Naval Facilities Engineering Command

Public Works Department Annapolis

NSA Annapolis

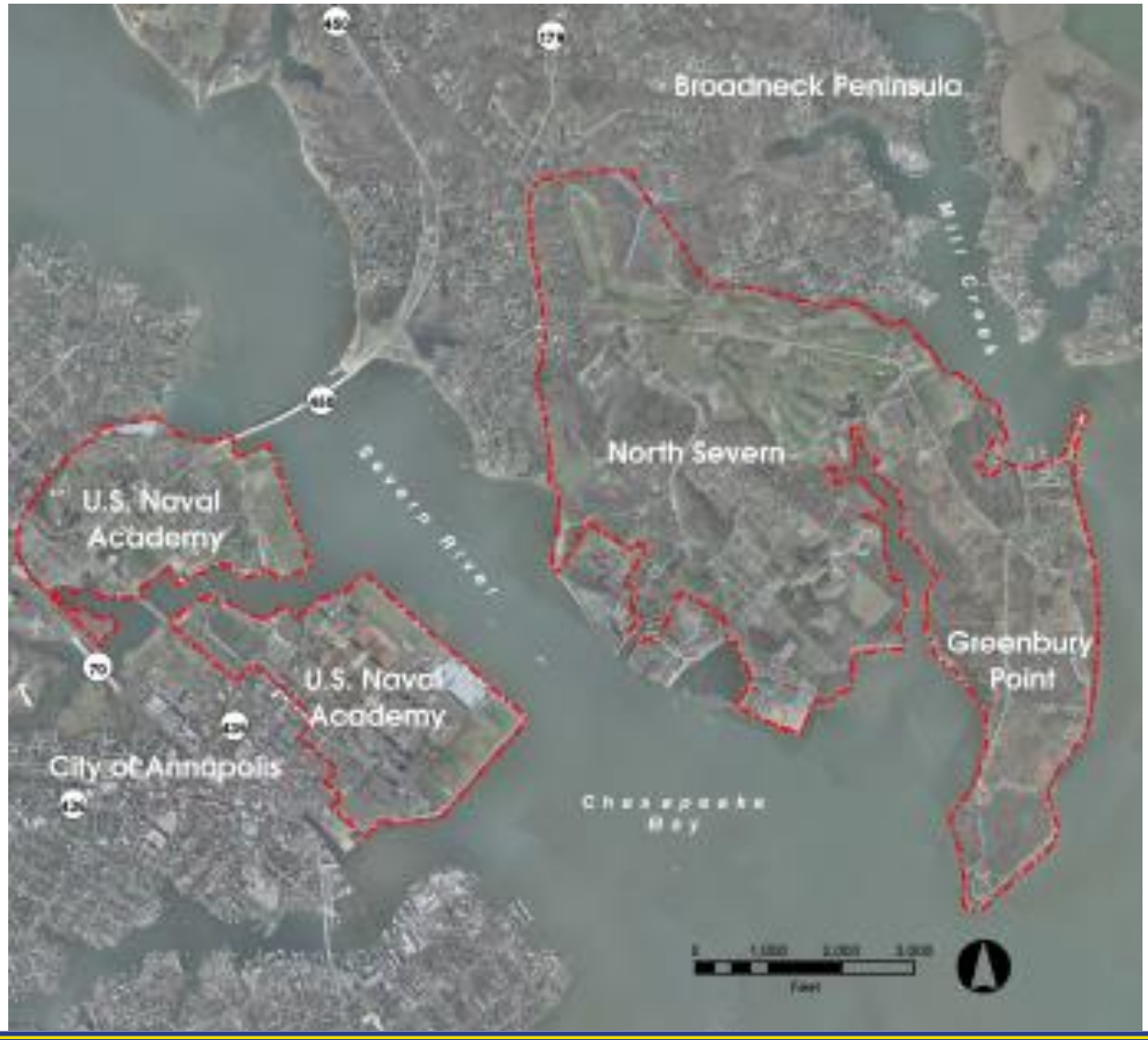
Climate Change – Sea Level Rise

Where We Are
Where We Are Going
How We Get There

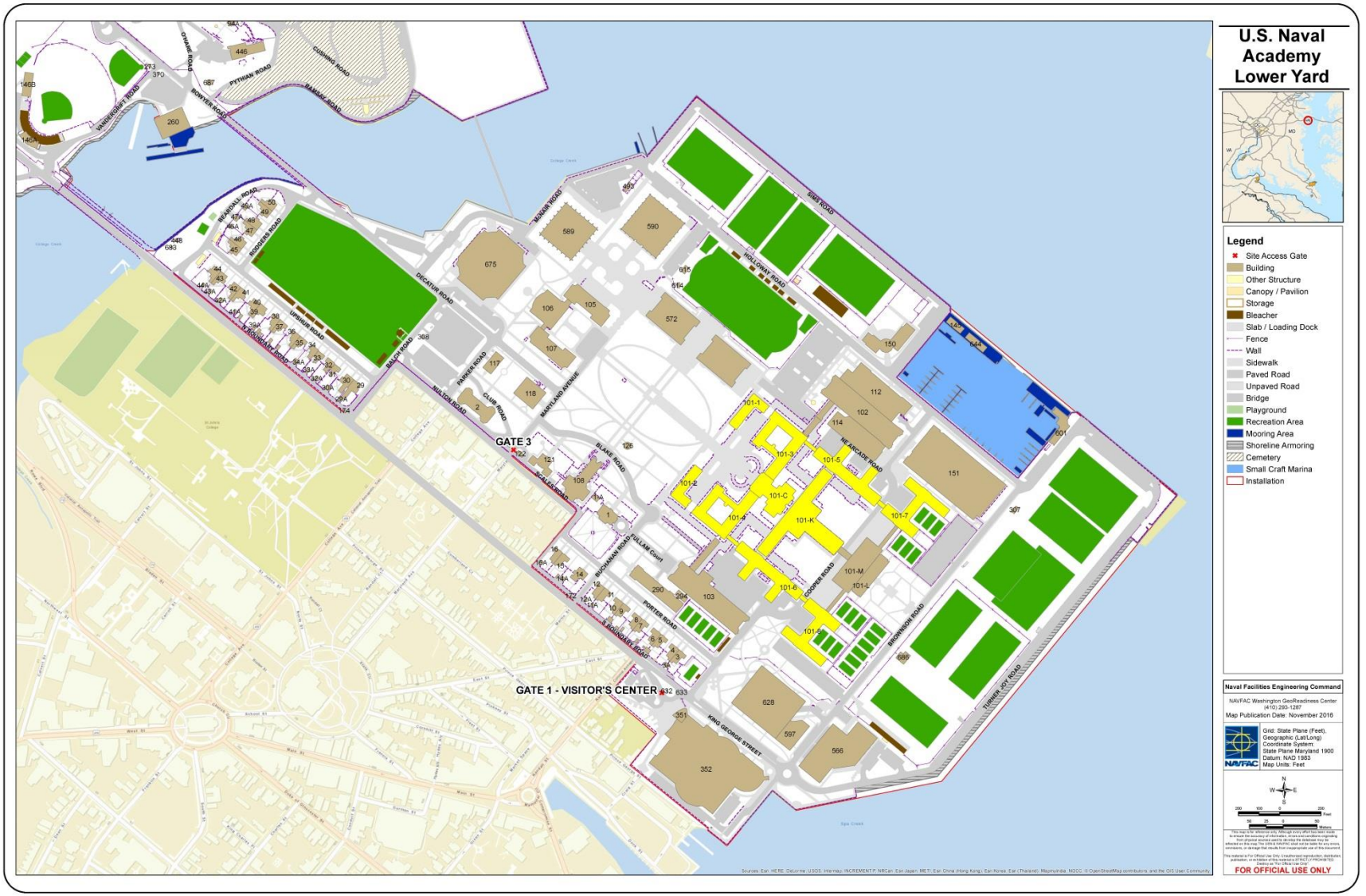
March 6, 2017

NSA Annapolis

Overview Map



NSA Annapolis – USNA Lower Yard



Where We Are

- **NSA Annapolis and the US Naval Academy are experiencing the following conditions which make the installation susceptible to the impacts of climate change**
  - **Increased coastal and nuisance flooding**
  - **Increased number of storm events**
  - **Sea level rise**
  - **Land subsidence**
  - **Aging stormwater system**
  - **Increase in number of yellow, red and black flag days**

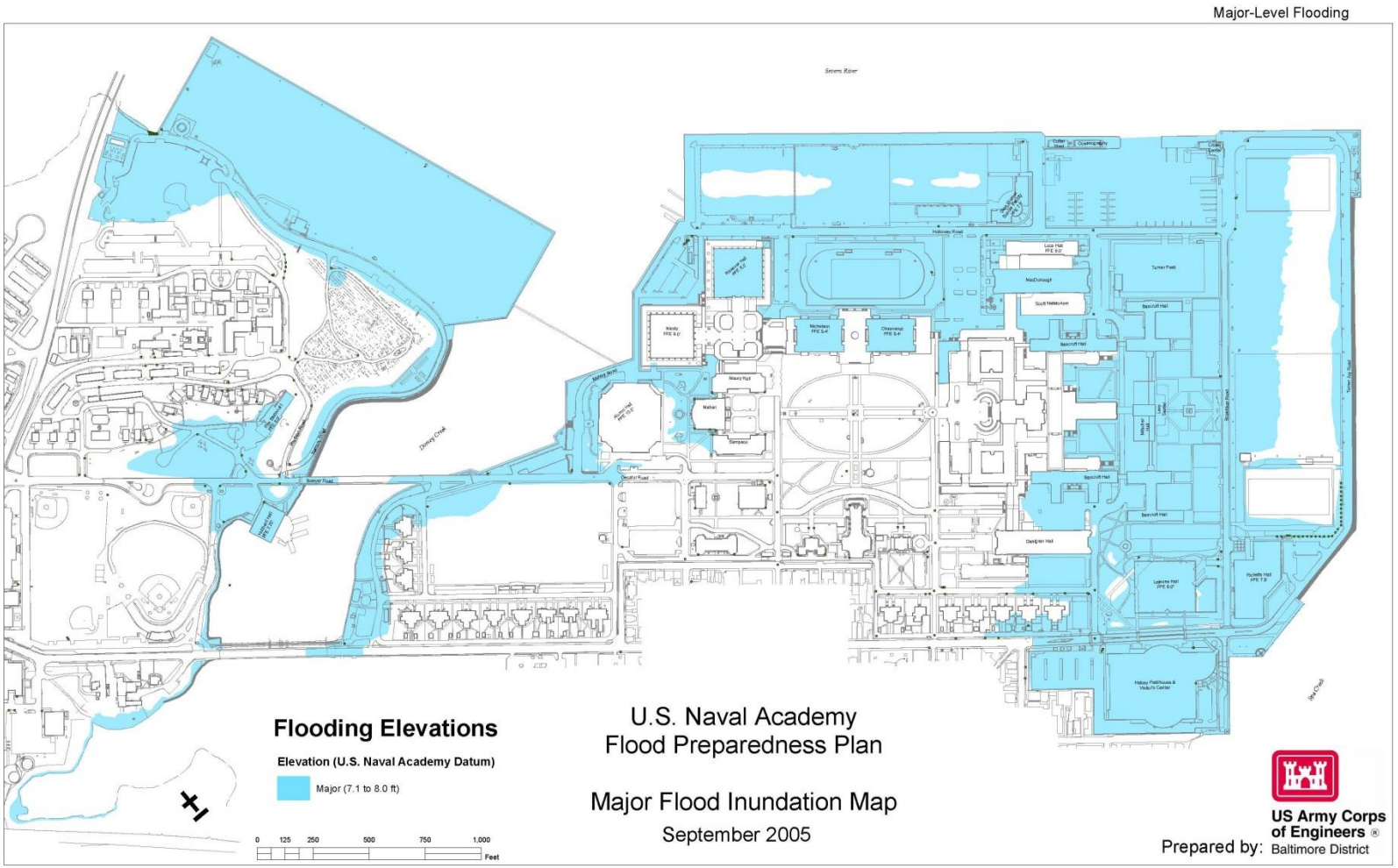
Climate Change Impacts

- **Sea level rise and subsidence**
  - **Increased minor/nuisance flooding**
    - Approximately 40 events per year
  - **Subsidence**
- **Aging stormwater system**
  - **Flooding through storm inlets**
- **Utility system**
  - **Flooding through utility tunnels**
- **Increase in storm events and severity**
  - **Isabel (2003) no longer considered 100-year event (surge 7.8')**

What we are Protecting

- **US Naval Academy**
  - **Historic structures – mission critical facilities**
    - Approximately 15 historic structures within the inundation area
    - Plant Replacement Value $1.6B
  - **Utility systems**
  - **Transportation systems**

NSA Annapolis Inundation Map



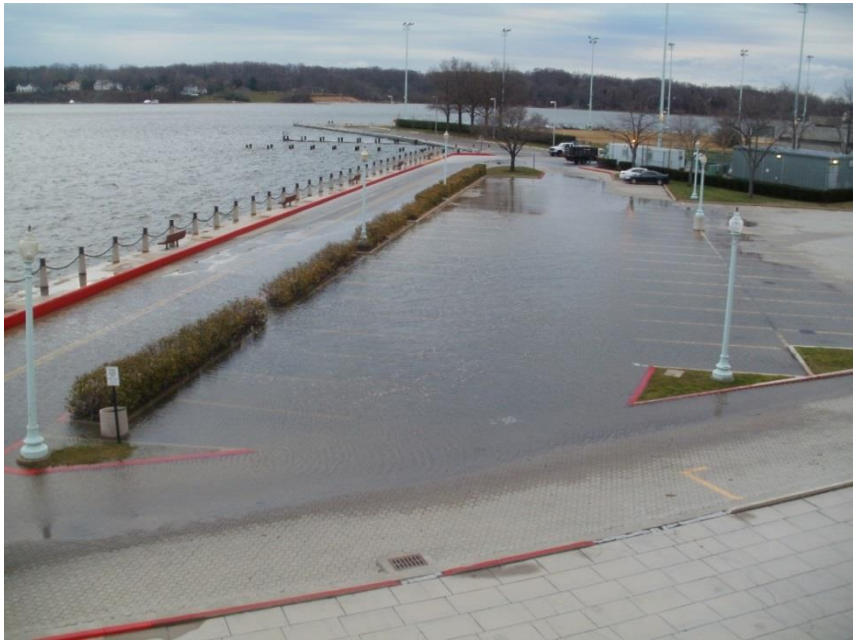
Nuisance Flooding

High Tide and Wind Combination
December 2012

Stormwater – Reverse Flow

Nimitz/Rickover Parking Lot

Sewall not over topped



Brownson Road

Sewall not over topped

Subsidence

Transportation System Closures

September 10, 2015

King George Street

USNA

Gate 1 - Closed

7- 8 inches water

Weather Events

Isabel 2003

- Storm surge 7.89’
- Flooding
  - Initially through storm drains and utility tunnels
- $150M – 200M damage
- Mission Impact
  - Temporary housing and classrooms

September 10, 2015

- 3.346 inches of rain
  - Door dams and sand bags deployed
    - $40,107
  - Damage from event
    - $41,675 (estimated)

Isabel

Where Are We Going

An installation and mission that adapt to the impacts of climate change

How We Get There

- **USNA Expertise and Guidance**
  - **Sea Level Rise Committee established by VADM Cater**
    - Provides analysis, guidance, and recommendations to USNA Superintendent on climate change
    - Identify vulnerabilities and prioritize solutions to minimize negate impacts to the installation and USNA operations

How We Get There

- **Executive Orders and Federal Guidance**
  - **E.O. 13653 – Preparing US for Impacts of Climate Change**
  - **E.O. 11988 – Floodplain Management**
    - Federal Flood Risk Management Standard (Required by E.O. 11998)
      - Has national security exemptions
  - **DoD Directive 4715.21 – Climate Change Adaptation and Resilience**

How We Get There

- **Planning**
  - **Navy Guidance**
    - NAVFAC Planning Tool
      - Climate Change – Installation Adaptation and Resilience
    - Installation Development Plans (Installation Comprehensive Plan)
    - Required to take climate change into consideration for the siting and development of future projects and programming
  - **Site Approvals/Review**
    - Is project located in floodplain?
      - Mitigation for location of project
  - **Construction projects**
    - Stormwater system repairs
    - Relocation of utility system

Standing water in utility tunnels

How We Get There

- **Physical Barriers**
  - **–Sea Wall**
  - **–Door Dams/Sand bags**
  - **–Aquafence or similar product**

USNA Door Dam - Nimitz

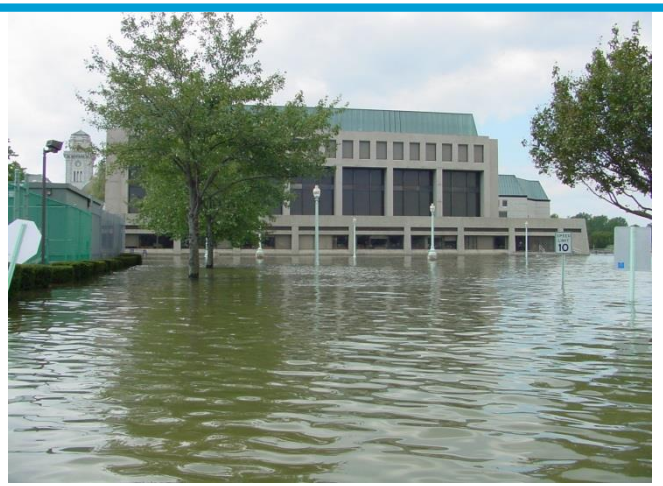
Aquafence

Automated Door Dam

How We Get There

- **Outreach and Collaboration**
  - **City of Annapolis**
    - Cultural Resources Hazard Mitigation Committee
  - **US Army Corps of Engineers**
  - **Maryland Silver Jackets**
  - **NOAA**
  - **Miami-Dade County**
  - **Other Naval Installations**

QUESTIONS



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