

GREENBELT INFRASTRUCTURE ASSESSMENT

TOWN OF CAPE ELIZABETH, MAINE

2020



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INTRODUCTION

The town of Cape Elizabeth (hereafter referred to as the Town) maintains approximately 19.5 miles of greenbelt trail in the form of 18 separate paths, many of which are connected. The trails consist of a natural dirt surface with boardwalks spanning wet areas. They provide access to numerous natural features, including Great Pond, Spurwink River and saltmarsh, Crescent Beach, and forested uplands.

The Town hired FB Environmental Associates (FBE) to work with the Cape Elizabeth Conservation Committee to perform a capital improvement plan assessment of all trails and associated boardwalks along the Greenbelt Trails within the town. The overall goal of the project was to inventory and evaluate all existing boardwalks and trail locations that may benefit from boardwalks and collect supporting data to facilitate permitting of trail maintenance activities and boardwalk construction. The specific objectives of the project were to:

- Conduct a field assessment to 1) identify and record condition of all existing boardwalks on greenbelt trails, 2) evaluate adequacy of existing boardwalks in regard to condition, length, and need for extension or maintenance, and 3) identify trail sections that require new boardwalks to improve the trail user experience and protect surrounding vegetation or wetland complex.
- Provide the Town with a complete geo-referenced index of current trail conditions to serve as a baseline of information and inform recommended upgrade type.
- Provide the Town with a summary of the prioritization of sites that require attention
- Perform wetland permitting requirements, including wetland delineations, to the standard required for the Maine Department of Environmental Protection for all highly impacted trail sites.

This report presents a written and graphical description of methodology used, summarized findings, and conclusions of the greenbelt infrastructure assessment pertaining to the above objectives, as well as other relevant findings of the field investigation. In tandem with the trail inventory database, this report is intended to serve as a guide for the Cape Elizabeth Conservation Committee to perform greenbelt trail boardwalk infrastructure improvement.

Such plans are essential for maintaining the scenic, cultural, and natural characteristics of Town greenbelt properties, while concurrently allowing for public access and recreational activities. This management plan was first submitted to the Cape Elizabeth Conservation Committee as a draft on August 6, 2020 and presented to the commission on August 11, 2020.



Boardwalk crossing the upper Spurwink marsh on the Town Center Trail.

METHODS

SPATIAL DATA REVIEW

Prior to undertaking the field assessment and wetland delineations, FBE obtained and examined spatial Geographic Information Systems (GIS) and other data from a variety of sources to provide an initial screening of natural resources on town greenbelt properties. The following information was examined for the town:

- Recent aerial imagery obtained from the Environmental Science Research Institute (ESRI).
- National Wetlands Inventory (NWI) map obtained from Maine GeoLibrary.
- National Hydrography Dataset (NHD) map obtained from Maine GeoLibrary.
- Trail layers obtained from the Town via Spatial Alternatives.
- Town zoning layer obtained from the Town via Spatial Alternatives.

The spatial data review facilitated the development and organization of a field work schedule to complete the greenbelt infrastructure assessment.

GREENBELT INVENTORY

FBE evaluated all existing greenbelt trail boardwalk infrastructure and locations requiring boardwalks using a quantitative assessment method developed by FBE for this project and approved by the Conservation Committee during an April 2020 Zoom meeting. The assessments took place from April to June 2020 and preliminary results were presented at the June 2020 Conservation Committee Zoom meeting. Site-specific data were collected during the inventory using Fulcrum electronic data collection software in tandem with handheld GPS equipment. Sites were initially categorized as either (1) an existing boardwalk assessment site, or (2) a trails assessment site that requires new boardwalk infrastructure where there was none previously. Data on physical parameters and site condition were recorded for the respective site type. FBE then devised detailed site improvement recommendations with comments regarding permitting implications. The following summarizes each assessment type; an example field form can be found in Appendix A.

Existing Boardwalk Assessment Site

Existing boardwalk sites were initially categorized according to how they were structurally compromised. Examples include missing boardwalk slats, rotting wood, instability, compromised landings, etc.. The severity of the impact was quantified by a condition rating that could be applied to each site (Figure 1). This one-to-five scale ranged from one or “Brand New” to five or “Completely Broken”. Creating a quantifiable scale to assess existing boardwalks will allow the Town to easily sort sites according to functionality. Boardwalks were then assessed for use level (light, moderate, or heavy traffic). This qualitative parameter was based on the field observer’s perceived use level and user traffic while on site, such as the frequency of bikers passing during the assessment or the severity of surrounding vegetation trampling. Physical parameters including length, width, maximum height from ground/water to boardwalk surface, and boardwalk slat gap width if parallel to travel, were measured and recorded. (The Conservation Committee has adopted a boardwalk standard width of 30 inches. All

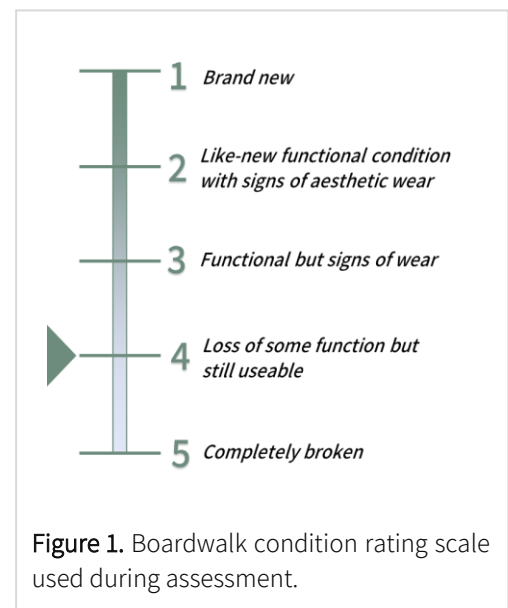


Figure 1. Boardwalk condition rating scale used during assessment.

new boardwalk suggestions were recommended to follow this width requirement.) Use type (walking/running, biking, dog walking) was noted for each trail. Photographs were taken of all boardwalks, noted boardwalk conditions, and associated surrounding areas. FBE assigned each site a photo number, from 1-01 to 2-64.

Improvement recommendations for each boardwalk site, if deemed necessary, were also recorded. Suggested recommendations for individual boardwalks include extending the boardwalk, replacing slats or segments due to broken or rotted wood, replacing decking, replacing foundations and posts, stabilizing the trail surface at the landings, etc. Multiple improvement recommendations were made for some sites.

All greenbelt trails having boardwalk infrastructure, including those consisting of boards placed flat on the ground with no proper foundation and those that were brand new and require no maintenance, were included in the boardwalk assessment category (Photos 1 and 2, respectively). In the event that multiple boardwalks with different conditions and physical parameters were directly adjacent to each other, they were logged as separate sites and their adjacency was noted (Photo 3). If a boardwalk site had wet or excessively muddy side trails around the existing boardwalk, created by bikers avoiding obstacles or hikers taking shortcuts, we recommended closing the side trails and making the existing boardwalk more biker-friendly, instead of extending the boardwalk into the side trail or shortcut.

Boardwalks requiring an extension may also require permitting (see section on permitting implications below). At each site, the presence of a wetland, distance to wetland, the Cowardin wetland type, and the potential presence of vernal pool were recorded.



Photo 1. Boardwalk site with no proper foundation, rated at a 4 on the boardwalk condition scale due to loss of some function.



Photo 2. Boardwalk in excellent condition, rated at a 1 on the boardwalk condition scale.



Photo 3. Adjacent boardwalks are logged as separate sites due to having different condition ratings.

Trail Assessment Site

Sections of trail that exhibited signs of needing new boardwalk infrastructure were categorized by trail surface type (packed dirt, rock stepping-stone, non-durable surface/mud, etc.) and evaluated for signs of impact (trail surface erosion, excessive muddiness, impact on surrounding vegetation, user-created side trails, etc.) The impact rating assigned to a trail site was based on the number of signs of impact present (Figure 2). Trail sites were also assessed for use level (light, moderate, or heavy traffic). As previously noted, this was a qualitative assessment based on perceptions during the assessment and inferred from the level of impact. User type was determined by observations on the site and clues from the area (bike tracks, dog prints, etc.). Length of impacted trail was measured for each site and as was user type (walker/runner, biker, dog walker). All noted boardwalk conditions and the site as a whole were photo documented. FBE assigned each site a photo number, from 1-01 to 2-64.

Trail site recommendations consist of new boardwalk installation or a trail re-route. Length, width, and height was specified for all recommended new boardwalks. If a re-route was suggested, the location and reason were detailed in site notes. Some sites may be improved by either method (Photo 4).

Trail sites requiring new boardwalks may also require permitting (see section on permitting implications below). At each site, the presence of a wetland, its type, and distance to the trail were recorded as well as the presence of potential vernal pools.

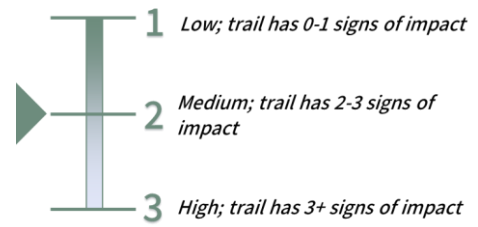


Figure 2. Trail condition and impact rating used during assessment.



Photo 4. Example of a trail assessment site viewed from above (top) and below (bottom) with a recommendation to re-route the trail or install a new boardwalk. In this example, the re-route appears to already be partially established by trail users and could be fully established with confirmation of land access rights.

During trail assessments, FBE considered whether springtime seasonal wetness was affecting trail site selection. FBE used the following criteria to assess whether a site should be entered into the database with a recommendation to build a boardwalk; 1) is the site passable, or is it unpleasant or challenging to walk through? Do shoes or bikes sink into mud or standing water? 2) Are bikers and walkers using the trail avoiding the segment and creating side trails, and if so, is that negatively impacting the surrounding vegetation? 3) Does the use of the trail during this wet period make the condition of the trail cumulatively worse? If these criteria were true for a trail site, the site was recorded with a boardwalk recommendation. The trail impact rating assigned to each site captures the degree to which these criteria apply (Photos 5 and 6). Sites rated as low impact are more likely to be wet only during spring or fall, yet the impact on surrounding ecosystem warranted a boardwalk recommendation.



Photo 5. Low priority site due to excessive muddiness and standing water, likely due mostly to seasonal wetness.



Photo 6. High priority site due to excessive muddiness, trail widening, and side trails negatively impacting surrounding vegetation.

SITE PRIORITIZATION

Sites are prioritized using the condition impact rating – as high, medium or low impact for trail assessment sites and as high, medium, low, or not a priority for existing boardwalk sites – and then by trail use level rating (heavily, moderately, or lightly trafficked). Boardwalks that do not need maintenance are either brand new (rated as one on the boardwalk condition rating scale) or show minimal aesthetic wear that does not require maintenance (rated as two on the boardwalk condition rating scale).

This system sorted the impact ratings applied to each site to prioritize sites by the urgency of the repair/update. The highest priority sites correspond with those with the highest impact rating. These are sites that, for example, are impassable and have deep mud and trail widening, or provide ineffective boardwalk infrastructure due to instability or broken boardwalk components, present as the highest priority due to their high impact rating.

Sites that are in heavily trafficked areas tend to experience more physical wear, causing impacts to worsen, such as negative impact on vegetation due to side trails around an excessively muddy stretch of trail. Increasing the user satisfaction through a boardwalk installation, in this example, also curbs the impact on surrounding vegetation. Highly impacted, heavily trafficked sites are top priority for maintenance or additional boardwalk infrastructure, while low impact, lightly trafficked sites are lowest priority (Photo 7).

The accompanying greenbelt infrastructure assessment database provides all assessment data in a format that allows the Town to search the greenbelt trail network by urgency of repair/update. The accompanying database metadata also provides instructions on utilizing the database to search by type of repair/update.



Photo 7. Three examples of top priority sites, rated as high impact, heavily trafficked.

WETLAND DELINEATION

Based on current State and U.S. Army Corps of Engineers (USACE) policy for identifying jurisdictional wetlands, wetland delineations were performed following the protocols described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, Version 2.0, January, 2012* (U.S. Army Corps of Engineers, 2012). Hydric soils were identified by applying criteria described in the USDA *Field Indicators of Hydric Soils in the United States: A Guide for Identifying and Delineating Hydric Soils, Version 8.2, 2018* (USDA, 2018).

The Routine Onsite Determination Method was used for this project. This methodology involves identifying wetlands based on three criteria: the presence of hydrophytic vegetation, hydric soils, and hydrology. For a given area to be considered a wetland, all three of these parameters must be met, with some exceptions allowed for disturbed areas.

Hydrophytic vegetation is defined as the community of macrophytes occurring in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to influence plant species composition (USACE, 2012). An indicator status is assigned to each plant species; this indicator status is then used to calculate the overall dominance of wetland plants in each stratum at each sample point.

A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service, 1994). Examples of hydric soil indicators include a histic epipedon or the presence of a dark A or Ap soil horizon underlain by a high value, low chroma (light gray) colored soil horizon with redoximorphic features (e.g., iron and manganese concentrations or depletions).

The term "wetland hydrology" encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Typical indicators of wetland hydrology include inundated soils, soils saturated to the surface, drainage patterns, water marks, and morphological adaptations such as buttressed trunks, shallow root systems, or multiple stemmed trees.

All wetlands and watercourses were classified using the U.S. Fish and Wildlife Service (USFWS) *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979). This water resource classification system is commonly referred to as “Cowardin Classification” (Appendix A). The Cowardin Classification is used to define wetlands and other aquatic resources by their landscape position, cover type, and hydrologic regime. Special modifiers can be added that describe water regime/chemistry, soil types, or disturbances.

Streams

The Maine Natural Resources Protection Act definition of river, stream, or brook was used for identification and delineation:

"River, stream or brook" means a channel between defined banks. A channel is created by the action of surface water and has two or more of the following characteristics:

- A. It is depicted as a solid or broken blue line on the most recent edition of the U.S. Geological Survey 7.5-minute series topographic map or, if that is not available, a 15-minute series topographic map.
- B. It contains or is known to contain flowing water continuously for a period of at least 6 months of the year in most years.
- C. The channel bed is primarily composed of mineral material such as sand and gravel, parent material or bedrock that has been deposited, or scoured by water.
- D. The channel contains aquatic animals such as fish, aquatic insects, or mollusks in the water or, if no surface water is present, within the stream bed.
- E. The channel contains aquatic vegetation and is essentially devoid of upland vegetation.

"River, stream or brook" does not mean a ditch or other drainage way constructed, or constructed and maintained, solely for the purpose of draining stormwater or a grassy swale.

Global Positioning System (GPS) Data Collection

FBE geo-located natural resource feature flags (e.g., wetlands and streams) using a mapping-grade GPS unit (Eos Arrow 100), utilizing the manufacturer’s data collection and post-processing standards designed to achieve sub-meter accuracy. (Note that sub-meter accuracy is attained only in ideal conditions, which are seldom present in the field.) FBE exported post-processed data to the ESRI shapefile format in the NAD 1983 UTM Zone 19N coordinate system.

Wetland Delineation Practices per MEDEP Permitting Requirements

In order to fulfill the Maine Department of Environmental Protection (MEDEP) wetland permitting requirements for Tier I Natural Resource Protection Act (NRPA) projects, FBE conducted wetland delineations within a 100-foot radius of all sites identified as highly impacted. Per MEDEP Tier I requirements, new wetland delineations were not conducted on sites that are already within wetland as reflected on an NWI map; however, presence of wetland was confirmed by FBE staff. Additionally, all necessary permitting maps were prepared for these sites. In some instances, the site was only



Photo 8. Cross Hill site 1-97 is an example of a site that was only partially within a mapped NWI wetland. FBE delineated this site to ensure accurate wetland lines within a 100-foot radius of the site.

partially within NWI wetlands. For this scenario, FBE delineated the wetlands to ensure that a 100-foot radius surrounding the site was accounted for (Photo 8).

Per the MEDEP NRPA documentation (page 20), the following wetland documents are required (MEDEP, 2019).

- “The appropriate United States Geological Survey Map (U.S.G.S. topography map, 7 1/2 minute if available) or the Maine Atlas and Gazetteer with the activity location clearly marked and labeled on the map. A photocopy of the applicable portion of the topography map is sufficient provided it is clear and readable.”
- “A description of the project and a top view drawing showing the area of freshwater wetland to be filled or otherwise altered; areas of any marsh or open water within the freshwater wetland being altered; and surface water bodies within 75 feet of the proposed alteration. All drawings must be drawn to scale and labeled with the applicant's name, the scale used and the date prepared. Please note that the Corps requires all drawings to be submitted on 8 1/2" x 11" paper which are clear, legible and reproducible.”
- “Color photos showing the wetland in the activity area. Label each photo with the applicant's name, town where the activity is located, and the date taken.”

PERMITTING IMPLICATIONS

To assist the Town with the future permitting of these recommendations, FBE has prepared an overview of the permit types that will likely be required for boardwalk construction and maintenance recommended by FBE (Table 1). As noted above, FBE has conducted wetland delineations and prepared all the wetland documents that will be required by the Maine Department of Environmental Protection (MEDEP) for the sites identified as highly impacted. Additionally, FBE has confirmed wetland presence and prepared wetland documents for medium and low impact sites that are already located within NWI wetland mapping. This will streamline future permitting efforts for medium or low priority sites.

A number of activities are exempted from permitting under the Section 480-Q-17 of the NRPA. If an exception has not already been used on a parcel and the site is not within or adjacent to a Wetland of Special Significance (WoSS), then an exemption may be applicable. This will require an inventory of the permits acquired by the town to-date.

It is worth noting that there are some boardwalks that may not have had an initial permit (sites with just a two-by-four laid over a wet crossing), and this will likely impact the permit required to conduct maintenance. If in-kind maintenance is required without an existing permit for the site, it is likely that any boardwalk maintenance actions will be categorized under new boardwalk and require a Tier 1 permit

Table 1. Permitting implications for each boardwalk recommendation type.

Recommendations	Permitting Implications
Trail Assessment Sites	
New boardwalk	Tier 1 or exemption
Boardwalk Assessment Sites	
Extension	Tier 1 or exemption
In kind-maintenance	Permit-by-Rule or exemption

RESULTS AND DISCUSSION

GREENBELT INVENTORY RESULTS

The greenbelt infrastructure assessment resulted in 164 identified sites, of which 119 sites were existing boardwalk sites and 45 sites were trail sites that require boardwalk infrastructure (Figure 3). The Town of Cape Elizabeth currently maintains a cumulative 2,777 feet of boardwalks on the Greenbelt trails and FBE identified that an additional 2,046 feet of new boardwalks or boardwalk extensions are needed.

Of the existing boardwalk infrastructure sites, almost half do not require maintenance or updates and are in fully functional condition (Table 2). We recommend an extension for 19 of the boardwalk sites to improve their functionality and their usability while decreasing negative impact on the surrounding vegetation (note that 6 of these 19 also require some other maintenance, but for summary purposes in this report, they are categorized by extension). We recommend in-kind maintenance for 46 of the existing boardwalk infrastructure assessment sites. In-kind maintenance refers to repairs or improvements that do not expand the footprint of the boardwalk, and include recommendations such as replacing rotting decking, replacing rotting foundations or posts or installing foundations on boardwalks that currently lack stability, or replacing damaged or missing boardwalk slats. The most recommended maintenance action on existing boardwalks (in-kind maintenance) was replace boardwalk slats and replace boardwalk segments (Figure 4). We recommend a new boardwalk at 45 locations. All suggested repairs, extensions, and new boardwalk recommendations are quantified using the rating system devised for this project, measured, and photo documented in the assessment database.

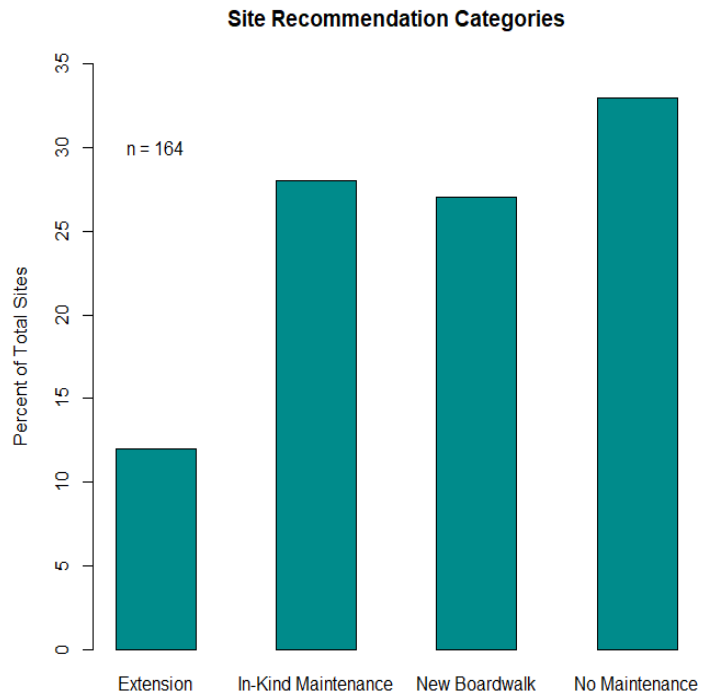


Figure 3. Recommended site maintenance categories as a percentage of total sites inventoried.

Table 2. Number of sites identified during the assessment.

	Count
Trail Assessment Sites	
New boardwalk	45
Boardwalk Assessment Sites	
Extension	19
In kind-maintenance	46
No maintenance	54
Total	164

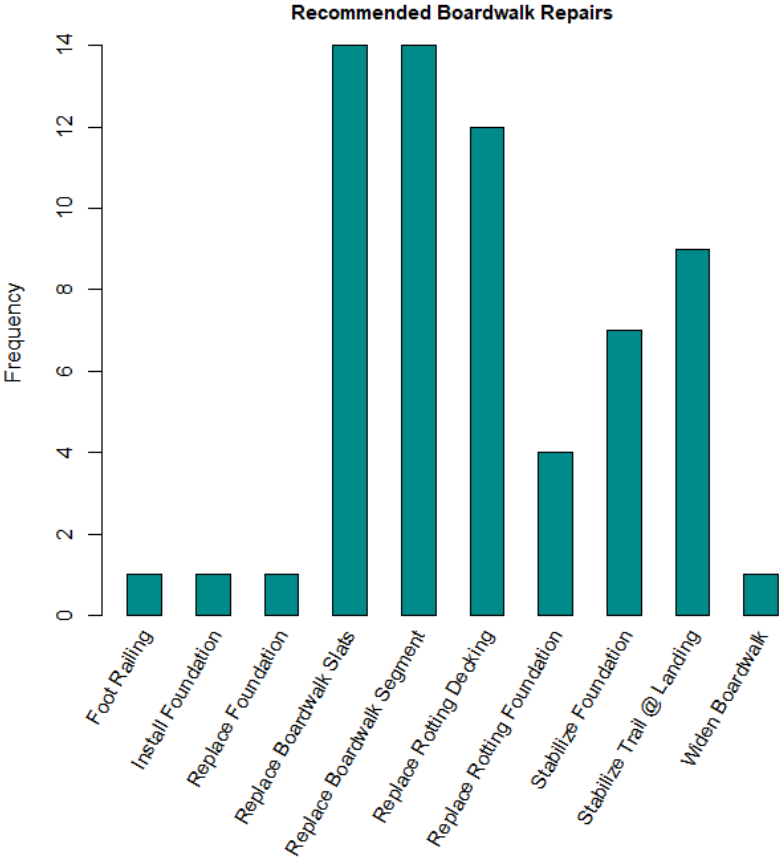


Figure 4. Frequency of the recommended maintenance categories for existing boardwalks.



Greenbelt assessment sites were identified at 16 of the 18 greenbelt trails in Cape Elizabeth (Table 3, Figure 5). The Stonegate Trail, Cross Hill Trail, and Gull Crest Trail had the largest number of identified sites at 34, 29, and 26 sites, respectively. The Pollack Brook Preserve and Turkey Hill Farm did not have any existing boardwalk infrastructure or sites that require new boardwalk infrastructure.

Table 3. Number of identified sites at all Greenbelt trails.

Greenbelt Trail	No. sites with no Recommendations	No. sites with Recommendations	Total Count
Stonegate Trail	11	23	34
Cross Hill Trail	7	22	29
Gull Crest Trail*	7	19	26
Winnick Woods	7	6	13
Highlands Trail	5	6	11
Robinson Woods	8	3	11
Runaway Farm Trail	0	7	7
Canterbury Trail	0	5	5
Town Center Trail	1	4	5
Town Farm Trail	0	5	5
Cottage Brook Trail	1	3	4
Great Pond Trail	3	1	4
Dyer Woods Trail	1	2	3
Hobstone Trails	0	3	3
Dyer Hutchinson Trail	1	1	2
Whaleback Trail	2	0	2
Pollack Brook Preserve	0	0	0
Turkey Hill Farm	0	0	0
Total	54	110	164
<i>The Gull Crest Trail was assessed prior to boardwalk infrastructure updates in May 2020, so it is possible some recommendations were already addressed.</i>			

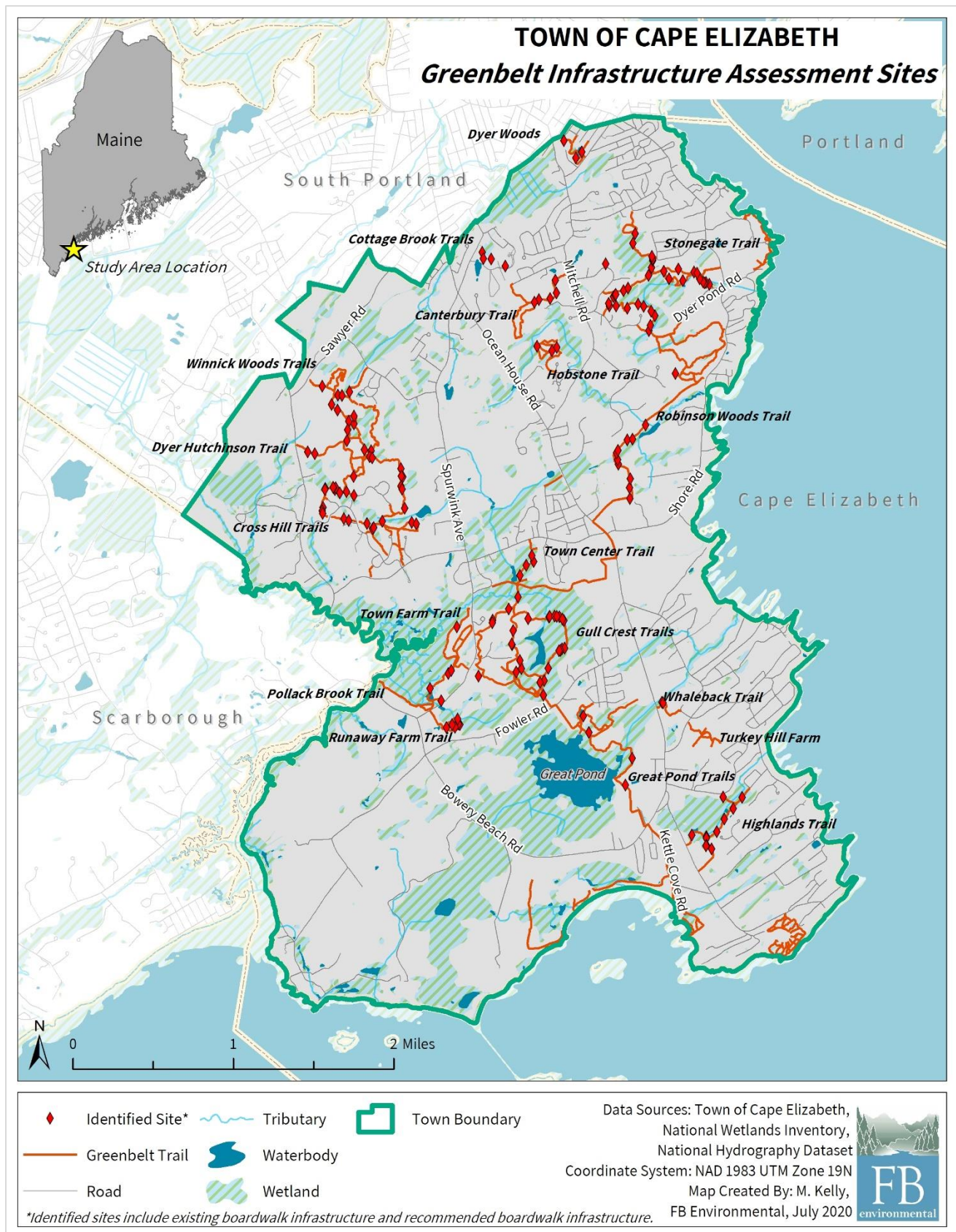


Figure 5. Sites identified during the greenbelt boardwalk infrastructure assessment, including existing boardwalk sites and recommended boardwalk sites.

SITE PRIORITIZATION SUMMARY

Sites identified during the greenbelt infrastructure assessment were prioritized by condition impact rating and trail use level. First, the site impact rating incorporates the severity and quantity of the impacts present at a site, indicating sites that should be treated as high priority (refer to Figure 1 and Figure 2 for rating scale for existing boardwalk assessments and trail assessments, respectively). Second, the trail use level indicates the order that trail updates and repairs should be completed to improve the greenbelt trails for the largest number of users. Site prioritizations are summarized below in Table 4 and displayed spatially in Figure 6. Figures 7-9 display identified sites and their corresponding site number at a zoomed-in scale. A full table of all prioritized sites is presented in Appendix B, Table B1 and Table B2, as well as in the database file.

Boardwalk Assessment Site Priorities

Seventeen high priority sites were identified for boardwalk assessment sites, and ten of these are rated as high impact on heavily trafficked trails (Table 4). All highest priority sites exhibited excessive muddiness and lacked complete boardwalk infrastructure; many lacked foundations (Photo 9). Note that Gull Crest 1-36 and 1-38 located on the outer loop of the Gull Crest Trail, were rated as high priority for repairs due to quantity/severity of rotting or missing boards (Photo 10). Gull Crest sites 1-34 – 1-38 were potentially fixed in May 2020 by scheduled repair work. At sites that are ranked as medium or low priority and experience muddiness or standing water, we recommend signage that requests bikers dismount while crossing wet areas. Deep bike ruts in muddy trail sections exacerbate existing problems and often encourage walkers and runners to seek alternate routes around the mud and create side trails.



Photo 9. Example of high priority boardwalks lacking foundations.



Photo 10. Example of high priority repairs. Site 1-38 requires more than ten repairs similar to this.

Table 4. Number of prioritized sites for all boardwalk assessment sites.

Boardwalk Assessment Sites	Count
High Priority	17
<i>High Impact/Heavily Trafficked</i>	10
<i>High Impact/Moderately Trafficked</i>	6
<i>High Impact/Lightly Trafficked</i>	1
Medium Priority	38
<i>High Impact/Heavily Trafficked</i>	10
<i>Medium Impact/Moderately Trafficked</i>	23
<i>Low Impact/Lightly Trafficked</i>	6
Low Priority	10
<i>Low Impact/Heavily Trafficked</i>	21
<i>Low Impact/Moderately Trafficked</i>	28
<i>Low Impact/Lightly Trafficked</i>	5
Not a Priority	54
<i>No Impact/Heavily Trafficked</i>	6
<i>No Impact/Moderately Trafficked</i>	3
Total	119

Trail Assessment Site Priorities

Nine high priority sites were identified for boardwalk assessment sites, and five of which are rated as high impact on heavily trafficked trails (Table 5). All highest priority sites exhibited excessive muddiness and multiple side trails that passed around the mud through the vegetation on either side of the trail (Photo 11). Many also had standing water in the trail at the time of assessment, exacerbated by deep bike ruts or footprints.



Photo 11. Example site of excessive mud with side trails going right and left around the site.

Table 5. Number of prioritized sites for all boardwalk assessment sites.

Trail Assessment Sites	Count
High Priority	9
<i>High Impact/Heavily Trafficked</i>	<i>5</i>
<i>High Impact/Moderately Trafficked</i>	<i>4</i>
Medium Priority	10
<i>Medium Impact/Heavily Trafficked</i>	<i>3</i>
<i>Medium Impact/Moderately Trafficked</i>	<i>4</i>
<i>Medium Impact/Lightly Trafficked</i>	<i>3</i>
Low Priority	26
<i>Low Impact/Heavily Trafficked</i>	<i>8</i>
<i>Low Impact/Moderately Trafficked</i>	<i>12</i>
<i>Low Impact/Lightly Trafficked</i>	<i>6</i>
Total	45

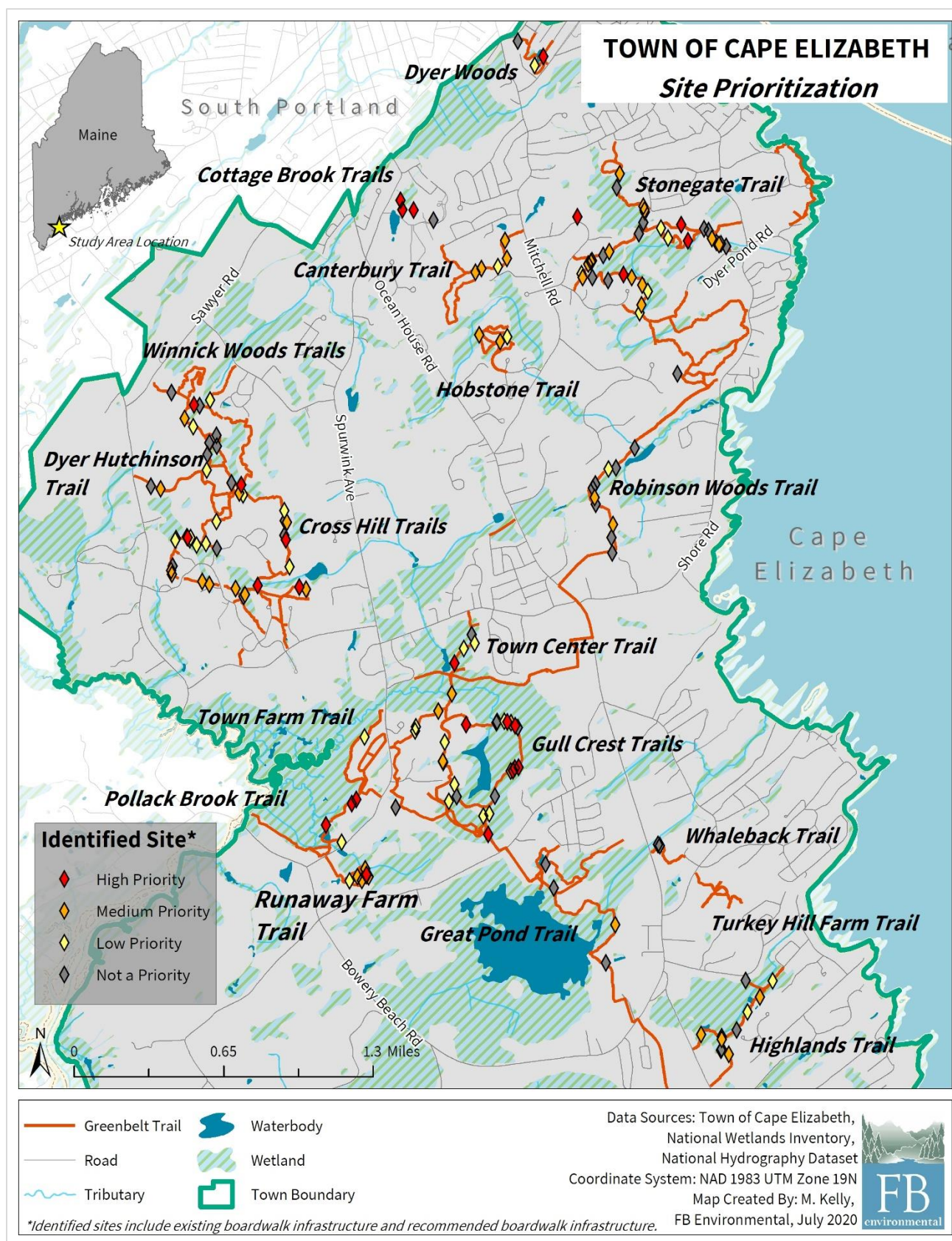


Figure 6. Map depicting identified boardwalk and trail sites. High priority sites are marked by red points, medium priority sites as orange points, low priority sites as yellow points, and sites that are not a priority as they do not need maintenance as grey points. Figures 7-9 display identified sites at a smaller scale.

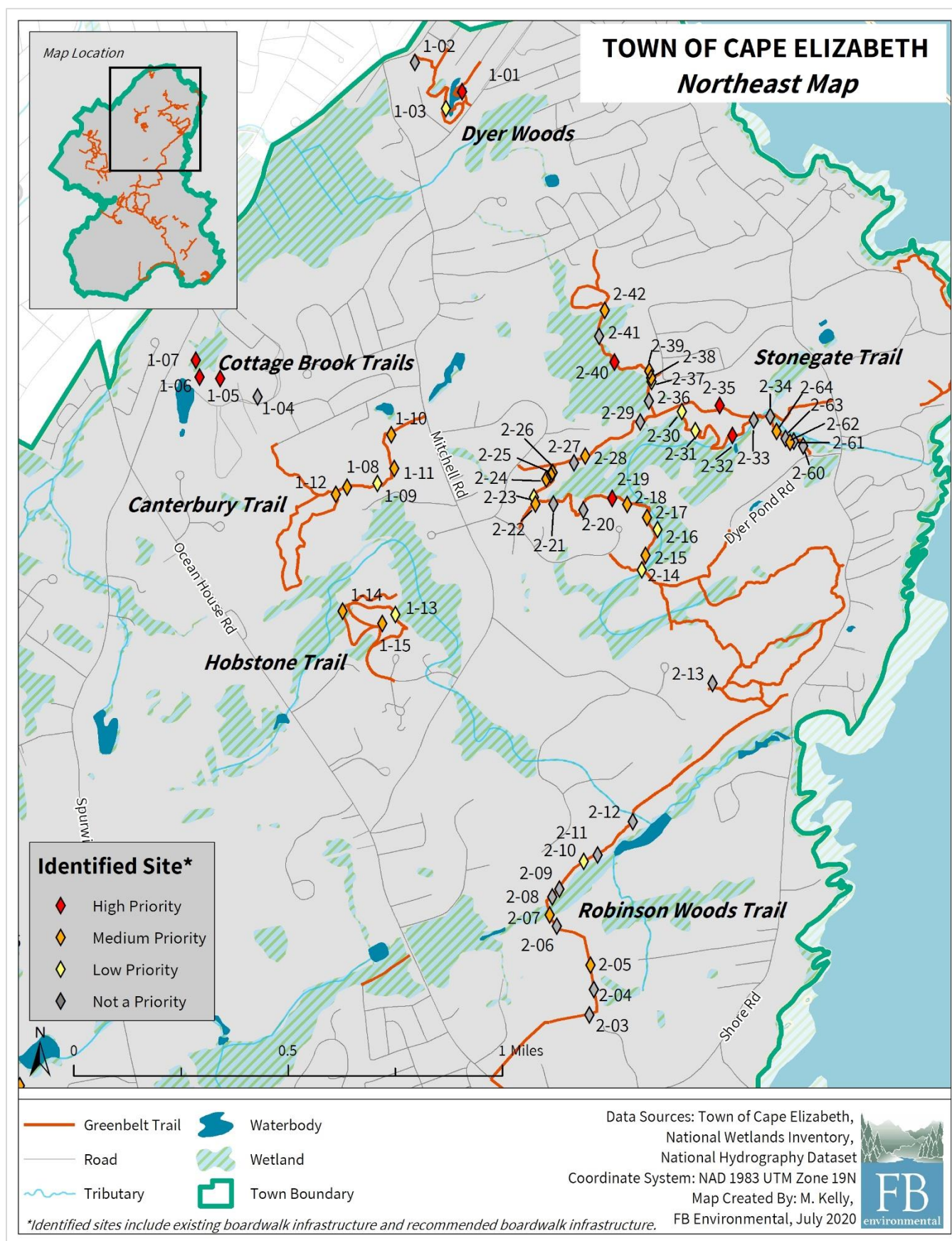


Figure 7. Map depicting identified sites and corresponding site numbers in the northeast area of Cape Elizabeth.

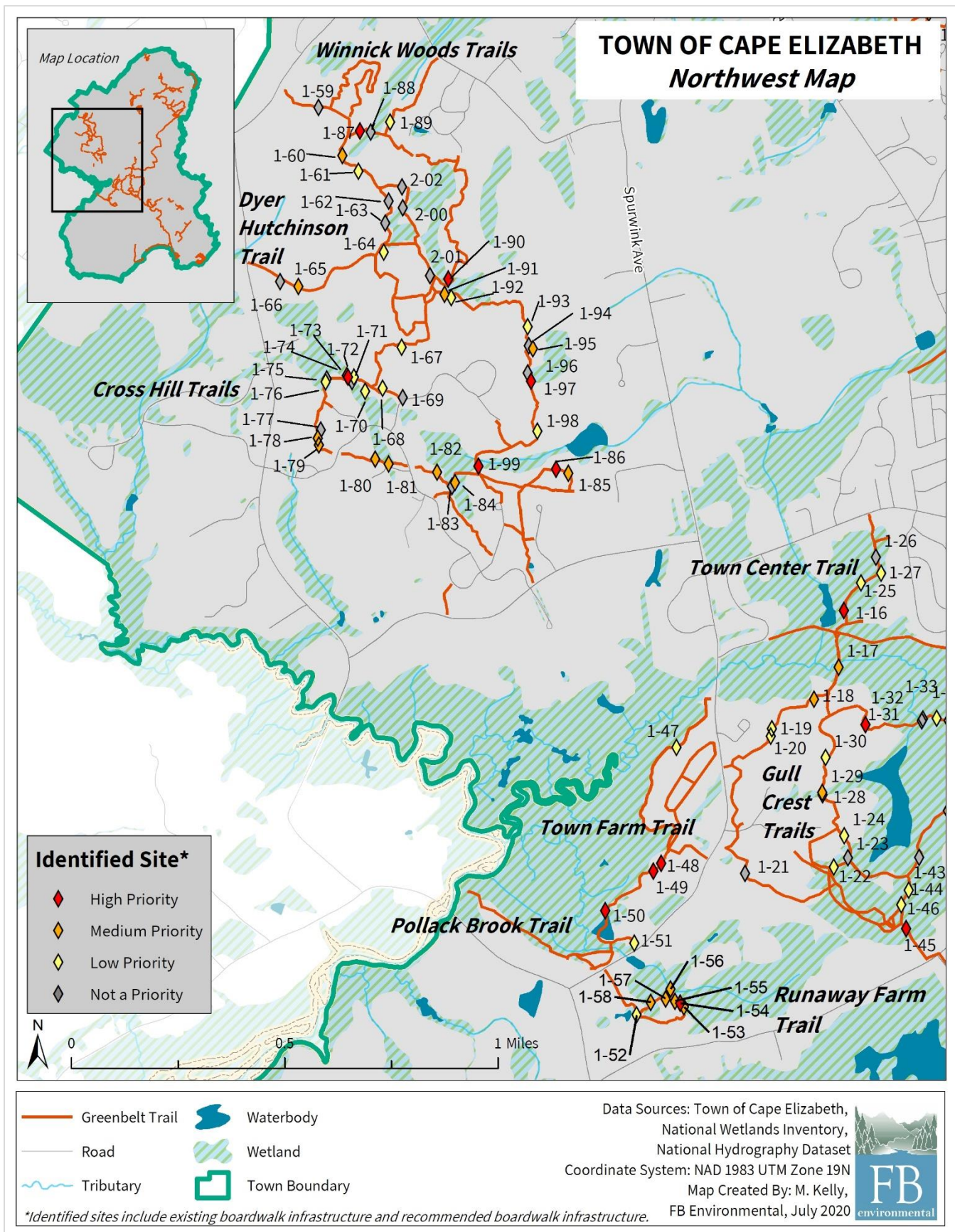


Figure 8. Map depicting identified sites and corresponding site numbers in the northwest area of Cape Elizabeth.

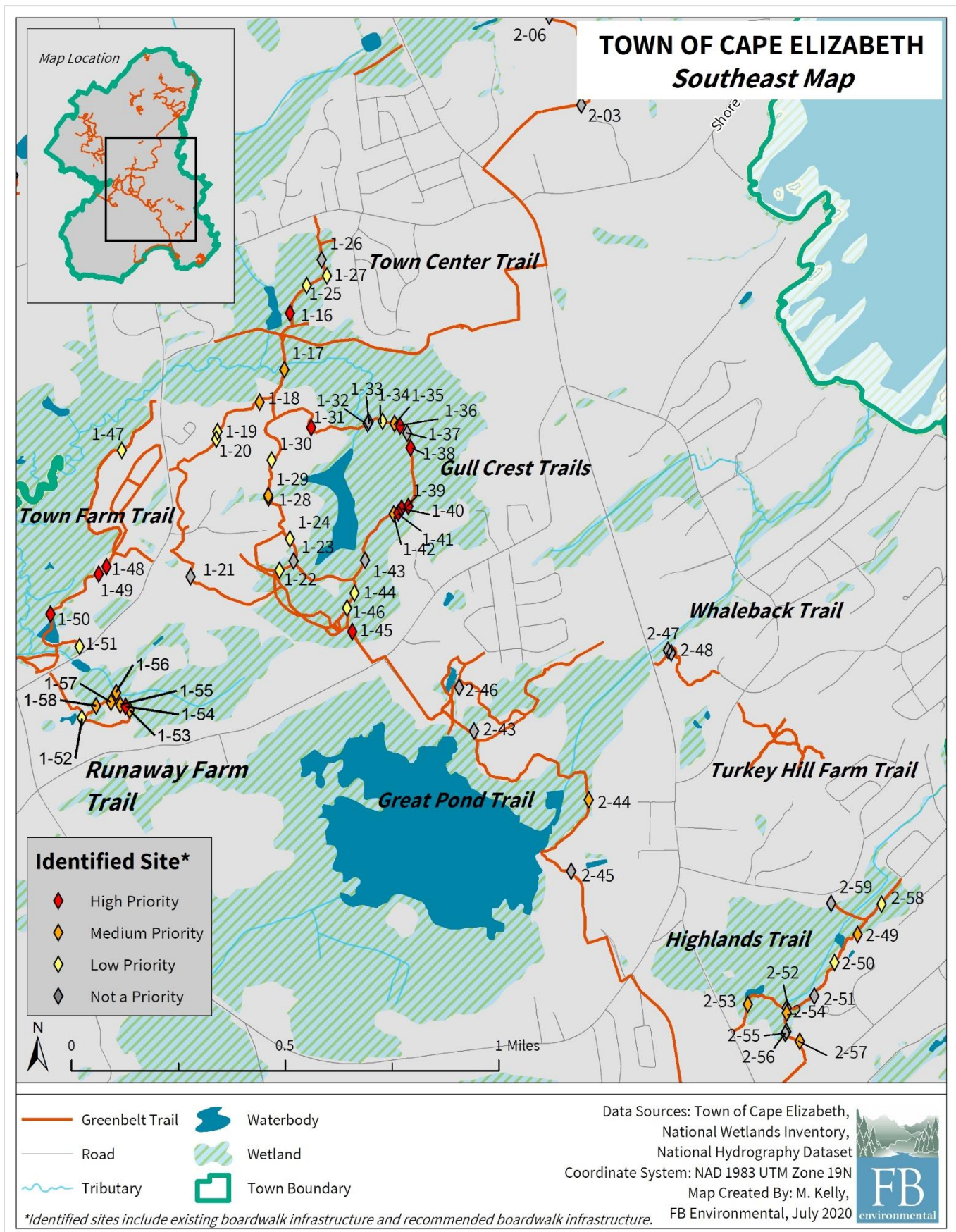


Figure 9. Map depicting identified sites and corresponding site numbers in the southeast area of Cape Elizabeth.

RECOMMENDATIONS

FBE recommends that the Cape Elizabeth Conservation Committee use the prioritization system discussed and presented in this report to focus on the following action items:

- Repair existing greenbelt boardwalk infrastructure that are high impact and located on heavily trafficked trails. Begin with repairs to rectify safety hazards in the future, such as missing or rotting boardwalk slats or boardwalk instability.
- Install new boardwalk infrastructure at high impact sites to protect the trail vegetation and increase user enjoyment. Start on trails that are heavily or moderately trafficked.
- At sites that consistently experience heavy traffic causing side trails on surrounding vegetation, consider posting educational signs about vegetation protection.
- At medium or low impact sites that are not priorities, consider posting additional signs requesting bikers dismount while crossing wet areas. Deep bike ruts in muddy trail sections worsen existing problems and often encourage walkers and runners to seek alternate routes around the mud and create side trails.
- For medium or low impact sites that are significant problems only during seasonal wetness, consider closing trails to bikers after heavy rain.
- Use the accompanying assembled database to track trail repairs/updates, changes, or user comments/complaints.



Greenbelt sign encouraging bikers to dismount to protect trail integrity.

Ultimately, the Cape Elizabeth Greenbelt Trail Network is a valuable resource for the town and surrounding communities. This report, in tandem with the trail inventory database can be utilized by the Cape Elizabeth Conservation Committees to prioritize areas for improvement and devise a plan of action.

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APPENDIX A: GREENBELT ASSESSMENT FIELD FORM

All data will be entered electronically in the field using Fulcrum data collection app.

1

Cape Elizabeth Greenbelt Infrastructure Assessment



Site Name: _____ Date: _____
GPS Point: _____ Time: _____

Trails Assessment: to assess trails adjacent to boardwalks that may impact boardwalk functionality and use

Observed User Group(s): _____

Trail Surface Type: ☐ Packed Dirt
☐ Paved
☐ Gravel
☐ Rock Stepping Stone
☐ Non-Durable Surface/Mud
☐ Other: _____

Signs of impact: ☐ Trail widening
☐ Exposed roots
☐ Trail surface erosion
☐ Excessive muddiness
☐ Impact on surrounding vegetation
☐ Visitor created trails/side trails.
☐ Other: _____

Trail Use Level: ☐ Low: Trail appears to be lightly used.
☐ Medium: Trail appears to be moderately used.
☐ High: Trail appears to be in a heavily trafficked area.

Trail Impact: ☐ Low: Trail has 0-1 signs of impact.
☐ Medium: Trail has 2-3 signs of impact.
☐ High: Trail has 3+ signs of impact.

Notes: _____

Boardwalk Assessment: to assess all boardwalks

Condition Assessment: ☐ Missing boardwalk slats
☐ Uneven boardwalk
☐ Rotting wood
☐ Impassable
☐ Impaired foot railing
☐ Compromised landing(s)

Boardwalk Use Level: ☐ Low: Boardwalk appears to be lightly used.
☐ Medium: Boardwalk appears to be moderately used.
☐ High: Boardwalk appears to be in a heavily trafficked area.

Boardwalk Condition: ☐ 1: Brand new
☐ 2: Like-new functional conditions with signs of aesthetic wear
☐ 3: Functional but signs of wear
☐ 4: Loss of some function but still useable
☐ 5: Completely Broken

Dimensions of existing boardwalk (specify unit):

Length: _____

Width: _____

Height: _____

If slats are parallel to travel, are boardwalk slat spacing larger than 1 inch? _____

Boardwalk Condition Notes: _____

All data will be entered electronically in the field using Fulcrum data collection app.

2

Recommended Maintenance

Boardwalk Needed? ☐ Yes
☐ No

Maintenance: ☐ Extension
☐ Reroute (*additional notes below*)
☐ Replace boardwalk segment
☐ Replace boardwalk slats
☐ Replace rotting wood (decking)
☐ Replace rotting wood (foundation/posts)
☐ Stabilize trail surfaces at landings
☐ Other: _____

Dimensions of proposed boardwalk or extension (specify units):

Length: _____

Width: _____

Height: _____

Permitting Implications

Wetland Present? ☐ Yes
☐ No

Distance to Wetland (ft): _____

Potential Vernal Pool
 Adjacent? ☐ Highly likely
☐ Likely
☐ Unlikely
☐ Unknown

Vernal Pool Notes: _____

Cowardin Wetland Type: _____

Resource Protection District site is located within:

☐ Resource Protection 1 – Critical Wetland District
☐ Resource Protection 2 – Wetlands Protection District
☐ Resource Protection 3 – Floodplain District
☐ Other: _____

Overlay District site is located within:

☐ Resource Protection 1 – Critical Wetland Buffer Overlay District
☐ Shoreland Performance Overlay District
☐ Great Pond Watershed Overlay District

To be delineated? ☐ Yes (new boardwalk or expansion recommended)
☐ No

Notes: _____

Photo Documentation (*Photos will be attached electronically*)

Photo Caption: _____

Photo Direction (cardinal direction camera pointed towards): _____

Additional site notes:

APPENDIX B: PRIORITIZATION TABLE OF IDENTIFIED SITES

Table B1. All existing boardwalk assessment sites prioritized by impact condition rating and trail use level.

Boardwalk Assessment Sites		Count
High Priority	High Priority	17
	<i>High Impact/Heavily Trafficked</i>	<i>10</i>
	Cross Hill 1-73	
	Cross Hill 1-99*†	
	Dyer Woods 1-01*†	
	Gull Crest 1-36	
	Gull Crest 1-38	
	Gull Crest 1-39	
	Gull Crest 1-40	
	Gull Crest 1-41	
	Winnick Woods 1-87*†	
	Winnick Woods 1-90*†	
	<i>High Impact/Moderately Trafficked</i>	<i>6</i>
	Cottage Brook Trail 1-06*†	
	Cottage Brook Trail 1-07*†	
	Gull Crest 1-45*†	
	Stonegate Trail 2-19*†	
	Stonegate Trail 2-35	
	Stonegate Trail 2-40	
	<i>High Impact/Lightly Trafficked</i>	<i>1</i>
	Runaway Farm 1-54	
Medium Priority	Medium Priority	39
	<i>Medium Impact/Heavily Trafficked</i>	<i>10</i>
	Cross Hill 1-74	
	Cross Hill 1-78	
	Cross Hill 1-79	
	Cross Hill 1-80*	
	Cross Hill 1-81	
	Gull Crest 1-29	
	Gull Crest 1-35	
	Gull Crest 1-42	
	Winnick Woods 1-60	
	Winnick Woods 1-91	
	<i>Medium Impact/Moderately Trafficked</i>	<i>23</i>
	Canterbury Trail 1-08*	
	Canterbury Trail 1-10	
	Canterbury Trail 1-11	
	Great Pond Trail 2-44	
	Highlands Trail 2-49*†	
	Highlands Trail 2-53	

	Highlands Trail 2-54	
	Highlands Trail 2-57	
	Robinson Woods 2-05	
	Robinson Woods 2-07	
	Stonegate Trail 2-15	
	Stonegate Trail 2-17	
	Stonegate Trail 2-18*	
	Stonegate Trail 2-24	
	Stonegate Trail 2-25*	
	Stonegate Trail 2-26	
	Stonegate Trail 2-28*	
	Stonegate Trail 2-38*	
	Stonegate Trail 2-39	
	Stonegate Trail 2-42	
	Stonegate Trail 2-62*†	
	Stonegate Trail 2-64	
	Town Center Trail 1-17	
	<i>Medium Impact/Lightly Trafficked</i>	5
	Hobstone Trails 1-15	
	Runaway Farm 1-53*†	
	Runaway Farm 1-55*†	
	Runaway Farm 1-56*†	
	Stonegate Trail 2-22	
Low Priority	Low Priority	10
	<i>Low Impact/Heavily Trafficked</i>	6
	Dyer Woods 1-03	
	Winnick Woods 1-61	
	Gull Crest 1-34	
	Stonegate Trail 2-14	
	Cross Hill 1-76	
	Robinson Woods 2-10	
	<i>Low Impact/Moderately Trafficked</i>	3
	Stonegate Trail 2-23	
	Stonegate Trail 2-16	
	Stonegate Trail 2-37	
	<i>Low Impact/Lightly Trafficked</i>	1
	Runaway Farm 1-52	
No Impact	Not a Priority	54
	<i>No Impact/Heavily Trafficked</i>	21
	Cross Hill 1-71	
	Cross Hill 1-75	
	Cross Hill 1-77	
	Cross Hill 1-83	
	Cross Hill 1-95	
	Cross Hill 1-96	

Gull Crest 1-28	
Gull Crest 1-32	
Gull Crest 1-33	
Gull Crest 1-37	
Gull Crest 1-43	
Robinson Woods 2-09	
Robinson Woods 2-11	
Robinson Woods 2-12	
Winnick Woods 1-59	
Winnick Woods 1-62	
Winnick Woods 1-63	
Winnick Woods 1-88	
Winnick Woods 2-00	
Winnick Woods 2-01	
Winnick Woods 2-02	
<i>No Impact/Moderately Trafficked</i>	<i>28</i>
Cottage Brook Trail 1-04	
Dyer Hutchinson 1-66	
Dyer Woods 1-02	
Great Pond Trail 2-43	
Great Pond Trail 2-45	
Great Pond Trail 2-46	
Gull Crest 1-23	
Highlands Trail 2-51	
Highlands Trail 2-52	
Highlands Trail 2-55	
Highlands Trail 2-56	
Highlands Trail 2-59	
Robinson Woods 2-03	
Robinson Woods 2-04	
Robinson Woods 2-06	
Robinson Woods 2-08	
Robinson Woods 2-13	
Stonegate Trail 2-20	
Stonegate Trail 2-21	
Stonegate Trail 2-27	
Stonegate Trail 2-29	
Stonegate Trail 2-33	
Stonegate Trail 2-34	
Stonegate Trail 2-36	
Stonegate Trail 2-41	
Stonegate Trail 2-60	
Stonegate Trail 2-61	
Stonegate Trail 2-63	
<i>No Impact/Lightly Trafficked</i>	<i>5</i>

	Cross Hill 1-69	
	Gull Crest 1-21	
	Town Center Trail 1-26	
	Whaleback Trail 2-47	
	Whaleback Trail 2-48	
<i>*Extension recommended</i>		
<i>†Permitting maps attached</i>		

Table B2. All trail assessment sites prioritized by impact condition rating and trail use level.

Trail Assessment Sites		Count
High Priority	High Priority	9
	<i>High Impact/Heavily Trafficked</i>	<i>5</i>
	Cross Hill 1-97 [†]	
	Gull Crest 1-31 [†]	
	Town Farm Trail 1-48 [†]	
	Town Farm Trail 1-49 [†]	
	Town Farm Trail 1-50 [†]	
	<i>High Impact/Moderately Trafficked</i>	<i>4</i>
	Cottage Brook Trails 1-05 [†]	
	Cross Hill 1-86 [†]	
	Stonegate Trail 2-32 [†]	
	Town Center Trail 1-16 [†]	
Medium Priority	Medium Priority	10
	<i>Medium Impact/Heavily Trafficked</i>	<i>3</i>
	Cross Hill 1-82	
	Cross Hill 1-84 [†]	
	Cross Hill 1-94	
	<i>Medium Impact/Moderately Trafficked</i>	<i>4</i>
	Canterbury Trail 1-12	
	Cross Hill 1-85 [†]	
	Dyer Hutchinson 1-65	
	Gull Crest 1-18	
	<i>Medium Impact/Lightly Trafficked</i>	<i>3</i>
	Hobstone Trails 1-14 [†]	
	Runaway Farm 1-57	
	Runaway Farm 1-58	
Low Priority	Low Priority	26
	<i>Low Impact/Heavily Trafficked</i>	<i>8</i>
	Cross Hill 1-64	
	Cross Hill 1-67	
	Cross Hill 1-70	
	Cross Hill 1-72	
	Cross Hill 1-92	
	Cross Hill 1-93	

	Cross Hill 1-98	
	Gull Crest 1-30	
	<i>Low Impact/Moderately Trafficked</i>	<i>12</i>
	Canterbury Trail 1-09	
	Gull Crest 1-19	
	Gull Crest 1-20	
	Gull Crest 1-22 [†]	
	Gull Crest 1-24	
	Gull Crest 1-44 [†]	
	Gull Crest 1-46 [†]	
	Highlands Trail 2-50	
	Highlands Trail 2-58	
	Stonegate Trail 2-30	
	Stonegate Trail 2-31	
	Winnick Woods 1-89	
	<i>Low Impact/Lightly Trafficked</i>	<i>6</i>
	Cross Hill 1-68	
	Hobstone Trails 1-13	
	Town Center Trail 1-25 [†]	
	Town Center Trail 1-27 [†]	
	Town Farm Trail 1-47	
	Town Farm Trail 1-51	
<i>[†]Permitting maps attached</i>		