Royal HaskoningDHV
Enhancing Society Together

client | The Environment Agency

Royal HaskoningDHV have developed practical guidance on design coastal conditions and a tool that can be used easily to calculate tidal boundary conditions at any point on the South West coastline and within our estuaries. With the data we now have available to us, alongside this new tool to help interpret it, we can produce design tide curves for tidal flood scenarios in minutes. With this time saving and confidence in the outputs our day to day work is made much easier."

Tim Hunt, Senior Engineer, Environment Agency

Tidal Parameters

The UK's surrounding seas have historically protected its coastlines against invasion. However the current threat to UK shores is now from the sea itself, with tidal flooding an increasing natural phenomenon, capable of devastating coastal towns and regional economies. According to Defra, in England alone 1.4 million people are risk from river or coastal flooding, which means effective flood risk assessment and defences are vital.

Royal HaskoningDHV's rivers, deltas & coasts engineers have developed an invaluable weapon in the appraisal and management of future flood risk. By providing a rapid, robust and consistent basis for tidal flood risk assessments, Royal HaskoningDHV's Tidal Parameters tool is providing substantial time saving and technical benefits to those involved in flood risk assessment and management, helping to protect the UK coastline and its communities.

Launched in 2010 in the Anglian region and 2012 in the south west region, Royal HaskoningDHV's Tidal Parameters tool was developed as an extension of the company's coastal flood boundary conditions project, which produced a dataset containing information about extreme sea levels, swell wave conditions (waves generated by storms), and tidal surges.

This highly intuitive tool takes the methods and guidance featured in the dataset to the next level, which means data no longer needs to be extracted and analysed. Environmental organisations using the tool, simply input a geographic location to gain a complete, time-series flood assessment.

To produce a tool that would be scientifically accurate and contain the information required for flood defence planning, Royal HaskoningDHV's team used its long-term geographic expertise in coastal planning and defences, and knowledge of the regulatory requirements for flood risk assessments.

David Worth, Technical Director, Royal HaskoningDHV, said: "The Tidal Parameters tool was a natural progression from the coastal flood boundary conditions database. All plans for building in coastal areas require a strategic flood risk assessment, which is essential for the subsequent design and construction of effective flood defences. Previously, organisations such as the Environment Agency could extract data from the coastal flood boundary conditions dataset for analysis, but the data was subject to individual interpretation. By using the Tidal Parameters tool, the analysis is already complete. It will save time and provide a consistent approach, ensuring that the information is correct every time."

Designed to be visually appealing, input is via screen entry boxes or interactive maps. Results are provided graphically as well as in tabular format and an export function enables information to be presented in a group setting.

Tidal Parameters

The Tidal Parameters tool uses innovative technology to separate areas of coastline into sectors, each with its own parameters. Astronomical tide and tidal surge components relevant to particular areas, are built-in and the user estimates what peak sea level can be tolerated. The application instantly creates minimum and maximum simulations representative of a storm surge.

Another feature is the specialist 'flood inundation' function, which can be included in the results on a sector-by-sector basis. The data defines specific areas that might flood. It then states how large these areas might be, the volume of water that could flow in, and how deep the flood water could become.

A further challenge for the team was establishing a mathematical basis to plot waves that change according to weather conditions. Wind direction can make storm tidal surges larger, and heavy storms have specific wind directions, which had to be taken into account. For example, East Anglia's storm winds usually come from the north, while on the Devon coast, winds generally blow in from the south. However, for lighter storms, the wind can originate from different directions. The team studied past storm events and used mathematical analysis to build a complete picture of variables involved and what to expect from different types of storms.

David continues: "The weather dependent tidal surge and wave information gathered was combined with existing data from the coastal flood boundary conditions database for the natural rise and fall of sea levels. The Tidal Parameters tool then created design and assessment criteria for each location.

"The data is not predictive, but can be used to advise what type of sea conditions to expect, how long for, and how it might vary. This is extremely effective in helping organisations plan effective sea defences and mitigate flood risk."

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