

“A break from convention by using alternative materials in an alternative design! By integrating our approach across the project teams, we have created an artificial badger sett which has proven very successful with the local badger population.”

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Project Manager (Geotech)



Green Apple Award 2023 case study

Gomshall Rock Cutting – Cardboard and FSC timber linear Sett

PROJECT	Gomshall Rock Cutting
CUSTOMER	Network Rail
LOCATION	Guildford
CONTRACT	One Team Wessex
COMPLETION	2023





what did the project involve?

Traditionally, artificial setts are designed and installed using large plastic or concrete drainage pipe for access tunnels with chambers made from wood or concrete blocks.

Depending on local population size, dynamics and behaviour artificial setts usually form a network of tunnels, chambers and entrances which branch out and provide compensation for a sett that's being closed.

Gomshall Rock Cutting was an embankment stabilisation project for Network Rail where a large badger sett had contributed to embankment instability and subsequent failure; sett closure and the construction of an artificial sett as compensation was required.

Working as an integrated team, Octavius' environmental and design teams together with ecologists and landscaping teams from Ecus developed a formal proposal to Natural England to interfere with and close the existing sett while providing an alternative linear sett comprising cardboard tubes and FSC timber.

Following the selection of a suitable site near the existing sett and within the Network Rail

boundary, the design for a linear artificial sett was evaluated. The main considerations being to prevent future trackside issues, optimise space availability and land access, while aligning with Octavius' single use plastic policy.



Image 1. Showing trench construction and initial sett placement

Natural England were consulted throughout this process to inform the license application for the work and ensure that the design and the materials used were acceptable to fulfil the license conditions.

Following an initial sketch of the linear sett, a final CAD design was developed using

cardboard tubes, FSC timber and site won material. During the consultation process with Natural England the detailed design and application was assessed resulting in a final submission whereon the license was granted for the proposal.

One large trench with two offshoot trenches were excavated and wooden chambers (installed with bedding material) were located in pre-prepared locations with connecting cardboard tubes.



Image 2. Showing and internal sett layout



Two tubes were used to form the sett entrances and two blank ends, located parallel to the line, were included to allow for sett expansion. Once the chamber tops were installed, the first layer of free draining materials (fine aggregate / sub-soil) was placed on top of the sett and wire mesh installed towards the rear of the sett to prevent sett expansion towards the line and counteract spoil movement in the same direction. A further layer of topsoil was then placed to bury the wire and further conceal the sett.



Image 3. Showing sett and blank ends

The cardboard tubes comprised of recycled paper bonded by natural plant starch adhesives which provides natural water proofing and extends the life of the tunnels while allowing natural settlement of materials supporting and overlying them. As the tubes eventually biodegrade the tunnels will revert to a natural condition providing greater opportunities for badgers to extend and create further tunnels, chambers, entrances to the sett. The sett design extended to 8m with two entrances and three chambers and was completed in three days.



Why do it?

Committed to a zero avoidable waste target, Octavius' environmental and design teams developed the solution to reuse site won soils and surplus aggregate from construction activities to help support the sett's connected tunnels and chambers while providing a free draining media to prolong the life of the tubes.

Single use plastics account for c.10% of Octavius' general waste stream. With a focus to reduce reliance on single plastics through sustainable procurement, value engineering and alternative approaches, great strides have been made to achieve these goals across all areas of the business, with the artificial sett at Gomshall being one of these.



Cost

The construction of the linear sett was carefully phased observing badger hibernation periods and project programme to ensure minimal disturbance to badgers while balancing the need to achieve value for money. The uncomplicated linear design made installation easier as did using light-weight cardboard and site won materials both of which ensured reduced manual handling and required less equipment which in turn accelerated the programme of work when compared to more traditional artificial sett design and build. In addition to this, no single use plastics were used, and no avoidable waste was produced. Estimated costs using traditional materials and equipment using the same linear sett design were calculated at c. £9k, by using alternative materials and fast tracking the construction process, savings of £2,800 were made.



Sustainable Materials

Integrating Octavius' single use plastic policy into design decisions at this level has challenged convention and produced an alternative solution to a relatively common ecological track side scenario. Octavius has integrated this approach into their ecological



procedures and ensured that their supply chain consultants are considering alternative approaches to conventional methods to reduce reliance on unsustainable materials; delivered through sub-contractor packages, best practice communication and alerts.



Benefits

Following construction and landscaping of the linear sett, monitoring of badger activity was undertaken via two camera traps positioned at the new entrances for a period of one month. Bait was laid from the new sett with suitable badger food in order to entice them from the old sett. Within two weeks, both camera traps captured two badgers using the new sett. Further monitoring is occurring over the next six to nine months to inform sett use and better gauge the longer-term success of the sett.

The initial monitoring results are favourable, in the longer-term we hope to see sett extension, occupancy rates increase and be used by social groups for breeding.

The learning from Gomshall has been integrated into a Biodiversity Toolkit which has been developed to specifically align with landscaping plans and highlight potential enhancement options that use site won

materials while focusing on circular economy principles. This has been well communicated throughout the Octavius business and is available to clients and the wider supply chain.

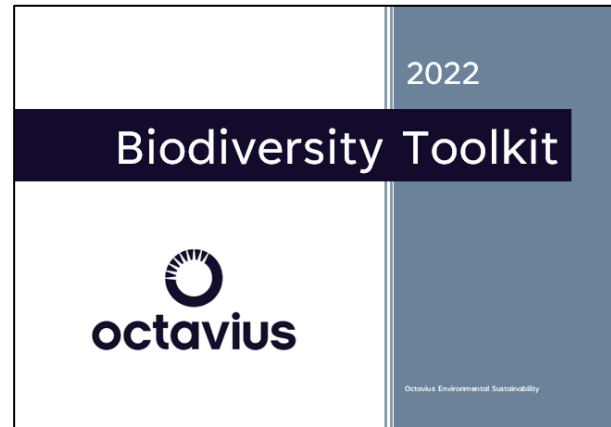


Image 4. Enhancement Options tool -Biodiversity Toolkit



Final Thoughts

The innovative approach to linear sett construction using site won materials, carboard tubes and FSC timber can easily be replicated and scaled up on other rail projects and provides significant ecological and construction programme benefits. The success of the scheme was driven by early engagement with Octavius' internal teams and supply chain partners to produce an effective ecological solution to a common issue.