



Environment
Agency



The Natural Capital Register and Account Tool version 1.2 – User Guide

Chief Scientist's Group report

July 2023

Project code: ENVWLB00460C

We are the Environment Agency. We protect and improve the environment.

We help people and wildlife adapt to climate change and reduce its impacts, including flooding, drought, sea level rise and coastal erosion.

We improve the quality of our water, land and air by tackling pollution. We work with businesses to help them comply with environmental regulations. A healthy and diverse environment enhances people's lives and contributes to economic growth.

We can't do this alone. We work as part of the Defra group (Department for Environment, Food & Rural Affairs), with the rest of government, local councils, businesses, civil society groups and local communities to create a better place for people and wildlife.

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Research at the Environment Agency

Scientific research and analysis underpin everything the Environment Agency does. It helps us to understand and manage the environment effectively. Our own experts work with leading scientific organisations, universities and other parts of the Defra group to bring the best knowledge to bear on the environmental problems that we face now and in the future. Our scientific work is published as summaries and reports, freely available to all.

This report is the result of research commissioned by the Environment Agency's Chief Scientist's Group.

You can find out more about our current science programmes at <https://www.gov.uk/government/organisations/environment-agency/about/research>

If you have any comments or questions about this report or the Environment Agency's other scientific work, please contact research@environment-agency.gov.uk.

Dr Robert Bradburne
Chief Scientist

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Licensing, citation and access

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When using NCRAT and associated resources, we ask that you acknowledge the outputs as '**Created using the Environment Agency Natural Capital Register and Account Tool version 1.2 (July 2023)**'.

NCRAT includes:

- Environment Agency Natural Capital Register and Account Tool version 1.2, Workbook
- Environment Agency natural capital scorecard version 1.2
- Environment Agency Natural Capital Register and Account Tool version 1.2, Quick-Start Guide
- Environment Agency Natural Capital Register and Account Tool version 1.2, User Guide
- Environment Agency Natural Capital Register and Account Tool, version 1.2, Technical Report

NCRAT can be accessed at www.gov.uk/government/publications/natural-capital-register-and-account-tool or by email request from the Environment Agency Natural Capital Team at naturalcapital@environment-agency.gov.uk.

For Environment Agency and Defra group staff; NCRAT is hosted on the [Environment Agency Natural Capital SharePoint site](#).

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Project team:

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Version history and change control

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|---------|-----------------|
| v1.0 | 06 April 2021 |
| v1.1 | 05 January 2022 |
| v1.2 | 12 July 2023 |

| Version | Changes to this document | Corresponding change to other NCRAT resources | Author | Date |
|---------|--|---|-----------|-----------|
| v1.2 | Pages, 2, 6 and 7 (amendments to authors, citation, and acknowledgments) | NCRAT User guide NCRAT Excel workbook | G. Kinsey | 15 Jan 24 |

Executive summary



“Building nature into our plans and decisions has never been more important to achieve our ambitions in improving the environment and reaching net zero. Doing this robustly enables us to engage with the many people who will help us deliver these improvements on the ground. This update of NCRAT brings the evidence it accesses up to date and will allow users to engage more easily in the process of accounting for natural capital in their projects and to have confidence in the results. I look forward to seeing how we and others can use it to make better places for people and nature.”

Dr Robert Bradburne - Environment Agency Chief Scientist

A natural capital register and account presents the value, quantity and quality of natural resources in a place. The outputs can change the way we see the environment and the value it gives to our lives and the economy, as well as helping to monitor net gain, or net loss, of natural assets.

This User Guide and the associated Technical Report provide an overview of the Environment Agency Natural Capital Register and Account Tool, what it can be used for, and a detailed explanation of its workings. Caveats, limitations and potential future developments are also discussed, and a case study shows outputs and use of NCRAT.

NCRAT can be used without specialist economic knowledge to create a strategic view of natural capital assets in a place (from Local Authority to River Basin District) and the value that they provide to the local economy.

Until now, a natural capital register and account took months to produce and thousands of pounds in specialists' fees. Now, with the 'Environment Agency Natural Capital Register and Account Tool', you can create an account yourself within days and for free. As far as we are aware, as a replicable, transferable, scalable and freely available tool, this remains the first of its kind.

The Environment Agency Natural Capital Team wants to empower staff and partners to take a natural capital approach in a robust, transparent and consistent way. To do this we are creating a suite of natural capital tools and products to help inform better decisions and conversations about England's natural assets. These tools will help us to design better outcomes for people and places, and collaborate with stakeholders on collective priorities, benefits and risks.

The Environment Agency Natural Capital Register and Account Tool, and its scorecard are among the first of these tools. It provides a way to create place-based natural capital registers and accounts using built-in benefit and valuation data, and when used alongside the scorecard it is a ready-made engagement product. NCRAT is primarily for use in England, but aspects may be adapted for use in Wales, Scotland and Northern Ireland.

The team's cross-cutting work is testing the theory of a natural capital approach and working towards developing best practice with common data standards.

The Natural Capital Team will be actively collecting feedback from users of NCRAT to add to an evaluation of its performance and using this to develop the next iteration.

In releasing this tool, it is important to note that:

- A natural capital register and account will only ever reveal a partial value of nature. There are many services and functions of nature that are not valued in this tool (for example, noise regulation or pollination) and there are many ecosystem services that cannot be effectively valued in any account, for example the full value of biodiversity
- It is not a decision-making tool but will complement an evidence base for a place to help support place-based decisions
- NCRAT and its outputs are not designed for use in a regulatory context or for flood appraisals
- The values presented for the ecosystem services are intended to show a partial view of the irreplaceable services that nature provides to the local economy for free, or little input. It is not a price or a value for exchange. Previously natural resources have not been valued at all, leading to reduction or mismanagement of the asset

There has been contention in some environmental circles, with economists and the government facing criticism for trying to put a “price tag” on nature. It is important to understand that this is not the intention of natural capital accounts. The intention is to communicate with audiences outside of the environment sector about how nature contributes to the local economy and wellbeing. Valuing the services that people receive from nature is a powerful way of doing this and can encourage more systematic and transparent thinking about the wider consequences of environmental decision-making.

Unless a quantity is attributed to a benefit that people get from nature, it may be unlikely to be recognised in the decision-making process. It is also helpful to then express benefits in monetary terms to be able to compare like-for-like (for example, costs in £ with benefits in £). Natural capital accounting encourages systematic and transparent thinking about the wider consequences of environmental decision making. We will only ever be able to present part of the natural capital story with quantity and monetary figures. The rest we must continue to describe in words and ensure these descriptions are given equal standing to any figures. This remains a challenge and one we will aim to meet in future iterations of NCRAT and its scorecard.

“... making the moral case for protecting nature for its own sake, because it is beautiful and important, and we have no right to destroy it – the case campaigners have been making for half a century or more - has demonstrably failed. When nature is valued at nothing, when it is invisible in the economic system by which we live, that system invariably tosses it aside.”

Isabella Tree, Chapter 17, The Value of Nature, in ‘Wilding, the return of nature to a British farm’ (2018).

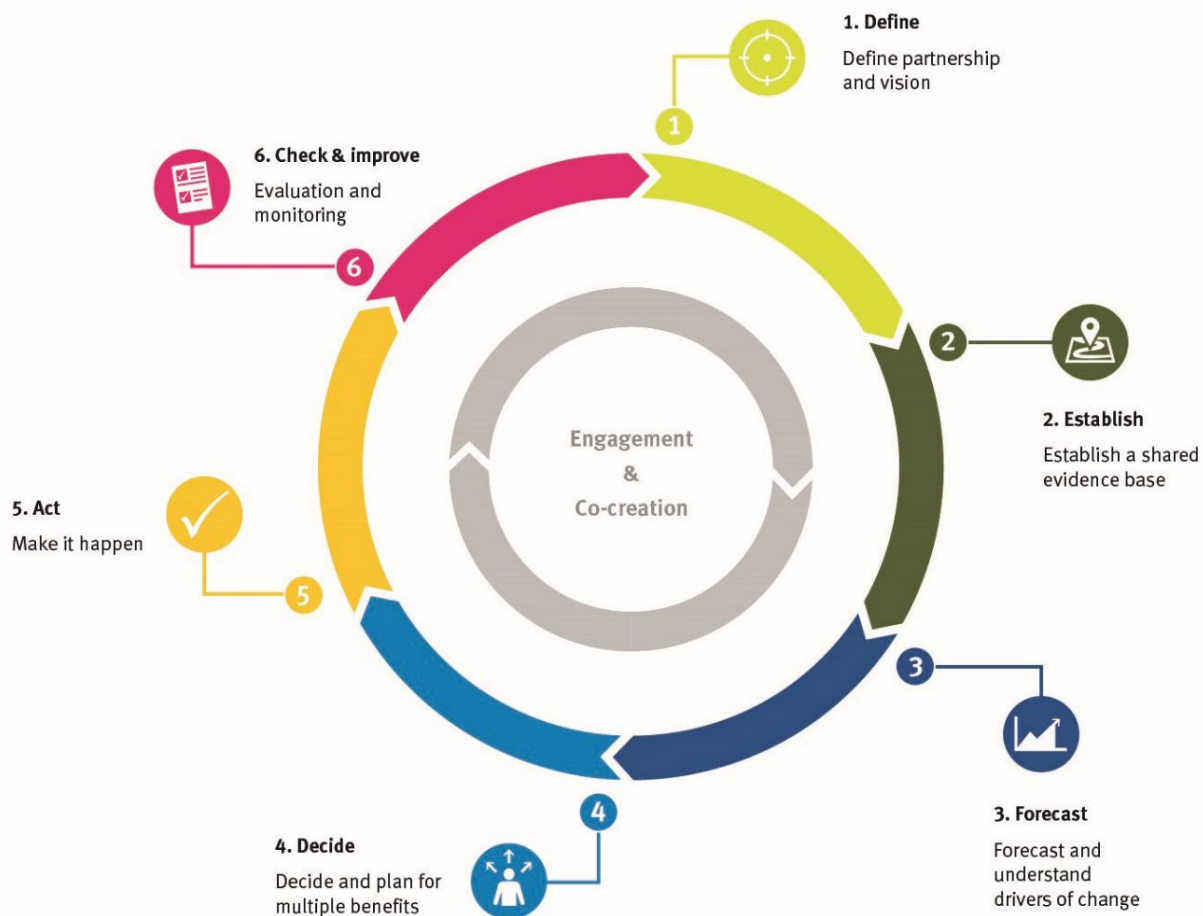
The Environment Agency Natural Capital Register and Account Tool

Purpose of NCRAT

The Environment Agency has developed NCRAT as a means to record the extent and condition of natural assets in a place (a natural capital register) and to use the information to estimate the flow of services from the assets. NCRAT then applies monetary values to some of those services and presents them in the form of a benefits statement of a natural capital account. By doing so, NCRAT enables organisations to present a documented account of their natural capital in a compatible format that extends their traditional financial reporting.

A natural capital register and account is a key part of establishing an evidence base as part of a place-based environmental planning and delivery cycle, as shown in Figure 1 (step 2).

Figure 1. A place-based environmental planning and delivery cycle



A natural capital register and account tells the environmental story a new way; describing the value produced by natural assets within a place which in turn can start new conversations about the value of our natural environment with different audiences.

Value can be expressed in many ways including, in part, in monetary terms. By calculating (where possible) a monetary value to the benefits produced by natural assets, we become better able to understand what the local economy might lose should those natural assets come under threat. It may help businesses better understand the value that natural capital provides to the local area and how it supports the local economy.

A natural capital register and account can:

- Help to establish a baseline register of natural assets and services for a place
- Bring into focus the value and benefits that the natural environment provides to the local economy and community
- Support prioritisation and place-based planning

Whilst the outputs from NCRAT are intended to provide decision makers with evidence to support place-based planning and investment, this should always be used alongside other information, such as may be gained by stakeholder engagement, to help inform decisions.

Some of the benefits that nature provides are too intangible or bundled with other benefits to be able to place individual monetary values on. The impact of some benefits can also vary greatly from person to person depending on an individual's circumstances. This means that not all the natural capital of a place can be quantitatively described with monetary figures, the rest we must describe qualitatively in words with the ongoing challenge of ensuring the narrative is given equal standing to any figures.

Overview of NCRAT

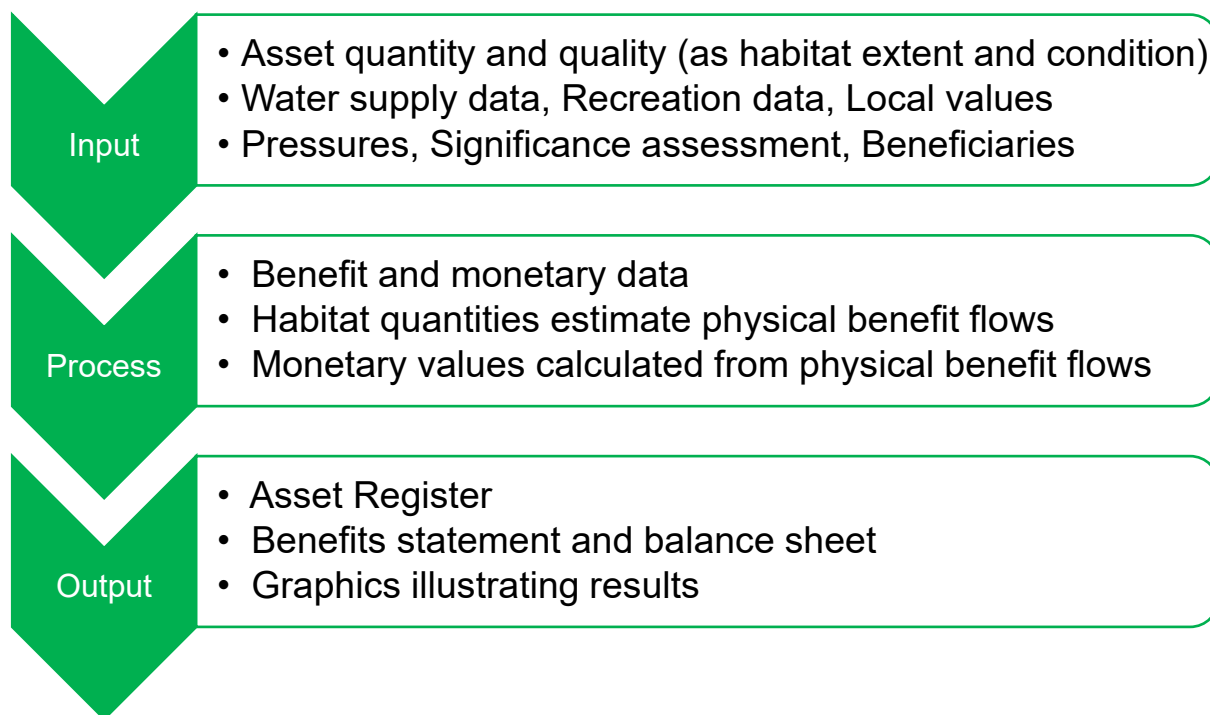
Applicability and layout of NCRAT

NCRAT is best applied at a scale above 10,000 hectares, up to a few million hectares.

NCRAT requires habitat extent and condition and other local data to be input by the user. The user will require some geographic information system (GIS) knowledge or assistance to obtain the necessary data for entry into NCRAT. In this guide, we have included links to GIS datasets where possible. If you require further guidance on how to do this, please contact the Environment Agency at naturalcapital@environment-agency.gov.uk.

NCRAT automatically runs calculations by using the user's input and employs built-in valuation data to generate estimated benefit quantities and any associated monetary values. It provides a summary of this information in a benefits statement. The flow chart in figure 2 shows these steps.

Figure 2. NCRAT flow chart



Colour-coding within NCRAT



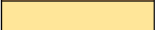
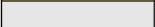
NCRAT contains instructions for the user, these are depicted in **blue** font.

NCRAT also contains notes to the user, these are depicted in **grey** font.

The cells and tabs in NCRAT are colour-coded to indicate where data needs to be entered and where it is optional (figure 3).

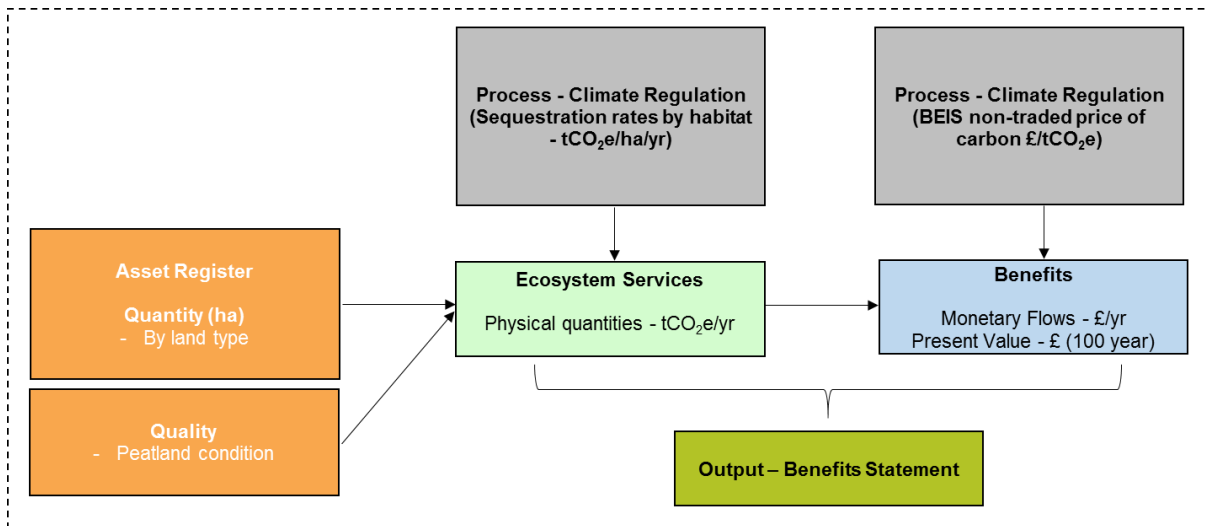
Figure 3: User input cell colour key used in NCRAT

Cells within input tabs that require user input are highlighted in the following colours:

| | |
|---|--|
|  | Dark orange: input data must be provided to run default calculations |
|  | Light orange: input data is optional (i.e. to override default assumptions) |
|  | Pale orange: input data could be provided, to enhance the register/account, but does not inform specific calculations in the tool |
|  | Grey: no local input data is required |

The structure of NCRAT is based around 'logic chains' that characterise the flow of benefits from natural capital. Logic chains are presented in the process tabs to show the component parts for each benefit flow calculation. An example of a logic chain, for the ecosystem service 'climate regulation', is shown in figure 4.

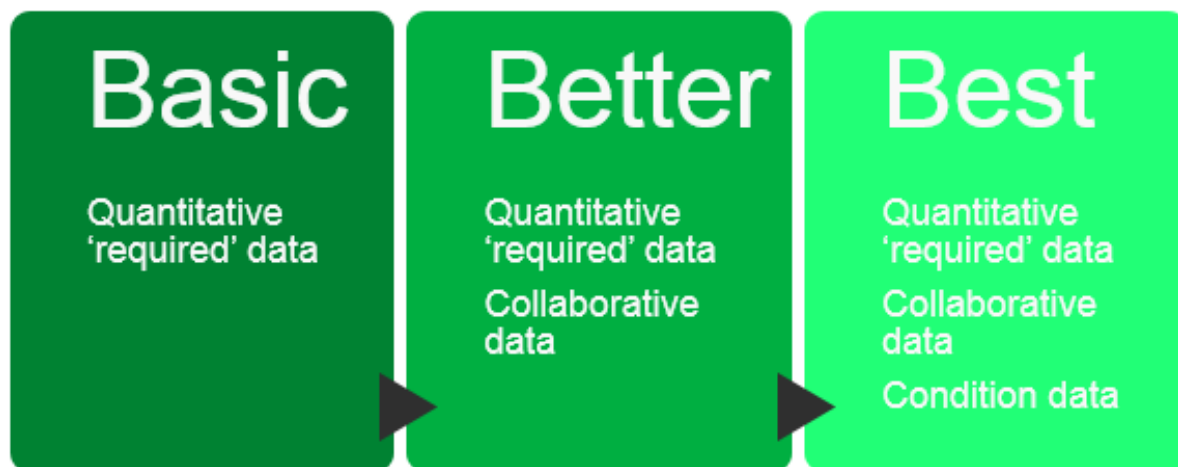
Figure 4: Logic chain example – climate regulation



Levels of data entry

NCRAT and its outputs can be completed to different levels or tiers, 'Basic, Better or Best' (figure 5).

Figure 5. Different tiers for completing NCRAT



The level of completion depends on the amount of data entered and whether the data for some aspects of NCRAT has been developed collaboratively.

It is strongly advised that a natural capital register and account is built in collaboration with others. Stakeholder engagement should be a fundamental aspect of determining the input data for and interpreting the results from the register and account. Other organisations and local stakeholder groups may be able to provide (or have access to) locally specific data, as well as providing different perspectives to qualitative assessments such as risks, pressures, and the significance of benefits in a place. Involving others will help to build a better shared understanding of a place's natural capital assets and the benefits they provide.

A 'basic' account can be produced by entering the required quantitative data in NCRAT's input tabs; 'Place Description', 'Asset Register' and 'Local Values'. Except for information on peatland, fish landings, education and volunteering, this basic data is relatively easy to obtain by using open-source, nationally available land cover data such as the Corine Land Cover inventory (see Annex 1), data available from the Environment Agency and data from the University of Exeter's Outdoor Recreation Valuation tool (see 'Using ORVal to generate recreation values' under the 'Tab input – local values' section).

A 'better' account can be produced by additionally completing the 'Significance assessment' and 'Beneficiaries assessment' tabs in collaboration with stakeholders. This type of collaborative work could take around 5-10 days, spaced over a period of several weeks.

A 'best' account goes even further and requires the inclusion of asset condition trend data in the 'Asset register' tab and completion of the 'NC Risks' tab to provide an overview of the pressures on assets. Some suggested sources of data are included in NCRAT.

Ecosystem Services and benefit flow calculations

Thirteen ecosystem services (sub-divided into twenty-two) are included in NCRAT. It includes information and values about ecosystem services for which we have been able to gather robust and reliable benefit and value information. These are shown in figure 6.

Figure 6. Icons for the ecosystem services quantified and valued in NCRAT



We aim to add more values for ecosystem services to the account in further development of NCRAT. Supporting services are not included, because, as they underpin cultural, provisioning and regulating services to introduce them would be to increase the risk of double counting in the account.

NCRAT automatically calculates benefit flows from user-input data, look-up tables and built-in monetary valuation data. This is used to generate the output benefits statement and other results for the account.

Benefit flow calculations use various data and assumptions. These are detailed within the process tabs in NCRAT.

In the main, NCRAT uses the extent of natural capital assets (habitats) to calculate benefits. There are some cases where the condition of an asset is used to calculate benefits, for example peatland condition is used to calculate carbon emissions. Where

asset condition is not included in the calculation of benefits, a default assumption is made that the asset is in average condition.

Asset condition data is recorded within NCRAT to provide a fuller picture of the state of natural capital assets and should inform the assessment of risks and pressures acting on natural capital assets.

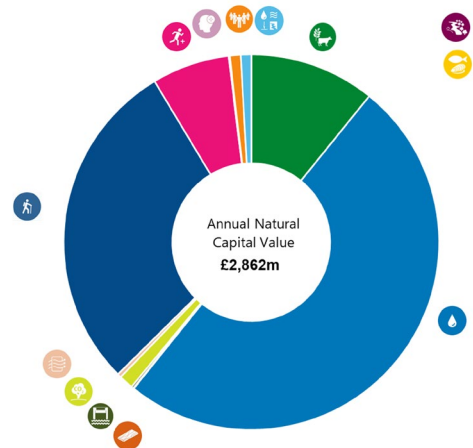
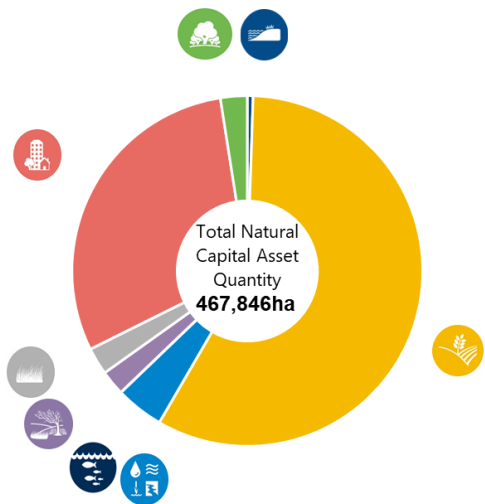
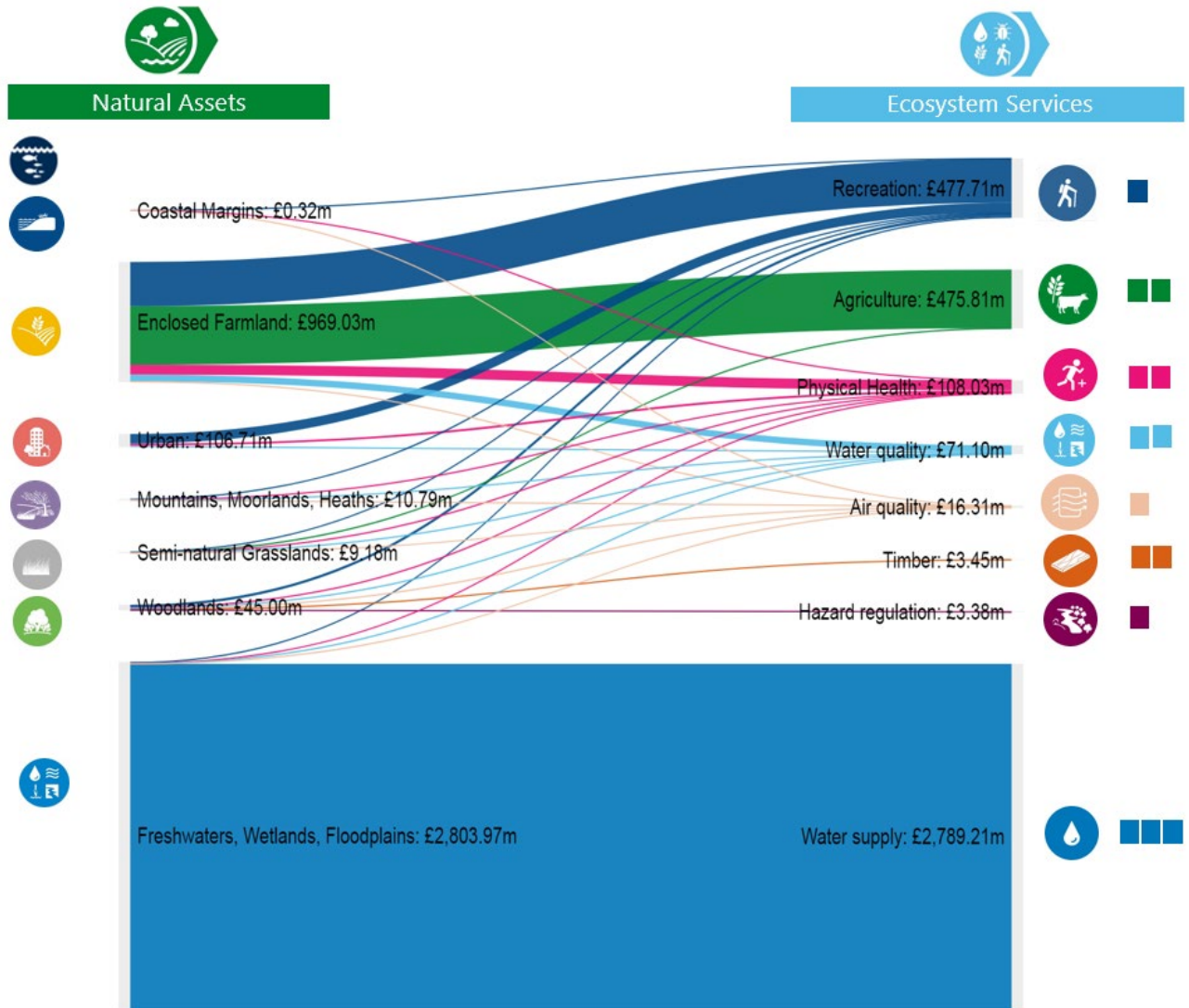
Outputs

NCRAT provides the options to generate:

- An asset register showing the extent of natural capital assets, categorised by habitat type, within a user-specified area
- A summary of the condition of the natural capital assets
- A physical flow account showing the estimated flows of services from the natural capital assets
- A monetary account showing the economic values in terms of benefits derived by wider society from natural capital assets
- The present value of the benefits that natural capital assets (if appropriately managed) can provide over time
- Automated graphics that illustrate the outputs for the benefits statement

To support users of NCRAT in communicating their natural capital account, the scorecard template can be completed after the register and account to summarise and present the graphics in a visually engaging way alongside an interpretive narrative (see figure 7).

Figure 7. Examples of graphics created in NCRAT



Tab by tab data entry

The guidance below is supplementary to specific instructions to the user within NCRAT itself. Please read this user guide alongside the instructions within NCRAT.

For Environment Agency users, a [data support package](#) is available on SharePoint. This enables selection of basic input data within a range of boundaries frequently used by the Environment Agency. For other users, with a place defined by a bespoke boundary, further guidance is given in the sections below.

Tab 'Input – Place Description'

The 'Input – Place Description' tab requires the user to enter information about the place for which the natural capital register and account is being produced. Users will need a defined boundary which outlines their place as well as local context of the surrounding environment. See figure 8.

Figure 8. Input tab for 'Place Description'

Description of place and purpose of the natural capital register and account

To provide context for the natural capital register and account for your chosen place, you may find it useful to enter some basic information about the place, location and purpose of creating a natural capital register and account, including who has been involved in its creation. This will support the assessment and communication of the results that are generated and presented within this tool. Your chosen 'place' might be a catchment, a local authority, an Environment Agency Area, etc.

Click +/- to show more/less

Instruction: Use the drop-down lists and free text cells to set out the basic details about the place and purpose of the account, including the organisations who have been involved in completing it. You may wish to include information about their specific involvement e.g. contributed to completing the risk register, and a relevant date. For water quality benefit flow values to be calculated in the tool, you must also select the required scale of the analysis in cell B17 i.e. 'management catchment', 'operational catchment' or 'other' (for example any area which crosses multiple operational catchments). If either management or operational catchment are chosen, the specific catchment must be selected from the corresponding drop-down lists (cells B23 and B26 respectively). If your chosen place does not align with a single management or operational catchment (if you selected 'other' for selected scale), you can select up to 40 operational catchments your area covers from the drop-down lists in cells B30:B69 along with the percentage of the catchments that are covered. For example, if your area covers two operational catchments in their entirety and half of a third, you should enter 100%, 100% and 50% in cells C30:C69 alongside the corresponding operational catchments. The relevant River Basin District should also be entered in cell B20 from the drop-down list in order to calculate water quality benefit flow values for transitional, coastal waters and lakes. Please see the User Guide for more information about what an operational and management catchment is, and a River Basin District, and where you can find more information about them.

Data sensitivity
OFFICIAL

Chosen name for your 'place'
Example

Set accounting price year
2023

Selected scale
Other

Relevant River Basin District
North West

Management Catchment (if appropriate)

Operational Catchment (if only one, see below to input multiple)

Operational Catchesments (if multiple included in your chosen place) and percentage of these covered

| Operational Catchesments | Percentage |
|-----------------------------------|------------|
| All | 5 |
| Bolin Dean Mersey Upper | 100 |
| Calder Upper | 1 |
| Croal Irwell | 99 |
| Dane | 100 |
| Dee Estuary | 39 |
| Dee Lower Chester Weir to Ceiring | 56 |
| Ditton | 97 |
| Douglas OC | 1 |
| Glaze | 99 |
| Gowy | 100 |

For detailed guidance on how to complete these cells please refer to the User Guide

Must be selected to activate values for TRaC waters. If multiple River Basins use space below (Cell:B84) to note these and see user guide for instruction

Use the drop down lists to add all the operational catchesments in your Area

Only include information in B30:C69 if "Other" is selected in B17. Please include the total % of the operational catchment included within your Area e.g. '100' or '45' (etc 1 100). The number must NOT be input as a % but a whole number e.g. 35.5 and not 35.5%. Calculations on water quality are generated from this information.

ReadMe | **Input - Place Description** | Input - Asset Register | Input - NC Risks | Input - Local Values | Input - Beneficiaries Assessment | Input - Significance Assessment

Drop-down lists and free text cells are provided to record the description of the place and the purpose of producing a natural capital register and account, including identifying those who have been involved in completing it. The cells should be completed as explained below.

Cell B8 input for 'Data sensitivity'

Free text. Enter an appropriate data sensitivity marking (for example, 'OFFICIAL'). This will appear throughout NCRAT. See Figure 9.

Figure 9. Cell input for 'Data sensitivity'



Cell B11 input for 'Chosen name for your place'

Free text. Enter your choice of name for the place. This will appear throughout NCRAT. See figure 10.

Figure 10. Cell input for 'Chosen name of your place'



Cell B14 input for 'Set accounting price year'

Free text. Enter an accounting price year (for example, '2021'). All the monetary values in the workbook will be inflated to the same price base. See figure 11.

Figure 11. Cell input for 'Set accounting price year'



Cell B17 input for 'Selected scale'

Select from the drop-down list. The options are 'Management Catchment', 'Operational Catchment' or 'Other'. See figure 12.

Figure 12. Cell input for 'Selected scale'



This input (along with appropriate inputs to cells B23, B26 and B30 (see sections below) is critical for generating the benefit flow calculations for water quality of rivers. Water quality

calculations for transitional and coastal (TraC) waters and for lakes depend on input into cell B20 'Relevant River Basin District' (see below).

A Management Catchment is a unit of geography used for managing the water environment. They have been delineated using Water Framework Directive (WFD) Regulations for waterbody catchments¹.

An Operational Catchment is a smaller geographical unit which Environment Agency staff refer to and use for local, place-based environment planning and implementation activities. These have been delineated using local knowledge of the water environment.

You can access information about the water environment for Management Catchments and Operational Catchments (including their boundaries) using the [Environment Agency Catchment Data Explorer](#). You can use place name, postcode, coordinates, or a catchment/water body name to search.

If selecting 'Other' you will need to enter all the relevant Operational Catchments within your place in cells B30 onwards (see 'B30 cell input' below).

NCRAT has also been designed to function at other scales. This includes River Basin Districts (RBDs)², Tier 2 or 3 [Environmental Land Management \(ELM\) schemes](#)³, multiple Operational Catchments, or Local Authority areas but please note, NCRAT is best applied at scale above 10,000 hectares up to a few million hectares.

If you are working at a scale smaller than a Management Catchment and using remote-sensed habitat information, such as Corine Land Cover data (see Annex 1 below), there is potential for a wide error margin due to the level of data resolution. To mitigate this, alternative local mapping data could be used instead. NCRAT has been designed to take data from any mapping source including data classified using the 'UKHab' system (see

¹ The '[Water Environment \(Water Framework Directive\) \(England & Wales\) Regulations 2017](#)' provides a framework for managing the water environment in England and Wales. This is also referred to as the WFD Regulations.

² RBDs are based on river basins and are used as the natural unit for coordinated water management for the WFD Regulations. RBDs cover entire water environment systems, including river, lake, groundwater, estuarine and coastal water bodies. See also the [Environment Agency Catchment Data Explorer](#).

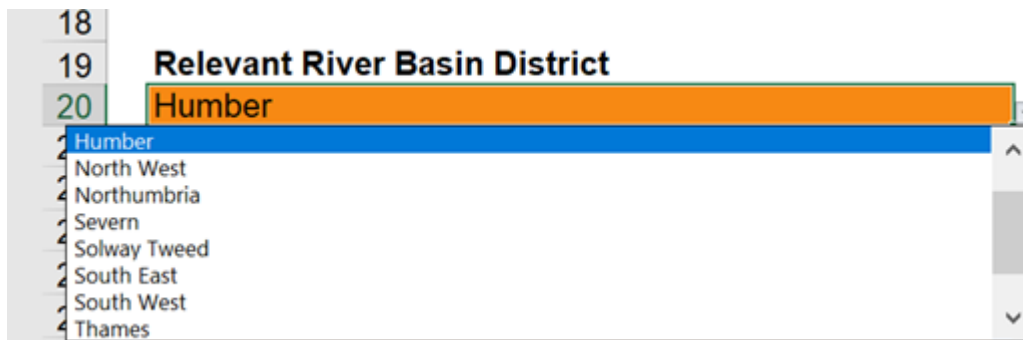
³ Tier 2 schemes are the delivery of locally targeted environmental outcomes, with outcomes likely to rely on collaboration between land managers. Tier 3 schemes are focused on landscape scale land-use change projects, which can be fully aligned with other government activities (for example, the [Nature for Climate Fund](#)).

'Input - asset register' section below). Manual data over-rides can also help mitigate this by tailoring the account to the local context.

Cell B20 input for 'Relevant River Basin District'

Select from the drop-down list. Choose the River Basin District (RBD) that applies to your place (see footnote 2, above, for more information on RBDs). See figure 13.

Figure 13. Cell input for River Basin District



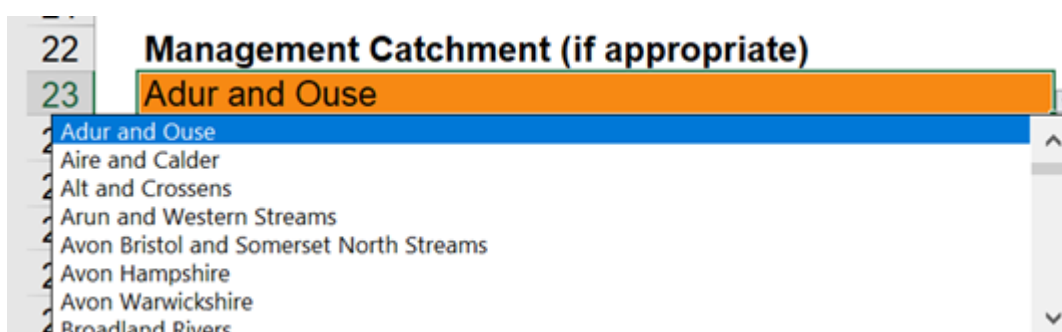
Once selected, NCRAT then automatically looks up the appropriate per-km² values from the 'Water Quality Look-up (TrC&L)' tab. This is critical for generating the benefit flow calculations for water quality of transitional and coastal (TraC) waters and for lakes. Water quality calculations of rivers are covered by the input into cell B17 'Selected Scale' (see above).

If your place covers multiple RBDs with multiple transitional and coastal waters, please see the 'Tab Input – Asset Register' section below for 'Rows 108 to 120 input for transitional and coastal waters and lakes - ecological status' and use cell B84 to record the RBDs present (see 'Cell B84 input' below).

Cell B23 input for 'Management Catchment (if appropriate)'

Select the Management Catchment that applies to your place from the drop-down list. This is for places based on a single Management Catchment. Leave blank if your place is a different scale (see 'Cell B17 input', above, for more information on Management Catchments). See figure 14.

Figure 14. Cell input for Management Catchment



Cell B26 input for 'Operational Catchment (if only one)'

Select the Operational Catchment that applies to your place from the drop-down list. This is for places based on a single Operational Catchment. Leave blank if your place is a different scale (see 'Cell B17 input', above, for more information on Operational Catchments). See figure 15.

Figure 15. Cell input for Operational Catchment



Cell B30 input for 'Operational Catchments (if multiple)'

Cells B30 down to B69 provide drop-down lists of Operational Catchments. See 'Cell B17 input', above, for more information on Operational Catchments. Additionally, data can be downloaded from [Defra Spatial Data](#) and clipped using GIS. Note, users will need to tick 'WFD Surface water operational catchments' from the drop-down layer list.

Ensure that 'Other' has been chosen under 'Selected Scale' (cell B17), then you will need to enter the names of all the relevant Operational Catchments in your place in cells B30 downwards. Also ensure that unused cells remain blank. See figure 16.

Figure 16. Cell input for multiple Operational Catchments

| Row | Operational Catchments (if multiple included in your chosen place) and percentage of these covered | Percentage |
|-----|--|------------|
| 28 | Operational Catchments | Percentage |
| 30 | Alt | 5 |
| 31 | Bollin Dean Mersey Upper | 100 |

Cells C30 down to C69 are for input of the percentages of each of the Operational Catchments present in your place. Ensure you enter values as numbers between 0 and 100 without the percentage symbol. For example, enter '4.6' or '100' but not '4.6%' or '100%'. If correctly entered, NCRAT will display the rounded figures without the percentage symbol as shown in figure 16 (above). Again, ensure that unused cells remain blank.

Map data of Operational Catchments can be downloaded from [Defra Spatial Data](#) (note, users will need to tick ‘WFD Surface water operational catchments’ from the drop-down layer list). For Environment Agency users, see the [data support package](#) on SharePoint.

A completed example shown in figure 17.

Figure 17. Completed input for multiple Operational Catchments

| 28 | Operational Catchments (if multiple included in your chosen place) and percentage of these covered | |
|----|--|------------|
| 29 | Operational Catchments | Percentage |
| 30 | Alt | 5 |
| 31 | Bollin Dean Mersey Upper | 100 |
| 32 | Calder Upper | 1 |
| 33 | Croal Irwell | 99 |
| 34 | Dane | 100 |
| 35 | Dee Estuary | 39 |
| 36 | Dee Lower Chester Weir to Ceiriog | 56 |
| 37 | Ditton | 97 |
| 38 | Douglas OC | 1 |
| 39 | Glaze | 99 |
| 40 | Gowpy | 100 |
| 41 | Goyt Etherow Tame | 100 |
| 42 | Roch Irk Medlock | 100 |
| 43 | Sankey | 100 |
| 44 | Weaver Lower | 100 |
| 45 | Weaver Upper | 100 |
| 46 | Wirral | 99 |
| 47 | Worthenbury | 36 |
| 48 | | |

Cell B72 input for ‘Local Authority (if appropriate)’

Optional free text. If appropriate, enter the name of the local authority (or authorities) covered by your place. This helps develop the descriptive narrative, context and relevance for your place’s register and account. It does not affect the calculations. See figure 18.

Figure 18. Cell input for ‘Local Authority’

| | |
|----|---|
| 71 | Local Authority (if appropriate) |
| 72 | Newark & Sherwood District Council |
| 73 | |

Cell B75 input for ‘Environment Agency Area (if appropriate)’

Optional free text. If appropriate, enter the name of the Environment Agency Area or Areas covered by your place. This helps develop the descriptive narrative, context and relevance for your place’s register and account. It does not affect the calculations. See figure 19.

Figure 19. Cell input for 'Environment Agency Area'

| | |
|----|---|
| 73 | |
| 74 | Environment Agency Area (if appropriate) |
| 75 | West Midlands |
| 76 | |

Cell B78 input for 'Area (other, if appropriate)'

Optional free text. If appropriate, enter your own choice of name for your place. This helps develop the descriptive narrative, context and relevance for your place's register and account. It does not affect the calculations. See figure 20.

Figure 20. Cell input for 'Area (Other, if appropriate)'

| | |
|----|-------------------------------------|
| 76 | |
| 77 | Area (other, if appropriate) |
| 78 | The Broads National Park |
| 79 | |

Cell B81 input for 'Size (ha)'

Optional free text. Enter the area of your place in hectares. This helps develop the descriptive narrative, context and relevance for your place's register and account. It does not affect the calculations. See figure 21.

Figure 21. Cell input for 'Size (ha)'

| | |
|----|------------------|
| 79 | |
| 80 | Size (ha) |
| 81 | 12,540 |
| 82 | |

Cell B84 input for 'Place description'

Optional free text. Enter a description of your place. Also use this space to record RBDs if your place covers more than one RBD (see 'Cell B20 input' above). Working collaboratively to generate a description helps capture the natural capital relevance for your place's register and account. It does not affect the calculations. See figure 22.

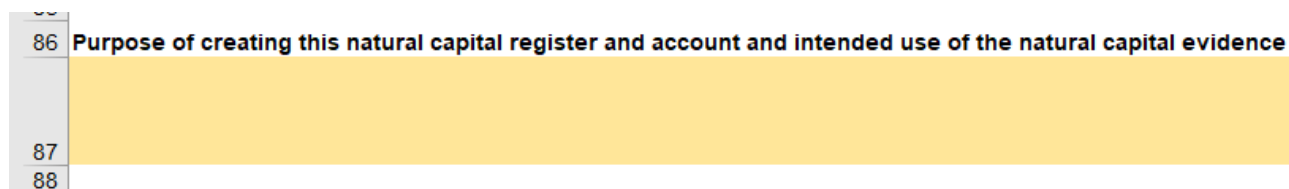
Figure 22. Cell input for 'Place description'

| | |
|----|--|
| 82 | |
| 83 | Place description |
| 84 | A chalk plateau in south western part of central southern England with two national nature reserves. Significant biodiverse chalk downland, archeological sites and extensive military training areas. |
| 85 | |

Cell B87 input for ‘Purpose of creating this natural capital register and account and intended use...’

Optional Free text. Enter the purpose of creating this register and account. Working collaboratively to develop an understanding of purpose helps show the relevance of the data collected and the outputs of NCRAT. It does not affect the calculations. Figure 23.

Figure 23. Cell input for ‘Purpose of creating this natural capital register and account’

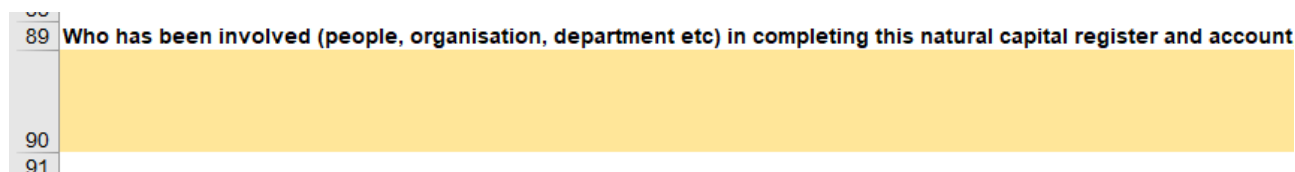


| | |
|----|--|
| 86 | Purpose of creating this natural capital register and account and intended use of the natural capital evidence |
| 87 | |
| 88 | |

Cell B90 input for ‘Who has been involved...’

Optional Free text. Enter the names of the people and organisations who have contributed to creating the natural capital register and account of your place. This helps develop buy-in for the outputs of NCRAT. It does not affect the calculations. Figure 24.

Figure 24. Cell input for ‘Who has been involved’



| | |
|----|--|
| 89 | Who has been involved (people, organisation, department etc) in completing this natural capital register and account |
| 90 | |
| 91 | |

Tab ‘Input – Asset Register’

The 'Input - Asset Register' tab is for the user to enter data about the quantity (in terms of extent of habitats) and quality (in terms of their condition and trend in condition) of the natural capital assets present in their place.

Natural capital quantity

Rows 13 to 22 summary of natural capital quantity

Rows 13 to 22 provide a summary table giving the totals for each of the eight broad habitats according to the [UK National Ecosystem Assessment](#) (UKNEA) classification scheme (see Annex 1). This is automatically populated from the user’s input of habitat extent data further down the tab. The data in the summary table is used in NCRAT’s calculations. Figure 25 shows an example of a completed summary table.

Figure 25. Summary of natural capital quantity

| UKNEA broad habitat type | Quantity (Ha) | % of total area |
|---|----------------------|------------------------|
| Coastal margins | 2,494 | 0.5 |
| Enclosed farmland | 270,621 | 57.8 |
| Freshwaters - Open waters, wetlands and floodplains | 20,754 | 4.4 |
| Marine | 68 | 0.0 |
| Mountains, moorlands and heaths | 10,779 | 2.3 |
| Semi-natural grasslands | 11,755 | 2.5 |
| Urban | 139,839 | 29.9 |
| Woodlands | 11,536 | 2.5 |
| Total | 467,846 | 100 |

Rows 26 to 63 input for habitat extent

In this section of the tab, users input data on habitat extent into column D. As a minimum, the dark orange cells must be populated for the asset register to be generated. See figure 26.

Figure 26. Input habitat extent rows 26 to 63 (example of mixed entry)

| UKNEA broad habitat type | UKHab level 3 or 4 classification | Quantity (Ha) | % of total area |
|--|--|----------------|-----------------|
| Coastal margins | Supralittoral rock (includes maritime cliffs and slopes) | | 0.0 |
| Coastal margins | Supralittoral sediment (includes coastal sand dunes and vegetated shingle) | | 0.0 |
| Coastal margins | Coastal saltmarsh (lv. 4) | 1,908 | 76.5 |
| Coastal margins | Intertidal mudflats (lv. 4) | 586 | 23.5 |
| Coastal margins | Uncategorised / not included above | | 0.0 |
| Coastal margins | Total | 2,494 | 100.0 |
| Enclosed farmland | Modified grassland | 165,237 | 61.1 |
| Enclosed farmland | Arable and horticulture (includes Intensive orchards) | 103,394 | 38.2 |
| Enclosed farmland | Uncategorised / not included above | 1,990 | 0.7 |
| Enclosed farmland | Total | 270,621 | 100.0 |
| Freshwaters - Open waters, wetlands and floodplains | Fen marsh and swamp | | 0.0 |
| Freshwaters - Open waters, wetlands and floodplains | Standing open water and canals | 1,917 | 9.2 |
| Freshwaters - Open waters, wetlands and floodplains | Rivers and streams | | 0.0 |
| Freshwaters - Open waters, wetlands and floodplains | Bog | 18,302 | 88.2 |
| Freshwaters - Open waters, wetlands and floodplains | Uncategorised / not included above | 534 | 2.6 |
| Freshwaters - Open waters, wetlands and floodplains | Total | 20,754 | 100.0 |
| Marine | Other littoral sediment | 68 | 100.0 |
| Marine | Uncategorised / not included above | | 0.0 |
| Marine | Total | 68 | 100.0 |
| Mountains, moorlands and heaths | Inland rock | | 0.0 |
| Mountains, moorlands and heaths | Dwarf shrub heath | | 0.0 |
| Mountains, moorlands and heaths | Dense scrub | | 0.0 |
| Mountains, moorlands and heaths | Uncategorised / not included above | 10,779 | 100.0 |
| Mountains, moorlands and heaths | Total | 10,779 | 100.0 |
| Semi-natural grasslands | Acid grassland | | 0.0 |
| Semi-natural grasslands | Calcareous grassland | | 0.0 |
| Semi-natural grasslands | Neutral grassland | | 0.0 |
| Semi-natural grasslands | Uncategorised / not included above | 11,755 | 100.0 |
| Semi-natural grasslands | Total | 11,755 | 100.0 |
| Urban | Built-up areas and gardens | | 0.0 |
| Urban | Uncategorised / not included above | 139,839 | 100.0 |
| Urban | Total | 139,839 | 100.0 |
| Woodlands | Broadleaved mixed and yew woodland | 9,701 | 84.1 |
| Woodlands | Coniferous woodland | 1,835 | 15.9 |
| Woodlands | Uncategorised / not included above | | 0.0 |
| Woodlands | Total | 11,536 | 100.0 |
| Total | | 467,846 | |

Habitat extent data from any source may be used. The default source for registers and accounts in the Environment Agency is [Corine Land Cover \(CLC\)](#). This dataset is open-source and has national coverage which allows us to share and compare results with others. NCRAT includes an alignment to enable data classified by CLC code to be input to each of the respective 8 broad habitats of the UKNEA classification system (column 1 of the tab).

Habitat data compiled using other classification systems can also be entered into NCRAT. To aid this, column C provides an alignment of the [UKHab](#) classification system to the UKNEA broad habitats. Users are reminded of the need to comply with the licence conditions for using the UKHab system and materials as detailed in the 'Licencing, citation and access' section above. See Annex 1 for more information on how CLC and UKHab classifications have been aligned to the UKNEA broad habitats. If data has been obtained that is organised using an alternative classification system, the user should align their classification to the UKNEA broad habitats in similar fashion.

Further sources of data are additionally suggested in column I. These include UK Centre for Ecology and Hydrology (CEH) [Land Cover Maps](#), Natural England [Priority Habitats Inventory](#) and [Open Street Map](#).

Habitat extent is the principal data required to generate the account and whilst the user is encouraged to gather as much information as possible, it is not always possible to obtain a fully comprehensive set of habitat data. To help with this, NCRAT allows for different level of completion:

- As a minimum requirement, the total extent in hectares of each of the broad habitats should be entered in the dark orange cells.
- Some of NCRAT's calculations (such as carbon sequestration) depend on input of more specific habitat information, these are indicated by the optional light-orange cells in column C ('coastal saltmarsh', 'fen marsh and swamp' and 'bog'), leaving these cells blank will mean a zero value is applied to the relevant calculations.
- Completing the light-yellow cells is also optional but will provide a more complete picture of habitat extent. Leaving them blank does not prevent benefit calculations within NCRAT. However, for the category of enclosed farmland, if you have data for the extent of modified grassland (i.e., pasture) and arable land these should be entered in cells D33 and D34 to improve the account's representation of agricultural production, otherwise a default 50:50 split is applied to 'uncategorised' enclosed farmland.

Natural capital asset condition

In this section of the tab (rows 74 to 179), a range of indicators are listed in column B and users input data on the associated condition into column D and enter the trend in condition by selecting from the drop-down lists in column G.

Indicator data for peatland and for waterbody ecological status (if entered) is used in the respective calculations for climate regulation and water quality.

The remaining indicators of condition, whilst not used in calculations, are particularly useful when considering the risks and pressures acting on natural assets and the ecosystem services they might provide (see 'Tab Input-NC Risks' section, below). Together, all the indicators can help provide a baseline narrative of the present condition of the natural capital assets in a place.

Trends in condition are likewise important for developing a more dynamic narrative for the place. For each indicator, the user can select from the drop-down list of 'improving', 'declining', 'stable' and 'unknown'.

The condition assessment should be referenced to a report, dataset or similar source and include the year of the assessment. Collaborative working with other organisations and local stakeholder groups may be able to provide locally specific data, as well as providing different insights to condition and trends.

The notes in column I, 'Data Source', describe where to obtain data for asset condition. Below are some additional notes for the more complex datasets and data entry requirements.

Rows 75 to 80 input for peatland extent and condition

Data on 'Peatland extent and condition' can be entered in cells D76 to D80. NCRAT has been set up to record peat condition by the four condition categories defined in the [UK Peatland Code \(2017\)](#), i.e. 'actively eroding', 'drained', 'modified' or 'near natural'. NCRAT uses these categories to calculate carbon emissions. If no condition data is entered then a zero value will be applied and used in the calculation of net carbon sequestration.

Local surveys may provide useful sources of peatland information which support this categorisation. If no suitable peatland condition information is available, the [Peatland Code Field Protocol](#) provides a guide to a desktop exercise for estimating areas by the four key categories. This requires mapping using a suitable GIS tool to estimate the required areas by category. Alternatively, some further suggest resources are described below.

The Natural England dataset [England Peat Status GHG and C storage](#) includes an approximation of the extent of peat derived from Cranfield Environment Centre's [NATMAP](#), the [British Geological Survey](#) of superficial geology, and the bog habitat polygons Natural England's [Priority Habitats Inventory](#).

Natural England have also produced a [Peaty Soils Location](#) map layer and a [Moorland Deep Peat AP Status](#) map layer.

For peat extent, the CEH [Land Cover Maps](#) may be the only dataset with full national coverage including peat lowland areas. CEH licence their land cover maps, with licence conditions depending on how the dataset is used. Please visit [CEH Land Cover Maps](#) for more information and contact details.

Chapter 7 of the Joint Nature Conservation Committee's 2011 report [Towards an assessment of the state of UK Peatlands](#) provides references and commentary on datasets, maps and peat condition.

It is advisable to add a note to the asset register and scorecard section of NCRAT's outputs saying what data you have used for peat extent and peat condition. The following note can be added to the scorecard template:

"Most peat in England is in degraded condition. Degraded peat is an emitter of carbon dioxide. If peat extent and condition is added to this account and depending on the extent of peat in the place, the climate regulation service figure may be negative, showing the place as having net emissions, rather than sequestration, of carbon dioxide equivalents."

Rows 81 to 84 input for woodland characteristics

This section is for the user to input data on the extent in hectares of 'woodland under management', of 'ancient woodland' and of 'woodland pasture'. These inputs are not linked to calculations but are useful for developing narrative and considering pressures on assets and risks to services.

'Woodland area under management', is based on the Forestry Commission's definition of having had a felling licence in the past ten years, being owned by government organisations or having a management plan. Forestry Commission provide an open data source [Felling Licence Applications England](#). GIS assistance will be required to extract the area of managed woodland with the data filtered to find licences granted within the last 10 years.

'Area of ancient woodland' is obtained by combining two elements of the Natural England [Ancient Woodland Database](#); namely 'Plantations on Ancient Woodland Sites' and 'Ancient Semi-Natural Woodland' where the information is extracted by GIS analysis.

'Area of wood pasture' is defined as a subset of 'broadleaved mixed and yew woodland' but is not separately defined within UKHab nor, therefore, the habitat extent section of the asset register tab. However, area information can be extracted by GIS analysis of [Corine Land Cover](#) (code 244).

Rows 85 to 92 (not in use)

Rows 93 to 107 input for river ecological and chemical status

This section of the tab is for counts of waterbodies and total lengths in kilometres of rivers categorised by ecological status and by chemical status. This information is used in calculations for water quality values and is also useful for developing narrative and for considering pressures.

Counts of waterbodies by ecological status and river length data are automatically populated when the 'selected scale' and 'operational catchments' are completed in the 'Input – Place Description' tab (see section above). Refer to column I, 'Data source' for further details.

Chemical status is not automatically generated and will need user input in cells D100 to D101. This data can be found by searching for the WFD waterbody or catchment area in the Environment Agency [Catchment Data Explorer](#).

Rows 108 to 120 input for transitional and coastal waters and lakes ecological status

This section of the tab is for counts of waterbodies and total areas (km²) of transitional and coastal (TraC) waters and lakes categorised by ecological status (high, good, moderate, poor or bad). This information is used in calculations for water quality values and is also useful for developing narrative and for considering pressures.

User input is required as this data is not automatically generated. The data can be obtained and input as follows.

Using GIS, the counts and areas of TraC and lakes within the boundary of the place can be identified by combining a series of datasets available from the [Defra Data Services Platform](#). This includes the Environment Agency shapefiles with boundaries of the WFD waterbodies, namely [WFD Transitional and Coastal Waterbodies](#) and [WFD Lakes Waterbodies](#), as well as classification data from the Environment Agency [Catchment Data Explorer](#).

To calculate the values for entry in the tab:

- Download the datasets, or relevant sections of the datasets which intersect your place, and load into GIS
- Select the TraC waters that intersect your place or use your judgement to decide how much of the waterbodies to include and clip them to that extent
- Select the Lakes which intersect your place or clip to the relevant extent
- For each TraC waterbody or lake identified or clipped, refer to its attributes to find its area (attribute 'shape_area'). This will be in m² and needs to be converted to km².
- For each waterbody check the attribute for its name. Type this name into the search in the Catchment Data Explorer. This will give the ecological status class of this waterbody.
- Enter the appropriate counts and the areas for each ecological status class in cells D109 to D120.

Alternatively, if your place is within a standard Environment Agency boundary, the information can be found in NCRAT's 'Water Quality Look-up (TrC&L)' tab. There are three tables in this tab, namely 'National Water Environment Benefit Survey (NWEBS) values', 'Transitional and Coastal Water Classification Data' and 'Lakes WFD classification data'.

To derive the data for your place, proceed as follows:

- In the 'Water Quality Look-up (TrC&L)' tab, filter the 'Transitional and Coastal Water Classification Data' table by operational catchment, river basin or 'EA WM area' to match your place's boundary.
- In similar fashion, filter the 'Lakes WFD classification data' table to include those lakes that fall within your place.
- Into cells D109 to D114 of the 'Input-Asset Register tab', enter the appropriate counts of water bodies for each ecological status for both TraC waters and lakes combined.
- Into cells D116 to D120 of the 'Input-Asset Register tab', enter the appropriate areas (in km²) of water bodies for each ecological status, again, for both TraC waters and lakes combined.

In the 'Input – Place Description' tab, you must select the relevant river basin district from the drop-down list (cell B20). This will activate the water quality values (from the 'NWEBS values' table in the look-up tab for TraC waters and lakes to calculate the benefit in the process tab.

If your place has TraC waters across more than one River Basin District (RBD), then proceed as follows:

- Save your main version of NCRAT separately and then make sufficient blank copies of NCRAT to allow you to run the TraC waters data for each RBD individually (as described above).
- Make a note of the totals for each RBD as shown in the 'Process – Water Quality (TrC&L)' tab 'summary' section (the annual values in cells D14 to F14 and 100-year discounted values in cells D18 to F18).
- Combine the individual RBD figures to give the totals for your place.
- Enter the new totals into your main copy to NCRAT in the 'Process – Water Quality (TrC&L)' tab, cells D14 to F14 and D18 to F18, overwriting the formulas there. Include a note of how you arrived at those totals (for example, add a 'comment' to tab 'Process - Water Quality (TrC&L)' cells D14 to F14 and D18 to F18).

Rows 121 to 129 input for groundwater overall status

This section is for inputting total extent (km²) and counts of groundwater bodies by quantitative status (good, poor or unknown) and chemical status (good, poor or unknown). These inputs are not linked to calculations but are useful for developing narrative and for considering the pressures on assets and risks to services.

Extent information for your place can be extracted from the [WFD Groundwater Bodies](#) dataset ([groundwater map layer](#)). For qualitative status, see also the Environment Agency [Catchment Data Explorer](#).

Rows 130 to 138 input for water availability (Q95) surface waters and groundwaters

This section is for input of counts of surface waterbodies categorised by their availability for licenced usage at lowest flow ('Q95').

Data can be found using the [Water Resource Availability and Abstraction Reliability](#) dataset.

Groundwater management units colour-coded according to 'water available for licensing', 'restricted water available for licensing' or 'water not available for licensing' can be found by clicking the [Available Downloadable Datasets](#) link.

Using the [Preview](#) link, select the 'Resource Availability at Q95' layer from the map's drop down layer list. This provides the lowest flow map which should be used to compile a count of surface waters by availability category.

Rows 139 to 144 input for bathing water status

This is for inputting counts of designated bathing waters categorised by condition status. Information can be found at [Bathing Water Data](#). Bathing water status is updated on an annual basis and is classified as 'excellent', 'good', 'sufficient' or 'poor'. These inputs are not linked to calculations but are useful for developing narrative and for considering the pressures on assets and risks to services.

Bathing waters can be selected individually or by county, district, borough or water company and may be downloaded in CSV format or viewed on screen by using the 'compare sites' tab.

Rows 145 to 159 input for SSSI condition

This is for inputting total counts of Sites of Special Scientific Interest (SSSIs), totals of SSSI areas categorised by condition status and proportions of total extent as categorised by condition status.

Information can be found by using the Natural England map dataset [Sites of Special Scientific Interest \(England\)](#).

Natural England's objective is to achieve 'favourable condition' status for all SSSIs. Favourable condition means that the SSSI's habitats and features are in a healthy state and are being conserved by appropriate management.

Rows 160 to 170 input for protected area statutory sites

This is for inputting counts of sites as categorised by statutory designation.

Information can be found at the JNCC's [UK Protected Area Datasets for Download](#) and [UK Marine Protected Area Datasets for Download](#).

Statutory sites are protected under UK, European and International law. The designations included for input are 'Special protected areas', 'Special areas of conservation', 'Ramsar sites' (Wetlands), 'National nature reserves' and 'Local Nature reserves' and 'Marine Protected Areas'.

Rows 171 to 173 input for protected area non-statutory sites

The recommended user inputs are count of sites and total area of sites (hectares).

Guidance on where data is held and how it can be accessed can be found in Section 4.3.2 of The Wildlife Trusts' [Local Wildlife Sites](#) report. Data can also be downloaded from the Natural England [Local Nature Reserves \(England\)](#) dataset.

Local Wildlife Sites (LWSs)⁴ are wildlife-rich sites selected for their local nature conservation value. They vary in shape and size and can contain important, distinctive and threatened habitats and species. In many parts of the UK they are the principal wildlife resource but their designation is non-statutory, their only protection comes via the planning system ([Local Wildlife Sites](#)).

Rows 174 to 179 input for green and blue space

This is for inputting total area of green space (ha) and total area of blue space (ha), with the option of including 'number of people living within a user-defined distance of green/blue space', 'access to green/blue space' and 'quality of green/blue space'⁵ at the user's discretion. It is up to the user to decide which GIS green and blue space datasets are most relevant to their place.

Information and downloads can be found in Natural England's [Green Infrastructure maps](#) or via the [Green Infrastructure portal](#).

⁴ LWSs are sites with "substantive nature conservation value" (The Wildlife Trusts, 2018 p.3).

⁵ The Green Infrastructure Framework defines greenspace quality as "Meeting the needs and expectations of both the staff and users of a site and the wider community and neighbourhood. Such sites are visually stimulating and attractive, safe, and welcoming to all sections of society, managed and maintained to the highest standards of sustainability, and provide an enjoyable and inspirational visitor experience".

Total area of green and/or blue space (ha) can be estimated using the 'Green and Blue Infrastructure Opendata Geopackage', which can be downloaded from the [Green Infrastructure Framework](#).

Green space has a broad definition and can include the following characteristics:

- An area of vegetation that is set within a landscape or townscape, which may include blue space (lakes, rivers and wetlands) as well as built environment features
- Not all greenspace is publicly accessible (for example, allotments or golf courses)
- Can be urban or rural, with high quality greenspace designed to deliver intended functions to meet defined needs.

The Green Infrastructure Framework's [Green Infrastructure maps](#) contain multiple layers depicting 'green and blue infrastructure assets', including 'all green infrastructure' (not limited to publicly accessible spaces), 'accessible green infrastructure' (limited to those with public access) and separate layers for 'blue infrastructure'. For further details refer to the [Green Infrastructure Mapping User Guide](#).

NCRAT does not provide indicators for the number of people living within a given distance of green/blue space, accessibility or quality. Users may instead define their own indicators and appropriate units to measure these. The suggested approach is to align to Natural England's 'Accessible Natural Green Space Standards' (ANGSt). Guidance on ANGSt and an accompanying toolkit is available from [ANGSt Review and Toolkit ENRR526](#).

Tab 'Input – Local Values'

This tab allows the user to add contextual, place-based information to the register and account. It offers an opportunity to refine the assessment by going beyond the default assumptions and tailoring some calculations to better represent your place.

The dark orange cells indicate where data entry is required to activate benefit flow calculations. Data entry is not essential for each of the dark orange cells, but where it is included, it will add more local context to the register and account outputs.

The tab also includes the opportunity to input benefits that are not directly linked to natural capital asset and extent data (such as volunteering days) and to override some of the default data and assumptions that are applied to calculate benefits.

Rows 15 to 91 input of place-specific local values

Table 1 below provides information on the inputs for rows 15 to 91. Where it says, 'default calculation', this means calculations and assumptions are made based on the data entered for asset extent or quality in tab 'Input – Asset Register'. Specific instructions and further guidance are provided in column L.

Table 1: Description of local value data input

| Ecosystem Service | Input |
|--|--|
| <p>Agriculture (Rows 18 to 42)</p> | <p>If cell E18 is left as ‘No’, the defaults are applied, and no further input is required. If ‘Yes’ is selected, then additional cells show as dark orange. These indicate options to input land area splits, local annual yields, and gross margins. These inputs will override the default national values used in NCRAT, including those for feed wheat, dairy cows, beef, sheep (lowland) and sheep (upland).</p> |
| <p>Fish and shellfish landings (Rows 48 and 49)</p> | <p>If relevant, input annual volume of fish and/or shellfish landings in tonnes to cell E48 and E49. Suggested source: MMO (2021) UK Sea Fisheries Annual Statistics Report 2020. Use the “UK and foreign landings by port 2016 - 2020 (updated)” file. Only include fish landings from vessels less than 10m in length</p> |
| <p>Water supply (Rows 50 to 52)</p> | <p>The Environment Agency holds information about annual authorised quantities of water abstraction for public water supply, energy generation and other uses. A value £/m³ is applied and used to quantify the monetary flows of water abstractions (this data can be accessed by Environment Agency staff or requested from the Environment Agency). Due to the sensitivity of the data, only aggregated total quantities by use can be provided for a place to prevent individual abstraction points being made identifiable. Annual abstraction licence volumes should be input in cells E50 to E52. See the section on ‘Obtaining abstraction licence quantities’ below.</p> <p>Data can be requested from the Environment Agency, with readymade data sets for EA Water Management Areas, EA/NE Public Face Areas, Counties, Local Authorities, WFD Management and Operational Catchments and WFD waterbodies. This is updated annually. External users should email naturalcapital@environment-agency.gov.uk to request. For internal Environment Agency staff, a Data Support Package can be found on SharePoint.</p> |
| <p>Timber (Row 54)</p> | <p>No user input is needed. The calculations in the process tab run using the habitat extent quantities input in the asset register.</p> |

| Ecosystem Service | Input |
|---|---|
| Renewable Energy (Rows 55 to 57) | <p>If relevant, input installed capacity (MW) of hydro-generation, onshore wind, and solar power into cells E55 to E57 to estimate physical and monetary flows.</p> <p>For solar power, installed capacity (MW) should reflect solar fields (i.e., solar power as a land-use). Solar panels installed on buildings (e.g., roofs) is outside of the natural capital scope. This data should be sourced from local knowledge.</p> <p>Use BEIS figures for installed capacity at the local authority level for hydro-generation and onshore wind can be sourced from Regional Renewable Statistics. Use the latest available years (e.g., 2021) for capacity figures and filter the spreadsheet for relevant Region and then relevant Local Authority(ies) – sum the numbers and input total MW.</p> |
| Climate regulation (Row 58) | <p>No user input is needed for physical flow (column E). The calculations in the process tab run using habitat extent quantities input in the asset register.</p> <p>User input is possible in cell I58 to select the non-traded carbon value series used in the monetary flow calculation. Whilst NCRAT adopts BEIS’ (2021) approach to use the central value, the user may optionally choose high or low value series for sensitivity.</p> |
| Air quality - PM2.5s (Rows 59 to 66) | <p>If cell E18 is left as ‘No’, the defaults are applied, and no further input is required. If ‘Yes’ is selected, then additional cells show as dark orange providing the option to override national assumptions (‘PM2.5N’ in Row 66) and input local data for a maximum of 3 Local Authorities. These can be selected from the drop-down lists and then the proportion of the total woodland entered for each to calculate local PM2.5 (‘PM2.5L’) air quality benefits in Rows 60 to 65.</p> |
| Air quality - SO2 (Row 67) | <p>No user input is needed. The calculations in the process tab run using habitat extent input in the asset register.</p> |
| Air quality - NO2 (Row 68) | <p>No user input is needed. The calculations in the process tab run using habitat extent input in the asset register.</p> |

| Ecosystem Service | Input |
|--|---|
| Air quality - O3 (Row 69) | No user input is needed. The calculations in the process tab run using habitat extent input in the asset register. |
| Hazard regulation (Row 70) | No user input is needed. The calculations in the process tab run using habitat extent (woodland) input in the asset register. |
| Recreation (adults) (Rows 76 to 79) | If relevant, enter local data for the number of visits per year. The Outdoor Recreation Valuation (ORVal) tool is used to generate the number of visits to green spaces for the purpose of recreation and a welfare value is associated with these visits. The 'Using ORVal to generate recreation values' section below provides instructions. Visitor numbers should be input to cells E76 to E79 and visit welfare values to cells I76 to I79. |
| Recreation (children) (Row 80) | No user input is needed. The calculations in the process tab run using assumptions based on the data entered for 'recreation (adults)'. |
| Physical Health (Row 81) | No user input is needed. The calculations in the process tab run using assumptions based on the data entered for 'recreation (adults)'. |
| Education (Row 82) | If data is available, input the number of annual nature-based educational visits for your place into cell E82 to estimate benefits in the account. Potential sources of data include organisations that facilitate educational visits (for example, local schools and colleges, National Trust, RSPB, Wildlife Trusts, Canal and River Trust, Crown Estates, Royal Palaces and Museums, English Heritage, etc.) |
| Volunteering (Row 83) | If data is available, input the number of annual nature-based volunteering days for your place into cell E83 to estimate benefits in the account. Potential sources of data will be similar to 'Education' above. |
| Water quality (Rows 87 to 90) | If Cells E87 and E89 are left as 'No', the defaults are applied, and no further input is required. The default is based on five out of six components of overall water quality value as calculated by the National Water Environment Benefit Survey |

| Ecosystem Service | Input |
|-------------------|---|
| | (NWEBS) values ⁶ . If 'Yes' is selected, then Cells E88 an E90 show as dark orange providing the user with the option to select the number of components out of six to use for the basis of valuation. The input in E87 is applied to rivers, and the input in E90 is applied to transitional and coastal waters and to lakes. |

The following sections provide instructions on how to source key elements of information to populate NCRAT. Some of NCRAT's Processes have prescribed ways of selecting the data (for example, the use of ORVal to generate visit data). Other Processes require the user to define whether or to what extent data items fall within the boundary of their place. A typical issue will be to make decisions on assets that overlap the boundary of the user's place (e.g., peatland or woodland area, part of which falls within the account boundary). Each case must be taken on its merits and the selected method may be a compromise between ease of data processing and accuracy. Users are advised to record their chosen methods for transparency and future reference.

Obtaining abstraction licence quantities

Readymade data sets for Environment Agency Water Management Areas are available from the Environment Agency. External users should email naturalcapital@environment-agency.gov.uk to request. For internal users, the [Data Support Package](#) can be found on SharePoint. The Data Support Package is updated annually.

The Environment Agency holds information about water abstraction licences and quantities. You can request data for your place by contacting the Environment Agency's National Customer Contact Centre⁷. You may need to include the boundary for your place as a GIS layer or be able to describe your place in terms of catchments or multiple catchments or Local Authority areas.

⁶ The components are as follows: 1) Fish, 2) Other animals such as invertebrates, 3) Plant communities, 4) The clarity of water, 5) The condition of the river channel and flow of water, and 6) The safety of the water for recreational contact. Safety for recreational contact is excluded to account for potential double-counting with recreation welfare value estimated using ORVal.

⁷ Environment Agency National Customer Contact Centre postal address: PO Box 544, Rotherham, S60 1BY. Telephone number: 03708 506 506

When contacting the Environment Agency with a data request the user should request total quantities in m³/year for both surface water and groundwater abstractions by use type (as per figure 15):

- Public water supply, code W-PWS-330 for surface water and groundwater quantities
- Energy generation, codes P-ELC-240 and P-EL-650 for surface water and groundwater quantities
- All other uses except public water supply (W-PWS-330) and energy generation (P-ELC-240) for surface water and groundwater quantities.

Figure 27 shows an example of the data provided in response to a request.

Figure 27. Example of format for water abstraction licence data. Red circle shows final data for entry into Tool

| | Surface Water Abstractions (SWABS) | | | Ground Water Abstractions (GWABS) | | | GWABS + SWABS | | |
|---------------------|------------------------------------|--|--|-----------------------------------|---|--|-------------------------------|---|--|
| | Public water supply - WPWS330 | Energy Generation (cooling) - PELC240 & PEL650 | All other (inc industry and agriculture) Purpose codes | Public water supply - WPWS330 | Energy Generation (cooling) - PELC240 (No PEL650) | All other (inc industry and agriculture) Purpose codes | Public water supply (WPWS330) | Energy generation - PELC240 & PEL650 (SWABS only) | All other (inc industry and agriculture) purpose codes |
| E.g. for an EA Area | Sum of FLPTPANQM3 | Sum of FLPTPANQM3 | Sum of FLPTPANQM3 | Sum of FLPTPANQM3 | Sum of FLPTPANQM3 | Sum of FLPTPANQM3 | | | |
| Place | 121,882,500 | 202,760,755 | 282,802,075 | 141,002,584 | 0 | 66,344,214 | 262,885,084 | 202,760,755 | 349,146,289 |

For the example in figure 27, enter the quantities circled in red in the 'Input - Local Values' tab as follows:

- Public water supply, code: W-PWS-330. Enter the sum of surface water and groundwater quantities in cell E50.
- Energy generation, codes: P-ELC-240 and P-EL-650. Enter the sum of surface water and groundwater in cell E51.
- All other uses except public water supply (W-PWS-330) and energy generation (P-ELC-240). Enter the sum of surface and ground water quantities in cell E52.

Please note. There is no service agreement with Environment Agency teams to provide this data. If teams find themselves under resourced and unable to provide the data, alternative data input might have to be sought, or the water supply element omitted from the account.

Please also note. Due to abstraction licencing categorisation, some very large abstractions for cooling water at energy generation plants may be captured in the 'All other uses' category and therefore a monetary value applied. If you are aware of any such abstraction, it is advised that these quantities are manually moved to the 'Energy Generation' category so that a value is not applied. Please see NCRAT's Technical Report for more detail.

Using ORVal to generate recreation values

The University of Exeter's [Outdoor Recreation Valuation \(ORVal\) tool](#) is used to generate the number of visits to green spaces for the purpose of recreation and a welfare value is associated with these visits. ORVal predicts the number of visits to green spaces for the purpose of recreation and estimates the associated welfare value in monetary terms.

If your place has a boundary that matches one or more of the predefined layers within ORVal:

1. Select 'explore sites'
2. Choose the appropriate place, for example 'catchment' or 'local authority' layer
3. Select your catchment, or local authority of choice on the map to reveal the appropriate 'ID'. If your place is defined by multiple catchments or local authorities ORVal allows multiple items to be selected
4. A panel on the left-hand side will appear. From this, select the 'detailed' site information.
5. You can then choose 'download' to obtain the data in .csv format.
6. In the 'Input - Local Values' tab in NCRAT, copy and paste the number of visits by socio-economic group into cells E76 to E79 and monetary welfare values into cells I76 to I79.

If your place has a custom boundary that does not fit with the predefined layers within ORVal, follow Section 6 in the [ORVal user guide](#).

Tab 'Input – NC Risks'

The 'Input – NC Risks' tab allows the user to input an assessment of the drivers of change on the extent and condition of habitats in their place.

Drivers of change, and their effect on natural capital assets, will ultimately impact delivery of ecosystem services. To show this, NCRAT's output includes a 'Natural capital risk register' that presents the level of risk present across natural capital assets to the ecosystem services they provide (see the 'Tab 'Output – NC assets' section below). This follows the approach set out by [Natural Capital Committee State Natural Capital Second Report \(2014\)](#).

NCRAT sets out six 'drivers of change' tabulated against the 8 broad habitat categories in terms of impact on extent and conditions. See Table 2, below, for descriptions of the drivers for change.

Rows 14 to 19 input of drivers of change to natural capital

There are drop-down lists in each cell for the user to assign the level of risk a driver of change has on a natural capital asset; 'High', 'Medium', 'Low', 'None' or 'No data':

- High likelihood the driver will affect natural asset(s) relative to other drivers listed
- Medium likelihood the driver will affect natural asset(s) relative to other drivers listed
- Low likelihood the driver will affect natural asset(s) relative to other drivers listed
- None – The driver is not expected to affect the natural asset(s)
- No data available to assess likelihood of driver or affect on natural asset(s)

These levels of risk are also defined in the tab.

Information to inform the risk rating is likely to come from a wide range of sources. It is recommended identifying and seeking the views of local stakeholder groups as they will be able to provide context-specific insights to support the qualitative assessments of drivers of change and relative risk on natural capital assets. Local engagement is important to developing a more rounded narrative to add nuance alongside the quantitative account and to identify the key risks to habitats.

Further interpretation and instructions are provided in the 'Input – NC Risks' tab and in the NCRAT Technical Report (section on 'Risks and uncertainties').

Table 2: Description of key drivers of change

| Driver for change | Description |
|--|--|
| Land-use change (incl. habitat loss) | This can be the result of various factors, including urban development or coastal erosion, as well as hazards such forest fires. Land-use change is most often permanent but, in some cases, can be temporary and is likely to affect the extent of habitat rather than condition. |
| Climate change | This includes pressure on habitats from changing climatic conditions including temperature, precipitation, soil aridity and storminess. Assessments of the likely impact of climate change over this century are provided in UK Climate Projections . |
| Resource extraction (incl. over-exploitation) | Over-exploitation of resources can impact habitats through both direct physical damage and additional stress on the resources on which they rely (for example, water availability). |
| Population growth | Pressure which comes from the demands of a higher population on natural resources and the environment. Note that the impact of population growth may be through future land-use change, resource extraction, and pollution. |
| Pollution | Includes both diffuse sources (for example, agriculture, urban run-off or atmospheric deposition) and point sources (for example, sewer overflows, wastewater treatment or abandoned mines). |
| Invasive species, diseases and pathogens | Invasive species, diseases and pathogens can have significant impacts on ecosystems, threatening the abundance, diversity and health of native species. |

Rows 22 to 24 input of user-prioritised drivers of change

There is also a free-text option for the user to identify and describe up to 3 additional drivers of change specific for their place. This is to support recording qualitative assessment of local context that may arise from engagement with stakeholder groups.

Tab 'Input – Significance Assessment'

The 'Input - Significance Assessment' tab enables the user to provide a fuller narrative of the importance of each service, including the scale over which it matters, and its relative significance in the place compared to others.

The assessment also includes categorical rating components for both significance of the benefit (within the place) and the extent to which it is reflected in the monetary valuation reported in the output benefits statement (referred to as 'representation').

Rows 15 to 45 inputs for qualitative assessment of benefits

There are free-text cells in columns D and E for inputting 'Context' and 'Scale/scope' (See Table 3, below, for definitions). There are drop-down lists in column F for the user to select the 'Significance' rating and in column H for the 'Representation' rating, and there are free-text cells in column J for Additional information. Inputting this information creates a qualitative account of the benefits that come from ecosystem services provision in their place.

Information may be best gathered from stakeholder engagement and should be a fundamental aspect of determining the significance of benefit flows. This ensures that important benefits are not overlooked by the account if they cannot be adequately evaluated in monetary terms.

Further instructions and definitions are provided within the tab.

Table 3: Significance assessment definitions

| Category | Description |
|-----------------------|--|
| Context | A description of the importance of each aspect of ecosystem service provision in a place and the main factors underlying this importance. This could relate to economic, social or cultural factors among others. For example, some elements of biodiversity may be unique to the area, or some services may underpin important socio-economic structures. |
| Scale/Scope | A qualitative account of the scale and spatial distribution over which the ecosystem service provision matters, covering both the flows and beneficiaries. The assessment should consider the importance of the benefits relative to others, in terms of the level of provision, the number and extent of beneficiaries, and associated values. The assessment may also consider the distribution of the benefit within a place (for example, the proportion of the catchment benefits). This may consider sub-divisions within the categorisations (for example by different socio-economic groups for the local population). |
| Representation | The extent to which the ecosystem service provision and benefits are reflected in the monetary value is reported in the 'Output - Benefits Statement'. In some cases, it may be substantially reflected, in others only a partial account is possible, or in the case of non-quantified benefits, not at all. |

Tab 'Input – Beneficiaries Assessment'

The 'Input - Beneficiary Assessment' tab allows the user to record who benefits from each ecosystem service either directly or indirectly.

This assessment can support a more detailed examination of the distribution of benefits, for example understanding whether there are important socio-economic factors to further account for a particular beneficiary group or identifying which beneficiary groups may be a potential source of future investment or funding. Whilst a natural capital register and account does not explicitly answer these types of questions, it can record information that helps to inform strategies and plans concerning the provision of benefits to different groups.

Rows 15 to 45 inputs for distribution of benefits

Input is via a series of drop-down lists in Columns G to J. These enable the user to select whether the beneficiary of a benefit flow is assessed as either, 'Primary', 'Secondary', 'Indirect' or 'None'.

Information can be gathered from stakeholder engagement as set out for the significance assessment and the risks tabs, above.

Further instructions are provided within the tab. Tables 4 and 5, below, provide a categorisation of the beneficiaries used in the assessment and describes the benefit levels used.

Table 4: Beneficiaries definitions

| Beneficiary | Description |
|-------------------------|--|
| Local population | Relates to those who reside in the place, whether individuals, households or community groupings |
| Wider society | Relates to the population who reside outside the place. Note this could include non-government organisations (NGOs) operating at national or sub-national levels, alongside households across the national population or other groupings of the wider population |
| Public Sector | Government (national or local), particularly in terms of cost savings to the provision of public services |
| Private Sector | Businesses such as farm businesses, forestry and timber organisations, utilities (for example, water companies or energy generation), manufacturing, services sector |

Table 5: Beneficiary assessment levels

| Benefit level | Description |
|----------------------|--|
| Primary | Beneficiary directly benefits from the ecosystem service and is the primary beneficiary. For example, the local residents directly benefit from volunteering activities (enhanced welfare). |
| Secondary | Beneficiary directly benefits from the ecosystem service even though they may not be the primary beneficiary. For example, the local population will benefit from increased food production due to increased local agricultural production. |
| Indirect | Beneficiary gains from the ecosystem service through another beneficiary. For example, public and private sector employers benefit from the improved physical health of the population through having a healthier work force (i.e. productivity gain). |
| None | No benefit flow to the specified beneficiaries, either directly or indirectly. |
| Not assessed | Beneficiary assessment not completed |

Process tabs

NCRAT automatically runs calculations using the data provided by the user in the 'input' tabs and from reference values in look-up tables and built-in monetary valuation data.

It quantifies the benefits and values of thirteen independent benefit flows, seven of which have been sub-divided, creating 22 in total (as detailed in Table 6 below). A process tab is included in NCRAT for each of these.

NCRAT uses built-in physical flow and monetary valuation data allowing for a replicable and semi-automated approach to producing a natural capital register and account for different places. Each 'process' tab describes the data, assumptions and calculations/process that are used to calculate the physical and monetary flows. The 'process' tabs also show the logic chains used to evaluate each particular benefit flow.

All data used to calculate benefit flows in physical and monetary terms are listed in the 'Metadata' tab within NCRAT. The 'Metadata' tab is used to contain links to essential data sources (for asset extent and condition as well as for evaluating physical and monetary benefit flows).

Table 6: Ecosystem services quantified in NCRAT with the physical and monetary flow measure

| Category | Ecosystem Service | Physical flow measure | Monetary flow measure |
|--------------|------------------------------------|---------------------------------------|-----------------------|
| Provisioning | Agriculture - Arable | Yield of arable production | Gross margin |
| | Agriculture - Livestock (dairy) | Yield of livestock (dairy) production | Gross margin |
| | Agriculture - Livestock (meat) | Yield of livestock (meat) production | Gross margin |
| | Fish landings – fish and shellfish | Volume of landings | Net profit |
| | Water supply (public water supply) | Abstracted raw water quantity | Resource rent |
| | Water supply (energy generation) | Abstracted raw water quantity | Not valued |

| Category | Ecosystem Service | Physical flow measure | Monetary flow measure |
|-------------------|---------------------------------|-----------------------------------|--|
| | Water supply (other) | Abstracted raw water quantity | Marginal value |
| | Timber | Volume of timber removals | Stumpage price |
| | Renewable energy – hydropower | Energy production | Resource rent |
| | Renewable energy – onshore wind | Energy production | Resource rent |
| | Renewable energy – solar power | Energy production | Resource rent |
| Regulating | Climate regulation | Net CO ₂ e sequestered | Abatement cost |
| | Air quality - PM _{2.5} | PM _{2.5} absorbed | Avoided cost (treatment and productivity) plus welfare value |
| | Air quality - SO ₂ | SO ₂ absorbed | Avoided cost (treatment and productivity) plus welfare value |
| | Air quality - NO ₂ | NO ₂ absorbed | Avoided cost (treatment and productivity) plus welfare value |
| | Air quality - O ₃ | O ₃ absorbed | Avoided cost (treatment and productivity) plus welfare value |

| Category | Ecosystem Service | Physical flow measure | Monetary flow measure |
|----------------------------|--|-------------------------------------|--|
| | Hazard regulation | Potential volume of water stored | Replacement cost of water storage depending upon option selected |
| Cultural | Recreation (adults) | No. visits to open spaces | Welfare value |
| | Recreation (children) | No. visits to open spaces | Not valued |
| | Physical health | No. active visits to open spaces | Avoided treatment cost |
| | Education | No. nature-based educational visits | Opportunity cost |
| | Volunteering | No. nature-based volunteering days | Replacement cost |
| Bundled⁸ | Water quality - rivers | N/A | Welfare value of good water quality |
| | Water quality - coastal, lakes and transitional waters | N/A | Welfare value of good water quality |

⁸ 'Bundled' is defined in [Enabling a Natural Capital Approach](#) (Defra, 2020), as an ecosystem service which "can include more than one service or a combination of use and non-use values. Currently includes Amenity, Biodiversity, Soil Quality, Water Quality, Landscape and Non-use benefits."

Outputs

The key outputs of NCRAT are the benefits statement and asset register. Other outputs include the benefit attribution and significance assessment tab, which should inform the accompanying narrative and interpretation of the account.

Tab 'Output – Benefits statement'

Summary of physical and monetary flows

The 'Output - Benefits Statement' tab reports the provision ('flow') of the benefits calculated in the process tabs.

In the statement, benefits are categorised according to an ecosystem service classification that incorporates some abiotic elements: 'Provisioning services' (the production of physical goods we consume such as food and water); 'Regulating services' (ecosystem processes related to climate, air quality, hazard regulation, etc.); 'Cultural services' (aspects of the natural environment that enrich our lives, such as recreational benefits); and 'Bundled' services (that combine multiple benefits).

The contribution of supporting services (the ecological processes and functions such as nutrient cycling that maintain the conditions for life on earth and underpin ecosystem service provision) to benefits flows is embedded within the monetary benefits for provisioning, regulating, cultural and bundled services.

Monetary values are given for the annual flow (£m per year at year 0) and over 100-years (£m, present value terms), with minimum and maximum values given when the data allows. A 'red-amber-green' (RAG) rating is also assigned to the monetary values to signify the level of confidence in the results (defined in Table 7, below). This RAG rating should not be confused with, and is not explicitly linked to, the assessment of the extent to which an ecosystem service is reflected in the monetary valuation reported in the output benefits statement (referred to as 'representation'). It is possible to have high confidence in the values generated by NCRAT, yet the value only partially represents an ecosystem service benefit flow.

The quantified results are accompanied by the outputs of the Significance Assessment (overall significance and representation) and Beneficiaries Assessment by beneficiary group to provide a broader qualitative account of benefits, including those not currently assessed in quantitative terms.

Table 7: Confidence rating assigned to the monetary value estimates for each ecosystem service

| Cell colour | Monetary valuation confidence description |
|--------------------|--|
| GREEN | High confidence in results. Input data and assumptions are based on statistical reports, peer reviewed values or industry standard methodologies |
| AMBER | Moderate confidence in results. Input data and/or assumptions from single source/not peer reviewed or based on sources that are not specifically tailored to this context. Some assumptions or estimations may be open to question. Accuracy is expected to better than plus or minus 50% |
| RED | Low confidence in results. Input data and/or parameters from a single source and low level of transferability from original context. It is expected that estimate is in the right order of magnitude. Order of magnitude implies that, for example, for an estimate of 5 the 'real' figure is within the range 0.5 to 50 |
| NO NUMBER | It is not possible to provide a result that can be judged to be in the right order of magnitude. This is due to unquantifiable uncertainty in the science, valuation or the relationship between them. Currently limited to qualitative assessment only. |

Creating a scorecard

There is a natural capital ‘scorecard template’ that accompanies NCRAT. This is a PowerPoint-format template that can display the results in an engaging way.

Infographics have been built into the tabs ‘Output – NC Assets’, ‘Output – Significance Assessment’ and ‘Output – Benefit attribution’. These automatically update with the data that is entered into NCRAT, although some user input is required to finalise these infographics. Once the graphics have been completed, they can be copied and pasted into the scorecard template.

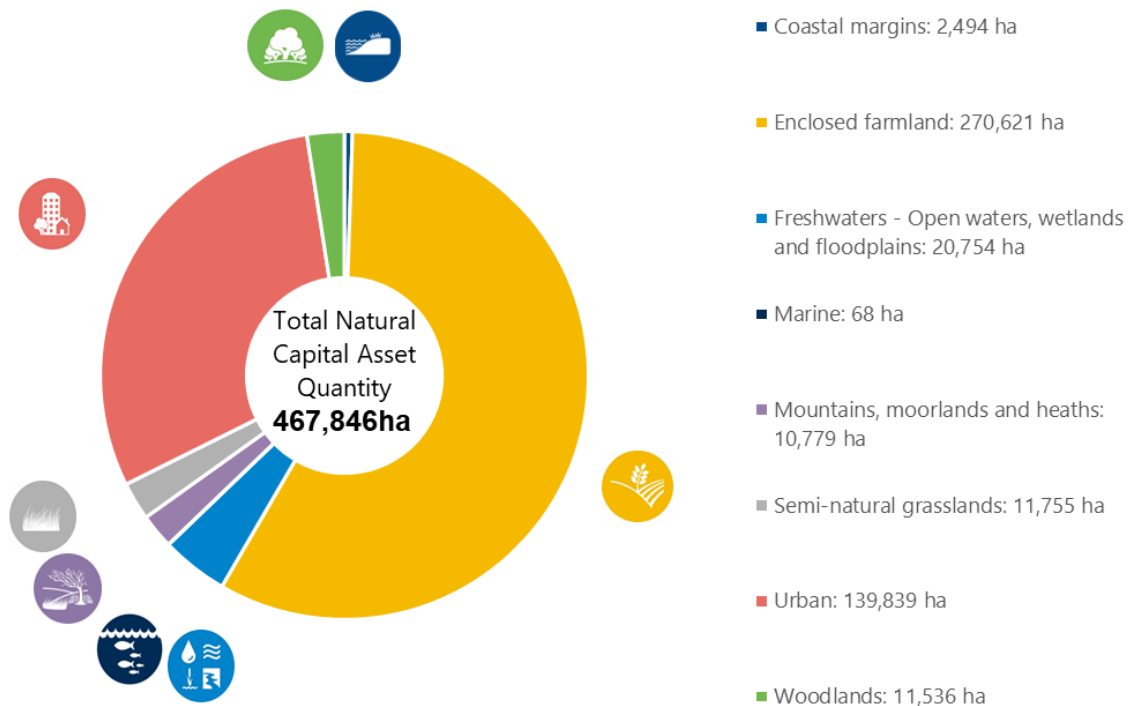
Tab ‘Output – NC Assets’

Graphic 1: Natural capital extent

This pie chart (see figure 28, below) is created automatically but requires some input to adjust it (see instructions below).

The pie chart displays the breakdown in natural capital extent by the 8 broad habitat types, automatically updating to changes in the “Input – Asset Register” tab. The total extent of each habitat types is displayed in the legend and gets automatically updated upon completing NCRAT.

Figure 28. Natural capital extent graphic



To create the graphic, the following steps were taken:

- The graph takes data from cells D14 to D21 of the “Input – Asset Register” tab. Note that to allow the legend to display the habitat extents; a ‘CONCAT’ formula has been applied to each habitat type in cells I14 to I21 with the text set to white to hide the numbers
- EA colour branding scheme has been applied to each segment
- The natural capital icons have been manually positioned accordingly
- The doughnut hole has been set to 42%.

Note, this graphic requires user input. In particular, the user must:

1. Manually reposition the natural capital icons to their corresponding segments following changes to the asset register (check the icon order matches the pie chart segments).
2. If you want to make the legend colour squares bigger; copy, paste and re-size the icons over the bullet points.

To transfer the graphic to the Scorecard:

1. Delete the example, copy the new graph and paste as an image to the Scorecard in the Natural Assets section under Natural Capital Extent.
2. Set width to 38.62cm, the height should automatically change to 22.45cm (if this doesn't happen check 'Lock aspect ratio' has been ticked) and position image in the corresponding green frame.

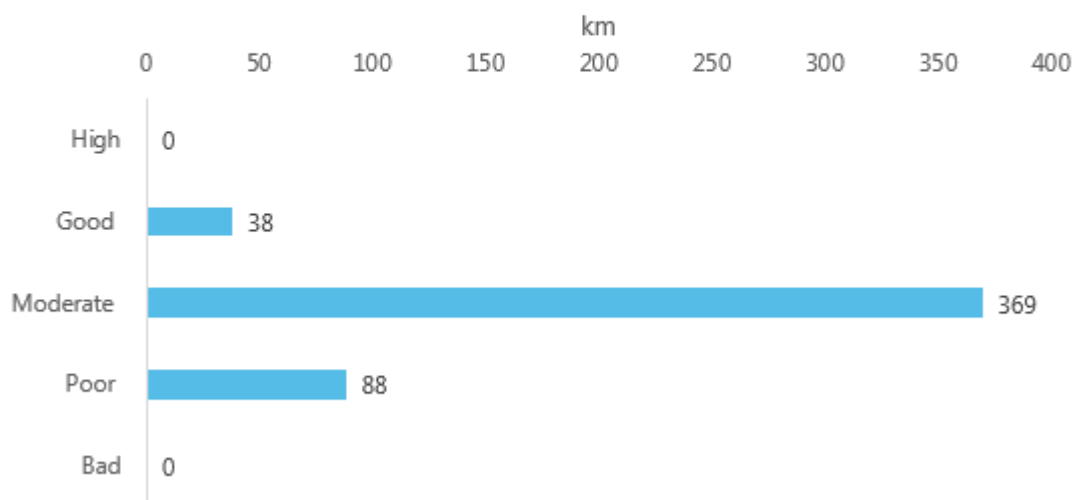
Graphic 2: River length by ecological status

This bar chart (see figure 29, below) is created automatically and requires no additional input.

This bar chart displays the breakdown of total river length by ecological status, automatically updating to changes in the “Input – Asset Register” tab.

Figure 29. River length by ecological status graph

River length by ecological status



To create the graphic, the following steps were taken:

- The graph takes data from cells D95 to D99 in the “Input – Asset Register” tab
- EA colour branding scheme for Water Quality applied to each bar.

To transfer the graphic to the Scorecard:

1. Delete the example, copy the new graph and paste as an image to the Scorecard in the Natural Assets section under River Length by Ecological Status.
2. Set size to 20cm x 35.97cm (aspect ratio should automatically be locked) and position in the corresponding green frame.

Graphic 3: Pressures

This table (see figure 30, below) is created automatically and requires no additional input.

This table displays the presence of a pressure on each broad habitat’s ability to support the provision of a given ecosystem service. The table automatically updates to changes in the “Input – NC Risks” tab. Note that “No data” is shown as the default rating if the “Input – NC Risks” tab is left blank.

Figure 30. Natural capital risk register (blank version)

Natural capital risk register

| Ecosystem Services Group | Natural capital assets (NEA Broad habitat type) | | | | | | | |
|--------------------------|---|-------------------|---|---------|---------------------------------|-------------------------|---------|-----------|
| | Coastal Margins | Enclosed Farmland | Freshwaters, Openwaters, Wetlands and Floodplains | Marine | Mountains, Moorlands and Heaths | Semi-natural Grasslands | Urban | Woodlands |
| Agriculture | | No data | | | No data | No data | | |
| Fish landings | No data | | | No data | | | | |
| Water supply | | No data | No data | | No data | No data | No data | No data |
| Timber | | | | | | | | No data |
| Renewable energy | | | No data | | | | | |
| Climate regulation | No data | No data | | | No data | No data | | No data |
| Air quality | No data | No data | No data | | No data | No data | | No data |
| Hazard regulation | | | | | | | | No data |
| Recreation | No data | No data | No data | No data | No data | No data | No data | No data |
| Physical Health | No data | No data | No data | No data | No data | No data | No data | No data |
| Education | | No data | No data | | No data | No data | No data | No data |
| Volunteering | | No data | No data | | No data | No data | No data | No data |
| Water quality | | No data | No data | | No data | No data | No data | No data |

To create the graphic, the following steps were taken:

- The table takes data from cells C12 to R19 of the “Input – NC Risks”.

To transfer the graphic to the Scorecard:

1. Delete the example, copy the table and paste (keeping source formatting) to the Scorecard in the Natural Assets section under Risk Register.
2. Set font size to 30.
3. Set table size to 13cm x 36cm and position in the corresponding green frame.

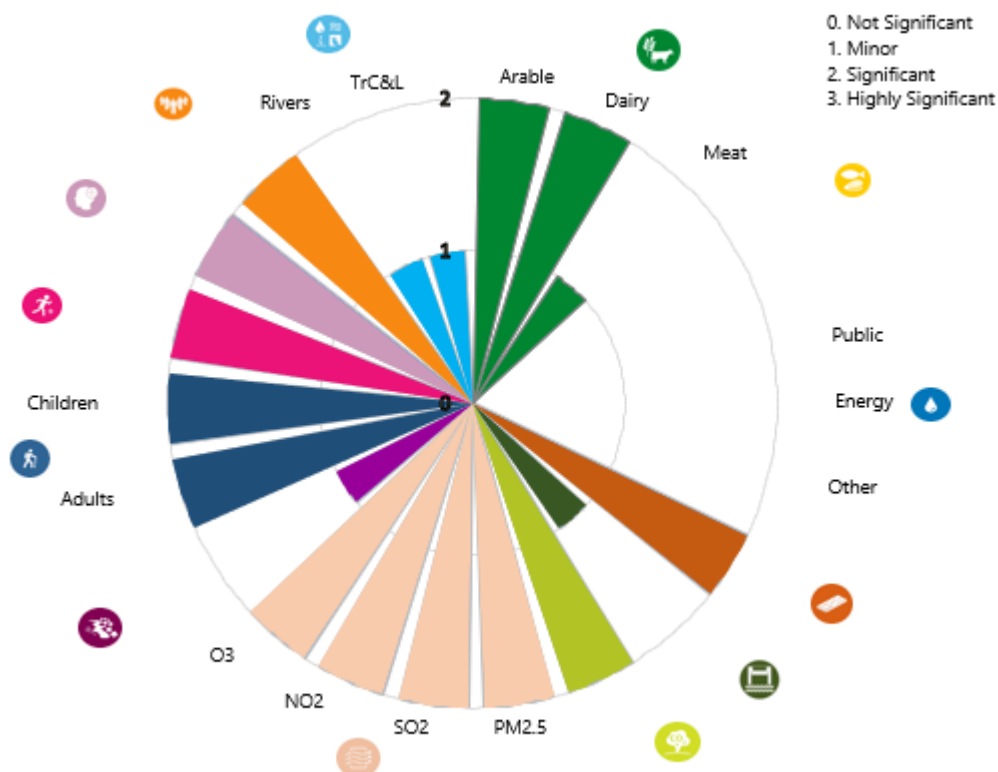
Tab ‘Output – Significance Assessment’

Graphic 4: Benefits Significance Assessment

This diagram (see figure 31, below) is created automatically and requires no additional input.

This diagram displays the significance level of each ecosystem service, automatically updating to changes in the “Input – Significance Assessment” tab.

Figure 31. Benefits significance assessment



To create the graphic the following steps were taken:

- For each of the 22 ecosystem services, the significance value is repeated 10 times (C55 to C295). This is automated from the table in cell B30 to D51 and creates the length of each segment in the Rose diagram. After each set of 10 values there is a blank value (shaded in grey) – this gives the gaps between the segments
- Columns D to P were created for each of the 13 ecosystem service groupings to allow for each segment to be colour-coded. The cells shaded green are linked to column C, with all others set to zero
- EA colour branding scheme is applied to the 13 ecosystem service groupings
- Natural capital icons and labels for sub-categories were added to the diagram

To transfer the graphic to the Scorecard:

1. Delete the example, copy the new graph and paste as an image to the Scorecard in the Ecosystem Services section.
2. Set size to 38cm x 44.59cm (aspect ratio should automatically be locked) and position in the blue frame.

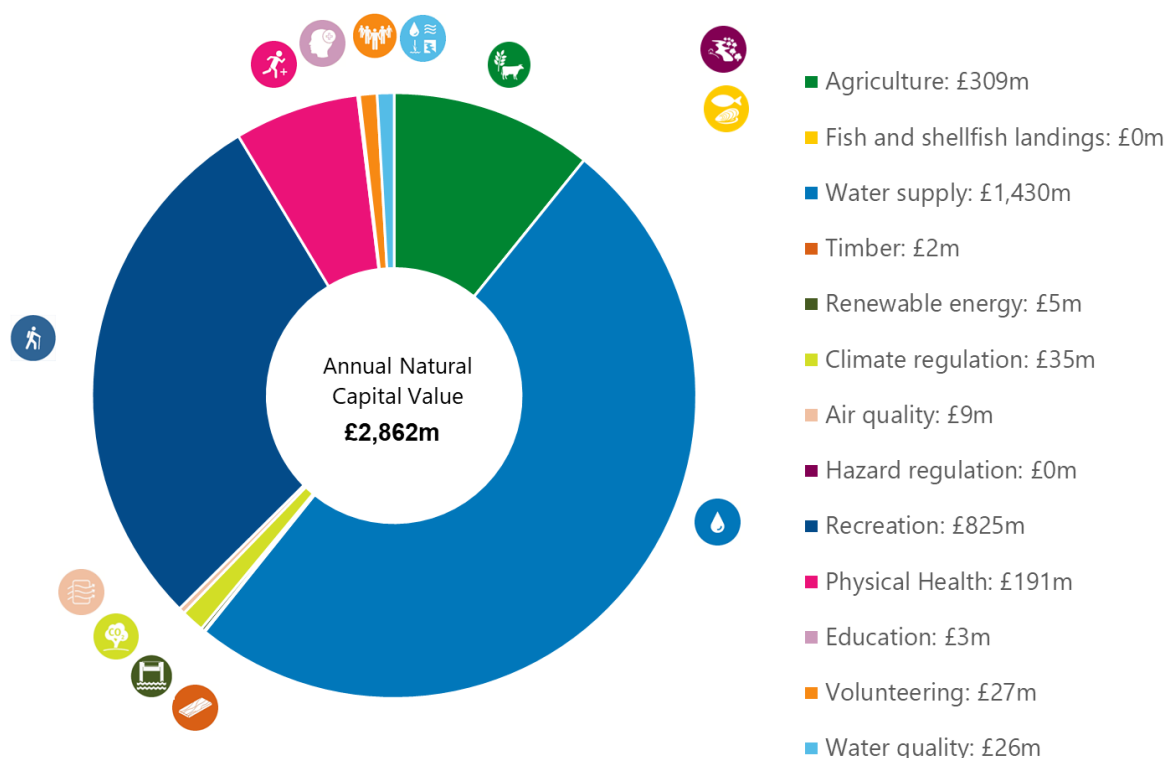
Tab 'Output – Benefit attribution'

Graphic 5: Benefit values

This pie chart (see figure 32, below) is created automatically but requires some input to adjust it (see instructions below).

This pie chart displays the breakdown in benefit flows for the 13 ecosystem service groups, automatically updating to changes in NCRAT. The annual value of each ecosystem service grouping is displayed in the legend.

Figure 32. Benefit values chart



To create the graphic the following steps were taken:

- Annual values for each of the 13 ecosystem service groups are calculated in cells C78 to C90 according to the rules in column L
- The graph takes data from cells J96 to K108 (which are linked to cells B78 to C90). Note that to allow the legend to display the annual values a 'CONCAT' formula has been applied to each ecosystem service grouping in cells J96 to K108 with the text set to white to hide the numbers
- EA colour branding scheme applied to each segment
- Natural capital icons were positioned accordingly
- Doughnut hole was set to 42%
- Annual natural capital value updates automatically upon tool completion

This graphic requires the user to manually reposition the ecosystem service icons to their corresponding segments following changes to their size (for clarity you can leave out the icons where ecosystem services are not represented in a slice in the doughnut results).

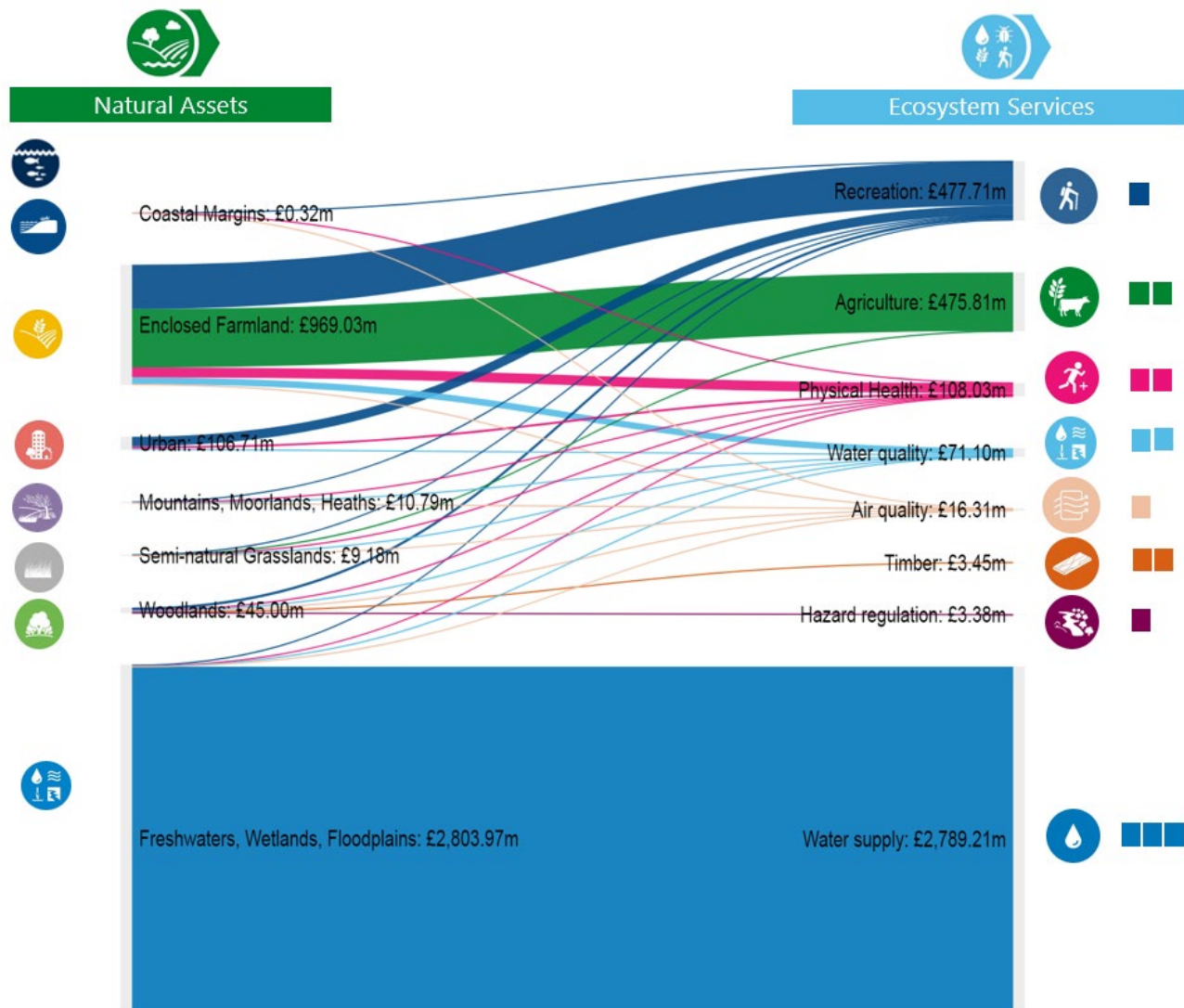
To transfer the graphic to the Scorecard:

1. Delete the example, copy the new graph and paste as an image to the Scorecard in the Value of natural capital benefits section.
2. Set size to 28cm x 44.13cm (aspect ratio should automatically be locked) and position in the orange frame.

Graphic 6: Benefit flows – Sankey diagram

Whilst the data for this is generated automatically, some user input is required to generate the customised Sankey diagram (see figure 33). This shows benefit flows from the habitat types to each of the 13 ecosystem service groups, automatically updating to changes in NCRAT. This graphic cannot be produced in Excel, instead it requires the use of the SankeyMatic software.

Figure 33. Benefit flows – Sankey diagram. Here the Sankey PNG image file has been copied into the scorecard template and the natural asset and ecosystem service icons manually matched against the flows



To create the graphic the following steps were taken:

- In cells B10 to L46, the total annual value for each of the 22 ecosystem services are attributed to the corresponding broad habitats following the attribution rules given in column L. For the 22 ecosystem services which are assessed in NCRAT, these are presented in cells B51 to L73
- Annual values for each of the 13 ecosystem service groups are calculated in cells C78 to C90 according to the rules in column L
- Through 'IF and CONCAT' formulae, the values in this table are converted into text which can be pasted directly into the SankeyMatic software (cells B125 to B236)
- The EA colour branding scheme has been applied to each ecosystem service in cells B78 to B90 and set to white to 'hide' them.

This graphic requires user input. In particular, the user must:

1. Open <http://sankeymatic.com/build/> (preferably in 'Chrome' browser) and clear all existing text in the "Inputs" section.
2. Copy and paste cells B126:B239 to the text box in the "Inputs" section and click the "show" button.
3. In the "Labels & Units" section add the prefix '£' and suffix 'm'. Adjust text size if required and move the "highlight" slider to the left (0). For position select "After the node" for the first labels and for labels on the other side move the slider to "Stage 2".
4. Under Nodes >> Default node colours, select "Use one colour", click on the grey box and choose R:235 G:235 B:235.
5. Under Diagram Size & Background, set "Diagram width" to 800 and "Diagram Height" to 600.
6. Optional: adjust the opacity, spacing and curviness of the lines along with the font (among other visual features). Guidance can be found in the Sankeymatic user manual (<http://sankeymatic.com/manual/>).
7. Optional: adjust the orderings of the habitat types and ecosystem service groupings by clicking and dragging the 'nodes' manually.
8. Save and export the graph by clicking the "Export 1200 x 1200 PNG" button. Note: "4x (Print)" should also be selected.
9. Copy this graph to the NCRAT.
10. Repeat the process to create the same graph without labels by unclicking the "Show labels" button under "Labels & Units". This is for use in the scorecard.
11. You will need to add the graph to Excel by using 'Insert > Picture' and choosing the Sankey PNG image file.
12. Round up the £ figures from the labelled Sankey diagram to the nearest million.

To transfer the graphic to the Scorecard:

1. Delete the example Sankey diagram and copy the new Sankey diagram without labels (step 10 above) and paste as an image to the Scorecard in the benefits section.
2. Follow the instructions in the scorecard template. It will require patience to get the sizing right; copy across the correct figures and make sure the right icons are in the right places.

Additional tabs included in NCRAT

There are a number of other tabs included in NCRAT that support the input, process and output tabs discussed above. These include look-up tables (for air quality and water quality data, unit values for process tabs, discount rates and GDP deflators), a metadata list and a change log, as shown in figure 34, below.

Figure 34. Screenshot of look-up tabs

Air Quality (PM2.5) Look-up Table
 Data sensitivity: OFFICIAL
 Last Updated: April 2020 using 2019 data

This tab provides the look-up table necessary for the Air Quality (PM2.5) (Local) calculations. These are taken directly from the effect and CEH (2019) Air Pollutant Removal Tool (see "Metadata" tab for more information). Note that Column E is used for the physical flows and F and G for the monetary flows (annual and asset values respectively).

| County | Ref | CODE | Physical flow, kg per ha, 2019 unit value | Base £ per ha, undiscounted, 2019 prices | £/ha, PV 100, 2019 prices |
|--------------------------------------|-----|-----------|---|--|---------------------------|
| Aberdeen City | 369 | S12000033 | 5 | 382 | 18,267 |
| Aberdeenshire | 367 | S12000034 | 4 | 17 | 552 |
| Aberdeenshire | 106 | E07000223 | 7 | 4,358 | 142,041 |
| Allerdale | 13 | E07000026 | 6 | 73 | 2,345 |
| Amber Valley | 20 | E07000032 | 7 | 798 | 27,198 |
| Angus | 268 | S12000041 | 4 | 37 | 1,181 |
| Antim and Newtownabbey | 301 | N09000301 | 4 | 249 | 7,904 |
| Ards and North Down | 391 | N09000011 | 6 | 300 | 9,649 |
| Argyll and Bute | 366 | S12000035 | 4 | 4 | 118 |
| Armagh City, Banbridge and Craigavon | 382 | N09000002 | 5 | 151 | 4,869 |
| Arun | 185 | E07000224 | 7 | 566 | 18,757 |
| Ashfield | 139 | E07000170 | 8 | 1,272 | 43,323 |
| Ashford | 85 | E07000105 | 8 | 149 | 5,136 |
| Avonbury Vale | 4 | E07000004 | 8 | 386 | 13,056 |
| Babergh | 163 | E07000200 | 8 | 203 | 6,525 |
| Barking and Dagenham | 229 | E08000002 | 6 | 28,382 | 979,288 |
| Barnet | 207 | E08000003 | 6 | 6,571 | 226,349 |
| Barnsley | 231 | E08000006 | 6 | 937 | 31,636 |
| Barrow-in-Furness | 15 | E07000027 | 6 | 1,327 | 41,753 |
| Basildon | 51 | E07000066 | 7 | 1,704 | 57,439 |
| Basingstoke and Deane | 59 | E07000084 | 7 | 276 | 9,562 |
| Bassellaw | 141 | E07000171 | 8 | 305 | 10,407 |
| Bath and North East Somerset | 269 | E06000022 | 7 | 810 | 26,750 |
| Bedford | 270 | E06000055 | 8 | 869 | 29,165 |
| Belfast | 383 | N09000003 | 5 | 1,941 | 62,743 |
| Berley | 212 | E08000004 | 7 | 4,636 | 153,338 |
| Birmingham | 232 | E08000025 | 7 | 11,920 | 404,521 |
| Elabur | 108 | E07000129 | 7 | 2,157 | 71,167 |
| Blackburn with Darwen | 271 | E06000008 | 7 | 1,003 | 33,600 |

Navigation tabs: PM2.5 Look-up | Water Qual OC Rivers Look-up | Water Qual MC Rivers Look-up | Water Qual Other Rivers Look-up | Water Quality Look-up (TrC&L)

These eight look-up tables contain the unit values that are used in estimating physical and monetary benefit flows based on the input selections made. These tabs should not be edited in any way. The dates of the latest updates of the data are provided at the top of each tab, which may be useful in considering the topicality of the data.

The 'Metadata' tab contains useful links to sites that provide input data for NCRAT. These are organised around asset extent, asset condition, physical flow data and monetary flow data. For each element there are links to the tab for which the data is used.

There are tabs of economic data (discount rates and GDP deflators) which are used to support calculations throughout NCRAT. Finally, there is a change log to allow details of changes to the released version to be documented.

Annex I. Habitat classifications and datasets

In order to align with the framework for linking natural capital to benefits set out in the [UK Natural Capital Committee Second Report](#), NCRAT bases its calculations on the 8 broad habitats used in the widely-accepted [UK National Ecosystem Assessment \(UKNEA\)](#) classification.

The [Corine Land Cover \(CLC\)](#) dataset was chosen as the default source for habitat data for use in NCRAT because it is open-source and has national coverage. Also, it was established under a European programme to compile geospatial environmental information in a standardised manner across the whole of Europe. The 2018 dataset is used, as it is the most up-to-date available.

Table 8: Corine Land Cover details

| Layer | Data Name | Data Description | Published by | Link |
|-----------|-----------|-----------------------------|-----------------------------------|-------------------------------|
| Landcover | CLC 2018 | Land cover from CORINE data | European Environment Agency (EEA) | CLC downloads |

Scale and resolution of the CLC dataset:

- Minimum mapping unit (MMU): 25ha (status layer), 5 ha (change layer)
- Minimum width of linear elements: 100m
- Nomenclature: standard European level-3
- Positional accuracy: better than 100m
- Thematic accuracy: >85%
- Equivalent scale: 1:250,000 (status layer), 1:100,000 (change layer)
- Conditions applying to access and use: Access to data is based on a principle of full, open and free access as established by the Copernicus data and information policy Regulation (EU) No 1159/2013 of 12 July 2013.

The CLC landcover dataset is organised according to the [CLC classification scheme](#) but this does not directly match with the [UKNEA classification scheme](#). So, to enable NCRAT to make use of CLC data for natural capital benefit calculations based on the UKNEA broad habitats, the CLC landcover classes have been aligned with the UKNEA broad habitats as shown in Table 9, below.

In similar fashion, to accommodate the use of more detailed ground-based habitat survey data in NCRAT, [UKHab](#) level 3 (and in some cases level 4) categories have also been aligned to the UKNEA broad habitats to enable the calculation of benefit flows and monetary values (Table 9).

Table 9: Alignment of UKNEA, CLC and UKHab as used in NCRAT

| UKNEA broad habitats | CLC classes | UKHab level 3 categories (or level 4 where specified) |
|---|---|--|
| Urban | Continuous urban fabric, discontinuous urban fabric, industrial or commercial units, road and rail network and associated land, port areas, airports, mineral extraction sites, dump sites, construction sites, green urban areas, Sport and leisure facilities | Built-up areas and gardens |
| Enclosed farmland | Non-irrigated arable land, land principally occupied by agriculture with significant areas of natural vegetation; | Modified grassland; Arable and horticulture (includes intensive orchards) |
| Semi-natural Grasslands | Natural grassland, transitional woodland-scrubs | Acid grasslands; Calcareous grassland; Neutral grassland |
| Woodlands | Broad-leaved forest, mixed forest and coniferous forest | Broadleaved mixed and yew woodland; Coniferous woodland |
| Mountains, moorlands and heaths | Moors and heathland | Inland rock; Dwarf shrub heath; Dense scrub |
| Coastal margins | Beaches, dunes sands, saltmarsh and intertidal flats | Supralittoral rock (includes maritime cliffs and slopes); Supralittoral sediment (includes coastal sand dunes and vegetated shingle); Coastal saltmarsh (level 4); Intertidal mudflats (level 4) |
| Freshwaters – Open waters, wetlands and floodplains | Water bodies, estuaries | Fen marsh and swamp; Standing open water and canals; Bog |
| Marine | Sea and ocean | Other littoral sediment |

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