

## Vegetated Solutions for Rail Embankments and Watercourses

### Low Carbon with High Biodiversity Gain

Railway embankments offer an incredible opportunity to create biodiverse and ecologically resilient low carbon landscapes. Salix have developed a range of nature-based solutions that sequester carbon and create low maintenance, diverse ecological networks.

### Advantages

- Low carbon construction materials and installation.
- Provides soil erosion control and long-term surface stability on steep slopes and embankments.
- We work with local growers, manufactures and suppliers to create a range of environmentally appropriate products and solutions.
- Biochar is a key component of our solutions, created from recovered and recycled organic materials which improve soil conditions whilst indefinitely locking carbon within the landscape.
- Construction programmes and costs can be greatly reduced using our nature-based solutions.



Photo source: Dr Phil Sterling — Butterfly Conservation





Network Rail Environmental Sustainability Strategy 2020-2050 aims:

- 1 A low-emission railway
- 2 A reliable railway service that is resilient to climate change
- 3 Improved biodiversity of plants and wildlife
- 4 Minimal waste and sustainable use of materials

**Nature-based Solutions:**

- ✓ We can account for all of the applied carbon within our products and help assist in calculating overall lifecycle carbon reductions when using nature-based solutions.
- ✓ Every tonne of biochar used is equivalent to storing 3.66 tonnes of CO<sub>2</sub> from the atmosphere. In addition, when biochar is applied to the land, it increases the carbon drawdown efficiency of plants by over 25%.
- ✓ We can apply any specified seed mix, or we can advise on site specific mixes for maximum ecological value and surface erosion stabilisation. Wildflowers are more resilient to climate change, support greater biodiversity and often have a deeper root structure compared with grasses, increasing the surface erosion protection.
- ✓ We convert natural arisings from habitat management projects to create high grade, sustainable biochar.
- ✓ Uniquely, all materials used are sustainably sourced and manufactured in the UK.





## Biochars

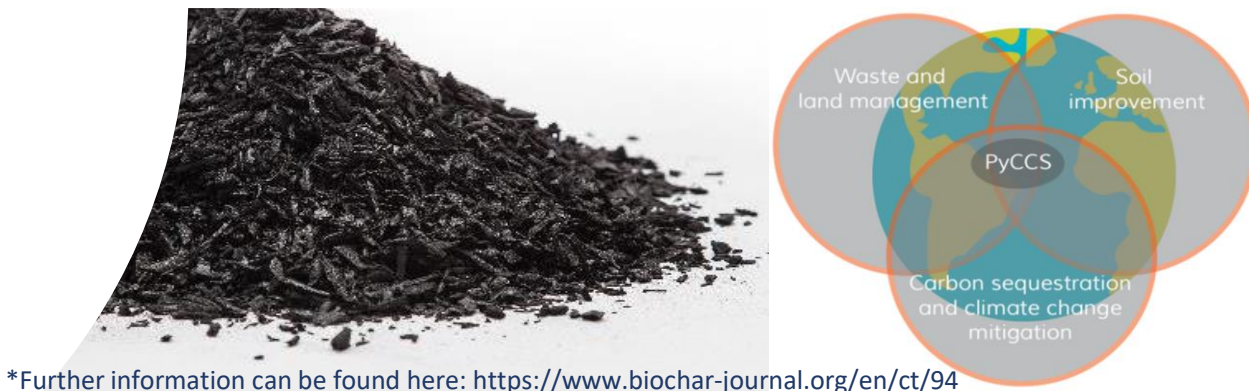
We incorporate biochars into our solutions.

Biochar is created through the processes of pyrogenic carbon capture and storage (PyCCS). The Intergovernmental Panel on Climate Change (IPCC) recommends biochar as a Negative Emissions Technology (NET) that can actively sequester carbon on a global scale\*. *IPCC special report, published 8<sup>th</sup> October, 2018.*

Our biochar is created through pyrolysis – the rapid heating of organic matter at high temperatures with restricted oxygen. The process produces solid carbon which provides significant benefits to soil health.

Biochar has been shown to be a key component in the vegetation establishment on poor or contaminated soils and engineered fill. Biochar is a highly stable (refractory) form of carbon, functioning for millennia.

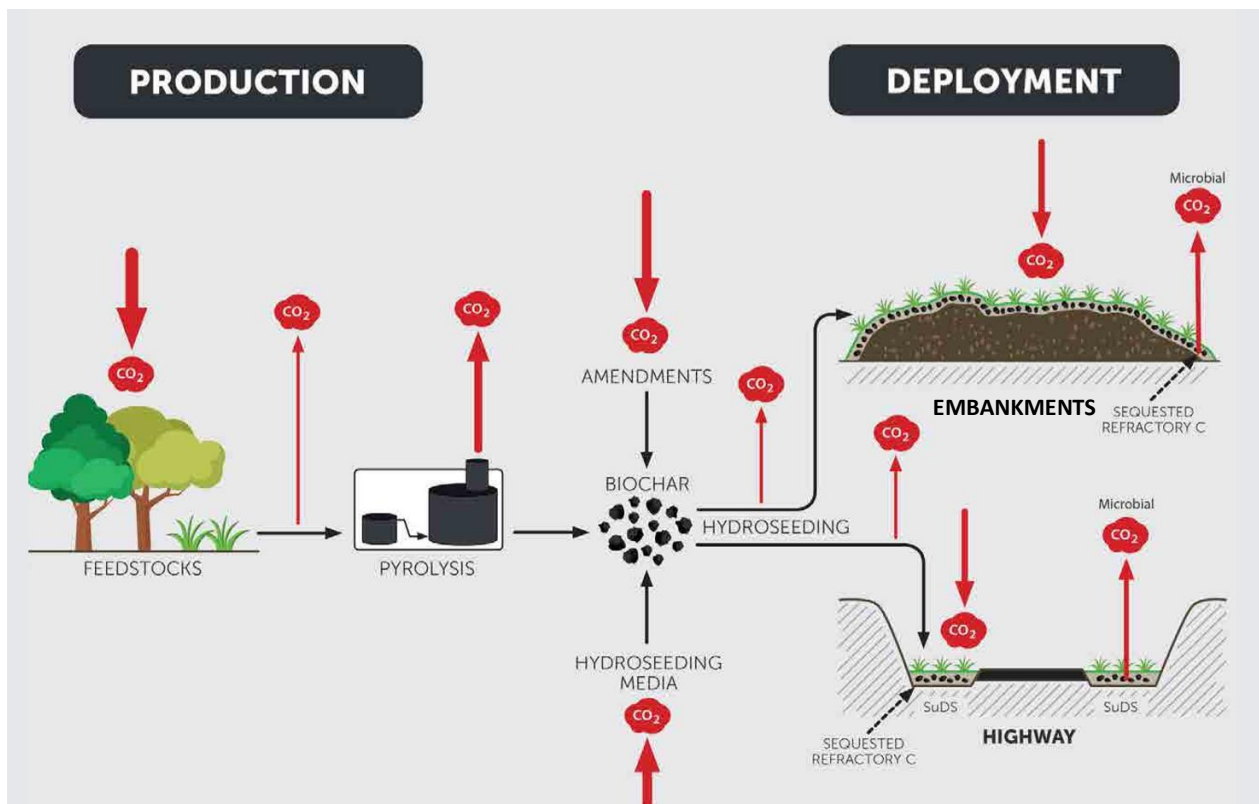
Biochar has a huge surface area relative to its size, which makes it ideal for inoculation with soil microbiota on sites where there is no viable soil ecology. Water retention within the root zone is another essential feature, especially with increasing extremities through climate change.



## Trees are only part of the carbon solution

It takes around 20 years for a tree to mature and become effective at carbon drawdown. Low carbon landscapes should incorporate a range of habitat types.

Biochars applied to soils improve the whole soil ecosystem. Wildflower meadows and associated soils offer significant carbon storage whilst providing considerable biodiversity gain.



\*Further information can be found here: <https://www.biochar-journal.org/en/ct/94>

## Trial on Network Rail embankment

Instead of importing topsoil, a nature-based approach was applied on an embankment that was particularly challenging. The site had a steep slope consisting of a thick, cold compacted clay sub-soil, susceptible to run-off over the winter period.

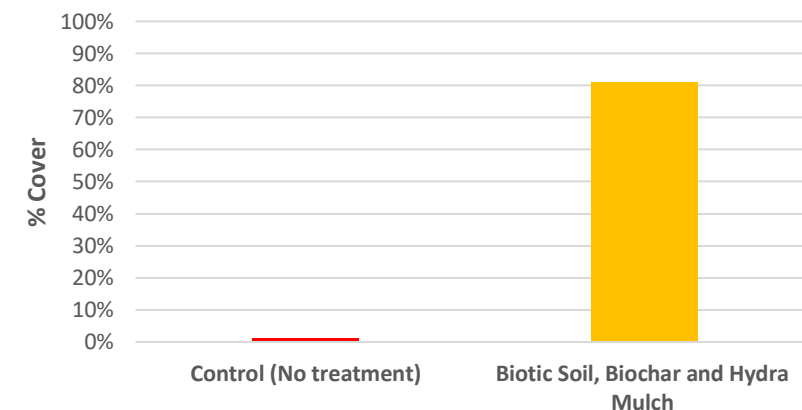
TerrAffix Hydrasoil was applied with biochar, a microbiological inoculant, and a nutrient carrier. An application of Hydramulch was subsequently installed to provide additional surface erosion protection. A site-specific custom seed mix was applied for effective vegetation establishment within weeks.

As no topsoil was used, wildflowers will thrive in the low nutrient soils, providing higher levels of biodiversity, greater resilience to climate change and often requiring no maintenance.

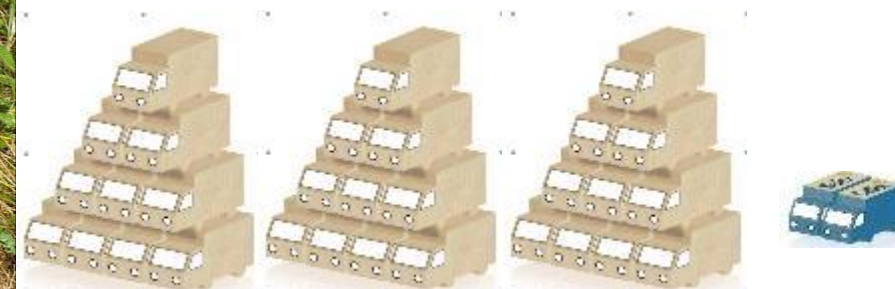
Our nature-based solution required only 1% of the transportation that imported topsoil would require and as such, offered immediate carbon savings over traditional construction methods. The biochar will also offer an immediate carbon lock and continue to improve the soil ecosystem and long-term carbon storage.



**Vegetation cover over clay Spring 2020  
(Following treatment winter 2020)**



**Two lorry loads of biotic soil, mulch and biochar can replace the need to import 200 lorry loads of topsoil, assuming 150mm depth**



Further information: <https://terraffix.co.uk/revegetating-a-challenging-railway-embankment/>



## Green Swale drainage alternative to slip form concrete

Nature-based solutions were applied to over 50km of carriage drainage on the A11 and the Norwich Northern Relief Road. A Salix Green Swale Solution was used as a direct alternative to slipform concrete. A Highways Agency departure was granted to utilise this nature-based solution on a large-scale infrastructure project.

A zero-soil solution was applied to aggregate fill to provide a low carbon, biodiverse, green swale that provides significant water quality benefits. This solution provided a 90% reduction in carbon footprint compared to concrete channels.

Research has shown that green swale channels can reduce total suspended solids by up to 85% as well as heavy metals and hydrocarbons by up to 80%. This provides significant water quality benefits within the water catchment and helps to contribute towards Water Framework Directive (WFD) objectives.

