The future of resilient flood defences

Jacobs' Patricia Nick, asset management strategic lead, looks at how the approach taken on Thames Estuary Asset Management (TEAM2100), the first of its kind on an estuary in Europe, offers a delivery model for the future.

The Environment Agency developed the Thames Estuary 2100 Plan to create a long-term approach to managing tidal flood defences on the famous River Thames in London and the Thames Estuary, including the iconic Thames Barrier. TEAM2100, the Environment Agency's largest flood-risk management programme, has trailblazed the approach to develop a 10-year programme of work to deliver the Plan. With the potential serious effects of climate change, it considers multiple possible future scenarios. Working collaboratively as an integrated delivery team with the Environment Agency and construction partner Balfour Beatty, Jacobs has helped safeguard approximately 4,000 different flood protection structures along the river and estuary.

In 2022, TEAM2100 focused on over 60 projects aiming to ensure the tidal walls, embankments and barriers along 350 km of the Thames continue to protect 1.42 million people and over £321bn of property from tidal flooding, while also improving environmental habitats and access to the river.

Programmatic approach to asset management

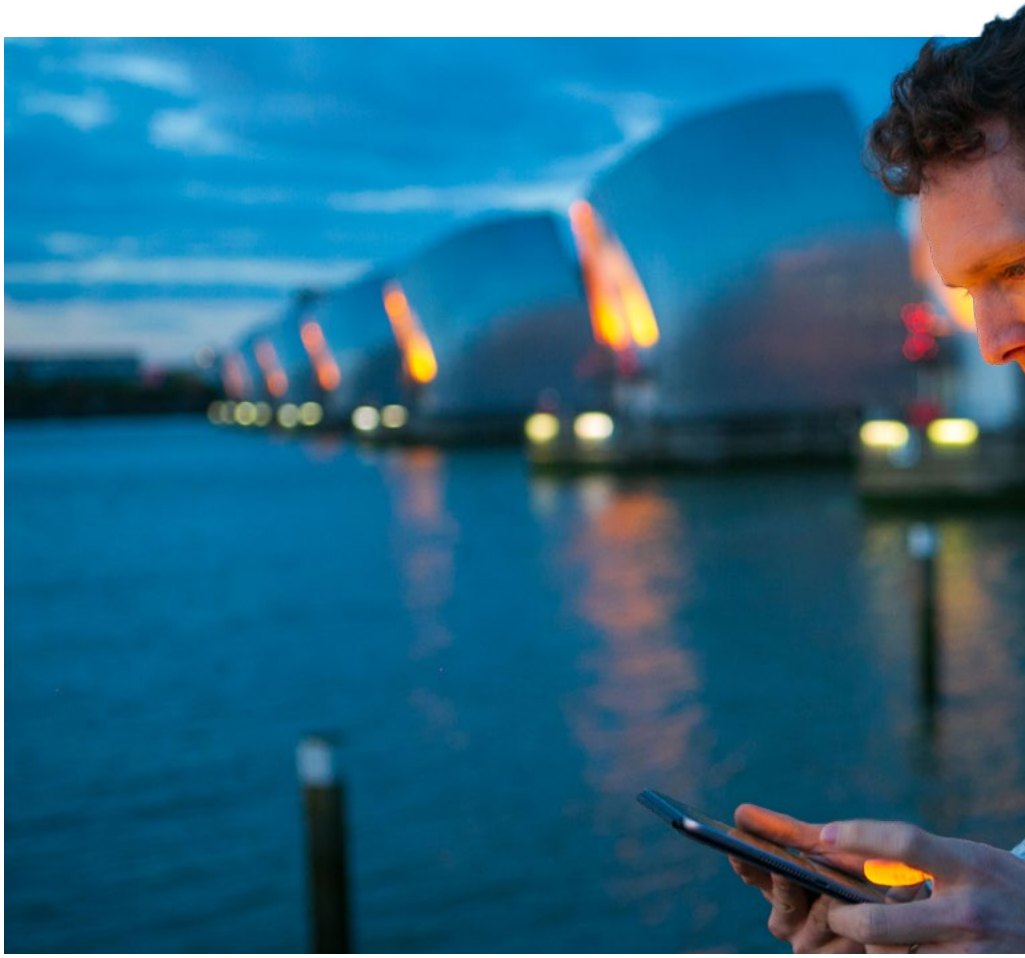
As part of the wider Thames Estuary 2100 Plan, TEAM2100 advocates a programmatic approach to managing tidal flood defences, aspiring to reduce the overall costs by investing in the right assets at the right time.

The programme is a first of its kind in applying asset management best practice, as well as continuously improving methods to manage critical infrastructure efficiently. Jacobs combined its programme and asset management expertise with the Environment Agency's knowledge and team to develop a service-focused asset management system which manages existing structures and creates new assets and systems over a 100-year life cycle.

The programme attained ISO 55001 certification within two years of project commencement, becoming the first UK government major programme and first UK flood and coastal erosion management project to achieve this recognition.

Lifecycle modelling to manage flood defences along the whole estuary has enabled development of risk-based asset management strategies for some 25 systems.

As part of aligning to industry best practice, TEAM2100 used the Water Services Association of Australia's leading Asset Management Customer Value Project, a rigorous benchmarking process, to provide a better appreciation of what needs to be done to improve management maturity. Used alongside auditing and integrated with the requirements of ISO 55001, the process improved transparency and provided a holistic view of TEAM2100, its strengths and areas for improvement. It also uses The Institute of Asset Management's Framework to drive continuous improvement in its asset management system.

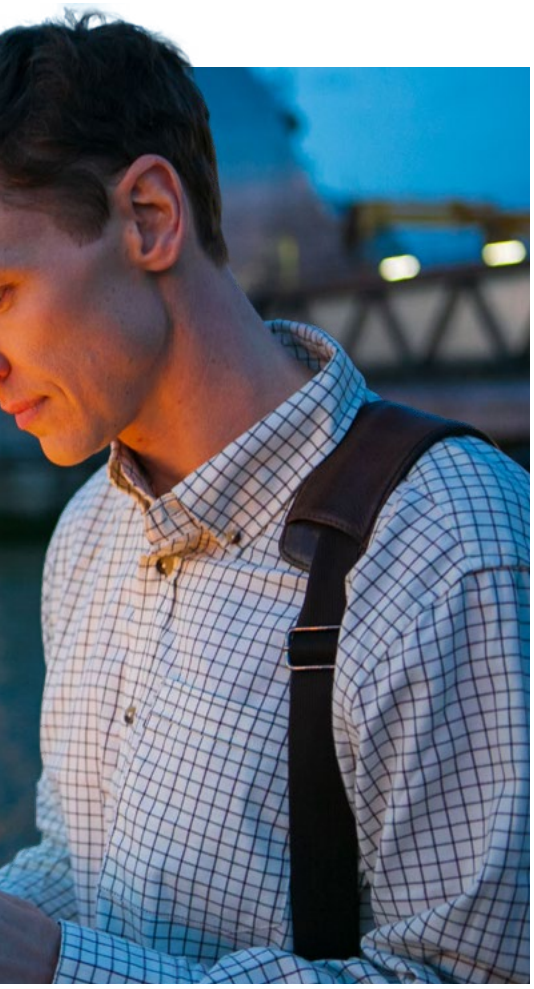


The asset management takes the 'adaptation pathways' approach, advocated by the National Flood and Coastal Erosion Management (FCERM) Strategy, which enables decision makers to identify where and when it is best to invest in improvements. Through investigation and scientific evidence gathering, various options are analysed for robustness and flexibility.

Leveraging data and technology to manage assets efficiently

Data and technology help manage in an efficient and intelligent way. For example, portable Leica Pegasus lidar equipment has been used to run surveys at low tide and is particularly useful for assets which are very difficult or dangerous to access. Pegasus makes planning for works and inspections on the foreshore much more effective – from time, cost and safety perspectives.

The team also created a web-based GIS portal – the award-winning Estuary Eye – and associated apps to offer a common data environment for review, management and use of collected data.



Jacobs feature - Patricia Nick, asset management strategic lead

The embedded videos and 3D information provide instant access to complex geospatial information. The tools enable a highly efficient approach to option and design appraisals, a foundation for creating an estuary-wide BIM model of the asset system, and an easy visual assessment of live project progress. With over 400 map layers, the Estuary Eye combines a data management tool and an appraisal and design tool, with an interface to a vast amount of new and historic field-collected data.

TEAM2100's Digital Asset Management Plans (AMPs) are an interactive, easy-to-use online platform sharing information about future activities required to deliver the Thames Estuary 2100 Plan. During the planning process, the team runs a series of asset management strategy scenarios on a lifecycle modelling tool to select the best performing strategy for each AMP, aiming at the best combination of whole life cost and asset condition. TEAM2100 is currently developing a carbon assessment capability into the lifecycle model to support the delivery of the Environment Agency's corporate environmental and sustainability goals.

Asset intelligence

To improve understanding of the health of the fixed portfolio, a structured approach to collecting georeferenced defect data provides asset intelligence and supports data-driven decision-making. The outputs enable users to understand and analyse defect occurrence and significance. This can potentially support investment decisions and, if the data is collected consistently over time, inform future updates of the Thames Estuary's asset deterioration curves to significantly enhance our ability to plan for future investments and be used for machine learning and automation purposes.

In summary

With sustainability and digital enablement at its heart, TEAM2100's approach to asset management is leading the way in finding innovative solutions to managing flood risk – providing climate resilience for our communities and protecting the environment. Having asset management at the core of infrastructure projects allows us to improve planning capabilities, optimise whole life costs associated with maintaining and operating infrastructure, extend our assets' useful life, and provide significant carbon reductions in asset lifecycle delivery. As one of the UK government's Pathfinder projects, this approach provides an exemplary model for other major infrastructure programmes to consider adopting.