APPENDIX A: STUDY AREA MAPS

Figure A1. Figure A1 Bluff Resilience Case Study Locations - Casco Bay Maine
Description: This map shows the locations CCSWCD has selected for case studies for its work on the State-led "Building Resiliency Along Maine's Bluff Coastline" project. Other project partners include Maine Geological Survey, Maine Dept. of Agriculture, Conservation, and Forestry, and the University of Maine (Orono). Bustins is one of four CCSWCD site locations.

Figure A2. Bustins Island Overview
Description: This map provides an overview of drainage patterns on Bustins Island as well as the selected Study sites (1-11). It also shows coastal bluff stability classifications created by the Maine Geological Survey. The drainage delineations were derived from 2m LiDAR elevation data using ArcGIS hydrology tools. Please note that the outputs are approximations and required manual adjustment by CCSWCD in some cases due to human modification of drainage patterns.

Figure A3. Case Study sites
Description: This map shows a "zoomed in" view of the data described in Figure A2, with additional topographic and hydrologic information. The additional hydrologic information includes drainage flow lines, as derived from Lidar.

Figure A4. Soils
Description: Information provided in this figure sourced from Maine Geologic Survey, Open-File No. 99-83 1999

Figure A5. Bustins Island Public Safety Map
Description: Map includes parcel information and local landmarks for reference purposes.

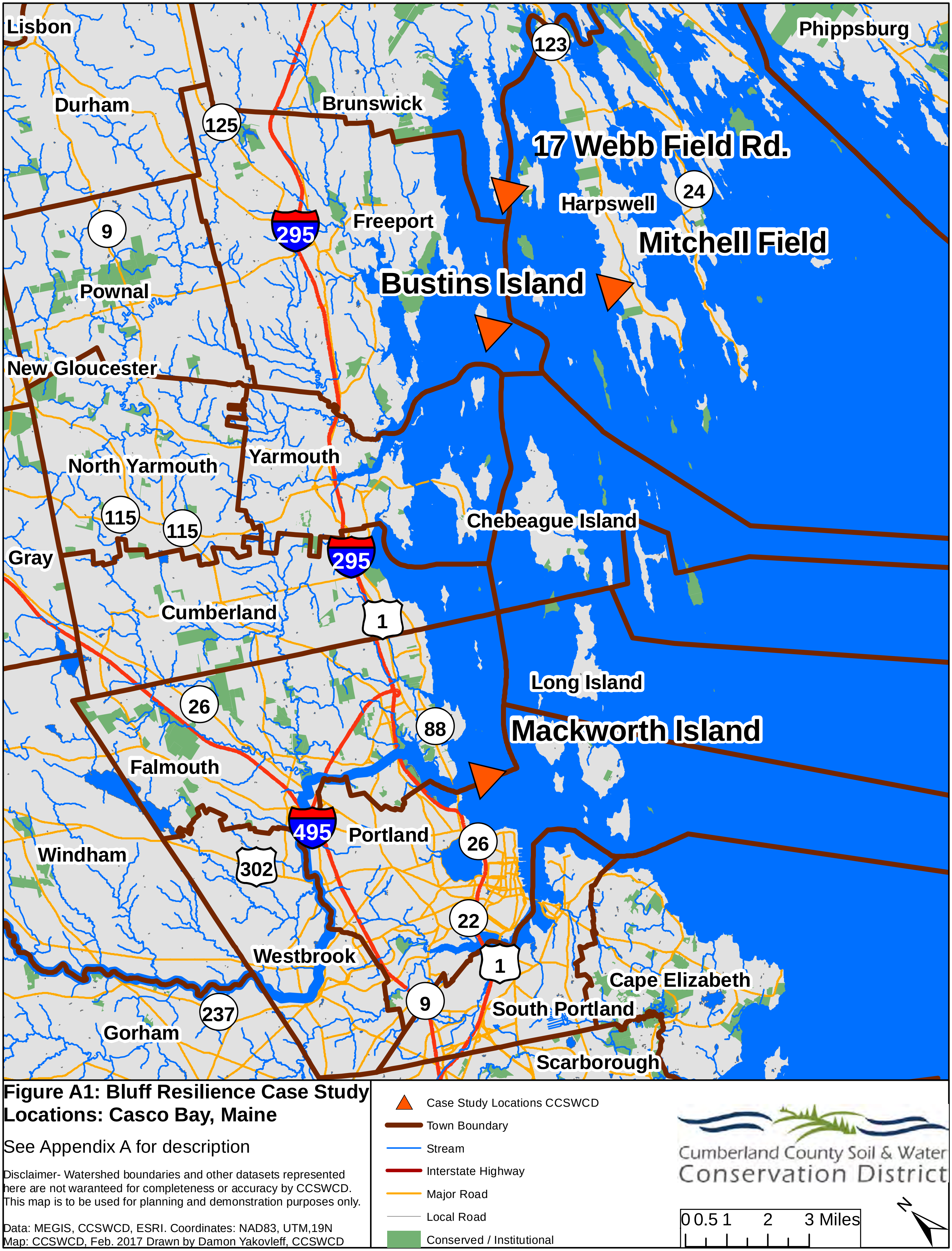


Figure A1: Bluff Resilience Case Study Locations: Casco Bay, Maine

See Appendix A for description

Disclaimer- Watershed boundaries and other datasets represented here are not waranteed for completeness or accuracy by CCSWCD. This map is to be used for planning and demonstration purposes only.

Data: MEGIS, CCSWCD, ESRI. Coordinates: NAD83, UTM,19N
Map: CCSWCD, Feb. 2017 Drawn by Damon Yakovleff, CCSWCD

Figure A2: Bustins Island Overview

See Appendix A for description

Disclaimer- Datasets represented here are not waranteed for completeness or accuracy by CCSWCD. This map is to be used for planning and demonstration purposes only.

Data: MEGIS, CCSWCD, ESRI, MGS.
Coordinates: NAD83, UTM Zone19N
Map: CCSWCD, May 2017
Drawn by Damon Yakovleff, CCSWCD

Bustins Sites
Sub-Watershed (Acres)
Stable
Unstable
Highly Unstable
Local Road

N

Cumberland County Soil & Water Conservation District

1 inch = 333 feet

0 0.05 0.1 0.2 Miles

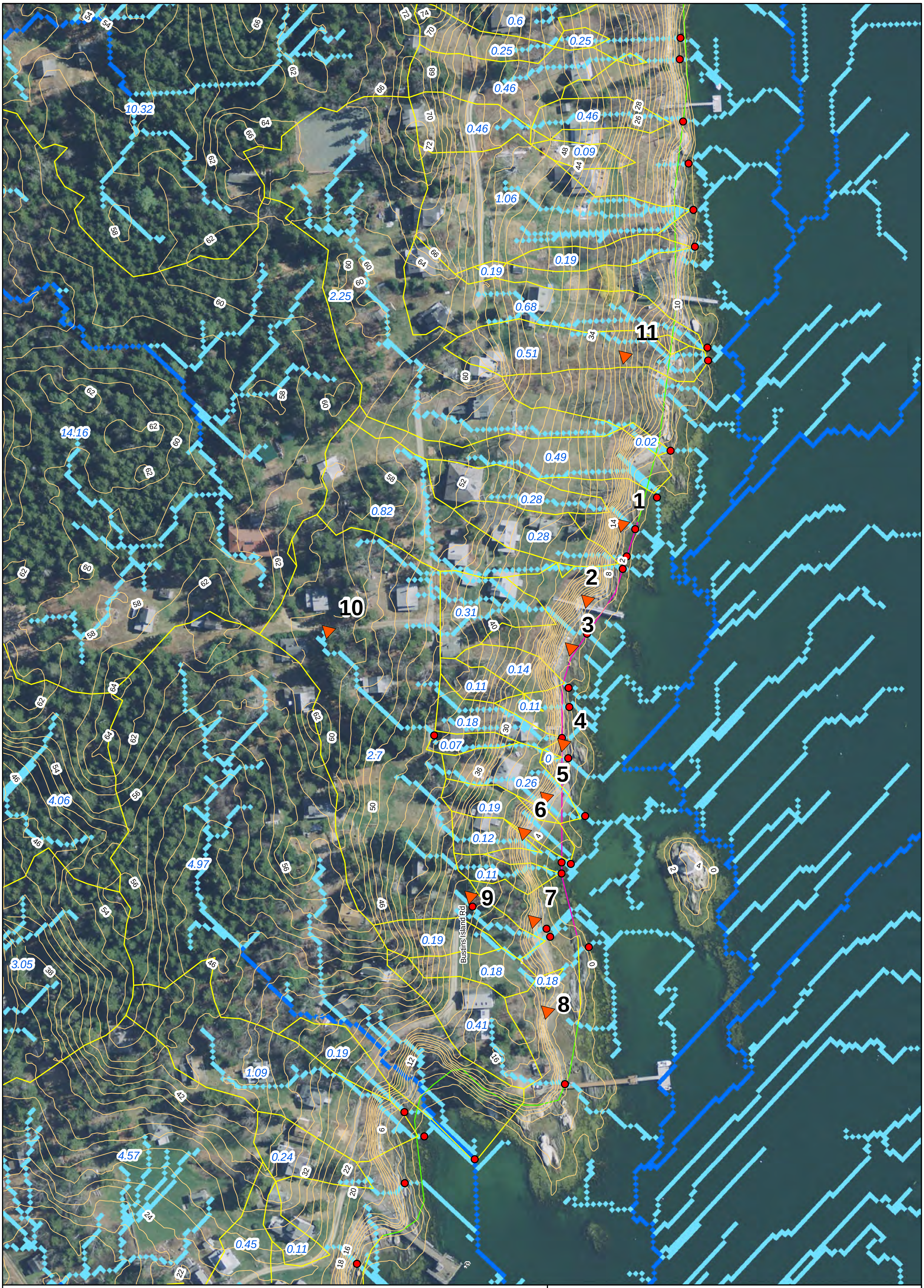


Figure A3: Case Study Sites

See Appendix A for description

Disclaimer- Datasets represented here are not waranteed for completeness or accuracy by CCSWCD. This map is to be used for planning and demonstration purposes only.

Data: MEGIS, CCSWCD, ESRI. MGS
Coordinates: NAD83, UTM Zone19N
Map: CCSWCD, May, 2017
Drawn by Damon Yakovleff, CCSWCD

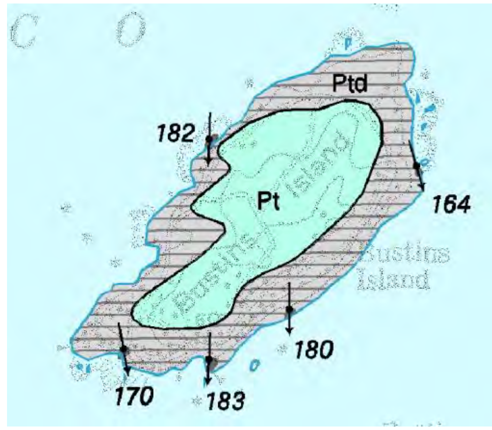
- Bustins Sites
- 2 ft Contours
- Stable
- Unstable
- Highly Unstable
- Local Road
- Sheet Flow
- Minor Drainage
- Major Drainage
- Sub-Watershed (Acres)
- Pour Point

N

Cumberland County Soil & Water Conservation District

1 inch = 133 feet

0 40 80 160 240 320 400 Feet



af — **Artificial fill** - Includes landfills, highway and railroad embankments, and dredge spoil areas. These units are mapped only where they are resolvable using the contour lines on the map, or where they define the limits of wetland units. Minor artificial fill is present in virtually all developed areas of the quadrangle.

Ha — **Stream alluvium** - Sand, silt, gravel, and organic material. Deposited on flood plains of modern streams.

Hms — **Marine shoreline deposits** - Sand to gravel beaches.

Hw — **Fresh-water wetlands** - Muck, peat, silt, and sand. Poorly drained areas, often with standing water.

Hwsm — **Salt marsh** - Peat, muck, silt, and clay. Coastal marsh, subject to tidal flooding. Thin, non-commercial peat layers are present atop a mineral substrate consisting of estuarine sands and muds.

Pmn — **Marine nearshore deposits** - Pleistocene gravel sand and mud deposited as a result of wave activity in nearshore or shallow-marine environments; not associated with beach morphology.

Pms — **Marine shoreline** - Pleistocene beach and dune sands deposited during regressive phase of marine submergence. Beach morphology is poorly preserved, but sand and gravel are present along the ridge crest.

Pp — **Presumpscot Formation** - Massive to laminated silty clays with rare dropstones and occasional shelly horizons, which overlie rock and till exposures, and are interbedded with and overlie end moraines and marine fan deposits; includes sand deposited as a distal unit of submarine fans.

Pem — **End moraines** - Linear ridges consisting of bedded sand and gravel interbedded with Presumpscot Formation silty clays and overlain by till on the ice proximal face of the moraine.

Pemmb - Merrill Brook end moraine
$Pemfg_x$ - Frost Gully end moraine 1 to 2
Pemwh - Winston Hill end moraine
Pemgp - Goose Point end moraine
Pemfp - Flying Point end moraine

Pmf — **Submarine outwash fans** - Thick sand and gravel accumulations formed at the mouth of subglacial tunnels at Pleistocene ice margins. The sand and gravel is interbedded with and overlain by Presumpscot Formation clays at the distal edges of the fans, and interlayered with and overlain by tills at their ice-contact faces. Each fan, or group of fans has been assigned a unique geographical name, listed below, together with the quadrangle in which the deposit is located:

Pmfph - Pleasant Hill marine fan
Pmfhm - Hedgehog Mountain marine fan
Pmfml - Mast Landing marine fan
Pmfbp - Bunganuc Point marine fan
$Pmfwh_x$ - Winston Hill marine fan 1 to 2
Pmffp - Flying Point marine fan

The correlations of these marine fan deposits and the end moraines are shown in Weddle (1994).

Pt — **Till** - Gravelly to bouldery, sandy matrixed diamicton.

Ptd — **Thin drift areas** - Areas with less than ten feet of drift covering bedrock. Till overlies bedrock on hillslopes and ridge crests; Presumpscot Formation silty clays are present in depressions; and nearshore deposits overlie till, Presumpscot Formation, and bedrock on hillslopes and at the base of these slopes. Small rock outcrops, and areas of numerous small outcrops are shown as gray areas.

Contact - Boundary between map units. Dashed were very approximate.

Bedrock exposures

135 135 — **Striations** - Observations made at dot. Number indicates azimuth of ice-flow direction. Flags indicate older trends. Multiple-striae sites on Harpswell Neck are shown with range of trends.

End moraine crests.

Scarps.

Mapped and inferred ice marginal positions.

Areas where original topography is disturbed by excavation (chiefly gravel pits).

10,150±450 (F) — **Marine fossil locality.**

USES OF SURFICIAL GEOLOGY MAPS

A surficial geology map shows all the loose materials such as till (commonly called hardpan), sand and gravel, or clay, which overlie solid ledge (bedrock). Bedrock outcrops and areas of abundant bedrock outcrops are shown on the map, but varieties of the bedrock are not distinguished (refer to bedrock geology map). Most of the surficial materials are deposits formed by glacial and deglacial processes during the last stage of continental glaciation, which began about 25,000 years ago. The remainder of the surficial deposits are the products of postglacial geologic processes, such as river floodplains, or are attributed to human activity, such as fill or other land-modifying features.

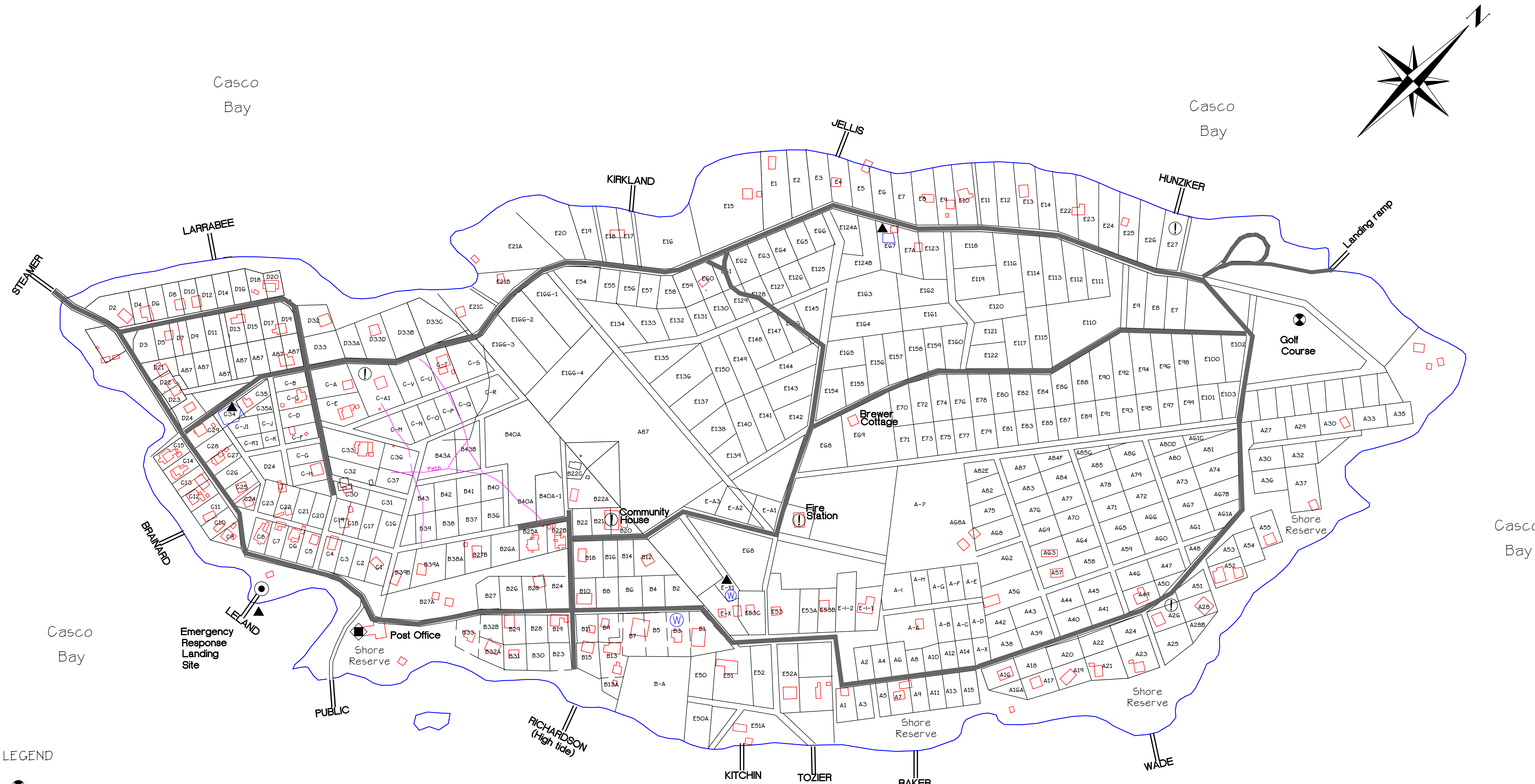
The map shows the areal distribution of the different types of glacial features, deposits, and landforms as described in the map explanation. Features such as striations and moraines can be used to reconstruct the movement and position of the glacier and its margin, especially as the ice sheet melted. Other ancient features include shorelines and deposits of glacial lakes or the glacial sea, now long gone from the state. This glacial geologic history of the quadrangle is useful to the larger understanding of past earth climate, and how our region of the world underwent recent geologically significant climatic and environmental changes. We may then be able to use this knowledge in anticipation of future similar changes for long-term planning efforts, such as coastal development or waste disposal.

Surficial geology maps are often best used in conjunction with related maps such as surficial materials maps or significant sand and gravel aquifer maps for anyone wanting to know what lies beneath the land surface. For example, these maps may aid in the search for water supplies, or economically important deposits such as sand and gravel for aggregate or clay for bricks or pottery. Environmental issues such as the location of a suitable landfill site or the possible spread of contaminants are directly related to surficial geology. Construction projects such as locating new roads, excavating foundations, or siting new homes may be better planned with a good knowledge of the surficial geology of the site. Refer to the list of related publications below.

OTHER SOURCES OF INFORMATION

1. Weddle, T. K., 1999, Surficial geology of the Freeport 7.5-minute quadrangle, Cumberland County, Maine: Maine Geological Survey, Open-File Report 99-114, 11 p.
2. Weddle, T. K., 1999, Surficial materials of the Freeport quadrangle, Maine: Maine Geological Survey, Open-File Map 99-66.
3. Neil, C. D., 1999, Significant sand and gravel aquifers of the Freeport quadrangle, Maine: Maine Geological Survey, Open-File Map 99-29.
4. Thompson, W. B., 1979, Surficial geology handbook for coastal Maine: Maine Geological Survey, 68 p. (out of print)
5. Thompson, W. B., and Borns, H. W., Jr., 1985, Surficial geologic map of Maine: Maine Geological Survey, scale 1:500,000.
6. Thompson, W. B., Crossen, K. J., Borns, H. W., Jr., and Andersen, B. G., 1989, Glaciomarine deltas of Maine and their relation to late Pleistocene-Holocene crustal movements, *in* Anderson, W. A., and Borns, H. W., Jr. (eds.), Neotectonics of Maine: Maine Geological Survey, Bulletin 40, p. 43-67.

Information provided in this figure sourced from Maine Geologic Survey, Open-File No. 99-83 1999



LEGEND

- Helicopter site
- Building location (approximate)
- Dry hydrant
- Fire pump
- Fire alarm
- Public safety room
- Dock
- Well
- Road suitable for motor vehicles

NOTES

1) Building locations and topographical features are approximate, based on 1978 photogrammetry by the James Sewall Co. of Old Town. All other features are based on mapping with a Trimble Pro-XL Global Positioning System (GPS), under conditions specified by the manufacturer for sub-meter accuracy.

2) Lot lines shown hereon are approximate, and are intended solely for the purpose of parcel identification.

Public Safety Map
of
Bustins Island Freeport, Maine

made for
Bustins Island
Village Corporation
Bustins Island Maine 04013

Job #051
Book #GPS
Scale: 1" = 150'
Date: 09/05/06

Island Surveys
125 Spinney Mill Road Arrowsic, ME 04530