



Monitoring and assessment of infrastructure scour: a case study A68 Galadean Bridge

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Scour can be responsible for compromising the stability of Highway Structures (e.g. trunk roads) and in some cases the embankments supporting the road pavement. In extreme cases this can even cause failure if scour is not identified and addressed at early stages.

All of Transport Scotland's Highway Structures crossing a watercourse are being 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", requiring a two-stage approach to identify Structures where the potential risk of scour is considered high. Additional reactive scour inspections to Structures are carried out, as a best practice, after periods of heavy rainfall and other events likely to cause flooding, such as thawing snow. The purpose of these inspections is to assess whether any deterioration has taken place at new or previously identified locations with high risk of scouring.

This study describes efforts to use engineering measures for increased protection against scouring for a case study in Scotland (A68 Galadean Bridge). A reactive inspection was carried out recently at the A68 Galadean Bridge, which is a two-span composite steel beam and reinforced concrete Structure, carrying the A68 Road across Leader Water between the towns of Lauder and Earlston in the Scottish Borders. The Leader Water currently travels under and through the A68 Galadean Bridge and immediately adjacent to the embankments supporting the road pavement of the A68 at the approach to the Structure. Sediment transport at Leader Water has been the cause of the formation of an "island" from depositing sediment, upstream of Galadean Bridge. The course of the river has been redirected towards the western riverbank as a result and is significantly eroding it. The flow has been directed on to the northwest embankment of the A68, deteriorating it and compromising the stability of the road.

As the Leader Water is designated as one of the Tweed Special Areas of Conservation, extensive engineering works are not allowed at this time. Emergency, short-term works are required to be carried out in order to temporarily protect the embankment from further deterioration. This phase of the works involves the installation of three courses of rock rolls, 30 metres length, in front of the affected area. Sediment deposited upstream of the Structure, forming the upper layer of the "island" will be used to fill the rock roll bags. The effectiveness of these works will be monitored and if required, more extensive works can be carried out in the future. A permanent scour remediation solution could involve re-channelling the watercourse back to its original position and thereafter regularly monitoring for the onset of future sediment transport. Such efforts can be also facilitated with novel approaches and frameworks as described in Valyrakis et. al. (2015).

References:

Valyrakis M., P. Michalis and H. Zhang (2015), A new system for bridge scour monitoring and prediction, IAHR World Congress at the World Forum, Delft, Hague, The Netherlands, 28 June - 03 July 2015, 4p.