MAKE IT WILD

IT'S NOT OUR AIM TO PROTECT NATURE, IT'S OUR PURPOSE.

# Carbon Offsetting with Make it Wild

## Summary

*Make it Wild* is a UK-based organisation focused on protecting and enhancing biodiversity, set up in response to the widespread loss of the nation's habitat and wildlife. It has 10 nature reserve sites in Yorkshire and a growing network of other locations including sites in Derbyshire and Norfolk. Establishing new woodlands is a major element of its habitat creation and it has planted over 80,000 trees since 2010.

These trees absorb carbon dioxide ($CO_2$) from the atmosphere as they grow, and this document explains how the amount of $CO_2$ being absorbed can be calculated. To ensure the maximum possible biodiversity benefit, *Make it Wild* plants a large variety of native, broadleaf tree species in these new permanent woodlands for wildlife. Protections and procedures are employed, including the replacement of losses, to ensure these trees will reach maturity. They will not be felled for timber but reserved for nature in perpetuity.

The calculation conservatively projects that the average tree, including its soil, roots, trunk, branches and canopy, will absorb 3.67 Tonnes of $CO_2$ in its first 40 years of growth. This quantity per tree can be applied as an offset for a business looking to mitigate the equivalent amount of its greenhouse gas emissions.

A detailed analysis of the calculations can be found in the Appendix.

Businesses utilising *Make it Wild's* carbon offsetting can visit our nature reserve sites and see "their trees" as they grow or can get actively involved in its conservation work

# Carbon Offsetting with Make it Wild

## 1. Introduction

Carbon offsetting or carbon mitigation are the terms used to describe supporting a process or organisation that is lowering the amount of carbon dioxide ($CO_2$) in the atmosphere and, in doing so, contributing to limiting the effects of climate change. Lowering atmospheric $CO_2$ can be achieved by its active removal or by reducing the amount that would otherwise be released by man-made activities.

### (i) Reducing $CO_2$ Release

The combustion of fossil fuels, such as the burning of coal or natural gas in electricity generating power stations or the consumption of petrol or diesel in vehicle engines, is the principal cause for the rise in the concentration of $CO_2$ in the earth's atmosphere. Processes that prevent that combustion by producing the same outcome without recourse to using fossil fuels are the types of projects that can be employed to offset $CO_2$ being released elsewhere. Examples include electricity power generation that utilises renewable energy such as solar power, wind power or hydroelectricity or Hydrogen-powered vehicles (especially if that Hydrogen was itself manufactured using renewable power).

### (ii) Removing $CO_2$

Processes that remove $CO_2$ from the atmosphere for long periods (measured in at least decades, preferably much longer) will also be vital for preventing the worst effects of climate change. There are technologies under development that could mean material amounts of $CO_2$ being captured from the atmosphere and 'locked-away'. These include chemical capture and physical capture, where the $CO_2$ can be stored in the same rocks that had once been drilled for oil and gas. It is hoped that one day this method will provide a significant solution for curtailing the rising levels of atmospheric $CO_2$.

Nature's own solution for removing $CO_2$ is the biological process of photosynthesis, where all green plants use sunlight to absorb the gas and convert it to sugars which allows them to grow. The world's trees take in (sequester) and retain huge quantities of carbon this way and so it is vital that we prevent further deforestation, and also plant more trees to create new woodlands (afforestation) to replace those that have been lost from the planet.

## 2. How much $CO_2$ can a new woodland absorb?

### (i) Planted Trees

All trees begin sequestering $CO_2$ from the moment they germinate and appear as tiny saplings but the rate in the early years is very gradual, measured in just grams of $CO_2$ per tree per year. As the tree grows, however, it develops more leaves and branches meaning it can harness more sunlight which, in turn, allows it to grow faster. This exponential rate of growth continues for decades, even for centuries for some species, where each year they absorb more than in the previous year. Eventually, the rate will begin to slow and plateau as the tree reaches full maturity and stop altogether towards the end of its natural life.

Each type of tree (species) has its own absorption rate, but the actual amount tree depends on many other factors including where on the earth it is growing (e.g. equatorial, tropical, temperate etc.). The amount of sunlight it receives, its altitude and local climate add yet more variance, as does access to water and vital minerals.

### (ii) Developing Woodland Soils

Deciduous trees are trees that drop their leaves in the winter and grow new leaves in the following spring. Temperature regions of the earth (including the UK) experience the changing seasons and the native, broadleaf trees shed their leaves so they can survive the cold winters. These leaves collect on the woodland floor and very gradually begin the process of decomposition, but this is slow, and the resultant soil becomes an increasingly rich, organic humus (decaying leaves and plants) containing and holding more carbon with every passing year.

*Make it Wild* creates new woodlands for wildlife in the UK and plants many different native species of tree to maximise the variety of other plants and animals that can live in this habitat. As such, it is necessary to quantify the amount of $CO_2$ absorbed as an average across all the tree types.


An average tree in a new woodland will remove from the atmosphere and lock into its timber and soil 1 elemental Tonne of Carbon (C) in the first 40 years of its growth. All of this C is derived from the $CO_2$ it has taken out of the atmosphere. Make it Wild typically plant between 20 to 30 different species of native, broadleaf trees to create new woodlands in their nature reserves and to maximise the resultant increase in biodiversity. This spans the full range of tree sizes from smaller shrubs to large trees such as Oak and Beech. *Make it Wild* can, therefore, be confident (for the purposes of carbon offsetting calculations), that, overall, 'average' trees are being planted.

The number of trees required for an offset is calculated from the Tonnage of greenhouse gas emissions that needs to be mitigated. The ratio of the molecular weight of $CO_2$ to C is 3.67. Therefore, dividing the $CO_2$ Tonnage by 3.67 and rounding up the answer derives the number of trees required.

Please refer to the Appendix for a referenced and detailed analysis of the numbers provided above.

### 3. Are all Offsetting Projects the Same?

There have been some media reports that have raised doubts about whether all offsetting schemes are being properly managed and delivered on the ground, with criticism of even some so-called 'independently verified' schemes, including several overseas.

It is certainly regrettable if any project has not proved to be wholly genuine in delivering what it has claimed to be doing and we would recommend any individual or business looking to support an offsetting organisation examine the provider's track record carefully.

*Make it Wild* was established in response to the loss of biodiversity. Shockingly nearly 70% of all wildlife has been lost over the last 50 years. The damage to our planet's ecology is happening everywhere but it is particularly acute here in the UK and *Make it Wild* is creating new nature reserves to help reverse the trend. It has 10 sites in North Yorkshire and a growing number of landowner partner sites across the UK.

New woodland creation is a major element of what we do but it is just part of a wider initiative to put back lost habitats which includes wildflower meadows and wetlands. It also involves protecting existing ancient woodland, adding hedgerows and rewilding - so that important flower-rich pasture and scrub can regenerate. Each of these different habitat types supports an inter-connected range of organisms adapted to each particular ecosystem (including plants, fungi, lichens, invertebrates, amphibians, birds and mammals). The principal objective is to enhance the local biodiversity.

Any organisation supporting *Make it Wild's* carbon offsetting provision is not just having the carbon in its growing trees assigned to it, but it is helping us deliver our biodiversity focus. These trees are planted to create permanent new woodlands for wildlife. They will not be felled for timber but reserved for nature in perpetuity. *Make it Wild* takes care of its newly planted trees, protecting them the elements, animal browsing and competing vegetation. It also replaces any losses in the first 5 years. The objective is that these trees survive for the long term so they can form the ancient woodlands of the future.

Make it Wild utilises a forward projection mechanism for computing the future carbon dioxide sequestration over a 40-year growing period. Supporters of its carbon offsetting can visit our nature reserve sites and see "their trees" as they grow or can get actively involved in our conservation work. We hold team-building days throughout the year with varied outdoor tasks including tree planting (winter only). More information on these team activity days can be found here.

**4. Accreditation**

*Make it Wild* has a long-established track record of woodland creation that spans more than 14 years and over 80,000 trees planted. We record the position of our planted trees with drone fly-over photography or third-party aerial imaging and this data is held on a digital record for each new plantation. We operate closely with several third parties who, via the provision of written and photographic evidence and on-the-ground inspection, verify the trees that we plant and, therefore, the carbon we are projected to offset.

*Make it Wild* enters into contracts prior to undertaking large scale planting projects. There are tight specifications laid down by bodies including The Forestry Commission, Natural England and The Woodland Trust to ensure the planting meets the necessary standards. The plantations are then subject to inspection and validation across the life of the agreements (typically 10 -12 years). For instance, if we are undertaking woodland creation under the Countryside Stewardship Schemes these are audited by the Rural Payments Agency, part of the government's Department for Environment, Food & Rural Affairs (DEFRA).

The four main principles of projects that will help the net reduction of $CO_2$ in the planet's atmosphere are 'Permanence' *(long-term change is necessary);* 'Low Leakage' *(the amount of CO2 released in delivering the project is relatively small)*; 'Co-Benefit' *(more than just carbon e.g. biodiversity enhancement)* & 'Additionality' *(truly extra, the project was not already in existence)*. All *Make it Wild* projects are designed to achieve these four objectives. The woodlands are created as part of permanent new nature reserves, supplied by local tree nurseries and other locally sourced materials. *Make it Wild* is also supported by staff and volunteers from the local community. The focus is on habitat creation and enhancing biodiversity and

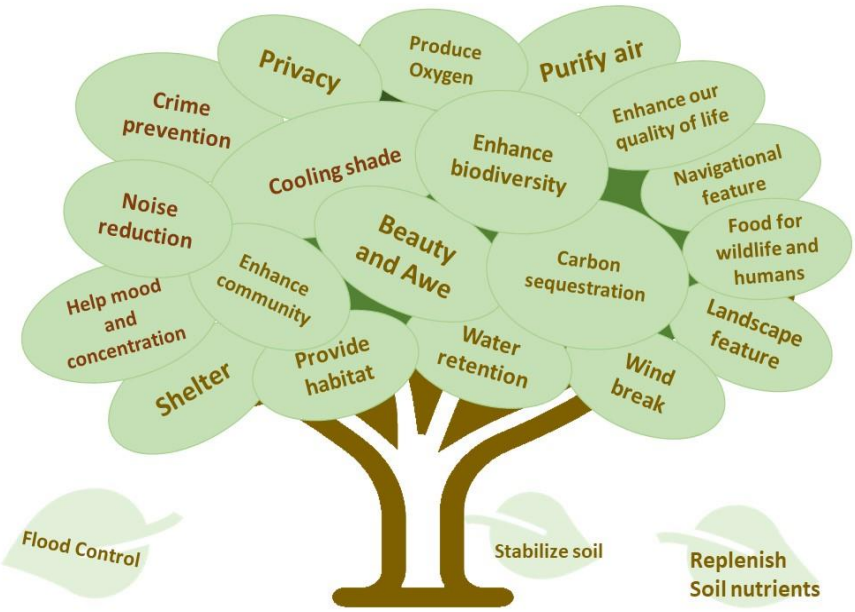
the monies we receive from our carbon offsetting partners is used to fund new planting – meaning every tree we plant is truly additional.

*Make it Wild* has not, to date, acquired formal external accreditation, although it is ready to do so. Primarily, this is because of high demand for its forward projecting carbon offsetting service, by its business partners. Waiting for the accreditation process to be completed would prevent us assigning trees to those partners. This process is known to be time-consuming and costly, and this would not only utilise precious resources needed for our conservation work. The extra cost would have to be reflected in our carbon offset pricing. Businesses partnering with Make it Wild for their offsetting can visit the sites with their assigned trees and, if they want to get more involved can engage their staff in our conservation work, including tree planting.

*Make it Wild* has access to other carbon offsetting projects around the world other than its own. These have been independently verified by bodies such as Gold Standard and Verra and these can be made available, if required. For further information on this subject, please contact us using the details given on page 6.

### 5. Our Nature Reserve Trees offer much more than $CO_2$ Sequestration

Trees offer considerably more than carbon dioxide absorption, otherwise known as sequestration. They provide shelter and habitat for thousands of other species, they're a food source, contribute to flood prevention, stabilise soil, provide shade and much more. Perhaps most fundamentally to our survival on the planet they give us the oxygen we need to breathe. This diagram below indicates just how important trees are to us and every living thing on earth:




Moreover, our trees are planted in new, permanent nature reserves with the focus on protecting and enhancing biodiversity. The woodlands are part of a range of habitats and our work includes restoring wildflower meadows, adding ponds and hedgerows, rewilding pasture and creating wetlands. We also add nesting boxes to increase nesting sites, and these include swift, kestrel, barn owl, tawny owl and pied flycatcher. We monitor and record the animal and plant species both from sightings and in surveys, working with a variety of experts including botanists, bird specialists as well as hosting authorities on dragonflies, moths and bats.

## 6. Further Information

More information on our carbon offsetting service is available on our website, www.makeitwild.co.uk
Please visit Carbon for business here  For testimonials, please click here.

Please also contact John Burgess on email john@makeitwild.co.uk or telephone 07909-745583

**Awards:**
**BBC Make a Difference - 2023**
**Hambleton Business Awards 2023 – Sustainability**
**Northern Enterprise – Most Dedicated Carbon Offsetting & Conservation Organisation 2023**
**Harrogate Advertisier Business Excellence Awards – Business Leader of the Year Award 2024**

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**APPENDIX**

To calculate the amount of carbon in woodlands and forests and, ultimately, individual trees we have utilised two principal reference sources.

1. From the journal, *Nature*, the paper reviewing global patterns of tree density in the world's natural forests.
https://www.nature.com/articles/s42003-023-04419-8

2. The UK government body, *Natural England's* analysis of carbon storage and sequestration by habitat type.
Natural England NERR094 Edition 2 v2.1 Carbon storage and sequestration by habitat - A review of the evidence (1).pdf

Extracting first from the Natural England paper:

*Woodland, trees and scrub*
*The largest carbon sequestration rates amongst seminatural habitats are in woodlands. Native broadleaved woodlands are reliable carbon sinks that continue to take up carbon over centuries with benefits for biodiversity and other ecosystem services, although the rate varies greatly with tree species and age and is strongly influenced by soils and climate.*

*Sequestration rates decline over time, but old woodlands are substantial and important carbon stores. Although woodland management may be important for a range of reasons, it is not essential to maintain carbon sequestration. Native woodland managed with a minimum intervention approach can be an effective climate change mitigation measure.*

*Timber production can have benefits for climate change mitigation where wood products store carbon for the long-term or replace more fossil fuel intensive materials and fuels; and can be produced in ways that support biodiversity, such as using native tree species and management of rides and forest edges. However, non-native species of tree generally support lower levels of biodiversity and plantations on peatlands have led both to the loss of biodiversity and carbon. Hedgerows, orchards and other trees outside woodland can also sequester and store carbon as well as providing other benefits within an agricultural and biodiversity context.*

*Native woodland is an effective carbon sink and over much of England can deliver comparable carbon uptake to non-native species and provide more benefits for biodiversity. Growing the right trees in the right place is however critical to maximise these benefits.*

The paper includes data on each woodland type in terms of the amount of carbon held (measured in Tonnes of Carbon per hectare) both in the soil and in the vegetation (trees), based on habitats that are 30 years old and 100 years old. See table overpage.

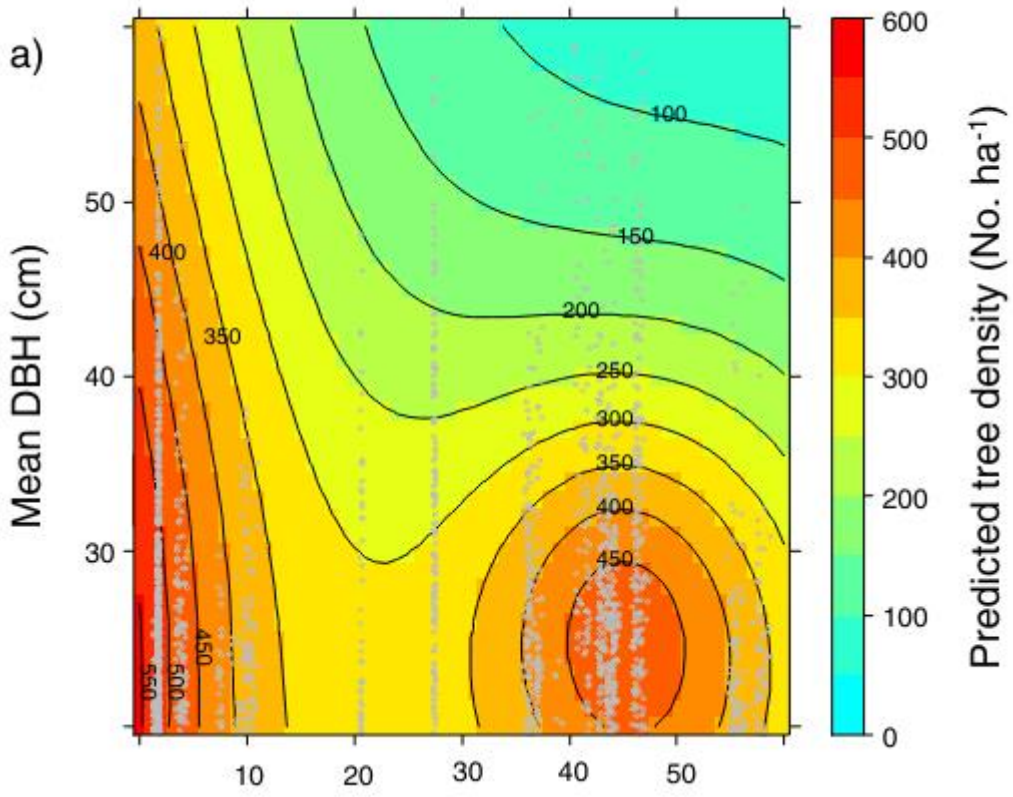
**Table 2.1** Summary of carbon storage values for woodland, tree and scrub habitats, using typical values derived from Woodland Carbon Code data and scientific literature

| Habitat Description | *Soil* Carbon (t C $ha^{-1}$) | *Soil* Depth (cm) | *Vegetation* Carbon (t C $ha^{-1}$) | *Soil + Veg.* Carbon (t C $ha^{-1}$) | *Confidence* [High, Medium, Low] | References |
|---|---|---|---|---|---|---|
| **Woodland** | | | | | | |
| **100-year Mixed native broadleaved woodland on mineral soil (to 1m)** | 151[bcd] [108 to 173] | *100cm* | 203[abc] [41 to 344] | **354 [149 to 517]** | ***Medium/ high*** Confidence is medium-high see Note at bottom of table. | [a]Woodland Carbon Code (2021) [b]Poulton and others (2003) [c]Butt and others (2009) [d]Vanguelova and others (2013) |
| **100-year Mixed native broadleaved woodland (to 15cm soil depth)** | 55[b] [50 to 59] | *15cm* | 203[abc] [41 to 344] | **258 [91-403]** | **Medium/ high** | [a]Woodland Carbon Code (2021) [b]Vanguelova and others (2013) |
| **30-year mixed broadleaved native woodland on mineral soil (to 1m)** | 151[b] [108 to 173] | *100cm* | 114[a] [22 to 204 ] | **255 [130-377]** | **Medium** | [a]Woodland Carbon Code (2021) Vanguelova and others (2013) |
| **30-year mixed broadleaved native woodland (to 15cm soil depth)** | 55[b] [50 to 59] | *15cm* | 114[a] [22 to 204 ] | **169** [72-263] | **Medium** | [a]Woodland Carbon Code (2021) [b]Vanguelova and others (2013) |
| **Hedgerow** | | | | | | |
| **Minimal/ Un manged Hedgerows** | 98.7 [66.52 to 111.93 ] | | 45.8 | **144.5** | **Low** | Axe, 2015, reported in Axe 2020 |
| **Orchards** | | | | | | |
| **Traditional Orchards** | 73.75 [47 to 111 ] | *30cm* | 21.4 [8.6 to 230.4] | **95.15** | **Low** | Robertson and others (2012) – Top 30 cm of soils & above and below ground biomass |
| NOTE: Woodland confidence is medium-high rather than high because the relationship between soil and tree carbon is not clear – maximum growth is probably on sites with medium soil carbon | | | | | | |

Extrapolating from this data for a 40-year woodland, indicates a combined soil and tree carbon figure of between180 to 270 Tonnes of Carbon per hectare of natural woodland, depending on soil type and depth. Mean value = 225 Tonnes of Carbon per hectare: **VALUE A.**

Referring now to the *Nature* paper, we see that tree densities vary dependent on the size (age-dependent), as measured at their diameter at breast height ("DBH") and the latitude at which the woodland is situated. The UK lies between latitudes 50° and 58° North.

Please refer to the chart overpage.




Typically, 40-year-old trees will have DBH's in the range 40 to 50 cm (approx. circumference range 1.25m to 1.60m). Reading off this chart between latitude 50 and 58 would indicate tree densities of natural UK woodlands will be in the range of 150 to 250 trees per hectare. **VALUE B.**

Taking the means of VALUES A and B leads to the conclusion that the mean Carbon content of a 40-year-old tree = 225/200 = 1.125 Tonnes. **VALUE C**

To ensure the numbers chosen are conservative a 12.5% contingency is then applied to VALUE C, giving a mean Carbon content of a 40-year-old tree of 1.00 Tonne.

Based on the relative molecular weights of Carbon (C) as 12 and Carbon Dioxide ($CO_2$) as 44 and taking this conservative figure of 1.0 Tonne of C means that 44/12 = **3.67 Tonnes of $CO_2$** has been sequestered from the atmosphere by the average UK tree in its first 40 years of growth.

Additional References (further reinforce the conservative value chosen by *Make it Wild*)

1. UK Forestry Commission
https://forestrycommission.blog.gov.uk/2023/06/16/england-tree-planting-increases-for-2022-23/
"Each and every tree planted can absorb up to 150kg of carbon *(dioxide)* per year", implying a 40-year-old-tree can absorb up to 6.00 Tonnes of $CO_2$ (63% more than the value *Make it Wild* applies.

2. University of Leeds
https://leaf.leeds.ac.uk/wp-content/uploads/sites/86/2021/01/UBoC-i-Tree-Report-2019-v2.0r.pdf
"Top 100 mature trees on campus contain an average of 1.85 Tonnes of Carbon" (hence have absorbed 6.80 Tonnes of $CO_2$)