

East West Rail Phase 2 Linear Badger Sett Design
Bicester, Oxfordshire to Bletchley, Buckinghamshire
East West Rail Alliance on behalf of Network Rail

BIG Biodiversity Challenge Award Category: *Innovation Award*

Project overview

East West Rail is the reopening the mothballed Oxford to Cambridge railway line. Phase 2 of the larger scheme involves the installation 37km of new railway connecting Bicester and Bletchley. This submission relates to the design and realisation of a linear badger sett used during Phase 2 of the scheme.

What were the biodiversity conditions on site, prior to the enhancement?

The existing railway footprint had to be expanded to accommodate the new works with compulsory land purchase being carried out under the provisions of a Transport and Works Act Order (TWAO). This resulted in the boundary line being fixed early in the development process; before the full requirements for artificial badger setts required as mitigation, had been determined. More than 200 badger setts were identified along the route. Categorising these setts, ecologists determined that 29 artificial setts were required to compensate for impacts of the works on the badger population and these were constructed over a 3-year period between 2019-2021.



Linear Badger sett in construction



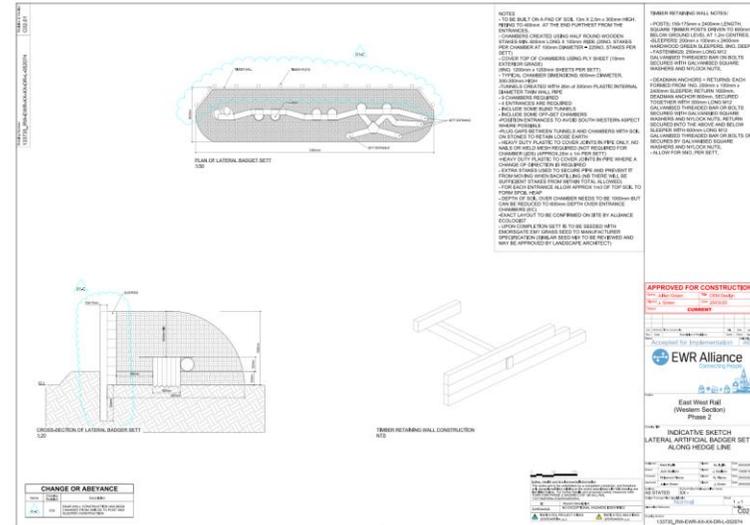
Example layout of tunnels and chambers



What were the reasons behind this project ?

With the limited land boundary fixed and restricted due to the requirements of the railway earthworks, the footprint available to construct 29 traditional artificial badger setts was insufficient. EWR Alliance (EWRA) ecologists explored and exhausted many traditional options, including engaging with adjacent landowners to purchase additional land outside the TWAO boundary, but negotiations were unsuccessful due to the perceived risk of tuberculosis (TB) and concern for livestock.

Without a viable mitigation option, EWRA would be unable to secure the necessary Natural England (NE) licence to legally undertake the works, causing a significant delay risk to the entire £1bn+ programme.



Approved for Construction design of the linear badger sett



Example of finished linear badger sett, prior to planting and seeding

What were the biodiversity measures taken?

Working as an integrated team, the ecology, construction, and landscape specialists mapped the 37km route, highlighting main and natal setts and mapped badger territories, identifying where the artificial badger setts needed to be located. During dedicated multidisciplinary workshops, the team explored options, developed ideas, and identified narrow strips of land allocated for environmental mitigation and hedge planting that could be utilised for artificial badger setts.

Although the strips of land were typically too narrow to install traditional sized artificial setts, the team worked in collaboration to design an innovative linear artificial badger sett. Occupying an area half the size of a traditional one, it could be constructed in the available narrow strip of land and still allow for the original environmental mitigation and hedge planting. This was achieved by creating a supporting wall on one side of the sett, building up earth and reducing the overall width of the sett from 7m (traditional sett) to 3m (linear sett) – halving the design footprint. The design of these hybrid badger setts had to be carefully integrated with the requirements for the earthworks, drainage and ancillary civil works to ensure that the overall scheme was fit for purpose.

Committed to, and with a zero-waste target, the team also developed the solution to reuse cohesive material from construction activities to help build around the sett's connected tunnels and chambers. The construction of the artificial setts was carefully phased taking into account the badger hibernation periods and project programme to ensure minimal disturbance to the badgers while balancing the need to achieve value for money on a major infrastructure project.

The EWRA also worked with the Animal and Plant Health Agency (APHA) to review the approach to badger mitigation and ensure it minimised the risk of perturbation and avoided possible consequential increases in bovine tuberculosis



Large spoil mounds, bedding and new sett entrances



Camera trap footage of adult badger and cubs using the linear sett



Further information

The new design was developed and included in the badger licence application. Gaining approval and consent from Natural England, the EWRA built 12 linear badger setts in the narrow strip of land which have proved to be more effective than traditional artificial setts – with 100% used by badgers within 5 months of construction and 70% being used for breeding within the first year of construction (the occupancy rate for the broad or traditional style setts was the same, but rate of confirmed breeding were 30% for those social groups, where the original main sett had been destroyed). The effectiveness of the linear setts is most likely due to the smaller footprint of the sett allowing the ability to fit the linear setts in closer to the point of loss and within the core territories of the specific clan, thus enabling faster discovery and uptake.

A first and innovative solution for the construction industry, the linear badger sett design and implementation demonstrates that despite having restricted space, smaller areas can be utilised successfully for badger mitigation, with minimal impact, reducing use of less sustainable materials and supporting zero waste targets.

The linear badger sett design and installation is easily replicable and creates considerable positive ecological impact for wildlife and a reduction in deposit of waste material offsite. It also has construction industry benefits in terms of overcoming a common issue, mitigating programme delay risks and avoiding the need for additional land purchase which could take up to three months to agree.

Project Team/What was the motivation for carrying out the enhancement?

To ensure the badgers retained a presence within the railway landscape and so the scheme was licensed by Natural England the linear badger sett innovation was thought of. This was achieved through continued project team presence of skilled ecologists, onboard since project commencement in 2016, which enabled an in-depth understanding of the badger territories and social groups. Integrated with the design and construction teams; including trusted contractors from Wildside Ltd and Ground Control Ltd, a collaborative, effective, repeatable and innovative badger mitigation solution was developed to benefit wildlife and overcome a common issue for the construction industry.