Flood Modeller Pro

Case Study

Two-dimensional inundation flood mapping for the city of Boston, USA

CH2M has mapped the possible effects of forecasted precipitation, sea level rise (SLR), storm surge and river dynamics in and around the Boston Water and Sewer Commission's service area for the present and future years within a risk management framework.

Due to its versatility and rapid computing time when compared to other similar 2D mapping tools available in the market, the Flood Modeller 2D FAST solver was used by CH2M to identify areas that may be prone to flooding at future year milestones in the years 2035, 2060, and 2100.

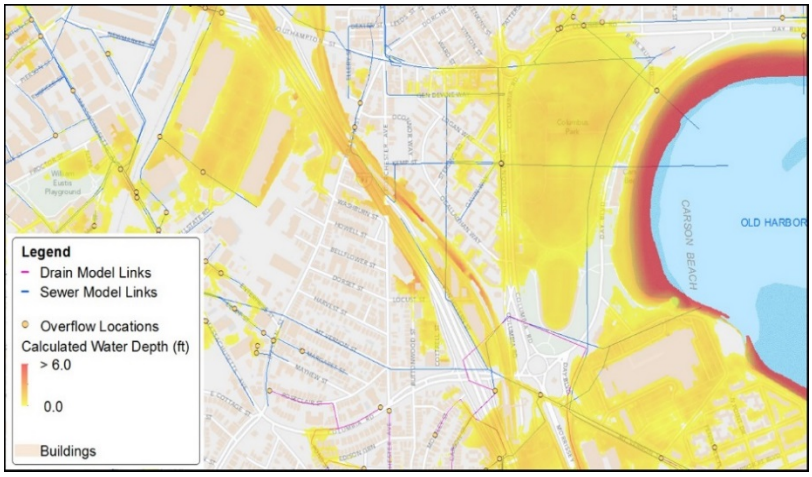
Flood Modeller Pro allows you to model river channels, floodplains and urban areas at your chosen level of detail. This fully integrated flood modelling package brings together CH2M's industry-leading 1D and 2D solvers into one stunning new interface.

The forecasted effects of changes in precipitation, sea level rise (SLR), storm surge and river dynamics were calculated for two greenhouse gas emission scenarios based on Intergovernmental Panel on Climate Change (IPCC) calculations at the selected future years to bound medium and high climate-related risks.

Flooded and inundated land areas were mapped using a combination of the Commission's sewer system and storm system models integrated with our 2D FAST solver. The solver was used to identify assets at risk and evaluate the benefits of regional solutions.

Flood Modeller Pro can be used for a range of applications, including:

- 1D and 2D floodplain modelling
- Floodplain mapping
- Flood forecasting
- Hydrological analysis
- Embankment/levee failure
- Dam breach analysis
- Options' appraisal
- Detailed design
- Structure blockage



Mapped outputs calculating the inundated areas in the City of Boston

Contact us

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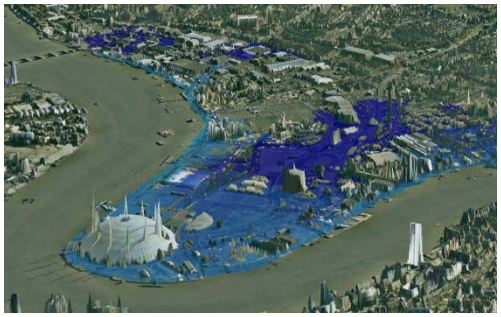
JACOBS

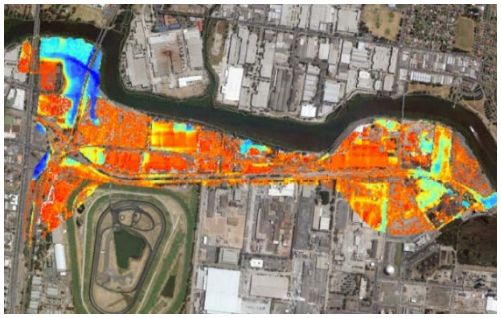
With a legacy stretching back 40 years, Flood Modeller allows users to model rivers, floodplains and urban areas, using our powerful 1D and 2D solvers.

"The industry-leading 1D and 2D solvers in Flood Modeller Pro have been applied to flood mapping projects across the globe, including Boston, New York, London and Sydney."

Vijay Jain
(CH2M)



Floodplain mapping in London, England



Floodplain mapping in Sydney, Australia

Model development and flood mapping

The initial phase of the project consisted of calculating sewer system and storm system responses to design storm conditions using the Commission's calibrated hydrologic and hydraulic model (USEPA SWMM5) for a baseline design storm event.

The models were then used to calculate responses to design storms modified with increased rainfall and boundary conditions for river and harbor water elevations at outfalls accounting for SLR, storm surge and river stage due to climate change.

The second phase involved the development of the 2D FAST model of Boston Harbor, three major tributaries and the Commission's entire service area.

Model topography used available LiDAR data (with rectangular grid cells with 6.25 feet of horizontal resolution and with vertical resolution of about 6 inches) and aerial imagery.

Other topographic features such as existing fences and surrounding river dams were easily overlaid upon the base topography. Building footprints were removed from the original LiDAR terrain model. The 2D FAST solver interprets the blanked areas as impermeable infinitely high walls. Model boundary conditions consisted of forecasted sea level and river water levels using feature shapefiles developed with our software and ArcGIS.

The final stage consisted of linking node overflows from the sewer system and storm system models as point sources within the 2D FAST model inland area. The validity of the model was tested by simulating inundation for FEMA's 100-year BFE zones and Hurricane Sandy.

Simulations of the two climate change scenarios were conducted for the years 2035, 2060 and 2100 without and with rainfall. Model runs were divided into two major categories: with and without FEMA's 100-year storm surge of about 5.1 feet. Results were integrated with the Commission's GIS for asset risk evaluations. Regional solutions including sea wall barriers were simulated to identify risk reduction under feasible mitigation cases.

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Inundation mapping, Boston, USA