



Town of Waterford

Municipal Infrastructure Resilience Project “Sewer Pump Station Assessment and Adaptation” **Final Report**

9/29/2016

Project Description

Project Name: Waterford Municipal Infrastructure Resilience Project
Sewer Pump Station Assessment and Adaptation

Grant Information: PO#4320, PS#2014-1

Project Location: Town of Waterford, multiple locations
15 Rope Ferry Road
Waterford, CT 06385

Awarded Funds: \$5,800

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Project Overview and Summary

As the Town discussed in its grant application, Waterford experienced flooding of multiple pump stations during recent storms that led to interruptions in service and the need for repairs. Interruptions in service led the Town to seek funding to evaluate the vulnerability of the seven pump stations currently in the FEMA 100 year floodplain. Upon award, the Town engaged the consulting firm Wright-Pierce to evaluate the vulnerability of these stations and to provide recommendations and associated costs to improve resiliency. The resulting report includes recommended design elevations and specific flood proofing projects to protect this critical infrastructure under future flood scenarios. The information provided in the report will help the Town prioritize repairs and capital plans relative to sewer pump stations.

Project Goals, Methods and Outcomes

Upon award, the Town hired Wright-Pierce to perform the assessment of the sewer pump stations. The consultant gathered information from the Waterford Utilities Commission and from available floodplain and Sea Level Rise data sources. This information was used to inform recommendations for resiliency projects. The project began in April of 2016. A draft report was produced and forwarded to CIRCA staff for review and comment in August of 2016. The final report was received by the Town on September 23, 2016. The report was completed for \$5,696.67. \$121.79 in awarded funds was not used for the project and is therefore not requested for reimbursement.

The project and resulting report had three significant outcomes:

1. A report that can be used in capital planning efforts to advance recommendations for pump station adaptation.
2. A report that can be used as a simple and effective tool to educate the public about opportunities to improve the resilience of Waterford's critical infrastructure.

3. A report that will be used to inform subsequent resiliency and adaptation planning efforts in Waterford.

Conformance with CIRCA's Mission

"to increase the resilience and sustainability of vulnerable communities along Connecticut's coast and inland waterways to the growing impacts of climate change on the natural, built, and human environment." This project provided Waterford with a foundation to implement resilient solutions to reduce vulnerability of the built environment and protect important natural resources from pollution and degradation. The sewer pump station project addressed all four of CIRCA's priority areas.

1. *Develop and deploy natural science, engineering, legal, financial, and policy best practices for climate resilience;*

This project provides a replicable approach to evaluating sewer pump stations and the associated costs managing municipal infrastructure. The project is an important step to help the Town incorporate climate resiliency into its capital program.

2. *Undertake or oversee pilot projects designed to improve resilience and sustainability of the natural and built environment along Connecticut's coast and inland waterways;*

The project includes recommended actions to address the most vulnerable sewer pump stations in Waterford. Implementing these recommendations and tracking the effectiveness of the work will help Waterford identify long-term cost savings and advocate for future investment in resiliency. The report is Waterford's first step toward on-the-ground implementation.

3. *Foster resilient actions and sustainable communities – particularly along the Connecticut coastline and inland waterways – that can adapt to the impacts and hazards of climate change; and*

The purpose of the project was to help Waterford become more resilient to the impacts and hazards of climate change. The final project report provides town staff with the information necessary to prioritize and implement adaptation projects for critical infrastructure. Developing a report with associated costs helps staff justify funding requests for resiliency projects.

4. *Reduce the loss of life and property, natural system and ecological damage, and social disruption from high-impact events.*

The sewer pump analysis directly reduces risk to natural systems and prevents ecological damage by providing the Town with a roadmap to reduce the risk of pollutant release into the environment as a result of storm damage. Following the recommendations in the report will reduce the potential for social disruption by ensuring that critical infrastructure continues to function during high-impact events.

Recognition for CIRCA

Waterford has created a climate resilience area on the Planning Department Website. This subpage references this project and the funding support from CIRCA. A link to this information will be added

to the Town's Facebook page. The report from this project will also be used in support of and recognized in Waterford's Climate Change Vulnerability, Risk Assessment and Adaptation Study.

Attachments:

Appendix A: Final Report Completed by Wright-Pierce

Appendix B: Invoice for Payment

**WASTEWATER PUMP STATION FLOODING
VULNERABILITY EVALUATION**

for the

**WATERFORD UTILITY COMMISSION
WATERFORD, CT**

SEPTEMBER 2016

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VULNERABILITY EVALUATION**

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Prepared By:

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**WATERFORD, CONNECTICUT
WASTEWATER PUMP STATION FLOODING
VULNERABILITY EVALUATION**

TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
1	INTRODUCTION	
1.1	INTRODUCTION.....	1-1
2	DATA COLLECTION	
2.1	DATA SOURCES	2-1
2.2	FLOOD ELEVATION DETERMINATION	2-3
3	MITIGATION	
3.1	SUMMARY OF FINDINGS	3-1
3.2	MITIGATION OPTIONS.....	3-1
3.2.1	Bolles Court Pump Station	3-2
3.2.2	Gardiners Wood Pump Station	3-3
3.2.3	Mago Point Pump Station.....	3-4
3.2.4	Niantic River Road Pump Station.....	3-5
3.2.5	Oil Mill Road Pump Station	3-6
3.2.6	Seaside Pump Station.....	3-7
3.2.7	Shore Drive Pump Station	3-8
4	IMPLEMENTATION	
4.1	INTRODUCTION	4-1
4.2	DETAILS	4-2
4.2.1	Impermeable Membrane & Coating Systems.....	4-2
4.2.2	Flood Doors/Barriers.....	4-3
4.3	NEXT STEPS	4-5
4.4	COST ESTIMATE	4-6

LIST OF APPENDICES

APPENDIX	DESCRIPTION
A	FIRMETTES AND SEA LEVEL RISE
B	GENERAL DETAILS

SECTION 1

SECTION 1

INTRODUCTION

1.1 INTRODUCTION

On the behalf of the Waterford Utility Commission (WUC), Wright-Pierce performed an evaluation of seven wastewater pumping stations that have been identified to have a potential for flooding.

The purpose of this report is to identify FEMA base flood elevations, identify areas of potential risk, and identify potential means of mitigating the impact of potential sea level rise.

The following pump station facilities were reviewed, as part of this report:

- Bolles Court
- Gardiners Wood
- Mago Point
- Niantic River Road
- Oil Mill Road
- Seaside
- Shore Drive

The facility evaluation was conducted in accordance with Connecticut Institute for Resilience and Climate Adaptation (CIRCA) Grant program to “reduce the loss property, prevent ecological damage, and social disruption from a failure” in the Town’s wastewater pump stations located along the coast and within the base floodplain. This report will serve the Town as the project proposal to be submitted to CIRCA to obtain funding and includes the following:

- Knowledge or experience that is transferable to multiple locations in Connecticut
- Well-defined and measurable goals.

- Implementation is recommended in no more than an 18-month time frame.

It should be noted that CIRCA gives preference to projects that leverage multiple funding sources and that involve collaboration with CIRCA.

SECTION 2

SECTION 2

DATA COLLECTION

2.1 DATA SOURCES

The base flood elevation (BFE) data was obtained from the Federal Emergency Management Agency (FEMA) website using the Flood Insurance Rate Maps (FIRMs). FIRMS are the official maps used in the National Flood Insurance Program. FIRMettes, full-scale section of a FIRM, were created for each facility and are included in Appendix A.

The BFE is the computed elevation to which floodwater is anticipated to rise during the base flood. The BFE is the regulatory requirement for the elevation or floodproofing of structures.

FEMA delineates BFE's as determined through Flood Insurance Studies (FIS's). FIS's are a compilation and presentation of flood risk data for specific watercourses and waterbodies including coastal flood hazard areas within a community. The FIS report contains detailed flood elevation data in flood profiles and data tables. Individual FIS's are modeled with Coastal Hydraulic and Hydrologic data as identified in each study. The mapped 100-year base flood elevations shown on the FIRMs include the effects of stillwater and wave effects.

FEMA has defined areas on FIRMs with the following designations.

A - Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Detailed analyses are not performed for such areas so no depths or base flood elevations are shown.

AE - The base floodplain where base flood elevations are provided.

V - Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. No base flood elevations are shown.

VE - Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Elevations for the evaluated pump stations were based on existing plans and available surveys and datum's were adjusted from NGVD 29 to NAVD 88, using Height Conversion of VERTCON for Google Earth (VERGE), to compare against the BFE's identified on the FIRMS. This evaluation is discussed further in the following section.

FEMA flood maps do not currently account for sea level rise. Climate change and sea level rise may also impact future flooding and a greater level of flood protection may be warranted. The flood mitigation measure implemented to provide a greater level of protection to address climate change and sea level rise depend on a number of factors including the feasibility of implementation on an existing structure, configuration and site constraints, and cost.

Sea Level Rise (SLR) Viewer presented by National Oceanic and Atmospheric Administration (NOAA) Digital Coast was used to identify inland areas that will be impacted by sea level rise up to 6-feet above mean higher high water (MHHW). SLR Maps for each facility can be found in Appendix A following their respective FIRMettes. Areas that are hydrologically connected (according to the digital elevation model used) are shown in shades of blue. Low-lying areas, displayed in green, are considered hydrologically "unconnected" areas that may flood. Blue areas denote a high confidence of inundation, orange areas denote a low confidence of inundation, and unshaded areas denote a high confidence that these areas will be dry given the chosen water level. The pump stations evaluated are on the border, or within areas noted as having a high probability of inundation (blue areas) under a certain SLR scenario. To address uncertainty in SLR rates relative to the life of the facilities it is recommended to protect the facilities to 3-feet above the FEMA BFE.

2.2 FLOOD ELEVATION DETERMINATION

The design flood elevation is dependent on project considerations and design standards developed by Federal, State, and Industry Standards.

For state funded activities in the flood plain the Commissioner of CT DEEP has powers and duties identified Section 25-68c under Title 25, Chapter 476a 'Flood Management' in the Connecticut General Statutes (C.G.S.). Such powers and duties include "to require that any flood control project be designed to provide protection equal to or greater than the base flood".

It further states, "Any state agency proposing an activity or critical activity within or affecting the floodplain shall submit to the commissioner information certifying that:", the proposal will not "pose a hazard to human life, health or property in the event of a base flood or base flood for a critical activity".

Under the powers and duties of the commissioner, the Certification for critical activities is required under section 25-68d. Critical activities are defined as construction of schools, hospitals, residential structures and the storage of hazardous or contaminated materials in a flood plain. Critical activities are regulated to the 500-year BFE when applying to the Connecticut Department of Energy and Environmental Protection (CT DEEP) for a Flood Management Certification. The applicable flood plain for critical activities is the 0.2 percent annual chance or 500-year base flood elevation. CT DEEP designates the calculation of the 500-year base flood as the 100-year base flood elevation multiplied by a factor of 1.25. The calculation is supported by FEMA technical fact sheet 1.6 'Designing for Flood Levels Above BFE'.

Executive Order 13690 (EO 13690), Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input, states federally funded projects are required to provide 3-feet of freeboard above the base flood elevation for critical actions. Wastewater pump stations would be considered critical actions. Critical Actions is defined as, any activity for which even a slight chance of flooding would be too great.

New England Interstate Water Pollution Control Commission (NEIWPCC) has issued a draft document, “Storm Resiliency and Adaptation Needs for Wastewater Conveyance and Treatment Facilities”. NEIWPCC incorporated requirements from this document into TR-16, Guides for the Design of Wastewater Treatment Works. The level of protection for critical equipment is consistent with EO 13690, which requires protection 3-feet above the one percent annual chance of flood elevation (100-year flood elevation).

According to TR-16, existing pump stations planned for upgrade or expansion should be improved to the maximum extent possible to meet the flood protection criteria established for new facilities. New pump station facilities should provide for non-interrupted operation of all units during a 100-year flood and critical equipment protected against flooding 3-feet above the 100-year flood elevation. Critical equipment is defined as all electrical, mechanical, and control systems associated with pump stations and are responsible for conveyance of wastewater. Non-critical equipment should be protected against flooding 2-feet above the 100-year flood elevation.

While FEMA flood maps do not currently account for sea level rise, the protection measure being proposed above the BFE (i.e.: 3 feet above the 100-yr flood elevation or 500-yr base flood) was included to begin planning for sea level rise.

The following table contains the relevant elevations for each of the seven (7) facilities evaluated.

Pumping Station	Ground Elevation Survey NGVD 29	Ground Elevation (NAVD 88)	First Floor/Access Elevation (NGVD 29)	FFE Convert (NGVD29 to NAVD88)	Delta	Current Flood Zone Elevation 2013 (NAVD 88)	500-YR Flood Elevation (1.25 x BFE)	CT DEEP 500-YR Flood Elevation + 1-FT	TR-16 Guidance 100-YR Flood Elevation + 3-FT	Design Elevation
Bolles Ct	6 (Survey 2011)	7.31	10	9.04	0.96	AE 10	12.5	13.5	13	13
Gardiners Wood	Not Available	10.04	13.5	12.51	0.99	AE 11	13.75	14.75	14	14
Mago Point	4.17 (Survey)	7.73	13.5	12.50	1.00	AE 13	16.25	17.25	16	16.25
Niantic River Rd	10	3.00	11.5	10.50	1.00	AE 12	15	16	15	15
Oil Mill Rd	8	6.30	12	11.01	0.99	AE 9	11.25	12.25	12	12
Seaside	12	16.37	13.5	12.52	0.98	AE 12	15	16	15	15
Shore Drive	7	6.25	12	11.03	0.97	AE 10	12.5	13.5	13	13

Notes:

1. Ground elevations determined from NOAA and USGS.
2. Flood Zones and Elevations taken from <https://msc.fema.gov/portal>
3. Finish floor elevations taken from available drawings

SECTION 3

SECTION 3

MITIGATION

3.1 SUMMARY OF FINDINGS

Our research shows that three (3) pump stations have a first floor elevation or access point below the 100-year base flood elevation.

- Bolles Court Pump Station has a first floor that is 0.96 feet below the 100-year BFE of 10.
- Mago Point has a first floor that is 0.5 feet below the 100-year BFE of 13.
- Niantic River Road Pump Station has a first floor that is 1.5 feet below the 100-year BFE of 12.

All seven (7) pumping stations have access points below the recommended flood protection elevation of 100-year base flood elevation plus 3-feet.

3.2 MITIGATION OPTIONS

In order to fully comply with the TR-16 guidance, critical equipment/infrastructure should be protected to the 100-year BFE plus three feet. Existing pump station plans, provided by the Waterford Utility Commission, were used for this evaluation. The pump station facility plans reference datum Mean Sea Level or NGVD 29. In order to evaluate the facilities, elevations had to be adjusted from NAVD 29 to NAVD 88 using a method described in Section 2 of this report. Prior to implementing any mitigation measures, a survey should be conducted at each facility to confirm elevations.

Our study did not evaluate the structural integrity or water-tightness of the structures. Some reinforcement or water-tight coatings may be required. Prior to designing upgrades to the facilities to protect against flooding, a structural inspection should be conducted to confirm what additional measures are necessary.

In many cases, the flooding conditions would significantly impact the existing pumping stations and the surrounding area that they serve. Therefore, only protecting the pumping station (if feasible) might not be the appropriate solution. Other options to consider are regional flood control or attempting to “minimize” damage to the facility and equipment. Potential options for each pumping station will be discussed in detail.

3.2.1 Bolles Court Pump Station

Bolles Court Pump Station is located at 528 Mohegan Avenue Parkway. FEMA Maps were reviewed to identify the flood elevation in regard to the Bolles Court Pump Station. The pump station is located on FEMA Map 09011C0363J (August 5, 2013) and located within flood zone AE with an established base flood elevation of 10.0. Critical equipment/infrastructure should be protected to elevation 13.0.

The existing grade around the exterior of the pump station is elevation 7.3 and the facility has a converted finished floor elevation of 9.04. Upgrades in 2014 included protecting electrical equipment and building vents above elevation 12.54. Pumps and motors were replaced with dry-pit submersible units during the upgrades. Electrical Motor Control Centers (MCCs) and the facility generator are located on the control room level at elevation 0.06 and the pump variable frequency drives (VFDs) are located on the motor level at elevation -13.29. However, the accessway is protected to elevation 12.54.

An abovegrade Nitrazyme chemical storage tank is located outside of the pump station and the tank is placed on a 6-inch maintenance pad for an approximate elevation of 5.5. The tank is anchored to the concrete maintenance pad and fill/vent lines are located above elevation 12.54.

A pad mounted electrical transformer is located on-site at approximate elevation of 6.5. W-P had discussions with the Connecticut Light and Power (now Eversource) during the pump station upgrade, to discuss the option of installing a pole mounted transformer in lieu of a pad mounted transformer. The electrical company indicated that their typical installation regardless of being

located in a floodplain, is to install a pad mounted transformer and were not willing to raise the transformer at that time.

Several manhole structures are below the BFE. Sewer lines should be evaluated within areas below the BFE. Sewer manholes should be protected from I/I in flood conditions by means of water-tight manholes or manholes raised above the BFE.

A 1,000-gallon double-walled fuel tank for the facility's generator, is located outside, abovegrade, and on a concrete pad. The tank is anchored to the concrete maintenance pad and vent/fill ports are located above elevation 12.54.

Mitigation measures include the following recommendations:

- Install floodproof doors on the facility.
- Install flood level instrument and alarm in case floodproof door fails.
- Install watertight manhole covers on structures located below BFE.
- The electrical service/transformer should be raised or pole mounted.

3.2.2 Gardiners Wood Pump Station

Gardiners Wood Pump Station is located at 302 Millstone Road. FEMA Maps were reviewed to identify the flood elevation in regard to the Gardiner's Wood Pump Station. The pump station is located on FEMA Map 09011C0483J (August 5, 2013) and located within flood zone AE with an established base flood elevation of 11.0. Critical equipment/infrastructure should be protected to elevation 14.0.

On the main floor, elevation 12.5, is a generator. Electrical panels are located inside the building in a drywell with the bottom floor elevation at -9.48 and the drywell is accessed by a fiberglass hatch located 1.5 feet above FFE (elevation 14). Lowest exterior adjacent finish grade to the pump station is 10.4. The wetwell hatch is located on the exterior of the pump station with a top elevation of 11.51.

Mitigation measures include the following recommendations:

- Install floodproof doors on the facility and flood proof any structural/wall penetrations below BFE.
- Install flood level instrument and alarm in case floodproof door fails.
- Install watertight manhole covers on structures located below BFE.
- Vent pipes/louvers for the pump station and fuel tank shall be raised above the BFE. In addition, the fill pipe for the fuel tank shall be raised above BFE and water tight.
- Hatch covers for wetwell and drywell shall be confirmed they are watertight and replaced as needed.
- The generator fuel tank should be secured to protect them from wave damage.
- Raise the bypass structure or install a watertight manhole cover.

3.2.3 Mago Point Pump Station

Mago Point Pump Station is located at 12 Fourth Street. FEMA Maps were reviewed to identify the flood elevation in regard to the Mago Point Pump Station. The pump station is located on FEMA Map 09011C0483J (August 5, 2013) and located within flood zone AE with an established base flood elevation of 13.0. Critical equipment/infrastructure should be protected to elevation 16.0.

The main finish floor elevation is 12.5 where the generator and HVAC equipment is located. The generator is located on a 6” maintenance pad. The fuel tank for the generator is located inside (approximate elevation 12.5) and anchored to prevent the tank from floating during a flood event.

A pad mounted electrical transformer is located on-site at approximate elevation of 3.5, however the transformer is positioned on a concrete electrical vault with a top of pad elevation of approximately 8.5.

The electrical level is elevation 3.17 and includes MCCs, VFD’s and pump control panels. Electrical panel on the exterior of the facility have a bottom elevation of 7.0.

Pump room level is elevation -24.20. Pumps and motors were replaced in 2011 with dry-pit submersible units during the upgrades.

An abovegrade Nitrazyme chemical storage tank is located outside of the pump station and the tank is placed on a 6-inch maintenance pad for an approximate elevation of 5.0. Chemical feed pumps are located at an approximate elevation of 7.5.

Mitigation measures include the following recommendations:

- Install floodproof doors on the facility and flood proof any structural/wall penetrations below BFE. Install flood panels on windows as needed.
- Install flood level instrument and alarm in case floodproof door fails.
- Install watertight manhole covers on manhole structures located below BFE.
- Vent pipes/louvers for the pump station and chemical tank shall be raised above the BFE so that airflow could be maintained during flood conditions. Otherwise, the facility would need to be shut down.
- Fill pipe for the chemical tank shall be raised above BFE and water tight.
- Chemical feed pumps shall be relocated above BFE.
- The electrical service/transformer should be raised or pole mounted.

3.2.4 Niantic River Road Pump Station

Niantic River Road Pump Station is located at 236A Niantic River Road. FEMA Maps were reviewed to identify the flood elevation in regard to the Niantic River Road Pump Station. The pump station is located on FEMA Map 09011C0481J (August 5, 2013) and located within flood zone AE with an established base flood elevation of 12.0. Critical equipment/infrastructure should be protected to elevation 15.0.

On the main floor, elevation 10.5, is a generator. Electrical panels are located inside the building in a drywell with the bottom floor elevation at -4.3 and the drywell is accessed by a fiberglass hatch located 1.5 feet above FFE (elevation 12).

Adjacent finish grade elevations on the exterior of the pump station is 7.75. Wetwell and bypass structure accessways are installed with watertight manhole covers.

Mitigation measures include the following recommendations:

- Install floodproof doors on the facility and flood proof any structural/wall penetrations below BFE. Install flood panels on windows as needed.
- Install flood level instrument and alarm in case floodproof door fails.
- Install watertight hatch on drywell as needed.
- Vent pipes/louvers for the pump station and fuel tank shall be raised above the BFE so that airflow could be maintained during flood conditions. Otherwise, the facility would need to be shut down.
- In addition, the fill pipe for the fuel tank shall be raised above BFE and water tight.
- The generator fuel tank should be secured to protect them from wave damage.

3.2.5 Oil Mill Road Pump Station

Oil Mill Road Pump Station is located at 25A Oil Mill Road. FEMA Maps were reviewed to identify the flood elevation in regard to the Oil Mill Road Pump Station. The pump station is located on FEMA Map 09011C0477J (August 5, 2013) and located within flood zone AE with an established base flood elevation of 9.0. Critical equipment/infrastructure should be protected to elevation 12.0.

The main finish floor elevation is 11.01. Finish grade elevation on the exterior of the pump station is 6.3.

The facilities bypass structure accessway is installed with a watertight manhole cover.

Wetwell hatch at approximate elevation of 10.8. The hatch should be confirmed it is watertight to prevent flooding of the wetwell.

Mitigation measures include the following recommendations:

- Install floodproof doors on the facility and flood proof any structural/wall penetrations below BFE. Install flood panels on windows as needed.
- Install flood level instrument and alarm in case floodproof door fails.
- Install locking manhole covers on manhole structures located below BFE.

3.2.6 Seaside Pump Station

Seaside Pump Station is located at 36 Shore Road. FEMA Maps were reviewed to identify the flood elevation in regard to the Seaside Pump Station. The pump station is located on FEMA Map 09011C0492J (August 5, 2013) and located within Flood zone AE with an established base flood elevation of 12.0. Critical equipment/infrastructure should be protected to elevation 15.0.

Main finish floor elevation (FFE) is 12.52 and houses the generator and electrical panels. An underground fuel tank for the generator is buried outside with a fill and vent extending abovegrade to elevation 15.0, assuming finish grade elevation on the exterior of the pump station is 12.0. The generator exhaust and intake louvers begin at elevation 14.27.

The interior fiberglass drywell hatch is raised to elevation 14.02 and the drywell vent is raised to elevation 18.0. The exterior wetwell hatch is raised to elevation 11.52.

The electrical transformer is pad mounted.

The facilities bypass structure accessway is installed with a watertight manhole cover.

Mitigation measures include the following recommendations:

- Install floodproof doors on the facility and flood proof any structural/wall penetrations below BFE. Install flood panels on windows as needed.
- Install flood level instrument and alarm in case floodproof door fails.
- Flood proof any structural/wall penetrations below BFE.
- Install watertight manhole covers on manhole structures located below BFE.

3.2.7 Shore Drive Pump Station

Shore Drive Pump Station is located at 2 Shore Drive. FEMA Maps were reviewed to identify the flood elevation in regard to the Shore Drive Pump Station. The pump station is located on FEMA Map 09011C0511J (August 5, 2013) and located within flood zone AE with an established base flood elevation of 10.0. Critical equipment/infrastructure should be protected to elevation 13.0.

The main finish floor elevation of the pump station is 11.03 and the generator and electrical panels are located. An underground fuel tank for the generator is buried outside with a fill and vent extending abovegrade. Wetwell hatch at approximate elevation of 10.78 should be confirmed it is watertight.

Confirm bypass structure accessway is installed with a watertight manhole cover.

Mitigation measures include the following recommendations:

- Floodproof doors installed on the facility and flood proof any structural/wall penetrations below BFE.
- Install flood level instrument and alarm in case floodproof door fails.
- Install watertight manhole covers on manhole structures located below BFE.
- Vent pipes/louvers for the pump station and fuel tank shall be raised above the BFE. In addition, the fill pipe for the fuel tank shall be raised above BFE and water tight.

SECTION 4

SECTION 4

IMPLEMENTATION

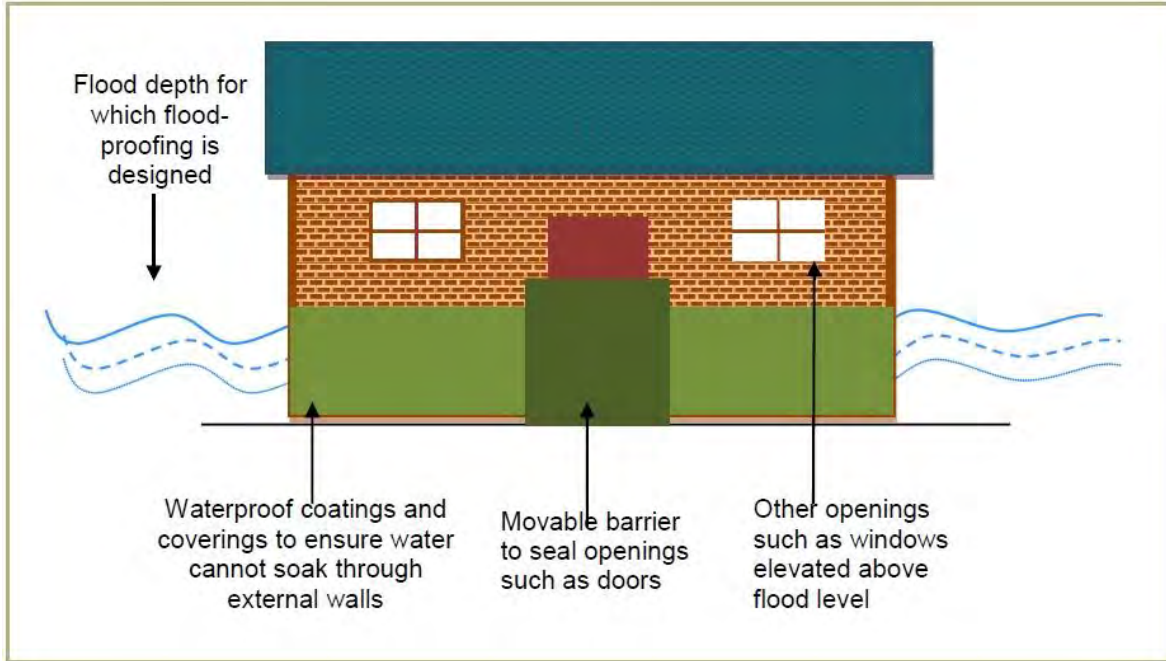
4.1 INTRODUCTION

Wastewater pump stations should be protected from damage during a flood event. Floodproofing a structure is defined as a combination of structural and non-structural additions, changes and adjustments to structures to reduce or eliminate flood damage to structures and the site. Dry floodproofing a structure can be a cost effective alternative solution to constructing a new facility outside of the floodplain or elevating the building above flood elevations. The structure itself should be made floodproof to the recommended protection elevations. With existing structures surfaces, impermeable membrane materials or waterproofing coating systems can be used on the surfaces of the structure. Additional courses of concrete or masonry may also be an appropriate solution to strengthen existing walls or provide an additional barrier for flood waters.

Structural openings, (i.e.: doors, windows, louvers, vents, pipe penetrations) should be watertight to prevent water from entering the building through the use of shields or barriers. More simple solutions for flood protection may include raising the elevations of vent pipes and fill pipes, replacement of standard manhole covers with watertight covers, and anchoring fuel tanks and chemical tanks to prevent flotation.

Floodproofing measures will require the WUC to mobilize operators and employees with adequate warning of an impending flood event. Some measures will also require ongoing maintenance. Floodproofing measures may take away from the aesthetics of the pump stations.

The floodproofing measures being discussed in the Section are relatively easy to retrofit to an existing structure and could be installed within a 6-12-month period making them a feasible and costs effective solution.



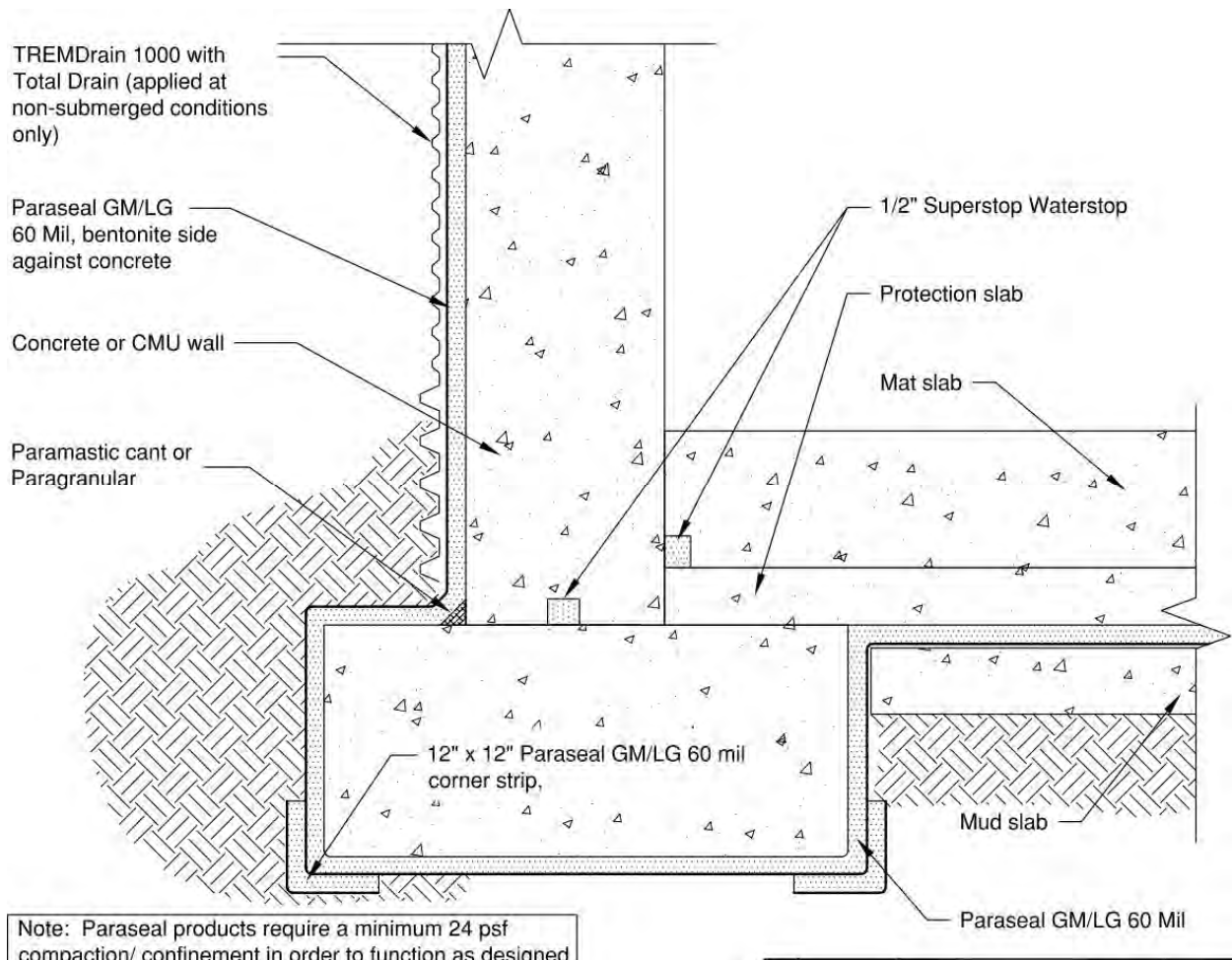
Source: ClimateTech Wiki

The following Section details some of the measures that can be implemented into the upgrades.

4.2 DETAILS

4.2.1 Impermeable Membrane & Coating Systems

Impermeable membranes and coatings can be used to seal walls to reduce or prevent the penetration of floodwater. Membranes and coatings are typically applied to exterior wall faces, making them cost-effective options for retrofitting existing buildings. The following is an example of membrane and coating systems that can be used on the existing pump stations for those areas above grade and above the elevation of the structural concrete. The detail shown is for new construction got the same principals apply.



Source: Tremco Products

4.2.2 Flood Doors/Barriers

Facilities with FFE below the flood design elevation, should be installed with flood doors or temporary barriers that can be manually installed in preparation for a flood event. Flood doors may be required under extreme conditions where flood event and elevations are well above the FFE of the pump station. Flood doors can be a costly option and can become a burden to operators under normal operation and maintenance. When flood elevations are a few feet above the FFE of the pump station, a temporary barrier that is manually installed prior to a flood event may be a preferable option. W-P would recommend temporary barriers for the pump stations to provide the station and equipment from flood water entering the facility. An example of temporary barriers includes the following:

Mechanical Seal Barrier: Mechanical barriers require installation by an operator prior to a flood event where the barrier is compressed against a mechanical seal. Similar system can be installed on window openings as well.



Source: Presray Products

Pneumatic Seal Barrier: Pneumatic barriers require installation by an operator prior to a flood event where the barrier is compressed against a frame by inflation of a gasket with air (hand pump or portable compressors).



Source: Presray Products

For addition cut sheets and installation details, please refer to Appendix B.

4.3 NEXT STEPS

Prior to designing or implementing floodproofing measures, a detailed site evaluation and field survey should be conducted by a licensed surveyor to verify elevations. A flood event will impact the seven (7) existing pumping stations identified but it will also impact the surrounding area that they serve. A survey would help identify existing site topography and grades and identify if the access road to the pump station would be flooded. Additional measures may need to be made in order to access the facility during a flood event. Other options to consider are regional flood control or attempting to “minimize” damage to the facility and equipment.

A detailed building evaluation should be conducted as well to verify the existing condition of the facility including a detailed structural evaluation to identify any cracks or damaged surfaces that need to be repaired and made watertight in addition to any recommended flood mitigation measures.

In order to implement the floodproofing measure within an 18-month period; the facility evaluation, design and bidding would be conducted within a 6-month period.

4.4 COST ESTIMATE

Based on the recommendations made in Section 3 and 4, budgetary cost estimates have been developed for each of the seven sewer pump stations summarized in the table on the next page. Assuming this work would be conducted as one project, allowances have been included for design, concrete repairs, field survey, membrane coatings and up to twenty manhole frame and cover replacements with watertight units.

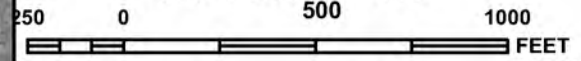
TOWN OF WATERFORD, CONNECTICUT						
PRELIMINARY PROJECT COST ESTIMATE SUMMARY						
WASTEWATER PUMP STATION FLOODING VULNERABILITY IMPROVEMENTS						
Location & Item Description	Quantity	Units	Unit Cost	Total Material Cost	Labor Cost	Total Cost
Bolles Court						
Install Flood Doors/Panels	2	EA	\$ 1,200.00	\$ 2,400.00	\$ 2,400.00	\$ 4,800.00
Flood Level Instruments and Programming	1	LS	\$ 1,500.00	\$ -	\$ 1,500.00	\$ 1,500.00
Raise Electrical Transformer	1	LS	\$ 5,000.00	\$ -	\$ 5,000.00	\$ 5,000.00
Subtotal						\$ 11,300.00
Gardiners Wood						
Install Flood Doors/Panels	2	EA	\$ 1,200.00	\$ 2,400.00	\$ 2,400.00	\$ 4,800.00
Flood Level Instruments and Programming	1	LS	\$ 1,500.00	\$ -	\$ 1,500.00	\$ 1,500.00
Raise vent and fill pipes	1	LS	\$ 1,000.00	\$ -	\$ 1,000.00	\$ 1,000.00
Anchor Fuel Tank	1	LS	\$ 500.00	\$ -	\$ 500.00	\$ 500.00
Replace Hatches	2	EA	\$ 5,000.00	\$ 10,000.00	\$ 15,000.00	\$ 25,000.00
Subtotal						\$ 32,800.00
Mago Point						
Install Flood Doors/Panels	2	EA	\$ 1,200.00	\$ 2,400.00	\$ 2,400.00	\$ 4,800.00
Flood Level Instruments and Programming	1	LS	\$ 1,500.00	\$ -	\$ 1,500.00	\$ 1,500.00
Raise vent and fill pipes	1	LS	\$ 1,000.00	\$ -	\$ 1,000.00	\$ 1,000.00
Relocate Chemical Feed Pumps	1	LS	\$ 1,500.00	\$ -	\$ 1,500.00	\$ 1,500.00
Raise Electrical Transformer	1	LS	\$ 7,500.00	\$ -	\$ 7,500.00	\$ 7,500.00
Subtotal						\$ 16,300.00
Niantic River Rd						
Install Flood Doors/Panels	2	EA	\$ 1,200.00	\$ 2,400.00	\$ 2,400.00	\$ 4,800.00
Flood Level Instruments and Programming	1	LS	\$ 1,500.00	\$ -	\$ 1,500.00	\$ 1,500.00
Raise vent and fill pipes	1	LS	\$ 1,000.00	\$ -	\$ 1,000.00	\$ 1,000.00
Anchor Fuel Tank	1	LS	\$ 500.00	\$ -	\$ 500.00	\$ 500.00
Replace Hatch	1	EA	\$ 5,000.00	\$ 5,000.00	\$ 7,500.00	\$ 12,500.00
Subtotal						\$ 20,300.00
Oil Mill Rd						
Install Flood Doors/Panels	2	EA	\$ 1,200.00	\$ 2,400.00	\$ 2,400.00	\$ 4,800.00
Flood Level Instruments and Programming	1	LS	\$ 1,500.00	\$ -	\$ 1,500.00	\$ 1,500.00
Subtotal						\$ 6,300.00
Seaside						
Install Flood Doors/Panels	2	EA	\$ 1,200.00	\$ 2,400.00	\$ 2,400.00	\$ 4,800.00
Flood Level Instruments and Programming	1	LS	\$ 1,500.00	\$ -	\$ 1,500.00	\$ 1,500.00
Subtotal						\$ 6,300.00
Shore Drive						
Install Flood Doors/Panels	2	EA	\$ 1,200.00	\$ 2,400.00	\$ 2,400.00	\$ 4,800.00
Flood Level Instruments and Programming	1	LS	\$ 2,000.00	\$ -	\$ 2,000.00	\$ 2,000.00
Raise vent and fill pipes	1	LS	\$ 1,000.00	\$ -	\$ 1,000.00	\$ 1,000.00
Subtotal						\$ 7,800.00
Subtotal - Raw						\$ 101,100.00
Miscellaneous Items						
Unaccounted for Items	1	20%	\$ -	\$ -	\$ -	\$ 20,220.00
Install Watertight Manhole Covers	20	EA	\$ 750.00	\$ 15,000.00	\$ 15,000.00	\$ 30,000.00
Field Survey	1	LS	\$ 7,500.00	\$ -	\$ 7,500.00	\$ 7,500.00
Concrete Repair Allowance	1	ALL	\$ 15,000.00	\$ 15,000.00	\$ -	\$ 15,000.00
Membrane Coating Allowance	1	ALL	\$ 50,000.00	\$ 50,000.00	\$ -	\$ 50,000.00
Mobilization/Demobilization @ 5%	1	LS	\$ -	\$ -	\$ -	\$ 10,816.00
Cleanup	1	LS	\$ 7,500.00	\$ 7,500.00	\$ -	\$ 7,500.00
Bonding	1	LS	\$ 2,500.00	\$ 2,500.00	\$ -	\$ 2,500.00
GC Overhead & Profit @ 20%	1	LS	\$ -	\$ -	\$ -	\$ 45,427.20
Subtotal						\$ 188,963.20
Subtotal - Construction						\$ 290,063.20
Engineering (Design) @ 10%						\$ 29,006.32
TOTAL PROJECT COST ESTIMATE						\$ 319,000.00

APPENDIX A

JOINS PANEL 0361



MAP SCALE 1" = 500'



PANEL 0363J

FIRM

FLOOD INSURANCE RATE MAP
 NEW LONDON COUNTY,
 CONNECTICUT
 (ALL JURISDICTIONS)

PANEL 363 OF 554
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GROTON, TOWN OF	090097	0363	J
LEDYARD, TOWN OF	090157	0363	J
NEW LONDON, CITY OF	090100	0363	J
WATERFORD, TOWN OF	090107	0363	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

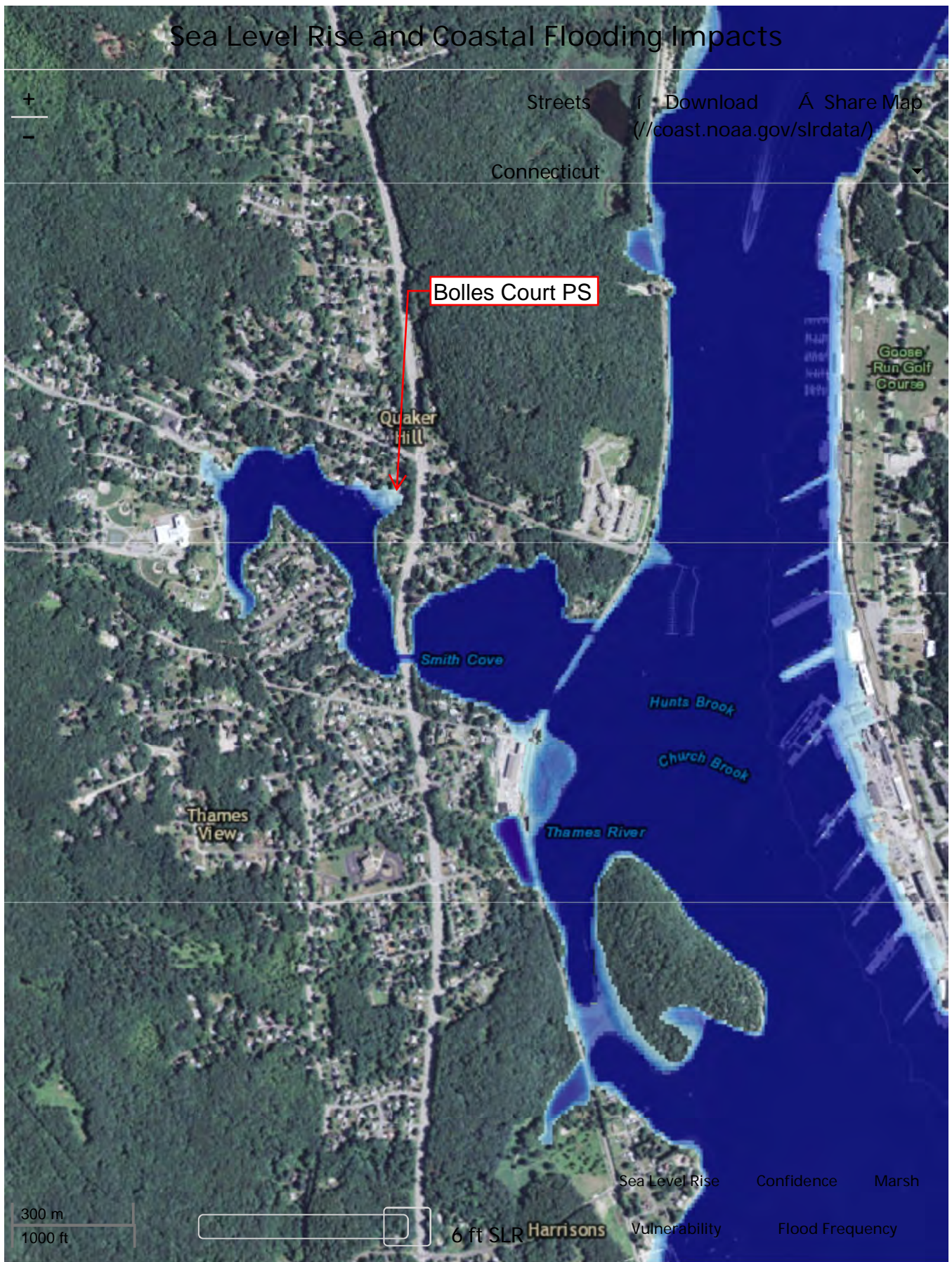


MAP NUMBER
 09011C0363J
MAP REVISED
 AUGUST 5, 2013

Federal Emergency Management Agency

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NATIONAL FLOOD INSURANCE PROGRAM



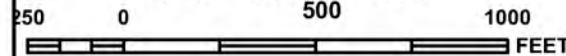
United States Department of Commerce (<http://www.doc.gov>) | National Oceanic and Atmospheric Administration



Gardiner's Wood PS



MAP SCALE 1" = 500'



PANEL 0483J

FIRM

FLOOD INSURANCE RATE MAP
 NEW LONDON COUNTY,
 CONNECTICUT
 (ALL JURISDICTIONS)

PANEL 483 OF 554
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EAST LYME, TOWN OF	090096	0483	J
WATERFORD, TOWN OF	090107	0483	J

-NOTE-
 THIS MAP INCLUDES BOUNDARIES OF THE COASTAL BARRIER RESOURCES SYSTEM ESTABLISHED UNDER THE COASTAL BARRIER RESOURCES ACT OF 1982 AND/OR SUBSEQUENT ENABLING LEGISLATION.

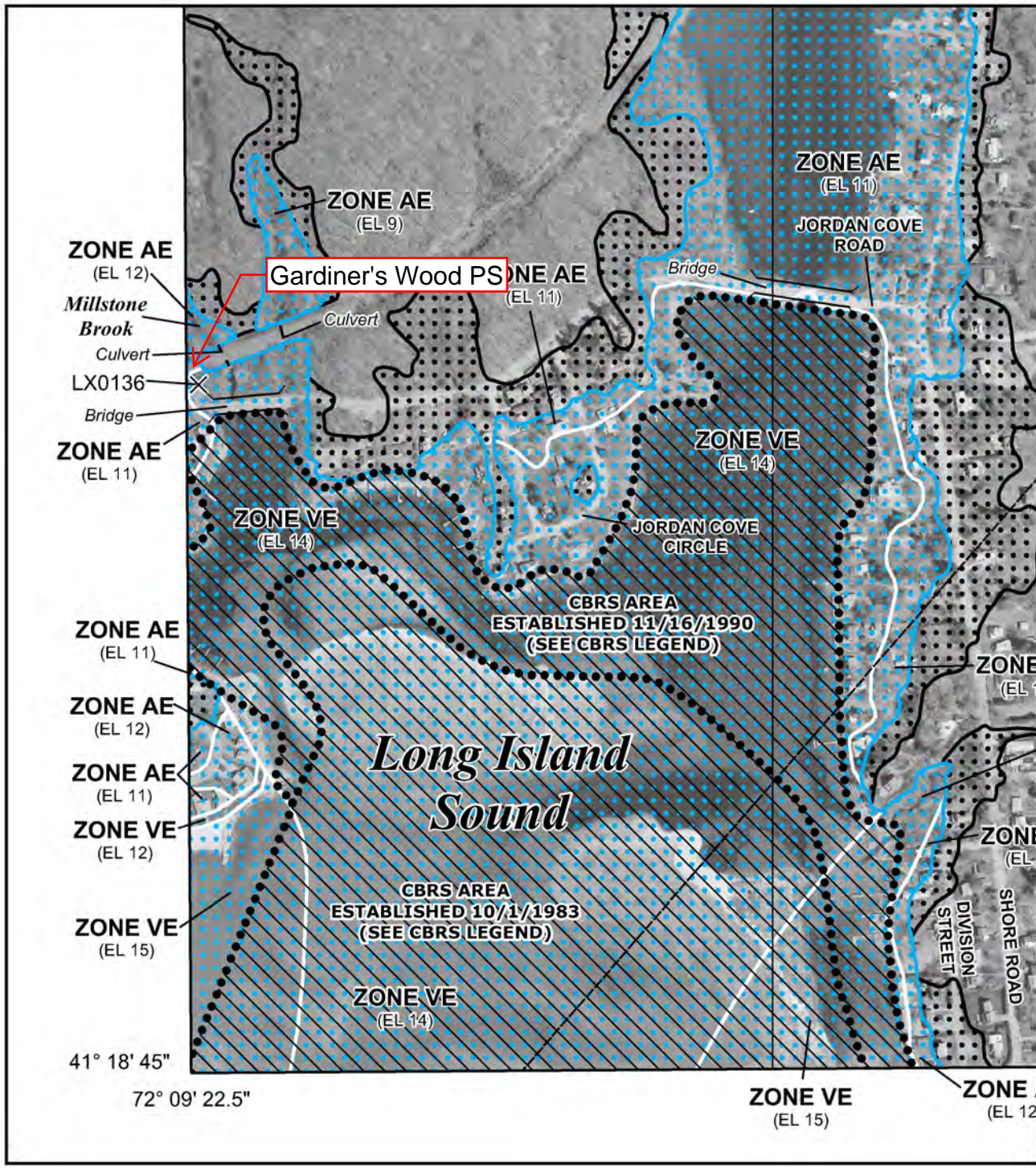
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



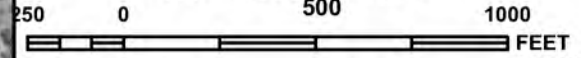
MAP NUMBER
 09011C0483J
MAP REVISED
 AUGUST 5, 2013

Federal Emergency Management Agency

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MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0484J

FIRM
FLOOD INSURANCE RATE MAP
NEW LONDON COUNTY,
CONNECTICUT
 (ALL JURISDICTIONS)

PANEL 484 OF 554
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WATERFORD, TOWN OF	090107	0484	J

-NOTE-
 THIS MAP INCLUDES BOUNDARIES OF THE COASTAL BARRIER RESOURCES SYSTEM ESTABLISHED UNDER THE COASTAL BARRIER RESOURCES ACT OF 1982 AND/OR SUBSEQUENT ENABLING LEGISLATION.

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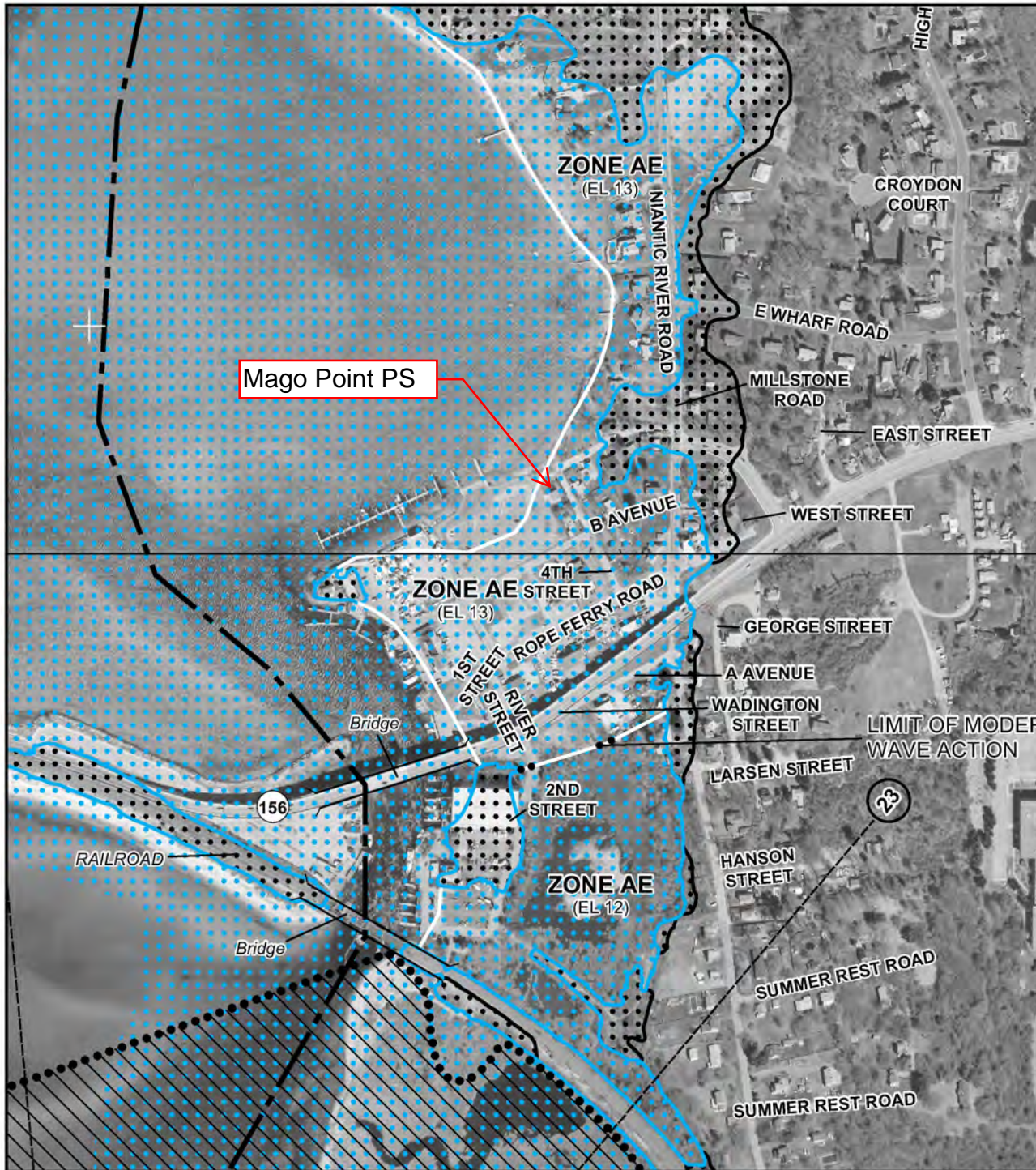
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MAP REVISED
 AUGUST 5, 2013

Federal Emergency Management Agency

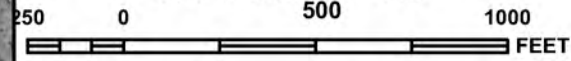
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



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MAP SCALE 1" = 500'



PANEL 0483J

FIRM
FLOOD INSURANCE RATE MAP
NEW LONDON COUNTY,
CONNECTICUT
 (ALL JURISDICTIONS)

PANEL 483 OF 554
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EAST LYME, TOWN OF	090096	0483	J
WATERFORD, TOWN OF	090107	0483	J

-NOTE-
 THIS MAP INCLUDES BOUNDARIES OF THE COASTAL BARRIER RESOURCES SYSTEM ESTABLISHED UNDER THE COASTAL BARRIER RESOURCES ACT OF 1982 AND/OR SUBSEQUENT ENABLING LEGISLATION.

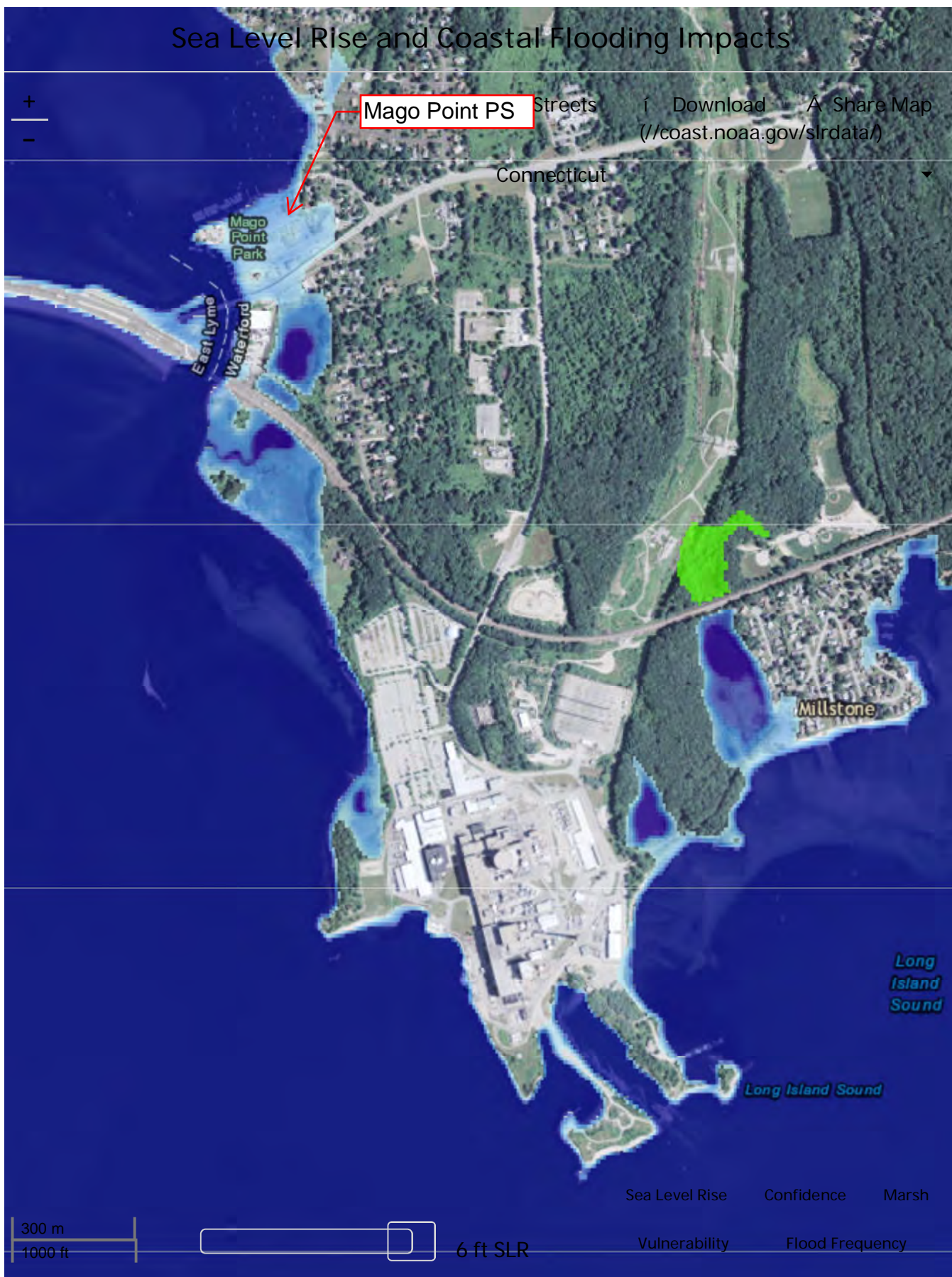
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



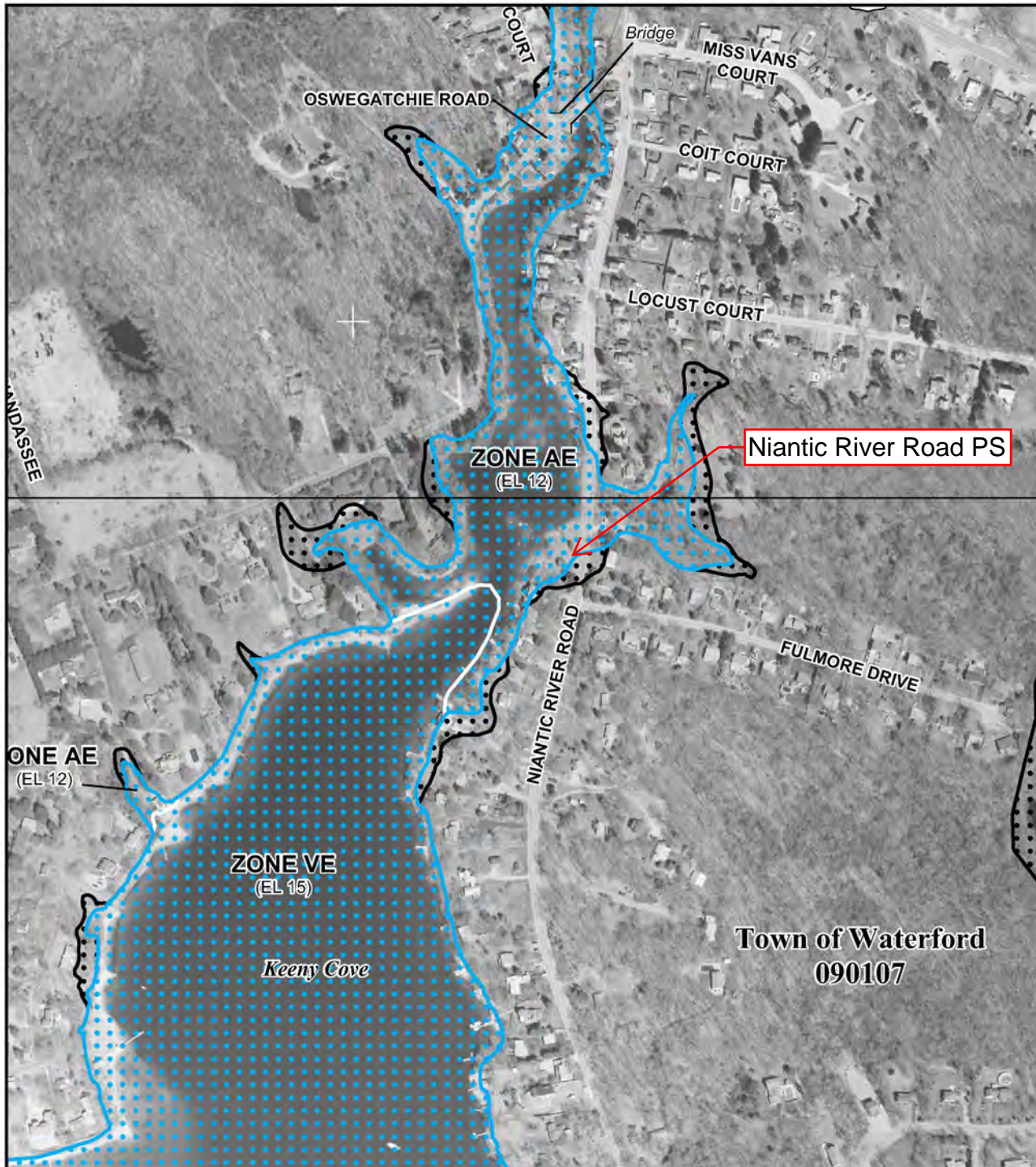
MAP NUMBER
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MAP REVISED
AUGUST 5, 2013

Federal Emergency Management Agency

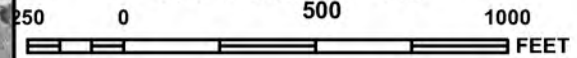
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



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MAP SCALE 1" = 500'



PANEL 0481J

FIRM

FLOOD INSURANCE RATE MAP
 NEW LONDON COUNTY,
 CONNECTICUT
 (ALL JURISDICTIONS)

PANEL 481 OF 554

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EAST LYME, TOWN OF	090096	0481	J
WATERFORD, TOWN OF	090107	0481	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



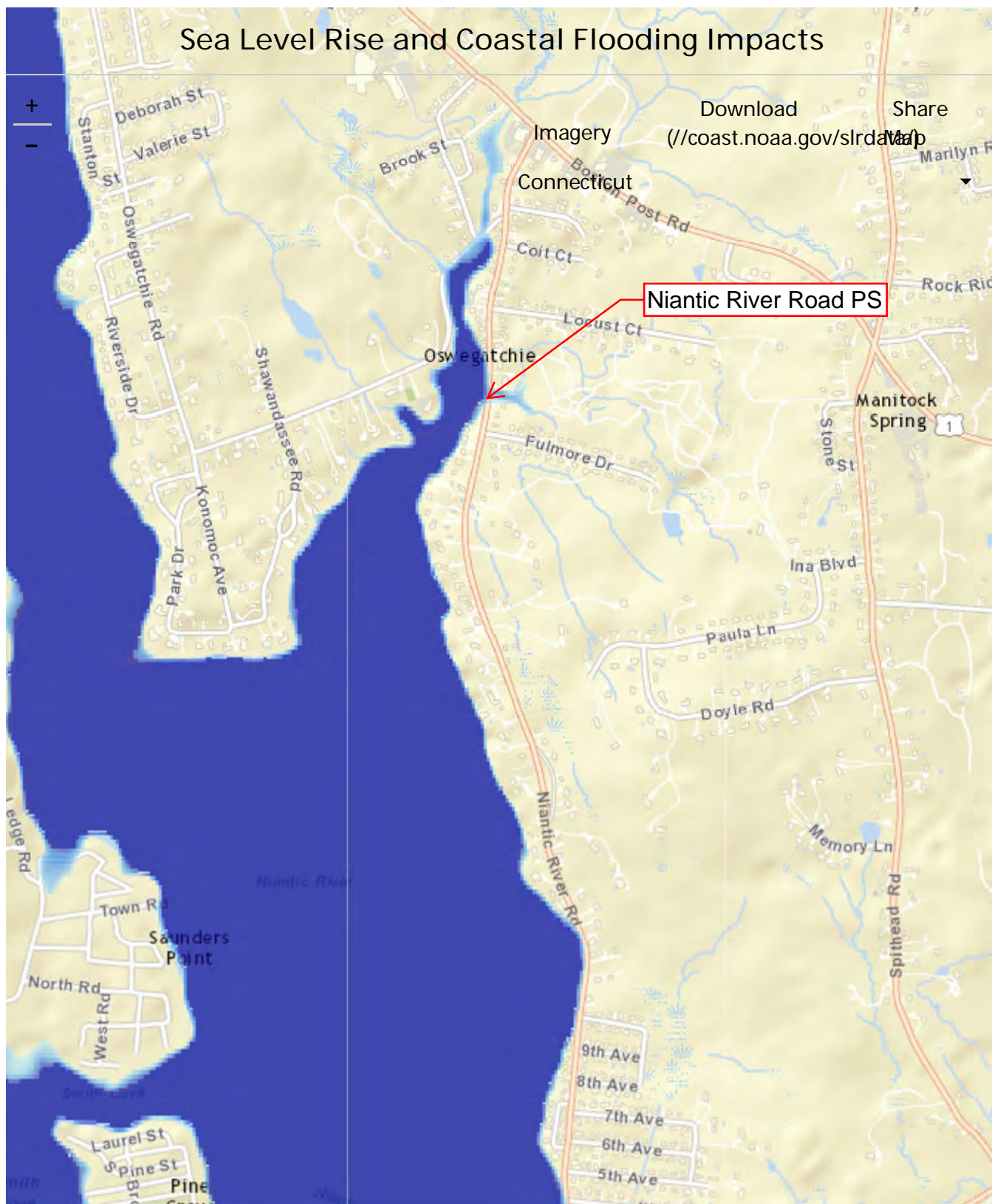
MAP NUMBER
 09011C0481J

MAP REVISED
 AUGUST 5, 2013

Federal Emergency Management Agency

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Sea Level Rise and Coastal Flooding Impacts



+
-

Download
Share
Imagery
Map
(//coast.noaa.gov/slr/)

Niantic River Road PS

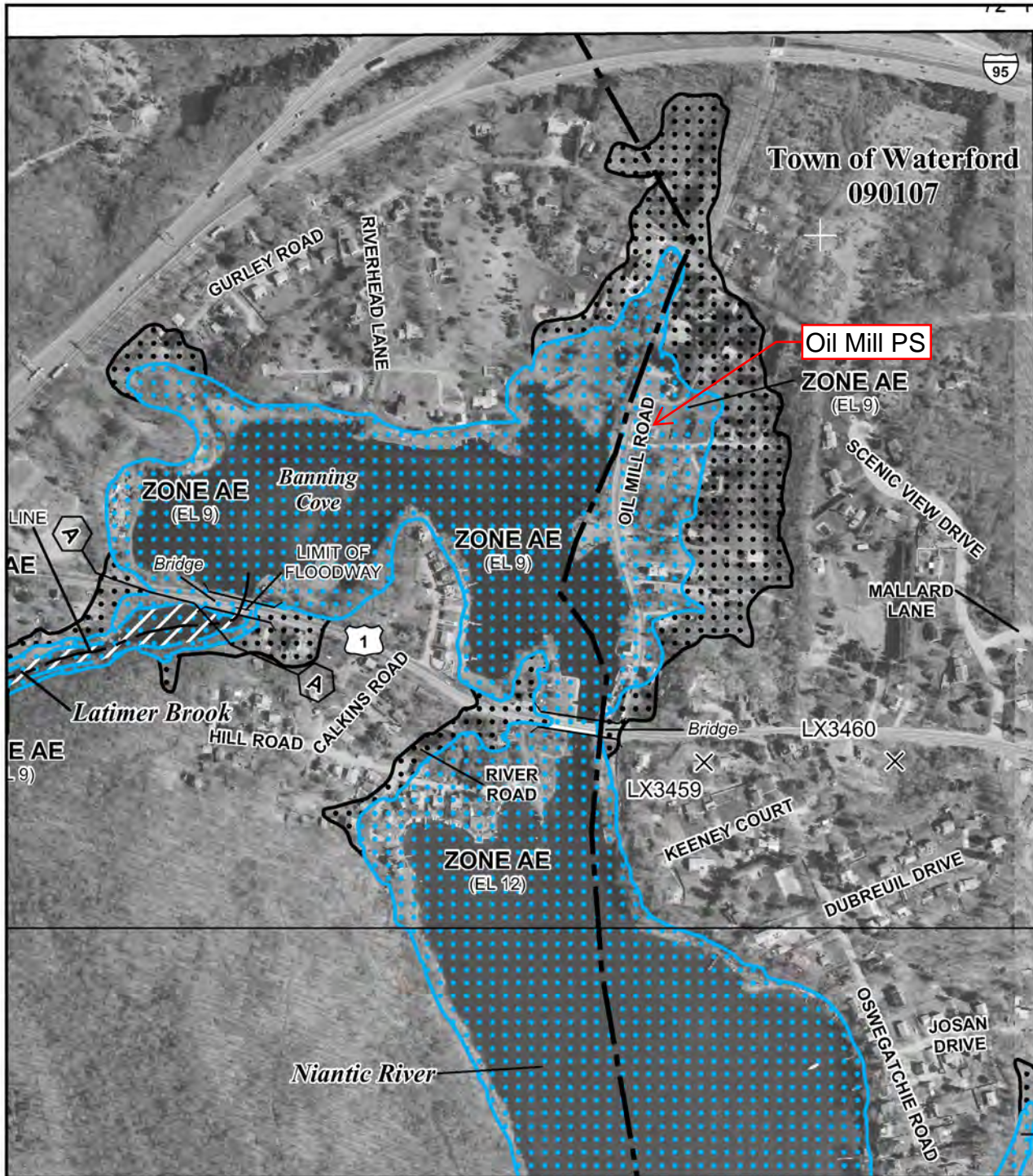
300 m
1000 ft



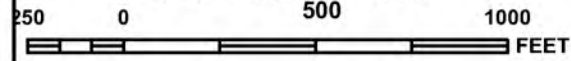
6 ft SLR

Sea Level Rise Confidence Marsh
Vulnerability Flood Frequency

United States Department of Commerce (<http://www.doc.gov>) | National Oceanic and Atmospheric Administration



MAP SCALE 1" = 500'



Town of Waterford
090107

PANEL 0477J

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
NEW LONDON COUNTY,
CONNECTICUT
(ALL JURISDICTIONS)

PANEL 477 OF 554
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EAST LYME, TOWN OF	090096	0477	J
WATERFORD, TOWN OF	090107	0477	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



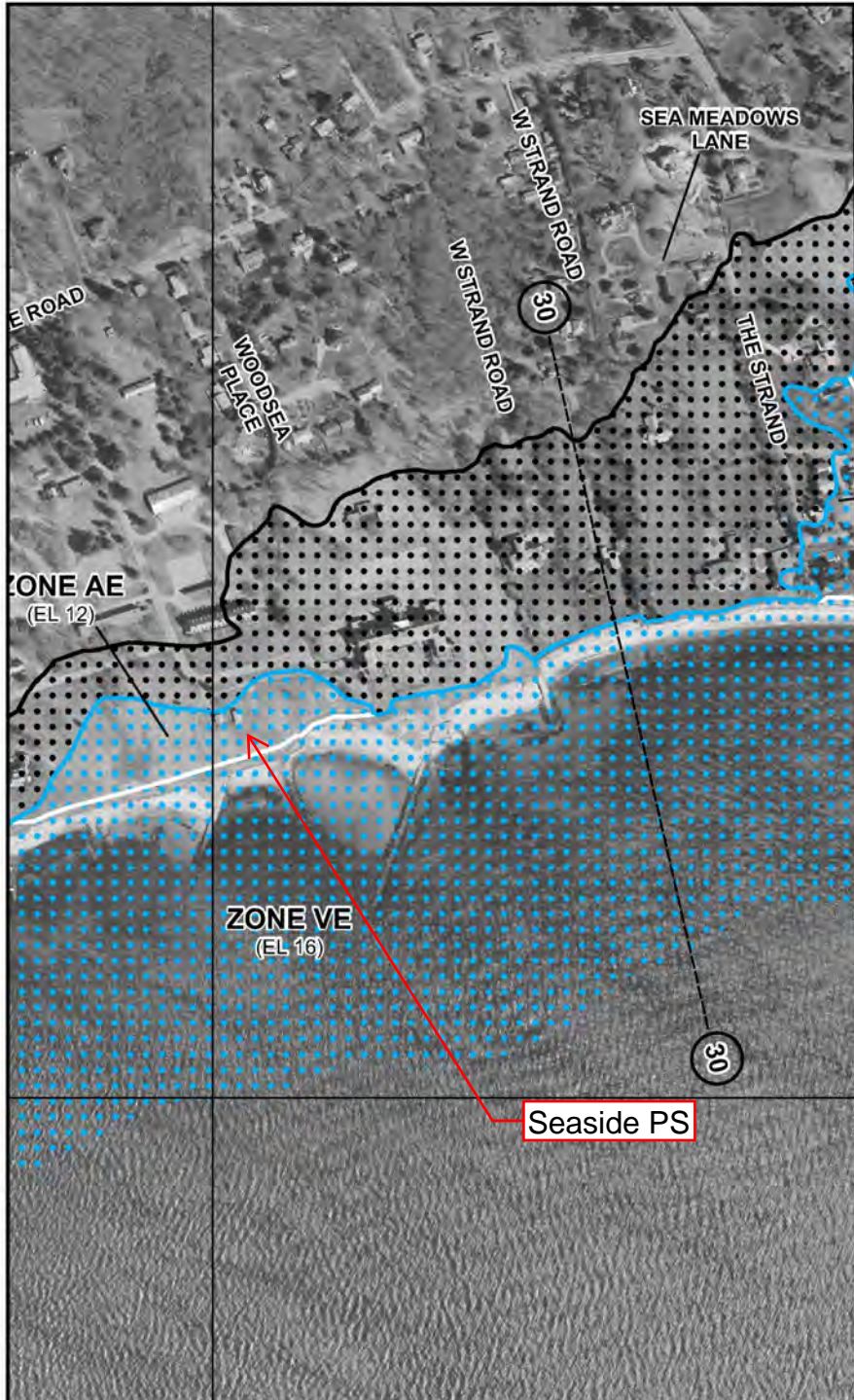
MAP NUMBER
09011C0477J
MAP REVISED
AUGUST 5, 2013

Federal Emergency Management Agency

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JOINS PANEL 0511

FLOODING EFFECTS FROM LONG ISLAND SOUND

ZONE AE (EL 12)

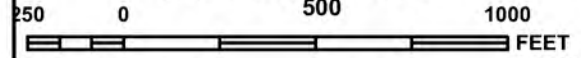
LIMIT OF MODERATE WAVE ACTION

ZONE AE (EL 11)

45° 76' 000m N



MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0492J

FIRM
FLOOD INSURANCE RATE MAP
NEW LONDON COUNTY,
CONNECTICUT
 (ALL JURISDICTIONS)

PANEL 492 OF 554
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WATERFORD, TOWN OF	090107	0492	J

-NOTE-
 THIS MAP INCLUDES BOUNDARIES OF THE COASTAL BARRIER RESOURCES SYSTEM ESTABLISHED UNDER THE COASTAL BARRIER RESOURCES ACT OF 1982 AND/OR SUBSEQUENT ENABLING LEGISLATION.

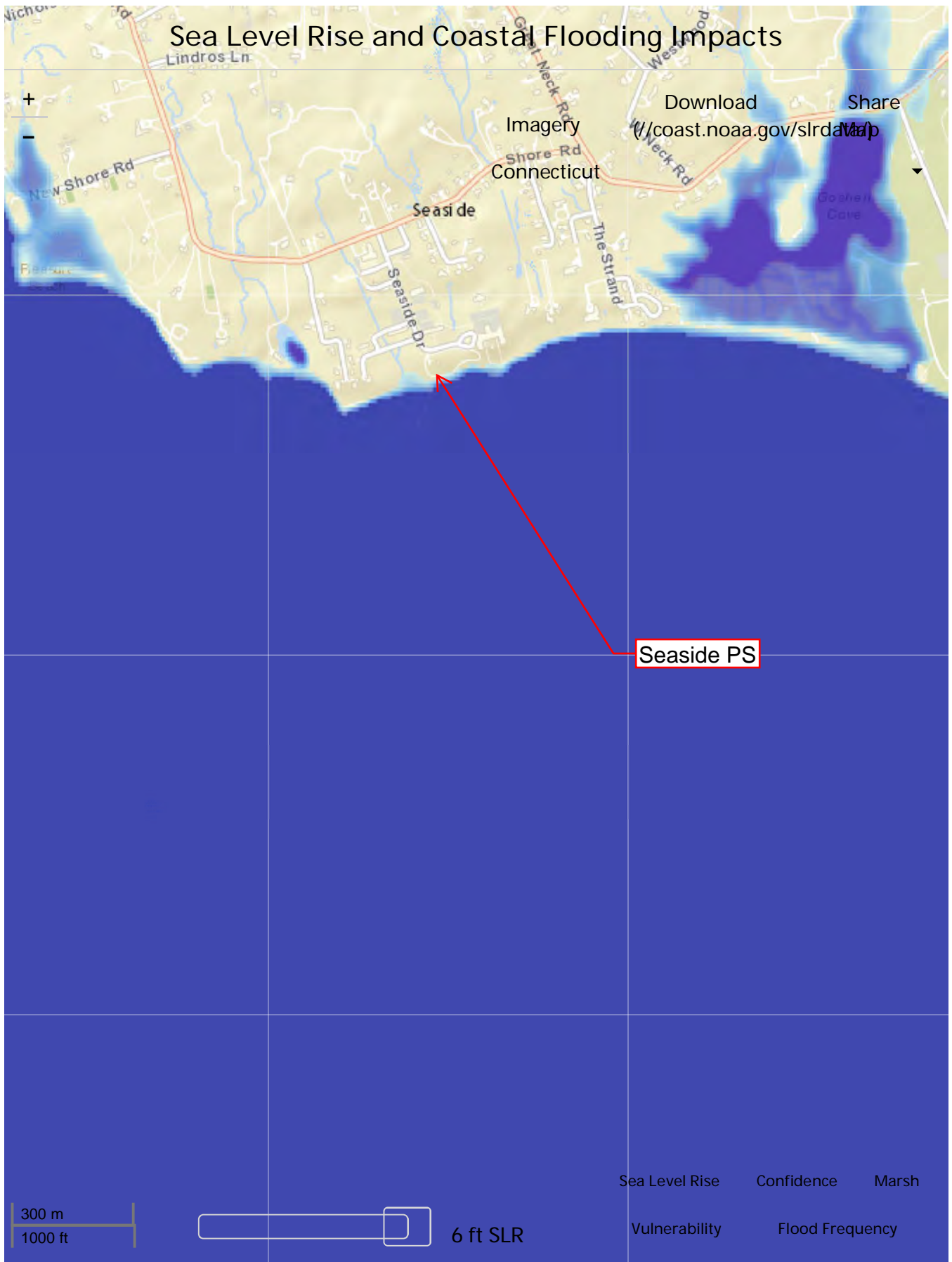
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
09011C0492J
MAP REVISED
AUGUST 5, 2013

Federal Emergency Management Agency

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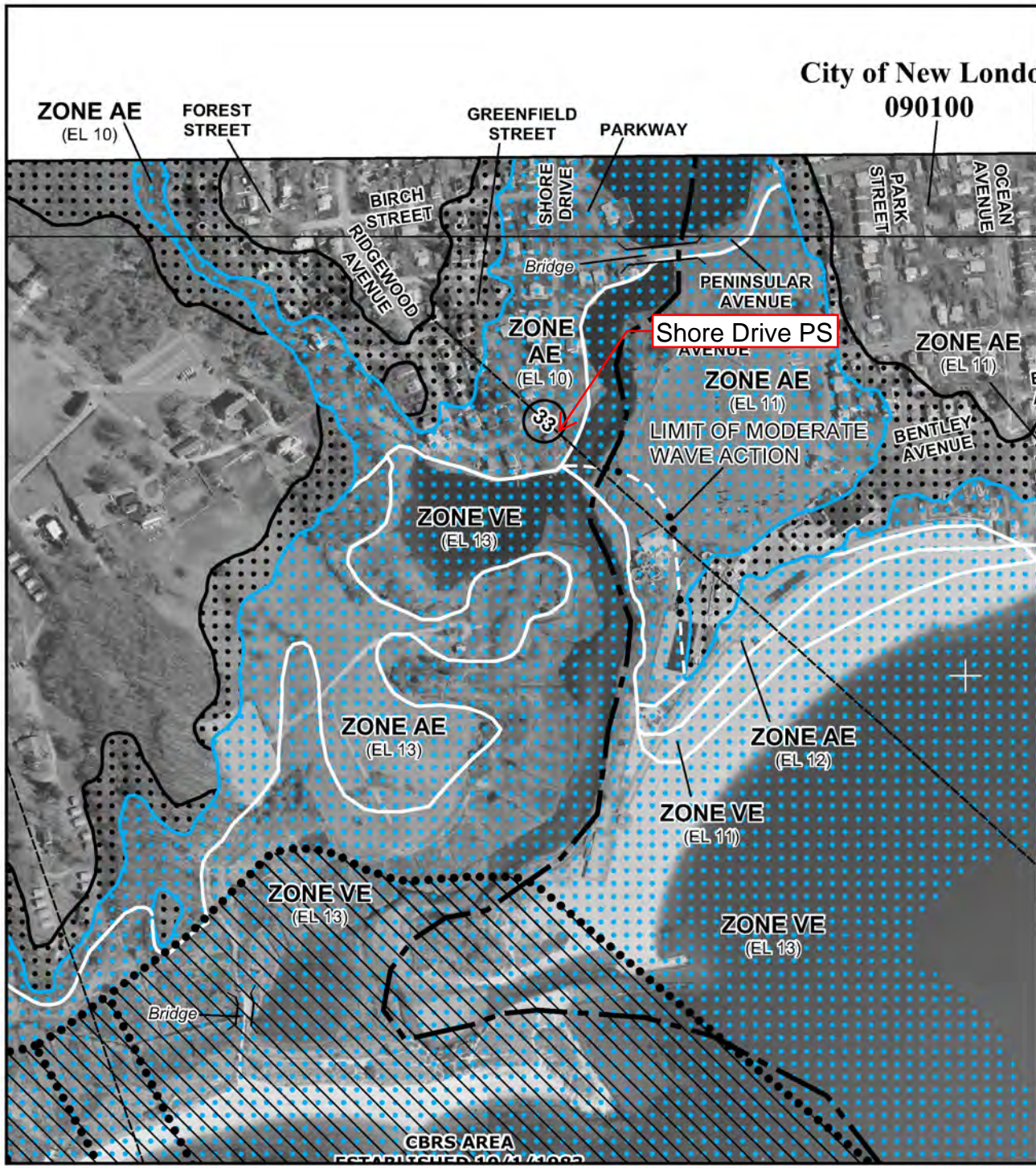
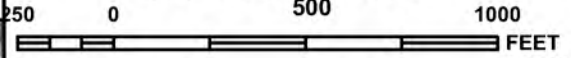
United States Department of Commerce (<http://www.doc.gov>) | National Oceanic and Atmospheric Administration

City of New London

090100



MAP SCALE 1" = 500'



PANEL 0511J

FIRM

FLOOD INSURANCE RATE MAP
NEW LONDON COUNTY,
CONNECTICUT
(ALL JURISDICTIONS)

PANEL 511 OF 554
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
NEW LONDON, CITY OF	090100	0511	J
WATERFORD, TOWN OF	090107	0511	J

-NOTE-
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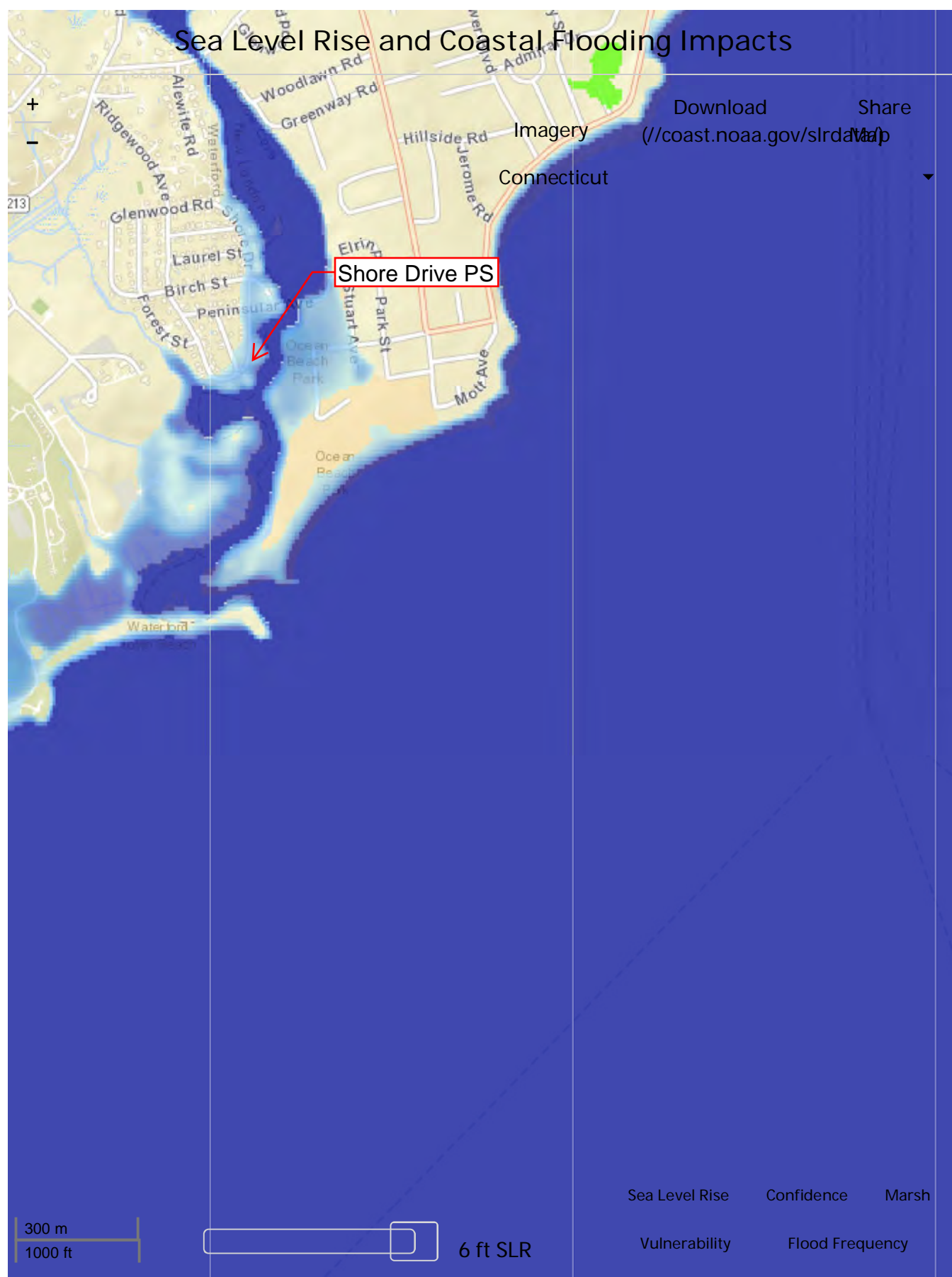
MAP NUMBER
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MAP REVISED
AUGUST 5, 2013

Federal Emergency Management Agency

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NATIONAL FLOOD INSURANCE PROGRAM



United States Department of Commerce (<http://www.doc.gov>) | National Oceanic and Atmospheric Administration

APPENDIX B

Size	Custom built to any dimensions up to 40 square feet
Panel	6061-T6 Aircraft Aluminum
Frame	Conversion frame is made of A36 Carbon Steel. 304/316 Stainless Steel also available.
Seals	Presray Pneuma-Seal® technology
Hardware	Welded aluminum hand grips for easy handling. Manually operated slide bolts lock panel into jamb.
Finish	Panel is bright aluminum. Frame is blast cleaned per SSPCSP7 and primed with one coat

AVAILABLE OPTIONS

- ▶ Multi-Panel Systems with removable mullions between panels for openings too wide to be accommodated by single panel
- ▶ Frame available in stainless steel
- ▶ Hand pump or portable compressors should facility air source not be available
- ▶ Floor or Wall Mounted Storage Racks, Transport Dollies to move panels into position
- ▶ A gate version (FB22G) is available in which the panel is stored in the ceiling and is lowered for deployment

CUSTOM BUILT TO MEET YOUR REQUIREMENTS

Every FB22 Flood Barrier is custom built from shop drawings to ensure that it meets the special needs of your facility.

Barriers are designed with a minimum of 2:1 factor of safety based on material yield strength. They can be mounted inside an opening (between doorjamb), or mounted on the face of the building with the frame installed in front of the opening.

The FB22 is primed and finished on site, or, if desired, final coat can be applied at our manufacturing facility.

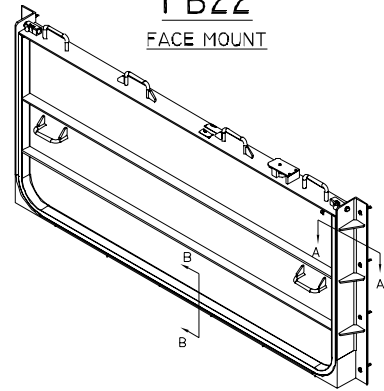


FOR MORE INFORMATION

845.373.6700 ■ www.presray.com ■ contact@presray.com

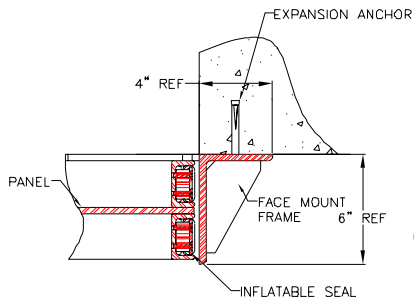
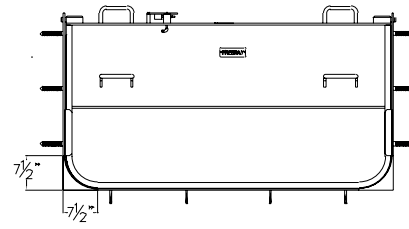
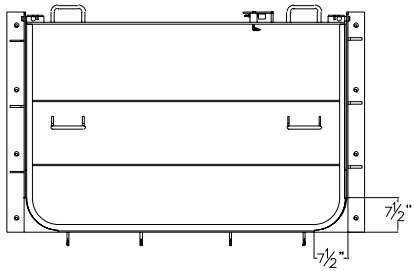
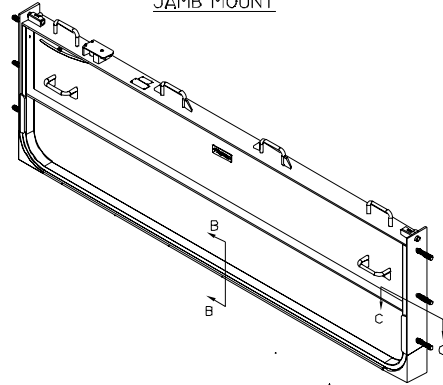
FB22

FACE MOUNT

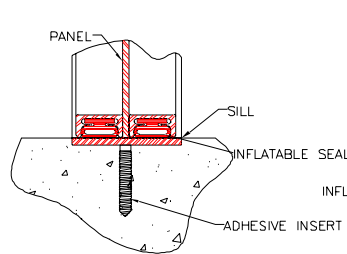


FB22

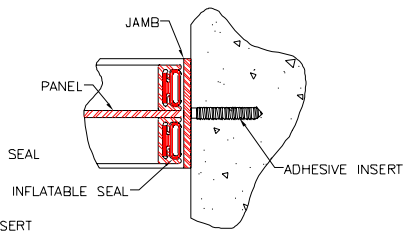
JAMB MOUNT



ALTERNATE FACE MOUNT
SECTION A-A



SECTION B-B



STANDARD JAMB MOUNT
SECTION C-C

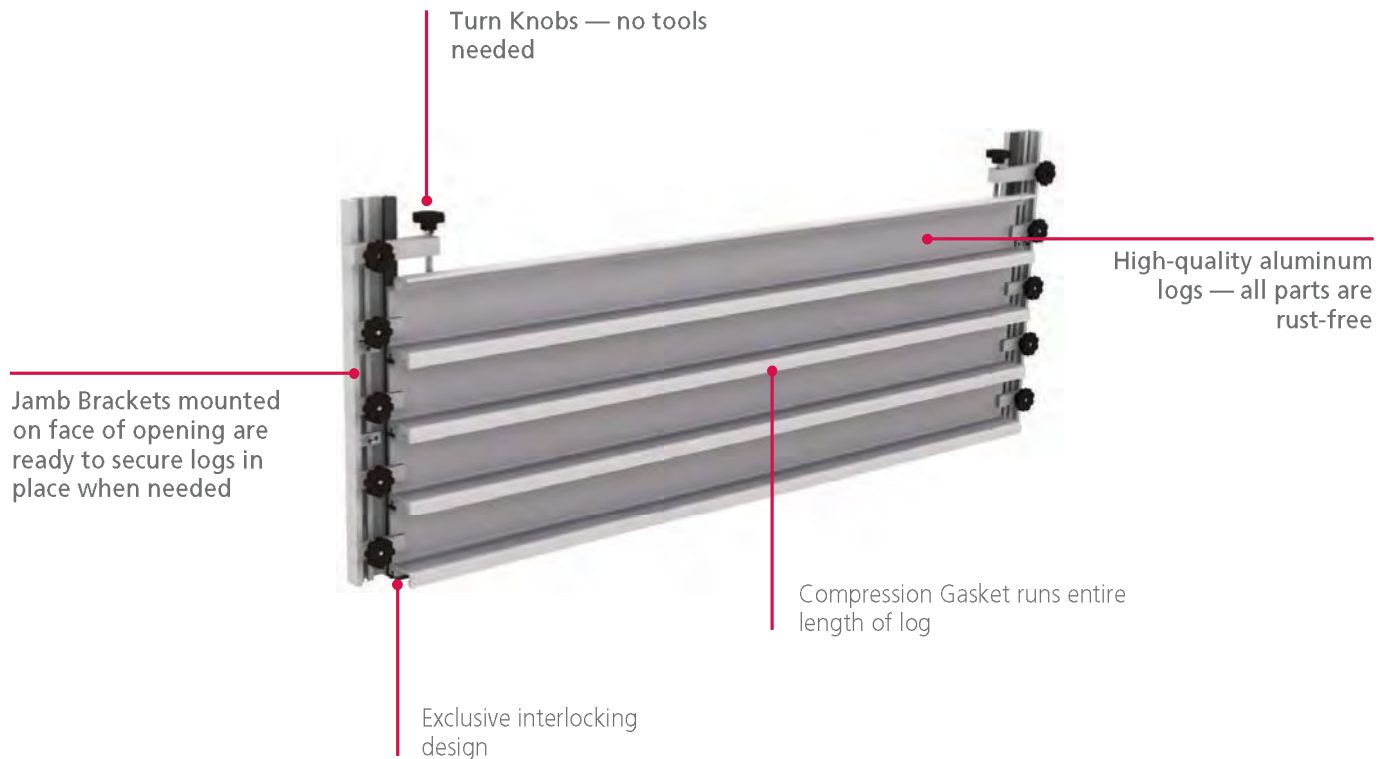
Logs	Presray AL6061-T6 aluminum channels
Frames	Presray AL6061-T6 aluminum jamb Extrusion Steel jambs optional for certain conditions
Seal	Presray compression gasket composed of high-density closed cell neoprene sponge with skin, retained in the stop logs and jambs
Hardware	Presray Compression Brackets; Presray Hold Down Brackets; KN8C Turn Knobs
Finish	Stop logs mill-finish aluminum; jambs mill-finish aluminum Steel jambs (if used) primed with one coat rust inhibitive, lead-free, red primer

CUSTOMIZED TO MEET YOUR REQUIREMENTS

Custom cut and assembled to the exact dimensions for your opening, FastLogs are designed with a minimum of 2:1 factor of safety based on material yield strength.

FastLogs are mounted in front of the opening using Jamb Brackets mounted on the face of the building. The Jamb brackets have mounting holes for concrete anchors and bolts (options include epoxy anchors for block walls, and studs for concrete embedment).

Short ordering times are possible because Presray keeps the aluminum logs, jamb brackets and hardware always in stock.



FOR MORE INFORMATION

845.373.6700 ■ www.presray.com ■ contact@presray.com

PRODUCT SPECIFICATIONS

CG11FS

Size	Custom built to match opening size
Panel	6061-T6 aluminum plate (steel or stainless steel optional)
Conversion Frame	Low carbon steel (stainless steel optional)
Seals	Presray type 25 durometer, fully-molded neoprene gaskets; no mitered joints (other materials available for special environmental conditions)
Hardware	Attachment Bolts: Presray type FS Handles: Welded on top and/or face of panel for ease of handling
Finish	Panel: Bright aluminum Frame: Primed with rust inhibitive, lead free, red primer.

AVAILABLE OPTIONS

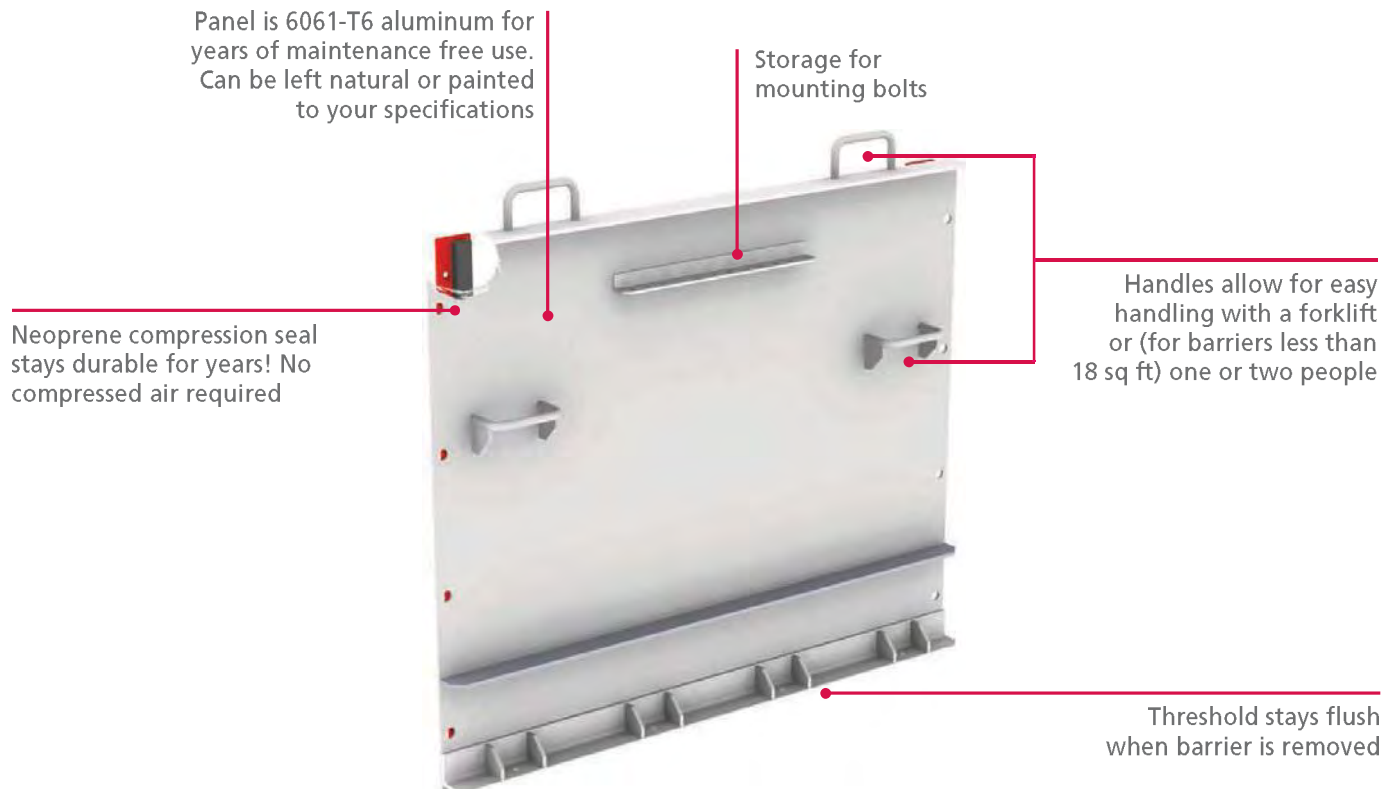
- ▶ Seals available in Viton® or other special materials
- ▶ Panel available in steel or stainless steel
- ▶ Epoxy anchors for block walls or studs for poured concrete

CUSTOM BUILT TO MEET YOUR REQUIREMENTS

Every CG11FS Flood Panel is custom built from shop drawings to ensure that it meets the needs of your facility.

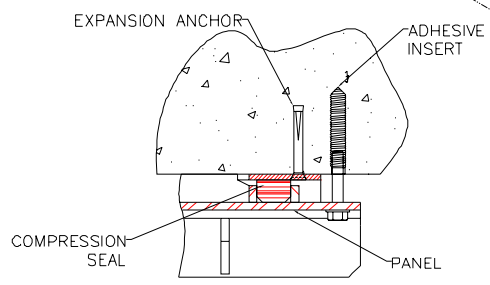
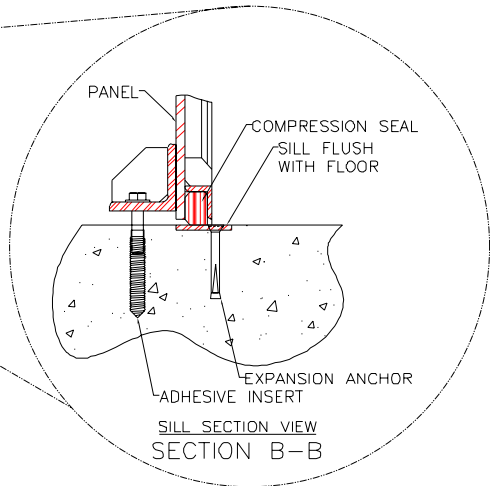
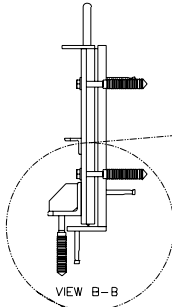
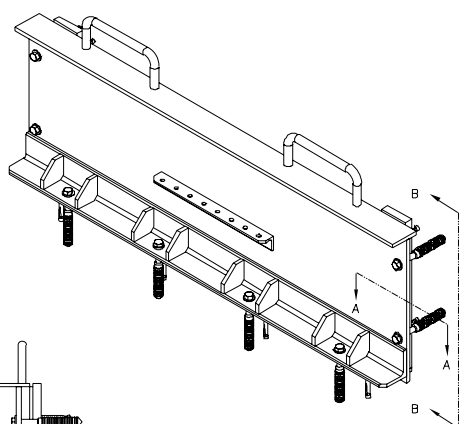
Seal areas can be designed to cover 3 or 4 sides of the panel.

Doors are designed with a minimum of 2:1 factor of safety based on material yield strength, and will provide an effective seal against the flood level for which it is designed.

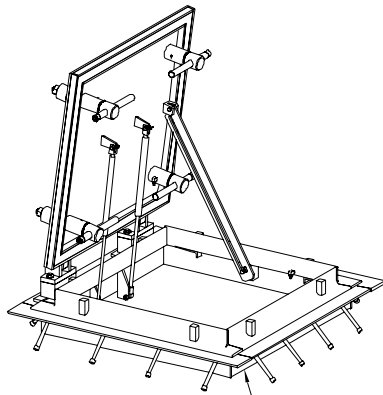


FOR MORE INFORMATION

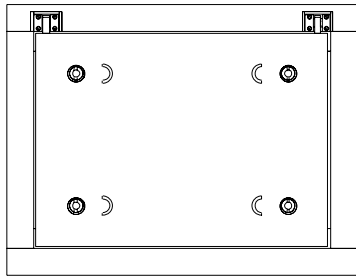
845.373.6700 ■ www.presray.com ■ contact@presray.com



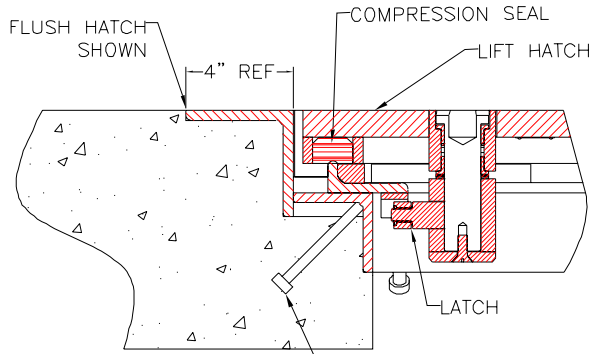
JAMB SECTION VIEW
SECTION A-A



RAISED HATCH SHOWN



PLAN VIEW



FLUSH HATCH SHOWN

4" REF

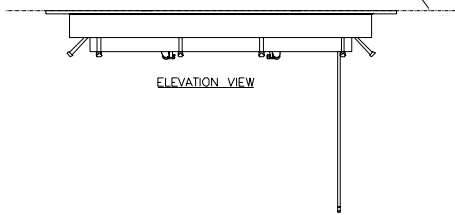
COMPRESSION SEAL

LIFT HATCH

LATCH

CAST IN PLACE SUBFRAME

FLUSH WITH SURFACE



ELEVATION VIEW



WRIGHT-PIERCE

Engineering a Better Environment

Water
Wastewater
Infrastructure

Town of Waterford
Waterford Utility Commission
15 Rope Ferry Road
Waterford, CT 06385

Invoice #: 106223
Project: 13495
Project Name: Waterford, CT - P.S. Vulnerability
Phase: A
Invoice Date: Jul-11-2016

Attention: Neftali Soto, PE
Chief Engineer

For Professional Services Rendered for the Period May-28-2016 To Jun-24-2016

RELATED TO: PS Vulnerability Assessment

REFERENCE: PO# FY16 / 275058

Professional Services

Wright-Pierce Personnel	1,133.69	
Total Professional Services		<u>1,133.69</u>
Current Invoice		<u>1,133.69</u>

Available Fee Analysis

Project Fee :	5,800.00
Prior Billings:	<u>0.00</u>
Total Available :	5,800.00

Amount Due This Invoice 1,133.69

BILLING RECAP

Previous Billings	0.00
Current Billing Amount	1,133.69
Fee Earned To Date	<u>1,133.69</u>
Amount Received	
Balance Due	

Invoices are due upon receipt. If not paid by Aug-11-2016, interest will be computed at the rate stated in the agreement.

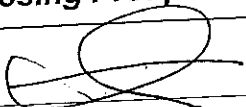
CC: Dennis A. Dievert Jr.

Wright-Pierce Personnel

	<u>Hours</u>	<u>Rate</u>	<u>Amount</u>
PROJ ENGINEER	7.00	142.76	999.32
PROJ ENGINEER	0.50	89.32	44.66
GIS TECH	1.25	71.76	89.71
			<u>1,133.69</u>

Total Project: 13495 -- Waterford, CT - P.S. Vulnerability

1,133.69

Account #		21010.52030	
Vendor #		6446	
P.O. #		275058	
Date Approved		7/19/16	
Fiscal Year		15/16	
Approved Payment Amount: \$ 1,133.69			
Does this close P.O.? Yes ___ No <input checked="" type="checkbox"/>			
If closing P.O. please attach department copy			
			
Department Head Signature			

WRIGHT-PIERCE

Engineering a Better Environment

Water
Wastewater
Infrastructure

Town of Waterford
Waterford Utility Commission
15 Rope Ferry Road
Waterford, CT 06385

Invoice # : 106581
Project : 13495
Project Name : Waterford, CT - P.S. Vulnerability
Phase : A
Invoice Date : Aug-11-2016

Attention: Neftali Soto, PE
Chief Engineer

For Professional Services Rendered for the Period Jun-25-2016 To Jul-29-2016

RELATED TO: PS Vulnerability Assessment

REFERENCE: PO# FY16 / 275058

Professional Services

Wright-Pierce Personnel	3,562.88	
Total Professional Services		<u>3,562.88</u>
Current Invoice		<u>3,562.88</u>

Available Fee Analysis

Project Fee :	5,800.00
Prior Billings:	<u>1,133.69</u>
Total Available :	4,666.31

Amount Due This Invoice 3,562.88

BILLING RECAP

Previous Billings	1,133.69
Current Billing Amount	3,562.88
Fee Earned To Date	<u>4,696.57</u>
Amount Received	0.00
Balance Due	<u><u>4,696.57</u></u>

Invoices are due upon receipt. If not paid by Sep-11-2016, interest will be computed at the rate stated in the agreement.

CC: Dennis A. Dievert Jr.

Wright-Pierce Personnel

	<u>Hours</u>	<u>Rate</u>	<u>Amount</u>
PROJ ENGINEER	23.00	142.76	3,283.45
GIS TECH	3.25	71.76	233.23
OFFICE ASSISTANT	0.50	92.40	46.20
			<u>3,562.88</u>

Total Project: 13495 -- Waterford, CT - P.S. Vulnerability 3,562.88

Water
Wastewater
Infrastructure
AUG 16 2016
WATERFORD UTILITY
COMMISSION

August 9, 2016

W-P Project No. 13495A

Mr. Neftali Soto, P.E.
Chief Engineer
Waterford Utility Commission
15 Rope Ferry Road
Waterford, CT 06385

Subject: Waterford Utility Commission – Pump Station Vulnerability Evaluation
Invoice for Services – July 2016


Dear Tali:

Please find the invoice enclosed for our efforts related to the pump station vulnerability evaluation including the submission of the DRAFT report for review and comment.


Feel free to call me with any questions.

Sincerely;

WRIGHT-PIERCE


Dennis Dievert Jr., PE
Project Manager

RECEIVED
AUG 17 2016
PERMITTING &
DEVELOPMENT

Account # <u>21010 . 52030</u>	
Vendor # <u>6446</u>	P.O. # <u>275065</u>
Date Approved <u>8/18/16</u>	Fiscal Year <u>16/17</u>
Approved Payment Amount: <u>\$ 3,562.88</u>	
Does this close P.O.? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
<i>If closing P.O. please attach department copy</i>	
 _____ Department Head Signature	

WRIGHT-PIERCE

Engineering a Better Environment™

Water
Wastewater
Infrastructure

Town of Waterford
Waterford Utility Commission
15 Rope Ferry Road
Waterford, CT 06385

Invoice #: 107350
Project: 13495
Project Name: Waterford, CT - P.S. Vulnerability
Phase: A
Invoice Date: Sep-29-2016

Attention: Neftali Soto, PE
Chief Engineer

For Professional Services Rendered for the Period Aug-27-2016 To Sep-23-2016

RELATED TO: PS Vulnerability Assessment

REFERENCE: PO# FY16 / 275058

Professional Services

Wright-Pierce Personnel 981.64

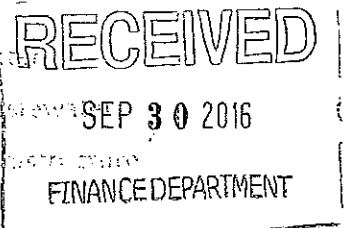
Total Professional Services 981.64

Current Invoice 981.64

Available Fee Analysis

Project Fee: 5,800.00
Prior Billings: 4,696.57
Total Available: 1,103.43

Amount Due This Invoice 981.64



BILLING RECAP

Previous Billings	4,696.57
Current Billing Amount	981.64
Fee Earned To Date	<u>5,678.21</u>
Amount Received	<u>4,696.57</u>
Balance Due	981.64

Invoices are due upon receipt. If not paid by Oct-29-2016, interest will be computed at the rate stated in the agreement.

CC: Dennis A. Dievert Jr.

Wright-Pierce Personnel

	<u>Hours</u>	<u>Rate</u>	<u>Amount</u>
PROJ ENGINEER	6.00	156.86	941.19
OFFICE ASSISTANT	0.75	53.93	40.45
			<u>981.64</u>

Total Project: 13495 -- Waterford, CT - P.S. Vulnerability

981.64

September 29, 2016

W-P Project No. 13495A

Mr. Neftali Soto, P.E.
Chief Engineer
Waterford Utility Commission
15 Rope Ferry Road
Waterford, CT 06385

Subject: Waterford Utility Commission – Pump Station Vulnerability Evaluation
Invoice for Services – September 2016

Dear Tali:

Please find the invoice enclosed for our efforts related to the pump station vulnerability evaluation including the submission of the FINAL report. This will be our final invoice for this project.


Feel free to call me with any questions.

Sincerely,

WRIGHT-PIERCE



Dennis Dievert Jr., PE
Project Manager

Account #		21010 . 52030			
Vendor #	6446	P.O. #	275065		
Date Approved	9/29/16	Fiscal Year	16/17		
Approved Payment Amount:		\$ 981.64			
Does this close P.O.?		Yes	<input type="checkbox"/>	No	<input checked="" type="checkbox"/>
<i>If closing P.O. please attach department copy</i>					
					
Department Head Signature					