

**Archimedean Screw
Hydropower scheme at
Staverton**

Construction Method Statement (outline)

For new fish/eel pass, remedial works to weir, and hydro installation

31st October 2018

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Version control

31.10.2018 first issue

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31.10.2018

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31.10.2018

Executive summary

The Staverton Leat hydropower project project requires works to Staverton Weir and Leat which are outlined in this document. Text below is based on information provided by a competent river works contractor based on precedent and accepted best practice for previous similar works consented by the EA in the South West.

Aim of proposed works to Staverton Weir

The main purpose of the project is to install a hydropower scheme at Staverton Town Mills, itself a former historic hydropower site. This new scheme will be in the form of an Archimedean Screw, providing up to 100kW of power to Dartington Estate and the local grid.

In order to provide enough water via Staverton Leat for hydro generation, the leat's historic water levels (circa 1970) must be restored. To achieve this, Staverton Leat and the weir require minor remedial works. Water inflow to the leat is controlled via the sluice gates at the eastern end of Staverton Weir. In order to achieve the necessary water levels in the leat, the upstream or western section of Staverton Weir needs to be repaired to its original state.

The weir's current state of disrepair has caused water levels to drop upstream. The existing fishway or easement at Staverton Weir is considered very inefficient and because of this the weir continues to present a significant barrier to upstream fish migration (migratory salmonids and eels) Part of the works will include rebuilding the easement as a best practice and functional fish and eel pass in the current location.

Condition of the weir

The weir is in a delicate physical condition and it is possible that the next large flood event (potentially this winter) will result in a large shift in equilibrium in the stretches of the river above and below the weir.

The back side of the entire weir has scoured which has caused the concrete pile cap to collapse. Large pieces of the concrete have been dispersed down into the pool below or swept further downstream into the river environment. The loss of support from the concrete cap has caused the sheet piling to fail. This has now completely breached, and over the next flood events it is anticipated that this will continue to tear along its length, and finally be washed into the river environment below.

What remains of the weir partially controls water velocities and sedimentation upstream. When the weir fails, the current equilibrium will be lost, and water will be accelerated along what is the current length of the weir. This will result in a loss of sedimentation of the weir pool upstream and a dramatic drop in water levels.

This in turn will cause several major impacts to the stretch of river above the weir:

- Loss of landscape – the increase in velocity will erode the banks upstream at an accelerated rate. It is expected that the bank supporting the Oak tree adjacent to the weir will be lost and the tree will collapse. The banks upstream of the weir will be destabilised with expected loss to erosion. There will be loss of banks immediately up and downstream.
- Drop of river levels - this will create a large hydraulic gradient across the flood plain. This will potentially drain the nearby lake. Vegetation will receive less water on the flood plain, which is a concern specifically to trees immediately adjacent to the river.
- Loss of ecology – Reduction in the wetted perimeter immediately upstream. Not only will there be a loss of habitable environment, but the new passage of water may create a hostile environment for fish passage.
- Permanent loss of a visual amenity – the current materials will be spread over the area downstream, creating visually unappealing debris.

Construction method

This outline Construction Method Statement (CMS) will be the model for Method Statements (MSs) required from contractors.

Contractors will monitor Dart river level gauges online to ensure awareness of conditions in case of rising river levels.

Construction materials to be used will not differ to the materials that form the existing weir structure.

The materials will comply with the Environmental Agency's specification for construction materials in river sites.

Ecological risk from pollution of the watercourse must be managed during works by suitable precautions. Contractors are required to adopt clear prevention and mitigation measures compliant with EA guidance, to eliminate identified areas of risk:

- Fuel/Oil Spillage resulting in soil contamination
- Fuel/Oil Spillage resulting in contamination of water course
- Contamination of watercourse with cementitious material
- Contamination of watercourse with chemicals
- Contamination of watercourse with sediments due to run off from excavations

During works, water flow through the works will be excluded by piled or bagged cofferdamming around the weir works, and by similar cofferdamming and/or closing off the leat intake for other works, removing connection to the watercourse.

Additionally, where required, works in the river will be scheduled in the appropriate season to minimise river impacts on migratory fish populations. The EA has been invited to advise which are the preferred periods on the Dart.

Description of proposed works to weir

The works at Staverton Weir are anticipated to proceed as follows:

- 1) Temporary access to the south/west bank of Staverton Weir will be created via a route through the grounds of Waters Reach. The precise route is to be finalised in an agreement with the landowners (agreement in principle has been sought). The route will consist of grass protection matting, having minimal impact. A small site compound and welfare facility will be created on land adjacent to the weir.
- 2) Minor repair works will be required along the long stretch of the weir (stretching from the fish easement to the leat intake sluice gates). This work is likely to consist of block stone and concrete.
- 3) A temporary cofferdam will be created to temporarily redirect flows around the works, and dewatered via strawbale filters or equivalent to the grassed riverbank.

- 4) Due to the poor state of the broad stretch of the weir between the fish easement and the south bank meadow, the degraded materials making up the existing weir (steel sheet piling and concrete) will be removed.
- 5) A new cut-off (possibly in the form of steel sheet piling) will be installed.
- 6) A new weir crest will be installed in the section of the currently breached piles, constructed from reinforced concrete. The concrete will be darkened and given a natural finish.
- 7) A reinforced concrete channel will be installed to replace the current fish pass. Aluminium baffles will be installed to the slope face to create the required hydraulics for fish passage. Plastic eel tiles will be fitted. (The pass has been submitted for, and will receive, approval from EA NFPP prior to its installation.)
- 8) The working area will be rewatered and the cofferdam will be pulled.
- 9) Spare materials will be removed and the site will be made good.

Description of other works

- 1) A route from the public road to the tail end of the leat will be created. This will consist of grass protection matting, having minimal impact. A small site compound and welfare facility will be created on land adjacent to the tail of the leat.
- 2) Access to the leat intake sluices will be via a route permitted by the landowner from the public road to the south bank of the sluices. The leat intake sluices will be serviced and ensured operational. The sluices will then be set fully closed and the leat allowed to dewater. Works will proceed when river levels are not likely to exceed the sluice exclusion level.
- 3) A temporary cofferdam will be created to temporarily exclude tailwater from the river entering the downstream end of the leat. The cofferdammed area will be dewatered via strawbale filters or equivalent to the grassed riverbank.
- 4) Minor repair works will be required at isolated points along the leat walls and bed. This work is likely to consist of concrete or cement patch repairs.
- 5) The hydropower foundation structure will be constructed in the leat. Mechanical and electrical equipment will be installed. The control enclosure hut will be erected over the machinery.
- 6) The temporary cofferdam will be pulled.
- 7) Electrical cable will be entrenched according to the cable route plan, taking due care in accordance with the tree survey and archaeological report and standards for buried cable.
- 8) Spare materials will be removed and the site will be made good.