



# *RESILIENCE SOLUTIONS FOR FLOODING AND EXTREME WEATHER*

Great Lakes and St. Lawrence Cities Initiative  
2018 Annual Conference  
Thursday, June 14, 2018

# *ABOUT DELTA INSTITUTE*

Who we are: Multidisciplinary team of 20 FTE, including urban planners, civil engineers, economists, scientists, architects, LEED APs, GIS experts.

What we do: We collaborate with communities to solve complex environmental challenges throughout the Midwest.

How we do it:

- Work with public and private partners to identify opportunities for market-based environmental solutions
- Design, test, and share on-the-ground solutions that yield social, environmental, and economic benefits for communities.



**SUSTAINABLE  
ENVIRONMENT.**



**SUSTAINABLE  
ECONOMY.**

# *CURRENT INITIATIVES*



Resiliency planning and implementation in:

- Gary, Indiana,
- Hobart, Indiana
- Michigan City, Indiana
- Muskegon, Michigan
- Sebewaing, Michigan
- Tuscola, Michigan



# WHY RESILIENCE?

Build capacity to deal with unexpected changes and come back *stronger than before*.

Integrates

- People
- Infrastructure & systems
- Environment



# WHAT'S IN A RESILIENCE PLAN?

ENGAGE STAKEHOLDERS &  
IDENTIFY COMMUNITY ASSETS  
e.g. outdoor recreation, utilities

EVALUATE DISTURBANCES  
e.g. floods, demand for  
recreation

ASSESS VULNERABILITY  
e.g. sensitivity, capacity to adapt

Resilience  
Strategies

ADOPT PLAN &  
IMPLEMENT



## VILLAGE OF SEBEWAING RESILIENCY PLAN

FEBRUARY, 2017

### Acknowledgements

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# *PLANNING WITH RESILIENCE COMPONENTS*

Don't have to undertake a resilience plan to incorporate resiliency into your planning, operations, and maintenance.

Address resilience in:

- Transportation Plans
- Parks Plans
- Energy Plans
- Master Plans

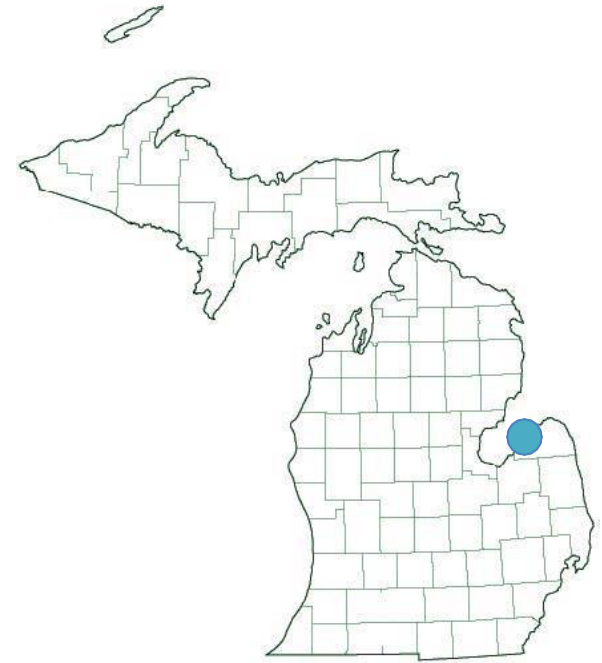


# *OTHER MECHANISMS FOR INCORPORATING RESILIENCE*

- Many municipalities already have tools that they can use to promote resiliency:
  - **Zoning**
    - Floodplain – define and regulate
    - Parking – permeable surfaces
    - Underground wiring
  - **Ordinances**
    - Siting utilities
  - **Budgeting**
    - Capital improvements

# SEBEWAING, MICHIGAN

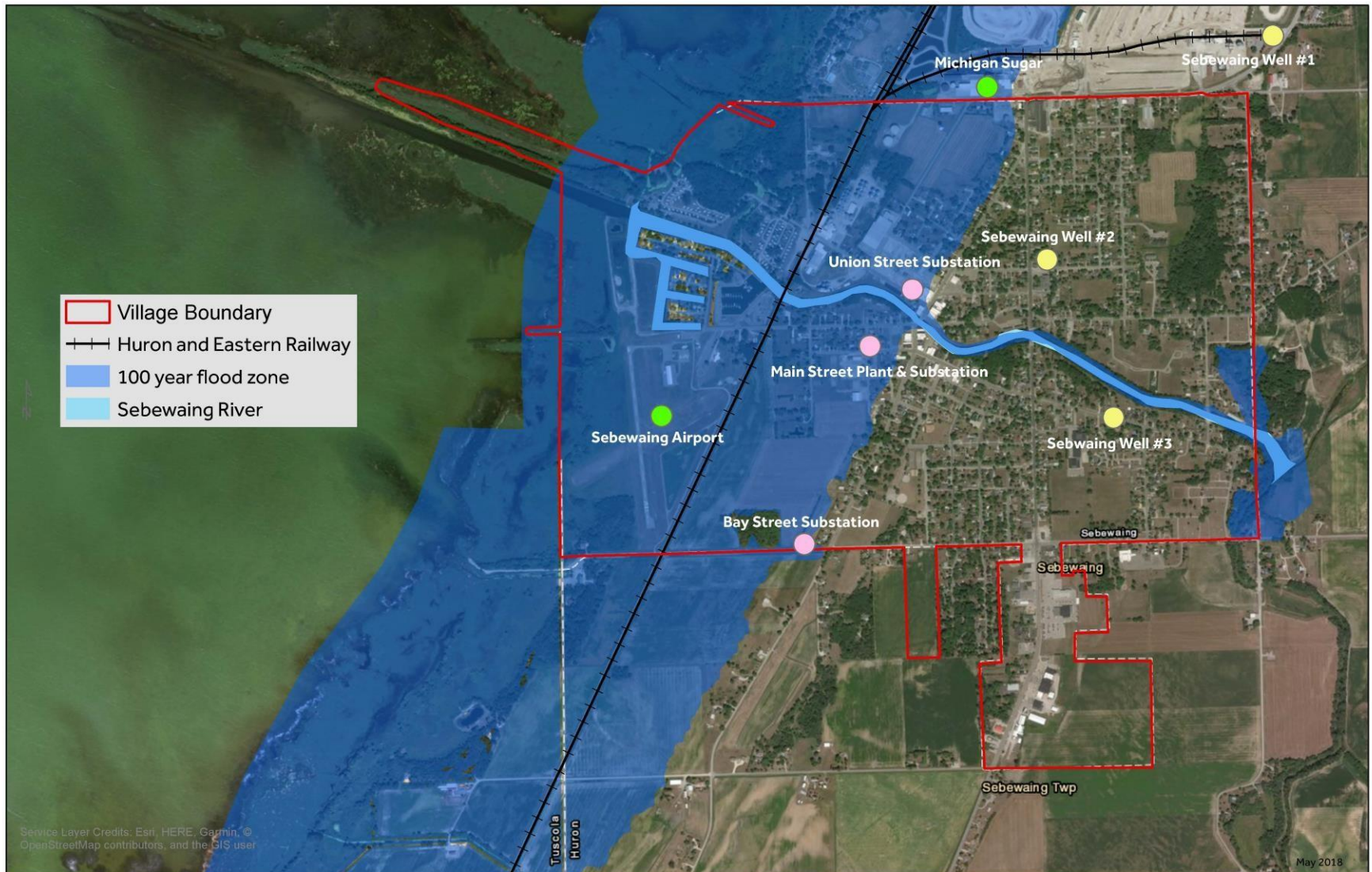
- Population: 1,610
- On the coast of Saginaw Bay
- Challenges:
  - Increase intensity and duration of rainfall
  - Ice jams in Sebewaing River
  - Increase in straight line winds, lightning strikes, flooding
  - Aging utilities





# SEBEWAING, MICHIGAN

## FOCUS ON UTILITIES



# SEBEWAINING, MICHIGAN

## FOCUS ON UTILITIES

### Solutions

#### Planning

- Resilience Plan(2017)
- Master Plan(2018)
- Zoning updates(2019)

#### Implementation

- Install new CHP engines
- Adopt new ordinance
  - Regulates siting and installation of new public utilities

# HOW IT ALL FITS TOGETHER

SEBEWAING, MICHIGAN

Resilience Plan(2017)

**Purpose:** To guide the Village in the development and adoption of climate adaptation and resilience strategies.

Implemented Recommendation: Public Utility Siting Ordinance

Master Plan(2018)

**Purpose:** To reflect the ideas and vision of the community and to guide future development. Recommendations from the Resilience Plan are incorporated as Action Items in the Master Plan.

Update Zoning(2019)

**Purpose:** To regulate the use of land. Contains rules to regulate the vision described in the Master Plan. The zoning ordinance was reviewed for where resilience efforts could be incorporated.

# *GARY, INDIANA*

- Population: 76,424
- On the coast of Lake Michigan
- Challenges:
  - Weather events
  - Urban run-off and stormwater management issues
  - Disinvestment and vacant land
  - Unclear municipal processes





# GARY, INDIANA

Service Index Layers ▼

Industrial Index Layers ▼

Economic Vitality Context Layers ▼

Conservation Index ▼

Recreation & Beautification Index ▼

Stormwater Index ▲

☒ Stormwater Master

1 - 40

40 - 60

60 - 80

80 - 100

Download

☐ Highest Impact Land

☐ Impervious Surface

☐ Soil Drainage

☐ Flood Reports

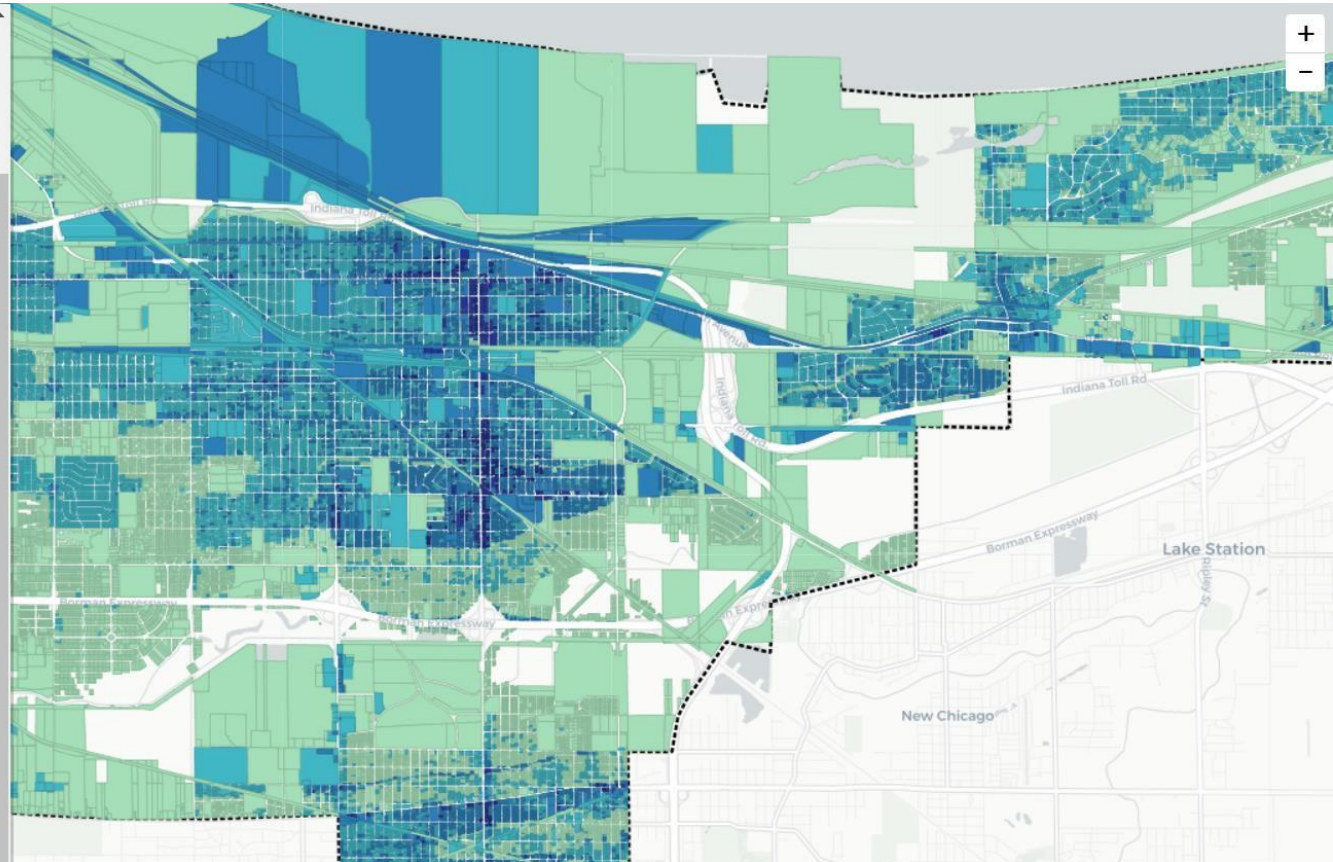
☐ Most Available Land

☐ Public Ownership - No Structure

☐ Public Ownership - With Structure

☐ Property Pipeline - No Structure

☐ Property Pipeline - With Structure



# GARY, INDIANA

## FOCUS ON VACANT LAND

### Solutions

#### Planning

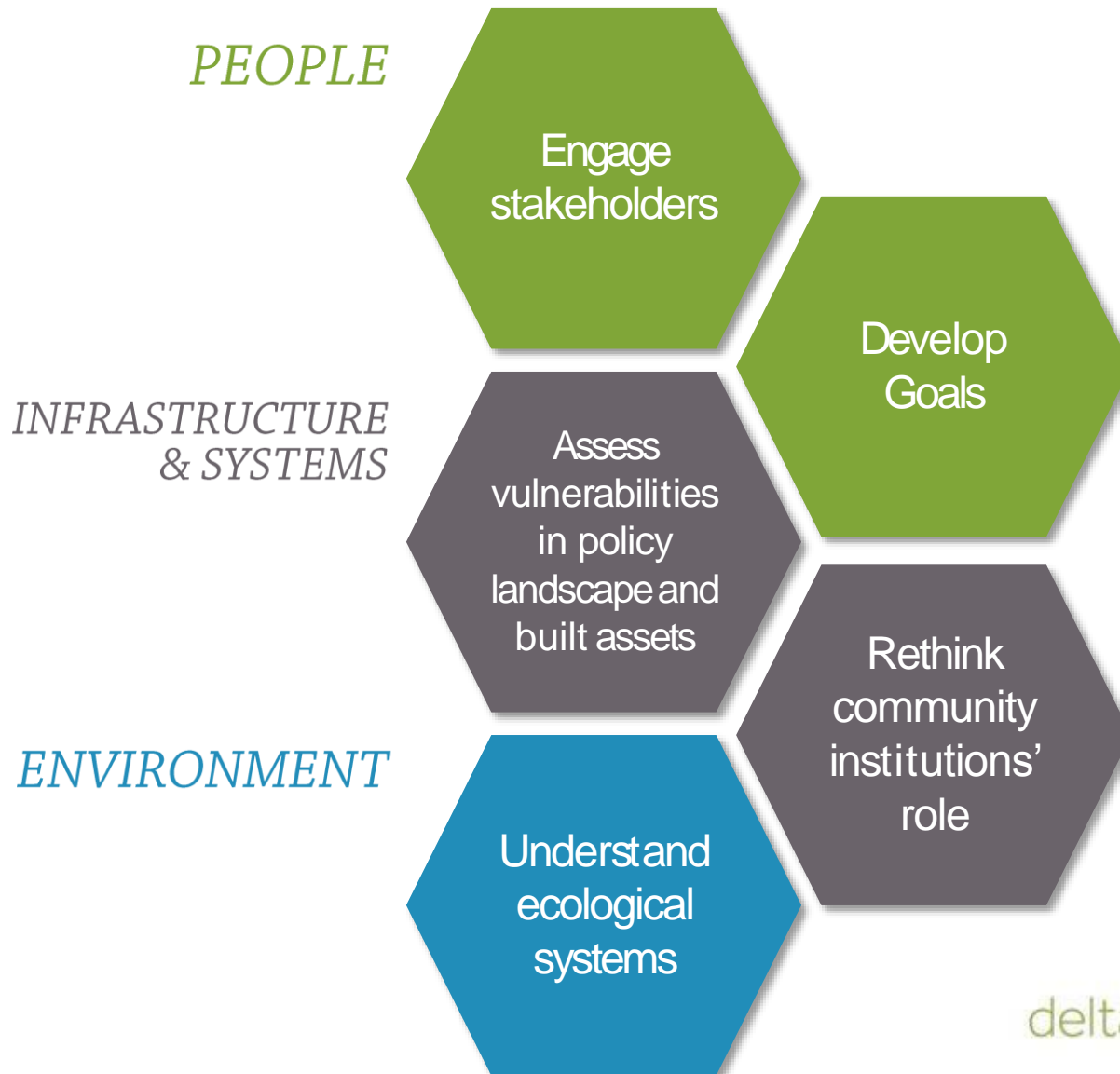
- Gary Asset Mapping (2015)
- Green Infrastructure Plan (2016 - 2018)

#### Implementation

- Hybrid poplar forests for stormwater management



# *RESILIENCE IS A LONG-TERM PROCESS*



# PEOPLE

- Who needs to be **at the table** when resilience planning?
- How can communities ensure planning for the most **vulnerable populations**?
- Who will **benefit** from resilience efforts?



Engage  
stakeholders

Develop  
Goals



# *INFRASTRUCTURE & SYSTEMS*


- What are the **global drivers** and **local impacts**?
- How does the **built environment** provide opportunities/challenges?
- How can **community institutions** work together to layer resiliency into each aspect of planning, operations, maintenance?

Assess  
vulnerabilities  
in policy  
landscape and  
built assets

Rethink  
community  
institutions'  
role

# ENVIRONMENT

- What should the system be **resilient to**?
  - Is the 100-year floodplain the right frame?
- How do people and systems **interact and depend on** ecological systems?
  - Residential use of water: drinking, washing
  - Commercial use of waterways: navigable channels
  - Recreational use of waterways: kayaking, swimming



Understand  
ecological  
systems

# RESOURCES

- Green Infrastructure Toolkit
  - Templates, plan sets, cross sections, costs, and material specifications
- Resilience Plans for Muskegon, Michigan and Sebewaing, Michigan
  - Examples of resilience assessments and analysis of disturbances
- Urban Tree Farms Toolkit (by end of 2018)



# *POSSIBLE FUNDING SOURCES*

Planning and implementation of resilience efforts increasingly rely on cooperation from **private and public parties**.

Below are possible public funding sources:

- State Department of Environmental Quality
- National Oceanic and Atmospheric Administration
- EPA Smart Growth Grants
- FEMA
  - Pre-Disaster Mitigation Program
  - Flood Mitigation Assistance Program
  - Hazard Mitigation Grant Program

\* Programs may require applicant to have an approved Hazard Mitigation Plan



# THANK YOU!

## Contact us:

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