



# **Natural Capital Catchment Register and Account Tool: Beta v1.0 Internal User Guide**

Report – v1.0 October 2019

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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# Foreword

The 25 Year Environment Plan (25 YEP) has the ambitious aim for our generation to become the first generation to leave the environment in a better state than we found it and to pass on a natural environment protected and enhanced for the future.

The 25 YEP takes a natural capital approach to delivering the environmental outcomes of the plan, as a result the Environment Agency is working to embed a natural capital approach into its ways of working.

## Executive summary

Natural capital is our stocks of 'environmental assets' such as water, soil, air and minerals that provide valuable goods and services (benefits) to people such as providing clean air and water, food and recreation as well as supporting sustainable economic growth.

A natural capital approach measures the quantity, condition and risks to natural capital assets; it values the services and benefits natural capital provides and uses this information to enable people to make better decisions to create a resilient environment that will continue to provide benefits for future generations.

Natural capital accounting provides a record of the stocks and flows of environmental assets in a given place, such as a catchment. The purpose is to provide decision makers with the necessary information to value natural assets and services in order to protect and enhance them.

The Natural Capital Catchment Register and Account Tool records the quantity of assets in a catchment (a natural capital register). It uses this information to measure the flow of services and benefits and apply monetary values where it is possible to do so (a natural capital account). It is intended to provide decision makers with evidence to support place-based planning. This does not replace any existing tools, data or approaches but contributes to the existing evidence base within the Environmental Planning Cycle that supports investment planning.

The tool has been designed for non-experts to use. It is based on open-source, nationally available datasets to allow sharing with external stakeholders. This user guide provides step by step instructions to enable users to create an account for a catchment of choice.

Please note this version (V1.0) is a Beta version with further development and refinement currently in progress. The [Natural Capital Team](#) welcome any feedback you wish to provide and encourage you to trial it in your place-based planning.



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# 1. Introduction

## A natural capital approach

Natural capital is our stock of environmental assets; the elements of the natural world such as land, forests, biodiversity, water, soil, air, geo-diversity and oceans that provide valuable goods and services to people such as providing clean air and water, food and recreation as well as supporting sustainable economic growth.

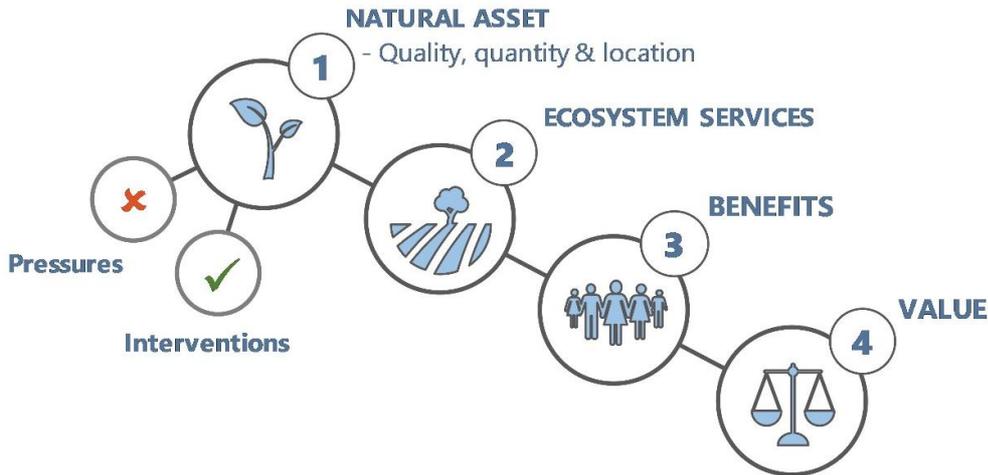


Figure 1. Natural capital assets, ecosystem services, benefits and values

A natural capital approach measures the quantity, condition and risks to natural capital assets; it values the services and benefits natural capital provides and uses this information to enable people to make better decisions to protect and enhance the environment for future generations.

Ecosystem services are categorised into provisioning (goods such as food and fuel), regulating (maintaining processes such as water regulation), cultural (enriching lives through things such as recreation) and supporting services (life support processes such as photosynthesis).

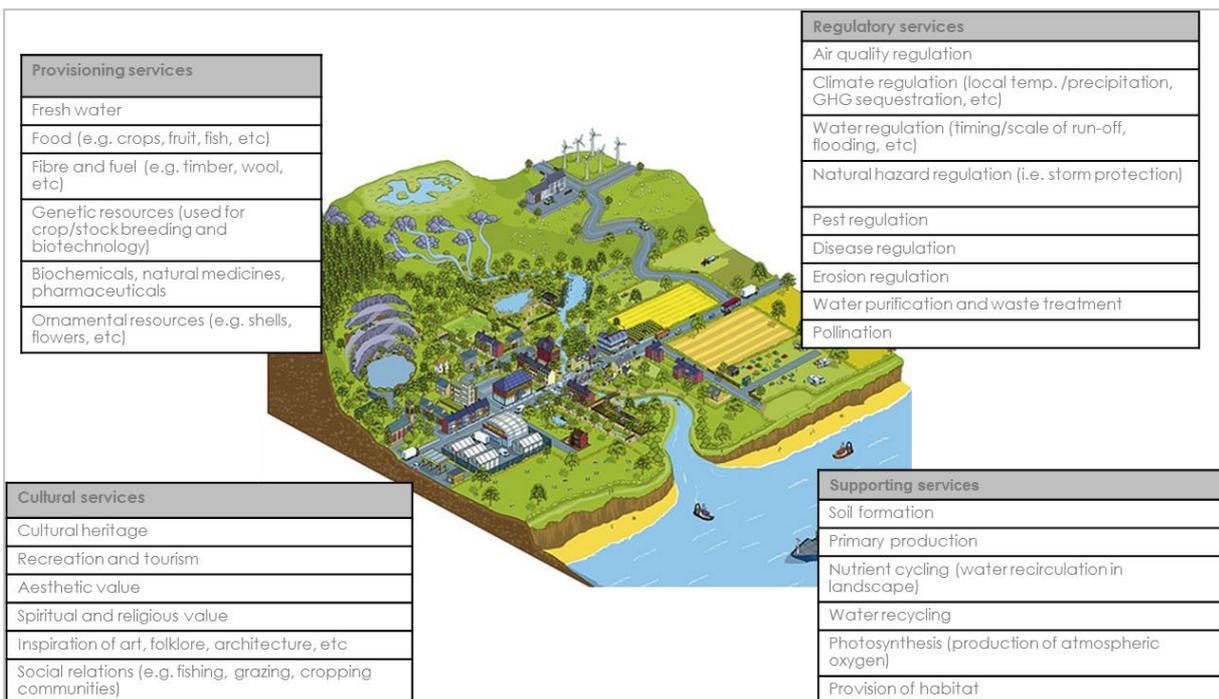


Figure 2. UK National Ecosystem Assessment categories of ecosystem services

The approach is intended to secure the stock of resources upon which society depends so they can provide a sustainable flow of services and benefits. In order to do this, we must establish the evidence base. A baseline of natural capital assets (a natural capital register) and the services and benefits they provide (a natural capital account) can be used, with other evidence, to develop collective priorities, identify integrated outcomes with multiple benefits and assess options to ensure natural resources are at the heart of decision making.

## Natural capital accounts

Natural capital accounting allows us to view the environment as an asset to invest in and manage sustainably. It allows disparate data and metrics about the quantity, quality and economic value of assets to be organised in a meaningful and comparable way.

Natural capital accounts provide a record of assets (also known as the natural capital register), and measure the flow of services and benefits in a given place using a value, in some cases, this is expressed in monetary terms.

Assigning a value can inform decision making and management of environmental risks and improvements. Failure to account properly for natural capital has led to undervalued services and over-exploited assets.

**The aim of natural capital accounting is to show how natural resources contribute to the economy in order to inform better decisions<sup>1</sup>.**

A natural capital account can provide a powerful engagement piece to help others recognise the value of the environment. While an account can only be considered as an indicative snapshot of the environment, as a result of indicative values and assumptions, when used over time, it can show how assets are changing. The 25 YEP focusses on net gain (natural capital assets and the benefits they provide increasing over time). Natural capital accounting can provide a tool to monitor this.

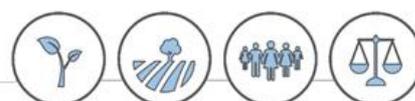
## 2. Natural Capital Catchment Register and Account Tool

### Background to the tool

The Natural Capital Catchment Register and Account Tool has been designed to provide information about natural capital assets, services and benefits at a catchment scale. It is a valuable contribution to the evidence base required for place-based environmental planning (see step 2 'establishing' within the Environmental Planning Cycle in Figure 3 below).

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<sup>1</sup> Science for Environment Policy (2017) Taking stock: progress in natural capital accounting. In-depth Report 16 produced for the European Commission, DG Environment by the Science Communication Unit, UWE, Bristol.



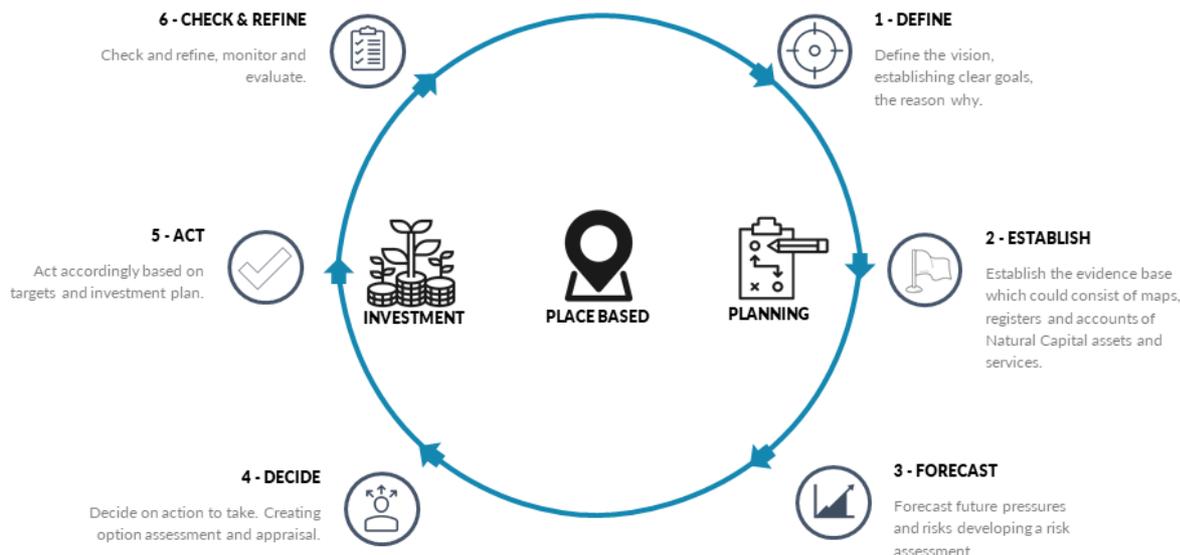


Figure 3. Place-based environmental planning and delivery cycle

This tool forms part of a suite of tools which are being trialled and tested to support the business to take a consistent and robust approach to applying a natural capital approach.

The outputs from the register and account tool should be considered within the context of uncertainties and gaps in information that is available. For example, it is not possible to assign a monetary value to all benefits, see Annex 1 for more details. Outputs should be used alongside other evidence such as risk assessments and opportunity mapping to inform decisions about what type of investments in the environment are needed and where.

This user guide outlines the data and methodology used to generate the account. It focuses on the process required to convert spatial GIS data into the asset register for a given catchment, and how this information informs the account.

The tool has been designed using open-source, nationally available data to allow sharing with external stakeholders. It is hoped this will support engagement with partners and promote local ownership and governance of natural resources. Beneficiaries will have a clear line of sight between their use of natural capital and the need to protect and enhance it.

Please note this version (V1.0) is a Beta version with further development and refinement currently in progress to expand the methodology used and ecosystem services quantified. The [Natural Capital Team](#) welcome any feedback you wish to provide and encourage you to trial the tool in your place-based planning.

## The tool in brief

The Natural Capital Catchment Register and Account tool requires 'Input' data of habitat quantities. The 'Process' tabs automatically run calculations to generate the benefit information and any associated values. The 'Output' provides a summary of this information in an account balance sheet. The flow chart in Figure 4 below depicts these steps.



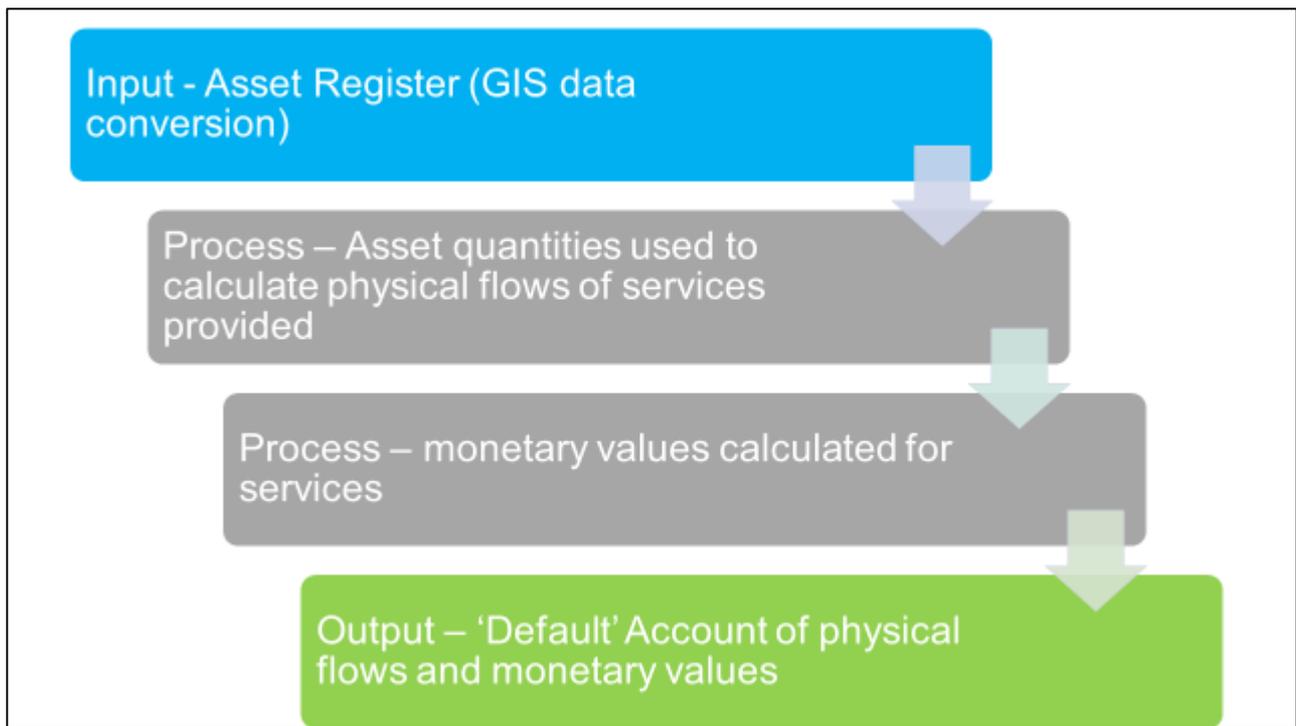


Figure 4. Natural Capital Catchment Account Tool methodology flow chart

Natural capital accounts typically assume assets (habitats) are in average condition to quantify the ecosystem service flow of benefits and monetary values. This assumption has been adopted in this tool and therefore we refer to this as the 'default' account. Further research is ongoing to explore where natural capital asset quality (condition), risk and pressure data can be incorporated in future versions.

The input data of natural capital asset quantities is derived from Corine Land Cover (2012) maps (see Annex 2 for more information on Corine). There are limitations in this data (i.e. granularity of data and frequency of updates) and therefore this tool currently functions best at a catchment scale to provide a high-level summary. The Corine data will be used to estimate the quantity of each broad habitat type in the catchment and its contribution of benefits to people from agriculture, standing timber, climate sequestration, air quality and flood storage.

The National Abstraction licence database (NALD, official sensitive data) provides annual authorised quantities of raw water abstraction for public water supply within the catchment. A £/m<sup>3</sup> is applied and used to quantify the monetary flows of water abstractions (this data can only be accessed by Environment Agency staff and due to the sensitivity of the data, only total quantities for a catchment can be shared to prevent individual abstraction points being made identifiable).

The Outdoor recreation value (ORVal) tool is used to generate a monetary value for number of visitors to green space within the catchment for purpose of recreation.

Using the three sources of input data listed above this tool quantifies the benefits and values of seven core ecosystem services - recreation, agriculture, public water supply, timber, climate regulation, air quality and hazard regulation (see Table 1 in Annex 1). All the valuation data – data used to calculation the monetary values are listed in the 'meta data' tab, within the tool.

There are many more ecosystem services that we are not yet able to quantify however their importance and significance to society must be considered in a qualitative way during



decision-making processes. A summary of the ecosystem services and their significance to society is shown in Table 2 of Annex 1.

The output you will get from the tool will be a monetary account with the following breakdown in values:

- Average annual benefit (£m) in year 0
- Average total value (£m) discounted over 100 years<sup>2</sup>
- Where some services allow, a min/max total value (£m) discounted over 100 years

It will provide the user with a snapshot of the quantifiable benefits that the assets (habitats) in the catchment are providing. As already stated above, those benefits that cannot yet be quantified by this tool should likely be given equal weighting in any subsequent decision making.

## Use of the tool

Natural capital accounts are a way of presenting information about the value of natural assets and the services and benefits they provide. The merits of assigning monetary values to aspects of the environment are that it allows these values to be considered in and inform planning and investment and decisions. The systematic process of producing natural capital registers and accounts helps organisations to:

- Recognise the value of specific aspects of the environment to society and engage with partners to create a shared vision for a catchment or place.
- Prioritise opportunities to enhance and protect assets and service of value to society.
- Justify greater and more strategic investment in the environment through catchment plans and priorities.
- Identify wider benefits from existing and planned work to secure alternative investment opportunities.

Natural capital register and accounts may provide a mechanism to measure and track net gain and losses as part of the ambition set out in the 25 YEP.

## 3. Generating input data

There are three pieces of 'input' data required for the tool.

1. Habitat quantity data using GIS for 'Input - Asset Register' tab
2. Welfare and recreation values for 'Process - ES recreation' tab
3. Abstraction licence quantities for 'Process - ES Water Supply' tab

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<sup>2</sup> The continuous value over 100 years assumes ongoing average asset quality. Discount rate is set by the Treasury in the latest Green Book.



## Generating habitat quantity data using GIS

The Natural Capital App is an ArcGIS Enterprise app for Environment Agency staff. Using the Corine Land Use 2012 dataset, the App allow the user to calculate total areas in hectares of different habitat types which make up the 'Input - Asset Register' data.

Alternatively, you may wish to use ArcGIS desktop to have greater flexibility and allow additional layers to be included. Instructions for this are provided in Annex 3.

### Opening the App

1. Open Internet Explorer or Chrome and paste this link into the address bar <https://eaimportalpoc.esriuk.com/portal/home/>
2. At the top right click on **Sign In**
3. Click on WINDOWS and enter your normal log in details
4. In the menu at the top click on Content and then choose the dark blue tab **My Organisation**.
5. You should see some available apps and maps. Find the Natural Capital App by entering **Natural Capital** in the search box.
6. Click on the 3 dots to the bottom right of the **Natural Capital App** and choose **View Application**

The screenshot shows the ArcGIS Enterprise portal interface. At the top, there is a navigation bar with 'Home', 'Gallery', 'Map', 'Scene', 'Groups', 'Content', and 'Organization'. A user profile for 'Pauline' is visible in the top right. Below the navigation bar is a blue header with the word 'Content'. Underneath, there are tabs for 'My Content', 'My Favorites', 'My Groups', 'My Organization', and 'Living Atlas'. A search bar contains the text 'Natural Capita'. Below the search bar, it shows '1 - 16 of 55' results. Three items are visible in the search results:

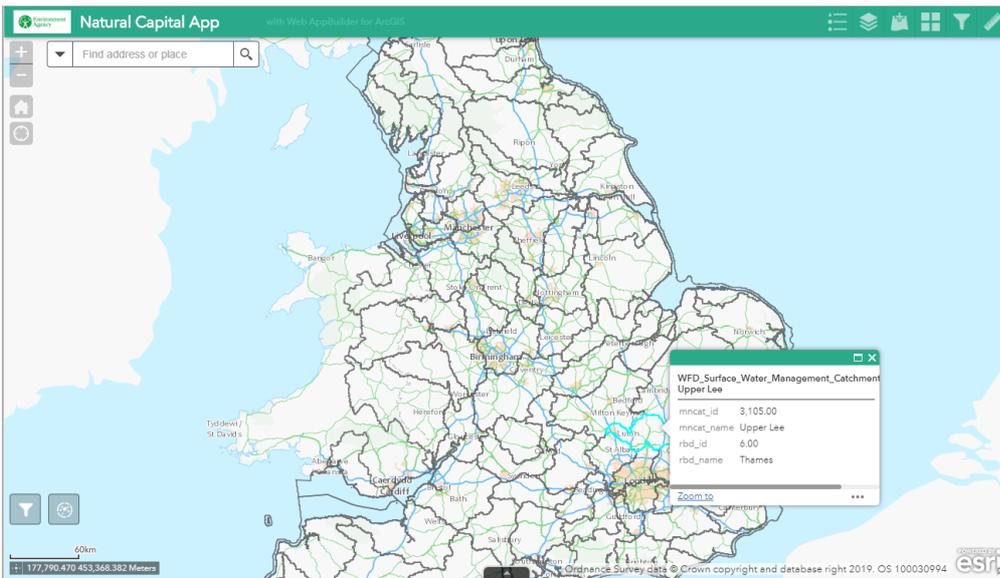
- Natural Capital App** by PMORROW: Created: Sep 18, 2019; Updated: Oct 24, 2019; View Count: 163.
- Shellfish Water areas** by SHURLEY: Created: Apr 26, 2019; Updated: Oct 23, 2019; View Count: 111.
- Bathing Water areas** by SHURLEY: Created: Apr 25, 2019; Updated: Oct 23, 2019; View Count: 99.

Each item includes a thumbnail map and a set of icons for sharing, favoriting, and more options.

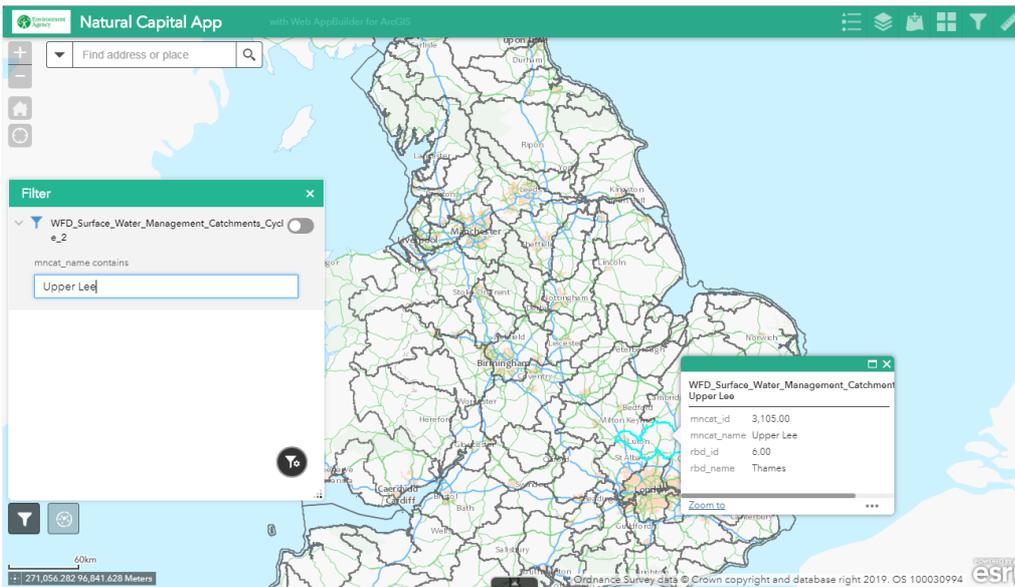
### Perform the Analysis

7. You should see a map with the WFD Cycle 2 Management Catchments. Click on the map to see the catchment names. Close the pop up window using the cross in the top right.

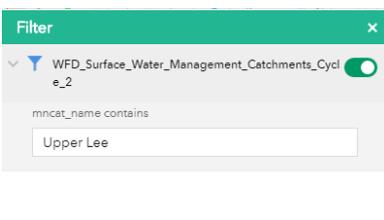




8. Click on the filter button  in the bottom left of the app to filter the catchment layer to your area of interest.
9. Type in the name of your catchment.



10. Click the grey/green slide button in the top right of the filter box to apply the filter.

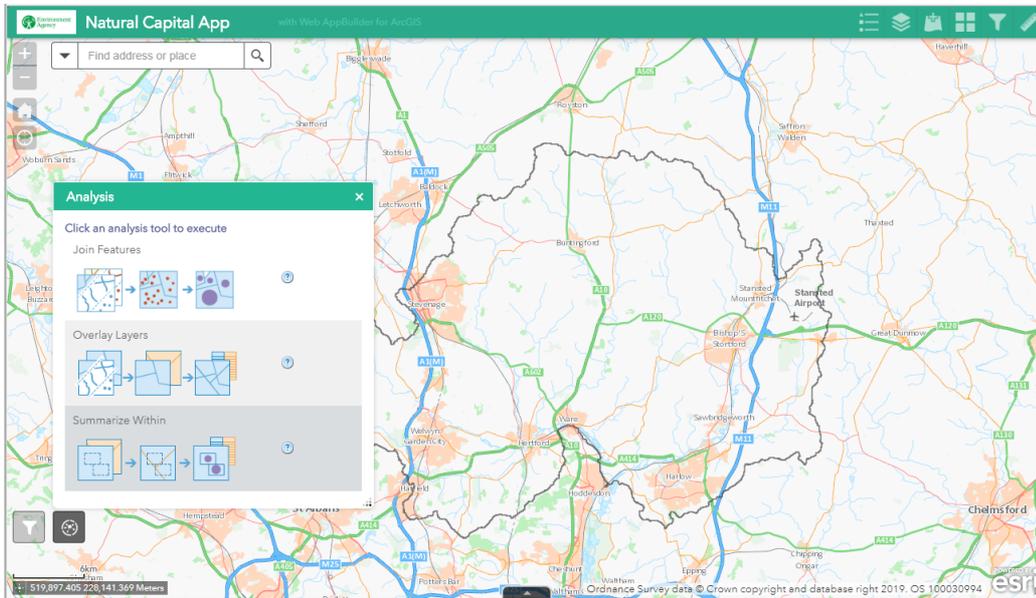


11. The map should zoom to your catchment. Make sure you have filtered to only one catchment.

12. Close the Filter window.

13. Click the Analysis button  in the bottom left corner.

14. Click on Summarize Within.

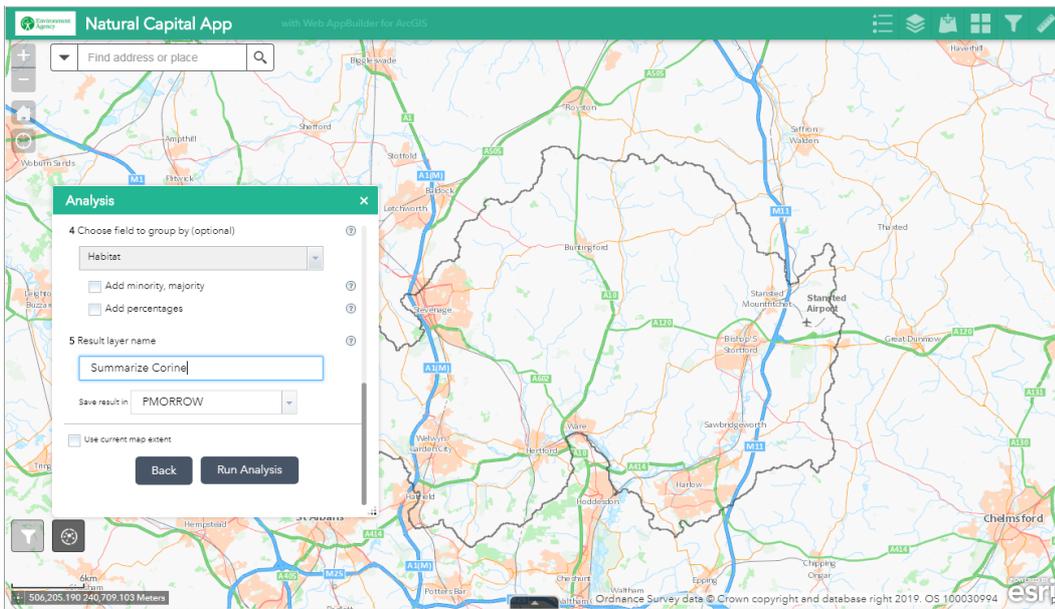


15. In the Analysis dialog box add the following

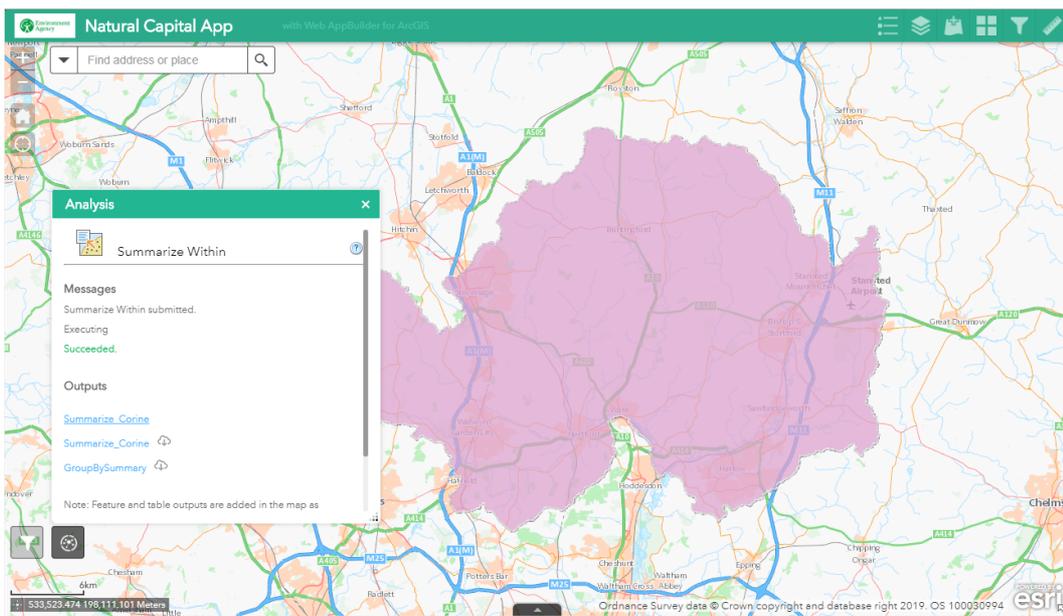
- Choose a polygon layer - WFD\_Surface\_Water\_Management\_Catchments Cycle 2 layer
- Choose a layer to summarize - Corine\_landcover\_2012
- Sum Area in - Hectares
- Choose field to group by – Habitat
- Result layer name – the layer will be saved in your own workspace. Choose a name eg.. Summarize Corine (you may need to rename subsequent analysis outputs)

16. Click on Run Analysis

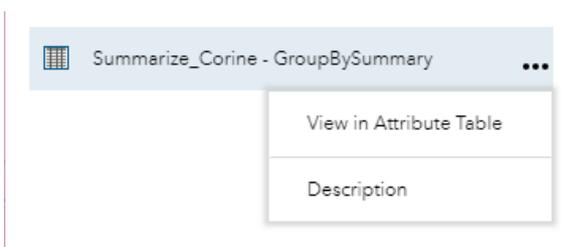




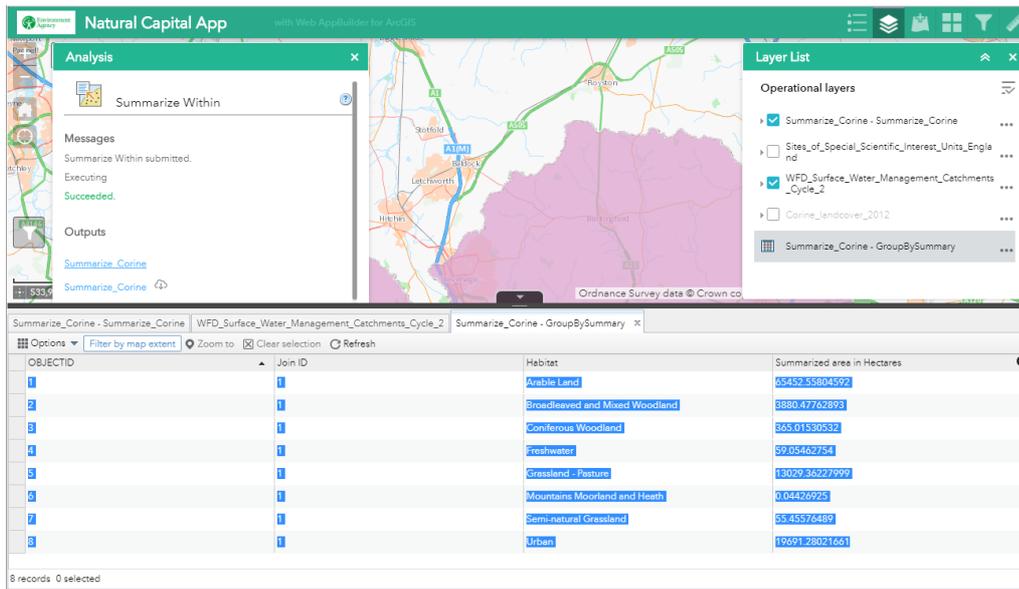
NB: The processing may take several minutes.



17. Click on the Layer List button  in the top right of the app to open the list.



18. Find your new table in the list and click on the 3 dots to the right (you may need to scroll to the right to see the dots). Choose View in Attribute Table.



## Transferring the data

19. Highlight the rows in the table by dragging the mouse over them and copy using Ctrl/C.
20. Paste into the Natural Capital Account Data Summary spreadsheet. NC\_Catchment\_Account\_Data\_Summary.xlsm which can be found in [I:\Resources\Natural Capital GIS\](#).
21. Go to the Results tab and click on the **Refresh Data button**
22. Copy the figures into the Natural Capital Catchment Register and Account Beta v1.0 spreadsheet in the 'Input - Asset Register' tab.
23. You may wish to go to your Content page in ArcGIS Enterprise and delete the files you have created if you no longer need them.

## Generating welfare and recreation values

To generate welfare and recreation values users need to access the Outdoor Recreation Valuation tool (ORVal) here: <https://www.leep.exeter.ac.uk/orval/>. This tool predicts the number of visitors to green spaces and estimates the associated welfare value.

1. Select 'explore sites'.
2. Choose the 'catchment' layer.
3. Select your catchment of choice on the map to reveal the catchment ID.
4. A panel on the left hand side will appear. Select the 'detailed' site information.
5. You can choose to 'download' the data in .csv format.





6. In the 'Process - ES recreation' tab of the tool, copy and paste the number of visitors by socio-economic group into cells G17-20 and welfare values into cells G36-39.

## Generating abstraction licence quantities

Your Area IEP teams have access to the National Abstraction Licensing Database (NALD) which holds details of abstractions licences. You need to extract annual authorised quantities of raw water abstraction in the catchment of choice. This is usually provided in an excel format and includes quantities in m3/year for both groundwater and surface water by use type.

1. Enter the total quantity for public water supply (use code - W-PWS-330) for groundwater and surface water and enter into 'Process - Water Supply' tab into cell G15.

# 4. Understanding the outputs

## Overview of the outputs

Seven broad ecosystem services are quantified in the tool, two of which have been subdivided creating nine in total. These have been grouped in the 'Output - 'Default' Account' tab into the broad categories and are detailed in Table 1 below. Supporting services (often considered the life support processes that support all other services) are not included in the account to prevent double counting.

| Category     | Ecosystem Service       | Physical measure                          | Monetary measure             |
|--------------|-------------------------|---|------------------------------|
| Cultural     | Recreation              | No. visitors to open spaces               | Welfare gain from recreation |
| Provisioning | Agriculture - Arable    | Area of land farmed - Feed wheat          | Associated production value  |
|              | Agriculture - Livestock | Area of land farmed - Dairy & Beef, Sheep | Associated production value  |
|              | Water supply            | Authorised raw water quantity             | Value of public water supply |



|            | Timber               | Quantity of standing timber      | Net value of sustainably managed timber |
|------------|----------------------|----------------------------------|---|
| Regulating | Climate regulation   | CO2 sequestered                  | Non-traded carbon value                 |
|            | Air quality - PM2.5s | PM2.5s absorbed                  | PM damage cost avoided                  |
|            | Air quality - SO2    | SO2 absorbed                     | SO2 damage cost avoided                 |
|            | Hazard regulation    | Flood water storage of woodlands | Costs avoided of storage reservoirs     |

Table 1. Ecosystem services quantified in the tool with the physical and monetary measure

The values provide only a partial snapshot of the true value of the environment. For example, the ecosystem service 'water supply' only takes public water supply into consideration however users must also consider other use types such as agriculture, industry and amenity.

The 'Output - 'Default' Account' tab breaks down the account into measures used to value benefits (e.g. tonnes of carbon sequestered) and monetary value (e.g. non-traded carbon value) as both sets of information can be valuable when engaging with stakeholders.

The monetary account provides the following breakdown of values:

- Average annual benefit (£m) in year 0
- Average total value (£m) discounted over 100 years
- Where some services allow, a min/max total value (£m) discounted over 100 years

The values are estimates based on a number of assumptions. A RAG status of confidence has been assigned to each ecosystem service that has been quantified.

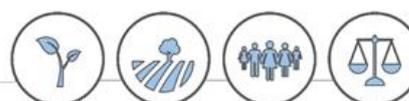
|       |   |
|-------|---|
| GREEN | High confidence in results. Input data and assumptions are based on statistical reports, peer reviewed values or industry standard methodologies                            |
| AMBER | Moderate confidence in results. Input data and/or assumptions from single source/not peer reviewed, or based on sources that are not specifically tailored to this context. |
| RED   | Low confidence in results. Input data and/or parameters from single source and low level of transferability from original to site   |

Table 2. Confidence status assigned to each ecosystem service quantified in the tool

The additional ecosystem services are listed as part of the output to signpost their intrinsic value where quantifiable values are not currently available. It is important that users consider the value to society of all ecosystem services and the benefits we derive. Annex 1 describes a qualitative approach to assessing the significance of other ecosystem services.

## Limitations and areas of future research

Valuation - the tool provides high level estimates of values for a range of ecosystem services. It is not an accurate balance sheet but can be used to recognise the value of the environment and what is at stake if we do not protect and enhance it. Further research is



ongoing to expand the number of ecosystem services within the tool and the complexity of the calculations.

Quality - this tool assumes average condition of habitats, future development will include condition as well as risk and pressures to assets and the impact on benefits we receive.

Scale - due to the limitations of the input habitat quantity data (Corine Land Cover map), the tool is only suitable for use at a catchment scale and larger (e.g. operational area) (further information is available in Annex 2). It cannot be reliably used for sub-catchments or at a project scale. Alternative input habitat data sources are being explored as well as the opportunity to incorporate data on sub-habitats such as kilometres of rivers.

Methodology - the sources of data and methodology used in the tool are subject to enhancement and development. This current version of the tool (V1.0) is a beta version intended for wider testing and feedback from users. Updated versions will be provided and details of these will be included in the 'change log' tab.



# Annex 1 - Scale and significance of gaps in ecosystem service benefits and value information

A natural capital register and account is a decision-support tool. It gathers disparate data to allow people to better understand and assess a place and the assets within it. Therefore, it's important that people understand the data within the context of uncertainties and gaps in information.

The tool provides an estimate of the monetary value of quantifiable benefits from a catchment. However, this estimate does not account for all of the benefits from all of the ecosystem services provided by the catchment; there are benefits that we have not been able to value in monetary terms.

Information about natural capital assets (location, quality and quantity) is generally more readily accessible and comprehensive (and in some cases, considered more accurate) than the quantifiable benefit values to measure ecosystem services. In this account, a RAG score is provided to indicate the level of confidence in the benefits value data for each ecosystem service that has been quantified. More information about the assumptions that underlie values is also provided. 16 ecosystem services are included in this account. However, currently, we are only able to quantify the benefits, with suitable robustness, for a proportion of these using an appropriate value. See table 1.

| UK NEA category | Ecosystem Service          | Quantified (benefit value included) | Unit used                                      |
|-----------------|----------------------------|-------------------------------------|--|
| Cultural        | Spiritual                  | No                                  |  |
|                 | Health                     | No                                  |  |
|                 | Amenity                    | No                                  |  |
|                 | Aesthetic / sense of place | No                                  |  |
|                 | Education                  | No                                  |  |
|                 | Recreation                 | Yes                                 | No. visitors to open spaces (millions)         |
| Provisioning    | Agriculture - Arable       | Yes                                 | Area of land farmed - Feed wheat (ha)          |
|                 | Agriculture - Livestock    | Yes                                 | Area of land farmed - Dairy & Beef, Sheep (ha) |
|                 | Water supply               | Yes                                 | Authorised raw water quantity (m3/yr)          |
|                 | Timber                     | Yes                                 | Quantity of standing timber (m3)               |
| Regulating      | Climate regulation         | Yes                                 | CO2 sequestered (tonnes)                       |
|                 | Air quality - PM2.5s       | Yes                                 | PM2.5s absorbed (tonnes)                       |



|  |                        |     |                                       |
|--|------------------------|-----|---------------------------------------|
|  | Air quality - SO2      | Yes | SO2 absorbed (tonnes)                 |
|  | Hazard regulation      | Yes | Flood water storage of woodlands (m3) |
|  | Disease and pests      | No  |                                       |
|  | Pollination            | No  |                                       |
|  | Soil quality / erosion | No  |                                       |
|  | Noise                  | No  |                                       |

Table 1: Ecosystem services quantified in this account

The extent of ecosystem services and benefits provided by a catchment vary, and not all of them can be quantified. For example, this account does not include an estimate of health benefits but this ecosystem service is provided by the catchment and is likely to be very important to the people living in and using the catchment. Nature-based opportunities for recreation play an important role in people's mental and physical health and wellbeing, for example, walking and playing sports in green spaces.

Where there is limited quantifiable information, it is useful to consider the ecosystem services and benefits provided by a catchment qualitatively. For example, there may be no provision of a service or benefit or only a small amount from a limited number of places in a catchment. Or, there could be large amounts provided from across the whole catchment. By doing this, decision makers can use and interpret the account in the broad catchment context.

A standard approach to this qualitative assessment provides a useful way to support the use of an account in decision making. To this end, as a starting point, we have applied a 'significance' score to the ecosystem services in this catchment based on Natural England's 'Accounting for National Nature Reserves: A Natural Capital Account of the National Nature Reserves managed by Natural England'<sup>3</sup>. The scores that Natural England have applied reflect the purpose of National Nature Reserves specifically. Therefore, they require local expert review to ensure they are representative of this catchment.

| UK NEA category | Ecosystem Service          | Significance score |
|-----------------|----------------------------|--------------------|
| Cultural        | Spiritual                  | 3                  |
|                 | Health                     | 2                  |
|                 | Amenity                    | Not assessed       |
|                 | Aesthetic / sense of place | 3                  |
|                 | Education                  | 3                  |
|                 | Recreation                 | 3                  |
| Provisioning    | Agriculture - Arable       | 1                  |

<sup>3</sup> 'Accounting for National Nature Reserves: A Natural Capital Account of the National Nature Reserves managed by Natural England' (Natural England Research Report NERR078, 2019)



|            |                         |              |
|------------|-------------------------|--------------|
|            | Agriculture - Livestock | 1            |
|            | Water supply            | 1            |
|            | Timber                  | 2            |
| Regulating | Climate regulation      | 3            |
|            | Air quality - PM2.5s    | 1            |
|            | Air quality - SO2       | 1            |
|            | Hazard regulation       | 1            |
|            | Disease and pests       | 1            |
|            | Pollination             | 1            |
|            | Soil quality / erosion  | 1            |
|            | Noise                   | Not assessed |

Table 2. Ecosystem Service Significance Score based on Natural England's Accounting for National Nature Reserves, 2019

| Score | Description  |
|-------|--|
| 0     | No provision or a very small amount from a few sites   |
| 1     | A small amount across the estate [catchment]   |
| 2     | A substantial amount from limited sites, or medium provision across the broader estate [catchment] |
| 3     | Large amounts across the whole estate [catchment]  |

Table 3: Description of scores applied to the ecosystem services and benefits

We have included information about ecosystem services for which we have been able to gather robust and reliable benefit and value information. However, there are still gaps and we welcome information from across the business and from our partners to improve this BETA version. For example, we know the environment provides hazard regulation to reduce the impact of flooding. We can currently provide an estimate of the value of this benefit from water storage provided by woodland. However, this is likely to be an underestimate given there are other sources of water storage i.e. flood plains.



## Annex 2 - CORINE data and National Ecosystem Assessment (NEA) broad habitat type

| Layer     | Data Name | Data Description            | Published by                      | Hyperlink to Data Source        |
|-----------|-----------|-----------------------------|-----------------------------------|---------------------------------|
| Landcover | CLC 2012  | Land cover from CORINE data | European Environment Agency (EEA) | Link: <a href="#">Landcover</a> |

The NEA sub-habitat type layer was derived from the CORINE dataset. The CORINE (Co-Ordinated Information on the Environment) data series was established by the EC European Community as a means of compiling geospatial environmental information in a standardized manner across the whole of Europe. The first iteration was in 1990, with subsequent releases covering 2000, 2006 and 2012. Here, the 2012 dataset is used, as it is the most up-to-date available. The CORINE land cover classes are different from the NEA sub-habitat types, so the layers were reclassified as shown in the table below. The NEA categories are generally broader than the CORINE categories, so in these cases were amalgamated to give the NEA categories.

| Original CORINE Land Cover Categories   | NEA Broad Habitat Type          |
|---|---------------------------------|
| 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 | Urban                           |
| Non-irrigated arable land, land principally occupied by agriculture with significant areas of natural vegetation  | Enclosed farmland               |
| Pastures  | Enclosed farmland               |
| Natural grassland, transitional woodland-scrubs   | Semi-natural Grasslands         |
| Broad-leaved forest, mixed forest   | Woodlands                       |
| Coniferous forest   | Woodlands                       |
| Moors and heathland   | Mountains, Moorlands and Heaths |
| Beaches, dunes sands, salt marshes  | Coastal margins                 |
| Water bodies, estuaries   | Freshwater                      |
| Intertidal flats, sea and ocean   | Marine                          |

Table 1. Data inputs and sources for NC status mapping



This mapping layer (Figure 1) was based on CORINE satellite data of 100 meter resolution (European Environment Agency (EEA), 2012). The dataset was reclassified from the original to reflect National Ecosystem Assessment habitat types.

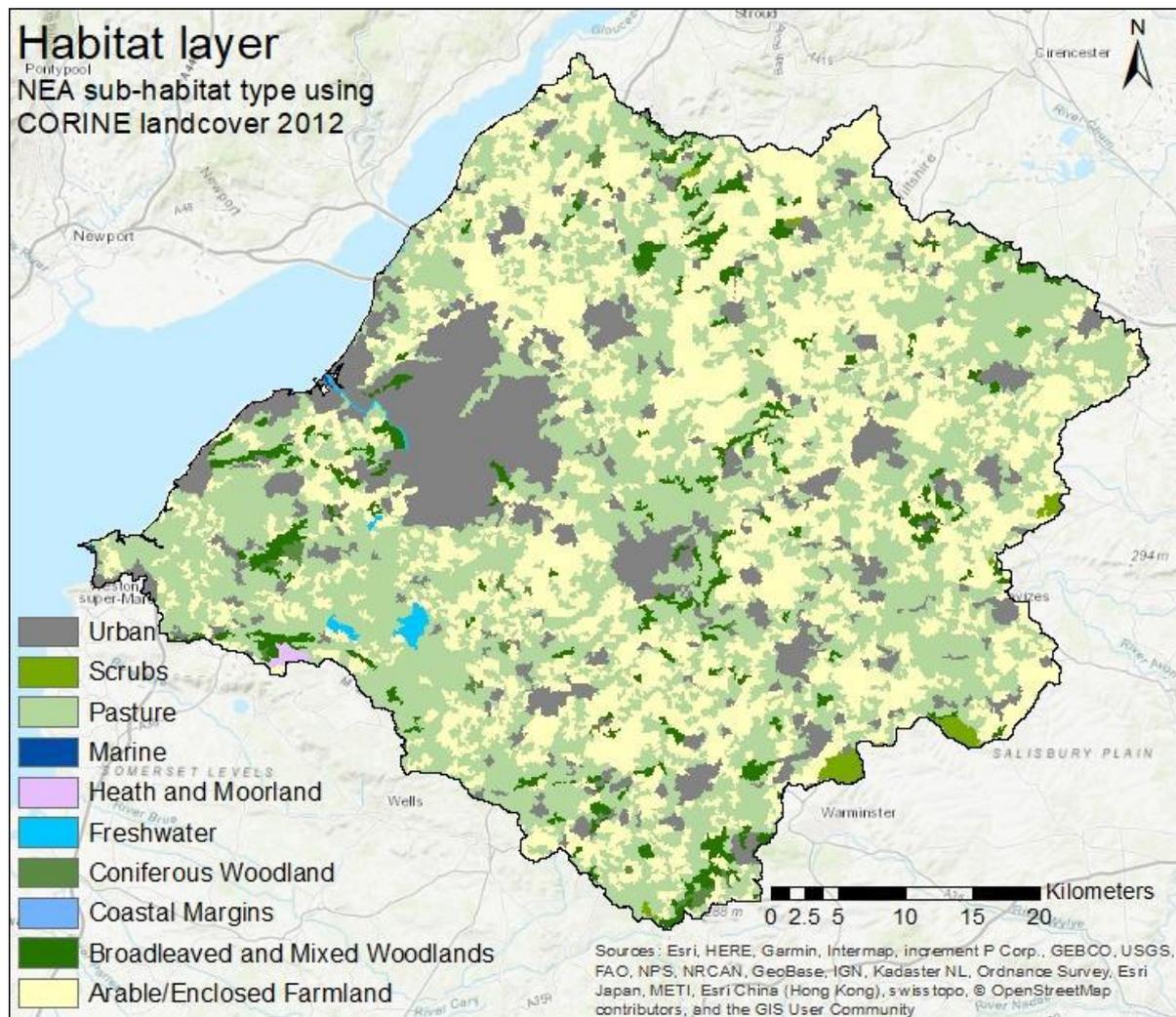
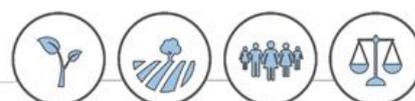


Figure 1. NEA habitat types based on CORINE satellite data (European Environment Agency (EEA), 2012).

**Scale and resolution of CORINE data set:**

- Minimum mapping unit (MMU): 25ha (status layer), 5 ha (change layer)
- Minimum width of linear elements: 10m
- Nomenclature: standard European level-3
- Potential accuracy: better than 100m
- Thematic accuracy: >85%
- Equivalent scale: 1:250,000 (status layer), 1:100,000 (change layer)

More information about the CORINE data set is available [here](#).



# Annex 3 - ArcGIS desktop guidance

The Natural\_Capital\_GIS.mxd ArcGIS project brings together a number of GIS layers of various scale, resolution and quality. The instructions below will help users calculate total areas in hectares of different habitats for input to the 'Input - Asset Register' tab.

You will need access to the Corine Land Cover maps (CLC\_2012\_England) land use dataset. This is available in the Natural\_Capital\_GIS.gdb geodatabase. If you don't have access see annex 4 for instructions on how to download the dataset.

The GIS Project and associated files are held in [I:\Resources\Natural\\_Capital\\_GIS](I:\Resources\Natural_Capital_GIS)

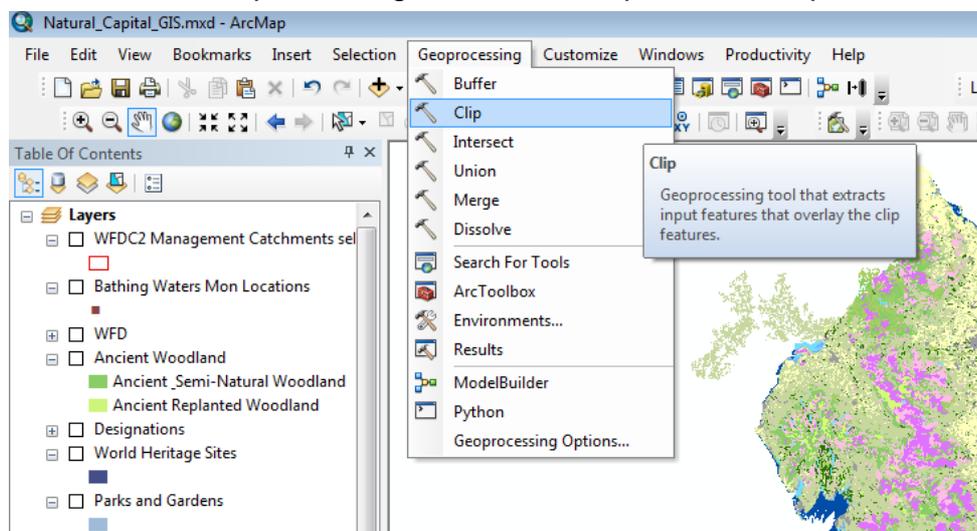
- ArcGIS Project Natural\_Capital\_GIS.mxd
- ArcGIS geodatabase Natural\_Capital\_GIS.gdb
- Symbology layer file CLC\_2012\_England.lyr
- NC Register spreadsheet NC\_Catchment\_Account\_Data\_Summary.xlsm

## Opening the Project

1. Visit [I:\Resources\Natural\\_Capital\\_GIS](I:\Resources\Natural_Capital_GIS).
2. Copy the entire folder Natural\_Capital\_GIS from I:\Resources to your own workspace – this could be the U:\ drive if you are working in the CMP
3. Open the ArcGIS Project Natural\_Capital\_GIS.mxd

## Perform the Analysis

4. Select your area of interest or catchment polygon either by using the select features tool  or right click on the name of the layer, open the attribute table and select the record using the grey boxes at the left hand side of the table. Then close the attribute table.
5. Right click on the name of the layer and choose Selection, Create Layer from Selected Features
6. From the Geoprocessing menu at the top, choose Clip.



7. Select the Corine Land Cover data layer (**CLC\_2012\_England**) as the input features and your catchment selection layer as the clip features.
8. The output file type will be a geodatabase feature class. Save this in the Natural\_Capital\_GIS.gdb geodatabase in your own workspace. Name the feature class **CLC\_2012\_England\_clip**
9. When the processing is complete the resulting layer will be added into your GIS project (map document).

Open the attribute table for the new layer. You will need a field called **Area\_Ha**.

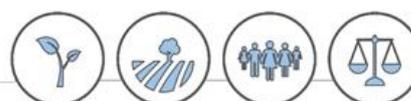
(If this doesn't already exist in the attribute table, from the menu at the top left add a new 'double' field to the table called **Area\_Ha**).

10. **Always update the information in the field whether it existed or you created it** – right click on the name of the field and choose Calculate Geometry. Select Area in hectares.

| FID | Shape * | code_12 | ID         | Remark | Area_Ha    | Shape_Leng   | Shape_Area    |
|-----|---------|---------|------------|--------|------------|--------------|---------------|
| 0   | Polygon | 111     | EU-1338719 |        | 54.448109  | 3362.944695  | 544481.0934   |
| 1   | Polygon | 111     | EU-1338741 |        | 111.775635 | 6011.334075  | 1117756.34725 |
| 2   | Polygon | 111     | EU-1338746 |        | 55.017445  | 3567.629909  | 550174.4477   |
| 3   | Polygon | 111     | EU-1338750 |        | 331.972791 | 10023.023003 | 3319727.9147  |
| 4   | Polygon | 112     | EU-1339043 |        | 30.331103  | 3528.046001  | 303311.0273   |
| 5   | Polygon | 112     | EU-1339045 |        | 30.328759  | 2831.575487  | 303287.5853   |
| 6   | Polygon | 112     | EU-1339053 |        | 29.436042  | 3620.742239  | 294360.42305  |
| 7   | Polygon | 112     | EU-1339067 |        | 30.036817  | 3022.74394   | 300368.17395  |
| 8   | Polygon | 112     | EU-1339074 |        | 606.745943 | 15996.456584 | 6067459.43365 |
| 9   | Polygon | 112     | EU-1339081 |        | 31.750941  | 3748.688961  | 317509.40855  |
| 10  | Polygon | 112     | EU-1339085 |        | 50.65514   | 3142.840943  | 506551.39845  |
| 11  | Polygon | 112     | EU-1339091 |        | 411.17     | 14901.813647 | 4111699.9993  |
| 12  | Polygon | 112     | EU-1339097 |        | 37.909875  | 3791.182708  | 379098.7491   |
| 13  | Polygon | 112     | EU-1339098 |        | 52.743994  | 4986.357209  | 527439.94405  |
| 14  | Polygon | 112     | EU-1339099 |        | 25.101316  | 2997.117861  | 251013.16125  |
| 15  | Polygon | 112     | EU-1339105 |        | 71.310013  | 7539.272032  | 713100.13015  |
| 16  | Polygon | 112     | EU-1339107 |        | 38.398517  | 3066.796833  | 383985.17005  |
| 17  | Polygon | 112     | EU-1339108 |        | 37.938428  | 3341.773204  | 379384.2759   |
| 18  | Polygon | 112     | EU-1339129 |        | 30.910387  | 2477.719132  | 309103.8679   |
| 19  | Polygon | 112     | EU-1339139 |        | 44.046503  | 3218.798618  | 440465.0297   |
| 20  | Polygon | 112     | EU-1339140 |        | 67.230032  | 6743.419603  | 672300.3226   |
| 21  | Polygon | 112     | EU-1339144 |        | 44.156857  | 3491.855256  | 441568.56855  |
| 22  | Polygon | 112     | EU-1339145 |        | 33.832091  | 3004.762064  | 338320.90505  |
| 23  | Polygon | 112     | EU-1339146 |        | 99.855565  | 8214.23693   | 998555.6481   |

11. You should also see a field called **Habitat** populated with habitat types. These have already been added to the CLC\_2012\_England layer and relate to the CLC Code as in the table below. (Green codes are present within the England cut of the dataset).

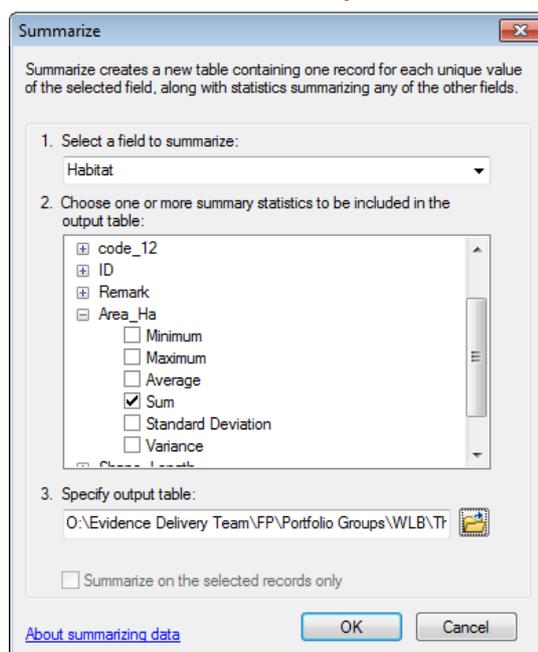
| UK NEA habitat type | Corine code   |
|---------------------|---|
| Coastal Margins     | 331/ <b>421</b> /422/ <b>423</b> /521                               |
| Enclosed Farmland   | <b>211</b> /212/213/221/ <b>222</b> /223/231/241/<br><b>242/243</b> |
| Includes:           |   |
| Grassland - Pasture | <b>231</b>  |
| Arable land         |   |



|                                |   |
|--------------------------------|---|
|                                | 211/212/213/221/222/223/241/242/243         |
| Freshwater                     | 411/412/511/512                             |
| Marine                         | 522/523                                     |
| Mountains Moorland and Heath   | 322/332/333/334/335                         |
| Semi-natural Grassland         | 321/323/324                                 |
| Urban                          | 111/112/121/122/123/124/131/132/133/141/142 |
| Woodland                       | 244/311/312/313                             |
| Includes:                      |   |
| Broadleaved and Mixed Woodland | 244/311/313                                 |
| Coniferous Woodland            | 312   |

Table 1. UK NEA habitat categories included in England cut of CLC 2012 in green

12. In the attribute table, right click on the Habitat field and choose **Summarize**. Expand the + next to Area\_Ha field and tick the **Sum** option. Make sure 'Summarize on selected records only' is not ticked.



13. Click on the file name option, choose geodatabase and save your table in the Natural\_Capital\_GIS.gdb geodatabase. Call the table **Sum\_habitats**, and click on ok.

14. Click Yes to add the resulting table into your map.

15. Right click on the table name and open the summary table in ArcMap. Select all the records then right click on the grey area to the left of the table and choose **Copy Selected**.



| OID | Habitat                       | Count_Habitat | Sum_Area_Ha  |
|-----|-------------------------------|---------------|--------------|
| 0   | Arable/Enclosed Farmland      | 97            | 78372.209629 |
| 1   | Freshwater                    | 19            | 807.421724   |
| 2   | Grassland - Pasture and scrub | 167           | 32423.729213 |
|     |                               | 25            | 11800.56228  |
|     |                               | 287           | 44767.391954 |
|     |                               | 130           | 8805.513508  |

16. Paste the copied records into the NC\_Catchment\_Account\_Data\_Summary spreadsheet in the “Corine data from ArcGIS” sheet.
  17. Go to the Results tab and **refresh the results**.
  18. It’s a good idea to double check your figures. In ArcGIS open the attribute table of the original catchment or area of interest selection layer you created. Scroll across to the right to the Shape\_Area field. This shows the total area of the polygon in m2 so you will need to divide by 1,000,000 to get km2. Compare this figure to the total area in your Catchment Account Data Summary.
- If you have more than one polygon then you can right click on the field name Shape\_Area and choose Statistics. This will create a popup box of statistics including one called Sum. This is the total area in m2.
19. Copy the figures from the Results tab into the Natural Capital Catchment Register and Account tool in the 'Input - Asset Register' tab

## Annex 4 - access Corine Land Cover Data

The Corine Land Cover Dataset should be available in the Natural Capital Geodatabase. If you don’t have access to this you can download the data from the Copernicus website

1. Corine land cover data download page
2. <https://land.copernicus.eu/pan-european/corine-land-cover>
3. For the Natural Capital project we are using the CLC 2012 dataset
4. Click the link and then click the Download button at the top of the map
5. You will need to log in or register for an account
6. Download ESRI FGDB (File Geodatabase)
7. Unzip the geodatabase file to your local drive, add the layer into the ArcMap project





8. You will get a message about Coordinate Systems. Click on Transformations.
9. Choose to Convert from GCS\_ETRS\_1989
10. Into: GCS\_OSGB\_1936
11. Using the transformation which ends with the word Petroleum
12. (ETRS\_1989\_To\_WGS\_1984 + OSGB\_1936\_To\_WGS\_1984 Petroleum)
13. Click on Ok, and then Close

## Annex 5 - Data Management Plan

### Background

The Natural Capital Catchment Register and Account Tool is based on input data via GIS conversion from nationally available, open source spatial datasets (Corine Land Cover), publically accessible ORVal tool and National Abstraction Licence Database collated into spreadsheets. This data management plan sets out the plan for the use of the data and spreadsheets and explains the restrictions on sharing externally.

Four main products are available for use to generate a catchment account:

- Natural Capital App <https://eaimportalpoc.esriuk.com/portal/home/>
- Natural\_Capital\_GIS.gdb – ArcMap project
- NC Catchment Account Data Summary – excel spreadsheet
- Natural Capital Catchment Register and Account Tool – excel spreadsheet

### Ownership

Data custodian of the products is the Natural Capital Programme Team, Environment and Business.



## Open Data

The products have been risk assessed under Open Data criteria. The tool is classified as 'OFFICIAL' as it contains only data deemed open source or publically available derived data. No confidential or sensitive data have been included. The full metadata list is included within the Natural Capital Catchment Register and Account Tool.

## Data input

Environment Agency teams may wish to use the products to replicate this analysis in a catchment of their choice to enhance the evidence base for catchment planning and strategic decision making.

Internal users will be responsible for inputting data into the tool. NB: National Abstraction licence database (NALD) provides annual authorised quantities of raw water abstraction for public water supply which is official sensitive data. Due to the sensitivity of the data, only total quantities for a catchment can be inputted into the tool to prevent individual abstraction points being made identifiable. External stakeholders must only have access to the outputs of the OFFICIAL version of the tool and not the raw data extracted from NALD.

## Spreadsheet maintenance

The catchment account spreadsheet contain process data used to generate the account values. These will be static datasets (i.e. will not be routinely updated) however when new data is made available, records will be kept by the Natural Capital Programme Team and updates will be actioned on a periodic basis. Any errors that are identified will be actioned on a periodic basis and logged on the spreadsheets 'change log' tab by the NCP Team.



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