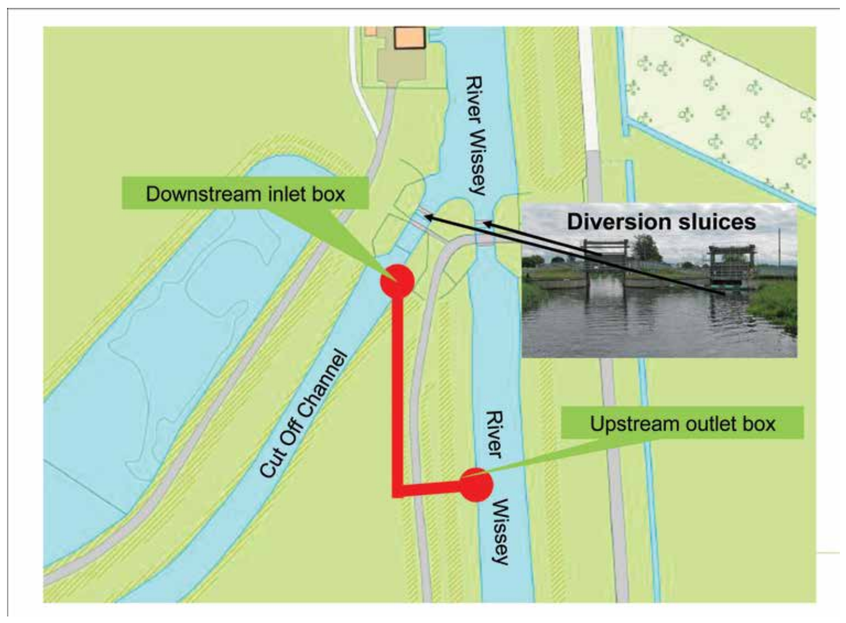
Connectivity at Barriers:
A Case study for technical fish pass solutions, Norfolk

Wissey Siphon Fish Pass

The Barriers...

Heavily modified water bodies dominate the Anglian region. Whilst some can be removed and restored many serve an important flood risk purpose, preventing flooding to local communities and some of the most productive arable land in the UK. Fisheries and biodiversity officers have not had it easy balancing EU water framework objectives with flood risk and water resource needs.
In this region a robust network of sluices form a fish un-friendly maze towards the sea. At Denver sluice it is possible for fish to enter the cut-off channel and effectivley landlock themselves with no access to suitable habitats or waterbody links. This is seen as a major contributing factor of WFD failure in this watercourse and a solution was needed.



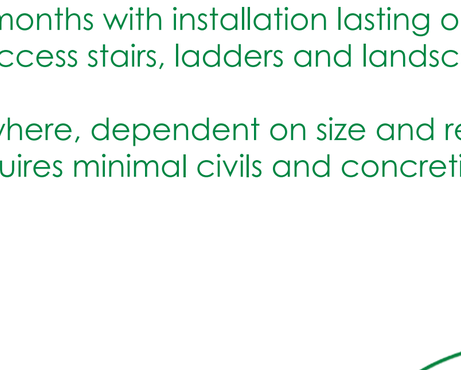
WHAT SOLUTION WAS REQUIRED?

Wissey diversion sluice required a solution which aided fish migration without compromising the current structure. it needed to:

- Maintain flood defence integrity
- **Suit multiple species (perch, roach, gudgeon, pike)**
- Work with 2.5m head difference
- Have cut-off isolation features
- Adhere to the current legislation
- be installed quickly beneath a public footway
- Operate well at low flows

Other options considered included a larnier fish pass, full bypass channel and fish flap valves, but due to flood risk and cost implications the siphon was considered the ideal solution for this site.


llowering siphon section into floodbank


entrance box in cut-off channel with access

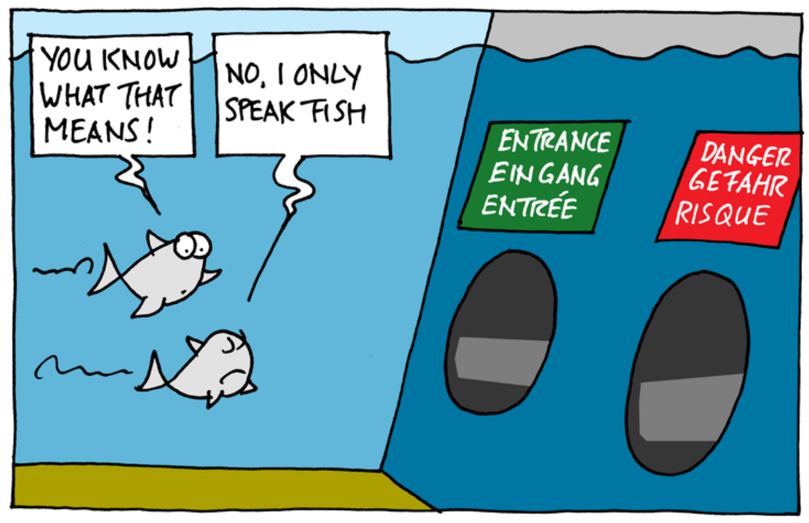
connecting the channels with siphon pipe

buried section complete

WORK ON THE GROUND.

The full project spanned nine months with installation lasting only 4 days. Total project cost including a monitoring suite, access stairs, ladders and landscaping finished within budget at £407k.

However siphon projects elsewhere, dependent on size and requirements start from £40k.
Installation is effortless and requires minimal civils and concreting due to the modular siphon design.



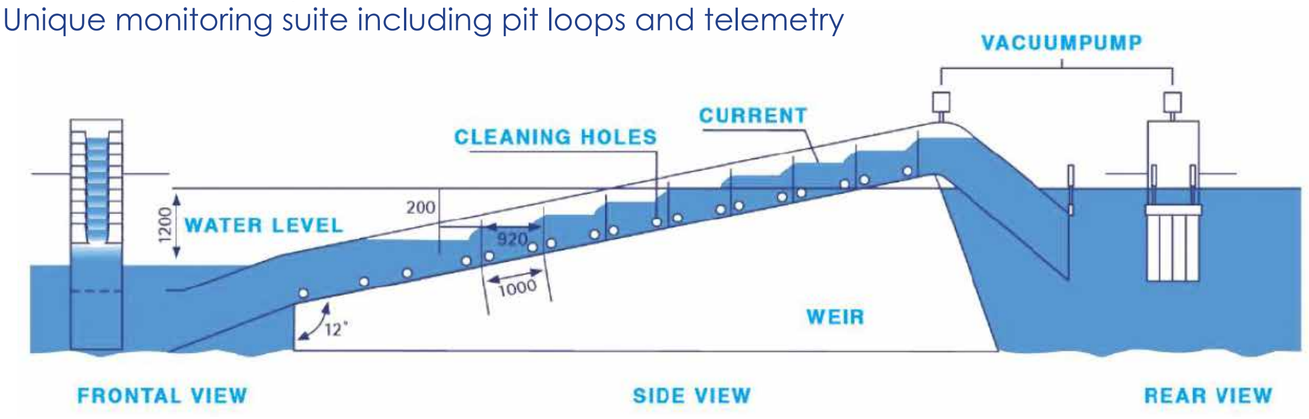
SUMMARY OF PROJECT DRIVERS

- Upper Wissey waterbody was failing its WFD classification based on fish.
- Improve fish classification from moderate to good.
- Additional positive impacts by adjoining tributaries such as Watton Brook.
- Ensure the sluice structure was compliant to the 2009 Eel regulations.
- Designate the structure as compliant to fish regulations.
- Help to improve the Norfolk sea trout fishery.

The Siphon Technology...

A Siphon Fish Pass is a pool and weir type pass contained within a composite pipe siphon. This means the flow rate is not subject to that of the watercourse but can be fully adjusted and changed by an alternating air bubble size within the vacuum. Each baffle section within the pipe is suitably spaced for the species watercourse requirements. The standard design, a concept used and developed in holland, was altered to better suit the UK environment which included:

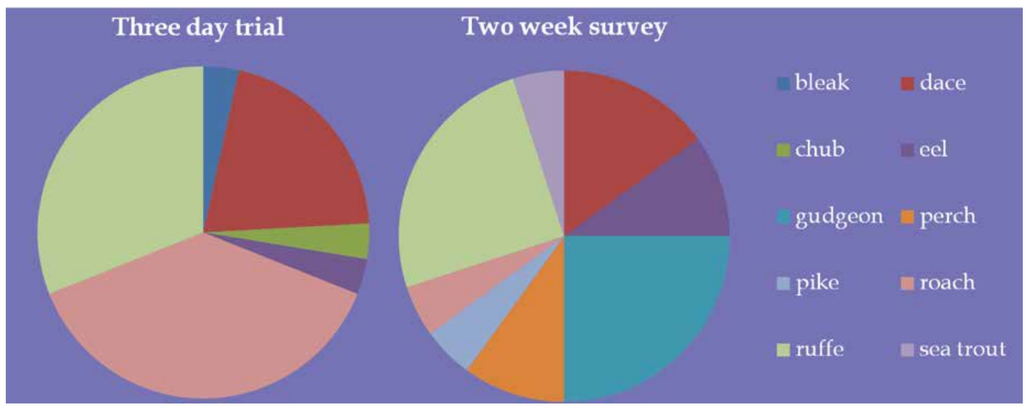
- Integrated eel pass
- Adherent knapp on each baffle
- Cut Off Valves for siphon isolation
- Unique monitoring suite including pit loops and telemetry



Monitoring...

Initial monitoring of the Siphon has already taken place by the Environment Agency in conjunction with Hull International Fisheries Institute. Fish tagging and fyke net surveys were conducted and provided evidence of use by a range of species including sea trout and eel. A full five year monitoring plan is currently in design by the Environment Agency in conjunction with Cranfield University. The key objectives are to catch around 3200 fish during the study period and tag at critical times such as sea trout spawning runs and downstream migration of the silver eel. This on-going study will involve:

- Fyke Netting
- PIT tagging
- Acoustic Tagging
- Video and DIDSON cameras
- Acoustic Doppler Current Profilers




Fish caught for siphon testing


Appearance of sea trout in Norfolk


Fyke net assembly

in partnership with Environment Agency

Cranfield UNIVERSITY

ACE

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A big thank you to the Environment Agency and partners for their continued support and partnership.