



## **EXECUTIVE SUMMARY**

### **Flooding Vulnerability Assessment Using the COAST Tool and Approach For the Portland Society for Architecture and the City of Portland, ME For the Commercial Street Waterfront Area**

Catalysis Adaptation Partners LLC (CAP), a consulting firm based in Scarborough, Maine, has produced a vulnerability assessment for the Commercial Street waterfront in Portland, Maine to storm surge and sea level rise. CAP was engaged by the Portland Society for Architecture, with the cooperation of the City of Portland, to use the COAST approach and software tool to quantify the vulnerability of the waterfront to building damage over time, assuming a scenario of 2 feet of sea level rise by 2050, and 4 feet of sea level rise by 2100.

CAP provided the following:

- Estimates of one-time damage to buildings and real estate improvements for a 100-year storm event, occurring in the years 2050, 2075 and 2100;
- Estimates for all cumulative expected damage to buildings by the years 2050, 2075 and 2100 for all projected storms; and
- A tally of parcels predicted to be permanently inundated by sea level rise on a daily basis by the years 2050, 2075 and 2100, if no action is taken.

The COAST software tool, whose development was funded by the US Environmental Protection Agency, is used to predict damages from varying amounts of sea level rise and storm surge. CAP, whose principals designed the software, use it to help communities throughout the country, from Maine to Minnesota to Florida. COAST is used to calculate the potential damage from one particular storm in the future, as well to calculate the accumulated potential damage from all storms that may occur over a period of years, from today until a point in the future.

The City of Portland's Commercial Street waterfront is obviously vulnerable to sea level rise and storm surge damage. COAST estimates \$111.5 million dollars in cumulative damage to the value of buildings, from all storms (with surge plus sea level rise), for the 87 years between now and the year 2100. Over the next 37 years, by 2050, \$32.9 million dollars in cumulative damage is estimated. This suggests that some large investments to project the waterfront - by both the government and private sectors - may be justified, with further study.

Furthermore, by the year 2100, \$46.4 Million in building value will be located on parcels predicted to be permanently inundated by the high tide on a daily basis (MHHW), without any storm surge, if no action is taken. Damage estimates for individual parcels are available for each scenario year by querying the COAST model output, as well as reference to the decade during which permanent inundation occurred.

Results of this study will help officials in the City of Portland and concerned stakeholders organize planning reforms or strategies that may be needed.

A table summarizing results and a sample illustration from the full report are below.



**Table 1-COAST Model Output for Commercial Street Waterfront, Portland ME  
Modeled Water Levels and Vulnerability Assessment Results For the 100 Year Storm  
in Years 2050, 2075 and 2100**

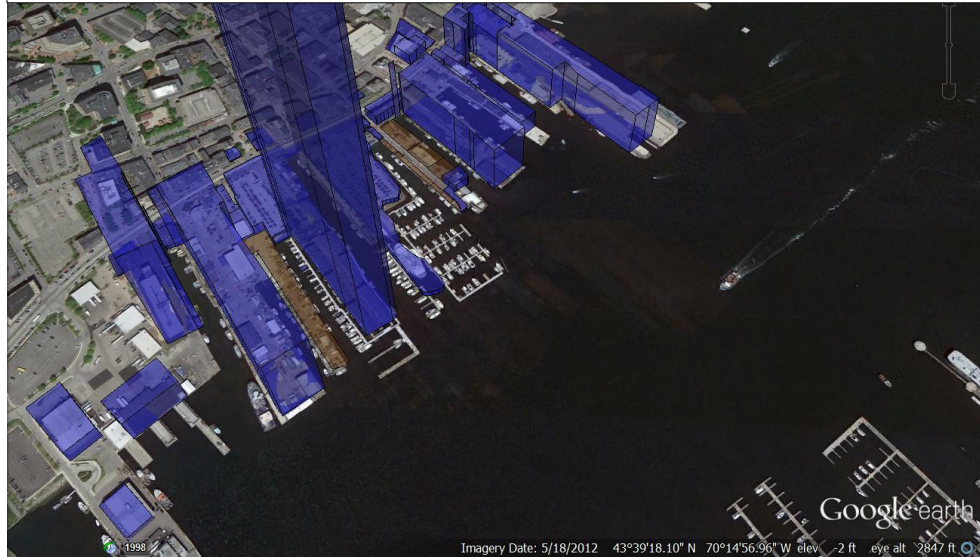
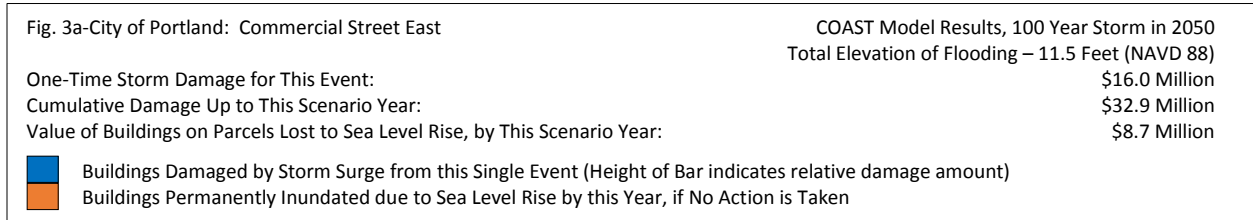
Year	Sea Level Rise Scenario	Storm Intensity (return period in years)	Predicted Elevation of Flood Height from FEMA Flood Insurance Study, 2012 NAVD88 (ft.) <sup>1</sup>	Model of Sea Level Rise Above MHHW in 2013 Selected (ft) <sup>2</sup>	COAST Model Total Flood Elevation for Each Scenario NAVD 88 (ft.)	COAST Model Expected Damage to the Value of All Buildings & Improvements From This Single Storm Incident in the Scenario Year (\$ Million)	COAST Model <u>Cumulative</u> Expected Damage to the Value of All Buildings & Improvements From All Storms, 2013 to Scenario Year, Including Value of Properties Completely Lost to Sea Level Rise (\$ Million) <sup>3</sup>	COAST Model Total Value of All Buildings & Improvements Removed from Inventory Due to Permanent Inundation by Sea Level Rise From 2013 to Scenario Year (\$ Million) <sup>3</sup>
2050	4 Feet by 2100	100 years	9.5	2.00	11.5	16.0	32.9	8.7
2075	4 Feet by 2100	100 years	9.5	3.00	12.5	25.2	69.6	11.9
2100	4 Feet by 2100	100 years	9.5	4.00	13.5	26.4	111.5	46.4

<sup>1</sup> Tidal state is included in FEMA FIS predicted flood elevations for the 100 year storm.

<sup>2</sup> Elevation of Mean Higher High Water (MHHW) in year 2013 is 4.65 feet (NAVD 88).

<sup>3</sup> No Discount Rate applied.

*This project is funded by the Portland Society for Architecture.*



For more information on use of the COAST Approach, contact Catalysis Adaptation Partners at [www.catalysisadaptation.com](http://www.catalysisadaptation.com).