**INTRODUCTION**

Assessment of design discharges for dikes requires knowledge on the frequency and magnitude of extreme flooding events. Current estimates for the magnitude of the design flood are based on the extrapolation of ~100 year of instrumental data, which lacks the registration of rarely occurring extreme events. The reconstruction of palaeoflood magnitudes and frequencies from sedimentary records provides insight in the potential maximum size of Rhine floods. This helps to improve the estimation of the magnitude of the design discharge with a reduced uncertainty.

The magnitude of a Middle-Holocene flood was reconstructed along a transect (II) in the Lower Rhine valley (Germany) based on the highest slackwater deposits found in a palaeochannel fill located on an elevated terrace level, which flanks the Middle Holocene floodplain (I).

**METHODS**

A Chézy-based hydraulic model was used to calculate the palaeoflood discharge out of carefully selected geological input data (palaeochannel dimensions (III)), reconstructed palaeofloodplain topography, surface and river bed roughness, and palaeostage indicators). To account for uncertainty, we considered 10 sets of input variables, which represent a realistic range of model inputs and results.

**RESULTS**

A best guess estimate of 13,250 cumecs was calculated for the minimum magnitude of floods that left the highest slackwater deposits in our cross section.

The associated recurrence time was estimated to 1,250-2,500 years, based on AMS dating and palynological analysis of the organic palaeochannel fill (IV).

At present, discharge waves are steeper than millennia ago, due to deforestation and river management. Correcting for these human impacts (which add ~6-16%), the investigated palaeoflood would correspond to ~15,000 cumecs, which is slightly lower than the present design discharge (V).

**CONCLUSIONS**

Geological-based discharge reconstructions provide unique information to bracket magnitudes of extreme flooding events.

Reconstructed Middle-Holocene palaeoflood magnitudes correspond well with previously estimated design discharges for Dutch dikes (V).