Scour is the leading cause of bridge collapse worldwide, being responsible for compromising the stability of structures’ foundations. Scour and erosion can take place without prior warning and cause sudden failure.

Assessment of Scour:
Transport Scotland’s Highway Structures crossing a watercourse are assessed through the Design Manual for Roads and Bridges (DMRB) BD 97/12 Standard entitled ‘The Assessment of Scour and Other Hydraulic Actions at Highway Structures’.

- Level 1 Scour Assessment
- Level 2 Scour Assessment

Monitoring and Identification of Scour:
- Reactive Structures Safety Inspections
- Special Inspections.

A Reactive Structures Safety Inspection was carried out at the A68 Galadean Bridge, which is carrying the A68 Road across Leader Water, between the towns of Lauder and Earlston, in the Scottish Borders (Fig.1).

Emergence Scour Protection Design
- Leader Water designated as one of the Tweed Special Areas of Conservation.
- Emergency works being carried out during Winter.
- Location – access; flow conditions.

Solution:
- Rock rolls chosen as best solution.
- Three rows of rock rolls placed in front of the eroded embankment, 30 metres length.
- Sediment from the ‘island’ used to fill the rock rolls.

Scour Exacerbation
- Indemnent weather conditions during construction led to further scour occurring, which led to a significant land slip, prior to the implementation of the rock rolls intervention measures.
- The design had to be revised to incorporate the land slip.

Challenges:
- Scour is the leading cause of bridge collapse worldwide, being responsible for compromising the stability of structures’ foundations. Scour and erosion can take place without prior warning and cause sudden failure.

Reactive Structures Safety Inspection Findings
- Sediment transport has been the cause of the formation of an ‘island’ from depositing sediment, upstream of the structure (Fig.2).
- The course of the river has been redirected towards the western river bank, significantly eroding it, forming a bend (Fig.2 & 3).
- The flow has been directed on to the northwest embankment of the A68, deteriorating it and compromising the stability of the road (Fig.3).

Design Alteration & Monitoring
- A visual monitoring regime was implemented until the construction of the new design proposal.
- The new proposal included a two-phase approach in the design and construction of the scour measures. The first phase included the construction of a platform in front of the road embankment and the implementation of rock rolls, forming the scour protection (Fig.6). The second phase included the reconstruction of the affected embankment (Fig.7).