

Buffer Design

This factsheet follows on from *Buffers – An Overview*¹.

The first four buffer functions mentioned in *Buffers - An Overview* are particularly relevant to the construction and operation of HS2:

1. **Enhancing/protecting biodiversity**
2. **Aesthetic functions i.e. noise reduction, improve visual quality**
3. **Improving/protecting water and air quality**
4. **Provide recreation opportunities**

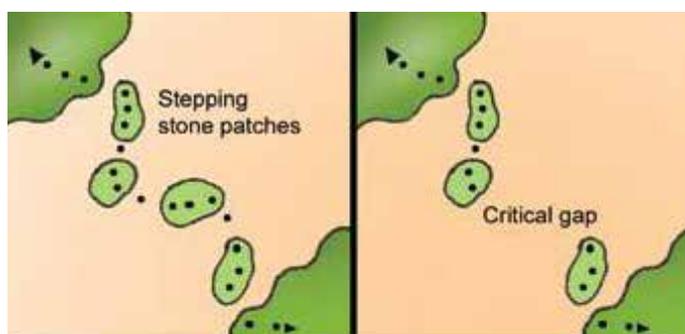
Biodiversity

Buffers can protect and enhance patches of high biodiversity by increasing the area of a patch, protecting it from impacts of development and/or increasing connectivity between patches.

The smaller the patch size the larger the edge to core habitat ratio and the greater the edge effects. Generally the larger the patch the greater the biodiversity contained within it. However, even individual trees can provide important stepping stones for biodiversity across the landscape and should not be discounted.

Patches should not be viewed in isolation – their position in the whole landscape and in relation to other patches and remnants must be analysed. Buffers can reduce critical gaps between patches, so even if they do not join patches together they can still increase landscape connectivity.

Critical gap size will vary between species and the general rule is: the smaller the species the smaller the gap needs to be. A good understanding of what species are important in an area is needed to define critical gap size.



The shape of the patch edge is also important when trying to protect and improve biodiversity. The more convoluted a patch edge the greater the impact of edge effects on the interior of the patch.



WTML/ Evelyn Simak

Buffers of varying widths can be used to reduce the length of the edge and so provide greater protection to species typical of interiors, which tend to be more sensitive to change and fragmentation than species typical of edges.

The linear shape of HS2 means that some patches will be bisected by the railway. This will increase edge effects (as new edges will be created) and decrease connectivity (as the patch will be split in two). It should be noted that if two patches have exactly the same area, but one has a clear corridor running through it (e.g. a railway or road), biodiversity will be higher in the intact patch.

If new edges are created in ancient woodland it may not be possible to implement planted buffers along newly created edges; ancient woodland can't be used to buffer ancient woodland. Nevertheless HS2 Ltd must strive to plant dense buffer habitat, where possible, to reduce the depth at which edge effects can penetrate the core habitat.

Planted corridors also have an important role in connecting patches together. Done correctly, they can increase the flow of species across an area. However, because corridors contain a lot of edge habitat, they can actually damage biodiversity by increasing the flow of species associated with edges rather than interiors.

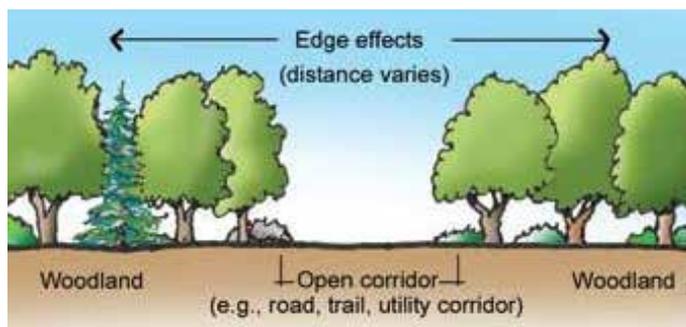
Furthermore, the habitat of corridors should match that of the patches it is connecting as closely as possible. Like buffers, construction of corridors must be considered at a variety of landscape scales to ensure the best possible design is achieved.

Multiple corridors or broad corridors (connectivity zones) are preferable to single corridors as they provide greater opportunities for connectivity. However, this may not always be possible in landscapes subject to multiple uses.

Aesthetics and visual quality

Buffers can improve the aesthetic appearance of an area by reducing noise and creating visually appealing landscapes. At the same time, the buffer may be used to provide recreational amenities, such as footpaths and cycle ways.

Buffers to improve aesthetics should be planted rather than allowing vegetation to grow naturally because planted areas are perceived as more visually appealing. The planting should contain a variety of species and be multi-layered to provide visual appeal and functionality. This may not fit with the objective



of what the buffer is for, so a compromise is to have a well-managed edge but a naturally regenerating interior.

Well-managed edges that include things like selectively mown strips of grass, fencing and signage about the buffer instil a desire for long-term care within a community, better ensuring a buffers' longevity.

Buffers made up of deciduous vegetation need to be wider than those made up of evergreens, to accommodate the effects of leaf drop in autumn. The ideal buffer design will achieve a balance between ecological functionality and visual appeal.

The denser a buffer is planted the better it is at reducing noise. Evergreen trees provide greater noise reduction than deciduous.

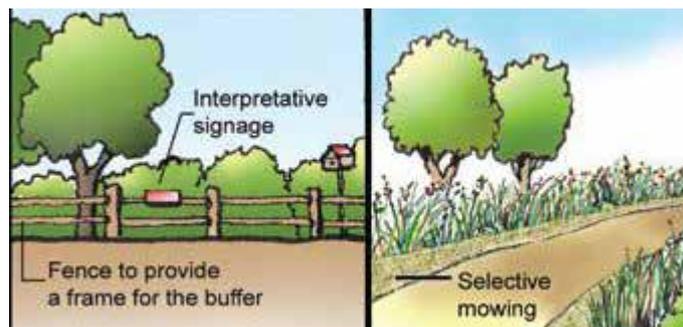
However, again a balance must be found between vegetation that is appropriate to an area, but that will also function as an effective noise barrier.

Manmade earthworks may also be incorporated into a planted buffer to improve its effectiveness at reducing noise. An additional factsheet on [Noise and Vibration](#)² is available.

Economics

The economic effects of buffers are often overlooked. In relation to HS2, there are a couple of factors worth considering:

- the placement of planted buffers to improve the visual amenity of an area may reduce impact on house prices close to the new railway line. The creation of greenways through buffers may add to this.
- buffers placed close to agricultural land can provide habitat for crop pollinators, which may benefit farm productivity.



While neither of these factors are primary reasons for planting buffers, they should be considered as part of overall buffer design.

Outdoor recreation

Buffers can be used to promote nature-based recreation activities. They can also be used to divert disturbance away from more sensitive habitat patches, without restricting access to natural spaces. Use of well laid paths and signage can foster a sense of ownership within a community, while protecting those habitats that benefit from reduced levels of disturbance.

References

1. Woodland Trust (2017) *Buffers - An Overview* <http://www.woodlandtrust.org.uk/get-involved/campaign-with-us/our-campaigns/hs2-rail-link/community-resources/>
2. Woodland Trust (2017) *Noise and Vibration: impact of trees and woodland.* <http://www.woodlandtrust.org.uk/get-involved/campaign-with-us/our-campaigns/hs2-rail-link/community-resources/>

All diagrams are taken from the United States Department of Agriculture National Agroforestry Center's [Design Guide for Conservation Buffers](#).



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