

EVALUATION OF WAVES AND WATER LEVELS IN THE TAMAR ESTUARY

Location: Tamar estuary, Plymouth, UK

Project Dates: October 2017

Clients: Geo Consulting Engineering Ltd.

Scope of work:

- Compute design wave and water levels in the Tamar estuary
- Hindcast fetch- and depth-limited historic wave time series from wind data
- Compute maximum wave runup and still water level in the estuary
- Conduct Extreme Value Analysis (EVA) on wave height and total water level

PROJECT DESCRIPTION

Design wave and water level conditions were required within the shallow, fetch-limited Tamar estuary, to determine suitable engineering solutions to a shore protection scheme on part of the estuary bank. Hindcast wave characteristics were estimated for the period 1996 – 2014 using measured wind data and empirical shallow water wave equations. Time series and extreme values for total water level were computed by accounting for astronomical tide, the inverse barometric effect (low pressure), wind set up, wave runup and wave setup. EVA provided extreme return-period values of wave height and still water levels for return-periods of up to 1-in-200 years.

Opposite: Study area and wave rose showing computed wave period and direction within the upper estuary.

Below: Still water levels (tide levels; black lines) and extreme return period total water levels (tide + surge + wind setup+ wave setup + wave runup; coloured lines) projected onto a representative profile from the study area.

