NATURE
Nature Assessment Tool
for Urban and Rural Environments

United Kingdom

Introduction, User Guide & Methods

For NATURE Tool Version 1.1.1 BETA

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Tool Development Led By

In Collaboration With

Tool Development Funded By

The NATURE Tool has been co-developed together with more than 30 organisations involved in the built environment sector, including

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1 Introduction to the NATURE Tool

Chapters 1 provides a high-level introduction to the NATURE Tool including tool updates and answers to some key questions. Please continue with Chapter 2 if you are mainly interested in the step-by-step tool user guidance. For a results and indicator overview refer to Chapter 3. More technical methods of how the tool model works, including how scores are calculated for each ecosystem service and benefit, are provided in Chapter 4.

1.1 What is the NATURE Tool?

The Nature Assessment Tool for Urban and Rural Environments (short: NATURE Tool) is a user-friendly, easy to use Excel tool to assess the impact of land-use and/or management changes on natural capital performance. This will encourage both better decision-making and clearly demonstrate the results of positive sustainable action during development, but can also be applied to nature conservation projects, for example. The NATURE Tool was first released in July 2021 as a BETA version and updated to version 1.1 in August 2022 with new features as summarised in Section 1.2.[1]

The NATURE Tool allows the assessment of up to 17 ecosystem services, physical and mental health benefits, and the abated carbon emissions from photovoltaic (solar) installations (abiotic service) through a scoring system, indicating both the direction and magnitude of project impacts. These scores are aggregated based on policy priorities resulting in an overall Natural Capital Score for the project. Carbon impacts (vegetation, soils and abated through photovoltaic) are also assessed in tonnes of carbon dioxide equivalent (t CO_2e) and in monetary terms following HM Treasury Green Book guidance.

The tool is free to use, applicable across the UK, and designed for the application by non-specialists without requiring excessive data or time. It can be used across different project stages and at different scales. The minimum requirements are a defined site boundary, habitat data, and data on the accessibility of greenspaces of the site.

The NATURE Tool can also be tailored to a local or corporate version, allowing the 'Objective Setter' to define policy priorities and natural capital objectives a project should achieve (see also Section 2.1.2). This means that, for example, a project-specific NATURE Tool version can be created.

1.2 What is New in NATURE Tool Version 1.1.1?

Version 1.1.1 BETA of the NATURE Tool has the following new features and improvements compared to version 1.1 BETA:

- A **confidence rating** has been implemented to enhance transparency regarding general model uncertainties. See Section 4.1.8 for more detail.
- **Aggregated score calculations for Cultural & Health, Regulating & Supporting and Provisioning services were updated**. This affects the absolute rather than the relative score range only, meaning that aggregated scores are better comparable to individual ecosystem services scores.
- It's now **easier to copy over results from the Biodiversity Metric 4.0** which resolves rounding issues when entering values manually.
- A smaller **bug in the Potential Score calculation has been resolved**, meaning that Potential Scores are now calculated more accurately.

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[1] NATURE-Tool.com

- A bug has been resolved which required population of the Photovoltaic section also for a BASIC assessment.
- The Scottish Water Status data link has been updated.
- Some **default values for the Photovoltaic sheet have been updated** based on further feedback from testing.
- The Abiotic Services header in the Summary Results sheet is now hidden when Photovoltaic Carbon Impact is not assessed.

Please note that most results from NATURE Tool version 1.1 and version 1.1.1 are comparable, apart from the Potential Score calculation and Aggregated Score calculations (Cultural & Health, Regulating & Supporting and Provisioning) which have been updated.

1.3 Why Using the NATURE Tool?

In the UK and beyond, there is a growing need for efficient ways to deliver built development, such as housing and transport infrastructure, in line with the goals of sustainable development. Widespread calls by sustainability leaders for a green recovery in response to Covid-19 have heightened this need. Over recent years, the ambition to secure environmental net-gains (ENG) from new developments have grown.[2,3] ENG is an approach to development that aims to leave the natural environment in a measurably better state than beforehand. This environmental improvement ambition is the basis for HM Government's 25 Year Environment Plan.

Leaving the environment in 'a better state' must mean much more than net gain for biodiversity (species and habitats). Whilst this is important, evidence and advice presented by the Natural Capital Committee[4] (an official advisor to HM Government) highlight that this ambition must involve protection and enhancement of the core contributions of natural features to wellbeing and prosperity.

These contributions – sometimes labelled ecosystem services – include regulation of air quality, sequestration of carbon, recreation including mental and physical health benefits, through access to natural outdoor spaces, and flood risk reduction. With the green recovery and 'build back better', now is the time to enable this ambition to be turned into project delivery. International assessments, such as the IPBES global assessment report, will ensure that ENG is promoted worldwide.[5,6]

A key industry challenge for the built environment sector to be resolved was how natural capital impacts and net-gains for the environment can be measured and assessed objectively and efficiently. In response, WSP and the Ecosystems Knowledge Network (EKN), in collaboration with Northumbria University, have led the development of the NATURE Tool to enable built environment professionals to define and objectively assess, measure, and manage to what extent new plans or developments achieve net-gains for the environment.

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[2] HM Government, 2018. A Green Future: Our 25 Year Plan to Improve the Environment. HM Government, London.

[3] MH CLG, 2018. National Planning Policy Framework. Ministry of Housing, Communities and Local Government, London.

[4] Please refer to https://www.gov.uk/government/groups/natural-capital-committee for an overview (Accessed: 15/08/2022).

[5] IPBES, 2019. The Global Assessment Report on Biodiversity and Ecosystem Services - Summary for Policymakers. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn.

[6] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/801508/ncc-advice-net-enviornmental-gain.pdf (Accessed: 15/08/2022)

The project team believes that the NATURE Tool will enable a step-change in how the built environment professions think about new development, enabling them to implement net-gains for the environment through transparent and objective assessments against clearly defined objectives. Overall, the NATURE Tool will not only help to make future land-use more sustainable, but will also to enable the built environment sector to play a more positive role by becoming a net-contributor to tackling environmental issues – a potential game-changer.

1.4 Who Can Use the Tool?

The NATURE Tool is aimed for all built environment professionals, planners, and related stakeholders, as well as environmental managers and conservation practitioners with a stake in projects which could affect natural capital, such as through land-use/management changes. This includes most planning and development projects including housing, infrastructure, and mining. But could also be used to assess the natural capital impact of conservation and afforestation projects, for example.

A typical tool application would be to assess natural capital impact of a proposed plan or development design. The assessment will then show whether the impact is acceptable and desired, or whether the plan or design could be amended to enhance natural capital impact and achieve net gains.

The tool can be applied by non-specialists as it requires only basic Excel skills. Working out some of the optional indicators also require basic to intermediate Geographic Information System (GIS) skills. Please also refer to Section 1.11 for available support.

1.5 When Should I Use the NATURE Tool?

Ideally, the NATURE Tool is used at the earliest stages of the planning and development process, as this provides the greatest opportunities for interventions to enhance the plan/design and achieve net gains for the environment. It can be used as soon as site boundaries can be estimated.

The NATURE Tool assessment should then be subsequently updated at key stages, when the plan/design is updated or when detail is added to track whether these changes have an impact on natural capital and whether such impacts are desirable. Setting natural capital objectives within the tool can help to define what success looks like from a natural capital-perspective. This can be done in the 'Objective Setter Area' of the tool.

1.6 What are the Data Requirements?

The NATURE Tool is purposefully designed so that it can be used with very little data (Basic Assessment) as well as with more data where this is available (Advanced Assessment). The minimum data requirements for running a Basic NATURE Tool assessment are:

- Access to Microsoft Excel
- A site boundary
- Baseline habitat areas (based on an amended JNCC Phase 1 Habitat Classification Framework)
- Post-development habitat areas (not required for baseline assessment)
- The level of accessibility of greenspaces for the baseline and post-development

Habitat areas can be recorded in the Phase 1 habitat classification as well as UK Habitat Classification, as it will be easy to translate into the NATURE Tool habitat framework. The tool also works with different levels of habitat classification, i.e. an area could be recorded simply as Woodland or Lowland mixed deciduous woodland, depending on the level of information available at that stage.

A NATURE Tool Data Checklist has been prepared which will help you to collect the data for your assessment and summarises optional advanced indicators. This can be downloaded from the NATURE Tool website (www.NATURE-Tool.com).

1.7 What the NATURE Tool Can and Cannot do?

The NATURE Tool can be used to:

- Incorporate the high complexity of natural capital and ecosystem service science into everyday planning decisions without demanding specific expertise or extensive resources.
- Help organisations to move natural capital to the core of land-use decisions to address both, the climate and ecological emergency.
- Make greenspaces deliver more for people and wildlife alike.
- Demonstrate positive natural capital impacts to regulators and stakeholders.
- Assess and manage natural capital net gains alongside biodiversity net gain (where applicable).
- Allow assessment of natural capital as part of day-to-day work, based on an industry-driven and tested tool, with little data and time requirements.
- Create your own (local) NATURE Tool version to define natural capital priorities and objectives for new development, which also enhances planning security.
- Provide the flexibility to assess the benefits you prioritise and to work with the data you have as most indicators are optional.
- Assess how a sites' natural capital is performing and how much of the site potential for natural capital has been achieved already.
- Provide you with a flexible and transparent tool that shows you how scores and values are calculated.
- Give you a new improved evidence base to better assess proposed plans and developments against national and local policies, including informing Environmental Impact Assessments (EIAs), for example.
- Enhance and optimise natural capital performance of your plan or development along the process.
- Allow you to easily communicate highly positive natural capital outcomes as you can achieve excellence standards for the project as a whole, as well as each natural capital benefit assessed.

What the NATURE Tool cannot do:

- Replace existing planning requirements such as an EIA. However the NATURE Tool results can feed into several EIA topics.
- Be a substitute for 'in house' ecological expertise, such as a planning ecologist.
- Provide a definite answer. Natural capital science is complex and has uncertainties - the tool outcomes are indicative and based mainly on published evidence and expert knowledge (rating system).
- Make a decision for you. The tool is a decision support tool and provides an additional information source to inform decisions; it cannot make decisions for you and decisions should never be made purely based on a tool.

- Set a political goal. What is and is not desirable in terms of natural capital impact is not decided by the NATURE Tool or its developers - it is a political/corporate decision. But the NATURE Tool allows you to set clear objectives against which a project can be objectively assessed.

1.8 How Does the Tool Work from a User Perspective?

The NATURE Tool results are summarised in two headline indicators, biodiversity and natural capital. Within the NATURE Tool, biodiversity relates to impacts on wildlife and species resilience. This is captured primarily through Biodiversity Net Gain (BNG) assessments. Natural capital, on the other hand, relates to the impact of a project on people, in the context of ecosystem services and health benefits provided by nature.

The tool user enters the habitat areas before and after an intervention as well as the level of accessibility of the site. The tool then automatically calculates natural capital performance and impact across the following key indicators:

1. **Change Score** - how will a project impact on the natural capital performance in relation to the baseline (pre-development)?
2. **Potential Score** - to what extent has the maximum site potential for natural capital been achieved?
3. **Completeness Score -** how complete is the assessment? This is defined as a measure of how detailed the entered habitat categories are and to what extent optional indicators were used.
4. **Policy Priority** - the policy priority (high, medium, and low) is based on national policy or as defined by the objective setter. The policy priorities determine how ecosystem services and benefits are weighted when aggregated to an overall people (project) score.
5. **All Objectives Met?** – will the project achieve the natural capital objectives as defined by the objective setter (see below)? Objectives can be defined for the Change Score, Potential Score, and Completeness Score.
6. **Achievements** - does the project achieve Net Gain (NG) and/or even a bronze, silver, or gold 'excellence standard'? This helps to highlight and communicate really positive natural capital impact.
7. **Biophysical/Monetary Carbon Impact** – Baseline and changes in carbon stocks in vegetation and soils expressed in tonnes of carbon dioxide equivalent (tCO_2e) and in monetary terms.

The NATURE Tool results indicators are further detailed in Section 3.5. The NATURE Tool can also be used to assess the natural capital baseline of a site.

1.9 How Does the Tool Work from an 'Objective Setter' Perspective?

To allow maximum flexibility, the Objective Setter (e.g. local planning authority or a company) can take the UK NATURE Tool model and create an adapted version. NATURE Tool versions can be created for a specific area such as a local authority, or for a business and its landholdings and projects. However, tool versions are also available for a specific project such as a masterplan or development.

There is a back-end to the UK NATURE Tool, accessible from the 'assessment status' sheet, where the objective setter can:

1. Decide which ecosystem services and benefits are mandatory and need to be assessed for each project.
2. Define biodiversity, ecosystem services, and benefit objectives (e.g. a minimum improvement of +15% is expected for recreation).
3. Define policy priorities on which basis the Natural Capital Score is aggregated. These should be based on (local/corporate) policy priorities and/or the natural capital vision/plan for a place.

This local/corporate tool version can then be shared with relevant tool users, so that they use this specific NATURE Tool version for relevant projects and sites rather than the standard UK version. Please refer to Section 2.1.2 for more information.

1.10 Where can I Find the Latest NATURE Tool Version and More Information?

Please note that the NATURE Tool is in continuous development with subsequent tool and guidance updates. Please visit www.NATURE-Tool.com for latest updates, guidance, and case studies. You can also sign up for the newsletter which keeps you informed of new updates and developments.

It is also worth checking with your relevant local authority and/or your ecology/sustainability department to find out whether a local/corporate NATURE Tool version is available.

1.11 Where can I get Support?

WSP and the Ecosystem Knowledge Network have led the development of the NATURE Tool and would be very happy to provide support including, but not limited to:

- Knowledge exchange;
- Tool user training;
- Ad-hoc user support such as through our NATURE Tool mentors;
- Running NATURE Tool assessments for you;
- Running accompanying Biodiversity Metric assessments;
- Helping you to create your own (local/corporate) NATURE Tool version;
- Results aggregation such as at the city or corporate level;
- Natural capital mapping and reporting including interpretation;
- Advice on site design and natural capital optimisation;
- Implementing the NATURE Tool in stakeholder consultation;
- Develop tailored tool versions for you in case you're looking for something slightly different;
- Develop natural capital offsetting and Payments for Ecosystem Services (PES) solutions (based on the NATURE Tool);
- Using the NATURE Tool outside the UK;
- Assessing larger geographies such as whole estates using our internal NATURE-E (Estate) Tool; and
- Monetary natural capital valuation incl. cost-benefit analysis and natural capital accounting.

Please contact the WSP NATURE Tool team for enquiries: NATURE-Tool@wsp.com.

1.12 What can I do to Support the NATURE Tool?

The development and maintenance of the NATURE Tool requires the support of the user community. If you discover a broken link, another issue, or have suggestions for improving the NATURE Tool then please contact the tool developer team (NATURE-Tool@wsp.com). The NATURE Tool development was always driven by the industry and end-user community and the project team wants this to continue to ensure the NATURE Tool works best for you.

We will also, from time to time, invite our newsletter subscribers to provide feedback on the tool or to explore future development priorities and collaboration opportunities. Please subscribe to the NATURE Tool newsletter to find out about these opportunities.

1.13 Key Opportunities in the Planning System for using the NATURE Tool

Although each UK nation has different regulatory and governance structures, they follow broadly consistent policy goals including:

- Respecting and adhering to the mitigation hierarchy in plans, projects, and programmes **using Strategic Environmental Assessment (SEA; and Sustainability Appraisal where this applies)/Environmental Impact Assessment (EIA)**. It is also important to recognise the role **which health impact assessments** can have as part of a wider sustainability appraisal. The NATURE Tool can be used to explore and assess a range of alternative options or scenarios, as well as identify mitigation and enhancement requirements. As the NATURE Tool is a site assessment tool, this would only be applicable where site boundaries can be defined.

- **Protecting and enhancing the natural environment** through the ecosystem services they provide using ideas associated with environmental benefits. This is a core purpose behind the NATURE Tool as it can be used to assess the impact of land-use and management interventions on the provision of ecosystem services and related health benefits.

- Promoting **placemaking** but with important differences noted between Wales, which is more local authority driven, and Scotland, England and Northern Ireland which have been more developer driven with the role of local authorities to provide more sites.

- Improving quality of development through **design**. Seeing the importance of national design guides/codes, but also local place plans/neighbourhood plans where top down meets bottom up. This represents a potential opportunity for the NATURE Tool to become **embedded in good environmental design for delivery of ecosystem services and other benefits for people**.

- Recognising the importance of **health and well-being** and sustainable communities highlights an important role for ensuring cultural ecosystem services are adequately represented in the NATURE Tool, which suggests the need to go beyond simple measures of recreation and education. Potential for increased role of the NATURE Tool feeding into **health impact assessments,** for example through assessing impacts of greenspace interventions on the provision of good air quality and physical/mental health benefits.

- Planning for the **climate emergency** where there is a strong government driver for responding to climate change. The NATURE Tool could be used to assess change in carbon storage by greenspaces and trees as the tool quantifies such impacts through a score, in tonnes of carbon dioxide equivalent, and in monetary terms. Furthermore, it can be used to assess the role of the soft estate in climate change adaptation through urban cooling and flood regulation.

- **Recognising the value of strategic/landscape scale planning on key issues**. Here, catchment management plans might be relevant (required under the Water Framework Directive). The NATURE Tool can assess water quality and availability impacts of land-use interventions.

- Improving the use of **digital e planning for plans and developments**. Planning for the Future, the English Planning White Paper (August 2020) is seeking to make greater use of digital technology to improve efficiency, in particular, map-based local plans. The digital platform of the NATURE Tool can be used to help provide stronger visual outputs to improve policy and decision-making processes.

- **Site allocation** for development. The NATURE Tool can be used to assess proposed sites in terms of their ecosystem services performance (how does it benefit people now) and potential (how could the site perform after interventions). This can help in selecting sites for development that do not have much ecosystem service value (to lose) and/or have greater potential for ecosystem service enhancements.

It is also important to stress that, in all UK nations, there has recently been significant new development in relation to planning policy, some of which is still emerging. In particular, the Brexit process has led to the proposed development of different governance frameworks for environmental protection, which represents a challenge for joined-up environmental planning.

2 Step by Step Tool User Guide

This chapter provides practical guidance for tool users.

When opening the NATURE Tool for the first time you should see the **Start** sheet. The Start sheet will prompt you to enable Excel macros which are required for the tool to work properly. From the **Start** sheet you will be able to access the **Assessment Status** sheet, which will act as your control panel for the assessment.

Please note, the following guidance accompanies the guidance, notes, and data links within the NATURE Tool and should be read alongside the integrated guidance. Integrated guidance notes can be accessed by clicking on the ⓘ buttons.

2.1 Tool Application Process

A NATURE Tool assessment can be implemented along the subsequent steps as summarised in Figure 2.1. Each step is further detailed in the following sections.
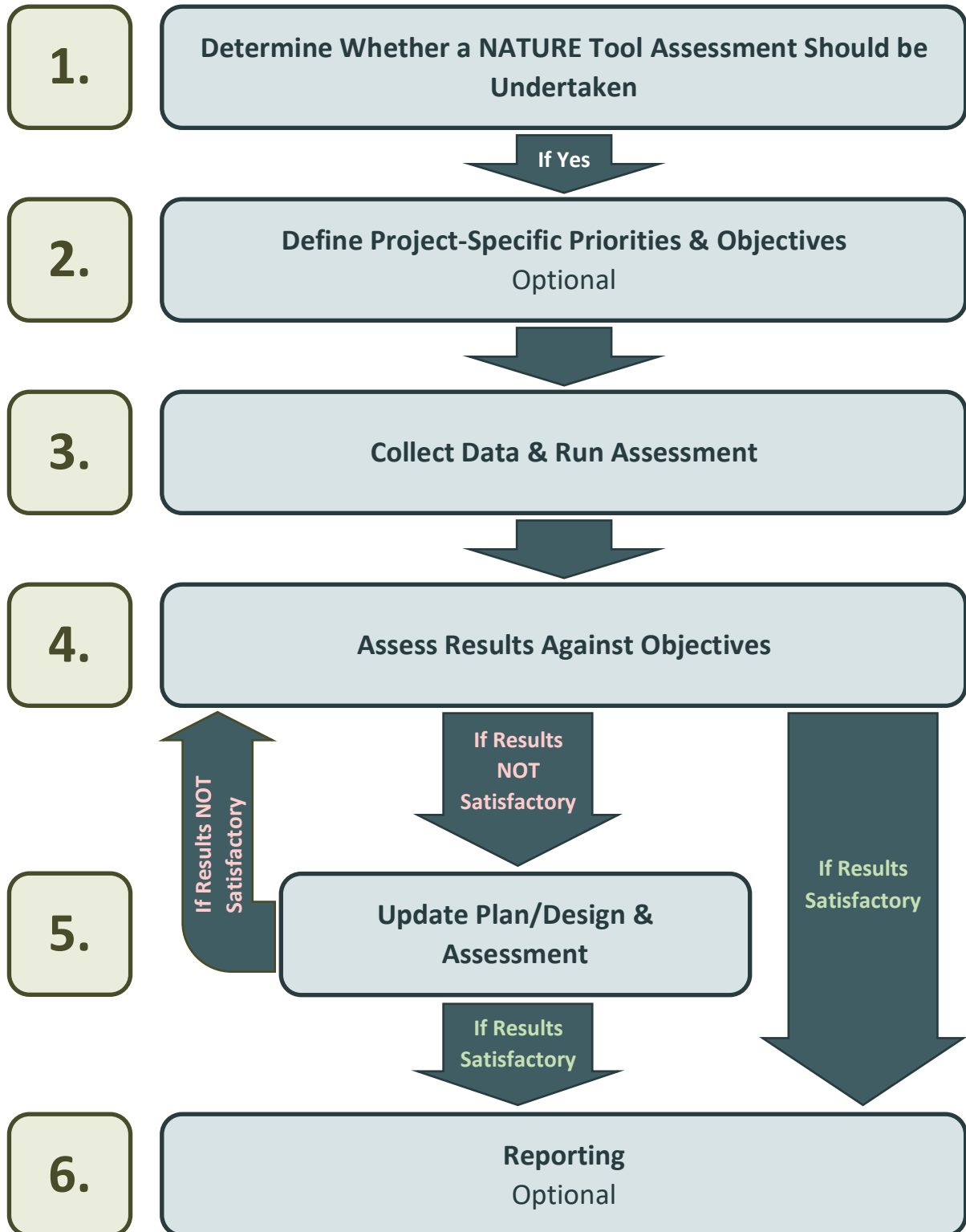
Figure 2.1 **NATURE Tool Application Process**

2.1.1 Determine Whether a NATURE Tool Assessment Should be Undertaken

The NATURE Tool is designed to measure and quantify the impact of projects on natural capital. Natural capital is usually affected when there are land-use/habitat changes, public access changes, and/or habitat management changes.

Referring to the HM Treasury's Green Book (2022)[7], the following screening questions can be used to consider the impact on natural capital.

Is the project likely to affect, directly or indirectly:

1. **The use or management of land, or landscape?**

2. **The atmosphere, including air quality, Green House Gas emissions, noise levels, or tranquillity?**

3. **An inland, coastal, or marine water body?** The water cycle cuts across natural assets, and includes non-tidal rivers, lakes, ponds, wetlands, floodplains as well as groundwater, coastal estuaries, the marine environment.

4. **Wildlife and/or wild vegetation, which are indicators of biodiversity?** Wildlife can be affected by direct changes to protected sites and by disrupting or creating connections between sites.

5. **The supply of natural raw materials, renewable and non-renewable, or the natural environment from which they are extracted?**

6. **Opportunities for recreation in the natural environment, including in urban areas?**

If the answer to one or more of these questions is "yes" or "maybe", then the Green Book recommends further assessment. In many cases the NATURE Tool would be suitable for such a natural capital assessment but other tools and approaches[8] may also be considered.

2.1.2 Define Project-Specific Priorities & Objectives (Optional)

This step is optional, as the tool also has default Policy Priorities for each UK country based on a review of respective planning policies (see also Section 4.1.9), and there is no requirement for defining natural capital objectives from the outset.

The NATURE Tool can be tailored to suit the context of a specific project and allows the definition of:

- Policy Priorities on which basis ecosystem services scores are aggerated, for example the Natural Capital Score (see Section 3.5.7);
- Objectives against which natural capital impacts are assessed. Objectives can be defined for the Change Score, Potential Score and/or Completeness Score, and for any ecosystem services and/or aggregated scores such as the Natural Capital Score (see Section 3.5.8); and
- The mandatory assessment scope, i.e. which ecosystem services and benefits need to be assessed.

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[7] HM Treasury, 2022. The Green Book - Central Government Guidance on Appraisal and Evaluation. London.
[8] See for example ENCA: Featured tools for assessing natural capital and environmental valuation or Ecosystems Knowledge Network Tool Assessor.

Mandatory scope, policy priorities, and objectives can be defined in the Objective Setter Area of the tool which can be accessed from the Assessment Status sheet. Please note that this sheet is password protected to avoid manipulation by unauthorised users. The password can be requested by contacting nature-tool@wsp.com.

Scope, priorities, and objectives can simply be selected from selection menus and should be defined by, or in consultation with, the relevant authority overseeing the project (the 'Objective Setter' such as the Local Planning Authority). But you can also set our own priorities and objectives should there be no relevant authority involved in the project. These could be aligned to your corporate environmental strategy and policies.

2.1.3   Collect Data & Run Assessment

The next step is to collect relevant data and to run the NATURE Tool assessment. Please note that data requirements are dependent on the assessment scope as defined in the Project Info & Options sheet. A useful Data Checklist has been produced, alongside the tool and guidance, which can be downloaded from the website.

More detail on how the tool is used, including data sources, is provided in Section 2.2 and within the relevant data entry sheets of the NATURE Tool.

2.1.4   Assess Results Against Objectives

Once the NATURE Tool assessment is completed, the results should be assessed against natural capital objectives for the project (see also Chapter 3). Natural capital objectives may have been quantified within the tool, in which case the Summary Results sheet would show in the 'Objectives Met?' column whether objectives have been met (see also Section 3.5.8). If no quantitative natural capital objectives were defined, results should be assessed against policies relating to natural capital.

It should be noted that there are trade-offs between ecosystem services which means that, in most cases[9], it is not possible to achieve net gains for all ecosystem services. It is also important to note that this assessment should not rely solely on the aggregated Natural Capital Score as this is only a crude indicator. It is advised to also assess all applicable ecosystem services and benefits.

If the NATURE Tool results are satisfactory and meet natural capital objectives, then you can continue with reporting the results (*skip next section*). If this is not the case, then it may be worth considering updating the plan/design to achieve further natural capital improvements.

2.1.5   Update Plan/Design & Assessment

If not all natural capital objectives have been met, then it may be worth revisiting the plan/design to seek further natural capital improvements. There are several options to achieve this including:

- Retaining more habitats;
- Changing the habitat composition post-development (including the right habitat in the right place);
- Improving public accessibility;
- Changing habitat management;
- Create habitats already during the construction phase; and/or
- Generally reducing the land-take for development to allow more space for natural capital.

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[9] Unless starting from a (near) zero baseline.

Section 3.6 provides more details regarding improving ecosystem services scores. Similar information is also directly accessible from the 'Info Note' buttons, which can be found next to the ecosystem services in the Summary Results sheet of the tool.

The NATURE Tool development team suggests trying out different design options within the NATURE Tool to discover which one would be most beneficial for natural capital and prioritised ecosystem services. Any updated plan or design should then be re-assessed, with the NATURE Tool and results assessed against the natural capital objectives. Once a satisfactory natural capital impact has been achieved, you can proceed to reporting.

In principle, offsetting certain ecosystem services may also be considered. This means that ecosystem services elsewhere would be improved to compensate for potential reductions in ecosystem services provision on-site. However, this option requires some careful consideration as the spatial context is very relevant for many ecosystem services.

For example, carbon storage offsetting could in principle be considered anywhere as it doesn't matter where carbon is stored. For recreation, on the other hand, offsetting is more challenging because the spatial distribution of beneficiaries also needs to be considered. If an accessible park to be developed would be offset with a new park far away from the project site, for example, then it is unlikely that this would benefit the same community that would disbenefit from the loss of the park on the doorstep. In any case, any offsetting site should be assessed separately with the NATURE Tool rather than merging two or more sites into one assessment.

2.1.6 Reporting (Optional)

Depending on the nature of the project, it may be required or useful to report the NATURE Tool results. Within the scope of an Environmental Impact Assessment (EIA), for example, NATURE Tool results for relevant ecosystem services can feed into the relevant EIA themes. But there are also many other opportunities to report NATURE Tool results, including natural capital portfolio aggregation for corporate/estate-wide reporting.

The NATURE Tool results sections have been designed to suit different audiences and contexts (see further details in Chapter 3). For best printing results, it is recommended a screen grab is taken of the relevant results section and pasted into your report.

2.2 Navigation Within the NATURE Tool

You can navigate the tool by only using integrated buttons such as this one:

Go to Sheet

It is recommended not to use the tabs at the bottom because use of tabs may lead to additional work (as not all of them will be required for every assessment option). All data entry sheets can be assessed from the Assessment Status sheet, which allows you to track your assessment progress.

	Sheet	Self-Selected Status ⓘ	Entry Status ⓘ	Navigation ⓘ
BASIC	1 Project Info & Options	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	2 Habitat Areas	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	3 Retained Habitats	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	4 Accessibility	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	5 Biodiversity	COMPLETE	NO ACTION REQUIRED	Go to Sheet
ADVANCED	Community Food & Fishing	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Commercial Food & Fishing	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Woodland Management	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Nature Designations	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Education	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Population Density & Visitors	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Water Status for Sub-Catchment	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Grazing & Mowing	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Air Quality Management Area	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Flood Risk & Watercourse	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Annual Winter Rainfall	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Slope Steepness	COMPLETE	NO ACTION REQUIRED	Go to Sheet
	Photovoltaic NEW ⓘ	COMPLETE	NO ACTION REQUIRED	Go to Sheet
RESULTS	Results Narrative/Interpretation ⓘ		RESULTS ARE READY TO VIEW	Go to Sheet
	Detailed Results			Go to Sheet
	Summary Results			Go to Sheet
	Headline Results			Go to Sheet

Figure 2.2 **Assessment Status Overview**

Data entry sheets, accessible from the Assessment Status sheet, usually have expandable sections. To expand a section, simply click on the plus button.

The section will expand. The content of the section will depend on previous entries. Sections will, for example, only show habitat types which are applicable to your project. To reduce the section again, simply click the minus button.

Please note that you will need to reduce and expand sections again should you make subsequent changes to your assessment such as to habitat areas otherwise, new habitats will not be visible.

Section colours will change based on the data entry status. They will appear red if entries are required, and yellow if optional entries are possible to enhance the assessment detail and therefore the completeness score:

Other colours mean that no further entries are necessary/all optional selections were made. The tool also has integrated error messages which show what kind of entry is still required, and where.

2.3 Data Entry

Any data should only be entered in pale yellow or pale red cells (examples below).

The latter applies if an entry is mandatory and usually comes with a red note or warning message. The only exceptions to this are the sheet status selection at the top of entry sheets (see below) and the **Results Narrative** sheet, where the entry field is white which is better for printing.

2.4 Sheet Status

Each data entry sheet contains a status bar at the top:

PLEASE SELECT SHEET STATUS
SHEET REQUIRES ATTENTION!

The top status is self-selected whilst the lower status is automatically populated based on your sheet data entries.

The self-selected status (top) helps you to keep track of your assessment across all entry sheets. You can change the status by clicking on it and then selecting the relevant status from the drop-down list which has the following options:

NOT STARTED
IN PROGRESS
READY FOR REVIEW
REVIEWED - UPDATE REQUIRED
READY FOR AUTHORISATION
COMPLETE

The status of each data entry sheet will also be displayed in the **Assessment Status** sheet.

The automatically populated status (bottom) depends on your entries in the relevant sheet and will show one of the following status options:

SHEET REQUIRES ATTENTION! This indicates that further data entries or changes are required. Without these, the tool will not calculate results properly.

(SOME) DEFAULTS APPLY This indicates that at least one default selection option still applies. Data entries and selections are not required but would enhance the accuracy of the assessment and the Completeness Score (see Section 3.5.6).

NO ACTION REQUIRED This indicates that all data has been entered and the sheet does not require further attention.

2.5 Assessment Status

The NATURE Tool contains several data entry sheets. To navigate through the sheets, users should refer to the **Assessment Status** sheet (see Figure 2.2). It helps you to navigate through your assessment and contains an overview of:

- Which sheets are required for your assessment;
- Which sheets still require attention and data entries;
- Which sheets are complete; and
- When results are ready to view.

The status of each data entry sheet is also summarised here (as shown in the completed assessment example in Figure 2.2).

Data entry sheets are split into BASIC and ADVANCED. The BASIC data entry sheets are always required, except for Biodiversity which only applies if you include biodiversity in the assessment scope (which can be changed in the **Project Info & Options** sheet). The ADVANCED sheets are only applicable for an ADVANCED NATURE Tool assessment (as selected in the Project Info & Options sheet), and data entries are always optional. Hence, you can complete a NATURE Tool assessment only using the first 4-5 data entry sheets. Each sheet can be assessed by clicking on the 'Go to Sheet' button. There is also a 'Back to Assessment Status' button at the top of each sheet.

It is recommended that the **Project Info & Options** sheet is completed first, as the functionality of the **Assessment Status** sheet depends on these entries. You can then go back to the **Assessment Status** sheet, check which sheet requires attention next, and then work through sheets in turn. In general, it is best to work through basic assessment sheets in order and then continue with advanced assessment sheets (in no particular order).

The **Assessment Status** sheet also allows you to assess results and detailed score calculation sheets. The detailed score calculation (Calc) sheets transparently outline how each score for each assessed ecosystem service is calculated. Other sheets show the data behind the calculations, as well as the **Objective Setter Area** and **Developer Area** sheets for reference.

A typical NATURE Tool assessment can be broken down into four key steps:

1. Enter general project info and options.

2. Enter habitat areas for the baseline (before development), during construction (if applicable), and post-development (not required for baseline assessment).

3. Enter further data in applicable data entry sheets.

4. Review the results and add an optional results narrative.

The following sections will guide you through the different data entry sheets requirements.

2.6 Project Info & Options (Basic)

This sheet allows you to define the scope and timescales of your NATURE Tool assessment. In the first section you will be prompted to enter some general details about the project and yourself, as the tool user. Some of this information will feed into the results sheets of the tool, such as the project name and the organisation completing the assessment. The next section allows you to enter the options for the assessment as well as assessment timescales.

Assessment type

The first selection option is the assessment type, where you can choose between a BASIC and an ADVANCED assessment. A BASIC assessment will require less data and time, but the outcomes will be less accurate which also affects the completeness score. The ADVANCED assessment allows you to enter optional advanced indicators, which enhances accuracy and the completeness score if populated with data. In case of doubt, it is recommended starting with an ADVANCED assessment, as it offers more options for data entry. All advanced data entry sheets are optional.

Assessment scope

The next selection option is between a CHANGE and a BASELINE assessment. A CHANGE assessment should be selected if you want to compare two site designs (usually before and after development or another kind of intervention). The BASELINE option should be selected if you only want to assess the natural capital performance of a site as it is.

Assessment status

The option is between a PROJECTION and a RETROSPECTIVE assessment. The only difference is that forPROJECTION, a delivery risk multiplier applies for newly created habitats. This doesn't apply for RETROSPECTIVE because it is assumed that post-development habitats are already established, which means there is no uncertainty as to whether the habitat creation may fail. For a BASELINE assessment it doesn't matter which one you select (but you still need to select one option).

Project timescales

Here you can define the timescale over which natural capital performance (impacts) will be assessed. You will be asked to enter the expected project completion year, which is the first post-development year. The value needs to be between 1950 and 2050. For baseline assessments this is usually the year of the assessment. The project completion year informs the monetary valuation of carbon impacts as the year is needed to apply appropriate discounting rates.

You will also be asked to enter the average duration of the construction phase as well as the expected project lifetime post-development. Together, these will make up the assessment timescale. The longer the assessment timescale, the higher the post-development scores for newly created habitats that need longer to provide their full ecosystem services potential, such as woodland.

You will also be prompted to enter the time for which funding and management for habitats is secured post-development. This should ideally match the expected project lifetime post-development. Both the lifetime post-development and the funding and management will be shown in the **Headline Results** sheet.

Mandatory/optional ecosystem services and benefits

Under mandatory ecosystem services & benefits you will see which ecosystem services and benefits are mandatory in order to assess which is defined by the objective setter (see also **Objective Setter Area** sheet). These cannot be changed by the tool user. In the UK version of the tool, only the aggregated Natural Capital Score is mandatory to assess (but can be hidden in the **Summary Results** sheet).

Under optional ecosystem services & benefits you can select which additional (non-mandatory) ecosystem services and benefits you want to assess for your project. In case of doubt, it is recommended that all services and benefits are assessed, (which is the default). Please note, for any un-selected services and benefits you will be prompted to provide a justification in the next sheet section.

The mandatory/optional ecosystem services and benefits tables will also show which policy priorities and objectives apply for the project. Policy priorities are either defined by the objective setter for an adapted NATURE Tool version, or based on a literature review of national environmental and planning policy for each UK country (see Appendix B) for the UK NATURE Tool version. Therefore, in the UK tool version policy priorities change based on the entered project location.

Objectives only apply for an adapted tool version as these are always defined by an objective setter. The UK NATURE Tool version does not prescribe objectives.

2.7 Habitat Areas (Basic)

All proposed land-use changes need to be entered in this sheet. The user should refer to the **Habitat Areas** sheet, subsequently entering the habitat and land-use areas for the baseline, duration, construction, and the post-development state of the site (only baseline for a BASELINE assessment). Habitat areas should be entered in hectares. As the NATURE Tool works on an area-basis, all linear features, such as hedgerows and watercourses, need to be converted into areas, which may require the use of Geographic Information System (GIS) software and assessments/assumptions on the width of habitats. A linear feature conversion mini tool is also available. Please ensure that the area of any linear features converted to polygons are removed from the underlying habitat polygons to avoid double-counting (two or more habitats covering the same geographical area).

Broad Habitat Category		Habitat Sub-category		Entry-level Habitat Category	Detail Level	Baseline Habitat Area	Average Habitat Area During Construction	Post-Development Habitat Area
				Duration		42 Years	2 Years	40 Years
				Total Area in Ha:		85.00	85.00	85.00
				Area Difference from Baseline in Ha (Needs to be Zero):			0	0
A	Woodland & scrub	A1.1 & A1.3	Broadleaved & mixed woodland	**Upland oakwood**	H			
				Upland mixed ashwoods	H			
				Lowland beech and yew woodland	H			
				Wet woodland	H			
				Upland birchwoods	H			
				Lowland mixed deciduous woodland	H	5.00	10.00	30.00
				Line of trees	H			
				Other woodland; broadleaved	H			
				Other woodland; mixed	H			
				Traditional Orchards	H			
				Broadleaved & mixed woodland (unspecified)	M			
		A1.2	Coniferous woodland	**Native pine woodlands**	H			
				Other Scot's Pine woodland	H			
				Other coniferous woodland	H			
				Coniferous woodland (unspecified)	M			
		A1		Woodland (unspecified)	L			

Figure 2.3 **Habitat Data Entry Form**

Please note, the total areas for the baseline, during construction, and post-development need to match. However, any habitat area not entered for the construction phase will automatically be assumed to be of zero natural capital value (zero-value dummy at the bottom of the table). Zero-value is assumed for an active construction area, for example. Hence, you only need to manually match the baseline area and the post-development area as the construction phase area will be matched automatically.

The habitat categories within the tool are based on the Joint Nature Conservation Committee (JNCC) Phase 1 habitat classification framework.[10] However, given that the Phase 1 habitat classification framework was not fit for purpose for the tool, the developers added and modified a range of habitat classes (see Appendix A for the full NATURE Tool habitat framework). Phase 1 does not support habitats such as green walls and other green infrastructure elements. The NATURE Tool habitat framework also allows easy translation from the UK Habitat Classification framework (UK Hab).[11]

Habitat areas can be entered for higher level categories (e.g. Woodland), as well as more specific categories (e.g. Lowland mixed deciduous woodland). You should always enter habitat areas in as

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[10] https://jncc.gov.uk/our-work/terrestrial-habitat-classification-schemes/#phase-1-habitat-classification
[11] https://ukhab.org/

much detail as possible, as this will increase the accuracy of the assessment and the completeness score. However, the project team recognises that this level of detail is not always available – especially at the earlier stages of the planning process. Hence, the NATURE Tool also allows entering broad habitat areas. The detail level column (see Figure 2.3) indicates whether a habitat category has a high, medium, or low detail. Habitat areas entered for medium/lower detail habitat categories reduce the completeness scores, as it could be any of the respective higher detail habitats which may have different ecosystem service provision.

The NATURE Tool also allows you to define your own mixed habitat categories at the bottom of the section. This feature may be useful, for example if you have an area of 'green infrastructure' mapped and know the habitat-mix, but not the location of each habitat that forms part of the green infrastructure area. If you use this feature, you will be prompted to enter the habitat proportion in the next sheet section. **However, it should be noted that the accuracy is usually lower when entering habitats in this way.**

2.8 Retained Habitats (Basic)

In the **Retained Habitats** sheet, you have the option to define habitat areas that have been retained from the baseline or created during the construction phase. Much of this sheet is populated from the **Habitat Areas** sheet which needs to be completed first.

By default, all baseline habitats (blue column) will be assumed to have reached their full ecosystem services potential (mature habitats). This sheet offers you the opportunity to adjust baseline habitat age values if required, therefore offering a closer representation of the actual baseline. But, in many cases, the blue baseline column can be left unchanged.

Also, by default, all habitats during construction and post-development are assumed to be newly created. If any habitats are retained, then the respective area needs to be entered in the grey and orange columns. **Please note, if a habitat is retained from baseline through to the post-development state, then you need to enter the area for both the construction and the post-development columns.** This is the case in the example in Figure 2.4 where, of the 10 ha of upland oakwood at baseline, 5 ha are retained until the post-development state of the site. It is important that you record retained habitat areas, as newly created habitats tend to score lower.

Entry-level Habitat Category	Years to Max Ecosystem Services Scores	Baseline			During Construction				Post-development			
		Total Habitat Area in Ha	Habitat Age if Below Max	Applied Starting Age for Calc	Total Habitat Area in Ha	New or Retained Habitat?	Applied Starting Age for Calc	Area in Ha	Total Habitat Area in Ha	New or Retained Habitat?	Applied Starting Age for Calc	Area in Ha
Upland oakwood	100	10.00			5.00	Newly Created	1	0.00	5.00	Newly Created	1	0.00
				100		Retained from BL	100	5.00		Retained from Con	4	
										Retained from BL	100	5.00

Figure 2.4 **Retained Habitats and Bassline Habitat Age**

Please tick the box at the top of the sheet after entering data. Otherwise the sheet status will always show 'Attention Required':

☑ **I'm happy with the default options and/or have completed my entries below.**

2.9 Accessibility (Basic)

Many natural capital assets, such as parks and woodlands, provide valuable cultural service opportunities (for example, recreation). However, the level of provision of cultural services often relies on an individual directly interacting with a natural space for this value to be realised. As such,

accessibility is essential when assessing the capacity of a green space' to provide a variety of cultural ecosystem services.

Within the NATURE Tool, accessibility is classified into four categories:

- Full Open Public Access (including sites closed during the night, for example);
- Public Footpath Access (only habitats within 50m buffer of a foot/cycle path should be considered);
- Private or Restricted Access (a greenspace that is only accessible to club-members, for example); and
- No Access (except for maintenance purposes, for example).

To distinguish accessibility, users should primarily rely on local site knowledge. However, as a final point of call, users could refer to the OS Open Greenspace map if unsure about baseline accessibility.

To be classified as 'Full Open Public Access' the land area must be wholly and fully unrestricted to the public, such as common parks or common land. 'Right to roam' access should be classified as private/restricted access unless the space is designed/optimised for public access.

If there is Public Footpath Access, you should only include the habitat area on-site which is located within a 50m buffer of the footpaths (including cycle paths; including where the path itself is located off-site but within 50m). You can do this by creating a 50m buffer around a path and then clipping the habitat layer to this buffer using GIS software.

Private/restricted access includes all greenspaces which are accessible to a limited number of people only (e.g. with membership). Private gardens usually fall into this category. Please only consider access for the purpose of recreation and general leisure. Where a site is only accessible for maintenance purposes, for example, these spaces should be classified as 'no access'. **Areas that are not designed/optimised for public access but have 'right to roam' access (Scotland) should also be classified as 'private/restricted access'.**

For the baseline, Full Open Public Access is the default whilst for the construction and post-development state, No Access is the default. This is effectively the worst-case scenario in terms of Change Scores.Therefore, it is strongly recommended to adjust these areas to reflect the actual circumstances on the ground.

2.10 Biodiversity (Basic)

This sheet is only relevant if you selected biodiversity as part of your assessment scope (see **Project Info & Options**). **Biodiversity is not assessed with the NATURE Tool itself and is not required for running a NATURE Tool assessment.** However, the NATURE Tool allows you to enter results from a Biodiversity Metric[12] assessment so that results can be presented alongside each other in the NATURE Tool.

For this indicator you can simply enter the site area and unit values in the applicable boxes, along with the status on biodiversity net-gain as shown in the example in Figure 2.5.

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[12] http://publications.naturalengland.org.uk/publication/6049804846366720

Biodiversity Metric version		3.0	
Total site area in ha		10.0	
On-site Baseline	*Habitat Units*	40.00	
	Hedgerow Units	0.00	
	River Units	0.00	
On-site Post-intervention	*Habitat Units*	60.00	
	Hedgerow Units	0.00	
	River Units	0.00	
Off-site Baseline	*Habitat Units*	0.00	
	Hedgerow Units	0.00	
	River Units	0.00	
Off-site Post-intervention	*Habitat Units*	0.00	
	Hedgerow Units	0.00	
	River Units	0.00	

Figure 2.5 **Biodiversity Data Entry**

This is all the data you need to enter for a BASIC NATURE Tool assessment. If all data is entered, the **Assessment Status** sheet should show that results are ready to view. All advanced indicators below are not required for a BASIC NATURE Tool assessment and are optional for an ADVANCED NATURE Tool assessment, as defaults apply if you don't make entries.

2.11 Community Food & Fishing (Advanced)

Community food and fishing is for private consumption only without selling food and fish, and is therefore to be distinguished from commercial food and fishing (see below). The right to grow, harvest or collect food, as well as the right to fish in a space is integral for community food and fishing services to be generated from a habitat.

Greater access for food and fishing would likely equate to a space being more prominently used for fishing, therefore generating greater additional service value. Please note that commercial fishing is assessed separately (see next section). **Please only enter areas where caught fish can be kept because this ecosystem service captures the food value rather than the recreational experience of catching fish and returning it to the water.**

The data entry tables are split into food and fish, as fish also depends on water quality (see below). Usually, only one side of the table is available for data entry – either food or fishing. Within the NATURE tool, the following categories can be selected based on local site knowledge:

- No or unlikely community food/fishing function
- Possible community food function
- Certain or likely community food function
- Open community fishing rights/function
- Private community fishing rights/function

Community fishing function also depends on water quality as the supply of fish is usually lower if the water quality is poor. Hence, if there are fishing rights/function, then please also distinguish into high,

good, moderate, poor, or bad Water Framework Directive status. Relevant data can be accessed from the link in the sheet.

2.12 Commercial Food & Fishing (Advanced)

Commercial food and fishing is for food and fish sold for commercial purposes. It includes commercial fisheries as well as commercial agricultural and horticultural food production. It also includes livestock which is mainly used for conservation grazing but where there is still a commercial output (meat) as a 'by product'. Similarly, the commercial growing/collection of berries and mushrooms can be considered.

The data entry tables are split into food and fishing. Usually, only one side of the table is available for data entry – either food or fishing. Within the NATURE tool, the following categories can be selected based on local site knowledge:

- No or unlikely commercial food/fishing function
- Food: Agricultural Land Classification (ALC) independent commercial food function
- Food: ALC dependent commercial food function
- Fishing: Commercial fishing function

Commercial fishing function also depends on water quality, as the supply of fish is usually lower if the water quality is poor. Fishing rights/function need to be distinguished as having high, good, moderate, poor, or bad Water Framework Directive status. Relevant data can be accessed from the link in the respective tool sheet.

For ALC-dependent food function, please also enter the ALC Category corresponding to the applicable Grade stated in table in the link sheet. This provides a mechanism to classify land according to the extent to which its physical or chemical characteristics impose long-term limitations on agricultural use.[13] With land classification being an important indicator for the capacity of a terrestrial ecosystems to produce food, this is accounted for within the tool. Please note that this indicator is only required for habitats usually in agricultural use. Links to relevant datasets are accessible from the sheet. Currently, no relevant data could be identified for Northern Ireland. Instead users should enter 'Not Defined'.

2.13 Woodland Management (Advanced)

The management of woodland impacts on the provision of wood production services. This is due to actively managed plantations being harvested on rotations, therefore generating the maximum timber value per area of the woodland. Woodlands that have not been managed for timber production are likely to produce less timber, as older trees will be in a state of decay and not suitable for timber. Furthermore, if a woodland is not managed for wood production, any usable wood produced in that space may not be harvested regardless of its condition.

Within the NATURE Tool, three categories can be selected:

- Primarily managed for wood production
- Minimum intervention management for wood production
- Not managed for wood production

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[13]
http://publications.naturalengland.org.uk/file/5526580165083136#:~:text=The%20Agricultural%20Land%20Classification%20provides,term%20limitations%20on%20agricultural%20use.&text=The%20principal%20physical%20factors%20influencing,are%20climate%2C%20site%20and%20soil.

To find and utilise data for this indicator, users should utilise woodland management plans or local knowledge relating to woodland management for the site. For each applicable woodland habitat category, enter the applicable area in the applicable management column.

2.14 Nature Designations (Advanced)

The presence of nature designations indicates that a site has particular value to nature, along with potentially greater cultural/historical significance. Within the NATURE Tool, this indicator is based on the presence and number of (inter)national and local nature designations. Choose the appropriate category for each applicable habitat area:

- No nature designations
- One local nature designation
- Two or more local nature designations
- One or more (inter)national nature designations (irrespective of additional local nature designations)

Please note that only the following designations should be considered:

- Local Nature Reserve (LNR)
- National Nature Reserve (NNR)
- Site of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- Special Areas of Conservation (SAC)
- National Park
- Area of Outstanding Natural Beauty (AONB)
- RAMSAR Site
- NGO Reserve (e.g. RSPB, Wildlife Trust, National Trust etc.)
- Ancient Woodland (ASNW/PAWS)
- Marine Conservation Zone
- Marine Nature Reserve

Links to spatial nature designation layers are available from the sheet. However, it should be noted that these national datasets may not contain all local designations as listed above and local site knowledge should also be utilised.

2.15 Education (Advanced)

If a habitat is located on a site which is frequently used for educational purposes, this area is assessed within the NATURE Tool with a higher multiplier for the education and knowledge service. For example, if a space receives frequent educational visits, it will score higher than the same place with less or no visits. This will usually be the case if habitats are located on a primary school ground or if a site is visited by pupils for organised outdoor ecological education.

Within the NATURE Tool the following categories apply:

- Primary Organised Educational Use or Located on Primary School Ground
- Used Regularly for Organised Educational Visits (at least once a week)
- Used Occasionally for Organised Educational Visits (at least once a month)
- Not Applicable

Information is usually based on the plan (for primary school grounds) and local knowledge or consultations with local schools or other educational organisations that may organise school trips for the purpose of ecological outdoor education.

The tool developers appreciate that it may be difficult to forecast if a site is accessed for organised educational visits throughout the whole expected post-development lifetime of the site. For example, if you know that a site is used for organised educational visits for the first 5 years but don't know how it will be used after, then you should only account for the first 5 years. In the NATURE Tool, this can be done by adjusting the habitat area accordingly. If the site is 1 ha in size, the expected lifetime is 20 years, and you know that organised educational visits will take place for (at least) 5 years (¼ of lifetime), then you should also only enter ¼ of the area which is 0.25 ha. Please use the comments box if you make any such time-based adjustments.

2.16 Population Density & Visits (Advanced)

The density of a population in a local site area is important when quantifying the likely demand for many cultural ecosystem services. For example, in high population areas such as cities, a greenspace such as a park would typically receive greater footfall then that same green space in an area with low population. With greater footfall, the number of beneficiaries also increases. Furthermore, the benefits of habitats which generate regulating services, such as air quality regulation, are likely to provide higher value because of a higher demand for air quality regulation, both because of poorer air quality and the higher number of beneficiaries.

Within the NATURE Tool, population is estimated as a measure of persons per hectare and the estimate for the site **for the post-development state** should be selected from the applicable drop-down menu.

When making the selection, users should estimate the population density for the project site as well as a 300m buffer around the site. Please refer to the guidance and data links in the sheet for working out the population density. The NATURE Tool also has an integrated helper tool to work out the population density, which can be accessed from the data entry sheet.

Despite low local population density, places may still attract large visitor numbers, such as in a National Parks. This also means that more people can benefit from ecosystem services even if they don't (permanently) live around the project site. Therefore the NATURE Tool also allows you to enter external visitor numbers. The selectable categories are aligned to the population density categories as the higher density/visitation category always applies for the multiplier. Hence, you need to estimate the visitor volume of the local area which would result in comparable greenspace footfall as the corresponding population density.

Example: If the local population density is <20 persons per ha but you expect external visitor numbers resulting in a footfall in greenspaces that is comparable to greenspaces located in areas with a local population density of 40-59 persons per ha, then please select 'Medium'. The tool developers appreciate that this may not always be easy to estimate but as yet, a better method (which is also compatible with the population density estimates/multipliers) has not been identified.

2.17 Water Status (Advanced)

This indicator informs the water quality regulation scores. The rationale is that there is higher demand for water quality improving habitats and vegetation if the water quality at the sub-catchment level is worse than when the water quality is already good.

This indicator is based on following categories, which relate to the EU Water Framework Directive (WFD) overall class at the sub-catchment level of water bodies:

- High
- Good
- Moderate
- Poor
- Bad
- No data (assumed moderate)

Due to the data for this indicator being complex and differing by country, the data guide is separated by country. Data links are accessible from the sheet.

England

Click on the areas your site is located until you reach the lowest level. Then enter the habitat areas for the overall class shown below the map which fall within this sub-catchment. In most cases, this would be the same class for all habitats on site, unless the site spans over 2 or more sub-catchments.

Wales

Please select 'WFD Cycle 3 (2021) Rivers and waterbodies'. Zoom in on the map to your site and select 'River Waterbody Catchments Cycle 3 2021' and 'Transitional Cycle 3 2021' in the Layer List. Click on the map layer which should open a pop-up window. Here, you can identify the overall class under 'OverallWB'. You may have to scroll down within the pop-up window first.

Scotland

On the map, zoom in to the location of your project site. If your site is covered by a layer on the map, then click on the layer to identify the class. If you site is not covered by a layer, then click on the water body (usually a linear feature - but not to be confused with the yellow nested catchment boundary lines) within the nested catchment of your site. The class is shown under 'ACB Classification' in the right-handed column (Classification).

Northern Ireland

On the map, zoom in to the location of your project site. Refer to the water body (usually a linear feature) within the sub-catchment of your site. Clicking on the water body will reveal the class.

2.18 Grazing & Mowing (Advanced)

The grazing or mowing regime of grassland habitats impacts the provision of a variety of ecosystem services. In the case of grazing, too many livestock can leave grassland in an 'overgrazed state', reducing the productivity and diversity of grassland. Through a similar mechanism, intensive mowing can also lead to reduced service output of grassland systems. At this stage, only the impact on carbon storage is implemented in the NATURE Tool.

Whether grassland is degraded is based on site knowledge and could be informed by a management plan. If grassland is non-degraded, the area can simply be entered in the corresponding column. If grassland is degraded, then the soil type is also relevant, which can be looked up from the links in the sheet. Respective areas should be entered in the table.

Within the NATURE Tool, this is captured under the following categories:

England and Wales	Scotland	Northern Ireland
Degr. Grassland on Clay Soil	Degr. Grassland on Alluvial Soil	Degr. Grassland on Arenosols
Degr. Grassland on Loamy and Clay Soil	Degr. Grassland on Brown Soil	Degr. Grassland on Cambisols
Degr. Grassland on Loamy Soil	Degr. Grassland on Calcareous Soil	Degr. Grassland on Fluvisols
Degr. Grassland on Sandy Soil	Degr. Grassland on Immature Soil	Degr. Grassland on Gelisols
Degr. Grassland on Sandy and Loamy Soil	Degr. Grassland on Mineral Gleys	Degr. Grassland on Histosols
Non-degraded grassland (Any Soil)	Degr. Grassland on Mineral Podzols	Degr. Grassland on Leptosols
	Degr. Grassland on Montane Soils	Degr. Grassland on Podzols
	Degr. Grassland on Peat	Degr. Grassland on Stagnosols
	Degr. Grassland on Peaty Gleys	Non-Degraded Grassland (any Soil)
	Degr. Grassland on Peaty Podzols	
	Non-Degraded Grassland (any Soil)	

Figure 2.6 **Grassland Degradation and Soil Types**

2.19 Air Quality Management Area (Advanced)

If the development site is located within an Air Quality Management Area (AQMA) then it can be assumed that the demand for air quality-regulating vegetation is higher because of generally higher air pollution. Within the NATURE Tool this is captured under the following categories and assessed for the project site as a whole:

- Located within AQMA
- Partially located within AQMA
- Not located within AQMA

Data for AQMA boundaries can be accessed via a link on the sheet. When looking up your project site, please ensure that '**AQMA Boundaries**' (not 'Local Authorities with AQMAs' as per default) and all pollutants are selected. Then select the relevant category from the drop-down menu within the sheet section.

2.20 Flood Regulation Location (Advanced)

The proximity of habitats to watercourses and flood risk areas relates to the likely demand of flood regulation services within the local area. Therefore, for habitats within close proximity to a watercourse or areas of higher surface water flood risk, a multiplier bonus is assigned to vegetation which offers flood regulation services. Please enter the habitat areas as per the following categories:

Table 2.1 **Flood Regulation Opportunity Area Categories**

Category	Criteria
Very High Opportunity Area	Located within a 30-year surface water flow route including 20m buffer
High Opportunity Area	Located within a 100-year surface water flow route (no buffer) and/or within a 50-meter buffer of any watercourse
Fairly High Opportunity Area	Located within the 20-meter buffer of a 100-year surface water flow route
Moderate Opportunity Area	Located within a 1,000-year surface water flow route (no buffer)
Standard Opportunity Area	Any other location

Relevant data on rivers and flood zones can be accessed via links accessible from the sheet. The use of GIS software may be required to create buffers (or to estimate habitats within the buffer in case where only online maps are available).

Please note that a 'flow route' is a sub-set of the respective flood risk later and so working out what is a 'flow route' as opposed to a 'pond' requires map interpretation. A flow route is an area where water may flow off when flooded – such as to the adjoining watercourse. Water in a pond created by flooding, on the other hand, will not flow off and remain in the same place. Figure 2.7 clarifies how to distinguish between flow routes and ponds. Ponds are identified by a red circle.

Please ignore/delete all surface water polygons/areas that are not in a flow route (before buffering)and exclude water bodies that are disconnected from the local flow route (such as a watercourse system), with the water body instead residing locally and creating an unconnected local pond.

Figure 2.7 **Flow Routes vs. Ponds Example**

Please note that each habitat area should only be entered once - for the highest category (from Excellent to Standard). No habitat area should be entered twice as this would result in double-counting. So if a habitat area is located within both, a Very Good and a Moderate location, then only enter the area in the Very Good Location column and **not** in any other column.

2.21 Annual Winter Rainfall (Advanced)

Rainfall can induce and enhance soil erosion, which is why areas that receive more rainfall have in principle a higher demand for erosion protection services. Especially dense and complex vegetation helps to prevent soil erosion with positive effects on sedimentation and agricultural productivity, for example.

To account for the increased demand for erosion protection in areas with more heavy rainfall, higher multipliers apply in such areas. Rainfall is usually more intense during winter, which is why winter rainfall has been chosen as main indicator. Relevant data can be accessed via the link provided in the sheet.

To access the data for your project site, scroll down until you see the following tabs and select 'Average maps'.

Then select the following options on the left-handed side of the page:

Climate variable

Days of rain ≥ 10.0 mm

Averaging period

◉ 1991-2020

○ 1981-2010

○ 1971-2000

○ 1961-1990

Period

Winter

Now you only need to look up the average value (days) for the location of your project site on the map and select the corresponding value from the drop-down menu in the NATURE Tool.

2.22 Slope Steepness (Advanced)

The influence of slope gradient on surface run-off and erosion is well documented in the literature.[14] A higher gradient of the project site's slope indicates higher erosion vulnerability and therefore higher demand for erosion protection such as from complex vegetation. To account for this within the NATURE Tool, any vegetation which offers erosion protection services in a space where the slope is steeper is assigned a higher multiplier value. Slope steepness is captured within the NATURE Tool under the following categories:

- >7 Degrees
- 3-7 Degrees
- <3 degrees

As relevant data is not accessible in the public domain in a fit-for-purpose format, the project team created a GIS shapefile to inform this indicator. The created shapefile can be downloaded via the link provided in the respective tool sheet. Please note and acknowledge that this data includes Ordnance Survey Data.[15]

After downloading the data, you can use GIS software to clip the slope data to the habitat layers of the project site and enter the respective habitat areas by slope steepness category into the NATURE Tool.

2.23 Photovoltaic (Advanced)

This indicator allows you to calculate the abated carbon from photovoltaic (PV) installations on your site. This is effectively the avoided carbon emissions in comparison to the general UK electricity mix. Please note that embodied carbon in PV installations (and alternative electricity production means)

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[14] See for example https://iforest.sisef.org/contents/?id=ifor0845-007

[15] Your use of this data is subject to terms at www.ordnancesurvey.co.uk/opendata/licence.
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are not accounted for. This is an abiotic service, which is part of natural capital but not an ecosystem service.Accordingly, a new abiotic services category has been created in the results sheet.

Start by selecting whether there are/will be any PV installations present on site. If there are none then no further input is needed for this sheet.

If there are present and/or planned installations please expand the respective sections, and follow the guidance. The only information required is:

- The total PV ground cover area in hectares; and
- The proportion of PV electricity used on-site (as this avoids emissions from transmission losses).

However, there are many optional entry options to amend the default entries.

On that basis the PV energy production in kWh as well as the abated carbon will be automatically calculated, the latter also feeds into the NATURE Tool results sheets. For more information on calculations refer to the info notes provided in the sheet.

3 Results, Indicators & Interpretation

After completing at least all basic data entry sheets, the Assessment Status sheet should indicate that results are ready to view:

> RESULTS ARE READY TO VIEW

The results from the NATURE Tool can be accessed from the Assessment Status Sheet and viewed across four sheets, which are explained in further detail in subsequent sections.

Please note that in the summary and headline results sheets, you will first need to click on the Update Results button in the top bar to populate results.

> Update Results

You should always update the results after making subsequent changes to your assessment as results may otherwise not display correctly. Further detail on the different results sheets is provided below.

3.1 Summary Results

The summary results sheet provides the best overview across the different results indicators the NATURE Tool offers. Figure 3.1 provides an overview of summary results for a change assessment of a fictive example project. The contents of this sheet can be flexibly adjusted for the target audience. Please note that Figure 3.1 shows all possible indicators that can be displayed. Figure 3.2 shows the same example results but with a reduced scope of indicators to be displayed. Which indicators to display can be adjusted in the display options at the top of the sheet (above the results).

The results are split into Biodiversity and Natural Capital as indicated on the left-handed side. The biodiversity results are usually imported the Defra Biodiversity Metric. The NATURE Tool does not calculate biodiversity results itself, but rather allows for Biodiversity Metric results to be entered in the relevant sheet so that they can be presented alongside the Natural Capital results.

For a baseline assessment, the summary results do not display all indicators as, for example, change cannot be assessed which means that there is no Change Score.

NATURE TOOL
Version 1.0 BETA
United Kingdom

SUMMARY RESULTS FOR ADVANCED CHANGE ASSESSMENT - PROJECTION
Example Project

Priorities Based On Default Priorities for England | Assessment By WSP

Services & Benefits	Baseline Units/ Score	Project Units/ Score	Unit/ Score Change	Change Score	Potential Score	Completeness Score (Max=10)	Policy Priority	All Objectives Met?	Achievements	Baseline Carbon Storage (t CO₂e)	Project Carbon Storage (t CO₂e)	Carbon Storage Change (t CO₂e)	Baseline Monetary Value (NPV; £2020)	Project Monetary Value (NPV; £2020)	Monetary Value Change (NPV; £2020)
BIODIVERSITY															
Biodiversity | Habitat	40	60	+20	+50%				N/A	🏆						
Biodiversity | Hedgerows	0	0	0	+0%				N/A							
Biodiversity | Rivers	0	0	0	+0%				N/A							
Natural Capital Score	39	46	+8	+20%	49%	10		N/A	🏆	894	2,027	1,133	£141,918	£326,980	+£185,061
Cultural & Health	22	25	+2	+10%	65%	10		N/A	Ⓖ						
Mental health	63	66	+3	+6%	62%	10	H	N/A	Ⓖ						
Physical Health	56	60	+4	+7%	61%	10	H	N/A	Ⓖ						
Aesthetic Values	74	81	+7	+9%	74%	10	L	N/A	Ⓖ						
Education & Knowledge	43	63	+19	+45%	54%	10	M	N/A	🏆						
Interaction with Nature	40	56	+17	+42%	57%	10	M	N/A	🏆						
Recreation	120	107	-13	-11%	89%	10	H	N/A							
Sense of Place	61	68	+7	+12%	66%	10	M	N/A	Ⓖ						
Regulating & Supporting	13	18	+5	+38%	53%	10		N/A	🏆						
Air Quality Regulation	16	28	+12	+73%	38%	10	H	N/A	🏆						
Carbon Storage	10	16	+6	+57%	33%	10	M	N/A	🏆	894	1,402	+507	£141,918	£202,231	+£60,313
Cooling & Shading	32	48	+16	+49%	66%	10	M	N/A	🏆						
Erosion Protection	52	64	+12	+23%	70%	10	L	N/A	🏆						
Flood Regulation	40	55	+14	+36%	63%	10	H	N/A	🏆						
Water Quality Regulation	46	57	+11	+25%	61%	10	L	N/A	🏆						
Pest Control	38	52	+14	+37%	52%	10	M	N/A	🏆						
Pollination	35	46	+11	+31%	46%	10	M	N/A	🏆						
Provisioning	3	3	-0	-1%	13%	10		N/A							
Food & Fish - Commercial	0	0	0	+0%	0%	10	M	N/A							
Food & Fish – Community	0	0	0	+0%	0%	10	L	N/A							
Water Availability	50	47	-3	-5%	47%	10	M	N/A							
Wood Production	0	1	+1	>100%	1%	10	H	N/A	Ⓖ						
Abiotic Services															
Photovoltaic Carbon Impact	0	7	+7	>100%				N/A	🏆	0	625	+625	£0	£124,748	+£124,748

Figure 3.1 **Summary Results Example for Change Assessment (All Indicators Displayed)**

NATURE TOOL
Version 1.0 BETA
United Kingdom

Example Project

Priorities Based On Default Priorities for England | Assessment By WSP

Co- funded by

Services & Benefits	Change Score	Potential Score	Completeness Score (Max=10)	Achievements	Carbon Storage Change (t CO$_2$e)	Monetary Value Change (NPV; £2020)
BIODIVERSITY						
Biodiversity | Habitat	+50%			🏆		
Biodiversity | Hedgerows	+0%					
Biodiversity | Rivers	+0%					
NATURAL CAPITAL						
Mental health	+6%	62%	10	G		
Physical Health	+7%	61%	10	G		
Aesthetic Values	+9%	74%	10	G		
Education & Knowledge	+45%	54%	10	🏆		
Interaction with Nature	+42%	57%	10	🏆		
Recreation	-11%	89%	10			
Sense of Place	+12%	66%	10	G		
Air Quality Regulation	+73%	38%	10	🏆		
Carbon Storage	+57%	33%	10	🏆	+507	+£60,313
Cooling & Shading	+49%	66%	10	🏆		
Erosion Protection	+23%	70%	10	🏆		
Flood Regulation	+36%	63%	10	🏆		
Water Quality Regulation	+25%	61%	10	🏆		
Pest Control	+37%	52%	10	🏆		
Pollination	+31%	46%	10	🏆		
Food & Fish - Commercial	+0%	0%	10			
Food & Fish - Community	+0%	0%	10			
Water Availability	-5%	47%	10			
Wood Production	>100%	1%	10	G		
Photovoltaic Carbon Impact	>100%			🏆	+625	+£124,748

Figure 3.2 **Summary Results Example for Change Assessment (Selected Indicators Displayed)**

The Natural Capital section covers ecosystem services, related health benefits, as well as the abiotic service photovoltaic carbon impact. It also contains the aggregated Natural Capital Score together with aggregated scores for Culture & Health, Regulating & Supporting, and Provisioning ecosystem services.

The different NATURE Tool assessment indicators (columns) are explained in Section 3.5. The different assessment categories (ecosystem services, abiotic services, health benefits, and aggregated scores) are explained in Section 3.6. Most of this information is also accessible directly from the sheet by clicking on the respective Info Note buttons (ⓘ).

3.2 Headline Results

The headline results offer a different approach to displaying results. Here, only headline indicators are presented without a break-down by service/benefit. Figure 3.3 shows headline results for an example project. Please note that the headline results should always be read alongside the summary results which provide much more detail. As for the summary results, the contents of the headline results can also be flexibly adjusted. The headline results section also contains general information about the project. Most of this information is from the Project Info & Options sheet.
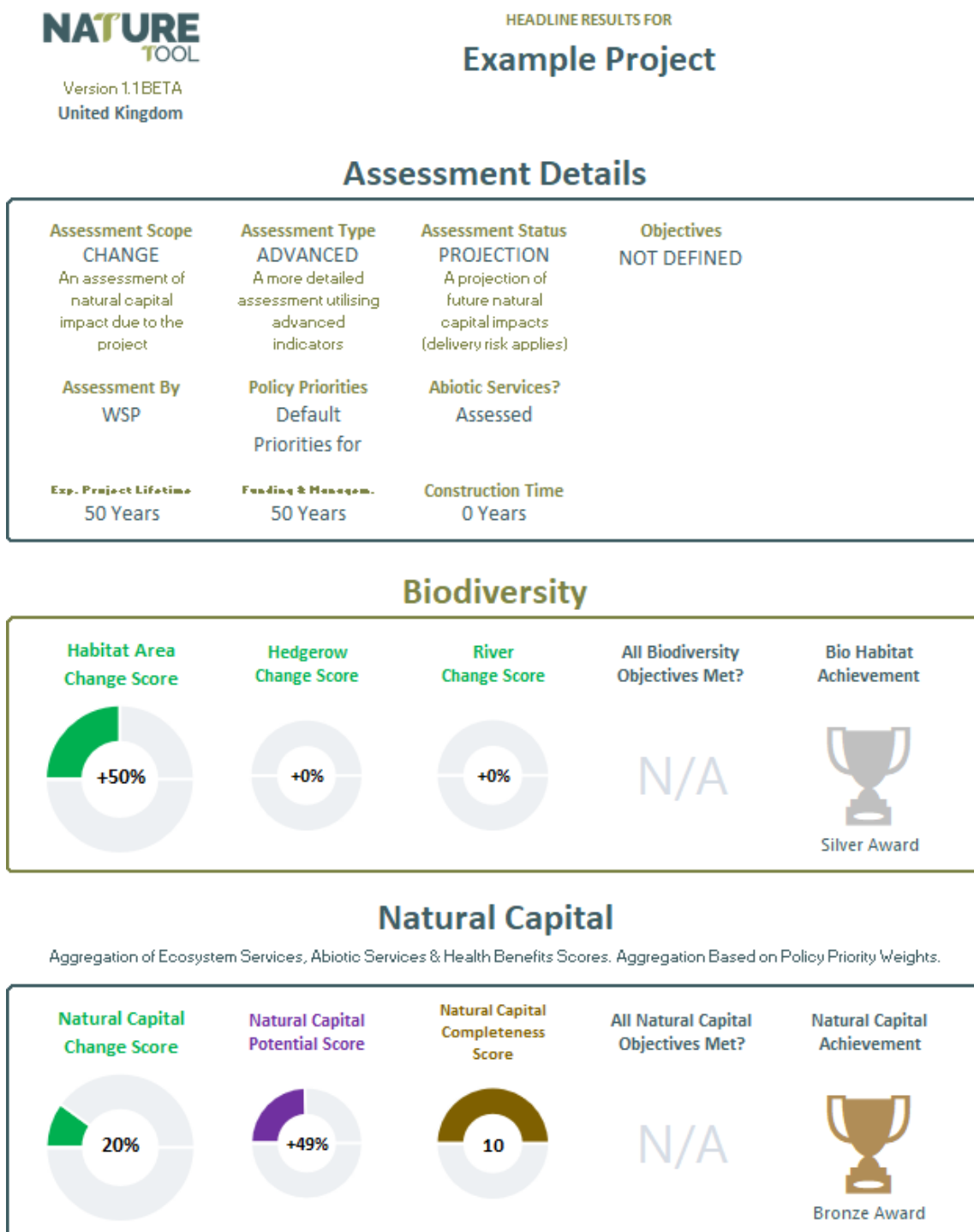
Figure 3.3 **Headline Results Example for Change Assessment**

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3.3 Detailed Results

The detailed results section is the most comprehensive results section with the NATURE Tool, offering a quantitative outlook across a variety of metrics to provide full transparency on how scores are calculated. This includes the calculation of aggregated scores, such as health scores and the overall Natural Capital Score. It also contains Info Notes detailing all indicators and calculations to provide a high level of transparency.

Please refer to the Detailed Score Calculation sheets (Calc sheets accessible from the Assessment Status sheet) for information regarding how scores are calculated for each ecosystem service. This includes detailed calculations for each habitat type assessed for the baseline, during construction, and post-development. Please also refer to Chapter 4 for more technical information on how NATURE Tool scores and indicators are calculated.

3.4 Results Narrative

As mentioned before, the NATURE Tool only provides indications based on incomplete evidence and indicators. It therefore does not capture the full complexities of natural capital impacts and trade-offs – nothing a tool could ever achieve. Therefore a qualitative section is also included in the tool. This gives you the opportunity to contextualise the results and provide further details and limitations to accompany the quantitative results. The results narrative section allows you to enter such detail for both Biodiversity and Natural Capital.

3.5 NATURE Tool Results Indicators Explained

This section explains the NATURE Tool results indicators as well as how they are calculated and how they can be used. These refer to the columns in the Summary Results sheet. Please note that most of this information is also directly accessible from the Summary Results sheet by clicking on respective Info Note buttons (ⓘ). Please refer to Section 6.3 for more details about how the NATURE Tool indicators and scores are calculated.

3.5.1 Baseline Units/Score

The baseline scores (units) provide an indication of the natural capital (biodiversity) performance of the site in its current state over the assessment period. This is effectively the business-as-usual scenario assuming the site remains unchanged.

The scores for natural capital are commonly based on base scores for each habitat type present. The base scores also depend on habitat maturity which, by default, is assumed mature for existing habitats (this can be adjusted in the Retained Habitats sheet). The base scores indicate the general level of ecosystem service provision by that habitat. The base scores are then adjusted based on multipliers in relation to indicators for ecosystem location and condition. A habitat receives, for example, a higher Recreation score if the habitat has good access. Please refer to the Detailed Results sheet for more information on how scores are calculated.

For biodiversity, units are commonly calculated with the Biodiversity Metric, with results being imported into the NATURE Tool so that results can be displayed alongside natural capital.

In a change assessment, the baseline scores (units) are used as the baseline against which project impacts are assessed and directly inform the Change Score. In a baseline assessment, the baseline scores (units) are one of the main indicators - for example when assessing the suitability/selection of sites for development which should be directed towards sites with low baseline scores (units) - because that means there is usually less to lose/more room for further score (unit) enhancement. The size of compared sites also needs to be considered.

3.5.2 Project Units/Score

The project scores (units) provide an indication of the natural capital (biodiversity) performance of the site in its proposed future state. It is based on the scores (units) indicated for the post-development state of the site, but also takes the natural capital performance during the construction phase into account (where applicable).

The scores for natural capital are commonly based on base scores for each habitat type present. The base scores also depend on habitat maturity which, by default, is assumed newly-created for any non-retained habitats (this can be adjusted in the Retained Habitats sheet). The base scores indicate the general level of ecosystem service provision by that habitat. The base scores are then adjusted based on multipliers in relation to indicators for ecosystem location and condition. For example a habitat receives a higher Recreation score if the habitat has good access. For the project scores, habitat delivery risks are also accounted for, which may reduce the score for certain habitats compared to already established habitats of the same type. Please refer to the Detailed Results sheet for more detail on how scores are calculated.

For biodiversity, units are commonly calculated with the Biodiversity Metric, with results being imported into the NATURE Tool so that results can be displayed alongside natural capital.

The project scores (units) are compared against the baseline to inform the Unit/Score Change and subsequently the Change Score.

3.5.3 Units/Score Change

The score (unit) change indicates the impact of the project on the score (units) for each service/benefit. The score (unit) change is calculated by subtracting the 'Baseline Units/Score' from the 'Project Units/Score'.

3.5.4 Change Score

The Change Score is the main indicator for measuring project success in terms of natural capital (biodiversity) impact. For each assessed ecosystem service and benefit, the Change Score indicates the percentage change against the baseline. A Change Score of +30%, for example, indicates that the service provision would be 30% higher than it would have been if the baseline state of the site remained in place. If the Change Score is greater than +100%, it will simply be displayed as >100% within the Summary Results sheet. The exact estimate is available in the Detailed Results sheet. A positive Change Score generally indicates a positive impact on natural capital (biodiversity). The higher the Change Score, the greater the indicative ecosystem service/benefit impact of the project.

The Change Score is calculated by dividing the 'Unit/Score Change' by the 'Baseline Units/Score'.

3.5.5 Potential Score

The Potential Score indicates how much of the maximum ecosystem services/benefit potential for the site has been/would be achieved. For example, a score of 40% indicates that the site achieves 40% of its maximum potential. The Potential Score is a main indicator of the NATURE Tool.

For a change assessment, the Potential Score relates to the Project Score (post-development, including construction time if applicable). In this case Change Score and Potential Score should be interpreted together. If, for example, the Change Score is high but the Potential Score is low then there are significant improvements compared to the baseline, but the baseline performance was also low to start with which makes it easier to achieve a high Change Score. An extreme example would be a zero baseline where any improvement, no matter how small, would result in Change Score of >100%. In cases of a zero/low baseline it is especially important to take the Potential Score into consideration when comparing the natural capital performance of different design options/scenarios.

On the other hand, for a baseline assessment the Potential Score relates to the Baseline Score. The Potential Score is the main indicator for a baseline assessment as it indicates how valuable the site is in terms of natural capital and, at the same time, how much room remains to improve natural capital performance on site. The lower the score, the higher the theoretical opportunity for improvement. This is particularly useful for site-selection, where low Potential Scores are preferred because there is less natural capital to lose and more potential to further enhance natural capital and achieve gains through positive design.

The Potential Score is calculated by comparing the existing (baseline assessment) or proposed (change assessment) score against the maximum possible site potential score (100%). The latter is calculated by assuming, for each habitat/land-use, that it is either retained or replaced by the best-scoring alternative, whichever achieves a higher score (taking into account delivery risks and habitat maturity for newly created habitats). The exception are open water and coastal habitats as it is assumed that these cannot easily be replaced with other habitats.

It should be noted that the Potential Score is a theoretical score and 100% may not often be achievable in practice. 100% is, for example, not achievable if there are any buildings/sealed surface on site which scores zero in terms of natural capital. Hence, a goal of 100% is often not realistic. It should also be noted that 100% can never be achieved across all ecosystem service categories, even for a project where it is the only objective to maximise natural capital. This is because of trade-offs between services. It would for example be impossible to maximise the commercial food provision score (all agricultural land) at the same time as the wood production score (all woodland).

3.5.6 Completeness Score

The Completeness Score indicates how complete the assessment is, and is mainly displayed for transparency. It indicates how accurate the assessment is, as far as user entries allow. Not considered are general uncertainties and caveats related to the scientific evidence informing the NATURE Tool. It is therefore NOT a general confidence score in the reliability of the results. It only indicates to what extent optional elements of the NATURE Tool have been completed by the tool user. Scores are rounded to full decimals and the maximum score is 10.

The Completeness Score calculation is based on both how detailed habitat data has been entered and how many optional advanced indicators have been used. Habitat areas can be entered at different detail levels. If all habitats are entered at the most detailed level, then this will maximise this part of the completeness score. If habitats are entered at a less detailed level, then the completeness score is reduced. For example if 'Woodland (unspecified)' is entered, then this could be any of the woodland habitats which may have different scores. This variation from the average score for 'Woodland (unspecified)' is accounted for by reducing the completeness score.

The second element considered in the Completeness Score is how many of the advanced indicators have been used. All advanced indicators have a default value which applies if no data is entered by the tool user. If default values apply, that also means that circumstances are not clear as far as advanced indicators are concerned. A habitat could, for example, be located within or outside a flood risk regulation opportunity area which impacts the flood risk regulation multiplier. This possible variation from the default multiplier is accounted for by a reduced Completeness Score.

3.5.7 Policy Priority

The Policy Priority informs how scores are aggregated for the Natural Capital Score, Cultural & Health score, Regulating & Supporting score, and Provisioning score, respectively. They are mainly displayed for reference and transparency. By default, policy priorities are based on a literature review, where relevant national planning policies were reviewed for each UK jurisdiction. The policy priority for each service and benefit can either be high, medium, or low. This classification is based on both the frequency of policies related to a service/benefit as well as how strongly the wording is formulated. Default policy priorities for each jurisdiction are outlined in Table 2.1.

Policy Priorities translate into aggregation weights as follows:

- High (H) = 3
- Medium (M) = 2
- Low (L) = 1

The applicable jurisdiction needs to be selected by the tool user in the Project Info & Options sheet. However, in adapted local/corporate versions of the NATURE Tool, the objective setter can also define Policy Priorities based on local/project policies. This can be changed in the Objective Setter sheet which is accessible via the Assessment Status sheet.

Table 3.1 **Default UK Policy Priorities**

	England	Wales	Scotland	Northern Ireland
Mental Health	High	High	High	High
Physical Health	High	High	High	High
Aesthetic Values	Medium	Medium	Medium	Medium
Education & Knowledge	Medium	Low	Medium	Low
Interaction with Nature	Medium	Medium	Medium	Medium
Recreation	High	High	High	High
Sense of Place	Medium	High	Medium	High
Air Quality Regulation	High	High	Medium	Medium
Carbon Storage (Habitat)	Medium	Medium	High	Medium
Carbon Avoided (Renewables)	Medium	Medium	High	Medium
Cooling & Shading	Medium	Medium	Medium	Medium
Erosion Protection	Low	Low	Medium	Low
Flood Regulation	High	High	High	Medium
Water Quality Regulation	Low	Medium	High	Medium
Pest Control	Medium	Low	Low	Low
Pollination	Medium	Medium	High	Low
Food & Fish - Commercial	Medium	High	High	Low
Food & Fish - Community	Low	Medium	Medium	Medium
Water Availability	Medium	Medium	Medium	Low
Wood Production	High	High	High	Low

As a result, an ecosystem services/benefit score with a high policy priority weights 3 times more strongly in the aggregated Natural Capital Score than the same score for a service/benefit with a policy priority weight of 1 (low).

Please note that physical and mental health scores are themselves aggregated scores based on a literature review (see info notes). That means that certain ecosystem services scores feed into the health scores which themselves feed into the aggregated Natural Capital Score, which would result in double-counting. To avoid the double-counting issue, any contribution of ecosystem services scores to the health scores is deducted from the ecosystem services scores when feeding into aggregated scores such as the Natural Capital Score. For more detail refer to the relevant section within the Detailed Results sheet.

3.5.8   Objectives Met?

For adapted (local/corporate/project) NATURE Tool versions, the objective setter can define quantitative natural capital objectives. If all objectives are met, a ✔ will be shown in the respective row. If any objectives were not met, a ✖ will be displayed. If no objectives were defined, 'N/A' will be shown. Please refer to the Detailed Results sheet for more detail. By default, no objectives are defined for the standard UK version of the NATURE Tool.

Objectives can be defined in the Objective Setter Area sheet (accessible from the Assessment Status sheet) for each ecosystem service/benefit, biodiversity, as well as aggregated scores such as the Natural Capital Score. Objectives can be defined for all or any of the following: Change Score, Potential Score, and/or Completeness Score.

3.5.9 Achievements

The NATURE Tool also indicates Achievements which highlight particularly positive impacts on natural capital (biodiversity) above and beyond what would usually be expected. The main intention of Achievements is to provide a simple means of communicating and reporting net gains for the environment and anything above and beyond.

Achievements are automatically allocated based on thresholds for the Change Score, Potential Score, and Completeness Score as shown in Table 3.2. Please refer to the Detailed Results sheet for more information

why an achievement has been achieved/missed.

Table 3.2 **Achievement Thresholds**

Achievement		Minimum Change Score	Minimum Potential Score	Minimum Completeness Score
G	Net Gain	+1%	1%	6.5
🏆	Bronze Excellence Standard	+20%	10%	7.5
🏆	Silver Excellence Standard	+40%	20%	8.5
🏆	Gold Excellence Standard	+60%	30%	9.5

3.5.10 Baseline Carbon Impact

The Baseline Carbon Impact represents the average carbon stock (tonnes of carbon dioxide equivalent; t CO2e) of baseline habitats over the assessment period plus carbon abated through existing photovoltaic installations, if applicable.

Average carbon stocks are based on estimated stocks in vegetation and corresponding soils. For woodland, carbon stock (changes) are based on the Woodland Carbon Code (WCC)[16] calculation tool (version 2.1). For other habitats, estimates are based on Natural England's publication Carbon Storage and Sequestration by Habitat 2021[17]. Please note that there is still significant uncertainty - particularly around soil carbon stock changes.

3.5.11 Project Carbon Impact

The Project Carbon Impact represents the average carbon stock (tonnes of carbon dioxide equivalent; t CO2e) of project habitats over the assessment period (both, during construction and post-development) plus carbon abated through new photovoltaic installations, if applicable.

3.5.12 Carbon Impact Change

The Carbon Impact Change (in terms of gains/losses to tonnes of carbon dioxide equivalent; t CO2e) indicates the impact of the project on carbon storage in vegetation and soils (and carbon abated due to photovoltaic installations, if applicable). The t CO2e are calculated by subtracting the 'Baseline Carbon Impact' from the 'Project Carbon Impact'.

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[16] https://woodlandcarboncode.org.uk/
[17] http://publications.naturalengland.org.uk/publication/5419124441481216

3.5.13 Baseline Monetary Value

The Baseline Monetary Value (Net Present Value; NPV) has been calculated for carbon impacts. The value represents the average carbon stock value of baseline habitats over the assessment timescale (plus the average value of carbon abated due to existing photovoltaic installations, if applicable). It is NOT the annual sequestration.

The monetary valuation approach follows the Green Book (HM Treasury 2022)[18], in combination with Supplementary Guidance on the Valuation of Energy Use and Greenhouse Gas Emissions for Appraisal (BEIS 2021)[19]. Both discounting future benefits and the increasing value per t CO2e over time has been considered.

The NATURE Tool development team intends to add monetary valuation for further ecosystem services in the future. Please get in touch if this is of interest to you.

3.5.14 Project Monetary Value

The Project Monetary Value (Net Present Value; NPV) has been calculated for carbon impacts. The value represents the average carbon stock value of proposed post-development habitats (and habitats during construction, if applicable) over the assessment timescale (plus the average value of carbon abated due to new photovoltaic installations, if applicable). It is NOT the annual sequestration.

3.5.15 Monetary Value Change

The Monetary Value Change (for gains/losses to tonnes of carbon dioxide equivalent) indicates the impact of the project on carbon storage in vegetation and soils (and carbon abated due to photovoltaic installations, if applicable), expressed in monetary terms.

3.6 Assessed Services, Benefits and Aggregated Scores Explained

This section explains the NATURE Tool assessment categories: ecosystem services, abiotic services, health benefits, and aggregated scores such as the Natural Capital Score. These refer to the columns in the Summary Results sheet.

The following sections include a short introduction to the service/benefit, how scores are calculated including indicators, and high-level suggestions for how scores could be enhanced. Please note most of this information is also directly accessible from the Summary Results sheet by clicking on respective Info Note buttons (ⓘ). Please refer to Chapter 4 for more technical detail on how ecosystem services scores and aggregated scores are calculated.

3.6.1 Biodiversity (Habitat, Hedgerows & Rivers)

Biodiversity is the term used to describe the variety of life on earth. It includes everything that is alive on our planet. Biodiversity | Habitat refers to biodiversity value and impact for habitats that are typically mapped as areas (as opposed to linear features such as hedgerows and rivers which are assessed separately). Biodiversity | Hedgerows/Rivers refers to biodiversity value and impact for hedgerows/rivers, measured by length.

Biodiversity Units are not directly calculated within the NATURE Tool, but rather imported from the Defra Biodiversity Metric[20] so that biodiversity and natural capital results can be presented alongside each other. The Change Score, Objectives Met? and Achievements are calculated within the NATURE Tool based on Biodiversity Units calculated within the Biodiversity Metric.

[18] https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent
[19] https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal
[20] http://publications.naturalengland.org.uk/publication/6049804846366720

Within the Biodiversity Metric 3.1, Biodiversity Units are calculated based on the habitat distinctiveness score which indicate the importance of habitats for biodiversity. This is effectively the habitat base score. There are also other factors influencing the Biodiversity Units:

- Condition: Biodiversity Units are higher when a habitat is in good ecological condition.
- Strategic significance: Biodiversity Units are higher when a habitat forms part of a network that has been identified as significant for nature.
- Delivery risk: For created habitats, there is a reduction in Biodiversity Units based on the likelihood of habitat creation to fail which depends on the type of habitat.
- Time to target condition: For created habitats, there is a reduction in Biodiversity Units based how long the habitat needs until it reaches target condition.

Please note that the Biodiversity Metric is purely habitat-based and does not directly consider the presence/record of species.

3.6.2 Natural Capital Score (Aggregated)

The Natural Capital Score is an aggregated headline indicator. It indicates the overall natural capital performance of the project and is based on scores for all ecosystem services/benefits as well as the Policy Priorities. This is effectively based on a Multi Criteria Decision Analysis (MCDA) framework and does NOT represent the overall value change in natural capital performance. Hence, the indicative Natural Capital Score should be read and interpreted alongside the individual ecosystem services/benefit results (and objectives, where applicable).

The aggregated Natural Capital Score is calculated as the average of each ecosystem services/benefits score below, each multiplied by the aggregation weight attached to the respective Policy Priority (see Section 3.5.7 for further detail). The abiotic Photovoltaic Carbon Impact is also considered, applying the Carbon Storage policy priority. Please refer to the Detailed Results sheet for a full calculation.

3.6.3 Cultural & Health (Aggregated)

The Culture & Health score is an aggregated headline indicator. It indicates the overall Culture & Health performance of the project and is based on scores for all ecosystem services/benefits, as well as the Policy Priorities within this category. This is effectively based on a Multi Criteria Decision Analysis (MCDA) framework and does NOT represent the overall value change in Culture & Health performance. Hence, the indicative Culture & Health score should be read and interpreted alongside the individual ecosystem services/benefit results within the category (and objectives, where applicable).

The aggregated Culture & Health score is calculated as the average of each ecosystem services/benefits score below, each multiplied by the aggregation weight attached to the respective Policy Priority (see Section 3.5.7 for further detail). Please refer to the Detailed Results sheet for a full calculation.

3.6.4 Mental Health (Aggregated)

The Mental Health score is an indicative aggregated indicator. It effectively aggregates ecosystem services scores based on their indicative contribution to Mental Health. This only indicates the contribution by natural capital and not any other engineered assets, such as the presence of a hospital.

The Mental Health score is effectively based on a Multi Criteria Decision Analysis (MCDA). A percentage-contribution to Mental Health is allocated to each ecosystem service which adds up to 100% (the Mental Health score). The percentage allocation is based on a literature review exploring the links between ecosystem services and Mental Health. To avoid double-counting when aggregating (the already aggregated) Mental Health score to the Natural

Capital Score, for example, the percentage allocation is deducted from the ecosystem services again when aggregated to the Natural Capital Score. Please refer to the Detailed Results sheet for a full calculation.

3.6.5 Physical Health (Aggregated)

The Physical Health score is an indicative aggregated indicator. It effectively aggregates ecosystem services scores based on their indicative contribution to Physical Health. This only indicates the contribution by natural capital and not any other engineered assets such as the presence of a hospital.

The Physical Health score is effectively based on a Multi Criteria Decision Analysis (MCDA). A percentage-contribution to Physical Health is allocated to each ecosystem service which adds up to 100% (the Mental Health score). The percentage allocation is based on a literature review exploring the links between ecosystem services and Physical Health. To avoid double-counting when aggregating (the already aggregated) Physical Health score to the Natural Capital Score, for example, the percentage allocation is deducted from the ecosystem services again when aggregated to the Natural Capital Score. Please refer to the Detailed Results sheet for a full calculation.

3.6.6 Aesthetic Values

The aesthetic value of nature is highly subjective and therefore difficult to reflect in a habitat-based scoring system which should be acknowledged when interpreting results. Different groups of society have different levels of appreciation for different natural settings and places. However, not valuing aesthetic and other cultural ecosystem services also means that they can be undermined in decision-making. It is important to stress, however, that this is only a broad indication of aesthetic value.

The Aesthetic Values Score only considers nature/habitats and not the aesthetics of constructed features such as buildings or monuments. The score is purely habitat-based and does not take into consideration wider landscape impacts, such as the appropriateness of habitats within the landscape setting. Nor does the automatically calculated score consider the preferences of the local community.

The Aesthetic Values Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present.
- Nature designations: The multiplier is higher based on whether it has local, national, or international nature designations.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or frequently visited which indicates a higher demand/likelihood of exposure.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Aesthetic Values score calculation sheet (AES Calc) for more detail on how the score is calculated.

Consider the following options to improve the Aesthetic Values Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Broadleaved woodland, scrub, semi-natural grassland, heathland, mire, swamp, marginal & inundation, open water, boulders & rocks, exposure & waste, arable field margins, hedgerows, urban/street trees, ornamental lakes, and introduced shrubland flower beds tend to score highest for this ecosystem service.
- Improve public access to habitats.

3.6.7 Education & Knowledge

Alongside more theoretical environmental education in the classroom, frequent interaction with the natural environment can form a key element of acquiring ecological knowledge.

The Education & Knowledge Score only considers informal interaction with/formal educational visits to nature/habitats. It does not consider, for example, classroom-based ecological education which means that the presence of a school building or education centre would not enhance the score.

The Education & Knowledge Score is based on a habitat base score, as well as the following multipliers:

- Educational use: The multiplier is higher for areas that are specifically designed for educational purposes, areas that are located on primary school grounds, and areas regularly visited for organised educational visits.
- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present.
- Nature designations: The multiplier is higher based on whether it has local, national, or international nature designations.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or frequently visited, which indicates a higher demand/likelihood of exposure.
- Habitat maturity: The score is usually higher for mature habitats that have already reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Education & Knowledge score calculation sheet (Edu Calc) for more detail on how the score is calculated.

Consider the following options to improve the Education & Knowledge Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores, as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Woodland, parkland, semi-natural grassland, heathland, mire, swamp, marginal & inundation, open water, coastland, exposure & waste, hedgerows, open mosaic habitats, allotments, trees, ornamental lakes, and cemeteries tend to score highest for this service.
- Improve public access to habitats.
- Organise formal outdoor educational trips to the site.
- Create high-scoring habitats on primary school grounds (where applicable).

3.6.8 Interaction with Nature

Interaction with nature refers to observing nature, such as bird watching, either formally or informally. It also includes random encounters with wildlife and more generally feeling 'connected to nature'. Interaction with nature should be distinguished from recreation. For example, amenity grassland or a natural sports pitch may provide great recreational opportunities but it is unlikely to provide many opportunities to interact with nature.

The Interaction with Nature Score is purely habitat-based and does not directly consider the presence of species. Nor does it consider species/habitat diversity across a site.

The Interaction with Nature Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present.

- Nature designations: The multiplier is higher based on whether it has local, national, or international nature designations.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or frequently visited which indicates a higher demand/likelihood of exposure.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Interaction with Nature score calculation sheet (IwN Calc) for more detail on how the score is calculated.

Consider the following options to improve the Interaction with Nature Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Broadleaved woodland, scrub, parkland, semi-natural grassland, heathland, mire, swamp, marginal & inundation, open water, boulders & rock intertidal coastland, hedgerows, and ornamental lakes tend to score highest for this service.
- Improve public access to habitats.

3.6.9 Recreation

The cultural ecosystem service recreation refers to greenspace that enables enjoyment, recovery from stress, and the promotion of good health. Accessible greenspace provides opportunities for a range of human activities such as walking, cycling, horse riding, climbing, and informal relaxation. Recreational activities are known to increase individual wellbeing.

The Recreation Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present. The Recreation Score is highly dependent on the level of accessibility and sites without any level of access receive a score of zero.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or frequently visited which indicates a higher demand/likelihood of exposure.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Recreation score calculation sheet (Rec Calc) for more detail on how the score is calculated.

Consider the following options to improve the Recreation Score:

- Improve public access to habitats. Habitats without access will score zero.
- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Woodland, scrub, parkland, neutral and amenity grassland, running water, allotments, trees, introduced shrub, natural sports pitches, recreation- & playgrounds, vegetated gardens, and flower beds tend to score highest for this service.

3.6.10 Sense of Place

Sense of place refers to the aspects of a place that makes it special and distinctive. This includes historic features, personal reasons, but also natural features such as habitats. The NATURE Tool provides indicative scores for different habitat types.

The Sense of Place Score is purely indicative and only captures a proportion of what gives a space sense. Not considered, for example, is how habitats fit into the local setting or interact with other features such as buildings, monuments or the landscape. It also doesn't consider any spiritual or religious meanings of a space to communities.

The Sense of Place Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is higher for sites that have better public access as people are more likely to benefit if they can be physically present.
- Nature designations: The multiplier is higher based on whether it has local, national or international nature designations.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or frequently visited which indicates a higher demand/likelihood of exposure.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Sense of Place score calculation sheet (SoP Calc) for more detail on how the score is calculated.

Consider the following options to improve the Sense of Place Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Woodland, parkland, semi-natural grassland, heathland, mire, swamp, marginal & inundation, open water, coastland, exposure & waste, hedgerows, trees, ornamental lakes, and cemeteries tend to score highest for this service.
- Improve public access to habitats.

3.6.11 Regulating & Supporting (Aggregated)

The Regulating & Supporting score is an aggregated headline indicator. It indicates the overall Regulating & Supporting performance of the project and is based on scores for all ecosystem services/benefits as well as the Policy Priorities within this category. This is effectively based on a Multi Criteria Decision Analysis (MCDA) framework and does NOT represent the overall value change in Regulating & Supporting performance. Hence, the indicative Regulating & Supporting score should be read and interpreted alongside the individual ecosystem services results within the category (and objectives where applicable).

The aggregated Regulating & Supporting score is calculated as the average of each ecosystem services score below, each multiplied by the aggregation weight attached to the respective Policy Priority (see Policy Priority info note for further detail). Please refer to the Detailed Results sheet for a full calculation.

3.6.12 Air Quality Regulation

Complex vegetation and especially trees usually have a positive effect on the regulation of air quality. This applies especially in areas where pollution emissions are comparatively high. Trees and other vegetation absorb, through physical deposition as well as chemical reactions, deleterious pollution such as nitrogen dioxide; but also carbon monoxide, sulphur dioxide, ozone, and fine particulates which are responsible for major illnesses such as respiratory ailments, heart disease and cancer.

Please note that good design is assumed such as not creating a canopy 'roof' over busy roads which could potentially worsen localised air quality.

The Air Quality Regulation Score is based on a habitat base score, as well as the following multipliers:

- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or frequently visited which indicates a higher demand/likelihood of exposure.
- Air Quality Management Area (AQMA): The multiplier is higher if a site is located in an area with an AQMA which indicates a higher demand for air quality regulation services.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Air Quality Regulation score calculation sheet (AQR Calc) for more detail on how the score is calculated.

Consider the following option to improve the Air Quality Regulation Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Coniferous woodland, scrub, and hedgerows tend to score highest for this service.

3.6.13 Carbon Storage

Carbon Storage in this context refers to natural carbon storage in vegetation and corresponding soils, which makes an important contribution to mitigating climate change and reaching climate/net-zero targets. The photosynthetic activities of trees and other vegetation sequester carbon dioxide from the atmosphere and therefore act as a net carbon sink, especially when carbon is stored in corresponding soils. This score indicates (the project impact on) average carbon stocks in vegetation and corresponding soils. It is NOT the carbon sequestration, as this would not appropriately account for the carbon loss of deforestation, for example. In addition to the scores, Carbon Storage is also assessed in biophysical terms (tonnes of carbon dioxide equivalent; t CO_2e) and in monetary values.

For woodland, carbon stock (changes) are based on the Woodland Carbon Code (WCC)[21] calculation tool (version 2.1). For other habitats, estimates are based on Natural England's publication Carbon Storage and Sequestration by Habitat (2021)[22]. Please note that there is still significant uncertainty particularly around soil carbon stock changes. Please also note that this impact of peatland management/degradation is not yet implemented. However, the development team intends to implement this in subsequent versions. Not considered in this assessment are, for example, non-natural carbon impacts - such as from building energy use or traffic (except the impacts of photovoltaic installations - see further below).

The Carbon Storage Score is based on a habitat base score, as well as the following multipliers:

- Grazing & Mowing: The multiplier is slightly higher for non-degraded grassland habitats.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Carbon Storage score calculation sheet (Car Calc) for more detail on how the score is calculated.

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[21] https://woodlandcarboncode.org.uk/
[22] http://publications.naturalengland.org.uk/publication/5419124441481216

Consider the following options to improve the Carbon Storage Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Coniferous woodland tends to score highest for this service.
- Change grassland management for degraded grassland (where applicable; minor effect on carbon storage).

3.6.14 Cooling & Shading

Green vegetation has an influence on the local climate, and particularly so in more urbanised areas. Urban areas are usually warmer than their surroundings. This Urban Heat Island Effect (UHIE) is caused by the built environment retaining heat, which is released during the night, as well as the concentration of waste heat from warming and cooling. The UHIE will increasingly combine with global warming caused by climate change. Green vegetation, in particular trees, have a significant cooling effect on the local climate in cities and towns. The temperature around vegetation is reduced by evapotranspiration. Trees and scrub also provide shading and protection from heat and UV radiation. Therefore, natural capital has the potential to play a vital role in helping urban areas to adapt to climate change.

Cooling & Shading only indicates the contribution of natural vegetation. Not considered are, for example, sunshade sails which also provide shading but which are not natural. Also not considered are engineered solutions to reduce waste-heat from buildings,.

The Cooling & Shading Score is based on a habitat base score, as well as the following multipliers:

- Level of accessibility: The multiplier is slightly higher for sites that have better public access as people are more likely to benefit from shading.
- Population density/external visitor numbers: The multiplier is higher in areas with higher population density and/or frequently visited which indicates a higher demand/likelihood of exposure. For Cooling & Shading, the population density is more significant because it also indicates the level of urbanisation/UHIE.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Cooling & Shading score calculation sheet (C&S Calc) for more detail on how the score is calculated.

Consider the following options to improve the Cooling & Shading Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Woodland, ground-based green walls, and trees tend to score highest for this service.
- Improve public access to habitats.

3.6.15 Erosion Protection

Soil erosion happens when wind and water results in the loss of nutrients, minerals, and organic compounds. Such loss reduces the fertility of soils and is therefore undesirable. Soil erosion also puts pressure on water bodies through increased sediment runoff. Vegetation cover can protect soils from eroding – especially complex vegetation such as woodlands and vegetation that provides good soil coverage such as grassland habitats. Arable fields where soils are often exposed to water and wind provide lower erosion protection services.

The Erosion Protection Score is based on a habitat base score, as well as the following multipliers:

- Slope steepness: The multiplier is higher for sites with steeper slopes because this makes soil erosion more likely which, in turn, indicates higher demand for Erosion Protection.
- Rainfall: The multiplier is higher in areas that experience more rainfall as heavy rain can contribute to soil erosion.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Erosion Protection score calculation sheet (Ero Calc) for more detail on how the score is calculated.

Consider the following options to improve the Erosion Protection Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Woodland, scrub, parkland, semi-natural grasslands, bracken, tall herb & fern, heathland, mire, swamp, marginal & inundation, and hedgerows tend to score highest for this service.
- Focus high-scoring habitat creations on areas with steeper slope.

3.6.16 Flood Regulation

Flood Regulation refers to the ability of natural habitats to slow down and store water in case of a flooding event. Woodlands, for example, do this by canopy interception, infiltration, and water storage in soils.

Please note that the Flood Regulation Score only provides a rough indication of flood regulation. Modelling floods is complex, and this high-level assessment cannot capture the full complexity of flooding events. Not considered, for example, is the reduced level of damage/disruption mitigated flooding events would otherwise cause. Hence, scores are essentially indicative.

The Flood Risk Regulation Score is based on a habitat base score, as well as the following multipliers:

- Flood regulation location: The multiplier is higher in locations that are more likely to be flooded as long as water could run off (flow routes).
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Flood Risk Regulation score calculation sheet (Fld Calc) for more detail on how the score is calculated.

Consider the following options to improve the Flood Regulation Score:

- Focus high-scoring habitat creations on areas with better flood regulation location such as within (close proximity to) surface water flow routes or in proximity to watercourses. See Flood Reg Location sheet for more detail.
- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Woodland tends to score highest for this service

3.6.17 Water Quality Regulation

Vegetation can retain, remove, and transform - for example nitrate pollution from agricultural habitats or other pollution sources such as from sewage overflows during periods of heavy rainfall. The complexity of vegetation is important because complex vegetation can trap more pollutants when water flows through.

Not considered in the score are engineered water quality improvement measures such as chemical water treatment facilities.

The Water Quality Regulation Score is based on a habitat base score, as well as the following multipliers:

- Water status: The multiplier is higher for sites located in areas with generally poorer water quality, indicating a higher demand for the service.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Water Quality Regulation score calculation sheet (WQ Calc) for more detail on how the score is calculated.

Consider the following option to improve the Water Quality Regulation Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Broadleaved woodland, mire, swamp, marginal & inundation, and running water tend to score highest for this service.

3.6.18 Pest Control

Pest control describes nature's ability to self-regulate pests, which are species that compete with humans for provisioning services such as food. Birds and spiders, for example, prey on pests and therefore naturally control pest populations. Chemical pesticides are a threat to natural pest control because natural enemies of pests are often more susceptible than the pests themselves. This is because pests build up resistance to chemical pesticides whilst their predators are more vulnerable and also generally smaller in population. Semi-natural habitats tend to have higher Pest Control Scores than improved grassland or arable fields, for example.

Not considered in this score are, for example, chemical pest treatment or other non-natural measures. Also not considered is the local demand for Pest Control, as this would require further context analysis. Arguably, Pest Control is more important in areas with higher volumes of agricultural production.

The Pest Control Score is based on a habitat base score, as well as the following multipliers:

- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Pest Control score calculation sheet (Pst Calc) for more detail on how the score is calculated.

Consider the following option to improve the Pest Control Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Broadleaved woodland, scrub, parkland, semi-natural grasslands, bracken, tall herb & fen, heathland, arable field margins, hedgerows, brown roofs, and trees tend to score highest for this service.

3.6.19 Pollination

Most wild plants and crop species depend on insect pollination. Pollination represents a vital ecosystem service supporting food supply and other ecosystem services, such as aesthetic values. Many pollinators in the UK, especially those associated with semi-natural habitats, have become less widespread which may have implications for pollination services. Semi-natural habitats tend to have higher Pollination scores than for example improved grassland.

Not considered in this score is the local demand for Pollination as this would require further context analysis. Arguably, Pollination is more important in areas with higher volumes of agricultural production, for example. Also not considered are for example the presence/establishment of bee hives on a site.

The Pollination Score is based on a habitat base score, as well as the following multipliers:

- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Pollination score calculation sheet (Pol Calc) for more detail on how the score is calculated.

Consider the following option to improve the Pollination Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Broadleaved woodland, scrub, parkland, neutral and calcareous grassland, heathland, hedgerows, allotments, and vegetated gardens tend to score highest for this service.

3.6.20 Provisioning (Aggregated)

The Provisioning score is an aggregated headline indicator. It indicates the overall Provisioning performance of the project and is based on scores for all ecosystem services/benefits as well as the Policy Priorities within this category. This is effectively based on a Multi Criteria Decision Analysis (MCDA) framework and does NOT represent the overall value change in Provisioning performance. Hence, the indicative Provisioning score should be read and interpreted alongside the individual ecosystem services/benefit results within the category (and objectives where applicable).

The aggregated Provisioning score is calculated as the average of each ecosystem services/benefits score below, each multiplied by the aggregation weight attached to the respective Policy Priority (see Policy Priority info note for further detail). Please refer to the Detailed Results sheet for a full calculation.

3.6.21 Food & Fish – Commercial

Commercial food and fish production includes all production/catch that has a commercial purpose – essentially food/fish that is produced/caught to be sold. This is in contrast to community food and fish which is assessed below.

The score only captures grown food but does not include, for example, pig or poultry farms. This is because, arguably, such food production is not based on an ecosystem service (apart from the food grown to feed animals which is included in the score). It could also lead to double-counting with grown food that is then fed to livestock.

The Food & Fish - Commercial Score is based on a habitat base score, as well as the following multipliers:

- Commercial food/fishing function: Scores are zero if a habitat is not used for commercial fishing/food production.
- Agricultural Land Classification (ALC) grade: The multiplier for food production is higher for sites with better ALC grade. The ALC grade indicates the quality of land for agricultural production. Please note that the ALC

grade multiplier only applies to habitat types which typically rely on it. Habitat types that are not connected to ALC classification include woodland, which may be used to collect mushrooms.

- Water status: The multiplier for fish production is higher for water that has a good status.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Food & Fish - Commercial score calculation sheet (FF£ Calc) for more detail on how the score is calculated.

Consider the following options to improve the Commercial Food & Fish Score:

- Retain/create agricultural land-uses in areas with higher ALC Grade/Class as these areas tend to be more productive.
- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Improved grassland, arable & horticulture tend to score highest for this service.

3.6.22 Food & Fish – Community

Community food and fish production refers to non-commercial food production such as gathering berries and mushrooms or managing an allotment for private consumption. This service also includes non-commercial angling where the fish caught can be kept.

Not captured within the score is the recreational aspect of, for example, recreational fishing or enjoying gardening in an allotment. The score only indicates the produce, rather than the experience of the process.

The Food & Fish - Community Score is based on a habitat base score, as well as the following multipliers:

- Community food/fishing function: Scores are zero if a habitat is not used for community fishing/food production.
- Water status: The multiplier for fish production is higher for water that has a good status.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Food & Fish - Community score calculation sheet (FFC Calc) for more detail on how the score is calculated.

Consider the following option to improve the Community Food & Fish Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Allotments, city farms, and community gardens tend to score highest for this service.

3.6.23 Water Availability

The availability of water is crucial for ensuring affordable and safe drinking water and sanitation. Habitats such as running and standing water contribute directly to water abstraction, whilst other habitats such as wetlands and woodlands allow the recharge of groundwater as surface water can impede through soil. This water availability function can be interrupted when surfaces are sealed or compacted.

Water Availability needs to be distinguished from water supply where water is abstracted. This has not been included because information is usually difficult to obtain. Also not considered within the score is the local demand for water availability, for example whether water is/will be in shortage in an area.

The Water Availability Score is based on a habitat base score, as well as the following multipliers:

- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Water Availability score calculation sheet (WA Calc) for more detail on how the score is calculated.

Consider the following option to improve the Water Availability Score:

- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Semi-natural grasslands, heathland, mire, swamp, marginal & inundation, open water, arable & horticulture, allotments, ornamental lakes & ponds, SuDS, cemeteries, and flower beds tend to score highest for this service.

3.6.24 Wood Production

Wood Production includes harvesting of timber and other woodland products, such as wood-based biofuels or firewood. Woodland habitats usually receive the highest scores, but orchards, scattered trees, and scrub can also provide some level of woodland products.

The Wood Production Score is based on a habitat base score, as well as the following multipliers:

- Woodland management: The multiplier is higher if a woodland is primarily managed for wood/timber production. The score is zero for woodlands that are not managed for wood production.
- Habitat maturity: The score is usually higher for mature habitats that already have reached their full ecosystem services potential.
- Delivery risk: For newly created habitats, a delivery risk penalty may apply where failure to create the intended habitat is likely to reduce ecosystem services.

Please refer to the Wood Production score calculation sheet (Wod Calc) for more detail on how the score is calculated.

Consider the following options to improve the Wood Production Score:

- Manage woodland for wood production.
- Retain/create high-scoring habitats. Please refer to the Min and Max Base Scores as well as the Years for Habitat to Reach Max Base Score (if created) for this ecosystem service in the Base Scores sheet. Coniferous woodland tends to score highest for this service.

3.6.25 Photovoltaic Carbon Impact

Photovoltaic Carbon Impact refers to the abated carbon emissions through the installation of photovoltaic (PV) systems for solar electricity production. This is based on the substitution of electricity from the general electricity generation mix (including coal and gas) by clean PV electricity. Also considered are potential savings to electricity transmission and operation losses which can be avoided if PV electricity is used on-site. Please note that the NATURE Tool also calculates the estimated electricity production in kilowatt hours (kwh) - see Photovoltaic sheet.

Please note that the carbon impact only considers carbon abated from electricity generation but not carbon emissions as part of the construction of PV panels, for example.

Photovoltaic Carbon Impact is calculated based on the location of the PV installation, informed by the PV GIS Tool[23], as well as standard specifications for PV installations, but with the option to amend. Carbon impact is calculated as a score which represents the abated carbon should new PV be installed. Impacts are also calculated in tonnes of carbon dioxide equivalent (t CO2e) and in monetary terms. The monetary valuation approach follows the Green Book (HM Treasury 2022)[24] in combination with Supplementary Guidance on the Valuation of Energy Use and Greenhouse Gas Emissions for Appraisal (BEIS 2021)[25]. Both, discounting future benefits and the increasing value per t CO_2e over time has been considered.

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[23] https://re.jrc.ec.europa.eu/pvg_tools/en/
[24] https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent
[25] https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

4 Methods – How does the NATURE Tool Model Work?

This methods section explaining how the NATURE Tool model works in more technical detail. The NATURE Tool mainly works on a scoring system. Section 4.1 details how scores and values are calculated for each ecosystem service assessed within the NATURE Tool. A high-level introduction to the NATURE Tool indicators and scores can be found in Section 3.5. The following sections are loosely based on the indicators (columns) as per Summary Results sheet of the tool. Section 4.2 provides more detail on how aggregated scores, such as the health benefit scores and the Natural Capital Score, are calculated.

Please note that there is some level of repetition from Chapter 3, where high-level introductions to the different NATURE Tool indicators and how they are calculated has been provided. This is to improve text flow and to provide the opportunity to read this Chapter without having to cross-reference.

4.1 Indicator/Ecosystem Services Score Calculations

4.1.1 Biodiversity Units

Biodiversity Units are not directly calculated within the NATURE Tool but rather imported from the Defra Biodiversity Metric[26]. This allows both biodiversity and natural capital results to be presented alongside each other. Please refer to the Biodiversity Metric user guide[27] for more information on how Biodiversity Units are calculated.

4.1.2 Ecosystem Services Baseline Score Calculation

The baseline scores provide an indication of the ecosystem services performance of the site in its current state over the assessment period. This is effectively the business-as-usual scenario assuming the site remains unchanged. It is used to inform the Change Score calculation. It is also useful for comparing different sites for the purpose of site selection, with development directed to sites with lower baseline scores.

Within the NATURE Tool model, the ecosystem services baseline scores for each habitat are calculated as follows:

(Access-Adjusted) Habitat Base Score
Basic Assessment

Advanced
Assessment
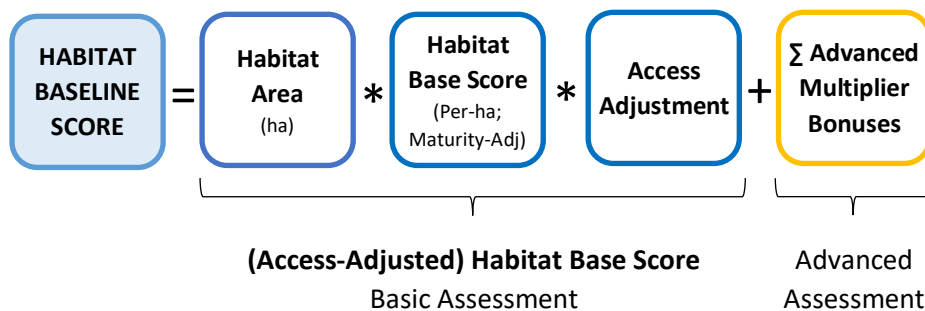
Multiplying the respective Habitat Area by the Habitat Base Score and the Access Adjustment (where applicable) results in the (Access-Adjusted) Habitat Base Score. For a Basic NATURE Tool assessment, this is also the Habitat Baseline Score. For an ADVANCED NATURE Tool assessment, there are also additional Advanced Multiplier Bonuses that are added (subtracted) from the Habitat Base Score to account for differences in habitat location/configuration and management/condition. The indicators on which this calculation is based are explained in the following sections.

All Habitat Baseline Scores are added together for each ecosystem service assessed to arrive at the (Total) Base Score as shown in the summary results section of the tool:

[26] http://publications.naturalengland.org.uk/publication/6049804846366720
[27] http://publications.naturalengland.org.uk/publication/6049804846366720

$$(\text{TOTAL}) \text{ BASELINE SCORE} = \text{HABITAT A BASELINE SCORE} + \text{HABITAT B BASELINE SCORE} + \dots + \text{HABITAT X BASELINE SCORE}$$
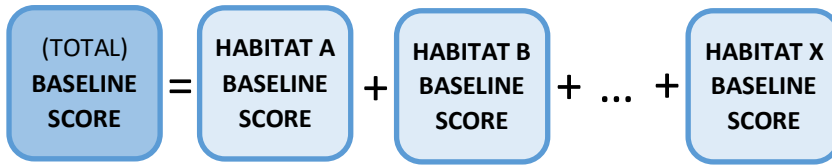
4.1.2.1   Habitat Area

The habitat area in hectare (ha) for each habitat present on site at baseline as entered in the Habitat Areas sheet.

4.1.2.2   Habitat Base Score (Per-ha; Maturity-Adjusted)

Each habitat type has a maximum per-ha base score on a 0-10 scale assigned to it. These scores can be reviewed in the respective Max Base Score column in the Base Scores sheet. The maximum base score indicates the general potential of a habitat to perform an ecosystem service. The maximum base scores are based on an extensive literature review, undertaken by Dr Alison Smith from the University of Oxford[28], which were refined by our expert group as part of the NATURE Tool development.

The maximum base scores are for habitats that have already reached their full ecosystem services potential which relates to habitat maturity. In the NATURE Tool model, it is assumed that most habitats need to mature until they reach their maximum ecosystem services potential. A newly planted woodland, for example, stores significantly less carbon than a mature woodland. Hence, the score increases with habitat maturity.

The time until a habitat reaches its maximum base score depends on both the habitat type as well as the ecosystem service assessed. Newly created grassland commonly reaches its maximum base score faster than newly created woodland, for example. The maximum base score for woodland is also reached earlier for recreation than for carbon storage. Due to a lack of published evidence, the base scores in year 1 to 100 after habitat creation are based on expert knowledge. The exception is carbon storage for woodlands where the annual base scores are based on the Woodland Carbon Code (WCC) calculation tool version 2.2[29]. The base scores in year 1-100 can be reviewed in the respective 'Base Score in Year' column in the Base Scores sheet.

For the baseline, it is assumed by default that existing habitats have already reached their maximum maturity and therefore their maximum base score. This is a precautionary assumption to not under-value the ecosystem services provision by existing habitats and can be changed in the Retained Habitats sheet of the tool.

The habitat base score is the average base score over the assessment timescale (duration of construction phase plus expected project lifetime post-development as entered in the Project Info & Options sheet). For habitats that already reached their maximum ecosystem services potential (default for baseline habitats), this equals the maximum base score. For habitats that have not yet reached their maximum ecosystem services potential this means that an increase in the post-development project lifetime will also increase the average base score.

4.1.2.3   Access Adjustment

All cultural ecosystem services (aesthetic values, education & knowledge, interaction with nature, recreation and sense of place) as well as the regulating service cooling & shading at least partially depend on the accessibility of a site. This is because the ecosystem service is (partially) realised on-site. The best example for this is recreation where access to a site is required to realise its recreational opportunities. Therefore, the NATURE Tool also applies an access adjustment multiplier.

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[28] Smith, A., Dunford, R., 2018. Land-cover scores for ecosystem service assessment (Research Report). Environmental Change Institute, Oxford.
[29] https://woodlandcarboncode.org.uk/

The multiplier, which has a 0-1 scale, is highest for full open public access and lowest for sites without access (zero in the case of recreation). The access multipliers can be reviewed in the Multipliers sheet of the tool.

4.1.2.4   *Sum of Advanced Multiplier Bonuses*

Ecosystem services provision does not only depend on habitat extent, type, and maturity, but also on the spatial location/configuration as well as the ecosystem management regime/condition. These are advanced indicators which are only applicable for ADVANCED NATURE Tool Assessments. They are also optional as default values apply should no user entry be made.

Please note that ecosystem condition is not to be confused with ecological habitat condition. The former relates to condition factors that impact the level of ecosystem services provision, whilst the latter refers to factors influencing Biodiversity Units within the Biodiversity Metric.

The spatial factor can be split into spatial configuration and spatial context. The former describes on-site configuration which can be addressed through establishing 'the right habitat in the right place'. This is for example the case for flood risk regulation. A habitat suitable for regulating flood risk will likely be more effective in a location that is more likely to be flooded provided the water would otherwise flow off to other areas where it could potentially damage properties and infrastructure. The latter describe factors that cannot usually be addressed within the context of a project. This includes factors like the average rainfall the area receives or whether the site is located within an Air Quality Management Area (AQMA). Management indicators relate to the habitat management such as the grazing/mowing regime of grasslands or whether a woodland is managed for wood production.

The NATURE Tool utilises up to 13 spatial and management bonuses which can both increase and reduce respective (access-adjusted) base scores. Each spatial/management category has a multiplier assigned. Multipliers have been assigned by an expert group as the published evidence on these factors is limited. This means that they should be understood as rating system rather than being evidence-based. These multipliers can be reviewed in the Multipliers sheet of the tool.

For each advanced indicator, a multiplier of 1 applies as the default. This means that the base score doesn't change should the default apply. The default multiplier represents the most common, likely, or average management or location. Depending on management and location as entered by the tool user, alternative multipliers apply which can be both above and below 1. Please note that the scale varies depending on the indicator and ecosystem service. The aim of the rating system resulting in multipliers was to best reflect the impact of the advanced indicator in terms of variance from the default (1). This means that there is no fixed or normalised scale for advanced multipliers. The Agricultural Land Classification (ALC) Grade multiplier informing commercial food production ranges from 0.5 to 2.8 indicating the differences in productivity depending on the ALC Grade. For Air Quality Management Area, on the other hand, the multiplier only ranges from 1 to 1.2.

Each Advanced Multiplier Bonus is calculated by subtracting 1 from the multiplier and multiplying the result by the (Access-Adjusted) Habitat Base Score. For example: If the Habitat Base Score is 5 and the multiplier is 1.1 then the respective Advanced Multiplier Bonus would be (1.1-1)*5 = +0.5.

4.1.3   Ecosystem Services Project Score Calculation

The Project Score provides an indication of the natural capital performance of the site in its proposed future state. This is effectively the intervention scenario, therefore it is not applicable to baseline NATURE Tool assessments.

The Project Score is based on the scores indicated for the post-development state of the site but also takes the natural capital performance during the construction phase into account (where applicable). The Project Score is therefore calculated based on a Construction Score and a Post-Development (Post-D) Score.

The ecosystem services Post-D Score for each habitat is calculated similarly to the Baseline Score, with the addition of the Delivery Risk Multiplier Penalty. The latter considers that the creation of certain habitats could fail to result in the

intended habitat. This, in turn, means that the intended ecosystem services may fail to materialise which needs to be considered.

$$\text{HABITAT POST-D SCORE} = \left[\underbrace{\text{Habitat Area (ha)} * \text{Habitat Base Score (Per-ha; Maturity-Adj)} * \text{Access Adjustment} + \sum \text{Advanced Multiplier Bonuses}}_{\text{Before Delivery-Risk Post-D Score}} \right] * \text{Habitat Delivery Risk Multiplier Penalty}$$
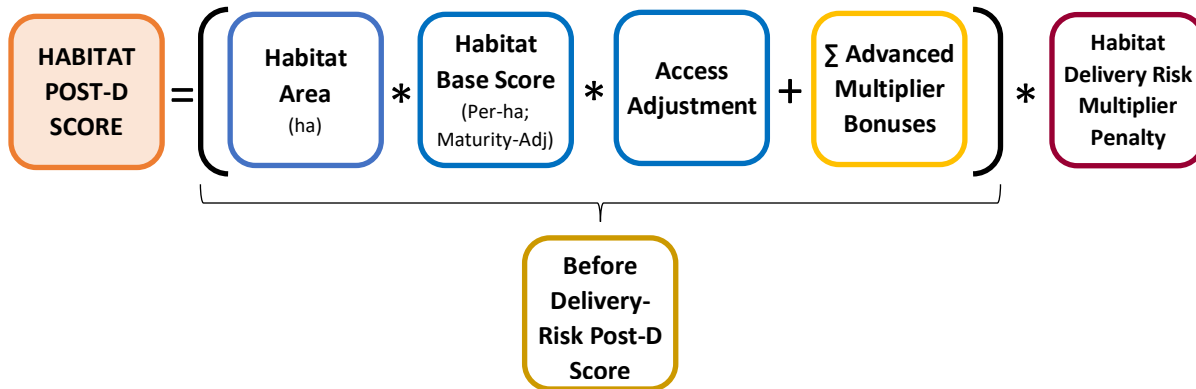
After multiplying the Habitat Area by the Habitat Base Score and the Access Adjustment (where applicable), and adding applicable Advanced Multiplier Bonuses, the result is multiplied by the Habitat Delivery Risk Multiplier Penalty which results in the Habitat Post-D Score. The indicators for this calculation are explained in subsequent sections.

The calculation of the Habitat Construction Score is similar:

$$\text{HABITAT CONSTR. SCORE} = \left[\text{Habitat Area (ha)} * \text{Habitat Base Score (Per-ha; Maturity-Adj)} * \text{Access Adjustment} + \sum \text{Advanced Multiplier Bonuses} \right] * \text{Delivery Risk Multiplier Penalty}$$
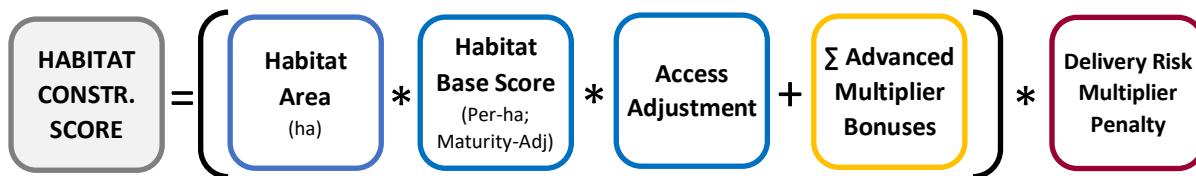
Scores during the construction phase of the project are considered separately because there may well be temporary habitats/land-uses (such as a construction site) present during this phase which should also be accounted for, especially if the construction phase is significant in terms of duration. There may also be opportunities to create new habitats at this stage rather than only after the construction phase which would enhance overall Project Scores.

All Habitat Post-D/Construction Scores are added together for each ecosystem service assessed to arrive at the (Total) Construction/Post-D Scores:

$$\text{(TOTAL) CONSTR. SCORE} = \text{HABITAT A CONSTR. SCORE} + \text{HABITAT B CONSTR. SCORE} + ... + \text{HABITAT X CONSTR. SCORE}$$

$$\text{(TOTAL) POST-D SCORE} = \text{HABITAT A POST-D SCORE} + \text{HABITAT B POST-D SCORE} + ... + \text{HABITAT X POST-D SCORE}$$
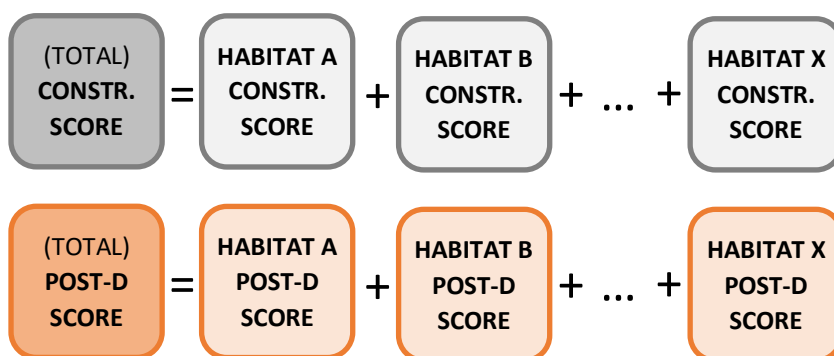
The Project Score is the combination of the Construction Score and the Post-D Score. For aggregation, the duration of each of these phases is considered as entered in the Project Info & Options sheet of the tool. The Project Score is calculated by multiplying the Construction Score and Post-D Score each by the respective phase duration and then dividing the result by the total assessment timescale.

$$\text{(TOTAL) PROJECT SCORE} = \left[\text{(TOTAL) CONSTR. SCORE} * \text{Constr. Phase Duration} + \text{(TOTAL) POST-D SCORE} * \text{Post-D Phase Duration} \right] / \text{Assessment Timescale (Constr. + Post-D Phase)}$$
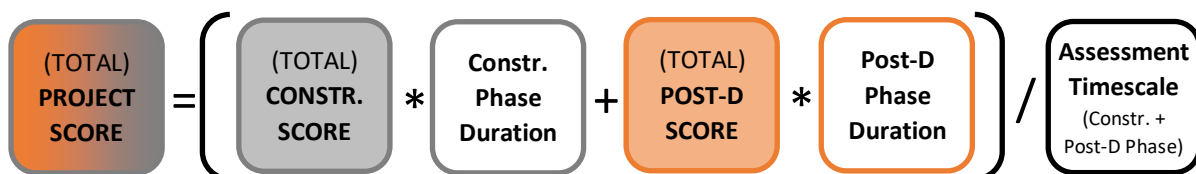
4.1.3.1 Habitat Area

The habitat area in hectare (ha) for each habitat present on site during construction and post-development, as entered in the Habitat Areas sheet.

4.1.3.2 Habitat Base Score (Per-ha; Maturity-Adjusted)

Please refer to Section 4.1.2.2 as the Habitat Base Score during construction and post-development is calculated similarly to the baseline. The only difference is that for the construction and post-development phases it is assumed by default that habitats are newly created. This is a precautionary assumption to not over-value the ecosystem services provision by newly created habitats. This can be changed in the Retained Habitats sheet of the tool.

4.1.3.3 Access Adjustment

Please refer to Section 4.1.2.3 as the Access Adjustment during construction and post-development is calculated similarly to the baseline.

4.1.3.4 Sum of Advanced Multiplier Bonuses

Please refer to Section 4.1.2.4 as the Sum of Advanced Multiplier Bonuses during construction and post-development is calculated similarly to the baseline.

4.1.3.5 Delivery Risk Multiplier Penalty

The Delivery Risk Multiplier Penalty is on a scale from 0 to 1 and takes into consideration that planned habitat creations have a possibility to fail. This depends on the difficulty to create a habitat successfully which depends on the habitat type. The estimated chance for habitat creation to fail is based on the habitat creation risk multiplier in the Biodiversity Metric 2.0.

However, instead of assuming that there is no level of ecosystem services provision if the intended habitat creation fails, the NATURE Tool assumes that still some habitat will be the result of the intended creation which means that also a certain level of ecosystem services provision can be assumed, even if not necessarily as high as for the intended habitat. To implement this consideration into the tool model, the development team estimated which alternative habitat would likely result from failing with creating the intended habitat.

On that basis, a Fail Score has been calculated which is the relative level of ecosystem services provision of the 'fall-back' habitat type. The Fail Score also has a scale of 0 to 1 as it is capped at 100% of the intended habitat should the fall-back habitat type provide greater ecosystem services provision.

This means that, should both the Chance for Habitat Creation to Fail and the Fail Score be below 1 (100%), then a negative Delivery Risk Multiplier Penalty would apply which reduces the Construction/Post-D Score.

On the other hand, should either the Chance for Habitat Creation to Fail or the Fail Score be 1 (100%), then the Delivery Risk Multiplier Penalty would be zero. This is because either the habitat creation is assumed to have no risk to fail and/or the fall-back habitat has the same (or higher) ecosystem services score as the intended one.

The Habitat Delivery Risk Multiplier per habitat is calculated as follows:

$$\text{Habitat Delivery Risk Multiplier Penalty} = \text{Before Delivery-Risk Post-D/Constr. Score} * \left(1 - \left(1 - \left(\text{Chance for Habitat Creation to Fail} + \text{Chance for Habitat Creation to Fail} * \text{Fail Score}\right)\right)\right) * -1$$

The calculation can be reviewed in the Delivery Risk Multiplier Penalty section within the respective calculation (Calc) sheets in the tool.

Please note that delivery risk only applies to the Projection assessment status as entered in the Project Info & Options sheet of the tool. It does not apply for a retrospective assessment because it is assumed that all new habitats have already been successfully created.

4.1.4 Unit/Score Change

The score (unit) change indicates the impact of the project on the score (units) for each ecosystem service/benefit. It is calculated for all, biodiversity, ecosystem services, health benefits and aggregated scores such as the Natural Capital Score.

The score (unit) change is calculated as follows:

$$\text{SCORE/UNIT CHANGE} = \text{PROJECT UNITS/SCORE} - \text{BASELINE UNITS/SCORE}$$

If the Baseline Units/Score are higher than the Project Units/Score then the Score/Unit Change will be negative. This would indicate that the baseline state of the site would provide a higher level of service/benefit provision (or higher Biodiversity Units) than the proposed state of the site after intervention. A positive Score/Unit Change on the other hand indicates than the proposed state of the site after intervention would provide a higher level of service/benefit provision (or higher Biodiversity Units).

4.1.5 Change Score

The Change Score is the main indicator for measuring project success in terms of natural capital (biodiversity) impact. For each assessed ecosystem service and benefit, the Change Score indicates the percentage change against the baseline.

The Change Score is calculated as follows:

$$\text{CHANGE SCORE} = \text{SCORE/UNIT CHANGE} / \text{BASELINE UNITS/SCORE}$$

Please note that a zero Baseline Score (Units) is replaced with a very low (0.0001) value to avoid a 'division by zero'-error.

A Change Score of +30%, for example, indicates that the service provision would be 30% higher as it would have been if the baseline state of the site would remain in place. If the Change Score is greater than +100%, it will simply be displayed as >100% in the Summary Results sheet. The exact estimate is available in the Detailed Results sheet. A positive Change Score generally indicates a positive impact on natural capital (biodiversity). The higher the Change Score, the greater the indicative ecosystem service/benefit.

4.1.6 Potential Score

The Potential Score indicates how much of the maximum ecosystem services/benefit potential for the site has been/would be achieved. A Potential Score of 40%, for example, indicates that the site achieves 40% of its maximum potential. Please note that this is only calculated for natural capital as the Biodiversity Metric does not calculate a site potential.

For a change assessment, the Potential Score as shown in the Summary Results sheet relates to the Project Score. Hence, it indicates how much (percent) of the site's ecosystem services potential would be achieved if the project was

implemented. For a baseline assessment on the other hand, the Potential Score as shown in the Summary Results sheet relates to the Baseline Score. It therefore indicates how much of the site's ecosystem services potential is already achieved by the baseline habitats. Both Potential Scores (related to the Baseline Score and the Project Score) are shown in the Potential Score section of the Detailed Results sheet. This sheet also shows the change from the Baseline Score-based Potential Score to the Project Score-based Potential Score.

The first step for calculating the baseline score is establishing the site potential. The starting point is the baseline habitats. The Habitat Baseline Score for each baseline habitat is compared to the highest-scoring alternative habitat that could replace the existing baseline habitat. This calculation considers that a habitat replacement would need to be newly created. Differences in habitat maturity between existing habitats and newly created habitats that could replace it as well as Delivery Risk Multiplier Penalties for habitats that could replace existing habitats are explicitly considered. The assessment timescale is also considered as a longer assessment timescale tends to increase scores for newly created habitats that need longer until they reach their full ecosystem services potential.

Also considered in the site potential calculation are the Access Adjustment multipliers and Advanced Multiplier Bonuses. That means that for example the highest level of accessibility is assumed for calculating the site potential for relevant ecosystem services. For Advanced Multiplier Bonuses, a pragmatic approach has been adopted to decide whether the highest relevant multiplier should be adopted to calculate the site potential. The guiding principle here is what can be reasonably achieved through the design and management of the site. For wood production, it is for example feasible to assume that all woodland could be managed primarily for wood production. However, for education and knowledge, it is not realistic to assume that all habitats could be located on a primary school ground which would effectively mean that the whole assessment site would have to become a primary school ground. In such cases, either the existing multiplier or the next best reasonably achievable multiplier has been chosen to calculate the site potential. The same applies for contextual multipliers such as the local population density. These are not maximised for calculating the site potential but rather regarded as external factors. Whether the maximum multiplier or the existing (baseline) multiplier is used to calculate the site potential scores can be reviewed for each multiplier in the Potential Score section of the respective ecosystem services calculation (Calc) sheet.

For each baseline habitat (with exceptions as detailed below), the higher of the two ecosystem services scores (retaining the baseline habitat or replacing it with a higher-scoring habitat type) is adopted for establishing the site potential. This is automatically done for all baseline habitats and all ecosystem services assessed. It can be reviewed in the Potential Score section of each calculation (Calc) sheet of the tool.

It should be noted, however, that the potential to replace habitats has its limitations. Within the NATURE Tool model, it is assumed that all habitat types could potentially replace each other but the following:

- Open water;
- Coastland; and
- Exposure & waste.

For the above habitats the tool model does not compare existing habitat scores with potential habitat replacements but rather assumed existing habitats would remain in place. The tool developers acknowledge that there are also limitations in the ability to replace certain other habitats with each other. Hence, the Potential Score is indicative only and such limitations should be acknowledged.

As Potential Scores are calculated for each ecosystem service separately, this also means that the potentially higher-scoring replacement habitat for one ecosystem service may be different from the replacing habitat for another. Hence, it may be possible to reach the maximum possible Potential Score for some ecosystem services but not for all at the same time. It should furthermore be acknowledged that any developed land/sealed surface present on site will prevent reaching the maximum site potential because developed land/sealed surface scores zero and can therefore always be enhanced by replacing it with a habitat.

The Habitat Potential Scores are added together to arrive at the Total Site Potential as per Detailed Results sheet. The Potential Scores are calculated by comparing the Total Site Potential with the (Total) Baseline Score and the (Total) Project Score, respectively:

Baseline Score-Based **POTENTIAL SCORE**	=	**BASELINE SCORE**	/	**Total Site Potential**

Project Score-Based **POTENTIAL SCORE**	=	**PROJECT SCORE**	/	**Total Site Potential**
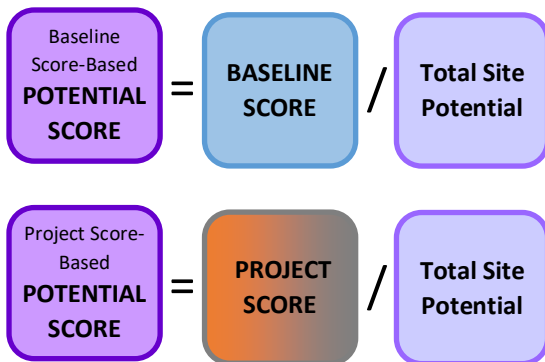
The result indicates what percentage of the Total Site Potential is achieved by the Baseline (Project) Score. A Potential Score of 100% would mean that there is no further improvement possible on site to enhance the respective ecosystem service – at least as far as the NATURE Tool model can account for such changes.

4.1.7 Completeness Score

The Completeness Score indicates how complete the assessment is and is mainly displayed for transparency. It indicates how accurate the assessment is as far as user entries allow. Not considered are general uncertainties and caveats related to the scientific evidence informing the NATURE Tool. It is therefore NOT a general confidence score in the reliability of the results. It only indicates to what extent optional elements of the NATURE Tool have been completed by the tool user. Scores are rounded to full decimals and the maximum score is 10.

There are two elements to the Completeness Score Calculation:

- Habitat-based Completeness Score; and
- Multiplier-based Completeness Score.

4.1.7.1 Habitat-based Completeness Score Calculation

The habitat-based Completeness Score relates to the detail level at which habitat types have been entered in the tool. The detail level is shown in the respective column in the Habitat Areas sheet. The detail level can be High (H), Medium (M) or Low (L) as shown in Figure 4.1 for woodland as an example.

A1.1 & A1.3	Broadleaved & mixed woodland	**Upland oakwood**	H
		Upland mixed ashwoods	H
		Lowland beech and yew woodland	H
		Wet woodland	H
		Upland birchwoods	H
		Lowland mixed deciduous woodland	H
		Line of trees	H
		Other woodland; broadleaved	H
		Other woodland; mixed	H
		Traditional Orchards	H
		Broadleaved & mixed woodland (unspecified)	M
A1.2	Coniferous woodland	**Native pine woodlands**	H
		Other Scot's Pine woodland	H
		Other coniferous woodland	H
		Coniferous woodland (unspecified)	M
A1		Woodland (unspecified)	L

Figure 4.1 **Habitat Entry Detail Levels for Woodland**

The higher the detail level of entered habitat types, the more accurate the assessment. Habitat categories with high detail level have ecosystem services scores directly attributed to them. For habitat categories with medium or low detail level, the ecosystem services scores are aggregated based on respective high-detail level habitat types within that broad habitat category. Aggregation is based on the indicative UK area proportion of the high-detail level habitats within the medium/low broad habitat category. This means that, for the medium/low detail level habitat categories, effectively the area-weighted average of the high-detail level habitat types applies.

However, in reality it is more likely to be one or few high-detail level habitats rather than a mix that represents the UK-average. This means that there is also considerable uncertainty around ecosystem services scores when (broad) habitats are entered at medium/low rather than high detail level.

The habitat-based Completeness Score makes such uncertainty transparent within the NATURE Tool model. It effectively compares ecosystem services scores of the medium/low-detail level habitats with the highest/lowest-scoring high-detail level habitat type within that category.

This can be best explained using an example. Assuming there are three high-detail level habitats (Y.1, Y.2 and Y.3) which together make up low-detail level Broad Habitat Y:

Entry-level Habitat Category	Detail Level	Ecosystem Services Score	UK Area Proportions
Habitat Y.1	H	2	*25%*
Habitat Y.2	H	4	*25%*
Habitat Y.3	H	9	*50%*
Broad Habitat Y (Aggregated)	L	**6**	***100%***

Figure 4.2 **Habitat Detail Level and Ecosystem Services Score Aggregation Example**

The applied ecosystem services score for Broad Habitat Y is calculated as the area-weighted score of the sub-habitats (2*0.25+4*0.25+9*0.5=6). However, instead of the area-weighted average Broad Habitat Y could be any (combination) of the sub-habitats which also means any ecosystem services score between 2 and 9.

The habitat-based Completeness Score accounts for this possible variation from the area-weighted average. The habitat-based Completeness Score calculates the maximum variation from the broad habitat score which in this example is 67%. The maximum variation from the aggregated broad habitat ecosystem service score (6) is 4 because 9-6=3 is lower than 6-2=4. The maximum variation (4) is 67% of the applied broad habitat score (6).

This means that the habitat-based Completeness Score for this ecosystem service would be 3.3 (or 3 as rounded to the full decimal) assuming Broad Habitat Y is the only habitat present. This is calculated by reducing the maximum possible habitat-based Completeness Score (benchmark) of 10 by 67%. Would the habitat area be entered as one or more of the high-detail level habitats (Y.1-3), then the habitat-based Completeness Score would be 10 because there is no further uncertainty (as far as habitat entry is considered) as these ecosystem services scores are directly assigned rather than aggregated.

4.1.7.2   Multiplier-based Completeness Score Calculation

A similar concept applies for the multiplier-based Completeness Score. Here, the possible variation from default multipliers for Advanced Multiplier Bonuses is accounted for. As mentioned before, each advanced multiplier has a default of 1 which applies in absence of a tool user entry.

This means that in reality, it could be a lower or higher multiplier than 1 as per multiplier range (see Multipliers sheet in the tool for details). This variation is made transparent through the multiplier-based Completeness Score. If the possible multiplier rage is 0.5-1.5, for example, then the multiplier-based Completeness Score would be 5 if the default multiplier of 1 applies (no user entry); assuming this is the only applicable multiplier for this ecosystem service. The maximum variation from the default of 1 is 0.5 which is 50%. Reducing the maximum multiplier-based Completeness Score of 10 by 50% results in a multiplier-based Completeness Score of 5.

It also means that, should the tool user enter the advanced multiplier section instead of leaving the default in, the multiplier-based Completeness Score would be 10 instead. That even applies if an indicator with a multiplier of 1 is selected (which is also the default multiplier). This is because in this case the multiplier of 1 is taken as certain rather than the likely/average/most common case (see also Section 4.1.2.4). Please note that the maximum possible variation from the default multiplier is capped at 100%. This is to avoid negative Completeness Scores.

4.1.7.3   (Total) Completeness Score Calculation

The habitat-based Completeness Score and multiplier-based Completeness Score are aggregated based on the possible score variation for each. Hence, an ecosystem services score of 5 with a Completeness Score of 8 indicates a possible variation of 20% which means that the score could be up to 20% lower (4) or higher (6). Considering the multiplier-based variation-cap of 100% means it could potentially even be higher than 6.

It is therefore advised to enter habitat areas at high-detail level and complete all advanced indicator sections of the NATURE Tool to achieve the highest possible accuracy and therefore a Completeness Score of 10 for all assessed ecosystem services.

4.1.8   Confidence Rating

The Confidence Rating indicates the general confidence in the scores and units calculated. It is mainly provided for transparency and considers general model uncertainties and caveats such as how well the model reflects the complexity of the ecosystem service/benefit and the evidence base informing scores and multipliers.

The Confidence Rating is fixed and does not change with how many advanced indicators were utilised or how detailed habitat data has been entered - this is reflected in the Completeness Score. The fixed Confidence Rating is based on the assumption that the highest habitat detail level and all relevant advanced indicators are utilised. It therefore applies for a Completeness Score of 10. The Confidence Rating can be High (Green), Medium (Yellow), Low (Orange) or Experimental (Red) as detailed in Table 4.1.

Table 4.1 **Confidence Rating Description**

Confidence Level		Description
(green)	High	Very confident: There is a strong evidence base upon which to base scores across the range of habitats and multipliers used for the respective ecosystem service. Please note that this category is not currently applicable.
(yellow)	Medium	Reasonably confident: There is some suitable evidence to calibrate the range of scores across habitats and multipliers and/or scoring applied to a limited range of habitats/multipliers for which there is a sound and simple rationale.
(orange)	Low	Low confidence: The relationship between the provision of the ecosystem service and habitats is complex. Evidence for scoring/multipliers is partial, although may be stronger for some habitats than others. Evidence gaps have been filled by consulting experts and with a degree of subjectivity, particularly for cultural services.
(red)	Experimental	An experimental approach which applies for aggregated benefit categories such as health benefits and the natural capital score. This category reflects the additional uncertainty and caveats attached to aggregated scores.

The starting point for developing the confidence rating for the NATURE Tool was the confidence rating implemented within the Environmental Benefits from Nature Tool (EBNT) (Smith et al., 2021). This approach has been chosen as basis for the NATURE Tool confidence rating because (a) the EBNT and NATURE Tool models employ a comparable scoring approach and are broadly based on a comparable evidence base, and (b) the EBNT confidence rating employs a pragmatic and well justified approach which is also suitable for the NATURE Tool. Natural England kindly agreed to share the approach used for defining the EBNT confidence rating to inform this project.

Within the EBNT, three confidence levels are applicable: Very confident, reasonably confident and low confidence. The same criteria have also been adopted for the NATURE-E Tool as per description column in Table 2.1. In addition, a fourth 'experimental' category has been created for the NATURE Tool confidence rating. Please note that, due to the creation of the fourth category for the NATURE Tool confidence rating, the colour coding (confidence symbology) between the EBNT and NATURE Tool does not match.

Table 4.2 shows the EBNT confidence rating, the applied NATURE Tool confidence rating, and the justification for applying the NATURE Tool confidence rating in the respective columns. Please note that ecosystem service category names may slightly differ between the EBNT and the NATURE Tool but essentially refer to the same service.

Table 4.2 **NATURE Tool Confidence Rating**

NATURE-E Tool Ecosystem Services, Benefits and Aggregated Categories	EBNT Confidence Rating	NATURE-E Tool Confidence Rating	NATURE-E Tool Confidence Rating Rationale
Natural Capital Score (aggregated)	N/A	**Experimental**	Scores are aggregated based on priority rather than value, applying a multi criteria decision analysis approach. Considering that aggregation is high-level and not based on (monetary) value, this should be considered an experimental approach with lower confidence than for the individual ecosystem services score calculations.
Cultural & Health (aggregated)	N/A	**Experimental**	*Same rationale as for the Natural Capital Score.*
Mental Health	N/A	**Experimental**	The physical and mental health scores are not based on health-specific indicators and scores but on a weighted aggregation relevant to health benefits. Whilst weights are informed by a literature review, this approach is
Physical Health	N/A	**Experimental**	

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NATURE-E Tool Ecosystem Services, Benefits and Aggregated Categories	EBNT Confidence Rating	NATURE-E Tool Confidence Rating	NATURE-E Tool Confidence Rating Rationale
			high-level and should therefore be considered an experimental approach with lower confidence than for the individual ecosystem services score calculations.
Aesthetic Values	Low	**Low**	Low confidence due to high level of subjectivity of scores and multipliers.
Education & Knowldge	Low	**Low**	Low confidence due to limited evidence base and high level of subjectivity.
Interaction with Nature	Low	**Low**	Low confidence due to limited evidence base.
Recreation	Low	**Low**	Low confidence due to high level of subjectivity of scores and multipliers.
Sense of Place	Low	**Low**	Low confidence due to high level of subjectivity of scores and multipliers.
Regulating & Supporting (aggregated)	N/A	**Experimental**	*Same rationale as for the Natural Capital Score.*
Air Quality Regulation	Medium	**Medium**	The NATURE Tool does not implement the 'canopy cover' and 'air pollution barrier' multipliers but is otherwise based on similar evidence as the EBNT. The 'air pollution barrier' multiplier has a rather marginal impact on the results in the EBNT and whilst the canopy cover multiplier has a more significant impact, the NATURE Tool confidence rating is still expected to fall within the Medium category.
Carbon Storage	Medium	**Medium**	The advantage of the NATURE Tool is that it also quantifies soil and vegetation carbon in biophysical and monetary terms. The scores are based on biophysical values. This is based on the Woodland Carbon Code (WCC, 2020) for woodland and Carbon Storage and Sequestration by Habitat 2021 (Natural England, 2021). On the other hand, the NATURE Tool does not consider peat degradation at this stage which is why Medium confidence has been assigned.
Cooling & Shading	Medium	**Medium**	The NATURE Tool and EBNT model and evidence base are comparable which is why the same confidence rating has been assigned.
Erosion Protection	Low	**Low**	Low confidence due to limited evidence base.
Flood Regulation	Low	**Low**	Whilst the EBNT utilises more multipliers, the NATURE Tool utilises a spatial model to identify locations where nature-based flood mitigation may be more beneficial. On aggregate, a low confidence has been assigned.
Water Quality Regulation	Low	**Low**	Low confidence due to limited evidence base.
Pest Control	Low	**Low**	Low confidence due to limited ability of model for complex ecosystem service realisation.
Pollination	Low	**Low**	Low confidence due to limited ability of model for complex ecosystem service realisation.
Provisioning (aggregated)	N/A	**Experimental**	*Same rationale as for the Natural Capital Score.*
Food & Fish - Commercial	Medium*	**Medium**	Based on a comparable evidence base as EBNT which is why the same confidence rating has been assigned.
Food & Fish - Community	Medium*	**Medium**	

NATURE-E Tool Ecosystem Services, Benefits and Aggregated Categories	EBNT Confidence Rating	NATURE-E Tool Confidence Rating	NATURE-E Tool Confidence Rating Rationale
Water Availability**	Low	**Low**	Low confidence due to complex service and limited evidence base.
Wood Production	Medium	**Medium**	Similar confidence rating applied as based on similar evidence base and model.

4.1.9 Policy Priority

The Policy Priority informs how scores are aggregated for the Natural Capital Score, Cultural & Health score, Regulating & Supporting score, and Provisioning score, respectively. They are mainly displayed in the Summary Results sheet of the tool for reference and transparency.

By default, Policy Priorities in the NATURE Tool are based on a literature of planning policies in the four UK countries, undertaken at Northumbria University.[30] The Policy Priorities have been derived from an in-depth ecosystem services policy assessment of key planning documents in England, Scotland, Wales, and Northern Ireland. Policies in the key documents were assessed based on the completeness of policy wording (0=none, 1=some, 2=most, 3=full)) compared to the respective ecosystem service and benefits definitions developed for the NATURE Tool, as well as the strength of those policy wordings (none, weak, medium, strong). The recommended default Policy Priorities for each country represent an amalgamation of the respective policy documents with respect to the highest scoring policies, and therefore provide a representation as to how the different countries priories the different ecosystem services and benefits assessed by the NATURE Tool. Please refer to Appendix B for the full policy review.

Table 4.3 shows the applicable Policy Priorities for each UK country. The respective priorities automatically apply when the tool user selects the project site location in the Project Info & Options sheet.

Table 4.3 **Default UK Policy Priorities**

	England	Wales	Scotland	Northern Ireland
Mental Health	High	High	High	High
Physical Health	High	High	High	High
Aesthetic Values	Medium	Medium	Medium	Medium
Education & Knowledge	Medium	Low	Medium	Low
Interaction with Nature	Medium	Medium	Medium	Medium
Recreation	High	High	High	High
Sense of Place	Medium	High	Medium	High
Air Quality Regulation	High	High	Medium	Medium
Carbon Storage (Habitat)	Medium	Medium	High	Medium
Carbon Avoided (Renewables)	Medium	Medium	High	Medium
Cooling & Shading	Medium	Medium	Medium	Medium
Erosion Protection	Low	Low	Medium	Low
Flood Regulation	High	High	High	Medium
Water Quality Regulation	Low	Medium	High	Medium

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[30] Please note that, since the original review in 2021 informing NATURE Tool Version 1.0 BETA, the Aesthetic Values Policy Priority for England has been adjusted from Low to Medium. This is due to the reference to "fostering [...] beautiful [...] places" within the National Planning Policy Framework (NPPF; 2021) core values (p. 5).

Pest Control	Medium	Low	Low	Low
Pollination	Medium	Medium	High	Low
Food & Fish - Commercial	Medium	High	High	Low
Food & Fish - Community	Low	Medium	Medium	Medium
Water Availability	Medium	Medium	Medium	Low
Wood Production	High	High	High	Low

In an adapted version of the NATURE Tool, the objective setter can also define Policy Priorities based on local/project policies. This can be changed in the Objective Setter Area sheet of the tool. Objective Setters can request the password for this sheet from the tool developers.

Policy Priorities translate into aggregation weights as follows:

- High (H) = 3
- Medium (M) = 2
- Low (L) = 1

As a result, an ecosystem services/benefit score with a High policy priority weights 3 times stronger in the aggregated Natural Capital Score (and other aggregated scores) than the same score for a service/benefit with a policy priority weight of 1 (Low). For further details on how aggregated scores are calculated refer to Section 4.2.

4.1.10 Objectives Met?

For adapted (local/corporate/project) NATURE Tool versions, the Objective Setter can define quantitative natural capital objectives. This can be done in the Objective Setter Area of the tool. Objectives can be defined for the Change Score, Potential Score and Completeness Score. They can be defined for each assessed ecosystem service and benefit as well as for aggregated scores including the Natural Capital Score. Please note that for biodiversity and the abiotic service photovoltaic carbon impact, objectives can only be defined for the Change Score. This is because relevant data is not available for other scores.

In the tool it is assessed which objectives have been met. This can be reviewed in the Objectives section of the Detailed Results sheet which shows which objectives (for the Change Score, Potential Score and/or Completeness Score) have been met and which ones have not.

If all defined objectives are met, a ✔ will also be shown in the respective row of the Summary Results sheet. If any objectives were not met, a ✖ will be displayed. If no objectives were defined, 'N/A' will be shown. For the standard UK version of the NATURE Tool no objectives are defined which means that all rows show 'N/A'.

4.1.11 Achievements

The NATURE Tool also indicates Achievements which highlight particularly positive impacts on natural capital (biodiversity) above and beyond what would usually be expected. Similarly to the objectives, achievements are based on minimum thresholds for the Change Score, Potential Score and Completeness Score as shown in Table 4.4. The main difference to the Objectives is that the achievement thresholds are pre-defined within the tool and cannot be adjusted by the Objective Setter. This is to allow transparent comparison between projects. Which thresholds have and have not been met can be reviewed in the Gain & Excellence Standard Achievements section of the Detailed Results sheet.

Table 4.4 **Achievement Thresholds**

Achievement	Minimum Change Score	Minimum Potential Score	Minimum Completeness Score

G	Net Gain	+1%	1%	6.5
🏆	Bronze Excellence Standard	+20%	10%	7.5
🏆	Silver Excellence Standard	+40%	20%	8.5
🏆	Gold Excellence Standard	+60%	30%	9.5

The thresholds above have been proposed to the project partnership when developing the NATURE Tool in 2020/21. After consulting the project partnership they have been adopted for the BETA version of the NATURE Tool. The Completeness Score thresholds have been included to guarantee a certain degree of accuracy for each achievement. This is to prevent that high achievements are displayed based on assessments with a high degree of uncertainty (low Completeness Score; see also Section 4.1.7).

4.1.12 Baseline Carbon Impact

The Baseline Carbon Impact represents the average carbon stock (tonnes of carbon dioxide equivalent; t CO_2e) of baseline habitats over the assessment period plus carbon abated through existing photovoltaic installations, if applicable.

Average carbon stocks are based on estimated stocks in vegetation and corresponding soils. For woodland, carbon stock (changes) are based on the Woodland Carbon Code (WCC)[31] calculation tool (version 2.1). For other habitats, estimates are based on Natural England's publication Carbon Storage and Sequestration by Habitat 2021[32]. For some habitats not referenced in the literature above, carbon values have been based on expert knowledge. The Baseline Carbon Impact is calculated similarly to the respective Baseline Score as detailed in Section 4.1.2. For woodland, the attribution of carbon stock for different maturity levels (years since habitat creation) could be based on the WCC. For other habitats, this was based on expert knowledge.

The scores for Carbon Storage are based on the literature referred to above. Hence, for calculating the baseline carbon impact in t CO_2e, the calculated score is simply multiplied by the factor 85.7. This factor is the result of normalising the maximum per-ha carbon storage per habitat of 857 t CO_2e to a 0-10 scoring scale.

The carbon abated through photovoltaic installations is based on abated carbon emissions in comparison to the general UK electricity mix as well as potentially avoided electricity transmission losses in the electricity grid following relevant HM Treasury Green Book Supplementary Guidance on the Valuation of Energy Use and Greenhouse Gas Emissions for Appraisal (BEIS 2021)[33].

4.1.13 Project Carbon Impact

The Project Carbon Impact represents the average carbon stock (t CO_2e) of project habitats over the assessment period (both, during construction and post-development) plus carbon abated through new photovoltaic installations, if applicable. The calculation is similar to the section above where the Project Carbon Storage Score is multiplied by the factor 85.7.


[31] https://woodlandcarboncode.org.uk/
[32] http://publications.naturalengland.org.uk/publication/5419124441481216
[33] https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal

4.1.14 Carbon Impact Change

The Carbon Impact Change (in terms of gains/losses to t CO_2e) indicates the impact of the project on carbon storage in vegetation and soils (and carbon abated due to photovoltaic installations, if applicable).

Carbon Impact Change is calculated similarly to the Unit/Score Change indicator (Section 4.1.4):

CARBON IMPACT CHANGE = PROJECT CARBON IMPACT − BASELINE CARBON IMPACT
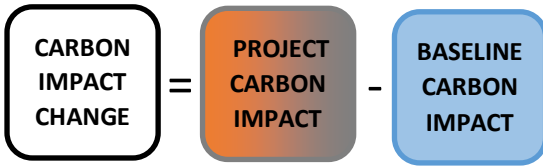
4.1.15 Baseline Monetary Value

The Baseline Monetary Value (Net Present Value; NPV) has been calculated for carbon impacts. The value represents the average carbon stock value of baseline habitats over the assessment timescale (plus the average value of carbon abated due to existing photovoltaic installations, if applicable). It is NOT the annual carbon sequestration.

The monetary valuation approach follows the Green Book (HM Treasury 2022)[34] in combination with Supplementary Guidance on the Valuation of Energy Use and Greenhouse Gas Emissions for Appraisal (BEIS 2021)[35].

This means that the carbon stock in each given year over the assessment timescale is multiplied by both the respective nominal CO_2e value as well as the applicable discount factor for that year to arrive at the present value. The average carbon stock value over the assessment timescale is then calculated by dividing the result by the assessment timescale years. Please refer to the Monetary Carbon Stock Value section in the carbon calculation (Car Calc) sheet of the tool for detailed calculations.

4.1.16 Project Monetary Value

The Project Monetary Value (Net Present Value; NPV) has been calculated for carbon impacts. The value represents the average carbon stock value of proposed post-development habitats (and habitats during construction, if applicable) over the assessment timescale (plus the average value of carbon abated due to new photovoltaic installations, if applicable). The calculation is similar to the one outlined in Section 4.1.15, just for carbon stored in project rather than baseline habitats.

4.1.17 Monetary Value Change

The Monetary Value Change (for gains/losses to t CO_2e) indicates the impact of the project on carbon storage in vegetation and soils (and carbon abated due to photovoltaic installations, if applicable), expressed in monetary terms.

Monetary Value Change is calculated similarly to the Unit/Score Change indicator (Section 4.1.4):

MONETARY VALUE CHANGE = PROJECT MONETARY VALUE − BASELINE MONETARY VALUE

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[34] https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent
[35] https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal
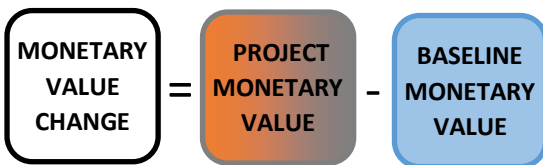
4.2 Calculation of Aggregated Scores

Section 4.1 outlined how scores and indicators are calculated for individual ecosystem services. The NATURE Tool also aggregates such scores to provide additional indicators that can help to inform decisions affecting natural capital and biodiversity.

4.2.1 Physical & Mental Health Benefits

The Physical and Mental Health Benefit Scores are aggregated based on ecosystem services scores. Within the NATURE Tool model, it is assumed that health benefits directly depend on ecosystem services. Or in other words, part of the ecosystem services provision results in health benefits. It is appreciated that this is a rough approach and health benefit scores are purely indicative.

Table 4.5 summarises how the Health Benefit Scores are calculated. This information is also available in the Health Score Calculation section of the Detailed Results sheet of the tool. The table shows to what proportion ecosystem services contribute to the Health Benefit Scores. Each column adds up to 100%. It effectively means that the Mental Health Benefits Score is based to 5% on the Aesthetics Value Score, 5% on the Education & Knowledge Score, 30% on the interaction with Nature Score, and so on. This aggregation applies to the Change Scores, Potential Scores, and Completeness Scores, respectively. The allocation of health weights for the score aggregation is based on a literature review. The literature included in the review is listed in Appendix C.

Table 4.5 **Health Score Aggregation**

Ecosystem Service	Mental Health Weight for Score Aggregation	Physical Health Weight for Score Aggregation
Aesthetic Values	5%	5%
Education & Knowledge	5%	0%
Interaction with Nature	30%	15%
Recreation	30%	30%
Sense of Place	15%	0%
Air Quality Regulation	0%	20%
Carbon Storage	0%	0%
Cooling & Shading	0%	5%
Erosion Protection	0%	0%
Flood Regulation	0%	10%
Water Quality Regulation	0%	0%
Pest Control	0%	0%
Pollination	0%	5%
Food & Fish - Commercial	0%	0%
Food & Fish - Community	15%	10%
Water Availability	0%	0%
Wood Production	0%	0%

How the calculation works can be clarified using a simple example with only three ecosystem services and one health benefit as shown in Table 4.6.

Table 4.6 **Health Score Aggregation**

Ecosystem Service (ES)	Ecosystem Services Score (e.g. Potential Score)	Health Weight for Score Aggregation
Ecosystem Service A	40%	25%
Ecosystem Service B	20%	25%
Ecosystem Service C	30%	50%

The Health Benefit Score in this example is calculated as follows:
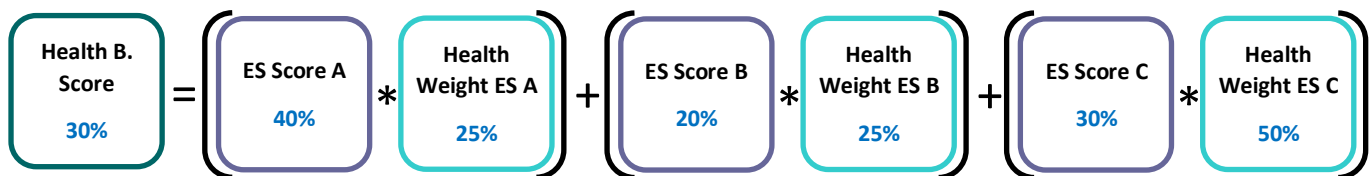
4.2.2 Natural Capital Score

The Natural Capital Score is an aggregated headline indicator. It indicates the overall natural capital performance of the project and is based on scores for all ecosystem services, abiotic services, and health benefits. Aggregation of scores is based on the Policy Priorities. For the abiotic service Photovoltaic Carbon Impact, the Carbon Storage policy priority applies.

The Natural Capital Score is calculated as follows:
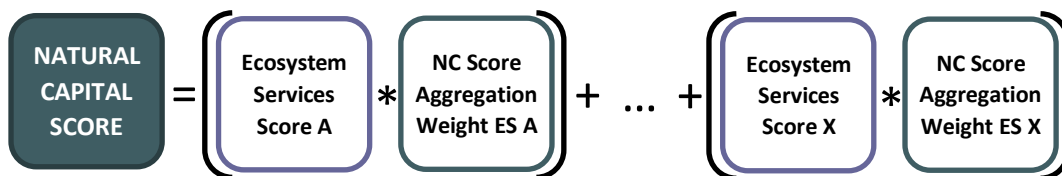
The Ecosystem Services Scores refer to the Change Scores, Potential Scores, and Completeness Scores. The Natural Capital (NC) Score Aggregation Weights are based on Policy Priorities which are adjusted for the Health Score Aggregation. The adjustment is required to avoid double-counting as the Mental and Physical Health Scores are themselves based on the aggregation of Ecosystem Services Scores (see Section 4.1.9).

Table 4.7 summarises how the Natural Capital Score Aggregation Weights are calculated, for example, where English Policy Priorities are applied. The Unadjusted Policy Priority Weights (column B) are based on the Policy Priorities for England (column A) in this example. They are different for other UK Countries (see Section 6.3.8).

To avoid double-counting, these weights (column B) have been adjusted for the Physical and Mental Health Weights for Score Aggregation (columns C and D; see also Section 4.2.1). The adjusted weights (column E) are calculated as follows:
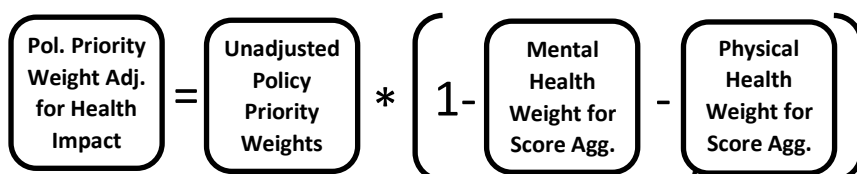
The Natural Capital Score Aggregation Weight (column F) is then calculated by dividing the respective ecosystem service/benefit Policy Priority Weight Adjusted for Health Impact (in column E) by the sum of all Policy Priority Weights Adjusted for Health Impact (sum of column E).

Table 4.7 **Natural Capital Score Calculation Weights for English Example**

Ecosystem Service/Benefit	Policy Priorities for England	Unadjusted Policy Priority Weights	Mental Health Weight for Score Aggregation	Physical Health Weight for Score Aggregation	Policy Priority Weight Adjusted for Health Impact	Natural Capital Score Aggregation Weight
Column	A	B	C	D	E	F
Mental Health	High	3			3.00	8%
Physical Health	High	3			3.00	8%
Aesthetic Values	Low	1	5%	5%	0.90	3%
Education & Knowledge	Medium	2	5%	0%	1.90	5%
Interaction with Nature	Medium	2	30%	15%	1.10	3%
Recreation	High	3	30%	30%	1.20	3%
Sense of Place	Medium	2	15%	0%	1.70	5%
Air Quality Regulation	High	3	0%	20%	2.40	7%
Carbon Storage	Medium	2	0%	0%	2.00	6%
Cooling & Shading	Medium	2	0%	5%	1.90	5%
Erosion Protection	Low	1	0%	0%	1.00	3%
Flood Regulation	High	3	0%	10%	2.70	8%
Water Quality Regulation	Low	1	0%	0%	1.00	3%
Pest Control	Medium	2	0%	0%	2.00	6%
Pollination	Medium	2	0%	5%	1.90	5%
Food & Fish - Commercial	Medium	2	0%	0%	2.00	6%

Food & Fish - Community	Low	1	15%	10%	0.75	2%
Water Availability	Medium	2	0%	0%	2.00	6%
Wood Production	High	3	0%	0%	3.00	8%

4.2.3 Culture & Health, Regulating & Supporting and Provisioning Scores

Similarly to the Natural Capital Score, the Culture & Health, Regulating & Supporting and Provisioning Scores (as shown in the Summary Results sheet of the tool) are aggregated based on Ecosystem Services/Health Benefit Scores. The only difference is that the former aggregation is based on all ecosystem services and benefits whilst, for the latter, only ecosystem services and benefits are considered that fall within the respective category. Therefore, please refer to Section 4.2.2 for methods.

The aggregation of the Culture & Health Scores is based on:

1. Mental health;
2. Physical Health;
3. Aesthetic Values;
4. Education & Knowledge;
5. Interaction with Nature;
6. Recreation; and
7. Sense of Place.

The aggregation of Regulating & Supporting Scores is based on:

1. Air Quality Regulation;
2. Carbon Storage;
3. Cooling & Shading;
4. Erosion Protection;
5. Flood Regulation;
6. Water Quality Regulation;
7. Pest Control; and
8. Pollination.

The aggregation of Provisioning Scores is based on:

1. Food & Fish – Commercial;
2. Food & Fish – Community;
3. Water Availability; and
4. Wood Production.

Please contact the NATURE Tool Team at WSP via

NATURE-Tool@wsp.com

In case you require further support or if you have suggestions for improvements

Tool Development Led By

In Collaboration With

Tool Development Funded By

The NATURE Tool has been co-developed together with more than 30 organisations involved in the built environment sector, including

This is an acknowledgement of the valuable contributions these organisations (in alphabetic order) made to its development and/or testing. Named organisations do not necessarily endorse the NATURE Tool.

Appendix A: NATURE Tool Habitat Classification Framework

Broad Habitat Category	Habitat Sub-category		Entry-level Habitat Category (Priority Habitats in Bold)	Detail Level
A Woodland & scrub	A1.1 & A1.3	Broadleaved & mixed woodland	**Upland oakwood**	H
			Upland mixed ashwoods	H
			Lowland beech and yew woodland	H
			Wet woodland	H
			Upland birchwoods	H
			Lowland mixed deciduous woodland	H
			Line of trees	H
			Other woodland; broadleaved	H
			Other woodland; mixed	H
			Traditional Orchards	H
			Broadleaved & mixed woodland (unspecified)	M
	A1.2	Coniferous woodland	**Native pine woodlands**	H
			Other Scot's Pine woodland	H
			Other coniferous woodland	H
			Coniferous woodland (unspecified)	M
	A1		Woodland (unspecified)	L
	A2.1	Dense scrub	Blackthorn scrub	H
			Hazel scrub	H
			Sea buckthorn scrub	H
			Bramble scrub	H
			Gorse scrub	H
			Hawthorn scrub	H
			Rhododendron scrub	H
			Mixed scrub	H
			Dense scrub (unspecified)	M
	A2.2	Scattered scrub	Scattered scrub	H
	A2		Scrub (unspecified)	L
	A3	Parkland & scattered trees	**Wood-pasture & parkland**	H
			Other parkland & scattered trees	H
			Parkland & scattered trees (unspecified)	M
	A4	Felled woodl.	Recently felled woodland	H
	A		Woodland & scrub (unspecified)	L
B Grassland	B1	Acid grassland	**Lowland dry acid grassland**	H
			Upland acid grassland	H
			Other lowland acid grassland	H
			Acid grassland (unspecified)	M

Broad Habitat Category	Habitat Sub-category		Entry-level Habitat Category (Priority Habitats in Bold)	Detail Level
	B2	Neutral grassland	**Lowland meadows**	H
			Upland hay meadows	H
			Other neutral & semi-improved grassland	H
			Neutral grassland (unspecified)	M
	B3	Calcareous grassland	**Lowland calcareous grassland**	H
			Upland calcareous grassland	H
			Calcareous grassland (unspecified)	M
	B4	Improved grassland	Agriculturally improved grassland	H
			Amenity grassland	H
			Improved grassland (unspecified)	M
	B		Grassland (unspecified)	L
C	Tall herb & fen	C1	Bracken	Bracken	H
		C3	Other tall herb & fern	Ruderal/Ephemeral	H
				Other tall herb & fern	H
		C		Tall herb & fen (unspecified)	M
D	Heathland	D	Heathland	**Lowland heathland**	H
				Upland heathland	H
				Mountain heaths & willow scrub	H
		D		Heathland (unspecified)	M
E & F	Mire, swamp, marginal & inundation	E1	Bog	**Blanket bog**	H
				Lowland raised bog	H
				Bog (unspecified)	M
		E2, E3, F1 & F2	Flush, spring, fen & swamp	**Lowland fens**	H
				Purple moor grass & rush pastures	H
				Upland flushes, fens & swamps	H
				Aquatic marginal vegetation	H
				Reedbeds	H
				Other swamps	H
				Flush, spring, fen & swamp (unspecified)	M
		E & F		Mire, swamp, marginal & inundation (unspecified)	L
G	Open Water	G1	Standing water	**Eutrophic standing waters**	H
				Mesotrophic lakes	H
				Oligotrophic & dystrophic lakes	H
				Aquifer fed naturally fluctuating water bodies	H
				Canals	H
				Reservoirs	H
				Ponds	H
				Standing water (unspecified)	M
		G2		**Rivers (priority habitat)**	H

Broad Habitat Category	Habitat Sub-category		Entry-level Habitat Category (Priority Habitats in Bold)	Detail Level
		Running water	Other rivers & streams	H
			Running water (unspecified)	M
	G		Open water (unspecified)	L
H Coastland	H1.1	Mud & sand intertidal coastland	**Blue mussel beds on sediment**	H
			Seagrass beds [Zostera noltii]	H
			Intertidal mudflats	H
			Sheltered muddy gravels	H
			Peat & clay exposures with piddocks	H
			Saline lagoons	H
			Beach	H
			Mud & sand intertidal coastland (unspecified)	M
	H1.3	Boulders & rocks intertidal coastland	**Intertidal chalk**	H
			Sabellaria alveolata reefs	H
			Intertidal underboulder communities	H
			Estuarine rocky habitats	H
			Splash zone with lichens	H
			Other littoral rock	H
			Boulders & rocks intertidal coastland (unspecified)	M
	H1		Intertidal coastland (unspecified)	M
	H2	Saltmarsh coastland	**Saltmarsh coastland**	H
	H3	Shingle above high tide mark	**Coastal vegetated shingle**	H
	H4	Rock & boulders above high tide mark	**Maritime cliff and slopes**	H
			Other rock & boulders above high tide mark	H
			Rock & boulders above high tide mark (unspecified)	M
	H6	Sand dune	**Coastal sand dunes**	H
	H		Coastland (unspecified)	L
I Exposure & waste	I1	Natural rock exposure & waste	**Inland rock outcrop & scree habitats**	H
			Limestone pavement	H
			Calaminarian grasslands	H
			Other inland rock & scree	H
			Natural rock exposure & waste (unspecified)	M
	I2	Artificial rock exposure & waste	Sand pit quarry or open cast mine	H
	I		Exposure & waste (unspecified)	M

Broad Habitat Category		Habitat Sub-category		Entry-level Habitat Category (Priority Habitats in Bold)	Detail Level
		J1.1	Arable & horticulture	**Arable field margins: tussocky grasses**	H
				Arable field margins: pollen & nectar	H
				Arable field margins: cultivated annually	H
				Arable field margins: game bird mix	H
				Arable field margins (unspecified)	M
				Temporary grass and clover leys	H
				Cereal crops: winter stubble	H
				Cereal crops: game bird mix fields	H
				Cereal crops: other	H
				Temporary grass & cereal crops (unspecified)	M
				Non-cereal crops	H
				Woody biofuel crops	H
				Intensive orchards	H
				Horticulture: allotments	H
				Horticulture: other	H
				Horticulture & non-cereal crops (unspecified)	M
				Arable & horticulture (unspecified)	L
J	Miscellaneous	J2	Hedgerows	**Native hedgerow with trees**	H
				Native hedgerow	H
				Hedge ornamental (non native)	H
				Other hedgerows	H
				Hedgerows (unspecified)	M
			Urban: Vegetated	**Open mosaic habitats on prev. dev. land**	H
				Allotments, city farms & community gardens	H
				Road island/verge	H
				Green roof: intensive	H
				Green roof: extensive	H
				Green roof (unspecified/other)	M
				Green wall: façade-bound	H
				Green wall: ground-based	H
				Brown roof	H
				Urban/street tree	H
				Artificial lake or pond	H
				SuDS: Bioswale	H
				SuDS: Rain garden	H
				SuDS: retention basin	H
				SuDS: retention pond	H
				Sustainable Drainage Feature (SuDS; unspecified)	M
				Introduced shrub	H

Broad Habitat Category		Habitat Sub-category		Entry-level Habitat Category (Priority Habitats in Bold)	Detail Level
				Cemeteries and churchyards	H
				Natural sports pitch, recreation- or playground	H
				Garden: vegetated	H
				Flower beds & other ground-level planters	H
				Vegetated built-up areas (unspecified)	L
			Urban: Non-vegetated	Developed land; sealed surface	H
				Artificial unvegetated, unsealed surface	H
				Built linear features	H
				Garden: unvegetated	H
				Non-vegetated built-up areas (unspecified)	L
			Urban: Mixed vegetated & non-vegetated	Gardens (unspecified: vegetated & non-vegetated)	L
				Commercial: Business & offices (B1)	L
				Commercial: Industrial (B2)	L
				Commercial: Other	L
				Public buildings	L
				Residential: High density	L
				Residential: Medium density	L
				Residential: High density	L
				Residential: Hotels (C1)	L
				Residential: Other	L
				Other mixed vegetated & non-vegetated	L
				Urban (unspecified)	L
		J4	Bare ground	Bare ground	H
Z	Zero-value	Z	Zero-value	Zero-value dummy	H

Appendix B: NATURE Tool – A UK wide Ecosystem Services Policy Assessment

By Matt Kirby[36]

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Background

One of the unique features of the NATURE Tool is the inclusion of a "Policy Priority" feature, in which a policy priority weight (High, Medium, and Low) can be defined for each ecosystem service (ES) and benefit the tool assessment. This feature is important for two reasons; firstly, ecosystems cannot fully deliver all ES to their maximum potential at once, due to the competing nature of some ES (Spyra et al., 2020). For example, land that is used for agriculture cannot provide the maximum potential of that land for recreation or wood production. Therefore, ES trade-offs can be established to prioritise certain ES over others. Secondly, this provides an opportunity to prioritise ES provision for the local/corporate context in which the tool is being used, where there may be a desire to prioritise certain ES's and benefits over others, for example giving high priority to flood risk regulation in an area where flooding is a particular issue. In addition, establishing the local ES priorities provides an opportunity for stakeholder involvement in the process.

Whereas, in most cases, the policy priority weights will be defined by the objective setter, there may be circumstances where this isn't applicable, or may not be possible. Therefore, to provide a "default" prioritisation of ES in the tool, a UK-wide policy assessment was conducted for key planning policy documents in England, Wales, Scotland, and Northern Ireland. The aim of this exercise was to establish the policy priorities of each ES and benefits in the NATURE Tool in relation to the four countries' policy priority of the respective benefits and ES.

Policy Documents Assessed

The key policy documents assessed are shown below in Table 1. These key documents were identified from the UK-wide policy review also conducted as part of the NATURE Tool development. Planning policy guidance, strategies, and frameworks were primarily assessed. These provide the most recent planning policy for each country and outline the varying government planning priorities. Legal acts and regulations were not included in this assessment as these set the legal basis for the planning process, for example requirements to produce plans and legal powers, as opposed to specific policy priorities and government ambitions. It is important to note that there is a disparity in the age of the policy documents assessed, with the Welsh and Scottish suite of policies recently published compared to those from Northern Ireland which are nearly 10 years old. The three most relevant policy documents for each country were selected in order to get a holistic understanding of the policy priorities with regard to the tools assessed ES's and benefits. Documents were also often complementary and cross referenced, for example, Future Wales cross-reference to Planning Policy Wales policies using an interactive feature of the digital document.

Table 1: UK policy documents included in the assessment

England	Wales	Scotland	Northern Ireland
National Planning Policy Framework 2019	Future Wales: the national plan 2040 - 2021	Scotland's Third Land Use Strategy 2021-2026	Strategic Planning Policy Statement for Northern Ireland (SPPS) – 2015
25 Year Environment Plan 2018	Natural Resources Policy - 2017	Scotland Planning Policy (updated 2020)	Living Places An Urban Stewardship and Design Guide for Northern Ireland
National Planning Policy Guidance – ongoing	Planning Policy Wales: 11 – 2021	National Planning Framework 3	Regional Development Strategy 2035 - 2012

As the suite of planning policy in Scotland is currently being reviewed and amended, the latest iteration of the Planning Policy Framework (4) was not published at the time of the review, therefore it could not be assessed. Certain documents were also screened for inclusion, for example The Construction Playbook in England, however it was deemed that these documents were not relevant for the exercise as no relevant policies were identified. In addition, the assessment was not meant to be exhaustive, but to provide an indication of how the four UK countries prioritise different ecosystem services in planning policy. Therefore not all policy documents which may have had relevance were assessed due to time constraints.

Assessment Approach

The policy assessment tool was conducted in a bespoke scoring matrix adapted from Hislop et al. (2019) Green Infrastructure Policy Tool which assesses the policy coverage (0=none, 1=some, 2=Most, 3=full) as well as strength of policy wording (none, weak, medium, strong)., Importantly policy strength can't score higher than policy coverage. The assessment criteria were changed to definitions developed for the ES's and benefits assessed by the NATURE Tool. An example of policies of differing coverage and strengths can be seen in Table 2.

Policy assessments are a qualitative exercise involving content analysis of the policy and, therefore, inherently have a level of subjectivity attached. However, this can be limited, and the objectivity of the assessment increased by following a clear and consistent guide detailing how the policy coverage and strength of wording is assessed. Some documents (for example Planning Policy Wales 11) make explicit reference to the degree of policy wording "*Where 'must' is used in the document it reflects a legislative requirement or indicates where action is needed now to make changes in practice over the long term to achieve strategic outcomes. Where 'should' is used it reflects Welsh Government expectations of an efficient and effective planning system*" (pg 6), which assisted in making these distinctions. For example, the use of the word "must" would lead to a strong policy wording score and "should" a medium policy wording score. Likewise, Scotland Planning Policy (pg 3) states "*Where 'must' is used it reflects a legislative requirement to take action. Where 'should' is used it reflects Scottish Ministers' expectations of an efficient and effective planning system*". These policy wordings were used to reflect both a medium and strong policy strength score for the assessment process.

Table 2: Example of ES Policy Assessment of varying coverage and strength

NATURE Tool ES Definition (coverage) "Flood regulation reduces surface runoff, peak flow, flood extent and flood depth through canopy interception, evapotranspiration, soil infiltration and physical slowing of water flow"

Some Coverage	Most Coverage	Full Coverage
NPPF: 118. Planning policies and decisions should: … **b) recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production;**	**Scottish Planning Policy:** It could also include ensuring development can withstand more extreme weather, including prolonged wet or dry periods, by **working with natural environmental process**es such as using landscaping and natural shading to cool spaces in built areas during hotter periods and **using sustainable drainage systems to conserve and enhance natural features whilst reducing the risk of flooding**	**25 YEP**: i. Expanding the use of **natural flood management solutions** By **working with natural processes,** we can better protect ourselves from hazards such as flooding. **Natural Flood Management involves the use of a variety of measures including tree planting, river bank restoration, building small-scale woody dams, reconnecting rivers with their flood plains and storing water temporarily on open land**

Weak Strength	Medium Strength	Strong Strength
Scottish Planning Policy: It could also include ensuring development can withstand more extreme weather, including prolonged wet or dry periods, by working with natural environmental processes such as using landscaping and natural shading to cool spaces in built areas during hotter periods and using sustainable drainage systems to conserve and enhance natural features whilst reducing the risk of flooding	**NPPF:** 150. New development **should** be planned for in ways that: a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, **including through the planning of green infrastructure**	**Planning Policy Wales 11**: 6.6.18 The provision of SuDS **must** be considered as an integral part of the design of new development and considered at the earliest possible stage when formulating proposals for new development

Results

As shown in Table 3, there was a range of overall coverage and policy strength between the four countries, with Scotland having the highest coverage at 79%, but Wales having the highest strength at 65%. Northern Ireland was lowest in terms of overall strength and coverage, with 49% and 32% respectively. England, Wales, and Scotland achieved similar overall scores. As is shown in summary Table 4 (below), there is a degree of consistency amongst the four countries in terms of those ES and benefits which scored full in terms of policy coverage. Specifically in relation to health (mental and physical), recreation, and flood regulation. The majority of ES and benefits had "most" coverage and "medium" strength. However consistent ES which were either not identified or poorly covered were pest control and education. Interestingly, erosion control was ranked low in all countries except Scotland for coverage.

Overall, there were some differences, with the most notable in Northern Ireland where multiple ES were not identified in the assessed documents. However, this may be the result of the age of the policy documents and may also account for its low overall scores. The largest inconsistencies were in relation to food & fish (commercial), where there was a range of coverage ranging from not being mentioned in Northern Ireland to full coverage in Scotland and Wales. Likewise, water quality regulation has "some" coverage in England, and "full coverage" in Scotland. As seen from the results, policy coverage often scores higher than policy strength, whereas it is important to note the method does not allow for strength to be higher than coverage in its score. The results show it was more common for ES to have broader coverage in policy compared to the strength of the policy wording. The full set of assessment results for each policy document assessed, along with corresponding polices scored can be accessed here.

Table 3: Summary Scores

Country	Total (Max=57)	Score	%
Scotland	Coverage	45	79%
	Strength	33	58%
Northern Ireland	Coverage	28	49%
	Strength	18	32%
Wales	Coverage	41	72%
	Strength	37	63%
England	Coverage	40	70%
	Strength	32	56%

Co- funded by UKRI Innovate UK

Table 4: Summary result of the policy assessment

NATURE Tool Ecosystem Services

Legend:

Coverage	None	Some	Most	Full
Score	0	1	2	3
Strength	None	Weak	Medium	Strong

(Score/colour key: None = white/0, Some = grey/Weak = 1, Most = yellow/Medium = 2, Full = green/Strong = 3)

		Cultural					Provisioning Services				Regulating Services								Health	
Country	Measure	Recreation	Aesthetic Value	Education & Knowledge	Interaction with Nature	Sense of Place	Food & Fish - Community	Food & Fish - Commercial	Wood Production	Water Supply	Flood Regulation	Erosion Control	Water Quality Regulation	Carbon Storage	Cooling & Shade	Air Quality Regulation	Pollination	Pest Control	Physical Health	Mental Health
Scotland	Coverage	Full	Most	Most	Most	Most	Full	Full	Most	Full	Most	Full	Full	Most	Most	Full	None	Full	Full	Full
	Strength	Medium	Medium	Medium	Weak	Medium	Medium	Medium	Medium	Weak	Medium	Weak	Medium	Medium	Medium	Medium	None	Medium	Medium	Medium
Northern Ireland	Coverage	Most	Most	None	Most	Full	Most	None	None	None	Most	None	Most	Most	Most	Full	None	None	Full	Full
	Strength	Medium	Weak	None	Weak	Medium	Weak	None	None	None	Medium	None	Medium	Weak	Weak	Weak	None	None	Medium	Medium
Wales	Coverage	Full	Most	None	Most	Full	Most	Full	Full	Most	Full	Weak	Most	Most	Most	Full	Most	None	Full	Full
	Strength	Full	Most	None	Weak	Full	Medium	Full	Full	Medium	Full	Weak	Medium	Medium	Medium	Full	Medium	None	Medium	Medium
England	Coverage	Full	Weak	Most	Most	Most	Weak	Most	Most	Most	Full	Weak	Most	Most	Most	Full	Most	Most	Full	Full
	Strength	Medium	Weak	Medium	Weak	Medium	Weak	Medium	Medium	Medium	Medium	Weak	Medium	Weak	Weak	Medium	Medium	Medium	Medium	Medium

Recommendations

As a result of the policy analysis, it is recommended that policy coverage is used as an indication of the ES priority weighting to be used as the default options in the NATURE tool. Policy strength consistently scored lower than the policy coverage, meaning that if the policy strength scores were used to inform the ES priority weighting, in England, Northern Ireland and Scotland no ES would be assigned a high priority. In addition to this, the policy assessment matrix used to carry out the policy assessment has four scores for coverage (0=none, 1=some, 2=Most, 3=full) as well as strength (none, weak, medium, strong). However, the NATURE weights the ES priorities from Low, Medium, and High. Therefore, it is recommended that ES scores are translated into NATURE policy priorities as shown below:

Table 5: Conversion of policy assessment scores

Policy Assessment Coverage Score	NATURE Tool ES Policy Priority
0	Low
1	Low
2	Medium
3	High

Therefore, the **following default priorities are recommended for adoption in the NATURE Tool:**

Table 6: Recommended Default Policy Priorities

Benefits & Ecosystem Services	Scotland Policy Priority (Recommended)	Northern Ireland Policy Priority (Recommended)	Wales Policy Priority (Recommended)	England Policy Priority (Recommended)
Mental Health	High	High	High	High
Physical Health	High	High	High	High
Aesthetic Values	Medium	Medium	Medium	Low
Education & Knowledge	Medium	Low	Low	Medium
Interaction with Nature	Medium	Medium	Medium	Medium
Recreation	High	High	High	High
Sense of Place	Medium	High	High	Medium
Air Quality Regulation	Medium	Medium	High	High
Carbon Storage	High	Medium	Medium	Medium
Cooling & Shading	Medium	Medium	Medium	Medium
Erosion Protection	Medium	Low	Low	Low
Flood Regulation	High	Medium	High	High
Water Quality Regulation	High	Medium	Medium	Low
Pest Control	Low	Low	Low	Medium
Pollination	High	Low	Medium	Medium
Food & Fish - Commercial	High	Low	High	Medium
Food & Fish - Community	Medium	Medium	Medium	Low
Water Availability	Medium	Low	Medium	Medium
Wood Production	High	Low	High	High

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