



NEWEA Climate Adaptation Strategies for Maine Coastal Communities WWTFs

Presented by:

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Introduction

- Introduction
- TR-16
- GENERIC adaptation strategies
 - Wiscasset WWTF
 - Ogunquit WWTF
- SPECIFIC adaptation strategies
 - Ogunquit WWTF
 - Ogunquit Pump Station No 1



Why?

- Sea level rise (SLR)
- Storm surge
- Increased precipitation frequency and intensity



What are options?

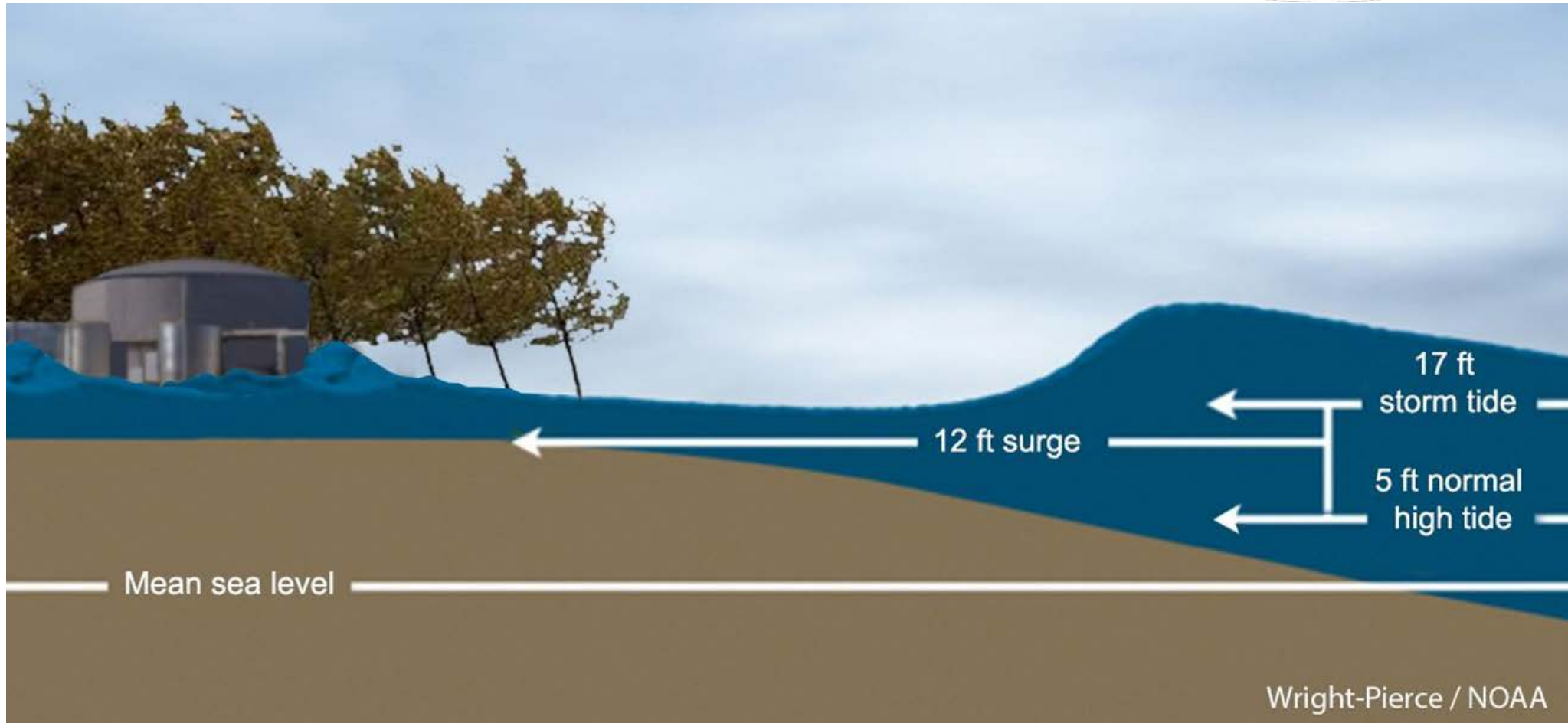
- Maintain status quo operation
- **Adapt**
- Relocate facilities

Focus on Adaptation



- **Executive Order 11988 – Floodplain Management**
- **Amended in January 2015 stating that all critical assets shall be protected to BFE +3 and all non-critical assets to BFE +2**
- **Roll back Exec. Order (August 2017)**
- **Maine DEP: “continue to follow TR-16”**

What is Storm Surge?



- **Project Goals**
- **Assess three flood event planning scenarios to identify risks to the wastewater treatment facilities and provide the Town with a cost / benefit curve to assist in prioritizing measures to protect this infrastructure from potential future threats over the next 50 years.**

- **Approach**
- **Examine readily available data (project record drawings, FEMA flood maps, topographic LiDAR data...)**
- **Identify 3 flood elevation planning scenarios (BFE +3, BFE +4 and BFE +6)**
- **Consider regulatory and funding agency requirements**

Introduction

- Sea level rise & storm surge parameters –
Coastal Flooding



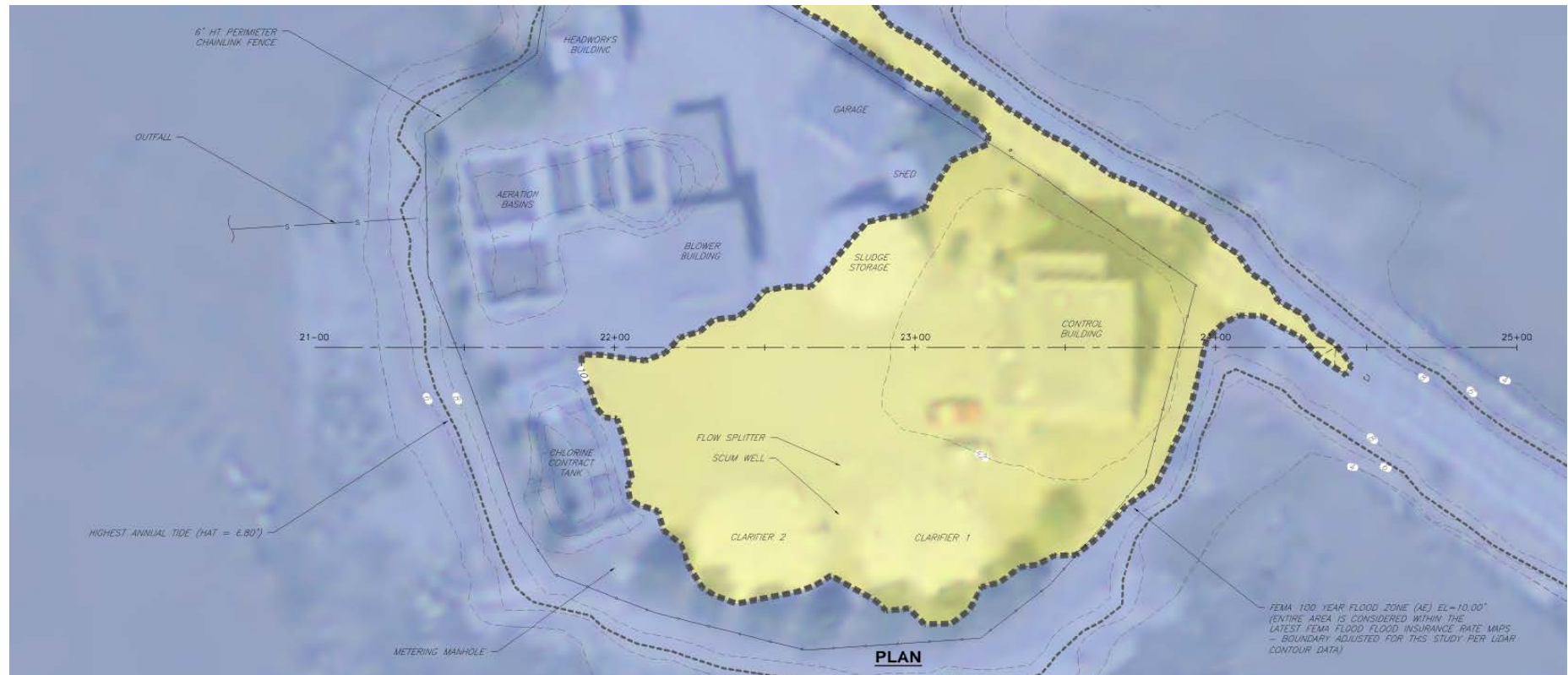


138 ft

Google earth

Potential Inundation

■ Wastewater Treatment Plant



Potential Inundation Effects

- **Wastewater Treatment Plant**



BFE + 3-FT Sea Level Rise

Potential Inundation Effects

- **Wastewater Treatment Plant**



BFE + 3-FT Sea Level Rise

Potential Inundation Effects

- **Wastewater Treatment Plant**



BFE + 3-FT Sea Level Rise

Modes of impact at POTW's:

- Overtopping tank walls
- Flow through doors
- Inundation of generators
- Water intrusion into electrical/control conduits
- Outfalls
(increased head on discharge)
- Limited Access?



Photo taken April 2010 by WSA
Superintendent Janine Burke.

Adaptation Strategies

- Relocate
- Shoreline stabilization
- Permanent barriers (sea wall)
- Temporary barriers
- Flood proofing
- Elevated structures
- Permanent emergency generator

Adaptation Strategies

- Shoreline Stabilization



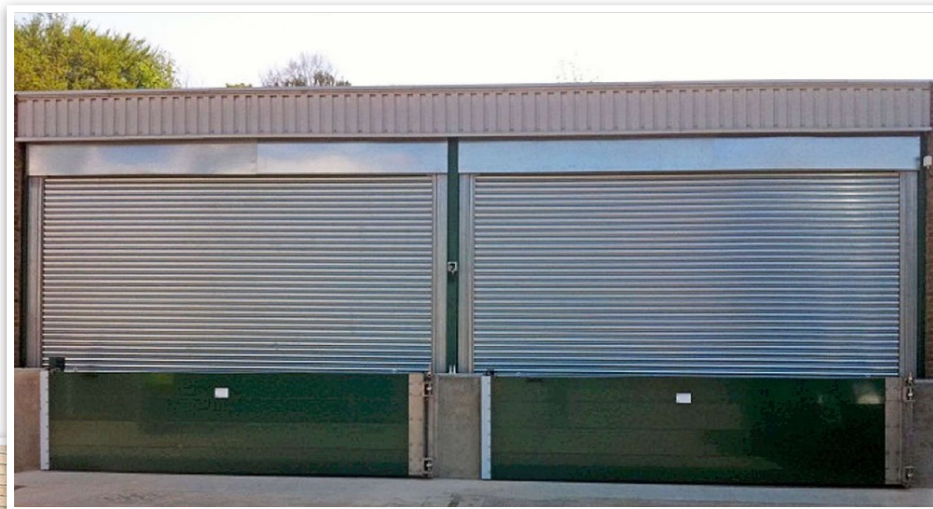
Adaptation Strategies

■ Permanent Barriers



Adaptation Strategies

- Temporary Barriers



Adaptation Strategies

- Elevated Structures



Adaptation Strategies

- Elevated Structures



Adaptation Strategies

■ Flood Proofing / Collection System



Additional Options for POTW's:

- Increase height of tank walls
- Install watertight doors/hatches
- Raise or otherwise protect electrical components
- Address accessibility?
- Provide pumping capability for effluent discharge/outfall



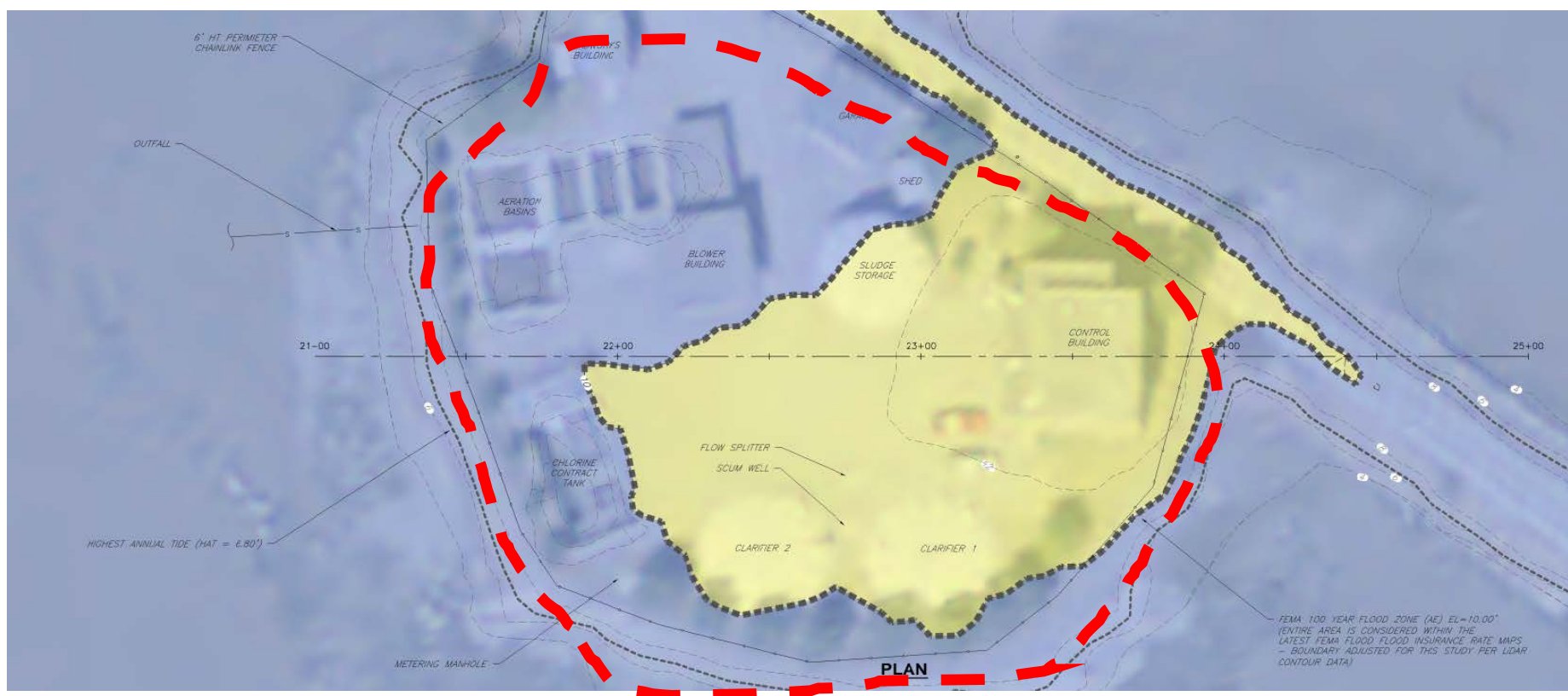
Cost Benefit Matrix

- Near-term improvement needs (elevate / flood proof structures, generator...)
- Mid-/ long-term protection (consider sea wall versus incremental short term O & M improvement needs)
- Long-term (relocation of the entire facility)

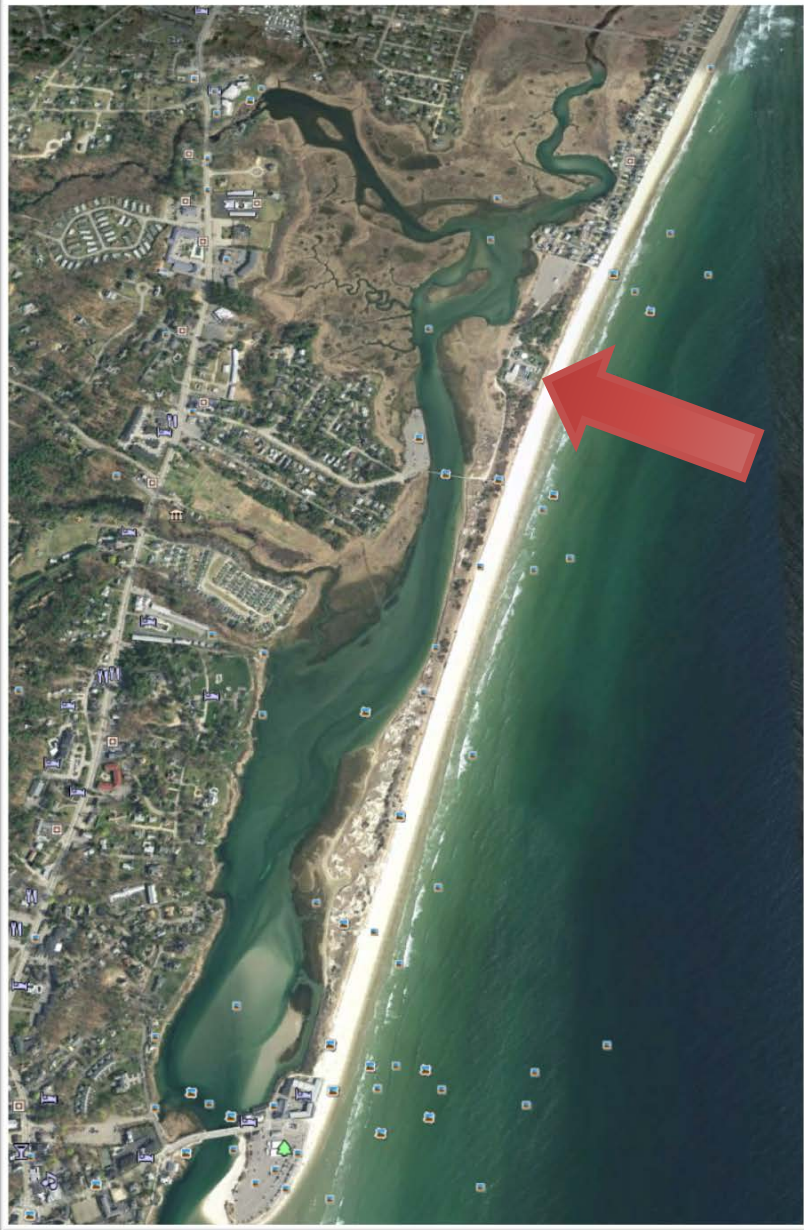


Wiscasset WWTF Conclusion

- Planning for sea wall around WWTF



Ogunquit WWTF Location



Ogunquit WWTF Climate Adaptation



WWTF and several pump stations are located in flood prone areas that are susceptible to SLR.

Modeling (Applied Coastal Research & Engineering)



100-yr. flood
existing conditions



100-yr. flood with
sea level rise in 2050



100-yr. flood with
sea level rise in 2100



WWTF – Beach Side



Ogunquit WWTF Strategy

- Protect from sea level rise
- Protect from shoreline change (Coastal Barrier Resource)
- Short-term – manage flooding
- Long-term - relocate WWTF

→ Specific Adaptation Strategies?

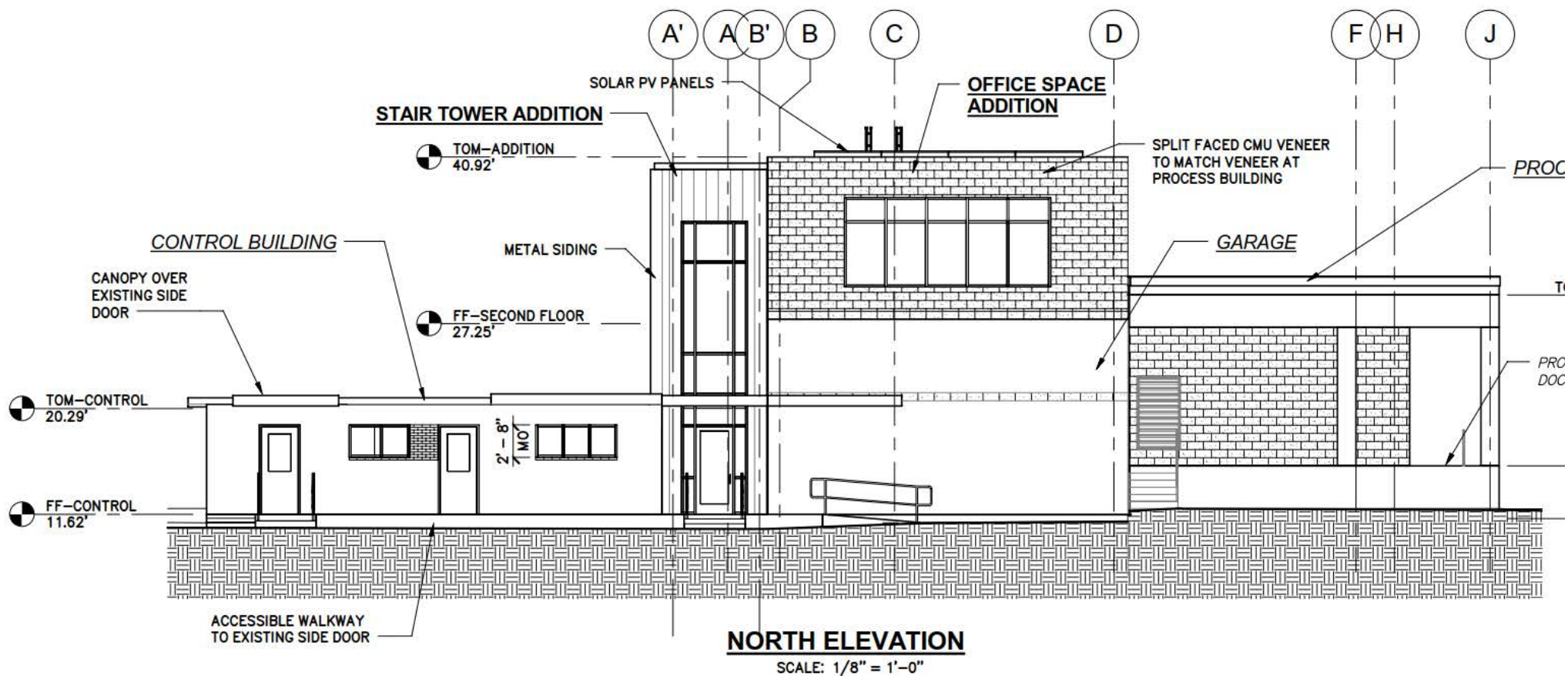
Manage Flooding - Philosophy

- Cannot protect from storm surge, all tanks will be overtopped, → abandon ship
- Storm tide would only last several hours
- Want ability to bring back online quickly



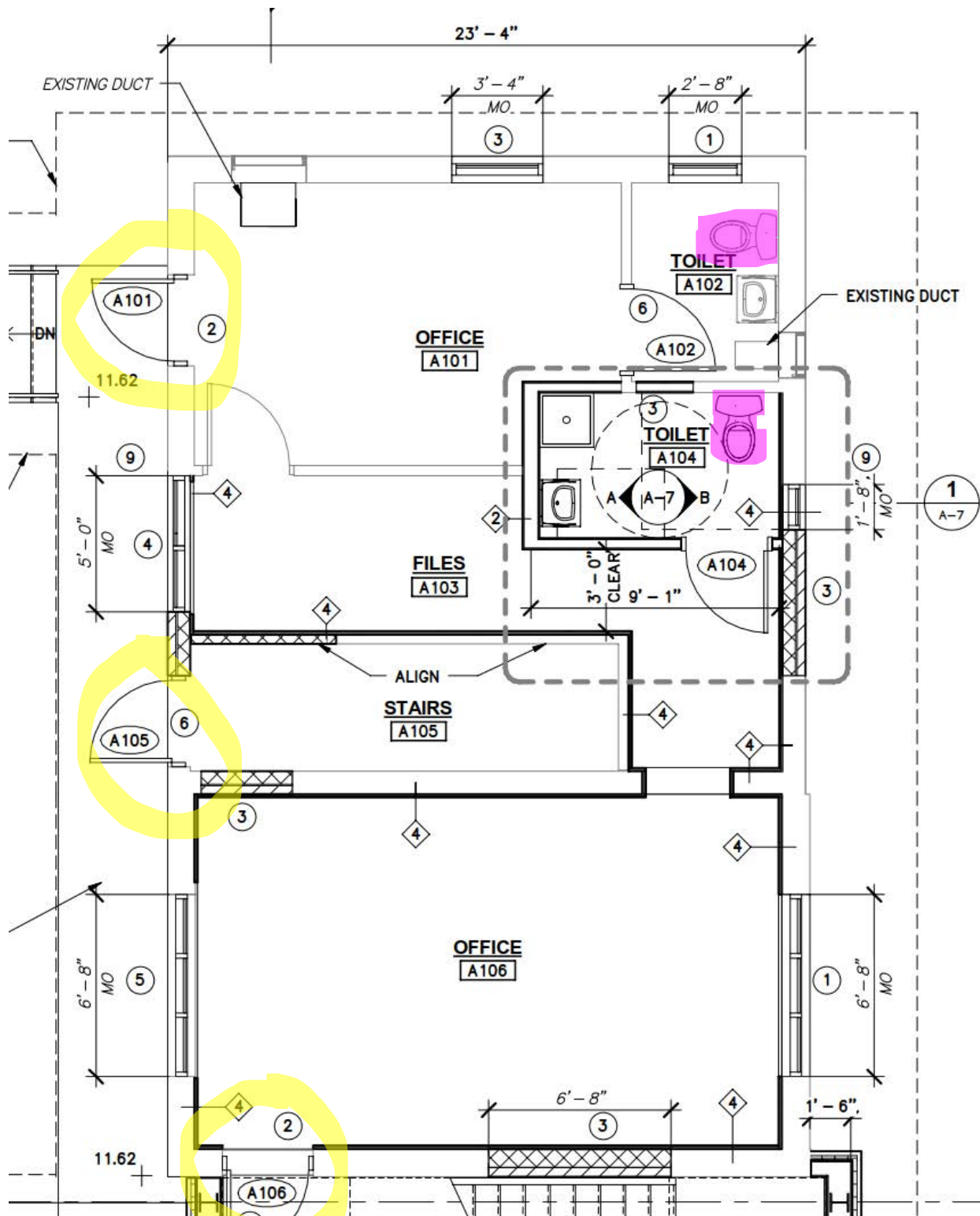
Manage Flooding – Raise Critical Infrastructure

- Relocating Main Control Panel and Motor Control Center to Second Floor

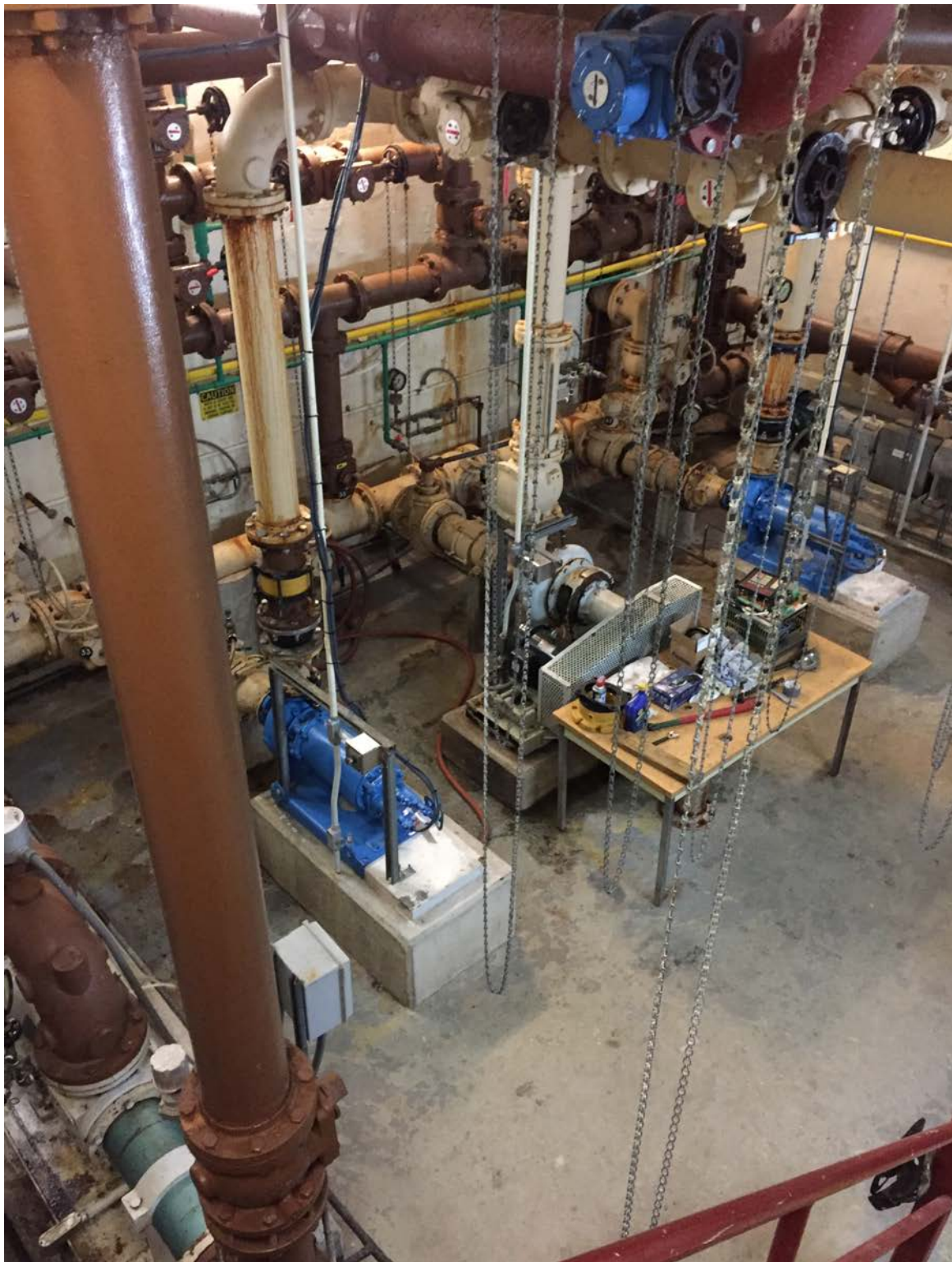


Doors

- Protection of below grade Pump Room



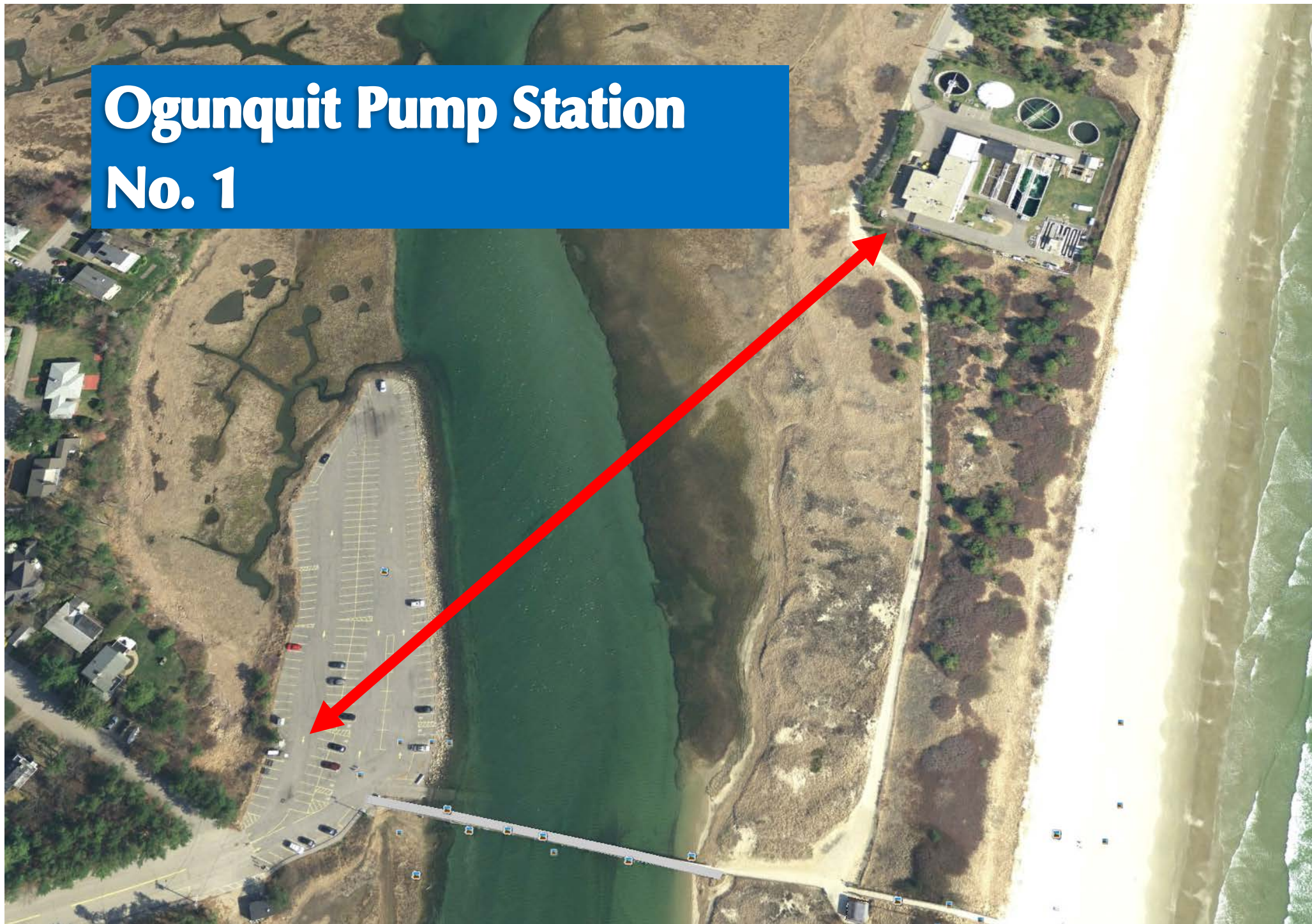
Pump Room

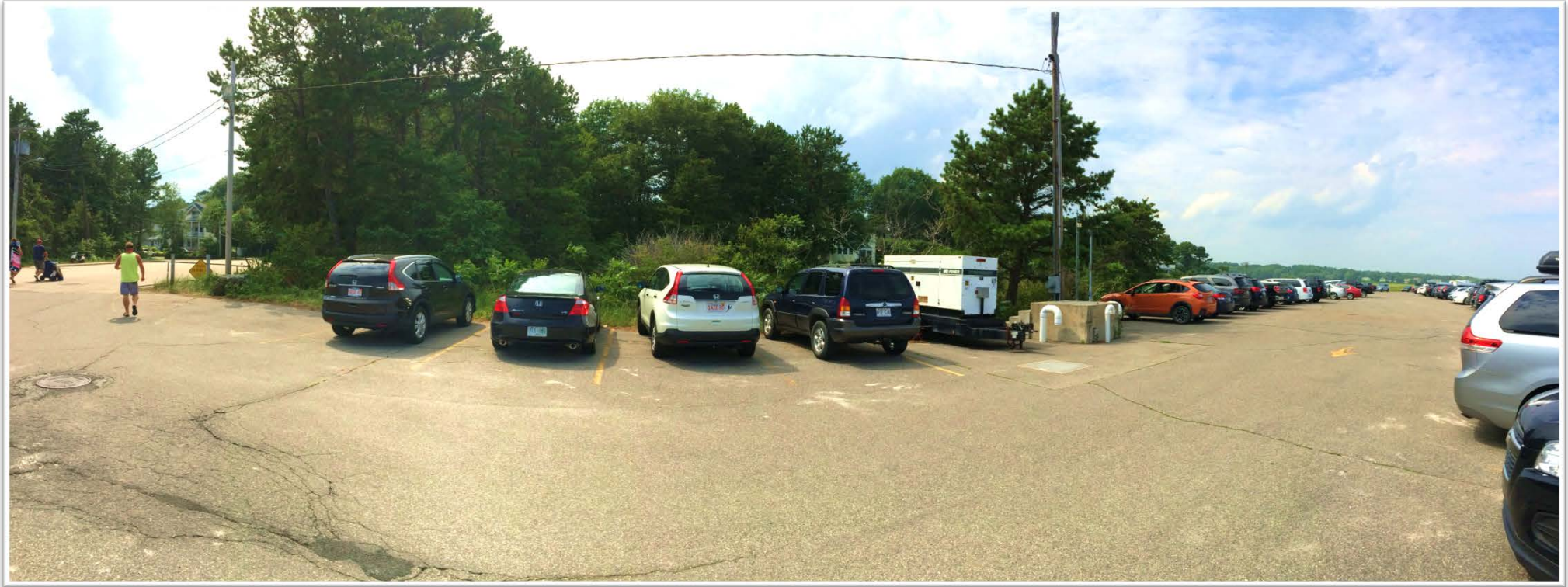
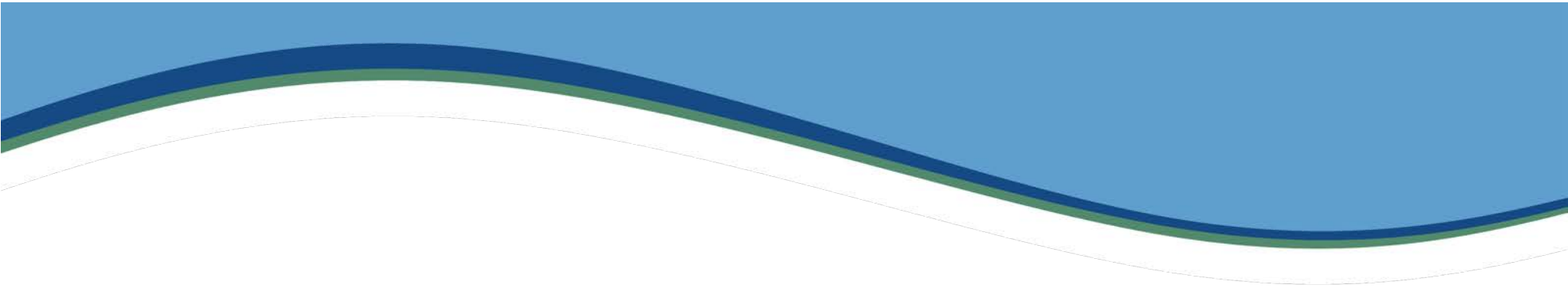


Manage Flooding – Pump Room

- Pump Room – design to bring online quickly after room floods
 - RAS pumps are submersible dry pit
 - WAS pumps- spare motors on shelf
 - Local control stations can be tethered above flood
 - Safety? Mechanical switches with pull cord (electrical above flood)
 - Large “sump pump”

Ogunquit Pump Station No. 1









Pump Station 1

- **Key Issues:**
 - **Flood Protection**
 - **Reliability**
 - **Aesthetics**



Modes of impact at Pump Stations

- Flow entering hatches
- Flow entering doors
- Water in control panels
- Inundation of generators
- Electrical/control conduits
- Accessibility?



Ogunquit Pump Station Strategy

- Raised Control Tower with “door to nowhere”
- Emergency power from offsite 1000’ away
- Underwater wet well - Hatches designed to support 8’ water
- Vented through roof



Underwater – Wet Well



Adaptation Strategies for Pump Stations:

- Construct berms/levees
- Raise facilities
- Install watertight doors/hatches
- Raise or otherwise protect electrical components
- Address accessibility?
- Emergency power offsite?



Other Adaptation Strategies for Sewers

- Watertight manhole covers
- Separation of combined sewers
- Backflow prevention at CSO discharge points
- Separate roof drain leaders
- Separate sump pumps
- Assess potential for damage from coastal erosion



Your Climate Adaptation Plan?

The goal of the plan is to...

- a. Identify the hazards and their potential risk to the system.
- b. Identify vulnerable assets and determine consequences
- c. Identify and evaluate adaptation practices
- d. Develop implementation plan to adapt
- e. Submit CAP to [AGENCY] within one-year from loan closing date.

Discussion



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Thank you!