

# Ashtabula County: Reach AC 10



## About the Program

In an on-going effort to assist property owners along Ohio's Lake Erie coast by providing free technical assistance, the *Lake Erie Shore Erosion Management Plan (LESEMP)* is being developed by the Ohio Department of Natural Resources through a partnership between the Office of Coastal Management, Division of Wildlife and Division of Geological Survey.

The *LESEMP* identifies the causes of erosion in specific areas called reaches which are stretches of shore with similar site conditions. The *LESEMP* then outlines the most likely means of successful erosion control based on reach-specific erosion issues, geology and habitat. The objective of the reach-based approach to erosion control is to simplify the decision process while enhancing the effectiveness of solutions to erosion related issues.

The *LESEMP* does not contain any regulatory oversight provisions.

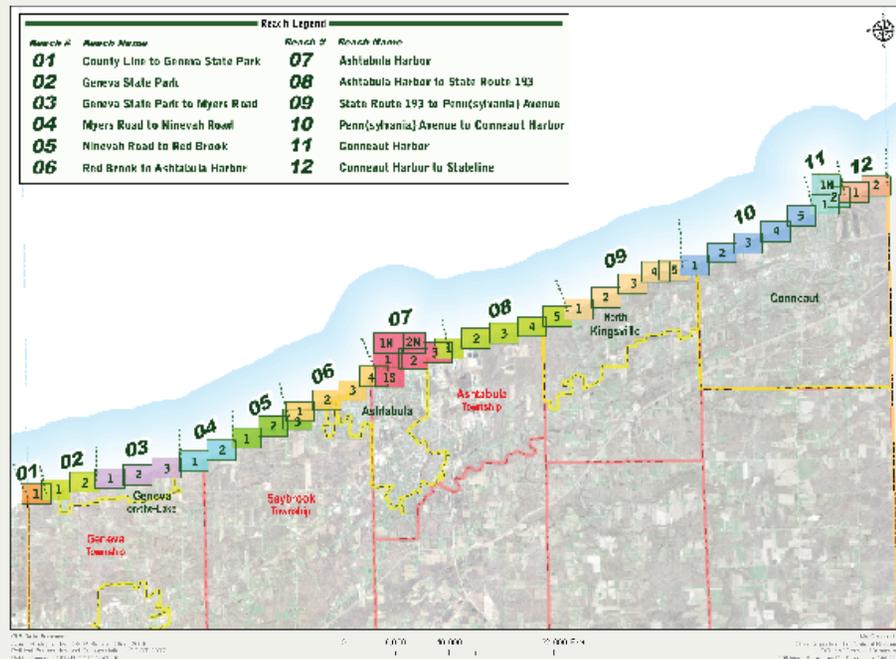
## Description

The reach from Pennsylvania (Penn) Avenue to the western breakwater of Conneaut Harbor is mainly residential with the exception of Conneaut Township Park at the eastern bounds. The residences are located at various distances from the top of bluff. This includes buildings over 100 feet away from the bluff edge, houses 30 feet or less from the bluff top, and some residences built on the bluff slope. Proceeding from west to east, the bluffs within this reach decrease in height from 40 to 65 feet, as measured at the county line (Reach AC 12). The lower two-thirds of the bluffs are till, which is overlain with glaciolacustrine silts, sands and clays. The shale bedrock nearshore is covered with a thin band of sand and gravel immediately offshore. Beaches are only present where structures are large enough to disrupt the littoral transport of sand. This is exhibited at Conneaut Waterworks and more prominently at Conneaut Township Park (formed by the western breakwater); both of which are located at the eastern end of this reach. Two notable headlands were created by shore structures. One is 1,045 to 435 feet west of Parrish Road and one has been created by the Conneaut Waterworks facility at Lake Erie Street. Both headlands appear to have formed due to the presence of structures. The first headland appears to have formed due to a groin field, while the second headland formed around the breakwater/revetment at the Waterworks facility.

The lack of adequate beaches combined with excess surface and ground water on and in the bluff, has lead to a reach prone to erosion at the toe and top of the bluff. Waves approaching the toe of the bluff cause erosion and undercutting. Surface and ground water reduce the stability of the overlying soils and cause the upper portion of the bluff to slump. Even those properties with adequate toe protection, either as beaches or structures, may experience erosion in the upper bluff.

## Recession /Erosion

The ODNR Division of Geological Survey has evaluated the recession of Ohio's Lake Erie shore over three time periods: 1876 to 1973, 1973 to 1990 and 1990 to 2004. Changes between the rates measured in each of the time periods can be attributed to development along the coast and natural factors



such as lake level changes. In the first time period, low coastal development persisted throughout Ohio's coast with some of the lowest development rates in Ashtabula County. In the 1970s, development increased causing an increase in the use of shore structures to protect properties. It was during this time that the highest lake levels were recorded and severe storms battered Ohio's shore. This coupling of storms and negative impacts of shore structures led to a general increase in recession rates. In the most recent time period, high lake levels were recorded once again, but the use of better designed shore structures worked to limit the levels of erosion.

For the purposes of determining recession rates within this reach, the data for each time period for the area from Pennsylvania (Penn) Avenue to Conneaut Harbor was analyzed.

Between 1876 and 1973, recession rates within this reach ranged from less than 1 foot per year to 3 feet per year. These relatively low rates are attributed to: 1) the presence of many shore-parallel structures; 2) the presence of beaches including the larger beach at Conneaut Township Park; and 3) the absence and deterioration of aging shore-perpendicular structures, which allows for the uninterrupted movement of sand along the shore.

During the 1973 to 1990 time period, average recession rates ranged from 0 to 4 feet per year. The highest rates were exhibited along the Burrington Heights roadway. Rates varied outside of this location. There were sections of shore with rates just above 0 feet per year coupled with areas reporting a range of 1 to 3 feet per year.

From 1990 to 2004, average recession rates ranged from 0 to 4.7 feet per year. While a majority of this reach recorded rates around 0 feet per year to just over 1 foot per year within this time frame, the section of shore north and northwest of Margor Drive exhibited rates up to 4.7 feet per year. The highest rates were recorded just to the east of a barge placed as shore protection located northwest of Margor Drive.

## Beaches /Sand Supply

Since sand supply is directly connected to beach presence, the size, number, location and widths of beaches are good indicators of sand supply. Based on a review of historic aerial images, it appears beach size does not change much within this reach. Overall, this reach is void of beaches, except for the central headland and the area from the Conneaut Waterworks facility to the Conneaut Harbor western breakwater. The beaches formed by the Conneaut Waterworks and harbor breakwaters appear to be stable and

growing, as these beaches were present over the past half century and were not significantly diminished during years of higher lake levels (i.e. 1973). The sand buildup around the groin formed headlands, however, it appears to be more susceptible to fluctuating lake levels with smaller beaches during higher lake levels and much larger beaches on both sides of the headlands during years with average or lower lake levels.

## Summary

The reach from Pennsylvania (Penn) Avenue to Conneaut Harbor contains high till bluffs fronted by small to non-existent beaches. The one exception lies at the eastern extent of the reach where moderately sized beaches are present from the west of the Conneaut Waterworks facility east to the western breakwater of Conneaut Harbor. Shore-parallel structures are the predominant structures used with shore-perpendicular (groins) present in higher number around the central headland. Slumping is a moderate threat to most residences and a severe threat to those houses located within 30 feet of the bluff edge.

## Recommendations

The recommendations included below are options that may be applicable to properties within this reach and should only be used for planning purposes. Based on the above physical characteristics, the following recommendations are suggested for Pennsylvania (Penn) Avenue to Conneaut Harbor. Each recommendation includes a brief overview of the solution prior to addressing areas within the reach where the recommendation is best suited. For more information on any of the items listed below, please refer to the Glossary and Appendix: Erosion Control Solutions.

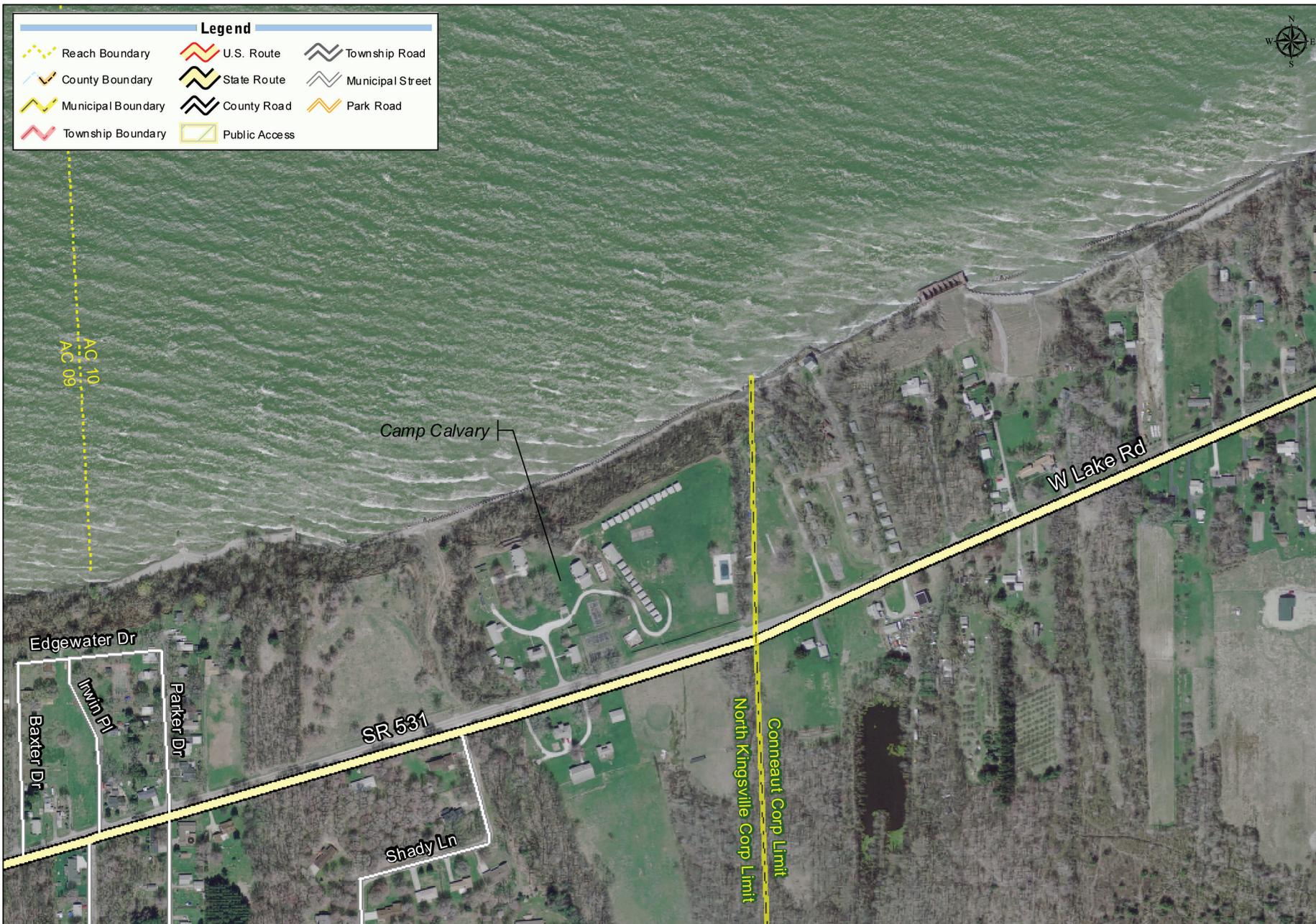
### Sand Resources:

**1. *Conserve Sand Resources:*** *Conserve sand resources within the shore and nearshore areas. Sand is a limited resource in constant fluctuation. Avoid removing sand from the system; sand moved or excavated during construction along the shore should be placed in the nearshore, not on the upland and should not be incorporated into the construction project.*

The reach from Pennsylvania (Penn) Avenue to Conneaut Harbor has a relatively low amount of sand within the shore area except for the larger (relative to the rest of the reach) beaches located near Conneaut Harbor. By

# Reach AC 10 - Penn(sylvania) Avenue to Conneaut Harbor

Map 1



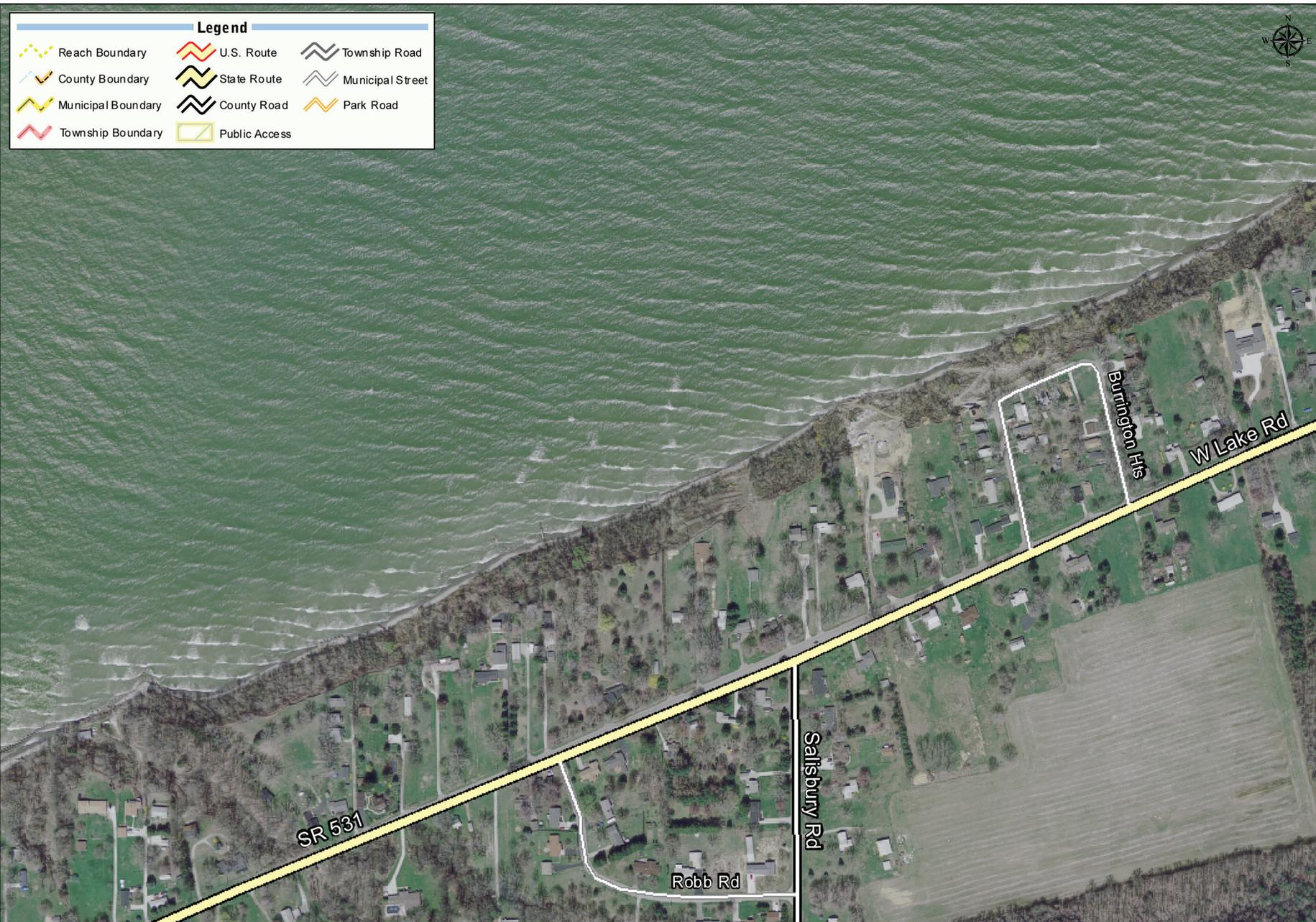
GIS Data Sources:  
 Aerial Photography - OSIP, State of Ohio, 2006  
 Political Boundaries and Transportation - ODOT, 2007  
 Public Access - ODNR OCM, 2009-10



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# Reach AC 10 - Penn(sylvania) Avenue to Conneaut Harbor

Map 2



Legend		
	Reach Boundary	
	County Boundary	
	Municipal Boundary	
	Township Boundary	
	U.S. Route	
	State Route	
	County Road	
	Township Road	
	Municipal Street	
	Park Road	
	Public Access	

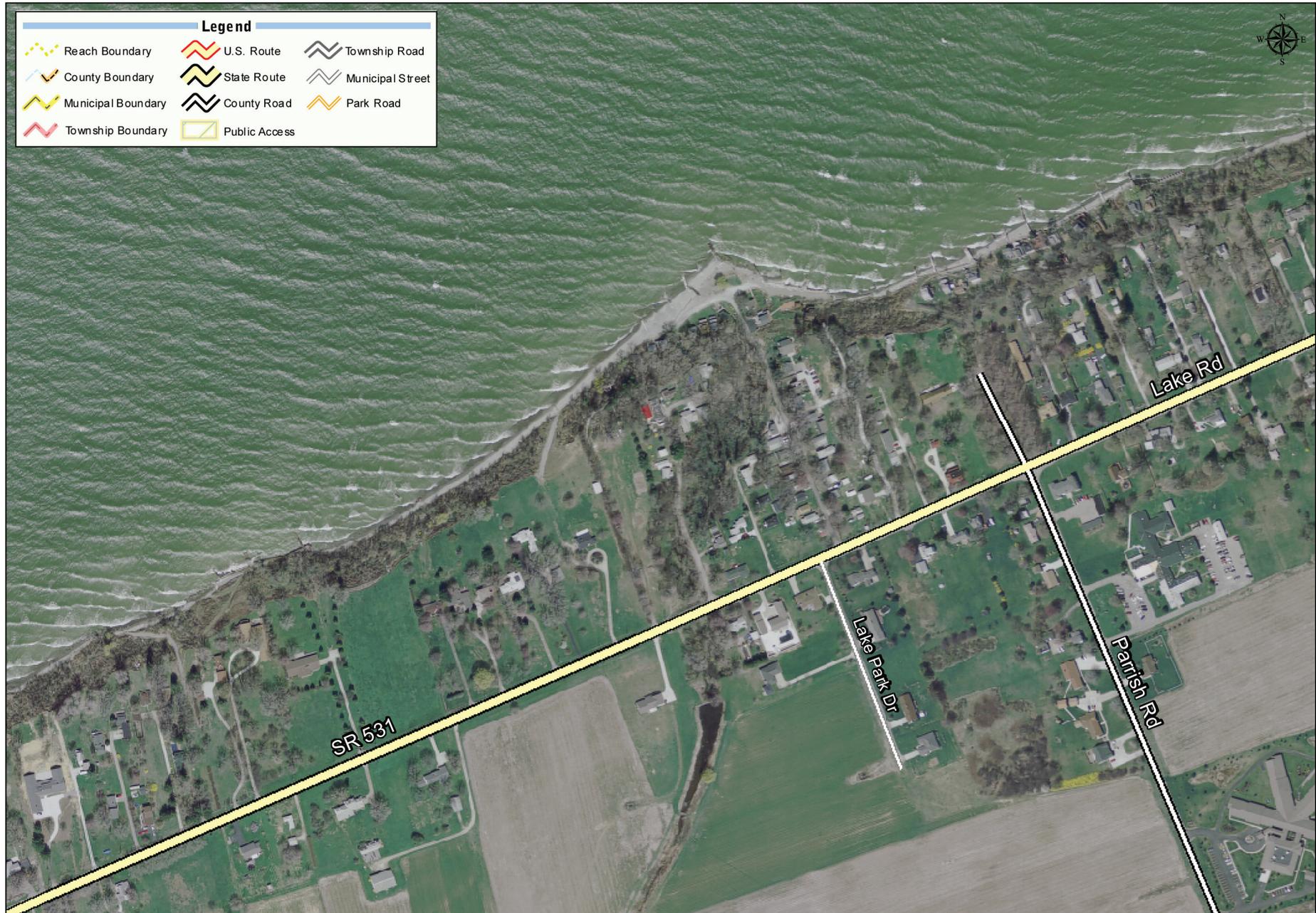
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Reach AC 10 - Penn(sylvania) Avenue to Conneaut Harbor

Map 3



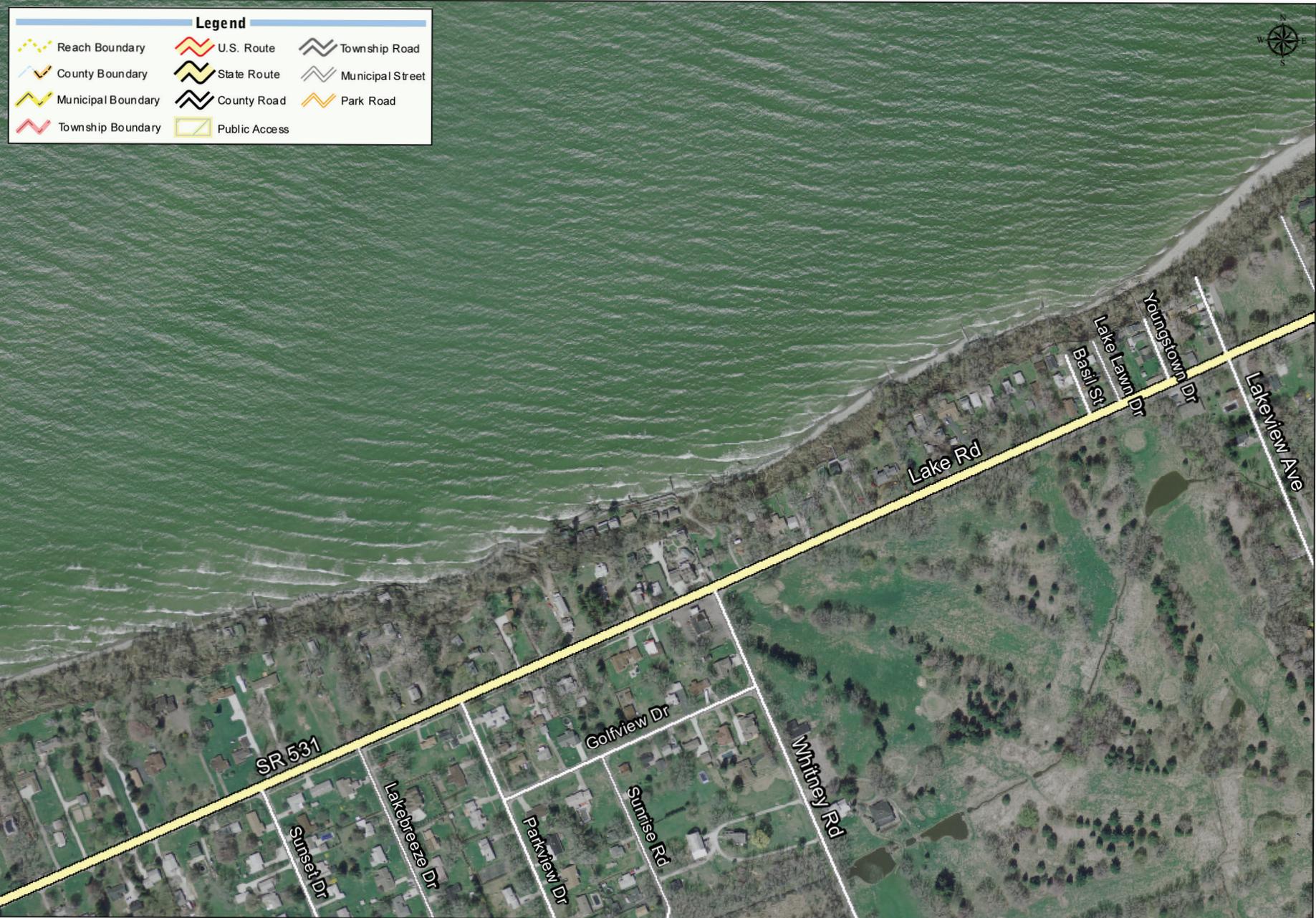
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0 250 500 1,000 Feet

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# Reach AC 10 - Penn(sylvania) Avenue to Conneaut Harbor

Map 4



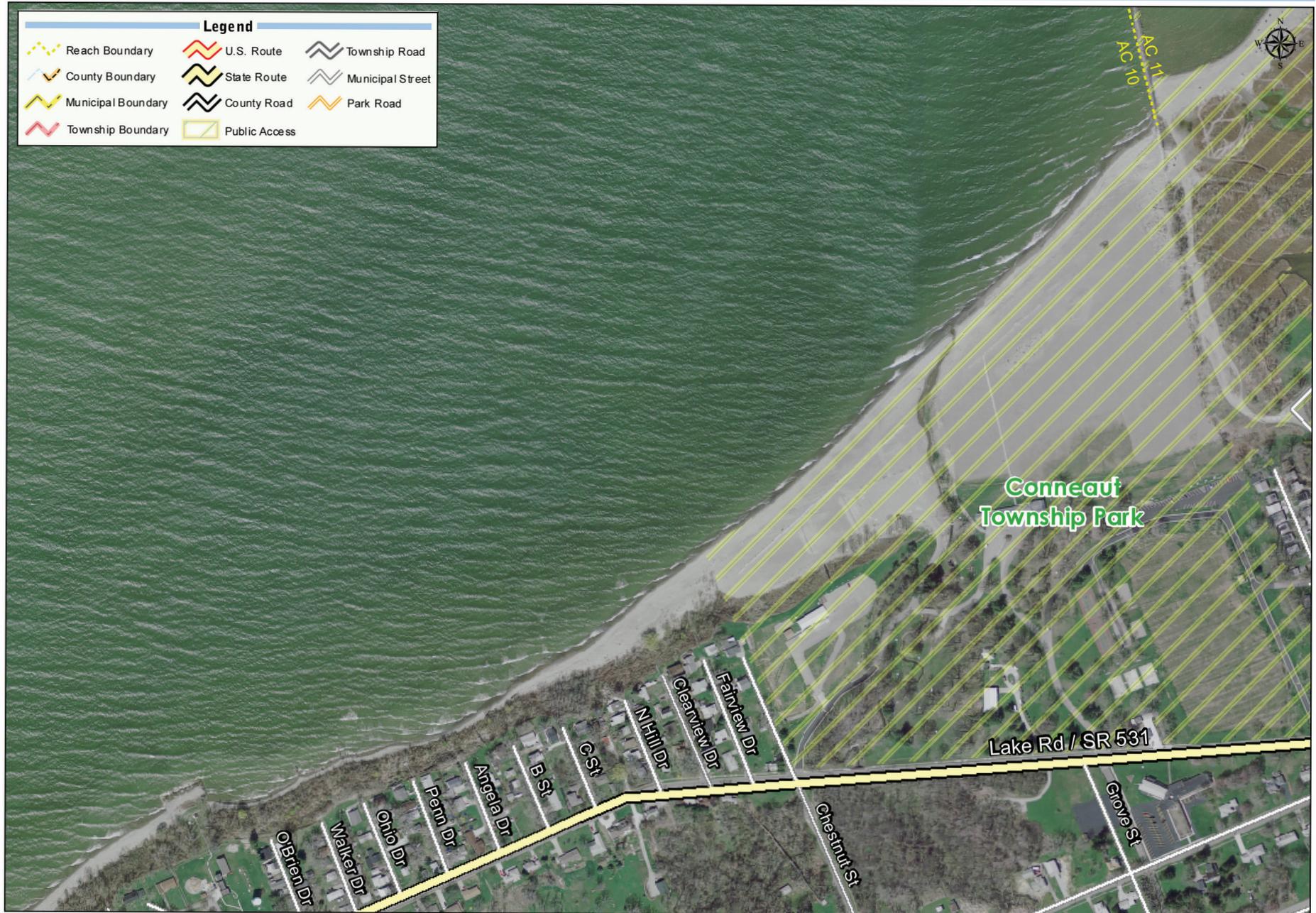
GIS Data Sources:  
 Aerial Photography - OSIP, State of Ohio, 2006  
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 Public Access - ODNR OCM, 2009-10



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Reach AC 10 - Penn(sylvania) Avenue to Conneaut Harbor

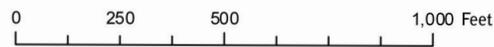
Map 5



**Legend**

Reach Boundary	U.S. Route	Township Road
County Boundary	State Route	Municipal Street
Municipal Boundary	County Road	Park Road
Township Boundary	Public Access	

GIS Data Sources:  
 Aerial Photography - OSIP, State of Ohio, 2006  
 Political Boundaries and Transportation - ODOT, 2007  
 Public Access - ODNR OCM, 2009-10



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conserving the already limited resource, some areas may be able to retain what little beach is present. Retaining sand and beaches within the shore area will be beneficial for protecting the toe of the bluff from wave action.

## Toe Protection:

2. **Revetments:** *Revetments along the toe of a bluff will aid in protecting against wave-based erosion. In areas without beaches, a structural measure may be necessary to protect the toe of the bluff. The bluffs within this reach*



Conneaut Township Park's bluff has been regraded and terraced into a series of large steps to help prevent erosion of the bluff. The top photo is taken standing atop the bluff & looking northwest toward Lake Erie. The bottom photo is taken standing in the middle of the beach & looking southwest toward the bluff.

*are ideal for revetment development. In essence, the revetments form a stable bluff slope, providing protection to the soil underneath while breaking up wave attacks. Since material eroded off the bluffs is one source of beach-building sand, some regulatory agencies may require that one of the design components for a revetment be the inclusion of sand pre-filling in the amount equal to that which would have been added to the system over the life of the structure.*

Revetments could be used throughout this reach, except along the far eastern edge where the larger beaches are present west of the Conneaut Water Works facility and Conneaut Harbor breakwater. When constructing a revetment, consideration should be given to the overall slope of the bluff, with re-grading or terracing done along upper portions of the bluff as necessary. By conducting all work during the same time period, disturbances to the bluff are minimized.

## Bluff Modifications:

3. **Re-Grading/Terracing:** *Re-grade or terrace less stable bluffs to a more gradual slope. By creating a lower (flatter) slope angle or terracing the slope to a series of steps, instability caused by gravity's forces on the upper bluff is decreased. Re-grading is a non-structural approach to stabilize the bluff that leaves the shore relatively unaltered. When re-grading, also examine the toe of the bluff to determine if toe protection is needed and if a structural (revetment) or non-structural (beach nourishment) solution would be preferable.*

Except for those areas where a building is too close to the bluff edge, re-grading could be applied to any property within the Pennsylvania (Penn) Avenue to Conneaut Harbor reach. Along properties that are too close to the bluff edge for re-grading or terracing, the best solutions may either be water management, structural protection of the property, or a combination of these measures.

4. **Surface Water Management:** *Route surface water away from the face of the bluff. In areas where gullies or rills are forming, surface water is slowly eroding the face of the bluff. Re-routing water away from the bluff may involve changing gutter or driveway drainage. Terracing of the bluff can also be used as a means of intercepting and diverting seeping ground water. Sources of surface water include, but are not limited to roof gutter downspouts, runoff from driveways and sidewalks, precipitation, and sprinkler systems.*

The re-routing of surface water should occur throughout this reach. Attention to the signs of surface water will allow for early action on limiting erosion due to runoff.

**5. Ground Water Management:** *Remove ground water from within the bluff. Drainage should be installed in areas with excess water in the bluff which are visible as seeps or springs in the middle of the bluff. A subsurface drainage system should remove water from an upper layer within the bluff (often a sandy layer), and should exit at the lake level to limit lower bluff erosion. Sources of ground water include, but are not limited to leaking septic systems, underground pipes and swimming pools.*

Along this reach, it is likely that all properties require some level of ground water management because of the bluff heights and composition (i.e. sand over till). The installment of ground water drainage systems will aid in stabilizing the upper portions of the bluff, while limiting the potential for debris slides from overly saturated clay layers.

**6. Vegetation:** *Encourage growth of vegetation along the bluff slope. Where possible plant vegetation, preferably native species, along the bluff to remove*

*excess ground water while retaining soil strength. It is also possible to simply allow the natural succession of native plant species to grow along the bluff.*

High levels of ground and surface water throughout the entire area from Pennsylvania (Penn) Avenue to Conneaut Harbor make every property well suited for the placement of vegetation along the bluff. Due to the height and slopes of the bluffs, specific species and types of vegetation may be better suited for different areas of the bluff (i.e. trees along the lower bluff).

### **Management and Monitoring:**

**7. Bluff-Top Management:** *Keep heavy materials, equipment and structures well back from the edge of the bluff-top. This applies to the placement of debris/yard waste near or over the edge of the bluff. Shrub and grass clippings can become saturated with water and greatly increase the weight on the bluff's slope, directly causing slumping. Any structure (concrete decks, stone walls) or heavy object (vehicles, boats) placed near the bank/bluff edge will increase the stress within the soil and can lead to slope failure.*

This recommendation is applicable to the entire reach from Pennsylvania (Penn) Avenue to Conneaut Harbor.



Overall, Reach AC 10 is void of beaches, except for the area that comprises Conneaut Township Park. The park's 0.4-mile long sand beach ranges in width from more than 1,000 feet along the east side which is marked by the Conneaut Harbor western breakwater, to around 200-feet wide at the park's west end. This photo is taken standing near the middle of the park's beach and looking west and shows how the beach with narrows dramatically.

**8. Coordination of Projects:** *Continuation of similar erosion control measures along a stretch of shore will often yield more effective protection than the installation of multiple types of structures adjacent to one another. Most erosion control measures function better when used over large areas of the shore.*

It appears shore structures have already been constructed within this reach as group projects. For instance, the groin field that created the central headland appears to have been built as a grouped project. When following the above recommendations, consider similar grouping of projects to achieve the desired results.

**9. Water Management-Monitoring:** *Monitor the bluff for any changes to the amount/flow of water. Any changes in water patterns on a bluff could be signs of potential future failure planes (i.e. areas of slumping or sliding). Regular monitoring of the bluff will allow for the early detection and correction of these smaller problems, which will likely be less costly than measures taken after the issues worsen.*

Similar to all reaches within Ashtabula County, the Pennsylvania (Penn) Avenue to Conneaut Harbor reach must give consideration to the high levels of surface and ground water present. The entire county receives more



*The reach from Pennsylvania (Penn) Avenue to Conneaut Harbor contains high till bluffs ranging from 40 to 65 feet tall which, for the majority of the reach, are fronted by small to non-existent beaches.*

precipitation than other counties to the west, and therefore property owners will always need to be aware of water on and within the bluffs. Careful monitoring throughout this reach will allow for pro-active measures to reduce excess surface and ground water.

**10. Shore Structure Management - Monitoring:** *Monitor and maintain shore structures. Routine monitoring of shore structures will allow for early detection of any potential failures. Smaller repairs performed more frequently will be less costly and can often increase how long the structure will be effective at controlling erosion. If removal of an aged or deteriorating structure is necessary, consider the above recommendations as potential future solutions.*

Some shore structures within this reach area already exhibiting deteriorated appearances and functionality, while others may be in need of maintenance in the near future. Monitoring older structures will provide advanced notice to when they are failing or causing damage to surrounding areas, while the monitoring the effect of new structures will allow for early alterations that will limit negative impacts.

## References:

- Carter, Charles H. and Donald E. Guy. Report of Investigations No. 122, Lake Erie Shore Erosion, Ashtabula County, Ohio: Setting, Processes, and Recession Rates from 1876 to 1973. State of Ohio, Department of Natural Resources, Division of Geological Survey, Columbus, 1983.
- Ohio Department of Natural Resources, 1998 Final Coastal Erosion Area (CEA) Mapping
- Ohio Department of Natural Resources, 2010 Final Coastal Erosion Area (CEA) Mapping

## Learn More:

LESEMP Webpages: [ohiodnr.com/tabid/20501.default.aspx](http://ohiodnr.com/tabid/20501.default.aspx)

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