Black & Veatch has extensive knowledge of all aspects of fish and eel pass design and management on UK rivers based upon successfully completed projects, whether for the Environment Agency or other clients.

We have developed a team of specialists that is supported by highly experienced personnel in related disciplines. We can therefore offer a full scope of services on obstruction removal and fish pass design.

Related services that Black & Veatch offers include:

- Fluvial and geomorphological assessments and audits
- Hydromorphology studies
- River restoration, habitat enhancement and habitat creation
- Ecological and environmental studies
- Geotechnical investigations
- Hydraulic and hydrological investigations
- Legislation & policy advice

Whatever your requirements, we can help you identify, evaluate, design and implement the right solution to meet your needs.

FEASIBILITY AND OUTLINE DESIGN

Black & Veatch professionals have a wealth of experience in undertaking feasibility studies in relation to fish and eel pass design, including obstruction removal. Recent examples of studies and outline design successfully completed by Black & Veatch are:

**PRIORITISATION PROJECT | North East England**

On behalf of the Yorkshire & North East Region of the Environment Agency, we developed a regional fish pass prioritisation model to aid fish passage assessment at approximately 60 weirs, sluices and gauging stations on rivers in North East England. The model focuses on environmental drivers and is suitable for use on a local, regional or national scale. A key deliverable of the project was the production of a template to aid individual fish passage assessment. The prioritisation model has now been used to assess a further 50 sites in the North West Region of the Environment Agency.

**CONWY FALLS FISH PASS | North Wales**

Black & Veatch carried out detailed investigations into the condition and functioning of an existing fish pass on the Conwy Falls in North Wales on behalf of the Environment Agency. The fish pass had originally been installed in 1996, but recent concerns had been two rubble mound breakwaters, one expressed regarding its condition and operation. The investigations included a diving inspection and hydraulic analysis to inform modifications and improvements to the fish pass. We went on to detail the proposed changes and to supervise the construction works on site.

**CHAFFORD SLUICE AND ASHURST WEIR FISH PASSAGE | Southern England**

This project for the South East Region of the Environment Agency was to identify and evaluate options for fish passage at flow control structures on the River Medway in Kent that currently obstruct upstream fish migration. The options considered included partial and full removal of the obstructions, Larinier type fish passes on the modified structures and semi-natural bypass channels. The options were appraised and the preferred options identified by means of RAG matrices. The project culminated with a formal option appraisal report and artistic impression drawings to facilitate stakeholder engagement prior to detailed design.
NANT MILLS FISH PASS | North Wales
On behalf of Dwr Cymru Welsh Water, we carried out investigations into the removal of a redundant weir and fish pass on the Afon Gwyrfai, which is a Special Area of Conservation river in Snowdonia National Park. The work included hydrological and geomorphological assessments to consider the impacts occurring due to increased erosion and deposition. The study recommended the removal of the existing weir and the installation of a natural rock ramp to maintain fish passage whilst avoiding excessive erosion. The project continued to detail design and supervision of the rock ramp’s construction.

BORROWASH WEIR FISH PASS | East Midlands
Borrowash Weir lies on the River Derwent downstream of Derby City. The Environment Agency has constructed a new fish pass around the weir, which comprises a 2.4m-wide, three-flight Larinier pass with an integrated eel pass. The pass was constructed in a sheet-piled bypass channel with reinforced concrete base and wing walls and includes facilities for monitoring cameras and telemetry equipment. Black & Veatch provided site supervision under the ECC contract. Borrowash was, upon completion, the largest fish pass of its type constructed in the midlands Region of the Environment Agency.

LEIGH BARRIER FISH PASS | Southern England
A feasibility study on behalf of the Southern Region of the Environment Agency on how to provide fish passage at the Leigh Barrier on the River Medway, near Tonbridge in Kent. The study identified and appraised four possible locations for a fish pass. It concluded with a recommendation to install a semi-natural ‘pool & weir’ type fish pass on a new channel to link a mill stream to the River Medway immediately downstream of the main sluice structure.

BETCHWORTH FISH PASS | Southern England
This project on the River Mole in Surrey, was carried out on behalf of the Thames Region of the Environment Agency in conjunction with the Betchworth Estate. The Environment Agency required a bypass fish channel, as opposed to a fish ladder incorporated within a new structure which would replace a failing weir. The landowner, however did not wish the new channel to be visible from his house. After detailed investigations, the option chosen was for the provision of a ‘rock ramp’ type fish pass in a new channel within the confines of the existing weir island. Black & Veatch carried out the design and then supervised the works on site.

LEVEN BRIDGE WEIR REFURBISHMENT AND FISH PASS | North East England
This project, for the North East Region of the Environment Agency, included the refurbishment of an existing weir structure on the River Leven in North Yorkshire and the provision of a new Larinier fish pass adjacent to the weir to allow salmonid migration upstream. The site had previously been a flow gauging station and the project included design and construction of a replacement gauge upstream. The project began with a feasibility study and then progressed on through outline design, detailed design and supervision of construction.

MIDLANDS GAUGING STATIONS FISH PASS PROGRAMME | Environment Agency
Black & Veatch provided improvements to fish passage at river gauging stations across the Midlands Region, covering 21 sites right through from feasibility assessment to detailed design and supervising construction. The design work included topographic, ecological and hydrometric surveys, structural and geotechnical investigations and hydraulic calculations to balance swimming conditions versus quality of flow monitoring. Computational Fluid Dynamic (CFD) modelling was used to improve the understanding of 3D flow regimes and the improvements which fish passes bring, which feeds into the knowledge-base to support national guidance.

DETAILED DESIGN AND SUPERVISION
Many of the feasibility studies completed by Black & Veatch have continued on to detailed design and supervision of construction. Further example projects are:

LEVEN BRIDGE WEIR REFURBISHMENT AND FISH PASS
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