

## Case Study 1: Calvert Green Overbridges

### Background

As set out in HS2 Phase One Information Paper E15: Green Bridges <sup>[11]</sup>, green bridges are designed to maintain safe movement and dispersal of animals and plants from one side of the railway to the other and are proposed as mitigation for fragmentation of habitats caused by the construction and operation of HS2.

The main difference between a standard bridge and a green bridge is the increased width to allow vegetation to be planted along the structure. The design of HS2 includes several green bridges which have been designed specifically for bats and/or to provide safe passage across the route for other species.

As well as providing safe passage and habitat linkages, the addition of vegetation also helps integrate green bridges into the landscape and their wider environmental and social setting.

### Calvert Green Bridges

An important bat population uses habitats associated with constituent woodlands of the former Bernwood Forest in Buckinghamshire, including Bechstein's bat *Myotis bechsteinii* which is very rare in the UK and classified as near threatened at the European level. The assemblage of woodland bats also includes breeding colonies of Brandt's bat *Myotis brandtii*, Natterer's bat *Myotis nattereri*, brown long-eared bat *Plecotus auritus*, Daubenton's bat *Myotis daubentonii* and whiskered bat *Myotis mystacinus*. The population uses habitats extending from Station Road overbridge, north-west of Quainton, to the intersection with the Bicester to Bletchley railway line near Calvert, approximately 9km along the HS2 route and in the 'Calvert Section' of the scheme. The relevant bat licences for the works in the Calvert area, which includes a map of the licensable areas, can be found on the Natural England website <sup>[15]</sup>.

To mitigate for the fragmentation of habitats and operational effects of the railway the permanent design of HS2 in the Calvert section includes five Type 1 green overbridges, specifically for Bechstein's bats (see Table 1), two overbridges and three underbridges to provide safe crossing points over and under HS2 Phase One and the Aylesbury Link railway line.

The structures largely align with existing flightlines or provide additional connectivity to account for future changes in local habitats (principally associated with the restoration of Calvert Landfill Site to the west of the route).

Linear vegetation will be planted to the east and west of the mitigation structures to encourage bats to use these structures as preferred crossing points and to reduce the collision risk. The Sheephouse Wood bat mitigation structure will also be provided to provide a physical barrier to prevent bats from Sheephouse Wood emerging on to the HS2 railway corridor.

Woodland vegetation along a corridor up to 50 metres wide will be planted to create a parallel flightline to the north-east of the HS2 Phase One Project to compensate for the loss of vegetation along the Aylesbury Link railway line (currently used by commuting bats). This planting will link existing woodlands. Vegetation management will be undertaken along parts of HS2 between Edgcott Road and Calvert, to discourage bats from continuing to use the railway corridor as a flightline.

Bridge Name	Community Forum Area (as set out as part of the Environmental Statement and Additional Provisions)	Other Function (outside of core vegetated zone)
School Hill Green Overbridge	CFA13 - Calvert, Steeple Claydon, Twyford and Chetwode	Road
Calvert Green Overbridge	CFA13 - Calvert, Steeple Claydon, Twyford and Chetwode	None
Footpath SCL/13 Green Overbridge	CFA13 - Calvert, Steeple Claydon, Twyford and Chetwode	Footpath/cycleway
Bridleway GUN/28 Accommodation Green Overbridge	CFA12 - Waddeston and Quainton	Bridleway/Farm Access
Bridleway QUA/36 Accommodation Green Overbridge	CFA12 - Waddeston and Quainton	Bridleway/Farm Access

Table 1: Type 1 green bridges in the Calvert section of HS2

### Design requirements

The mandatory design elements for HS2 Type 1 green bridges are:

- no artificial lighting provision, unless essential for safety purposes and no light spill onto the flight path of bats, either on the bridge or on the approaches to the bridge.
- hedgerows and/or trees shall provide continuous cover over the bridge and connect directly into the adjacent vegetation at either end of the bridge (except for gated access points for maintenance, the size and number of which should be kept as low as reasonably practicable).
- As a minimum, the vegetated width shall be 30m comprising a 12m double hedgerow and grassland core vegetated zone, with an additional 9m of vegetated surface on either side.
- The core vegetated zone shall be maintained as a wide double hedgerow (with each hedgerow individually measuring at least 3m wide, plus a gap of at least 3m between the two hedgerows). On the outside of both hedgerows, a minimum provision of 1.5m of

meadow grassland shall be made as a further habitat buffer for the hedgerows. The base of the hedgerows and gap area in between shall be sown with an appropriate grassland mix.

- The vegetated areas outside of the core vegetated zone could support a farm access track, bridleway and/or footpath, but these shall not be hard-surfaced or artificially lit.
- Footpaths and/or bridleways could also be accommodated within the gap between the hedgerows of the core vegetated zone, but these shall not be hard surfaced, artificially lit, or more than 4m in width.
- Where the type 1 green bridge also provides for a road, the carriageway and any footways or verges associated with it shall be located outside of the 30m vegetated width (i.e. with no 'shared' areas). Similarly, any accesses or public rights of way with a paved surface shall be located outside of the 30m vegetated width.
- A suitably experienced ecologist's view shall be sought on the maturity and height of stock required for hedgerows to ensure that it is fit for purpose. Hedgerows shall be maintained in the long-term at an appropriate height to be suitable to achieve the ecological objectives for the green bridge. It is expected that hedgerows should be at least 1.5m in height on the bridge decks and two metres on the approaches to those bridges.

## Monitoring

There will be post-construction and operational maintenance inspections of green bridges to ensure the habitat is meeting its mitigation objectives.

Post-construction and operational monitoring of the bat population will be carried out, as agreed with Natural England as part of the bat licence, to establish whether favourable conservation status is being maintained. It will focus on how bats adapt to the mitigation measures that have been implemented to maintain connectivity within the landscape, the uptake of newly planted habitats by bats, population changes and flightline usage and will use methodologies including radio-tracking, thermal imaging, infra-red filming, and automated static monitoring.

HS2 hope to publish results of the monitoring in future to aid understanding of bat use of green bridges for the wider industry.

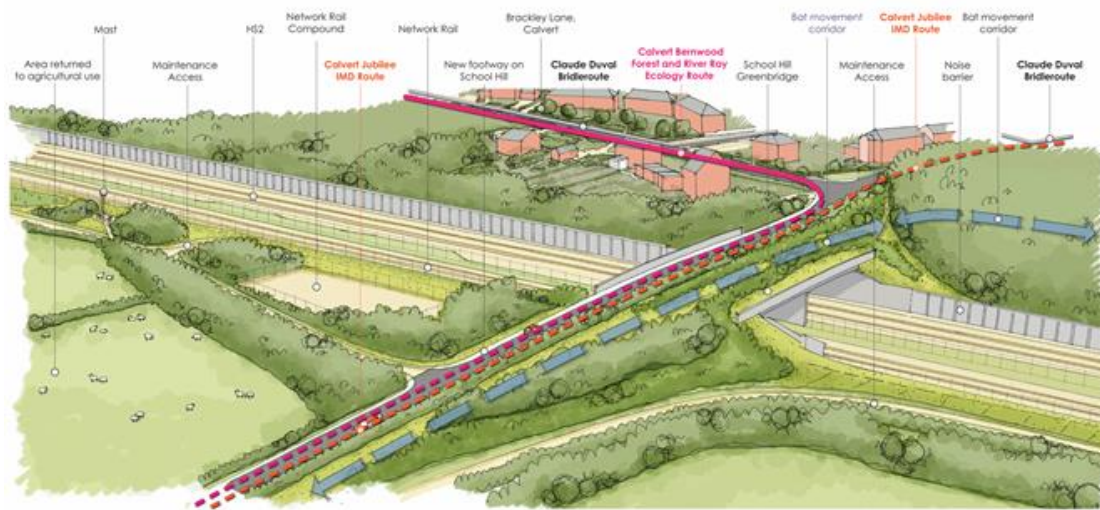


Figure 1: Artist's impression of School Hill green bridge. Artist's impressions are subject to change as designs develop

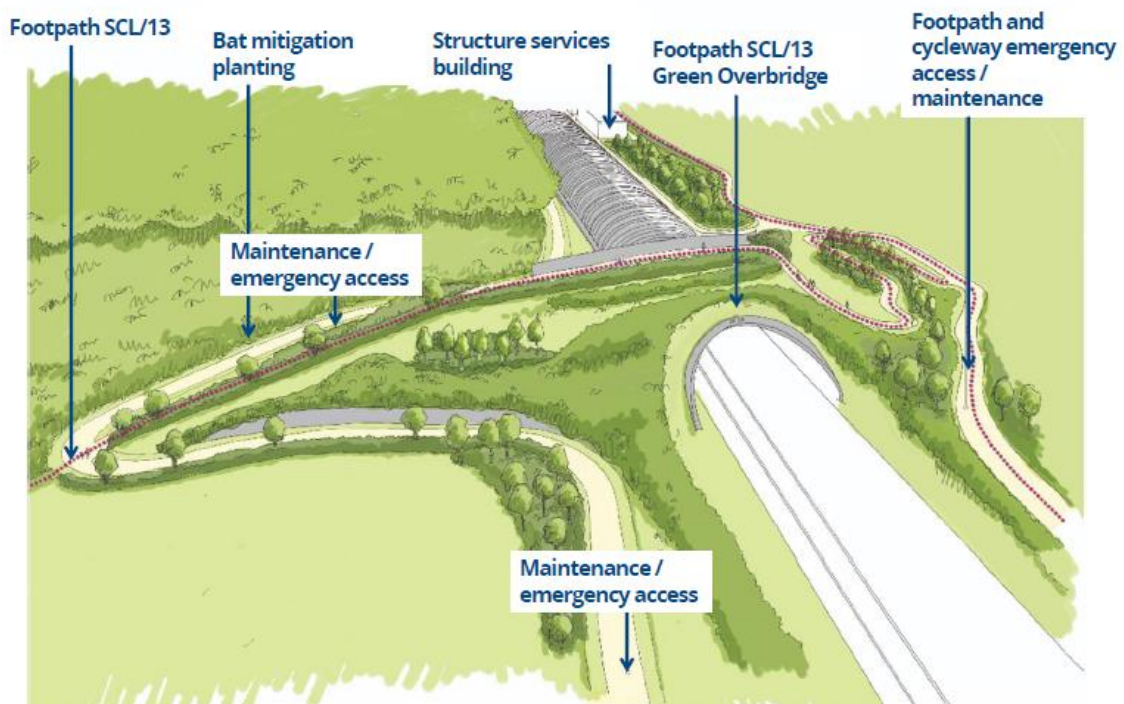


Figure 2: Artist's impression of SCL/13 at the northern end of the SWBMS. From public consultation. Artist's impressions are subject to change as designs develop.