

TOWN OF BEVERLY SHORES

LONG-TERM SHORELINE PROTECTION PLAN
PUBLIC INFORMATION MEETING 2

OVERVIEW OF TONIGHT'S PRESENTATION

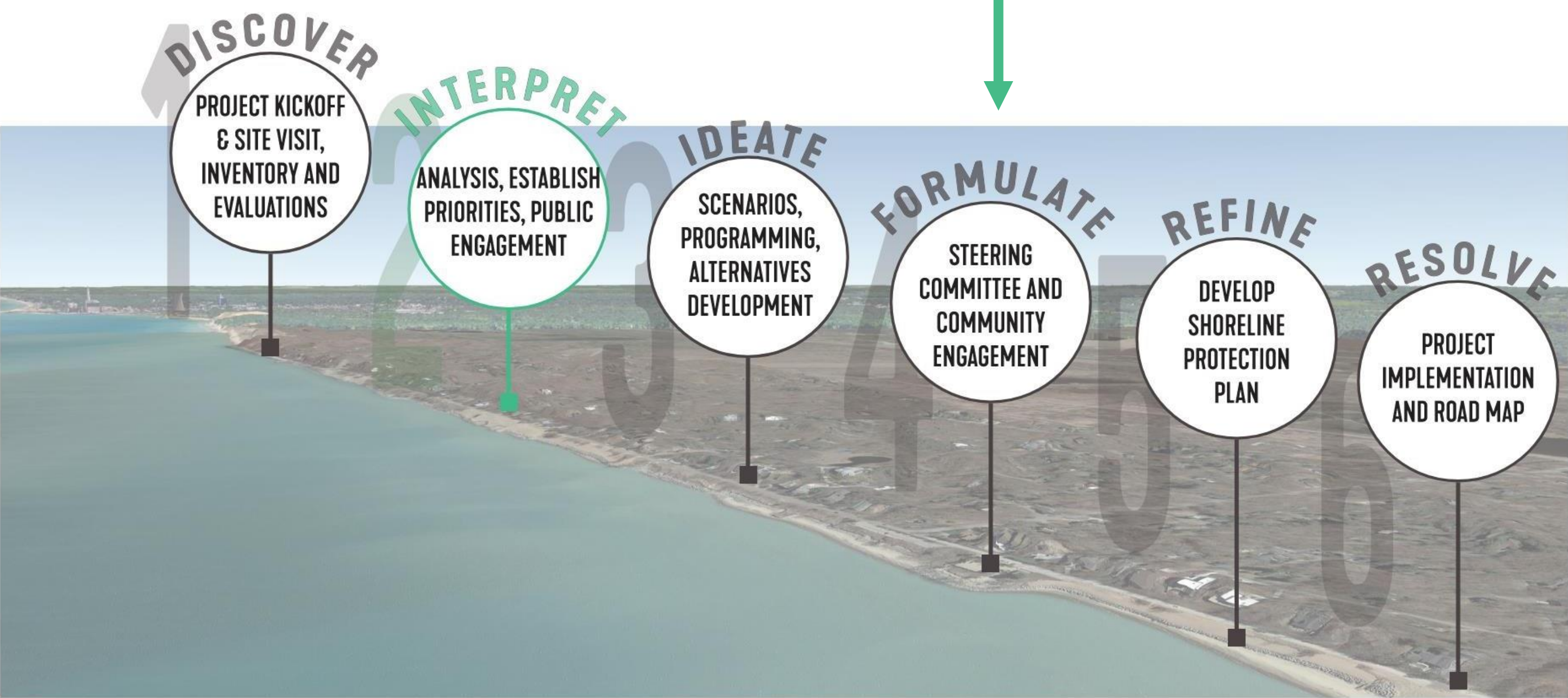
OVERVIEW OF THE PROBLEM

EXPLORING A SOLUTIONS TOOL KIT

REVIEWING A RANGE OF ALTERNATIVE OPPORTUNITIES


PROCESS OVERVIEW

WHERE WE ARE




EXPECTATIONS

HOW WILL WE MEASURE SUCCESS?

- Design for a long-term resilient shoreline
 - Preserve and enhance community character and uniqueness
 - Establish and maintain a clear and positive collaborative relationship and process between the Town and National Park Service (NPS)
 - Maximize funding eligibility
 - Provide a balanced design framework to model across southern Lake Michigan
- 

EXPECTATIONS

WHAT DO WE HOPE TO ACHIEVE?

- Holistic coastal resilience strategy in low and high water levels
 - Variety of public water access and community spaces
 - Comprehensive stormwater and green infrastructure strategy
 - Connected native habitat network
 - Organized pedestrian, traffic and parking strategy
 - Coordinated materials and aesthetics (i.e. furnishings, signage/wayfinding, structures, hardscape and softscape)
 - Clarify ownership and operations management
 - Manage and steer resident desires and pressures
- 

THE PROBLEM

AN EVOLVING COASTLINE

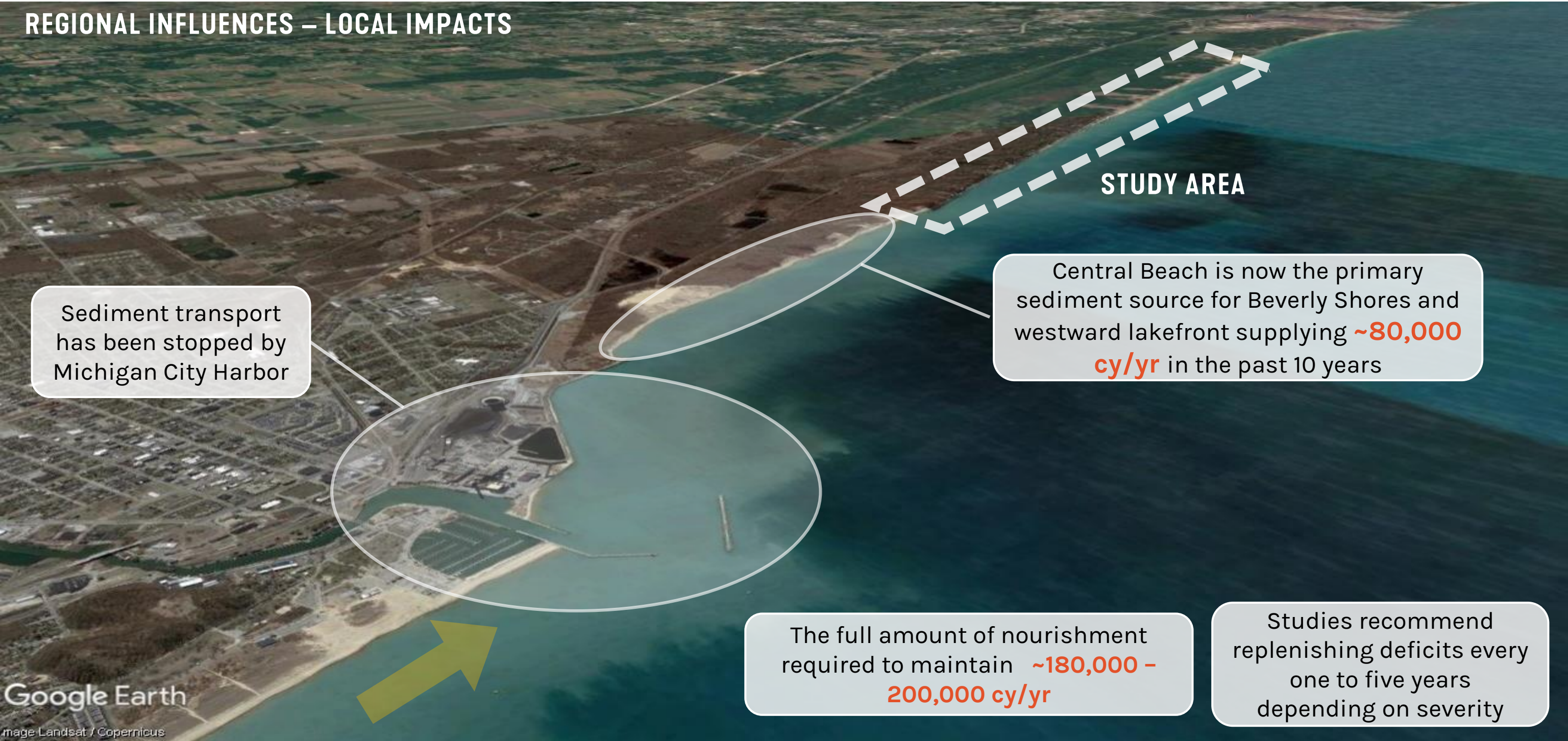
REGIONAL INFLUENCES/LOCAL IMPACTS

SAND DEFICIT

ENHANCED VULNERABILITY

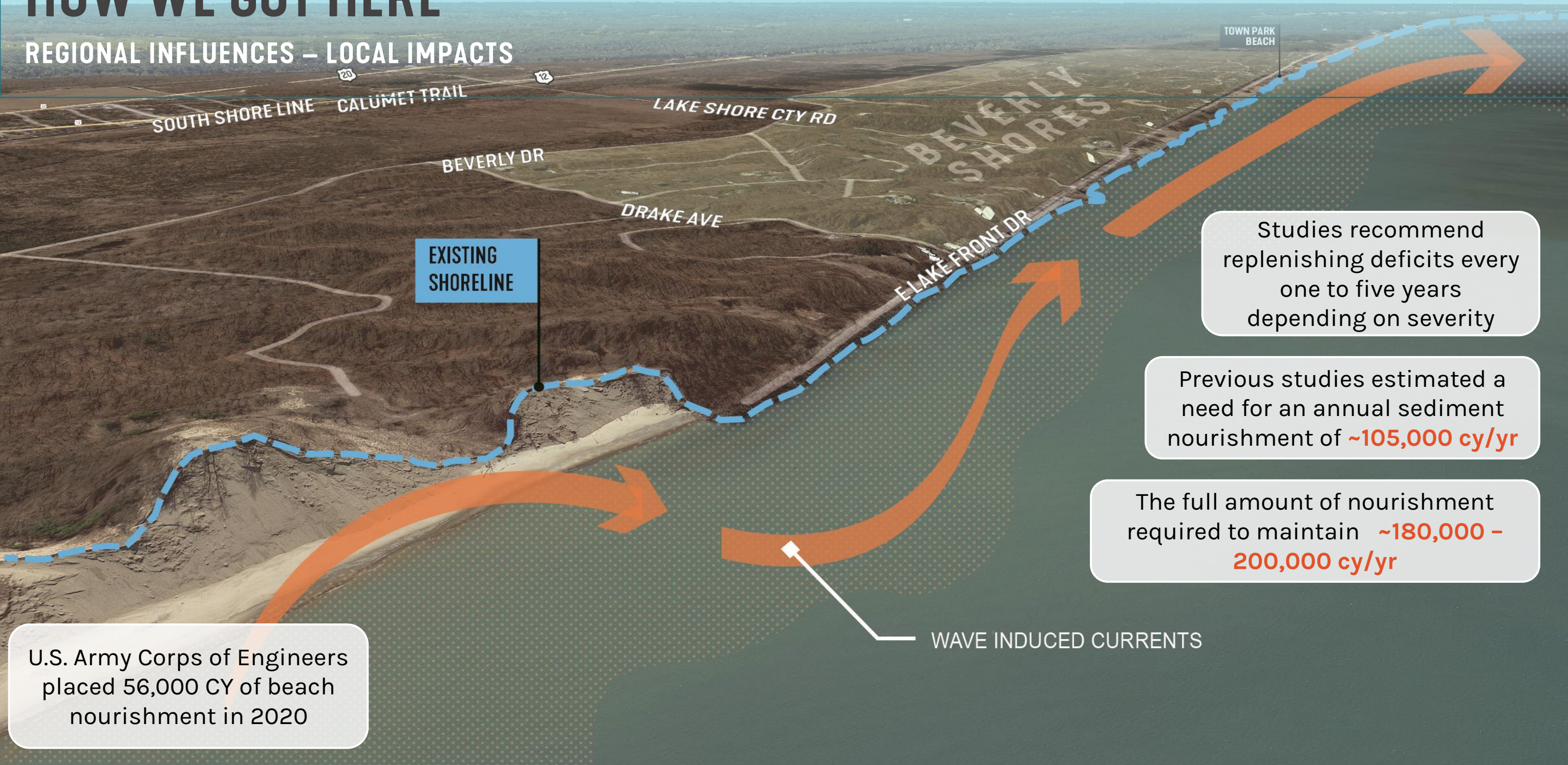
HOW WE GOT HERE

REGIONAL INFLUENCES – LOCAL IMPACTS



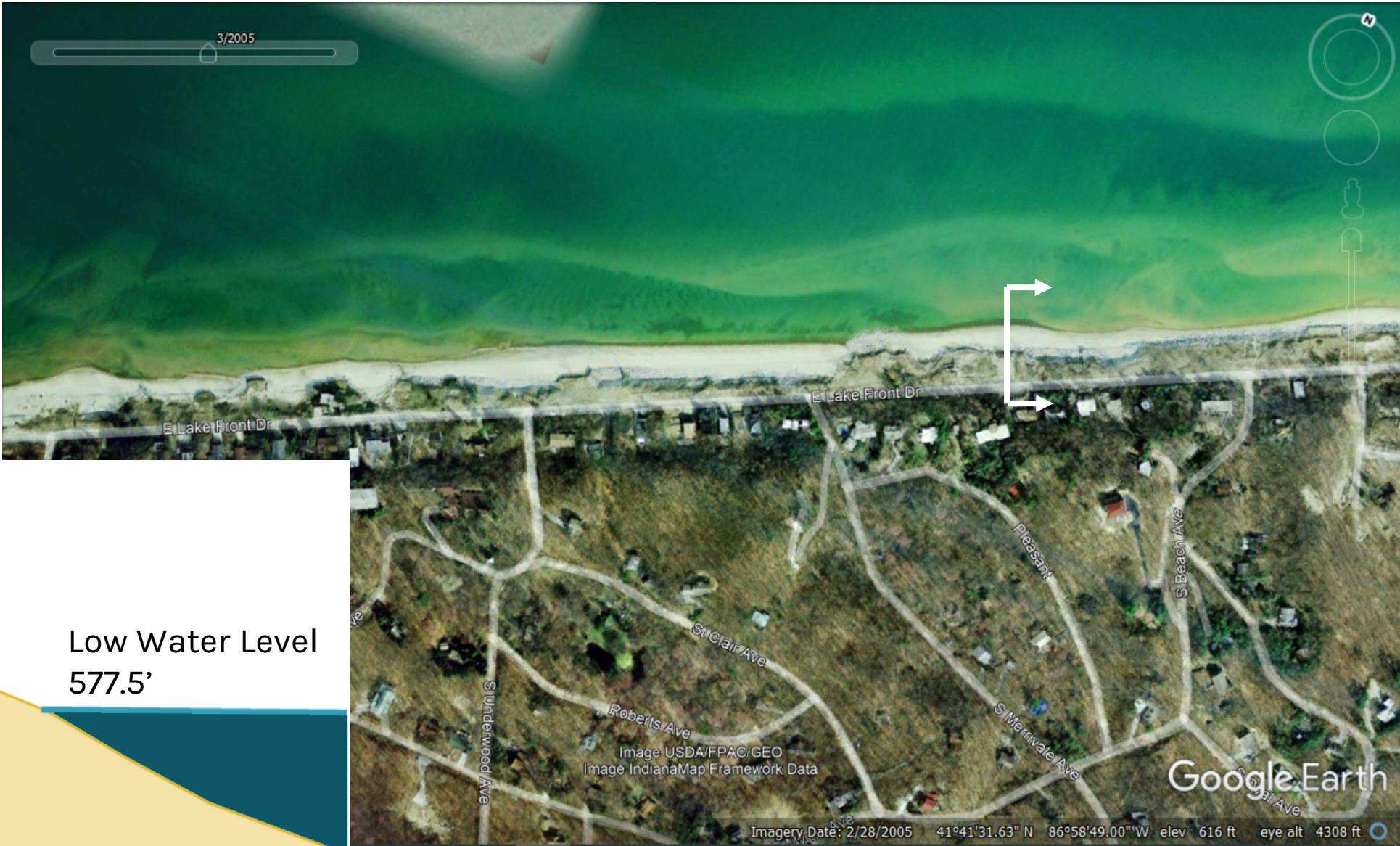
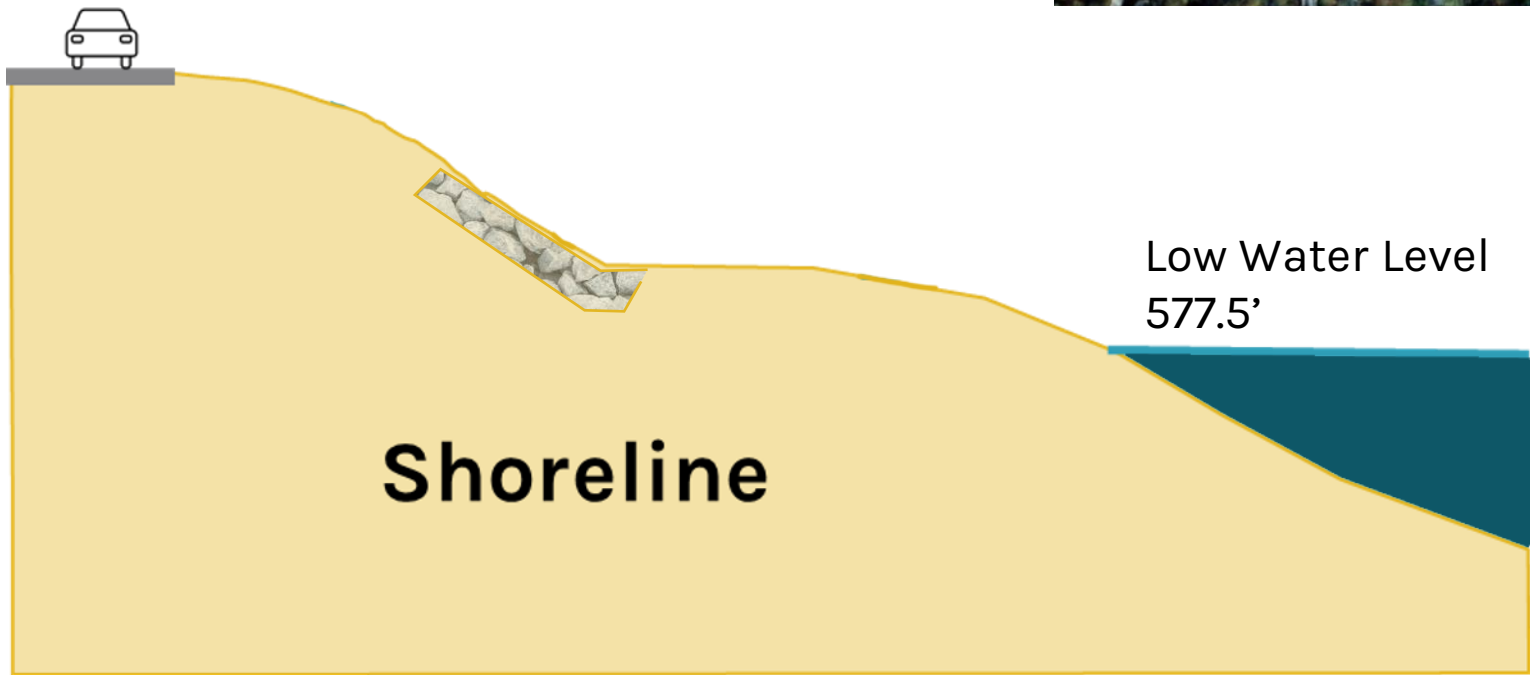
HOW WE GOT HERE

REGIONAL INFLUENCES – LOCAL IMPACTS



AN EVOLVING LAKEBED

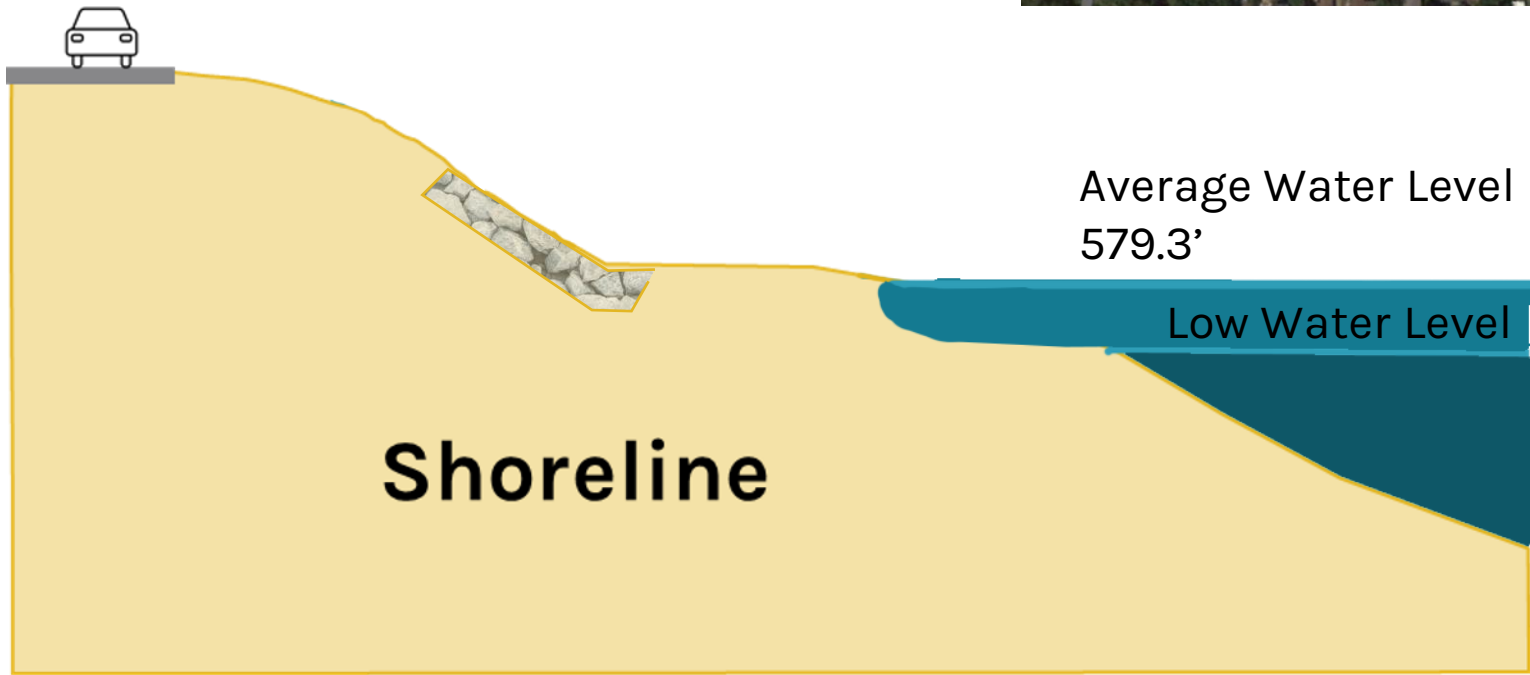
LOW WATER LEVEL



- “a lake-wide surface so low that the water level will seldom fall below it” (National Atmospheric and Oceanographic Administration)

AN EVOLVING LAKEBED

AVERAGE WATER LEVEL

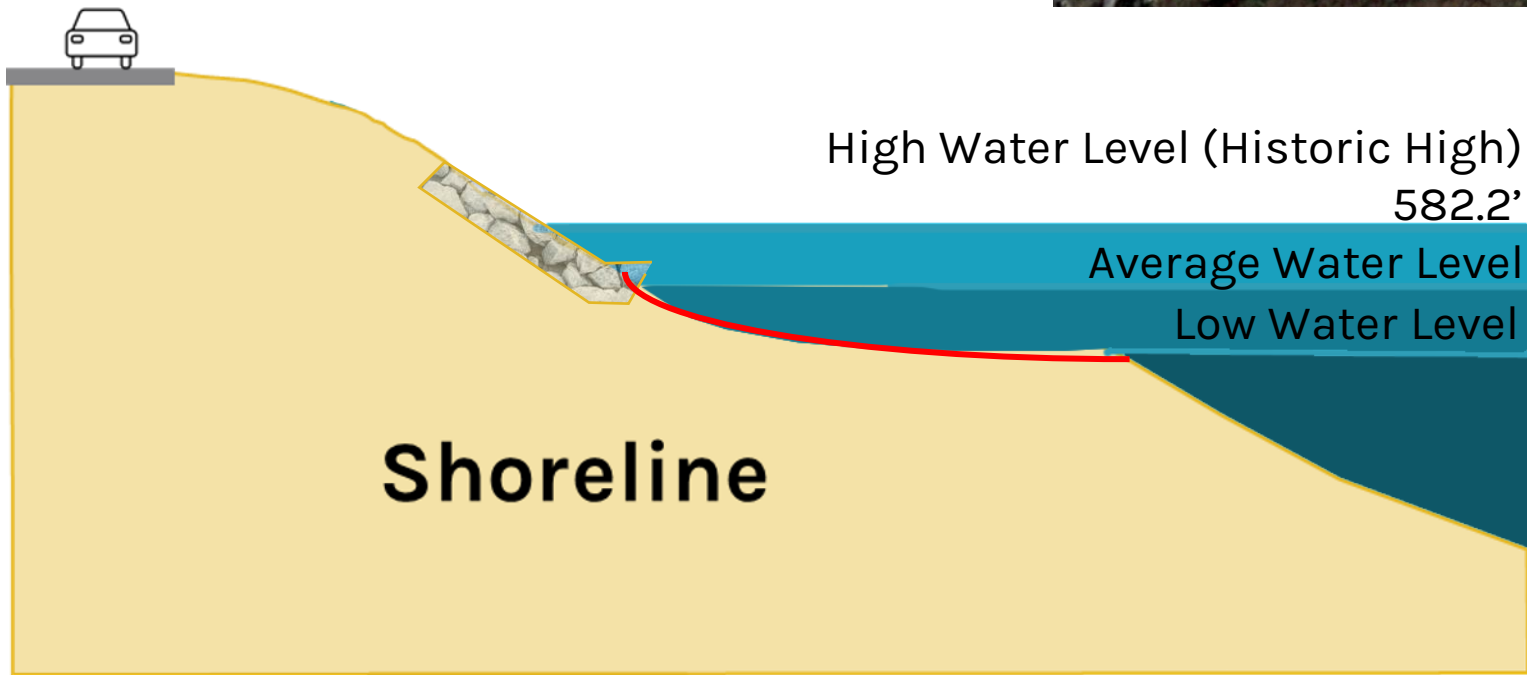


- Average water level defined as 50% Exceedance Probability (based on historic water level measurements)

- 99% chance of occurring over 50 years

AN EVOLVING LAKEBED

HIGH WATER LEVEL



- High Water Level Scenario = Highest observed mean lake water level (2020)
- 39% chance of occurring over 50 years

HOW WE GOT HERE

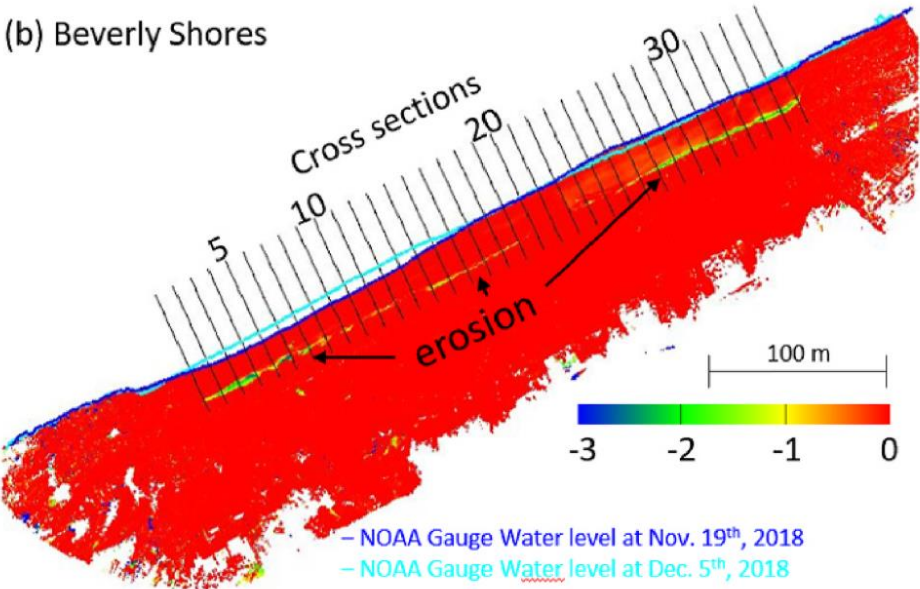
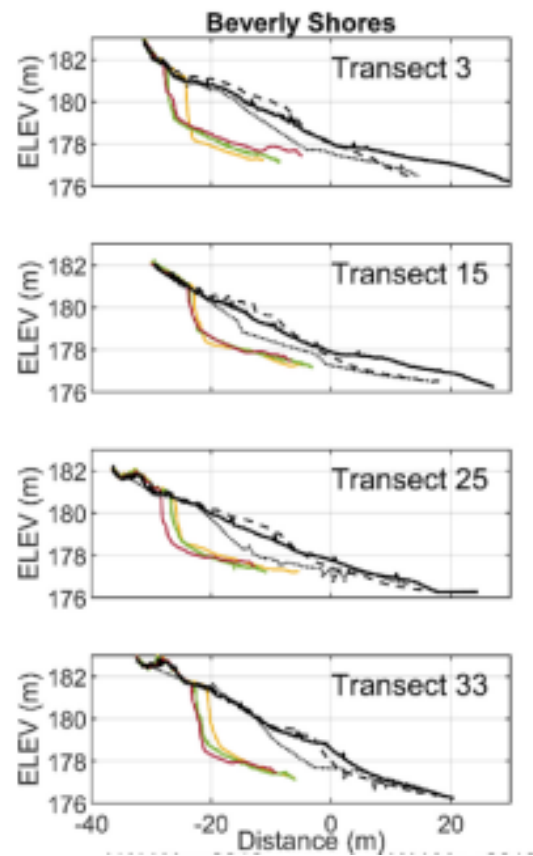
A DYNAMICALLY STABLE SHORELINE

**All beach locations, top of banks, and dimensions are based off of historical aerials. They are approximate and for reference only.



RECENT CROSS SHORE CHANGE – PURDUE UNIVERSITY STUDY

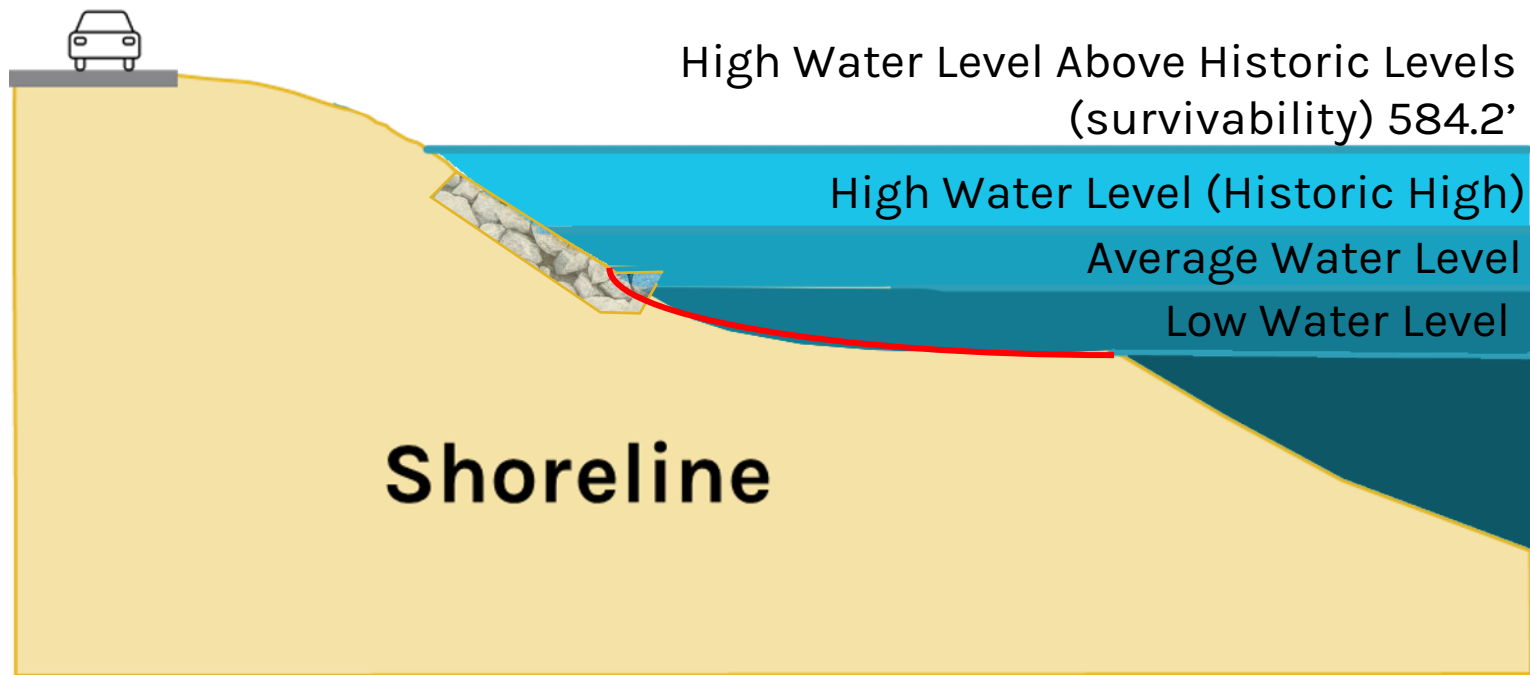
TROY ET AL. 2021



- Foreshore slope has steepened
- Recent survey's indicate that erosion is likely to continue in response to the 2018-19 high water levels and storms

AN EVOLVING LAKEBED

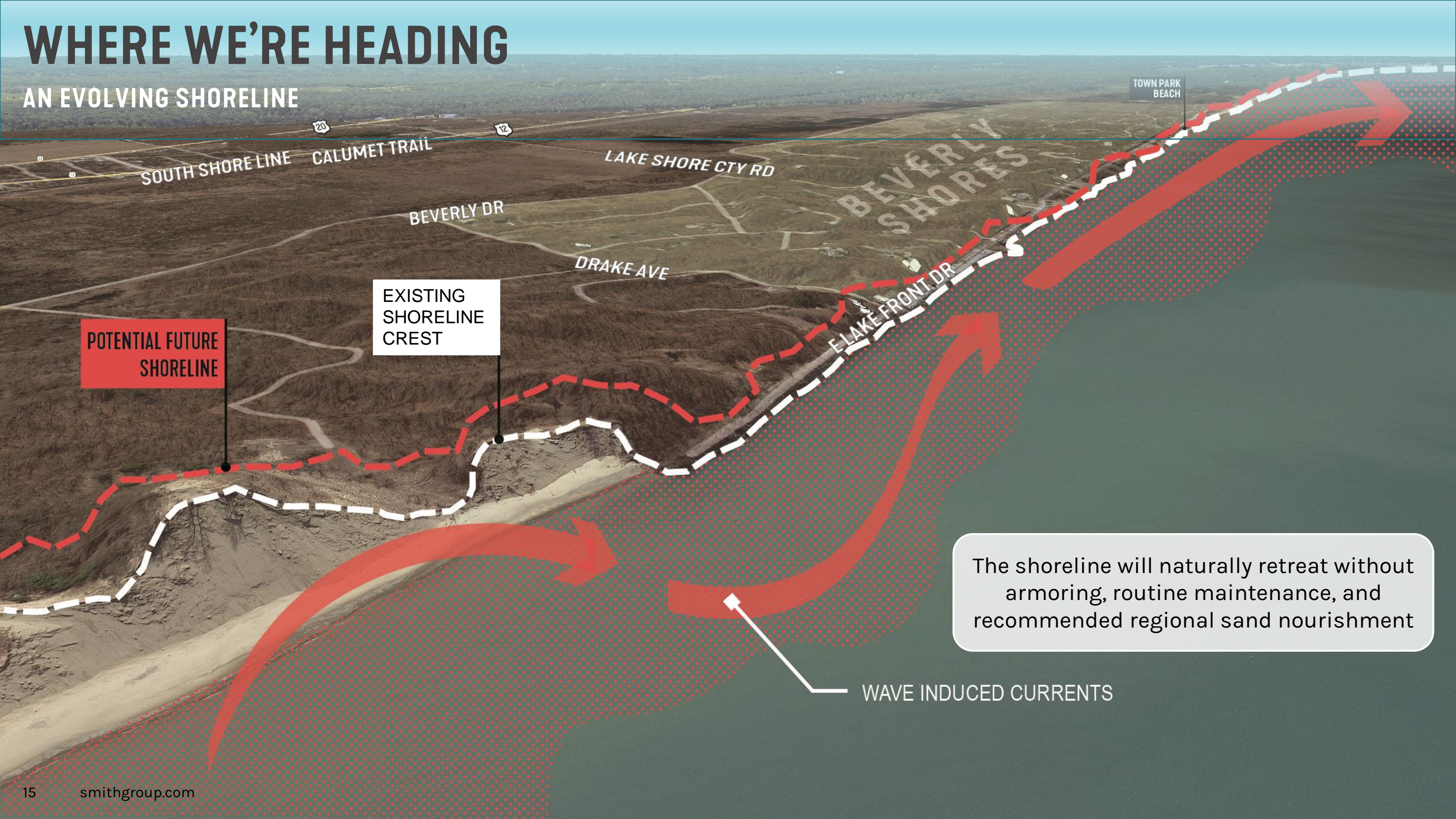
ABOVE HISTORIC LEVEL



- 500-year Return Period Lake Level Consistent with flood protection planning
- 2 feet above Observed Historic High
- 10% chance of Occurring over 50 years
- Based on climate change modeling (Michigan Technological University) predicts an increases in lake levels above 2019 highs by 2050

WHERE WE'RE HEADING

AN EVOLVING SHORELINE



POTENTIAL FUTURE SHORELINE

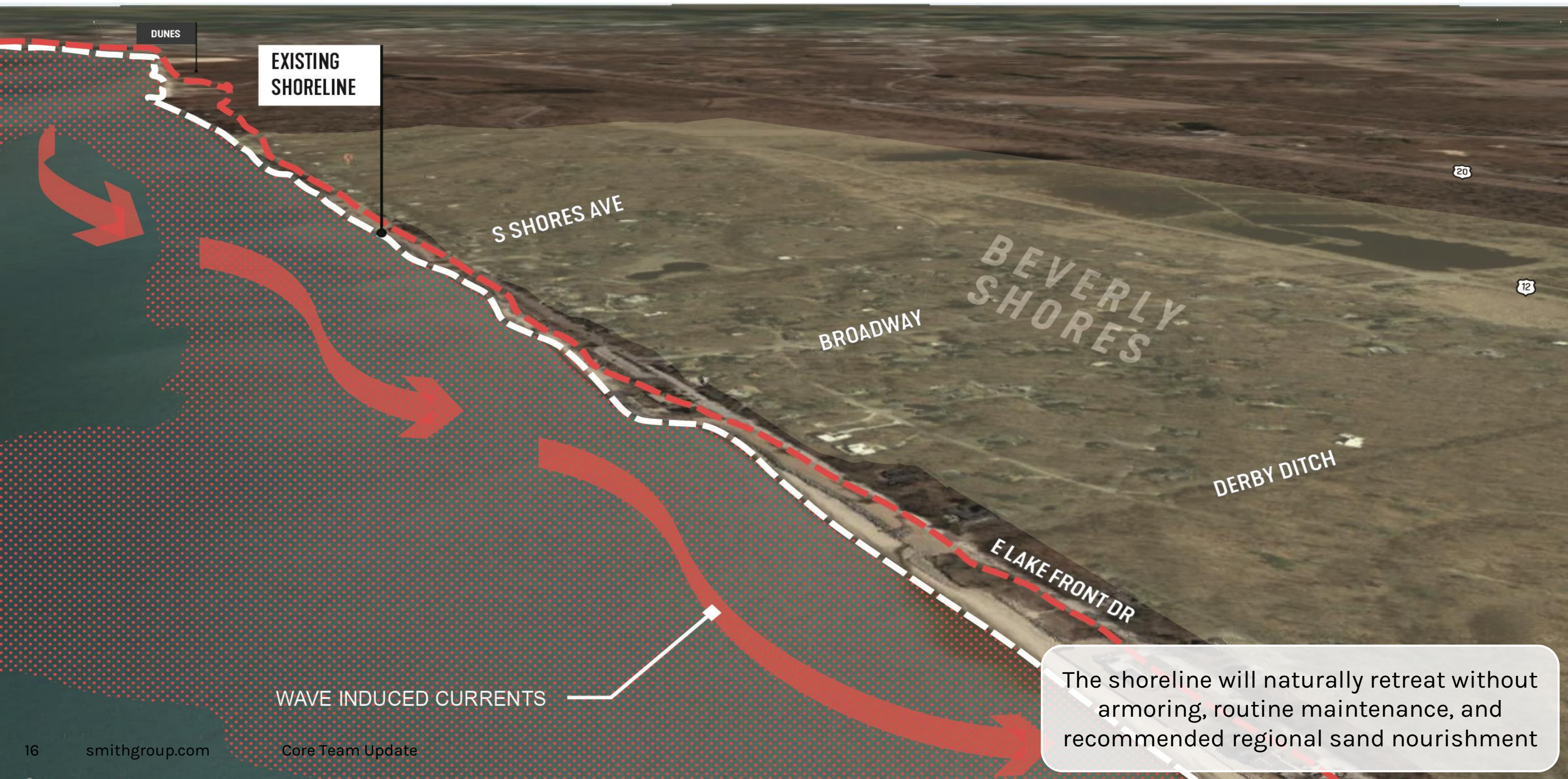
EXISTING SHORELINE CREST

The shoreline will naturally retreat without armoring, routine maintenance, and recommended regional sand nourishment

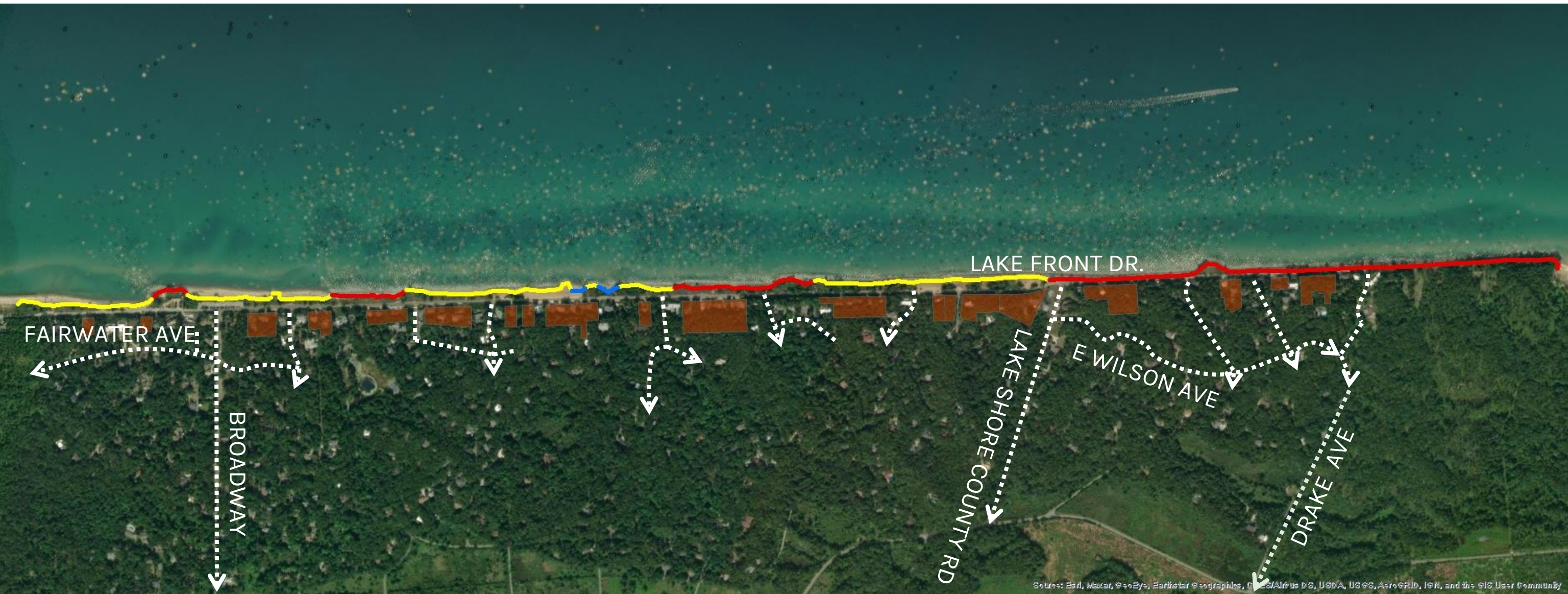
WAVE INDUCED CURRENTS

WHERE WE'RE HEADING

AN EVOLVING SHORELINE

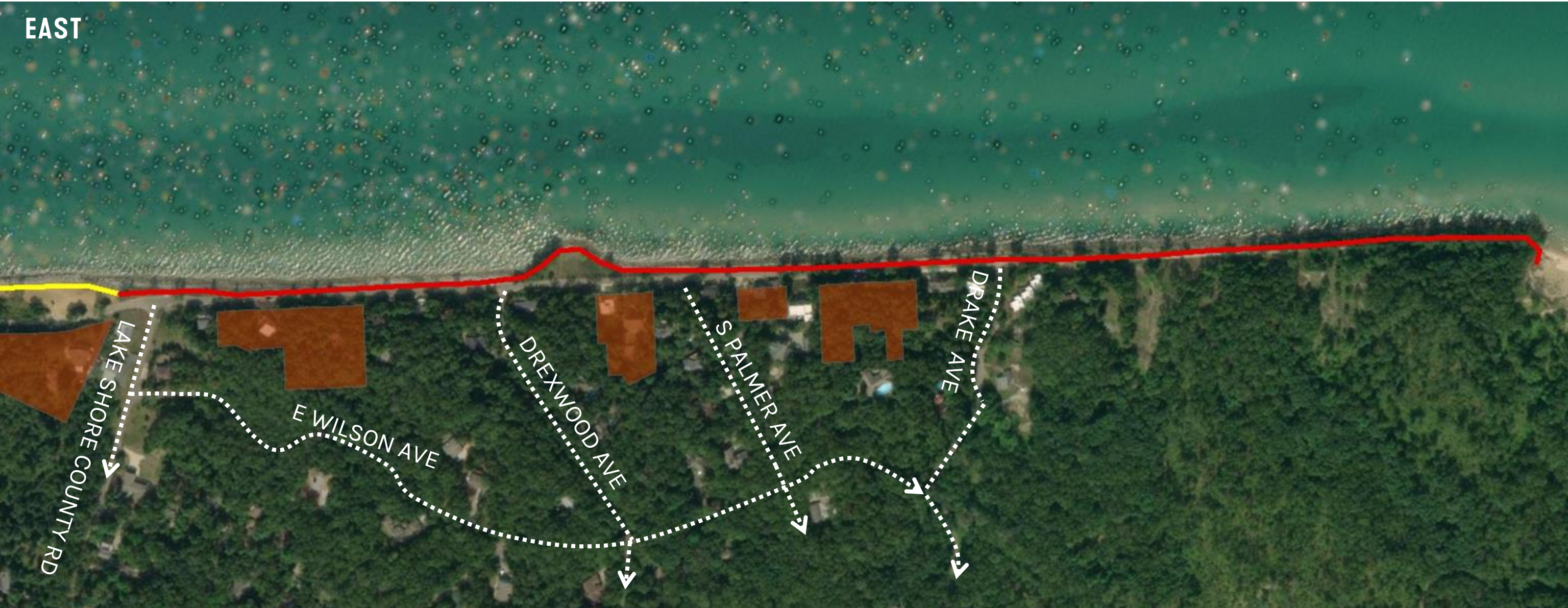


OVERVIEW RISK/VULNERABILITY



ACCESS AND SAFETY RISK

EAST



SHORELINE VULNERABILITY: —
CONSIDERS SHORELINES DAMAGE POTENTIAL, OVERTOPPING
POTENTIAL, EXISTING CONDITIONS AND SPACE FOR
ADAPTATION

PROPERTY AT RISK:
IF LAKE FRONT DRIVE IS LOST WHICH OF THE ADJACENT PROPERTIES
HAVE NO ALTERNATE ACCESS/EGRESS THROUGH EXISTING OR
PLATTED ROADWAYS.

ACCESS AND SAFETY RISK

MIDDLE

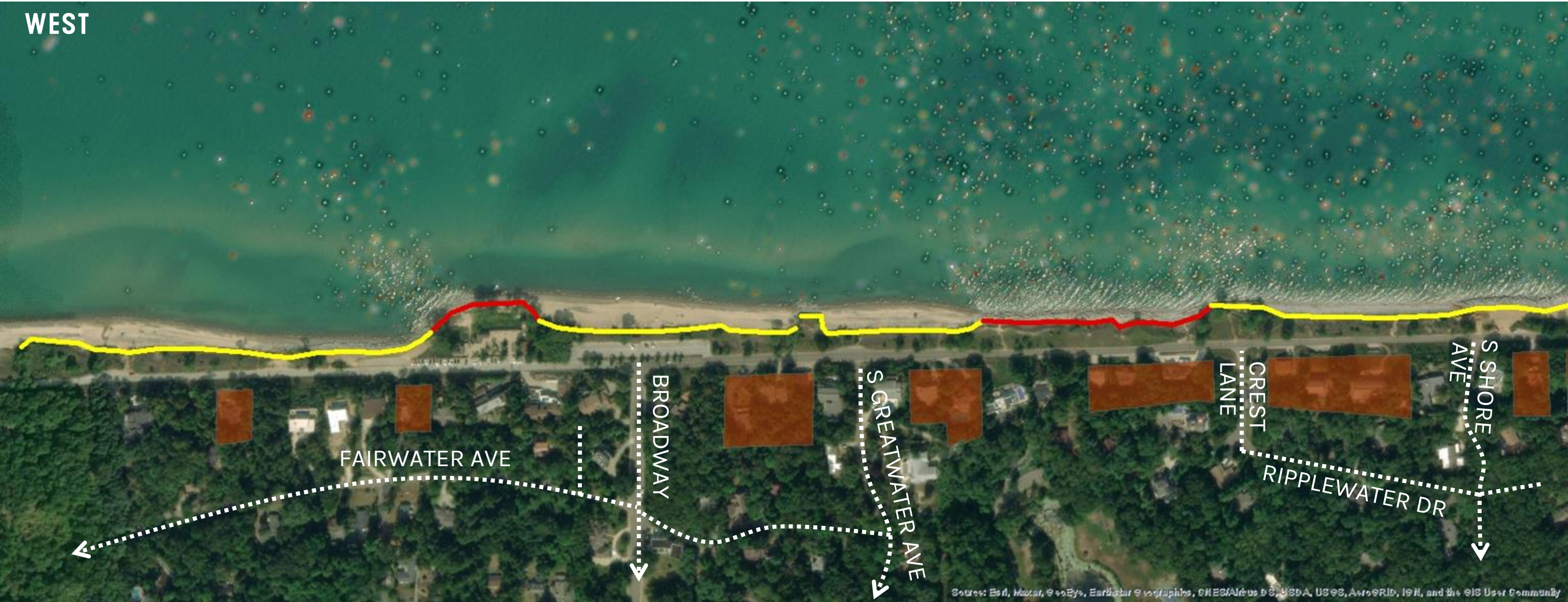


SHORELINE VULNERABILITY: —
CONSIDERS SHORELINES DAMAGE POTENTIAL, OVERTOPPING
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ACCESS AND SAFETY RISK

WEST



SHORELINE VULNERABILITY: —
CONSIDERS SHORELINES DAMAGE POTENTIAL, OVERTOPPING
POTENTIAL, EXISTING CONDITIONS AND SPACE FOR
ADAPTATION

PROPERTY AT RISK:
IF LAKE FRONT DRIVE IS LOST WHICH OF THE ADJACENT PROPERTIES
HAVE NO ALTERNATE ACCESS/EGRESS THROUGH EXISTING OR
PLATTED ROADWAYS.

SO WHAT'S AT RISK?

WITHOUT FURTHER ACTION



SOLUTIONS TOOL KIT

LAND AND WATER

PROTECT

ADAPT

EVOLVE

STRATEGIES TO RESPOND – PROTECT

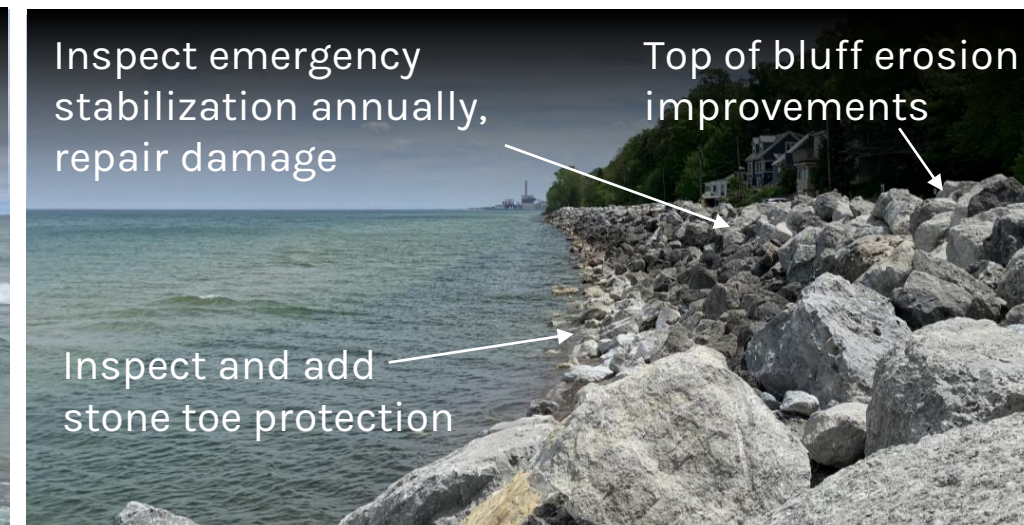
- Inspect emergency stabilization annually, repair damage as needed
- Inspect the toe of bluff and implement toe protection to reinforce the emergency repair work.
- Focus: protecting the road

Advantages:

- Leverages Emergency repairs
- Limited capital cost
- Provides ability to plan for future operations and maintenance (O&M) costs

Challenges:

- Permitting and funding of further revetment work will be limited in the future
- Does little to address aesthetics,
- Does little to increase shoreline resilience
- Limit's ability to re-establish public access to the water



STRATEGIES TO RESPOND -ADAPT

- protect the roadway and access to and from homes by leveraging the existing landform to create a new more resilient shoreline with ecological and recreation benefits
- incorporate green infrastructure elements to address stormwater risks to the shoreline.

Advantage:

- Fosters partnership with NPS and
- Increased grant funding opportunities
- Increases shoreline resilience
- Restores lost uses

Challenges:

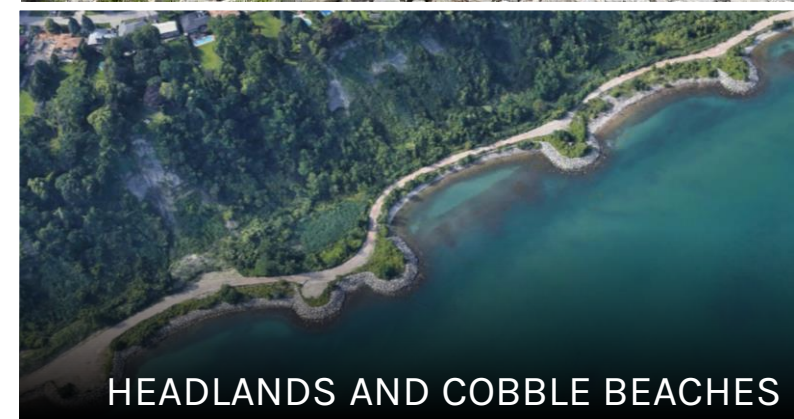
- Increased capital cost
- Longer timeline to implement (5-10 years).



MULTI-BENEFIT SHORELINE
IMPROVEMENTS



GREEN
INFRASTRUCTURE



HEADLANDS AND COBBLE BEACHES

STRATEGIES TO RESPOND- EVOLVE

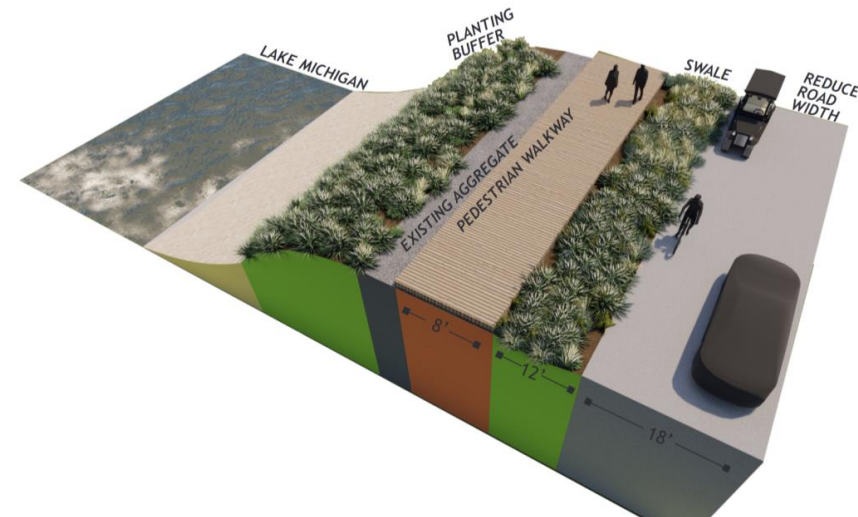
- Create a new vision for the use and function of E Lake Front Drive and the Shoreline

Advantage:

- leverages multiple funding sources to offset significant capital cost,
- focus on restoring use of the shoreline in a way that reduces future O&M costs.
- Increase resilience

Challenge:

- significant capital cost
- Timeline to implement (10-15 years)
- Requires significant stakeholder and partner coordination



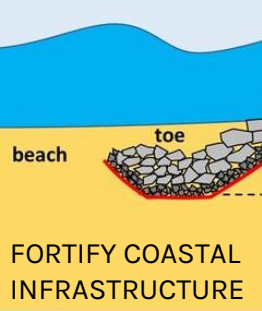
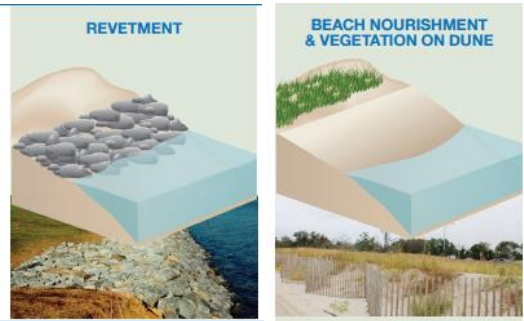
ELEMENTS OF EACH APPROACH

Protect

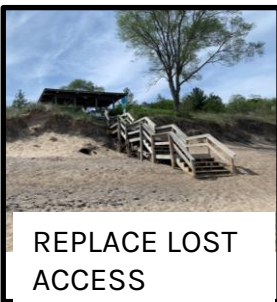
Adapt

Evolve

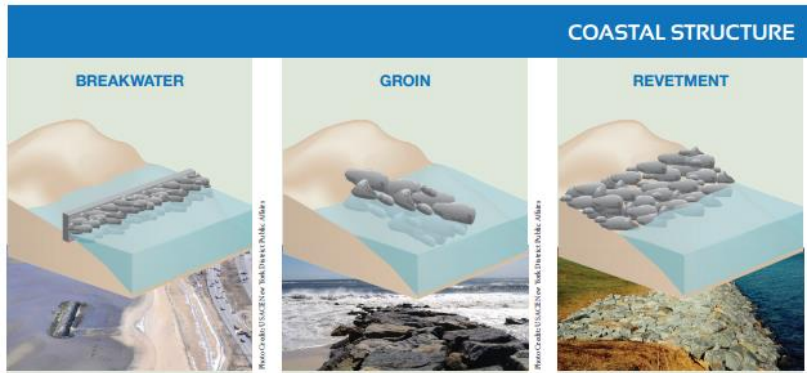
SHORELINE



LANDSIDE



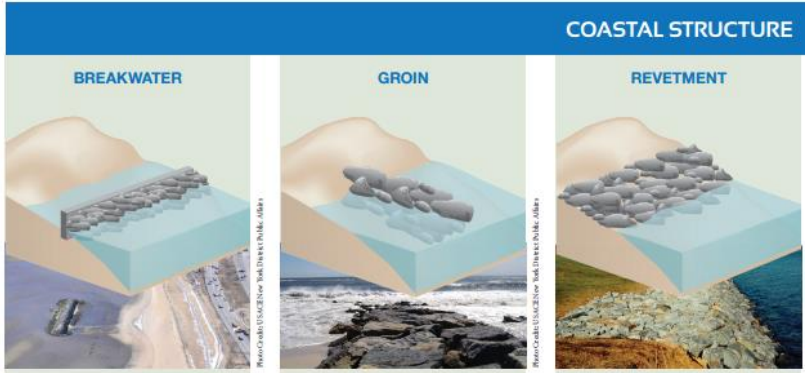
SHORELINE



LANDSIDE

ROAD DIETING, MOBILITY, GREEN INFRASTRUCTURE, COMPLETE/GREEN STREETS

SHORELINE



LANDSIDE

ROAD REMOVALS, GREENWAYS, TRANSIT LINKS, GREEN INFRASTRUCTURE

GRANTS AND FUNDING OPPORTUNITIES



ALTERNATIVE OPPORTUNITIES

EAST
MIDDLE
WEST

DRIVERS – SEEKING BALANCE

VULNERABILITY/RISK

PROPERTY LOSS
ECONOMIC IMPACT
SAFETY

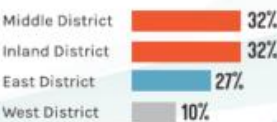
QUALITY OF LIFE

AESTHETIC VALUES
PUBLIC ACCESS
GREEN INFRASTRUCTURE



WHAT WE HEARD

Where are you from in the community?



How could we improve Derby Ave Beach?...



TOP 10 COMMUNITY PRIORITIES

- SWIMMING BEACHES AND SAND
- BEACH ACCESS
- SOCIAL SPACES AND OVERLOOKS
- PEDESTRIAN EXPERIENCE
- WATERCRAFT ACCESS AND STORAGE
- NATIVE LANDSCAPE, HABITAT AND NATURE VIEWING
- RESIDENT AND VISITOR PARKING MANAGEMENT (INCL. GOLF CARTS)
- STORMWATER MANAGEMENT
- WATER QUALITY
- NPS COLLABORATION

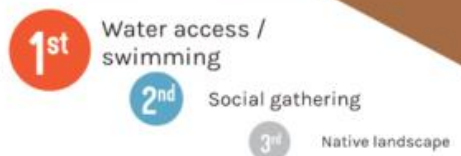
Number of participants?



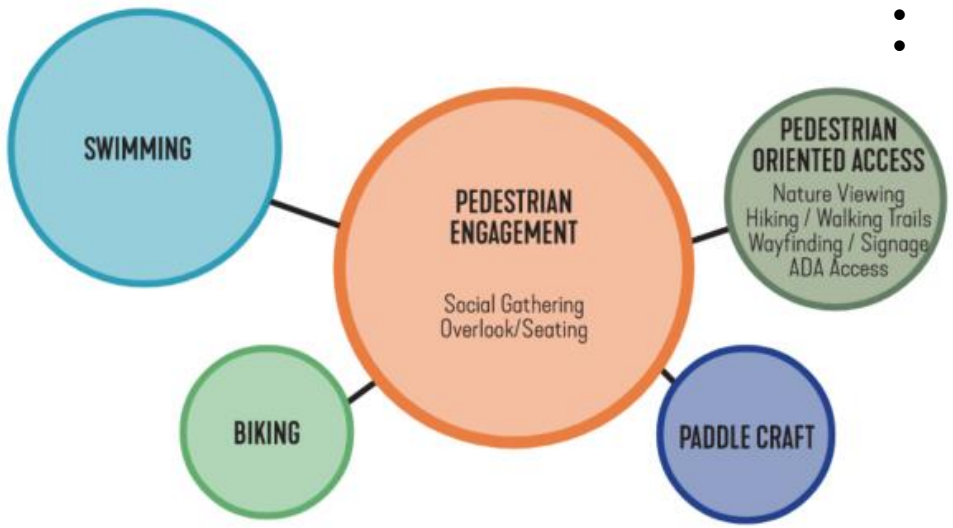
Average number of responses?



What activity would you like more of?



DATA GATHERED DURING PUBLIC INPUT MEETING NUMBER 1

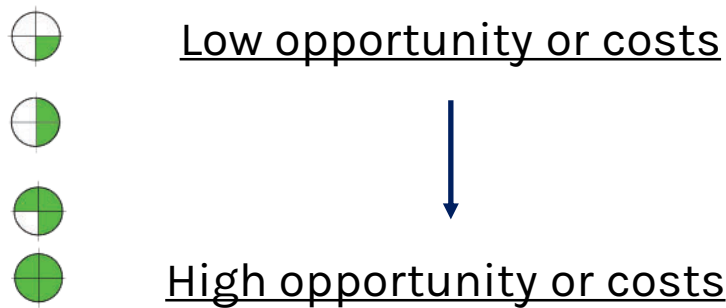


EVALUATION AND PRIORITIZATION

	Capital Costs	Operation and Maintenance Cost	Funding Sources	Community Benefit	Habitat restoration or creation
Protect					
Adapt					
Evolve					

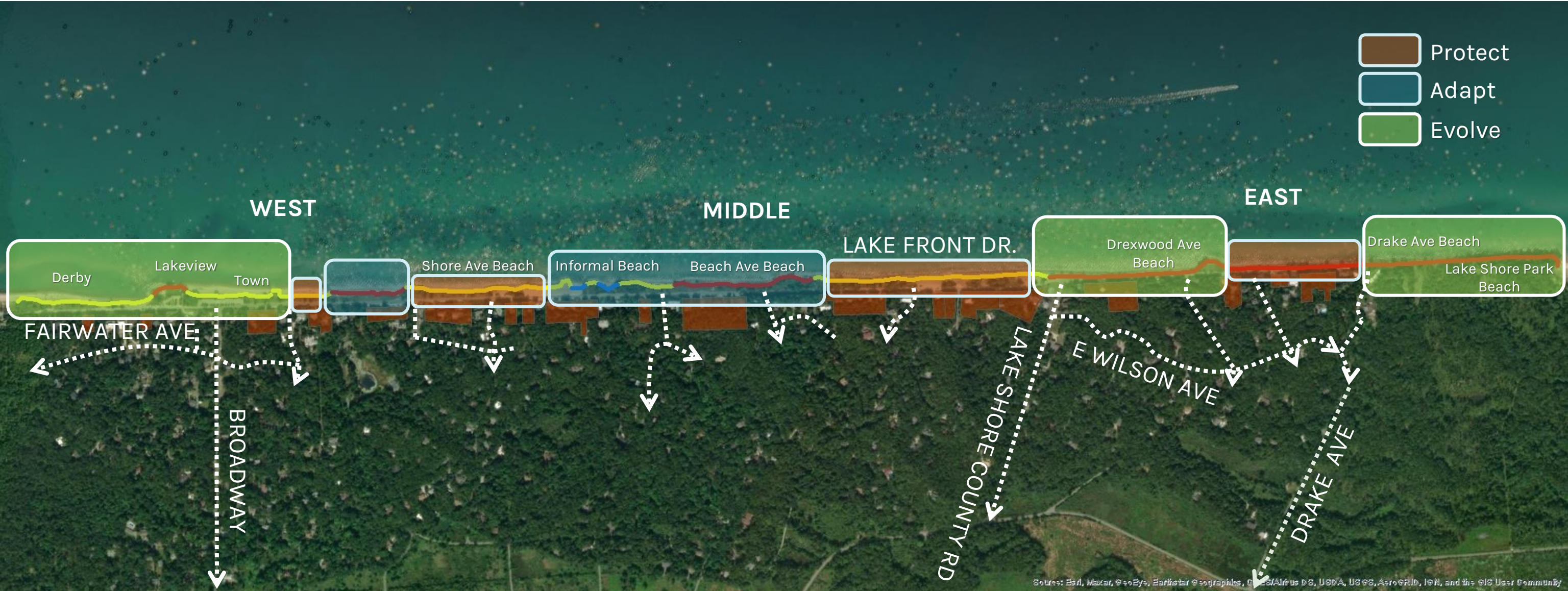
Strategy Ranking Matrix

- The Strategy ranking matrix is an overall review of each of the three strategies.



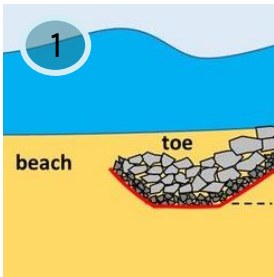
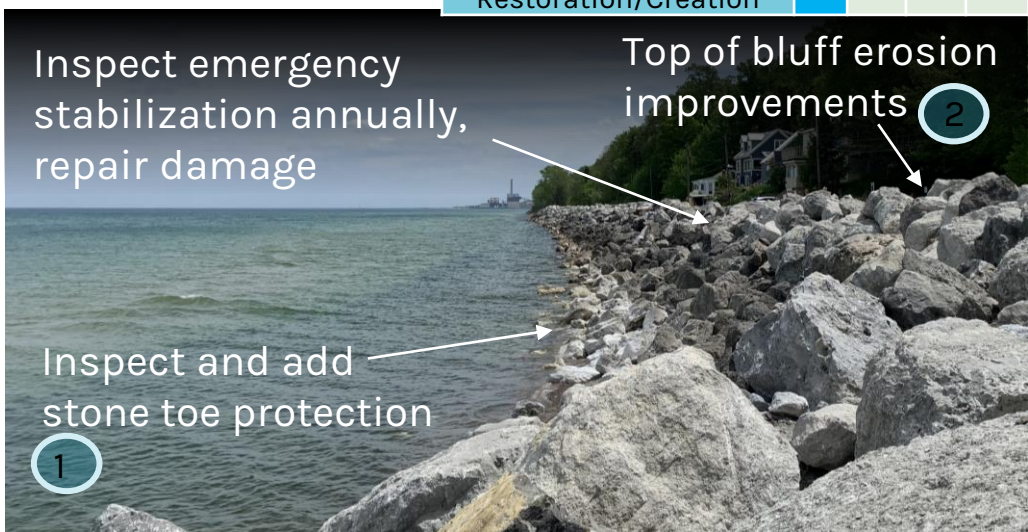
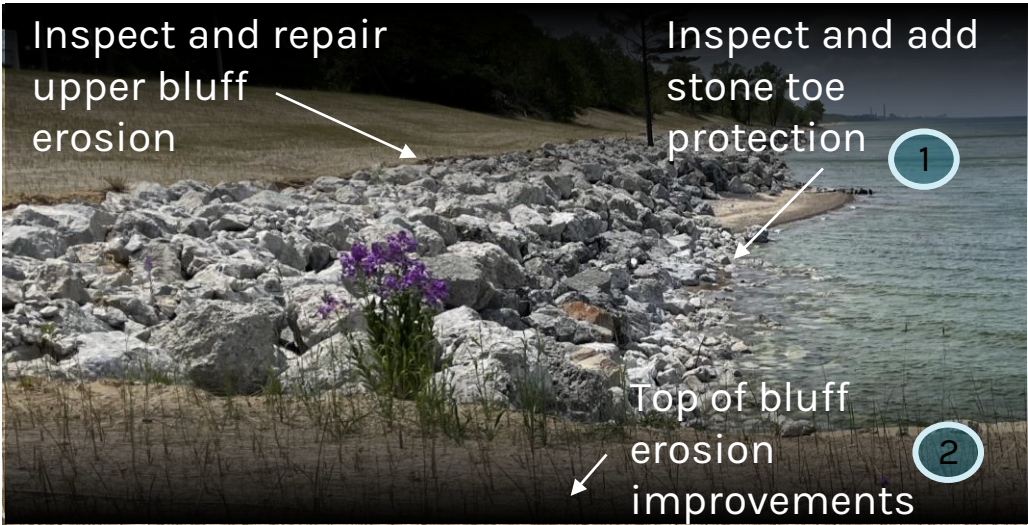
SUMMARY

OPPORTUNITIES FRAMEWORK



PROTECT

	Low		High
Capital Costs			
O&M Costs			
Funding			
Community Benefit			
Habitat Restoration/Creation			



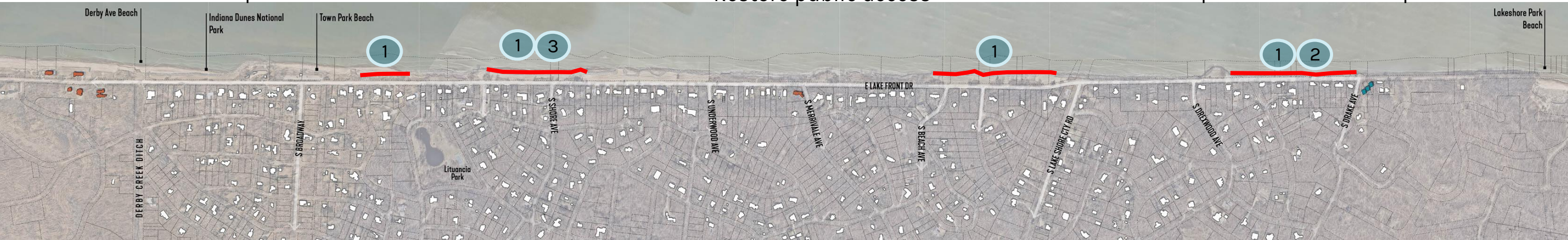
Stone toe protection



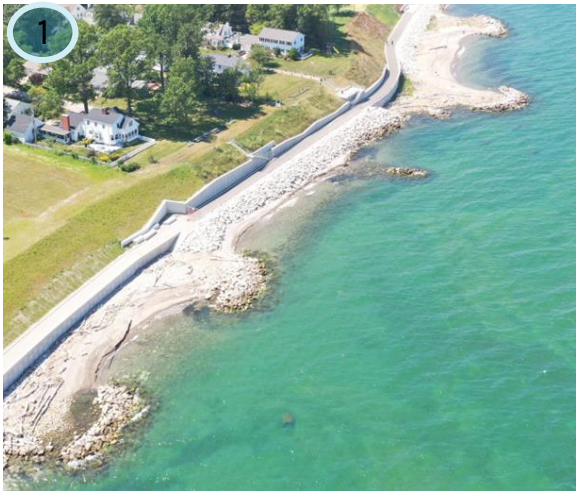
Restore public access



Top of bluff erosion improvements



ADAPT



Multi-benefit shoreline improvements



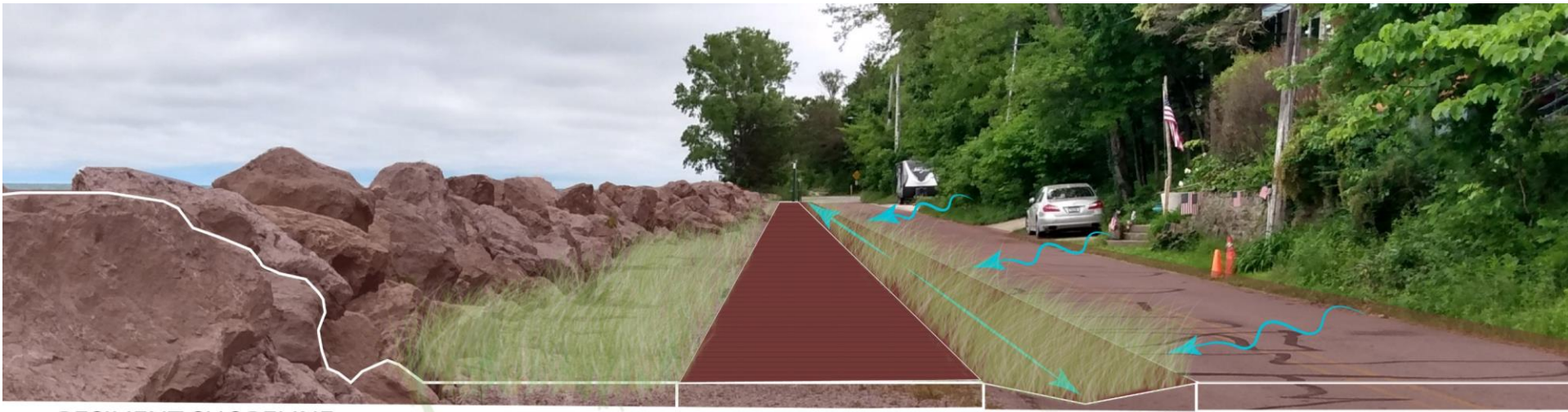
Landside improvements



Headland and Cobble Beach



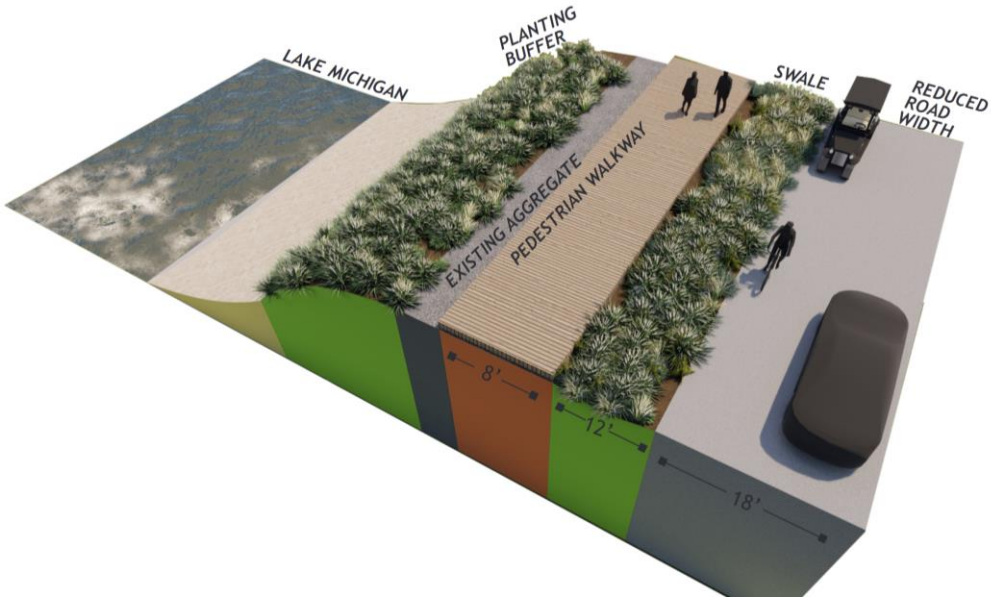
ADAPT



RESILIENT SHORELINE

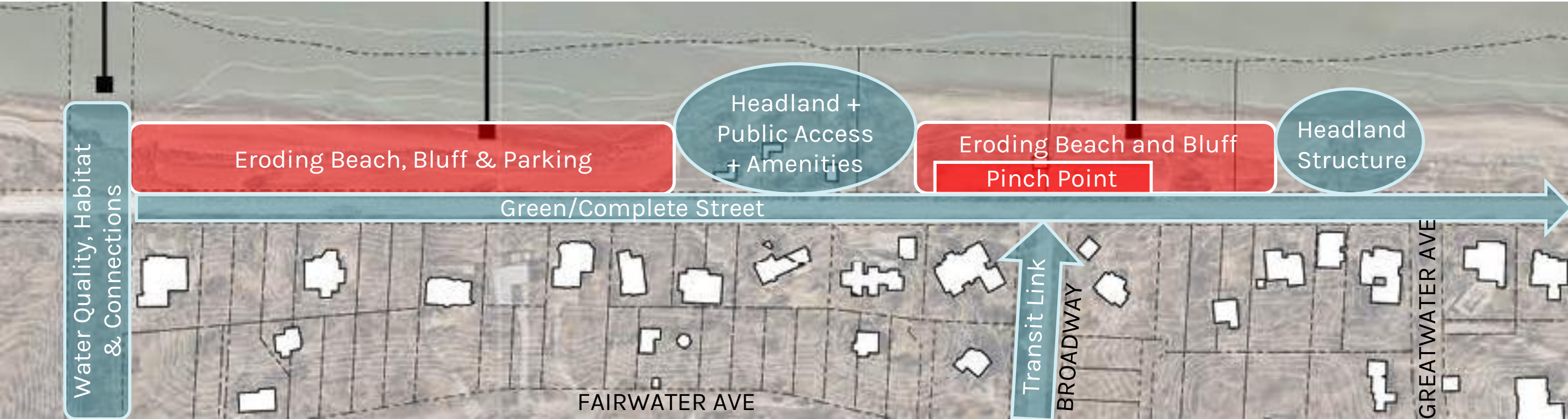
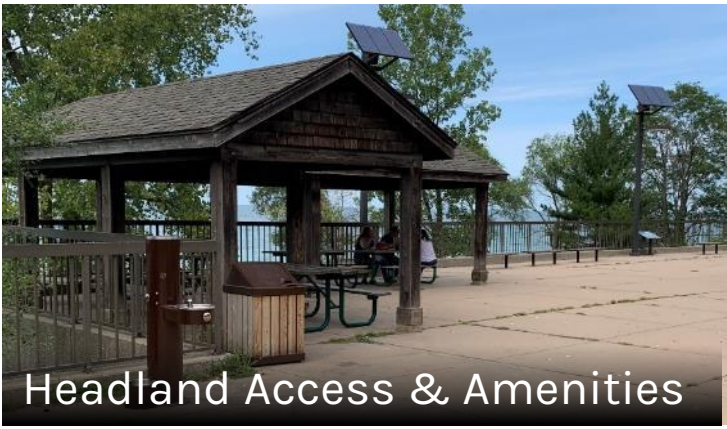
Green/Complete Street

REDUCE THE ROAD WIDTH TO PROVIDE STRONGER MOBILITY AND GREEN INFRASTRUCTURE ALONG THE LAND ADJACENT TO THE WATER'S EDGE



EVOLVE - WEST

ISSUES AND OPPORTUNITIES



EVOLVE - WEST

RESILIENT BEACHES AND SHORELINE



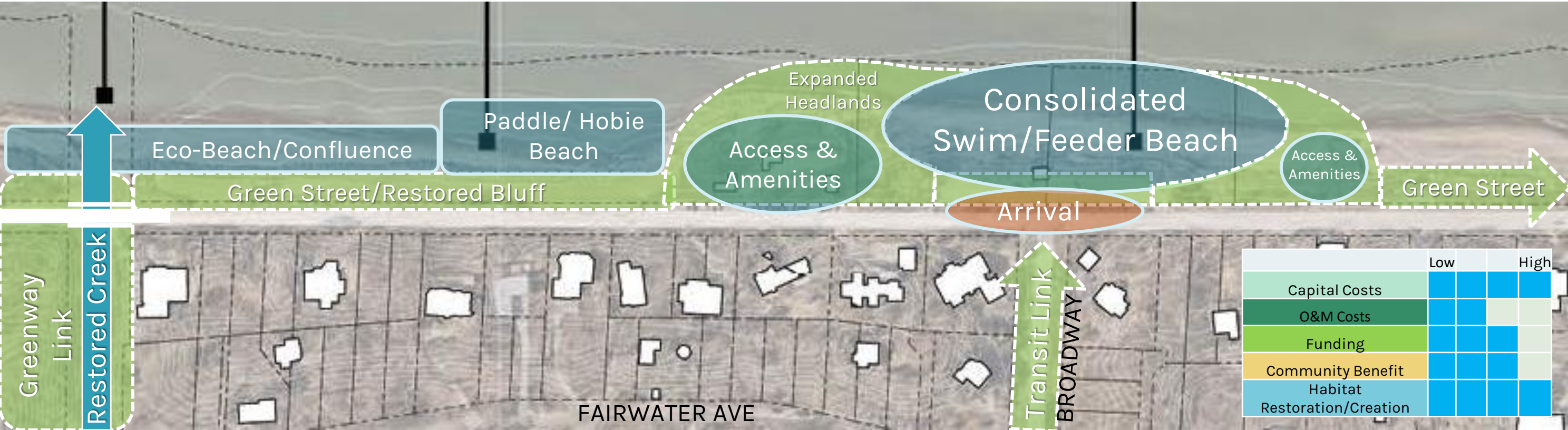
Eco Beach



Paddle/ Hobie Craft Beach



Consolidated Swim Beach



EVOLVE - WEST

RESILIENT BEACHES AND SHORELINE



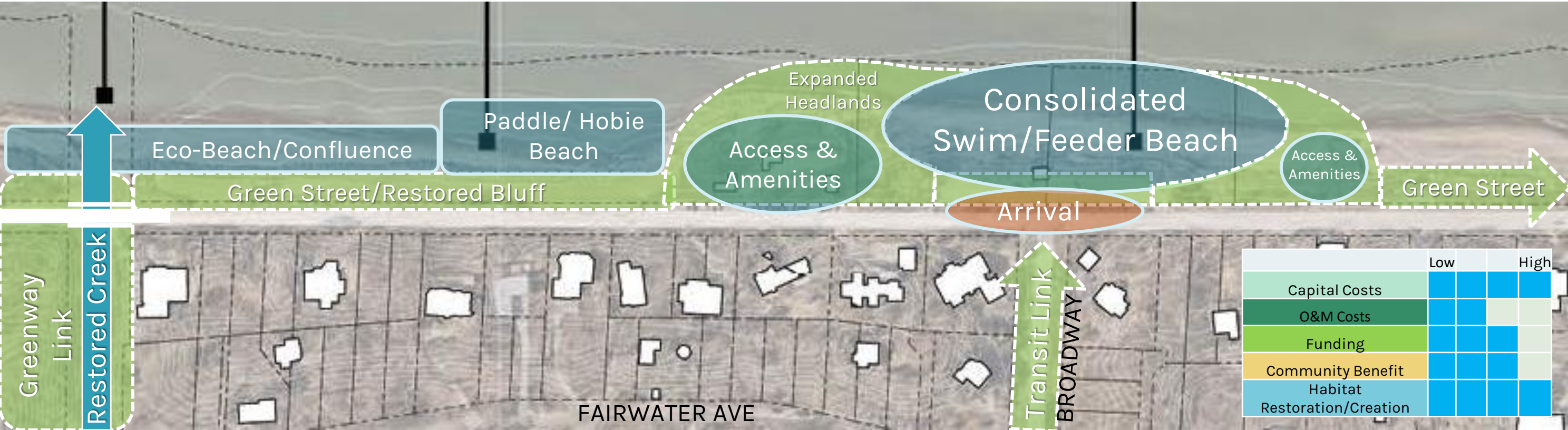
Eco Beach



Paddle/ Hobie Craft Beach



Consolidated Swim Beach



EVOLVE - WEST

RESILIENT BEACHES AND SHORELINE



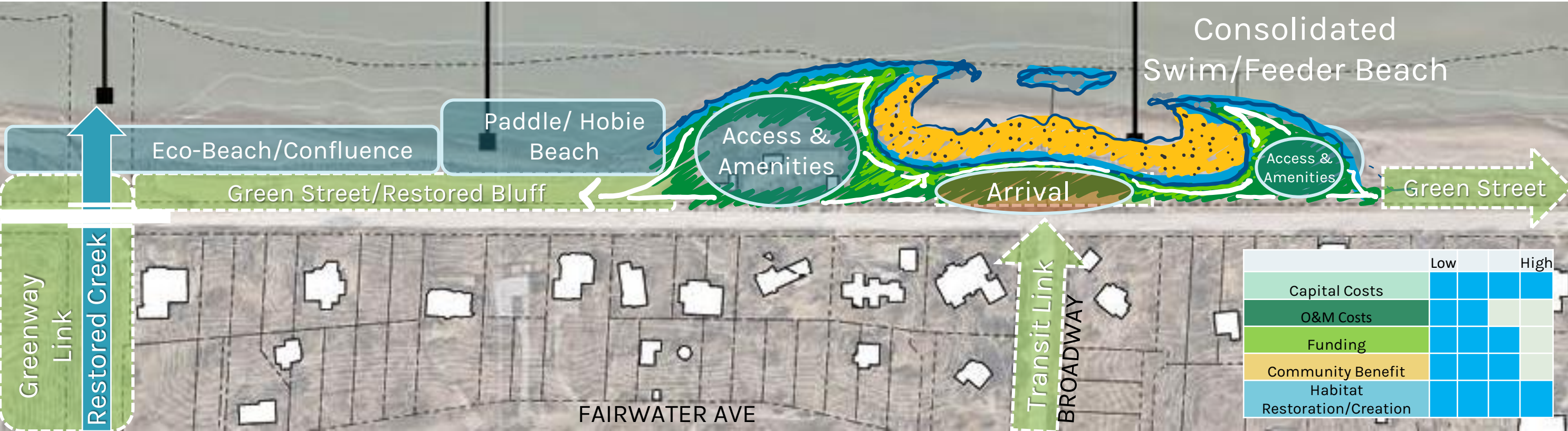
Eco Beach



Paddle/ Hobie Craft Beach

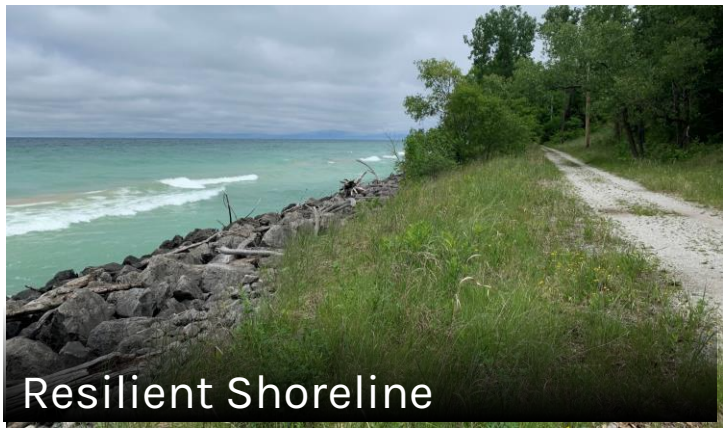
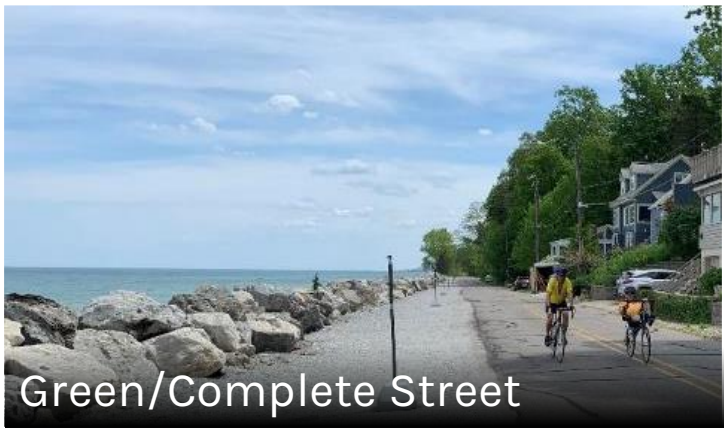


Consolidated Swim Beach



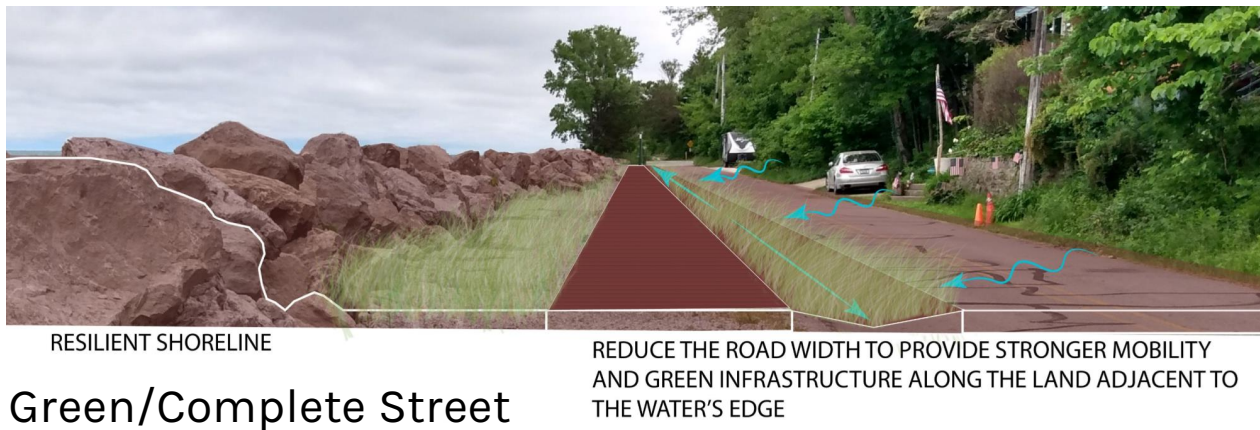
EVOLVE - EAST

ISSUES AND OPPORTUNITIES



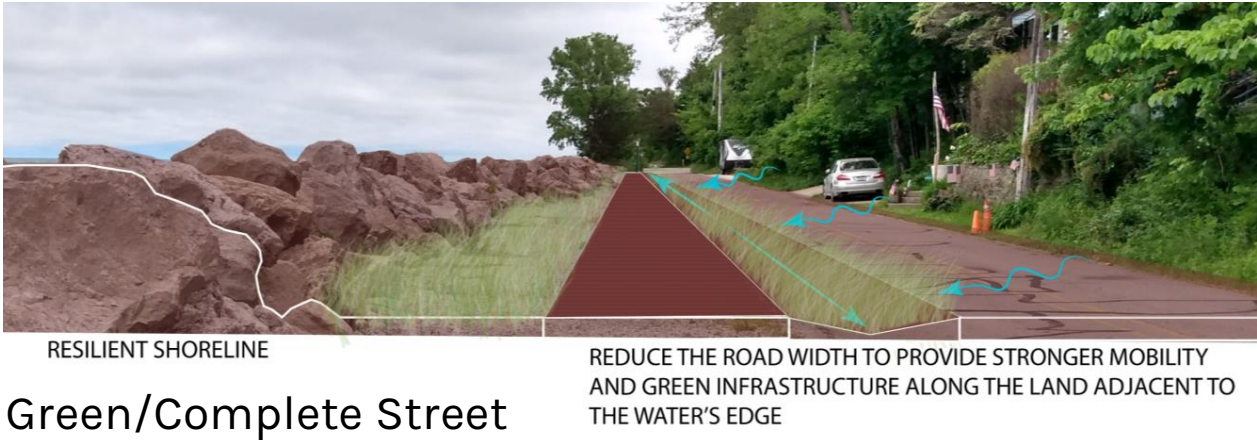
EVOLVE - EAST

RESILIENT BEACHES AND SHORELINE



EVOLVE - EAST

RESILIENT BEACHES AND SHORELINE



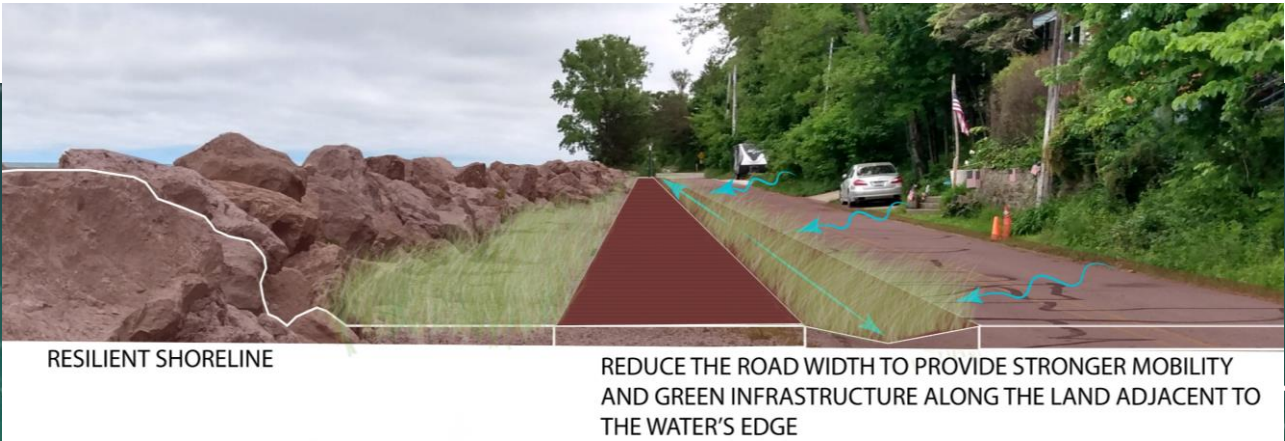
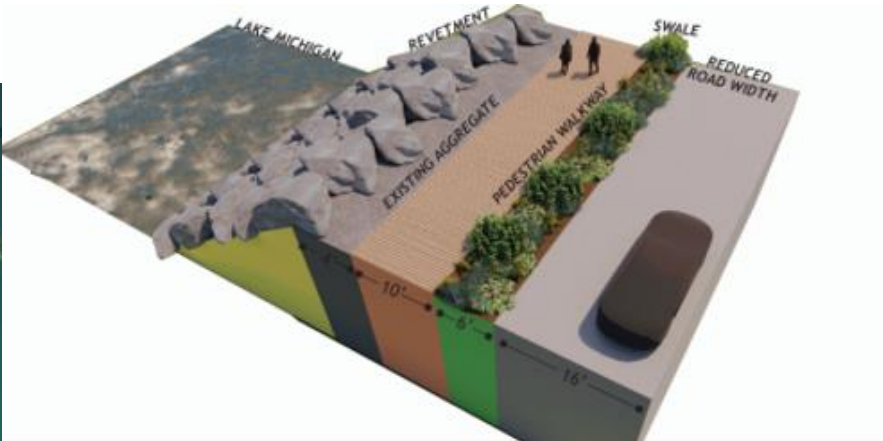
SUMMARY

COASTAL RESILIENCE FRAMEWORK



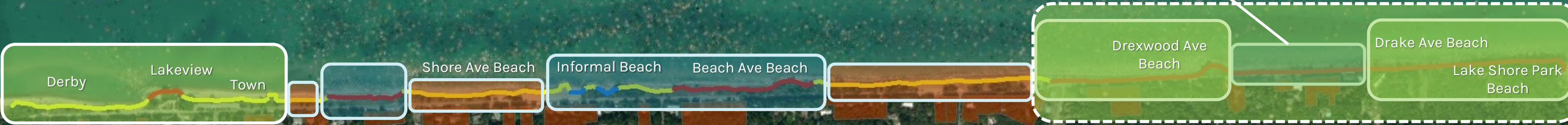
SUMMARY

OPPORTUNITIES FRAMEWORK



- Protect
- Adapt
- Evolve

Evolve



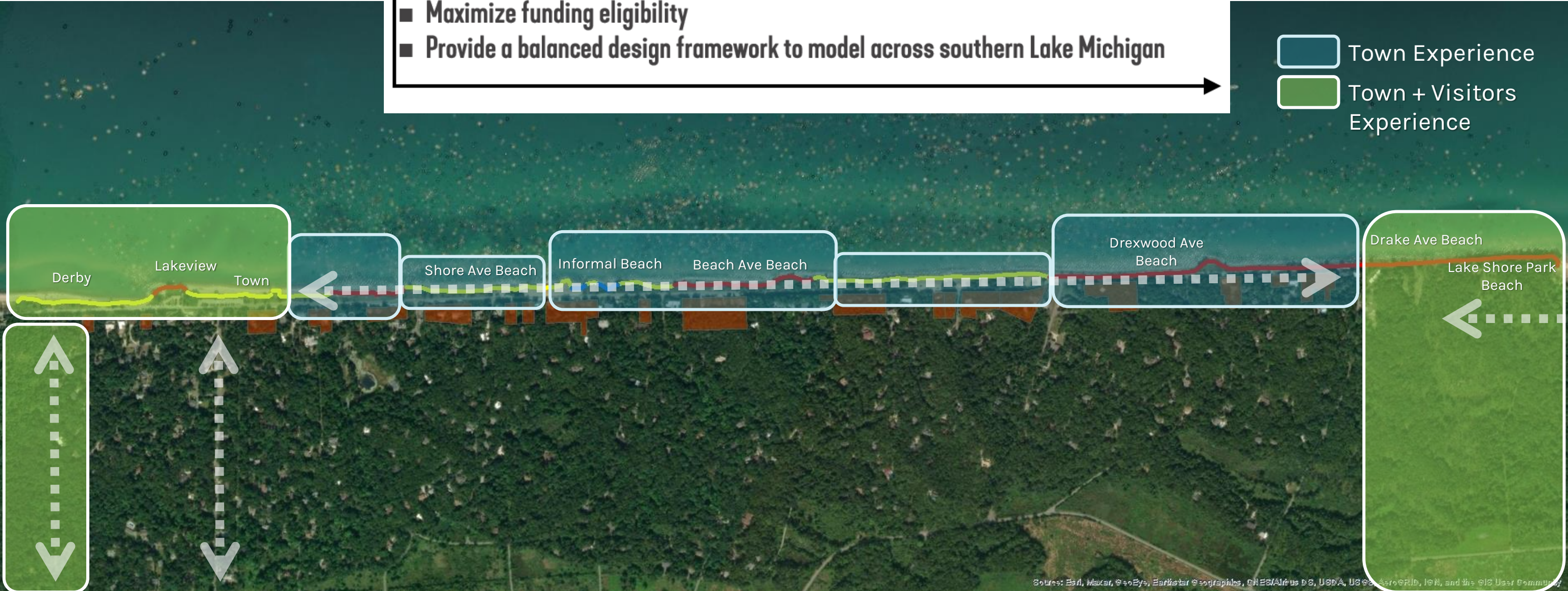
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

SUMMARY

VISITOR FRAMEWORK

- Design for a long-term resilient shoreline
- Preserve and enhance community character and uniqueness
- Establish and maintain a clear and positive collaborative relationship and process between the Town and National Park Service (NPS)
- Maximize funding eligibility
- Provide a balanced design framework to model across southern Lake Michigan

Town Experience
Town + Visitors Experience



WHERE DO WE GO FROM HERE?

