**Action Pack sheet:**

**Improving the Carbon Footprint of Your Burial Ground**

*This sheet explains how churchyards and cemeteries are currently storing carbon and how you can maximise this. It gives ideas to help manage burial grounds in ways that reduces the carbon footprint*

**The Carbon Cycle and Fossil Fuels**

Many of us are striving to reduce our **Carbon Footprint** as a response to climate change. The Anglican Churches of England and Wales have a target of 2030 to reach zero carbon whilst local authorities and other denominations have similar targets in place. Carbon dioxide is a key greenhouse gas which needs to be reduced but it is also crucial to life. Life revolves around the carbon cycle which, when in balance, is releasing and using both carbon dioxide and oxygen in a balanced way.

When we think about capturing carbon, most of us think of tree planting but actually this is not always the best thing to do. Trees, shrubs, grassland and soil all store carbon. A tree in the wrong place can damage precious habitats and trigger a release of carbon so care is needed.

**Trees, shrubs and woodland**

Trees and shrubs store carbon in wood, within the branches, roots and trunks. Trees store more carbon than other plants due to their size and long lifespan; a veteran tree has been storing carbon within its wood for a great many years. Due to this, trees are often seen as the pinnacle of carbon sequestration, and tree planting schemes are promoted as a way to combat climate change.

**Grassland**

Grasslands are often overlooked as an important store of carbon as they don’t contain large visible plants like trees or shrubs. Grasslands do store carbon within their leaves, stems and roots though and can hold a great deal of carbon within the soil. It is estimated that up to 30% of the earth’s carbon is stored in grasslands as soil carbon.

**Soil carbon**

Soil carbon is the carbon that enters the soil through decomposing plant matter.

When plants or parts of plants die, they are broken down and used as food by invertebrates such as insects and worms, by fungi and by bacteria and other microbes. Whilst some carbon dioxide is released through this process a great deal of the plant matter is incorporated into the soil. This plant matter is made primarily of carbon and oxygen.

The more mature soil is, the better for carbon storage. A mature, complex, undisturbed soil has a wide range of invertebrates, fungal mycorrhizae, bacteria and other microbes all of which are made of carbon molecules. Burial ground grassland tends to be full of different grasses, flowering plants, fungi and lichens. This richness above ground leads to a corresponding richness below.

**So, which is the best?**

It is not easy to directly compare the carbon within a veteran tree, a group of shrubs and an area of grassland, there are so many variables such as tree size, age and type, number of species within the grassland, soil depth, underlying rock, management and rainfall. Rather than doing a direct comparison it is more useful to know that individual trees, grasslands and areas of woodland are **all** excellent carbon stores. With trees, shrubs and woodlands most of the carbon is above ground and visible, with grasslands it is mainly invisible - within the soil.

Burial grounds can be a good store of carbon. The majority contain undisturbed grassland which has been storing carbon within the soil for decades, centuries or even millennia. They also contain trees, sometimes an area of woodland and native shrubs.

**Reducing the Carbon Footprint of a burial ground**

When planning how to reduce your churchyard, chapel yard or cemetery carbon footprint there are two aspects to consider:

1 How can you manage a burial ground to allow the most carbon storage.

2 How can you reduce the carbon dioxide or other greenhouse gases by reducing the oil and other chemicals you use.

**Managing a burial ground for carbon storage**

**Trees** (see sheets A4 inspecting and caring for trees, A5 yews and other veteran trees, A6 practical management of trees and shrubs and A7 caring for hedgerows)

Whether intentionally planted or self-seeded, burial ground trees are storing carbon so try to avoid cutting down or pruning trees unless this is necessary for safety reasons or potential damage to buildings or monuments.

Existing Trees and Shrubs:

* Prolong the life of trees and native shrubs like hazel by pollarding or coppicing.
* Consider allowing branches of veteran and ancient yews to touch the ground and take root, this is rejuvenating and keeps the tree living for longer.
* Deadwood contains carbon and decomposes slowly. Think of deadwood as an asset to be stored, either in a deadwood pile or if possible, leaving it within the tree where it will also provide holes, nooks and crannies for wildlife too.
* Wood is also a useful product and by making something long-lasting you will be storing carbon for the lifetime of what you make. If a tree needs to be felled can the wood be used for floorboards, furniture or even a bowl or two?
* Do you have hedges? Increasing the area of a hedge leads to a direct increase in carbon storage. Could it be left to grow taller and wider and any gaps planted up.
* Do you need to rake up dead leaves in autumn or can they be left beneath trees? If left they will be pulled into the soil by worms and will increase soil carbon. Raking them up to put into a compost heap helps too and is the best option if they can’t be left.

Planting new trees and shrubs

* There is sometimes a place for new planting in burial grounds. You may be replacing a tree that came down in a storm, or planting in an area of grassland which does not contain much diversity. Try doing the simple survey in our Burial Ground Botanical Companion (on our website – caringforgodsacre.org.uk) to see if the chosen location for a new tree is already full of species in which case a different place would be better.
* Could you plant a hedge if you need a new boundary, perhaps to delineate a churchyard extension? The young, vigorous hedge plants will store carbon particularly rapidly in their first years of quick growth.
* If you have flowerbeds, can you plant some shrubs within them?

**Grassland** (see sheets A2 caring for grassland, A3 cutting long grass and dealing with grass cuttings and A8 creating a wildflower meadow and helping wildlife).

Burial ground grasslands are likely to be excellent for carbon storage as they tend to contain a rich array of plant species. Their carbon storage can be increased by managing them in a traditional, less intensive way.

The higher the number of different plants growing in the grassland, the greater the amount of stored carbon. This is because an assemblage of meadow species growing together will use the available resources (light, water, minerals) effectively as different species have different needs. In other words, more species result in a more efficient use of available resources, which increases productivity, thus increasing carbon being removed from the atmosphere and used for plant growth.

More plants also mean more plant debris going into the soil and a wider range of animals including soil invertebrates which may be specific to particular plants. By having a range of meadow flowers as well as grasses there is more carbon stored within plant roots, as the meadow flowers tend to have longer roots than grass species.

A longer sward means that more carbon is used in producing the stems and leaves of plants, it also means that roots go deeper to support the larger plants. Deeper rooting leads to more soil activity which in turn leads to more soil carbon storage.

Short grass will store carbon but does not store as much as long grass.

Grassland with a few species will store carbon but does not store as much as grassland full of different grasses, wildflowers and a rich association of animals.

N.B. grasslands do not continue to store more and more carbon over centuries, they reach a point of saturation. It is important to keep that carbon locked away within the grassland. This is the same for other natural habitats such as peat bogs or mature forests.

Consider:

* Increasing the amount of long, meadow grass within your burial ground.
* Managing short grass areas a little differently – how about having medium grass which is cut monthly with the cutting bar at its highest setting? This small difference will increase carbon storage both above and below ground whilst remaining manageable and neat.
* Keeping a record of the plants within your grassland; many burial grounds have a wide variety of grassland plants but for those that don’t, you might consider enhancing the sward with seed or plug planting.

**Soil Carbon**

Burial grounds tend to have mature, undisturbed soils. When soil is bare it erodes which leads to the carbon within the soil being released back in the atmosphere. When plant debris within soil is exposed, it quickly decomposes, releasing carbon. Burial ground soils rarely erode as they are not broken up by ploughing or excavation. Apart from grave digging these soils have been gradually deepening, with a complex network of invertebrates, fungi and microbes forming. Grave digging, whilst it is disturbing to the soil, leaves soil open to the air for a short time following which the soil is replaced and turves laid back on top.

Longer vegetation such as meadows rather than short lawn creates a deeper zone of active soil associated with deeper plant roots. Active soil contains more stored carbon as it is full of life.

Consider:

* Following the steps above for grassland, this affects the soil and the carbon stored within it.
* Avoiding unnecessary digging, burial grounds contain biodiverse, mature habitats so no need to try and ‘enhance’ by putting in a pond or making extra flower beds.
* Keeping soil covered with vegetation helps to prevent carbon loss so include ground cover plants within flower beds.

**Reducing the oil and other chemicals that you use** (see D6 sustainability)

The management tasks that you, and other churchyard volunteers do may use fossil fuels, but this can be reduced or even eliminated. Here are some principles in carbon reduction to consider and try and follow.

Consider:

Reducing the use of power tools as most of these (including grass mowers) are petrol driven and less use means less carbon dioxide. Do you need a leaf blower or hedge trimmer or will a rake and clippers do? When you need to buy new tools maybe choose electric ones and consider an electricity supplier that uses renewable energy.

Mowing less often, rather than short grass (cut fortnightly) how about a combination of medium grass (cut monthly) and long grass (left uncut for 3 to 4 months) – far less mowing needed and far more flowers!

Using what you have near at hand. Moving things in vehicles involves fossil fuels so try to use or buy local. Do you decorate the church with flowers locally grown or imported?

Saving water, collecting and using rain for watering flowers. Treating and moving water takes time, chemicals and fossil fuels. Why not install water butts on the church downpipes?

Avoiding chemicals such as herbicides and pesticides. We have seen that more diversity means more carbon storage and producing these chemicals can be a carbon heavy process.

Composting green waste or let it decompose *in situ,* in a deadwood pile or as leaf litter. N.B. always rake up and move grass cuttings to a compost heap, do not leave them to rot on the sward or you’ll lose your wildflowers!

Do you burn leaves or deadwood? How about creating a deadwood pile and putting leaves into the compost. Burning releases carbon immediately unlike slow decomposition.

**Try and take a step on this journey**

It’s key that you do this gradually, change takes time, and it is important to keep managing your site whilst you change systems. Try and bring volunteers and the local community along with you as you make these changes, there may be ideas that would work in your gardens or public green spaces too. Start with something small, such as moving from fortnightly to monthly mowing of short grass areas and then follow this up with another change that is achievable, water butts perhaps. Every step on the journey helps and its good to focus on what you canachieve rather than what you can’t easily change.