Wood Environment & Infrastructure Solutions, Inc.
511 Congress Street, Suite 200
Portland, ME 04101, USA
T: +1 (207) 775-5401
www.woodplc.com

25 November 2019

Project Number: 3611191238

Kathleen Leyden
Director, Maine Coastal Program
32 Blossom Lane
Augusta, ME. 04333-0021

Subject: **Island Road Vulnerability Assessment, South Thomaston, Maine**
Penobscot Bay Working Waterfront Resiliency Analysis
State of Maine, Department of Marine Resources

Wood Environment & Infrastructure Solutions, Inc. (Wood) is pleased to provide the Maine Department of Marine Resources (DMR) this report on the assessment of vulnerability and recommendations for improved resilience along Island Road in South Thomaston, Maine (Town). This report is part of Wood's assessment of active working waterfront access sites in nine other communities included in DMR's Penobscot Bay Working Waterfront Resiliency Analysis project. Reports on the other nine working waterfront sites are provided under separate cover. Our work was performed in general accordance with the terms and conditions included in Wood's proposal dated 1 March 2019.

1.0 INTRODUCTION

Wood's original scope of work for DMR's Penobscot Bay Working Waterfront Resiliency Analysis Project included an assessment of the causeway between Spruce Head and Spruce Head Island in South Thomaston, Maine relative to vulnerability to flooding under various flood and sea level rise (SLR) scenarios. At the request of the Town, DMR requested that Wood alter the scope of work to accommodate an evaluation of the vulnerability of Island Road which extends between Spruce Head and causeway to Spruce Head Island (**Figure 1**). The focus of the evaluation includes:

Area A: A low-lying stretch of Island Road just east of Village Road to Hall's Point Road; and

Area B: A segment of Island Road between Seal Cove Road and Elwell Point Road; this segment includes a low-lying stretch of Island Road near the entrance to Point View Road and a portion of Island Road which may be realigned near a parking near the entrance of Seal Cove Road.

Over the past several years, the Town has observed road hazards associated with inundation and icing of Island Road, primarily in the two low-lying focus areas. In addition to public safety concerns, Island Road provides the only egress between the mainland and Spruce Head Island, and loss of access could severely impact island commerce which includes lobster fishing, processing cooperatives, restaurants and other businesses. Commerce on Spruce Island, the 7th largest Maine port for lobster and fish processing/sales, supports an estimated 114 jobs and 16 million dollars of gross annual revenue.

Given the importance of maintaining access to Spruce Island, the Town seeks to make improvements to Island Road and has been awarded a $330,000 grant from the Northern Border Regional Commission (NBRC) to improve an 800-ft section of the road that is in poor condition. Recognizing the proximity of Island Road to the coastline, the Town has requested that Wood evaluate the vulnerability of the road to storm and tidal flooding, and to provide recommendations for improved resilience. The Town intends to incorporate the findings of the vulnerability assessment and resilience measures into the road improvement project to the extent feasible.

2.0 SCOPE OF WORK

To meet the Town's need for an evaluation of the vulnerability of Island Road to inundation from storm, tide and seal level rise, Wood completed the work detailed below.

1. Reviewed readily-available information on coastal vulnerability and the economic, geologic and physiographic setting of South Thomaston, focusing on Island Road. Information included, but was not limited to:
    a. Area topography;
    b. Maine Geological Survey Coastal Landslide Hazards maps (https://www.maine.gov/dacf/mgs/pubs/online/landslides/landslides.htm);
    c. South Thomaston 2010 Comprehensive Plan (https://www.maine.gov/dacf/municipalplanning/comp_plans/South%20Thomaston%202010.pdf);
    d. Knox County Hazard Mitigation Plan (http://www.midcoastplanning.org/PDFs/KC-HMP-2012.pdf); and
    e. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map, effective 6 July 2016.
2. Conducted site visit on 18 June 2019 with Owen Casas, Town Administrator; Cheryl Waterman, Select Board member; Betty Gray, Knox County Emergency Management Agency; and Gerry Grierson, Road Commissioner; observed and photographed existing condition of Island Road.
3. Reviewed information provided by the Town on road right-of-way, past flood events, road improvement grant application and the cost estimate for road improvements.
4. Completed a topographic survey of Island Road for evaluation of vulnerability to flood hazards and SLR.
5. Collaborated with Woods Hole Group (WHG) to complete modelling of potential inundation of Island Road from storm surge, waves, and tide under three SLR scenarios.
6. Prepared this report detailing the objectives, methodology and findings of the preliminary site review.

3.0 INUNDATION MODELLING

The inundation modeling by WHG included development of water surface elevation (WSE) exposure profiles for current and potential future tidal and storm surge under three SLR scenarios. WHG developed WSE exposure profiles along two transects which bisect the low-lying areas of Island Road of greatest concern to the Town (refer to **Figure 1**).

SLR scenarios were reviewed using the U.S. Army Corps of Engineers' Sea-Level Change Curve Calculator (Version 2017.55), specifying the Bar Harbor long-term tide gauge, a regionally-informed vertical land movement rate from the National Oceanic and Atmospheric Administration (NOAA), and the NOAA et. al (2017) SLR curves.[1] In discussion with the DMR project team, the preferred SLR scenarios defined for evaluating short term, mid term, and long term impacts were selected as 1 ft, 2 ft, and 4 ft, respectively. These projected increases in sea level roughly correspond with NOAA's Intermediate Scenario for the years 2030, 2050, and 2085 with a rather low exceedance probability (17%) and are consistent with the SLR scenarios required by the Maine Department of Transportation for design of transportation infrastructure. The SLR scenarios are summarized below.

SLR Scenario	Relative Time	Estimated Year
1 ft SLR	Short Term	2030
2 ft SLR	Mid Term	2050
4 ft SLR	Long term	2085

The Mean Higher High Water (MHHW) and Highest Annual Tide (HAT) tidal datums referenced by WHG were sourced from the nearest long-term NOAA tide station and from spatial files developed by Maine Geological Survey.[2] The 1%-annual-chance still water level (present day) was obtained from the 2016 FEMA Flood Insurance Study for Knox County. The inundation maps developed by WHG depict the 1%-annual-chance coastal storm event as defined by FEMA. This Base Flood Elevation (BFE), which take into account wave effects, was used to evaluate acute (storm surge) inundation impacts. WHG conducted wave modelling using FEMA's overland wave modelling approach.

The table below provides the return frequency for flood events for the short term, mid term and long term scenarios evaluated in this study. Please note, for example, that a one hundred year flood is not a flood event that occurs once every 100 years; rather, this event has a 1% (1 in 100) chance of occurring every year. In this report, the 100 year flood is referred to as 1%-annual-chance flood.

Table 1. Flood Return Period

Event Return Period	Percent Chance of Occurrence per Period		
	10 Years (Short Term)	30 Years (Mid Term)	65 Years (Long Term)
10 Year Flood	65.1	95.8	99.9
25 Year Flood	33.5	70.6	93
50 Year Flood	18.3	45.5	73.1
100 Year Flood	9.6	26	48

[1] https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf
[2] https://www.maine.gov/dacf/mgs/hazards/highest_tide_line/index.shtml

3.0 FINDINGS

3.1 Site Observations and Meeting with Town Officials

Photographs of Island Road and nearby property are included in **Appendix A**. Highlights of the site visit to Areas A and B (refer to **Figure 1)**, and discussions with Town officials are provided below.

Area A: In Area A, near the intersection of Island Road and Village Road, Island Road crosses a narrow neck of land bordered by tidal inlets to the north and south. The road lies within about 10 ft of the shore to the south and is separated from the shore to the north by about 180 ft of saltmarsh. Key observations include:

- Island Road dips downward and is close to the elevation of the adjacent tidal marsh;
- The southern edge of Island Road lies within a few feet of riprap used to protect the shoreline to the south;
- Some of the riprap along the shoreline south of Island Road appears to have been dislodge seaward, apparently due to wave and tide action;
- Culverts beneath Island Road and Village Road appear are obstructed, limiting the effectiveness for stormwater drainage;
- Town officials pointed out that sand from winter application appears to be building up along the road shoulder, reducing drainage of precipitation off the road.
- Town officials noted an area of erosion on Village Road, about 200 ft southwest of its intersection with Island Road.

Town officials noted that during extreme high tides and storm surge events, waves overtop Island Road, and freezing ocean spray occurs on the road during the winter months. Town officials did not recall a storm event that resulted in closure of Island Road, but that inundation of the road resulted in safety concerns. Town officials had no knowledge of road wash out due to wave and tidal action and added that the land in Area A consists largely of historic fill to create a connection between the former island to the east and the mainland to the west.

Area B: In Area B, Island Road dips downward from the lobster pound toward Elwell Point Road and the Spruce Head Island causeway to the east. At its lowest elevation, Island Road lies within about 10 ft of a cove (former lobster pound) to the north-northeast, and within about 275 ft of the shoreline to the south-southwest. Key observations include:

- The shoreline of the cove north of Island Road is protected by riprap.
- The cove inlet is protected by a stone block dam and pier.
- Erosion of the shoreline south of Island Road was observed southeast of Elwell Point Road; riprap placed along the shore in this area does not extend to the road shoulder.
- No obvious evidence of road bed erosion or washout was observed in Area B other than the area noted above southeast of Elwell Point Road.

Town officials noted that storm surge has resulted in flooding of Island Road in the vicinity of the cove where the road is at its lowest elevation in Area B. The operator of the lobster pound provided photos of this flood event during the winter of 2018-2019. The Town is considering straightening the curve in Island Road adjacent to the lobster pound, resulting in relocation of the lobster pound parking lot to the northeast (opposite) side of Island Road.

Flooding at lobster pound adjacent to Island Road, winter 2018/2019.

3.2 Inundation Modelling

The results of flood modelling by WHG are provided in **Appendix B**, which include maps depicting the 1%-annual-chance flood zones and BFEs for each SLR scenario based on modelling data for Transects 1 and 2. A summary of WSE data for the transects through Area A (Transect 1) and Area B (Transect 2) are shown in **Tables 2 and 3** below. Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

Table 2. Area A Elevations - Transect 1

Scenario	*MHHW*	*HAT*	*1% Still Water Level*	*1% Wave Crest Elevation (BFE) at Road*
Present day	4.9	6.8	9	11
Short Term (+1 ft), 2030	5.9	7.8	10	13
Mid Term (+2 ft), 2050	6.9	8.8	11	15
Long Term (+4 ft), 2085	8.9	10.8	13	17
Approximate Island Road Elevation	**9**			

Table 3. Area B Elevations - Transect 2

Scenario	MHHW	*HAT*	*1% Still Water Level*	*1% Wave Crest Elevation (BFE) at Road*
Present day	4.9	6.8	9	10
Short Term (+1 ft), 2030	5.9	7.8	10	11
Mid Term (+2 ft), 2050	6.9	8.8	11	13
Long Term (+4 ft), 2085	8.9	10.8	13	16
Approximate Island Road Elevation	**10**			

Based on the data in **Appendix B** and the summary tables above, we note:

Area A

- The elevation of Island Road (about 9 ft) lies above MHHW and HAT elevations for all scenarios except the long term SLR of +4 ft;
- The road elevation is at or below the 1%-annual-chance still water elevation for all scenarios; and
- The BFE, which considers wave action, lies about 2 ft. above the road elevation for the present day scenario, and ranges from 4 ft to 8 ft. above the road elevation for the short term to long term SLR scenarios modelled.

Area B

- The elevation of Island Road (about 10 ft) lies above MHHW and HAT elevations for all scenarios except the long term SLR scenario of +4 ft;
- The road elevation is at or below the 1%-annual-chance still water elevation for all scenarios accept the present day; and
- The BFE, which considers wave action, is at the road elevation for the present day scenario, and ranges from 1 ft to 6 ft above the road elevation for the short term to long term SLR scenarios modelled.

The flood maps in **Appendix B** depict progressive shrinking of areas outside the 1%-annul-chance flood zone (Zone X) and expansion of areas impacted by flooding in Zone AE (coastal flood zone) and Zone VE (coastal flood zone with velocity/wave hazard).

4.0 RESILIENCE MEASURES

The Town has been awarded a $330,000 grant from the NBRC to improve an 800-ft section of Island Road that includes work in Areas A and B on **Figure 1**. As provided in **Appendix C**, the engineering firm Gartley & Dorsky of Rockport, Maine provided the Town an estimate of costs for reconstruction of Island Road in portions of Areas A and B. This work includes, among others, raising the road elevation 2 to 3 ft and stabilizing the adjacent shoreline.

Based on the assessment by Wood, the proposed reconstruction effort should consider:

- A geotechnical evaluation of the proposed road reconstruction areas to evaluate the potential settlement and other design considerations; Wood understands the segment of Island Road in Area A is founded on historic fill of unknown character;
- Repair or replacement of road culverts to improve drainage and reduce flooding of Island Road in Area A, and evaluate the benefit of adding road culverts at Area B;
- Raising the roadbed of Island Road at least 3 ft in Area A and 2 ft in Area B to reduced flooding potential for improved resilience through the current and short term scenarios;
- Design and construction of shore protection measures (e.g., riprap) that considers the inundation and wave modelling data and accommodates the long term storm flood scenario to the extent feasible (i.e., wave heights of 3 to 4 ft);

- Placement of a geogrid to stabilize the road base and help prevent washout due to flood events; and

- Evaluation of the benefits of geocomposite drains beneath the road bed to help prevent instability from hydrostatic pressure following potential flood events.

With evaluation and inclusion of the above considerations, where appropriate, the proposed reconstruction of Island Road at the two vulnerable locations (Area A and Area B) is likely to provide a relatively high degree of resilience for the present day and short term flood scenarios, which extend from around 2020 to 2030. Based on a reasonable design life for roads in Maine of about 10 years, the condition of Island Road and updated SLR forecasts can be evaluated prior to future maintenance or other improvement measures.

5.0 CONCLUSIONS

Over the past several years, the Town has observed road hazards associated with inundation and icing of Island Road, primarily in two low-lying areas. In addition to safety concerns, Island Road provides the only egress between the mainland and Spruce Head Island, and loss of access could severely impact island commerce which includes lobster fishing, processing cooperatives, restaurants and other businesses. Given the importance of maintaining access to Spruce Island, the Town seeks to make improvements to Island Road and has been awarded a $330,000 grant from the Northern Border Regional Commission (NBRC) to improve an 800-ft section of the road which includes the two low-lying, vulnerable sections.

Recognizing the proximity of Island Road to the coastline, the Town requested that Wood evaluate the vulnerability of the road to storm and tidal flooding, and to provide recommendations for improved resilience. The Town intends to incorporate the findings of the vulnerability assessment and resilience measures into the road improvement project to the extent feasible.

Reconnaissance of Island Road by Wood indicated that two low-lying areas are very close to the shoreline and are vulnerable to inundation by storm surge and wave action. Erosion of the road shoulder and/or adjacent shoreline was observed, and riprap placed for shore protection appears to be undersized in some areas. Wood recommended consideration of several resilience measures that can be incorporated into the proposed road reconstruction project. These include, among others, completing a geotechnical evaluation to better characterize unknown historical fill materials, use of a geogrid in the road base to improve stability, shoreline protection measures based on the flood and wave modelling data, and raising of the road bed 2 to 3+ ft to reduce the risk of inundation.

The proposed resilience measures are likely to substantially reduce the risk of road closure for the present day and short term flood scenarios (i.e., over the next ~10 years). The performance of the road over the next decade can be evaluated in association with updated SLR data to evaluate the need for future improvements or alternate egress design, such as bridge crossings.

6.0 CLOSURE

Wood appreciates the opportunity to support the Town of South Thomaston with this evaluation. Please contact us with any questions or comments.

Sincerely,
Wood Environment & Infrastructure Solutions, Inc.

D. Todd Coffin
Associate Project Manager

Peter H. Thompson
Principal Project Manager

Attachments: Key Definitions and Abbreviations

Figure 1	Site Location
Table 1	Flood Return Period
Table 2	Area A Elevations - Transect 1
Table 3	Area B Elevations - Transect 2
Appendix A	Photolog
Appendix B	WHG Modelling Data
Appendix C	Island Road Reconstruction Cost Estimates

KEY DEFINITIONS AND ABBREVIATIONS

Base Flood Elevation (BFE)	Elevation of flooding, including wave height, having a 1% chance of being equaled or exceeded in any given year.
FEMA	Federal Emergency Management Agency
Highest Annual Tide (HAT)	The elevation of the highest predicted astronomical tide expected to occur at a specific tide station over the National Tidal Datum Epoch.
Mean Higher High Water (MHHW)	The average of the higher high water height of each tidal day observed over the National Tidal Datum Epoch. The highest high tide or water height is referred to as the Highest Astronomical Tide (HAT) and is defined as the highest level which can be predicted to occur under average meteorological conditions and any combination of astronomical conditions.
National Tidal Datum Epoch	The specific 19-year period adopted by the National Ocean Service as the official time segment over which tide observations are taken and reduced to obtain mean values (Mean Lower Low Water, etc.) for tidal datums.
NAVD 88	North American Vertical Datum of 1988
One hundred year Flood	A flood event with a 1% (1 in 100) chance of occurring every year.
Flood Return Period	The average number of years between floods of a certain size is the return period or recurrence interval.
SLR	Sea Level Rise
Still Water Elevation	The elevation that the surface of the water would assume in the absence of waves referenced to a specified vertical datum at the defined recurrence interval.
Wave Crest Elevation	The elevation of the crest of a wave as a combination of the design still water elevation and the wave height.
Wave Height	Vertical distance between the crest and the trough of a wave.
Zone AE	Coastal Flood Zone or base floodplain, as identified on FEMA Flood Insurance Rate Maps.
Zone VE	Coastal flood zone with velocity hazard (wave action), as identified on FEMA Flood Insurance Rate Maps.
Zone X (unshaded)	Area of minimal flood hazard or otherwise outside the area of the 500-year recurrence internal for flooding, as identified on FEMA Flood Insurance Rate Maps.

wood.

N

0 125 250 Feet

Prepared/Date: BRP 10/01/19 | Checked/Date: TC 10/01/19

Figure 1
Site Location

Island Road Vulnerability Assessment
Penobscot Bay Working Waterfront Resiliency Analysis

Document: P:\Projects\Penobscot Bay Resiliency Analysis\4.0_Deliverables\4.5_Databases\GIS_SOUTH_THOMASTON\MXD\South_Thomaston_11x17LS.mxd PDF: P:\Projects\Penobscot Bay Resiliency Analysis\4.0_Deliverables\4.5_Databases\GIS_SOUTH_THOMASTON\PDF\Figure 1 - Site Location.pdf 10/01/2019 7:36 AM brian.peters

APPENDIX A

Photo Log

PHOTO 1:

Area A - Island Road, view to southeast and rise in elevation from low-lying area at near intersection with Village Road (right side of photo).

PHOTO 2:

Area A - Island Road, view to west and rise in elevation beyond intersection with Village Road (left side of photo).

PHOTO 3:

Area A – Island Road at intersection with Village Road; note cracks in road leading from reported culvert under Island Road to marsh.

PHOTO 4:

Area A - Saltmarsh and bay north of Island Road, view to northeast..

PHOTO 5:

Area A - Coastal wetland and bay south of Island Road, view to southeast.

PHOTO 6:

Area A - Riprap along shoreline south of Island Road; note apparent movement of riprap seaward.

PHOTO 7:

Area A - Island Road looking south; note buildup of winter sand in roadway.

PHOTO 8:

Area A – Village Road near intersection with Island Road, view to southwest.

PHOTO 9:

Area A - Stone at entrance to culvert beneath Village Road, near intersection with Island Road.

PHOTO 10:

Area A - Erosion on shore side of Village Road near intersection with Island Road.

PHOTO 11:

Area B - Low-lying stretch of Island Road near intersection with Point View Road, view to southeast.

PHOTO 12:

Area B - Low-lying stretch of Island Road adjacent to clove (former lobster pound) on right side of photo, view to northwest.

PHOTO 13:

Area B - Slight rise in elevation of Island Road toward the northwest, beyond a cove (former lobster pound) on right side of photo; note riprap slope protection on shore of former lobster pound.

PHOTO 14:

Area B - Commercial lobster pound and cove; inlet to cove in background, view to the north.

PHOTO 15:

Area B - Erosion on south edge of Island Road shoulder, near north end of causeway to Spruce Head Island, view to northeast.

PHOTO 16:

Area B - Riprap along shore south of Island Road, near north end of causeway to Spruce Head Island, view to northeast.

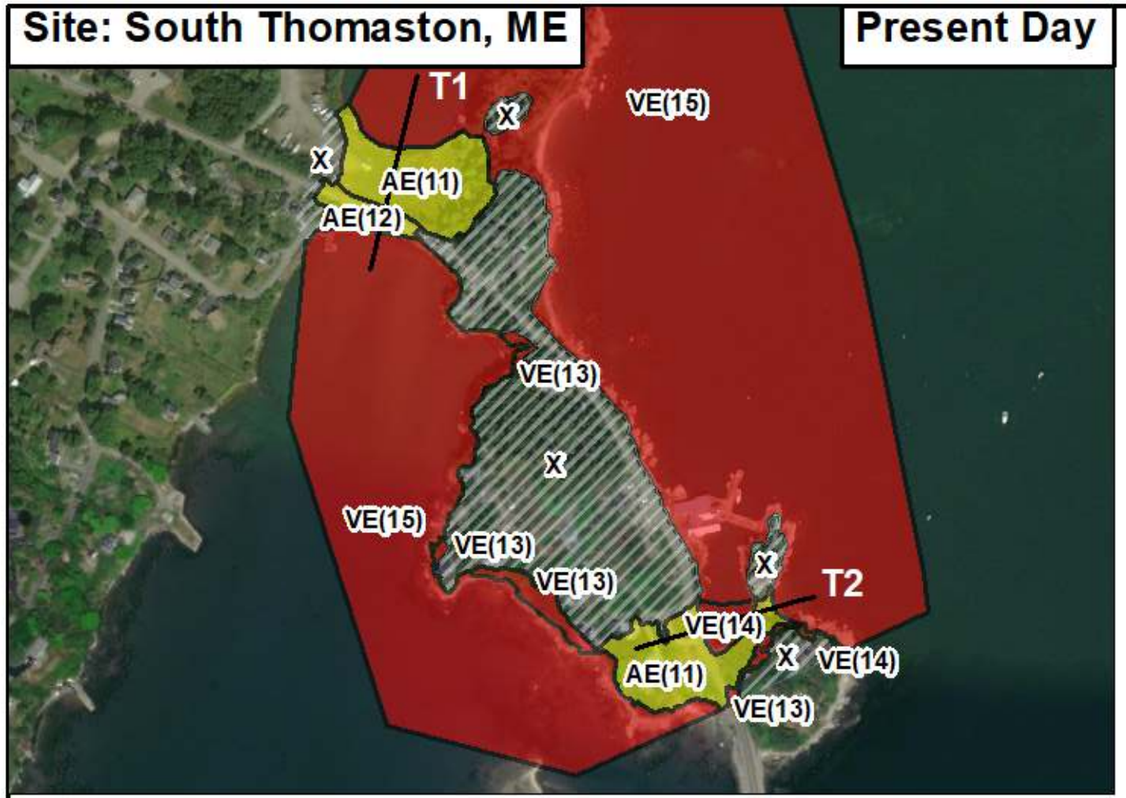
PHOTO 17:

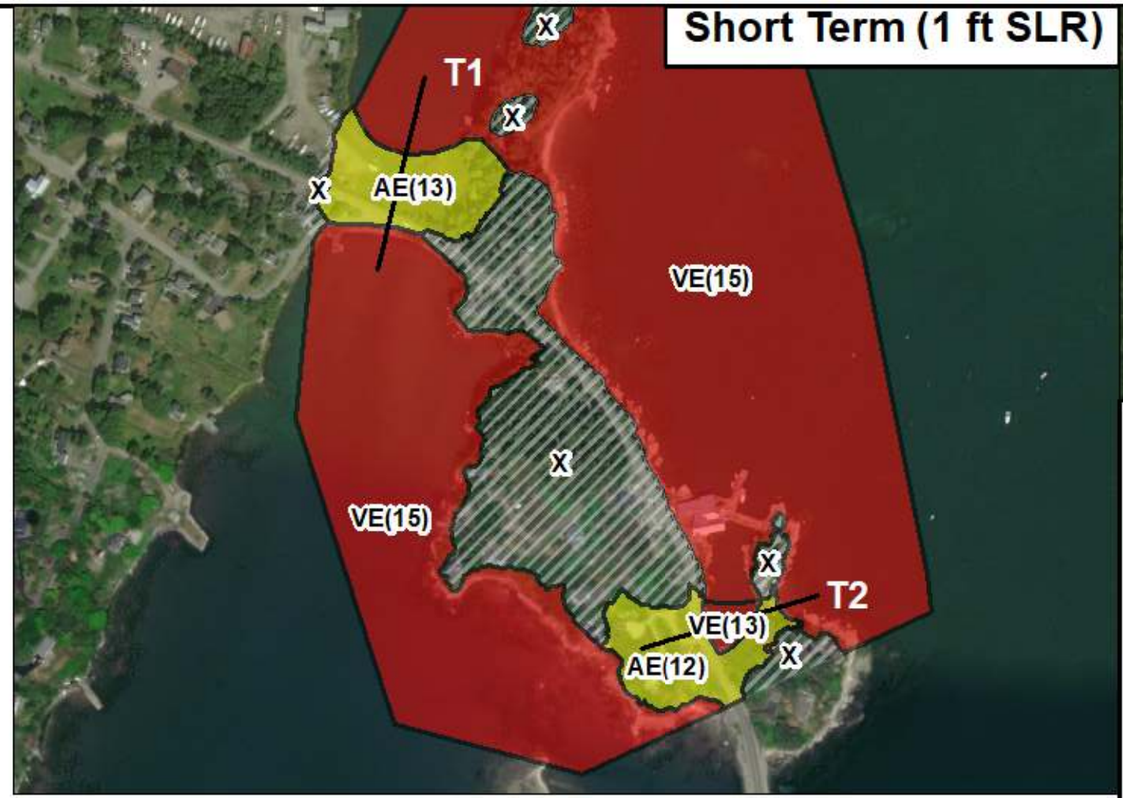
Area B - Curve in road across from lobster pound (left side of photo) proposed for straightening, view to southeast.

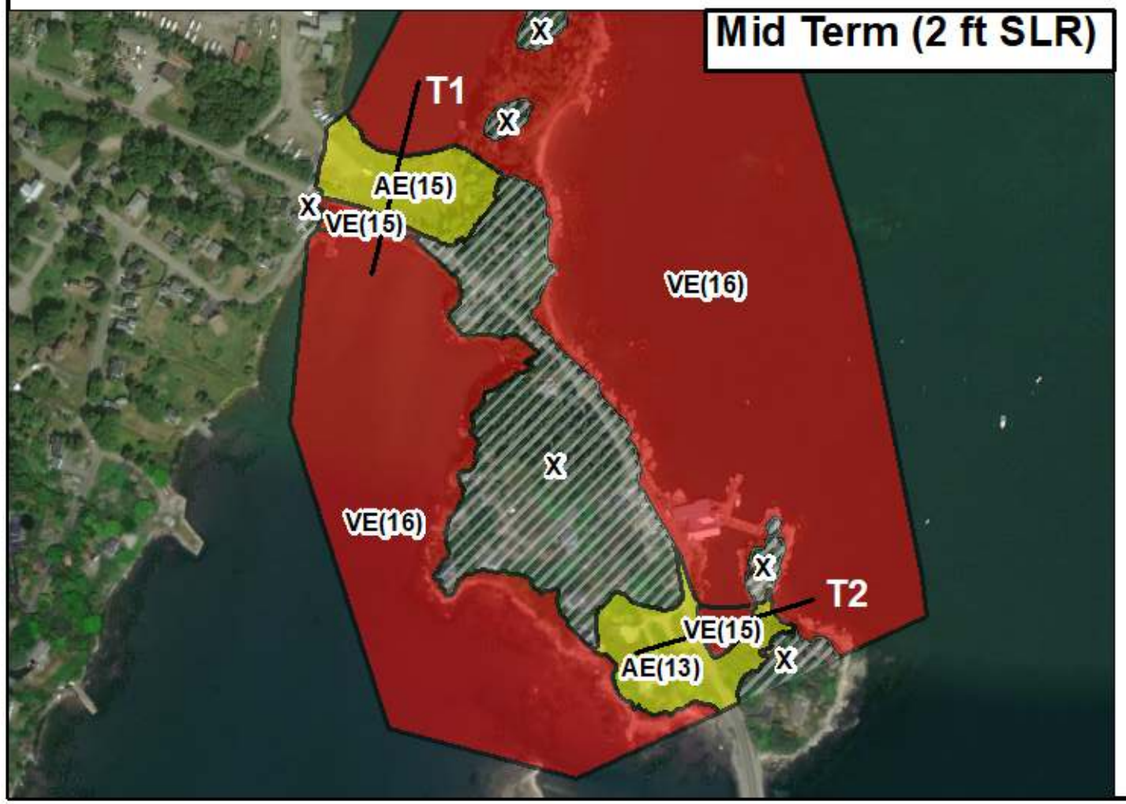
APPENDIX B

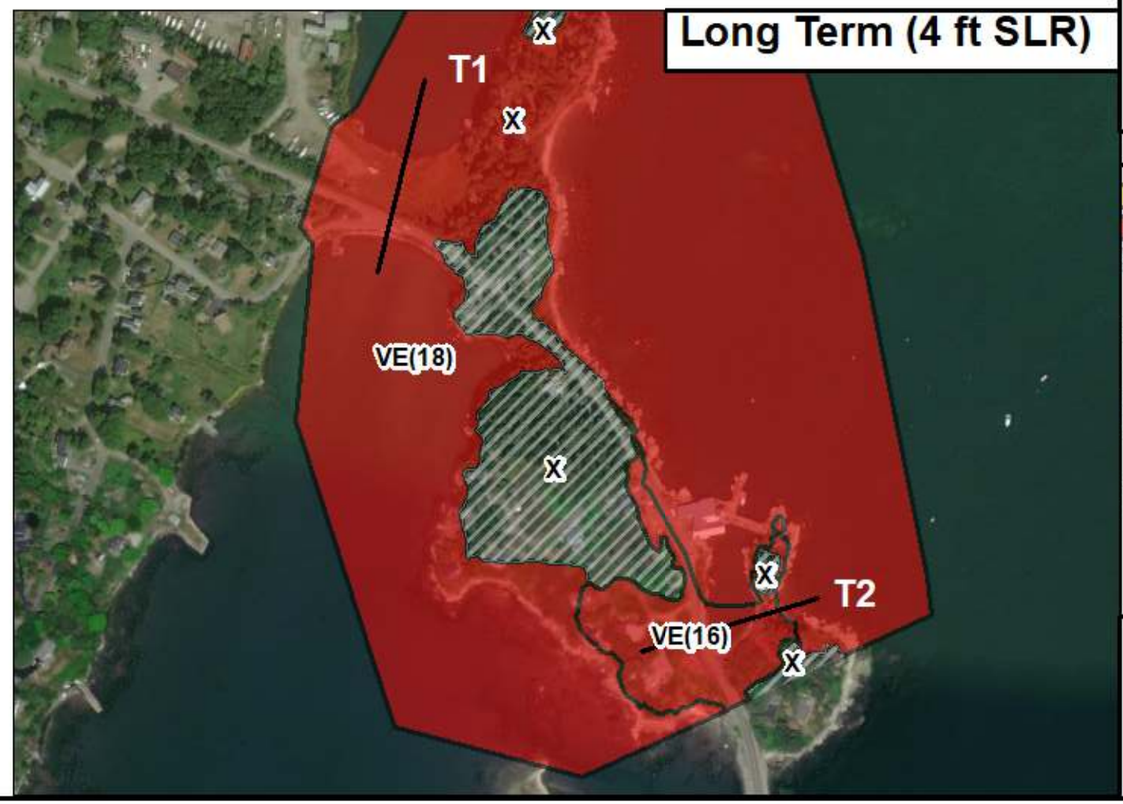
WHG Modelling Data

Site: South Thomaston, ME









1. Maps indicate the 1%-annual-chance flood zones and base flood elevations.

2. This does not constitute a revision to the FEMA FIRM map which is done through FEMA's Letter of Map Revision process for which additional analysis and/or modeling may be required.

3. Flood mapping was developed for planning purposes only. No other use of this map should be made.

4. Elevations in reference to vertical datum NAVD88

S. Thomaston Transects

AE

VE

X

N

Zone AE : Coastal flood zone. Base Flood Elevations determined.

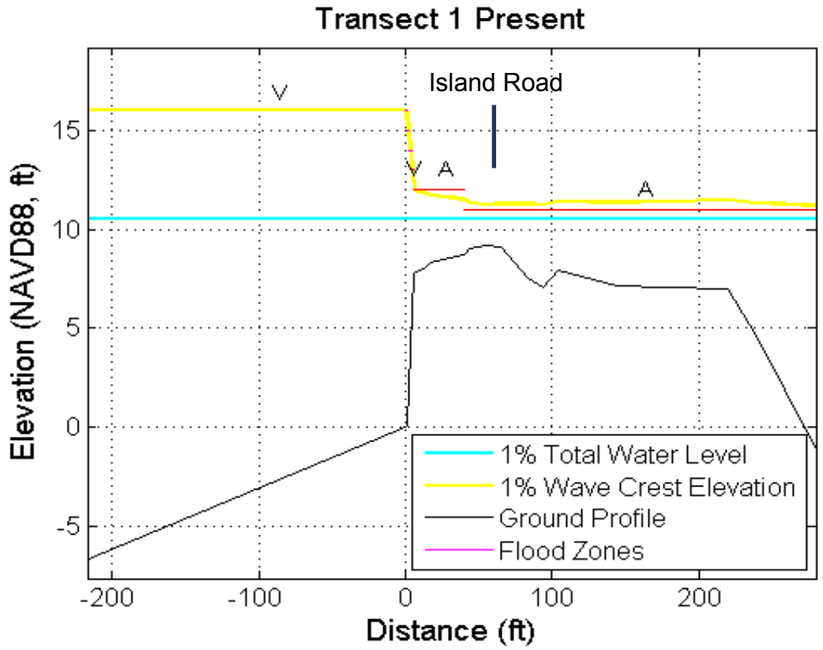
Zone VE : Coastal flood zone with velocity hazard (wave action). Base Flood Elevations determined.

Zone X : Areas determined to be outside the 1% annual chance floodplain.

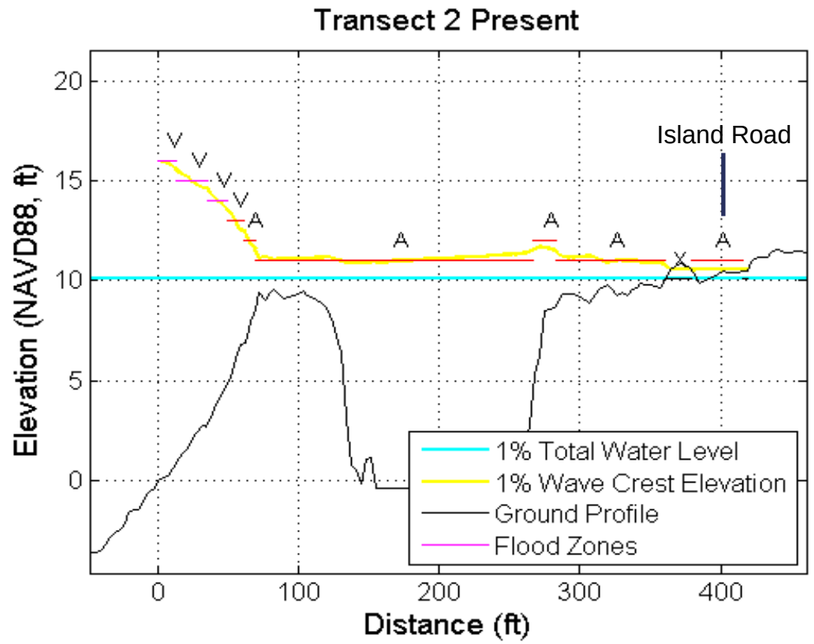
0 250 500 Feet

WOODS HOLE GROUP
A CLS COMPANY

Present Day Scenario
South Thomaston, Maine

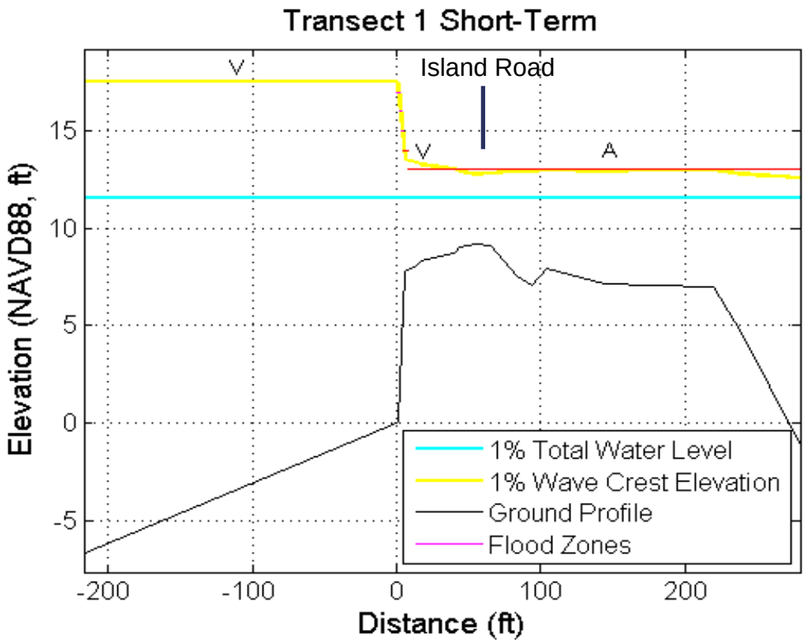


VIEW TO WEST



VIEW TO EAST

Short Term Scenario
South Thomaston, Maine



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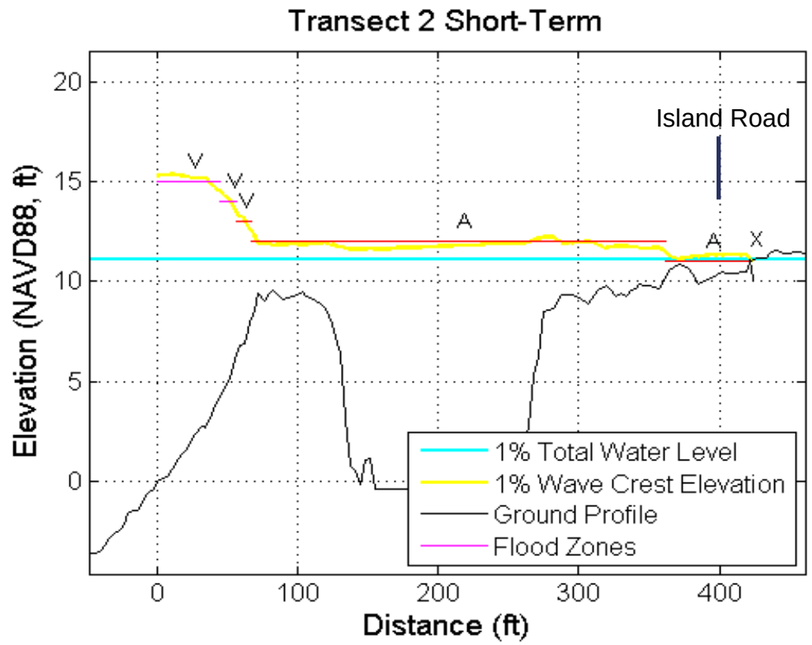
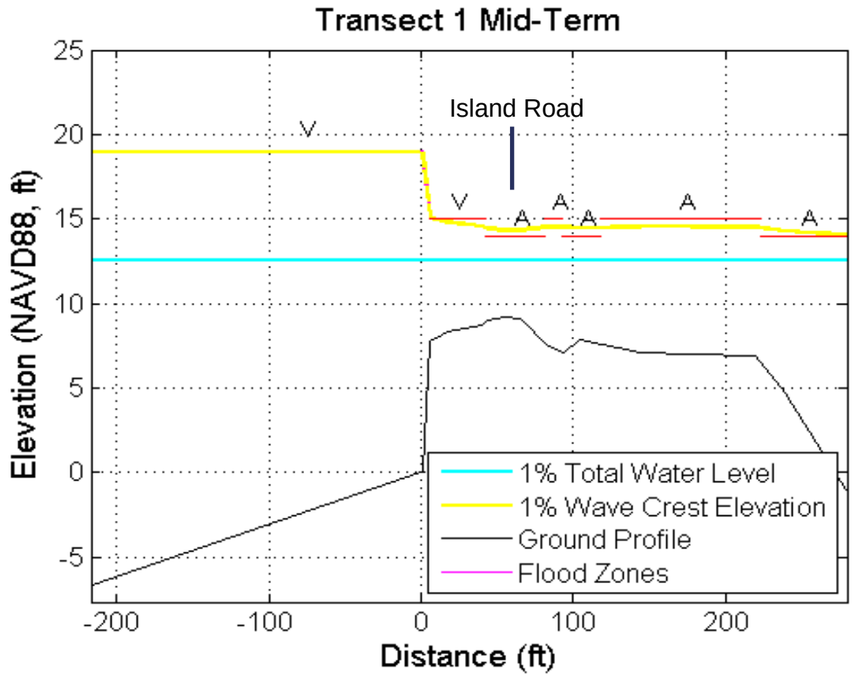
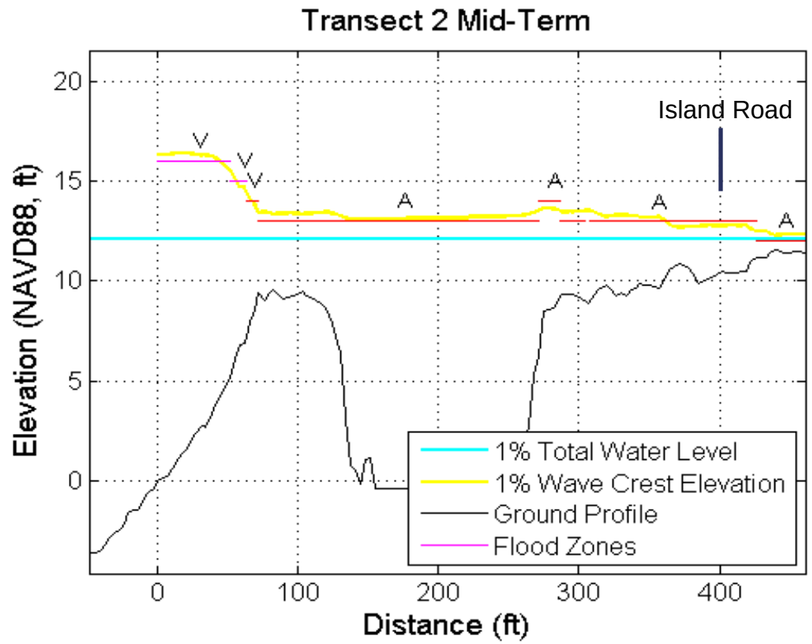


VIEW TO EAST

Mid Term Scenario
South Thomaston, Maine

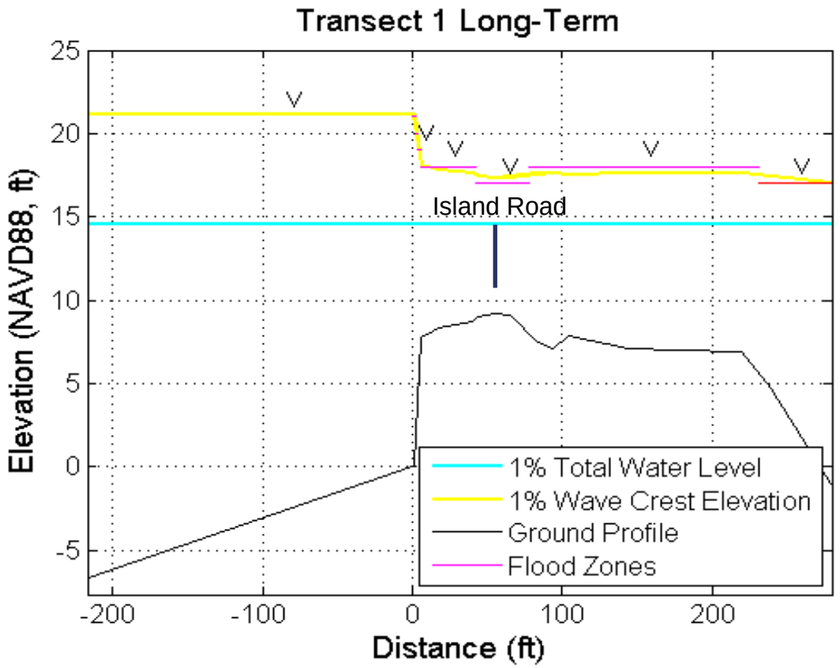


VIEW TO WEST



VIEW TO EAST

Long Term Scenario
South Thomaston, Maine



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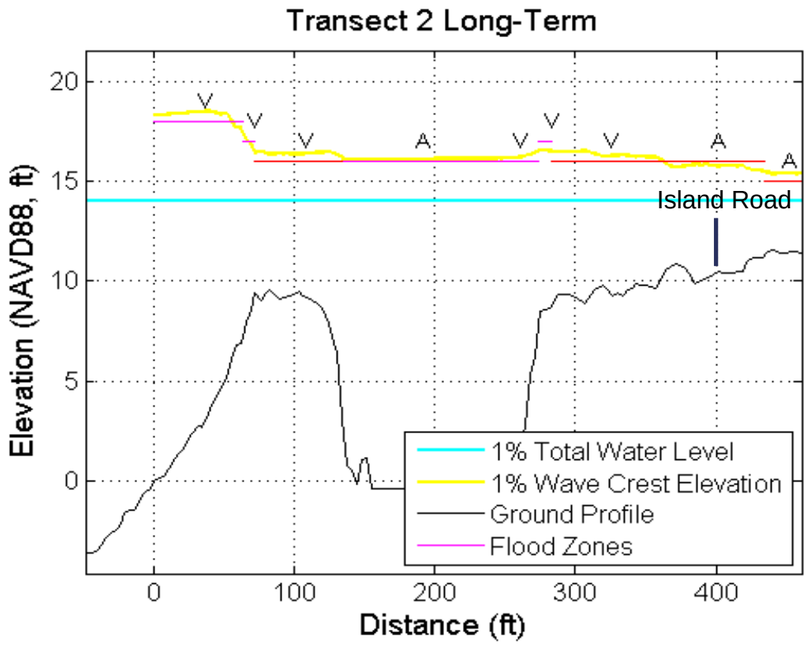

VIEW TO EAST

APPENDIX C

Island Road Reconstruction Cost Estimate

Gartley & Dorsky
ENGINEERING SURVEYING

February 8, 2019

Betty Thomas
Town of South Thomaston
PO Box 147
South Thomaston, ME 04858

Project #: 2019-041

RE: Town of South Thomaston – Island Road Reconstruction
Estimated Construction Costs

Dear Betty,

The intent of this letter is to provide the Town of South Thomaston with an estimate of the probable construction cost to reconstruct two sections of Island Road in South Thomaston. The two projects are located at the intersection of Island Road and Village Road, and along Island Road adjacent to Elwell Point. It is our understanding that the Town wishes to perform the following:

Intersection of Island Road and Village Road:

- Reconstruct Island Road beginning 100' west of the Island/Village Road intersection and extending ±380' east to the intersection with Halls Point;
- Raise the roadway approximately 2' – 3' in elevation;
- Reduce the super elevation of the roadway curve;
- Reconstruct the existing retaining wall adjacent to the intersection;
- Stabilize eroding shoreline.

Island road adjacent to Elwell Point:

- Reconstruct Island Road beginning adjacent to the parking lot for the seafood company and extending ±400' to the "new" bridge;
- Raise the roadway elevation;
- Realign road away from the "pond" area;
- Stabilize shoreline along "pond".

Below is the summarized construction cost estimate:

Estimate of Probable Construction Cost (Intersection of Island Road and Village Road)-

Site Preparation, Traffic Control & Existing Road Recycling	$ 12,000.00
Site Work (Aggregate, Fill & Geotextile Fabric)	$ 50,000.00
Asphalt and Guardrail	$ 44,000.00
Stabilization, Erosion Control, Loam & Seed	$ 28,000.00
Subtotal	$ 134,000.00
Mobilization (±5%)	$ 7,000.00
Contingency (±20%)	$ 27,000.00
Total Construction Cost	**$ 168,000.00**

Estimate of Probable Construction Cost (Island Road adjacent to Elwell Point)-

Site Preparation, Traffic Control & Removing Existing Road	$ 18,000.00
Site Work (Aggregate, Fill, Ledge Removal & Geotextile Fabric)	$ 80,000.00
Asphalt and Guardrail	$ 38,000.00
Stabilization, Erosion Control, Loam & Seed	$ 16,000.00
Subtotal	$ 152,000.00
Mobilization (±5%)	$ 8,000.00
Contingency (±20%)	$ 30,000.00
Total Construction Cost	**$ 190,000.00**

The total combined construct cost estimated for both projects is $358,00.00, for planning purposes we recommend carrying a range of $**325,000.00 to $385,000.00**. We have included a 20% contingency to accommodate for unknown issues. This estimate is for planning purposes only. This probable construction cost letter is based on our best judgement as experienced and qualified professionals familiar with the construction industry. However, because we cannot control the cost of the labor, material, equipment or services furnished, we cannot guarantee the actual construction cost will not vary from our estimate. We will be able to refine this cost estimate once designs have been completed. Do not hesitate to contact us with any questions you may have.

Sincerely,
Gartley & Dorsky Engineering & Surveying Inc.

Andrew D. Hedrich, P.E.
Senior Engineer

Alyssa D. Gartley, E. I
Design Engineer