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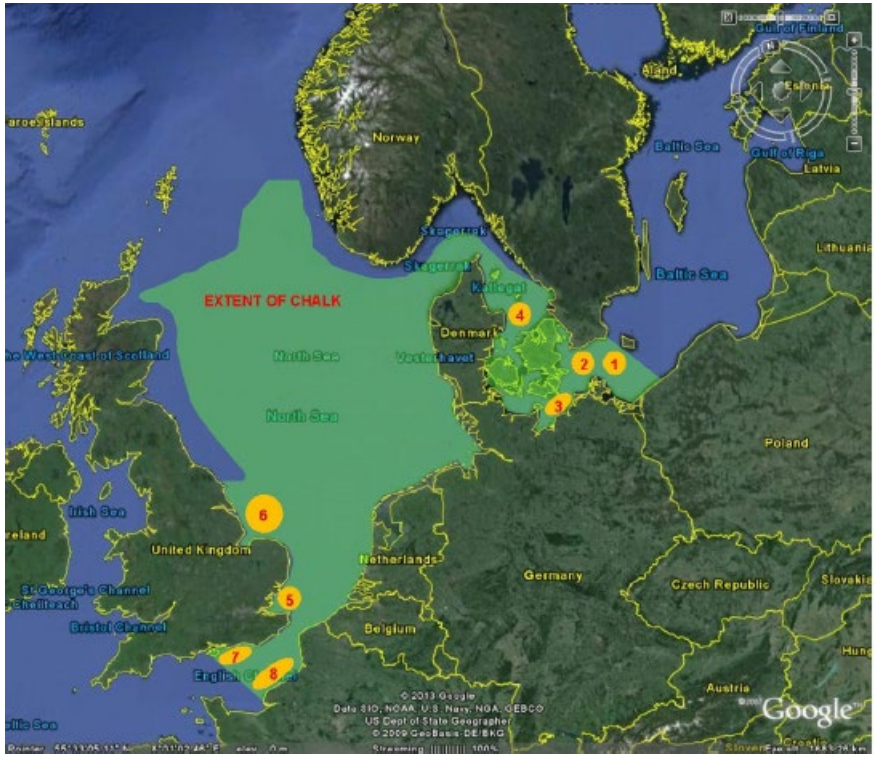
ALPHA:
NUMERICAL ANALYSIS OF LATERALLY LOADED PILES DRIVEN IN CHALK

- Chalk is widespread under N. Europe & often encountered at foundation depths
- Several planned or completed offshore wind projects are founded in chalk
- Basic mechanisms of driven pile behaviour poorly understood in chalk; poor design method reliability

- PISA (2013-2018) JIP (Ørsted, ICL, OU, 9 developers) delivered new PISA-numerical and PISA-1D design methods for lateral capacity in sands and clays
- UK Innovate (2014-2017) JIP (Iberdrola, ICL, GCG) delivered preliminary design for axial capacity in chalk
- ALPACA JIP (2017-2020) (ICL, OU, several industrial sponsors), extended scope to cover lateral field tests & intensive laboratory testing of chalk



Broad extent of Chalk in NW Europe and selected planned or completed offshore wind projects

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ALPHA aims to develop a reliable lateral design method for large diameter offshore wind turbine piles in chalk, through application of PISA-numerical design approach:

1. Synthesis of in-situ testing characterisation data with advanced triaxial, oedometer, ring shear & other experiments to develop a theoretical framework for chalk behaviour

2. Numerical modelling with the bespoke finite element code ICFEP:
   - Versatile constitutive model developed for calcarenites
   - Non-local regularisation to facilitate rigorous modelling of chalk's marked softening behaviour
   - 3D FE model for the ALPACA near-scale instrumented lateral pile tests, allowing for application at other chalk sites and practical design application