GEI Consultants

Consulting
Engineers and
Scientists

# Flood Vulnerability Assessment

Bath, Maine

**Submitted to:**
City of Bath
55 Front Street
Bath, ME  04530

**Submitted by:**
GEI Consultants, Inc.
5 Milk Street
Portland, ME  04102
207-797-8901

Revised March 29, 2024
December 11, 2023
Project 2204496

Leila Pike, P.E.
Project Manager

Lissa Robinson, P.E.
Senior Civil Engineer

# Table of Contents

## Tables



## Figures



## Appendices



LAP/LCR:bdp
\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\01_ADMIN\Flood Vulnerability Report\Bath Vulnerability Assessment Report_Rev 2023-03-29.docx

# Executive Summary

The City of Bath, Maine retained GEI Consultants, Inc. to assess the vulnerability of infrastructure and open spaces (i.e., wetlands and conserved land) to flooding from storm surge, sea level rise, and extreme riverine events. The purpose of the work was to evaluate present-day flood risk, flood risk in 2050, and flood risk in 2100 and recommend next steps towards adaptation, including timelines for when adaptation measures should be in place to limit the impact flooding may have on people, places, and infrastructure within the City.

GEI's work on this project included the development of a 2-dimensional (2D) hydraulic model of the lower Kennebec and Androscoggin rivers to simulate 15 flood scenarios, including average daily tidal conditions at present day sea levels, and average daily tidal conditions for intermediate and high rates of sea level rise in the years 2050 and 2100. Additionally, we developed the model to simulate flooding due to 1% annual chance storm surge and 1% annual chance riverine events for present-day and future sea levels. The hydraulic model was developed using the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center – River Analysis System (HEC-RAS) Version 6.3 (USACE, 2022).

The results (i.e., water surface elevation, depth and extent of inundation, duration of inundation) of the flood vulnerability assessment were compiled and organized by land use: transportation, buildings, industries, public safety, power, pump stations, open spaces, and ports. The results for the 15 flood scenarios are summarized in the report and its attachments (figures, tables, and appendices). This study identified the following key assets that warrant adaptation in the near-term based on two critical flood scenarios:

- For present-day sea levels, approximately 1.1 miles of roadways, 44 residential buildings, 4 remediation sites, 4 pump stations, and 146.2 acres of wetland not likely already experiencing flooding due to average daily tides would likely be inundated during combined 1% annual chance ("100-yr") coastal storms and riverine events.

- For average daily tides and average daily streamflows in the year 2050 and assuming 1.5 ft of sea level rise, approximately 0.1 miles of roadways, 13 residential buildings, 2 remediation sites, and 73.8 acres of wetland not likely already experiencing flooding due to average daily tides would likely be inundated during high tides.

The model results were used to identify at-risk locations and develop adaptation timelines for roadways, pump stations, and remediation sites. Based on the results of the flood vulnerability assessment, we suggest the following locations be prioritized for adaptation efforts due to their present-day risk of flooding:

- Washington Street near the Harward Street intersection, including the eastern end of Harward Street.
- Butler Head Road and Varney Mill Road near the intersection of the two.
- Washington Street near the Hunt Street intersection.
- Commercial Street.
- Hawkes Lane (a private road).
- North Bath Road east of the Varney Mill Road intersection.
- Ridge Road near the Hawkes Lane intersection.
- The Freight Shed Property, Kennebec Tavern and Marina, Dry Cleaning and Dyeing (Brackett's Market), and Old Shipyard remediation sites.
- The Hunt Street, Commercial Street, Harward Street, and the BIW North Yard pump stations.

Additionally, building owners with buildings identified in Figs. 5 and 6 as likely within the limits of flood inundation should consider adapting to flood risk through elevating, flood-proofing, or relocating.

Flood adaptation options for roadways, suggestions for next steps for remediation sites and pump stations and building flood-proofing measures are provided in this report.

# 1. Introduction

This report presents the methods and findings of a flood vulnerability assessment for the City of Bath, Maine (the "City"). The goal of the study was to assess the vulnerability of public and private infrastructure and open spaces to flood inundation due to coastal storm surge, sea level rise (SLR), and extreme riverine events and identify timeframes for when adaptation measures should be taken to increase the resiliency of the City to the impacts of flooding.

A two-dimensional (2D) hydraulic model of the lower Androscoggin and Kennebec Rivers was developed using the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center – River Analysis System (HEC-RAS) software, Version 6.3.0 (USACE, 2022) to simulate flood scenarios due to tidal and riverine events (Fig. 1). The model simulated 15 scenarios to evaluate flood risk, including present-day flood risk, flood risk in 2050, and flood risk in 2100 under both the "commit to manage" and "prepare to manage" SLR scenarios identified by the Maine Climate Council (Maine Climate Council, 2020). The City of Bath is situated along the banks of the Kennebec River, which subjects the City to both extreme tidal events from coastal storms and extreme riverine events that occur along the lower Kennebec and Androscoggin Rivers. Flood risk was evaluated due to extreme coastal events, extreme riverine events, and the combination of the two events for each of the three timeframes identified above.

This project was funded with a Community Action Grant through the Governor's Office of Policy Innovation and the Future (GOPIF) Community Resilience Partnership. While this project was underway, the City of Bath procured funding through the Maine Coastal Program Coastal Communities Grant to enhance the community and stakeholder engagement process around the results and implications from the flood vulnerability analysis and to advance decision-making around flood adaptation. The report provides the technical methods, findings, and recommendations as part of the GOPIF-funded vulnerability assessment. Forthcoming will be an interactive, online ArcGIS StoryMap of the results of the study created by the Gulf of Maine Research Institute (GMRI).

The North American Vertical Datum of 1988 (NAVD88) was the reference datum for elevations in this report and the hydraulic model unless otherwise specified.

# 2. Project Background

In 2019, the City of Bath adopted a Climate Action Plan that highlights the impacts sea level rise could have on the City of Bath (Kyzivat, 2019). In August 2022, the City of Bath adopted a resolution for a commitment to strengthen climate action, citing a need for committing and preparing to manage for sea level rise, and directed the Climate Action Commission with updating the 2019 Climate Action Plan to meet or exceed goals identified in the Maine Climate Council's 2020 "Maine Won't Wait" Climate Action Plan (City of Bath, 2022a). The City applied for a GOPIF Community Action Grant to advance their goals in climate action. The grant was awarded in 2022 and used to fund this study.

The City of Bath has a history of flooding, including most recently during a December 2022 coastal storm event that inundated roadways in the City for several hours during the high tide at the peak of the storm (Photo 1). The tidal nature of the lower Kennebec River puts the City of Bath at risk of flood inundation during storm surge events.

**Photo 1 - December 23, 2022 Flooding near Commercial Street**

The City of Bath is located along the western bank of the lower Kennebec River and extends from Merrymeeting Bay, where the Androscoggin River meets the Kennebec River, to the confluence of the Winnegance Creek into the Kennebec River. The downtown area of the City is located near the Sagadahoc Bridge (Route 1 Bridge) crossing. Both the Kennebec and Androscoggin Rivers are influenced by tidal action in the lower reaches of the rivers near the extents of the City of Bath.

The tidal nature of the rivers means that flooding in the area can occur from riverine events, coastal events, or a combination of the two. The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRMs) provide estimates for 1% annual chance ("100-yr") base flood elevations and flood extents due to coastal events. The FIRMs for the City of Bath specify a flood zone of AE 8, which corresponds to a coastally influenced zone of elevation 8.0 ft NAVD88 (FEMA, 2015a). The impact of a riverine event occurring coincidentally to a coastal storm is not considered in FEMA's study nor is the effect of sea level rise. Existing studies assessing the impact of riverine flooding and the impact of combined riverine and coastal flooding are not readily-available for the City of Bath.

# 3. Hydrologic and Hydraulic Data

The 2D hydraulic model developed for this study uses tide data measured in the Kennebec River, streamflow measurements from the Kennebec and Androscoggin Rivers, sea level rise projections developed by the National Oceanic and Atmospheric Administration (NOAA) and recommended by the Maine Climate Council, and storm surge data provided by the Federal Emergency Management Agency (FEMA). The data sources are described in further detail below.

## 3.1 Tidal Data

In November 2022, a Hohonu water level monitor was installed in the Kennebec River near the Maine Maritime Museum located at 243 Washington Street in Bath (Hohonu, 2022). The installation of this monitor was not part of this project; however, water level readings were readily available for download and used in developing tidal hydrographs for use in the hydraulic model. Water level measurements were downloaded for the period between December 4, 2022, and December 6, 2022, and used to develop average daily tidal hydrographs. The water level measurements during this period indicated a peak water surface during high tide of elevation (El.) 4.6 ft and a minimum water surface during low tide of El. -3.1 ft. For reference, the NOAA Tide Gage in Portland, ME, indicated a Mean Higher-High Water (MHHW) elevation of 4.65 ft and a Mean Lower-Low Water (MLLW) elevation of -5.26 ft (NOAA, 2023). The MHHW and MLLW are the average height of the highest and lowest tide recorded at a given tide station each day during the recording period.

Water level measurements from December 22, 2022, to December 25, 2022, were downloaded to use in the development of a tidal hydrograph inclusive of a coastal storm event at an order of magnitude of the December 23, 2022 storm. A peak water surface El. of 7.2 ft was measured at the Hohonu water level monitor in the Kennebec River during the December 2022 storm event. The NOAA Tide Gage in Portland, ME measured a peak water surface elevation of 8.46 ft during the December 2022 storm event.

To develop the 1% annual chance (“100-yr”) storm tidal hydrograph, the time series of water level measurements during the December 2022 storm period were scaled up by 1.2 ft so that the peak water surface elevation matched FEMA’s 100-yr still water elevation (SWEL) of 8.3 ft for the Kennebec River near Bath, Maine, as indicated by the FEMA Flood Insurance Study (FIS) for Sagadahoc County, Maine (FEMA, 2015b).

The average daily tidal hydrograph and the 100-yr storm tidal hydrograph developed for this study are presented in Fig. 2. To account for sea level rise, each of the hydrographs was scaled by adding a constant value, equivalent to the sea level rise amount used in this study, to the time series of data used to create theoretical average daily tidal hydrographs and 100-yr storm tidal hydrographs for the years 2050 and 2100.

## 3.2 Sea Level Rise

The Maine Climate Council recommendations for sea level rise for the years 2050 and 2100 were used as guidance for projected sea level rise estimates to use in this study (Maine Climate Council, 2020). For each timeframe, both "commit to manage" and "prepare to manage" sea level rise amounts were evaluated, for a total of four sea level rise values included as part of this study, summarized in Table 1.

**Table 1. Sea Level Rise Estimates for 2050 and 2100**

| Timeframe | Commit to Manage SLR Amount (ft) | Prepare to Manage SLR Amount (ft) |
|---|---|---|
| 2050 | 1.5 | 3.0 |
| 2100 | 4.0 | 8.8 |

## 3.3 Streamflow Data

The City of Bath is on the western banks of the lower Kennebec River downstream of the confluence with the Androscoggin River. The northern end of Bath is on the banks of Merrymeeting Bay, which is at the confluence of the Androscoggin River with the Kennebec River.

Streamflow values for both rivers were estimated for use in this study.

Average daily river flows and 1% annual chance ("100-yr") river flows were estimated based on U.S. Geological Survey (USGS) stream gage data for the Androscoggin and Kennebec Rivers, the FEMA FIS for Sagadahoc County (FEMA, 2015b), and a study on future peak streamflows in coastal Maine rivers (USGS, 2013).

Average riverine flows for the Kennebec and Androscoggin rivers were developed using mean annual flow values estimated by StreamStats (USGS, 2023a) at the USGS Gage 01049265 (Kennebec River at North Sidney, ME) (USGS, 2023b) and USGS Gage 0105900 (Androscoggin River near Auburn, ME) (USGS, 2023c). The average riverine flows were prorated to get an estimate of streamflow values near the downstream ends of the Androscoggin and Kennebec Rivers, near the City of Bath. The average riverine flows were prorated by the scale factors of 1.2 and 1.1 for the Kennebec and Androscoggin, respectively. The scale factors were based on the ratio of 100-yr streamflow events provided by FEMA for the downstream ends of each river and the 100-yr streamflow event estimated using the USGS flood frequency software PeakFQ (USGS, 2019) at the two USGS gages mentioned above.

The FEMA FIS for Sagadahoc County provides 100-yr peak discharges for the Kennebec River at the inlet to Merrymeeting Bay and for the Androscoggin River at the State Route 201 bridge. The 100-yr discharges provided by FEMA for the Kennebec and Androscoggin Rivers are 233,000 cfs and 106,960 cfs, respectively (FEMA, 2015b).

For the 2050 and 2100 time horizons, 100-yr streamflow values for the Kennebec and Androscoggin Rivers were scaled to account for a likely increase in peak river flows due to climate change. The 2013 USGS report titled "Modeled Future Peak Streamflows in Four Coastal Maine Rivers" (USGS, 2013) estimates that by 2050, peak flows would be evenly distributed between increases and decreases of 25 percent for the four coastal Maine basins studied. For this study, we used a 25% increase in peak streamflow values to estimate streamflows in 2050 during 100-yr riverine events and a 50% increase in peak streamflow values to estimate streamflows in 2100 during 100-yr riverine events. A summary of the average and 100-yr streamflow values for the two rivers and the three time horizons included in this study is provided in Table 2 below.

**Table 2. Streamflow Values Used in the Hydraulic Model**

| River | Present-Day Average Daily Flows (cfs) | Present-Day 100-yr Flows (cfs) | 2050 100-yr Flows (cfs) | 2100 100-yr Flows (cfs) |
|---|---|---|---|---|
| **Kennebec** | 12,000 | 233,000 | 291,250 | 349,500 |
| **Androscoggin** | 7,500 | 106,960 | 133,700 | 160,440 |

Note: Flow values estimated for each river near their discharge into Merrymeeting Bay.

## 3.4 Flood Scenarios

Fifteen flood scenarios were developed to evaluate the flood risk in the City of Bath. The scenarios incorporated estimates for present-day conditions, estimated 2050 conditions, and estimated 2100 conditions. For each timeframe, three combinations of tidal and streamflow events were used: average daily tides and average riverine flows, 100-yr coastal storm tides and average daily river flows, and 100-yr coastal storm tides combined with 100-yr riverine flows. For the 2050 and 2100 time horizons, two scenarios of sea level rise were included in order to estimate flood risk under both the "commit to manage" and "prepare to manage" sea level rise scenario. A matrix of the 15 flood scenarios used as part of this study is provided in Table 3. The results tables in the later sections of this report correspond to the numbered mapping scenarios in Table 3. Mapping scenarios 1, 4, 7, 10, and 13 correspond with the average tidal conditions and average riverine flows. Areas inundated for these scenarios would likely experience flooding during average daily high tides.

**Table 3. Flood Scenarios**

| Timeframe | SLR Amount (ft) | Tidal Conditions | Riverine Flows | Mapping Scenario |
|---|---|---|---|---|
| Present Day | 0 | Average | Average | 1 |
| | | 100-yr | Average | 2 |
| | | 100-yr | 100-yr | 3 |
| 2050 | 1.5 "Commit to Manage" | Average | Average | 4 |
| | | 100-yr | Average | 5 |
| | | 100-yr | 100-yr[1] | 6 |
| 2050 | 3.0 "Prepare to Manage" | Average | Average | 7 |
| | | 100-yr | Average | 8 |
| | | 100-yr | 100-yr[2] | 9 |
| 2100 | 4.0 "Commit to Manage" | Average | Average | 10 |
| | | 100-yr | Average | 11 |
| | | 100-yr | 100-yr[1] | 12 |
| 2100 | 8.8 "Prepare to Manage" | Average | Average | 13 |
| | | 100-yr | Average | 14 |
| | | 100-yr | 100-yr[2] | 15 |

Notes:
1. River flows increased by 25%.
2. River flows increased by 50%.
3. "Commit to Manage" and "Prepare to Manage" sea level rise recommendations from the Maine Climate Council (2020).
4. "100-yr" tidal conditions and riverine flows correspond to the 1% annual chance events.

# 4. Flood Exposure Methods

## 4.1 GIS Asset Data

We compiled a GIS database of the assets that were included as part of this vulnerability assessment using data provided by the City of Bath and data from publicly available data sources. The data was organized into nine categories for the vulnerability analysis: transportation, buildings, education, public safety, power, port facilities, industries, open space, and pump stations.

The GIS assets within the transportation category include roads, bridges, transit lines, sidewalks, railroads, and parking lots. Data for roads, sidewalks, and parking lots were provided by the City of Bath. The parking lot data was extracted using the tax parcel map layer. Bridge and railroad data were downloaded from the Maine GeoLibrary (State of Maine, 2022). Data for the Bath City Bus transit lines was digitized using bus routes provided on the City Bus website (City of Bath, 2022b).

The City of Bath provided GIS data for buildings and a tax parcel map with land use categories. These two data sources were used to categorize buildings as commercial, industrial, institutional, municipal, residential, or state-owned. The buildings data was used to identify schools and childcare centers, the library, non-profit organizations, and public safety buildings.

Public safety data consisted of law enforcement and fire station buildings, landfill sites, and remediation sites in a range of stages of remediation. The remediation sites were downloaded from the Maine Department of Environmental Protection (DEP) GIS website (Maine DEP, 2022).

Power data included streetlight and control box locations provided by the City of Bath. Central Maine Power facilities, such as substations, were extracted using the tax parcel database. Locations of port facilities were digitized by GEI based on aerial imagery. For the category of industries, Bath Iron Works (BIW) and the Maine Maritime Museum were included in this study. Their facilities were identified using the tax parcel database.

Open space data consisted of wetlands, city/conservation parcel data, and Kennebec Estuary Land Trust (KELT) data layers. Wetland data was acquired for the state of Maine from the National Wetlands Inventory (U.S. FWS, 2022). City/conservation parcel data and KELT-owned land was extracted from the City's tax parcel database. Additionally, KELT trail data was provided by KELT.

## 4.2 Hydraulic Model

GEI developed a two-dimensional (2D) hydraulic model of the lower Androscoggin and Kennebec Rivers to simulate the 15 flood scenarios included as part of this study. The model was developed using the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center – River Analysis System (HEC-RAS) software, Version 6.3.0 (USACE, 2022). The model simulates 2D flows using an unsteady analysis, the diffusion equation set, and a 20-second fixed computation interval.

The model simulates flow over an area of approximately 49.2 square miles and along a 10.9-mile reach of the Kennebec River starting at the upstream end of Merrymeeting Bay and continuing to the confluence of Winnegance Creek. The model also includes an 8.4-mile stretch of the Androscoggin River starting upstream near the Route-196 Brunswick-Topsham Bypass Bridge and continuing downstream through Merrymeeting Bay to where it joins the Kennebec River (Fig. 1). The model includes two hydraulic structures: the Sagadahoc Bridge (Route 1 Bridge) and the Carlton Bridge (the old Route 1 Bridge). We also incorporated the effect of smaller structures by hydro-reinforcing the terrain to represent the hydraulic conveyance at several small culverts and bridges. The purpose of the 2D model was to simulate tidal and riverine flow conditions along the Kennebec River for the 15 flood scenarios that were evaluated to estimate peak water surface elevations, flood extents, depths of flooding, and duration of flood inundation at specific locations. The model used stage hydrographs representative of the tidal hydrographs developed for this study at the downstream end of the model and constant flows for the streamflows of the Androscoggin and Kennebec Rivers at the upstream ends of the models. The model grid size was set to 50 ft by 50 ft to optimize for model accuracy, stability, and run time, with a refined area near downtown with cell sizes of 20 ft by 20 ft. Breaklines were input to align the cell faces of the mesh with linear features such as the two bridges and the shoreline of downtown Bath.

The digital elevation model (DEM) (i.e., terrain) for the model was compiled from the following data sources: a 1-meter LiDAR survey downloaded from USGS (USGS, 2020) and a 3-meter resolution NOAA that includes digitized bathymetry data of the Kennebec River (NOAA, 2022). The terrain was modified to include buildings using the buildings shapefile provided to us in the GIS data by the City of Bath. The DEM elevations were referenced to NAVD88.

The 2D flow area included spatially varied Manning’s n-values based on the 2016 National Land Cover Database (NLCD) for the Conterminous United States (MRLC, 2019). Manning’s n-values were assigned to land cover groups based on Chow (1959) and our engineering judgment.

# 5. Transportation Flood Exposure Results

The flood exposure of transportation-related infrastructure was evaluated for the 15 flood scenarios, outlined in Table 3, using the methods described in Section 4. The mileages of roads, bus routes, sidewalks, and railroads likely to be inundated under the scenarios included in this study are summarized in Table 4. The acreage of parking lots likely to be inundated during each scenario is summarized in Table 5. The likelihood of bridges and/or bridge approaches being overtopped for each flood scenario evaluated is summarized in Table 6.

For a combined 100-yr coastal storm and riverine event for present-day water levels (Scenario 3), approximately 1.1 miles of roadway are likely to be inundated. By 2050, approximately 0.1 miles of roadway are likely to be inundated during high tides of average daily tide cycles for the "commit to manage" sea level rise estimate and 0.6 miles for the "prepare to manage" sea level rise estimate. During coastal storms and extreme riverine events, estimates for miles of roadways inundated increase, as seen in Table 4.

Maps showing model results of inundated road segments for average daily conditions and combined 100-yr coastal storm and riverine flooding events for the 2050 and 2100 timeframes can be seen in Figs. 3 and 4. In addition to displaying inundated road segments, these figures show the estimated flood extents in 2050 and 2100 due to the combined 100-yr and coastal and riverine event under the "commit to manage" (Fig. 3) and "prepare to manage" (Fig. 4) sea level rise scenario.

Details of the model results for the 15 flood scenarios for each road likely to be inundated are provided in Appendix A. These results include approximate length of roadway inundated, peak water surface elevation, depth of flooding, and duration of flooding during one tide cycle (i.e., a 12-hr time period) that includes the peak water surface elevation. For roads and flood scenarios where higher depths of flooding are predicted to occur, the roads would also likely flood during tide cycles leading up to and following the peak of the storm event.

**Table 4. Transportation Flood Exposure Summary (Miles Inundated)**

| Transportation Asset | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roads | - | 0.7 | 1.1 | 0.1 | 1.5 | 2.3 | 0.6 | 2.8 | 3.0 | 0.9 | 3.0 | 3.3 | 3.4 | 4.9 | 5.4 |
| Bus Routes | - | 0.2 | 0.3 | <0.1 | 0.5 | 0.7 | 0.2 | 0.9 | 0.9 | 0.3 | 0.9 | 1.0 | 1.0 | 1.3 | 1.3 |
| Sidewalks | - | 0.3 | 0.4 | 0.1 | 0.7 | 1.1 | 0.2 | 1.5 | 1.6 | 0.4 | 1.7 | 1.7 | 1.8 | 2.5 | 2.6 |
| Railroads | - | 0.1 | 0.1 | <0.1 | 0.2 | 0.3 | <0.1 | 0.5 | 0.5 | 0.1 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 |

The flood exposure assessment for parking lots included surface parking lots identified in the City tax parcel data. Parking spots along streets and garage parking were not included as part of this study. The model results suggest that less than 0.1 acres of parking lots are estimated to be inundated during a combined 100-yr coastal storm and riverine event during present-day sea levels. By 2050, approximately 1.0 acres of parking lots are likely to be inundated during combined 100-yr coastal storm and riverine events for the "commit to manage" sea level rise scenario and approximately 1.9 acres for combined 100-yr storm conditions and the "prepare to manage" sea level rise scenario. By 2100, the estimated area of parking lots inundated increases to up to 2.7 acres inundated for combined 100-yr storm conditions and the "prepare to manage" sea level rise scenario.

Many of the parking lots likely to be inundated are in the downtown area along Water Street, Commercial Street, and near King Street as seen in Figs. 3e and 4e.

**Table 5. Parking Lots Flood Exposure Summary**

| Parking Lots | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Acres Inundated | - | - | <0.1 | - | 0.1 | 1.0 | - | 1.7 | 1.9 | - | 2.0 | 2.1 | 2.2 | 2.7 | 2.7 |

There are eighteen bridges in the City of Bath based on the Maine DOT bridge GIS data (State of Maine, 2022). The model results suggest that two of the bridges would likely be inundated for the flood scenarios evaluated as part of this study: the Whiskeag Bridge (Figs. 3c and 4c) and the Winnegance Bridge. A summary of exposure for each of these bridges is provided in Table 6.

**Table 6. Bridge Flood Exposure Summary (Approach and/or Bridge Inundated)**

| Bridge Name | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Whiskeag | - | - | Yes | - | Yes | Yes | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| Winnegance | - | - | - | - | - | - | - | - | - | - | - | - | Yes | Yes | Yes |

# 6. Buildings Flood Exposure Results

The flood exposure of building structures in the City of Bath was evaluated for the 15 flood scenarios, outlined in Table 3, using the method described in Section 4 of this report. Building locations and uses (residential, commercial, etc.) were based on GIS buildings data and tax parcel information provided by the City of Bath. A building was considered flooded if the inundation touched the structures. The accuracy of the flood exposure assessment for buildings depends on the accuracy of the GIS data. In some cases, building structures such as garages, sheds, or other non-residential structures were included in the residential buildings count due to the classification method of the GIS data, which could lead to the results over-estimating the number of buildings inundated. In the case of the Bath Iron Works (BIW) property, the buildings GIS data included many structures that may have been temporary at the time, which has possibly overestimated the number of buildings at risk of flood exposure for the "Industrial" use category. Re-classifying the buildings data was beyond the scope of this study. These results should be considered approximate.

Table 7 provides a summary of the flood exposure results for the buildings in the City of Bath, broken down into building use.

The model results for inundated buildings for average daily conditions and combined 100-yr coastal storm and riverine flood events in 2050 and 2100 can be seen in Fig. 5 ("commit to manage") and Fig. 6 ("prepare to manage"). In addition to displaying inundated buildings, these figures show the estimated flood extents due to the combined 100-yr coastal storm and riverine event under the "commit to manage" and "prepare to manage" sea level rise scenario for 2050 and 2100 .

**Table 7. Buildings Flood Exposures Summary (Number Inundated)**

| Buildings | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Buildings Total*** | ***-*** | ***84*** | ***92*** | ***27*** | ***158*** | ***187*** | ***58*** | ***221*** | ***233*** | ***88*** | ***240*** | ***251*** | ***263*** | ***361*** | ***377*** |
| Commercial | - | 9 | 9 | 3 | 15 | 22 | 9 | 33 | 35 | 9 | 36 | 37 | 40 | 44 | 44 |
| Industrial (BIW) | - | 32 | 32 | 10 | 71 | 81 | 19 | 86 | 87 | 32 | 88 | 89 | 89 | 93 | 94 |
| Institutional | - | 2 | 2 | 1 | 2 | 3 | 2 | 5 | 5 | 2 | 6 | 6 | 8 | 21 | 21 |
| Municipal | - | 4 | 5 | - | 7 | 10 | 3 | 10 | 10 | 5 | 10 | 10 | 10 | 15 | 16 |
| Residential | - | 37 | 44 | 13 | 62 | 70 | 25 | 86 | 95 | 40 | 99 | 108 | 115 | 187 | 201 |
| State | - | - | - | - | 1 | 1 | - | 1 | 1 | - | 1 | 1 | 1 | 1 | 1 |

The model results suggest that for combined 100-yr coastal storm and riverine events for present-day sea levels, approximately 92 buildings are likely to experience flooding, which includes 44 residential building, 9 commercial buildings, 4 municipal buildings, 2 institutional buildings, and 32 industrial buildings. By 2050, approximately 27 buildings are likely to experience flooding during high tides due to the "commit to manage" sea level rise estimate, which includes 13 residential buildings and 10 industrial buildings. The estimates for approximate buildings inundated increases for increased sea level rise and combined coastal and riverine storm events in the 2050 and 2100 time horizons.

This study includes a summary of flood exposure results for buildings owned by Bath Housing, charity organizations, and churches (Table 8). Buildings owned by Bath Housing and buildings classified as churches in the tax parcel data are not likely to experience flood inundation until 2100 during 100-yr storm events under the "prepare to manage" sea level rise scenario. One building listed as a charity organization would be likely to experience flooding in 2050 during 100-yr storm events under the "prepare to manage" sea level rise scenario. This estimate increases to 10 for the 2100 "prepare to manage" sea level rise scenario.

**Table 8. Bath Housing, Churches, and Charity Buildings Flood Exposure Summary (Number Inundated)**

| Buildings | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bath Housing Buildings | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 |
| Churches | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 1 |
| Charity Buildings | - | - | - | - | - | - | - | 1 | 1 | - | 2 | 2 | 2 | 10 | 10 |

Buildings related to education and childcare, such as schools and daycares, were included in this study but the model results suggest that these buildings are not likely to experience flood inundation under the 15 flood scenarios that were evaluated.

# 7. Industries Flood Exposure Results

Bath Iron Works (BIW) and the Maine Maritime Museum (MMM) were the two industries included as part of this study. Table 9 provides a summary of flood exposure for land parcels associated with these industries and includes land area impacted and an estimated number of buildings inundated. The area for these properties is based on the tax parcel information provided by the City. Note that only the impacted area was included in the totals, not the entire area of the parcel, if only part of the parcel would be inundated.

**Table 9. Industries Flood Exposure Summary**

| Industry | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BIW Area Inundated (acre) | - | 7.5 | 9.1 | 0.5 | 28.7 | 30.9 | 4.4 | 33.3 | 34.1 | 9.3 | 34.8 | 35.0 | 35.9 | 39.5 | 39.8 |
| BIW Area Inundated (%) | - | 6.0 | 7.3 | 0.4 | 23.0 | 24.8 | 3.5 | 26.7 | 27.3 | 7.4 | 27.9 | 28.1 | 28.8 | 31.6 | 31.9 |
| BIW Buildings (# Inundated) | - | 32 | 32 | 10 | 71 | 81 | 19 | 86 | 87 | 32 | 88 | 89 | 89 | 93 | 94 |
| MM Museum Area Inundated (acre) | - | 3.2 | 3.3 | 1.7 | 3.8 | 3.8 | 2.8 | 4.3 | 4.3 | 3.3 | 4.6 | 4.7 | 5.0 | 6.6 | 6.8 |
| MM Museum Area Inundated (%) | - | 21.5 | 22.0 | 11.8 | 25.5 | 25.9 | 18.8 | 28.8 | 29.2 | 22.6 | 31.2 | 31.6 | 33.7 | 44.9 | 45.8 |
| MM Museum Buildings (# Inundated) | - | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 6 | 6 |

The estimated flood extents and buildings impacted for BIW are shown on Figs. 5e-5f and Figs. 6e-6f for the "commit to manage" and "prepare to manage" sea level rise scenarios, respectively. The estimated flood extents and buildings impacted for the MMM are shown on Fig. 5g and Fig. 6g for the "commit to manage" and "prepare to manage" sea level rise scenarios, respectively.

The model results suggest that approximately 9.1 acres of BIW property (representing 7.3% of the BIW property) and 3.3 acres of the MMM property (representing 22.0% of the MMM property) would be likely to experience flood inundation during a combined 100-yr coastal and riverine event under present-day sea levels, impacting approximately 32 and 2 buildings, respectively. By 2050, approximately 0.5 acres and 10 buildings on BIW property and 1.7 acres and 1 building on MMM property would be likely to experience flooding during high tides under the "commit to manage" sea level rise scenario. The estimates for area and buildings impacted increases for increased sea level rise and combined coastal and riverine storm events in the 2050 and 2100 time horizons.

# 8. Public Safety Flood Exposure Results

This study included an evaluation of the impact to public safety for the 15 flood scenarios. Public safety buildings included law enforcement buildings and the fire station. Areas related to public safety included the landfill site and Maine DEP remediation sites in all stages of remediation. Table 10 provides a summary of the flood exposure results for buildings and areas that may impact public safety.

**Table 10. Public Safety Flood Exposure Summary**

| Public Safety | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Law Enforcement (Yes/No) | - | - | - | - | - | Yes | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| Fire Station (Yes/No) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Landfill (Yes/No) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Remediation Sites (# Inundated) | - | 4 | 4 | 2 | 5 | 8 | 4 | 12 | 12 | 4 | 12 | 12 | 13 | 16 | 17 |

The model results suggest that the City of Bath Police Department, along with the parking lot where police vehicles are often parked, is at risk of flooding by 2050 under combined 100-yr coastal storm and riverine events and the "commit to manage" sea level rise scenario (Figs. 5f and 6f). The model results suggest that the fire station and landfill are not likely to experience flood inundation under the flood scenarios evaluated as part of this study.

For remediation sites included as part of the Maine DEP database, four sites are likely to experience flood inundation due to 100-yr storm events for present-day sea levels. By 2050, two sites are likely to experience flooding during high tides due to the "commit to manage" sea level rise scenario and four sites for the "prepare to manage" sea level rise scenario. The estimated number of remediation sites that would likely experience flood inundation increases to 17 sites for a combined 100-yr coastal storm and riverine event in 2100 for the "prepare to manage" sea level rise scenario. Remediation sites are of interest for their potential to expose or release harmful constituents.

A detailed list of the remediation sites, their remediation status, and their estimated flood exposure for the 15 flood scenarios is provided in Appendix B.

# 9. Power Flood Exposure Results

The flood exposure for power-related assets was evaluated for the 15 flood scenarios described in Table 3. A summary of the flood exposure results is provided in Table 11. The power-related assets included as part of this study were CMP-owned parcels, control boxes, and streetlights.

**Table 11. Power Assets Flood Exposure Summary (# Inundated)**

| Power Asset | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Control Boxes (# Inundated) | - | 1 | 2 | - | 2 | 3 | - | 5 | 5 | 1 | 5 | 5 | 5 | 6 | 6 |
| Streetlights (# Inundated) | - | 41 | 47 | 5 | 73 | 104 | 26 | 127 | 134 | 46 | 142 | 145 | 150 | 171 | 178 |
| CMP Parcels (# Inundated) | - | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 |
| CMP Area Inundated (acres) | - | 2.2 | 2.5 | 1.8 | 2.6 | 3.6 | 2.0 | 3.8 | 4.4 | 2.2 | 4.3 | 4.8 | 4.9 | 6.3 | 6.6 |
| CMP Percent Inundated (%) | - | 2.8 | 3.3 | 2.3 | 3.3 | 4.7 | 2.7 | 5.0 | 5.8 | 2.9 | 5.6 | 6.3 | 6.4 | 8.2 | 8.6 |

The model results suggest that for a combined 100-yr coastal storm and riverine event for present-day sea levels, 47 streetlights, 2 control boxes, and 2.5 acres of CMP property would be within inundated areas. By 2050 for the "commit to manage" sea level rise scenario, 5 streetlights and 1.8 acres of CMP property would likely experience flooding during high tides and 3 control boxes, 104 streetlights, and 3.6 acres of CMP property would likely be within flood extents of a combined 100-yr coastal storm and riverine event. The estimates for the number of power-related assets within the flood extents increases with higher rates of sea level rise as shown in results summarized in Table 11.

The CMP substation near Washington Street and Castine Avenue can be seen alongside predicted flood extents in 2050 and 2100 for combined 100-yr coastal storm and riverine events under the "commit to manage" and "prepare to manage" sea level rise scenarios in Figs. 5h and 6h, respectively. The property would be likely to be inundated for storm events under both time horizons.

It is important to note that the elevations used to determine if these power assets are within predicted flood boundaries are based on ground-surface elevations from LIDAR data. The actual elevations of electrical equipment, such as control boxes, or components of substations that could be damaged due to flooding, may be higher than the predicted peak water surface elevations from the model results in the event the power assets are, for example, on elevated concrete pads or pole mounted. Field survey of vulnerable electrical equipment should be performed to determine elevations.

# 10. Pump Station Flood Exposure Results

The potential flood exposure of pump stations within the City of Bath was evaluated for the 15 flood scenarios outlined in Table 3. Table 12 presents a summary of pump stations that would be expected to be inundated during the 15 scenarios. Pump stations within the City-provided GIS database that were not included in this table were not estimated to be impacted during the flood scenarios evaluated in this study.

**Table 12. Pump Stations Flood Exposure Summary (Y/N)**

| Pump Stations | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Total Impacted*** | - | ***4*** | ***4*** | - | ***4*** | ***5*** | ***2*** | ***6*** | ***6*** | ***4*** | ***7*** | ***7*** | ***7*** | ***9*** | ***9*** |
| Hunt St | - | Y | Y | - | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Commercial St | - | Y | Y | - | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Harward St | - | Y | Y | - | Y | Y | - | Y | Y | Y | Y | Y | Y | Y | Y |
| Private - BIW North Yard | - | Y | Y | - | Y | Y | - | Y | Y | Y | Y | Y | Y | Y | Y |
| Castine Ave | - | - | - | - | - | Y | - | Y | Y | - | Y | Y | Y | Y | Y |
| Riverview Rd | - | - | - | - | - | - | - | Y | Y | - | Y | Y | Y | Y | Y |
| Private - Bath Canning Co | - | - | - | - | - | - | - | - | - | - | Y | Y | Y | Y | Y |
| Bridge St | - | - | - | - | - | - | - | - | - | - | - | - | - | Y | Y |
| Farrin Place | - | - | - | - | - | - | - | - | - | - | - | - | - | Y | Y |

The model results suggest that there are four pump stations likely to be within the flood extents for 100-yr coastal storm events for present-day sea levels: the Hunt Street, Commercial Street, Harward Street, and the BIW North Yard pump stations. By 2050, the Hunt Street and Commercial Street pump stations are estimated to be susceptible to flooding during high tides for the “prepare to manage” sea level rise scenario. By 2100, seven pump stations would be likely to experience flooding during high tides for the “prepare to manage” sea level rise scenario.

It is important to note that the elevations used to determine if these pump stations are within predicted flood boundaries are based on ground-surface elevation from LIDAR data. The actual elevations of the components of the pump stations that may be damaged due to flood inundation or impact the operability of the pump station may be different (i.e., lower or higher) than what was used and alter the flood exposure results. Field survey should be performed to confirm pertinent elevations of the pump stations.

# 11. Open Space Flood Exposure Results

The flood exposure of open spaces in the City of Bath was evaluated for the 15 flood scenarios included as part of this study. Open spaces included Kennebec Estuary Land Trust (KELT) trails and property, wetlands from the National Wetlands Inventory database (U.S. FWS, 2022), and "City/Conservation" parcels from the City of Bath tax parcel database. Many of the wetlands in the database were within coastal areas and therefore within the extent of present-day average tidal boundaries. For this study, we wanted to see the area of wetlands subjected to coastal flooding that are not likely already experiencing daily tidal action. For the results, we have presented the area inundated as the difference between the area within the predicted flood extents for each scenario and the area within the boundary of average tides and average daily streamflows for present-day conditions. A summary the flood exposure results for open spaces is provided in Table 13.

**Table 13. Open Space Flood Exposure Summary**

| Inundation / Open Space | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KELT Trails (miles) | - | 0.1 | 0.1 | <0.1 | 0.1 | 0.3 | 0.1 | 0.3 | 0.3 | 0.1 | 0.3 | 0.4 | 0.4 | 0.8 | 1.0 |
| KELT Area (acre) | - | 7.9 | 9.1 | 5.5 | 9.9 | 11.7 | 7.2 | 12.0 | 13.6 | 8.4 | 13.4 | 14.9 | 15.0 | 20.6 | 22.7 |
| KELT Area (%) | - | 1.6 | 1.8 | 1.1 | 2.0 | 2.4 | 1.5 | 2.4 | 2.8 | 1.7 | 2.7 | 3.0 | 3.0 | 4.2 | 4.6 |
| Wetlands Area (acre) | - | 116.0 | 146.2 | 73.8 | 153.8 | 178.0 | 114.1 | 178.0 | 190.6 | 142.9 | 184.2 | 197.4 | 198.9 | 223.1 | 229.4 |
| Wetlands Area (%) | - | 26.1 | 32.9 | 16.6 | 34.6 | 40.1 | 25.7 | 40.1 | 42.9 | 32.2 | 41.5 | 44.4 | 44.8 | 50.2 | 51.6 |
| Conservation Parcels | - | 26 | 27 | 25 | 30 | 37 | 26 | 38 | 39 | 27 | 39 | 39 | 40 | 44 | 44 |
| Conservation Area (acre) | - | 26.1 | 29.5 | 16.7 | 33.2 | 39.1 | 22.6 | 41.2 | 45.1 | 27.8 | 44.9 | 48.7 | 49.0 | 65.3 | 72.3 |
| Conservation Area (%) | - | 5.0 | 5.7 | 3.2 | 6.4 | 7.5 | 4.3 | 7.9 | 8.7 | 5.3 | 8.6 | 9.3 | 9.4 | 12.5 | 13.9 |

The model results suggest that for a combined 100-yr coastal storm and riverine events for present-day sea levels, 9.1 acres of KELT property, 146.2 acres of wetland, and 29.5 acres of City/Conservation parcels would likely be inundated. By 2050, 5.5 acres of KELT property, 73.8 acres of wetland not currently subjected to tidal action due to average daily tides, and 16.7 acres of City/Conservation parcels would likely be subjected to flooding during high tides for the "commit to manage" sea level rise scenario. For the "prepare to manage" sea level rise scenario in 2050, approximately 25.7% of the wetlands not presently subjected to daily inundation due to average daily tidal action would likely experience "nuisance flooding."

For future sea levels, wetlands would likely be subjected to a process known as "coastal squeeze" where coastal wetlands are lost due to increasing depths of water and wetlands are limited in their inland migration due to the presence of impervious infrastructure and/or slopes that are not conducive to wetland migration.

# 12. Ports Flood Exposure Results

Port facilities included in the flood exposure assessment included the North End Boat Launch (Figs. 5e and 6e), the Waterfront Park Pier (Figs. 5f and 6f), and the South End Boat Launch (Figs. 5j and 6j). Private Port facilities, including those part of Bath Iron Works and the Maine Maritime Museum, were not evaluated as part of this study. A summary of the flood exposure results for ports can be seen in Table 14. A boat launch off Anchor Road near Morse High School was included in the evaluation, but the model results suggested that inundation would not be likely under the flood scenarios included as part of this study. We chose to perform the flood exposure assessment on the top of the ramp/and or pier for each of the locations. Boat ramps and piers are unlikely to be damaged during flood inundation, however, periods of inundation may limit the times when the facilities are usable.

**Table 14. Ports Flood Exposure Summary (Y/N)**

| Ports | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| North End Boat Launch (Top of Ramp) | - | Y | Y | - | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| South End Boat Launch (Top of Pier) | - | Y | Y | - | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Waterfront Park Pier | - | Y | Y | - | Y | Y | - | Y | Y | Y | Y | Y | Y | Y | Y |

For the three facilities likely to be impacted, the model results suggest that they would likely experience flood inundation under present-day sea levels for the combined 100-yr coastal storm and riverine event. By 2050, the North and South End Boat Launches would likely experience flood inundation during average high tides for average daily tidal conditions and average riverine flows under the "prepare to manage" sea level rise scenario. By 2100, the three facilities would likely experience flood inundation during average high tides for average daily tidal conditions and average riverine flows under the "commit to manage" sea level rise scenario. During the periods of inundation, the use of the facilities would likely be limited.

# 13. Flood Adaptation Recommendations

Measures taken to increase the flood resiliency of a community and adapt to flood risk can fall within a few categories, such as: fortify (keep water out), retreat (move the land use or infrastructure out of the flood inundation extents) or adapt (design the land use or infrastructure to accommodate the water). The decision around which measure to take can depend on several factors, including the overall risk of flood exposure, the sensitivity to flooding for a particular asset, and the adaptive capacity. For example, electrical equipment constitutes an asset that is highly sensitive to flooding and would likely be damaged or inoperable if exposed to flood inundation. Assets like roads can usually withstand some level of flooding without damage and so are often considered not very sensitive to flooding in a structural sense. There is an element of public safety concern that would require forecasting and deployment of road closures during flood events. Infrastructure that could be easily relocated, elevated, or flood-proofed would be considered to have a high adaptive capacity. Infrastructure or assets that are not easy to relocate or flood-proof are often considered to have a low adaptive capacity.

We have suggested timelines for adaptation for specific roadways and have provided several adaptation options for the key roadways at risk for flooding in the near-term time horizon. We have also highlighted specific pump stations and remediation sites that are at a risk of flood exposure in the near-term, medium-term, and the long-term time horizon for follow-up field investigation and survey. In addition to the specific roadways, pump station, and remediation sites, we have provided general flood adaptation guidelines and resources for building owners. It is possible that actual storm events could result in unanticipated adverse conditions not accounted for in this study.

## 13.1 Flood Adaptation Recommendations for Road Networks

We have suggested timelines for road adaptation based on the risk of flood exposure and the impact inundation would have on community members, such as the number of buildings that would be inaccessible if a roadway was blocked due to flooding and if alternate routes are available. Roadways have a relatively low sensitivity to flooding and our recommendations assume that roads would remain operable after experiencing flood inundation. This study does not provide guidance on public safety concerns during inundation, and we recommend that the City develop a plan to address potential public safety issues such as flooding along roads.

Tables 15, 16, and 17 provide our recommendations for near-term, medium-term, and long-term road adaptation priorities. We have included the time horizon when the roadway would likely experience flooding due to combined 100-yr coastal storm and riverine events and for when the roadway would likely experience flooding due to average daily tides and average riverine flows. We have also included whether an alternate route exists for roadway travelers to avoid the inundated segment, the approximate number of buildings that would be impacted due to inundation, and other considerations.

Following the tables of timeline recommendations, we have included adaptation alternatives for the near-term road recommendations.

**Table 15. Near-Term Road Recommendations**

| Road Name | Timeline for 100-yr Storm Flooding[1] | Timeline for Flooding During Average Daily High Tides | Alternate Route?[2] | Approximate # of Buildings Impacted[3] | Other Considerations |
|---|---|---|---|---|---|
| **Washington Street** and Harward Street near the intersection of the two | Present-Day | 2050, *Prepare*<br>2100, *Commit* | No | 60 | |
| **Butler Head Road** | Present-Day | 2050, *Commit* | No | 14 | Access to road dependent on access to Varney Mill Road and either Ridge Road or both North Bath Road and Whiskeag Road. |
| **Varney Mill Road** near Butler Head Road Intersection | Present-Day | *2100, Commit* | No | 45 | Access to road dependent on access to either Ridge Road or North Bath Road and Whiskeag Road. |
| **Washington Street** near Hunt Street Intersection | Present-Day | 2050, *Prepare*<br>2100, *Commit* | Yes | 7 | |
| **Commercial Street** north of Route 1 Bridge including Summer, Arch, Broad, and Lambard Streets | Present-Day | 2050, *Commit* | Yes | 8-20 | Buildings impacted are located along Commercial Street and the number of buildings impacted depends on the flood scenario. |
| **Commercial Street** and Vine Street, south of Route 1 Bridge | Present-Day | 2100, *Commit* | Yes[4] | 2 [5] | If this area is inaccessible, access to Water Street from the South would be impacted, but Water Street would likely remain accessible via Centre Street, Elm Street, and Front Street for present-day flood scenarios. |

| Road Name | Timeline for 100-yr Storm Flooding[1] | Timeline for Flooding During Average Daily High Tides | Alternate Route?[2] | Approximate # of Buildings Impacted[3] | Other Considerations |
|---|---|---|---|---|---|
| **Hawkes Lane (private)** | Present-Day | 2100, *Commit* | No | 10 | Access to road dependent on access to Ridge Road, which is estimated to be accessible during present-day 100-yr storm flooding. |
| **North Bath Road** | Present-Day | 2100, *Commit* | Yes | 4 | Access to road dependent on access to Ridge Road and/or Whiskeag Road, which are estimated to be accessible during present-day flood scenarios. |
| **Ridge Road** near Hawkes Lane Intersection | 2050, *Commit* | 2100, *Commit* | No[6] | >150 | For flood scenarios where Ridge Road is inaccessible, North Bath Road would likely be inaccessible, cutting off access to Butler Head via North Bath Road and Ridge Roads. |

Notes:
1. "100-yr Storm" refers to a combination of a 1% annual chance coastal and riverine event.
2. Alternate routes refers to if the road can be avoided by other travelers coming from non-inundated areas, but alternate routes would likely not be available to areas directly alongside impacted sections of the roads.
3. Number of buildings approximated based on GIS buildings layer and aerial imagery.
4. For present-day flood scenarios, alternate routes available via Centre Street, Elm Street, and Front Street.
5. Assuming access still available via Centre Street, Elm Street, and/or Front Street.
6. The alternate route for the Butler Head Area would be North Bath Road, which would likely be inaccessible during flood scenarios when Ridge Road would be inaccessible.

**Table 16. Medium-Term Road Recommendations**

| Road Name | Timeline for 100-yr Storm Flooding[1] | Timeline for Flooding During Average Daily High Tides | Alternate Route?[2] | Approximate # of Buildings Impacted[3] | Other Considerations |
|---|---|---|---|---|---|
| **Front Street**<br>**Water Street**<br>**Centre Street**<br>**Elm Street**<br>**Washington Street** between School Street and Centre Street | 2050, *Commit* | 2100, *Prepare* | Yes | 50 | These streets, together with Commercial Street[4], encompass the "downtown" area of the City north of the Route 1 Bridge. The approximate number of buildings impacted assumes these roads would be inundated at the same time. |
| **King Street** | 2050, *Commit* | 2100, *Prepare* | Yes | 2 | |
| **Whiskeag Road** near Whiskeag Creek | 2050, *Commit* | 2100, *Prepare* | Yes | 6 | This section of road includes a culvert between Whiskeag Creek and Whiskeag Pond. The capacity of the culvert for combined coastal and riverine events should be considered for future adaptation measures. |
| **Washington Street** near Castine Avenue and including the eastern end of Spring and Hinckley Streets | 2050, *Commit* | 2100, *Prepare* | Yes | 5 | Impacted buildings and areas include BIW property and the CMP Substation. |
| **Castine Avenue** including southern end of Middle Street | 2050, *Commit* | 2100, *Prepare* | Yes | 6 | Included in the likely inundation along Castine Avenue is the CMP Substation at the intersection of Castine Avenue and Washington Street. |

Notes:
1. "100-yr Storm" refers to a combination of a 1% annual chance coastal and riverine event.
2. Alternate routes refers to if the road can be avoided by other travelers coming from non-inundated areas, but alternate routes would likely not be available to areas directly alongside impacted sections of the roads.
3. Number of buildings approximated based on GIS buildings layer and aerial imagery.
4. Including connector streets to Commercial Street, such as Summer, Arch, Broad, and Lambard Streets.

**Table 17. Long-Term Road Recommendations**

| Road Name | Timeline for 100-yr Storm Flooding[1] | Timeline for Flooding During Average Daily High Tides | Alternate Route?[2] | Approximate # of Buildings Impacted[3] | Other Considerations |
|---|---|---|---|---|---|
| **Washington Street** near Thorne Head | 2050, Prepare 2100, Commit | 2100, Prepare | No | 10 | Access to and from this area depends on accessibility of Washington Street near the Harward Street Intersection, which would likely be inundated during the flood scenarios when this northern section of Washington Street would be likely to be inundated. |
| **School Street** | 2050, Prepare 2100, Commit | 2100, Prepare | Yes | 4 | Consider addressing in conjunction with Washington Street near the School Street intersection. |
| **Bridge Street** | 2050, Prepare 2100, Commit | 2100, Prepare | Yes | 3 | Alternate route assumes Route 209 near intersection of Stoney Brook Road in Phippsburg would not be inundated, the area of which was not included in this study. |

Notes:
1. "100-yr Storm" refers to a combination of a 1% annual chance coastal and riverine event.
2. Alternate routes refers to if the road can be avoided by other travelers coming from non-inundated areas, but alternate routes would likely not be available to areas directly alongside impacted sections of the roads.
3. Number of buildings approximated based on GIS buildings layer and aerial imagery.

### *13.1.1 Washington Street and Harward Street*

For present day sea levels, approximately 725 ft of Washington Street and 103 ft of Harward Street, near the intersection of the two, are at risk of inundation during a combined 100-yr coastal and riverine storm event. The peak water surface elevation for the storm event is estimated to be approximately 8.9 ft, which would inundate Washington Street and Harward Street with depths of up to 3.5 ft and 1.2 ft, respectively. Washington Street would likely be inundated between 6 and 7 hours during the peak of the storm, with additional periods of inundation likely during high tides on either end of the peak of the storm. The end of Harward Street near the intersection of Washington Street would likely be inundated between 3 and 4 hours during the peak of the storm, with additional periods of inundation likely during high tides on either end of the peak of the storm.

By 2050, approximately 620 ft of Washington Street and 40 ft of Harward Street, near the intersection of the two, would be likely to be inundated during high tides for the “prepare to manage” sea level rise scenario. Washington Street would likely be inundated by depths up to 2.2 ft for durations between 5 and 6 hours during peak high tide. Depth, durations, and lengths inundated for the other flood scenarios near this location are summarized in Appendix A and flood extents and sections of roadway inundated for the "commit to manage" and "prepare to manage" sea level rise scenarios can be seen in Figs. 3 and 4, respectively.

There are approximately 60 buildings located along Washington Street north of Harward Street, which are only vehicularly accessible via Washington Street. This includes buildings located along Mast Landing and Mariner's Way. If this eastern end of Harward Street and the section of Washington Street north of the Harward Street intersection becomes impassible, these buildings would become inaccessible to emergency vehicles and building occupants would not be able to evacuate or access emergency services. There are no alternate routes available. We have provided three adaptation options for this area below.

### Adaptation Option 1: Do Nothing

If the roadways remain as they are, they would likely be subject to flood inundation under the scenarios described above. During times of inundation, the buildings located north of the Washington Street and Harward Street intersection would likely be inaccessible. The City might urge building occupants who may need access to medical services to temporarily seek shelter elsewhere when large coastal storm events are anticipated to occur. It is up to the public safety and emergency response agencies whether building occupants should shelter in place or attempt to drive through inundated areas and this study does not intend to usurp the responsibility of public safety emergency response agencies.

### Adaptation Option 2: Elevate the Roads

Elevating the roads above 8.9 ft (approximately 3.5 ft above the low point of Washington Street and 1.2 ft above the low point of Harward Street) would likely remove the risk of road inundation during combined 100-yr coastal storm and riverine events in the near-term and the risk of flooding during high tide in 2050 for both sea level rise scenarios and 2100 for the "commit to manage" sea level rise scenario. Both roadways would still likely be inundated by up to 1.7 ft and 3.2 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the "commit to manage" and "prepare to manage" sea level rise scenarios, respectively. The inundated roadway sections would likely be impassable for several hours during the peak of the storm. It is not clear if buildings in this area have basements that would also be impacted.

Elevating the roads above 10.6 ft (approximately 5.2 ft above the low point of Washington Street and 2.9 ft above the low point of Harward Street) would likely remove the risk of road inundation due to combined 100-yr coastal storm and riverine events in 2050 under the "commit to manage" sea level rise scenario. The roads would still likely be inundated by up to 1.5 ft during the "prepare to manage" sea level rise scenario.

Elevating the roads above 13.4 ft (approximately 8.0 ft above the low point of Washington Street and 5.7 ft above the low point of Harward Street) would likely remove the risk of flood inundation along the roads due to combined 100-yr coastal storm and riverine events in 2050 for both sea level rise scenarios and in 2100 under the "commit to manage" sea level rise scenario.

#### Adaptation Option 3: Connect Washington Street to High Street North of Harward Street

For this adaptation option, an alternate route to avoid impassable sections of Washington Street would be created by joining Washington Street to High Street, such as by extending Mast Landing. During times of inundation, the inundated area could be avoided by traveling along the alternate route. This option would likely reduce periods of time when the building occupants along Washington Street north of the Harward Street intersection would lose access to and from their buildings.

### *13.1.2 Washington Street North of the Intersection with Hunt Street*

For present day sea levels, approximately 650 ft of Washington Street north of the intersection with Hunt Street would likely experience flood inundation during a combined 100-yr coastal storm and riverine event. The peak water surface elevation for the storm event would be approximately 8.4 ft, which would inundate the road by up to 2.9 ft for around 5 to 6 hours at the peak of the storm.

By 2050, approximately 560 ft of Washington Street north of the intersection with Hunt Street would be likely to be inundated during high tides under the "prepare to manage" sea level rise scenario. Inundation of up to 2.1 ft for approximately 4 to 5 hours during peak high tide would be likely to occur.

There are approximately 7 buildings located along this stretch of Washington Street north of Hunt Street which would be likely to be inaccessible during periods of inundation. These buildings may also have basements that may be flooded. If this section of the road becomes impassible due to flood inundation, occupants within these buildings would likely be inaccessible to emergency vehicles and occupants themselves would not be able to evacuate using Washington Street. Washington Street would still be accessible from the north via Marshall Street and from the south via Robinson Street.

Depth, durations, and lengths inundated for the other flood scenarios near this location are summarized in Appendix A and flood extents and sections of roadway inundated for the 2050 and 2100 timeframe for the "commit to manage" and "prepare to manage" sea level rise scenarios can be seen in Figs. 3 and 4, respectively.

### Adaptation Option 1: Do Nothing

If the roadway remains as is, it would likely be subject to flood inundation under the scenarios described above. During times of inundation, the seven buildings located on Washington Street north of the Washington Street and Hunt Street intersection would likely be inaccessible. The City could issue evacuation notices to these building occupants when extreme coastal storm events are anticipated. It is up to the public safety and emergency response agencies whether building occupants should shelter in place or attempt to drive through inundated areas and this study does not intend to usurp the responsibility of public safety emergency response agencies.

### Adaptation Option 2: Elevate the Road

Elevating the section of Washington Avenue in this area above 8.4 ft (approximately 2.9 ft above the low point of the road) would likely remove the risk of inundation during combined 100-yr coastal storm and riverine events in the near-term and the risk of flooding during high tide in 2050 for both sea level rise scenarios and 2100 for the “commit to manage” sea level rise scenario. The road would still likely be inundated by up to 1.6 ft and 3.0 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the “commit to manage” and “prepare to manage” sea level rise scenarios, respectively. The roadway would likely be impassable for several hours during the peak of the storm.

Elevating the road above 10.0 ft (approximately 4.4 ft above the low point of the road) would likely remove the risk of flood inundation due to combined 100-yr coastal storm and riverine events in 2050 under the “commit to manage” sea level rise scenario and could provide increased flood protection for buildings located on the west side of the road. The road would still likely be inundated by up to 1.4 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the “prepare to manage” sea level rise scenario.

Elevating the road above 12.5 ft (approximately 7.0 ft above the low point of the road) would likely remove the risk of flood inundation due to combined 100-yr coastal storm and riverine events in 2050 under the “prepare to manage” sea level rise scenario and in 2100 under the “commit to manage” sea level rise scenario and could provide increased flood protection for buildings located on the west side of the road.

### Adaptation Option 3: Abandon the Road

For this option, the City could explore converting Washington Street north of Hunt Street and south of the Maine Maritime Museum from a roadway into a flood control structure using a combination of gray and green infrastructure methods. The Maine Maritime Museum would still be accessible along Washington Street from the north and Hunt Street could still be used to access Washington Street to the south of the Hunt Street intersection. Alternate access to buildings between Hunt Street and the Maine Maritime Museum could be established from Middle Street.

### *13.1.3 Butler Head Road and Varney Mill Road*

For present day sea levels, approximately 1,315 ft of Butler Head Road and 586 ft of Varney Mill Road, near the intersection of the two, would likely experience flood inundation during a combined 100-yr coastal storm and riverine event. The peak water surface elevation for the combined storm event would be approximately 9.9 ft along Butler Head Road and 9.4 ft along Varney Mill Road, which would inundate the roads by up to 4.3 ft and 1.8 ft, respectively. Butler Head Road would likely be inundated between 6 and 7 hours during the peak of the storm event and Varney Mill Road would likely be inundated between 4 and 5 hours during the peak of the storm event. The roads would likely be inundated during high tides leading up to and following the peak high tide.

By 2050, approximately 402 ft of Butler Head Road would be likely at risk of flood inundation during high tides under the "commit to manage" sea level rise scenario. Inundation of up to 0.6 ft would be likely for approximately 2 to 3 hours during high tide. For the "prepare to manage" sea level rise scenario, inundation of up to 2.1 ft would be likely for approximately 5 to 6 hours during high tide of the average daily tide cycle.

Varney Mill Road would be likely to experience flooding during high tide by 2100 under the "commit to manage" sea level rise estimate. Under this scenario, inundation up to 1.0 ft for approximately 2 to 3 hours during high tide would be likely to occur.

There are approximately 45 buildings for which Varney Mill Road is the sole access, 14 of which stem from Butler Head Road. If Butler Head Road becomes impassible due to flood inundation, the 14 buildings located along the road would be inaccessible to emergency vehicles and building occupants themselves would not be able to evacuate using Butler Head Road. If Varney Mill Road near the intersection of Butler Head Road becomes impassible due to flood inundation, the 45 buildings, including the 14 along Butler Head Road, would be inaccessible to emergency vehicles and building occupants themselves would not be able to evacuate using Varney Mill Road. There are no alternate routes available to these areas.

Depth, durations, and lengths inundated for the other flood scenarios near this location are summarized in Appendix A and flood extents and sections of roadway inundated for the 2050 and 2100 timeframe for the "commit to manage" and "prepare to manage" sea level rise scenarios can be seen in Figs. 3 and 4, respectively.

**Adaptation Option 1: Do Nothing**

If the roadways remain as they are, they would likely be subject to flood inundation under the scenarios described above. During times of inundation, the 45 buildings accessed from Varney Mill Road, including the 14 buildings accessed solely from Butler Head Road, would likely be inaccessible. The City could issue evacuation notices to these occupants when extreme coastal storm events are anticipated to occur. It is up to the public safety and emergency response agencies whether building occupants should shelter in place or attempt to drive through inundated areas and this study does not intend to usurp the responsibility of public safety emergency response agencies.

### Adaptation Option 2: Elevate the Roads

Elevating Butler Head Road above 9.9 ft (approximately 4.3 ft above the low point along the road) and Varney Mill Road above 9.4 ft (approximately 1.8 ft above the low point along the road) would likely remove the risk of inundation during combined 100-yr coastal storm and riverine events in the near-term and the risk of flooding during high tide in 2050 under both sea level rise scenarios and 2100 under the “commit to manage” sea level rise scenario.

Butler Head Road would still likely be inundated by up to 2.2 ft and 3.4 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the “commit to manage” and “prepare to manage” sea level rise estimates, respectively. Varney Mill Road would still likely be inundated by up to 2.0 ft and 3.3 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the “commit to manage” and “prepare to manage” sea level rise estimates, respectively. The inundated roadway sections would likely be impassable for several hours during the peak of the storm.

Elevating Butler Head Road above 12.1 ft (approximately 6.5 ft above the low point of Butler Head Road) and Varney Mill Road above 11.4 ft (approximately 3.8 ft above the low point of Varney Mill Road) would likely remove the risk of flooding due to combined 100-yr coastal storm and riverine events in 2050 under the “commit to manage” sea level rise scenario. Butler Head Road would still likely be inundated by up to 1.2 ft and Varney Mill Road by up to 1.3 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 under the “prepare to manage” sea level rise scenario.

Elevating Butler Head Road above 15.0 ft (approximately 9.4 ft above the low point of the road) and Varney Mill Road above 14.3 ft (approximately 6.7 ft above the low point of the road) would likely remove the risk of flood inundation along these roads due to combined 100-yr coastal storm and riverine events in 2050 under both sea level rise scenarios and 2100 under the “commit to manage” sea level rise scenario.

### Adaptation Option 3: Re-Route Butler Head Road and Elevate Varney Mill Road

Puffin Lane, located off Blackwater Cove Road (a private road), could be connected to Mallard Road in order to provide alternate access to the buildings along Butler Head Road. Varney Mill Road could be elevated following the recommendations described above. The section of Butler Head Road at risk of flood inundation under the flood scenarios evaluated for this study would remain at risk of flood inundation. During periods of flooding, building occupants located along Butler Head Road could travel south along Mallard Road to Puffin Lane to Blackwater Cove Road. Varney Mill Road, if elevated, could be used to access the areas along Varney Mill Road north of the Varney Mill Road and Butler Head Road intersection.

### *13.1.4 Commercial Street*

In the near-term, our model results suggest that Commercial Street would have the highest risk of flood exposure for the downtown area. The "downtown area" refers to the general area of flood inundation within Figs. 3e and 4e., which stems from the intersection of Commercial Street and Front Street to the north down to just south of the Route 1 bridge to the south and inland to Middle Street. There are approximately 50 buildings of mainly commercial use that would be impacted by flood inundation in this area and several areas of surface parking lots. This area also includes Bath City Hall, the Bath City Police Department, the Bath Water District, the Bath Area Food Bank, the Neighborhood Café Soup Kitchen, the Washington House Apartments, and the Mid Coast Medical Group Endocrinology and Diabetes facility. Our near-term flood adaptation recommendations for the downtown area are focused on Commercial Street. It would be likely that by adapting areas of Commercial Street, the flood risk to other roads in the "Downtown Area" that are at risk in the 2050 and 2100 timeframes would be reduced.

For present-day water levels, Commercial Street, Summer Street, and Vine Street would likely experience flood inundation during coastal storm events. Approximately 1,481 ft of Commercial Street, including 1,171 ft from the Hampton Inn to Broad Street, and 310 ft on south of Route 1, would be at risk of flood inundation during a combined 100-yr coastal storm and riverine event. Along the northern end of Commercial Street near the waterfront, water depths up to 3.3 ft are estimated to occur for the peak water surface elevation of approximately 8.7 ft. Inundation would occur for approximately 6 to 7 hours during the peak of the storm event. For the combined 100-yr coastal storm and riverine event scenario, 125 ft of the eastern end of Summer Street would also likely experience flood inundation with depths up to 2.3 ft.

Along the southern end of Commercial Street, south of the Route 1 Bridge, the peak water surface elevation would be approximately 7.8 ft for a combined 100-yr coastal storm and riverine event for present-day water levels. This would likely inundate Commercial Street in this area by up to 1.1 ft for approximately 2-3 hours. During the peak of the storm, in addition to 310 ft of Commercial Street in this area, approximately 77 ft of Vine Street would likely experience flood inundation, with depths up to 0.4 ft.

By 2050, approximately 235 ft of Commercial Street, north of the Summer Street intersection, would likely be at risk of flood inundation during high tides under the "commit to manage" sea level rise scenario. Inundation would be likely for approximately 2 to 3 hours during high tide with flood depths up to 0.8 ft. For the "prepare to manage" sea level rise scenario, approximately 752 ft of Commercial Street would likely be inundated with depths up to 2.3 ft north of the Summer Street intersection

Depth, durations, and lengths inundated for the other flood scenarios near this location are summarized in Appendix A and flood extents and sections of roadway inundated for the 2050 and 2100 timeframe for the “commit to manage” and “prepare to manage” sea level rise scenarios can be seen in Figs. 3 and 4, respectively.

### Adaptation Option 1: Do Nothing

If the roadway remains as it is, it would likely be subject to flood inundation under the scenarios described above. In the near-term, portions of Commercial Street and neighboring buildings would likely be inaccessible during coastal storm events. During the times of inundation, up to approximately 22 buildings along Commercial Street would be inaccessible. The City could issue evacuation notices for these buildings and temporarily close portions of these streets when large coastal storm events are anticipated to occur. It is up to the public safety and emergency response agencies whether building occupants should shelter in place or attempt to drive through inundated areas and this study does not intend to usurp the responsibility of public safety emergency response agencies.

### Adaptation Option 2: Elevate Commercial Street and Side Connector Streets

Commercial Street, if elevated, could reduce the risk of flood exposure along Commercial Street and could act as a flood barrier to roads to the west of Commercial Street in the downtown area. Elevating Commercial Street along the waterfront above 8.7 ft (approximately 3.3 ft above the low point along the road) and along the section south of the Route 1 Bridge to 8.0 ft (approximately 1.3 ft above the low point of the road) would likely remove the risk of flood inundation during a combined 100-yr coastal storm and riverine event in the near-term, the risk of flooding during high tide in 2050 for both sea level rise scenarios, and the risk of flooding during high tide in 2100 for the “commit to manage” sea level rise scenario. Commercial Street would still likely be inundated in 2050 for a combined 100-yr coastal storm and riverine event by up to 1.7 ft and 3.1 ft for the “commit to manage” and “prepare to manage” sea level rise scenarios, respectively. South of the Route 1 Bridge, Commercial Street would still likely be inundated by 2050 during a combined 100-yr coastal and riverine event by up to 2.2 ft and 3.7 ft for the “commit to manage” and “prepare to manage” sea level rise scenarios, respectively.

Elevating Commercial Street (and the eastern ends of Summer Street, Arch Street, and Broad Street) above 10.4 ft (approximately 5.0 ft above the low point of the road near the waterfront and 3.7 ft above the low point of the road south of the Route 1 Bridge) would likely remove the risk of flooding along Commercial Street during a combined 100-yr coastal and riverine event in 2050 under the “commit to manage” sea level rise scenario. This may also reduce and/or remove the risk of flood inundation along other streets in the downtown area.

Commercial Street would still likely be inundated by up to 1.4 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the “prepare to manage” sea level rise scenario. The inundated roadway sections would likely be impassable for several hours during the peak of the storm. If Commercial Street is elevated, drainage should be considered for the area west and north of the road to avoid prolonged ponding due to overtopping of the road during storm conditions in the 2050 time horizon. The eastern ends of Summer Street, Arch Street, and Broad Street could be elevated to meet the final grade of Commercial Street. The inundated roadway sections would likely be impassable for several hours during the peak of the storm events.

**Adaptation Option 3: Flood Barrier**

A flood barrier system along the waterfront near the Kennebec Tavern and Marina, which is near the low point of Commercial Street, could provide protection again flood inundation during extreme coastal events. A flood barrier in this area could reduce the risk of flood inundation along Commercial Street for combined 100-yr coastal storm and riverine events for present day sea levels and flooding during high tides in 2050 for both sea level rise scenarios evaluated. To reduce the risk of flooding due to coastal storm events in 2050, the flood barrier system would likely need to extend along the waterfront for the length of Commercial Street.

### *13.1.5 North Bath Road*

For present day water levels, approximately 230 ft of North Bath Road, east of Varney Mill Road, would likely experience inundation during a combined 100-yr coastal storm and riverine event. The peak water surface elevation for the combined storm event would be approximately 9.0 ft, which would inundate the road by up to 1.6 ft for approximately 5-6 hours. The road would likely be inundated during high tides leading up to and following the peak high tide.

By 2100, approximately 20 ft of North Bath Road would be likely at risk of flood inundation during high tides under the “commit to manage” sea level rise scenario. Inundation of up to 0.9 ft would be likely for approximately 3 to 4 hours during high tide.

There are approximately four buildings that would be impacted. North Bath Road and Ridge Road provide access to the Butler Head area. Ridge Road would likely be accessible during combined 100-yr coastal storm and riverine events for present-day water levels and for average daily tides in 2050 so it could serve as an alternate route to the Butler Head area if North Bath Road were to be inundated.

Depth, durations, and lengths inundated for the other flood scenarios near this location are summarized in Appendix A and flood extents and sections of roadway inundated for the 2050 and 2100 timeframe for the “commit to manage” and “prepare to manage” sea level rise scenarios can be seen in Figs. 3 and 4, respectively.

### Adaptation Option 1: Do Nothing

If the roadway remains as is, it would likely be subject to flood inundation under the scenarios described above. During times of inundation, the four buildings impacted would likely be inaccessible. The City could issue evacuation notices to these occupants of these buildings when extreme coastal storm events are anticipated to occur. Ridge Road could be used as an alternate route to the Butler Head area during times of flood inundation. The City could deploy temporary signs directing vehicles away from the inundated areas. It is up to the public safety and emergency response agencies whether building occupants should shelter in place or attempt to drive through inundated areas and this study does not intend to usurp the responsibility of public safety emergency response agencies.

### Adaptation Option 2: Elevate the Road

Elevating North Bath Road above 9.0 ft (approximately 1.6 ft above the low point of the road) would likely remove the risk of inundation during combined 100-yr coastal storm and riverine events in the near-term and the risk of flooding during high tide in 2050 for both sea level rise scenarios. Flooding during high tide would still be likely by 2100 for the "prepare to manage" sea level rise scenario. The road would still likely be inundated by up to 2.1 ft and 3.5 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the "commit to manage" and "prepare to manage" sea level rise scenarios, respectively. The roadway would likely be impassable for several hours during the peak of the storm. Ridge Road would likely be inundated for a combined 100-yr coastal storm and riverine event in 2050 for both sea level rise scenarios and so could not provide an alternate route to Butler Head under this scenario.

Elevating the road above 11.1 ft (approximately 3.7 ft above the low point of the road) would likely remove the risk of flood inundation due to combined 100-yr coastal storm and riverine events in 2050 under the "commit to manage" sea level rise scenario. North Bath Road could be used to access the Butler Head Area under this flood scenario. However, the road would still likely be inundated by up to 1.4 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the "prepare to manage" sea level rise scenario. Ridge Road would likely be inundated under these latter flood scenarios which would cut off access to the Butler Head area.

Elevating the road above 14.0 ft (approximately 6.6 ft above the low point of the road) would likely remove the risk of flood inundation due to combined 100-yr coastal storm and riverine events in 2050 under the "prepare to manage" sea level rise scenario and in 2100 under the "commit to manage" sea level rise scenario. North Bath Road could be used to access the Butler Head Area under these flood scenarios.

#### Adaptation Option 3: Convert the Road to a Bridge

The section of North Bath Road at risk of flood inundation currently impounds a body of water to the south of the road. If the road were to be elevated, the City should consider the impacts of converting the road to a bridge and increasing the capacity of the hydraulic connection north and south of the bridge. There would likely be implications for inundation extents on the southern side of the crossing. The City should engage with an engineering professional to study this adaptation option further if it is a desired option. The level of flood risk reduction would depend on the elevation of the bridge. The impacts on flood risk of various design elevations are provided in **Adaptation Option 2: Elevate the Road**.

### *13.1.6 Ridge Road and Hawkes Lane*

For present day sea levels, approximately 342 ft of Hawkes Lane (a private road) near the intersection with Ridge Road would likely experience flood inundation during a combined 100-yr coastal storm and riverine event. The peak water surface elevation for the combined storm event would be approximately 7.5 ft, which would inundate the road by up to 1.0 ft for approximately 7 to 8 hours during the peak of the storm. The road would likely be inundated during high tides leading up to and following the peak high tide. Ridge Road would not likely experience flood inundation in the near-term for the flood scenarios included as part of this study.

For a combined 100-yr coastal storm and riverine event in 2050, Hawkes Lane would likely be inundated by up to 3.8 ft and Ridge Road would likely be inundated by up to 2.8 ft for the "commit to manage" sea level rise scenario. For the "prepare to manage" sea level rise scenario and a combined 100-yr coastal storm and riverine event, Hawkes Lane would likely be inundated by up to 5.6 ft and Ridge Road would likely be inundated by up to 4.6 ft. The roads would likely be inundated during high tides leading up to and following the peak high tide.

There are approximately 10 buildings for which Hawkes Road is the sole access. If Hawkes Lane becomes impassible due to flood inundation, the 10 buildings located along the road would be inaccessible to emergency vehicles and occupants of these buildings would not be able to evacuate using Hawkes Lane. Ridge Road leads to Varney Mill Road and the Butler Head area. North Bath Road would be an alternate route to Varney Mill Road and the Butler Head area, however, for most of the scenarios when Ridge Road would likely be inundated, North Bath Road would also likely be inundated, which would cut off access to over 150 buildings in the area.

Depth, durations, and lengths inundated for the other flood scenarios near this location are summarized in Appendix A and flood extents and sections of roadway inundated for the 2050 and 2100 timeframe for the "commit to manage" and "prepare to manage" sea level rise scenarios can be seen in Figs. 3 and 4, respectively.

### Adaptation Option 1: Do Nothing

If the roadways remain as they are, they would likely be subject to flood inundation under the scenarios described above. During times of inundation, the 150 buildings accessed from Ridge Road and North Bath Road, including the 10 buildings from the private Hawkes Lane, would likely be inaccessible. The City could issue evacuation notices to these occupants of these buildings when extreme coastal storm events are anticipated to occur. It is up to the public safety and emergency response agencies whether building occupants should shelter in place or attempt to drive through inundated areas and this study does not intend to usurp the responsibility of public safety emergency response agencies.

### Adaptation Option 2: Elevate the Roads

Elevating Hawkes Lane above 7.5 ft (approximately 1.0 ft above the low point along the road) would likely remove the risk of inundation during combined 100-yr coastal storm and riverine events in the near-term. The road would still likely experience flooding during high tide in 2100 under both sea level rise scenarios. Ridge Road would not likely experience flood inundation in the near-term due to the flood scenarios evaluated as part of this study.

Hawkes Lane would still likely be inundated by up to 2.7 ft and 4.5 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the “commit to manage” and “prepare to manage” sea level rise estimates, respectively. Ridge Road would still likely be inundated by up to 2.8 ft and 4.6 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 for the “commit to manage” and “prepare to manage” sea level rise estimates, respectively. The inundated roadway sections would likely be impassable for several hours during the peak of the storm.

Elevating Hawkes Lane and Ridge Road above 10.2 ft (approximately 3.8 ft above the low point of Hawkes Lane and 2.8 ft above the low point of Ridge Road) would likely remove the risk of flooding due to combined 100-yr coastal storm and riverine events in 2050 under the “commit to manage” sea level rise scenario. Both roads would still likely be inundated by up to 1.8 ft during the peak high tide of a combined 100-yr coastal storm and riverine event in 2050 under the “prepare to manage” sea level rise scenario.

Elevating Hawkes Lane and Ridge Road above 13.9 ft (approximately 7.4 above the low point of Hawkes Lane and 6.4 ft above the low point of Ridge Road) would likely remove the risk of flood inundation along these roads due to combined 100-yr coastal storm and riverine events in 2050 under both sea level rise scenarios and 2100 under the “commit to manage” sea level rise scenario.

## 13.2 Prioritization for Further Investigation of Remediation Sites

Remediation sites included in this study have been categorized into near-term, medium-term, and long-term risk of flood exposure based on the results of the hydraulic model. The estimated timeframes for flood exposure are summarized in Table 18.

In the near-term, we recommend that the City of Bath engages environmental scientists and/or remediation specialists to examine the remediation methods used for the sites at risk of flood exposure in the near-term with remedies currently in place (Freight Shed Property, Kennebec Tavern and Marina, and the Old Shipyard) and assess whether those methods can withstand flood inundation without releasing hazardous substances.

The Dry Cleaning and Dyeing (Brackett's Market) site is listed as in the remediation stage. For this site, we recommend that the City of Bath engages with the remediation specialists who work on the site cleanup to ensure that the remediation methods can withstand flood inundation without releasing hazardous substances.

For sites where flood inundation may release hazardous substances, we recommend that the City and/or State DEP works with remediation specialists to put new solutions in place to reduce the risk of releasing hazardous substances.

**Table 18. Flood Risk Time Horizons for Remediation Sites**

| Remediation Site Name | Remediation Status[1] | Timeline for 100-yr Storm Flooding[2] | Timeline for Flooding During Average Daily High Tides |
|---|---|---|---|
| **Near-Term Concerns** | | | |
| **Freight Shed Property** | Remedy in place: Closed | Present-Day | 2050, *Commit* |
| **Kennebec Tavern and Marina** | Remedy in place: Closed | Present-Day | 2050, *Commit* |
| **Dry Cleaning and Dyeing (Brackett's Market)** | Remediation Stage | Present-Day | 2050, *Prepare*<br>2100, *Commit* |
| **Old Shipyard** | Remedy in place: Closed | Present-Day | 2050, *Prepare*<br>2100, *Commit* |
| **Medium-Term Concerns** | | | |
| **Moses and Columbia Block** | Remedy in place: Closed | 2050, *Commit* | 2100, *Prepare* |
| **Bath Iron Works** | Remedy in place: Closed | 2050, *Commit* | 2100, *Prepare* |
| **15 Vine Street** | Complaint Investigated | 2050, *Commit* | 2100, *Prepare* |
| **Stinson Canning Co.** | Investigation Stage | 2050, *Commit* | 2100, *Prepare* |
| **Long-Term Concerns** | | | |
| **Grant Building** | Remediation Stage | 2050, *Prepare*<br>2100, *Commit* | 2100, *Prepare* |

| | | | |
|---|---|---|---|
| **Frank Smith Cleaners** | Investigation Stage | 2050, *Prepare*<br>2100, *Commit* | 2100, *Prepare* |
| **Coal Pocket** | Remediation Stage | 2050, *Prepare*<br>2100, *Commit* | 2100, *Prepare* |
| **Prawer Block** | Investigation Stage | 2050, *Prepare*<br>2100, *Commit* | 2100, *Prepare* |

Notes:
1. Remediation status based on ME DEP Remediation Site Database, accessed November 2022.
2. "100-yr Storm" refers to a combination of a 1% annual chance coastal and riverine event.

## 13.3 Flood Adaptation Recommendations for Pump Stations

The pump stations identified as being at risk of flood exposure under the flood scenarios evaluated as part of this study have been categorized into near-term, medium-term, and long-term time horizons for adaptation measures. These recommendations are based on flood exposure at the ground surface elevation. It is possible that the flood elevation at which a particular pump station could be impacted is higher or lower due to elements elevated above or below ground level. Our recommendations are summarized in Table 19.

For the four pump stations likely at risk of flood exposure in the near-term (Hunt Street, Commercial Street, Harward Street, and the private BIW North Yard Station), we recommend that the City engages with professionals to perform a site assessment of the pump stations to evaluate the limiting elevations that flood water would impact or damage the system (such as the sill of a doorway or the elevation of sensitive electrical equipment). This field survey would help inform the risk of flood exposure of the pump stations.

For pump stations that remain near-term risks, we recommend that the City work with professionals to evaluate adaptation options, such as relocating the pump station, installing a barrier system to keep floodwater out and away, floodproofing the pump station, or elevating the structure.

Pump stations that remain at risk of flooding may contribute to additional localized flooding if the station becomes inoperable. During periods of flood inundation, increased localized flooding may occur.

**Table 19. Flood Risk Time Horizons for Pump Stations**

| Pump Station | Timeline for 100-yr Storm Flooding[1] | Timeline for Flooding During Average Daily High Tides |
|---|---|---|
| **Near-Term Concerns** | | |
| Hunt St | Present-Day | 2050, *Prepare*<br>2100, *Commit* |
| Commercial St | Present-Day | 2050, *Prepare*<br>2100, *Commit* |
| Harward St | Present-Day | 2100, *Commit* |

| | | |
|---|---|---|
| Private - BIW North Yard | Present-Day | 2100, *Commit* |
| **Medium-Term Concerns** | | |
| Castine Ave | 2050, *Commit* | 2100, *Prepare* |
| **Long-Term Concerns** | | |
| Riverview Rd | 2050, *Prepare* | 2100, *Prepare* |
| Private - Bath Canning Co | 2050, *Prepare* | 2100, *Prepare* |

Notes:
1. "100-yr Storm" refers to a combination of a 1% annual chance coastal and riverine event.

## 13.4 Flood Adaptation Recommendations for Buildings

There are 92 buildings at risk of flood exposure during combined 100-yr coastal storm and riverine events and 27 buildings at risk of flood exposure during average daily tidal conditions by 2050 under the "commit to manage" sea level rise scenario. We have provided some guidance below on actions building owners can take to increase their resiliency to the damaging effects of flood inundation. For additional guidance, building owners can review the following material provided by FEMA:

1. "Protect Your Home from Flooding" (FEMA, 2020).
2. "Reducing Flood Risk to Residential Buildings that Cannot be Elevated" (FEMA, 2015c).
3. Homeowner's Guide to Retrofitting (FEMA, 2014).

Our first recommendation is for building owners to understand their risk of flood exposure by consulting the tables and flood exposure maps (Figs. 5a-5j and 6a-6j) associated with this report, FEMA Flood Insurance Rate Maps (FIRMs), and the forthcoming ArcGIS StoryMap that will present the results of this study in an interactive, online format.

There are several actions building owners could take to adapt to flood exposure without elevating or relocating the building itself. For buildings at risk of flooding due to extreme events, we recommend building owners elevate indoor and outdoor utilities and electrical system components (such as air conditioners, heat pumps, water meters, electric service panels, outlets, switches) at least one foot above the potential flood elevation. We recommend that building owners secure outdoor fuel storage tanks to limit their potential for mobilization during periods of flood inundation.

Building owners should identify valuable possessions and documents and secure them in an area above the potential floodwater. Additionally, building owners should consider building material when renovating buildings and opt for flood-resistant materials, such as: tile, vinyl, and/or rubber. Basements and foundations should be checked for cracks and sealed to prevent seepage and building-owners should install sump pumps to pump groundwater away from buildings. This study does not address potential issues related to infrastructure getting wet such as mold.

Buildings at risk of flooding during high tide by 2050 would likely experience daily flood inundation in addition to flooding during extreme coastal events. In addition to the adaptation measures recommended above, these building owners should weigh the options of relocating or elevating the buildings. Building owners would need to consider access to the building and vehicular storage if elevating the building is selected as the adaptation measure.

Using the results of this study, the City of Bath could consider using zoning policies to restrict development in areas at risk of flood exposure, particularly areas at risk of flooding due to flooding during high tide by the year 2050 and/or areas at risk of flooding due to combined 100-yr coastal storm and riverine events due to present-day sea levels.

## 13.5 Flood Adaptation Recommendations for Wetlands

For future sea levels, wetlands will likely be subjected to a process known as "coastal squeeze" where coastal wetlands are lost due to increasing depths of water and wetlands are limited in their inland migration due to the presence of impervious infrastructure and/or slopes that are not conducive to wetland migration. While the extent of future wetlands may be limited, it is also likely the case that the existing extents of wetlands are the product of land use.

Wetlands migration and development can be facilitated through targeted managed realignment projects on areas of land currently used as grassland or with forests. Even with these efforts, it would be likely that more wetlands could be lost than could be created through managed realignment (McLachlan, 2018). We recommend that the City of Bath engage with a wetlands specialist to review the results from this modeling study and identify areas that would be conducive to managed realignment projects.

# 14. Limitations

This report presents the results of a flood vulnerability assessment for the City of Bath. The results are based on readily available online information, published references, GIS data provided by the City of Bath, and our professional judgement.

The data, conclusions, and recommendations in this report are based on the data received and reviewed during our analyses. Specifically, elevations of assets are based on ground-surface LIDAR data. Site specific survey should be performed for components of critical infrastructure that are likely above the ground surface (such as control boxes) to determine flood elevations that would cause damage. Additionally, this flood vulnerability assessment included readily available online GIS data and GIS data provided by the City of Bath. This data represents a snapshot in time and assumes that the databases have been maintained with up-to-date information. This study included limited hydraulic analysis and does not include an evaluation of the structural integrity of culverts, bridges, dams, piers, roads, shorelines, and other appurtenances.

The 1% annual chance still water elevation was based on the FEMA FIS for Sagadahoc County (FEMA, 2015b). These model results are limited by the methods FEMA used to develop this value in the lower Kennebec River near the City of Bath. The streamflows were input as constant flows representing the estimated peak flow. The flows during extreme river events would likely build up to the peak and recede back to average conditions over time. Developing storm hydrographs for riverine flows was not included within the scope of this study.

Stormwater infrastructure, such as catch basins, were not included in the hydraulic analysis. Stormwater infrastructure would likely reduce ponding in low lying areas after tide recedes.

Because the methods, procedures, and assumptions used to develop the analysis are approximate, the results should be used only as a guidance. Actual flood inflow volumes, water surface elevations, and flood timing may differ from the results presented in this report.

The professional services for this project have been performed in accordance with generally accepted engineering practices; no warranty, express or implied, is made. Actual conditions are expected to vary from the flood scenarios presented in this report. This study looked at the risk of flood exposure but did not provide a comprehensive assessment of consequences for human health and/or the environment. Our mention of emergency response actions is not meant to be all inclusive but rather to provide an example of where support may be needed such as with local, state, and federal emergency management organizations, public health officials, fire, police, medical professionals, etc.

Reuse of this report for any purposes, in part or in whole, is at the sole risk of the user.

# 15. References

Chow, V.T. (1949). Open Channel Hydraulics, McGraw-Hill Book Company, Inc., New York.

City of Bath (2022a). Resolution – Commitment to Strengthening Climate Action.

City of Bath (2022b). City Bus webpage. Accessed November 2022 from https://www.cityofbathmaine.gov/CityBus/.

FEMA (2020). Protect Your Home from Flooding.

FEMA (2015a). Flood Insurance Rate Map. Sagadahoc County, Maine, July.

FEMA (2015b). Flood Insurance Study. Sagadahoc County, Maine, July.

FEMA (2015c). Reducing Flood Risk to Residential Buildings that Cannot be Elevated, September.

FEMA (2014). Homeowner's Guide to Retrofitting, June.

Hohonu (2022). Maine Maritime Museum, Kennebec River, Bath, ME. Water level data accessed on January 24, 2023 from https://dashboard.hohonu.io/map-page/hohonu-118/MaineMaritimeMuseum,KennebecRiver,Bath,ME.

Kyzivat, Emily (2019). City of Bath: 2019 Climate Action Plan.

Maine Climate Council (2022). Maine Won't Wait. A Four-Year Plan for Climate Action, December.

Maine Department of Environmental Protection (Maine DEP) (2022). Remediation Sites GIS Database. Accessed November 2022 from https://www.maine.gov/dep/gis/datamaps/index.html#brwm.

McLachlan, Jack (2018). "High net loss of intertidal wetland coverage in a Maine estuary by year 2100" Spire, 2018 Issue.

Multi-Resolution Land Characteristics Consortium (MRLC) (2019). "NLCD 2016 Land Cover Conterminous United States." January 2019. Downloaded March 2022 from https://www.mrlc.gov/.

NOAA (2023). Station 8418150. Portland, ME. Water level data accessed January 2023 from https://tidesandcurrents.noaa.gov/stationhome.html?id=8418150.

NOAA (2022). Continuously Updated Digital Elevation Model – 1/9 Arc-Second Resolution Bathymetric-Topographic Tiles. Accessed January 2023 from https://coast.noaa.gov/dataviewer/#/lidar/search/.

State of Maine (2022). Maine GeoLibrary Data Catalog. Access November 2022 from https://www.maine.gov/geolib/catalog.html.

USACE (2022). Hydrologic Engineering Center – River Analysis System (HEC-RAS), Version 6.3.0, August.

USGS (2023a). StreamStats Report. Access January 2023 from: https://streamstats.usgs.gov/ss/.

U.S. Fish and Wildlife Services (U.S. FWS) (2022). National Wetlands Inventory for the State of Maine. Accessed November 2022 from https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/.

USGS (2023b). USGS 01049265 KENNEBEC RIVER AT NORTH SIDNEY, MAINE. Accessed January 2023 from: https://waterdata.usgs.gov/nwis/wys_rpt/?site_no=01049265.

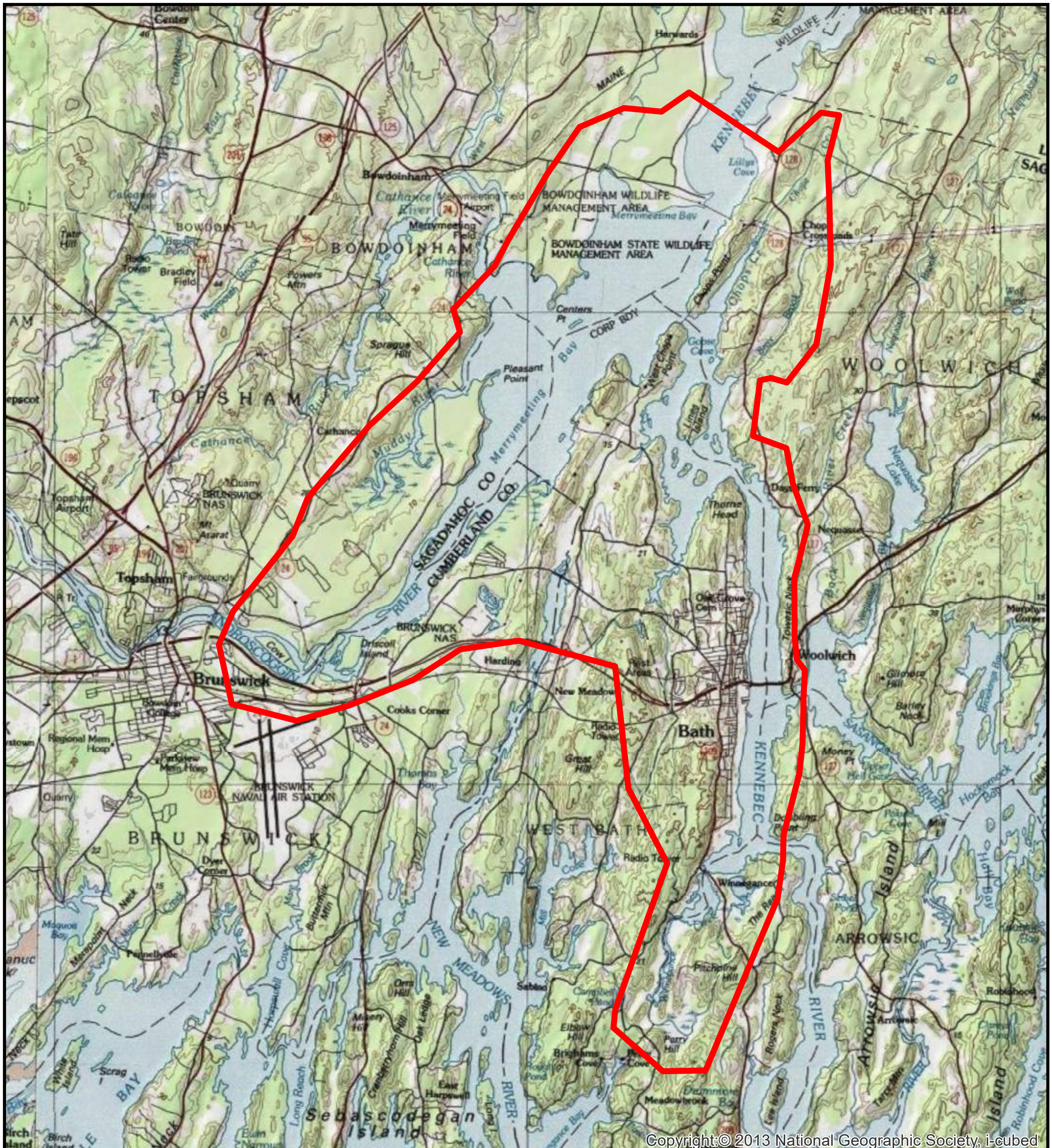
USGS (2023c). USGS 01059000 ANDROSCOGGIN RIVER NEAR AUBURN, MAINE. Accessed January 2023 from: https://waterdata.usgs.gov/nwis/wys_rpt/?site_no=01059000.

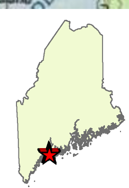
USGS (2020). 2020 USGS Lidar: South Coastal Maine (QL2), October.

USGS (2019). PeakFQ, Flood Frequency Analysis Computer Program Version 7.3, November.

USGS (2013). Modeled Future Peak Streamflows in Four Coastal Maine Rivers, June.

# Figures



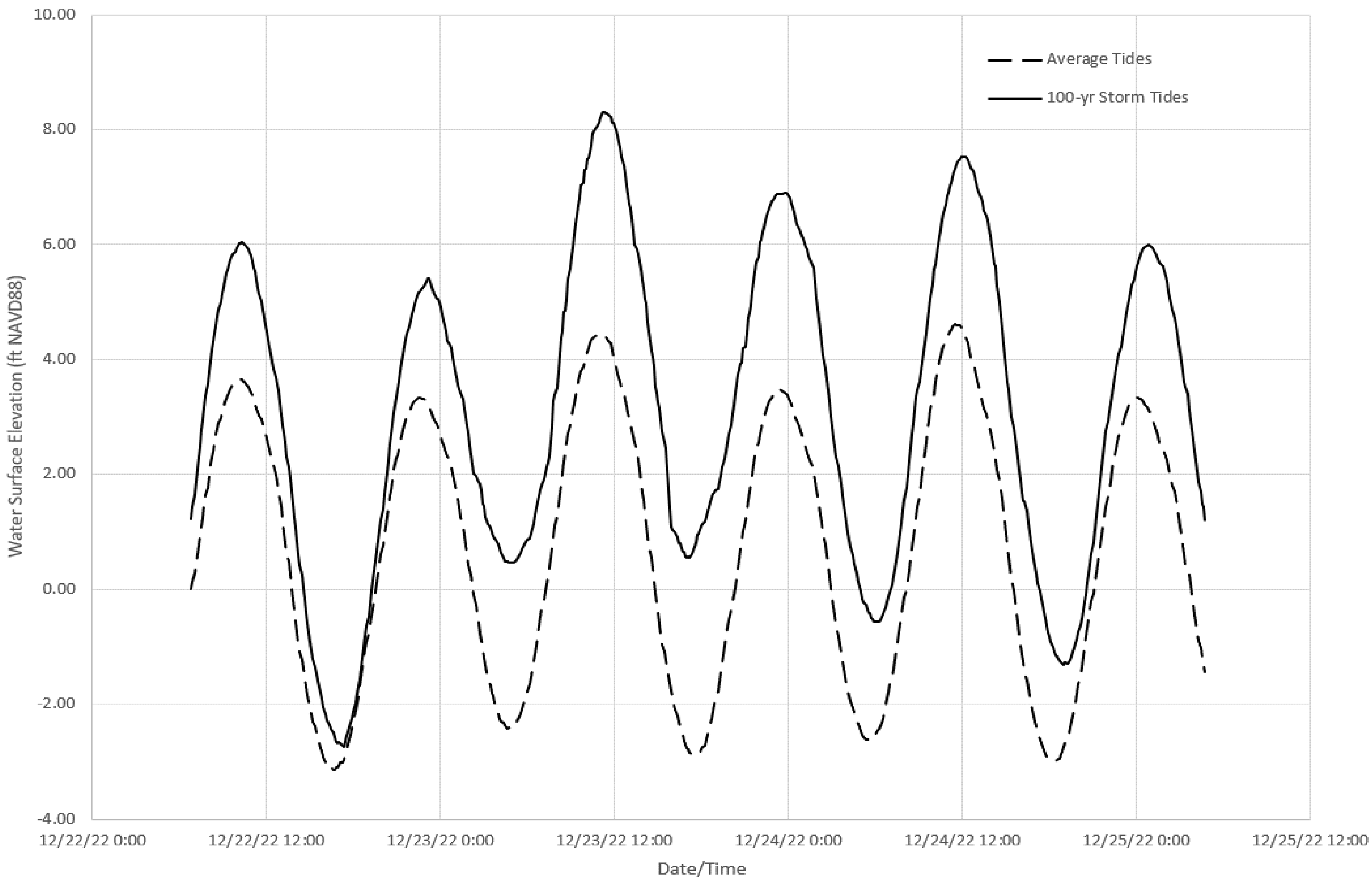
N

0 5,000 10,000 20,000

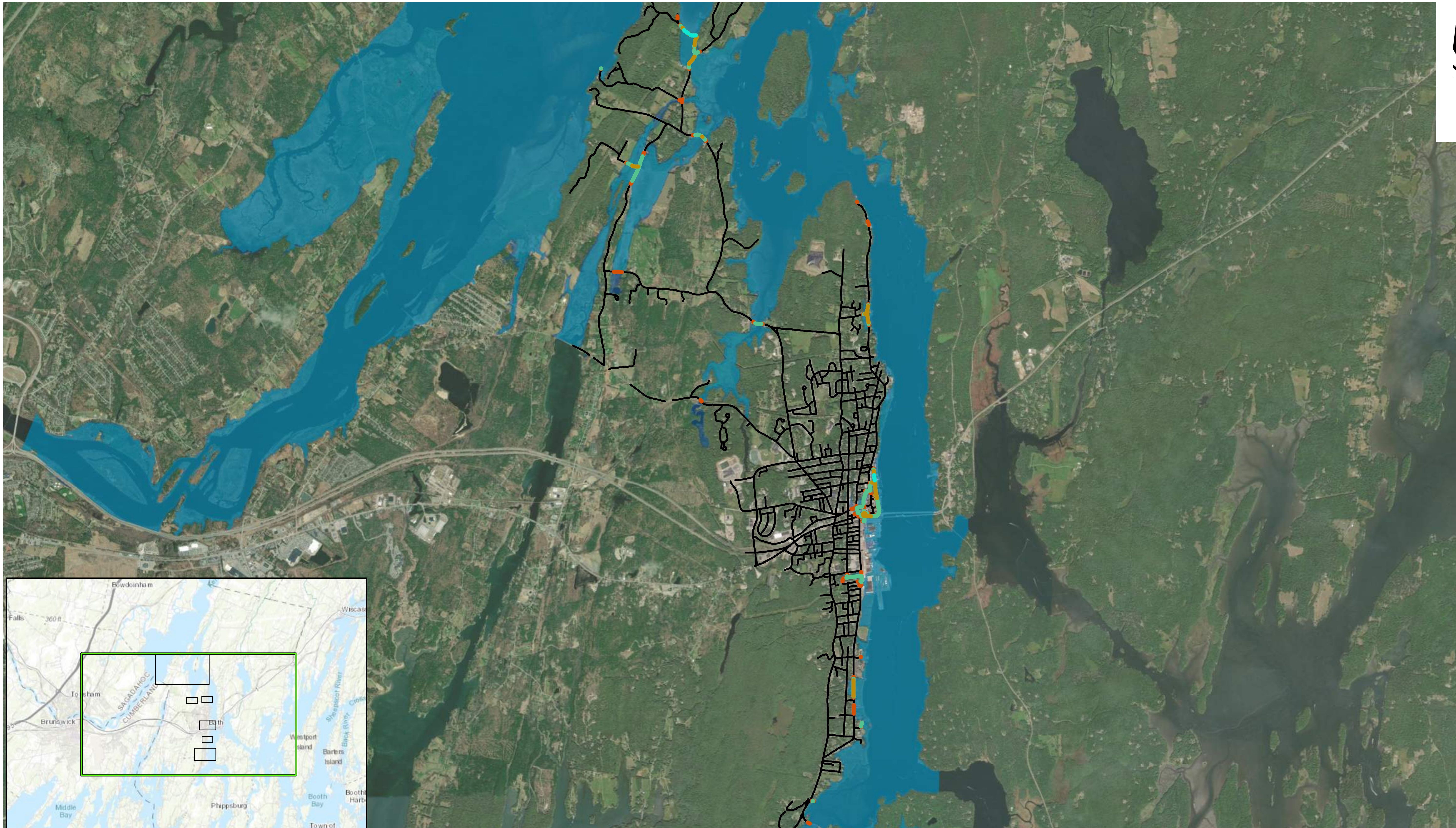
Feet

| | | |
|---|---|---|
| Flood Vulnerability Assessment<br>Bath, Maine | GEI Consultants | 2D MODEL AREA<br>AND SITE LOCATION |
| City of Bath<br>Bath, Maine | Project 2204496 | March 2024 Fig. 1 |

Y:\SHARED\PROJECTS\2022\2204496_Bath_Vulnerability_Study\GIS\Maps\Fig1_2D Model and Site Location.mxd




| | | |
|---|---|---|
| **Flood Vulnerability Assessment**<br>**Bath, Maine** | GEI Consultants | **TIDAL HYDROGRAPHS** |
| **City of Bath**<br>**Bath, Maine** | **Project 2204496** | **March 2024** **Fig. 2** |




***LEGEND:***

*Scenario Road Inundation Likely to Occur:*

**2050: Commit to Manage**
- Scenario 4: Average Conditions
- Scenario 6: 100-yr Conditions

**2100: Commit to Manage**
- Scenario 10: Average Conditions
- Scenario 12: 100-yr Conditions

***NOTES:***

1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundaries shown on map represent Scenario 6 and Scenario 12.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

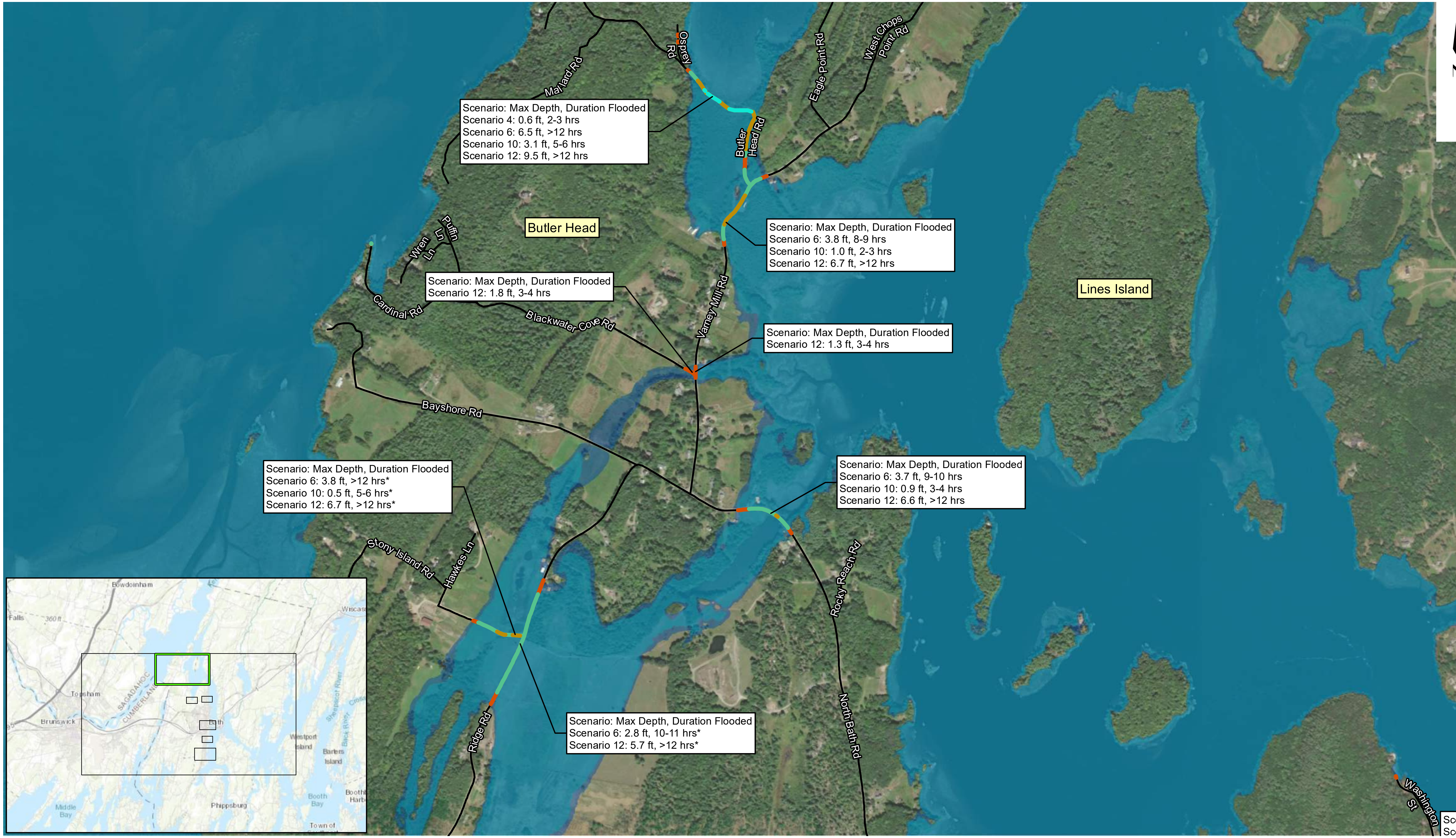
0 4000

Feet

| Flood Vulnerability Assessment<br>Bath, Maine | GEI Consultants | "COMMIT TO MANAGE"<br>FLOOD VULNERABILITY<br>OF ROADS |
|---|---|---|
| City of Bath<br>Bath, Maine | Project 2204496 | March 2024 Fig. 3a |

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_2050_Roads_240319.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




**LEGEND:**

*Scenario Road Inundation Likely to Occur:*

| **2050: Commit to Manage** | **2100: Commit to Manage** |
|---|---|
| Scenario 4: Average Conditions | Scenario 10: Average Conditions |
| Scenario 6: 100-yr Conditions | Scenario 12: 100-yr Conditions |

***NOTES:***

1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundaries shown on map represent Scenario 6 and Scenario 12.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

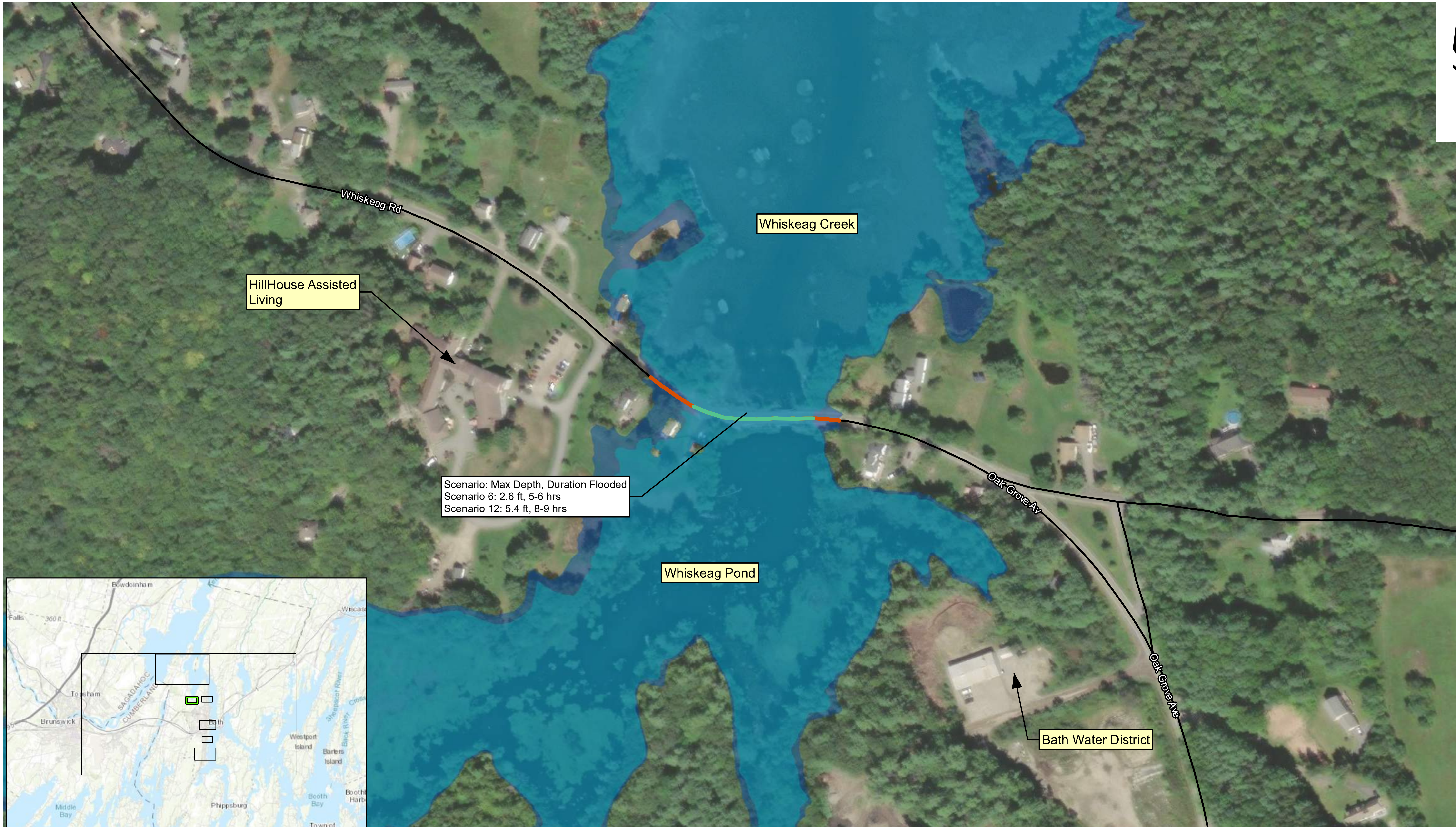
"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF ROADS

March 2024

Fig. 3b

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_2050_Roads_240319.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




***LEGEND:***

*Scenario Road Inundation Likely to Occur:*

**2050: Commit to Manage**
- Scenario 4: Average Conditions
- Scenario 6: 100-yr Conditions

**2100: Commit to Manage**
- Scenario 10: Average Conditions
- Scenario 12: 100-yr Conditions

***NOTES:***
1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundaries shown on map represent Scenario 6 and Scenario 12.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF ROADS

March 2024

Fig. 3c

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_2050_Roads_240319.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


**LEGEND:**

*Scenario Road Inundation Likely to Occur:*

**2050: Commit to Manage**
- Scenario 4: Average Conditions
- Scenario 6: 100-yr Conditions

**2100: Commit to Manage**
- Scenario 10: Average Conditions
- Scenario 12: 100-yr Conditions

**NOTES:**
1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundaries shown on map represent Scenario 6 and Scenario 12.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

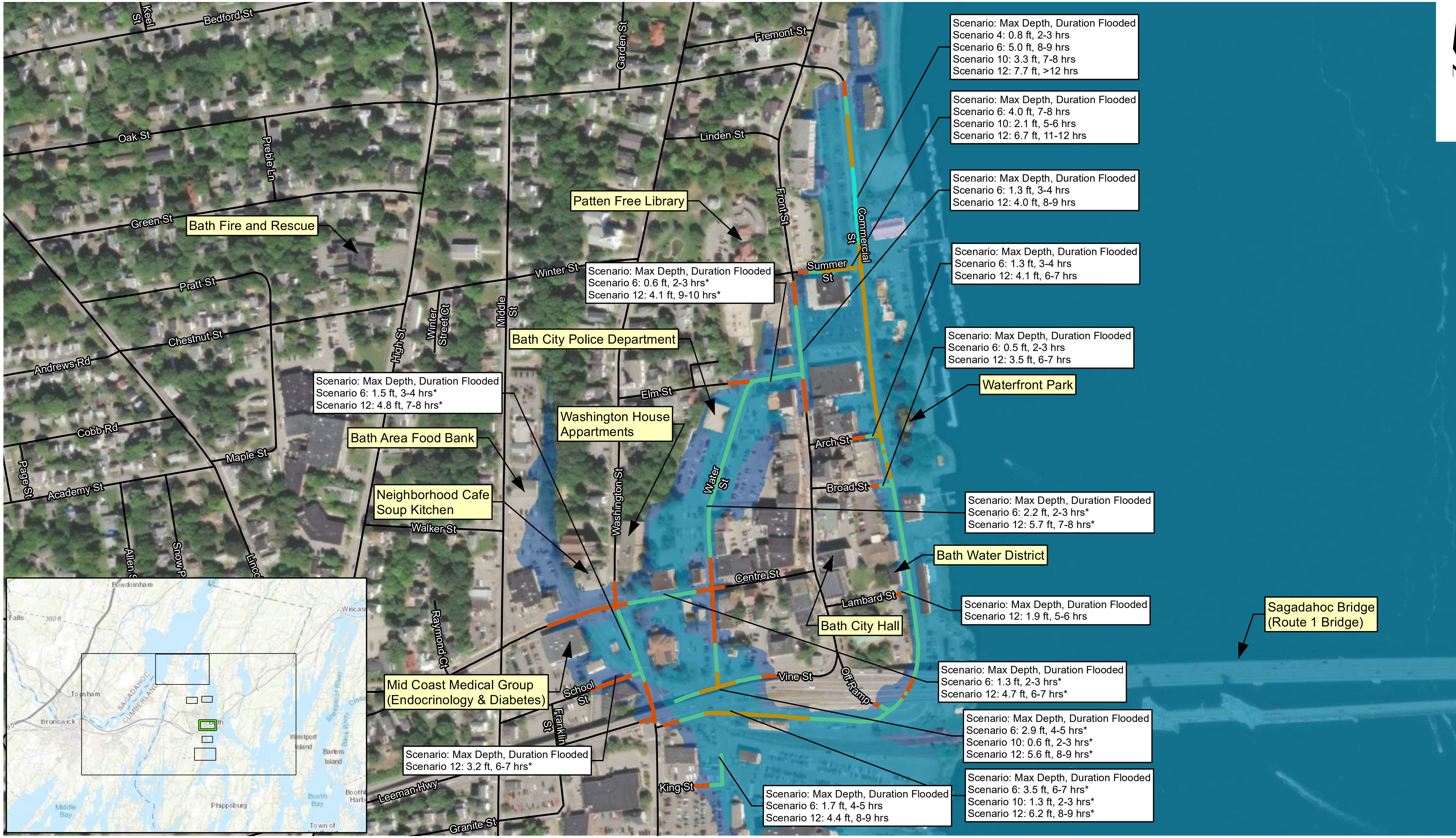
GEI Consultants

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF ROADS

Project 2204496 | March 2024 | Fig. 3d

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_2050_Roads_240319.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




**LEGEND:**

*Scenario Road Inundation Likely to Occur:*

| **2050: Commit to Manage** | **2100: Commit to Manage** |
|---|---|
| Scenario 4: Average Conditions | Scenario 10: Average Conditions |
| Scenario 6: 100-yr Conditions | Scenario 12: 100-yr Conditions |

**NOTES:**

1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundaries shown on map represent Scenario 6 and Scenario 12.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 300

Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

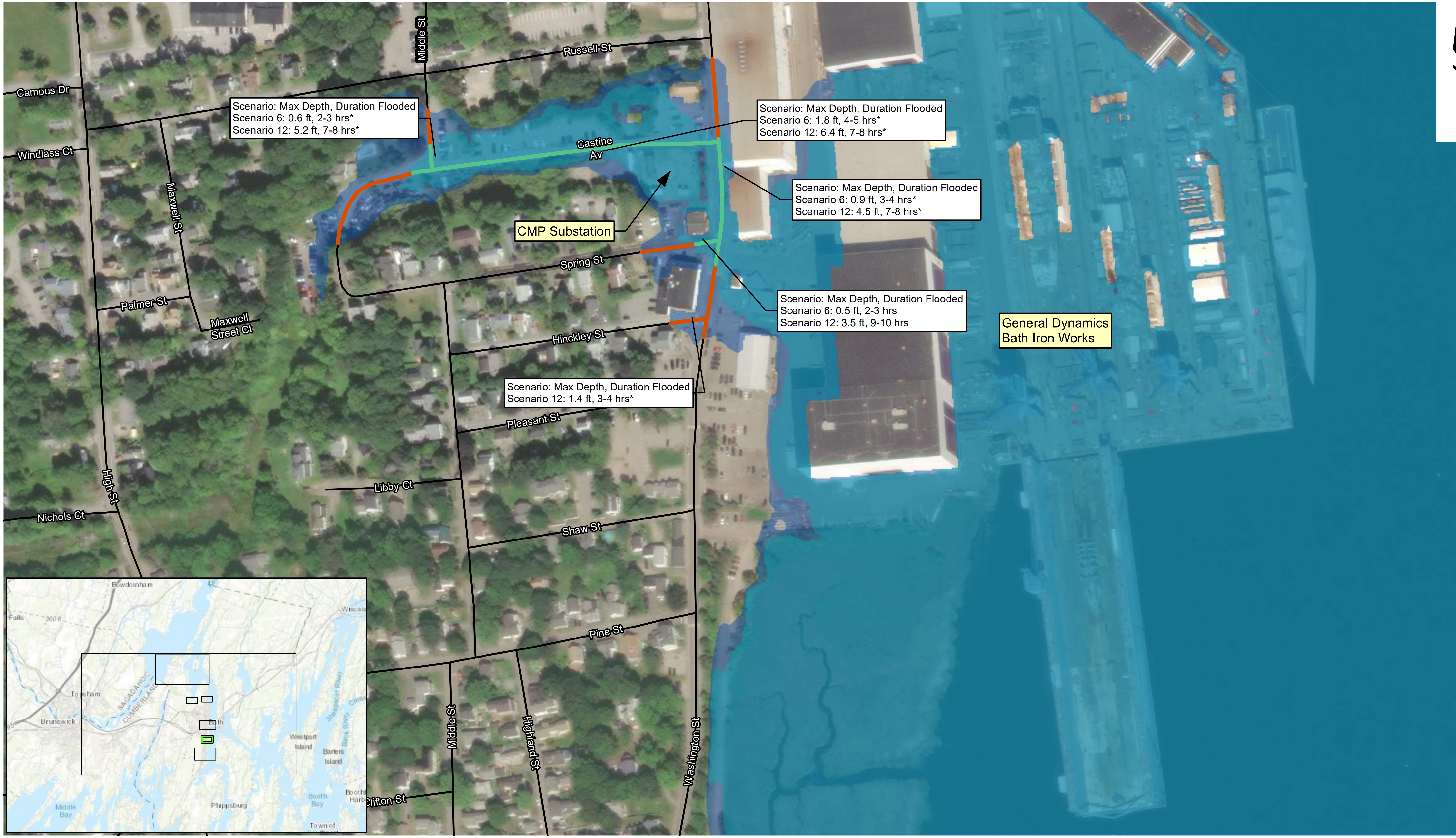
"COMMIT TO MANAGE" FLOOD VULNERABILITY OF ROADS

March 2024

Fig. 3e

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_2050_Roads_240319.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




***LEGEND:***

*Scenario Road Inundation Likely to Occur:*

| **2050: Commit to Manage** | **2100: Commit to Manage** |
|---|---|
| Scenario 4: Average Conditions | Scenario 10: Average Conditions |
| Scenario 6: 100-yr Conditions | Scenario 12: 100-yr Conditions |

***NOTES:***

1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundaries shown on map represent Scenario 6 and Scenario 12.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF ROADS

March 2024

Fig. 3f

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_2050_Roads_240319.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


**LEGEND:**

*Scenario Road Inundation Likely to Occur:*

| 2050: Commit to Manage | 2100: Commit to Manage |
|---|---|
| Scenario 4: Average Conditions | Scenario 10: Average Conditions |
| Scenario 6: 100-yr Conditions | Scenario 12: 100-yr Conditions |

***NOTES:***

1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundaries shown on map represent Scenario 6 and Scenario 12.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 400
Feet

Flood Vulnerability Assessment
Bath, Maine

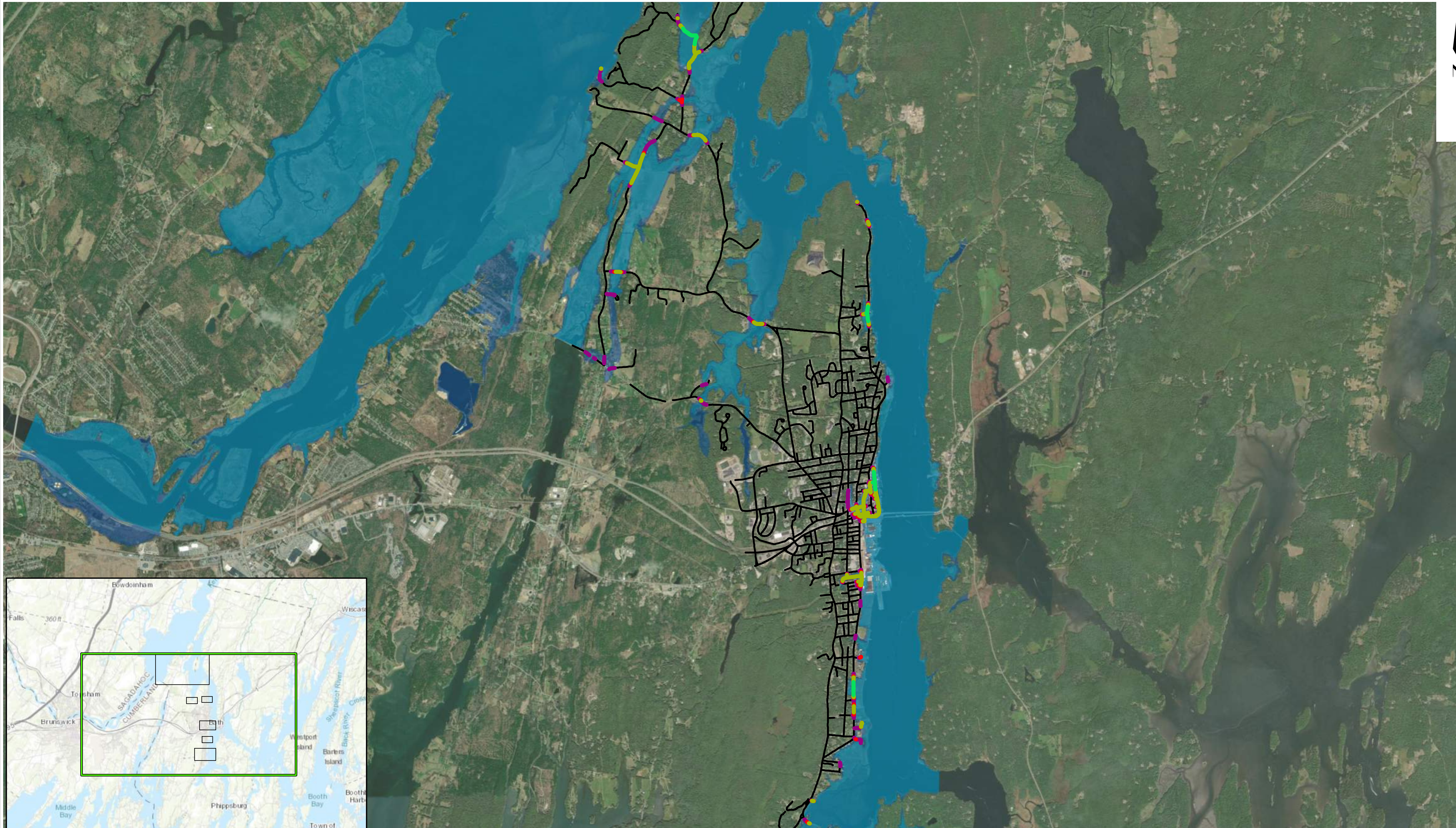
City of Bath
Bath, Maine

GEI Consultants

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF ROADS

Project 2204496 | March 2024 | Fig. 3g

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_2050_Roads_240319.mxd




***LEGEND:***

*Scenario Road Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***

1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundary shown based on Scenario 9 and Scenario 15.
3. Flood durations correspond to time flooded over one tidal cycle (approx, 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 4000

Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

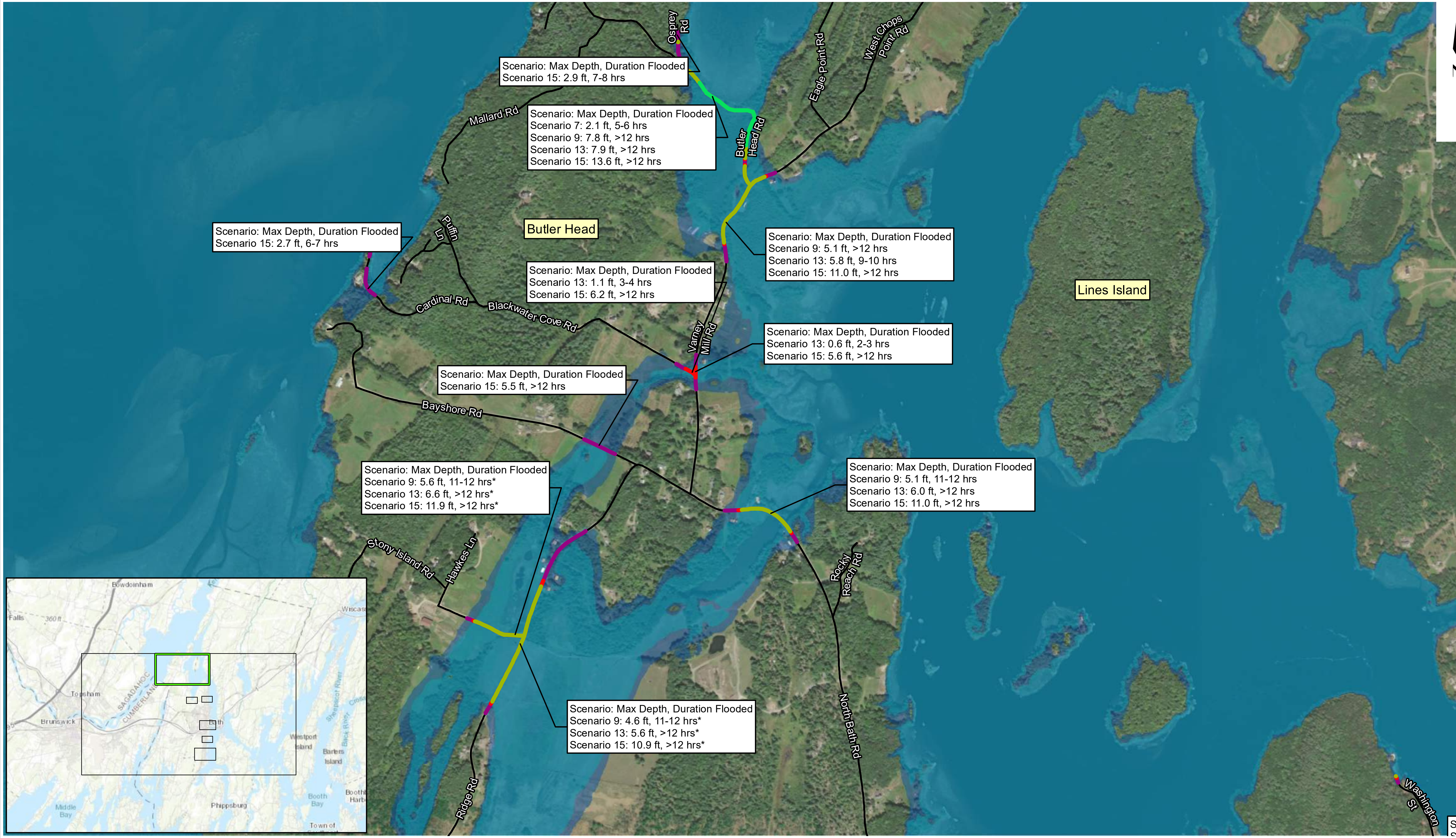
GEI Consultants

"PREPARE TO MANAGE" FLOOD VULNERABILITY OF ROADS

Project 2204496 | March 2024 | Fig. 4a

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Roads_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




***LEGEND:***

*Scenario Road Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundary shown based on Scenario 9 and Scenario 15.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 1000
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

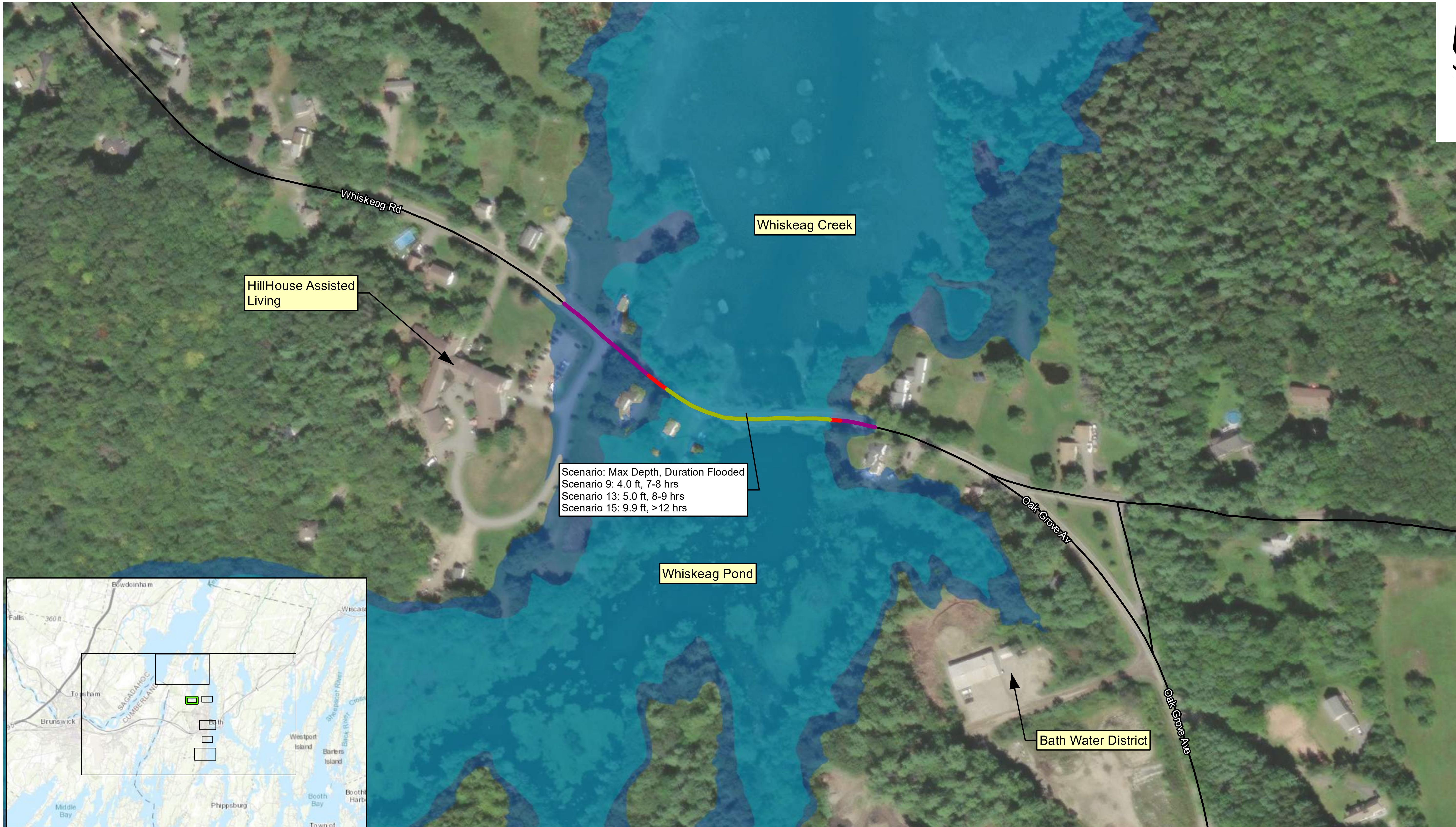
Project 2204496

"PREPARE TO MANAGE" FLOOD VULNERABILITY OF ROADS

March 2024

Fig. 4b

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Roads_240320.mxd




***LEGEND:***

*Scenario Road Inundation Likely to Occur:*

| **2050: Prepare to Manage** | **2100: Prepare to Manage** |
|---|---|
| Scenario 7: Average Conditions | Scenario 13: Average Conditions |
| Scenario 9: 100-yr Conditions | Scenario 15: 100-yr Conditions |

***NOTES:***

1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundary shown based on Scenario 9 and Scenario 15.
3. Flood durations correspond to time flooded over one tidal cycle (approx, 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"PREPARE TO MANAGE" FLOOD VULNERABILITY OF ROADS

March 2024

Fig. 4c

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Roads_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


***LEGEND:***

*Scenario Road Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundary shown based on Scenario 9 and Scenario 15.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

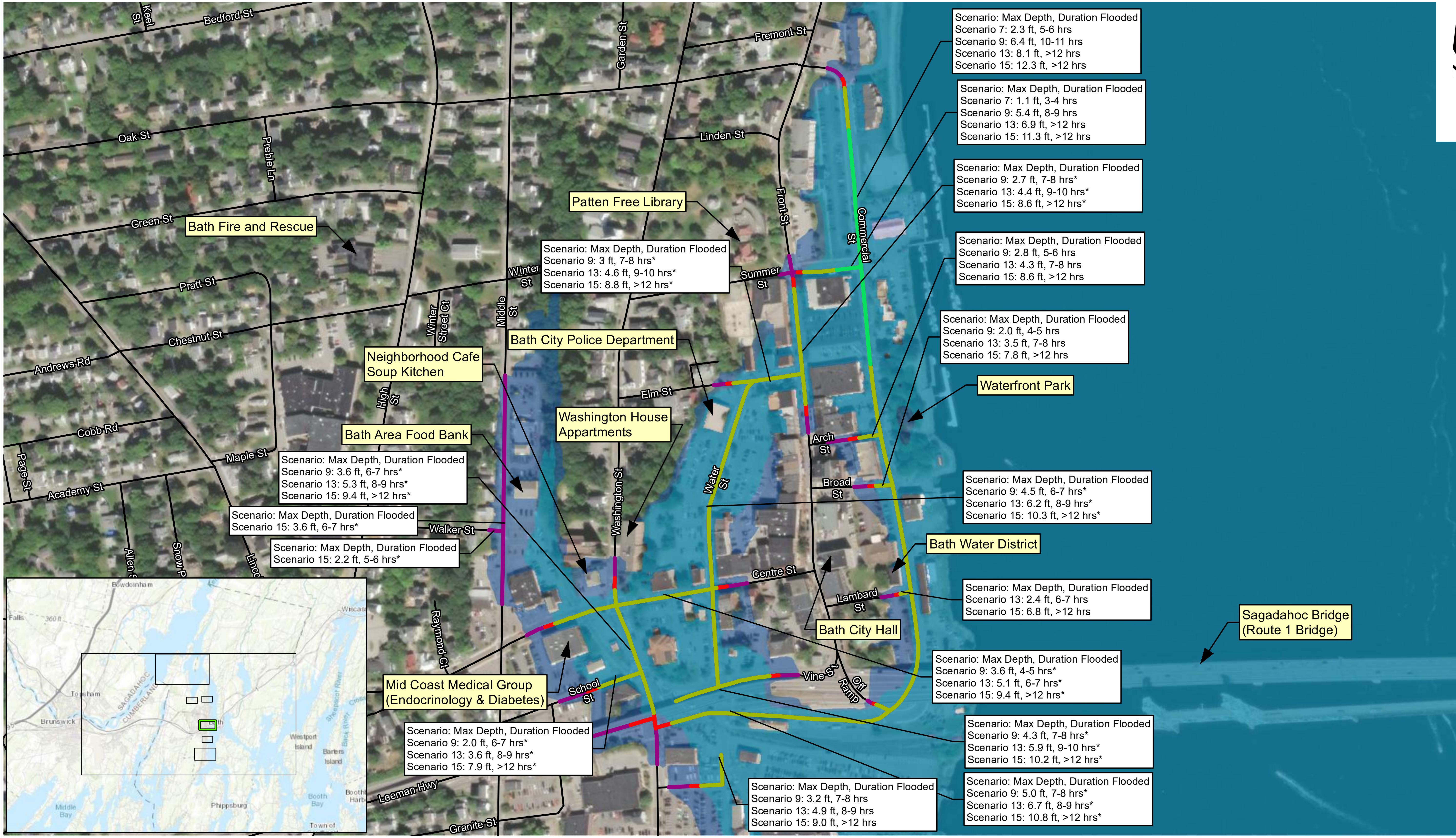
"PREPARE TO MANAGE" FLOOD VULNERABILITY OF ROADS

March 2024

Fig. 4d

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Roads_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




***LEGEND:***

*Scenario Road Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundary shown based on Scenario 9 and Scenario 15.
3. Flood durations correspond to time flooded over one tidal cycle (approx, 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 300 Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

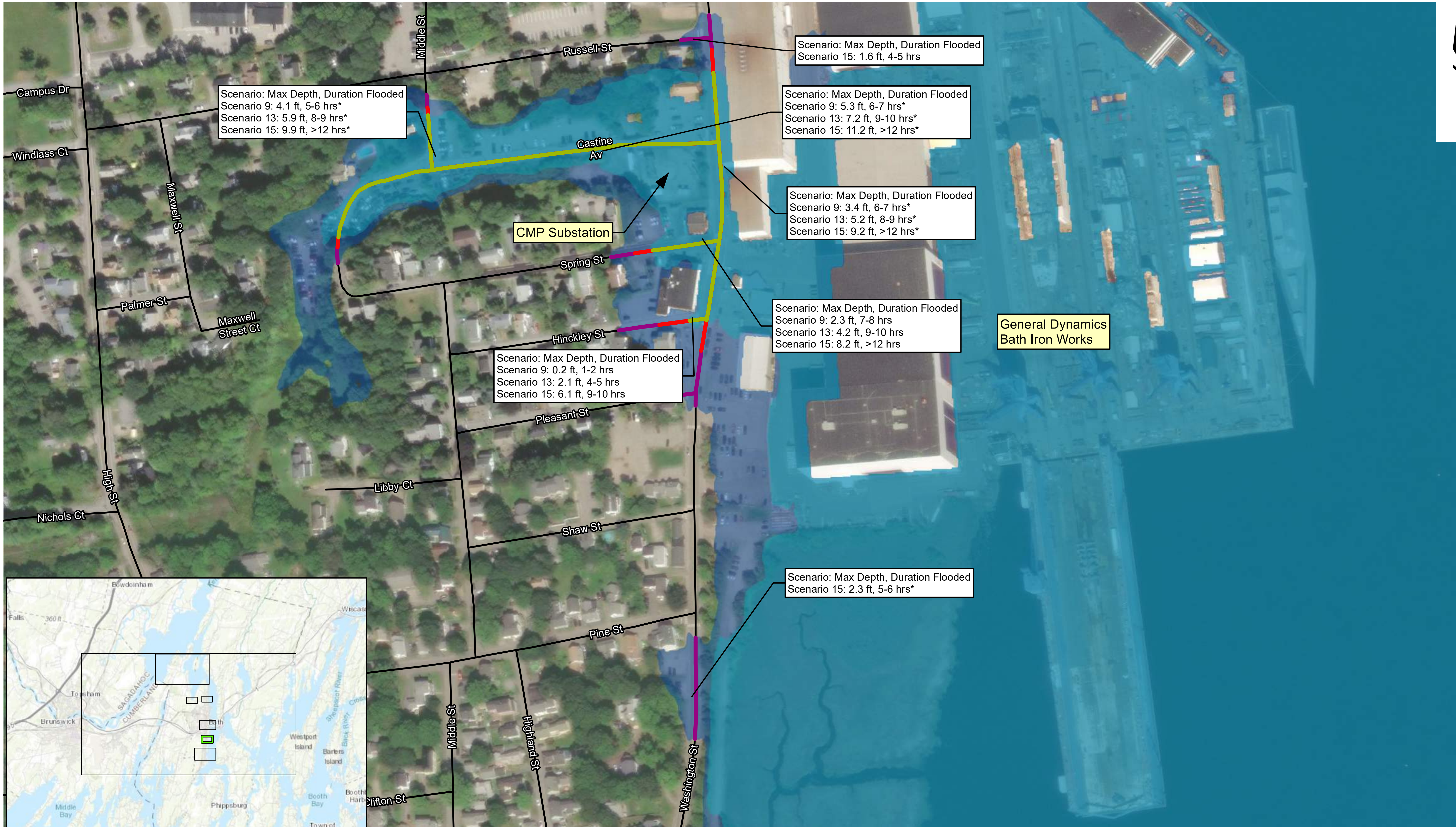
"PREPARE TO MANAGE" FLOOD VULNERABILITY OF ROADS

March 2024

Fig. 4e

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Roads_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




***LEGEND:***

*Scenario Road Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundary shown based on Scenario 9 and Scenario 15.
3. Flood durations correspond to time flooded over one tidal cycle (approx, 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

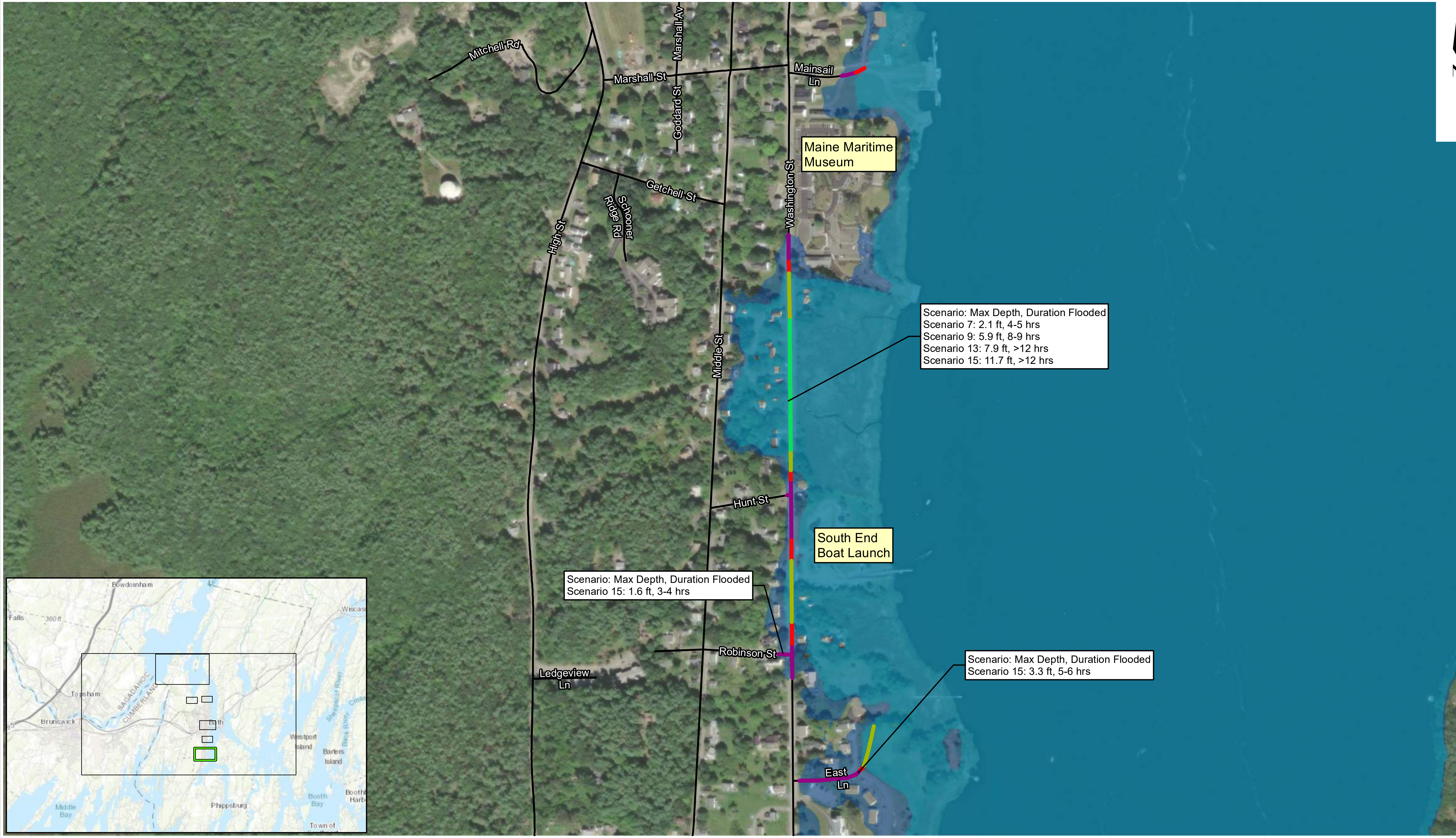
Project 2204496

"PREPARE TO MANAGE"
FLOOD VULNERABILITY
OF ROADS

March 2024

Fig. 4f

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Roads_240320.mxd




**LEGEND:**

*Scenario Road Inundation Likely to Occur:*

| **2050: Prepare to Manage** | **2100: Prepare to Manage** |
|---|---|
| Scenario 7: Average Conditions | Scenario 13: Average Conditions |
| Scenario 9: 100-yr Conditions | Scenario 15: 100-yr Conditions |

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Flood boundary shown based on Scenario 9 and Scenario 15.
3. Flood durations correspond to time flooded over one tidal cycle (approx. 12 hrs) that includes MHHW or peak of the 100-yr event.
4. Flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

0 400
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

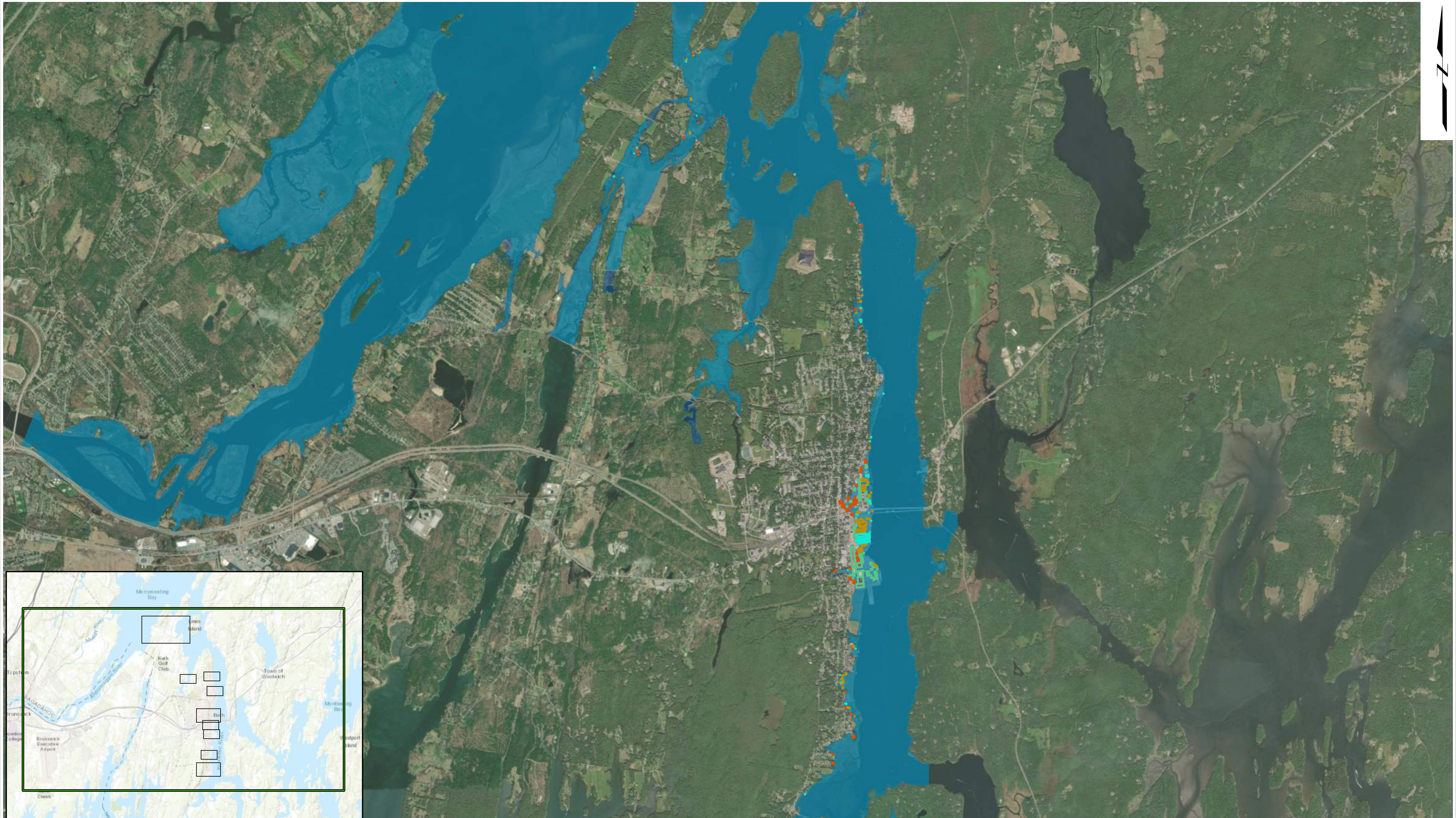
Project 2204496

"PREPARE TO MANAGE" FLOOD VULNERABILITY OF ROADS

March 2024

Fig. 4g

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Roads_240320.mxd



**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

**2050: Commit to Manage**
- Scenario 4: Average Conditions
- Scenario 6: 100-yr Conditions

**2100: Commit to Manage**
- Scenario 10: Average Conditions
- Scenario 12: 100-yr Conditions

**NOTES:**
1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 4000
Feet

| Flood Vulnerability Assessment<br>Bath, Maine | GEI Consultants | "COMMIT TO MANAGE"<br>FLOOD VULNERABILITY<br>OF BUILDINGS |
|---|---|---|
| City of Bath<br>Bath, Maine | Project 2204496 | March 2024 Fig. 5a |

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd


## LEGEND:

*Scenario Building Inundation Likely to Occur:*

**2050: Commit to Manage**
- Scenario 4: Average Conditions
- Scenario 6: 100-yr Conditions

**2100: Commit to Manage**
- Scenario 10: Average Conditions
- Scenario 12: 100-yr Conditions

***NOTES:***
1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 600
Feet

Flood Vulnerability Assessment
Bath, Maine

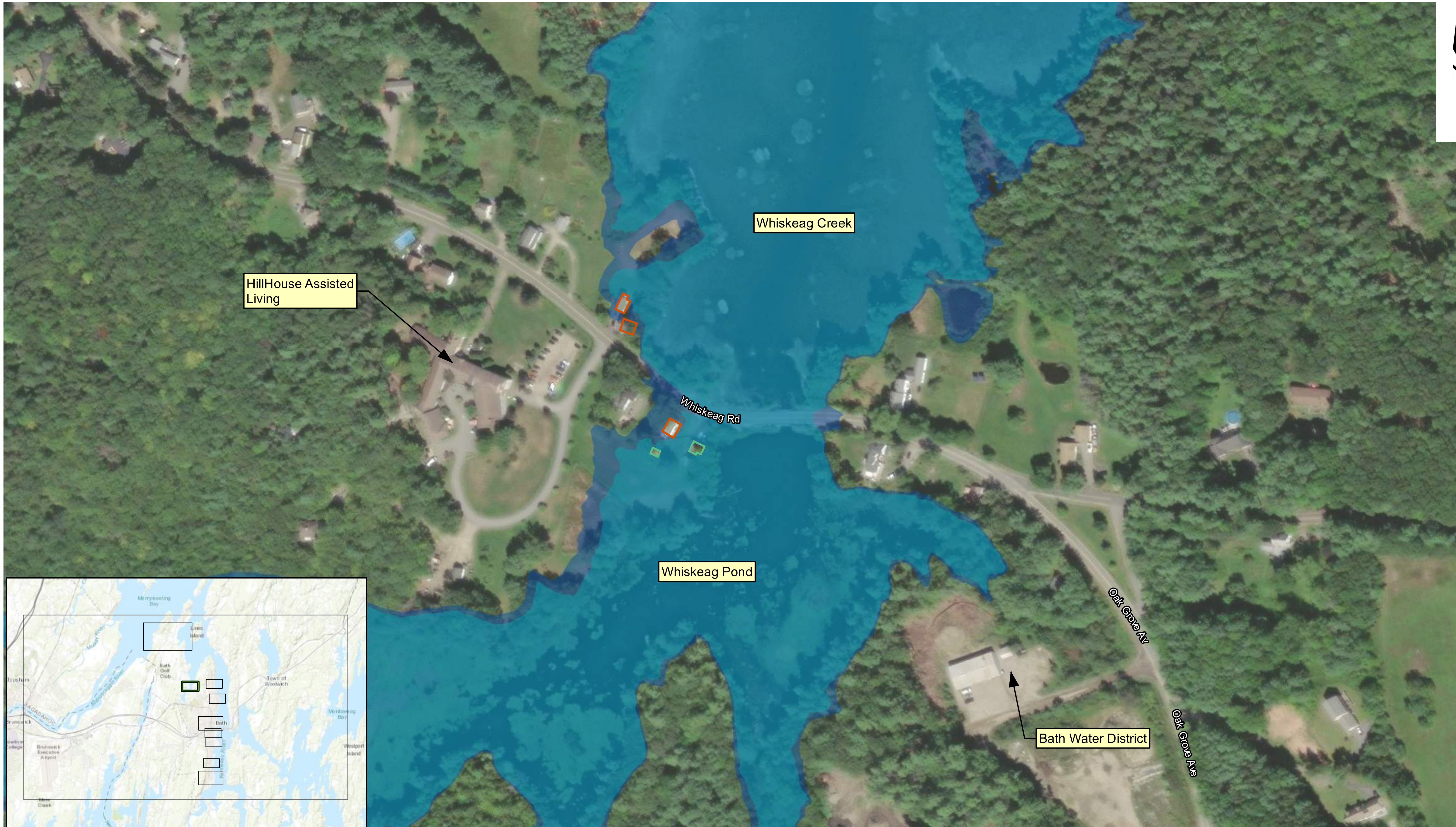
City of Bath
Bath, Maine

GEI Consultants

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

Project 2204496 | March 2024 | Fig. 5b

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd




***LEGEND:***

*Scenario Building Inundation Likely to Occur:*

**2050: Commit to Manage**
- Scenario 4: Average Conditions
- Scenario 6: 100-yr Conditions

**2100: Commit to Manage**
- Scenario 10: Average Conditions
- Scenario 12: 100-yr Conditions

***NOTES:***
1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

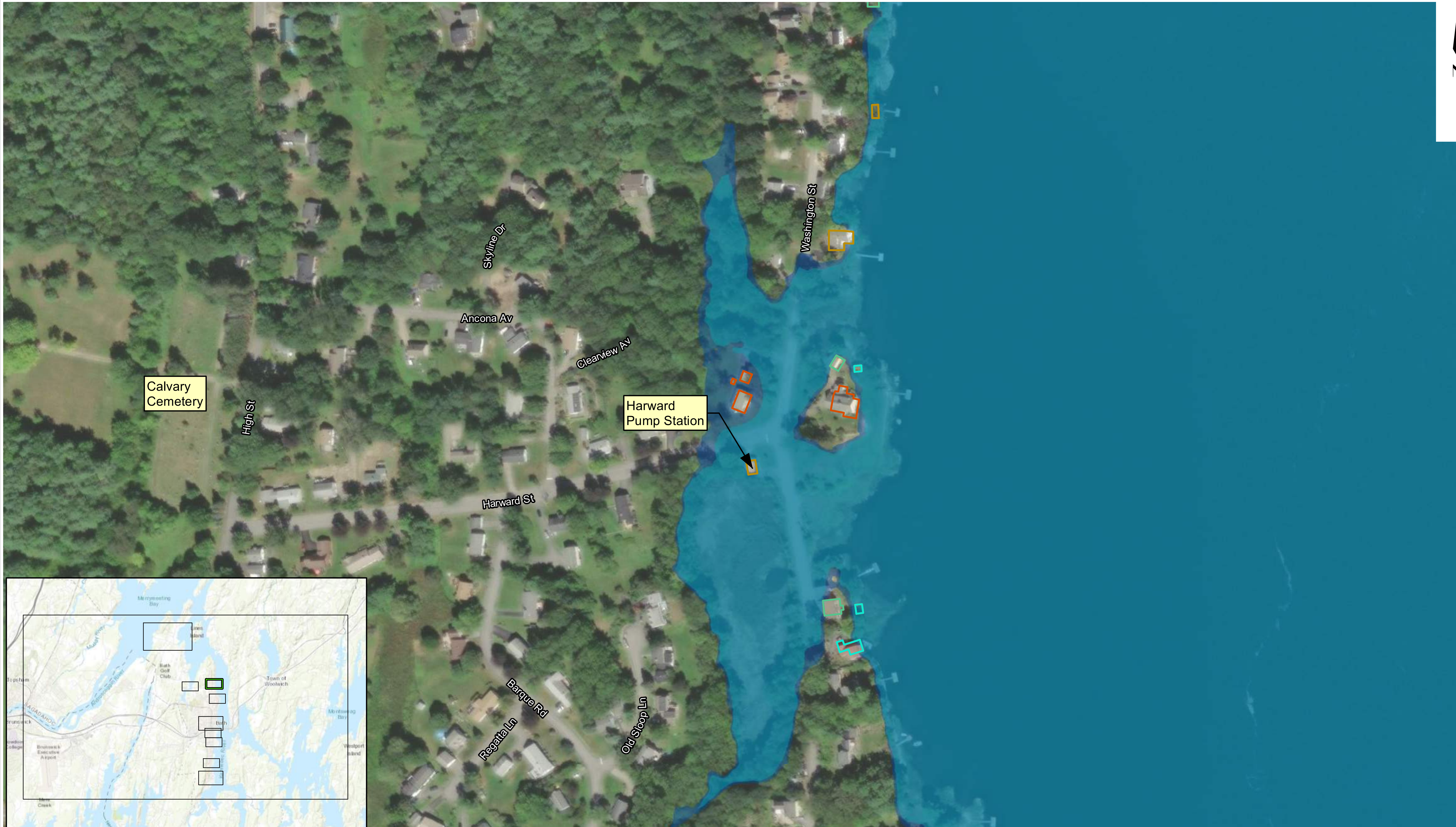
City of Bath
Bath, Maine

GEI Consultants

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

Project 2204496 | March 2024 | Fig. 5c

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd




**_LEGEND:_**

*Scenario Building Inundation Likely to Occur:*

**2050: Commit to Manage**
- Scenario 4: Average Conditions
- Scenario 6: 100-yr Conditions

**2100: Commit to Manage**
- Scenario 10: Average Conditions
- Scenario 12: 100-yr Conditions

**_NOTES:_**
1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

March 2024

Fig. 5d

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


***LEGEND:***

*Scenario Building Inundation Likely to Occur:*

**2050: Commit to Manage**
- Scenario 4: Average Conditions
- Scenario 6: 100-yr Conditions

**2100: Commit to Manage**
- Scenario 10: Average Conditions
- Scenario 12: 100-yr Conditions

***NOTES:***
1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

March 2024

Fig. 5e

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

| **2050: Commit to Manage** | **2100: Commit to Manage** |
|---|---|
| Scenario 4: Average Conditions | Scenario 10: Average Conditions |
| Scenario 6: 100-yr Conditions | Scenario 12: 100-yr Conditions |

**NOTES:**

1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 300
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

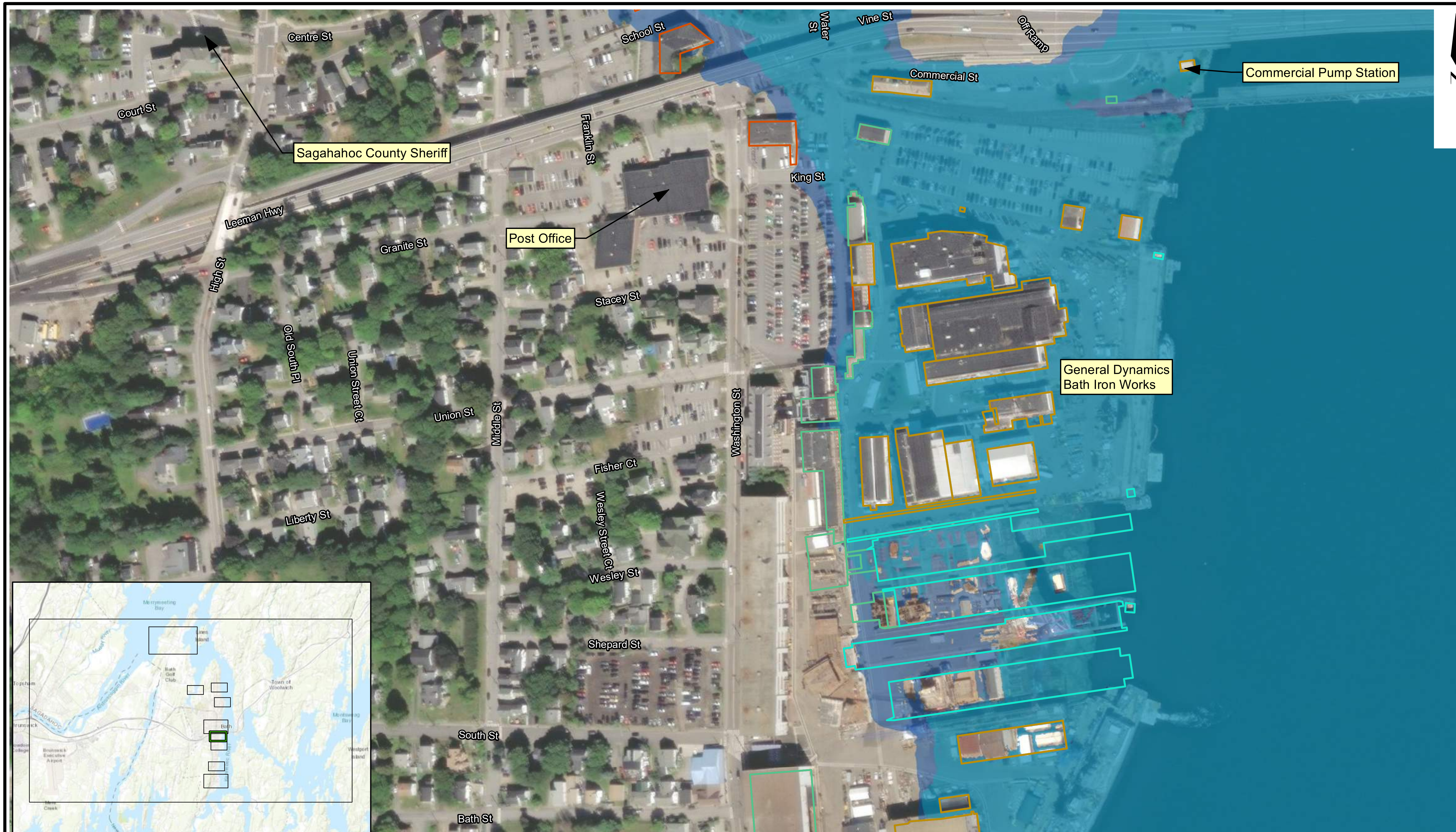
"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

March 2024

Fig. 5f

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

| **2050: Commit to Manage** | **2100: Commit to Manage** |
|---|---|
| Scenario 4: Average Conditions | Scenario 10: Average Conditions |
| Scenario 6: 100-yr Conditions | Scenario 12: 100-yr Conditions |

**NOTES:**
1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

March 2024

Fig. 5g

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

| **2050: Commit to Manage** | **2100: Commit to Manage** |
|---|---|
| Scenario 4: Average Conditions | Scenario 10: Average Conditions |
| Scenario 6: 100-yr Conditions | Scenario 12: 100-yr Conditions |

**NOTES:**
1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

Project 2204496 | March 2024 | Fig. 5h

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

| 2050: Commit to Manage | 2100: Commit to Manage |
|---|---|
| Scenario 4: Average Conditions | Scenario 10: Average Conditions |
| Scenario 6: 100-yr Conditions | Scenario 12: 100-yr Conditions |

***NOTES:***

1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 200

Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

Project 2204496 | March 2024 | Fig. 5i

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd


***LEGEND:***

*Scenario Building Inundation Likely to Occur:*

| **2050: Commit to Manage** | **2100: Commit to Manage** |
|---|---|
| Scenario 4: Average Conditions | Scenario 10: Average Conditions |
| Scenario 6: 100-yr Conditions | Scenario 12: 100-yr Conditions |

***NOTES:***

1. Commit to Manage scenarios reference 1.5 ft and 4.0 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundaries shown on map represent Scenario 6 and Scenario 12.

0 300
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

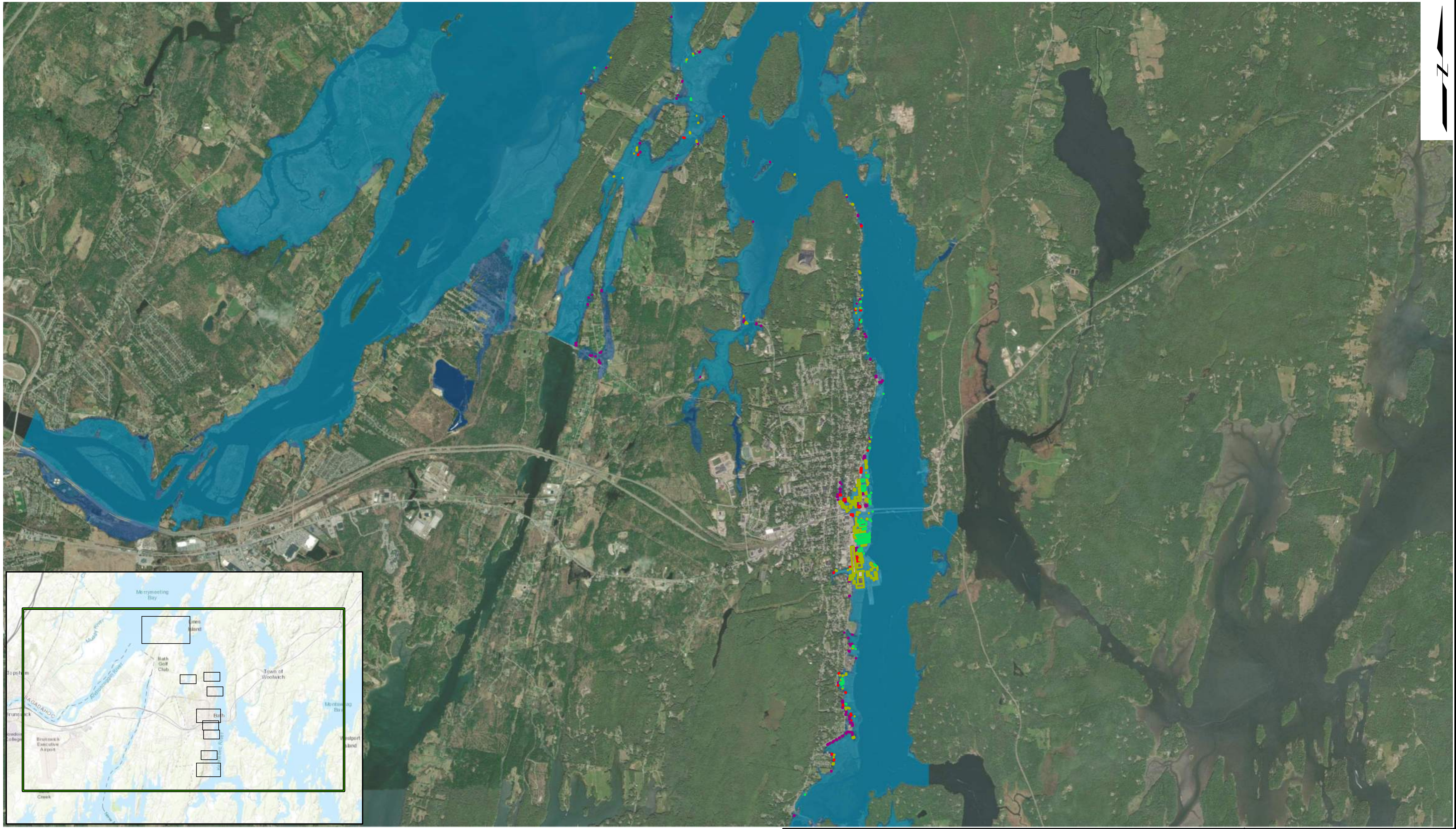
GEI Consultants

"COMMIT TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

Project 2204496 | March 2024 | Fig. 5j

B:\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Commit_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




***LEGEND:***

*Scenario Building Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

0 4000
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

"PREPARE TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

Project 2204496 | March 2024 | Fig. 6a

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

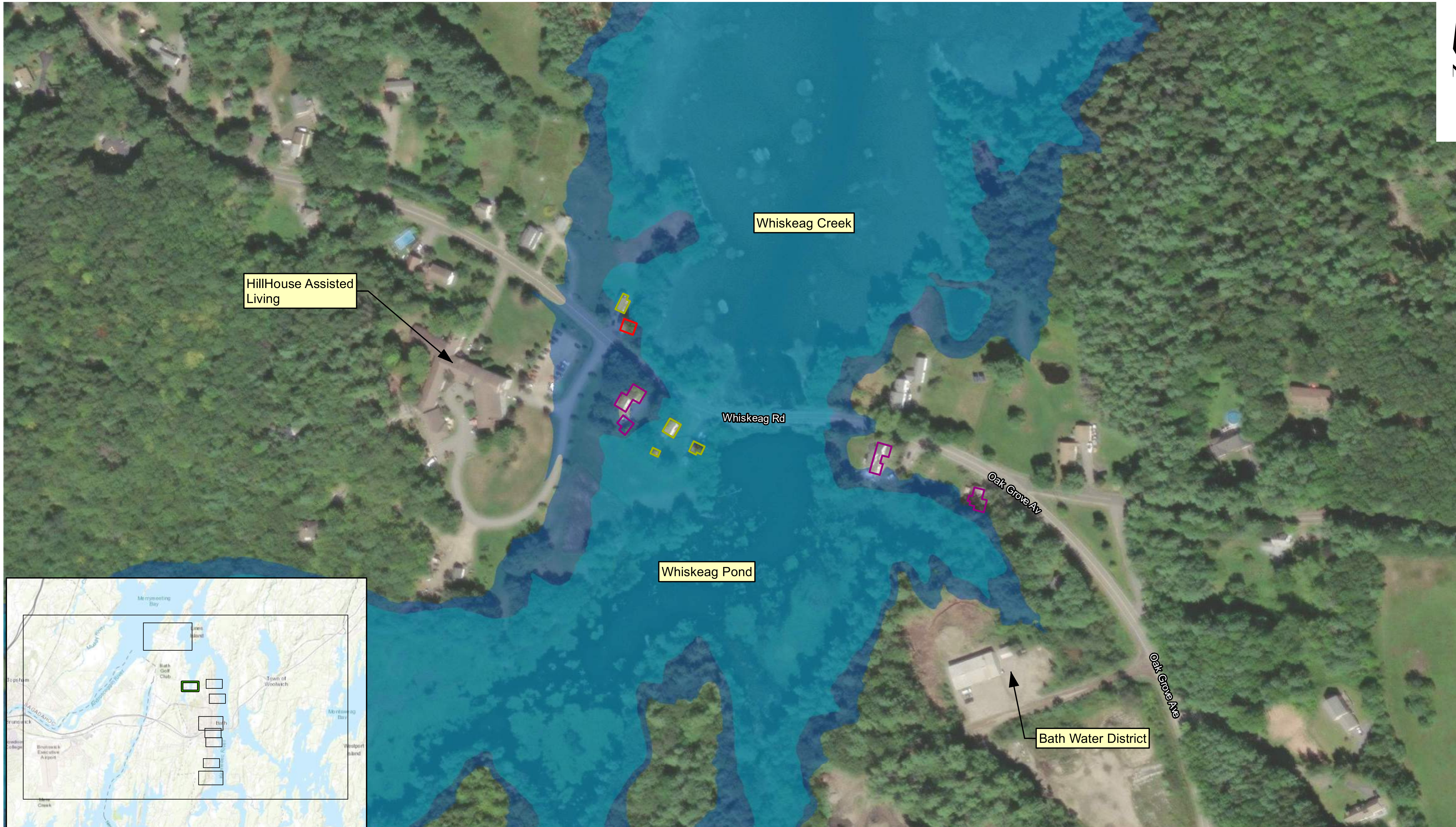
**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

**NOTES:**
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

| | | |
|---|---|---|
| Flood Vulnerability Assessment<br>Bath, Maine | GEI Consultants | "PREPARE TO MANAGE" FLOOD VULNERABILITY OF BUILDINGS |
| City of Bath<br>Bath, Maine | Project 2204496 | March 2024 Fig. 6b |

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




***LEGEND:***

*Scenario Building Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"PREPARE TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

March 2024

Fig. 6c

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

0 200

Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

"PREPARE TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

Project 2204496 | March 2024 | Fig. 6d

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd


***LEGEND:***

*Scenario Building Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***

1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"PREPARE TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

March 2024

Fig. 6e

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

0 300
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

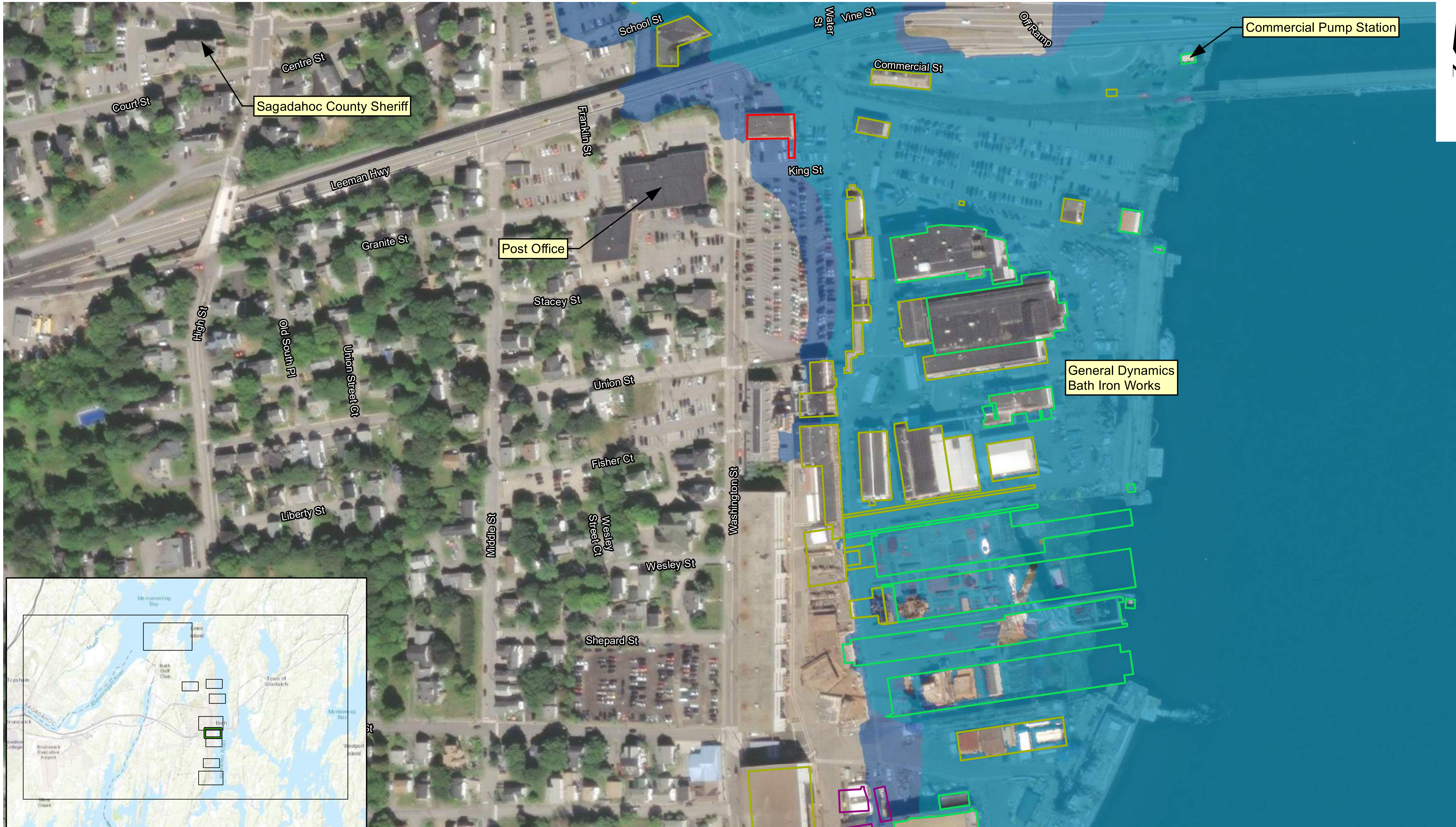
GEI Consultants

"PREPARE TO MANAGE" FLOOD VULNERABILITY OF BUILDINGS

Project 2204496 | March 2024 | Fig. 6f

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

| **2050: Prepare to Manage** | **2100: Prepare to Manage** |
|---|---|
| Scenario 7: Average Conditions | Scenario 13: Average Conditions |
| Scenario 9: 100-yr Conditions | Scenario 15: 100-yr Conditions |

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"PREPARE TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

March 2024

Fig. 6g

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


***LEGEND:***

*Scenario Building Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

***NOTES:***
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

"PREPARE TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

Project 2204496 | March 2024 | Fig. 6h

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,


**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

**NOTES:**
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

0 200
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

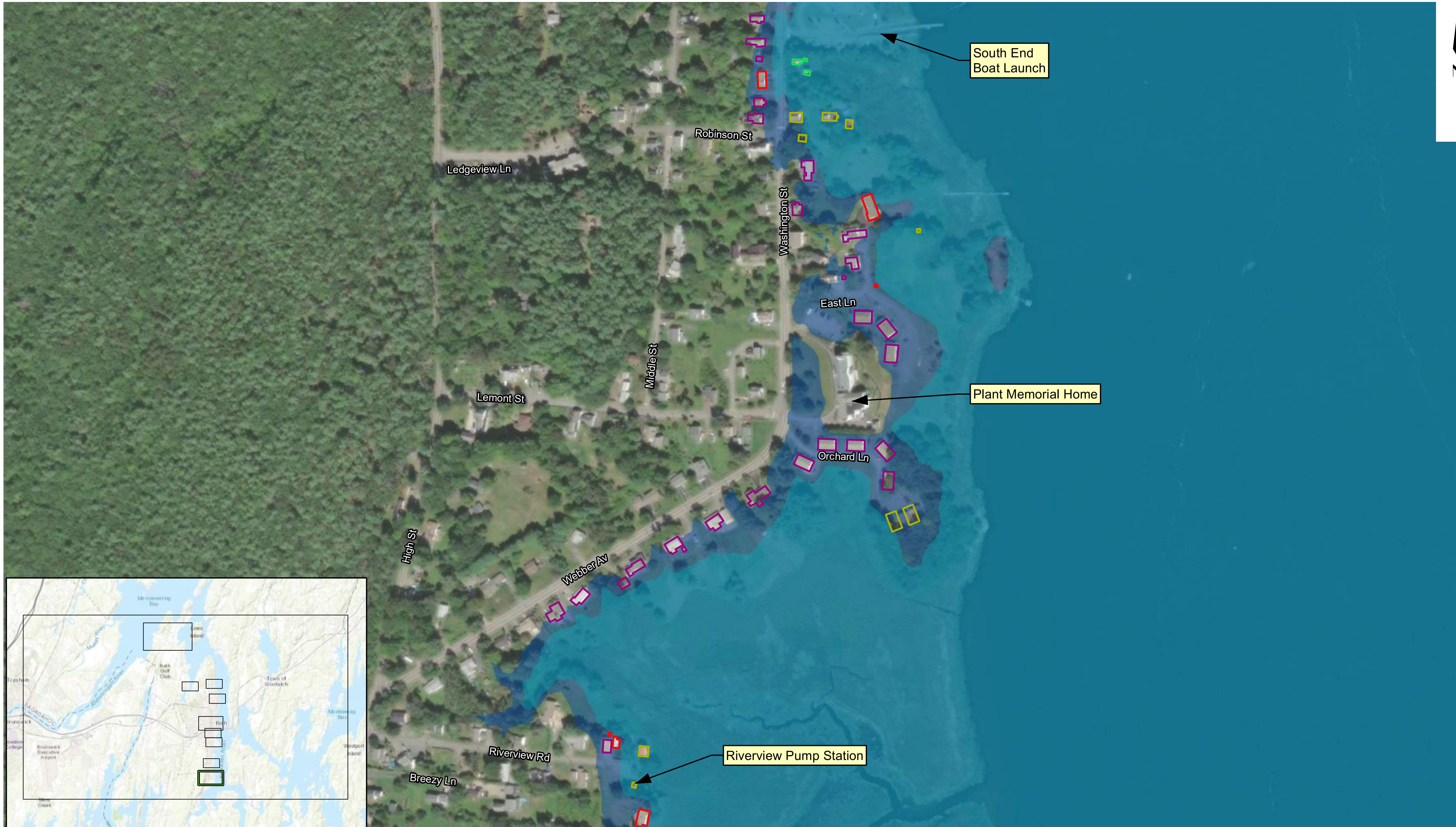
GEI Consultants

"PREPARE TO MANAGE" FLOOD VULNERABILITY OF BUILDINGS

Project 2204496 | March 2024 | Fig. 6i

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,




**LEGEND:**

*Scenario Building Inundation Likely to Occur:*

**2050: Prepare to Manage**
- Scenario 7: Average Conditions
- Scenario 9: 100-yr Conditions

**2100: Prepare to Manage**
- Scenario 13: Average Conditions
- Scenario 15: 100-yr Conditions

**NOTES:**
1. Prepare to Manage scenarios reference 3.0 ft and 8.8 ft of sea level rise by 2050 and 2100, respectively.
2. Average and 100-year scenarios reference average tides and riverine flows and combined 100-yr coastal and riverine events, respectively.
3. Model results based on HECRAS and USGS (2020) LiDAR.
4. Flood boundary shown based on Scenario 9 and Scenario 15.

0 300
Feet

Flood Vulnerability Assessment
Bath, Maine

City of Bath
Bath, Maine

GEI Consultants

Project 2204496

"PREPARE TO MANAGE"
FLOOD VULNERABILITY
OF BUILDINGS

March 2024

Fig. 6i

\\geiconsultants.com\data\Data_Storage\Working\BATH, CITY OF MAINE\2204496 Bath Vulnerability Study\GIS\Vulnerability_Results_Prepare_Buildings_240320.mxd

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS,

# Appendix A

## Road Model Results

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Arch Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | 36 | 44 | - | 59 | 69 | - | 78 | 87 | 101 | 164 | 171 |
| Peak Water Surface Elevation (ft) | - | - | - | - | 9.7 | 10.2 | - | 11.2 | 11.7 | - | 12.2 | 13.0 | 13.2 | 17.0 | 17.5 |
| Max Depth of Inundation (ft) | - | - | - | - | 0.8 | 1.3 | - | 2.3 | 2.8 | - | 3.3 | 4.1 | 4.3 | 8.1 | 8.6 |
| Duration of Inundation (hrs)[3] | - | - | - | - | 2-3 | 3-4 | - | 4-5 | 5-6 | - | 6-7 | 6-7 | 7-8 | >12 | >12 |
| **Bayshore Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 312 | 365 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.0 | 18.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 4.1 | 5.5 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 7-8 | >12 |
| **Blackwater Cove Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | 133 | 131 | 206 | 243 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | 14.0 | 13.3 | 17.1 | 18.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | 1.8 | 1.1 | 4.8 | 6.2 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | 3-4 | 3-4 | 8-9 | >12 |
| **Bridge Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | 46 | 47 | - | 88 | 91 | 132 | 285 | 288 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | 11.2 | 11.2 | - | 12.0 | 12.1 | 13.4 | 17.1 | 17.2 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | 2.8 | 2.7 | - | 3.6 | 3.7 | 5.0 | 8.7 | 8.8 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | 7-8 | 7-8 | - | 9-10 | 9-10 | >12 | >12 | >12 |
| **Broad Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | 38 | - | 48 | 54 | - | 61 | 66 | 75 | 118 | 124 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 10.0 | - | 11.0 | 11.5 | - | 12.0 | 13.0 | 13.0 | 16.8 | 17.3 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 0.5 | - | 1.5 | 2.0 | - | 2.5 | 3.5 | 3.5 | 7.3 | 7.8 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 2-3 | - | 4-5 | 4-5 | - | 5-6 | 6-7 | 7-8 | >12 | >12 |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refe to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak water surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Butler Head Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | 1,116 | 1,315 | 402 | 1,331 | 1,508 | 1,064 | 1,461 | 1,595 | 1,136 | 1,538 | 1,696 | 1,622 | 1,737 | 1,762 |
| Peak Water Surface Elevation (ft) | - | 8.3 | 9.9 | 6.1 | 9.8 | 12.1 | 7.6 | 11.3 | 13.3 | 8.6 | 12.3 | 15.0 | 13.4 | 17.1 | 19.1 |
| Max Depth of Inundation (ft) | - | 2.8 | 4.3 | 0.6 | 4.3 | 6.5 | 2.1 | 5.7 | 7.8 | 3.1 | 6.7 | 9.5 | 7.9 | 11.6 | 13.6 |
| Duration of Inundation (hrs)[3] | - | 5-6 | 9-10 | 2-3 | 7-8 | >12 | 5-6 | 8-9 | >12 | 5-6 | 11-12 | >12 | >12 | >12 | >12 |
| **Cardinal Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 151 | 464 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 19.2 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.6 | 2.7 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 2-3 | 6-7 |
| **Castine Avenue** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | 657 | - | 881 | 890 | - | 900 | 903 | 910 | 910 | 910 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 8.1 | - | 11.1 | 11.6 | - | 12.3 | 12.6 | 13.4 | 17.1 | 17.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 1.8 | - | 4.9 | 5.3 | - | 6.1 | 6.4 | 7.2 | 10.9 | 11.2 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 4-5* | - | 5-6* | 6-7* | - | 7-8* | 7-8* | 9-10* | >12* | >12* |
| **Centre Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | 212 | - | 510 | 532 | - | 557 | 574 | 599 | 717 | 730 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 9.3 | - | 11.2 | 11.6 | - | 12.2 | 12.7 | 13.1 | 17.0 | 17.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 1.3 | - | 3.2 | 3.6 | - | 4.2 | 4.7 | 5.1 | 9.0 | 9.4 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 2-3* | - | 3-4* | 4-5* | - | 5-6* | 6-7* | 6-7* | 9-10* | >12* |
| **Commercial Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | 955 | 1,481 | 235 | 2,437 | 2,610 | 752 | 2,735 | 2,754 | 1,431 | 2,776 | 2,796 | 2,838 | 2,893 | 2,900 |
| *Section 1: North of Summer Street* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | 8.3 | 8.7 | 6.1 | 9.8 | 10.4 | 7.6 | 11.3 | 11.8 | 8.6 | 12.3 | 13.0 | 13.4 | 17.1 | 17.6 |
| Max Depth of Inundation (ft) | - | 2.9 | 3.3 | 0.8 | 4.4 | 5.0 | 2.3 | 5.9 | 6.4 | 3.3 | 6.9 | 7.7 | 8.1 | 11.8 | 12.3 |
| Duration of Inundation (hrs)[3] | - | 5-6 | 6-7 | 2-3 | 6-7 | 8-9 | 5-6 | 9-10 | 10-11 | 7-8 | 10-11 | >12 | >12 | >12 | >12 |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refe to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak wat surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Commercial Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | 955 | 1,481 | 235 | 2,437 | 2,610 | 752 | 2,735 | 2,754 | 1,431 | 2,776 | 2,796 | 2,838 | 2,893 | 2,900 |
| *Section 2: South of Route 1 Bridge* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | 7.8 | - | 9.8 | 10.2 | - | 11.3 | 11.7 | 8.0 | 12.3 | 12.9 | 13.4 | 17.1 | 17.5 |
| Max Depth of Inundation (ft) | - | - | 1.1 | - | 3.1 | 3.5 | - | 4.6 | 5.0 | 1.3 | 5.6 | 6.2 | 6.7 | 10.4 | 10.8 |
| Duration of Inundation (hrs)[3] | - | - | 2-3* | - | 5-6* | 6-7* | - | 7-8* | 7-8* | 2-3* | 7-8* | 8-9* | 8-9* | >12* | >12* |
| **Creekside Ln** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 204 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 18.3 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.1 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5-6* |
| **East Lane** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 469 | 470 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 17.2 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.2 | 3.3 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 5-6* | 5-6* |
| **Elm Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | 166 | - | 218 | 224 | - | 231 | 236 | 244 | 283 | 288 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 9.4 | - | 11.3 | 11.7 | - | 12.3 | 12.9 | 13.2 | 17.1 | 17.6 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 0.6 | - | 2.5 | 2.9 | - | 3.5 | 4.1 | 4.4 | 8.3 | 8.8 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 2-3* | - | 6-7* | 7-8* | - | 7-8* | 9-10* | 9-10* | >12* | >12* |
| **Front Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | 137 | 226 | - | 341 | 371 | - | 395 | 413 | 435 | 554 | 571 |
| Peak Water Surface Elevation (ft) | - | - | - | - | 9.8 | 10.3 | - | 11.3 | 11.8 | - | 12.3 | 13.0 | 13.4 | 17.1 | 17.6 |
| Max Depth of Inundation (ft) | - | - | - | - | 0.8 | 1.3 | - | 2.2 | 2.7 | - | 3.3 | 4.0 | 4.4 | 8.1 | 8.6 |
| Duration of Inundation (hrs)[3] | - | - | - | - | 2-3* | 3-4* | - | 7-8* | 7-8* | - | 8-9* | 8-9* | 9-10* | >12* | >12* |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refe
   to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak wat
   surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Harward Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | 75 | 103 | - | 127 | 145 | - | 156 | 169 | 91 | 173 | 184 | 189 | 230 | 239 |
| Peak Water Surface Elevation (ft) | - | 8.3 | 8.9 | - | 9.8 | 10.6 | - | 11.3 | 12.1 | 8.6 | 12.3 | 13.4 | 13.2 | 17.1 | 17.9 |
| Max Depth of Inundation (ft) | - | 0.6 | 1.2 | - | 2.1 | 2.9 | - | 3.6 | 4.4 | 0.9 | 4.6 | 5.7 | 5.5 | 9.4 | 10.2 |
| Duration of Inundation (hrs)[3] | - | 2-3 | 3-4 | - | 4-5 | 6-7 | - | 5-6 | 8-9 | 3-4 | 7-8 | 9-10 | 9-10 | >12 | >12 |
| **Hawkes Lane** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | 342 | - | 378 | 520 | - | 504 | 558 | 181 | 545 | 577 | 575 | 630 | 648 |
| Peak Water Surface Elevation (ft) | - | - | 7.5 | - | 7.7 | 10.2 | - | 9.8 | 12.0 | 7.0 | 11.3 | 13.9 | 13.1 | 17.0 | 18.4 |
| Max Depth of Inundation (ft) | - | - | 1.0 | - | 1.2 | 3.8 | - | 3.3 | 5.6 | 0.5 | 4.8 | 7.4 | 6.6 | 10.5 | 11.9 |
| Duration of Inundation (hrs)[3] | - | - | 7-8* | - | 8-9* | >12* | - | 11-12* | 11-12* | 5-6* | >12* | >12* | >12* | >12* | >12* |
| **Hinckley Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | 37 | - | 67 | 77 | 102 | 185 | 189 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | 11.5 | - | 12.3 | 12.7 | 13.4 | 17.1 | 17.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | 0.2 | - | 1.0 | 1.4 | 2.1 | 5.8 | 6.1 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | 1-2 | - | 2-3 | 3-4 | 4-5 | 8-9 | 9-10 |
| **King Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | 116 | 131 | - | 155 | 164 | - | 175 | 182 | 196 | 263 | 268 |
| Peak Water Surface Elevation (ft) | - | - | - | - | 9.8 | 10.2 | - | 11.3 | 11.7 | - | 12.3 | 12.9 | 13.4 | 17.1 | 17.5 |
| Max Depth of Inundation (ft) | - | - | - | - | 1.3 | 1.7 | - | 2.8 | 3.2 | - | 3.8 | 4.4 | 4.9 | 8.6 | 9.0 |
| Duration of Inundation (hrs)[3] | - | - | - | - | 3-4 | 4-5 | - | 6-7 | 7-8 | - | 7-8 | 8-9 | 8-9 | >12 | >12 |
| **Lambard Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | 31 | 34 | - | 39 | 43 | 49 | 90 | 96 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | 11.5 | 12.0 | - | 12.5 | 12.9 | 13.4 | 17.3 | 17.8 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | 0.5 | 1.0 | - | 1.5 | 1.9 | 2.4 | 6.3 | 6.8 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | 2-3 | 2-3 | - | 3-4 | 5-6 | 6-7 | 10-11 | >12 |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refer to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak wat surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Lenfest Lane** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 242 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 18.3 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.2 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 5-6 |
| **Middle Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | 52 | - | 111 | 117 | - | 125 | 128 | 134 | 860 | 893 |
| *Section 1: Near Walker Street Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 17.5 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.2 | 3.6 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 5-6 | 6-7 |
| *Section 2: Near Castine Avenue Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 8.1 | - | 11.1 | 11.6 | - | 12.3 | 12.7 | 13.4 | 17.1 | 17.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 0.6 | - | 3.6 | 4.1 | - | 4.8 | 5.2 | 5.9 | 9.6 | 9.9 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 2-3* | - | 5-6* | 5-6* | - | 6-7* | 7-8* | 8-9* | >12* | >12* |
| **North Bath Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | 230 | - | 332 | 492 | - | 504 | 612 | 20 | 591 | 675 | 670 | 868 | 929 |
| Peak Water Surface Elevation (ft) | - | - | 9.0 | - | 9.6 | 11.1 | - | 11.2 | 12.5 | 8.3 | 12.2 | 14.0 | 13.4 | 17.1 | 18.4 |
| Max Depth of Inundation (ft) | - | - | 1.6 | - | 2.2 | 3.7 | - | 3.8 | 5.1 | 0.9 | 4.8 | 6.6 | 6.0 | 9.7 | 11.0 |
| Duration of Inundation (hrs)[3] | | - | 5-6 | - | 5-6 | 9-10 | - | 8-9 | 11-12 | 3-4 | 9-10 | >12 | >12 | >12 | >12 |
| **Old Brunswick Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 607 | 726 |
| *Section 1: Near Ridge Road Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 15.1 | 18.3 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 4.4 | 7.6 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 5-6* | 6-7* |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refe to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak wat surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Old Brunswick Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 607 | 726 |
| *Section 2: Near Lenfest Lane Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 18.3 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2-3* |
| *Section 3: Near Creekside Lane Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 18.3 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 5.5 | 6.7 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | >12* | >12* |
| **Orchard Lane** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | 6 | 447 | 448 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | 13.4 | 17.1 | 17.2 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | 0.3 | 4.0 | 4.0 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | 2-3 | 6-7 | 6-7 |
| **Osprey Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 202 | 281 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 19.1 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.8 | 2.9 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 2-3 | 7-8 |
| **Ridge Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | 1,140 | - | 1,095 | 1,340 | - | 1,272 | 1,442 | 1,434 | 2,161 | 2,554 |
| *Section 1: Near Hawks Lane Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 10.2 | - | 9.8 | 12.0 | - | 11.3 | 13.9 | 13.0 | 17.0 | 18.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 2.8 | - | 2.3 | 4.6 | - | 3.8 | 6.4 | 5.6 | 9.5 | 10.9 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 10-11* | - | 9-10* | 11-12* | - | 10-11* | >12* | >12* | >12* | >12* |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refe to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak water surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Ridge Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | 1,140 | - | 1,095 | 1,340 | - | 1,272 | 1,442 | 1,434 | 2,161 | 2,554 |
| *Section 2: Near Old Brunswick Road Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 15.2 | 18.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 0.6 | 3.8 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 2-3* | 9-10* |
| **Riverview Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 172 | 175 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 17.2 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.2 | 2.3 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 5-6 | 5-6 |
| **Robinson Street** | | | | | | | | | | | | | | | |
| Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 56 | 58 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 17.2 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.5 | 1.6 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 3-4* | 3-4* |
| **Russell Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 60 | 64 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 17.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.3 | 1.6 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 4-3 | 4-5 |
| **School Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | 133 | 144 | - | 160 | 169 | 183 | 268 | 279 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | 11.3 | 11.7 | - | 12.3 | 12.9 | 13.3 | 17.1 | 17.6 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | 1.6 | 2.0 | - | 2.6 | 3.2 | 3.6 | 7.4 | 7.9 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | 5-6 | 6-7 | - | 6-7 | 6-7 | 8-9 | >12 | >12 |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refe to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak water surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Spring Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | 51 | - | 128 | 144 | - | 161 | 167 | 183 | 265 | 269 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 9.7 | - | 11.1 | 11.6 | - | 12.3 | 12.7 | 13.4 | 17.1 | 17.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 0.5 | - | 1.9 | 2.3 | - | 3.1 | 3.5 | 4.2 | 7.9 | 8.2 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 2-3 | - | 5-6 | 7-8 | - | 8-9 | 9-10 | 9-10 | >12 | >12 |
| **Spring View Lane** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 281 | 379 |
| Peak Water Surface Elevation (ft) | | | | | | | | | | | | | | 17.0 | 18.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.3 | 4.7 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 5-6 | 9-10 |
| **Summer Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | 109 | 125 | - | 154 | 164 | 78 | 177 | 184 | 123 | 191 | 197 | 204 | 260 | 264 |
| Peak Water Surface Elevation (ft) | - | 8.2 | 8.6 | - | 9.7 | 10.3 | 7.4 | 11.2 | 11.7 | 8.4 | 12.2 | 13.0 | 13.2 | 17.1 | 17.6 |
| Max Depth of Inundation (ft) | - | 1.9 | 2.3 | - | 3.4 | 4.0 | 1.1 | 4.9 | 5.4 | 2.1 | 5.9 | 6.7 | 6.9 | 10.8 | 11.3 |
| Duration of Inundation (hrs)[3] | - | 4-5 | 4-5 | - | 6-7 | 7-8 | 3-4 | 7-8 | 8-9 | 5-6 | 10-11 | 11-12 | >12 | >12 | >12 |
| **Town Landing Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 161 | 182 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 17.8 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.2 | 3.9 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 5-6 | 7-8 |
| **Varney Mill Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | 193 | 586 | - | 676 | 799 | - | 794 | 879 | 379 | 857 | 1,048 | 1,031 | 1,431 | 1,573 |
| *Section 1: Near Butler Head Road Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | 8.3 | 9.4 | - | 9.8 | 11.4 | - | 11.3 | 12.7 | 8.6 | 12.3 | 14.3 | 13.4 | 17.1 | 18.6 |
| Max Depth of Inundation (ft) | - | 0.7 | 1.8 | - | 2.2 | 3.8 | - | 3.7 | 5.1 | 1.0 | 4.7 | 6.7 | 5.8 | 9.5 | 11.0 |
| Duration of Inundation (hrs)[3] | - | 1-2 | 4-5 | - | 4-5 | 8-9 | - | 6-7 | >12 | 2-3 | 7-8 | >12 | 9-10 | >12 | >12 |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refer to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak water surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Varney Mill Road** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | 193 | 586 | - | 676 | 799 | - | 794 | 879 | 379 | 857 | 1,048 | 1,031 | 1,431 | 1,573 |
| *Section 2: Near Blackwater Cove Road Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | 14.1 | 13.4 | 17.1 | 18.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | 1.3 | 0.6 | 4.3 | 5.6 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | 3-4 | 2-3 | 7-8 | >12 |
| **Vine Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | 77 | - | 271 | 281 | - | 304 | 312 | 112 | 322 | 329 | 342 | 398 | 404 |
| Peak Water Surface Elevation (ft) | - | - | 7.8 | - | 9.8 | 10.3 | - | 11.3 | 11.7 | 8.0 | 12.3 | 12.9 | 13.3 | 17.1 | 17.6 |
| Max Depth of Inundation (ft) | - | - | 0.4 | - | 2.4 | 2.9 | - | 3.9 | 4.3 | 0.6 | 4.9 | 5.6 | 5.9 | 9.7 | 10.2 |
| Duration of Inundation (hrs)[3] | - | - | 1-2* | - | 4-5* | 4-5* | - | 7-8* | 7-8* | 2-3* | 7-8* | 8-9* | 9-10* | >12* | >12* |
| **Walker Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 43 | 46 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.2 | 17.7 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.7 | 2.2 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 4-5 | 5-6 |
| **Washington Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | 1,321 | 1,365 | - | 1,540 | 2,072 | 1,180 | 2,872 | 3,049 | 1,365 | 3,277 | 3,399 | 3,629 | 5,005 | 5,151 |
| *Section 1: Northern Washington Street near Thorne Head* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | 11.3 | 12.2 | - | 12.3 | 13.5 | 13.4 | 17.1 | 18.0 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | 0.4 | 1.3 | - | 1.4 | 2.7 | 2.6 | 6.3 | 7.2 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | 2-3 | 4-5 | - | 3-4 | 5-6 | 5-6 | 8-9 | >12 |
| *Section 2: Near Harward Street Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | 8.3 | 8.9 | - | 9.8 | 10.6 | 7.6 | 11.3 | 12.1 | 8.6 | 12.3 | 13.4 | 13.4 | 17.1 | 17.9 |
| Max Depth of Inundation (ft) | - | 2.9 | 3.5 | - | 4.4 | 5.2 | 2.2 | 5.9 | 6.6 | 3.2 | 6.9 | 8.0 | 8.0 | 11.7 | 12.5 |
| Duration of Inundation (hrs)[3] | - | 5-6 | 6-7 | - | 6-7 | 7-8 | 5-6 | 8-9 | 11-12 | 5-6 | 9-10 | >12 | >12 | >12 | >12 |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refer to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak water surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Washington Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | 1,321 | 1,365 | - | 1,540 | 2,072 | 1,180 | 2,872 | 3,049 | 1,365 | 3,277 | 3,399 | 3,629 | 5,005 | 5,151 |
| *Section 3: Between School Street and Centre Street* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 9.6 | - | 11.3 | 11.7 | - | 12.3 | 12.9 | 13.4 | 17.1 | 17.5 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 1.5 | - | 3.2 | 3.6 | - | 4.2 | 4.8 | 5.3 | 9.0 | 9.4 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 3-4* | - | 5-6* | 6-7* | - | 6-7* | 7-8* | 8-9* | >12* | >12* |
| *Section 4: Near Castine Avenue Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 9.1 | - | 11.1 | 11.6 | - | 12.3 | 12.7 | 13.4 | 17.1 | 17.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 0.9 | - | 2.9 | 3.4 | - | 4.1 | 4.5 | 5.2 | 8.9 | 9.2 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 3-4* | - | 6-7* | 6-7* | - | 6-7* | 7-8* | 8-9* | >12* | >12* |
| *Section 5: Near Pine Street Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 17.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.1 | 2.3 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 4-5* | 5-6* |
| *Section 6: Near Rose Street Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 17.1 | 17.3 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.2 | 1.4 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.5* | 3.5* |
| *Section 7: Near Hunt Street Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | 8.3 | 8.4 | - | 9.8 | 10.0 | 7.6 | 11.3 | 11.4 | 8.6 | 12.3 | 12.5 | 13.4 | 17.1 | 17.3 |
| Max Depth of Inundation (ft) | - | 2.8 | 2.9 | - | 4.3 | 4.4 | 2.1 | 5.8 | 5.9 | 3.1 | 6.8 | 7.0 | 7.9 | 11.6 | 11.7 |
| Duration of Inundation (hrs)[3] | - | 5-6 | 5-6 | - | 7-8 | 7-8 | 4-5 | 8-9 | 8-9 | 5-6 | 8-9 | 9-10 | >12 | >12 | >12 |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refe to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak water surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] | Avg.[1] | 100-yr T[1] | 100-yr T & R[1] |
| **Road Name** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Water Street** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | 722 | - | 949 | 1,008 | - | 1,008 | 1,008 | 1,008 | 1,008 | 1,008 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | 9.4 | - | 11.3 | 11.7 | - | 12.3 | 12.9 | 13.4 | 17.1 | 17.6 |
| Max Depth of Inundation (ft) | - | - | - | - | - | 2.2 | - | 4.1 | 4.5 | - | 5.1 | 5.7 | 6.2 | 9.9 | 10.3 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | 2-3* | - | 5-6* | 6-7* | - | 6-7* | 7-8* | 8-9* | >12* | >12* |
| **Whiskeag Rd** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | 46 | - | 177 | 259 | - | 277 | 574 | - | 439 | 762 | 758 | 1,222 | 1,336 |
| *Section 1: Near Ridge Road Intersection* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | - | 12.0 | - | 11.3 | 13.9 | 13.0 | 17.0 | 18.4 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | - | 1.1 | - | 0.4 | 3.0 | 2.2 | 6.1 | 7.5 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | - | 2-3 | - | 0-1 | 4-5 | 4-5 | 10-11 | >12 |
| *Section 2: Near Whiskeag Creek* | | | | | | | | | | | | | | | |
| Peak Water Surface Elevation (ft) | - | - | 9.1 | - | 9.8 | 11.0 | - | 11.3 | 12.4 | - | 12.3 | 13.8 | 13.4 | 17.1 | 18.3 |
| Max Depth of Inundation (ft) | - | - | 0.7 | - | 1.4 | 2.6 | - | 2.9 | 4.0 | - | 3.9 | 5.4 | 5.0 | 8.7 | 9.9 |
| Duration of Inundation (hrs)[3] | - | - | 1-2 | - | 2-3 | 5-6 | - | 4-5 | 7-8 | - | 6-7 | 8-9 | 8-9 | >12 | >12 |
| **Williams Court** | | | | | | | | | | | | | | | |
| Total Length Inundated (ft) | - | - | - | - | - | - | - | 61 | 61 | - | 72 | 73 | 84 | 119 | 120 |
| Peak Water Surface Elevation (ft) | - | - | - | - | - | - | - | 11.3 | 11.3 | - | 12.3 | 12.4 | 13.4 | 17.1 | 17.2 |
| Max Depth of Inundation (ft) | - | - | - | - | - | - | - | 1.5 | 1.6 | - | 2.5 | 2.6 | 3.6 | 7.3 | 7.4 |
| Duration of Inundation (hrs)[3] | - | - | - | - | - | - | - | 4-5 | 4-5 | - | 5-6 | 5-6 | 7-8 | 11-12 | 11-12 |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows, "100-yr T" refers to 1% annual chance coastal storm flood scenarios, and "100-yr T & R" refei to combined 1% annual chance coastal storm and riverine event flood scenarios
2. Peak Water Surface Elevations reference NAVD88.
3. Flood durations correspond to the duration that the the area of the road experiencing the max flood depth is inundated over one tidal cycle that includes the peak water surface elevation (approximately a 12-hr period) and flood durations with an asterisk (*) may be less than shown due to the potential for stormwater drainage.

# Appendix B

## Remediation Model Results

| | Present-Day | | | 2050 (1.5 ft SLR) Commit to Manage | | | 2050 (3.0 ft SLR) Prepare to Manage | | | 2100 (4.0 ft SLR) Commit to Manage | | | 2100 (8.8 ft SLR) Prepare to Manage | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Avg.[1] | 100-yr T[2] | 100-yr T & R[3] | Avg.[1] | 100-yr T[2] | 100-yr T & R[3] | Avg.[1] | 100-yr T[2] | 100-yr T & R[3] | Avg.[1] | 100-yr T[2] | 100-yr T & R[3] | Avg.[1] | 100-yr T[2] | 100-yr T & R[3] |
| **Remediation Site Name**<br>*remediation status* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| **Freight Shed Property**<br>*remedy in place: closed* | - | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Kennebec Tavern and Marina**<br>*remedy in place: closed* | - | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Dry Cleaning and Dyeing (Brackett's Market)**<br>*remediation stage* | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Old Shipyard**<br>*remedy in place: closed* | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| **Moses and Columbia Block**<br>*remedy in place: closed* | - | - | - | - | Yes | Yes | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| **Bath Iron Works**<br>*remedy in place: closed* | - | - | - | - | - | Yes | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| **15 Vine Street**<br>*complaint investigated* | - | - | - | - | - | Yes | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| **Stinson Canning Co.**<br>*investigation stage* | - | - | - | - | - | Yes | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| **Grant Building**<br>*remediation stage* | - | - | - | - | - | - | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| **Frank Smith Cleaners**<br>*investigation stage* | - | - | - | - | - | - | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| **Coal Pocket**<br>*remediation stage* | - | - | - | - | - | - | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| **Prawer Block**<br>*investigation stage* | - | - | - | - | - | - | - | Yes | Yes | - | Yes | Yes | Yes | Yes | Yes |
| **Steam Laundry**<br>*investigation stage* | - | - | - | - | - | - | - | - | - | - | - | - | Yes | Yes | Yes |
| **South Yard (BIW)**<br>*remedy in place: closed* | - | - | - | - | - | - | - | - | - | - | - | - | - | Yes | Yes |
| **Center St Laundry**<br>*complaint investigated* | - | - | - | - | - | - | - | - | - | - | - | - | - | Yes | Yes |
| **798 Washington Street**<br>*remedy in place: closed* | - | - | - | - | - | - | - | - | - | - | - | - | - | Yes | Yes |
| **Front Street Parking Lot**<br>*remediation stage* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | Yes |

*Notes:*

1. "Avg." refers to average daily tidal conditions and average daily riverine flows
2. "100-yr T" refers to 1% annual chance coastal storm flood scenarios
3. "100-yr T & R" refers to combined 1% annual chance coastal storm and riverine event flood scenarios
4. Remediation status based on ME DEP Remediation Site Database, acessed November 2022