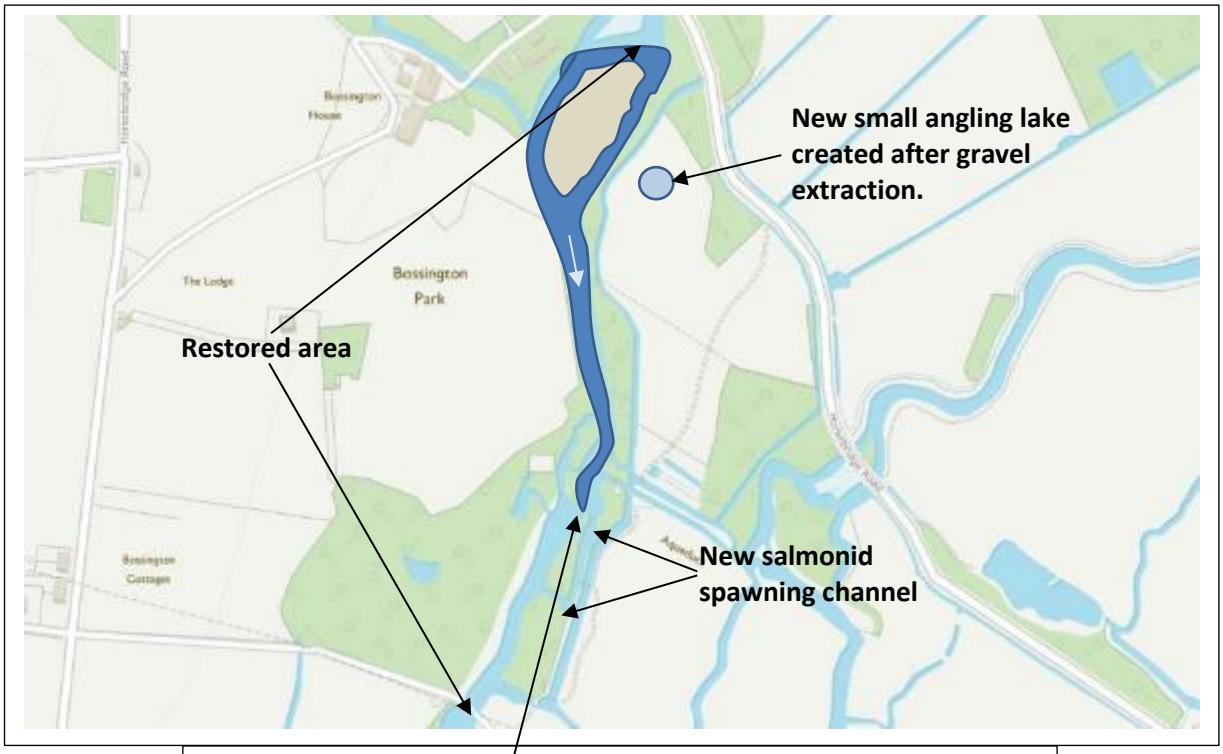
Test and Itchen River Restoration Strategy Projects completed in 2017.

The Test and Itchen River Restoration Strategy was involved in four collaborative river restorations in 2017. While not that many, two of these where the largest and consequently the most expensive collaborative projects completed since the inception of the Strategy in 2012. At Bossington Estate, one of the largest impounding structures on the Test was removed and at Southington in Overton one of the oldest impounding structures was removed. In both cases once the structures were removed the river was extensively restored through removing silt, narrowing, bed raising and re-instating meanders. Both of these technically challenging projects have transformed what were silty canal-like stretches of river back to free flowing, resilient sections of Chalkstream. This will enable the plants and animals usually associated with a Site of Scientific Interest (SSSI) Chalkstream to thrive once again; in the case of Overton for the first time in centuries. It will also make these stretches of river passable for all fish species whether travelling up or downstream. It is a credit to both the owners of these structures to enable this to happen and have the vision to see that this will improve and benefit the river well into the future. Credit is also due to the two sets of contractors for undertaking these technically challenging projects and completing them successfully: Cain Bio-engineering at Bossington and Robert Bull at Overton.

The other two, no less important restorations, took place at Wherwell Estate and on the Timsbury carrier both on the River Test for which the details will follow.

In total, the above collaborative restoration projects for 2017 restored just over 2km of the River Test, removed two major impounding structures, increased flood storage at one site, reduced flood risk at another, introduced 6000t of gravel, established a small lake for fishing and created one 100m long purpose-built salmonid spawning channel. Fish have already spawned in areas not possible before, and trout and grayling were seen freely swimming up and downstream at Southington for the first time in what could be centuries. Just to add some extra interest, an archaeological dig also took place in parallel with the restoration project at Southington. This was a great project as the local community were involved throughout. The Overton Biodiversity Society carried out the pre-works water vole surveys and the Overton Archaeological Society worked alongside county archaeologist in uncovering the history of the site. This was all rounded off with an enjoyable evening of presentations on the restoration works, the history of the site and looking at the numerous historic objects found.

Bossington Estate structure removal, River Test – T102/T103 – Restore – SU 33875 30768



Location and image of the large impounding structure at Bossington Estate

The above map shows the extent of the major restoration at Bossington Estate carried out by Cain Bioengineering. The darker area shows the length of river that was in poor condition due to the impounding effects of the two large structures. The largest of which is shown above.

Many of these historic structures are now redundant and while the impounded and slow flowing nature of the channel may provide ideal conditions for anglers to catch large stocked trout, it is at the same time stifling the river of its true potential.

Removing old structures that has been a landmark for many is a difficult decision to make for those involved but the benefits of this forward thinking decision will be seen well into the future.

Impounded river upstream of the structures at Bossington

The above photo shows the impounding effect upstream of the structures when they were still in place. While this may be an extreme example of an impounded section of the River Test it is representative of the negative effect impoundments have. A large portion of the Test and Itchen River Restoration Strategy is to encourage river keepers and fishery managers to promote the benefits of river restoration to anglers as some may like the above image and it's ability to hold large stocked fish. Stocked fish can still be caught in restored sections but importantly wild fish can also flourish in the newly created habitats. Numerous surveys have also proved that increased velocities also provide the correct conditions for increased numbers of Chalkstream invertebrates and promote the growth of macrophytes (weeds) such as *Ranunculus*. While river restoration is improving the SSSI status of the river it can at the same time provide anglers with a more natural fishing experience and a wider variety of challenges in a setting more appropriate and characteristic of a world famous Chalkstream. The removal of an impounding structure can also potentially reduce flooding to nearby at risk properties.

Structures removed and river restored

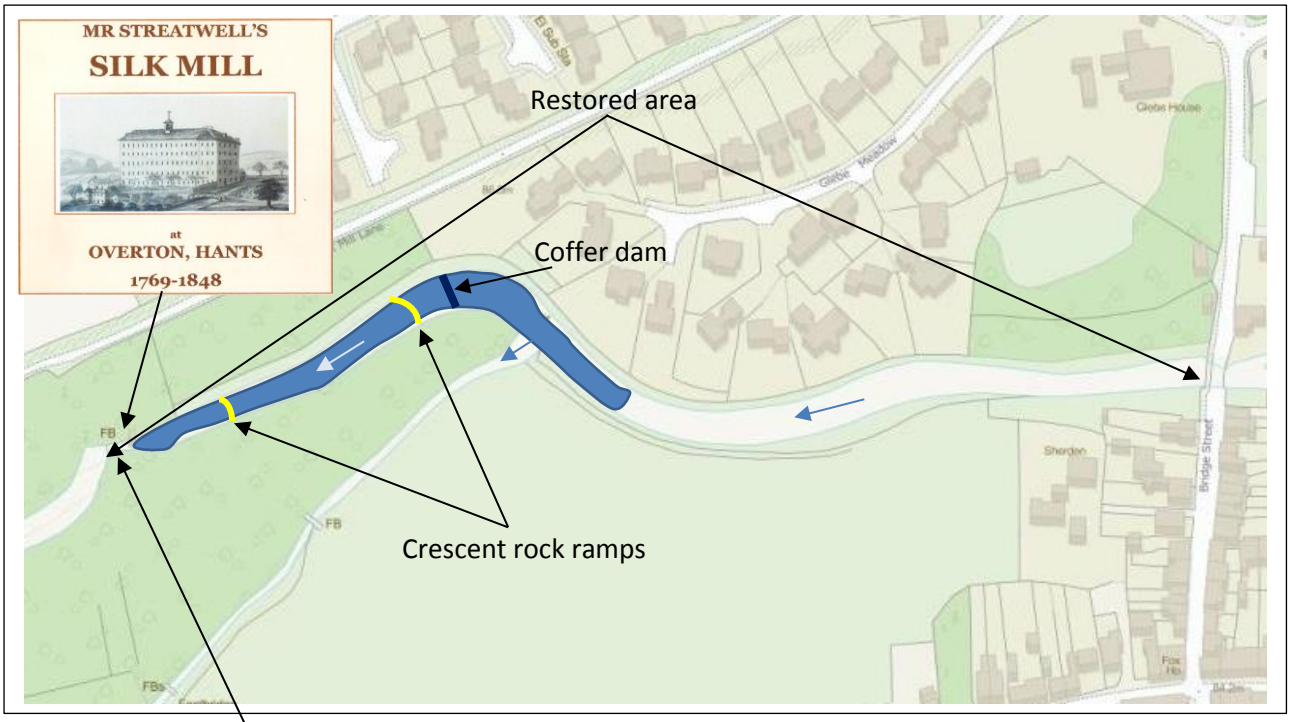
This is the same stretch of river once the structures had been removed. On removal the level dropped by nearly one metre, see arrow. The channel was then narrowed and sinuosity created by bank re-profiling and the introduction of woody material. The bed was then raised using locally-won gravel. The 'new' gravel bed was deliberately contoured to provide high velocity points for wild fish and deeper slower areas for stocked fish. Once finished the excavation hole for the gravel was re-profiled and will be used as a small beginners fishing lake. The silt that had accumulated upstream of the structures was also used in the narrowing process and also spread along the banks. This image was taken soon after the completion of the works in the autumn of 2017 and in-channel and bankside vegetation has yet to establish. Based on previous restoration projects this process will be quick now that the key ingredients of light and increased velocities are now present. Along with the already present seed base the margins will also be planted up with appropriate plants. In-channel weed growth can expect to change dramatically from ribbon weed to a wide variety of Chalkstream macrophyte species. Small shoots of *Ranunculus* were already growing only weeks after completion. In time this will provide excellent habitat for invertebrates and juvenile and adult fish species, though whether the river keeper will appreciate the extra work during the weed cut periods is yet to be seen!

Photo showing location of the old structures, the new spawning channel and the restored section downstream.

A total of 800m of channel was restored at Bossington Estate. Reducing the water level by removing the structures also allowed the banks to be lowered. In many places these had historically been built up with dredged material from the river, creating a ridge along the bank top. Removing this ridge and re-profiling the banks to a more natural gradient has reconnected the river with the flood plain and created an additional area of flood storage.

There were some unfortunate issues with the immediate downstream owners regarding coloured water during this project and this is obviously regrettable, but in the long run what has been achieved here is a substantial improvement for the benefit of the River Test. As if to give a seal of approval to the whole project, salmon were seen spawning on the newly introduced gravel upstream of the old structure only weeks after the project had finished. This was taken as a sign by all involved that what had been achieved was a huge success for the environment and will in time hopefully inspire others to follow suit.

Southington House, Overton, River Test – T008/T009 – Rehabilitate – SU 50953 49769



Location and image of historic impounding structure.

Siltation upstream of structure.

The above map shows the extent of the 400m long restoration, the location of the Silk Mill, and the historical impounding structure at Southington House. The shaded area shows the extent of the in-channel siltation.

The collaborative river restoration at Southington House was one of the most challenging and interesting of all the restorations undertaken by the Strategy so far. Not only was it technically challenging but historic records showed that there had been a structure at this site since the 15th century and a working Silk Mill straddled the river here from 1769 to 1848. Consequently this valuable historical heritage had to be taken into account.

Before any works could start the site had to be cleared of a large number of sycamore trees to create access and light. A coffer dam was then installed at the first bend, see map. Prior to draining the works area, a small number of trout and eels were caught and relocated downstream of the works area. The river was then diverted through a series of pipes and pumped to downstream of the works area so that work could take place in a dry river bed. This also allowed the archaeologists the opportunity to search the river bed prior to the start of the works.

Archaeologist working in the drained pool downstream of the structure.

A small selection of the archaeological finds.

Throughout the project it was important that the finished restoration recognised the historical value of the site and tried to retain evidence of its industrial past. 7000 original bricks from the upstream wing walls and downstream pool were cleaned and used again once the structure had been removed. The original iron gate post over the bridge was also retained and the iron fencing around the pool replicated. Archaeologists found a wide variety of objects such as musket shot, ink wells used in the Silk Mill, oyster shells, clay pipes, cutlery, coins and china. Very small horse-shoes shaped pieces of iron where also found. These turned out to be children's boot irons which children working in the mill would have worn on the heels of their shoes to extend the life of their leather soles.

The contractor Robert Bull facilitated this valuable work by using his machinery to uncover the foundations of the old silk mill and workers cottages while at the same time working on a very challenging restoration.

Before - River diverted and structure partially removed.

After - Structured removed, river reinstated and upstream banks re-profiled.

Dismantling the structure had to be done sympathetically so as to retain as much as possible of the original historic brickwork. During this process a large oak beam was uncovered under the silt lying across the width of the channel. A core sample was taken and carbon dated which revealed the beam was from 1769 the date the Silk Mill started.

Clearing the site and maintaining a dry channel for the duration of the works was challenging. A rough estimate suggests that pumping the river through pipes around the site for the duration of the 28 day project was the equivalent of 19,000 tanker lorries. 3000t of silt was also removed from the bed once the river was drained. At the end of the project this was spread around the entire site area to help level the ground.

One of the biggest problems to overcome during this project was to maintain a flow of water through an upstream SSSI offtake channel once the structure was removed. To regain the head lost, two crescent rock ramps were constructed upstream of where the structure once stood (see map). Each of these had to be designed to allow up and downstream fish passage for all species. With technical advice from fish pass colleagues 1.5 tonne blocks of Portland stone were positioned and angled to make up this difference.

One of the two rock ramps being installed. Notice the spirit level!

Finished rock ramp looking upstream. River reinstated and flowing over lowest set centre stone.

Eel tile

Providing up and downstream fish passage for all species was a major part of this restoration. Fish had not been able to get past the structure for maybe centuries. Once removed and the river reinstated trout and grayling were seen swimming up and downstream immediately, even the 'Brickies' were impressed. The image on the left shows an eel tile. Eels are not good at swimming against higher velocities and use these tiles by twisting through the nodules. To keep with the aesthetic of the brick work the eel tiles will be made of oak not black plastic. These will then be secured to the brick work on the bed running alongside the true right bank wing wall.

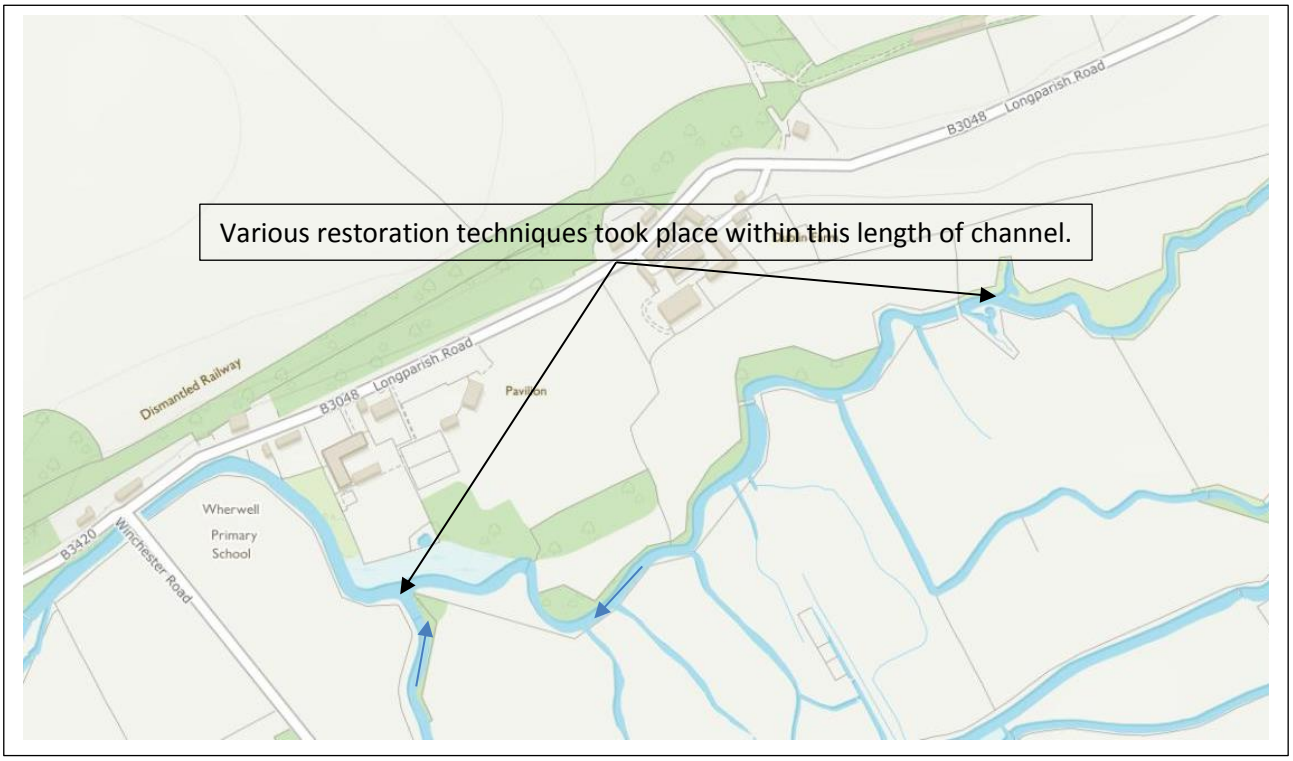
Aerial photo showing the downstream end of the restoration. The second rock ramp is just out of shot to the left and the SSSI offtake channel can be seen at the top.

The resident Kingfisher enjoying a Brook Lamprey amongst the woody material.

While the downstream end of this project had historical and technical issues to overcome, the stretch upstream of the SSSI offtake was far more basic in comparison. Here the river was overgrown and shaded. To improve this section the banks were reprofiled and the channel opened up. Locally sourced woody material was then introduced to create meanders and new bank side habitat, much to the delight of the resident Kingfisher.

Credit must be paid to the contractor Robert Bull for this project. He not only overcame the technical issues but was very patient in accommodating the wishes of the archaeologist throughout the project in uncovering the valuable history of the site. The whole project also reduced the flood risk to nearby properties and the adjacent recreation ground.

Wherwell Estate, River Test – Restoration of Beat 3, 4 and 5 - T053 – Rehabilitate
SU 39876 41370 (middle of site).



Map showing the extent of the restoration works at Wherwell

While no less important than the previous restorations at Bossington and Southington, the collaborative restoration project at Wherwell Estate was far less technical. Although some of the nearly 700m long reach provided some good chalk stream habitat much of the channel was over wide and featureless. Historic dredging particularly at the downstream end of the reach has resulted in a deep, silty, slow flowing section of river. The restoration, again carried out by Robert Bull, looked to improve the poorer sections within the reach.

Having identified the areas for improvement a variety of restoration techniques were used using locally-won materials.

Bankside woody material was used in the wide sections to create meanders and provide cover and habitat for a variety of chalkstream species. In time these will also fill in with silt and help narrow the river. Another technique used for building meanders was to use locally-won bankside material. Where appropriate shallow scrapes were dug just back from the bank and the material gained used to build meanders in to the channel. This technique provides an excellent source of material and also creates a shallow pool for a variety amphipians, insects and plants.

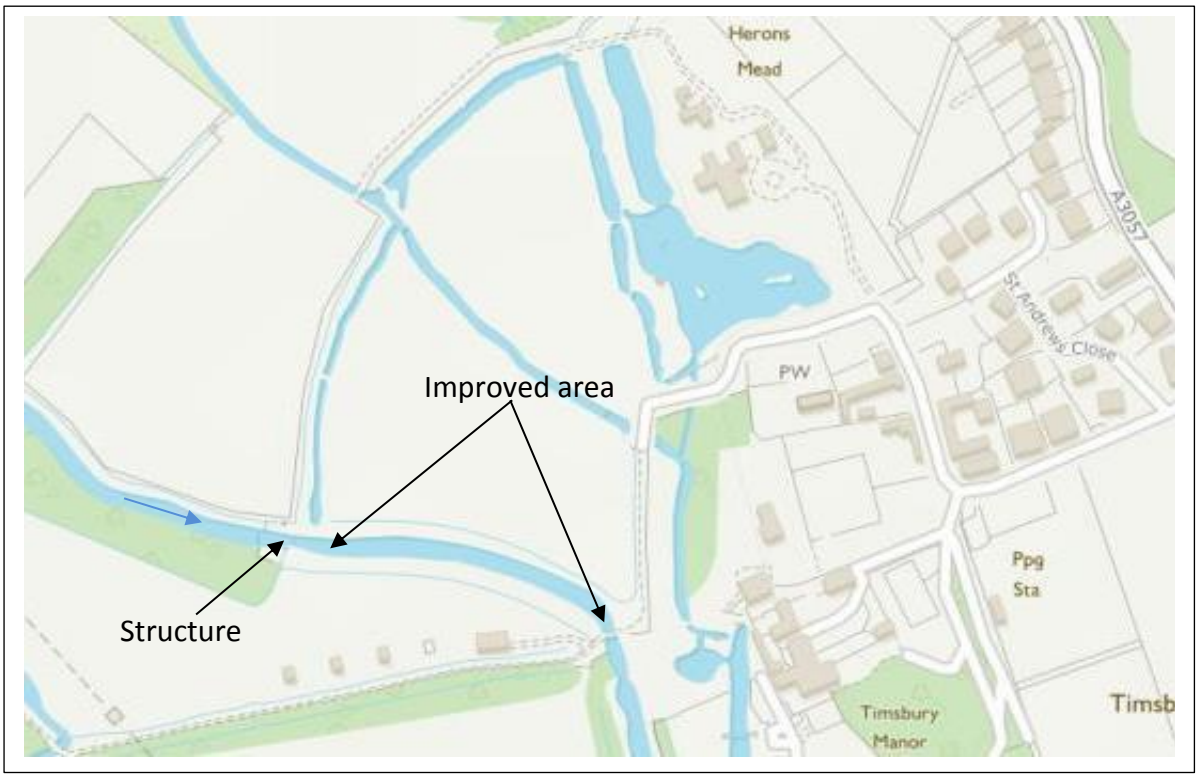
Inside meander created using locally-won material.

Pinch point

To add variety to the uniform channel a couple of Pinch points were also incorporated into the restoration. These are built at an appropriate location by making a shallow scrape in the bed and using the material to create 'shoulders' from each bank. This then increases velocities, provides potential spawning and juvenile habitat and provides shallow pools for adult fish. When building pinch points there is always the danger that you are impounding the river upstream. Consequently they have to be positioned in areas with good gradient and not be made too narrow.

The collaborative restoration work at Wherwell Estate follows on from the successful collaborative projects carried out on Beat 8 and 9 in 2016. It is hoped that by working with the river keeper there this work can continue over the following years.

Herons Mead, Timsbury, River Test – Downstream section of T136 – Restore – SU 34377 24473



Map showing the length of improved channel at Herons Mead

This 170m long stretch of river was the smallest and most basic of all the projects carried out in 2017. The short stretch has a structure at the upstream boundary and a bridge at the downstream boundary. The river here is a traditionally managed fishery with neat margins and a uniform bed, consequently this stretch has little habitat variety. The owner also owns the structure at the top of the section. This is presently having a negative effect on approximately 500 m of river upstream of it. The small scale of this collaborative restoration was a way to show the owners just some of the potential of their stretch. Meanders where created on both banks to add sinuosity to the channel and the banks re-profiled. Some tree planting took place and further planting with native plants will take place in the spring. It is hoped that by seeing this basic improvement it will encourage them to remove the structure so that the the channel upstream can also be improved. If this does happen, further improvements could be made to this section such as bed raising. Numerous discussions on removing the structure have already taken place with all the interested parties and these are still ongoing. Hopefully all will come to an agreement that the structure can be removed as this will allow a presently degraded canal like section of river the opportunity to provide a variety of in-channel habitats for the benefit of the riverine SSSI and all those involved.

The new meanders staked out and the structure in the foreground.

The meanders recently completed and the banks re-profiled.

The Future

It is noticeable that the Strategy has worked with some of same owners since it first started in 2012 with many of these being on the River Test. This is not to say the Itchen is being ignored, rather that there is more potential on the Test for real change. Many of the owners and fisheries the Strategy first worked with are now seeing their projects mature with an improvement in plant, fish and invertebrate life and are consequently looking for other areas to improve. However, none of these decisions are taken lightly. Deciding to restore or improve a stretch of river is a big decision to make particularly when paying rods are happy with things the way they are. Often though, this is based on the fact that present conditions provide ideal habitat for large stocked fish. While this may be the case this type of habitat is usually stifling the river and it's inhabitants of it's true natural potential. An example of this is the major restoration which took place at Bossington Estate this year. The impounded river upstream of the structure provided ideal fishing for large stocked fish and was very much a land mark feature for many people. For Bossington Estate to remove this feature was a major decision and should be applauded. It shows an awareness and forward thinking that the structure was no longer needed and was having a negative effect on the river. By removing it they have created a true Chalk River again, made it more resilent to climate change and provided the correct conditions for all chalk stream flora and fauna to flourish. Features such as deeper holes and slacker water have still been incorporated to hold the larger stocked fish so the fishery is now providing rods with a variety of fishing experiences. There are many similar structures of various sizes on both rivers. While some may be needed, many are not. The examples at Bossington and Southington will hopfully inspire others to follow suit.

There really have been some major changes made for the long term benefit of the river. There will always be some inevitable distruption downstream when undertaking a major restoration and there were some problems associated with this during 2017. Hopefully in time the long term benefits of these works will be seen to out-weight the short term disturbance. Lessons were learnt and these will be acted on in future projects. The Test and Itchen River Restoration Strategy would like to thank all the owners and contractors it worked with in 2017 as well as local internal Environment Agency staff who provided advice and dealt with the permits associated with these projects.

All the Strategy restoration projects are based on survey work carried out prior to the start of the Strategy. This identified areas on both rivers which would benefit from restoration for the benefit of the SSSI. Each numbered 'reach' was scored and restoration options provided. All the restorations to date have been based on these recommendations. Work has already

started on some exciting collaborative projects for 2018. Presently the largest of these is on the Itchen north of Winchester.

For any further information or to arrange a site visit please feel free to contact Heb Leman at heb.leman@environment-agency.gov.uk or on 07702 719398.

Maps for both rivers and further information can be found here:
http://www.therrc.co.uk/sites/default/files/files/Designated_Rivers/Test_Itchen/itchenv6.pdf

http://www.therrc.co.uk/sites/default/files/files/Designated_Rivers/Test_Itchen/testv5.pdf

http://www.therrc.co.uk/sites/default/files/files/Designated_Rivers/Test_Itchen/appendices.pdf

Suspected salmon cutting a redd on the newly introduced gravel at Bossington. This is upstream of the recently removed structure and only two weeks after the completion of the project.
Image courtesy of Cain Bioengineering.