

04.

IN THIS CHAPTER:

- + COMMUNITY
- + MOBILITY
- + NATURE
- + WATER

The Framework

The plan's frameworks of community, nature, water, and circulation adapt to the changing needs of the surrounding communities and the environment. Together, these systems work to bolster the quality of the natural environment, physical and mental well-being, safety, and Cleveland's economic development and tourism.



Community

The lakefront is a popular destination for Clevelanders. From walking and biking trails to bird watching hot spots and fishing destinations, the eastern lakefront offers a variety of recreational experiences. The park spaces along the lakefront welcome over 800,000 visitors each year. Despite the experiences currently offered at the park, there is a lack of a clear identity and understanding of what is offered along the lakefront. Many users feel there are not enough activities or programming at the lake to maintain interest or inspire prolonged visits.

KEY CHALLENGES:

Lack of identity and definition of the park spaces.

Most community members do not see the collection of park spaces along the lakefront as one discernible place. When asked what they call this section of the lakefront, most participants responded that they were unsure or that they do not have a name for the space. The physical disconnection between spaces and lack of visitor amenities that unite park spaces contribute to the isolation of the individual elements.

Limited recreation experiences that meet the needs of diverse and intergenerational users.

While the lakefront is popular for anglers, birders, bikers, and walkers, it does not provide enough diversity in programming and facilities to address the recreational desires and needs of the communities surrounding the lakefront, specifically youth and families. One of the top reasons community members give for not visiting the lakefront regularly is that there is no reason to go or not enough to do there, especially when compared with other park spaces along the lakefront. Awareness of existing programs and the availability of programs that meet community interests contributes to this perception. Additionally, the lack of space and capacity to host and program larger events is limited in this section of the lakefront.

Not enough space.

Community members want to be close to the water to take in views, enjoy open space, and gather with friends and family. However, 41% of survey participants feel that the lakefront has limited space for activities and programs. Participants expressed a desire for more educational programming, watersports, walking and hiking areas, community events, biking trails, and space for pick-up sports games.

Few visitor amenities.

People would like to spend more time by the lake, but the current visitor amenities do not provide enough to meet the needs of users. Survey participants expressed a desire for more amenities including concessions, picnic tables, vendors, wayfinding, trailheads, and restrooms to elevate the visitor experience.



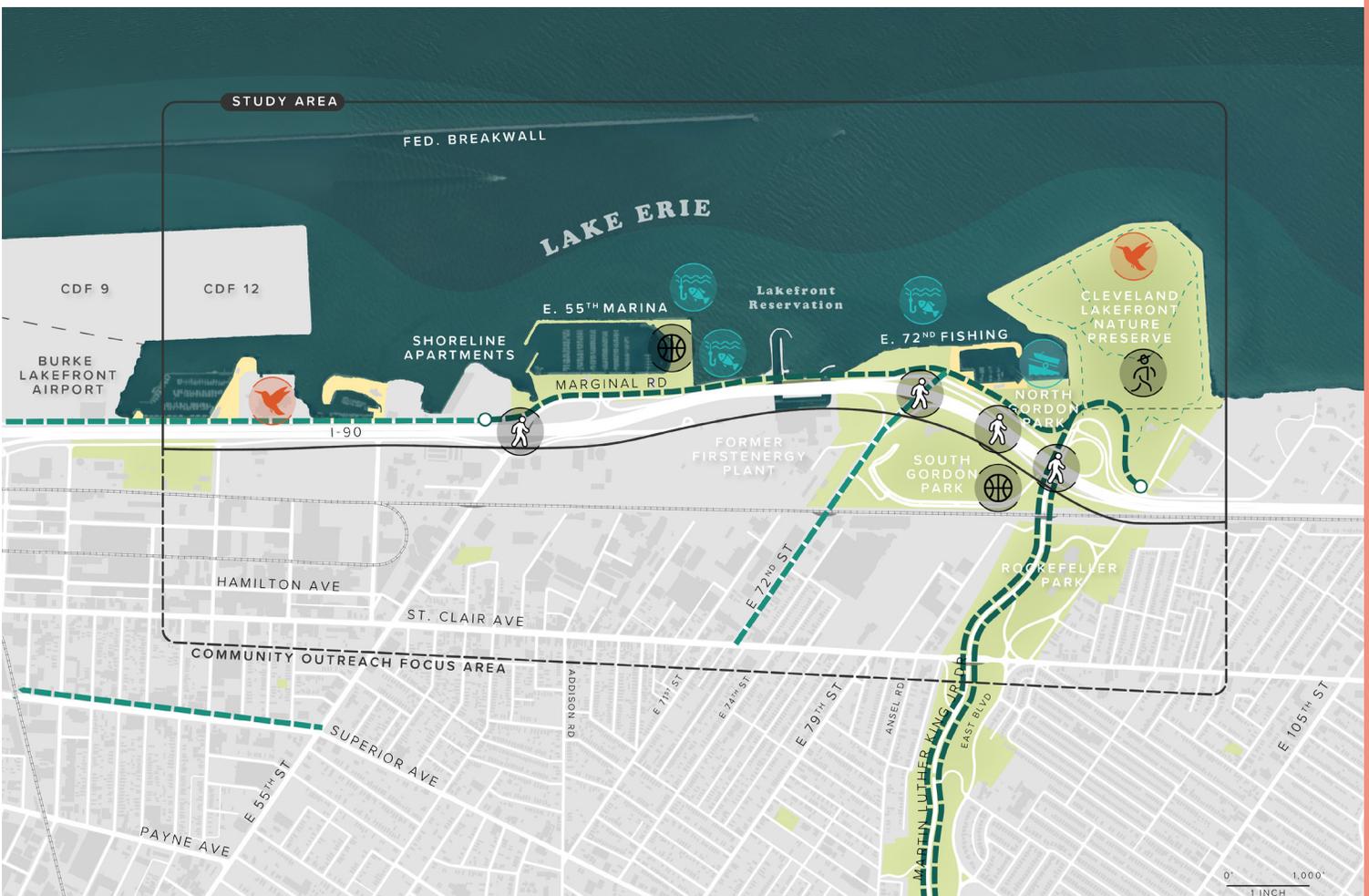
FISHING



BIRDING



HIKING & BIKING



Legend

ACTIVITIES

- Sports
- Walking + Hiking
- Fishing
- Birding

BIKES + TRAILS

- Lakefront Trail
- On-Street Bike Route
- Recreational Trail
- Pedestrian Highway Crossing

The map above identifies current active, passive, and nature-based recreation opportunities along the eastern lakefront.

SOURCE: CITY OF CLEVELAND GIS, CLEVELAND METROPARKS

THE CHEERS COMMUNITY FRAMEWORK:

Expanded parkland and recreation experiences will provide new visitor amenities, activity zones, space for events without disrupting daily use, and gathering areas for the community.

1 Ensure equity in access to recreational assets.

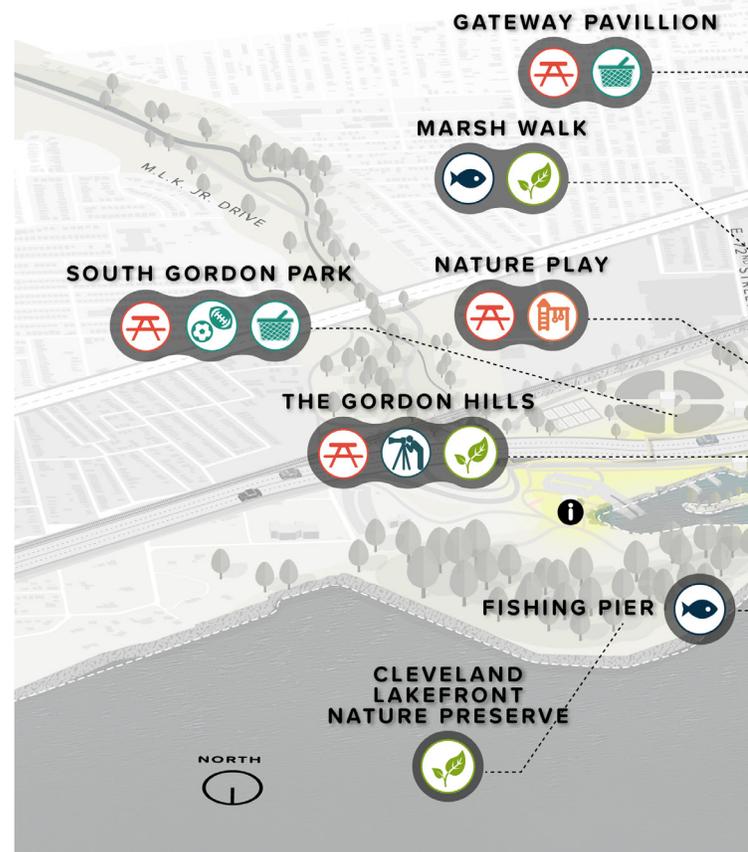
The proposed plan includes new recreational amenities and assets not currently available on the east side of Cleveland, including nature-based recreation, opportunities to wade and walk into the water, places to rent and operate watercraft, and intergenerational play spaces.

2 Build upon and improve existing recreational areas.

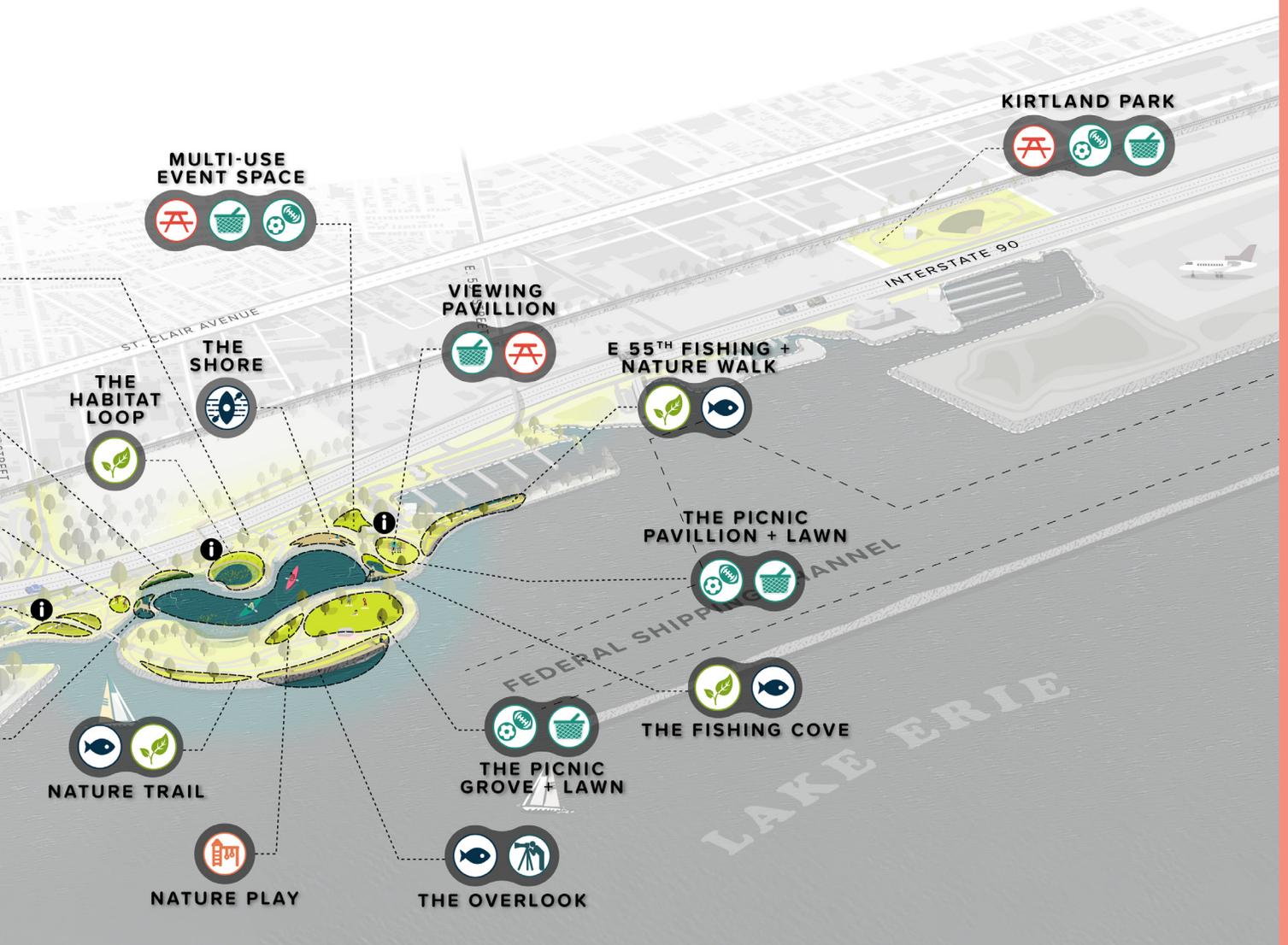
Existing fishing and nature recreation areas will be expanded, and park spaces will be united to create a unified park and visitor experience. New visitor amenities like concessions, restrooms, seating areas, and comfort stations will be dispersed through the park spaces to serve visitors and community members.

3 Create flexible spaces that adapt to community needs and recreation trends.

A variety of flexible program spaces including lawns, picnic areas, play spaces, observation areas, and gathering spaces will provide opportunities for the park to grow and adapt to community needs and respond to changing recreation trends. These areas will provide spaces for visitors to enjoy a variety of activities from taking in expansive views of the city, enjoying a picnic in a shaded grove of trees to playing a pick-up game of soccer or kickball.



-  **Visitor Amenities (concessions, restrooms, etc.)**
-  **Play Areas**
-  **Water Recreation**
-  **Fishing/Water Habitat**
-  **Viewing/Scenic Area**
-  **Lawn - Picnic Area**
-  **Lawn - Recreation Area**
-  **Natural/Habitat Area**
-  **Gateway/Information Point**



Activities

A 365-Day Lakefront Destination

The eastern lakefront will be a dynamic destination that provides interest and activities throughout the year, changing with each season. New programming will emphasize the importance of enjoying the lakefront throughout the year, even during winter months! In the winter, visitors can partake in sledding and snow tubing on the Gordon Hills, cross country skiing and winter walks on lakefront trails, ice fishing, and skating while observing the stillness of the lake and wondering at the beauty of naturally-created ice sculptures created by wind forces.

(left: Cleveland Metroparks)



Mobility

Many community members live mere minutes from the lakefront. However, the lakefront spaces often feel much further removed as the presence of I-90 and the rail lines form a dividing line between communities and this great natural and cultural asset. The heavy presence of car-centric infrastructure in lakefront park spaces only further exacerbates the issue, leaving the impression that pedestrians and bicyclists are not welcome or safe moving to and within the lakefront.

KEY CHALLENGES:

Safety of pedestrian and bicycle circulation and crossings.

Walking, jogging, and biking are some of the most popular activities community members engage in while visiting the lakefront. However, many community members feel that existing bicycle and pedestrian crossings and routes are not safe or accessible to all. There was also a desire for more types of trails along the lakefront including more natural, earthen trails and wider multiuse paths to accommodate multiple modes.

Barriers to accessing the lakefront from adjacent neighborhoods.

The number one concern with the current lakefront is the difficulty in accessing park areas from adjacent neighborhoods. Community members felt that out of every challenge facing the park, access was the number one issue. I-90 and the rail lines create both a physical and psychological divide, alienating communities from the lakefront with limited and unsafe crossings and access points.

Car-dominated infrastructure along the lakefront.

Between the heavily trafficked highway directly adjacent to the lakefront, numerous on- and off-ramps, connector roads, and ample surface parking, much of the lakefront's current open space is dominated by impervious space that only serves vehicular traffic.

Lack of wayfinding and signage.

Many community members were uncertain or unaware of the current assets along the lakefront and cited the need for clearer directional and wayfinding signage to help orient visitors. The lack of branding, signage, identity, and physical disconnection between spaces contribute to the isolation of the individual park spaces.

Challenges moving within park spaces.

One of the key challenges to accessibility and mobility along the lakefront is the lack of connectivity between individual park spaces. The proximity of I-90 near the former FirstEnergy site disconnects the lakefront park spaces and severs North Marginal Road, leaving visitors with only a single narrow trail connection along the highway. Visitors traveling by car are forced to navigate a spaghetti-like road network and take a short drive along I-90 to get from North Gordon Park to E. 55th Street marina.



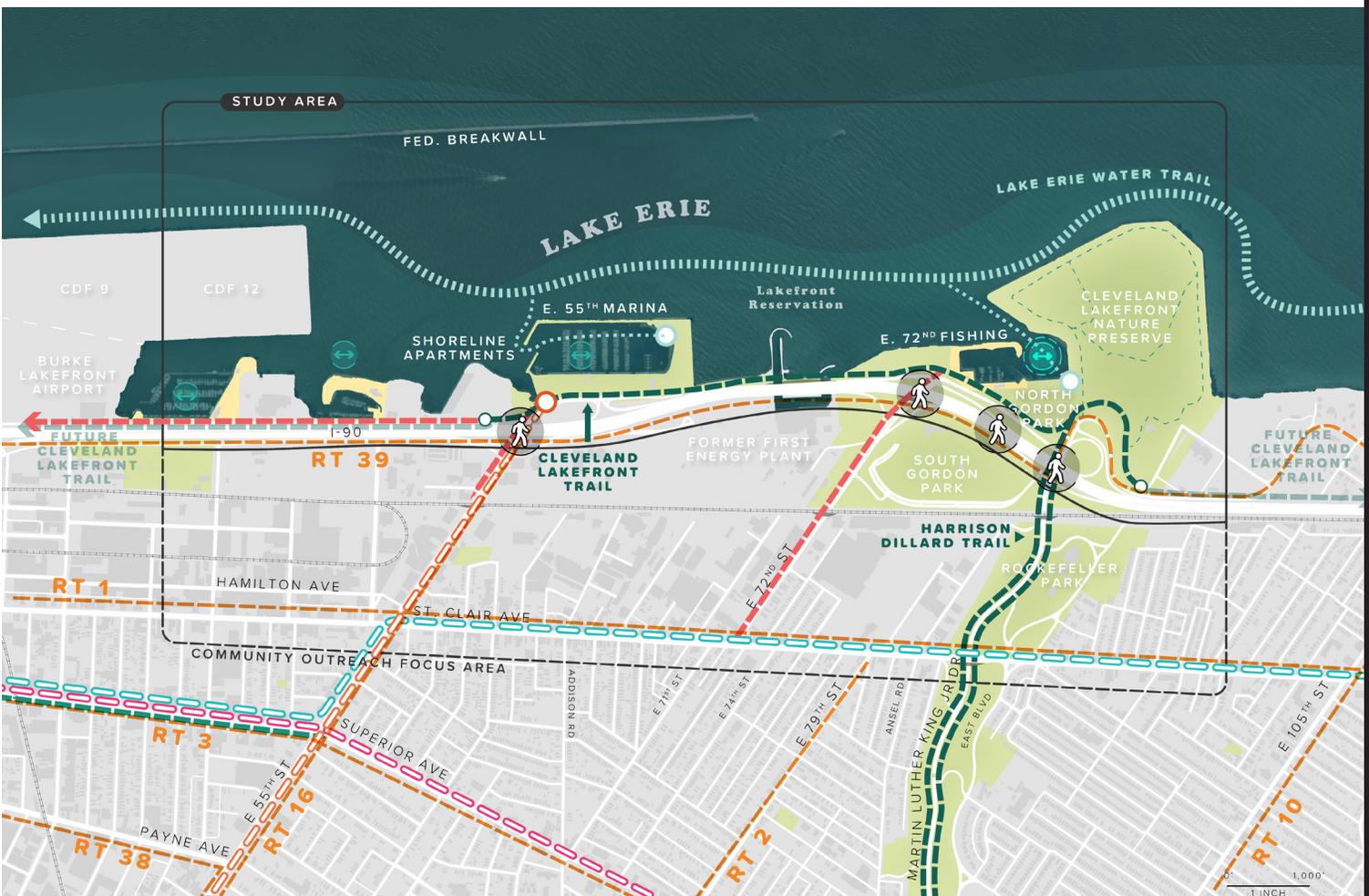
VEHICULAR



BICYCLE



PEDESTRIAN



Legend

ACTIVITIES

- Pedestrian Highway Crossing
- Boat Launch
- Public Boat Launch
- RTA Bus Routes

EXISTING BIKE + TRAILS

- Pedestrian/Bike Trail
- On-Street Bike Route
- Recreational Trail

PLANNED MIDWAY TRAILS

- Orange Way
- Magenta Way
- Blue Way

The map above identifies current and planned mobility routes.

SOURCE: CITY OF CLEVELAND GIS, CLEVELAND METROPARKS, GOOGLE EARTH, AND CLEVELAND.COM

THE CHEERS MOBILITY FRAMEWORK:

Improved systems of mobility will reconnect residents from adjacent communities to the lakefront with expanded bike and pedestrian access, opportunities for transit, and revised vehicular circulation.

1 Improve access to the lakefront.

Community greenways along existing streets, new multi-use paths, protected bike routes, and new and improved pedestrian bridges over I-90 will provide safer, more accessible routes to the lakefront from adjacent communities. East 55th and 72nd streets will include new bicycle and pedestrian infrastructure that will allow for more seamless movement between the community and the lakefront. A new pedestrian bridge near the former FirstEnergy site and improvements to the existing pedestrian bridge at Gordon Park will provide additional north-south connection points to the lakefront. Through each of the four alternatives explored in the First Energy ReUse Study (2017), the common vision was enhanced connectivity to the waterfront, expanded pedestrian and bike networks, and quality development that met the needs of the existing community while also attracting new investment. The CHEERS mobility framework underscores the need to maintain affordability and public access through the FirstEnergy site.

Improvements to bike and pedestrian infrastructure and safety in addition to the exploration of shuttle routes and increasing the frequency of current RTA lakefront routes will provide visitors with additional modes of transportation to reduce long-term dependency on the car. A shuttle route will be established to bring visitors out to the Isle during regular intervals and for larger events. Space for additional mobility options including rental bicycles and scooters are included at key gateways and trailheads to provide access to the lakefront and within park spaces.

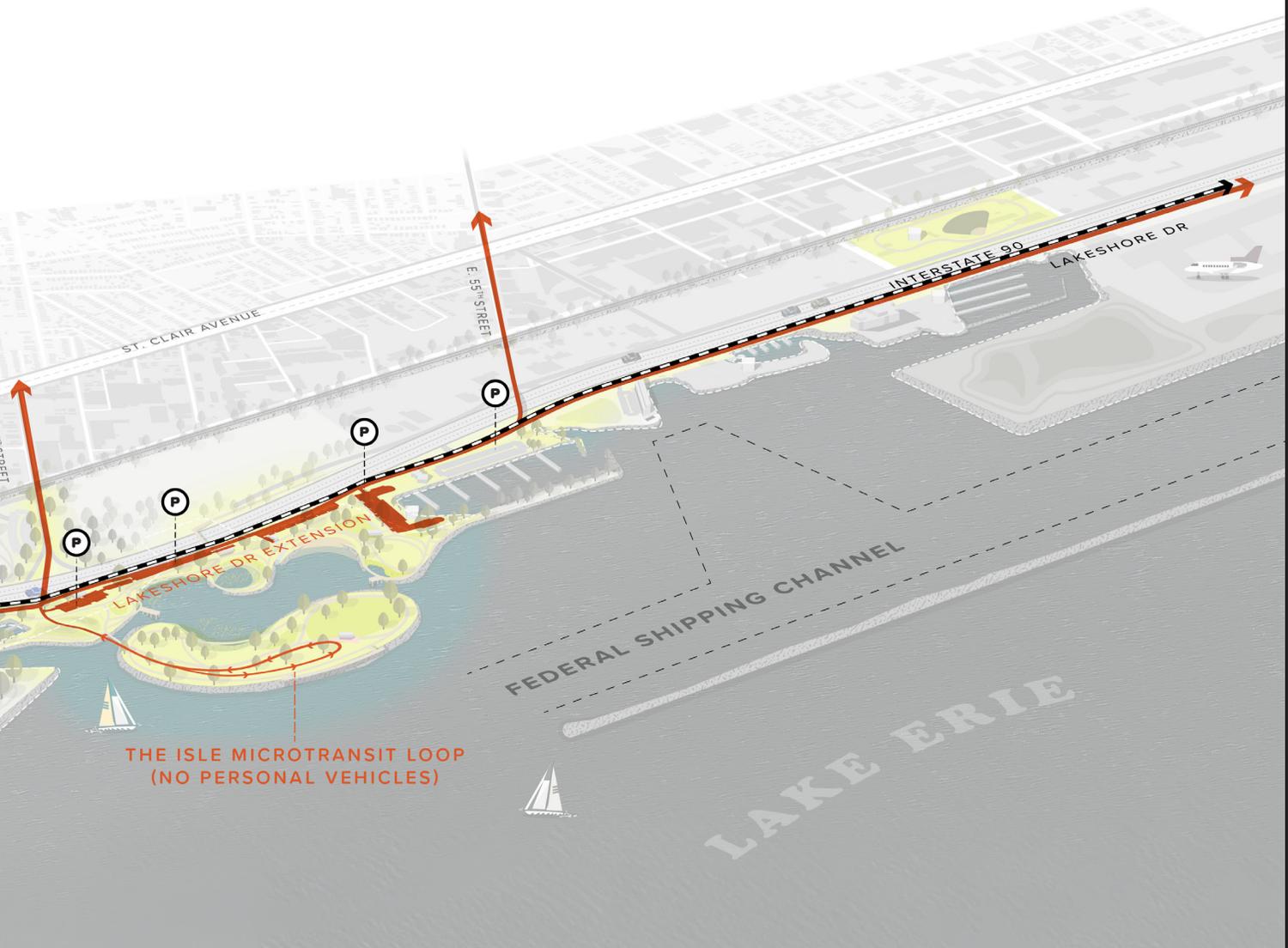


 **Vehicular Circulation**

 **RTA Bus Route 39**

 **Parking**

While ODOT has not done any study on the relocation of I-90, the CHEERS concept plan would not prevent any future exploration to relocate the highway. However, any effort to relocate this section of I-90 would likely have to be identified as a regional priority for northeast Ohio due to the expected cost. The implementation of the CHEERS plan would require additional study and approvals to address potential traffic impacts to I-90 and existing interchanges.



2

Simplify and improve vehicular circulation and parking.

While improvements to pedestrian, bicycle, and transit infrastructure highlight the importance of diversifying modes of transit to the lakefront, there is still a need for safe and accessible vehicular access. The expansion of parkland adjacent to I-90 will allow for the connection of Marginal Drive, which currently is disconnected by the highway. This new connected drive – called Lakeshore Boulevard – will be transformed into a tree-lined parkway that connects the park spaces along the lakefront. Lakeshore

Boulevard will provide access to parking areas. Enhanced tree trenches and green stormwater infrastructure will manage and filter runoff from the park road. While buffered sidewalks and bike lines provide additional mobility options. Parking areas will be strategically located adjacent to Lakeshore Boulevard and near nodes of activity. To accommodate new visitors and community members, the plan adds about 500 new parking spaces. In addition, the flexible event space with grass pavers will provide additional space for parking when needed during larger events.

3 Create a diversity of trail experiences that connect park spaces.

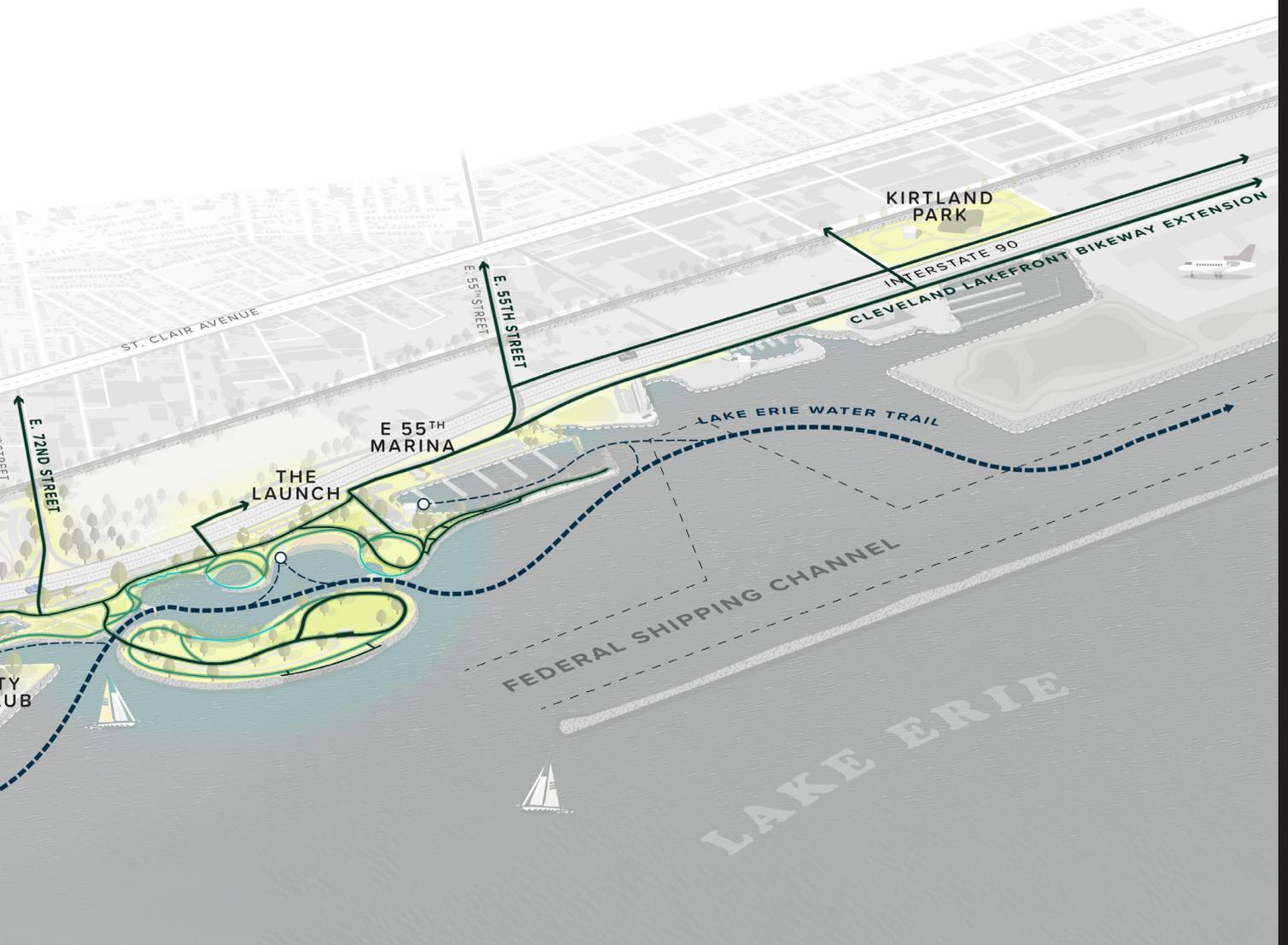
The plan includes a variety of trail experiences. Multi-use paved trails will provide space for biking, walking, and running. Natural surface trails will meander through new wetlands, marshes, and grasslands. Boardwalk trails will extend over the Cove, wetlands, and marsh areas providing a closer link to the water. These trails will connect to existing regional and local trails like the Lake Erie Water Trail, the Cleveland Lakefront Bikeway, and the Harrison Dillard Bikeway, furthering local and regional mobility and connectivity.

4 Establish new park gateways and a clear wayfinding system.

The lakefront is one of the city's most important cultural and natural assets. However, many users find getting to and navigating through the lakefront park spaces difficult, especially when walking or bicycling. The proposed plan establishes a series of new entry points and gateways that will welcome the community into the park spaces with improved pedestrian and bicycle infrastructure and visitor amenities. Gateways will provide framed views of Lake Erie, public art, wayfinding signage, and groves of trees and native plantings. A clear wayfinding system will help orient visitors, provide visual interest, and unite park spaces under one clear visual identity. These new gateways will also serve as trailheads, connecting visitors to local and regional trail connections.



-  **Multi-Use Trail**
-  **Nature Trail**
-  **Boardwalk Trail**
-  **Lake Erie Water Trail**
-  **Land Access Point**



Cleveland, Ohio

Lake Erie Water Trail

The Lake Erie Water Trail route stretches 25 miles along the Cuyahoga County shoreline. The trail celebrates Lake Erie's natural and scenic beauty with signage and key launch points for kayaks, paddleboards, and other non-motorized watercraft. Signage along the trail will provide users with crucial information about how to traverse the lake safely as conditions can change rapidly. Brochures and maps will contain tips and information about other access points and areas of refuge. The proposed route crosses through the eastern lakefront. The CHEERS mobility framework suggests additional stops at North Gordon Park, the Launch, and E. 55th Marina.

(left: Cleveland Metroparks)

CHEERS Trail Experiences

Trails and pathways were one of the most frequently requested improvements to the eastern lakefront. The CHEERS plan creates a diversity of accessible trails and experiences that loop through the park’s wetlands, grasslands, marshes, and community park spaces. Multi-use, natural surface, and boardwalk trails provide a varied, but connected experience. The trail systems link the eastern lakefront park spaces from east to west and to existing regional and local trails into adjacent neighborhoods.





Multi-use paved trails for biking, walking, and jogging will loop through the new programmed spaces within the park, connecting visitors with the lakefront's diverse range of recreational and natural spaces. This lakefront multi-use trail will connect to the existing Cleveland Lakefront Bikeway, linking the eastern lakefront to other park spaces like Kirtland Park, other lakefront reservation parks, and Downtown. At the Martin Luther King Jr. Drive intersection, the multi-use trail will connect to the Harrison Dillard Bikeway, providing a key linkage to University Circle. Educational and interpretive signage will inform visitors about the history of the lake, its development over time, and its significance to communities. Wayfinding signage and mile markers will orient visitors to nearby program areas, natural restoration points, and trail linkage points.

(left: Hunter's Point South – New York, David Lloyd)



Visitors will trek through a variety of natural surface trails that meander through the various habitat areas along the lakefront. Pathways will take visitors through the natural beauty of the Habitat Loop to the top of the Gordon Hills to take in expansive views of Lake Erie, along the edge of the Isle through native grassland habitat and Oak Savannah, and the naturalized banks and marshlands of the Cove. These quiet trails will provide ample opportunities to identify rare plant and bird species, learn about the ever-changing nature of Lake Erie, and take in a moment of respite from the hustle and bustle of the city to reconnect with nature. Natural surface trails will be designed with nature in mind, transitioning to Boardwalk Trails in areas that cross over the Cove or areas that are designed to be inundated as conditions change.

(left: Parklands at Floyds Fork – Louisville, KY, Charles Neer)



Elevated boardwalk trails will provide a new trail experience that brings visitors closer to the water. These trails will hug the shoreline and cross through wetlands and nearshore habitat areas that are occasionally inundated as conditions change along the lake. The boardwalk trails will connect visitors to other trails along the lakefront. The change in materials, elevation, and sound of walking along the boardwalk will provide a cue to visitors that they are traversing sensitive natural areas. Interpretive signage will provide educational opportunities and information about Lake Erie and natural restoration areas. Depending on the context and edge condition, trails may be concrete, metal, or wood decked with railings.

(left: Minghu Wetland Park – Lupanshui, China, Turenscape)



Nature

During the past 200 years, the lakefront has been almost entirely developed, stripping away all but a few remnants of natural habitat. To accommodate early industrial activities, the natural shoreline of Lake Erie was extended and hardened. Today, the eastern lakefront is highly urbanized with few natural areas. However, portions of the lakefront provide critical stopover habitat for a wide variety of migratory birds, acting as an island of habitat. The addition of new park areas and the availability of dredge material for habitat creation provide opportunities for natural restoration of aquatic and terrestrial habitats.

KEY CHALLENGES:

Fragmented habitat corridors.

The Lake Erie shoreline is an important stopover for migrating birds, bats, and insects, and locations along the lakefront are listed as migrant “hot spots” on eBird and are within designated “Important Bird Areas” by the National Audubon Society. Federally listed species such as Kirtland Warbler, Red Knot, and Piping Plover have been observed on the lakefront and are only three of the approximately 280 documented bird species. The suitable nearshore habitat in and around the lakefront is limited and fragmented, but highly used. Existing habitat areas are home to over 300 species of birds, amphibian and reptile species, and mammals.

Lack of tree canopy.

The eastern lakefront has a notable lack of tree cover when compared to surrounding areas. A healthy tree canopy helps mitigate heat island effects, contributes to habitat space, and enhances the visual appeal of park spaces. The prevalence of transportation-related infrastructure and industrial uses has created spaces devoid of mature tree canopy.

Limited native vegetation and habitat areas.

Vegetation communities along the lakefront are indicative of urban environments. Most of the vegetated areas north of the railroad are mowed lawn with horticultural trees

associated with maintained park spaces and road right of ways. Naturalized areas, such as those found in the Cleveland Lakefront Nature Preserve, include restored prairie meadows, successional deciduous forest communities as well as cultural meadows. Scrub communities with a mix of trees, shrubs, and grasses mostly dominated by weeds and invasive species are dotted throughout the lakefront. All plant communities within the study area contain a mix of native and invasive species.

Species of note include state-listed threatened species, the flat-stem pondweed (*Potamogeton zosteriformis*), which was observed by Cleveland Metroparks within the East 55th Street Marina in 2017 and 2019. Other desirable species such as native American eelgrass (*Vallisneria americana*) and pondweed species (*Potamogeton* spp.) were observed in the harbor in 2012, 2017 and 2019. Although these species were not dominant at any location within the lakefront, these species provide ‘good fish’ habitat inside of the east-west breakwall. Non-native and nuisance species such as Eurasian milfoil (*Myriophyllum spicatum*) and coontail (*Ceratophyllum demersum*) occurred most frequently within lakefront areas. Aquatic vegetation within the lakefront was primarily associated with the shallower sheltered areas along the shoreline, including along the southern side of the east-west breakwall, within E. 55th Street Marina and the E. 72nd Street Harbor and Gordon Park boat ramp.



AVIAN



TERRESTRIAL



AQUATIC



Legend

ECOLOGY

- Doan Brook (culverted)
- Doan Brook (stream)
- Open Deep Water Habitat
- Protected Shallow Water Habitat
- CSOs
- State Threatened Aquatic Vegetation

SHORELINE CONDITIONS

- Bulkhead
- Riprap Revetment

EXISTING HABITAT

- Cultural Meadow
- Deciduous Forest
- Hedgerow
- Mowed Lawn
- Oak Savannah (restored)
- Prairie Meadow (restored)
- Successional Meadow (restored)
- Impervious Areas

This map shows the various habitat zones of the CHEERS study area, as well as the shoreline conditions, and invasive plant species.

SOURCE: GREAT ECOLOGY, THE PORT OF CLEVELAND, WRT

THE CHEERS NATURE FRAMEWORK:

Enhanced, restored, and newly established habitat areas will improve the ecological function of the lakefront, provide connectivity to adjacent areas, improve recreational experiences for visitors, and provide an immersive and educational experience.

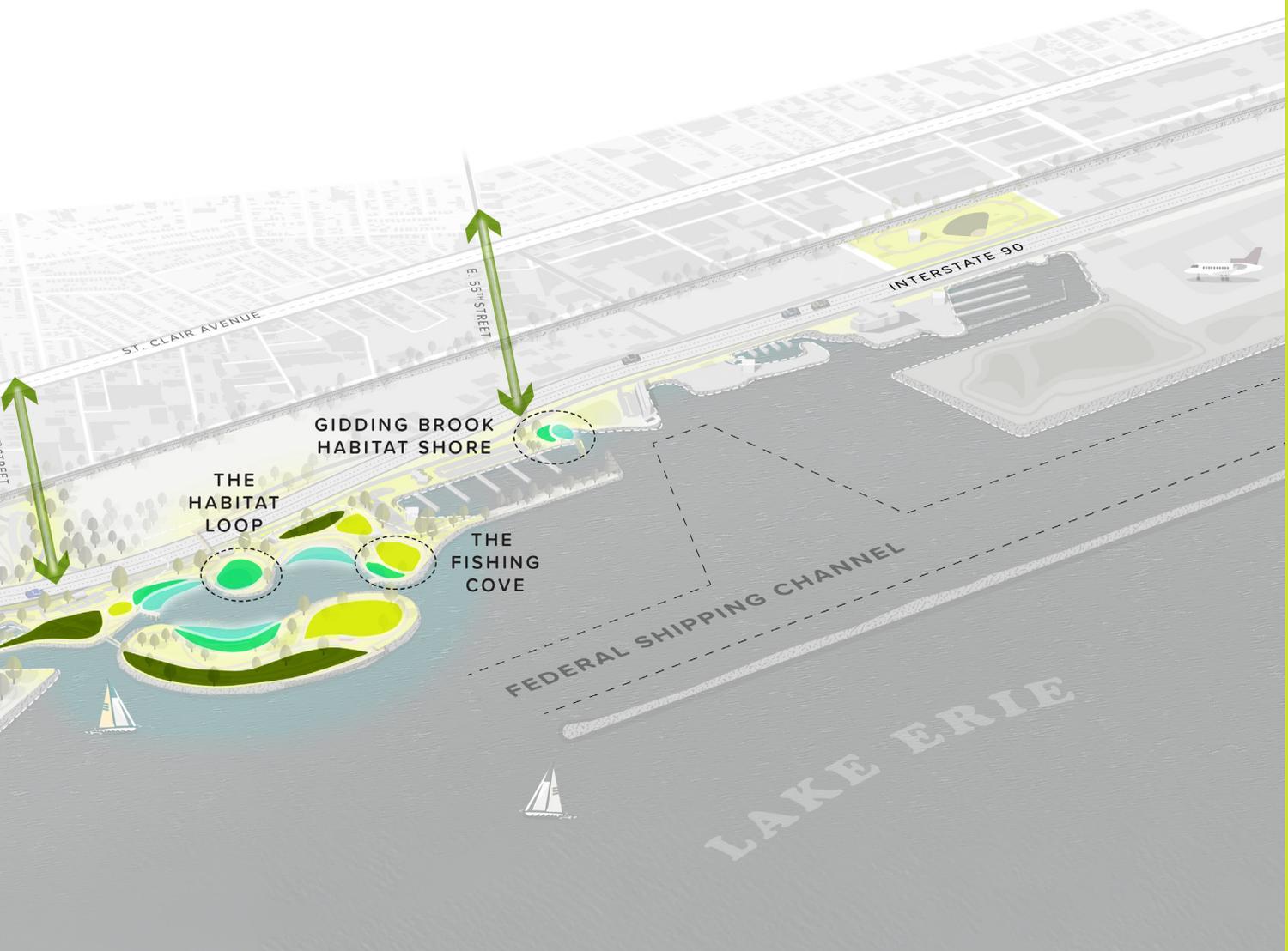
The proposed plan will build and strengthen the community’s relationship with the waterfront while also enhancing, restoring, and creating the ecosystems that biota depend on. Finding balance between the natural and human environments as well as the intended uses of the project area is a primary goal of the CHEERS project.

1 Balance nature and human use.

To achieve the balance between nature and human use, the design and restoration of natural habitats within the project area must be intentional with a focus on the re-establishment of historic habitat complexes along Cleveland’s Lake Erie shoreline. This will provide opportunities for biodiversity maintenance and provision of ecosystem goods and services that have been absent in the project area for decades due to industrial and residential development, shoreline modification, and isolation from nearby natural areas. A continuum of representative – historic Lake Erie shoreline habitat types as well as rare Ohio habitats will be featured throughout the project area.



The proposed design for the lakefront includes both large and small shore and submerged habitat development concepts to achieve functionality (from an ecosystem perspective) and accessibility (to humans and biota). In an urban or industrial setting, such as Cleveland’s Lake Erie shoreline, incorporating larger natural habitat parcels will provide a protective buffer from adverse effects of adjacent land uses, while providing smaller habitat patches will provide refuge for birds and wildlife. The enhancement and restoration of aquatic, shoreline, marsh, and upland habitat types will improve the quality of natural habitats within the project area and provide greater ecological connectivity between land and water. It will also provide greater connectivity between the project area, Doan Brook, and the



CLNP to the east of the project area. Habitat enhancement and restoration will have the added benefit of improving the visitor experience by immersing visitors in nature and providing outdoor educational opportunities along the waterfront in areas such as the Habitat Loop and the Isle. Finally, creating and restoring habitats within the CHEERS project area will provide improved recreational fishing in designated fishing areas and passive recreational activities such as birdwatching throughout the project area.

The location of the eastern lakefront, which is encompassed by two major natural systems – aquatic habitat and upland coastal habitats of Lake Erie – informed the natural elements incorporated into the design. A priority

- **Wooded Habitat**
- **Lawn/Prairie**
- **Shore Habitat**
- **Submerged Habitat**
- ← **Neighborhood Green Connections**

in creating and restoring natural habitat within the project area is to add habitat structure and complexity as well as improve the natural transition from aquatic to upland habitats to improve overall ecological function.

2

Improve upland shore habitat.

Newly created land from dredged material will allow restoration of larger areas of upland and coastal habitats adjacent to aquatic habitat. These areas include beach and dune habitats in the Shore area as well as successional forest and shrub habitats, which are currently limited along the waterfront. Additionally, vegetation communities such as native oak savannas and grasslands may be created on the Isle and in pockets throughout the project area depending on intended programming.

Restored and created upland habitats within the concept plan will provide stop over, refuge, and breeding habitat for a wide range of species as well as additional recreational space for waterfront visitors. Upland habitat restoration within the project area will primarily benefit highly mobile migratory and resident songbirds. While resident songbirds (those species that do not fly south of the U.S. during winter) are seasonally abundant in the area and are not in need of special consideration in habitat restoration efforts, neotropical migrants are in decline due to destruction of overwintering habitat in southern latitudes and fragmentation or loss of breeding habitats in the U.S. By incorporating native oak savanna and grassland habitat on the Isle and forest and shrub habitat within the Habitat Loop and adjacent to marsh areas, the area will provide important habitat for neotropical migrant species and draw these species away from BLK Airport, which may result in a reduction of wildlife conflicts. The creation of oak savanna and native grasslands will increase habitat acreages for several grassland bird species of conservation concern in Ohio such as bobolink (*Dolichonyx oryzivorus*) and eastern meadow lark (*Sturnella magna*) and will have the added benefit of deterring the colonization of the project area by larger bodied birds such as Canada geese (*Branta canadensis*) who prefer open mowed grass areas. Following the establishment of upland habitats, resident and neotropical songbirds are expected to readily colonize restored and created upland habitats within the area, exploiting newly available areas for foraging and breeding (Simenstad and Thom 1996).

3

Improve aquatic and in-water habitats.

Newly created upland habitats will naturally transition to aquatic habitats such as marshes, submerged aquatic vegetation (SAV) beds. In-water fish habitat will be restored and created using dredge material. This will improve the connection between land and water for biota and visitors alike. Shoreline softening (i.e., removal of bulkheads and riprap revetments) throughout the area will be integral to providing natural transitions, improved ecological function, and for creating opportunities for park users to touch the water.

Several opportunities exist where fish habitat can be enhanced by adding topographic variation through the placement of dredged material, to form underwater mounds or berms to promote fish aggregation, which would improve fish habitat as well as recreational fishing. Target species in the project area include: black bass (*Micropterus salmoides*), sunfish species, yellow perch (*Perca flavescens*), and walleye (*Sander vitreus*). Optimal siting criteria for these submerged fish habitat features would need to be developed in later (permit-level) design phases, giving consideration to avoiding interference with navigation, and providing access to both shore- and vessel-based anglers.

4

Soften edge conditions to improve ecosystem services and increase coastal resiliency.

Three types of shorelines will be established along the lakefront – softened, semi-hardened, and hardened. The conversion of hardened shorelines to softened shoreline and creation of new softened shorelines in areas where site conditions allow will stabilize the shore, reduce erosion, provide ecosystem services, and increase coastal resiliency.

Softened and semi-hardened shorelines will be established along 17,000 linear feet of new and existing shoreline. To achieve a softened shoreline, the plan will employ “living shoreline” stabilization design techniques using natural elements such as wetland vegetation, wood, and stone, alone or in combination as a hybrid approach, with some of the

more traditional ‘hard’ or ‘gray’ shoreline structures such as riprap revetments. In areas where wave action is limited, shorelines will be softened and feature different variations of a natural transition from open water habitat to aquatic habitat such as SAV beds into emergent wetland habitat, and finally into upland habitat. Topographic variation on the lakebed for fish habitat improvements will be created using mounded dredge material and large woody debris to create the habitat transitions. In these softened locations, vegetation will act as a buffer to upland areas and can even help dissipate small wave action to protect the underlying sediment. Large woody debris or other wood material may be used to help support the edge of the vegetated areas as they are establishing and will decompose over time to allow the succession of established plant communities to take its place.

Where wave energy prevents a more softened approach to protection, a hybrid shoreline treatment will be applied whereby a riprap revetment is built to the outer edge of the vegetated shore to protect against scour and water, wave, and ice erosion. This approach will protect against shoreline erosion in areas of open water exposure while allowing natural habitats such as emergent marshes to be developed upslope of the revetments within the project area such as in the Habitat Loop.

5 Create emergent wetlands.

Native emergent coastal marsh habitat will be created along softened and semi-softened shorelines throughout the project area within the Habitat Loop, along the Marsh Walk, and on the south side of the Isle. Native marsh habitat will be created by placement of dredge material and the topographic re-contouring of that material to establish an optimal elevation gradient, allowing for the expression of several different plant species with varying inundation tolerances. Marsh species selection will depend on slope, water levels, and community associations with an overall emphasis on increasing habitat structure. This will include incorporating a mosaic of submerged aquatic, emergent vegetation, and upland shrub fringe habitat. Emergent marsh within the project area will withstand a range of environmental conditions and fluctuating water levels indicative of Lake Erie. Emergent marsh habitat would then transition into upland shrub and forest habitat or into green space depending on the intended use of the area. Emergent wetlands within the project area would improve water quality, provide fish and invertebrate habitat, and provide breeding and foraging habitat for a variety of bird species.



Ecology + Infrastructure

Habitat Near Airports

Bird strikes are a key concern for wildlife experts and airport operators. Over the past 30 years, Burke Lakefront Airport (BLK) has recorded over 700 bird strikes. Based on this data, larger bodies species (Canada Geese, Gulls) pose the most risk to aircraft while smaller bird species (Killdeer, Swallows) rarely cause serious collisions. Creating new nodes of habitat along the lakefront will provide alternative spaces for migrating birds, helping to divert species away from BLK. Review of species of concern and a three-dimensional view of collisions will help refine habitat along the eastern lakefront and determine potential risk. Coordination and engagement with BLK and the FAA will continue to determine wildlife management strategies for implementation that supports airport operations.

(left: Cleveland Plain Dealer, Chuck Crow)



Water

The entirety of the shoreline is hardened with boulders, breakwaters, and steel bulkheads and does not contain adequate areas for wave dissipation, means to break energy associated with storm events, or areas to adjust to lake level fluctuations. Water level fluctuations and extreme storm events in the region are increasing in frequency and severity due to climate change, therefore exposing communities and infrastructure on the Great Lakes to threats of erosion, wave surges, flooding, and storm impacts. The inadequacy of the hardened shoreline to provide buffer from climate threats intersects with vulnerabilities specific to the project area, putting the communities and wildlife within and near the project area at risk.

KEY CHALLENGES:

Intense wave action.

The lack of in-water and nearshore habitat along the eastern lakefront has resulted in a shoreline with no natural means of protection from storms and wave action. The hardened shoreline with boulder walls, breakwaters, and steel bulkheads provides no areas for wave dissipation or means to break energy associated with storm events. Of the over 50,000 linear feet of shoreline in the eastern lakefront over 30,000 linear feet is riprap revetment and 17,000 linear feet is steel bulkhead while only 263 feet is unstructured shoreline that enters the water on a natural slope. Based on the intense wave action along the lakefront, design wave heights ranged from about 12.6 feet north of the Shoreline Apartments to about 16 feet at the east end of the study area. Study points included areas of higher and lower wave energy to be mapped throughout the lakefront.

Impact of ice and winter conditions.

On average, 82.4% of Lake Erie is covered in ice each winter year based on data from 1973 to 2018 from the Great Lakes Engineering Research Laboratory (GLERL). Ice forms initially at the coastline where structures will be constructed and freezes the interior of the lake last. Cleveland is, on average, at or below freezing temperature for 78 consecutive days (December 5th to February 21st). Based on available data, an ice thickness of 24 inches was assumed for design purposes.

Increased frequency and intensity of storm events.

Impending risks due to rising lake levels and increased frequency of storm events due to climate change are an ever-present threat to the eastern lakefront. Flooding and damage to critical infrastructure are cause for growing alarm as the associated costs and impact to adjacent communities continues to climb. High winds, waves, freezing temperatures, and more frequent storms have resulted in more frequent highway closures, erosion, infrastructure damage, and higher reported vehicular collisions. During 2012's Superstorm Sandy, 67 mile-



FLOODING



WAVES



ICE



Legend

-  CSO Outfall
-  Doan Brook Watershed
-  NEORS D Shoreline Storage Tunnel Alignmnet

The location of CSO outfalls, culverted and daylighted streams, and wetlands are depicted in the map above.

SOURCE: CITY OF CLEVELAND GIS, WKSU, CLEVELAND.COM, CLEVELAND METROPARKS



per-hour winds and 20-foot waves on Lake Erie were documented, resulting in closure of all 10 lanes of traffic and structural damage along the shoreline’s hardened edges. High waves frequently collide with the hardened shore, spraying water onto the highway causing wet or icy roadway or high water, resulting in extremely hazardous driving conditions. Large quantities of roadway crew time and resources are required to maintain the roadway and mitigate these risks. About 20% of crashes in this section of I-90 have occurred in wet pavement conditions.

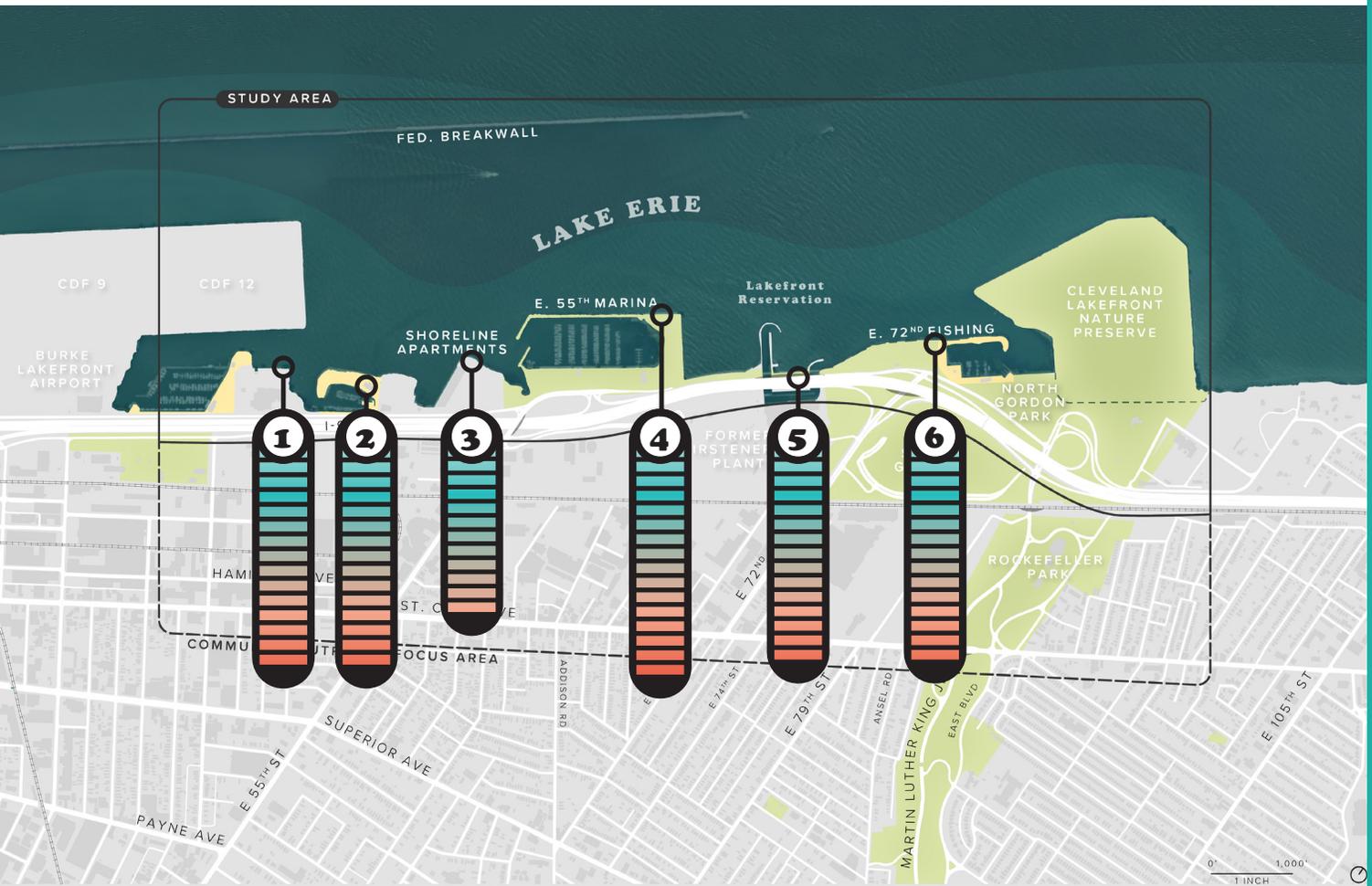
Lake level fluctuations.

Lake Erie’s water level is currently at a historic high. Water levels within the lake are influenced by long-term variations, seasonal changes, and short-term conditions. Long-term and seasonal changes are generally considered variations in the static water level, while short-term changes are the result of local wind setup, storm surge, or seiche. These ever-changing create provide challenges to providing access to the water and determining appropriate design heights for proposed improvements and new infrastructure.

Degraded water quality and unmanaged stormwater.

Like many post-industrial cities across the country, Cleveland is facing the challenge of upgrading and maintaining aging water and sewer infrastructure and working to contain pollution by reducing combined sewer overflows (CSO). In combined systems, stormwater and sewage are conveyed in the same pipe. During dry weather, sewage is transported to a treatment facility, but during wet weather events, stormwater enters the systems and may cause it to reach capacity, leading to a mix of sewage and stormwater overflowing and discharging into Lake Erie and other water bodies. There are 11 CSOs in or near the eastern lakefront. Combined, these outfalls account for 363 overflows per year, resulting in over 340 million gallons of overflow. The NEORS’s proposed Shoreline Tunnel project is expected to reduce the number of overflows in the eastern lakefront from 363 per year to 14 per year, resulting in a reduction of 310 million gallons per year. However, water quality and management of impervious surfaces to reduce pollution and degradation of Lake Erie will continue to be a concern even after the

- ◀ Partially frozen portion of the lake at the E. 55th fishing area. (Cleveland Metroparks)
- ▶ High winds and big waves along the E. 72nd fishing area in April 2020. (David Petkiewicz, cleveland.com)



Site	1	2	3	4	5	6
Wave Height (ft)	15.88	15.82	12.59	16.01	15.74	15.62
Period (sec)	8.79	8.74	8.66	8.91	8.67	8.57

This map shows the intensity of waves by height and return period for selected locations along the waterfront.

SOURCE: KS ASSOCIATES

THE CHEERS WATER FRAMEWORK:

The creation of the Isle using dredge material will provide protection from wave action, storms, and ice, allowing the establishment of expansive new habitat and natural areas within the Cove and along the Lakeshore.

Improve water quality in Lake Erie.



Improving water quality was a key consideration in the layout of the proposed plan. Water quality considerations include:

- Maintaining open water areas between the Isle and the Lakeshore to allow prevailing westerly winds to promote water flow along wind-driven surface currents and prevent stagnant areas.
- Positioning improvements in a way that takes advantage of currents generated by short-term changes in water level due to wave set up or seiche.
- Considering long-term maintenance considerations for debris collection and removal.
- Enhancing water quality benefit by locating natural filtration areas near existing outfall structures.

The resulting plan includes the Cove, which is protected by the Isle – an offshore landform – that dissipates wave energy. The Cove will open to the harbor to the west and east to allow for water circulation. Additional flow modeling will be conducted during detailed design of the Isle and Lakeshore so the final design can be adjusted and fine-tuned for water circulation. Coordination with the Northeast Ohio Regional Sewer District (NEORS) and Project Clean Lake will continue through detailed design and implementation.

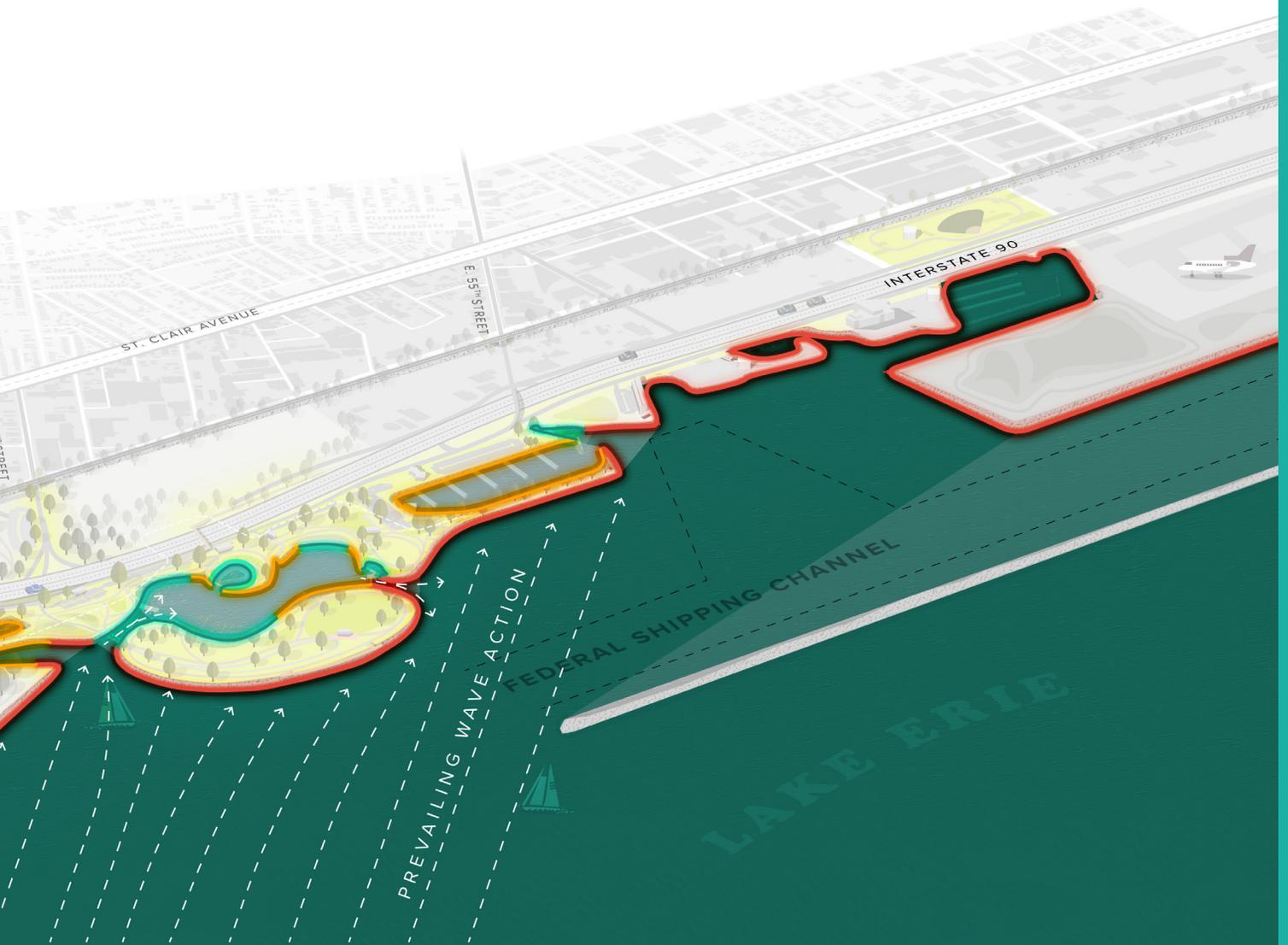


SHORE CONDITIONS

-  **Hardened Shoreline (Riprap)**
-  **Semi-Hardened Shoreline (Riprap)**
-  **Softened Shoreline (Natural)**

WAVE ACTION

-  **High Intensity**
-  **Moderate Intensity**
-  **Mild Intensity**
-  **Low Intensity**



Sandusky, Ohio

Sandusky Bay Initiative

ODNR is spearheading an initiative to transform Sandusky Bay into an area that supports wildlife and people by restoring wetlands and aquatic ecosystems while reducing wave action. The projects will reuse tons of dredged material the U.S. Army Corps of Engineers produces each year from the bay's shipping channel. The material will be used to create "in-water wetlands," using clean material that helps naturally protect the shoreline over time. The approach uses softer shorelines and includes materials that may degrade over time as vegetation is established. The projects will enhance fish habitat and support quality of life for city residents. Funding was supported by Ohio's Healthy Lake Erie Fund.

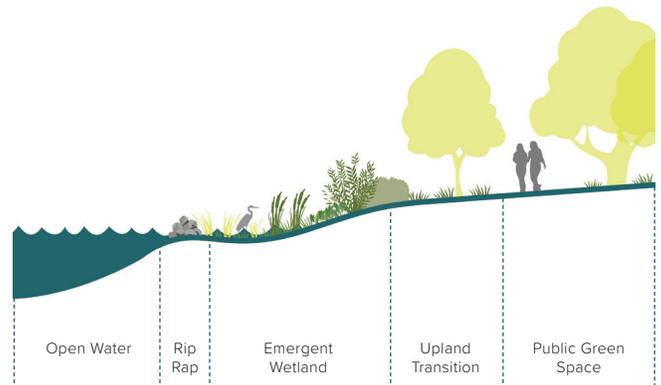
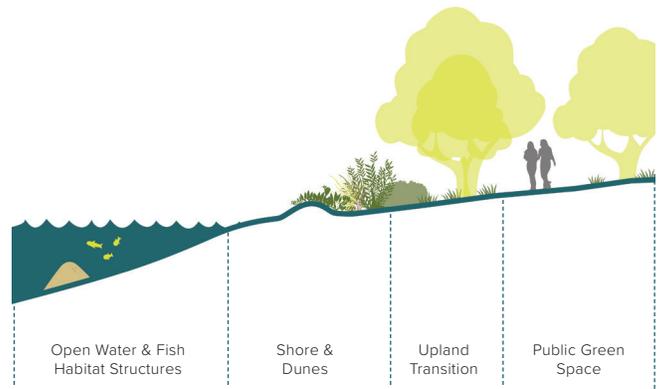
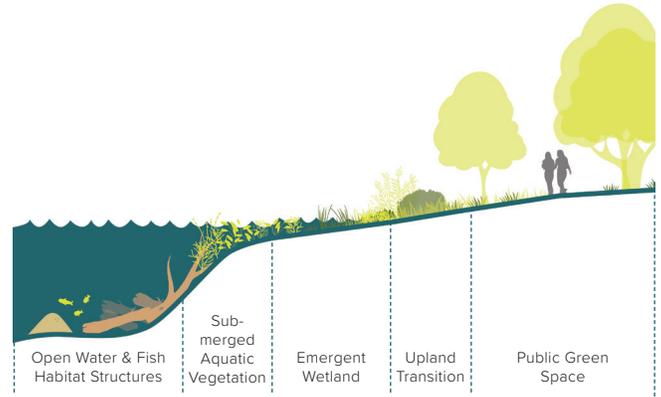
(left: KS Associates)

2 Provide protection from wave action and ice.

To allow for in-water and coastal improvements, which is a central objective of the project, detailed studies to review the range of water levels, waves, and ice forces along the eastern lakefront were conducted. Design conditions for new proposed elements were established based on a detailed study of the meteorological and oceanographic conditions along the lakefront, also known as a metocean analysis.

The analysis was performed in two steps. The first reviewed conditions on a large scale throughout the eastern lakefront, which informed the development of initial concepts. After the creation of a final concept using results from stakeholder and community engagement, a more detailed metocean analysis was performed. Historic and recent water level data was used to select design water levels for return periods, ranging from two to one hundred years, representing water levels with a 50% annual change of occurrence to a 2% annual change of occurrence. Water levels for design ranged from low water datum at an elevation of 569.2 feet IGLD 1985 (International Great Lakes Datum) to high water events ranging from 574.5 to 576.2 feet IGLD 1985.

Hydrographic survey data and wave hindcast data was then used to calculate preliminary design wave conditions at selected locations throughout the harbor. This method provided a base understanding of the forces to be considered while developing design concepts. Considering the wave and ice forces in the project area, substantial shore protection needed to be included in the design of project features, particularly lake-facing edges exposed to open-lake wave energy. Sheltered areas, or areas sheltered by other improvements were designed with a softer, more natural water interface. The proposed plan proposes 7,300 linear feet of hardened shoreline on open water lake-facing edges, 12,000 linear feet of semi-softened or hybrid shorelines, and 5,000 linear feet of naturalized or softened shoreline.



Sections depicting types of natural (softened) and semi-hardened shoreline typologies proposed for CHEERS. Each type includes space for nearshore, upland, and aquatic habitat.

3

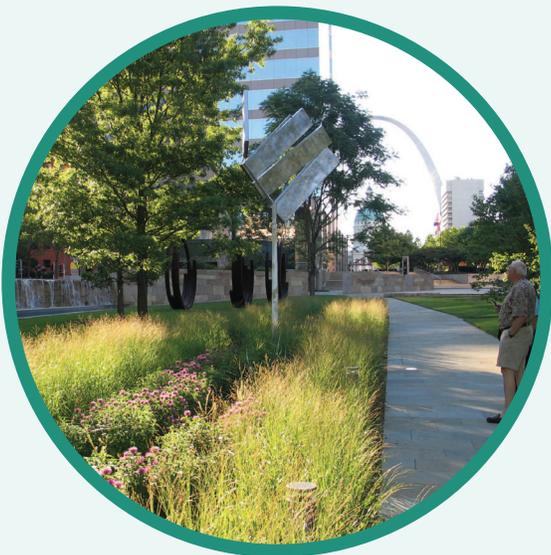
Manage stormwater and impervious surfaces.

Proposed improvements will maximize natural areas and minimize the use of impervious surfaces, where possible. Project areas that include impervious surfaces like paths, parking areas, and buildings will include stormwater management and treatment measures like rain gardens, filtration areas, and tree trenches. These improvements will help filter runoff, reduce the burden on the combined sewer system, and improve the water quality of Lake Erie. This level of stewardship and stormwater management is even more important since a majority of the proposed area will drain directly to the lake.

4

Incorporate flexibility in design elements to allow the shoreline to adapt to changing conditions.

Climate projections estimate that Cleveland is expected to see an increase in temperature of four degrees by 2070, more intense heat waves, more frequent and intense storms, an increase in heavy precipitation, and longer freeze-free seasons. These potential impacts and the dynamic nature of the lake require that design elements account for dynamic conditions over the coming decades with strategies that allow the shoreline to adapt while preserving habitat space and continued community use. Major program elements and circulation paths are situated in areas with protection from lake level changes, wave action, and ice. Natural areas create buffers along the edges of the Isle and Lakeshore, allowing for water level fluctuations.



Best Management Practices (BMPs)

Green Stormwater Management

Managing runoff from impervious surfaces using green stormwater infrastructure has multiple benefits – it helps reduce the burden on the sewer in a combined sewer area, filters and removes pollutants before water enters the lake, provides visual interest with planting, and supports habitat when planted with pollinator and native species. Stormwater best management practices (BMPs) can take many forms in and around parks, including rain gardens, swales, wetlands, porous paving, and tree trenches. The project pictured on the left – Citygarden – includes a 5,000 square foot rain garden perimeter planted with native grasses and wildflowers. This BMP manages over two-thirds of the impervious surfaces in the park.

(left: Nelso Byrd Woltz Landscape Architects)