Pont Briwet Road & Rail Bridge

Key Words
Rock Revetment Design
Scour Protection Design
Development of tidal / surge boundary conditions
Flood Estimation
TUFLOW Hydraulic Modelling
TUFLOW FV Morphological Modelling
Geomorphological Monitoring Strategy
Water Quality Monitoring Strategy
Flood Risk Management Consent

Client Architect & Other Organisations
Gwynedd Consultancy
Network Rail
Hochtief Construction (Main Contractor)
Hewson Consulting Engineers (Bridge Design)
Beazley Sharp (Railway / Permanent Way Design),

Description
In May 2013 Hochtief Construction was successful in winning the design and build contract for the Pont Briwet Bridge in North Wales. Edenvale Young, Hewson Consulting Engineers (Bridge Design), Beazley Sharp Railways and Nick Stilwell Associates (Highways) were appointed to undertake the design of the bridge.

The bridge is located in an SAC where the foreshore / estuary geomorphology is highly dynamic with frequent and rapid change in the estuary and foreshores. In order to address concerns associated with the impact of the temporary works Edenvale Young developed a geomorphological modelling and monitoring strategy which included:-
• Pre-construction survey including LiDAR, aerial survey, topographic and bathymetric survey
• Hydrodynamic and geomorphological modelling with TUFLOW FV
• Time lapse photography during construction
• Topographic survey monitoring of recession and scour hole development
• LiDAR and aerial photography during construction.

Edenvale Young’s responsibilities also included the:-
• Design of scour protection under the bridge and localised scour protection to the piles using the results of the TUFLOW FV modelling.
• The detailed design and specification of rock revetment structures subject to locally generated waves within the estuary. This included: evaluation of rock deterioration during the lifetime of the bridge; assessment of wave conditions against the approach embankments and design of falling toes at the base of the structure.
• The preparation of a water quality monitoring strategy which included sampling and testing before during and after construction.
The TUFLOW FV model was constructed with a combination of LiDAR and bathymetric survey. Preliminary modelling indicated that a scour hole would develop on the downstream side of the bridge and that there were recessionary pressures on the northern bank which would have an impact on the salt marshes (see Figure 4).

These conclusions were confirmed during the construction of the works by the monitoring programme (see Figure 2). The monitoring data also allowed calibration of the TUFLOW FV model and a range of scenarios were tested to assess the impact of installing a temporary and cofferdams within the estuary.