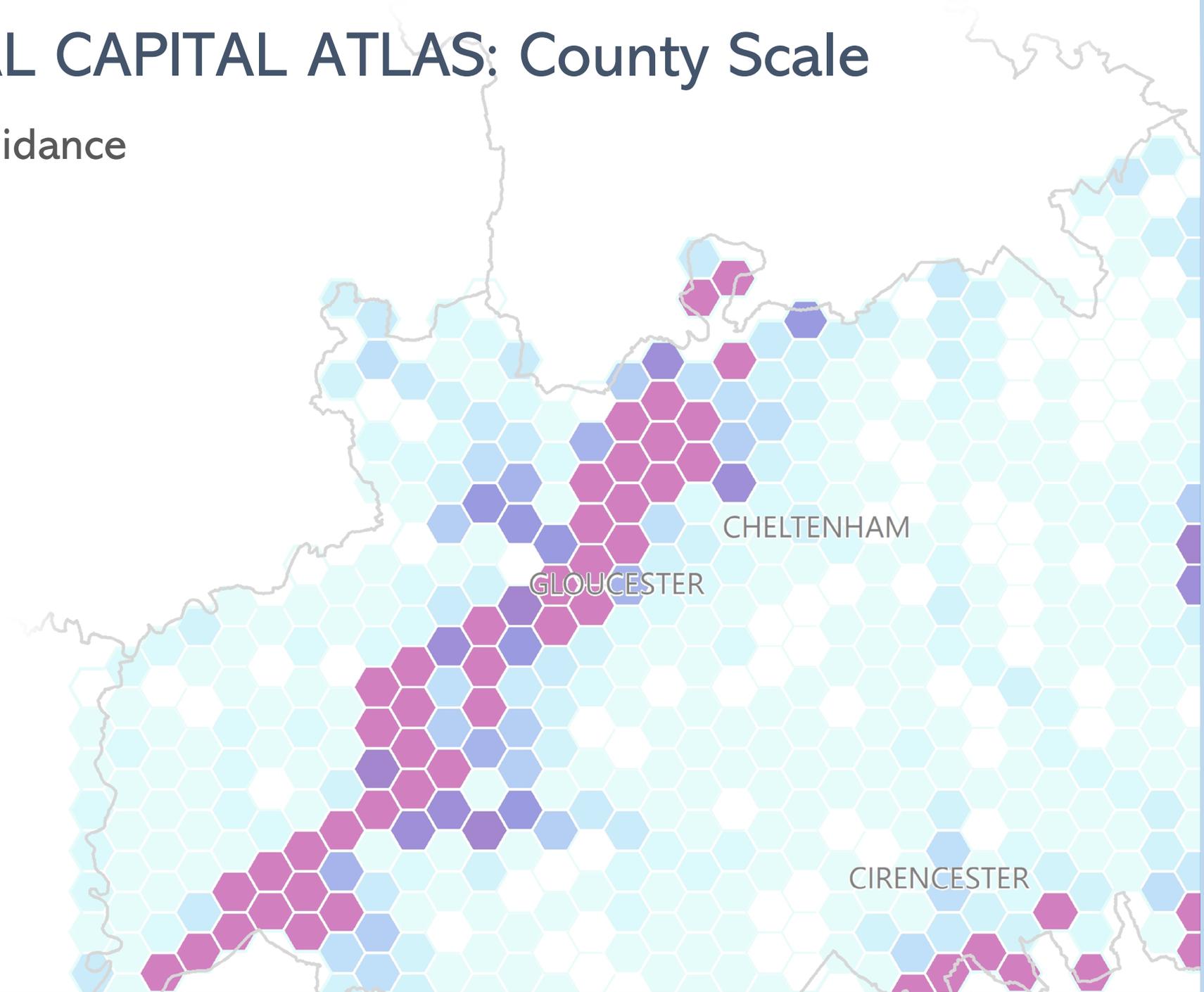


NATURAL CAPITAL ATLAS: County Scale

GIS User Guidance



July 2020



This document is an output from the Natural England County & City Natural Capital Atlas project (NE191022-1418-045), delivered by Westcountry Rivers Ltd.

Published in July 2020.

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Cover map: Quantity indicator for active flood plain in Gloucestershire, based on data from the Environment Agency's Risk of Flooding from Rivers and Sea dataset. © Natural England, 2020.

Project Summary

The Natural England County & City Natural Capital Atlas project, completed in Spring 2020, aimed to assess the extent and state of Natural Capital in counties and metropolitan regions across England. The project followed on from the National Natural Capital Atlas, which mapped natural capital across the whole of England. Both sets of atlases map out the Natural Capital Indicators (Lusardi et al., 2018) to show how much, how good and where England's ecosystem assets are, and the benefits they are providing to people. The atlases use the best available and nationally consistent data sets and highlight data gaps.

The natural capital atlases produced from this project are based on local authority areas which have been combined together into counties or similarly sized regions. Throughout this document the atlas areas will be referred to as 'county/city zones'.

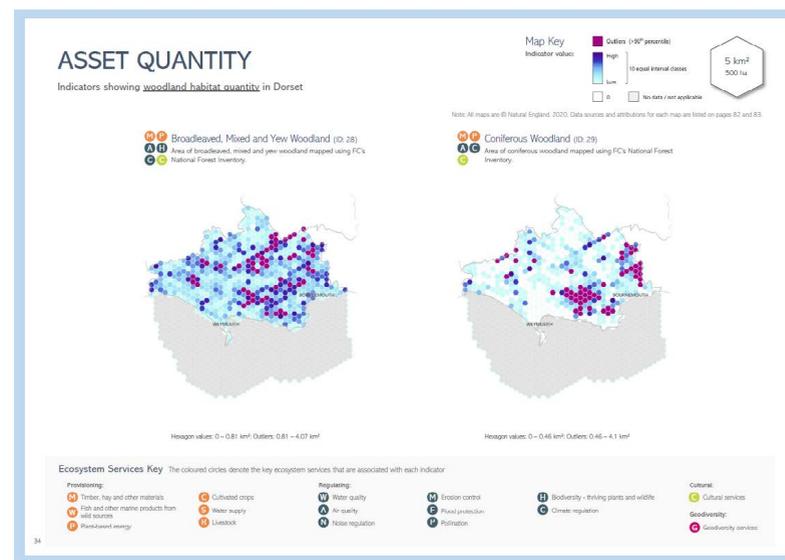
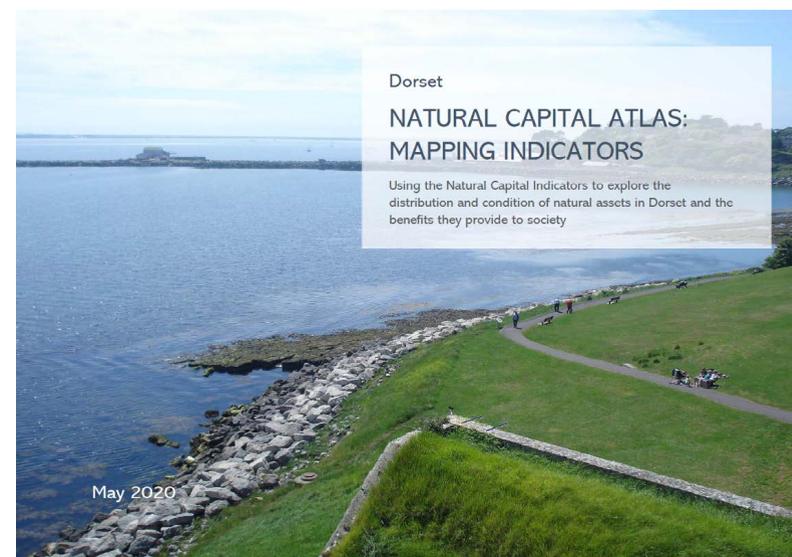
A template has been created so that the mapped outputs for the county-scale assessment can be easily recreated. This may be useful in order to use different colour scales, to combine county/city zones together into regions, or to cut to different areas. This document describes the processes that can be undertaken to achieve this.

The outputs are mapped as 5km² hexagonal units and are based on nationally available and consistent datasets. They are suitable for use at the scale of regions, counties, cities, and major river catchments. They may be less suitable for very local-scale assessments. In addition, please note that the accuracy and value of local assessments can be enhanced greatly if local data is available.

Related Documents & Outputs

This user guidance document is one of a number of outputs produced from Natural England County & City Natural Capital Atlas project. The following outputs should be referred to for further detail:

- Map Template & Data Package
- Natural Capital Atlases for 44 counties and city regions
- 'How to start using your natural capital atlas'
- Data & Indicator Summary



Pages from the Dorset Natural Capital Atlas (Natural England, 2020)

User Guidance: Aims

This document describes some of the processes which can be undertaken to 'personalise' the County & City Natural Capital Atlas data to a particular region or area.

The processes are based on simple-to-apply 'cuts' of the national mapped outputs and adjustment to symbology, with no change to the 5km² summary spatial unit used. Though simple, these processes will require some familiarity with GIS software, in particular ArcMap.

Requirements

To use the county-scale outputs (5km² hexagons) to create your own maps, you will need the following files and software:

Software:

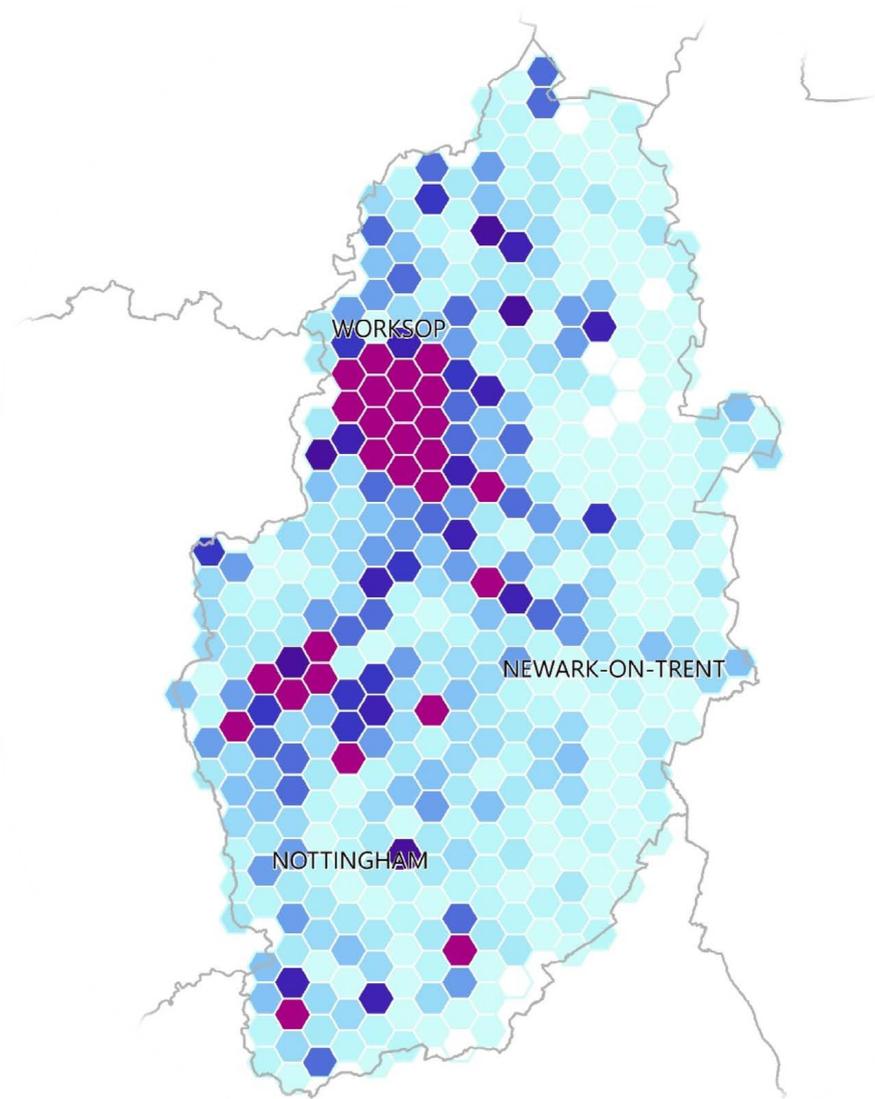
- ArcMap 10.0 or later

Files:

- County & City Natural Capital Atlas data package (County Atlas Map Data.gdb)
- County & City Natural Capital Atlas ArcMap template (NC County Atlas MXD.mxd)

Document Structure

- Description of Mapping Inputs p.5
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- Method: Using Local Data to Create Additional Natural Capital Maps p.9
- Dataset and Indicator Index p.10-11



Area of Woodland Priority Habitats in Nottinghamshire
© Natural England, 2020.

Description of Mapping Inputs

To use the county-scale GIS data, you first need to obtain the data package and map template from Natural England. The County Atlas Map Package folder contains the following sub-folders:

- **ArcMap Project** – contains the map template (.mxd)
- **County Atlas Map Data** – contains the geodatabase
- **Documentation** – contains the metadata and supporting documentation

Data

The data package consists of an Esri file geodatabase with a series of feature classes (datasets) that contain the indicator values used in the county-scale natural capital atlases. It also includes some subsidiary datasets that are used to give context to the final maps, such as labels. The following files are included in the geodatabase:

Indicator datasets, summarised by 5k² hexagons:

- **HexGrid_Quantity** - Hexagonal grid containing asset quantity indicator values.
- **HexGrid_Quality** - Hexagonal grid containing asset quality indicator values.
- **HexGrid_Location** - Hexagonal grid containing asset spatial configuration indicator values.
- **HexGrid_ESFlows** - Hexagonal grid containing ecosystem service flow indicator values.

Indicator datasets, showing original data:

- **WFD_2016C2** - Line dataset of rivers, canals and surface water and their WFD status (overall, ecological, chemical and the various element levels). Also includes rivers with a 'Physical Modification SWMI' from the Reasons for Not Achieving Good dataset. Definition queries and categorical symbology allow this dataset to be used for multiple indicators.
- **SSSI_Units_England** - Polygon dataset of SSSIs and their condition
- **WFD_Groundwater** - Polygon dataset of groundwater bodies assessed under WFD, with a joined column showing those at good status in 2016.
- **River_Obstructions** - Point dataset of 'Potential Sites of Hydropower Opportunity' (used for the 'River Continuity' indicator).

Supporting datasets:

- **ZoneBoundaries** - Polygon dataset showing the actual boundaries of the counties and city zones in the atlases.
- **HexZoneBoundaries** - Polygon dataset created by dissolving all the hexagons allocated to each county, to give a boundary of the analysed area for each of the counties and city zones in the atlases.
- **TownsCities_ZonesIntersect** - Point dataset of major towns and cities, with the county/city zone they fall within.
- **NE_Area_Teams** - Polygon dataset showing the Natural England area teams.

Spatial Units

The maps included in the County and City Scale Natural Capital Atlases were created using a grid of hexagonal spatial units covering the extent of England. Each unit has an area of 5 km². The indicator datasets were summarised to these units to clearly show spatial patterns at a county scale. The size of the spatial unit does not reflect the resolution of the input data.

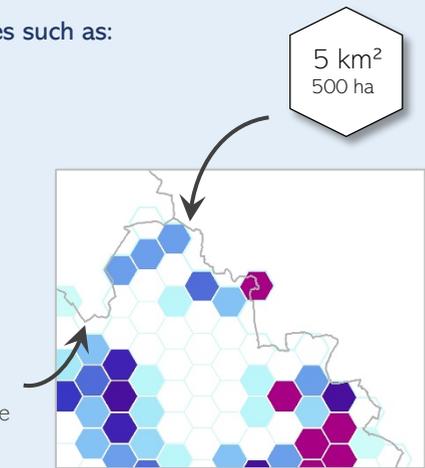
Allocation of hexagons

To allow the creation of all 44 atlases, each hexagon has been 'allocated' to a county/city zone, based on which county the centroid of the hexagon falls within. In addition, each of the hexagons has been allocated as either 'Land' or 'Marine', again based on the centroid of the hexagon. These allocations are there to allow easy cutting of the data without overlaps, and to show the difference between no value and 'null' values (see page 8 of your atlas for more information). However these allocations are a simplification, and in creating your own maps you may choose to disregard them or use alternative groupings.

Each hexagon contains attributes such as:

- **Fr_Reedbed_Area**
Area of reedbeds
- **Wo_AncWood_Area**
Area of ancient woodland
- **SoilCarbon**
Soil carbon/organic matter content value

The allocation of hexagons is approximately consistent with the county boundary (grey line)



The hexagon datasets also contain some additional columns of contextual data where relevant, such as which county/city zone it has been allocated to, whether the hexagon falls within, or partially within, a moorland area, the total length of WFD river in each hexagon, and the total area of SSSI. See pages 10-11 of this document for details of the columns in each dataset.

Creating Natural Capital Maps

There are multiple ways in which the natural capital mapping data can be manipulated to create a bespoke map for an area or region. Three of these methods are described in this guidance. In order of increasing complexity, these include:

- 1) Using 'Data Frame Properties' to show only the hexagons in your county/city zone
- 2) Using 'Select by Location' to select a set of hexagons for a different geographical area of interest
- 3) 'Clip' the data and change the 'symbology' to highlight local differences

There is also a section on how to present and interpret the natural capital maps you produce using the data.

Initial steps to work with the MXD

The map template document is stored in the 'ArcMap project' sub-folder. You need to have ArcMap 10.0 or later to open this file. The first time you open the file, the links to the datasets will likely be broken.

Open the map template and fix broken file pathways

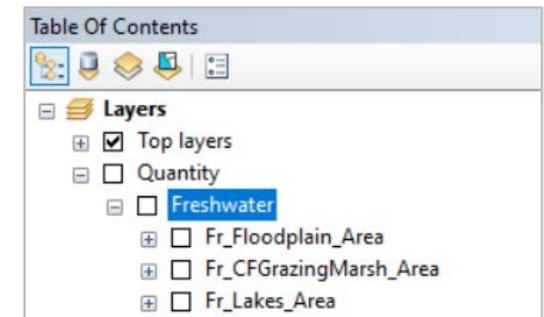
- Open the 'Natural Capital Atlas Template' ArcMap project document (.mxd)
- If the file pathways are broken (red exclamation marks next to the data layers), right-click on a data layer in the Table of Contents (e.g. 'Flood Plain Area' in the Quantity > Freshwater layer group) and select **Data > Repair Data Source...**
- Browse to the file location on your computer and select the corresponding file (for quantity indicators this is **HexGrid_Quantity**).
- Click OK and all the data layer pathways will now be fixed.

1) Using 'Data Frame Properties' to show only the hexagons in your county/city

The following steps will allow you to recreate the maps in the atlas, simply by excluding all of the information outside of your county. This can be done several ways. A simple way is to use **Data Frame Properties**:

- Turn on the 'HexZoneBoundaries' layer and use **'Select Features'** to select your county/city zone. Alternatively use 'Select by Attribute'. Right click on the layer and select **'Data'** then **'Export Data'**. Ensure it is set to **'Export: Selected Features'** then save in a suitable location. Once exported click 'Yes' when prompted to add the new layer to the map.
 - Alternatively use a **Definition Query** to temporarily cut the layer down to your area of interest. In the **Layer Properties** window, go to the **Definition Query** tab and use the **Query Builder** to select the area of interest and click OK.
- In the top bar, click **'View'** and then **'Data Frame Properties'**. Go to the **'Data Frame'** tab. Under **'Clip Options'**, use the dropdown box to change from 'No Clipping' to **'Clip to shape'**. Click **'Specify shape...'**, click the option **'Outline of Features'** and then under layer select your exported zone of hexagons. Click OK and all the layers will be visually clipped to the area of interest (note: all of the data remains in the attribute table, it is really a 'mask'). For instructions on how to fully clip the data to your area, see page 8).
- You can now turn layers on and off as required to create different maps.
- If liked, you can exclude layers from the mask, for example to show the actual county boundary. Drag the relevant layers you would like to exclude out of the group, or create a new group of excluded layers. Then return to 'Data Frame Properties', click **'Exclude Layers...'** and select the relevant layer or group of layers.

Layer groups reflect the structure of the Natural Capital Atlas document



Bookmarks

To export all your maps at exactly the same extent and position:

- 1) Select your county from 'HexZoneBoundaries' (or select the area you are focusing on from another dataset)
- 2) Right click on the layer and choose 'Selection' and 'Zoom to Selected Features'
- 3) Go to the Bookmarks tab and choose 'Create Bookmark'
- 4) When you are ready to export each map, click the saved bookmark to return the map to the saved position.

Creating Natural Capital Maps cont.

2) Using 'Select by Location' to select a different set of hexagons and create a more local or wider regional version of the map

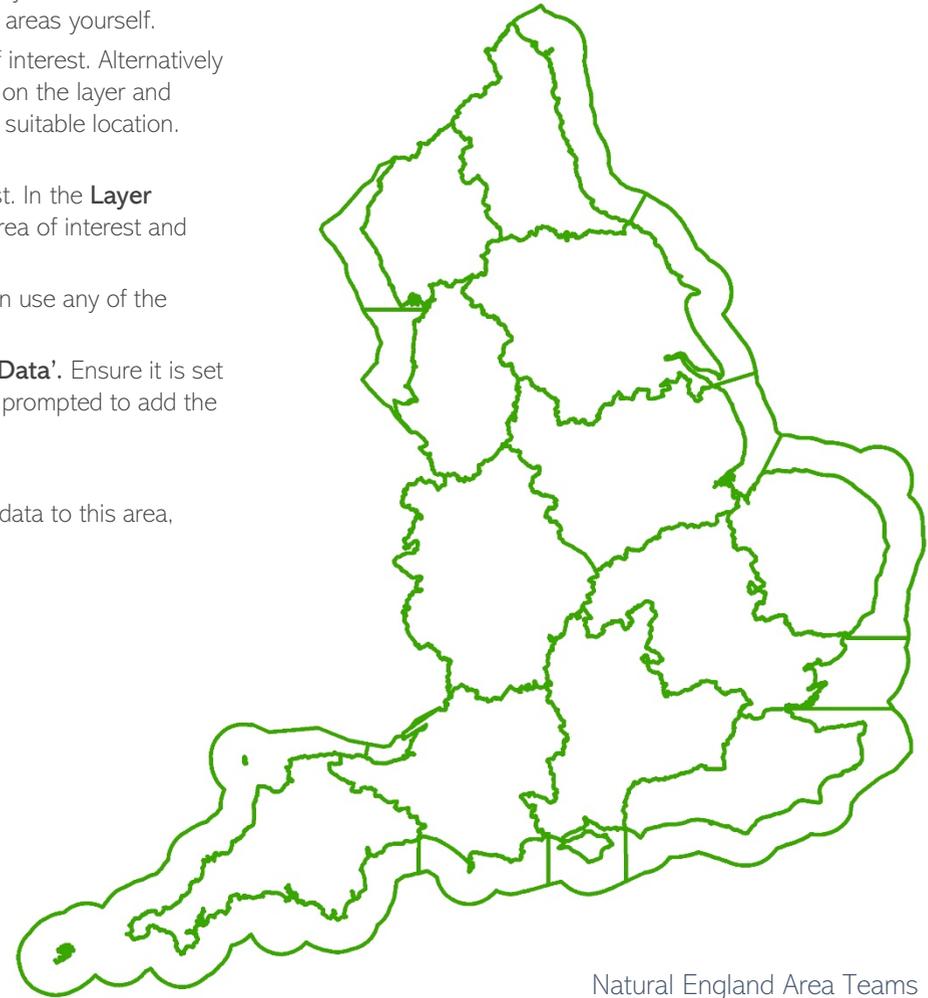
The following steps will allow you to recreate the maps in the atlas but by 'masking' to a different area or region. In this example, the maps will be masked to a Natural England Area, using the layer included in the map project. The box below suggests other possible areas of interest. You will need to source and import the shapefile for these areas yourself.

- Turn on the 'Natural England Area Teams' layer and use '**Select Features**' to select your area of interest. Alternatively use 'Select by Attribute'. You may need to select both the terrestrial and marine area. Right click on the layer and select '**Data**' then '**Export Data**'. Ensure it is set to '**Export: Selected Features**' then save in a suitable location. Once exported click 'Yes' when prompted to add the new layer to the map.
- Alternatively use a **Definition Query** to temporarily cut the layer down to your area of interest. In the **Layer Properties** window, go to the **Definition Query** tab and use the **Query Builder** to select the area of interest and click OK.
- Use '**Select by Location**' to select all the hexagons which '**Intersect**' the exported area. You can use any of the hexagon layers to do this, for example 'Co_Beach_Area'.
- Right click on the hexagon layer you have used for the selection and select '**Data**' then '**Export Data**'. Ensure it is set to '**Export: Selected Features**' then save in a suitable location. Once exported click 'Yes' when prompted to add the new layer to the map.
- Use the '**Dissolve**' tool to create a boundary of the hexagons in your area of interest.
- Then follow the instructions on the previous page to use '**Data Frame Properties**' to mask the data to this area,

Mapping other regions

The map project MXD contains a shapefile for Natural England Areas, which is one way to split the country into regions. Other areas can be mapped, as long as you have access to a shapefile of the boundary of the area of interest. Options could include:

- Local Authority area
- River catchment
- Catchment Based Approach (CaBA) partnership work area
- National Park or other designated site



Natural England Area Teams

© Natural England copyright. Contains Ordnance Survey data © Crown copyright and database right 2020

Creating Natural Capital Maps cont.

3) 'Clip' the data and change the 'symbology' to highlight local differences

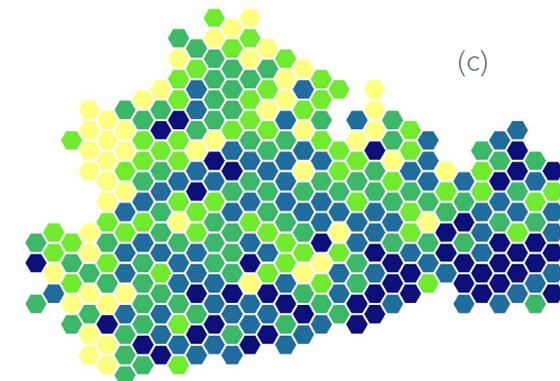
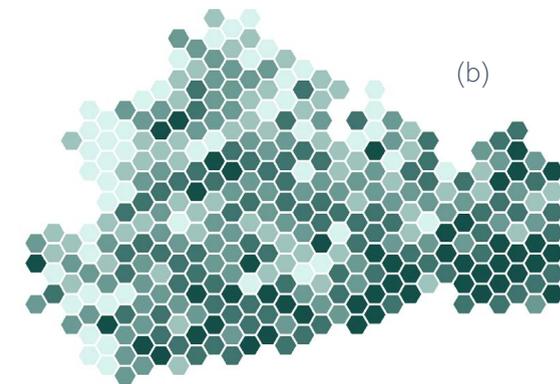
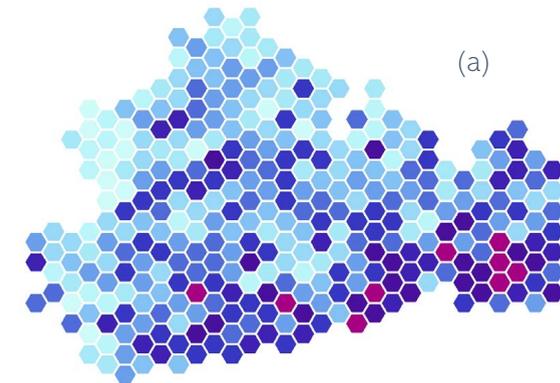
The previous two methods for creating natural capital maps assume you wish to keep the same symbology as is used in the atlases. However, the symbology for the indicators summarised by hexagons (typically a scale from pale to dark blue with purple used to show outliers), is based on the range of data across the country. To show local differences more clearly, it is necessary to clip the data and then symbolise based on the range of data within the area of interest.

To clip to one of the county/city zones used in the atlases:

- Import the Quantity indicators hexagon grid (HexGrid_Quantity). **Select by Attributes** using the 'Zone' field to select the hexagons in your county/city zone. Right click on the layer and select **'Data'** then **'Export Data'**. Ensure it is set to **'Export: Selected Features'** then save in a suitable location. Once exported click 'Yes' when prompted to add the new layer to the map.
- Repeat for the other HexGrid shapefiles if needed (Quality, Location and Ecosystem Service Flow)
- Use the **'Quantities'** option under **Symbology** properties to create your own colour scale for each of the indicators. Select the indicator under **'Value'**, then use a suitable colour ramp option. The data can be split into classes using various automated methods or by entering manual values. Click **'Classify'** to explore these options.
- Copy and paste the layer and repeat the symbology changes for different indicators. You can then build up a full set of indicator maps with bespoke local colour scales.

To clip to a different region, for example a Natural England Area:

- Turn on the 'Natural England Area Teams' layer and use **'Select Features'** to select your area of interest. Alternatively use 'Select by Attribute'. You may need to select both the terrestrial and marine area. Right click on the layer and select **'Data'** then **'Export Data'**. Ensure it is set to **'Export: Selected Features'** then save in a suitable location. Once exported click 'Yes' when prompted to add the new layer to the map.
 - Alternatively use a definition query to temporarily cut the layer down to your area of interest. In the **Layer Properties** window, go to the **Definition Query** tab and use the **Query Builder** to select the area of interest and click OK.
- Import the Quantity indicators hexagon grid (HexGrid_Quantity).
- Use **'Select by Location'** to select all the hexagons in HexGrid_Quantity which **'Intersect'** the exported area. Right click on HexGrid_Quantity layer you have used for the selection and select **'Data'** then **'Export Data'**. Ensure it is set to **'Export: Selected Features'** then save in a suitable location. Once exported click 'Yes' when prompted to add the new layer to the map.
- Repeat for the other three HexGrid shapefiles if needed.
- Then symbolise as required as per previous instructions.



Area of Improved Grassland in Surrey, shown with (a) the atlas colour scheme, based on the national range of values; (b) a single colour ramp based on the Surrey values only and; (c) a three-colour ramp based on the Surrey values only.

Creating Natural Capital Maps cont.

Presenting your maps

To make best use of the natural capital data for your local area, it is important that maps are clearly presented and easy for the audience to understand and interpret.

Legend

The generic legend used in the atlas has been included in the map package. This can be opened in PowerPoint and then adjusted to the colour schemes you choose to use.

→ To format the colour scale bar, right click on the shape and select 'Format Shape...'. Select gradient fill if not already selected, and then use the sliders and the 'Eyedropper' tool to recreate the colours in your map.

Map descriptions

It is also important to correctly describe what is being mapped, to avoid confusion or misinterpretation. The natural capital indicators were developed first, and have been clearly worked through using the logic chain. Then, the best available data has been used to map at a national scale. However, the mapped data may vary slightly from the wording in the indicators. Always check the text above each map in the atlas to understand what exactly has been mapped and where the data has come from, and use this information when presenting your maps. You can also check the metadata for more information.

Copyright information

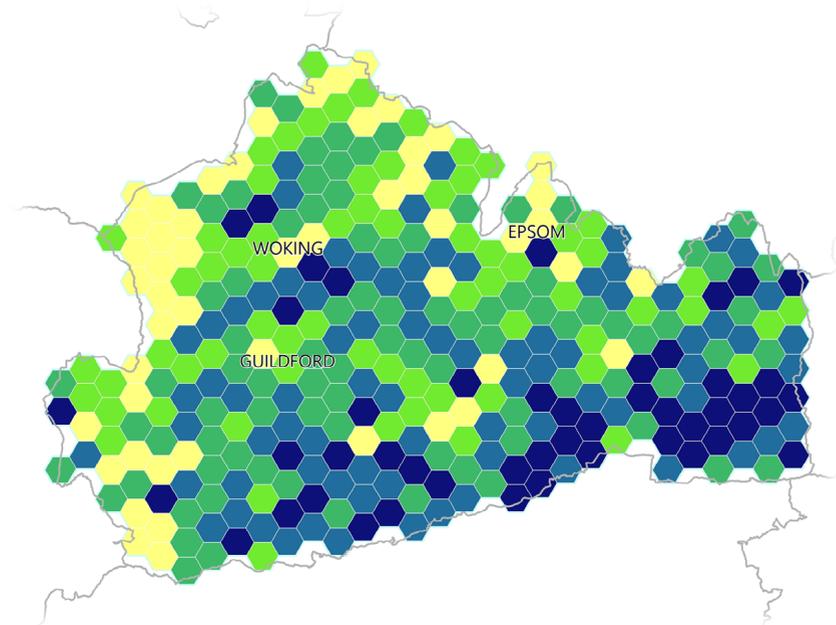
You will also need to include copyright information, which can be found at the back of each atlas.

Ecosystem services buttons

The ecosystem services buttons and key have also been included in the map package. These can also be used to aid interpretation of the maps. When recreating maps in the atlas, the buttons can be copied, or if you are using local data to map an indicator not included in the atlas, then you can use the indicator tables produced in the '[Natural Capital Indicators: for defining and measuring change in natural capital \(NERRO76\)](#)' project to look up the relevant ecosystem services and include these buttons next to your map.

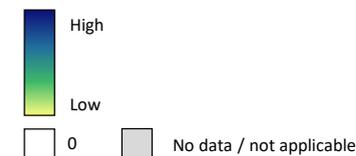
Example:

R C Improved Grassland in Surrey
Area of improved grassland in Surrey mapped using CEH's LCM2015.



Map Key

Indicator value:



LCM2015 © NERC (CEH) 2011. Contains Ordnance Survey data © Crown Copyright 2007.
Rowland, C.S.; Morton, R.D.; Carrasco, L.; McShane, G.; O'Neil, A.W.; Wood, C.M. (2017) Land Cover Map 2015 (25m raster, GB). NERC Environmental Information Data Centre.
<https://doi.org/10.5285/bb15e200-9349-403c-bda9-b430093807c7>

Using Local Data to Create Additional Natural Capital Maps

The County and City Scale Natural Capital Atlases and the supporting documents and mapping resources provide an easy and pragmatic starting point upon which to build your natural capital evidence base. Local data might be available to map some of the Natural Capital Indicators which have not been mapped in the atlases.

If local data is available for any additional indicators, it may be valuable to present the data in its original resolution or summarised into hexagonal data. These alternative local datasets will initially need to be obtained. Then, here is a brief summary of how to create maps in the style of those included in the atlases:

① Source data for each indicator and process the data so that it can be imported into GIS software

② Map the indicators that don't require summary analysis

→ Depending on the local area and the purpose of the assessment, it may be decided that summary maps (i.e. the hexagonal unit maps) are not required for all of the indicators and that 'raw data' maps are more appropriate. In this situation, it is a simple case of suitably symbolising the data.

③ Calculate indicator values per spatial unit (i.e. hexagons)

Please note that summarising by the 5km² hexagons typically works best for quantity indicators, where the area or length of a natural asset is the indicator. Consider whether you may be conflating two pieces of information, such as area and quality, by summarising the data by hexagon. In this case it may be best to show the raw data (above).

→ Import or locate the appropriate 'HexGrid' shapefile (e.g. if the new indicator is a quantity indicator, use 'HexGrid_Quantity')

→ Add a field to the attribute table to contain the indicator values (e.g. Bracken_Area). Set the field type as 'Double'.

→ Calculate the summarised values for each indicator in turn. There are a number of tools in ArcMap that allow you to summarise datasets according to the boundaries of another dataset. The tool you choose will be dependent on the dataset in question (e.g. raster/vector, file size) and your computer processing power. The **Tabulate Intersection** tool allows you to split and attribute vector datasets according to specific boundaries. The output table can then be joined to the HexGrid shapefile and then Field Calculator can be used to permanently add the information to the newly created field in the attribute table. The **Zonal Statistics** tool (available with the Spatial Analyst extension) allows you to summarise raster datasets.

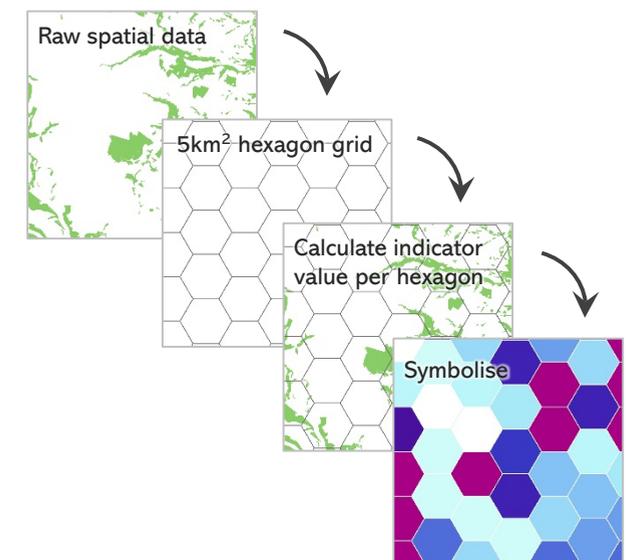
④ Symbolise layers and create maps

→ Decide whether you will use the national symbol thresholds or adjust the symbols so that they are tailored to the local range of values. Use the map template to identify symbol classes and colours if required.

Datasets that could be sought locally:

- **Detailed habitats** – this is the most important addition to a local assessment. The national assessment uses NE's Priority Habitats Inventory, which only shows priority habitat but ideally all habitats should be included. Local Records Centres may hold this information.
- **Water quality monitoring**
- **River flow monitoring**
- **Soil measurements & peat depth**
- **Species records**
- **Tree surveys** (e.g. age, species)

See the Dataset and Indicator Index (p10-11) for a list of datasets that were used in the atlases. Most of these are openly accessible and available for download from their respective websites.



Datasets & Attribute Tables Key

Asset Quantity – HexGrid_Quantity

Please note: the columns in the attribute table are not in the same order as the maps in the atlas

Map ID	Attribute Table Heading	Indicator	Map ID	Attribute Table Heading	Indicator
1	Fr_Floodplain_Area	Active flood plain	30	Wo_AncWood_Area	Ancient woodland
2	Fr_CFGrazingMarsh_Area	Coastal & floodplain grazing marsh	31	Wo_PriorityHab_Area	Priority woodland habitats
3	Fr_Lakes_Area	Lakes & standing waters	32	Ur_BlueSpace_Area	Blue space
4	Fr_LowFens_Area	Lowland Fens	33	Ur_GreenNotSemiNat_Area	Green space: not semi-natural
5	Fr_LowRaiseBog_Area	Lowland raised bog	34	Ur_OpenMosHab_Area	Open mosaic habitats
6	Fr_River_Length	Rivers	35	Ur_SemiNatHab_Area	Semi-natural habitats
7	Fr_ModWaters_Area	Modified waters (reservoirs)	36	Ur_WoodScrub_Area	Woodland, scrub and hedge
8	Fr_Reedbed_Area	Reedbeds	37	Co_Beach_Area	Beach
9	Fr_Ponds_Area	Ponds	38	Co_Lagoon_Area	Coastal lagoons
10	Fr_BBog_Area	Blanket bog	39	Co_Mflat_Area	Mudflats
11	Fr_Wood_Area	Woodland	40	Co_SMarsh_Area	Salt marsh
12	Fr_OtherSemiNatHabs_Area	Other semi-natural habitats	41	Co_SDune_Area	Sand dunes
13	Fa_ArableHort_Area	Arable & horticulture	42	Co_SCliff_Area	Sea cliff
14	Fa_ImpGrass_Area	Improved grassland	43	Co_Shing_Area	Shingle
15	Fa_Orchard_Area	Orchards & top fruit	44	Ma_InterRock_Area	Intertidal rock
16	Gr_HayMeadow_Area	Meadows	45	Ma_MaerlBed_Area	Maerl beds
17	Gr_OtherSemiNatGrass_Area	Other semi-natural grasslands	46	Ma_Reef_Area	Reefs
18	<i>see Fr_BBog_Area (ID 10)</i>	Blanket bog	47	Ma_SGrass_Area	Sea grass beds
19	MMH_DSHeath_Area	Dwarf shrub heath	48	Ma_ShallSubSed_Area	Shallow subtidal sediment
20	MMH_InRock_Area	Inland rock, scree and pavement (AML)	49	Ma_ShelfSubSed_Area	Shelf subtidal sediment
21	MMH_Lake_Area	Lakes and reservoirs (AML)	50	Ma_SubRock_Area	Subtidal rock
22	MMH_MountHeathWS_Area	Mountain heath and willow scrub	-	HexID	Each hexagon has a unique ID which can be used for Joins
23	MMH_River_Length	Rivers (above moorland line)	-	LandMarine	Whether the hexagon is a 'Land' or 'Marine' hexagon, based on the location of the centroid
24	MMH_SemiNatGrass_Area	Semi-natural grassland (AML)	-	Zone	The county/city zone the hexagon has been allocated to, based on the location of the centroid
25	MMH_UpFlushFenSwamp_Area	Upland flushes fens and swamps	-	Moor	Whether the hexagon falls partially or entirely within an upland area
26	MMH_WoodPast_Area	Wood pasture (AML)			
27	MMH_Wood_Area	Woodland (AML)			
28	Wo_BroadMixYew_Area	Broadleaved, mixed & yew woodland			
29	Wo_Conif_Area	Coniferous woodland			

Datasets & Attribute Tables Key

Asset Quality – HexGrid_Quality

Map ID	Attribute Table Heading	Indicator
57	NutriSoil	Nutrient status of soil/sediment
58	DeepPeat_Area	Peat depth
59	SoilCarbon	Soil carbon/organic matter content
60	SoilInverts	Soil biota
61	ExpectedPlantPer	Naturalness of biological assemblage
62	PolPlantCount	Presence & frequency of pollinator (larval & adult) food plants
63	VegCoverPer	Extent of permanent vegetation cover
66	All_DesHistoric	Designated historic environment assets
67	All_Tranquil	Tranquility
68	All_PROW	Public Rights of Way
-	Moor	Whether the hexagon falls partially or entirely within an upland area
-	SSSI_Area	Total area of SSSI in each hexagon, regardless of status
-	Groundwater_TotalArea	Total area of groundwater in each hexagon, regardless of status
-	WFDC2RiverLength	Total length of rivers assessed under Cycle 2 of WFD in each hexagon, regardless of status

Asset Location – HexGrid_Location

Map ID	Attribute Table Heading	Indicator
69	TotalPHI_Area	Patch size, shape and edge – Total Priority Habitat Area
	AvgPatch_Area	Patch size, shape and edge – Average Patch Size

Ecosystem Service Flow – HexGrid_ESFlows

Map ID	Attribute Table Heading	Indicator
72	WaterAvailable	Amount of water available for abstraction
73	<i>See HexGridQuality - SoilCarbon</i>	Carbon sequestered and greenhouse gases fixed

The following datasets are used in the atlases for the maps which, rather than summarising by hexagon, show the original data. These datasets have been provided as a simple way to re-create the maps in the atlas. However, the data will be updated over time. If you would like to make more up-to-date maps in future you will need to download the data directly from the source. See next pages for sources of the data.

Asset Quality & Ecosystem Service Flow – WFD_2016C2

Map ID	Attribute Table Heading	Indicator
52	REG_CLASS	Naturalness of flow regime
53	SWMIPhysMod	Lack of physical modifications of water bodies
55	CHEM_CLASS	Chemical status of water bodies
56	PHO_CLASS	Nutrient status of water bodies
64	ECO_CLASS	Naturalness of watercourses
74	OV_CLASS	Water Quality (chemical & biological, including viral & bacterial)

Asset Quality – WFD_Groundwater

Map ID	Attribute Table Heading	Indicator
51	GoodStatus	Natural aquifer function

Asset Quality – River_Obstructions

Map ID	Attribute Table Heading	Indicator
54	NA	River continuity – lack of obstructions

Asset Quality – SSSI_Units_England

Map ID	Attribute Table Heading	Indicator
65	CONDITION	Favourable condition of SSSIs

Dataset Sources

Numbers in pink show which maps/indicators the dataset was used to create.

Please note: the indicator list and data references include the coastal and marine indicators, which only appear in the relevant atlases.

Centre for Ecology & Hydrology (CEH)

- **Land Cover Map 2015** (13, 14, 20, 63)
LCM2015 © NERC (CEH) 2011. Contains Ordnance Survey data © Crown Copyright 2007.
Rowland, C.S.; Morton, R.D.; Carrasco, L.; McShane, G.; O'Neil, A.W.; Wood, C.M. (2017) Land Cover Map 2015 (25m raster, GB). NERC Environmental Information Data Centre.
<https://doi.org/10.5285/bb15e200-9349-403c-bda9-b430093807c7>
- **UK Lakes Portal** (3, 21)
UK Lakes Database © Centre for Ecology and Hydrology
Contains Ordnance Survey data © Crown copyright and database right [2020]
Hughes M., Bennion H., Kernan M., Hornby D.D., Hilton J., Phillips G. & Thomas R. (2004) The development of a GIS-based inventory of standing waters in Great Britain together with a risk-based prioritisation protocol. Water, Air, and Soil Pollution: Focus, 4 (2-3), 73-84.
[10.1023/B:WAF0.0000028346.27904.83](https://doi.org/10.1023/B:WAF0.0000028346.27904.83)
- **Inventory of reservoirs amounting to 90% of total UK storage** (7, 21)
Durant, M.J.; Counsell, C.J. (2018). Inventory of reservoirs amounting to 90% of total UK storage. NERC Environmental Information Data Centre. <https://doi.org/10.5285/f5a7d56c-cea0-4f00-b159-c3788a3b2b38>

Department for Environment, Food & Rural Affairs (Defra)

- **Strategic Noise Mapping** (67)
© Defra
- **Structure of the agricultural industry in England and the UK at June 2016** (70, 71)
<https://www.gov.uk/government/statistical-data-sets/structure-of-the-agricultural-industry-in-england-and-the-uk-at-june>

EMODnet / Natural England / Defra

- **Intertidal mudflats layer for England** (39)
Contains Defra information © Defra - Project MB0102

Environment Agency

The following datasets were used in this atlas:
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- **Saltmarsh Extents** (40)
- **WFD Water Body Water Status** (52, 55, 56, 64, 74)
- **Reasons for Not Achieving Good Database** (53)
- **WFD River Waterbodies Cycle 1** (6, 23)
- **WFD River Waterbodies Cycle 2** (52, 53, 54, 55, 56, 64, 74)
- **WFD Groundwater Bodies Cycle 2** (51)
- **Surface Water Resource Availability and Abstraction Reliability Cycle 2** (72)
- **Risk of Flooding from Rivers and Sea** (1)
- **Potential Sites of Hydropower Opportunity** (54)
- **Detailed River Network** (9)

Forestry Commission

- **National Forest Inventory** (11, 27, 28, 29, 36)
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Historic England

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- **Scheduled Monuments** (66)
- **World Heritage Sites** (66)
- **Registered Battlefields** (66)
- **Registered Parks and Gardens** (66)

Joint Nature Conservation Committee (JNCC)

- **UKSeaMap 2018** (48, 49, 50)
© Joint Nature Conservation Committee
- **Potential Annex 1 Reefs** (46)
© Joint Nature Conservation Committee

Map/Indicator List

Asset Quantity

- 1 Active flood plain
- 2 Coastal & floodplain grazing marsh
- 3 Lakes & standing waters
- 4 Lowland fens
- 5 Lowland raised bog
- 6 Rivers
- 7 Modified waters (reservoirs)
- 8 Reedbeds
- 9 Ponds
- 10 Blanket bog
- 11 Woodland
- 12 Other semi-natural habitats
- 13 Arable & horticulture
- 14 Improved grassland
- 15 Orchards & top fruit
- 16 Meadows
- 17 Other semi-natural grasslands
- 18 Blanket bog
- 19 Dwarf shrub heath
- 20 Inland rock, scree and pavement (above moorland line)
- 21 Lakes and reservoirs (above moorland line)
- 22 Mountain heath and willow scrub
- 23 Rivers (above moorland line)
- 24 Semi-natural grassland (above moorland line)
- 25 Upland flushes fens and swamps
- 26 Wood pasture (above moorland line)
- 27 Woodland (above moorland line)
- 28 Broadleaved, mixed & yew woodland
- 29 Coniferous woodland
- 30 Ancient woodland
- 31 Priority woodland habitats
- 32 Blue space
- 33 Green space: not semi-natural
- 34 Open mosaic habitats
- 35 Semi-natural habitats
- 36 Woodland, scrub and hedge
- 37 Beach
- 38 Coastal lagoons
- 39 Mudflats
- 40 Salt marsh
- 41 Sand dunes
- 42 Sea cliff
- 43 Shingle
- 44 Intertidal rock
- 45 Maerl beds
- 46 Reefs
- 47 Sea grass beds
- 48 Shallow subtidal sediment
- 49 Shelf subtidal sediment
- 50 Subtidal rock

Asset Quality

- 51 Natural aquifer function
- 52 Naturalness of flow regime
- 53 Lack of physical modifications of water bodies
- 54 River continuity – lack of obstructions
- 55 Chemical status of water bodies
- 56 Nutrient status of water bodies
- 57 Nutrient status of soil/sediment
- 58 Peat depth
- 59 Soil carbon/organic matter content
- 60 Soil biota
- 61 Naturalness of biological assemblage
- 62 Presence & frequency of pollinator (larval & adult) food plants
- 63 Extent of permanent vegetation cover
- 64 Naturalness of watercourses
- 65 Favourable condition of SSSIs
- 66 Designated historic environment assets
- 67 Tranquility
- 68 Public Rights of Way

Asset Location

- 69 Patch size, shape and edge

Ecosystem Service Flow

- 70 Production of crops
- 71 Number and type of reared animals
- 72 Amount of water available for abstraction
- 73 Carbon sequestered and greenhouse gases fixed
- 74 Water Quality (chemical & biological, including viral & bacterial)

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Natural England

The following datasets were used in this atlas: © Natural England copyright. Contains Ordnance Survey data © Crown copyright and database right [2020]

- **Priority Habitat Inventory** (2, 4, 5, 8, 10, 12, 15, 16, 17, 18, 19, 20, 22, 24, 25, 31, 35, 38, 41, 42, 43, 69)
- **SSSI Units** (65)
- **Open Mosaic Habitat (Draft)** (34)
- **Wood Pasture and Parkland** (26)
- **Open Marine Evidence GDB** (44, 45, 47)
- **Ancient Woodlands** (30)

Natural England & Centre for Ecology & Hydrology (CEH)

- **Natural Capital Maps** (57, 59, 60, 61, 62, 73)

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Natural England, British Geological Survey (BGS) and Cranfield University

- **Peaty Soils Location** (58)

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Office for National Statistics (ONS)

- **Built-up Areas (December 2011) Boundaries V2** (32, 35, 36)

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Ordnance Survey

The following datasets were used in this atlas: Contains Ordnance Survey data © Crown copyright and database right [2020]

- **VectorMap District** (7, 9, 21, 32, 37)
- **Open Green Space Layer** (33)
- **Boundary-Line™**

Rural Payments Agency (via MAGIC)

- **Moorland Line (England)** (20, 21, 23, 24, 26, 27)

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N.b. Dataset used as a guide for identifying habitats above the moorland line.

Public Rights of Way Data – Multiple Sources

The rights of way data is derived from multiple sources, directed from the rowmaps website: www.rowmaps.com

All datasets used have open licenses (terms equivalent to OS Opendata License or Open Government License). The following Local Authorities produced data that was used to map rights of way in England (70)

- Barnsley Metropolitan Borough Council
- Bath & North East Somerset Council
- Bedford Borough Council
- London Borough of Bexley
- Birmingham City Council
- Blackburn with Darwen Borough Council
- Blackpool Council
- Bolton Council
- BCP Council
- Bracknell Forest Council
- City of Bradford Metropolitan District Council
- Brighton & Hove City Council
- Bristol City Council
- London Borough of Bromley
- Buckinghamshire County Council
- Bury Council
- Calderdale Council
- Cambridgeshire County Council
- Central Bedfordshire Council
- Cheshire East Council
- Cheshire West and Chester Council
- Cornwall Council
- Cumbria County Council
- Derbyshire County Council
- Devon County Council
- Doncaster Council
- Dorset Council
- Dudley Metropolitan Borough Council
- Durham County Council
- East Riding of Yorkshire Council
- East Sussex County Council
- Essex County Council
- Gateshead Council
- Gloucestershire County Council
- Hampshire County Council
- Herefordshire Council
- Hertfordshire County Council
- Hull City Council
- Isle of Anglesey County Council
- Isle of Wight Council
- Kent County Council
- Kirklees Council
- Knowsley Metropolitan Borough Council
- Lake District National Park
- Lancashire County Council
- Leicester City Council
- Leicestershire County Council
- Lincolnshire County Council
- Manchester City Council
- Medway Council
- Norfolk County Council
- North Lincolnshire Council
- North Somerset Council
- North Yorkshire County Council
- Northamptonshire County Council
- Northumberland County Council
- Nottingham City Council
- Nottinghamshire County Council
- Oldham Council
- Oxfordshire County Council
- Peterborough City Council
- Plymouth City Council
- Bournemouth, Christchurch and Poole Council
- Portsmouth City Council
- Reading Borough Council
- Redcar and Cleveland Borough Council
- Rochdale Borough Council
- Rotherham Metropolitan Borough Council
- Rutland County Council
- Salford City Council
- Sefton Council
- Sheffield City Council
- Shropshire Council
- Slough Borough Council
- Somerset County Council
- South Gloucestershire Council
- Southampton City Council
- St Helens Council
- Staffordshire County Council
- Stockport Metropolitan Borough Council
- Stockton Council
- Suffolk County Council
- Surrey County Council
- Tameside Metropolitan Borough Council
- Thurrock Council
- Torbay Council
- Trafford Council
- Wakefield Council
- Walsall Council
- Warrington Borough Council
- Warwickshire County Council
- West Berkshire Council
- West Sussex County Council
- Wigan Council
- Wiltshire Council
- Royal Borough of Windsor and Maidenhead Council
- Wirral Council
- Wokingham Borough Council
- Worcestershire County Council
- City of York Council

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