

City of Duluth

Shoreline Risk Assessment and Prioritization

February 2022

Agenda

- Introductions and Project Background
 - *Background Questions and Comments*
- Study Process and Area of Study Overview
- Prioritization Methodology Review and High Priority Site Identification
- Demo of Online Engagement Tools -Website, Survey, Crowdsource Map
- Questions and Comments

Project Team

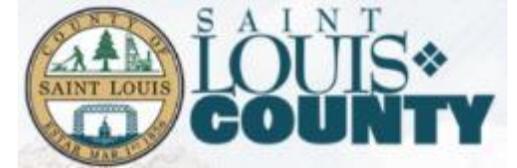
Project Partners

- City of Duluth
- St. Louis County
- Federal Emergency Management Authority
- Minnesota Homeland Security and Emergency Management

Project Consultants

- Ramboll
- MSA

Funding provided by FEMA Advance Assistant Hazard Mitigation Grant Program



FEMA



Background

- Storm events have caused shoreline failure along Lake Superior for decades
- Increasing storm frequency, intensity, and fluctuating lake levels have increased the risk of shoreline collapse
- Ramboll evaluated available information to determine the high priority shoreline segments that will require mitigation
- This project team is working together to identify practical solutions to address shoreline erosion and bank failures
- Project scope includes portions of the North Shore and the harbor side of Park Point Recreation Area



Shoreline Erosion

- Causes of Erosion
 - Upland water infiltration
 - Storm events – increased water flow on banks
 - Wind and wave action
 - Lack of vegetation
- Shoreline characteristics can influence erosion extent
 - Soil type
 - Bank angle
 - Vegetation
 - Depth to bedrock
 - Stormwater flow and control measures
 - Site development



Information Used to Inform Priority Shoreline Areas

01 Aerial drone video (from June 2021)

02 Historic and current aerial imagery

03 Visual condition assessment and photograph documentation

04 Discussions with the City of Duluth and St. Louis County

Prioritization Categories

Based on these datasets, approximately 20 miles along the North Shore were evaluated for each of the following categories

01

Presence and Value of Assets

Monetary value

Community value

Public safety

02

Shoreline Stability

Presence of hardened shoreline features

Erosion rates / evidence of erosion

Bank height and slope

Type and presence of vegetation

03

Distance from Shoreline to Asset

Distances in combination with potential for erosion indicate likelihood for asset damage

Scoring Matrix

- A ranking of 1, 2, or 3 was assigned to each category

Score	Presence and Value of Asset	Shoreline Stability	Distance from Asset to Shoreline
1	No assets present	Hardened feature, no visible erosion	Greater than 50 feet
2	Vacant structures, fish hatchery abandoned utilities or roadways	Bluff <10 feet, heavily vegetated, some shoreline protection	Greater than 5 feet, but less than 50 feet
3	Roads, culverts, residential properties, utilities, historical sites, water treatment plant, turnouts	Bluff >10 feet, little to no vegetation, visible evidence of erosion	Less than 5 feet

- Scores were summed across all 3 categories for each area, for a total score between 3 and 9
- Low scores, such as 3 or 4, represent low priority areas
- High scores, such as 8 or 9, represent high priority areas

Scoring Matrix Examples

Example 1:

Score = 3+2+2 = 7

Score	Presence and Value of Asset	Shoreline Stability	Distance from Asset to Shoreline
1	No assets present	Hardened feature, no visible erosion	Greater than 50 feet
2	Vacant structures, fish hatchery abandoned utilities or roadways	Bluff <10 feet, heavily vegetated, some shoreline protection	Greater than 5 feet, but less than 50 feet
3	Roads, culverts, residential properties, utilities, historical sites, water treatment plant, turnouts	Bluff >10 feet, little to no vegetation, visible evidence of erosion	Less than 5 feet

Example 2:

Score = 2+3+1 = 5

Score	Presence and Value of Asset	Shoreline Stability	Distance from Asset to Shoreline
1	No assets present	Hardened feature, no visible erosion	Greater than 50 feet
2	Vacant structures, fish hatchery abandoned utilities or roadways	Bluff <10 feet, heavily vegetated, some shoreline protection	Greater than 5 feet, but less than 50 feet
3	Roads, culverts, residential properties, utilities, historical sites, water treatment plant, turnouts	Bluff >10 feet, little to no vegetation, visible evidence of erosion	Less than 5 feet

Example of Shoreline Scoring Results



Erosion

- 1 - No visible erosion/Protected
- 2 - Bluff < 10 feet, vegetation, some protection
- 3 - Bluff > 10 feet, little to no vegetation, visible erosion

Asset Type

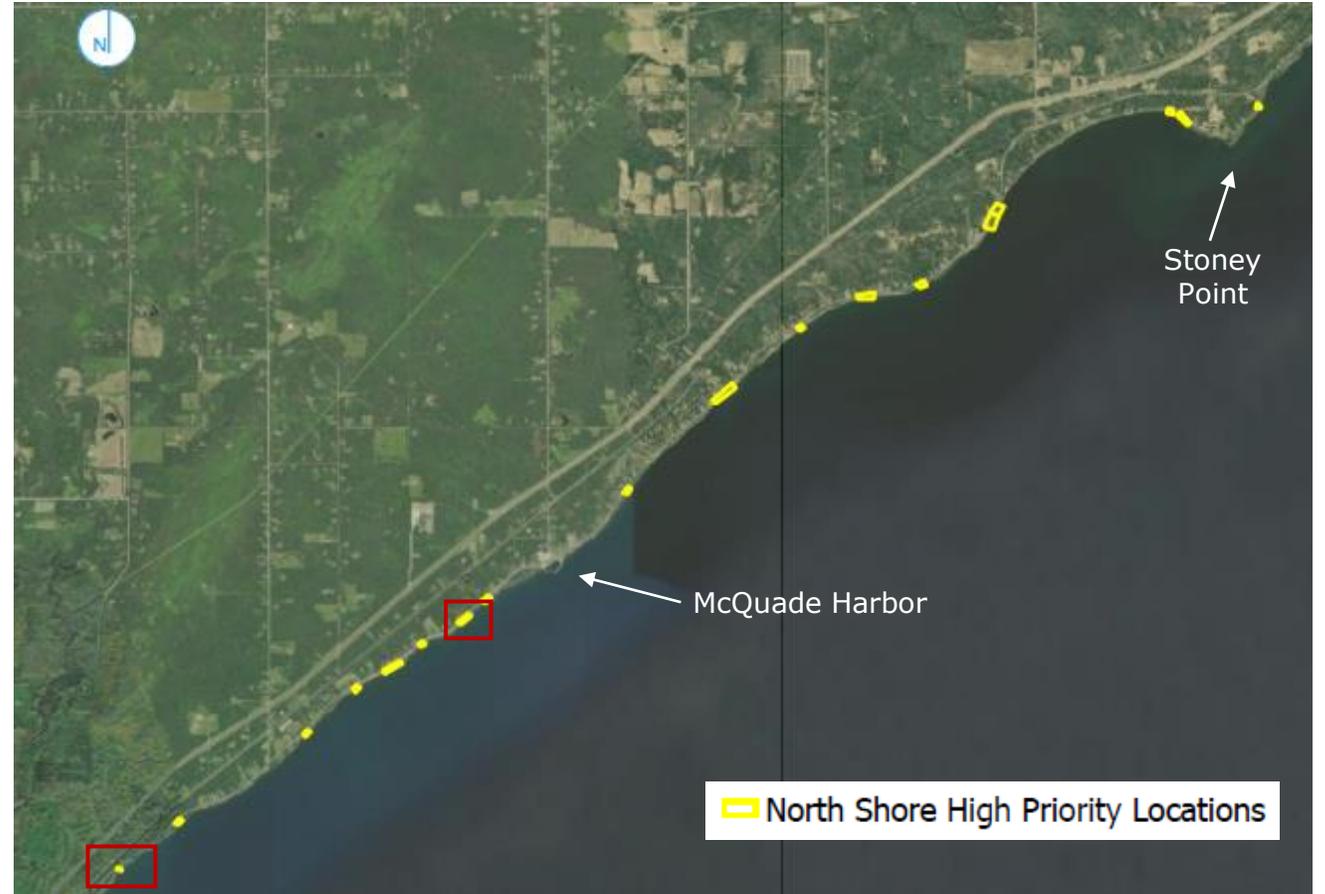
- 1 - No Asset Present
- 2 - Fish Hatchery, Vacant Structures
- 3 - Roadways, Utilities, Residential Properties

Proximity

- 1 - > 50 feet
- 2 - < 50 feet, > 5 feet
- 3 - < 5 feet

Results of Shoreline Prioritization Evaluation

- Shoreline segments with scores of 8 and 9 were determined to require mitigation in the near future
- 20 separate segments had a score of 8 or 9
- Total length of priority segments = 2.0 miles



Example of High Priority Shoreline Segments



Example of High Priority Shoreline Segments



Next Steps

- Conduct an evaluation of mitigation options for each priority area
- Each area is unique; potential options will consider:
 - Shoreline failure type
 - Topography and bank angle
 - Wave action
 - Soil type
 - Geotechnical data
 - Construction costs
 - Permitting requirements
- A mitigation option for each priority area will be identified
- The City will evaluate grant opportunities to financially support the implementation of selected shoreline mitigation options

Harbor Side of Park Point Recreation Area

- The Park Point Recreation Area is being evaluated separately from the North Shore area
- Bay-side priority areas have been assessed
- Final step will be to review proposed mitigation options and concept drawings



Project Stages and Outreach

01 →

Identify and evaluate priority sites

- **Public Meeting#1**
- **Launch Project Website**
- **Survey#1**
- **Crowdsource Map**
- **Pop-Up Meeting #1**

02 →

Review of mitigation options

- Public Meeting#2
- Project Website Updates
- Survey#2
- Pop-Up Meeting #2

03 →

Review of selected mitigation option for each priority area

- Public Meeting#3
- Project Website Updates
- Survey#3
- Pop-Up Meeting #3

04

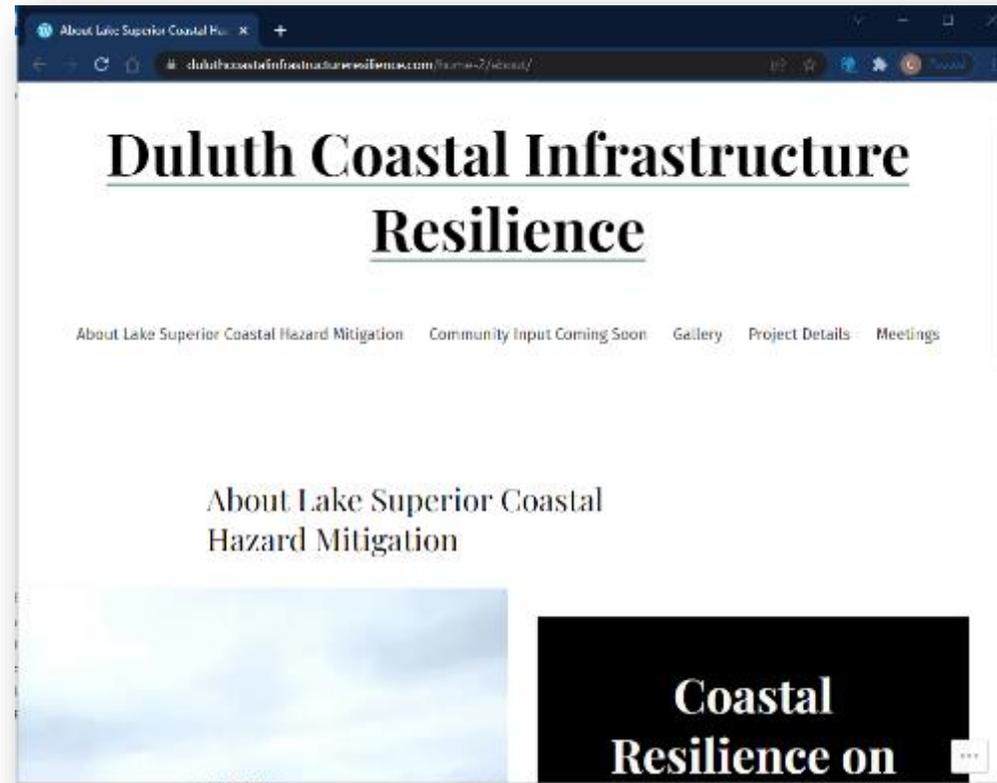
Complete study and submit for further review and funding

Online Engagement Tools Demonstration

duluthcoastalinfrasturureresilience.com

Tour Project Website

- About
- Project Details
- Gallery
- Meetings
- Community Input Tools
 - *Survey*
 - *Crowdsource Mapping App*



Thank you! Questions?

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