

# Coastal Structures Risk Communication of the Great Lakes Districts of the US Army Corps of Engineers



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# Introduction and Agenda

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## **Purpose:**

Communicate the risk of breakwater and structure conditions to local stakeholders and navigation system users. With a focus on structure condition, function, and economic consequences of coastal structures on the Great Lakes.

## **Focus Topics:**

1. Coastal Structure Risk Communication
2. Condition Assessment of Coastal Structures
3. Harbor Infrastructure Inventory Process
4. Next Steps and Open Discussion



# Regional Risk Communication Meetings



# Great Lakes Navigation System (GLNS)

60 Commercial Projects, including 45 with structures  
79 Recreational Projects, including 61 with structures

Two Rivers  
Manitowoc

Sheboygan

Port Washington

Milwaukee

Kenosha

Waukegan

Lake Michigan

● Commercial  
▲ Recreational

Chicago Harbor  
Chicago River  
Calumet Harbor  
Indiana Harbor  
Michigan City  
Burns Waterway Harbor  
Burns Small Boat Harbor

IL

IN

OH

PA

CANADA

Lake Ontario

NY



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# Coastal Structures

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## Great Lakes Navigation



- 104+ miles of navigational structures on the Great Lakes
- Most built between 1860 and 1940
- Timber crib construction (typical)
- Low Lake water levels since the 1990's have accelerated deterioration



# Typical Coastal Structures



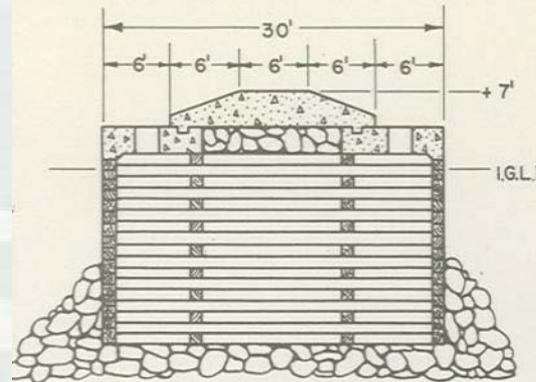
Steel Sheet  
Pile  
Structures



Rubble  
Mound/Laid-Up  
Stone Structures



Other  
Components:  
safety  
(railings,  
walking  
surface, etc.)



Typical Wood  
Crib/ Concrete  
Cap Structures  
Cross-section



# Structure Function/Consequences

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*Calumet Harbor, IL&IN*

**Contain and reduce shoaling in navigation channel**



*Milwaukee Harbor, WI*

**Protect navigation channel and shoreline infrastructure**



*St. Joseph Harbor, MI*

**Control wave climate within navigation channel and harbor**



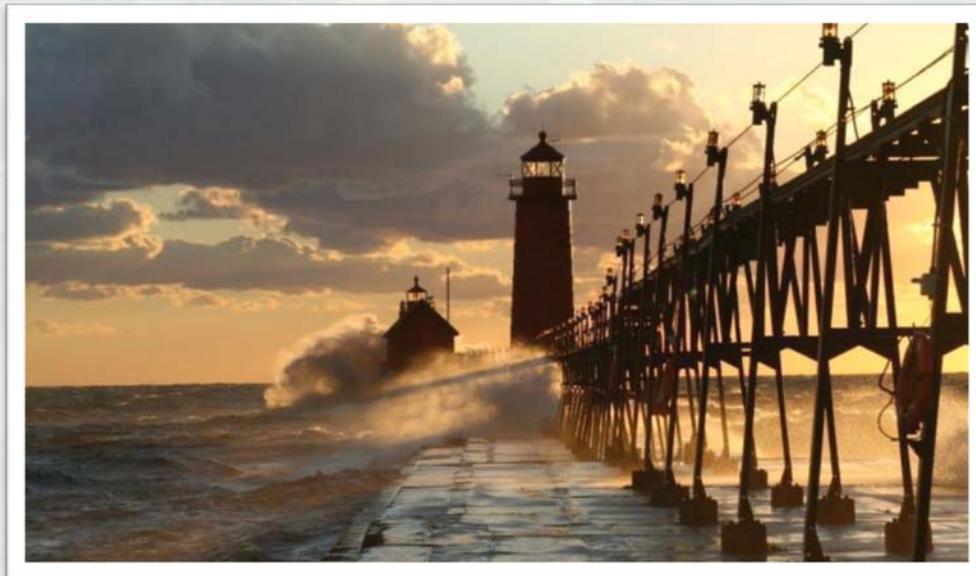
# Coastal Structure Risk Communication

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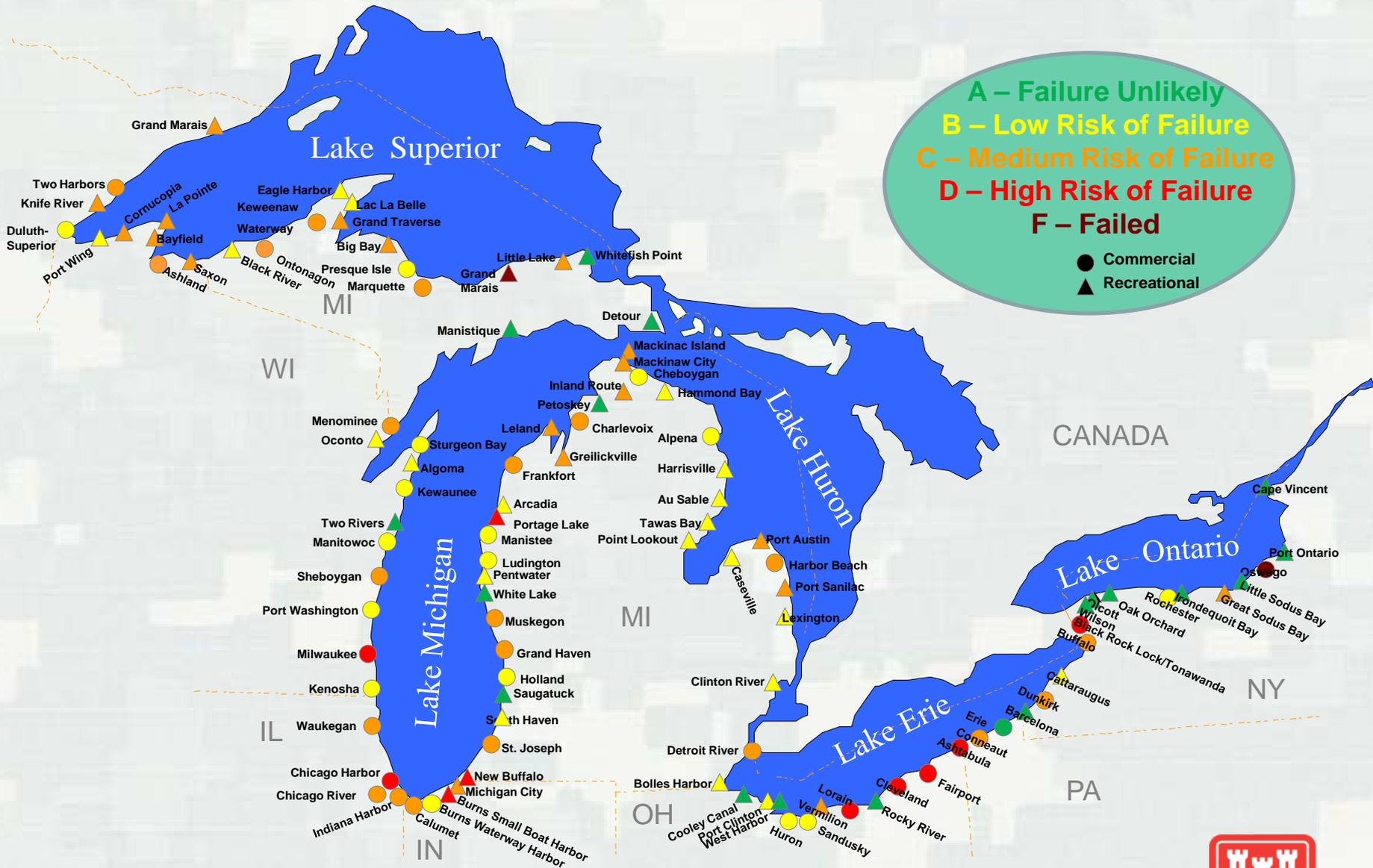
Program Objective: Communicate the risk of breakwater and structure conditions to local stakeholders and navigation system users

## Process:

1. Conduct Condition Assessments
  - Commercial Harbors- Use detailed Breakwater Assessment Team (BAT) Evaluation
  - Recreational Harbors- Rely on expert elicitation
2. Conduct Harbor Infrastructure Inventory on all structures
3. Prepare summary document that conveys the current condition of the harbor infrastructure as well as the risk involved in the event of failure
4. Share with stakeholders in regional meetings



# Harbor Structure Condition Assessments



# Harbor Infrastructure Inventory Process

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- Gather information on critical infrastructure protected by federally maintained navigation structures
  - ▶ Review Documents:
    - Project Drawings
    - Harbor Fact Sheet
    - Aerial/Satellite Photography; Photo document critical infrastructure
  - ▶ Identify Critical Infrastructure to Visit
  - ▶ Research Identified Critical Infrastructure
- Site Visit Tasks
  - ▶ Met with Local Officials, Port Authority, Harbor Master, when available
  - ▶ Visit Identified Areas/Critical Infrastructure & Gather Information
- Post Site Visit Tasks
  - ▶ Create Report Following the Standard Report Template



# Harbor Infrastructure Inventory Report Content

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- **HARBOR LOCATION**
- **PROJECT DESCRIPTION**
  - Authorization, harbor type (commercial or recreational), length of breakwater structures and channel
- **DATE OF SITE VISIT**
- **SUMMARY OF STRUCTURES**
  - Lists all structures and facilities that are believed to be protected by the federal navigation structures; also identify any other potential stakeholders
- **SUMMARY OF IMPACT**
  - Summarizes any potential damage that could be experienced if the federal breakwater fails.
- **DESCRIPTION OF STRUCTURES**
  - Aerial photo with all potential affected structures shown along with pictures and a brief description of each potentially affected structure

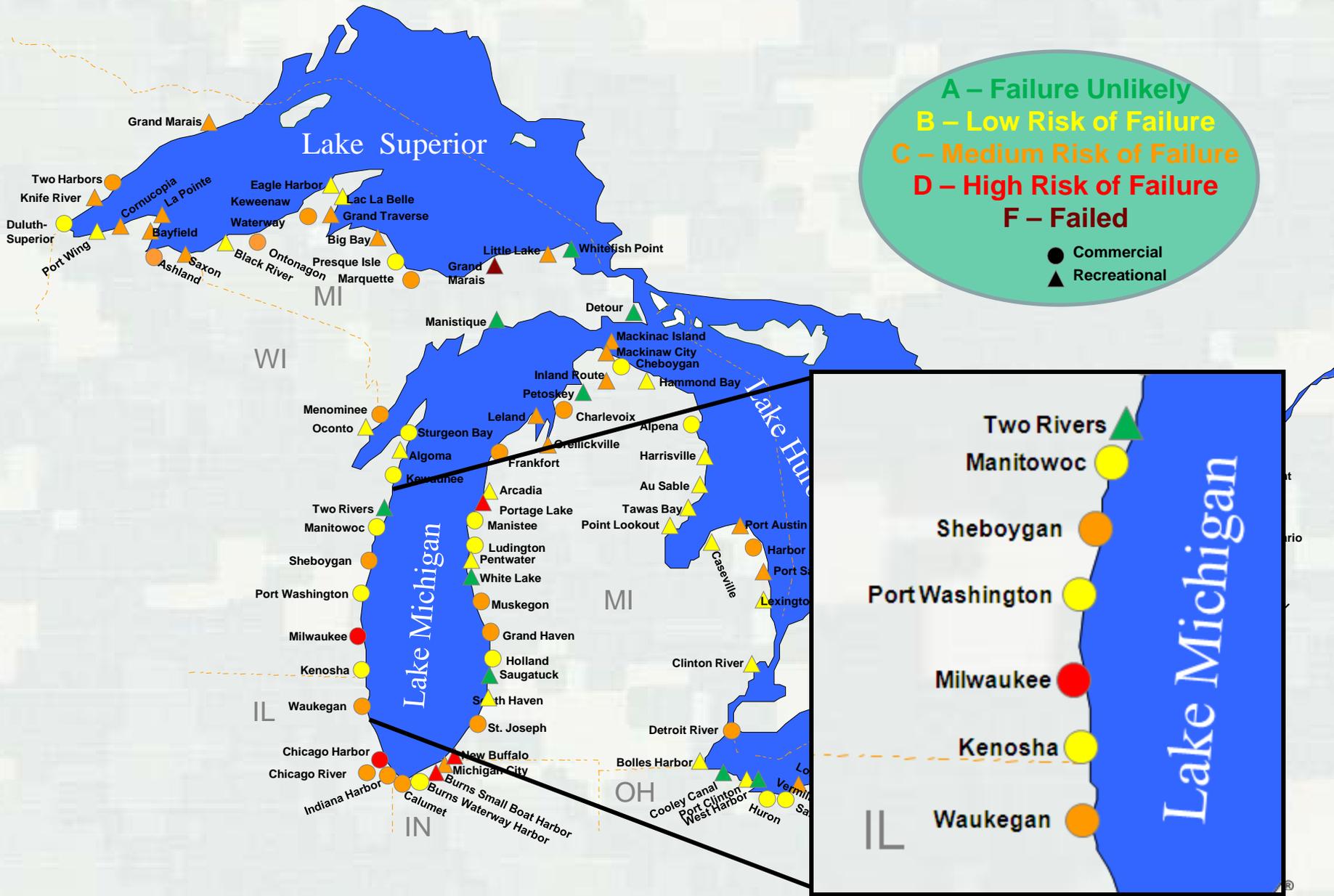


# High Level Display of Potential Impact Areas

- Three potential impact areas were defined at 500 ft intervals
- Shows potential value of land and infrastructure within each “potential impact area” based on tax assessment data

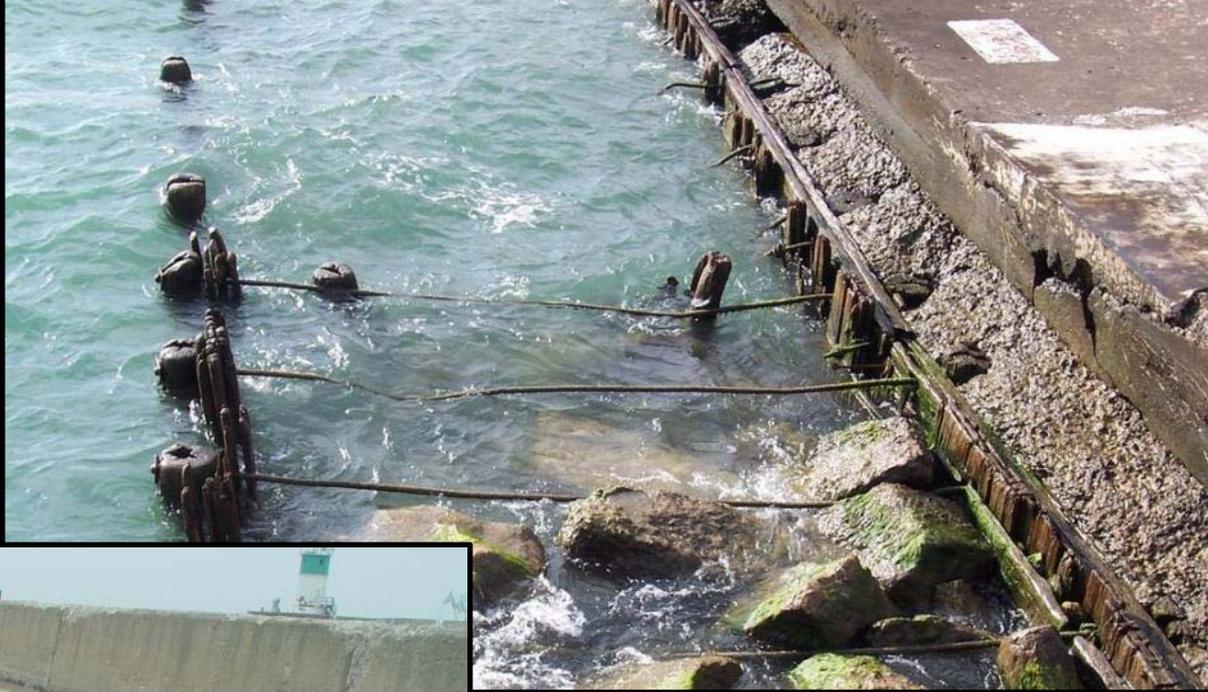


# Harbor Structure Condition Assessments



# Waukegan Harbor:

D: High Risk of Failure



AUG 6 2007



# Waukegan Harbor:

\$6M estimated cost to upgrade D rated structures to an acceptable level of risk (Level B)

## Infrastructure:

1. Waukegan Harbor Marina
2. Akzo Nobel R&D Facility
3. Bait and Tackle Supplies
4. US Coast Guard
5. Harbor House
6. Waukegan Yacht Club
7. Cement factory (LaFarge)
8. Lordahl Engineering Co
9. St. Mary's Cement
10. National Gypsum Co.
11. Larsen Marine
12. Bombardier Motor Corp US
13. Waukegan Water Plant
14. Beach House



Image © 2011 TerraMetrics

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# Waukegan Harbor:

## Potential Impact Areas

Buffer Feet	Land Value	Improv. Value	Total Assessed Value
1,000	\$29M	\$13M	\$42M
1,500	\$32M	\$14M	\$46M
2,000	\$35M	\$16M	\$51M



# Kenosha Harbor:

B – Low Risk of Failure



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# Kenosha Harbor:

No reaches at Kenosha are rated below A & B risk level

## Infrastructure:

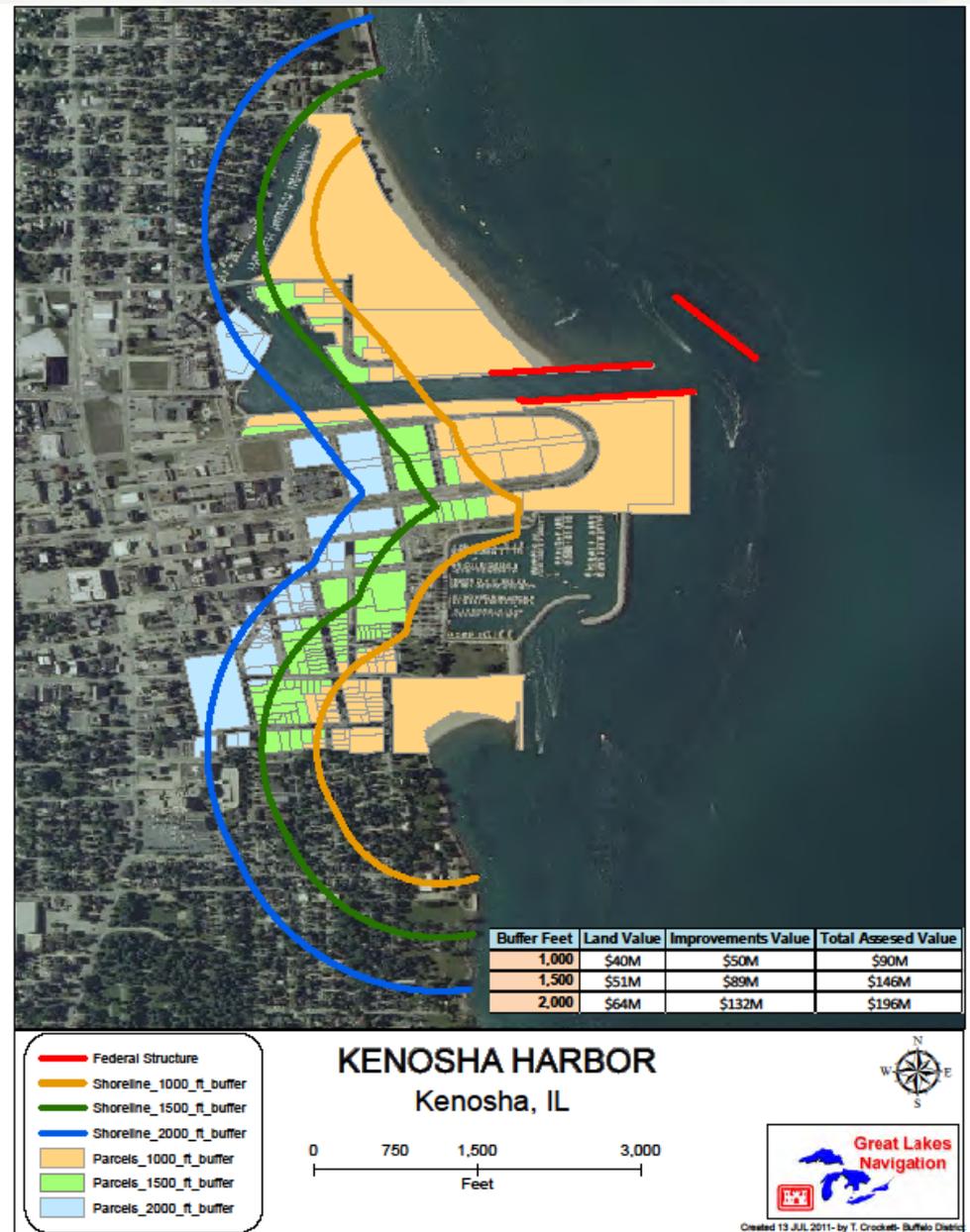
1. Water Treatment Plant
2. U.S. Coast Guard Station
3. Civil War Museum
4. Kenosha Public Museum
5. Apartment Complex
6. Kenosha Yacht Club
7. Simmons Island Boat Harbor
8. City Hall



# Kenosha Harbor:

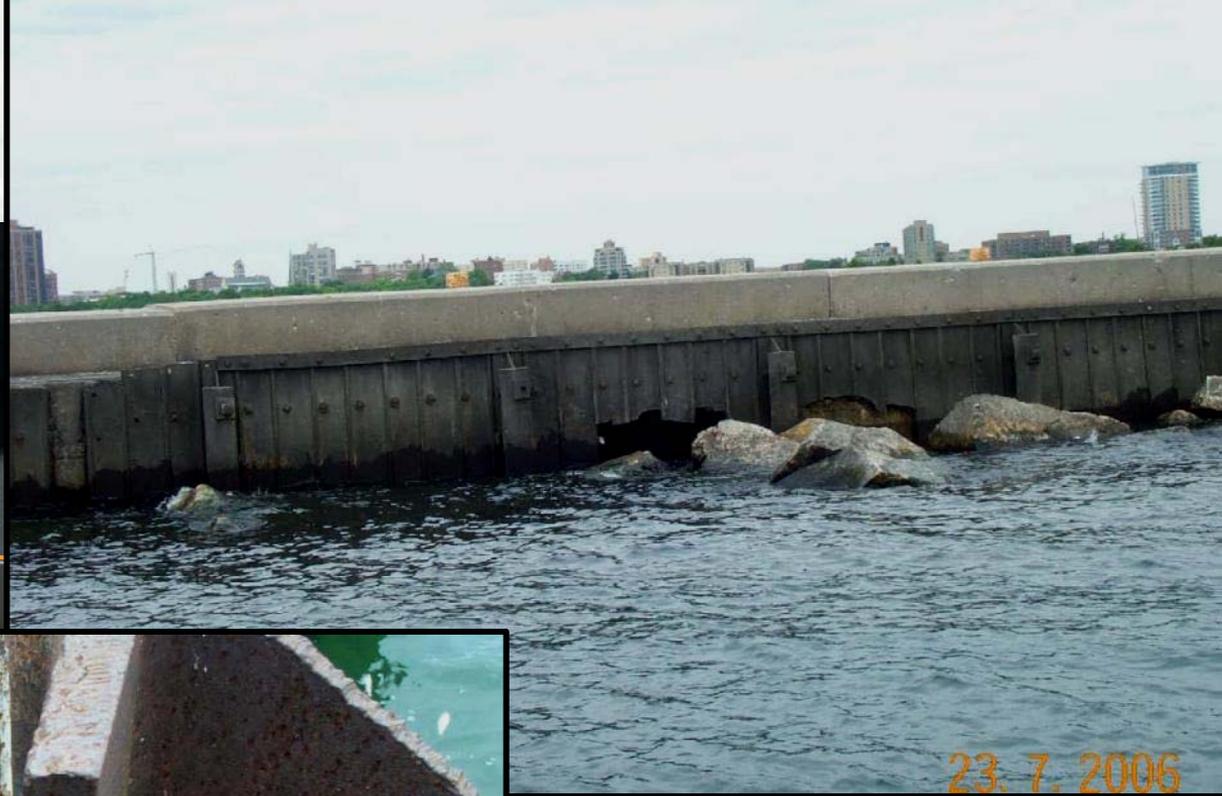
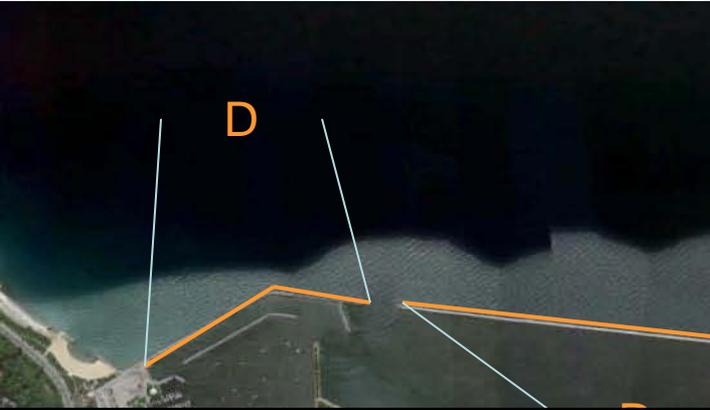
## Potential Impact Areas

Buffer Feet	Land Value	Improv. Value	Total Assessed Value
1,000	\$40M	\$50M	\$90M
1,500	\$51M	\$89M	\$146M
2,000	\$64M	\$132M	\$196M



# Milwaukee Harbor

D- High Risk of Failure



# Milwaukee Harbor:

\$49M estimated cost to upgrade D rated structures to an acceptable level of risk (Level B)

## Infrastructure:

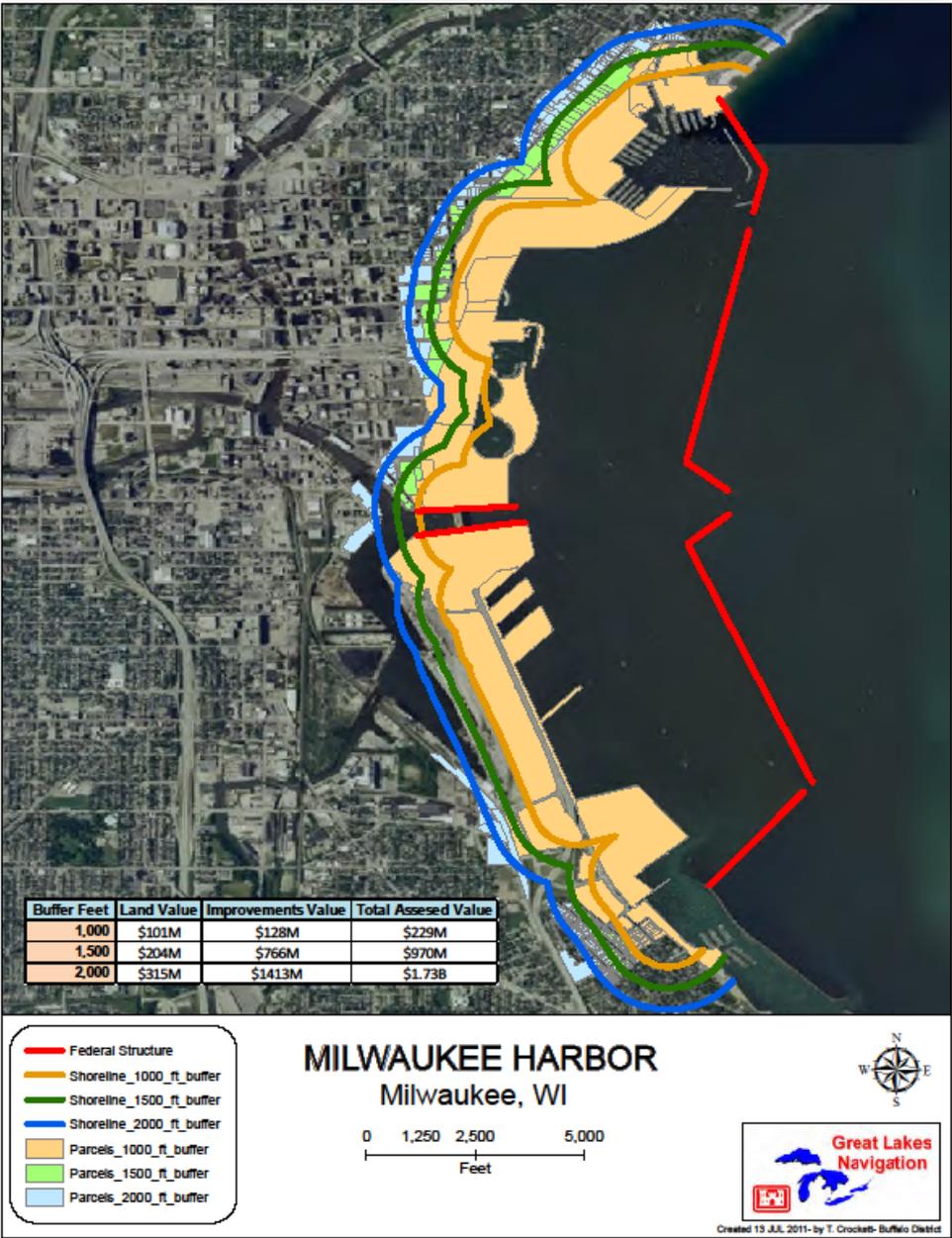
1. Beach Park
2. McKinley Marina
3. Milwaukee Yacht Club
4. Milwaukee Sailing Center
5. Veteran Park
6. Art Museum and Memorial Complex
7. Port Authority Pier
8. Milwaukee Festival Grounds
9. State Park
10. Marcus Amphitheater
11. I-794 Bridge and Causeway
12. Milwaukee Municipal Sewer Department
13. Milwaukee Port Authority Facilities
14. Milwaukee Port Authority Hdq.
15. Car Ferry Terminal
16. Coast Guard Station/Sector Hdq.
17. Navy Reserve Center



# Milwaukee Harbor:

## Potential Impact Areas

Buffer Feet	Land Value	Improv. Value	Total Assesed Value
1,000	\$101M	\$128M	\$229M
1,500	\$204M	\$766M	\$970M
2,000	\$315M	\$1413M	\$1.73B



# Port Washington Harbor: B- Low Risk of Failure



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# Port Washington:

No reaches at Port Washington are rated below A & B risk level

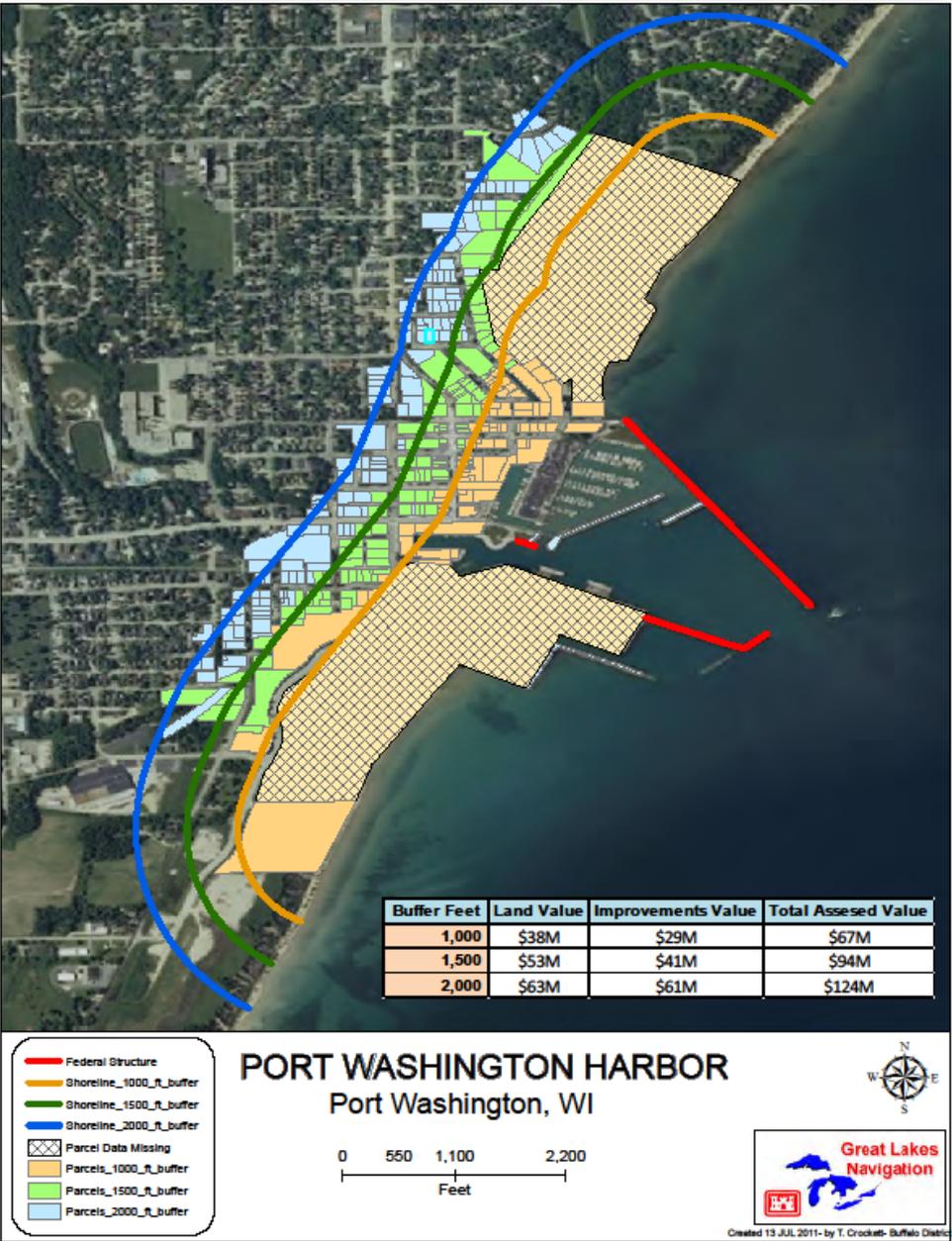
## Infrastructure:

1. Municipal Wastewater Treatment Plant
2. Water Treatment Plant
3. Small Diner
4. Port Washington Marina
5. Downtown retail
6. Holiday Inn hotel
7. Condos
8. Townhouse Complex



# Port Washington Harbor: Potential Impact Areas

Buffer Feet	Land Value	Improv. Value	Total Assessed Value
1,000	\$38M	\$29M	\$67M
1,500	\$53M	\$41M	\$94M
2,000	\$63M	\$61M	\$124M



# Sheboygan Harbor:

D: High Risk of Failure

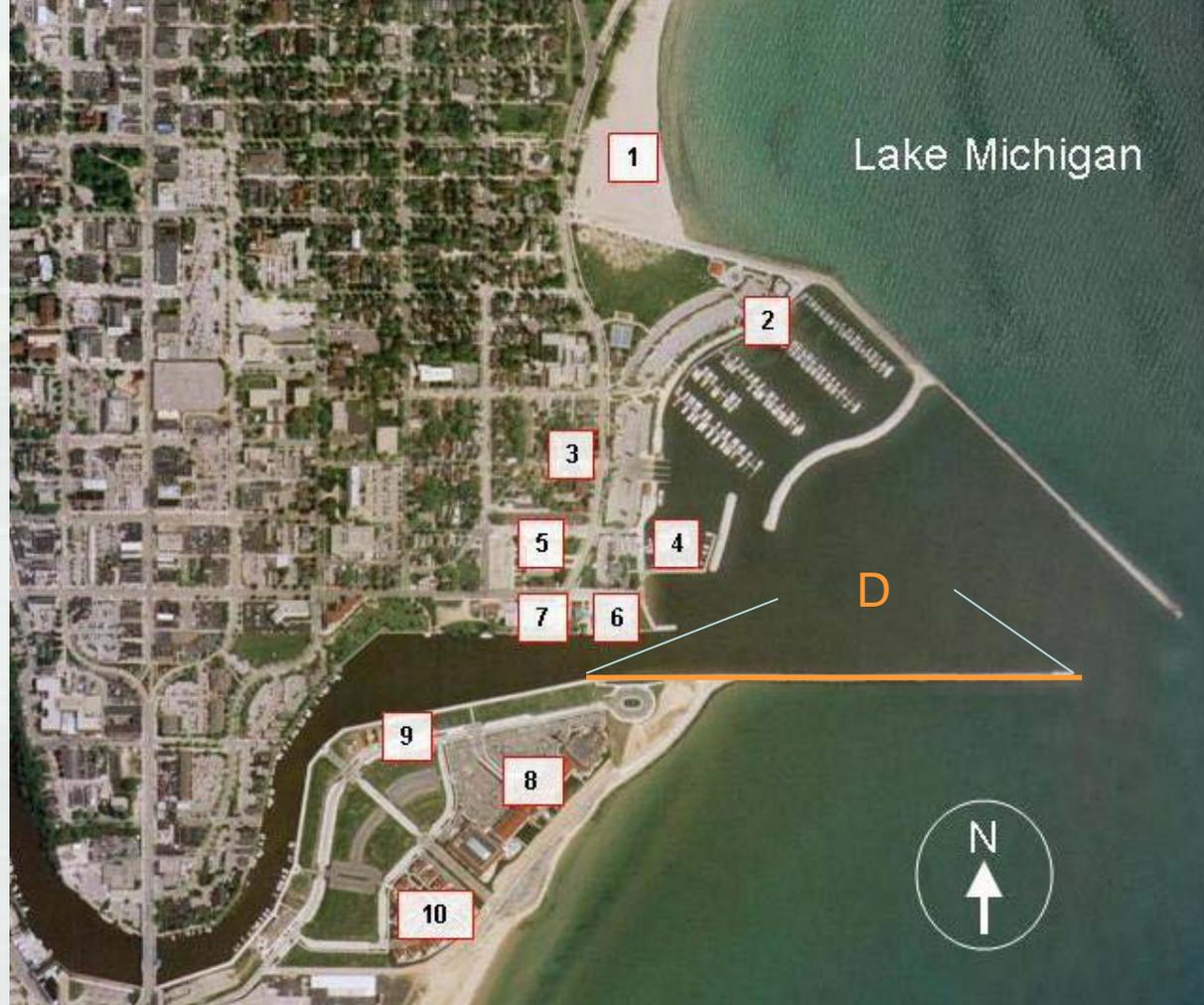


# Sheboygan Harbor:

\$13.5M estimated cost to upgrade D rated structures to an acceptable level of risk (Level B)

## Infrastructure:

1. Public Park
2. Harbor Centre Marina
3. Residential
4. Sheboygan Yacht Club
5. Sheboygan Municipal Auditorium and Armory
6. US Coast Guard Station
7. Apartment Building
8. Harbor Resort Complex
9. Retail Space
10. Condos



# Sheboygan Harbor: Potential Impact Areas

Buffer Feet	Land Value	Improv. Value	Total Assessed Value
1,000	\$47M	\$96M	\$143M
1,500	\$92M	\$146M	\$238M
2,000	\$115M	\$172M	\$287M



# Manitowoc Harbor: B: Low Risk of Failure



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# Manitowoc Harbor:

No reaches at Port Washington are rated below A & B risk level

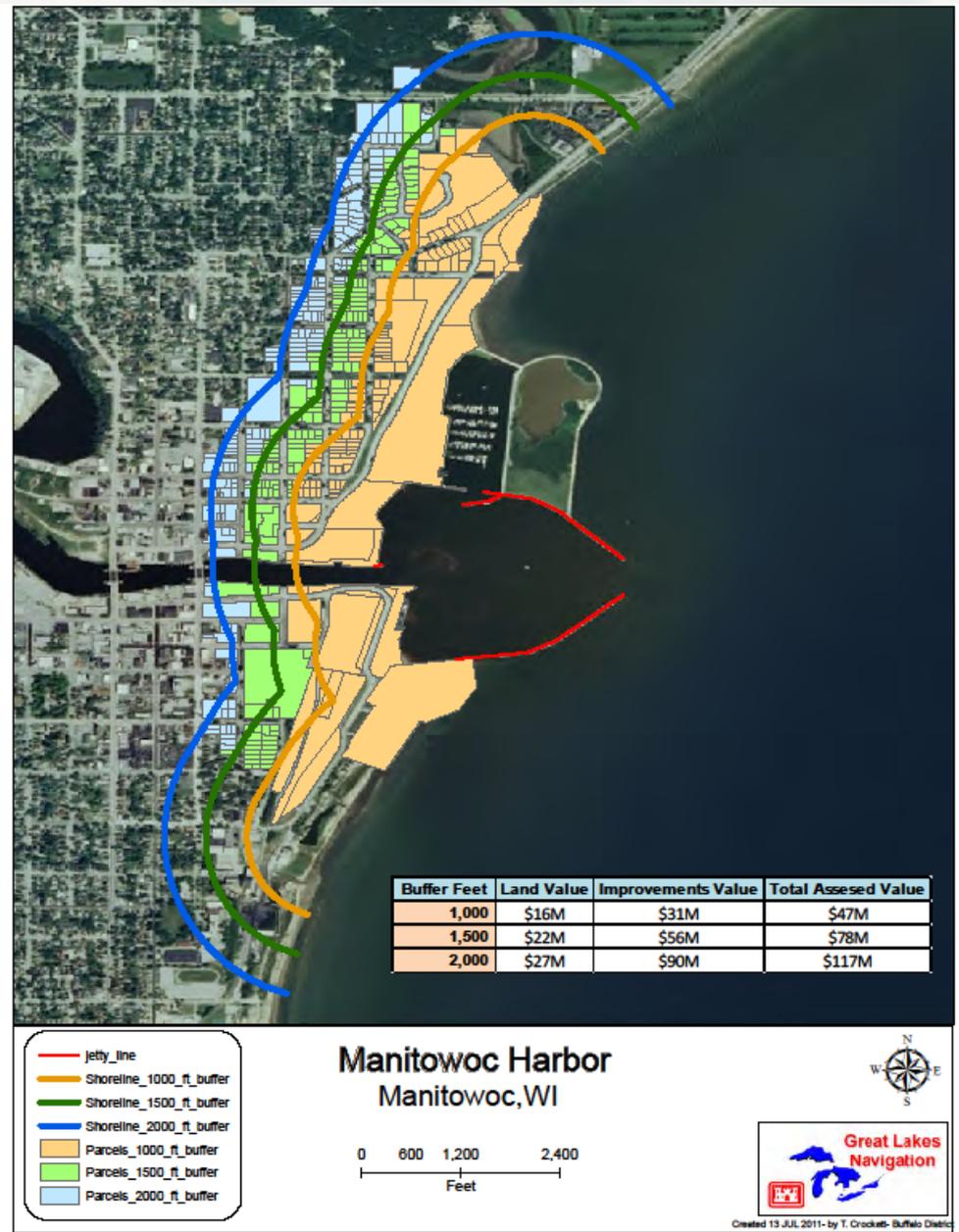
## Infrastructure:

1. Municipal Waste Water Treatment Plant
2. Lake Michigan Car Ferry Terminal
3. Utility Coal Storage
4. Budweiser Brewing Facility
5. Wisconsin Maritime Museum
6. Best Western Hotel
7. YMCA
8. Manitowoc Marina
9. Elementary School
10. Residential Area



# Manitowoc Harbor: Potential Impact Areas

Buffer Feet	Land Value	Improv. Value	Total Assessed Value
1,000	\$16M	\$31M	\$47M
1,500	\$22M	\$56M	\$78M
2,000	\$27M	\$90M	\$117M



# Two Rivers Harbor: B- Low Risk of Failure

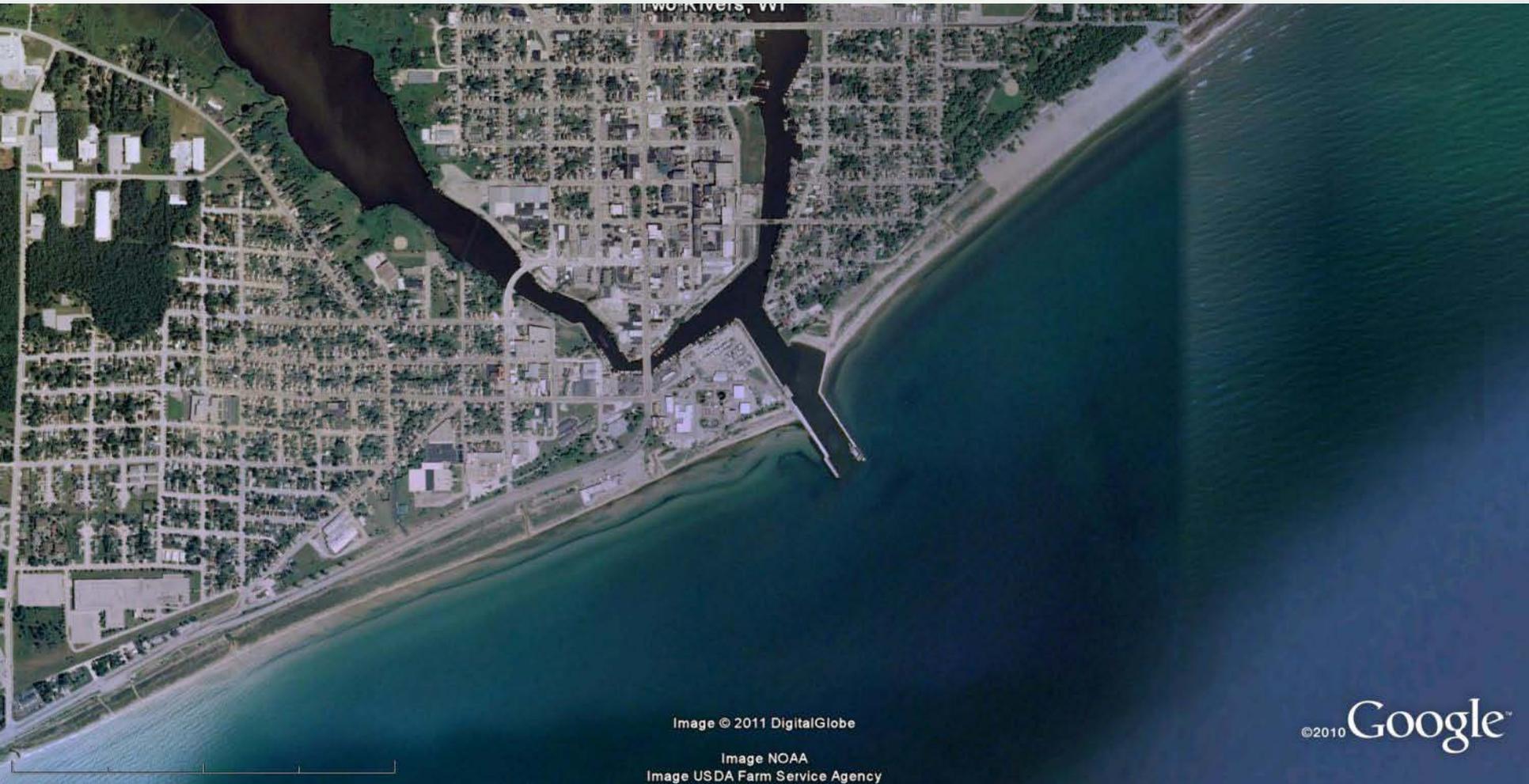


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Image NOAA  
Image USDA Farm Service Agency

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# Two Rivers Harbor:

No reaches at Port Washington are rated below A & B risk level

## Infrastructure:

1. US Coast Guard Station
2. Two Rivers Waste Water Treatment Plant
3. City Utility Motor Pool
4. Water Treatment Plant
5. Sea Gull Marina
6. Residential



# Two Rivers Harbor:

## Potential Impact Areas

Buffer Feet	Land Value	Improv. Value	Total Assessed Value
1,000	\$5M	\$18M	\$23M
1,500	\$8M	\$32M	\$40M
2,000	\$10M	\$43M	\$53M



**TWO RIVERS HARBOR**  
Two Rivers, WI

0 330 660 1,320  
Feet

Federal Structure  
 Shoreline\_1000\_ft\_buffer  
 Shoreline\_1500\_ft\_buffer  
 Shoreline\_2000\_ft\_buffer  
 Parcels\_1000\_ft\_buffer  
 Parcels\_1500\_ft\_buffer  
 Parcels\_2000\_ft\_buffer

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# What Can Be Done?

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- Federal Funding
  - ▶ Funding request through the Federal Budget process each fiscal year
    - Contract structural repair
    - Government floating plant repair
- Local Funding
  - ▶ Mechanisms in place to accept local funding
- Transfer to State/Local Entity
  - ▶ Section 216 Process



# Questions?



# Coastal Structure Risk Outreach Meetings

**Purpose:** Communicate the risk of breakwater and structure conditions to local stakeholders and navigation system users.

**Target Audience:** Stakeholders (port authorities, city/county officials, harbor masters, and other navigation interest groups) within selected region

**Products:** PowerPoint presentation, general overview brochure, and harbor specific infrastructure inventory summary

**Potential Dates:** 1<sup>st</sup> Meeting August 16, 2011 (Milwaukee, WI) plans for two addition meetings in FY11.

