

Technical Memorandum

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Via Email: jfitch@scarboroughmaine.org
To: Jami Fitch, Sustainability Coordinator, Town of Scarborough
From: Leila Pike, P.E. (GEI), Ilan Gasko, E.I. (GEI)
Date: March 27, 2025
Re: Flood Vulnerability Analysis Results
 Flood Vulnerability Assessment
 Scarborough, Maine
Project No.: 2403961

GEI Consultants, Inc. conducted a coastal flood vulnerability study to evaluate risk of infrastructure and open spaces to flood inundation due to coastal storm surge and sea level rise (SLR) in the Town of Scarborough, Cumberland County, Maine (the “Town”) (Figure 1). The study evaluated present-day flood risk due to coastal storm surge as well as estimated flood risk in 2030, 2050, and 2100 due to sea level rise and storm surge.

This work was based on Task 2.7 of our proposal dated April 1, 2024. This memo provides an overview of methodology and a summary of vulnerable assets (i.e., infrastructure and open space). The assets included in the study were based on available GIS data provided by the Town and publicly available data sources. More information on the GIS asset data is provided in the Data Review Memo (GEI, 2025).

Elevations in this report are referenced to the North American Vertical Datum of 1988 (NAVD88) in feet unless otherwise specified.

1.0 Flood Risk Analysis

Coastal flood risk for the Town was evaluated for ten (10) flood scenarios as part of a screening-level evaluation of flood risk. The scenarios included present-day sea levels and estimated sea levels in 2030, 2050, and 2100 based on sea level rise guidance published by the Maine Climate Council (MCC) (2024). Flood risk was evaluated for mean-higher-high water (MHHW), highest astronomical tide (HAT), the max recorded water level at the NOAA tide gage in Portland, Maine (Max Tide), and coastal storm surge stillwater elevations. The events evaluated were the 10%, 2%, 1%, and 0.2% annual chance coastal storm events (i.e., 10-year, 50-year, 100-year, and 500-year annual recurrence intervals, respectively).

The flood scenarios evaluated as part of this study represent static water levels (i.e., no wave action). Areas anticipated to be subject to wave action will be shown on the ArcGIS StoryMap that will accompany this project and will be considered in asset prioritization for adaptation. Areas where wave action is likely to occur will be based on the Limit of Moderate Wave Action from the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS) study for Cumberland County (FEMA, 2024).

For this screening-level flood risk study, tidal transparency across structures and throughout the Scarborough Marsh was assumed (i.e., water levels were assumed to be the same upstream and downstream of structural tidal restrictions and the same across the marsh system). While this is not currently the case, planning for tidal transparency across structures is of increasing interest with benefits for both the built and natural environments and there are ongoing projects in Scarborough to achieve this goal for some restrictions. When tidal flow is squeezed, accelerated, and misdirected through undersized culverts and bridges, it can result in untimely structural wear, higher road maintenance costs, shortened service life, and unplanned road closures. Restricted tidal flow can also impact natural settings by limiting flood protection, pollutant break down, and fish and wildlife habitat, among other factors.

There is also the factor of natural tidal attenuation. As reverse riverine flow from rising tides travels inland it attenuates due to, for example, freshwater flows discharging to the ocean, friction of the stream channel on tidal flows, or tidal restrictions (i.e. culverts, bridges, etc.). This attenuation may result in a difference in peak high tide elevation at the outlet of the marsh compared to the upper limit of tidal influence.

Therefore, with the tidal transparency assumption throughout the marsh, flood extents presented in this study likely differ from what would be experienced in the marsh under present-day and future sea levels given the existing tidal restrictions. In some instances, the results presented in this study may conservatively overestimate the flood extents. In other cases, the results presented in this study may underestimate flood extents. Additionally, flood risk due to precipitation was not evaluated as part of this study.

The results from this evaluation should be used to help identify and prioritize infrastructure at risk of flooding. Water elevations included in this study are for preliminary guidance and to help make early decisions about impacted areas. In the event the Town of Scarborough decides to move forward with infrastructure and open space designs to address flooding, additional more detailed analysis will need to be performed. The data sources used for water levels and sea level rise estimates are described in the Data Review Memo (GEI, 2025).

1.1 Flood and Mapping Scenarios

The flood scenarios included in this study were developed by adding sea level rise estimates to present-day “High Tide” values (i.e., MHHW and HAT elevations) and coastal storm surge stillwater elevations to estimate future “High Tide” and storm surge elevations. This resulted in 42 water surface elevations, which were pared down to 10 elevations by grouping together similar values, highlighting that particular water surface elevations could occur through multiple combinations of tides, storm surge values, and sea level rise values. The 42 water surface elevations considered for this study, color coded into 10 “groups,” are provided in Table 1-1.

Table 1-1. Summary of Water Surface Elevations

Sea Level Rise		Water Surface Elevations (ft, NAVD88)						
		“High Tides”		Coastal Storm Events				
Planning Scenario	SLR (ft)	MHHW	HAT	10 yr	50 yr	100 yr	Max Tide Jan. 13, 2024	500 yr
Existing Sea Levels	0.0	4.6	6.5	7.9	8.5	8.8	9.3	9.5
2030: Commit/Prepare	0.8	5.4	7.3	8.7	9.3	9.6	10.1	10.3
2050: Commit	1.5	6.1	8.0	9.4	10.0	10.3	10.8	11.0
2050: Prepare	1.9	6.5	8.4	9.8	10.4	10.7	11.2	11.4
2100: Commit	4.0	8.6	10.5	11.9	12.5	12.8	13.3	13.5
2100: Prepare	7.4	12	13.9	15.3	15.9	16.2	16.7	16.9

Notes:

1. SLR values from the MCC (2024). “Commit” values represent MCC adopted “Commit to Manage” sea level rise values for 2050 and 2100. “Prepare” values represent the projected values in 2050 and 2100 under a high rate of sea level rise.
2. Present-day values for MHHW, HAT, and Max Tide from the NOAA Tide Gages in Pine Point and Portland, ME (NOAA, 2024a,b).
3. Values for the 10-yr, 50-yr, 100-yr, and 500-yr coastal storm events from the FEMA FIS study for Cumberland County (FEMA, 2024).

After similar water surface elevations were grouped, flood scenario elevations were created based on the highest water surface elevation for each group. The flood scenarios were arranged from lowest to highest water surface elevation and numbered 1 to 10. Flood Scenario 1 would have the smallest inundation extent and lowest water surface elevation and Flood Scenario 10 would have the largest inundation extent and highest water surface elevation. The ten flood scenarios, corresponding water surface elevations, and the time horizon in which the water surface elevation would likely occur during coastal storm events and for “High Tides” are summarized in Table 1-2.

Table 1-2. Summary of Flood Scenarios

Flood Scenario	Water Surface Elevation (ft)	Flood Risk Time Horizon	
		Coastal Storm Event	“High Tide”
1	7.3	Now	2030
2	8.0	Now	2050
3	8.8	Now	2050
4	9.6	Now	2100
5	10.3	2030	2100
6	10.8	2050	2100
7	11.4	2050	2100
8	12.8	2100	2100
9	13.9	2100	2100
10	16.9	2100	2100

1.2 Flood Exposure Methodology

The water elevations for the ten flood scenarios were used to create ten flood inundation extents using a “bathtub” approach based on the town-wide Digital Elevation Model (DEM). A “bathtub” refers to a simplified approach where the water surface is treated as if it were filling up a bathtub. With this approach, which is standard practice for conceptual flood vulnerability assessments, areas below a certain elevation are considered inundated providing a computationally efficient way to evaluate flood scenarios. The bathtub model assumed tidal transparency throughout the marsh. The ten inundation extents were used to identify which GIS-based “assets” would be exposed to flooding for each scenario included in this study.

Assets identified as being at risk of flood inundation for Flood Scenarios 1 through 4 would likely experience flood inundation during coastal storms events for present-day water levels. Additionally, these assets would likely experience “High Tide” flooding in 2030 (Flood Scenario 1), 2050 (Flood Scenarios 2 and 3), and 2100 (Flood Scenarios 4).

Assets identified as being at risk of flood inundation for Flood Scenarios 5 through 7 would likely experience flood inundation during coastal storms events for water levels in 2030 (Flood Scenario 5) and 2050 (Flood Scenarios 6 and 7). Additionally, these assets would likely experience “High Tide” flooding by 2100.

Assets identified as being at risk of flood inundation for Flood Scenarios 8 through 10 would likely experience flood inundation during coastal storm events and “High Tides” by 2100.

The GIS data included in this study represent a snapshot in time of locations and configurations for assets, such as roads, parcels, and building footprints. Actual locations may differ. Refer to the Data Review Memo (GEI, 2025) for more detail on specific GIS data sources and DEM creation. These results should be considered approximate.

The results of the initial flood exposure analysis have been summarized in Section 2 of this memo.

2.0 Flood Exposure Results

Results of the flood exposure analysis have been summarized in tables in this memo. In the following sections, we have provided a summary of flood exposure for the assets included in this study. Detailed flood exposure results for the asset categories included in this study are provided in Appendix A. The last column of the tables provides an overall area, length, or number of assets that have been included in the study, regardless of whether or not the assets are inundated, as a means for comparison for the number of assets that would likely be inundated.

To note, the following assets were included in the database of assets but were outside the area of coastal flood extents included in this study, and therefore, not included in the results: utility substations, hospitals, police stations, schools, and electric vehicle charging stations.

2.1 Buildings and Parcels

We assessed the flood exposure to buildings and parcels. Parcels represent areas (as opposed to point locations), and, in some cases, a portion of the area might experience flood inundation for typical tides for present-day sea levels. For these results, we summarized the area above present-day HAT that would likely be inundated.

A summary of the number of buildings and parcels inundated in each scenario are provided in Tables 2-1 and 2-2, respectively. More detail of the flood exposure of these assets is provided in Appendix A.

Table 2-1. Buildings Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Buildings Inundated	61	112	220	321	422	499	588	924	1,091	1,369	12,853

Notes:

1. Asset information (location, area, etc.) from the Structures GIS layer (Scarborough, 2024). The data includes a variety of structures, including but not limited to, residential, commercial, industrial, and small ancillary structures. We did not differentiate in our analysis between these structure types nor did our analysis include information on habitability, dwelling units versus offices, or daytime versus nighttime use.

Table 2-2. Parcels Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Parcels Impacted	360	506	715	887	988	1,106	1,209	1,553	1,763	2,070	9,670

Notes:

1. Asset information (location, area, etc.) from the Parcels GIS layer (Scarborough, 2024).
2. A parcel is considered impacted if any portion of the parcel above present-day HAT would likely be inundated.

2.2 Coastal Infrastructure

Coastal infrastructure assets include boat launches and coastal structures. Boat launches were considered at risk if the top of the boat ramp would be inundated for a given flood scenario. Coastal Structures were identified from a database created by the Maine Geological Survey (MGS) of structures such as seawalls, bulkheads, and jetties that are present along the shoreline. Coastal Structures, as with other assets within the study, were not field verified or surveyed. This study did not investigate the structural integrity of coastal structures.

A summary of the boat launches inundated in each scenario is provided in Table 2-3. A summary of the number of coastal structures overtopped in each scenario is provided in Table 2-4. More detail of the flood exposure of these assets is provided in Appendix A.

Table 2-3. Boat Launches Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Boat Launches Inundated	4	5	5	6	6	6	6	6	6	6	6

Notes:

1. Asset information (location, area, etc.) from the Boat Launch GIS Layer (Maine GIS, 2021) and municipal property layer provided by the Town (Scarborough, 2024).
2. Asset locations chosen as the top of the boat ramp based on satellite imagery.

Table 2-4. Coastal Structures Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Structures Overtopped	44	47	52	58	66	68	69	74	80	85	85

Notes:

1. Asset information (location, area, etc.) from the Coastal Structures GIS Layer (Maine DACF, 2023a,b,) and the Prouts Neck Seawall and Dune Restoration Project (GEI, 2024).

2.3 Conservation and Recreation

Conservation and recreation assets include beaches, parks and open spaces, sand dunes, walking trails, and wetlands. Several of these assets are represented as polygon areas (as opposed to point locations), and, in some cases, a portion of the polygon area may experience flood inundation during typical tides for present-day sea levels. One example of this is wetlands. For these results, we summarized the area above present-day HAT that would likely to be inundated.

Several of these natural, coastal assets, such as beaches, dunes, and wetlands, would likely migrate inland over time with rising sea levels. For this study, we have provided a summary of the inundation area for the existing present-day extents of these resources.

A summary of the acreage inundated in each flood scenario for beaches, parks and open spaces, sand dunes, and wetlands are provided in Tables 2-5 through 2-8, respectively. A summary of the number of walking trails inundated in each scenario is provided in Table 2-9. More detail of the flood exposure of these assets is provided in Appendix A.

Table 2-5. Beach Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Area in Study
Area Inundated above HAT, acres	5	9	13	16	19	21	22	25	28	29	29

Notes:

1. Asset information (location, area, etc.) from the Beach Shoreline Types and Dry Beach Width GIS layers (Maine DACF, 2023c,d).
2. Approximate beach areas estimated using polyline boundaries.
3. Area inundated represents acres that would likely be inundated above present-day HAT.

Table 2-6. Parks and Open Spaces Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Area in Study
Area Inundated above HAT, acres	3	8	13	18	23	26	30	108	113	131	3,767

Notes:

1. Asset information (location, area, etc.) from the Protected Properties GIS layer, excluding marsh, municipal properties, and parking lots (Scarborough, 2024).
2. Area inundated represents acres that would likely be inundated above present-day HAT.

Table 2-7. Sand Dune Boundaries Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Area/ Number in Study
Area Inundated above HAT, acres	11	21	44	63	79	89	100	203	230	261	279
Number of Sand Dunes Impacted	7	7	7	9	9	10	11	12	12	12	12

Notes:

1. Asset information (location, area, etc.) from the Sand Dune Boundaries GIS layer (Maine DACF, 2024a). Area inundated represents acres that would likely be inundated above present-day HAT.
2. Number of sand dunes is based on the number independent polygons in the GIS layer.

Table 2-8. Wetlands Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Area in Study
Area Inundated above HAT, acres	228	434	564	661	734	805	861	1,073	1,204	1,403	5,051

Notes:

1. Asset information (location, area, etc.) from the National Wetlands Inventory (USFWS, 2024).
2. Area inundated represents acres that would likely be inundated above present-day HAT. This includes up to approximately 200 acres of Estuarine and Marine Wetland and Deepwater, where it may be acceptable to be inundated from coastal storm surge due to their ecological function.

Table 2-9. Walking Trails Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Length Inundated, miles	0.3	0.9	1.6	2.0	2.4	2.6	3.1	4.1	4.6	5.8	24.5
Number of Trail Systems Impacted	5	6	6	6	6	6	6	7	7	8	13

Notes:

1. Asset information (location, area, etc.) from the Walking Trails GIS layers (Scarborough, 2024).

2.4 Drainage Infrastructure

Drainage infrastructure assets included catch basins, culverts, dams, detention ponds, outfalls, and outlet control structures. A summary of drainage infrastructure assets inundated in each flood scenario

is provided in Table 2-10. An asset is considered flooded if part or all of the asset is located within the inundation zone, regardless of the elevation of portions of the asset. This study does not consider whether the size of the drainage asset is appropriate for present-day or future flood and flow scenarios, but instead identifies assets that would likely be inundated in one or more of the ten scenarios evaluated as part of this study. Dams were identified as overtopped or not. More detail of the flood exposure of these assets is provided in Appendix A.

Table 2-10. Drainage Infrastructure Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Catch Basins Inundated	12	27	43	62	75	86	97	168	227	296	3,282
Number of Culverts Inundated	6	17	28	52	77	111	133	193	218	290	2,628
Number of Dams Overtopped	1	1	1	1	1	2	2	2	3	3	4
Number of Detention Ponds Inundated	1	2	2	2	3	4	4	7	7	9	110
Number of Outfalls Inundated	30	38	50	57	59	73	78	92	102	119	683
Number of Outlet Control Structures Inundated	1	1	1	1	1	1	1	1	1	3	39

Notes:

1. Catch basins, culverts, detention ponds, outfalls, and outlet control structure GIS data from their associated layers in the Scarborough GIS Database (Scarborough, 2024).
2. Tidally influenced culverts were considered inundated if the surface at the road crossing would likely overtop.
3. Dams data from the Dams GIS Layer (MEMA, 2024a), LiDAR (USGS, 2020), and satellite imagery.

2.5 Public Safety

Assets in the Public Safety category included evacuation routes, fire hydrants, municipal safety (i.e., fire and rescue, public works, and utilities), Maine Department of Environmental Protection (DEP)-registered tanks, DEP remediation sites, streetlights, and wells. These assets were classified as “Public Safety assets” because if inundated, they could significantly harm the health and safety of the public who rely on them. Utility substations, hospitals, and police stations were also assessed, but were outside the area of coastal flood extents included in this study, and therefore, not included in the results.

Summary tables of the number of DEP-registered tanks, DEP remediation sites, hydrants, streetlights, and wells that would likely be inundated are provided in Tables 2-11, 2-12, 2-14, 2-15, and 2-17, respectively. A summary of the length of evacuation route roadways and number of routes that would likely be inundated for each flood scenario is provided in Table 2-13. A summary of the acreage of properties associated with municipal safety (i.e., Fire and Rescue, Public Works, and Utility) that would likely be inundated for the flood scenarios included in this study is provided in Table 2-15. More detail of the flood exposure of these assets is provided in Appendix A.

Table 2-11. DEP-Registered Tanks Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Tanks Inundated	-	-	-	-	-	-	-	-	1	1	58

Notes:

1. Asset information (location, area, etc.) from the DEP-Registered Tanks GIS layer (Maine DEP, 2019).

Table 2-12. DEP Remediation Sites Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Sites Inundated	2	2	2	2	2	3	3	3	3	4	28

Notes:

1. Asset information (location, area, etc.) from the DEP Remediation Sites GIS layer (Maine DEP, 2023) and the parcels GIS layer (Scarborough, 2024). The Maine DEP database specifies that the four identified remediation sites are closed and have a remedy in place. The location of the remedy in the parcel is not readily available. A remediation site may be partially inundated, but the location of the remedy or previous location of the contamination may be unaffected.

Table 2-13. Evacuation Routes Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Length Inundated, miles	0.0	0.3	0.6	0.7	0.9	0.9	1.4	2.4	2.7	3.5	38.2
Number of Evac. Routes Impacted	-	2	2	2	3	3	4	4	4	5	10

Notes:

1. Asset information (location, area, etc.) from Roads GIS layer (Scarborough, 2024) and the Maine Hurricane Evacuation Dashboard (MEMA, 2024b).

Table 2-14. Hydrants Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Hydrants Inundated	1	3	8	17	17	24	32	61	78	116	1,042

Notes:

1. Asset information (location, area, etc.) from the Hydrants GIS layer (Scarborough, 2024).

Table 2-15. Municipal Safety Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Area/ Number in Study
Area inundated above HAT, acres	-	-	-	0.1	0.8	2.0	2.9	8.0	12.7	14.6	129.4

Scenario	1	2	3	4	5	6	7	8	9	10	Area/ Number in Study
Number of Properties Impacted	-	-	-	1	2	2	2	2	2	2	12

Notes:

1. Asset information (location, area, etc.) from the municipally-owned Fire and Rescue, Public Works, and Utility asset features of the Protected Properties GIS layer (Scarborough, 2024).
2. Area inundated represents acres that would likely be inundated above present-day HAT.
3. Properties are listed as impacted if any portion of the parcel above present-day HAT would likely be inundated.

Table 2-16. Streetlights Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Streetlights Inundated	5	9	30	48	57	68	81	119	144	189	1,342

Notes:

1. Asset information (location, area, etc.) from the Streetlights GIS layer (Scarborough, 2024).

Table 2-17. Wells Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Wells Inundated	3	3	3	7	8	8	9	9	13	16	392

Notes:

1. Asset information (location, area, etc.) from the MGS Wells GIS layer (Maine DACF, 2024c).
2. The Water Well Information Law, passed in 1987, requires that drilling companies submit information on new water wells to MGS. Data on wells drilled prior to 1987 were collected by a survey of well drillers in the 1970s and through a voluntary well driller reporting program in the mid-1980s. The database of wells drilled prior to 1987 is likely incomplete, and results from this analysis should be considered approximate. The database includes 392 well locations for the Town of Scarborough. It has been our experience that some of the wells may not be appropriately located. Work on this project did not include verifying that the wells were appropriately located (i.e., within a parcel, near a structure, etc.).

2.6 Sewer Infrastructure

Sewer infrastructure assets included manholes, pump stations, septic tanks, and treatment plant facilities. If sewer infrastructure become inundated, there is a potential for buildings to temporarily lose access to sewer services, which poses a significant public health risk due to the potential for untreated sewage to back up into homes and business, exposing people to harmful bacteria, viruses, and parasites that can cause illness. Similar to a pump station failure, an inundated septic tank can become overwhelmed, leading to a reduced ability to properly treat sewage, potentially releasing untreated wastewater into the environment. Summaries of sewer infrastructure assets that would likely be inundated for each flood scenario are provided in Tables 2-18 through 2-21, respectively. Additionally, Table 2-19 summarizes the number of service connections that would likely be affected by inundated pump stations. More detail of the flood exposure of these assets is provided in Appendix A.

Table 2-18. Manholes Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Manholes Inundated	16	28	50	75	98	124	158	293	366	493	2,554

Notes:

1. Asset information (location, area, etc.) from the Manholes GIS layer (Scarborough, 2024).

Table 2-19. Pump Stations Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Stations Inundated	-	-	-	5	7	8	10	17	19	27	66
Number of Service Connections Affected	-	-	-	800	1,516	1,584	3,890	4,974	4,974	5,105	5,141

Notes:

1. Asset information (location, area, etc.) from the Pump Stations GIS layer (Scarborough, 2024) and field work conducted by GEI on Oct. 23, 2024 to refine critical elevations at several pump station facilities.

Table 2-20. Septic Tanks Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Parcels with Septic Tanks Impacted	165	224	278	311	338	368	384	460	513	626	3,634

Notes:

1. Septic tank GIS data from the Parcels, Structures, and Sanitary Sewer Connections GIS layers (Scarborough, 2024). Parcels with structures but without sanitary sewer connections were assumed to have one septic tank each. The results are approximate, as this assumption excludes parcels with more than one septic tank and parcels with both sanitary sewer connections and septic tanks and includes parcels with neither sanitary sewer connections nor septic tanks. Additionally, the locations of assumed septic tanks are not readily available. A parcel with a septic tank may be inundated, but the septic tank itself may be unaffected.
2. For parcels with assumed septic tanks that are located adjacent to tidally influenced areas, we assumed a parcel would be impacted if any portion of the parcel above present-day HAT would likely be inundated.

Table 2-21. Treatment Plant Facilities Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Facilities Impacted	-	-	-	-	-	-	-	-	-	11	17

Notes:

1. Treatment plant facilities GIS data from the structures GIS layer (Scarborough, 2024).

2.7 Transportation

Transportation assets included bridges, railroads, roads, and sidewalks. Electric vehicle charging stations were also assessed but were outside the area of coastal flood extents included in this study, and therefore, not included in the results. A summary of the number of bridges inundated in each scenario is provided in Table 2-22. Bridges were assumed to be inundated if the surface of the deck was lower in

elevation than the water surface. A summary of the acreage and number of parking lots inundated in each scenario is provided in Table 2-23. Summaries of the number of railroads, roads, and sidewalks, and the associated inundated length for each scenario are provided in Tables 2-24 through 2-27, respectively. More detail of the flood exposure of these assets is provided in Appendix A.

Table 2-22. Bridges Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Bridges Inundated	-	2	2	2	2	2	7	9	10	12	37

Notes:

1. Asset information (location, area, etc.) from the Bridges GIS layer (Maine DOT, 2021a), LiDAR (USGS, 2020), and satellite imagery.

Table 2-23. Parking Lots Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Area/ Number in Study
Area inundated above HAT, acres	-	0.1	1.5	2.9	3.6	4.0	4.4	5.2	5.4	7.6	12.6
Number of parking lots Impacted	-	1	2	2	2	2	2	2	3	4	4

Notes:

1. Asset information (location, area, etc.) from the Protected Properties GIS layer (Scarborough, 2024). This study does not include on-street parking nor parking lots not included in the Protected Properties GIS layer.
2. Area inundated represents acres that would likely be inundated above present-day HAT.
3. Parking lots are listed as impacted if any portion of the parcel above present-day HAT would likely be inundated.

Table 2-24. Railroads Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Length Inundated, miles	0.2	0.3	0.5	1.3	1.8	2.0	2.6	3.3	3.7	4.5	10.7
Number of Rail Lines Impacted	1	1	2	2	2	2	2	2	3	3	9

Notes:

1. Asset information (location, area, etc.) from the Railroads GIS layer (Maine DOT, 2021b).

Table 2-25. Public Roads Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Length Inundated, miles	0.5	1.2	2.7	4.1	5.4	6.5	8.2	14.6	18.5	25.1	194.5

Scenario	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Number of Roads Impacted	7	13	29	38	47	53	62	93	99	111	433

Notes:

1. Asset information (location, area, etc.) from the Roads GIS layer (Scarborough, 2024).

Table 2-26. Private Roads Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Length Inundated, miles	0.1	0.3	0.5	0.7	1.0	1.2	1.4	2.6	2.9	4.1	73.1
Number of Roads Impacted	5	8	12	16	19	22	28	39	41	56	409

Notes:

1. Asset information (location, area, etc.) from the Roads GIS layer (Scarborough, 2024).

Table 2-27. Sidewalks Flood Exposure Summary

Scenario	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Length Inundated, miles	0.1	0.2	0.3	0.3	0.4	0.5	0.7	1.1	1.6	2.6	31.6
Number of Sidewalks Impacted	2	2	2	3	6	8	9	13	15	18	119

Notes:

1. Asset information (location, area, etc.) from the Sidewalks GIS layer (Scarborough, 2024).

3.0 Conclusions

GEI conducted a coastal flood vulnerability study to evaluate risk of infrastructure and open spaces to flood inundation due to coastal storm surge and sea level rise (SLR) in the Town of Scarborough. The study evaluated present-day flood risk due to coastal storm surge as well as estimated flood risk in 2030, 2050, and 2100 due to sea level rise and storm surge.

The assets included in the study were based on available GIS data provided by the Town and publicly available data sources. Assets were reviewed and refined for this study with members from the Town. The work from this study will serve as a foundation for the next steps of this project, including asset prioritization and adaptation recommendations.

GEI appreciates the opportunity to participate in this important project for the Town. This work relied on the significant contributions of Town staff as well as use of Scarborough's comprehensive and remarkable GIS programming. The Town's establishment of such a strong GIS system is commendable and an excellent example for other towns in Maine.

4.0 Limitations

This memo presents the initial results of a flood vulnerability assessment for the Town of Scarborough. The results are based on readily available online information, published references, data provided by the Town of Scarborough, limited field observations conducted by GEI, as indicated, and our professional judgement. The purpose of this flood vulnerability assessment was to identify areas and infrastructure at risk of flood inundation. The numbers included in this study should be considered approximate. The results of this study should not be used to guide designs. We recommend site survey and site-specific design be completed for any infrastructure projects the Town performs.

The GIS data included in this study represent a snapshot in time of locations and configurations for assets, such as roads, parcels, and building footprints. The compiled data was clipped to the Town's boundaries. Elevations of asset data are based on LiDAR (USGS, 2020), proposed roadway elevations from the Route 1 and Route 9 adaptation project, and as-built survey near the Prouts Neck Beach Club (GEI, 2024). Additionally, we did not evaluate the potential for inland migration of natural resources over time, such as beaches, dunes, and wetlands.

The flood extents are based on static water elevations (i.e., "bathtub models"). The sea level rise values used were based on information from the MCC (2024). Tidal datums are based on data from NOAA stations 8418445 and 8418150 (NOAA, 2024a,b). Coastal storm event stillwater elevations included in this study are based on the FEMA FIS for Cumberland County (FEMA, 2024).

Actual tides, storm surge elevations, and rates of sea level rise will vary from what has been presented in this report. The flood extents presented in this report do not include the effects of wave action. Wave runup and overtopping on coastal-located infrastructure would likely increase the flood extents and may contribute to damage of infrastructure. Additionally, tidal transparency was assumed throughout the Scarborough Marsh. Flood risk due to precipitation and rainfall runoff were not evaluated as part of this study. Flood extents in this report may overestimate the tidal flood extents for "sunny day" (i.e., no rainfall runoff) conditions but underestimate conditions during coincident tidal and precipitation storm events. Because the methods, procedures, and assumptions used to develop the analysis are approximate, the results should only be used as guidance.

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

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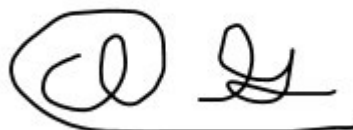
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Sincerely,

GEI CONSULTANTS, INC.



Leila Pike, P.E.
Project Manager

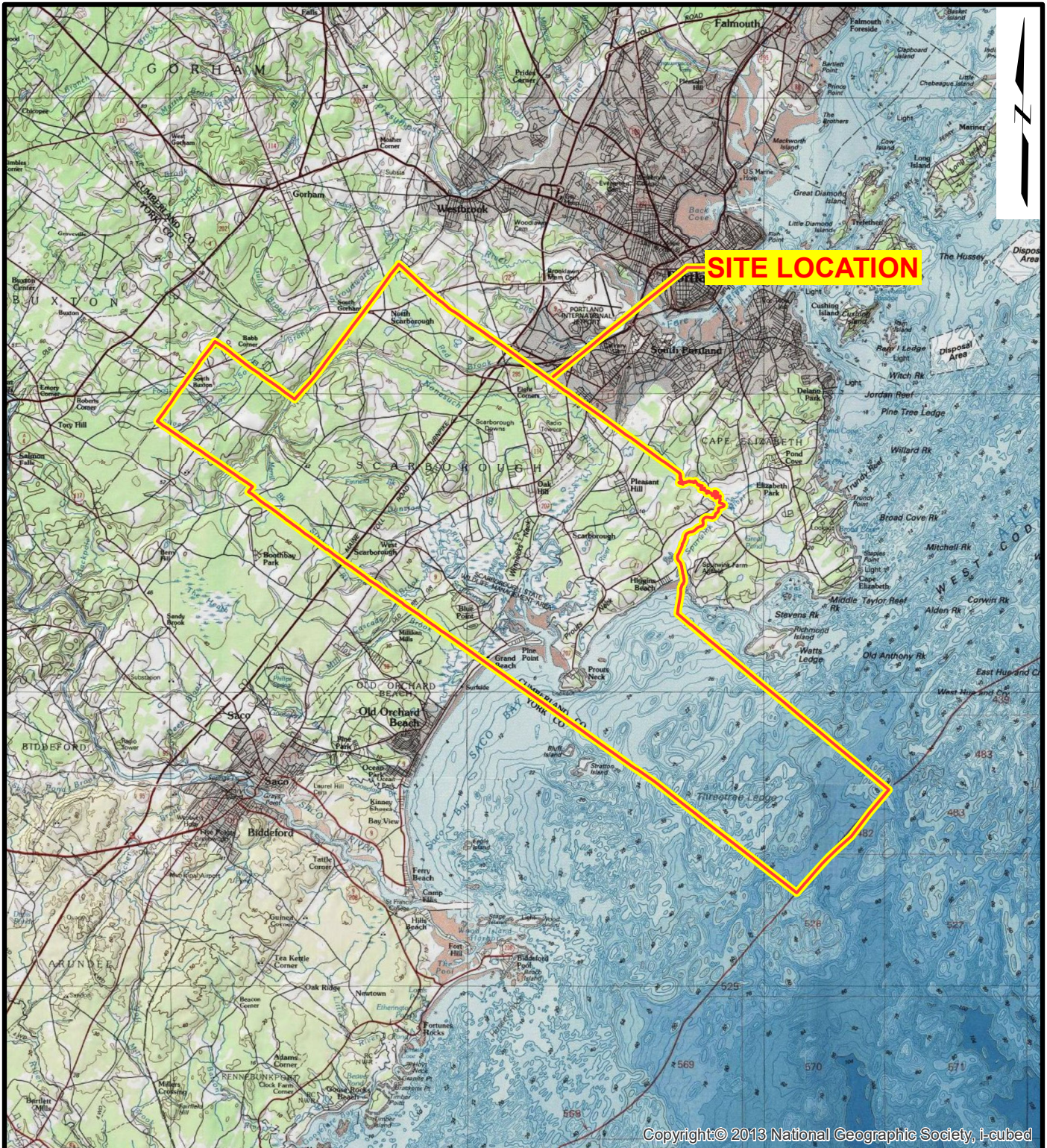


Ilan Gasko, E.I.
Staff Professional

Attachments

Figure 1 Site Location
Appendix A Flood Exposure Summaries

IG/LAP:bdp
\\geiconsultants.com\data\Data_Storage\Working\SCARBOROUGH ME, TOWN OF\2403961 Scarborough Vulnerability Assessment\01_ADMIN\Results
Memo\Scarborough Flood Vulnerability Analysis Results_2025-03-27.docx



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Feet

Flood Vulnerability Assessment
Scarborough, Maine

Town of Scarborough
Scarborough, Maine



Project 2403961

SITE LOCATION

March 2025

Fig. 1

Appendix A Flood Exposure Summaries

Buildings and Parcels Flood Exposure Summary

Buildings

Table A.1. Buildings Flood Exposure

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Buildings Impacted	61	112	220	321	422	499	588	924	1,091	1,369	12,853

Notes: Asset information (location, area, etc.) from the Structures GIS layer (Scarborough, 2024). The data includes a variety of structures, including but not limited to, residential, commercial, industrial, and small ancillary structures. We did not differentiate in our analysis between these structure types nor did our analysis include information on habitability, dwelling units versus offices, or daytime versus nighttime use.

Parcels

Table A.2. Parcels Flood Exposure

Parcels	1	2	3	4	5	6	7	8	9	10	Area/ Number in Study
Number of Parcels Impacted	360	506	715	887	988	1,106	1,209	1,553	1,763	2,070	9,670
Area of Parcels Inundated above HAT, acres	288	557	780	987	1,163	1,323	1,479	2,087	2,452	3,248	27,374

Notes: Asset information (location, area, etc.) from the Parcels GIS layer (Scarborough, 2024). Area inundated represents acres inundated above present-day HAT. Parcels are considered impacted if any portion of the parcel above present-day HAT would likely be inundated.

Coastal Infrastructure Flood Exposure Summary

Boat Launches

Table A.3. Boat Launches Flood Exposure

Boat Launch Name	1	2	3	4	5	6	7	8	9	10
<i>Number of Boat Launches Inundated</i>	4	5	5	6	6	6	6	6	6	6
Clay Pitts	X	X	X	X	X	X	X	X	X	X
Ferry Beach	X	X	X	X	X	X	X	X	X	X
Pine Point Co-Op	X	X	X	X	X	X	X	X	X	X
Scarborough Marsh Audubon Center	X	X	X	X	X	X	X	X	X	X
Seavey Landing	-	X	X	X	X	X	X	X	X	X
Dunstan Landing	-	-	-	X	X	X	X	X	X	X

Notes: Asset information (location, area, etc.) from the Boat Launch GIS Layer (Maine GIS, 2021) and municipal property layer provided by the Town (Scarborough, 2024). Asset locations chosen as the top of the boat ramp based on satellite imagery. X indicates the asset would likely be inundated. Six boat launches were included in this study.

Coastal Structures

Table A.4. Coastal Structures Flood Exposure

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Structures Overtopped	44	47	52	58	66	68	69	74	80	85	85

Notes: Asset information (location, area, etc.) from the Coastal Structures GIS Layer (Maine DACF, 2023a,b) and the Prouts Neck Seawall and Dune Restoration Project (GEI, 2024).

Conservation and Recreation Flood Exposure Summary

Beaches

Table A.5. Beach Flood Exposure (acres inundated)

Beach Name	1	2	3	4	5	6	7	8	9	10	Area in Study
<i>Sum of Area Inundated above HAT, acres</i>	5	9	13	16	19	21	22	25	28	29	29
Higgins	1.2	2.4	3.2	3.4	3.6	3.6	3.7	3.7	3.7	3.7	3.7
Pine Point	1.2	1.7	2.2	2.6	3.0	3.2	3.4	3.9	4.3	4.4	4.4
Scarborough	1.1	2.1	3.3	5.1	6.0	6.5	6.9	7.8	8.3	8.7	8.7
East Grand	1.0	1.4	1.8	2.2	2.4	2.5	2.7	3.4	4.2	4.3	4.3
Western	0.4	0.9	1.3	1.9	2.9	3.6	4.2	5.4	5.9	6.4	6.4
Ferry	0.3	0.5	0.7	0.9	1.1	1.1	1.1	1.2	1.2	1.2	1.2

Notes: Asset information (location, area, etc.) from the Beach Shoreline Types and Dry Beach Width GIS layers (Maine DACF, 2023c,d). Approximate beach areas estimated using polyline boundaries. Area inundated represents acres that would likely be inundated above present-day HAT. East Grand Beach is also known as Grand Beach, or the western portion of Pine Point Beach.

Parks and Open Spaces

Table A.6. Parks and Open Spaces Flood Exposure (acres inundated)

Parks and Open Space Names	1	2	3	4	5	6	7	8	9	10	Area in Study
<i>Sum of Area Inundated above HAT, acres</i>	3	8	13	18	23	26	30	108	113	131	3,767
Willey Park	1.0	2.8	4.7	6.7	7.6	8.1	9.0	10.3	11.2	13.3	15.1
Eastern Trail	0.9	1.9	3.0	3.6	4.9	6.2	7.6	9.5	10.8	14.2	22.7
Scarborough Memorial Cemetery	0.4	0.8	1.1	1.5	1.8	2.0	2.3	2.9	3.3	4.4	65.2
Scarborough River Wildlife Sanctuary	0.4	0.6	0.8	0.9	1.1	1.2	1.2	1.5	1.6	2.0	47.8
Sea Mist Landing	0.2	0.4	0.6	0.8	0.9	1.1	1.2	1.6	1.7	1.8	1.8
Peterson Park	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1	2.3	11.4
Open Space Lots	0.1	0.5	1.8	2.4	3.0	3.1	3.2	3.2	3.2	3.2	3.2
Private Conservation Easement	0.1	0.3	0.4	0.6	0.8	1.0	1.2	1.6	2.3	6.5	138.9
Higgins Creek	0.1	0.2	0.4	0.6	0.7	0.7	0.8	0.9	1.0	1.1	1.1
Springbrook Park	-	0.1	0.1	0.2	0.2	0.3	0.3	1.4	2.5	6.8	9.3
Historic Hunnewell House	-	-	-	0.2	0.3	0.7	1.3	1.7	1.7	1.7	1.7
Baywoods	-	-	-	-	0.7	0.7	0.8	0.8	0.8	0.8	0.8
Massacre Pond	-	-	-	-	-	-	-	71.7	71.7	71.7	71.7
Snowberry Park	-	-	-	-	-	-	-	0.3	0.3	0.3	0.3
Piper Shores	-	-	-	-	-	-	-	0.1	0.1	0.5	0.8
Evergreen Farms	-	-	-	-	-	-	-	-	-	0.1	0.6

Notes: Asset information (location, area, etc.) from the Protected Properties GIS layer, excluding marsh, municipal properties, and parking lots (Scarborough, 2024). Area inundated represents acres that would likely be inundated above present-day HAT.

Sand Dunes

Table A.7. Sand Dune Boundaries Flood Exposure (acres inundated)

Sand Dune Name	Sand Dune Type	1	2	3	4	5	6	7	8	9	10	Area/ Number in Study
<i>Sum of Area Inundated above HAT, acres</i>		11	21	44	63	79	89	100	203	230	261	279
<i>Number of Sand Dunes Impacted</i>		7	7	7	9	9	10	11	12	12	12	12
Pine Point, landward	D2	5.6	11.2	27.2	38.3	45.7	52.4	59.4	88.1	105.6	123.3	135.5
Ferry & Western Beach, landward	D2	3.7	6.2	8.0	9.1	12.9	13.5	14.3	21.5	22.3	23.6	24.3
Higgins, landward	D2	0.7	1.9	5.2	8.9	10.8	11.5	11.9	12.4	12.6	13.8	16.0
Pine Point, seaward	D1	0.2	0.7	1.0	1.5	1.8	2.0	2.3	18.5	22.5	25.0	25.1
Higgins, seaward	D1	0.1	0.9	1.6	2.9	4.0	4.7	5.4	6.3	6.5	6.7	6.7
Ferry & Western Beach, seaward	D1	0.1	0.3	0.7	1.7	3.1	3.7	4.4	7.2	8.9	11.6	12.1
Scarborough Beach, seaward	D1	0.1	0.2	0.2	0.3	0.5	0.6	0.7	12.4	14.4	19.2	21.0
East Point, Prout's Neck, seaward	D1	-	-	-	0.1	0.1	0.2	0.3	0.6	0.7	1.0	1.1
Western Cove, Prout's Neck	D1	-	-	-	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
East Point, Prout's Neck, landward	D2	-	-	-	-	-	0.4	0.6	0.8	0.9	0.9	1.0
East Point, Prout's Neck, just North	D1	-	-	-	-	-	-	0.1	0.1	0.2	0.3	0.3
Scarborough Beach, landward	D2	-	-	-	-	-	-	-	34.4	34.9	35.5	35.5

Notes: Asset information (location, area, etc.) from the Sand Dune Boundaries GIS layer (Maine DACF, 2024a). D1 stands for Frontal Dune, D2 stands for Back Dune. Area inundated represents acres that would likely be inundated above present-day HAT. Number of sand dunes is based on the number independent polygons in the GIS layer.

Wetlands

Table A.8. Wetlands Flood Exposure (acres inundated)

Wetland Type	1	2	3	4	5	6	7	8	9	10	Area in Study
<i>Area Inundated above HAT, acres</i>	228	434	564	661	734	805	861	1,073	1,204	1,403	5,051
Freshwater Forested/ Shrub Wetland	156.9	322.2	414.8	470.7	516.7	549.9	584.5	675.8	730.3	881.1	1,535.1
Estuarine and Marine Wetland	37.9	54.4	67.0	77.3	83.8	89.0	92.4	148.1	152.2	156.6	159.3
Freshwater Emergent Wetland	16.6	33.5	51.9	71.5	87.8	102.0	117.2	147.6	162.4	193.2	221.0
Freshwater Pond	1.7	2.2	2.6	2.9	3.1	18.4	18.7	44.0	62.1	62.3	62.5
Riverine	8.4	9.4	9.8	16.4	16.9	17.4	17.7	19.8	21.5	22.6	23.5
Estuarine and Marine Deepwater	6.5	12.0	18.3	21.9	25.2	28.1	30.4	37.4	43.9	55.1	108.5
Lake	-	-	-	-	-	-	-	-	32.0	32.1	32.1
Other	-	-	-	-	-	-	-	-	-	0.4	0.5

Notes: Asset information (location, area, etc.) from the National Wetlands Inventory (USFWS, 2024). Area inundated represents acres that would likely be inundated above present-day HAT. This includes up to approximately 200 acres of Estuarine and Marine Wetland and Deepwater, where it may be acceptable to be inundated from coastal storm surge due to their ecological function.

Walking Trails

Table A.9. Walking Trails Flood Exposure (length inundated, feet)

Trail Name	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
<i>Length Inundated, miles</i>	0.3	0.9	1.6	2.0	2.4	2.6	3.1	4.1	4.6	5.8	24.5
<i>Number of Trail Systems Impacted</i>	5	6	6	6	6	6	6	7	7	8	13
Wiley Recreation Area	750	1,112	1,662	2,609	3,008	3,306	3,591	4,223	5,103	6,584	8,414
Eastern Trail - Off Road	610	2,027	3,394	3,631	4,676	5,460	6,689	8,136	8,817	11,597	22,057
Eastern Trail - On Road	128	1,457	3,026	3,506	3,872	4,134	5,039	7,133	8,224	8,578	38,807
Libby River Farm	137	194	331	543	747	854	1,079	1,484	1,571	1,817	6,832
Peterson Field	12	13	15	16	18	18	32	100	130	171	6,162
Wildlife Sanctuary	-	29	51	69	89	105	115	134	143	804	2,505
Pleasant Hill Preserve Trails	-	-	-	-	-	-	-	300	488	984	9,565
Eastern Trail - Proposed	-	-	-	-	-	-	-	-	-	66	2,289

Notes: Asset information (location, area, etc.) from the Walking Trails GIS layers (Scarborough, 2024). Length inundated represents feet inundated.

Drainage Infrastructure Flood Exposure Summary

Table A.10. Drainage Infrastructure Flood Exposure

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Catch Basins Inundated	12	27	43	62	75	86	97	168	227	296	3,282
Number of Culverts Inundated	6	17	28	52	77	111	133	193	218	290	2,628
Number of Detention Ponds Inundated	1	2	2	2	3	4	4	7	7	9	110
Number of Outfalls Inundated	30	38	50	57	59	73	78	92	102	119	683
Number of Outlet Control Structures Inundated	1	1	1	1	1	1	1	1	1	3	39

Notes: Catch basins, culverts, detention Pond, outfalls, and outlet control structures GIS data from their associated layers in the Scarborough GIS Database (Scarborough, 2024). Tidally influenced culverts were considered inundated if the surface at the road crossing would likely overtop.

Dams

Table A.11. Dams Flood Exposure

Dam Name	1	2	3	4	5	6	7	8	9	10
<i>Number of Dams Overtopped</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>3</i>	<i>3</i>
Foxwells Bridge Brook Dam	X	X	X	X	X	X	X	X	X	X
Willow Brook Dam	-	-	-	-	-	X	X	X	X	X
Mill Brook Dam	-	-	-	-	-	-	-	-	X	X

Notes: Asset information (location, area, etc.) from the Dams GIS Layer (MEMA, 2024a), LiDAR (USGS, 2020), and satellite imagery. X indicates the asset would likely be overtopped. Four dams were included in this study.

Public Safety Flood Exposure Summary

DEP-Registered Tanks

Table A.12. DEP-Registered Tanks Flood Exposure

Owner	Location	Registration #	1	2	3	4	5	6	7	8	9	10
Scarborough Public Works Dept	20 Washington Ave	12022	-	-	-	-	-	-	-	-	X	X

Notes: Asset information (location, area, etc.) from the DEP-Registered Tanks GIS layer (Maine DEP, 2019). X indicates the asset would likely be inundated. 58 registered tanks were included in this study.

DEP Remediation Sites

Table A.13. DEP Remediation Sites Flood Exposure

Remediation Site Name	Location	1	2	3	4	5	6	7	8	9	10
<i>Number of Sites Impacted</i>		2	2	2	2	2	3	3	3	3	4
Route 207 Property	Route 207	X	X	X	X	X	X	X	X	X	X
Conroy's Garage	3 East Grand Ave	X	X	X	X	X	X	X	X	X	X
Southgate House	577 U.S. Route 1	-	-	-	-	-	X	X	X	X	X
Carsons	433 U.S. Route 1	-	-	-	-	-	-	-	-	-	X

Notes: Asset information (location, area, etc.) from the DEP Remediation Sites GIS layer (Maine DEP, 2023) and the parcels GIS layer (Scarborough, 2024). The Maine DEP database specifies that the four identified remediation sites are closed and have a remedy in place. The location of the remedy in the parcel is not readily available. A remediation site may be partially inundated, but the location of the remedy or previous location of the contamination may be unaffected. X indicates the asset would likely be at least partially inundated. 28 remediation sites were included in this study.

Evacuation Routes

Table A.14. Evacuation Routes Flood Exposure (length inundated, miles)

Road Name	1	2	3	4	5	6	7	8	9	10	Dry Length
<i>Length Inundated, miles</i>	-	0.3	0.6	0.7	0.9	0.9	1.4	2.4	2.7	3.5	38.2
<i>Number of Evac Routes Impacted</i>	-	2	2	2	3	3	4	4	4	5	10
Black Point Rd	-	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8	1.1	2.9
Pine Point Rd	-	0.1	0.3	0.3	0.3	0.3	0.5	1.0	1.0	1.1	3.1
Spurwink Rd	-	-	-	-	<0.1	<0.1	<0.1	0.1	0.1	0.4	3.0
Route 1	-	-	-	-	-	-	0.2	0.6	0.8	0.9	5.4
Gorham Rd	-	-	-	-	-	-	-	-	-	0.1	5.4

Notes: Asset information (location, area, etc.) from Roads GIS layer (Scarborough, 2024) and the Maine Hurricane Evacuation Dashboard (MEMA, 2024b).

Hydrants

Table A.15. Hydrants Flood Exposure

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Hydrants Inundated	1	3	8	17	17	24	32	61	78	116	1,042

Notes: Asset information (location, area, etc.) from Hydrants GIS layer (Scarborough, 2024).

Municipal Safety

Table A.16. Municipal Safety Flood Exposure (acres inundated)

Property Name	1	2	3	4	5	6	7	8	9	10	Area/ Number in Study
<i>Area Inundated above HAT, acres</i>	-	-	-	0.1	0.8	2.0	2.9	8.0	12.7	14.6	129.4
<i>Number of Properties Impacted</i>	-	-	-	1	2	2	2	2	2	2	12
Scarborough Fire Department	-	-	-	0.1	0.1	0.3	0.4	0.7	0.7	0.7	0.7
Scarborough Public Works	-	-	-	-	0.7	1.7	2.5	7.3	12.0	13.9	14.8

Notes: Asset information (location, area, etc.) from the municipally owned Fire and Rescue, Public Works, and Utility asset features of the Protected Properties GIS layer (Scarborough, 2024). Area inundated represents acres that would likely be inundated above present-day HAT. Properties are listed as impacted if any portion of the parcel above present-day HAT would likely be inundated.

Streetlights

Table A.17. Streetlights Flood Exposure

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Streetlights Inundated	5	9	30	48	57	68	81	119	144	189	1,342

Notes: Asset information (location, area, etc.) from the Streetlights GIS layer (Scarborough, 2024).

Wells

Table A.18. Wells Flood Exposure

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Wells Inundated	3	3	3	7	8	8	9	9	13	16	392

Notes: Asset information (location, area, etc.) from the MGS Wells GIS layer (Maine DACF, 2024c). The Water Well Information Law, passed in 1987, requires that drilling companies submit information on new water wells to MGS. Data on wells drilled prior to 1987 were collected by a survey of well drillers in the 1970s and through a voluntary well driller reporting program in the mid-1980s. The database of wells drilled prior to 1987 is likely incomplete, and results from this analysis should be considered approximate. The database includes 392 well locations for the Town of Scarborough. It has been our experience that some of the wells may not be appropriately located. Work on this project did not include verifying that the wells were appropriately located (i.e., within a parcel, near a structure, etc.).

Sewer Infrastructure Flood Exposure Summary

Manholes

Table A.19. Manholes Flood Exposure

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Manholes Inundated	16	28	50	75	98	124	158	293	366	493	2,554

Notes: Asset information (location, area, etc.) from the Manholes GIS layer (Scarborough, 2024).

Pump Stations

Table A.20. Pump Stations Flood Exposure

Pump Station Name	No. of Direct Service Connections	No. of Network Service Connections	1	2	3	4	5	6	7	8	9	10
Number of Stations Inundated			0	0	0	5	7	8	10	17	19	27
Number of Direct Service Connections Affected			-	-	-	776	1,184	1,252	2,043	2,733	3,233	3,483
Number of Network Service Connections Affected			-	-	-	800	1,516	1,584	3,890	4,974	4,974	5,105
Private-11	10	10	-	-	-	X	X	X	X	X	X	X
Public-7	287	287	-	-	-	X	X	X	X	X	X	X
Public-1	479	503	-	-	-	X	X	X	X	X	X	X
PS-60	0	0	-	-	-	X	X	X	X	X	X	X
PS-61	0	0	-	-	-	X	X	X	X	X	X	X
Public-15	85	145	-	-	-	-	X	X	X	X	X	X
Public-3	323	571	-	-	-	-	X	X	X	X	X	X
Private-7	68	68	-	-	-	-	-	X	X	X	X	X
Public-10	44	44	-	-	-	-	-	-	X	X	X	X
Public-11	747	3,549	-	-	-	-	-	-	X	X	X	X
Private-31	52	52	-	-	-	-	-	-	-	X	X	X
Private-22	9	9	-	-	-	-	-	-	-	X	X	X
Public-16	43	43	-	-	-	-	-	-	-	X	X	X
Public-21	148	148	-	-	-	-	-	-	-	X	X	X
Public-12	4	4	-	-	-	-	-	-	-	X	X	X
Public-2	172	1,324	-	-	-	-	-	-	-	X	X	X
Public-6	262	4,974	-	-	-	-	-	-	-	X	X	X
Public-9	440	684	-	-	-	-	-	-	-	-	X	X
Public-13	60	60	-	-	-	-	-	-	-	-	X	X
Private-30	19	19	-	-	-	-	-	-	-	-	-	X
Private-17	29	29	-	-	-	-	-	-	-	-	-	X
PS-33	0	0	-	-	-	-	-	-	-	-	-	X
Public-8	131	131	-	-	-	-	-	-	-	-	-	X
Public-14	15	19	-	-	-	-	-	-	-	-	-	X
Private-19	17	17	-	-	-	-	-	-	-	-	-	X
Private-10	26	26	-	-	-	-	-	-	-	-	-	X
Private-3	13	13	-	-	-	-	-	-	-	-	-	X

Notes: Pump station GIS data from the Pump Stations GIS layer (Scarborough, 2024) and field work conducted by GEI on Oct. 23, 2024. Field work consisted of point survey of critical elevations at select public pump stations to refine flood risk. Direct service connections are sewer connections that directly feed into a given pump station. Network service connections include all service connections that eventually feed into a downstream station. X indicates the asset would likely be at least partially inundated. 66 pump stations and 5,141 service connections were included in this study.

Septic Tanks

Table A.21. Septic Tanks Flood Exposure

Scenario	1	2	3	4	5	6	7	8	9	10	Number in Study
Number of Parcels Impacted Above HAT	165	224	278	311	338	368	384	460	513	626	3,634

Notes: Septic tank GIS data from the Parcels, Structures, and Sanitary Sewer Connections GIS layers (Scarborough, 2024). Parcels with structures but without sanitary sewer connections were assumed to have one septic tank each. The results are approximate, as this assumption excludes parcels with more than one septic tank and parcels with both sanitary sewer connections and septic tanks and includes parcels with neither sanitary sewer connections nor septic tanks. Additionally, the locations of assumed septic tanks are not readily available. A parcel with a septic tank may be inundated, but the septic tank itself may be unaffected. For parcels with assumed septic tanks that are located adjacent to tidally influenced areas, we assumed a parcel would be impacted if any portion of the parcel above present-day HAT would likely be inundated.

Treatment Plant

Table A.22. Treatment Plant Facilities Flood Exposure

Facility Name	1	2	3	4	5	6	7	8	9	10
<i>Number of Facilities Impacted</i>	-	-	-	-	-	-	-	-	-	11
SSD Aeration Train 3	-	-	-	-	-	-	-	-	-	X
SSD Aeration Trains 1 and 2	-	-	-	-	-	-	-	-	-	X
SSD Blower Building	-	-	-	-	-	-	-	-	-	X
SSD Bulk Material Storage	-	-	-	-	-	-	-	-	-	X
SSD Compost Building	-	-	-	-	-	-	-	-	-	X
SSD Secondary Clarifier 1	-	-	-	-	-	-	-	-	-	X
SSD Secondary Clarifier 2	-	-	-	-	-	-	-	-	-	X
SSD Secondary Clarifier 3	-	-	-	-	-	-	-	-	-	X
SSD Sludge Processing Building	-	-	-	-	-	-	-	-	-	X
SSD Sludge Tank 3	-	-	-	-	-	-	-	-	-	X
SSD Sludge Tanks 1 and 2	-	-	-	-	-	-	-	-	-	X

Notes: Treatment plant facilities GIS data from the structures GIS layer (Scarborough, 2024). X indicates the asset would likely experience inundation. 17 facilities were included in this study.

Transportation Flood Exposure Summary

Bridges

Table A.23. Bridges Flood Exposure

Bridge Name	1	2	3	4	5	6	7	8	9	10
<i>Number of Bridges Inundated</i>	-	2	2	2	2	2	7	9	10	12
Town Line	-	X	X	X	X	X	X	X	X	X
Black Point Road	-	X	X	X	X	X	X	X	X	X
Center Payne Road	-	-	-	-	-	-	X	X	X	X
Causeway	-	-	-	-	-	-	X	X	X	X
Dunstan River	-	-	-	-	-	-	X	X	X	X
New River	-	-	-	-	-	-	X	X	X	X
CSX Railroad	-	-	-	-	-	-	X	X	X	X
Phillips	-	-	-	-	-	-	-	X	X	X
CSX Railroad	-	-	-	-	-	-	-	X	X	X
Spurwink	-	-	-	-	-	-	-	-	X	X
Pleasant Hill	-	-	-	-	-	-	-	-	-	X
Eastern Trail	-	-	-	-	-	-	-	-	-	X

Notes. Asset information (location, area, etc.) from the Bridges GIS layer (Maine DOT, 2021a), LiDAR (USGS, 2020), and satellite imagery. X indicates the asset would likely be at least partially inundated. 37 bridges were included in this study.

Public Parking Lots

Table A.24. Public Parking Lots Flood Exposure

Parking Lot Names	1	2	3	4	5	6	7	8	9	10	Area in Study
<i>Sum of Area Inundated above HAT, acres</i>	-	0.1	1.5	2.9	3.6	4.0	4.4	5.2	5.4	7.6	12.6
Ferry Beach Parking	-	0.1	0.4	1.2	1.7	1.9	2.1	2.2	2.3	2.3	2.3
Hurd Park Overflow Parking	-	-	0.6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Hurd Park Parking	-	-	0.5	0.9	1.1	1.3	1.5	2.2	2.2	2.2	2.2
Scarborough Public Schools Bus Lot	-	-	-	-	-	-	-	-	0.1	2.1	6.0
Higgins Beach Parking	-	-	-	-	-	-	-	-	-	0.2	1.3

Notes: Asset information (location, area, etc.) from the Protected Properties GIS layer (Scarborough, 2024). Area inundated represents acres that would likely be inundated above present-day HAT. The Scarborough Public Schools Bus Lot and Higgins Beach Parking do not include on-street parking nor parking lots not included in the Protected Properties GIS layer.

Railroads

Table A.25: Railroads Flood Exposure (length inundated, miles)

Rail Line Name	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Length Inundated, miles	0.2	0.3	0.5	1.3	1.8	2.0	2.6	3.3	3.7	4.5	10.7
Number of Rail Lines Impacted	1	1	2	2	2	2	2	2	3	3	9
Pan Am, Freight Main	0.2	0.3	0.4	1.1	1.5	1.6	2.2	2.7	2.9	3.4	5.7
Rigby Running Track	-	-	0.1	0.2	0.3	0.4	0.5	0.6	0.7	1.0	3.0
ON Pan Am, Freight Main	-	-	-	-	-	-	-	-	0.1	0.1	0.9

Notes. Asset information (location, area, etc.) from the Railroads GIS layer (Maine DOT, 2021b).

Roads

Table A.26: Public Roads Flood Exposure (length inundated, feet)

Road Name	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
<i>Length Inundated, miles</i>	<i>0.4</i>	<i>1.0</i>	<i>2.5</i>	<i>3.8</i>	<i>5.1</i>	<i>6.2</i>	<i>7.9</i>	<i>14.1</i>	<i>17.8</i>	<i>24.4</i>	<i>194.5</i>
<i>Number of Roads Impacted</i>	<i>6</i>	<i>12</i>	<i>28</i>	<i>37</i>	<i>46</i>	<i>52</i>	<i>61</i>	<i>91</i>	<i>97</i>	<i>109</i>	<i>433</i>
Snow Canning Rd	922	1,115	1,213	1,297	1,319	1,335	1,348	1,382	1,432	1,621	1,621
Sawyer St	656	802	887	949	979	998	1,021	1,079	1,114	1,204	2,670
King St	241	375	758	1,618	1,659	1,678	1,699	2,955	2,955	2,955	2,955
Payne Rd	230	584	1,182	1,292	1,482	1,600	1,715	2,045	2,349	2,574	24,773
Champion St	160	246	402	468	468	468	468	468	468	468	468
Winnocks Neck Rd	22	162	502	1,485	2,592	2,882	3,056	4,385	6,002	6,248	7,670
Black Point Rd	-	1,106	1,697	2,171	2,707	3,043	3,375	7,903	8,888	12,103	27,779
Pine Point Rd	-	573	1,749	1,898	2,091	2,253	3,382	5,725	5,879	6,198	17,026
Old Neck Rd	-	241	459	827	1,194	1,521	2,386	3,451	3,823	3,823	3,823
Jones Creek Dr	-	181	853	1,286	1,698	1,989	2,246	2,246	2,246	2,246	2,246
Milliken Rd	-	70	121	174	246	307	360	403	435	666	1,452
Avenue 6	-	5	23	217	223	223	223	223	223	223	223
Clay Pits Rd	-	-	662	1,046	1,291	1,738	1,994	2,378	2,543	2,785	3,354
Starbird Rd	-	-	538	626	685	726	782	907	925	1,009	1,064
Vesper St	-	-	411	616	660	691	705	737	756	930	930
Avenue 4	-	-	288	372	372	372	372	372	372	372	372
Bayview Ave	-	-	285	360	603	692	783	884	934	1,373	1,451
Avenue 5	-	-	254	433	492	543	594	781	815	815	815
Avenue 3	-	-	236	266	359	410	413	413	413	413	413
Avenue 1	-	-	206	296	325	361	374	602	674	674	674
Avenue 2	-	-	206	245	363	382	396	435	435	435	435
Avenue 7	-	-	169	190	217	228	228	228	228	228	228
Tasker Ave	-	-	112	154	253	295	315	332	332	332	332
Shipwreck Rd	-	-	73	363	496	547	547	547	547	547	547
Sargent Rd	-	-	73	105	147	179	228	387	447	646	1,949
Seavey Landing Rd	-	-	31	74	108	136	192	450	499	612	2,743
Kent St	-	-	19	76	76	76	76	76	76	76	76
Woodside Dr	-	-	6	37	83	137	181	275	355	622	1,442
Partridge Ln	-	-	-	404	883	963	1,146	1,370	1,370	1,370	1,370
Driftwood Ln	-	-	-	233	470	525	555	625	680	1,036	1,778
Scottow Hill Rd	-	-	-	149	208	250	299	367	413	553	5,007
Morning St	-	-	-	147	461	510	556	585	603	770	868
Baywoods Dr	-	-	-	76	224	436	711	960	960	960	960

Flood Vulnerability Analysis Results
Flood Vulnerability Assessment
Scarborough, Maine
March 27, 2025

Road Name	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Melbourne Dr	-	-	-	69	341	395	531	657	657	657	657
Woodrock Dr	-	-	-	53	83	114	218	437	620	838	838
Ferry Rd	-	-	-	39	80	99	120	275	613	1,622	1,851
Dunstan Landing Rd	-	-	-	6	32	50	73	136	181	291	1,757
Hawthorn Cir	-	-	-	-	229	382	615	615	615	615	615
Southgate Rd	-	-	-	-	178	261	496	822	1,096	1,909	1,909
Ocean Ave	-	-	-	-	130	201	263	364	430	1,346	2,703
Cedar Cir	-	-	-	-	125	321	448	590	590	590	590
Old County Rd	-	-	-	-	94	131	210	1,377	2,538	2,676	2,676
Spurwink Rd	-	-	-	-	93	158	220	332	595	2,100	15,977
Fern Cir	-	-	-	-	70	179	559	616	616	616	616
Hemlock Cir	-	-	-	-	16	500	596	596	596	596	596
Manson Libby Rd	-	-	-	-	7	245	329	542	693	2,804	3,951
Nonesuch Cove Rd	-	-	-	-	-	561	697	828	912	1,219	1,616
Tall Pines Rd	-	-	-	-	-	167	841	3,020	3,139	3,219	3,869
Coulthard Farms Rd	-	-	-	-	-	151	254	651	814	1,116	3,166
E Grand Ave	-	-	-	-	-	146	985	2,585	3,337	3,337	3,337
Oak St	-	-	-	-	-	127	212	372	388	388	388
Beech Ridge Rd	-	-	-	-	-	23	143	382	482	946	24,249
Route 1	-	-	-	-	-	-	777	3,341	4,126	5,750	33,084
Spruce Cir	-	-	-	-	-	-	135	588	588	588	588
Granite St	-	-	-	-	-	-	108	278	278	278	278
Ashton St	-	-	-	-	-	-	59	94	146	364	694
Bliss St	-	-	-	-	-	-	40	236	315	315	315
Dunefield Ln	-	-	-	-	-	-	38	393	433	433	433
Pine St	-	-	-	-	-	-	37	165	306	306	306
Thomas Dr	-	-	-	-	-	-	31	1,180	1,815	1,815	1,815
Beach St	-	-	-	-	-	-	18	86	321	321	321
Bayberry Ln	-	-	-	-	-	-	-	833	1,082	1,082	1,082
Fogg Rd	-	-	-	-	-	-	-	672	1,122	2,589	8,101
Hampton Cir	-	-	-	-	-	-	-	671	1,012	1,012	1,012
Coach Lantern Ln E	-	-	-	-	-	-	-	557	773	773	773
Wynmoor Dr	-	-	-	-	-	-	-	493	1,185	1,768	1,768
Coach Lantern Ln W	-	-	-	-	-	-	-	416	832	832	832
Dover St	-	-	-	-	-	-	-	271	287	287	287
Rhonda Dr	-	-	-	-	-	-	-	269	774	774	774
Pinewood Cir	-	-	-	-	-	-	-	255	419	761	927
Old Mill Rd	-	-	-	-	-	-	-	223	944	967	2,676
Grandview Dr	-	-	-	-	-	-	-	220	363	472	1,279
Phinneas Ln	-	-	-	-	-	-	-	195	599	971	1,053

Flood Vulnerability Analysis Results
Flood Vulnerability Assessment
Scarborough, Maine
March 27, 2025

Road Name	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Hackmatack Dr	-	-	-	-	-	-	-	141	267	1,042	3,419
Washington Ave	-	-	-	-	-	-	-	138	186	1,250	5,226
Pleasant Hill Rd	-	-	-	-	-	-	-	137	267	497	17,491
River Sands Dr	-	-	-	-	-	-	-	133	204	1,347	1,347
Eleventh St	-	-	-	-	-	-	-	132	256	275	275
Pintail Point Dr	-	-	-	-	-	-	-	127	706	1,309	1,545
Wood Ln	-	-	-	-	-	-	-	127	234	362	362
Ninth St	-	-	-	-	-	-	-	122	249	249	249
Old Colony Ln	-	-	-	-	-	-	-	112	253	394	2,002
Clearwater Dr	-	-	-	-	-	-	-	110	934	3,554	4,440
Roundabout Dr	-	-	-	-	-	-	-	89	140	300	1,401
Ross Rd	-	-	-	-	-	-	-	75	211	381	4,412
Sea Rose Ln	-	-	-	-	-	-	-	67	166	338	338
Bay St	-	-	-	-	-	-	-	38	309	323	323
Kimball Dr	-	-	-	-	-	-	-	26	263	263	263
Iris Dr	-	-	-	-	-	-	-	25	93	291	801
Sandy Point Rd	-	-	-	-	-	-	-	12	241	626	1,224
Rose Hill Way	-	-	-	-	-	-	-	11	65	175	270
Pillsbury Dr	-	-	-	-	-	-	-	-	830	1,079	1,918
Catherine Dr	-	-	-	-	-	-	-	-	726	963	963
Willowdale Rd	-	-	-	-	-	-	-	-	360	453	3,112
Greenwood Ave	-	-	-	-	-	-	-	-	190	356	1,973
Horseshoe Dr	-	-	-	-	-	-	-	-	172	1,659	3,225
Bornheimer Pl	-	-	-	-	-	-	-	-	92	588	2,730
Eastern Road Marsh	-	-	-	-	-	-	-	-	-	1,031	11,209
Prospector Ln	-	-	-	-	-	-	-	-	-	241	1,231
Tenney Ln	-	-	-	-	-	-	-	-	-	132	4,070
Val Ter	-	-	-	-	-	-	-	-	-	745	839
Whistler Lndg	-	-	-	-	-	-	-	-	-	352	2,006
Woodview Dr	-	-	-	-	-	-	-	-	-	657	1,231
Gorham Rd	-	-	-	-	-	-	-	-	-	318	29,463
Indian Woods Rd	-	-	-	-	-	-	-	-	-	395	2,397
Kingfisher Dr	-	-	-	-	-	-	-	-	-	169	955
Lincoln Ave	-	-	-	-	-	-	-	-	-	507	2,068
Pearl St	-	-	-	-	-	-	-	-	-	161	1,107
Plover Ln	-	-	-	-	-	-	-	-	-	6	276

Notes: Asset information (location, area, etc.) from the Roads GIS layer (Scarborough, 2024). Segments of U.S. Route 1 through the marsh and U.S. Route 9 through the marsh near Cascade Brook are not included in this table because this study used proposed roadway elevations for these roads for adaptation projects currently underway. The roads in their existing conditions currently experience flood inundation.

Table A.27. Private Roads Flood Exposure (length inundated, feet)

Road Name	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
<i>Length Inundated, miles</i>	<i>0.2</i>	<i>0.4</i>	<i>0.7</i>	<i>1.0</i>	<i>1.3</i>	<i>1.5</i>	<i>1.7</i>	<i>3.2</i>	<i>3.5</i>	<i>4.7</i>	<i>73.1</i>
<i>Number of Roads Impacted</i>	<i>6</i>	<i>9</i>	<i>13</i>	<i>17</i>	<i>20</i>	<i>23</i>	<i>29</i>	<i>41</i>	<i>43</i>	<i>58</i>	<i>409</i>
Black Rock Rd	478	727	1,067	1,429	1,561	1,585	1,653	2,111	2,382	2,382	2,382
Wiley Way	196	352	632	720	763	774	786	820	853	876	876
Virdap St	150	220	299	308	308	308	308	308	308	308	308
Osprey Ln	123	368	446	470	560	560	560	560	560	560	560
Blaine Ave	28	48	88	194	204	208	214	255	281	281	281
Harmons Is	27	366	514	673	708	754	791	880	1,010	1,281	1,623
Tide Mill Ln	-	41	109	185	221	262	292	363	436	477	477
Lane By The Sea	-	21	45	59	71	174	323	323	323	323	323
Hunnewell Ave	-	2	98	226	274	303	343	408	452	531	828
Ferry Rd	-	-	113	205	205	205	205	205	205	205	1,851
White Sands Ln	-	-	80	172	302	302	302	302	302	302	302
Sea Meadows Ln	-	-	35	64	92	111	133	178	213	213	213
Whispering Surf Ln	-	-	7	91	157	208	215	215	215	215	215
Roundabout Dr	-	-	-	198	409	465	521	545	545	545	1,401
River Bend Ln	-	-	-	140	376	414	414	414	414	414	414
Canterbury Ln	-	-	-	91	193	223	297	535	750	1,055	1,055
Chase Deer Ln	-	-	-	76	295	309	330	377	377	377	377
Higgins Creek Rd	-	-	-	-	52	145	222	293	334	438	838
Birch Ln	-	-	-	-	28	77	142	225	264	434	1,469
Avenue B	-	-	-	-	23	29	35	47	55	86	375
Reef Ln	-	-	-	-	-	256	426	426	426	426	426
Running Tide Dr	-	-	-	-	-	69	197	788	788	788	788
Winnocks Neck Sq	-	-	-	-	-	62	94	181	235	235	235
Longwave Pl	-	-	-	-	-	-	100	142	200	200	200
Emily Way	-	-	-	-	-	-	86	214	214	214	214
Gravel Rd	-	-	-	-	-	-	47	159	251	357	868
Cattail Ln	-	-	-	-	-	-	45	188	188	188	188
Moonlight Dr	-	-	-	-	-	-	39	254	254	254	254
Claudia Way	-	-	-	-	-	-	12	486	486	486	486
Massacre Ln	-	-	-	-	-	-	-	1,098	1,098	1,098	1,098
Garrison Ln	-	-	-	-	-	-	-	893	893	893	893
Saccarappa Ln	-	-	-	-	-	-	-	886	918	918	918
Arrowhead Ln	-	-	-	-	-	-	-	339	339	339	339
Moors Point Rd	-	-	-	-	-	-	-	269	500	500	500
Hurdle Fence Rd	-	-	-	-	-	-	-	246	287	299	299

Flood Vulnerability Analysis Results
Flood Vulnerability Assessment
Scarborough, Maine
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Road Name	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
Hummingbird Ln	-	-	-	-	-	-	-	232	232	232	232
Trostle Ln	-	-	-	-	-	-	-	218	218	218	218
Smithers Way	-	-	-	-	-	-	-	206	226	544	593
Tenth St	-	-	-	-	-	-	-	73	147	167	167
Autumn Ln	-	-	-	-	-	-	-	60	174	265	265
Wildrose Ln	-	-	-	-	-	-	-	51	82	210	1,965
Harmon St	-	-	-	-	-	-	-	-	139	458	458
Sprague Way	-	-	-	-	-	-	-	-	21	101	1,487
Stone Rd	-	-	-	-	-	-	-	-	-	652	1,027
Cloutier Ln	-	-	-	-	-	-	-	-	-	607	986
Alden Ln	-	-	-	-	-	-	-	-	-	557	581
Country Club Rd	-	-	-	-	-	-	-	-	-	537	692
Oriole Way	-	-	-	-	-	-	-	-	-	324	412
Campus Dr	-	-	-	-	-	-	-	-	-	320	3,819
Verrier Ln	-	-	-	-	-	-	-	-	-	306	306
Manson Libby Rd	-	-	-	-	-	-	-	-	-	288	3,951
Cottage Ln	-	-	-	-	-	-	-	-	-	271	271
Pinewood Cir	-	-	-	-	-	-	-	-	-	167	927
Summerfield Ln	-	-	-	-	-	-	-	-	-	157	1,165
Oceanwood Dr	-	-	-	-	-	-	-	-	-	93	1,577
Strawberry Fields Ln	-	-	-	-	-	-	-	-	-	50	1,487
Sandpiper Cove Rd	-	-	-	-	-	-	-	-	-	9	863
Cedarbrook Dr	-	-	-	-	-	-	-	-	-	7	673

Notes: Asset information (location, area, etc.) from the Roads GIS layer (Scarborough, 2024).

Sidewalks

Table A.28. Sidewalks Flood Exposure Summary (length inundated, feet)

Adjacent Road Name	1	2	3	4	5	6	7	8	9	10	Length/ Number in Study
<i>Length Inundated, miles</i>	0.1	0.2	0.3	0.3	0.4	0.5	0.7	1.1	1.6	2.6	31.6
<i>Number of Sidewalks Impacted</i>	2	2	2	3	6	8	9	13	15	18	119
Pine Point Rd (Clambake)	478	547	547	547	547	547	547	547	547	547	547
Pine Point Rd (Snowcannng Rd to East Grand Ave)	128	572	865	934	948	948	948	948	948	948	948
Pine Point Rd	-	-	-	10	150	328	391	594	594	594	831
Ocean Ave	-	-	-	-	112	184	258	355	420	1,280	1,928
Bayview Ave	-	-	-	-	66	204	272	381	438	880	920
US Route 1 (Anjons)	-	-	-	-	42	98	98	98	98	98	98
East Grand Ave	-	-	-	-	-	180	1,101	2,589	3,112	3,112	3,112
US Route 1 (Marsh)	-	-	-	-	-	39	73	73	73	73	73
Coulthard Farms Rd	-	-	-	-	-	-	1	136	389	707	2,762
Phinneas Ln	-	-	-	-	-	-	-	178	614	930	1,085
King St	-	-	-	-	-	-	-	130	130	130	130
Bornheimer Pl	-	-	-	-	-	-	-	18	121	625	2,712
Pine Point Rd (Eastern Trail to Holly St)	-	-	-	-	-	-	-	15	65	199	7,413
Clearwater Dr	-	-	-	-	-	-	-	-	669	3,067	4,036
Woodview Dr	-	-	-	-	-	-	-	-	15	253	253
Val Ter	-	-	-	-	-	-	-	-	-	259	429
Grandview Dr	-	-	-	-	-	-	-	-	-	101	935
Tenney Ln	-	-	-	-	-	-	-	-	-	58	3,419

Notes: Asset information (location, area, etc.) from the Sidewalks GIS layer (Scarborough, 2024).