

Engaging Eels - The Artecology Eelevator Holbrooks Stream, Shalfleet, Isle of Wight

Island Roads Highways PFI (Client) with Artecology, Environment Agency and Arc Consulting

BIG Biodiversity Challenge Award category: Client Award

Project overview

If ever there was a project that exemplified overcoming barriers for biodiversity in built infrastructure projects, this must be it! What could have remained everyday roadworks has become instead, thanks to the determination of the client, a springboard for innovation, helping the globally threatened European Eel negotiate impassable obstructions and move on to new life upstream! And all it took was a dash of cross-discipline STEAM-style imagination and Island Roads' (IR, Highways PFI) willingness to go the extra mile... The 'Eelevator' with its Heart and Dart Eel Tiles was designed by Artecology, commissioned by the Island Roads' Structures team, supported by EA Biodiversity Officer and ecologists at Arc, plus some very special volunteers. In all around 15 people played a part. The budget was only £2,000 and although the installation site is just a few square metres, it has unlocked over 5km of upstream habitat for eels and other fish to reach new spawning and refuge areas.

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

An existing concrete culvert apron, raised above the stream channel and already imposing a significant barrier to fish passage, was further raised as a consequence of culvert repairs using inserted sleeve creating a new 'lip' into the culvert pipe and further breaking connectivity between headwaters and downstream waters to the Yar estuary.

Were there any specific reasons that led to this project?

The rationale for the project was a need for ecological mitigation (via EA licencing) following essential repairs to the A3054 road culvert at Holbrooks. Island Roads engineers worked with EA licencing and biodiversity/fisheries teams and Arc Consulting (ecologists) to devise an enhancement scheme that could solve both new and existing fish passage obstacles as well as creating new small-scale in-channel freshwater habitat on the otherwise sterile concrete channel apron.



Artecology at work! The Eelevator with Heart & Dart Tiles

Artecology was commissioned by Island Roads to design a solution that would meet licencing requirements and biological enhancement objectives. IR and EA staff worked together on the installation of the structure.

What were the biodiversity measures taken?

Island Roads, working with the Environment Agency, agreed a method for the culvert repair, pulling through a plastic sleeve and curing with UV; quick and effective, but inevitably leaving a step-up into the culvert for any aquatic wildlife moving upstream. Holbrooks had a significant drop-off from its concrete apron into a deep scour-pool, so the opportunity to fix the culvert step became an opportunity for Island Roads to more significantly reconnect water levels between downstream reaches and the upstream catchment.

Eel migration into Island waterways is a high-priority conservation objective for local, regional and national bodies and this project offered a chance to develop a new method for solving existing and future fish passage. Island Roads wanted to do more than the basics, and instead looked at its full programme of culvert repairs and commissioned an original biodiversity solution that could be used and used again. And so the Elevator was borne! A basic tile design was devised to provide physical purchase for eels moving upstream as well as water retention and low-flow capture. 180 tiles were then cast and a steel frame created to provide the main ramp between scour pool and spillway.

The installation was built over 2 days, put together in situ allowing the project to respond to the specific features of the channel, creating a range of micro-features, such as backwater pools and textured infill for plant colonization. Island Roads have created a retrofit system for fish passage that is quite unlike the standard 'bristle and tube' options currently available. Its advantages are its great strength, permanence, extended benefits to other aquatic species, sympathy with the built form of the infrastructure, added asset resilience and, very importantly, the introduction of a beautiful, ornamental quality to public infrastructure that is entirely at one with its ecological functionality.



How would you best describe the project?

It is both Mitigation and Enhancement! But certainly takes enhancement measures into new and innovative territory thanks to the client lead.

Further information

A modular system, consisting of a steel-framed ramp lined with eel tiles retrofitted directly onto the existing concrete infrastructure and joined to a kerbed 3-tile-wide pavement running up and into the culvert mouth. Edges were newly concreted to provide an additional stippled surface. The 'Heart and Dart' tiles were cast from a folded paper sculpture (using origami techniques) in specially-sourced high-performance natural concrete. Installation took 2 days; Island Roads and EA participated to better see and understand the possibilities of this technique.

It is too early to fully evaluate benefits as the Eelevator is a brand new R&D, project. But, within days of installation, sticklebacks were spotted exploring the tiles' contours so the signs are good! Island Roads and EA teams monitoring wildlife use of the structure; nearby county wildlife trust offices also informed.

Tips:

- Pack as much biological punch into small areas as possible!
- Think multi-species – overlapping biological advantages
- Folding and perforating for increased surface area and niche creation
- Punctuated intervention, affordable stepping stones of concentrated biological benefit across infrastructure, you don't need to do everything everywhere!

Lessons learnt: Always make sure your waders are fully waterproof before you get in a river and however tempting it is, don't crawl through the culvert! The Big Biodiversity Challenge is an absolutely essential consideration! Encouraging clients that doing just one thing towards biodiversity can make a world of difference is a great gateway to further engagement with the environment AND significant new thinking in partnership with regulators and local conservation teams.



The team on installation day: The Hunter family, Environment Agency, Artecology, Arc & Island Roads.

What was your personal motivation for carrying out the enhancement?

'Our work involves helping people get about smoothly but here we loved the challenge of helping eels enjoy safe passage too! Our sites are often environmentally sensitive so we work with Arc and Artecology to assess what's necessary but also what opportunities there are to enhance biodiversity. It was brilliant to be part of a local team supporting global ecology!' Joanne Huett, Island Roads Project Manager (Structures)