Lake Erie Shore Erosion Management Plan

Ashtabula County: Reach AC 07

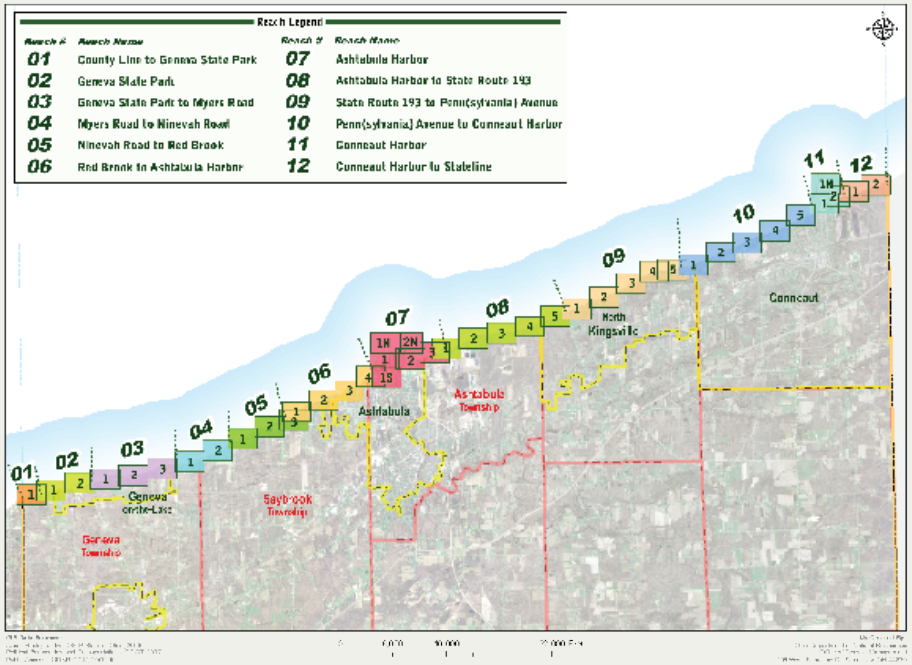
LESEMP

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 Ashtabula Harbor reach is located between the western harbor breakwater and the eastern edge of the First Energy facility. This area is mainly industrial, however, there are recreational attractions including boating access along the river, the western beach/wetland, and Lakeshore Park on the east side of the harbor. The artificially filled and armored port facility was built in the floodplain of the Ashtabula River and has substantially altered the natural lakeshore. Erosion has not been an issue within the harbor reach due to the extensive shore hardening. Instead, sand has been accreting inside of the harbor's western breakwater (shoaling) during at least the past half century. A beach and wetland have formed on the inside of the breakwater due to the significant accretion.

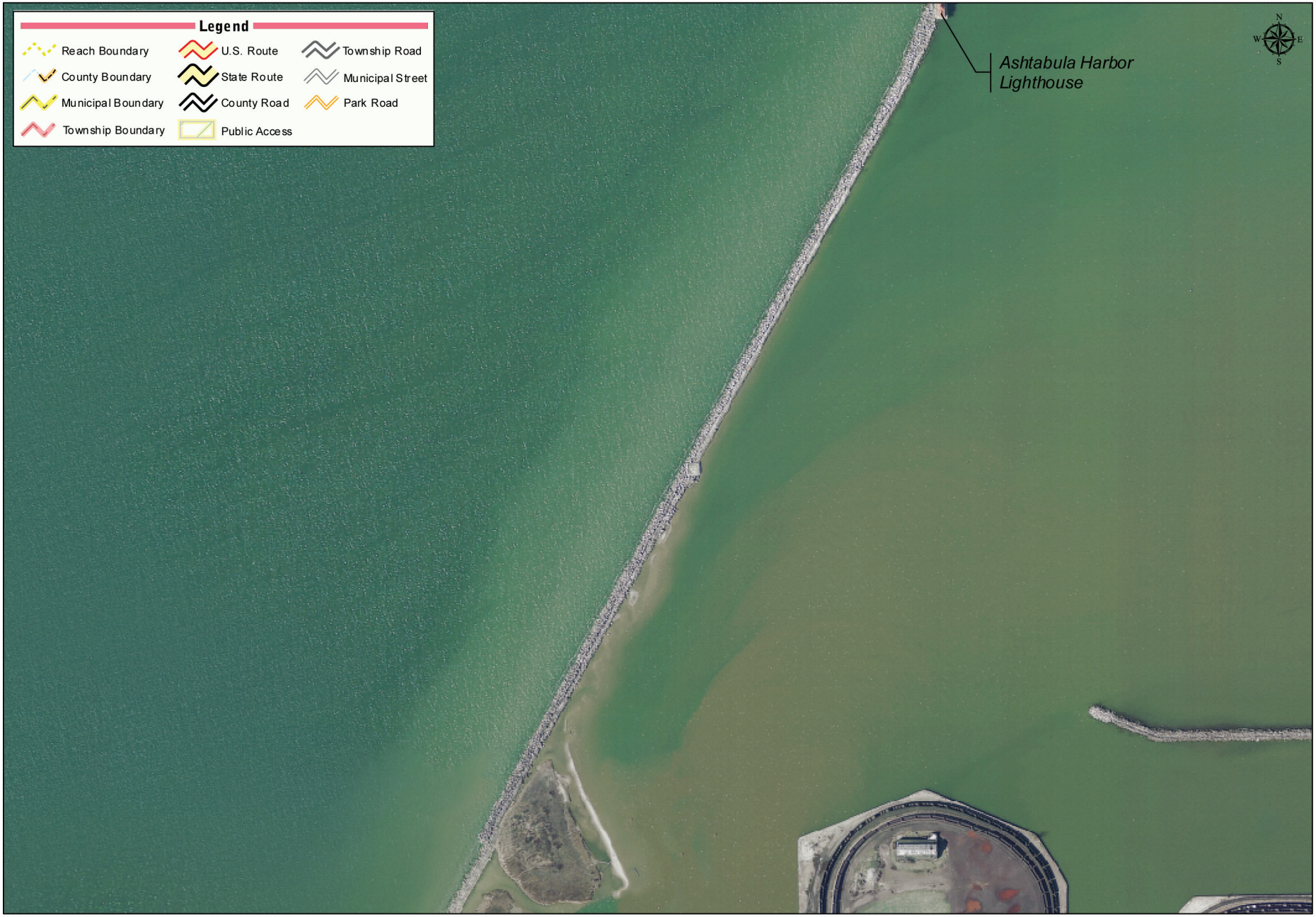
On the east side of the harbor is Lakeshore Park, a recreational area which contains a beach formed by a series of three detached breakwaters and a groin near the western edge. The western portion of the park's shore is also protected by a revetment. The revetment, located west of the beach area, was built over or in place of a failing seawall. Construction of the revetment occurred between 1970 and 1980. The groin at the western edge of the park was built in 2004.

Lakeshore Park is a notable feature within Ashtabula Harbor, as the beach area is the one location not hardened by attached shore structures (not including the shoaling) and is an area of accretion.

Directly east of Lakeshore Park is the First Energy facility which contains a series of attached breakwaters and revetments. Two of the breakwaters are oriented shore-perpendicular, one 1,350 feet long, the other 1,126 feet long. While these structures are of considerable length, neither extend beyond the landward end of the harbor's eastern breakwater and therefore do not have as significant an affect on littoral drift as they would if located away from the harbor. The breakwaters at the First Energy facility – including the two shore-perpendicular and one oriented roughly parallel to shore – are used to reduce wave energy and protect the facility's water intake and discharge pipes. Revetments also line the shore at the First Energy property and are used to reduce erosion along the eastern margin of the facility.

Reach AC 07 - Ashtabula Harbor

Map 1N



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 07 - Ashtabula Harbor

Map 2N

GIS Data Sources:
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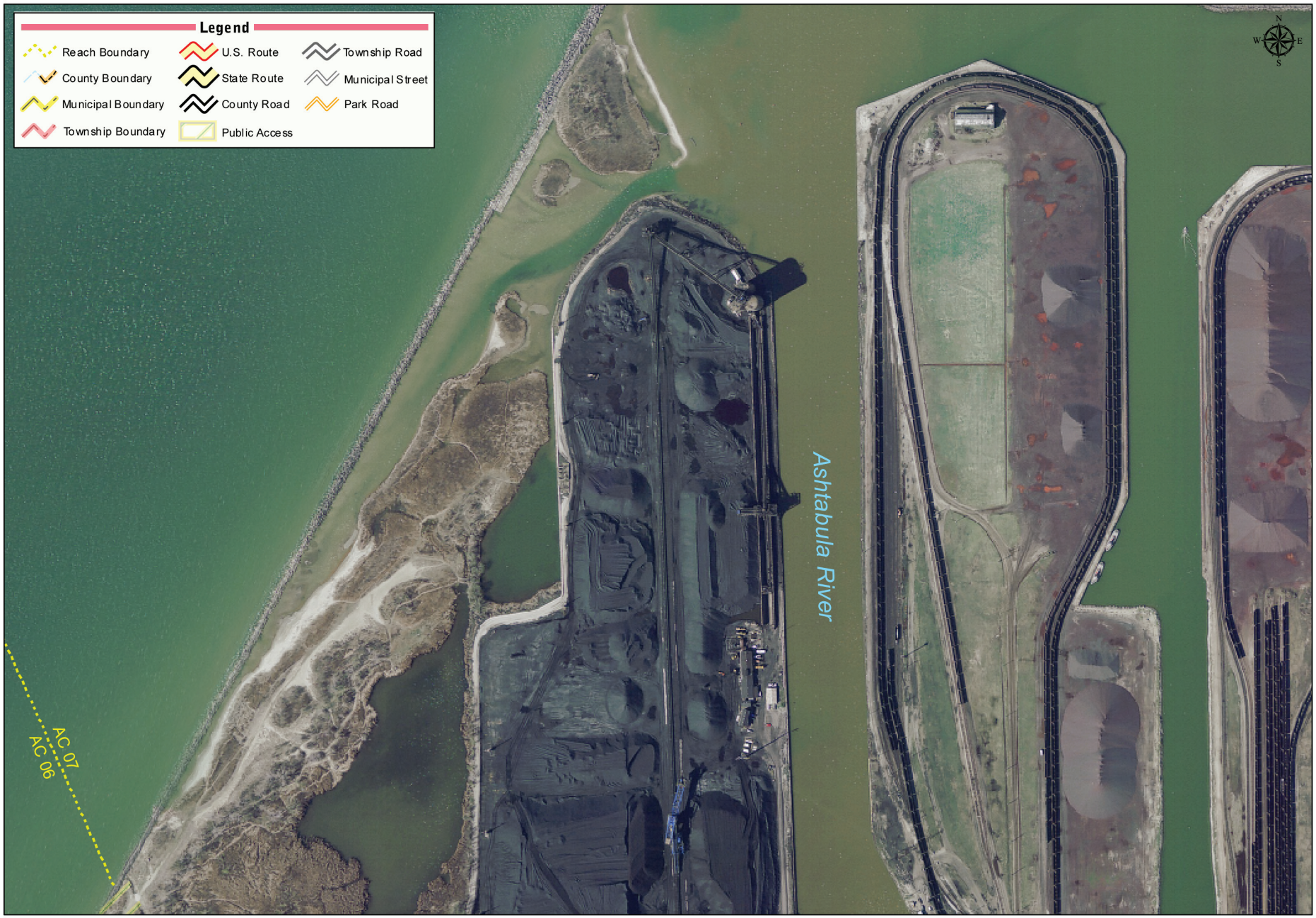
Reach AC 07 - Ashtabula Harbor

Map 1



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Map 2

GIS Data Sources:
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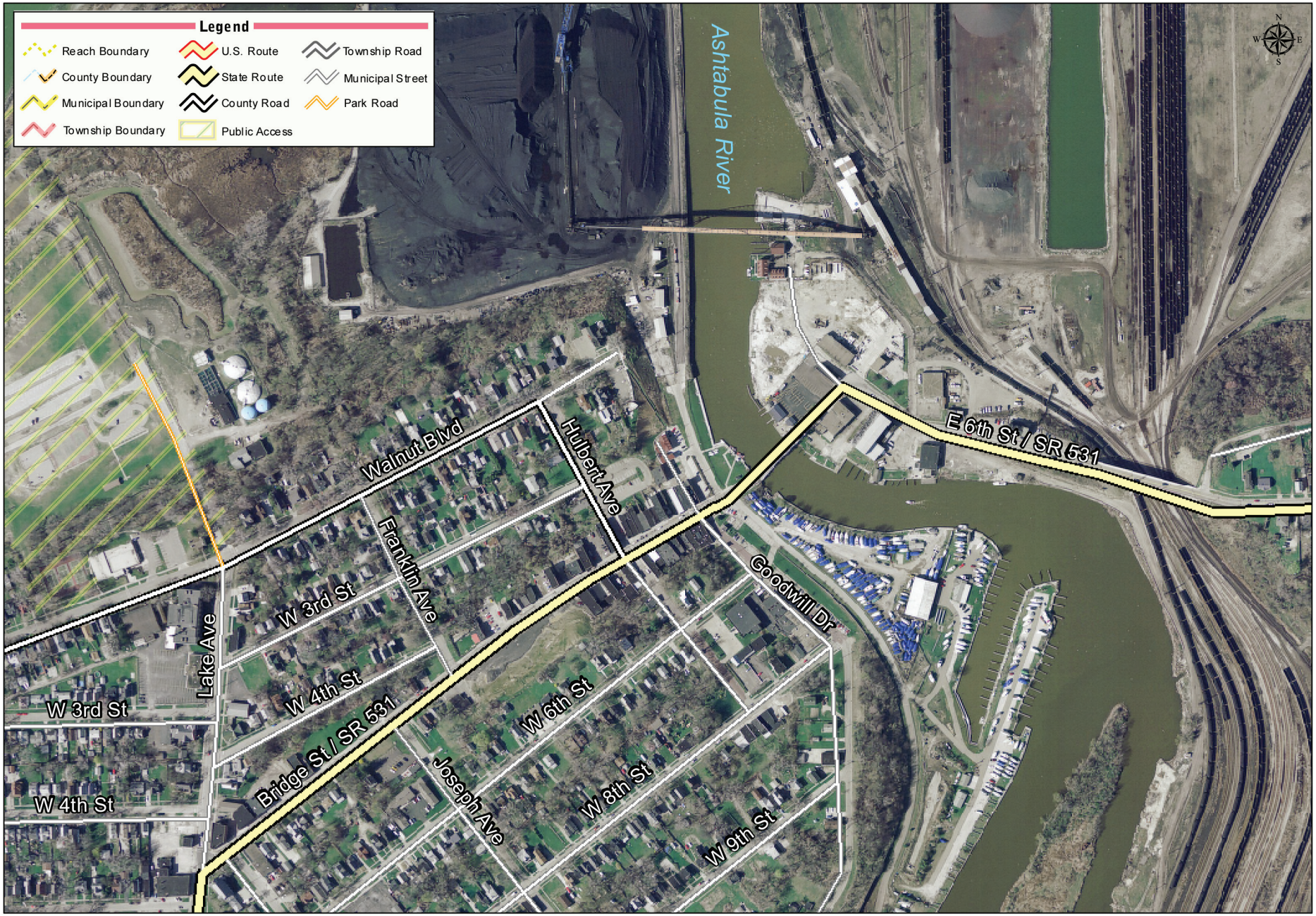
Reach AC 07 - Ashtabula Harbor

Map 1S



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Reach AC 07 - Ashtabula Harbor

Map 3

GIS Data Sources:
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The breakwaters surrounding Ashtabula Harbor affect sediment levels updrift (west) and downdrift (east) due to the lack of sand transport around the harbor structures. Littoral drift within this reach flows from west to east, with sand typically accumulating on the western side of a structure. Since the harbor breakwaters are so large, compared to private residential structures, the impact of their presence occurs over a greater distance. For instance, those areas located in the eastern neighboring reach (AC 08) have a limited sand supply and are exhibiting higher rates of erosion due to the lack of protective beach presence. Typically, the larger the structure (most often referring to shore-perpendicular), the greater the impacts to sand supply, both updrift (i.e. accretion of sand at Walnut Beach Park in Reach AC 06) and downdrift (i.e. erosion within Reach AC 08).

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. Since the Ashtabula Harbor is a hardened shore feature, it was deemed unnecessary to evaluate recession at this location over all three time periods. The only location within this reach where erosion and accretion have been recorded is at Lakeshore Park. From 1973 to 1990, the beach area of the park experienced average recession rates ranging from just over 0 to 3.7 feet per year. Within the third time period, from 1990 to 2004, no recession was recorded in this area. In that same timeframe, the beach size increased with additional sand along the eastern half of the beach. No data is available to measure the amount of accretion at this location, but it is notable for this reach.

The 53.2-acre Lakeshore Park is east of the Ashtabula River. The eastern 900 feet of shore is a groomed-sand swimming beach. In 1982, 34,000 cubic yards of sand were placed on the beach after the three 125-foot long, segmented, rubble-mound breakwaters were constructed to help stabilize the beach.

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, there are two locations within the Ashtabula Harbor reach where changes have occurred over the past half century. First, the area on the east side of the western harbor breakwater has been continually changing. It appears the volume of sand within the harbor has been slowly increasing over time. The most stable section of this feature is the southern portion of the beach/wetland complex which is adjacent to the breakwater and Walnut Beach Park. The northern extent of the shoaling shows the greatest fluctuations and will likely be an area of continuous erosion and accretion.

The second significant change to the harbor area is the creation of Lakeshore Park between the port infrastructure and the First Energy breakwater at the eastern margin of the reach. Historically, the park location was an area void of sand and half fronted by a seawall. Presently, three offshore breakwaters, a groin and a minimal beach have been added as well as a revetment in place of the aged seawall. In more recent years, the park shore has changed little, even with changes in lake level. Lakeshore Park is a site with minimal sand but minor wave based erosion and beach accretion due to its location behind the harbor breakwaters.

Summary

The Ashtabula Harbor reach contains the port infrastructure for the Ashtabula River, Lakeshore Park on the east, and the First Energy facilities. A hardened shore around the port and First Energy facilities has created a reach with negligible erosion. Accretion is occurring within two areas- the inside of the western breakwater where shoaling is occurring and the Lakeshore Park beach. Due to the large breakwater structures around the harbor, sand supply is significantly altered. Sand is accreting updrift of

this reach, most noticeably at Walnut Beach Park, and erosion is occurring downdrift throughout the neighboring areas to the east.

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 upon the above physical characteristics, the following recommendations are suggested for Ashtabula 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 Management:

1. Sand Bypassing: Move sand from areas of excess accretion, usually updrift of a shore perpendicular structure, to areas downdrift. By redistributing sand within the nearshore system, the littoral drift in the area will be more evenly dispersed.

Sand bypassing should occur from areas updrift and within the harbor breakwaters to areas downdrift of the First Energy breakwaters. Sand placed updrift of the First Energy breakwaters will not reach areas downdrift and therefore will not achieve the same results of enhancing sand supply outside of this reach. If the area of shoaling within the western harbor breakwater is bypassed to reduce the amount of sand in the interior of the harbor, care should be taken to avoid disturbing wetland areas.

Any sand bypassed around Ashtabula Harbor should be placed as close to the shore as possible to ensure sand is not lost from the system. Once the sand is lost to the offshore environment, it can no longer be used for beach building which is a means of naturally protecting the shore from erosion.

2. Federal Breakwaters- Impacts: Evaluate (monitor) the federal breakwaters to determine if their impacts on sand distribution can be lessened.

The federal breakwaters, also referred to as the harbor breakwaters, are continually impacting the entire region, not just this reach. The effects of these structures are noticed updrift in Reach AC 06, as exhibited by the large beach between the intersection of Union Avenue and Walnut Boulevard and the western breakwater. Effects are also seen downdrift in Reach AC

Ashtabula Harbor's west breakwater is at the east end of Walnut Beach. The limestone boulder breakwater extends 1.4 miles into Lake Erie and provides fishing access. The Ashtabula Harbor Lighthouse is at the end.

08 where sand is limited and erosion rates are elevated due to the lack of adequate beaches for protection of the shore. By evaluating the levels of sand near the existing structures, the best solutions for limiting the effects of the structures on sand supply can be determined and reviewed for applicability to this site. The most likely solution for the interruption of littoral drift will include the transport of sand downdrift, outside of the harbor structures to increase the sand supply within areas to the east.

3. 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.

While new construction may be limited within this reach, there will always be some activity occurring along the shore. Any movement of sand must consider the downdrift impacts. Since the harbor breakwaters already limit sand downdrift, new construction within this reach should consider placing the moved or excavated sand to the east of the First Energy breakwaters.

4. Dredging: Dredge marinas and harbors on as frequent a basis as possible to add sand into the littoral system. Dredging of navigation channels at harbors and marinas not only enhances navigation for boaters,

it also provides sand for downdrift areas when placed along the shore. When dredged material is disposed of on the upland or in offshore areas, the material is no longer a benefit to the littoral system. In-lake placement is preferred as long as the sand meets the grain size and total organic carbon criteria. Uncontaminated dredge material that is composed of sand and gravel should be placed in the nearshore through sidecasting or placing downdrift. Placing sand in shallow water keeps the sand in the nearshore environment and the littoral system. Sand placed into deeper waters will likely be lost to the littoral system and will not nourish downdrift beaches.

Dredging plans for the Ashtabula River and associated marinas should take into consideration whether there are beneficial uses of uncontaminated sediments.

5. Beach Nourishment: Supplement the current sand supply with beach nourishment, also known as beach fill or pre-fill. Beaches protected by groins and detached breakwaters will benefit from initial nourishment (pre-fill during or directly after construction) and periodic re-nourishment. The sand used in these projects should be acquired from an upland source.

The one area within the Ashtabula Harbor reach that would benefit from beach nourishment is Lakeshore Park. Since the beach is already protected by detached breakwaters, sand added to this location will likely remain in place longer than if the area were not protected from wave action. Periodic renourishing may retain or possibly increase the sand supply at this location.

Management and Monitoring:

6. 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.

Monitoring the physical conditions of the harbor breakwaters, port infrastructure, Lakeshore Park structures, and the First Energy shore protection measures allows for maintenance issues to be detected early with corrective measures taken before the structural problems become unmanageable. Given the size and great necessity for the structures within this reach, it is important that structures are monitored on a regular basis to allow for the planning of future repairs or replacements. In many cases, the larger structures will require more costly repairs or replacements due to the size, required materials and time commitment necessary.

Looking north into Ashtabula Harbor from atop the state Route 531 bridge.

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***

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