TOWN OF BOWERS BICYCLE AND PEDESTRIAN IMPROVEMENTS STUDY

September 2022

The report reflects the views of the authors, who are responsible for the facts and accuracy of the research. The contents do not necessarily reflect the official view of FHWA, FTA, or DelDOT.

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Preface

Dover Kent MPO is pleased to provide this publication, *TOWN OF BOWERS BICYCLE AND PEDESTRIAN IMPROVEMENTS STUDY*. Funded by FHWA, FTA, DelDOT and the Town of Bowers, this resource is intended to describe the existing transportation conditions within Bowers and along Bowers Beach Road. The publication offers various alternatives that would improve bicycle and pedestrian access in the surrounding area, as well as suggesting a number of recreational amenities within the town.

Dover Kent MPO is responsible to ensure existing and future transportation projects are continuing, cooperative, and comprehensive and as such, appreciates continued support from FHWA, FTA, DelDOT, and our local MPO partners in order to ensure transportation policy information is shared. We are pleased to acknowledge the following collaborators on this project:

Town of Bowers Steering Committee

- Ada Puzzo, Mayor
- Judy Martin
- Mark Puzzo
- Ken Riese
- Marge Ventura

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Introduction/Executive Summary

The Town of Bowers partnered with the Dover/Kent County Metropolitan Planning Organization (MPO) to prepare the *Town of Bowers Bicycle and Pedestrian Improvements Study*. The goal is to encourage and promote opportunities for people who walk and bike to safely access destinations in the town. Existing bicycle and pedestrian facilities are inconsistent and feel stressful and unsafe.

This study presents recommendations for bicycle and pedestrian improvements on Bowers Beach Road between Little Heaven Road and N. Bayshore Drive in the Town of Bowers. It also includes recommendations for improved recreational amenities within the Town of Bowers, including a service building, wayfinding/placemaking signage, bike racks, a bike repair station, a wetland boardwalk, and a kayak/fishing pier.

A drop-in workshop was held on May 12, 2022, prior to the presentation of the draft project recommendations to the Town Council. The draft recommendations were also presented during the 2022 Bowers Beach Buccaneer Bash. Feedback was overwhelmingly positive and has been incorporated into the final recommendations presented in this report. These are planning-level recommendations, and it is recommended that additional door-to-door public outreach be conducted before advancing these projects to conceptual design.

The implementation of this plan will require extensive coordination between the Town of Bowers, the Dover/Kent MPO, the Delaware Department of Transportation (DelDOT), and the Delaware Department of Natural Resources and Environmental Control (DNREC).

Background

Bowers' Comprehensive Plan supports efforts to "expand the state bike and pedestrian network to reach into Bowers." The town is also part of the Delaware Bayshore Byway and would like to expand and improve opportunities for active recreation and transportation. Access to key destinations may include a network of on- and off-road walking and biking corridors that connect with neighboring towns. In addition, population trends and potential economic opportunities afforded by DNREC's Delaware Bayshore Initiative indicate it may be necessary to expand the town's physical and/or social infrastructure to attract and accommodate the ecotourism trade.

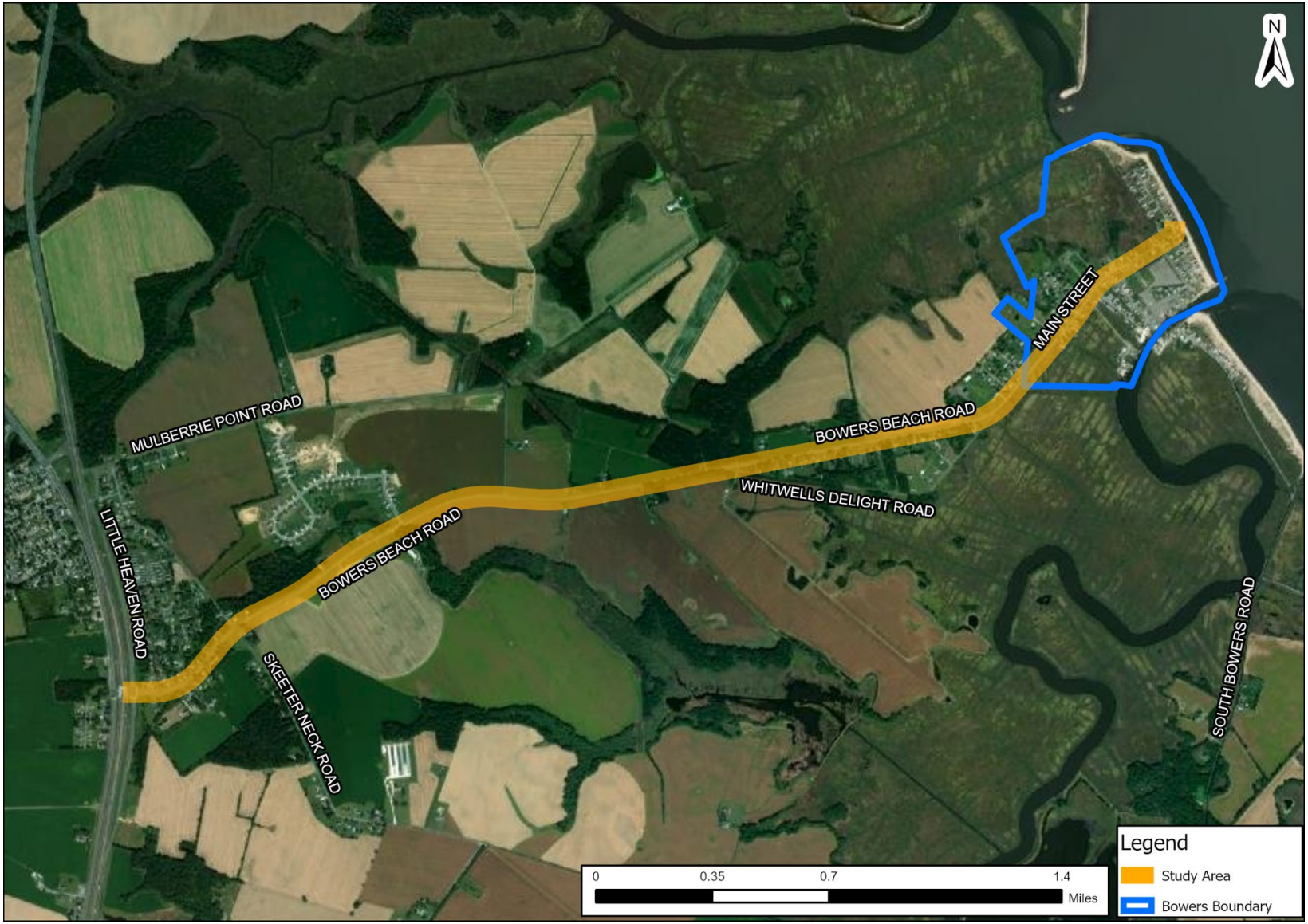

Figure 1. Overview of study area.

Purpose and Need

The purpose of the *Town of Bowers Bicycle and Pedestrian Improvements Study* is to evaluate opportunities for active recreation (walking and bicycling) access to key destinations in the town. The focus is on safety, rights of way, connections to neighboring communities, expanded physical infrastructure, and contributions to economic development. The study area consists of the approximately 3.6-mile length of Bowers Beach Road/Main Street between Little Heaven Road and N. Bayshore Drive. This study is needed to improve safety and connectivity for all road users, including people who walk, bike, and drive. Expanded connectivity to a low-stress transportation network will increase access to local destinations and recreational amenities. This study will:

1. Evaluate and recommend appropriate bicycle facilities along Bowers Beach Road/Main Street between Little Heaven Road and N. Bayshore Drive
2. Evaluate and recommend appropriate bicycle and pedestrian facilities to connect to key destinations in the Town of Bowers
3. Recommend signage and safety improvements
4. Evaluate how active recreation facilities can benefit local economic development
5. Encourage walking and bicycling in the Town of Bowers

Overview of Study Process

This study was guided by a steering committee assembled by the Town of Bowers and led by Mayor Ada Puzzo. A kickoff meeting was held with the steering committee and the MPO to review the project scope and task deliverables, reports, and timelines. The consultant (WRA) provided an overview of the concept of bicycle Level of Traffic Stress (LTS), which is one of the primary means by which the Delaware Department of Transportation (DelDOT) prioritizes projects.

After this kickoff, the MPO and WRA inventoried Bowers Beach Road/Main Street and streets in the Town of Bowers, noting lane widths, shoulder widths (if any), sidewalks (if any) and other key roadway elements. Right-of-way width was estimated based on GIS data. A speed study was conducted to confirm DelDOT's LTS data. Environmental constraints, including wetlands and floodplains, were mapped.

A public meeting was held to introduce the project to the public and gather feedback. Multiple alternatives for bicycle and pedestrian improvements were developed based on the public feedback and existing conditions assessment. The alternatives were evaluated based on a feasibility assessment. Next, a progress meeting was held with the town and MPO to review the alternatives and plan for additional public engagement. Recommended alternatives were presented to the public in May and June 2022. The refined, final recommendations are presented in this report.

Existing Conditions

Town of Bowers Overview

The Town of Bowers is a coastal community in Kent County, Delaware, located about ten miles southeast of Dover. It is situated on the Delaware Bay, on the north side of the mouth of the Murderkill River and just south of the mouth of the St. Jones River. It is in a low-lying area that is home to large expanses of wetlands. According to the 2020 U.S. Decennial Census data, the Town of Bowers has an estimated total population of 287. This is down from the 2010 total population estimate of 335. However, the 2019 *Town of Bowers Comprehensive Plan* states that part-time residents may not be represented in these estimates.

Although the Town of Bowers was first incorporated in 1907, the earliest recorded European settlements in the area began in the late 1600s (indigenous communities resided in and utilized the area long before this time). The town has a long legacy of being a center for maritime activities such as commercial fishing and oyster-harvesting; this legacy is still celebrated today. Historically, Bowers also served as a summer destination, with visitors arriving by steamship and staying at beachside cottages and hotels. While small grocery stores, restaurants, and fishing boats are part of the community's character, large-scale industry has never taken place here. As a result of this history, Bowers has created a working maritime heritage that it hopes to preserve for future generations.[1]

Landmarks within the town boundaries include the Bowers Beach Maritime Museum, the Bowers Fire Company station, the Saxton United Methodist Church, the Bayview Tavern, JP's Wharf, several public parks, and Bowers Beach. Parking for the beach is available on the south side of Main Street between S. Flack Avenue and Clifton Cubbage Drive. Currently, Bowers Beach Road is the only means of getting to and from the town other than by water. On the south side of the Murderkill River is the unincorporated community of South Bowers, but there are no roads or bridges connecting the two communities. The Town of Bowers has very few sidewalks, which means that people on foot are generally required to walk in the streets.

Flooding is a recurring problem in Boweers due to its proximity to the Murderkill and St. Jones Rivers and wetlands, historic drainage ditches, beach erosion, strong winds, and other factors.[2] Combined with the low elevation and projected sea level rise, Bowers is expected to see increasingly severe flooding in the coming years. This is likely to affect homes, businesses, and the ecology of the area. Another concern is the feasibility of evacuation in the event of a disaster: Because Bowers Beach Road is the only road leading into and out of town, water spilling over from the wetlands onto the road could prevent residents from evacuating to higher ground. Studies by DNREC and other state entities have developed recommendations to mitigate flooding in the town, such as increased dredging and the repairing of drainage systems.

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[1] *Town of Bowers Comprehensive Plan* (2019), 20.
[2] DNREC, *Management Plan for the Delaware Bay Beaches* (2010), 151.

Bowers Beach Road Overview

Bowers Beach Road extends from Old Beach Road (just west of SR 1) to the western boundary of the Town of Bowers. It then continues eastward as Main Street within the Town of Bowers, terminating at N. Bayshore Drive. The portion outside of Bowers is about 3 miles long, and the Main Street portion in town is about 0.6 miles long. The present study is limited to the portion of Bowers Beach Road between Little Heaven Road (just east of SR 1) and N. Bayshore Drive. Known hazards on the road include poor drainage and periodic localized flooding/ponding.

Area Improvements

Some of the recent developments and improvements in the area near Bowers are relevant to its planning for bicycle and pedestrian facilities either because they may affect or have already affected traffic volumes within the study area, or because they provide an indication of future flood mitigation activity. This section briefly summarizes these recent improvements. Due to the COVID-19 pandemic's impacts on travel patterns, it is currently difficult to determine how these improvements have so far affected traffic volumes in the study area.

DE Turf Sports Complex

DE Turf Sports Complex is located just south of Frederica, and about an eight-mile drive from Bowers. It is the largest all-synthetic turf sports complex in the Mid-Atlantic, featuring 12 lighted fields and 700 seats at one of the fields. In its first year, the facility had 125,650 visitors, according to *Delaware Business Times*.[3] Bowers Beach is the closest beach town to the sports complex. Recently, some teams and spectators have been incorporating a visit to Bowers during their time at DE Turf, and it is expected that this trend will continue.

For more information on the DE Turf Sports Complex, visit https://www.deturf.com/.

[3] Katie Tabeling, "Investor proposes $30M+ resort near DE Turf," *Delaware Business Times*, August 18, 2020, https://delawarebusinesstimes.com/news/investor-proposes-resort/.

Exit 88 Interchange

Between 2015 and 2019, a grade-separated intersection was built at Bowers Beach Road and SR 1, replacing the former at-grade signalized intersection. The completed project provides an overpass for traffic on SR 1 to travel over the intersection without stopping. Local traffic can use Old Beach Road and the newly constructed Little Heaven Road, the at-grade roads along either side of SR 1, as their north-south routes. This project allows vehicles to turn on to or off Bowers Beach Road more safely and with less traffic delay. The project also added pedestrian crosswalks across Old Beach Road, Little Heaven Road, and Bowers Beach Road at Little Heaven Road, which makes it possible for pedestrians to cross under SR 1 (although there is currently very little sidewalk connectivity beyond these crosswalks), and bike lanes along Bowers Beach Road between Little Heaven Road and Skeeter Neck Road.

For more information on this DelDOT intersection project, visit https://deldot.gov/projects/index.shtml?dc=details&projectNumber=T200412202.

South Bowers Road Improvements

South Bowers Road in South Bowers is scheduled for flood mitigation improvements in 2022. Unlike the projects summarized above, this project should not have an affect on the number of visitors to the Town of Bowers. However, it may provide a model for future flood mitigation on streets in Bowers. The project will raise the road by five inches to reduce its frequency of flooding. The project is an experiment for DelDOT because it will use a type of asphalt that is lighter and more porous than traditional asphalt. The greater porosity allows flood water to flow through the road rather than being dammed on one side of it. This new construction technology is also less expensive because the asphalt can be added to the top of the existing road, rather than requiring a full road reconstruction. If the project is successful, the technology will likely be used in other coastal communities in Delaware. Therefore, it may provide a relatively feasible option for reducing road flooding in the Town of Bowers.

For more information on this project, visit https://www.delawarepublic.org/delaware-headlines/2022-03-30/new-project-will-help-combat-flooding-at-bowers-beach.

Transportation

Bowers Beach Road is classified as a major collector between Little Heaven Road and Skeeter Neck Road and a minor collector between Skeeter Neck Road and S. Bayshore Drive in the Town of Bowers. According to Average Annual Daily Traffic (AADT) data from DelDOT, which is summarized in Table 1, traffic volumes along the roadway have increased in recent years, likely as result of development along Bowers Beach Road (volumes decreased in 2020, likely due to the impact of COVID-19 on driving patterns). Despite the overall upward trend in AADT in recent years, the road's existing two-lane configuration is able to handle current and future increases in motor vehicle volumes.

Table 1. Bowers Beach Road AADT, 2012-2020

Year	AADT Little Heaven Road to West Atlantic Avenue	AADT West Atlantic Avenue to Hubbard Avenue	AADT Hubbard Avenue to North Flack Avenue
2020	1,202	828	247
2019	1,512	1,041	311
2018	1,459	1,005	300
2017	1,452	1,000	299
2016	1,445	946	276
2015	1,482	970	262
2014	1,357	888	248
2013	978	931	240
2012	975	928	229

Desktop analysis and site visits were used to collect information on the existing conditions along Bowers Beach Road and Main Street in the study area. Right-of-way widths were estimated using GIS data, not a survey. The road consists of one drive lane in each direction, except for two intersections where turn lanes are also present. Bowers Beach Road's right-of-way varies from approximately 60 ft at the western end of the study area to 50 ft for a short section of road east of Old Bowers Road/Road 374. Entering town limits, the right-of-way is approximately 60 ft from W. Atlantic Avenue to Cedar Avenue, where it drops to 50 ft. The right-of-way decreases again at Hubbard Avenue to 40 ft, and again at S. Flack Avenue to 30 ft.

The paved width of the road also varies. Portions of the roadway have 12-ft drive lanes with 10-ft paved shoulders, 12-ft drive lanes with no shoulders, 12-ft drive lanes with 7- and 8-ft paved shoulders, and 10-foot drive lanes with 2-ft paved shoulders. Between Little Heaven Road and Skeeter Neck Road, there are unprotected bike lanes on either side of the road. Farther east, Bowers Beach Road's western approach to Sand Dollar Lane includes about 200 ft of sidewalk along the north side of the road. A crosswalk across Sand Dollar Lane connects the sidewalk to a shared use path. The shared use path continues eastward along the north side of Bowers Beach Road for about 570 ft.

There are two sections of sidewalk along Main Street in the Town of Bowers, both of which are on the north side of the street. One portion is directly east of the fire station and is about 165 ft long, and the other portion is about 65 ft farther east and is about 40 ft long. See Figure 2 for an overview of the existing bicycle/pedestrian transportation infrastructure in the study area. There are currently no bicycle facilities in Bowers. However, the combination of low vehicle volumes and speeds and limited available right-of-way in town means that on-road signage would be appropriate to allow in-town streets other than Main Street to be used as bicycle routes. As described later in this study, as Main Street narrows as one moves from west to east, the recommended bicycle facility transitions from a separated shared-use path at the west end of town to on-road, separated bike paths, to non-separated bike paths, to sharrows.

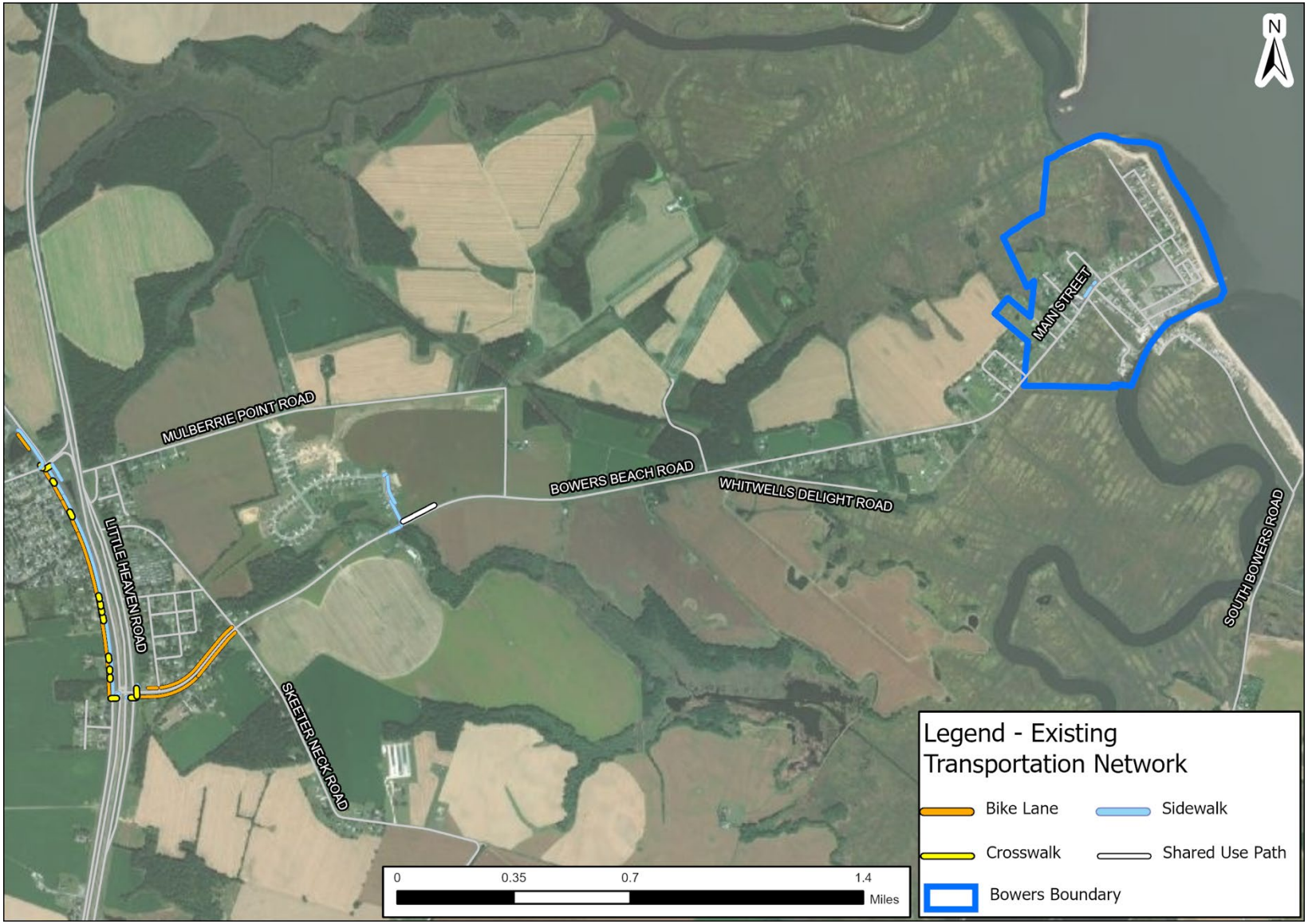


Figure 2. Map of existing transportation network.

Crash data for Bowers Beach Road for the period of March 29, 2019–March 29, 2022, were reviewed. Of the thirteen crashes that occurred during that period, none were fatal, and none involved pedestrian or bike injuries.

On the afternoon of Monday, November 22, 2021, vehicle speed data was collected at the following three intersections in the study area: Bowers Beach Road at Old Bowers Road/Route 374 (50 mph posted speed limit), Bowers Beach Road at the east end of Whitwell Delight Road (35 mph posted speed limit) and Main Street at Church Street (25 mph posted speed limit). Tables 2–4 summarize the data collected during the speed study. Notably, 60% of vehicles observed in the eastbound lane at Whitwell Delight Road were driving more than 5 mph over the posted speed limit of 35 mph, with the fastest vehicle driving at 49 mph. The highest speed observed at any of the intersections was 70 mph, which was observed in the eastbound lane at Old Bowers Road, where the posted speed limit is 50 mph.

Table 2. Speed Study Results: Bowers Beach Road at Old Bowers Road/Route 374

Bowers Beach Road	**Eastbound** (entering town)	**Westbound** (leaving town)
Posted speed limit	50 mph	50 mph
Average Speed	55 mph	55 mph
% more than 5 mph over speed limit	39%	40%
Pace	48-57 mph	50-59 mph
Vehicles observed	28	25
Highest speed observed	70 mph (1 car)	65 mph (1 car)

Table 3. Speed Study Results: Bowers Beach Road at east end of Whitwell Delight Road

Bowers Beach Road	**Eastbound** (entering town)	**Westbound** (leaving town)
Posted speed limit	35 mph	35 mph
Average Speed	42 mph	39 mph
% more than 5 mph over speed limit	60%	48%
Pace	38-47 mph	35-44 mph
Vehicles observed	25	27
Highest speed	49 mph (1 car)	47 mph (1 car)

Table 4. Speed Study Results: Main Street at Church Street

Bowers Beach Road	**Eastbound** (entering town)	**Westbound** (leaving town)
Posted speed limit	25 mph	25 mph
Average Speed	27 mph	25 mph
% more than 5 mph over speed limit	20%	23%
Pace	23-32 mph	18-27 mph
Vehicles observed	30	26
Highest speed	38 mph (1 car)	36 mph (1 car)

Environmental Constraints

Environmental constraints in the study area are illustrated in the map in Figure 3.

Town of Bowers

As shown in Figure 3, the entire Town of Bowers is in the 100-year floodplain. The town is bound by the Delaware Bay to the east and the Murderkill River to the south. The mouth of the St. Jones River lies just north of the town. There are two large areas of wetlands in town: one lies to the north of Bowers Beach Road and west of N. Flack Avenue, and the other lies to the south of Bowers Beach Road and west of Davidson Street. Drainage ditches created in the 20th century act as artificial streams through the marshland; these ditches could allow seawater to flow inland in the event of coastal flooding. Types of habitats in this area include marsh uplands, high marsh, low marsh, and beaches. A variety of wildlife either resides in or migrates through the area.

Due to its low elevation and environmental conditions, the town is very susceptible to flooding from storm surges (especially along the Murderkill River and the adjacent docks) or heavy rainfall (especially on streets such as N. Flack Avenue and at the main beach parking area). Impervious surfaces are some of the most susceptible locations to flooding. In addition, the only overland route between the Town of Bowers and Little Heaven is via Bowers Beach Road; this could present challenges if the town must be evacuated in the event of severe weather, as the road itself is likely to flood.

Bowers Beach Road

As shown in Figure 3, about 5,300 ft (or about one mile) of Bowers Beach Road, from the town limits to Old Bowers Road/Road 374, is in the 100-year floodplain. Additionally, two sections of Bowers Beach Road totaling about 2,000 ft are adjacent to wetlands. A stream crosses under the road about 150 ft west of Sand Dollar Lane. There are drainage ditches along most of the length of the road between Skeeter Neck Road and the east end of Whitwell Delight Road. Finally, several portions of the Bowers Beach Road, totaling about 8,400 ft (1.6 miles), are adjacent to land protected through the Delaware Agricultural Lands (Aglands) Preservation Program.

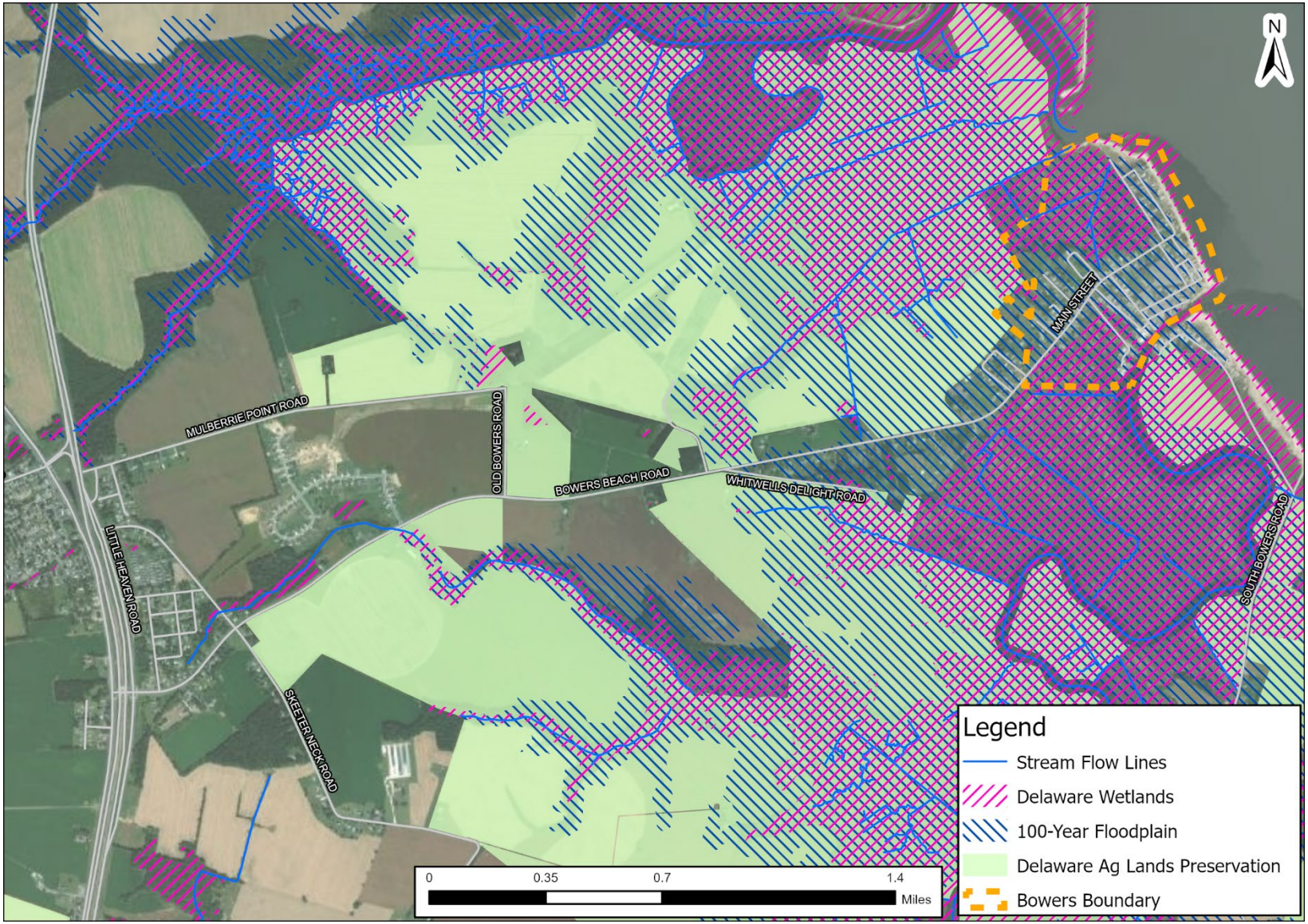


Figure 3. Map of environmental constraints including Delaware wetlands, streams, the 100-year floodplain, and lands conserved through the Delaware Agricultural Lands Preservation Program.

Public Property

Town of Bowers

Figure 4 shows the parcels in the Town of Bowers owned by the state, the Town of Bowers, or Kent County. The state-owned land on the north end of town is owned by DNREC and is part of the Ted Harvey Conservation Area's Buckaloo Tract. Most of the Ted Harvey Conservation Area lies in unincorporated New Castle County. Hunting is allowed in the Buckaloo Tract, but none of the Conservation Area's marked deer stands are located within town limits.[4] DNREC also owns the public parking area located between S. Flack Avenue and Clifton Cubbage Drive and the Bowers Beach Boat Ramp located along the Murderkill River.

Figure 4. Map of publicly owned property in the Town of Bowers.

Bowers Beach Road

As shown in Figure 5, there are three state-owned parcels and one county-owned parcel along Bowers Beach Road. Zoning, ownership, and frontage information for each of the parcels is summarized in Table 5. The total length of publicly owned road frontage is about 1,398 ft, or about nine percent of the three-mile portion of the study area that is outside of the Town of Bowers. Additionally, most of this publicly owned frontage is zoned for Agricultural Conservation.

[4] Ted Harvey Conservation Area, Morris & Buckaloo Tracts Hunting, accessed April 4, 2022, https://documents.dnrec.delaware.gov/fw/Hunting/Documents/wildlife-area-maps/Ted-Harvey-Morris-Buckaloo.pdf

Figure 5. Map of publicly owned property in the study area vicinity.

Table 5. Publicly owned parcels along Bowers Beach Road, listed from west to east

Parcel #	**Owner**	**Zoning**	**Frontage along Bowers Beach Road**
8 00 12200 02 2100 000	DelDOT	RMH (Residential Manufactured Home)	100 ft
8 00 12300 01 0406 000	Kent County	AC (Agricultural Conservation)	60 ft
8 00 12300 01 2101 000	DNREC Division of Fish and Wildlife	AC (Agricultural Conservation) PDR (Purchased Development Rights)	Approx. 784 ft
8 00 12300 01 2025 000	DNREC	AC (Agricultural Conservation)	Approx. 454 ft
Total			Approx. 1,398 ft

Bicycle Level of Traffic Stress

Bicycle Level of Traffic Stress (LTS) is a measure being used by DelDOT to better understand how comfortable streets are for bicycle riding. Transportation planners use LTS to analyze the existing bicycle network and determine the appropriate bike facility for a given context. LTS analysis uses factors such as the speed of traffic, volume of traffic, and the number of lanes to rate each roadway segment on a scale of 1 to 4, where 1 is a low-stress place to ride and 4 is a high-stress place to ride. Streets with higher LTS have higher traffic speeds and volumes, more intense lane configurations, and less/less protected space for cycling They provide a more dangerous and/or higher stress cycling experience. Therefore a smaller proportion of people is comfortable riding a bicycle on them. Figure 6 shows the characteristics that impact bicyclist comfort, and Figure 8 defines each LTS category. The LTS methodology provides a quantitative way to assess the amount of stress a person on a bike experiences when riding on any given roadway.

As outlined in the *Blueprint for A Bicycle Friendly Delaware, A Statewide Policy Document* (2018), DelDOT uses LTS to score bike infrastructure projects based on improved low-stress access to public transportation, employment, schools, community centers, and existing parks and trails . The goal is for new bicycle facilities to be low-stress and accessible to bike riders of all ages and abilities.

For studies like this one, LTS can be used to analyze the bike network and to guide the selection of the appropriate bikeway type to close “gaps” in the low-stress network and create a comfortable riding experience.

Using LTS for Bicycle Network Analysis

When mapped, LTS shows the total connectivity of a network and enables the evaluation of how many destinations can be accessed using low-stress routes (LTS 1 or 2). LTS acknowledges that most adults are comfortable riding a bike on the road in low-stress circumstances but that high-stress roadways create barriers between “islands” of low-stress connectivity. This is illustrated by Figure 7, which shows that most streets in Bowers are already low stress (LTS 1 and 2) since they are low speed and low volume. However, Bowers Beach Road and a portion of Main Street are high stress (LTS 3 and 4) due to higher speeds and volumes. This means that it is possible to bike around the town relatively comfortably, but it is not possible to go on a longer ride beyond the town limits without being exposed to a high degree of traffic stress. This analysis of Bowers Beach Road as a “high-stress” environment was supported by feedback from area residents and visitors.

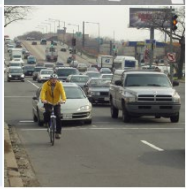
Level of Traffic Stress	Description	Example
1	Safe for children to use; Usually completely separated from auto traffic	
2	Tolerated by most mainstream adult populations of cyclists; Roads with low volume and low speed auto traffic	
3	Tolerated by riders who are enthused and confident; Heavy traffic with separated bike facility	
4	Only tolerated by strong and fearless riders; cyclists must interact with high volumes or speeds of auto traffic.	

Figure 8. Level of Traffic Stress definitions. Source: Blueprint for a Bicycle Friendly Delaware.

"Traffic stress... is a combination of perceived danger and other stressors... associated with riding a bike close to motor traffic."

-Northeastern University Professor Peter Furth, 2012

Number of Lanes	Average Daily Traffic	<25 mph	30 mph	35 mph	40 mph	45 mph	50+ mph
2-way street (no centerline)	0-750	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
	751-2000	LTS 1	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
	2001-3000	LTS 1	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
	3001+	LTS 2	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
1 through lane per direction (1-way street or 2-way street with centerline)	0-750	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
	751-2000	LTS 1	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
	2001-6000	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4
	6001+	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4
2 through lanes per direction	0-6000	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	6001+	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4
3+ through lanes per direction	any ADT	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4

Figure 6. Characteristics that impact bicycle comfort in mixed traffic situations (no bicycle infrastructure). Source: Blueprint for a Bicycle Friendly Delaware.

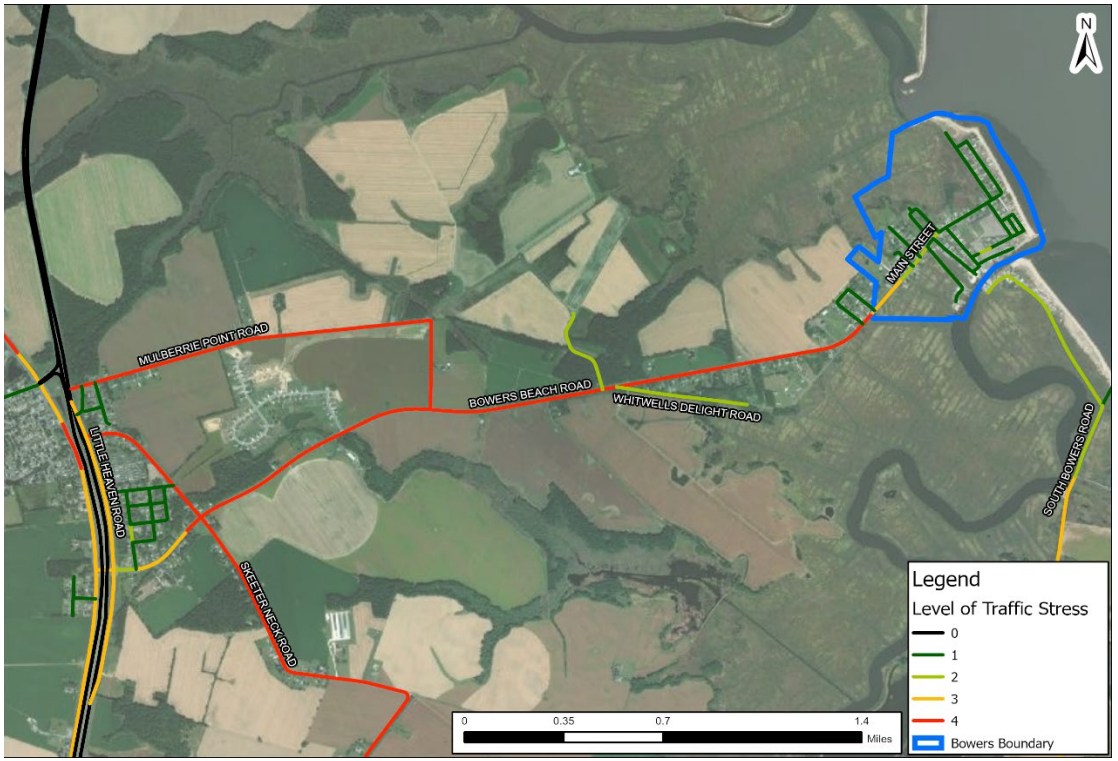


Figure 7. Map showing Level of Traffic Stress in Bowers and vicinity.

Using LTS for Bikeway Facility Selection

Guidance for selecting the appropriate facility for any given corridor type is provided by the Federal Highway Administration (FHWA) *Bikeway Selection Guide* (2019). A robust bicycle network requires thoughtful planning in order to provide good connections and access to destinations. The *Bikeway Selection Guide* identifies three different bicycle user profiles that roughly corelate with the LTS levels: interested but concerned (LTS 1), somewhat confident (LTS 1 or 2 preferred; 3 tolerated), and highly confident (can ride LTS 1-4). The guide highlights the fact that different types of users are comfortable using different types of infrastructure, as shown in Figure 9.

With user groups in mind, the guide offers seven principles of bicycle network design, which are shown in Figure 10. Following these principles will result in a bicycle network that provides a safe and convenient transportation alternative for all users.

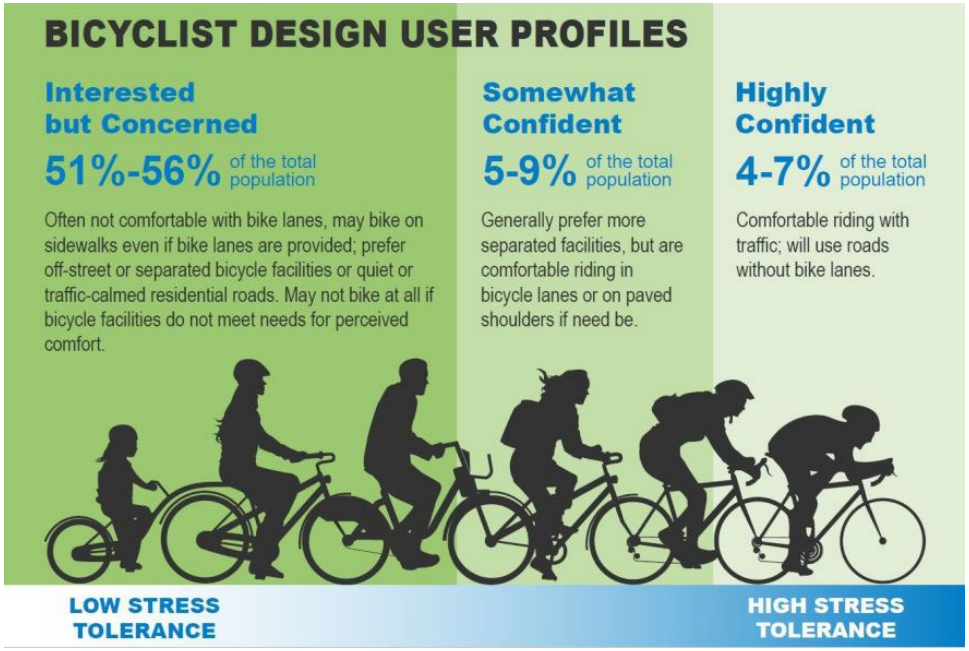


Figure 9. Bicyclist Design User Profiles. Source: FHWA Bikeway Selection Guide.

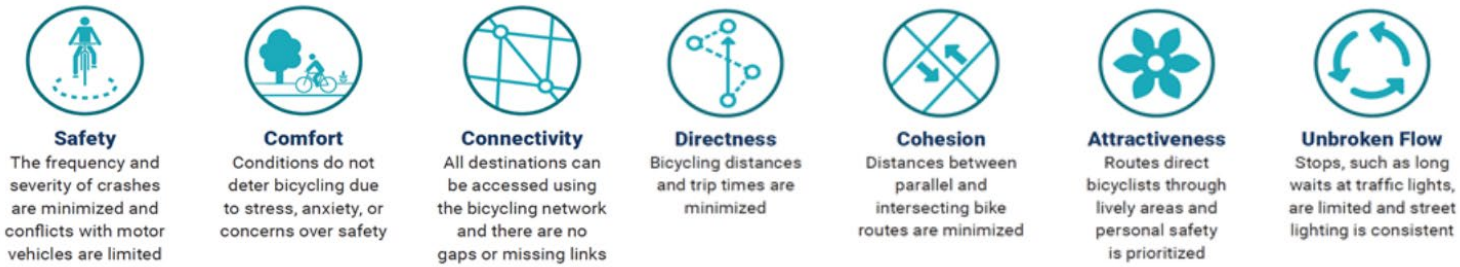


Figure 10. Seven Principles of Bicycle Network Design. Source: FHWA Bikeway Selection Guide.

The principles outlined in this guide combined with an LTS analysis of the local transportation network provides a useful way to determine what types of bicycle and pedestrian facilities are appropriate for each segment of the study area. This is the methodology that will be used to determine the appropriate bicycle and pedestrian facility types for Bowers Beach Road and Main Street.

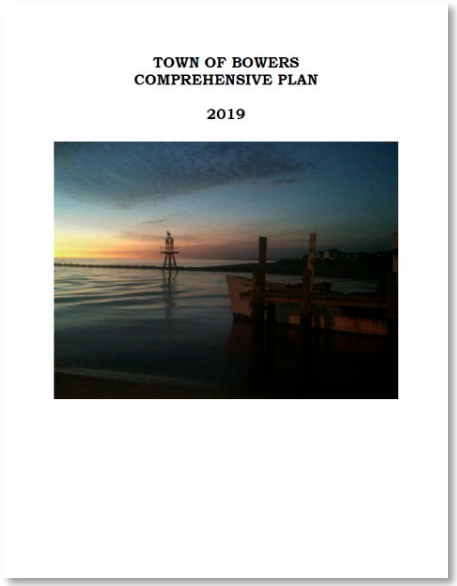
Relevant Plans, Reports, and Policies

There are several relevant plans, reports, and policies in place that were taken into consideration when developing recommendations for Bowers' active transportation network. This section provides a high-level summary of each document, with a focus on recommendations or policies that impact Bowers' transportation network.

Planning and Transportation

Town of Bowers Comprehensive Plan (2019)

This plan provides useful information about flooding and drainage concerns in Bowers, including a history of dredging in the area, a description of soil conditions, and photographs of the more problematic flooding locations. The plan also contains a list of relevant environmental regulations, such as Delaware's Beach Preservation Act and the Clean Water Act. Finally, the Comprehensive Plan emphasizes the unique character and working maritime history of the Town of Bowers and explains the town's plans to preserve these qualities while also creating a more desirable location for businesses and ecotourism.



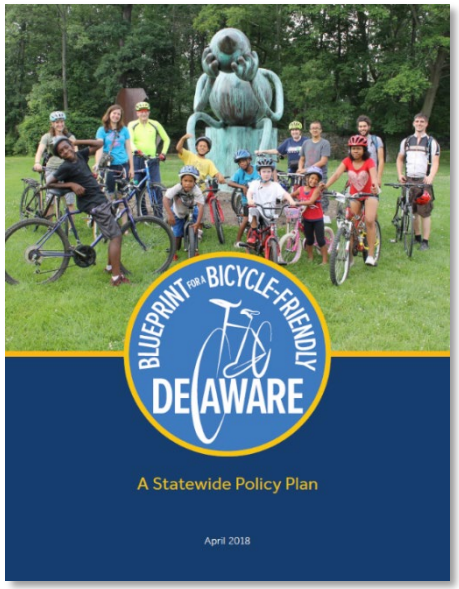
Little Heaven Employment Center Master Plan (2020)

link to map, link to text

This document is a master plan for the development of an employment center in the Little Heaven area, across SR 1 from the study area. The text component of the plan describes the recommended land use types in the employment center, environmental and design considerations, and feasible levels of development given different levels of improvement to the transportation infrastructure. The development of this employment center could increase demand for driving, walking, and biking within the study area, which would impact both the Little Heaven community and the Town of Bowers. Therefore, it will be important for future transportation improvements along Bowers Beach Road and in the Little Heaven area coordinate with one another.

Blueprint for a Bicycle Friendly Delaware: A Statewide Policy Plan (2018)

link



In 2018, DelDOT adopted the *Blueprint for a Bicycle Friendly Delaware: A Statewide Policy Plan*. As noted in the document, the plan "lays out a series of innovative strategies for planning, design, coordination and communication tools" to accomplish the following goals:

- Goal 1: Develop a complete, comfortable, connected bicycle network
- Goal 2: Improve bicyclist safety and confidence
- Goal 3: Foster a culture of bicycling that benefits all Delawareans

Those strategies are:

- Network Development: Creating local plans that identify the desired bicycle network
- Project Prioritization and Funding: identifying and prioritizing projects that expand the low-stress bicycle network
- Project Development and Design Guidance: Designing and constructing facilities that extend the bicycle network and produce a safer, more comfortable experience for bicyclists and other users

The plan also includes a "Tool Kit" to support municipalities with local bicycle network and project planning, of which this study is an example. Historically, bicycle projects in Delaware were often initiated at the state level in collaboration with local partners. This plan changes the funding process by requiring a locally driven participatory planning process to identify projects and funding priorities. Those projects are evaluated and prioritized by the state's Metropolitan Planning Organizations (MPOs), and the top three to five projects are submitted to DelDOT for funding. DelDOT reviews the projects to ensure they are "cost-effective, feasible, and connected to regional and statewide networks." The plan emphasizes using LTS in the evaluation of bicycle projects.

DelDOT Complete Streets Policy: 2010 and Beyond (2010)

link

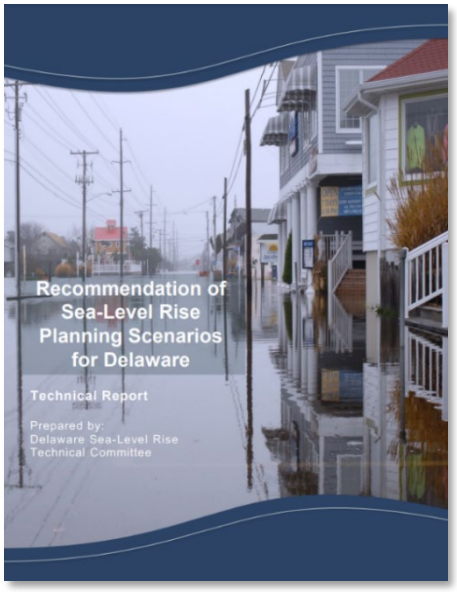
This presentation was created by DelDOT to summarize Delaware's Complete Streets Policy, which became effective in January 2010. The presentation shares some of the challenges of planning and building Complete Streets, such as the competing needs of different transportation modes, growing traffic volumes, and existing land use patterns. It also includes photographs of bicycle and pedestrian facilities from across the State of Delaware. Finally, the presentation includes guidelines for designing Complete Streets in urban, suburban, and rural contexts, which may be useful to Bowers in developing its own bicycle and pedestrian improvements both within the built-up part of town and along rural stretches of road.

Flooding/Sea Level Rise

Recommendation of Sea-Level Rise Planning Scenarios for Delaware: Technical Report (2017)

link

This in-depth technical report was prepared by the Delaware Sea-Level Rise Technical Committee for DNREC. It examines various sea level rise (SLR) planning scenarios for the State of Delaware. It includes information on the collection of SLR data, explorations of trends in the data, and predictions for SLR in Delaware. One of the sections most relevant to the Bowers study is a description of the consequences of SLR, which include erosion and loss of homes, conversion of wetlands to mudflats, effects on infrastructure and tourism, and evacuation costs. These consequences should be considered when carrying out bicycle and pedestrian improvements.



Final Drainage Report: Town of Bowers Beach, Kent County, Delaware (2011)

This report was prepared by KCI Technologies Inc. for DNREC. It discusses three different types of flooding events in the area (Spring Tide flooding, Nor'easter flooding, and Extreme Storm Event flooding), as well as the common causes of flooding (clogging of drainage ditches, erosion of sand dunes, etc.). The report also offers several potential flood mitigation measures, such as building seawalls, re-aligning drainage ditches, removing sediment and vegetation from storm drains, replenishing dunes, and raising roadways. According to this report, flooding along Wyatt Street, Hubbard Avenue, S. Flack Avenue, and on the north side of town tends to have the most serious impacts. Given this, any improvements should either avoid these flood-prone areas or incorporate flood mitigation measures to accompany the changes.

Management Plan for the Delaware Bay Beaches (2010)

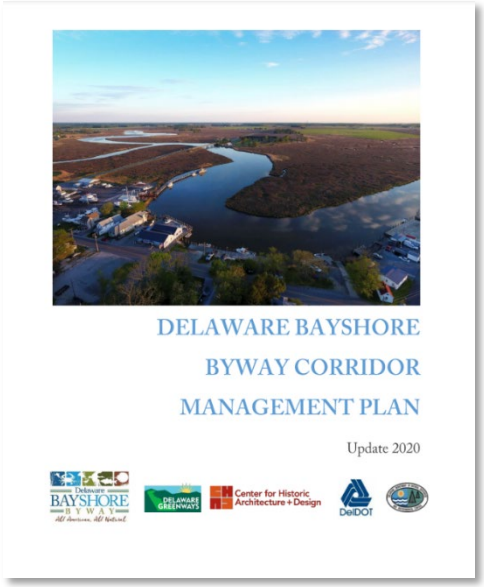
This document is a management plan created by the DNREC Division of Soil and Water Conservation (now the Division of Watershed Stewardship). It gives a full background of the history of dredging at Bowers Beach and a description of existing structures used to prevent flooding (such as the jetty along the Murderkill Inlet). It also offers several management strategies, which involve filling sand from other locations and planting beach grass to hold the dunes together. Finally, the management plan provides blueprints for potential dune filling and cost estimates; however, it should be noted that these proposals were created in 2010 and likely need to be updated to reflect today's needs and implementation costs.

Ecotourism

Delaware Bayshore Byway Corridor Management Plan Update (2020)

link

This document is an update to the 2013 Delaware Bayshore Byway Corridor Management Plan. The Delaware Bayshore Byway is a scenic two-lane route that follows roads and views along the Delaware River and Bay Estuary. It extends from New Castle to the beach resorts outside of Lewes and is approximately 100 miles in length depending upon the selected route. With Bowers' support, the 2020 update to the Corridor Management Plan added the Bowers area (Town of Bowers, Ted Harvey Conservation Area and Bennett's Pier Road) to its list of "Discovery Zones." The plan discusses the Bowers Beach Discovery Zone's existing ecotourism-related attractions, and opportunities, challenges and recommendations related to increasing its ecotourism draw.



The Delaware Bayshore Initiative

According to its webpage (dnrec.alpha.delaware.gov/fish-wildlife/bayshore-initiative/), DNREC's Delaware Bayshore Initiative seeks to "collaboratively build on the region's reputation as a unique and beautiful natural resource, and help improve the shoreline economy by encouraging more Delawareans and visitors to enjoy it through activities such as recreational fishing, hunting, boating, and ecotourism." The Bayshore Initiative identifies three major areas for improvement: land conservation, recreation and education, and community engagement. Bowers Beach is the northernmost of the Delaware Bay beaches. A more walkable and bikeable Bowers will support these focus areas, particularly recreation and education by enhancing "public access to lands and waters for outdoor recreation pursuits" and community engagement by enhancing "visitor experiences and support[ing] tourism."

Public Engagement

Steering Committee

In July 2021, the first meeting between the Dover/Kent MPO, WRA, and the Town of Bowers project steering committee was held. The steering committee was composed of town residents who represent biking and pedestrian interests, parks, museums, history, and events. The steering committee met several times over the course of preparing this study.The committee consisted of the following members:

- Mayor Ada Puzzo
- Judy Martin
- Mark Puzzo
- Ken Riese
- Marge Ventura

Overview of Public Participation

In addition to input from the steering committee, the project team sought public input through a variety of means.

Project team members attended the Bowers Heritage Day on October 10, 2021. Visual aids were available to explain the project concept and timeline. Printed copies of a community survey were available along with a QR code to allow attendees to take the survey online. The survey was also posted on the Town of Bowers' website and distributed by Mayor Puzzo via email.

A drop-in workshop was held on May 12, 2022, prior to the presentation of the draft project recommendations to the Town Council. Members of the public provided feedback during the drop-in workshop. Members of the Council and the Mayor asked questions and provided feedback during the Council meeting.

Project team members attended the Buccaneer Bash on May 28, 2022. Visual aids were available to describe project recommendations. Printed copies of a community survey were available along with a QR code to allow attendees to take the survey online. The survey was also posted on the Town of Bowers' website and distributed by Mayor Puzzo via email.

The study was also was presented at the public meetings of the Dover/Kent MPO's Public Advisory Committee, Technical Advisory Committee, and Council on June 9, June 14, and July 6, 2022, respectively.

A final draft of the study was posted on the Dover/Kent MPO's website for public comment from August 3 through September 2, 2022. No public comments were received. The Dover/Kent MPO Council voted to approve this study at their September 7, 2022 meeting.

Heritage Day & Fall 2021 Community Survey

A public survey was administered at the Town of Bowers' 2021 Heritage Day event, which took place on October 10, 2021. The survey invited respondents to share information about whether they walk and bike around Bowers, and whether they have any suggestions for bicycle and pedestrian improvements in the town.

Twenty-four people completed the survey. Twelve of the respondents (50%) identified as regular visitors to Bowers, ten (about 42%) as residents, one (about 4%) as a business owner, and one (about 4%) as a first-time visitor. Twenty-two respondents said they walk around Bowers; of these, five said they walk around the beach area, three said they walk all over town, and the remaining answers were varied. Nine respondents said they bike around Bowers. Responses about where they biked varied widely. One respondent said it is not safe to ride a bike in town, and another said they ride a bike in town, but not "past the Fire Hall" due to safety concerns. Several respondents expressed concern about the speed of vehicle traffic.

Suggested improvements collected from the survey include a walking/biking path leading from Route 1 to the beach and within town, more sidewalks in town, speed bumps, four-way stops at intersections, improved signage, a boardwalk or trail along the wetlands, and a fishing pier at the inlet on the north-facing beach. One respondent proposed cleaning the storm drain channels and ditches to reduce flooding impacts. Of all the improvements, a designated walking/biking path and sidewalks were the most widely suggested. The complete feedback from Heritage Day can be found in Appendix A of the study.

Online Survey Responses

An online survey was circulated October 15-19, 2021, to gather further information on the public's interest in recreation improvements. A total of five responses were collected. Two of the respondents identified as residents, and two as regular visitors. Four respondents said they walk around town, mostly along or near the beach. Four respondents said they bike in the area.

For proposed improvements, respondents suggested building more sidewalks, separated pathways and trails, and making pathways wider. One respondent suggested adding speed bumps, and another recommended adding "bike stands" (probably referring to bike racks) at beach entrances. The complete feedback from the online survey can be found in Appendix A of the study.

Buccaneer Bash & Spring 2022 Community Survey

Feedback on bicycle and pedestrian improvement ideas was collected at the 2022 Bowers Beach Buccaneer Bash (May 28-29, 2022). A total of 38 surveys were completed. About 58% of the respondents identified as residents, about 32% as regular visitors, and about 8% as first-time visitors.

There were several trends noticeable in the feedback. Many respondents expressed their interest in better access for modes of transportation other than cars. For example, they suggested constructing bike lanes and shared-use paths, which would improve the safety of the area as well as offer more recreation opportunities. Sidewalks were another suggested road improvement. One respondent expressed concern about potential overcrowding if the town became accessible by public transit; another asked whether golf carts, scooters, and similar vehicles would be allowed on walkways. Overall, respondents were interested in more infrastructure for pedestrians and bicyclists, as the existing opportunities are limited.

For recreation improvements, a wetland boardwalk was one of the most widely discussed ideas. Option 4, which is the longest of boardwalk options presented in this study (further described on page 56), received the most interest, though one respondent pointed out that any improvements along the St. Jones River could present safety issues due to the danger presented by rivers. Another respondent asked about restoring a full boardwalk along the Murderkill River. The joint kayak launch/fishing pier was well-received, with respondents saying it would improve access to the water. Several respondents shared their preference for the location of a service building, such as near the main parking area or in a place that is accessible to both beach users and museum visitors. Bike racks and improved signage were also discussed. Finally, while a couple of respondents expressed interest in additional parking near the St. Jones River, other respondents said that this area should be protected as much as possible because it is part of a wildlife preserve. The complete feedback from the Buccaneer Bash can be found in Appendix A of the study.

Figure 11. Tabling at Bowers Beach Buccaneer Bash 2022.

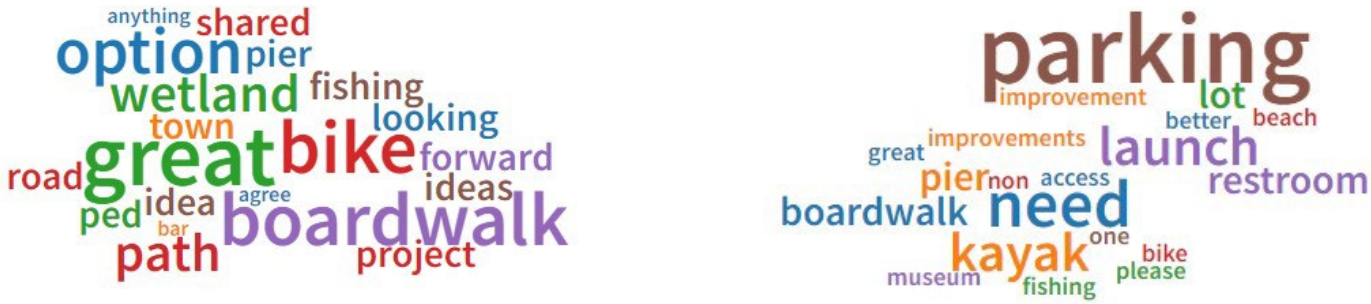


Figure 12. Word clouds of responses about bicycle and pedestrian improvements (l) and recreational improvements (r) from the Buccaneer Bash survey.

Issues and Opportunities

The biggest challenge facing the Town of Bowers is flooding. During multiple visits to Bowers, water in the streets was observed. Flooding will need to be addressed in order to support all transportation types. Storm drain channels and ditches should be cleared, and the recommendations from the 2011 Final Drainage Report should be implemented. Recent DNREC projects to reduce impervious surfaces at the public parking area will help mitigate flooding, but further creative solutions will need to be deployed across Bowers.

Figure 13. Flooding in Bowers.

The largest opportunity is Bowers' potential to grow as a destination for outdoor recreation. Recent improvements in the surrounding area including the DE Turf Complex as well as existing annual events like the Buccaneer Bash and Heritage Festival have introduced new visitors to the charm of the Town of Bowers and the beauty of Bowers Beach. Further investments in active transportation and recreation have the potential to bring tourism dollars to local businesses and institutions.

Bowers Beach Road/Main Street Bicycle/Pedestrian Facility Alternatives

Development of Alternatives

Alternatives for bicycle/pedestrian facilities on Bowers Beach Road and Main Street were developed based on the existing conditions assessment and the community feedback received in the fall of 2021. Factors that were considered in the development of each alternative included land use, existing infrastructure, available right-of-way, environmental constraints and a bicycle LTS analysis. Each alternative was also assessed for multimodal connectivity and functionality in order to evaluate impacts on all modes of travel, including walking, biking, and driving. These analyses help to ensure that the preferred alternatives are feasible and avoid or minimize environmental, infrastructure, property and other impacts.

Due to the extreme environmental and physical constraints throughout the study area including steep drainage ditches, utilities (shown in Figure 15) and wetlands (shown in Figure 16), only one alternative was found to be feasible for some segments of the study area.

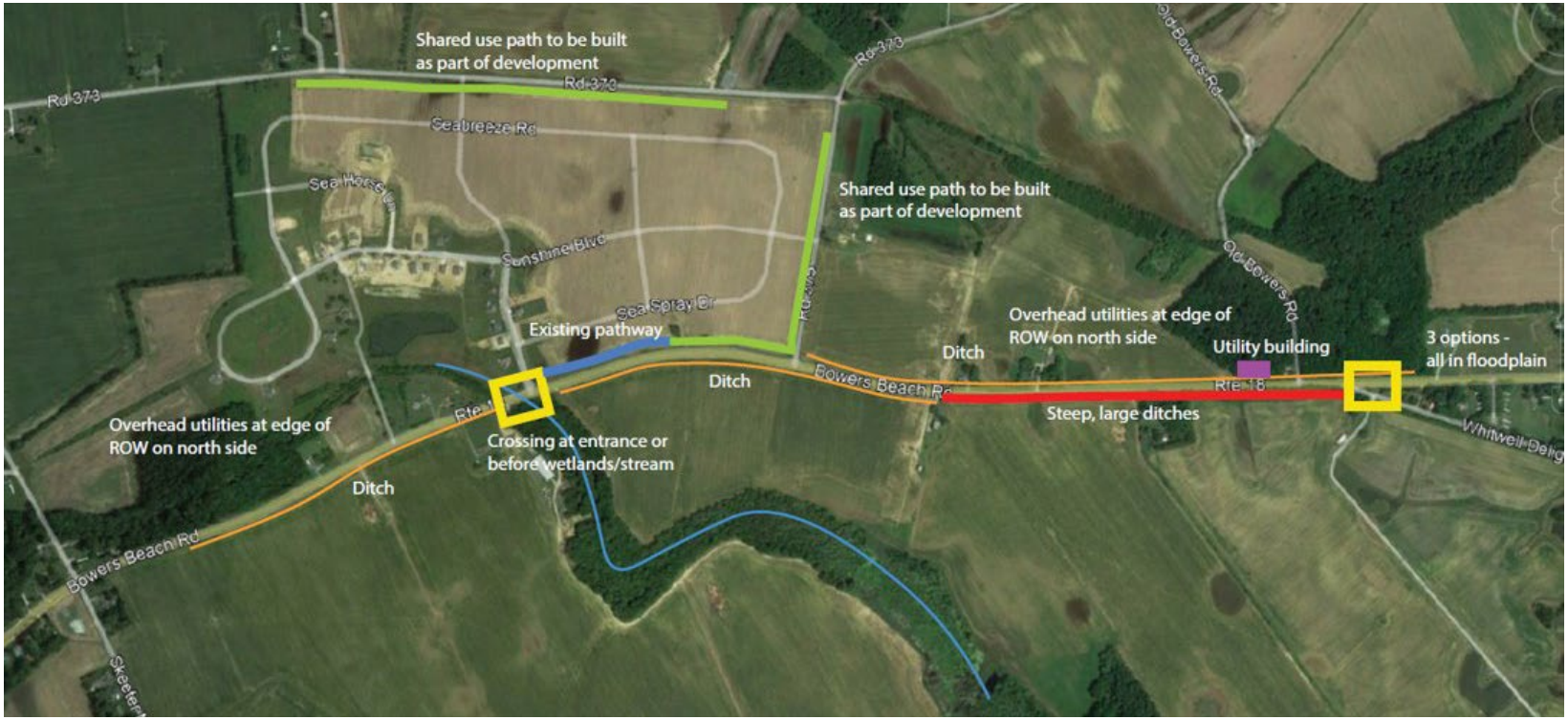


Figure 14. Diagram of constraints between Skeeter Neck Road and Whitwell Delight Road.

Feasibility Assessment

This section presents a feasibility assessment of alternatives for bicycle/pedestrian facilities along Bowers Beach Road and Main Street. Because conditions differ along the 3.6-mile length of road, the road is broken down into six segments, and recommended alternatives are highlighted for each segment. The segments are shown in Figure 16.

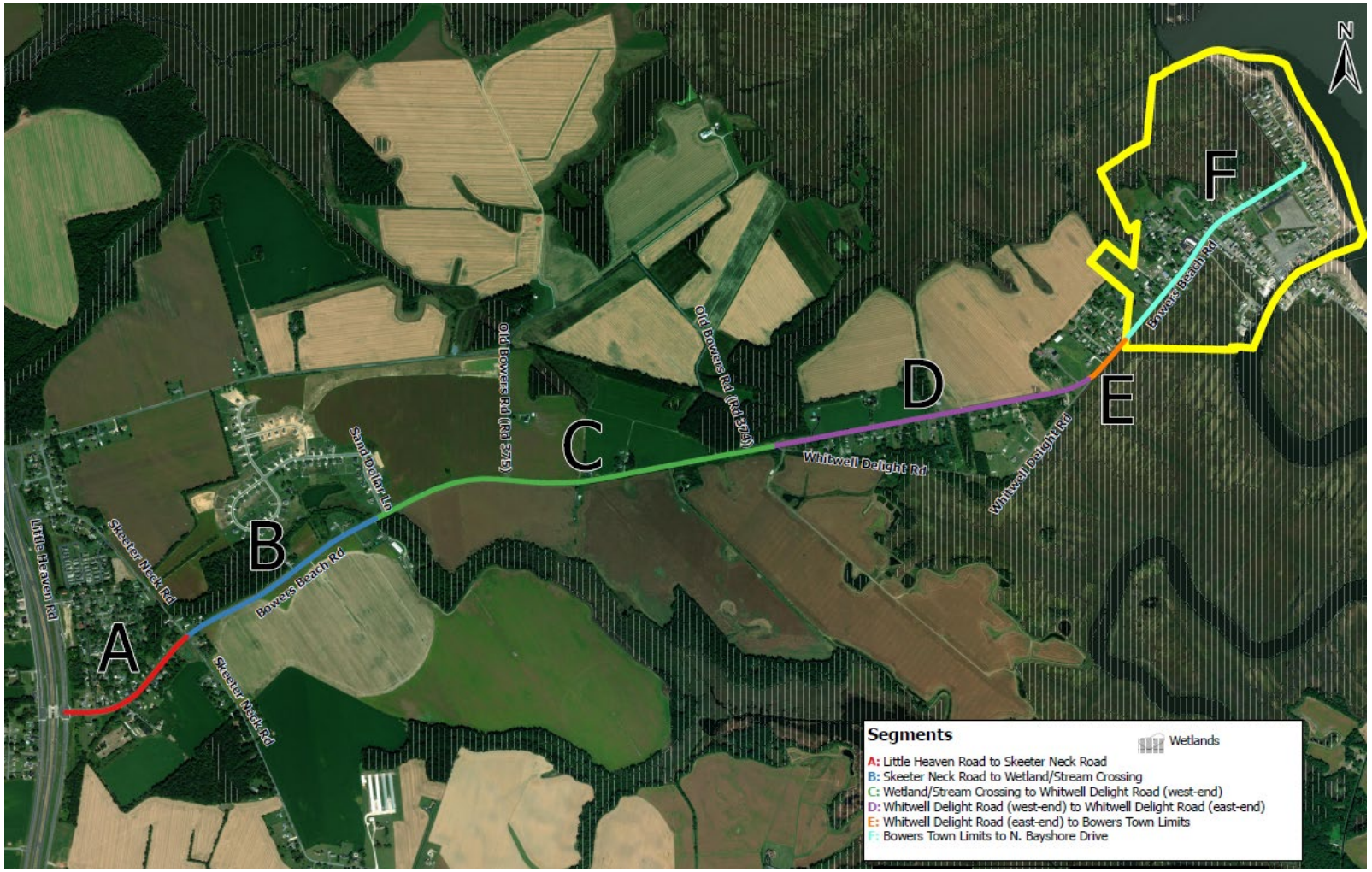


Figure 15. Bowers Beach Road Study Segments.

Segment A: Little Heaven Road to Skeeter Neck Road

As shown in Figure 17 , this road segment generally consists of two 12’ drive lanes, two 8’ paved shoulders, 8’ of unpaved right-of-way on the north side of the road, and 10’ of unpaved right-of-way on the south side.

Three alternatives were developed for this road segment, which are shown in Figure 18–Figure 20. Table 6 summarizes pros and cons for each of the alternatives.

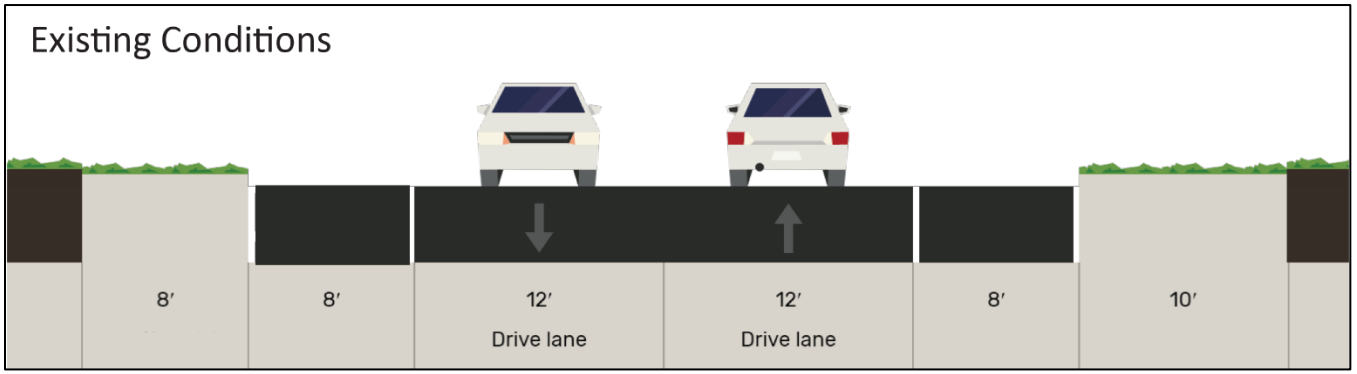


Figure 16. Segment A existing conditions.

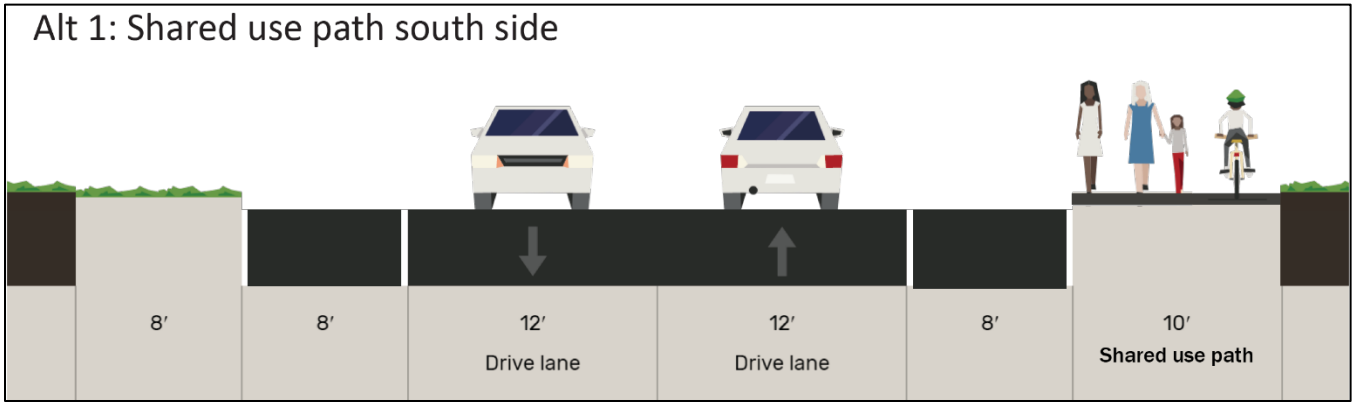


Figure 17. Segment A, Alternative 1, looking east.

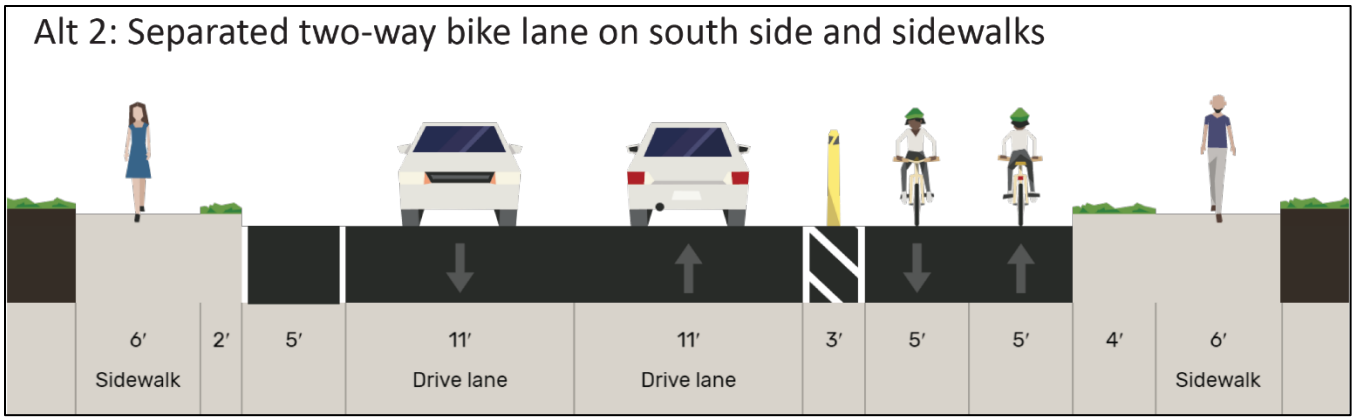


Figure 18. Segment A, Alternative 2, looking east.

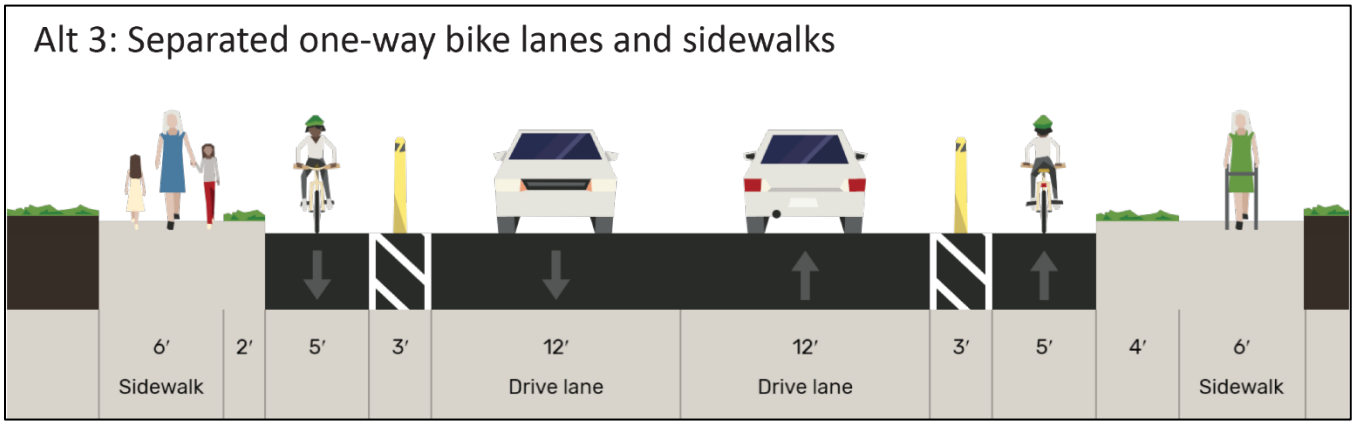
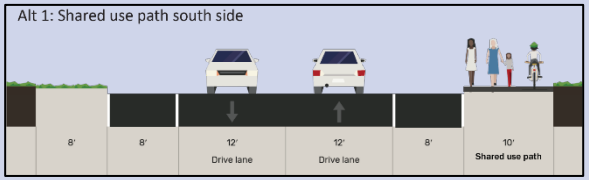
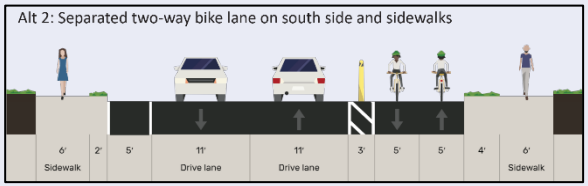
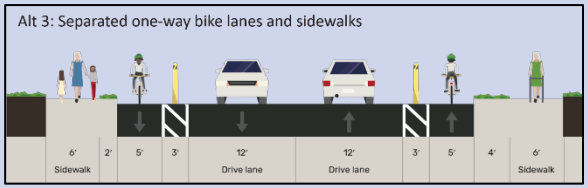


Figure 19. Segment A, Alternative 3, looking east.

Table 6. Pros and cons of alternatives for Segment A

	Pros	Cons
Alternative 1 **Shared Use Path south side** 	• Lowest stress facility (completely separated from vehicular traffic) • Can be used by people walking and biking (cost-effective) • Aligns with proposed path to the east (segment B)	• Requires construction outside of existing paved area (expensive)
Alternative 2 **Separated 2-way bike lane south side + sidewalks both sides** 	• Low-stress facility (separated bike lanes) • Bike lanes align with proposed path to the east • Bike lanes fit within existing paved area	• Bike lanes may impede trash pick-up and mail delivery vehicles because located between houses and drive lane; will require coordination with responsible agencies • Sidewalks require construction outside of existing paved area (expensive)
Alternative 3 **Separated 1-way bike lanes both sides + sidewalks both sides** 	• Low-stress facility (separated bike lanes) • Bike lanes fit within existing paved area • Drive lanes and existing pavement markings do not need to be shifted	• Bike lanes may impede trash pick-up and mail delivery vehicles because located between houses and drive lane; will require coordination with responsible agencies • Sidewalks require construction outside of existing paved area (expensive) • Would require a transition across the road to connect north side bike lane to proposed south side shared use path to the east • Sidewalks require construction outside of existing paved area (expensive)

Segment B: Skeeter Neck Road to Wetland/Stream Crossing

As shown in Figure 21, this road segment generally consists of two 12-ft drive lanes, intermittent paved shoulders that vary in width between 0 and 8 ft, and about 28 ft of unpaved right-of-way on the south side of the road, which contains a drainage ditch whose alignment and width vary. At the eastern end of this segment, an approximately 200-ft length of sidewalk begins. This sidewalk continues into Segment C and ends at Sand Dollar Lane.

Due to the presence of wetlands along a large portion of the north side of this segment, only one alternative was developed for the segment. This alternative is depicted in Figure 22. Table 7 presents pros and cons for this alternative.

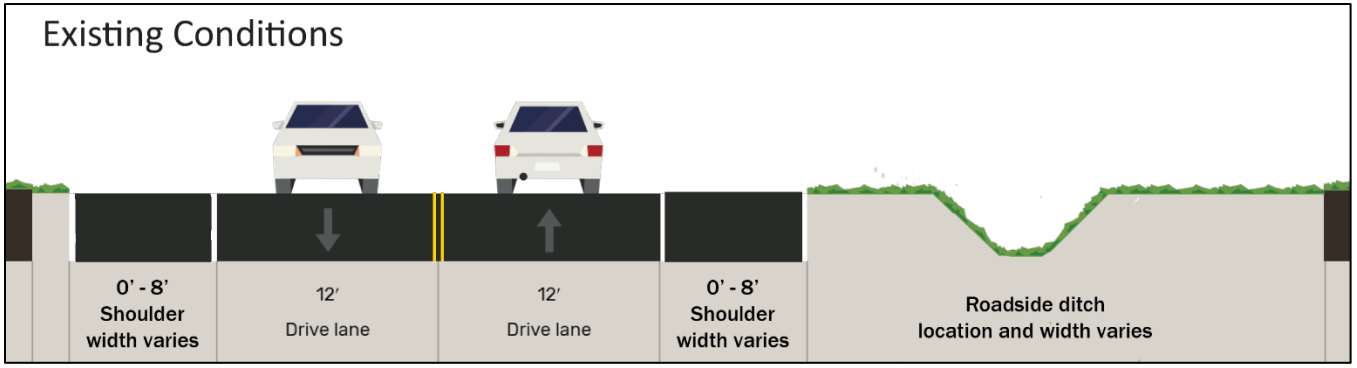


Figure 20. Segment B existing conditions, looking east.

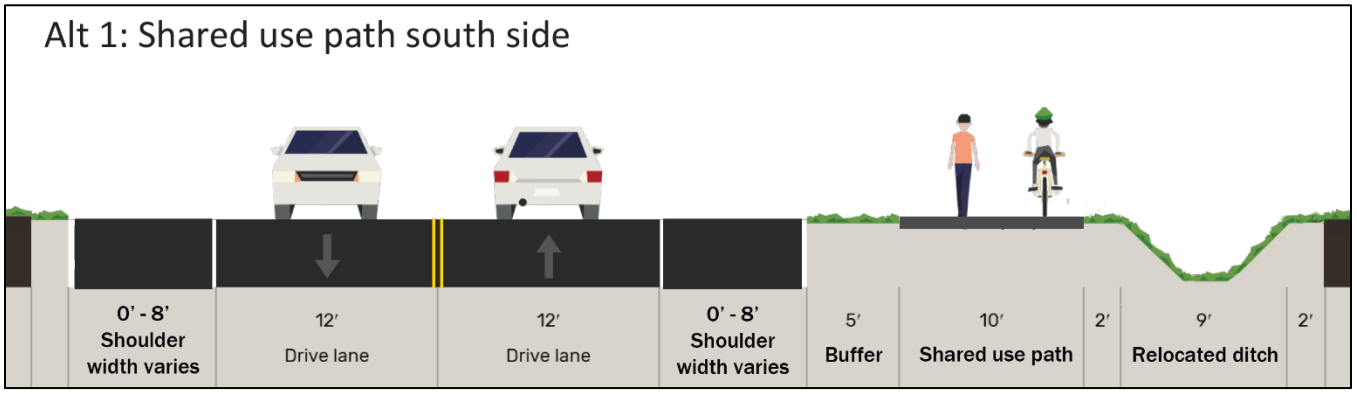
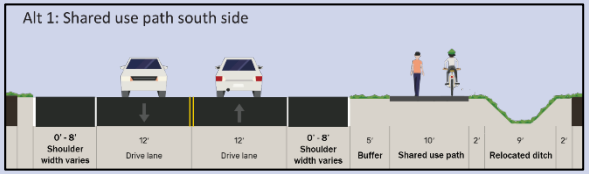


Figure 21. Segment B, Alternative 1, looking east.

Table 7. Pros and cons of alternative for Segment B

	Pros	Cons
Alternative 1 **Shared Use Path south side** 	• Lowest stress facility (completely separated from vehicular traffic) • Can be used by people walking and biking (cost-effective) • Does not encroach on wetlands on north side of road • Fewer driveway crossings on south side of road than north side (simplifies design and makes facility safer)	• Requires construction outside of existing paved area (expensive) • Requires relocation of drainage ditch (expensive, potential environmental impacts)

The transition from Segment B to Segment C occurs near where Bowers Beach Road crosses the stream. This area is shown in Figure 23. The culvert over the stream does not have sufficient space to accommodate the pathway on the south side of the roadway. Therefore, it will be necessary to provide a mid-block crossing just to the west of the culvert to allow the pathway to transition from the south side of the road in Segment B to the north side of the road in Segment C. This mid-block crossing could incorporate a refuge island in the center of the roadway, and tie into the existing sidewalk on the north side of the road. A user-activated Rectangular Rapid Flashing Beacon (RRFB) could be used to alert motorists to bicyclists and pedestrians crossing the roadway. An example of an RRFB and refuge island at a mid-block crossing is provided below in Figure 26.

Figure 22. Location of stream crossing and proposed location for mid-block crossing between Segment B and Segment C.

Segment C: Wetland/Stream Crossing to Whitwell Delight Road (west end)

As shown in Figure 24 , this road segment generally consists of two 12-ft drive lanes, intermittent paved shoulders that vary in width between 0 and 8 ft, and about 28 ft of unpaved right-of-way on the north side of the road. This unpaved area contains utility poles and a drainage ditch. The north side of this road segment also contains the previously mentioned sidewalk that extends east from Sand Dollar Lane for about 200 ft and the developer-built shared use path that extends west from Sand Dollar Lane for about 570 ft. This path is planned to extend eastward to Old Bowers Road/Road 375. Due to the environmental constraints illustrated in Figure 15, only one alternative was developed for Segment C. This alternative is depicted in Figure 25. In order to implement this alternative where the sidewalk has already been installed, the sidewalk would need to be widened to 10 ft to meet shared use path standards. Table 8 presents pros and cons for this alternative.

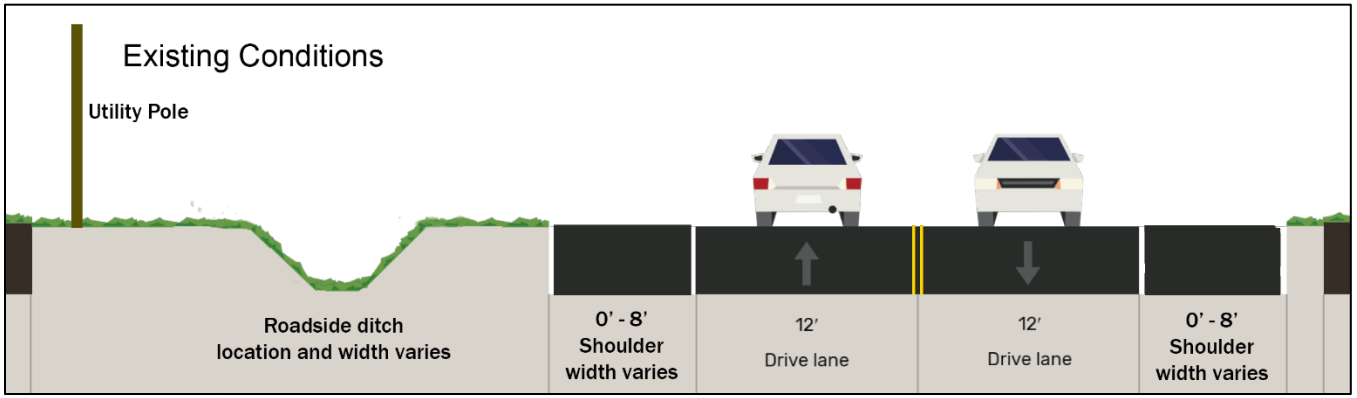


Figure 23. Segment C and D existing conditions, looking east.

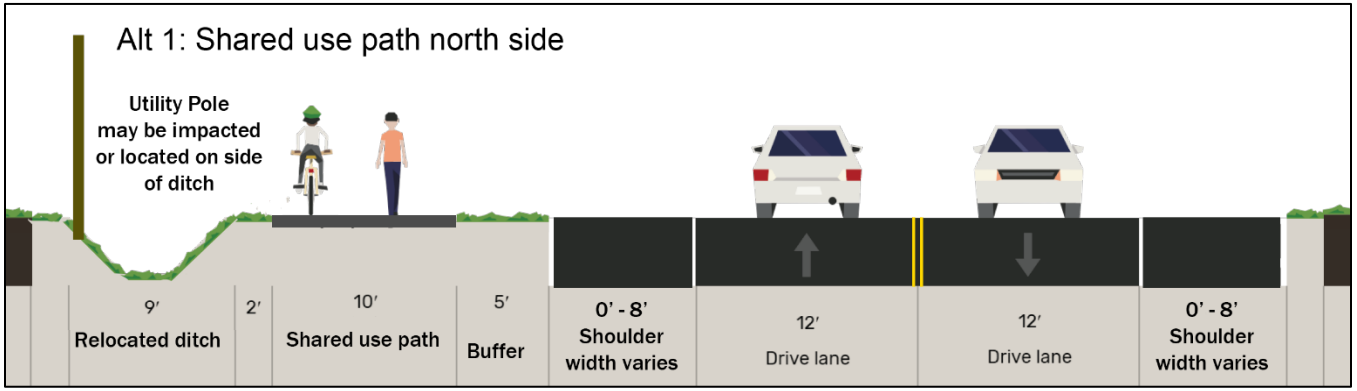


Figure 24. Segment C and D, Alternative 1, looking east.

Table 8. Pros and cons of alternative for Segment C

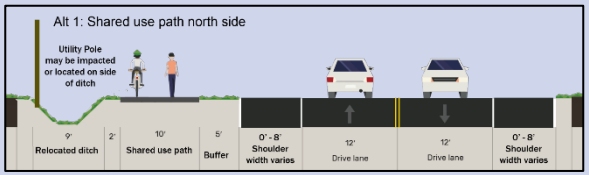
	Pros	Cons
Alternative 1 **Shared Use Path north side** 	• Lowest stress facility (completely separated from vehicular traffic) • Can be used by people walking and biking (cost-effective) • Can tie into existing path installed by private developer	• Requires construction outside of existing paved area (expensive) • Requires relocation of drainage ditch (expensive, potential environmental impacts) • May impact utility poles (if relocation or reinstallation of poles is required, adds cost, time, and complexity to project)

Figure 25. A RRFB with a refuge island on Cleveland Avenue in Newark, Delaware.

Segment D: Whitwell Delight Road (west end) to Whitwell Delight Road (east end)

Segment D of Bowers Beach Road has the same existing section as Segment C (Figure 24).

Two alternatives were developed for Segment D. Alternative 1, which is also Alternative 1 for Segment C, is shown above in Figure 25. In Alternative 2, shown in Figure 28, the bike facility would depart from Bowers Beach Road and use Whitwell Delight Road instead. As shown in Figure 7, this segment of Bowers Beach Road is at LTS 4, while Whitwell Delight Road is at LTS 2. As shown in Figure 27, Whitwell Delight Road consists of one 8-ft drive lane in each direction, which indicates low traffic volume and speed. Therefore, a low-stress facility could be provided on Whitwell Delight Road by adding sharrows to the existing vehicular lanes. Table 9 presents pros and cons for Alternatives 1 and 2.

Figure 26. Whitwell Delight Road existing conditions, looking east.

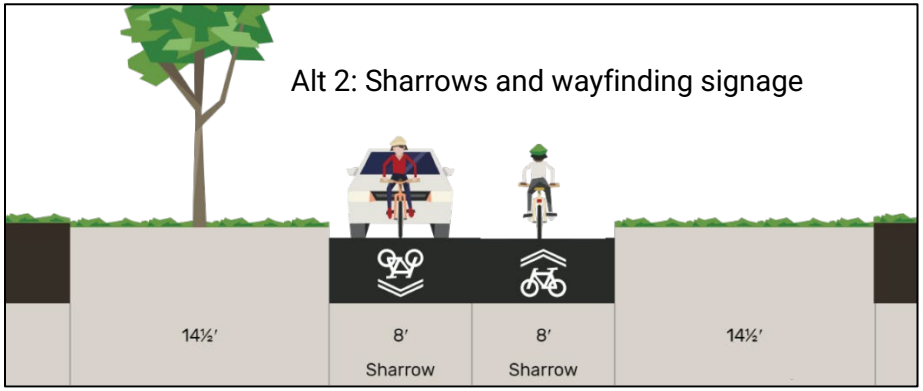
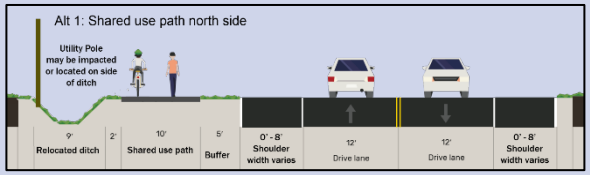
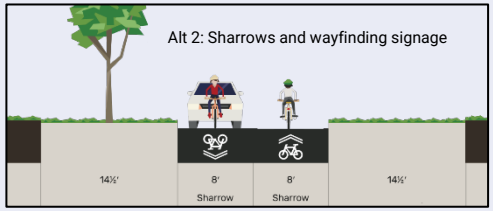


Figure 27. Segment D, Alternative 2, looking east.

Table 9. Pros and cons of alternatives for Segment D

	Pros	Cons
Alternative 1 **Shared Use Path north side** 	• Lowest stress facility (completely separated from vehicular traffic) • Can be used by people walking and biking (cost-effective) • Ties into planned extension of developer-built pathway to the west	• Requires relocation of drainage ditch (expensive, potential environmental impacts) • May impact utility poles (if relocation or reinstallation of poles is required, adds cost and complexity to project)
Alternative 2 **Sharrows and wayfinding signage on Whitwell Delight Road** 	• Extremely low cost • No impacts (only requires paint on existing roadway and wayfinding signs) • Low-stress due to road's low vehicle speeds and volumes	• Not a separated facility— people walking and biking will share the road with people driving • Aggressive dog

Segment E: Whitwell Delight Road (east end) to Bowers town limits

As shown in Figure 29, this road segment generally consists of two 11-ft drive lanes, a 7-ft paved shoulder on the north side, an 8-ft paved shoulder on the south side, and about 5 ft of unpaved right-of-way on the north side of the road, which contains utility poles. There are wetlands to the south of the road.

Three alternatives were developed for this road segment, which are shown in Figure 30–Figure 32. Table 10 presents pros and cons for each of the alternatives. Note that Alternative 3 was eliminated from consideration by the project steering committee due to the numerous challenges it presents.

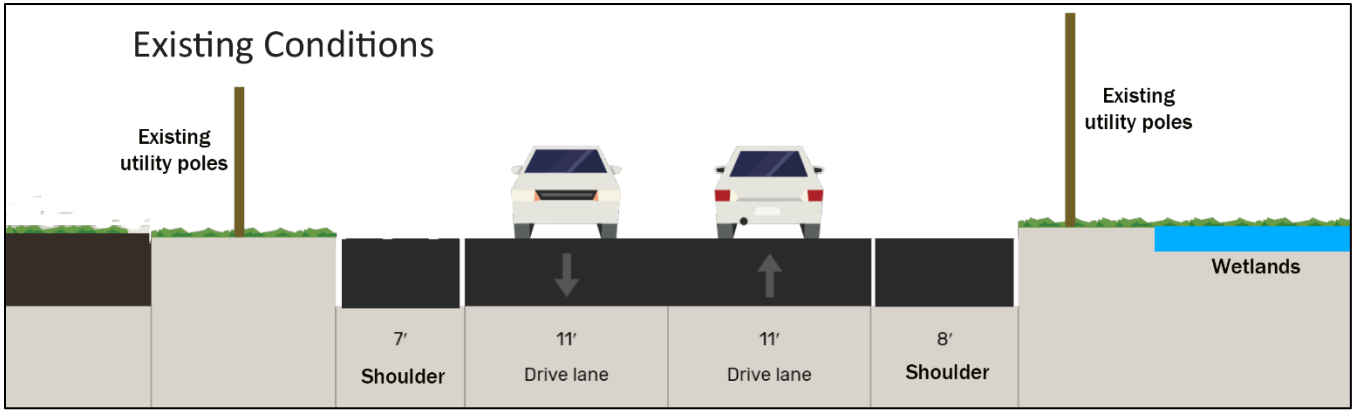


Figure 28. Segment E and most of Segment F existing conditions, looking east.

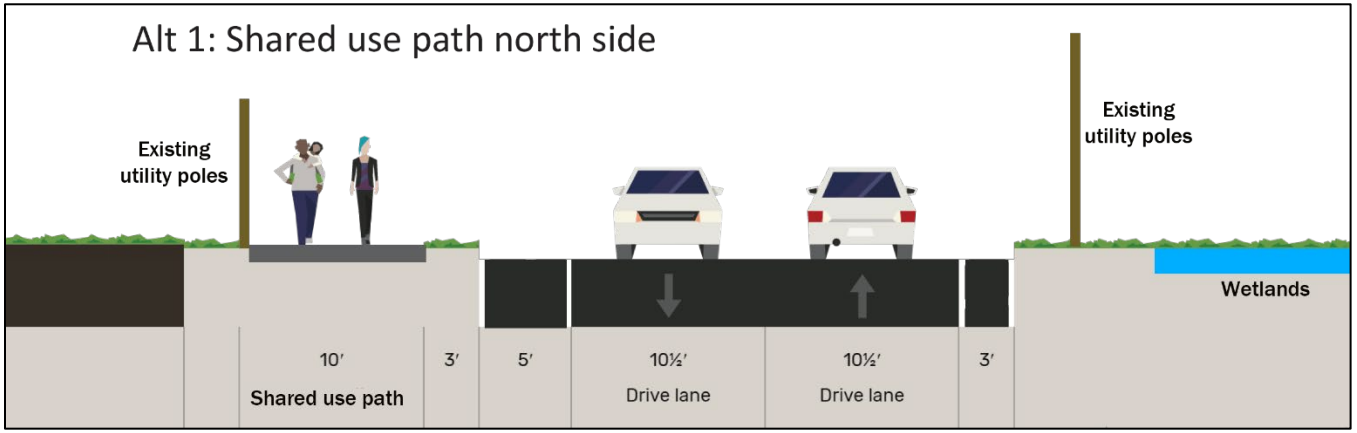


Figure 29. Segment E (and Segment F west of Cedar Avenue), Alternative 1, looking east.

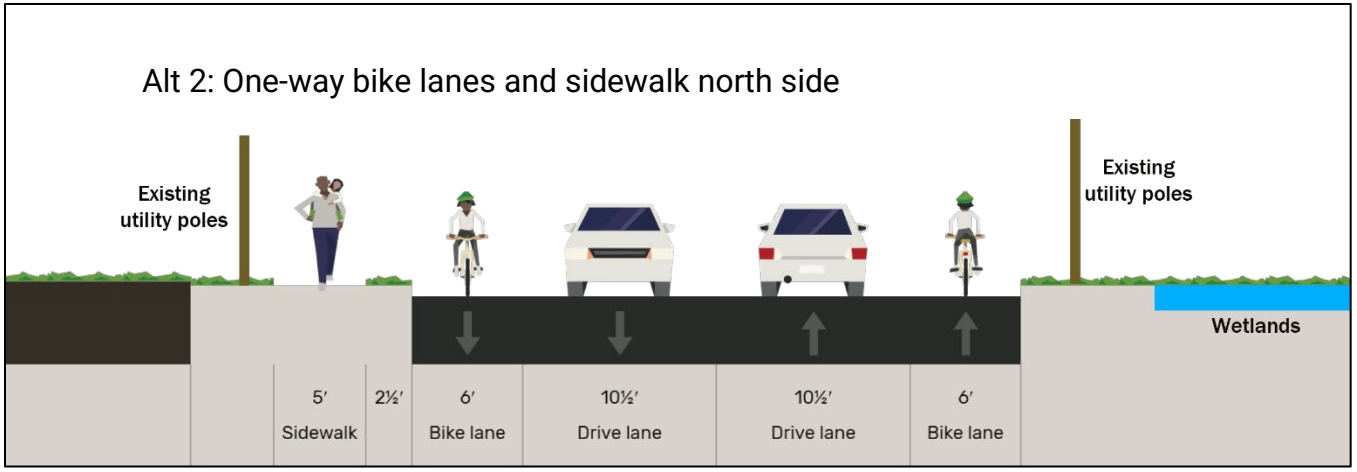


Figure 30. Segment E (and Segment F west of Cedar Avenue), Alternative 2, looking east.

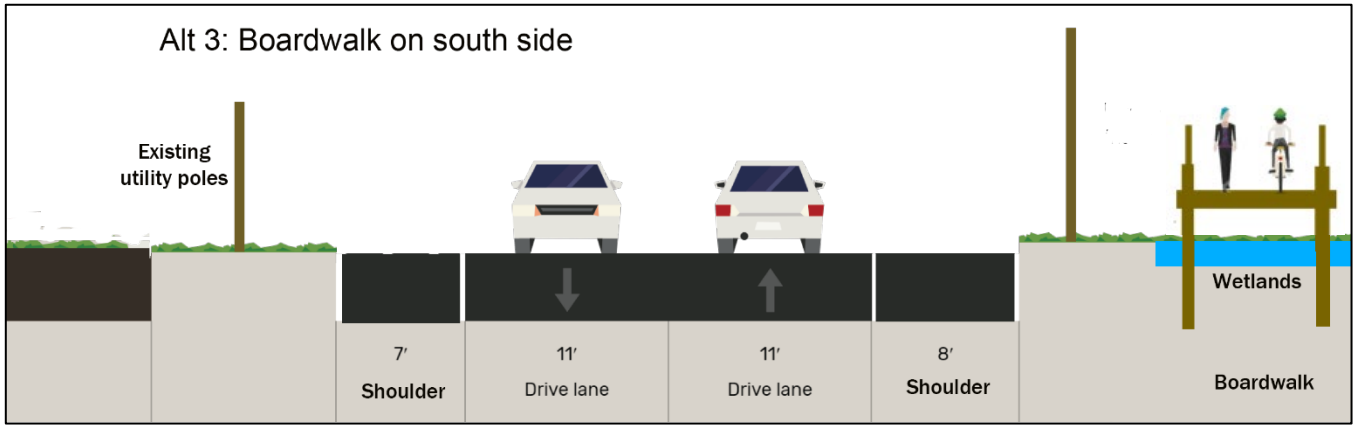
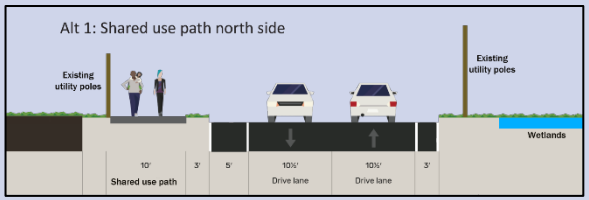
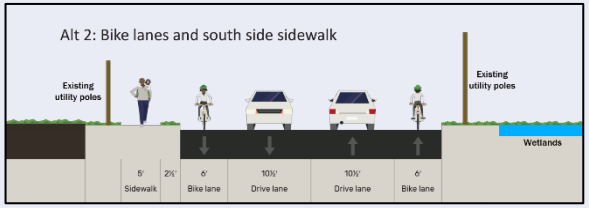
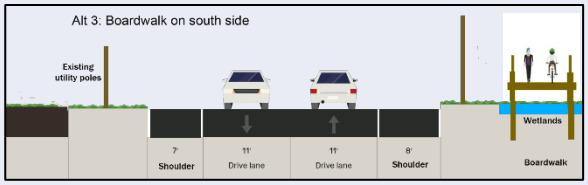


Figure 31. Segment E, Alternative 3, looking east.

Table 10. Pros and cons of alternatives for Segment E

	Pros	Cons
Alternative 1 **Shared Use Path north side** 	• Lowest stress facility (completely separated from vehicular traffic) • Can be used by people walking and biking (cost-effective) • Would tie into Alternative 1 for Segment D to the west	• Requires construction outside of existing paved area and relocation of curb (expensive) • Requires relocation of drainage ditch (expensive, potential environmental impacts) • May impact utility poles (if relocation or reinstallation of poles is required, adds cost and complexity to project)
Alternative 2 **Bike lanes both sides + sidewalk north side** 	• Bike lanes fit within existing paved area	• High vehicular speeds and poor lines of sight would be stressful for some bikers using unprotected bike lanes • Would require a transition across the road to connect south side bike lane to proposed north side shared use path to the west • Better location to transition to on-road bike facilities may be further in town where roadway speeds and volumes are lower • Bike lanes may impede trash pick-up and mail delivery vehicles because located between houses and drive lane; will require coordination with responsible agencies • Sidewalk requires construction outside of existing paved area

		and relocation of curb (expensive)
Alternative 3 **Boardwalk on the south side** 	• Highly visible bikeway that people would be excited to walk and ride	• Would not be directly accessible to people who live along the Bowers Beach Road corridor across from the facility since they would have to travel to the north or south end of the boardwalk to access it • Environmental impacts • High price • For these reasons, the Steering Committee eliminated this alternative from consideration

Segment F: Bowers Town Limits to N. Bayshore Drive

The existing conditions of the western portion of Segment F (between the town limits and Cedar Avenue) are shown in Figure 29. This portion generally consists of two 11-ft drive lanes, a 7-ft paved shoulder on the north side, an 8-ft paved shoulder on the south side, and about 5 ft of unpaved right-of-way on the north side of the road, which contains utility poles. There are wetlands to the south of the road. Between Cedar Avenue and S. Flack Avenue, the paved section of the roadway remains roughly the same as that shown in Figure 29, but the right-of-way narrows and there is residential development on both sides of the roadway. Between Cedar Avenue and Hubbard Avenue, the right-of-way is about 50 ft. There is a non-continuous sidewalk located on the north side of the roadway between the Bowers Fire Company station and Williams Avenue. Between Hubbard Avenue and S. Flack Avenue, the right-of-way further narrows to 40 ft. East of S. Flack Avenue, the right-of-way narrows to 30 ft.

The alternatives for segment F correspond with the available space in the right-of-way. In the 60-ft wide right-of-way section between the town limits and Cedar Avenue, the alternatives are consistent with Segment E Alternatives 1 and 2, shown in Figure 30 and Figure 31 above. The recommended alternatives for the remaining portions of Segment F (east of Cedar Avenue) are shown below, in Figure 33-Figure 35.

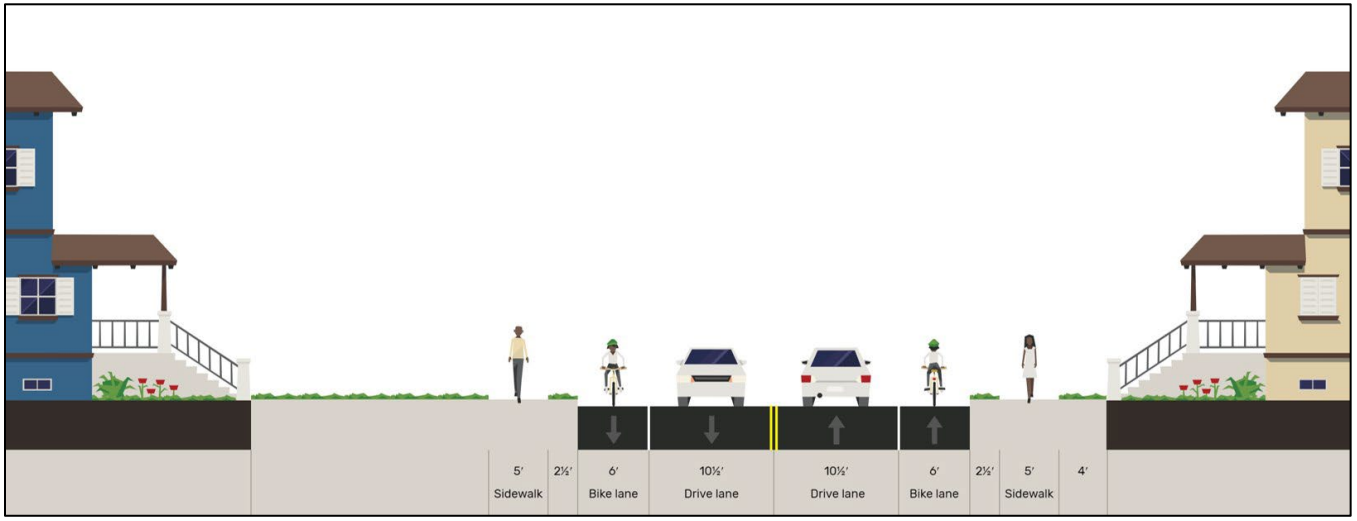


Figure 32. Segment F, Cedar Avenue to Hubbard Avenue (50-ft right-of-way), recommended alternative.

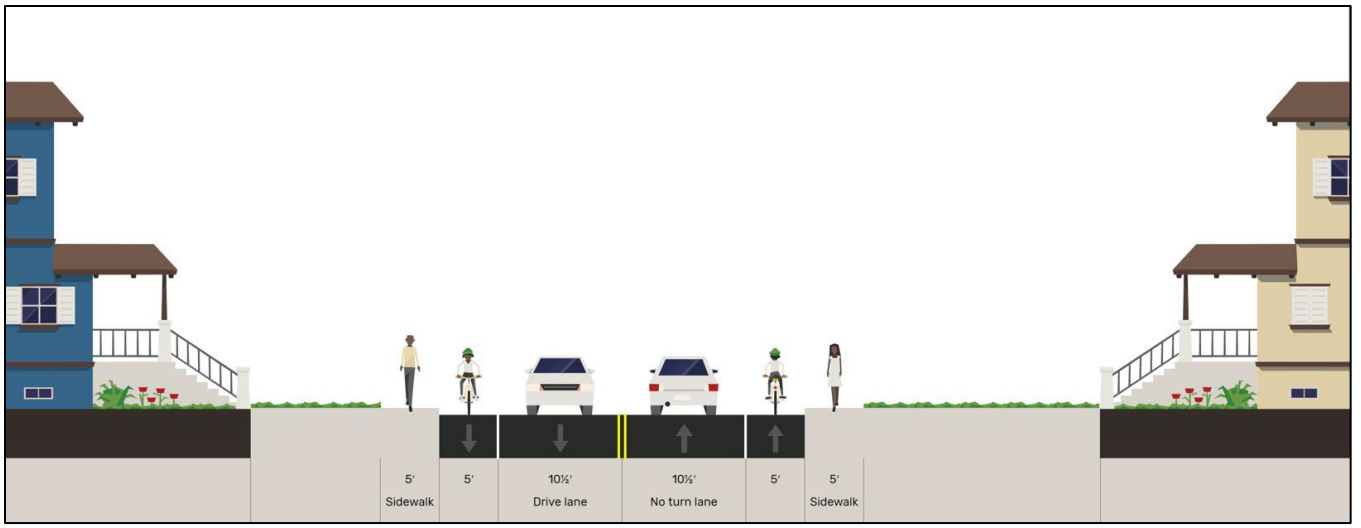


Figure 33. Segment F, Hubbard Avenue to S. Flack Avenue (40-ft right-of-way), recommended alternative.

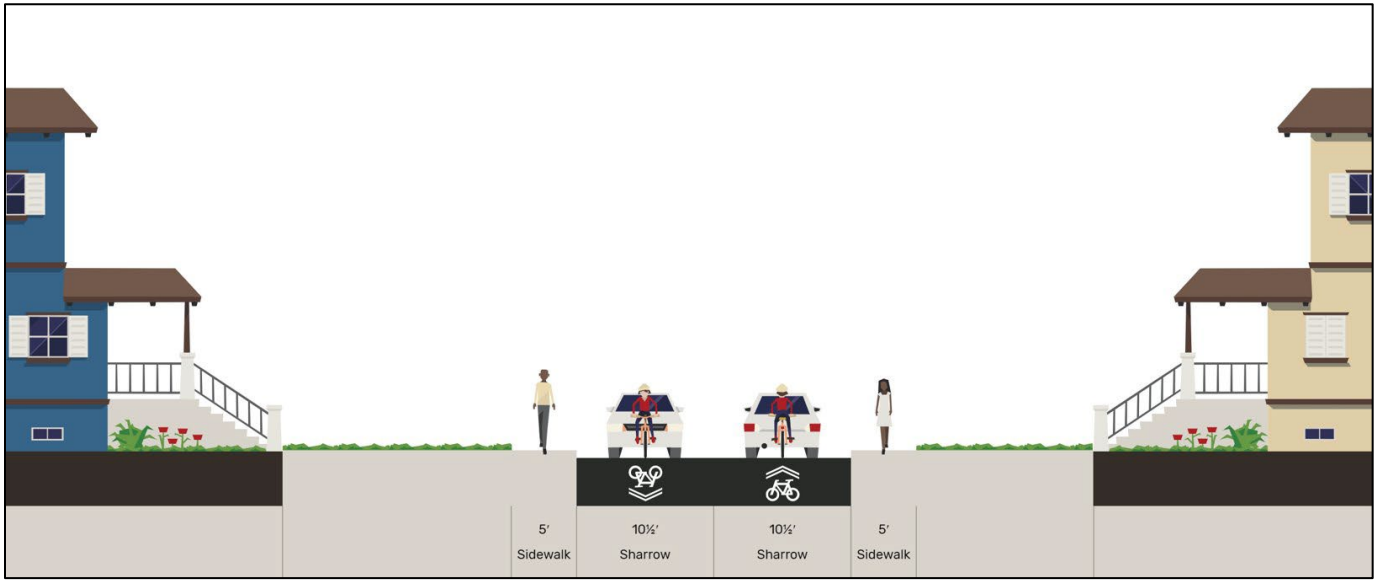


Figure 34. Segment F, S. Flack Avenue to N. Bayshore Drive (30-ft right-of-way), recommended alternative.

Recommendations

Bowers Beach Road and Main Street

Preferred alternatives were selected after discussion with the steering committee and consideration of public feedback collected in May and June 2022. The recommendations are illustrated in Figure 36 and described below.

Segment A: Little Heaven Road to Skeeter Neck Road

Alternative 2, the separated two-way bike lane and sidewalks, was selected as the preferred alternative. It was acknowledged that advancing any low-stress bike improvements along Segment A would require door-to-door outreach, as residents' homes are not set back very far from the roadway. Due to existing bike lanes, this is a lower priority than the shared use path proposed along Segments B-E.

Segment B: Skeeter Neck Road to Wetland/Stream Crossing

Segment B only had one feasible alternative, which is a shared use path on the south side of the roadway. Outreach to the property owners along this segment is recommended before advancing this project to concept design. A mid-block crossing with an RRFB is recommended to connect the south side path along Segment B to the north side path along Segment C.

Segment C: Wetland/Stream Crossing to Whitwell Delight Road (west end)

Segment C only had one feasible alternative, which is a shared use path on the north side of the roadway. Outreach to the property owners along this segment is recommended before advancing this project to concept design.

Segment D: Whitwell Delight Road (west end) to Whitwell Delight Road (east end)

Alternative 1, a shared use path on the north side of the road, was selected as the preferred alternative. However, Alternative 2, sharrows and signage along Whitwell Delight Road, could be an interim improvement.

Segment E: Whitwell Delight Road (east end) to N. Bayshore Drive

It was determined that motor vehicle speeds are too high on this segment of road to transition from the shared use path to on-road bicycle lanes. Therefore, Alternative 1, a shared use path on the north side of the roadway, is recommended.

Segment F: Bowers Town Limits to N. Bayshore Drive

Between the western edge of town and Cedar Avenue, it is recommended to continue the north side shared use pathway recommended for Segment E. Between Cedar Avenue and S. Flack Avenue, it is recommended to transition to sidewalks and on-road bike lanes. This will require another mid-block crossing to allow eastbound cyclists to access the on-road bike lane, and westbound cyclists to enter the shared use path. Because Main Street's right-of-way narrows as one moves eastward, there is not enough room for bike lanes to the east of S. Flack Avenue. Therefore, sharrow markings are recommended for Main Street between S. Flack Avenue and N. Bayshore Drive.

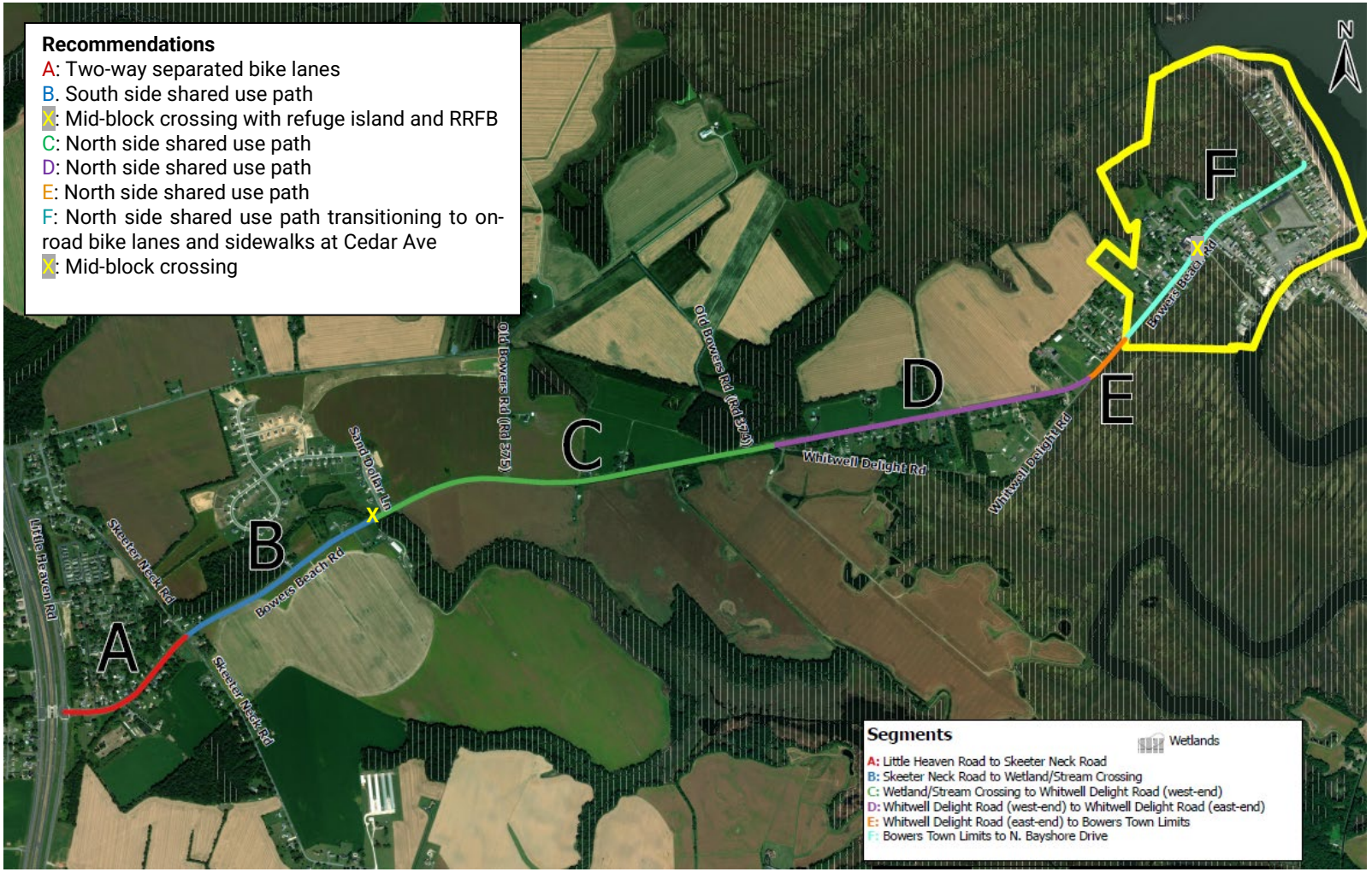


Figure 35. Map of Bowers Beach Road/Main Street Recommendations.

The completion of a low-stress bikeway between Little Heaven and Bowers would attract new "bike tourists" to the town. Although some cyclists may begin their trip locally, consideration should be given to providing a public parking facility in Little Heaven, so out-of-town cyclists could have a convenient place to park their car. This parking facility could be provided in conjunction with the redevelopment of Little Heaven according to the Little Heaven Employment Center Master Plan (highlighted on page 19), which includes the goal of improving public health outcomes through recreation opportunities.

Recreational Access Plan for the Town of Bowers

As described in the public engagement section of this study, much of the feedback heard during Heritage Day and via the fall 2021 Community Survey revolved around recreational amenities that would improve the quality of life for residents of Bowers, while increasing the appeal of Bowers to prospective visitors.

Recommendations fall into the following categories:

- Additional transportation improvements around town
- Service building
- Wayfinding/placemaking signage
- Informational signage
- Bike racks
- Bike repair station
- Wetland boardwalk alternatives
- Kayak launch/fishing pier
- Connector road and parking area

The proposed locations for these improvements are shown on the map in Figure 37. For larger scale maps of proposed recreational amenities within town, please refer to Appendix B of the study.

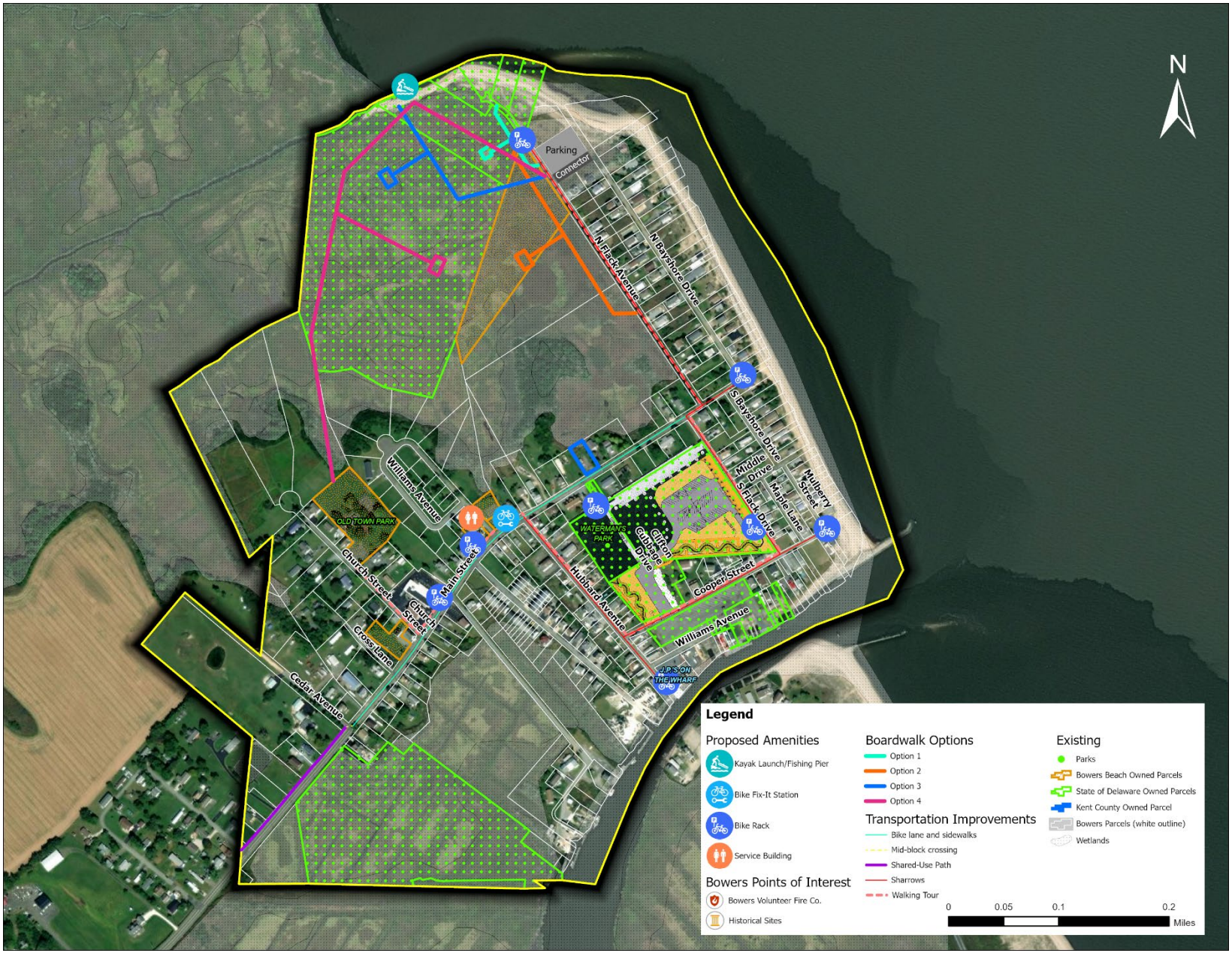


Figure 36. Master plan map showing recreational access amenities.

Additional Transportation Improvements within Town

As shown in the LTS assessment on pages 17-18, the majority of streets in the Town of Bowers are considered low stress because traffic speeds and volumes are low. Because the streets are low stress, it is appropriate to use sharrow markings to designate preferred bike routes. An example of a sharrow is shown in Figure 39. Most of the non-local traffic entering Bowers uses the parking lot or boat ramp, which are primarily accessed from Clifton Cubbage Drive; therefore, parallel streets including Hubbard Avenue, S. Flack Avenue, and N. Flack Avenue have been identified as good locations for bike routes. Cooper Avenue has been identified as another low-stress bike route parallel to Main Street.

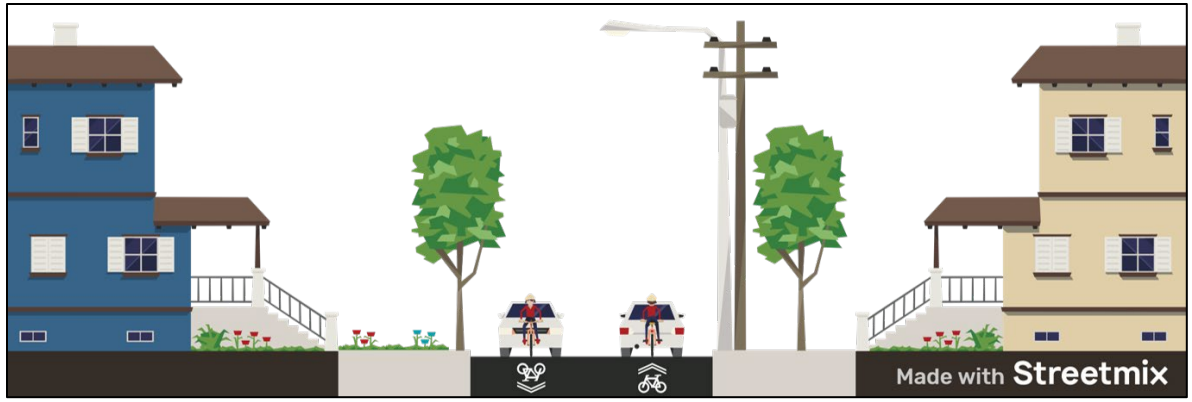


Figure 37. Typical section of sharrow markings for preferred low-stress bike routes including Hubbard Avenue, Cooper Avenue, S. Flack Avenue, and N. Flack Avenue.

Figure 38. Sharrow pavement markings being installed in Newark, DE. Source: Bike Delaware.

Service Building

A service building, which is a small structure with several amenities, is one possible in-town improvement. Ideally, this facility would include restrooms, a water station, a snack bar where ice cream and other food items could be purchased, and seating such as outdoor picnic tables. Operation of the facility could be limited to the summer months when the area receives the most visitors. The services provided at this building would benefit recreation and tourism within the town.

There are two possible locations for this facility. Locating the service building near the Bowers Beach Maritime Museum would benefit users of the museum. Because this location would be on town-owned land, the town could choose to build the facility there without needing to seek permission from a private property owner. The second recommended location is in the main parking area between Clifton Cubbage Drive and S. Flack Avenue. This location would provide visitors to the beach and wetlands with easier access to the facility, as it would be in a more central location. Because the parking lot is state-owned, the state would need to agree to host the facility on their property, or a land transfer would need to be negotiated. However, if this could be achieved, this location would be convenient for more people compared to the museum location.

Figure 39. Example of service building with restrooms and concession stand. Source: Emma's Eats.

Wayfinding/placemaking signage

One method of guiding people through town is wayfinding/placemaking signage. Wayfinding signs direct people to major points of interest and designated routes. In Bowers, these signs could provide wayfinding for the historic walking tour, beach access, the small boat launch, and bicycle/pedestrian facilities and services. Wayfinding signs would help visitors find their way and ultimately have a more enjoyable experience.

Figure 40. Examples of wayfinding signs.

Informational signage

Informational signage is one method of providing learning opportunities. Bowers' wetlands and beaches are home to ospreys, red knots, horseshoe crabs, and other iconic wildlife. Visitors could read informational signs to learn about the different plant and animal species, as well as phenomena such as erosion and sea level rise. The area also has a rich human history that includes recreation and tourism, fishing and oyster harvesting, and shipbuilding. Signs could be placed at the sites already included in the historical walking tour, such as the former location of the Johnson Hotel and the tall pole on Cooper Avenue. The inclusion of historical photos would give visitors an idea of what the area previously looked like and how it has changed over time.

Another important part of the town's history is its indigenous legacy. Historically the coastline and forests surrounding present-day Bowers were home to tribes such as the Lenape, who depended on the region's trees, crops, meat, fish, and other natural resources. These people are a part of the region's story to this day, and the Lenape Indian Tribe of Delaware and the Nanticoke Indian Association are both recognized by the State of Delaware. Because of this, their legacy should be included in any learning opportunities that are offered. Information provided by the Bowers Beach Maritime Museum, the Delaware Public Archives, and Delaware's indigenous communities may be used to create accurate educational signage on this topic. The signs could also direct visitors to the museum, where they could learn more about the area's indigenous communities.

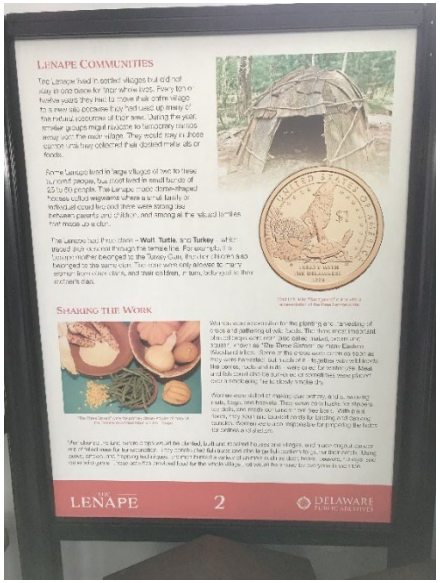


Figure 41. Informational signs at Bombay Hook National Wildlife Refuge (l). Source: Bombay Hook National Wildlife Refuge is a Delaware Natural Wonder (onlyinyourstate.com).

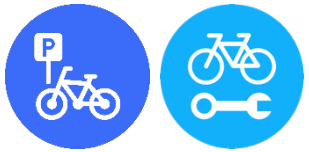
Figure 42. Information sign about history of Lenape communities in Delaware (r). Source: Bowers Beach Maritime Museum.

Bike racks

Providing bike racks at key destinations in town would increase accessibility for bicyclists. These could be standard bike racks or decorative bike racks that can also serve as public art (such as the rack shown in Figure 44), which could be designed by local artists. Possible bike rack locations include the Bowers Fire Company station, the Bowers Beach Maritime Museum, the parking lot between Clifton Cubbage Drive and S. Flack Avenue, the southern end of Hubbard Avenue, the eastern ends of Cooper Avenue and Main Street (near the beach access points), and the northern end of N. Flack Avenue. Bike racks could be placed or moved according to the town's current needs and interests.

Figure 43. Example of a decorative bike rack (l). Source: Streetscapes

Figure 44. Example of bicycle repair station, Gordons Pond Trail (r). Source: Delaware Greenways.



Bike repair station

In addition to bike racks, a bike "fix-it" station, or bike repair station, would make the area more bicycle-friendly. Shown in Figure 45, bike repair stations typically include a bike stand, an air pump, and additional tools such as wrenches and screwdrivers. The area around Bowers Beach Maritime Museum and the bocce courts offers a possible location for the repair station, though the choice of location would depend on where the community felt it would receive the most use from bicyclists.

Wetland boardwalk alternatives

To increase recreational and educational opportunities in the marsh, a wetland boardwalk could be constructed. It could consist of a main path, possibly looping from one point to another, and an overlook extension for viewing the surrounding area. A boardwalk such as this would give access to environments such as marsh uplands, high marsh, low marsh, drainage ditches, tidal flats, and beach, each with its own variety of plants and animals. Other features such as osprey nesting platforms and informational signage could additionally be included. A local example of a wetland boardwalk that improves recreational access can be found at Slaughter Beach.

Four recommended options are described below. Concepts for alignments are shown in Figure 37. The alignments were selected so as to minimize impacts on private property. Therefore, most or all of each alignment is proposed on land owned by either the Town of Bowers or the State of Delaware. Note that the following options serve as examples of what could be done. Should a boardwalk be constructed, the actual route and length will depend on a number of factors, including material costs, land use, public interest, and the feasibility of building in these sections of the marsh (due to the presence of drainage ditches and other obstacles).

Figure 45. Example of a wetland boardwalk, Slaughter Beach.
Source: Delaware Online.

- Option 1: The main path would be 420 ft and the overlook extension would be 120 ft; the total length would be 540 ft. It would be built entirely on public land. This is the shortest and least expensive of the 4 options and it would offer the fewest recreational opportunities.
- Option 2: This option is an extension of Option 1. The main path would be 1,100 ft and the overlook extension would be 185 ft; the total length would be 1,285 ft. A portion of the pathway would be required to be built on private property at the southern end of N. Flack Avenue.
- Option 3: This option would extend through the marsh as far as the north-facing beach adjacent to the St. Jones River. The main path would be 900 ft and the overlook extension would be 220 ft; the total length would be 1,120 ft. The advantage of this option is that it offers substantial recreational opportunities and gives a new means of accessing the beach. The main drawback is that, unlike Option 4, it is not a full loop. Users would have to return the way they came, unless they exited the beach via N. Flack Avenue. This option would be completely on public land.
- Option 4: This option is a loop that extends to the beach and down to North Bowers Beach Community Park (labeled as Old Town Park in Figure 37). It is considerably longer than the other options. The main path would be 2,700 ft and the overlook extension be 500 ft; the total length would be 3,200 ft. It would provide access to all of the nearby environments, and it would offer the most recreational opportunities. It would also reduce foot traffic on N. Flack Avenue as visitors could return along Main Street. However, it would be the most expensive to construct, and a small part of the boardwalk would need to cross over privately owned land. According to the survey information collected from the 2022 Buccaneer Bash, Option 4 was the most popular among respondents.

In order for the boardwalk to be fully accessible according to ADA requirements, the walking surface must have a minimum clear width of 36” to allow for wheelchair access, and turning and passing spaces must have a minimum clear width of 60”. Access ramps must have a slope of no more than 1:12 (or 8.33%). To prevent wheelchair wheels and crutch tips from becoming stuck, the boardwalk would need to be built with no more than 1/2” of space between the boards. Another key feature is adequate edge protection, which will ensure users do not fall from the boardwalk. One more potential feature is a beach access route, which could be utilized if the boardwalk were extended as far as the north-facing beach (as in Options 3 and 4). A full list of accessibility design requirements and considerations may be found in the 2010 ADA Standards for Accessible Design and in the USDA Accessibility Guidebook for Outdoor Recreation and Trails.

One issue that must be addressed before constructing a wetland boardwalk is hunting safety. The proposed boardwalk area falls within the Buckaloo tract of the Ted Harvey Wildlife Area. In-season hunting is permitted within this tract; several deer stands are found to the west of the Town of Bowers, and waterfowl blinds are found in the Logan Lane tract to the north. To address this safety concern, it is recommended that safety zones be established in and around the boardwalk before the structure is completed, so that no hunting is permitted near the area where people would be walking. (The use of safety zones is already present around several parking areas within the Ted Harvey Wildlife Area.) In addition to the primary safety zone along the boardwalk, a buffer zone around the boardwalk could also be utilized. Finally, coordination with the DNREC Division of Fish and Wildlife would be required to maintain safety around the boardwalk area during hunting season, and public outreach would ensure that hunters who use the tract are aware of the changes. These solutions would keep visitors safe as they use the boardwalk, while also maintaining the majority of the tract for hunting.

The risk of drowning is another safety issue. While the St. Jones River is a viable place for recreation such as fishing and kayaking, it is also a moving body of water, and the changing tide and fast currents are potential hazards to those who are not aware of the risk. Because there would not be lifeguards present at this location, signage and available life buoys could be employed to keep visitors safe, though there are other solutions that may also be effective. Life buoys are already available on the southern and eastern sides of town (see Figure 47).

Figure 46. Example of a deployable life buoy at Bowers Beach.

One final concern is the impact of floodwaters on the boardwalk. According to the Delaware Sea-Level Rise Technical Committee's report *Recommendation of Sea-Level Rise Planning Scenarios for Delaware* (2017), 97% of tidal wetlands in Delaware would be impacted if the state experiences a 0.5-m rise in sea level by 2100, and 99% would be impacted in the event of a 1.5-m rise within the same time. Either of these scenarios would seriously impact the Town of Bowers, an area that is already prone to flooding. To avoid damage and inundation of new structures, the boardwalk would need to be elevated on stilts based on projections for future sea height in the area, or it could be built along sections of marsh with slightly higher elevation. More information can be found in *Recommendation of Sea-Level Rise Planning Scenarios for Delaware*.

Kayak launch/fishing pier

To improve recreational access around the St. Jones River, a floating kayak launch and fishing pier could be built on the north-facing beach. This would allow for easier entering and exiting of kayaks, and it would offer new recreational fishing opportunities. A floating pier would allow visitors to use the facility regardless of the tide. Similar designs within Kent County are found at the Port Mahon boat launch, and at Scotton Landing off Trap Shooters Rd.

It is possible to make the fishing pier accessible to all users. To meet ADA requirements, the gangways of the pier must have a slope of no more than 1:12 (or 8.33%), and 25% of the pier's railings must be no more than 34" above the ground to allow for wheelchair access. Other features include handrail extensions, edge protection, and dispersion of 34" railings to offer a variety of fishing environments (varying water depths, shade, etc.). The full list of features may be found in the 2010 ADA Standards for Accessible Design, the Mid-Atlantic ADA Center Recreation Standards, and the Pacific ADA Center Accessible Fishing Piers and Platforms Guide. While these features would increase the usability of the pier itself, the beach in between the pier and N. Flack Avenue would likely be an obstacle, as there is currently no parking area or walkway over the sand. However, the construction of a boardwalk (if connected to the beach) and a beach access route would solve this problem.

Due to the accumulation of sediment at this location, it might be necessary to implement dredging to deepen the channel. Documents such as the town's comprehensive plan (2019) tend to focus on the need to dredge the mouth of the Murderkill River, rather than the St. Jones River. However, the *Management Plan for the Delaware Bay Beaches* (2010) acknowledges that the St. Jones River channel could be a viable source of sand for beach replenishment, due to the accretion of sediment at this location. Doing so would simultaneously deepen the river mouth (which would allow for increased marine activity) and help mitigate beach erosion at the receiving site for the dredged sand. It should be noted that, while dredging has its advantages, it also has potential drawbacks, which include increased shoreline erosion in some locations, pollution of the water, and habitat degradation for marine species. Any effort to dredge the channel would need to be led by DNREC, and it should be done only after thorough analysis of these environmental risks.

Figure 47. Example of a kayak launch, Port Mahon. Source: Delaware Surf Fishing.

Connector road and parking area

It is recommended that a small connector road be built to connect N. Flack Avenue and the north end of N. Bayshore Drive. This would allow larger vehicles to more easily drive to and from the head of the boardwalk, since there is currently not enough room for large vehicles to easily turn around on N. Flack Avenue. This would create more accommodating conditions for visiting groups (such as students from nearby schools) as well as maintenance vehicles. It would also reduce vehicle traffic on N. Flack Avenue by shifting some traffic to N. Bayshore Drive. To reduce environmental impacts and flood risk, the road could be made from gravel, permeable pavement, or another porous material.

A second potential amenity is a small parking area on the eastern side of N. Flack Avenue, just north of the connector road's proposed location. This would benefit any visiting groups that need to park close to the nearby facilities, such as a boardwalk or kayak launch. Because the area along N. Flack Avenue is prone to flooding, the surface of the secondary parking area could be made from a porous material, so that water does not accumulate. Environmental impacts would need to be considered, as the land within and adjacent to the proposed parking area is classified as wetland. Another potential negative affect is the increased noise and foot traffic near the houses on this streets. For these reasons, a connector road is likely the more feasible of these two improvements because it would have fewer environmental and noise impacts than a parking area.

Figure 48. Example of permeable pavement. Source: EPA.

Implementation

The implementation of this plan's recommendations will require extensive coordination between the Town of Bowers, Dover/Kent MPO, DelDOT, and DNREC. Depending on the funding source and type of project, different agencies may be the lead agency for implementation. For example, the implementation of a shared use path along Bowers Beach Road should be led by DelDOT, while the implementation of a wetland boardwalk and kayak launch/fishing pier should be led by DNREC. Smaller projects in the recreational access plan, such as the service building, bike racks, and informational signage, can be coordinated by the Town of Bowers.The implementation of the plan will benefit from a local "project champion" who will promote the plan to potential partners and pursue funding opportunities, espeically for the larger projects.

Planning Level Cost Estimate

The following two tables provide planning-level cost estimates for the proposed Bowers Beach Road transportation improvements and the wetland boardwalk alternatives.

Bowers Beach Road Transportation Improvements

Table 11. Bowers Beach Road transportation improvements

Option	Length of segment	Type of bike facility	Bike facility cost/mile	Bike facility cost	Type of pedestrian facility	Pedestrian facility cost/mile	Pedestrian facility cost	Total Cost
Segment A **Little Heaven Rd to Skeeter Neck Rd**	2,030 ft	Two-way separated bike lane	$1.5-3M	$600,000–$1,150,000	sidewalks	$400,000	$150,000	$750,000–$1,300,000
Segment B: **Skeeter Neck Rd to Wetland/Stream Crossing**	2,890 ft	Shared use path	$1.5M	$800,000	Shared use path	N/A	N/A	$800,000
Mid-Block Crossing with RRFB	N/A	Crossing	N/A	$50,000	Crossing	N/A	N/A	$50,000
Segment C*: **Wetland/Stream Crossing to Whitwell Delight Rd (west end)**	3,770 ft	Shared use path	$1.5M	$1,100,000	Shared use path	N/A	N/A	$1,100,000
Segment D: **Whitwell Delight Rd (west end) to Whitwell Delight Rd (east end)**	4,330 ft	Shared use path	$1.5M	$1,200,000	Shared use path	N/A	N/A	$1,200,000
Segment E: **Whitwell Delight Rd (east end) to Bowers Town Limits**	880 ft	Shared use path	$1.5M	$250,000	Shared use path	N/A	N/A	$250,000
Segment F: **Bowers Town Limits to Cedar Ave**	650 ft	Shared use path	$1.5M	$200,000	Shared use path	N/A	N/A	$200,000
Mid-Block Crossing with RRFB	N/A	Crossing	N/A	$50,000	Crossing	N/A	N/A	$50,000
Segment F: **Cedar Ave to Hubbard Ave**	1,320 ft	Bike lanes	$100,000	$25,000	Sidewalk	$400,000	$100,000	$125,000
Segment F: **Hubbard Ave to S. Flack Ave**	920 ft	Bike lanes	$100,000	$20,000	Sidewalk	$400,000	$70,000	$90,000
Segment F: **S. Flack Ave to Bayshore Dr**	310 ft	Sharrows	$10,000	$500	On-street	N/A	N/A	$500
TOTAL	17,100 ft/ 3.25 mi			$4,300,000-$4,900,000			$320,000	$4,600,000–$5,200,000

*Segment C estimate excludes the portion of shared use path already constructed and the portion that is to be built by the developer.

Wetland Boardwalk Alternatives

Table 12. Wetland boardwalk alternatives

Option	Length of main path	Cost of main path	Length of overlook	Cost of overlook	Total length	Total cost
Option 1: **Small Overlook Loop**	420 ft	$400,000	120 ft	$165,000	540 ft	$600,000
Option 2: **Large Overlook Loop**	1,100 ft	$1,000,000	185 ft	$225,000	1,285 ft	$1,200,000
Option 3: **Beach Loop**	900 ft	$800,000	220 ft	$255,000	1,120 ft	$1,100,000
Option 4: **Town Loop**	2,700 ft	$2,500,000	500 ft	$506,000	3,200 ft	$3,000,000
Assumptions: 10’ wide path with pedestrian loading only, top deck less than 30” above ground, no hand railing with wheel stop; approximate cost $90/sf; overlook is assumed to be 25’x25’ These numbers are to aid in comparison and need to be compared with DNREC						

Potential Funding Sources

Individual recommendations in this study may be eligible for different sources of funding. This section provides brief overviews of potential federal, state, and private funding opportunities.

Federal Funding Opportunities

National Scenic Byways Program

Organization: FHWA

State DOTs and Tribal governments are eligible apply for funds. The funding may be used for planning and developing a State Scenic Byway Program, and planning activities, construction projects, conservation projects and interpretive projects for National Scenic Byways, All-American Roads. For more information, visit National Scenic Byways Legislation - National Scenic Byways Program - Planning, Environment, & Real Estate - FHWA (dot.gov).

Land and Water Conservation Fund (LWCF) State and Local Assistance Program

Organization: NPS

Municipalities, counties, state agencies and regional park authorities are eligible to apply for funds. The funding can be used for acquisition of land for parks and/or development or rehabilitation of certain public recreational facilities. The program requires a 50% match, which can be cash or in kind. For more information, visit https://www.nps.gov/subjects/lwcf/stateside.htm and https://www.nrpa.org/our-work/advocacy/the-land-and-water-conservation-fund-lwcf/applying-for-lwcf-grants/ and see 23 U.S. Code § 133.

Surface Transportation Block Grant (STBG) Program

Organization: Federal Highway Administration

Eligible projects under the STBG include recreational trail projects that are eligible under the Recreational Trails Program (see below) and other bicycle and pedestrian facilities. States, local governments, and natural resource agencies, among others, are eligible to apply. Grants generally require a 20% funding match from non-federal sources. For more information, visit https://www.fhwa.dot.gov/specialfunding/stp/.

Transportation Alternatives (TA) Set-Aside from the STBG Program

Organization: Federal Highway Administration

The TA Set-Aside Program replaced the MAP-21 Transportation Alternatives Program (TAP). It is a set-aside from the STBG Program described above. Eligible projects include recreational trail projects that are eligible under the Recreational Trails Program (see below) and other bicycle and pedestrian facilities. States, local governments, and natural resource agencies, among others, are eligible to apply. DelDOT administers the program for the State of Delaware. Grants require a 20% funding match from non-federal sources. For more information on the program as of 2022, visit https://www.fhwa.dot.gov/environment/transportation_alternatives/guidance/ta_guidance_2022.pdf.

Recreational Trails Program (RTP)

Organization: Federal Highway Administration

The Recreation Trails Program is a set-aside fund from the TA Set-Aside described above. Funds may be used for a variety of public trail-related purposes, including development of new trails, restoration and maintenance of existing trails, and acquisition of land or easements. The funds are administered by each state. Grants generally require a 20% funding match from non-federal sources. For more information, visit Recreational Trails - Environment - FHWA (dot.gov) and see 23 U.S. Code § 206.

Congestion Mitigation and Air Quality Improvement (CMAQ) Program

Organization: Federal Highway Administration

CMAQ funds may be used for projects that will contribute to attainment or maintenance of a National Ambient Air Quality Standard (NAAQS) in NAAQS nonattainment or maintenance areas, and that are in the MPO's current transportation plan or Transportation Improvement Program. The project must reduce emissions to be eligible for funding, so trail projects should be usable for transportation, not just recreation. For more information, visit https://www.fhwa.dot.gov/bipartisan-infrastructure-law/cmaq.cfm.

USDOT Additional Funding Opportunities

USDOT releases details on potential grants throughout the year, so more grant opportunities applicable to this project may become available.

State Funding Opportunities

Outdoor Recreation, Parks and Trails Program (ORPT)

Organization: Delaware Department of Natural Resources and Control (DNREC)

Funds may be used for park land acquisition, planning and design of parks or trails, and construction of outdoor recreational facilities. Municipalities, counties, and park districts are eligible to apply. Grants generally require a 50% match, which can be cash or in kind. For more information, visit Outdoor Recreation, Parks and Trails Program - DNREC Alpha (delaware.gov).

Community Transportation Fund

Organization: DelDOT

Community Transportation Fund (CTF) dollars are distributed to each of Delaware's 62 legislators. The Fund can be used for a wide variety of transportation-related projects. The legislators submit projects within their district for funding from their share of the funds.

Private Funding Opportunities

Project funding could come from private sources, including area businesses and charitable foundations. Depending on the funding source, the applicant may have to be a non-profit organization rather than a government agency. Delaware Greenways could be a non-profit partner.

Next Steps

The following steps should be taken to implement the recommended alternatives and recreational access plan.

Table 13. Implementation steps

Implementation step	Responsible party or parties	Timeframe
Adopt Town of Bowers Bicycle and Pedestrian Plan	Dover/Kent MPO Council Bowers Town Council	September 2022 TBD
Work with the developer of the Bowers Landing site to facilitate construction of a shared use path along the north side of Bowers Beach Road to Old Bowers Road	Kent County Department of Land Use, DelDOT Development Coordination Section, Dover/Kent MPO	TBD
Pursue private and grant funding for smaller projects	Town of Bowers	Beginning July 2022
Identify transportation improvements for submission for consideration in Dover/Kent MPO's Transportation Improvement Program (TIP)	Town of Bowers Dover/Kent MPO	Beginning July 2022
Work with DNREC to identify appropriate projects and funding sources; advance projects through funding process	Town of Bowers DNREC	Beginning July 2022
Consider project for the TIP through the approved prioritization process	Dover/Kent MPO	TBD
Incorporate the project in the DelDOT Capital Transportation Program, beginning with the Project Development phase, to develop a more detailed concept design and cost estimate	DelDOT	After project is included in the adopted TIP, subject to availability of funding

Appendix A – Public Engagement Results

Heritage Day & Fall 2021 Community Survey

Total of 24 responses

1. What is your relationship to the Town of Bowers?

- 10 Residents
- 1 Business owner
- 12 Regular visitors
- 1 First time visitor

2a . Do you walk around Bowers?

- 22 Yes
- 2 No

2b. If so, where?

- 9 No response
- 5 beach area
- 3 all over
- 1 from Town to Rt. 1
- 1 Main Street
- 1 to beach on Main Street
- 1 Town limits
- 1 downtown

3. Do you have ideas for making Bowers more walkable?

- Nice macadam 5-7’ pathway from Bowers to Rt. 1
- A sidewalk/boardwalk would be great for the views of the water through the marshes and up and down Beach Rd. with a bike route.
- Complete bike path to Rt. 1 to beach
- Bike path
- Paved and designated paths
- Sidewalks, beach accessible to dogs year-round
- Put speed bumps on Main Street
- Marked walking trails
- Walkways / pier
- More sidewalks or shoulders
- A sidewalk on Main Street
- Better signage, routes available, maps
- Speed bumps, stop sign all ways at intersections
- Need to slow traffic down!!!
- More sidewalks
- Build a trail around the perimeter or through the wetlands
- Walking within the Town is fine. I don’t think any further improvement is necessary. Traffic is low.
- Resurfacing roads will help
- Trails throughout Town and by the water

4a. Do you bike around Bowers?

- 9 Yes
- 15 No

4b. If so, where?

- 2 No response
- 1 just around Town, not past the Fire Hall, not safe otherwise
- 1 Skeeter Neck Road/Bowers Road

- 1 around Town and Kent Court
- 1 no place safe to ride
- 1 from Town to Rt. 1
- 1 roads
- 1 all over

5. Do you have ideas for making Bowers more bike-friendly?

- A sidewalk/boardwalk would be great for the views of the water through the marshes and up and down Beach Rd. with a bike route.
- Need a completed path
- Bike lane or bike path
- Open the sections of roadways that aren't bikeable
- Paved, designated biking/walking paths
- Bike lanes
- Defined bike paths, cones to protect bikers
- Bike trails
- Bike lanes
- Bike trails through the marsh would be lovely
- Have safer routes, dedicated
- Better space at edge of roads
- Need to slow traffic down!!!
- More sidewalks
- Better access to Rt. 1 / Little Heaven should be considered. Use Whitwells Delight Road as bike route and add in wider shoulder elsewhere on the way out. Consider Old Bowers and Mulberrie Pt. as bike route to Mulberrie Pt.
- Bike path
- Trails! We live along the Lewes-Georgetown trail and use it often.

Notes from conversations with people:

- Clean out storm drain channels and ditches to minimize routine flooding
- What about golf carts? Need to follow rules of the road, signage, etc.
- Build a fishing pier at the north end inlet
- Extend the beach inland (west) and add a walking path at the north end past Flack Ave.

Online Survey Responses (October 2021)

Total of 5 survey responses

- 2 Residents
- 2 Regular visitors
- 1 Did not provide an answer

Do you walk around Bowers?

- 4 Yes
- 1 Did not provide an answer

If so, where?

- Beach and boat ramp area mostly
- n/a
- Mostly on the beach, but also around the town to visit friends and occasionally playground
- beach

Do you bike around Bowers?

- 4 Yes
- 1 Did not provide an answer

If so, where?

- I would if there were a bike rental place there.
- Same as walking. To beach, friends, and playground.
- town and dock areas

How can Bowers be made more walkable?

- Sidewalks and/or a running path.
- Speedbumps and sidewalks. Although, concrete hurts my back so asphalt trails are best.
- safer wider paths
- Bike lanes and a designated bike path for longer distances.
- Bike trails away from traffic where possible. Bike stands at beach entrances.
- safer wider paths that lead all over Town and out of the Town

Buccaneer Bash & Spring 2022 Community Survey

Total of 38 responses

- 22 (about 58%) Residents
- 12 (about 32%) Regular visitors
- 3 (about 8%) First time visitors
- 1 (about 3%) Other

Comments regarding bicycle and pedestrian improvements:

- bike and ped paths will be great on bowers beach rd, especially with how people drive on that road!
- wetland boardwalk,restrooms,snack bar
- Great ideas and much needed!
- I like the bike walk path, the small service building and the wetland boardwalk
- wetland boardwalk and fishing pier!
- I like the shared path separate from the road

- b,c,or d
- looking forward to going signs posting town limits
- any improvements would benefit the town
- anything will be better than what we have now
- PREFER PINK AND ORANGE
- GREAT IDEA
- NECESSARY FOR SAFETY
- NO BUT GREAT IDEA
- OPTION 1 FOR ALL SECTIONA
- OPTION 4 FOR THE BOARDWALK
- looking forward
- agree with the project
- go big or go home
- d
- great ideas
- Great plan
- bike and ped yes, bathroom yes, DART no, keep it quaint!!
- In favor of the project
- shared use path improve public health and property values
- limit the footprint
- Bike Lane, sidewalks, boardwalk option
- Longer bike trail option and fishing pier

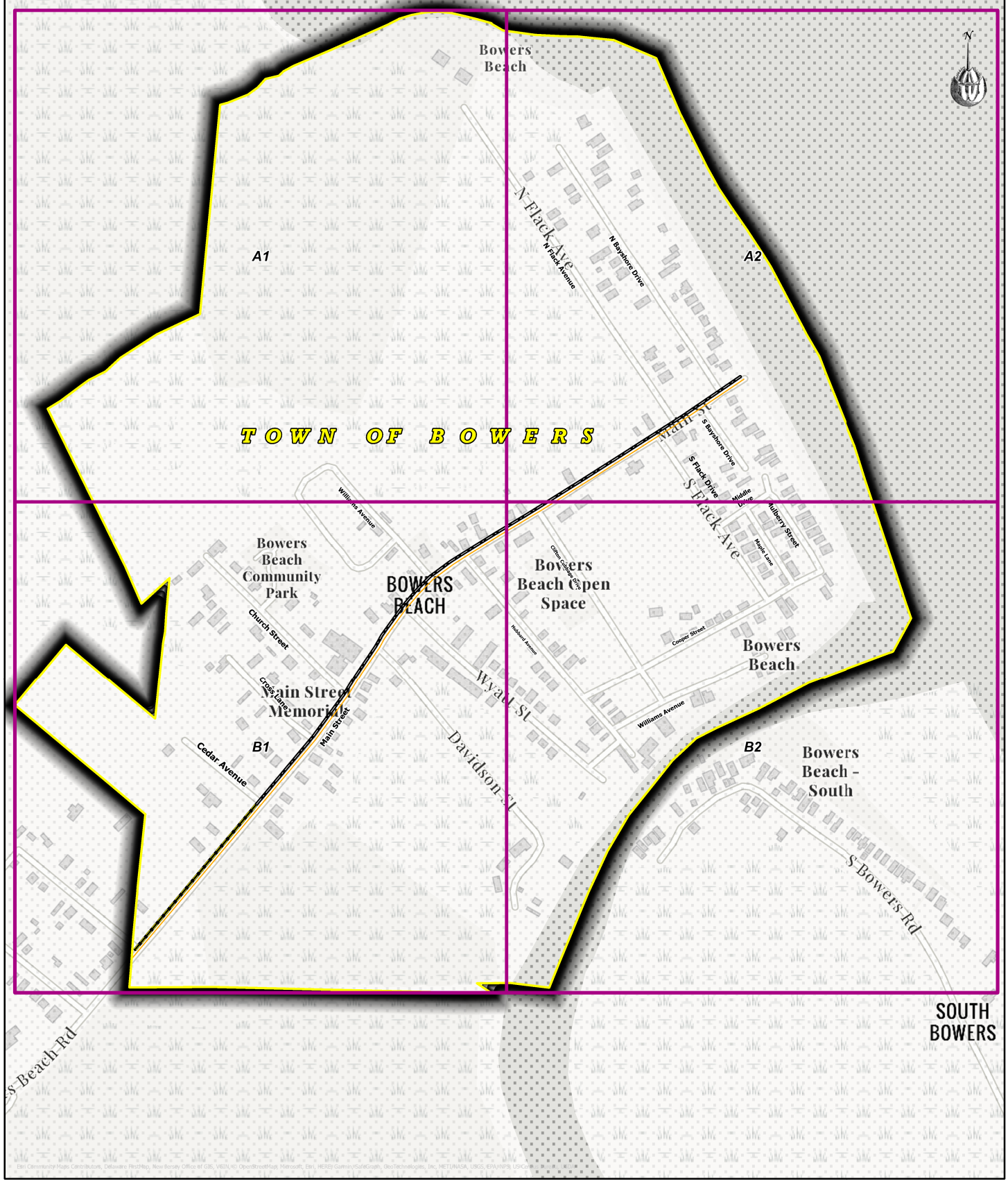
Comments regarding recreation improvements:

- Boardwalk lot pier restroom access beach better bike fishing great improvement improvements museum on one please
- a permanent restroom instead of having porta potties will be one of the greatest improvements we could have in this town, as well as kayak pier and wetland boardwalk,
- for the kayak launch, I do not support the addition of more parking or a connector road The wetlands should be protected!!
- good with all of it
- They all seem worthwhile. I would prefer to see them funded mainly through gifts, grants, and user fees other than taxpayer funds.

- concerned about safety. Rivers are dangerous. And sanctuary?
- would be nice to restore the boardwalk along the murderkill
- need water such as tidewater
- fishing pier please!
- all of it sounds great!
- all need improvement
- horse trails
- WE NEED IMPROVEMENT
- WONDERFUL
- ANY KAYAK LAUNCH WOULD BE A PLUS
- NEED CORRECT SIGN FOR BEACH PARKING. ONLY ONE SIGN IS NOW MISLEADING
- MAYBE PUT A RESTROOM/SNACKBAR BY THE PARKING LOT WHERE IT IS CLOSE TO THE BEACH AND THE MUSEUM
- I THINK THE CONCESSION STAND WOULD BE BETTER BETWEEN THE BRACH AND THE MUSEUM. ON THE MAIN ST SIDE OF THE PARKING LOT
- no
- public restroom
- wetland boardwalk, service building, kayak launch and bike racks GREAT
- Would like parking with St Jones access
- Need parking places for bikes
- will non motorized golf carts or scooters be allowed on the walkways? residents before profit!!
- Please create better access for non car users
- parking lot and the bike and ped improvements
- hobie cat launch and trailer parking
- I like the proposed fishing pier location.

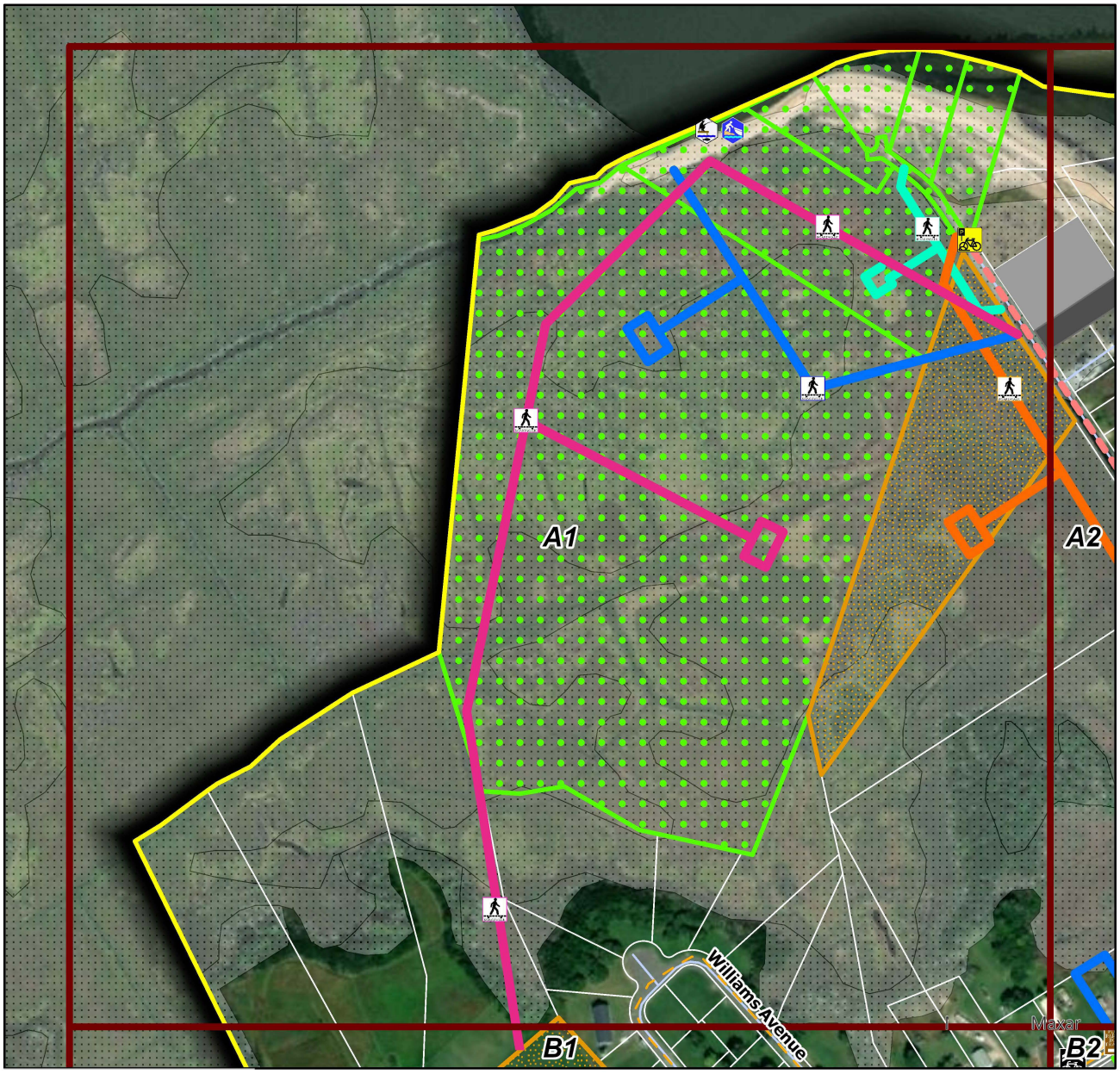
Appendix B – Recreational Improvements Tile Maps

Bowers Beach - Bike & Pedestrian Study Index



NW Quadrant

BOWERS BEACH - BIKE & PEDESTRIAN STUDY



Tile: A1

MAP LEGEND

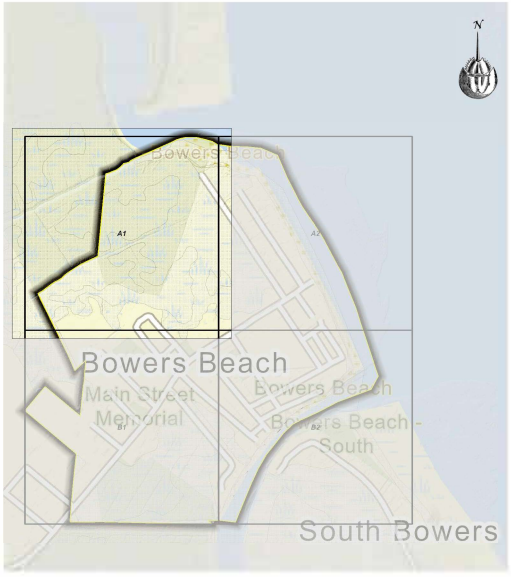
Points of Interest
- Fire Department
- Historical
- Park
- Beach

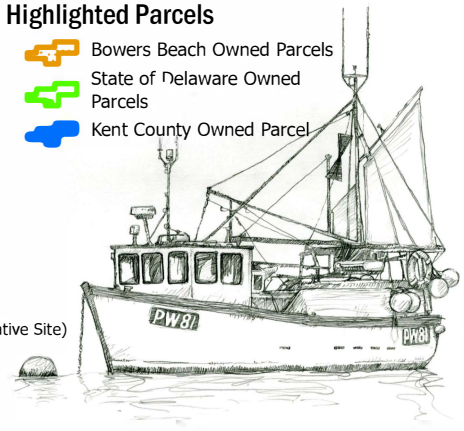
Proposed Amenities Points
- Bike Rack
- Bike Repair Station
- Board Walk - Option 1
- Board Walk - Option 2
- Board Walk - Option 3
- Board Walk - Option 4
- Fishing Pier - Kayak Launch
- Restroom / Water Station
- Restroom / Water Station - (Alternative Site)
- Sharrow

Signage
- Beach Access
- Public Parking
- Parking - Fishing, Kayak
- Public Parking - Boats & Trailers

Pedestrian and Bike (Option)
- Bike & Pedestrian
- On Road Bike Lane
- Path

Highlighted Parcels
- Bowers Beach Owned Parcels
- State of Delaware Owned Parcels
- Kent County Owned Parcel





BOWERS BEACH - BIKE & PEDESTRIAN STUDY

NE Quadrant

Tile: A2

MAP LEGEND

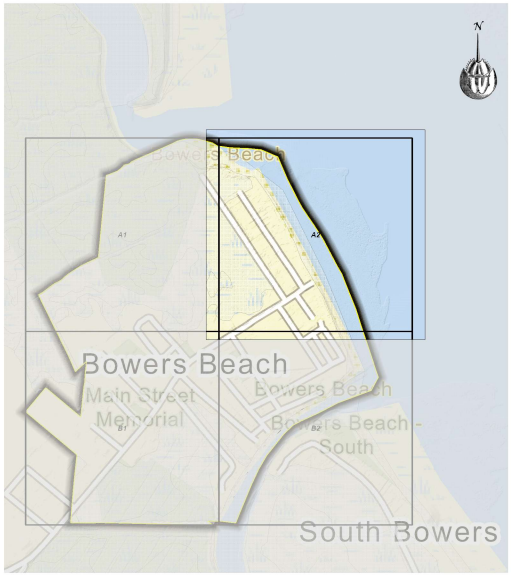
Points of Interest
- Fire Department
- Historical
- Park
- Beach

Proposed Amenities Points
- Bike Rack
- Bike Repair Station
- Board Walk - Option 1
- Board Walk - Option 2
- Board Walk - Option 3
- Board Walk - Option 4
- Fishing Pier - Kayak Launch
- Restroom / Water Station
- Restroom / Water Station - (Alternative Site)
- Sharrow

Signage
- Beach Access
- Parking - Fishing, Kayak
- Public Parking
- Public Parking - Boats & Trailers

Pedestrian and Bike (Option)
- Bike & Pedestrian
- On Road Bike Lane
- Path

Highlighted Parcels
- Bowers Beach Owned Parcels
- State of Delaware Owned Parcels
- Kent County Owned Parcel



SW Quadrant

BOWERS BEACH - BIKE & PEDESTRIAN STUDY

Tile: B1

MAP LEGEND

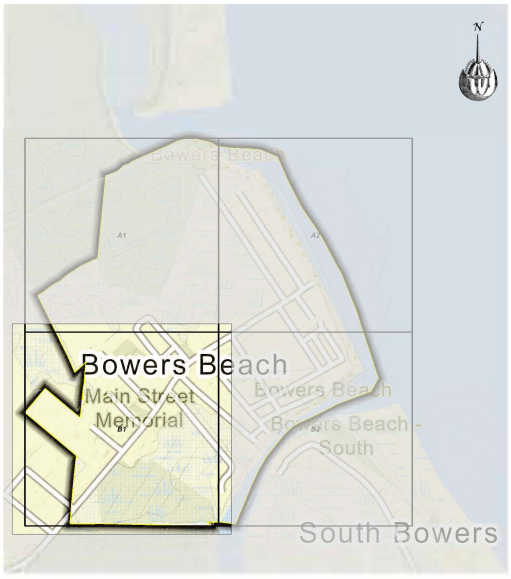
Points of Interest
- Fire Department
- Historical
- Park
- Beach

Proposed Amenities Points
- Bike Rack
- Bike Repair Station
- Board Walk - Option 1
- Board Walk - Option 2
- Board Walk - Option 3
- Board Walk - Option 4
- Fishing Pier - Kayak Launch
- Restroom / Water Station
- Restroom / Water Station - (Alternative Site)
- Sharrow

Signage
- Beach Access
- Parking - Fishing, Kayak
- Public Parking
- Public Parking - Boats & Trailers

Pedestrian and Bike (Option)
- Bike & Pedestrian
- On Road Bike Lane
- Path

Highlighted Parcels
- Bowers Beach Owned Parcels
- State of Delaware Owned Parcels
- Kent County Owned Parcel



SE Quadrant

BOWERS BEACH - BIKE & PEDESTRIAN STUDY

Tile: B2

MAP LEGEND

Points of Interest
- Fire Department
- Historical
- Park
- Beach

Proposed Amenities Points
- Bike Rack
- Bike Repair Station
- Board Walk - Option 1
- Board Walk - Option 2
- Board Walk - Option 3
- Board Walk - Option 4
- Fishing Pier - Kayak Launch
- Restroom / Water Station
- Restroom / Water Station - (Alternative Site)
- Sharrow

Signage
- Beach Access
- Public Parking
- Parking - Fishing, Kayak
- Public Parking - Boats & Trailers

Pedestrian and Bike (Option)
- Bike & Pedestrian
- On Road Bike Lane
- Path

Highlighted Parcels
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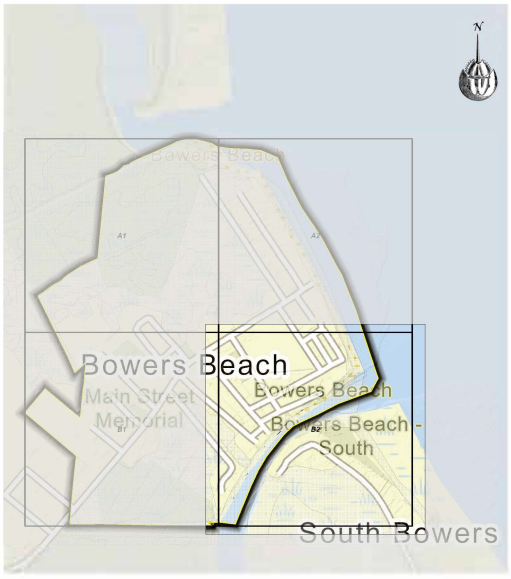

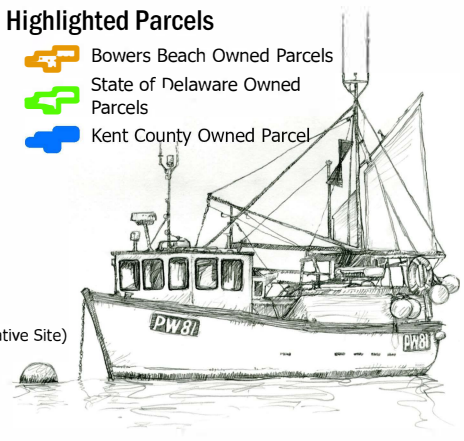


TOWN of BOWERS
Inc.
1907
KENT COUNTY
DELAWARE


DOVER/KENT COUNTY MPO
METROPOLITAN PLANNING ORGANIZATION