

St Ives Flood Alleviation Scheme

solving a long standing flooding problem in town centre

by
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The town of St Ives in West Cornwall is one of the most important centres of tourism in the region and is internationally renowned for its cultural heritage. The town is built between four beaches, two of which have Blue Flag status and extends inland from one of these beaches generally following the course of the Stennack River. Properties in St Ives have suffered frequent flooding from the river over a period of years; there have been eight flooding incidents since 1992, the latest being in August 2004. These incidents can affect 190 businesses and access to a further 2,500 residential properties.



St Ives: Construction work underway to prevent frequent flooding of town centre

photo: courtesy EC Harris LLP

The period between rainfall and the onset of flooding is very short due to the steepness of St Ives and the dense urban catchment. In steep areas, flooding tends to be shallow and fast flowing, whilst in the flatter areas in the town centre it can be deep and ponded due to being unable to escape in the existing culvert, which has limited capacity. Also, the outfall is subject to tidal conditions. The culvert also encounters a high volume of highway drainage in flood conditions which, if full cannot be dealt with. This leads to localised flooding in the highways and adjacent properties. In the flood of 2002, eight people were rescued by the inshore lifeboat - in the town centre.

Solution

The Environment Agency, in partnership with Cornwall County Council and Penwith District Council, employed the project team consisting of Mowlem Civil Engineering, Halcrow and EC Harris, to review the current situation and produce solutions. A number of options were developed and budget costed. These were priced in conjunction with EC Harris & Mowlem Civil Engineering under their respective national frameworks with the Environment Agency.

The current defences along the Stennack River are mainly walled sections and a number of trash screens of variable quality and effectiveness. The current culvert, which runs through the bottom of the town has limited capacity and has a number of access points for highways drainage.

Solutions considered included creating storage and various methods

of conveying the water to reduce levels. The storage option was dismissed, as there was no area large enough to create a sufficient reservoir pond far enough down the catchment. Other options were developed and budget priced and two solutions were favoured.

(a) New flood walls, increased size culverts under roads and new trash screens and associated structures at the top of the town, and a new tunnel diverting the flow to a nearby beach. This would allow the bottom of the town and existing culvert to become, effectively, for highway drainage in flood events.

(b) As (a) above for the upper town, but instead of the tunnel, create a new highway drainage system through the main streets of St Ives town centre and reline and seal the existing culvert to take flood waters from the Stennack River.

Both of these options were put to public consultation and developed further. Due to public concern and the issue of discharging flood water onto a Blue Flag beach, the tunnel option was dismissed and option (b) developed to create a budget approval design and costing.

A risk workshop was arranged to identify the project risks; this was attended by all partners and was facilitated by EC Harris, using one of their resident risk experts. The risks were identified, reviewed and valued, and measures agreed for possible mitigation measures and any residual risks. These were then entered into the Monte Carlo risk simulation and used in budget submission - which was approved in July 2005.

Wastewater Treatment & Sewerage

Post budget approval

The project team developed the design to maintain best value and provide the best solution. A number of value engineering workshops and risk meetings were held to ensure that the best value and least risk solution was being produced. A number of specialist culvert relining contractors were approached and their expertise utilised to ensure the best solution was implemented on the culvert relining section of the project.

During this development, Cornwall County Council (who were partly funding the project) raised the point that their own contractor, Cormac, would be able to carry out the lower town highway drainage works as payment in kind. This was developed and Cormac produced a price for the work. EC Harris market tested this cost using local projects, other National Environment Agency projects and EC Harris's national specialist water database of costings, Bench₂O. A number of negotiations were held and a final price was agreed in October 2005.

The works

The works consisted of 440m of 450mm twinwall pipe, being laid at a depth between 1.5m and 2.5m, associated laterals and a new pumping station. Trial trenches were carried out to identify the existing services and locate the best route through the heavily service populated highways. These trenches and historical data also indicated the presence of Blue Elvan rock anywhere one metre below the surface.

Work commenced on the lower town on November 2005, with a 26

week programme and was completed ahead of programme and under budget in April 2006. Less rock than anticipated was encountered and an average rate of pipelaying of 3-5m/day was achieved.

Second phase

The second phase of works being carried out by Mowlem Civil Engineering commenced in Mat 2006. These works consist mainly of:

- * replace small culverts with larger sections and raised walls upstream of those culverts, so that more water can be conveyed through the system;
- * reline the existing culvert and blocking off all incoming highways drainage and have bolt down covers so that the culvert will become pressurised under flood conditions;
- * place larger screens across culvert openings to reduce the risk of blockage & enable safe operation and maintenance, and remotely monitor water levels both sides of the screens;
- * carry out structural repairs to stabilise and improve existing channel walls where required.

The work is subject to two summer embargoes where works to the highway is prohibited. This phase of the works is targeted to be completed by Spring/Summer 2008.

Note: *C. Whitton is a Managing Surveyor at EC Harris LLP and Fiona Geddes project Manager for the Environment Agency.*
