



Naugatuck River Greenway Trail Design and Management Guide

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Credits

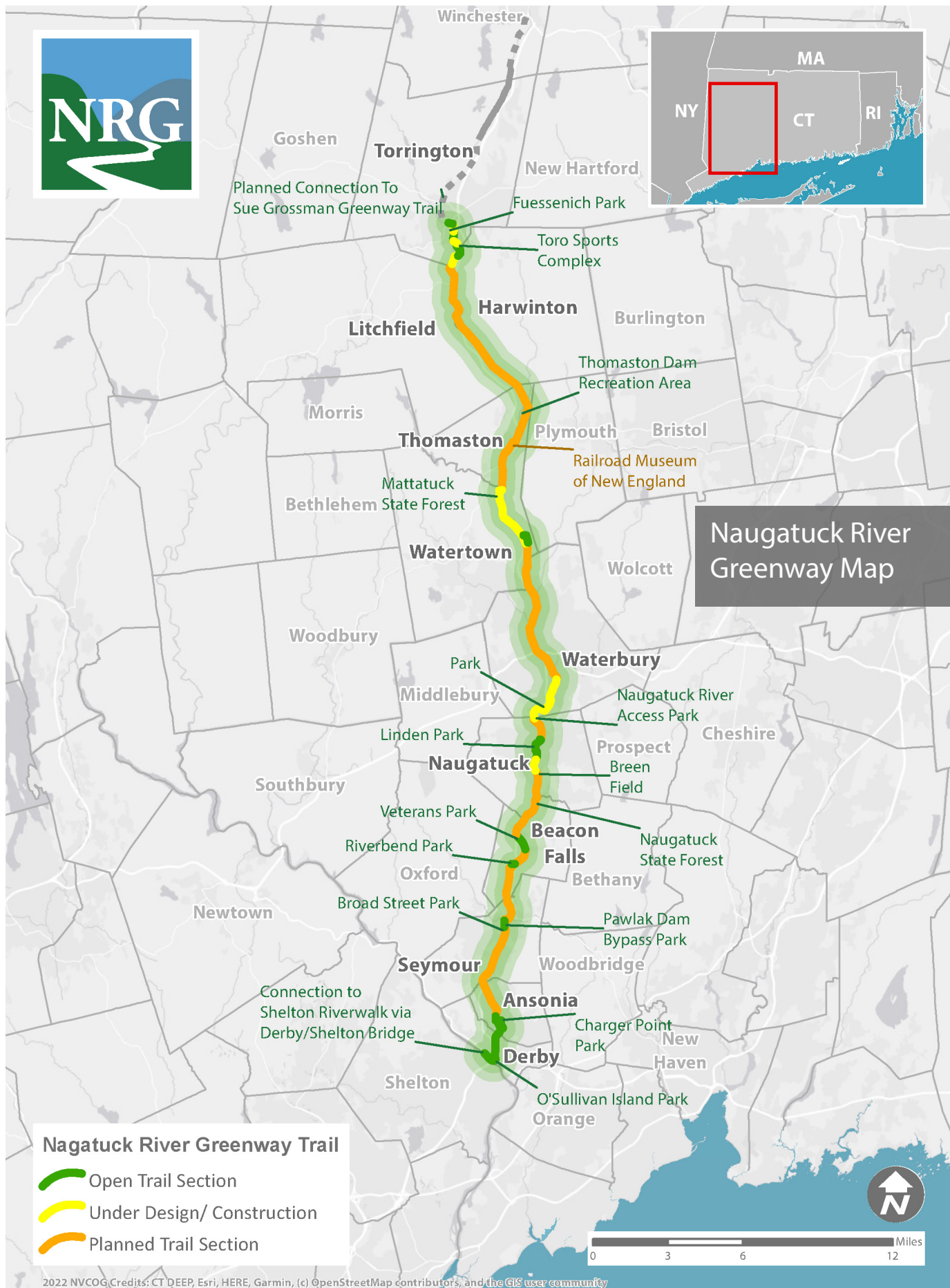
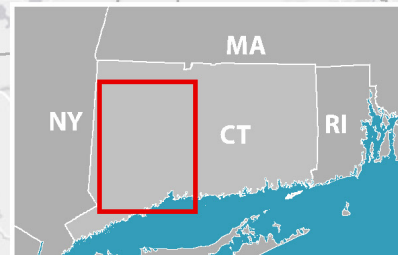
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NRG Steering Committee:

Rista Malanca, Co-Chair
Jack Walsh, Co-Chair

NVCOG Staff:

Rick Dunne, Executive Director
Mark Nielsen, Assistant Director
Joshua Lecar, Director of Planning
Aaron Budris, Senior Regional Planner
Richard Donovan, Transportation Planner II
Kevin Ellis, P.E., Transportation Engineer



Background and Introduction

The Naugatuck River Greenway (NRG) is an officially designated Connecticut State Greenway consisting of open and green spaces along the Naugatuck River. The NRG Trail is a partially constructed multi-use path within the greenway corridor. When complete, the NRG Trail will link 11 municipalities, help reclaim the Naugatuck River for recreation, provide an alternate mode of transportation, support tourism and economic development in the region, and improve the quality of life of residents.

The NRG Trail, as envisioned, will begin in Torrington and follow the river south through Litchfield, Harwinton, Thomaston, Watertown, Waterbury, Naugatuck, Beacon Falls, Seymour, and Ansonia before ending in Derby at the Housatonic River. As of 2022, there are eight sections of the NRG Trail open to the public in six communities, totaling more than five miles, and representing just over 12% of the total length of the planned trail. Additional sections are in various phases of design and conceptual planning, with construction underway or expected in the coming years.

The NRG Trail will be an accessible multi-use trail, meaning that it will ideally be at least 10 feet wide to allow bidirectional travel, be physically separated from vehicular traffic, and feature either a paved surface (typically asphalt) or compacted stone dust to allow for wheeled users. The trail will, where possible, be compliant with the Americans with Disabilities Act (ADA), ensuring that the trail will be accessible to not only pedestrians and bicyclists, but to users of all abilities. While a road separated facility is ideal, the reality of the geography and physical constraints of the Naugatuck River valley may dictate compromises. Sections of the trail could potentially be developed as on-road bike lanes for cyclists combined with sidewalks for pedestrians. Shared use roadways where motor vehicles, cyclists and pedestrians share the road could also be implemented where low motor vehicle volumes and speeds permit and are conducive to safe shared use. A “rail with trail”



Busy trails offer many opportunities for conflict, many of which can be mitigated with proper trail design and management practices.

option may be necessitated by proximity to an active rail line with no feasible alternative to locate the trail along a different alignment. Along these sections within the active rail corridor, proper separation and safety measures will be installed.

National research regarding conflicts on multiple-use trails by Federal Highway Administration (FHWA) and the Rails to Trails Conservancy (RTC) concluded that conflicts on shared-use trails are few, if any, and most users are generally satisfied with their experiences. The perception of users is that these trails are much safer than on-road facilities and do not pose any significant hazards. Even a small number of conflicts, however, can have serious consequences. These trails do attract a wide range of users with differing abilities, behaviors, and travel speeds. The comingling of all levels of bicyclists, pedestrians, and others can create safety concerns and potential for conflict, especially as the number and density of users increase. Conflicts can arise because of the varying travel characteristics of different user groups.

Some examples of trail conflict are when:

- Bicyclists ride too fast for conditions or traffic on the trail.
- Bicyclists ride in a reckless manner.
- Trails are too narrow for traffic, or do not provide proper sightlines to ensure safe use.
- Groups of walkers/rollers travel side-by-side or take up too much of the trail width making it difficult for traffic to pass.
- Pets are allowed to walk on the trail unleashed or a leashed pet is allowed to walk on the opposite side of the trail from its owner, blocking traffic.
- Pets are allowed to approach other trail users or owners do not clean up after them.
- Parents do not supervise young children who wander onto the wrong side of the trail or are not skilled enough to ride properly.
- Users are inattentive to others on the trail and unaware of the abilities and needs of others.
- Higher speed users not announcing themselves when approaching slower users, who can be startled or inadvertently step into the path of the bicyclist.

While these “conflicts” may not all result in physical contact or collision, inconsiderate or perceived bad behavior by others can make the use of the trail less enjoyable and limit trail use. It is important for all users to be reminded that the trail is a multi-user/shared facility and not a single-use facility intended for the sole enjoyment and use of one type of user. Walkers will encounter bicyclists with different abilities and skill levels, as well as those traveling at faster rates, and bicyclists will need to yield to and move around all kinds of walkers, including children, users with mobility challenges, and those pushing a stroller or walking a dog. They will not be able to ride as fast as they would want and there will be times when their movement is obstructed. It is also important for bicyclists to alert walkers that they are approaching from the rear and of their intention to pass.

Research demonstrates that proper trail design, good operations and management practices, as well as on-going maintenance can effectively

minimize the potential for many conflicts, enhance user safety, and contribute to user satisfaction. These practices also have the effect of limiting liability concerns. When a trail is designed and built to acceptable standards and well maintained, the municipality’s exposure to liability is significantly reduced. The physical layout of the trail can provide sufficient space to accommodate multiple users and ameliorate over-crowding. Soft shoulders, clear zones, and frequent rest areas can be provided for users to stop and rest, keeping trail traffic free flowing. Information and education practices can provide trail users with sufficient understanding of trail etiquette, trail ethics, and trail courtesy. Rules and regulations are also needed to define trail sharing responsibilities. If they are in effect, it is important that they be consistently and regularly enforced.

The ultimate success of the NRG Trail, and the pleasure and safety of trail users, depends on a combination of good design, effective trail management and maintenance, and the implementation and fair enforcement of well thought out rules and regulations. This document will address common issues and best practices in all three of those aspects of trail development and operation. While municipalities will have ultimate say in how the section of NRG Trail in their community will be developed and operated, the NRG Trail will eventually be one interconnected trail system. Coordination between trail communities on rules and regulations, common wayfinding and signage, and minimum design standards can help make inter-municipal travel along the trail seamless and help prevent potential conflict.

Multiuse Trail Design Considerations

Each municipality through which the NRG Trail will pass will be responsible for the future development of the trail within that respective municipality. Decisions about how the trail will look and function will be made locally, and municipalities are encouraged to develop a trail that meets local needs, both aesthetically and functionally. As those decisions are made, however, the overall vision of the NRG trail should be considered. The goal of the NRG Trail is to provide a continuous, safe multi-use path for users of all abilities between Torrington and Derby, and trail sections developed should support that stated goal.

Design Standards



The NRG Trail Phase I in Waterbury under construction and prior to paving in Spring 2022.

To ensure continuity of the NRG Trail, basic design standards typical of multi-use trails should be followed on all NRG Trail segments. For instance, the trail needs to be at least 10 feet wide to carry bi-directional bicycle traffic but can be as little as 8 feet in constrained areas for short distances. Wider trail widths, 12-to-14 feet, should be considered in areas where higher traffic is expected, where a greater variety

of users is expected, or where people may move more slowly. The wider width will help to avoid congestion and potential conflict. Sight lines should be adequate to see and anticipate oncoming or slow traffic ahead and for the user speeds expected.

Existing design standards should be referenced when developing the NRG Trail to ensure user safety and trail functionality. The American Association of State Highway and Transportation Officials (AASHTO) published the “Guide for the Development of Bicycle Facilities, 4th Edition” in 2012. The guide covers both shared use paths and on-road bike facilities and presents guidance on signalization improvements. Since most of the NRG Trail is envisioned as a shared use path, the AASHTO guide should cover most, if not all NRG Trail development scenarios. More information about the AASHTO guide can be found at www.transportation.org.

The National Association of City Transportation Officials (NACTO) publishes the “Urban Bikeway Design Guide,” focusing on on-road bicycle facilities in urban settings. The NACTO guide can be useful for sections in more urban settings and can be found at www.nacto.org. Guides do not prescribe explicit standards that must be followed; rather they present best practices and design considerations that, when followed, will help ensure safety and a quality experience. The strict adherence to the design standards may not be possible or practical along the entire trail; however, adequate warning and proper signage are necessary to inform users a change in the trail condition.

Trail sections should also be designed and constructed with long term maintenance needs in mind. Maintenance activities require a commitment of time, personnel, and funds. Some maintenance activities can be greatly reduced through good design and proper construction of the trail. A good base and sub-base will reduce growth of vegetation and be less susceptible to

settling. Clear zones around the trail will reduce the chances of vegetation intruding onto the trail. Proper drainage along, across and under the trail will prevent water from undermining the trail base and reduce the chances of frost heaves and cracking. The trail should be banked or crowned so that water can sheet flow off the trail surface, or the trail should be constructed with permeable pavement. Municipalities should implement Low Impact Development (LID) techniques to retain and infiltrate runoff to protect water quality whenever possible. The use of good quality material that can withstand heavy use is critical. Less expensive or poorer quality items will only increase maintenance costs in the long run and necessitate more frequent repair and replacement. Involving trail maintainers in the design process can help trail designers anticipate maintenance issues early in the process.

Accessibility

The same attributes that make multiuse trails enjoyable for different users, namely that these trails are wide, flat, and smooth, also make them an ideal place for people with disabilities or mobility impairments to recreate and travel. The NRG Trail and trail amenities should meet the 2010 Americans with Disabilities Act (ADA) Standards of Accessible Design wherever possible. For trail sections constructed under a federal program, or using federal funding, adherence to ADA standards and guidelines is required. These standards set out acceptable width, slope, materials, etc. of trails, ensuring that users of all abilities will be able to benefit from and be able to use the trail. More information about ADA standards can be found at https://www.ada.gov/2010ADASTandards_index.htm. In addition, federally funded trail projects must also comply with the Uniform Federal Accessibility Standards (UFAS, <https://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/ufas>).

Trail Surface

A smooth, hard trail surface is required to carry wheeled users, and trails in the northeast are typically asphalt paved or compacted stone dust. There are pros and cons to each of these surfaces. Compacted stone dust trails are typically less

expensive to build but require regular upkeep and grooming to maintain an accessible surface. These trails are constructed with 3/8" or smaller crushed fines; or crushed stone, cinder or rock dust as it can also be called, compacted with a vibrating plate or roller compactor to create a hard trail surface. Stone dust trails can suffer from erosion issues, especially on steeper grades, can get rutted in wet conditions, and can be encroached upon by weeds. There are resins and other stabilizers advertised that could potentially help reduce erosion and rutting and improve surface longevity. Asphalt paved surfaces are



Compacted stone dust trails can become rutted when wet, and often require more upkeep than paved trails. (Air Line State Park Trail, East Hampton)

more expensive to build initially but require less ongoing maintenance. Paved trails also support more varied wheeled uses including roller skates, in-line skates, scooters, and small wheeled strollers, and can more easily be cleared of snow in the winter, if such a practice is intended. While many runners and walkers prefer a softer stone dust surface, paved trails can be designed with

soft shoulders to accommodate these users, and to allow pedestrians to step out of the way of other faster trail users.

Bridges



Prefabricated pedestrian bridges like the one installed over the Waterbury Rail Line in Ansonia are popular due to decreased construction timelines and cost compared to bridges constructed on site.

Structures to carry trail users over watercourses, roadways, or other obstructions are often the most complex part of trail design and ultimately one of the most expensive aspects of trail construction. Proper planning, design, and decision making about bridge type and materials can have a substantial impact on the cost, longevity, maintenance requirements, and user safety and experience. Bridge structures can employ any of a variety of materials including metals, wood, concrete, high strength alloys or composites, or steel cables. Weathering steel has become a popular material choice for pedestrian bridges. As this material weathers, it builds up a protective layer of oxidation, eliminating the need for painting and reducing the need for ongoing maintenance. It also blends well with many surroundings. Pedestrian bridge decks are typically poured concrete or rot-resistant wood planking. Decking should be textured for bicyclist safety. Railings should be 42 to 48 inches high and be designed without any large gaps to prevent falls. Bridges over rail or roadways may need to have additional taller netting or fencing.

Prefabricated pedestrian bridges that are constructed offsite, then transported to the bridge location, assembled, and dropped onto abutments with a crane, are a popular choice

for multiuse trails. “Prefab” bridges are typically cheaper, cause less site disturbance, and can speed up construction timelines as compared to those built on site. Some models offer the ability to span lengths of over 200 feet. The need for structural support within a water or floodway and greatly increase permitting requirements and timelines. The re-use of existing bridge abutments whenever possible can reduce the design and permitting costs and timelines.

Amenities

Trail amenities are critical to the enjoyment and functionality of multiuse trails. Street furniture, comfort stations, kiosks, bike racks, and lighting are all important considerations when designing the NRG Trail. The 2017 NRG Economic Impact Study recommended including the “three Bs” when developing the trail; bathrooms, benches, and bike racks. Similarly, respondents to the CT Trail Census (www.cttrailcensus.uconn.edu) annual statewide survey of multiuse trail users most frequently cited more or improved amenities including bathrooms, water fountains and garbage cans as the improvements that would most greatly enhance trail experience.



Trailside plazas like Franklin Square in Torrington can be a great place to hold events, encourage trail users to interact with local businesses, and draw residents and visitors to the trail.

While these amenities add to the cost of construction and maintenance, they can provide for a much more enjoyable experience for trail users. Not offering trail users restroom facilities or trash receptacles can lead to unwanted consequences like trail users relieving themselves

in public or litter and can lead potential trail users to look elsewhere for trail experiences. Rest areas off the side of the trail with benches and other amenities are important to avoid potential conflicts that can be caused by stopped and resting trail users blocking trail traffic.

Also important is access to off-trail amenities for trail users. Easy access to local businesses, green spaces, and cultural resources can greatly improve user experience and benefit local communities and should be considered during trail design. As trails are being designed, access to and from businesses, residential areas, transit, and other recreational features like parks and playgrounds should all be considered, along with wayfinding at trail entrances/ exits to direct trail users to relevant opportunities.

Signage and Wayfinding

Since most of the planning and construction for the NRG Trail will be implemented at the local level, the materials, feel and look of the trail may undoubtedly vary from town-to-town based on local needs and desires. Regardless of these differences, it is important to emphasize that the NRG is a single entity that will traverse 11 communities. Visitors to the completed trail should know that they are on a section of the NRG, and be met with a familiar system of signage and wayfinding no matter which town they are in. A well designed and implemented unified brand and signage program is critical to the continuity of the NRG. In 2016, funded with a CT DEEP Recreational Trails Grant, and with support and assistance from the NRGSC and consultant Milone and MacBroom, NVCOG developed and published the “Naugatuck River Greenway Uniform Signage and Wayfinding Design Manual”. The manual was developed to assist NRG municipalities and partners in the development and installation of various signs to be used along the NRG route. It presents a branding policy, logo, color palette, and graphics to be implemented on all NRG Trail sections, while allowing local adjustments to reflect needs and styles of each municipality. Various uniform signage templates can be obtained free of charge from NVCOG.

The NRGSC can review and guide sign plans to ensure that signage guidelines are adhered



The NRGSC developed the Uniform Signage and Wayfinding Design Manual that was published in 2016.

to, that content is appropriate and properly presented, and that signs are installed at proper locations. Some assistance and guidance for signage design may be offered on a case-by-case basis by NVCOG staff. In 2019, NVCOG designed and purchased interpretive and trailhead signage for open sections of NRG Trail with a CT DEEP Recreational Trails grant, and those design templates are available for reproduction for additional trail sections. While each town or partner is ultimately responsible for their signage, collaboration with regional partners will be critical in the development of a unified signage program. It is recommended that signage be incorporated in the design and construction phases of trail development. Construction funding should be used to purchase and install a full suite of signage along each trail section. This will ensure that proper signage is in place when the trail section opens to the public and will avoid the need for additional funding to design and purchase signs. The Naugatuck River Greenway Uniform Signage and Wayfinding Design Manual can be found at: <https://nvcogct.gov/what-we-do/naugatuck-river-greenway/nrg-signage-program/>

Lighting



Lighting may be appropriate on certain sections of NRG Trail, like in Seymour.

Lighting along trails can improve user safety by improving visibility in low light conditions or after dark and can be used to extend the typical “dawn to dusk” hours of operation on trails. Lighting is used in many environments to reduce criminal activity, and while there has been little research into the relationship between lighting and crime on trails, well-lit trails can give users added peace of mind at night. While lighting may not be appropriate in all settings, it should be considered on NRG in more densely populated areas and where commuter use is expected to be

more prevalent. In addition, AASHTO guidelines suggest that lighting should be installed in the following situations:

- In tunnels or at overpasses
- Trailheads
- Bridge entrances and exits
- Public gathering places
- Along streets
- Crosswalks
- Where the path crosses another path or sidewalk
- On signage

There are attractive wired and solar powered lighting options available that are suitable for trail use. Solar powered fixtures can be installed more easily without the need to run wires and are a good option in more remote locations or when adding lights to an existing trail. Wherever possible, full cutoff fixtures that minimize light pollution impacts should be used. Information about how to limit light pollution, and listings of dark sky friendly fixtures can be found the International Dark-Sky Association website (<https://www.darksky.org/>).

Municipalities should contact their Eversource or United illuminating municipal representative for details about their trail lighting needs. The same programs that are used to provide lights on municipal streets should also apply to the NRG Trail.

Measuring and Tracking Trail Use

Once a trail is constructed, it is important to measure trail use to understand benefits of the investment in the trail development, and to help understand trail user needs. There are several automated trail user counting technologies available that can be installed either during or after trail construction. Automated trail counters



The CT Trail Census has been collecting information about multiuse trail users across CT since 2016 using infrared pedestrian counters and user surveys.

offer trail managers valuable information about trail user volumes and use patterns. These systems range from relatively simple infrared sensor-based portable counters that count all users, to more complex systems that pair an infrared counter with inductive loops or other sensors that can determine direction of travel

and distinguish between different modes of travel.

The more complex count technologies often require sensors to be placed directly in or below the trail surface, so incorporating their installation into design plans is important. Some count systems offer real-time data monitoring but may require ongoing monthly fees to access a cell network to transfer data. The cost for acquiring counters, installing them, and maintaining them should be considered during trail planning and design phases.

The Connecticut Trail Census, a program administered by the University of Connecticut Department of Extension, has been collecting information about trail users on multiuse trails since 2016, including on the Derby section of NRG Trail. The CT Trail Census program pairs infrared pedestrian counter data with information collected through an online user survey to give communities information about who is using the trail when, how they are using the trail, the features that trail users find important, and issues that may need to be addressed. In 2022, CT Trail Census began offering a service upon request. The menu of options includes short term counts, survey deployment, and help interpreting results. More information can be found at www.cttrailcensus.uconn.edu. NVCOG also owns and can deploy infrared pedestrian counters and can assist with data collection and guidance on trails in the Naugatuck Valley Region.

Maintenance

One reason why multiuse trails are popular is because they are seen as, and generally are, a safe place to walk, bike, and recreate. Like any other town park or facility, ongoing maintenance and upkeep is critical to the safety and enjoyment of the trail. That responsibility will fall to the local municipality. Details about how trail segments will be maintained, by whom, and how that will be funded will be incorporated into specific maintenance plans that will be developed as part of the future designs of NRG Trail sections. The extent of maintenance needs and associated costs will vary widely based on trail design and local conditions.

Regular maintenance of trails is much the same as that of local parks and roads and includes activities like keeping the trail surface free of obstacles and leaves, mowing or string trimming of grassy areas along the trail, upkeep of landscaped areas and litter removal. If comfort stations, fountains, kiosks, or other amenities are present, those will need to be maintained as well. In most municipalities, trail maintenance is typically undertaken by the Public Works or Parks Department. Volunteers and “friends of” groups can supplement municipal maintenance efforts. Proper and timely maintenance and removal of hazards requires regular patrols to identify potential issues proactively, and greatly reduces local liability.

Vegetation Control

One of the biggest ongoing maintenance issues on trails is vegetation control. While wooded or landscaped paths provide a pleasing trail setting, vegetation can also introduce hazards when

that vegetation falls or encroaches on the trail. For the safety of trail users, maintainers must regularly monitor the trail for potential hazards, and address issues promptly. This includes:

- Clean-up of fallen limbs, branches, and trees, especially after storms.
- Mowing the shoulder/clear zone provided along both sides of the trail. Typically, mowing would be done weekly or bi-weekly, depending on conditions. Regular mowing will deter the spread of vegetation onto the trail. Structures, such as signs, in the area to be mowed should be limited to reduce interference and need for manual trimming.
- Leaf removal.
- Pruning tree limbs and shrubs – a minimum nine-foot vertical clearance along the trail should be maintained.
- Tree removal – unhealthy trees pose a safety hazard. The trail should be regularly inspected to identify unhealthy trees, and these should be removed. Also, clearing of saplings or strategic removal of larger trees can improve the health and vitality of the adjacent woodlands.
- Removal of invasive plant species and weed control. Safer manual removal techniques should be used whenever possible. For the safety of trail users and adjacent waterways and natural habitat, herbicides should be carefully applied only when other techniques cannot be used.
- Planting and maintaining trees, shrubs, and flowers. Native plants should be used to minimize upkeep needs and provide habitat for native wildlife.

Litter Removal and Trash Collection

Municipalities will decide whether to provide trash receptacles at rest areas, access points and along the greenway Trail. Receptacles provide a place for users to place their trash and may reduce litter; however, if the garbage is not collected regularly, these areas can overflow and become unattractive very quickly. Maintenance needs can be minimized by limiting receptacles to a few trailhead areas that are easy for workers to access. If they are not going to be monitored and emptied regularly, trash receptacles should not be provided at all. If receptacles are not installed, efforts should be made to encourage trail users to pack out their own trash. Even if trash receptacles are provided, some litter will most likely be left along the trail by inconsiderate users, so it will be necessary for maintenance crews to pick it up to keep the trail clean. Again, this needs to be done regularly, if not daily.

Winter Maintenance

One difficult decision that trail managers need to make is whether to remove snow and ice and otherwise maintain the trail for use during the winter. While multiuse trail use does typically decline during the winter, they are popular destinations for recreation year-round. Some communities choose to clear snow and ice to keep the trail open to typical recreational and commuter traffic. Others may choose to close the trail when snow and ice are present or open the trail to winter uses like cross country skiing or snowshoeing.

When snow and ice disrupt other outdoor recreation opportunities, a cleared trail may offer the only opportunity for outdoor exercise in many communities. A review of data from the CT Trail Census showed that trail use rebounded much more quickly on trails that cleared snow from the trail (like the Derby section of NRG), and that winter use on those trails dipped less in winter than those that did not clear snow after storms. The NRG Trail will also increasingly be used by residents for transportation as it gets connected and built out, and communities need to think about those users when considering winter trail maintenance.

Trail users that commute to work on the trail or use the trail to access transit or businesses could lose their primary form of transportation for long periods of time in the winter if trails are not cleared. Since the NRG Trail has a real



Clearing snow from the trail can provide residents with an important winter recreation outlet and keep the trail open for commuters.

opportunity to be used for non-motorized transportation, and because of the importance of winter recreation options, municipalities should strongly consider maintaining their sections of NRG during the winter.

Trail Surface and Infrastructure Upkeep

Debris including sand and other foreign objects needs to be removed from trail and on-road route surfaces. This includes street sweeping during the spring to pick up any traction sand that has been spread or tracked onto the trail during winter. It may also be necessary to repair and patch potholes or cracks along paved sections. In the long term, trails will need to be resurfaced. Data from the RTC survey indicated the average life of a paved trail surface is about 17 years, while a soft trail needs resurfacing about every nine years. The cost of repaving an asphalt trail needs to be included in the operations and maintenance plan. Pavement markings may be installed to delineate directional trail lanes, on-road bicycle routes, and at road crossings. To be effective, the markings need to be maintained in good condition and remain visible. Periodic inspection of the markings will be necessary with reapplication of paint or other material as required.

Much like roadways, multiuse trails are designed and constructed with culverts, bridges, storm drains, and other various structures. Culverts and drainage channels need to be cleaned periodically to ensure proper drainage and reduce the likelihood of water flowing or ponding over the trail. Structures need to be inspected at regular intervals, typically every three-to-four years, and may require periodic painting, as well as rehabilitation and repair to extend their useful lives and ensure the safety of trail users.



Grassy areas near water, like along the NRG Trail, are attractive to Canada Geese, which can lead to unsanitary and unpleasant trail conditions.

Bridges require special attention to keep them in safe working order. Bridges need to be inspected at least once per year focusing on user safety and structural integrity of the span, deck, and components, as well as bridge abutments. For bridges over watercourses, abutments should be monitored for scour after storms or periods of flooding. The AASHTO Manual for Maintenance Inspection of Bridges or the CT DOT's Bridge Inspection Manual (https://portal.ct.gov/-/media/DOT/documents/dpublications/inspection_manual_2019-11-15rev.pdf) can

help guide inspections. The DOT has a bridge inspection program focusing on bridges carrying motor vehicle traffic or spanning roadways. Inspection of all other bridges on the NRG Trail is the responsibility of the municipality in which the bridge is located.

Bridges have varying maintenance needs based on type and material. Wood structures or decks may need to be sealed occasionally. Painted bridges will need to be re-painted periodically. Components including railings, fencing, rub rails, and decking may should be repaired or replaced promptly if damaged or excessively worn to ensure user safety. Ongoing maintenance needs should be a factor when selecting bridge type. Regional contracting for periodic pedestrian bridge inspection could help reduce costs through economies of scale and should be explored.

Trailside Amenity Maintenance

A variety of amenities will be installed along the NRG Trail, including route, guide, regulatory, warning and information signs, benches, picnic tables, bicycle racks, rest areas and restroom facilities. These items need to be maintained and replaced or repaired when damaged. Signs are susceptible to vandalism and need to be replaced quickly if damaged. Temporary signs should be installed in the interim if necessary. If permanent bathroom facilities are provided, regular monitoring and upkeep will be required to maintain sanitary conditions. If the municipality cannot properly clean and maintain permanent restrooms, then none should be provided. Since restrooms are so important to trail users, alternatives to permanent facilities such as portable toilets (e.g., Port-o-potty, etc.) should be considered in the absence of permanent facilities. The municipality should ensure that temporary restroom facilities are serviced on an appropriate schedule.

Trailhead kiosk and informational signage also needs regular upkeep. To minimize maintenance of these types of signs, the information posted (trail map, rules and regulations, emergency contact information and historic/interpretive) should be static and not require continual update.

These displays should be sealed or covered to protect against discoloration or fading in sunlight. If other information is provided on or at the kiosk, such as take-away brochures, community announcements, listing of trailside services and paid advertisements, it is important to ensure the information is current. Efforts need to be made to keep the supply of hand-outs sufficient, remove out-of-date announcements and material, and make sure the area is neat and orderly.



Vandalism is a common maintenance issue on trails and should be dealt with quickly to discourage would be vandals.

As reported by the RTC, the most common criminal problems along shared-use trails are vandalism and graffiti, targeted mainly at signs. Addressing vandalism can be a time consuming and costly maintenance activity; it is an intermittent and non-recurring action that is often not easy to budget or plan for.

When it occurs, it is important to replace or repair the damaged items quickly to demonstrate a willingness to maintain the trail at a high level and an unwillingness to tolerate any damage to the trail system. It is similarly important to replace and repair damaged and vandalized signs along on-road bicycle routes.

Communities can reduce or minimize the effects of vandalism by:

- Anchoring signs and posts securely.
- Using materials that are less susceptible to vandalism – steel or composite posts as opposed to wooden; washable material as opposed to material that is not easily cleaned.
- Limiting the placement of signs in remote areas.
- Covering unique or intricate signs with a vandal-proof material to protect it.

Maintenance Costs and Cost Factors

For the purposes of estimating the economic impact of trail maintenance for the 2017 NRG Economic Impact Study, an annual maintenance cost of \$5,000 per mile was used based on a literature review and focus groups with trail maintainers. Trail design choices can significantly influence the extent and type of maintenance needed. For instance, while soft surface stone dust trails are more economical to build, they require regular grooming and regrading, and are subject to rutting and erosion, especially after heavy rain events. Weed control is more of an ongoing effort to prevent encroachment onto stone dust trails. A 10-foot-wide unpaved path can narrow over time without a concerted effort to keep weeds at bay. Grassy lawn areas require regular mowing, whereas well-designed, more natural vegetation landscaping can be more low maintenance. Fences should be installed sparingly, and only where they serve a specific and needed function. The desire for amenities or high maintenance landscaping should be balanced with the realistic ability to maintain those features. Department heads or workers that will ultimately be responsible for upkeep should be brought into the design process early on to provide insight about design features that may be difficult or costly to maintain in the future.

Rules and Regulations



Rules and regulations should be clearly posted at trailheads.

A clearly posted set of well thought out rules and regulations is also important to enhance safety on multi-use trails. To appeal to the widest audience possible, and have the largest positive benefit to the community, the general best practice is to limit the rules and regulations imposed on trail users. To be able to accommodate various user types and abilities while also avoiding serious conflicts, however, some rules and regulations are necessary and important.

Regulations generally refer to allowed or disallowed activities and other imposed laws. This can include speed limits, permitted, and prohibited uses, or hours of operation. Rules typically address user behavior including trail etiquette or who has the right of way. Rules, regulations, and any prohibitions should be clearly posted and evenly enforced. This section will address some rules and regulations commonly seen on multiuse trails, discuss potential issues with imposing them, and present a recommended set of initial rules and regulations that municipalities may customize for their section of trail.

Permitted Uses

Typically, permitted uses on multiuse trails include walking and running along with bicycles, roller and in-line skates, scooters, wheelchairs,

strollers, and other human-powered wheeled means of locomotion. On trails where snow is not removed, skiing and snowshoeing may also be permitted when conditions are appropriate. Motorized vehicles including motorcycles, dirt bikes, all-terrain vehicles, and snowmobiles are prohibited. The recent rise in popularity of electric-assist bicycles (e-bikes), e-scooters and other light personal-mobility devices like hoverboards have blurred the lines between motorized and non-motorized uses. The State of Connecticut, like 35 other states, uses three-class system to categorize e-bikes. This system classifies e-bikes into the following:

- **Class 1:** Bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the e-bike reaches 20 mph.
- **Class 2:** Bicycle equipped with a throttle-actuated motor, that ceases to provide assistance when the e-bike reaches 20 mph.
- **Class 3:** Bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the e-bike reaches 28 mph.

In Connecticut, Class 3 e-bikes are not allowed on multiuse trails, and local governments or trail managers have the authority to further restrict e-bike use on their trails. Connecticut has the strictest e-bike helmet rules in the nation, requiring that all e-bike riders and passengers wear a helmet (See Appendix A for details).

The recently enacted Infrastructure investment and Jobs Act (IIJA), also referred to as the Bipartisan Infrastructure Law (BIL), modified the definition of electric bicycles. The definitions codified into law are consistent with the classifications described above. However, the act did not change what types of motorized vehicles are permitted on non-motorized and pedestrian trails built with federal aid funds. Electric-assisted bicycles are permitted on non-motorized trails if they meet the definitions

included in the federal regulations. In addition, electric-assisted scooters, while not specifically defined as an “e-bike,” can be accommodated and allowed on multi-use trails if operated safely and appropriately with the user announcing their presence and yielding to walkers.

There is a perception that the introduction of e-bikes and micro mobility devices to multiuse trails is unsafe because some of them may be easier to use at higher speeds or are larger or heavier than their non-assisted counterparts. Some communities have subsequently prohibited their use on trails, but that may not be an appropriate response to this new and growing outdoor recreation sector. E-bikes, for instance, have opened outdoor recreation to individuals who may not have been able to fully participate previously. They allow users who may have difficulty riding long distances, or riding traditional bicycles at all, to participate and make use of multiuse trails. E-bikes and scooters can also extend the range of commuting on traditional bikes or scooters as a form of transportation, encouraging new and longer bicycle commutes. Communities should weigh the benefits with the potential costs of allowing e or e-assist vehicles.



The increase in popularity of e-bikes and micro mobility devices like this “hoverboard” have blurred the line between motorized and non-motorized trail uses.

Instead of reacting to individual devices as they continue to evolve and be introduced, RTC recommends managing the potential issues that they present. Since speed, noise, pollution, size, and weight are the concern, devices that operate at a safe speed, generate little noise, do

not produce exhaust, and are of similar size and weight of traditional bicycles should be allowed. If communities do prohibit their use, they may have a difficult time with enforcement since newer e-bikes and scooters are increasingly difficult to distinguish from their traditional non-motorized counterparts. A full discussion of e-bike and personal micro mobility devices on multiuse trails can be found at <https://www.railstotrails.org/resource-library/resources/micromobility-devices-on-multiuse-trails/>

Speed is not only a concern with electric devices on the trail. Differing speeds of users are the main cause of conflict on multiuse trails. Many trails have a posted speed limit to discourage high speeds, but speed limits present issues when it comes to enforcement. Very few trail users have a speedometer or know how fast they are traveling at any given time. Those trying to enforce a speed limit also likely do not know how fast trail users are traveling. Since different speeds are appropriate on different sections of trails and in different conditions, one solution to the speed issue is to require users to travel at a “safe speed.” This allows enforcement officials to take all information into account and to use their discretion when determining whether an enforcement contact needs to be made.

Hours of Operation

Many trail managers limit trail use to certain times of day. Some are open from dawn until dusk, sunrise until sunset, or for certain set hours like 5 a.m. to 9 p.m. These regulations are put in place out of concerns for safety of users traveling on the trail in the dark, or to avoid the additional cost of lighting or night patrols. Limiting times that people are allowed to use the trail can, however, severely limit trail functionality for some users. Since the NRG Trail is intended to provide a non-motorized transportation option to residents, managers should take those users into account as well as recreational users. On sections of trail that see more commuter use like the Farmington Canal Heritage Trail in New Haven, and the CTfastrak trail in New Britain, the CT Trail Census pedestrian counters have recorded regular light traffic that would be outside normal hours of operation of most trails. These users are likely traveling on the trail to get to or from work, or otherwise using the trail as

a form of transportation. Setting strict hours of operation effectively outlaws these trail uses. A “Dawn until Dusk” timetable can severely limit the hours of operation in the fall and winter when “Dawn” can be later than and “Dusk” can be earlier than the hours of a first shift workday. Managers can also consider limiting hours at trailhead parking areas, but not on the trail itself, to limit recreational users after hours. On trails where there will likely be commuter use, trail managers should consider not setting hours of operation, or setting more generous hours with those users in mind.

Pets

Dog walkers are a common sight on many multiuse trails, and leashed pets are allowed on most trails. Pets, specifically dogs, can cause a problem on trails when they are allowed off leash, impede traffic by crossing travel lanes while leashed, are allowed to approach other trail users, or when owners neglect to pick up pet waste. Problems with pet waste can be decreased by providing pet waste bags and disposal bins; however, this increases the responsibility of trail managers to regularly pick up and dispose of the waste. Dogs, even when leashed, can be a safety concern especially on constrained or busy trails. The City of Derby’s section of NRG Trail is very busy and is constrained with fence on each side of the trail for much of its length. After numerous issues with pet owners not controlling or picking up after their pets and causing conflicts, the city chose to prohibit all pets on their section of trail. Since pet walkers are a substantial user group, banning pets is not recommended in most situations. In certain places, however, like on very busy or constrained trails, or where there has been a history of pet related problems, pet prohibitions may be warranted.

Proposed Posted Rules and Regulations

The following rules and regulations are intended as a starting point for municipalities when developing trail rules. Municipalities may alter or add to these basic rules due to local conditions or needs. All attempts should be made to keep rules as consistent as possible between connected trail segments. Rules should be posted at all trailheads and trail access points.

- Be considerate of all trail users and respect everyone’s right to use the trail.
- Motor vehicles and Class 3 e-bikes are prohibited.
- Class 1 and Class 2 e-bikes and small micro mobility devices are allowed if operated safely.
- All trail users must travel at a safe speed, and never faster than 15mph.
- Keep to the right of the trail, pass on the left, and do not block travel lanes.
- Faster trail users must yield to slower trail users.
- Faster users must announce themselves before overtaking slower users.
- Wheeled users under 15 years old and all e-bike riders must wear a helmet by law.
- Helmets and protective gear are encouraged for all wheeled users.
- Pets must be leashed and controlled. All pet waste must be promptly removed.
- Call 911 for an emergency.
- Non-emergency trail condition issues can be reported to XXX-XXX-XXXX.

Patrols and Enforcement



Police bicycle patrols can deter illicit activity, encourage proper trail use, and allow for closer “community policing” contact with trail users.

To ensure safety and an enjoyable experience for all users, it is important that the trails are patrolled regularly, and for the rules and regulations to be enforced fairly and consistently. Regular patrols are important to provide a sense of security for trail users, to explain and reinforce rules and regulations, and, when necessary, to take enforcement action against bad actors. Regular trail patrols are also essential to monitor trail conditions. The results of an RTC survey indicated that about 75% of the trails they surveyed were patrolled by the police or park rangers, while the remaining 25% used volunteer patrols. Many municipal police departments have implemented bicycle patrols, a very visible enforcement presence that also allows for closer “community policing” contact with trail users. Volunteer patrols could be used to supplement police and ranger patrols, but their function would be limited to providing information to users and reporting rules violations and problems to the police or park rangers with the authority to issue citations. While volunteer patrols may lack police powers to issue citation, they can be effective in educating users regarding rules of the trail

and trail etiquette. Busier trails can effectively become “self-policing” with trail users reporting illicit activities or inconsiderate behavior, and the lack of privacy on a busy trail driving criminal activity away. Since nearly all trail users today have a cell phone, the public can be a valuable source of information about violations or trail condition. Trail users should be encouraged to dial 911 for emergencies and be provided with a way to report condition or trail maintenance issues.

In the case of an emergency on the trail, it is important for trail users to be able to contact emergency responders and convey their location on the trail. An emergency locator system can provide easy to understand location to emergency dispatchers. The need to pinpoint a location along the trail in the event of an emergency or incident underscores the importance of installing trail mileage markers at set intervals along the trail. By installing markers with an address or universal location code along the trail approximately every 1/8-mile, trail users can always be close to or within sight of a locator.

Conclusion

While design, maintenance, and rule development and enforcement decisions will be made locally on the NRG Trail, continuity should be a goal. Long distance users of the completed trail should not be surprised by different rules when crossing municipal lines or encounter unmaintained sections of trail. The towns should use this guide and consult with the NRGSC and COGs to align these efforts.

The Naugatuck River Greenway Steering Committee (NRGSC) should be used as a resource when developing sections of NRG Trail. NRGSC meetings can be a great place to hear what is and is not working on open sections of NRG Trail and can be a sounding board for what is planned or envisioned for trail sections going forward. The NRGSC meets quarterly, and a schedule and more information can be found on their webpage hosted by the NVCOG: <https://nvcogct.gov/who-weare/commissions-committees/nrg-steering-committee/>.

The Naugatuck Valley Council of Governments and Northwest Hills Council of Governments have assisted with numerous multi use trail projects and COG staff can be a valuable resource as trail sections are funded, designed, and built. Trail users and prospective trail user groups should also be involved in decision making about trail design, rules, and maintenance.

With proper design and construction that make the trail functional and pleasurable for users, and the continued buildout of trial sections connecting to the communities along the river and the amenities they have to offer, the NRG trail will become a popular destination for recreationalists and a vital piece of infrastructure for non-motorized transportation. With proper maintenance, clear rules and regulations, and fair enforcement, the trail will be enjoyed safely by various trail user types for generations to come.

Appendix A: Connecticut E-Bike Laws

CONNECTICUT'S E-BIKE LAW

CT

CONNECTICUT'S E-BIKE LAW FOR THE ROAD

- » E-bikes are regulated like bicycles. The same rules of the road apply to both e-bikes and human-powered bicycles.
- » E-bikes are not subject to the registration, licensing, or insurance requirements that apply to motor vehicles.
- » Connecticut designates three classes of e-bikes:
 - Class 1: Bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the e-bike reaches 20 mph.
 - Class 2: Bicycle equipped with a throttle-actuated motor, that ceases to provide assistance when the e-bike reaches 20 mph.
 - Class 3: Bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the e-bike reaches 28 mph.
- » Helmets are required for riders of all classes of e-bikes. Persons under 16 years of age may not ride a Class 3 e-bike, unless as a passenger.
- » Class 3 e-bikes are not allowed on a bicycle trail or path or multiuse trail or path.
- » Local governments have the authority to restrict the use of e-bikes under motor power on bike paths. When in doubt, check with your town, city, or county for local rules and regulations.

* The following Connecticut laws are referenced: Public Act 18 - 165 (HB 5313, 2018 session)

eMTB GUIDELINES

- » On federal, state, county and local trails, e-mountain bike (eMTB) access varies significantly.
- » Generally, any natural surface trail that is designated as open to both motorized and non-motorized uses is also open to eMTBs.
- » eMTBs may not be allowed on trails managed for non-motorized activities.
- » Do not ride your eMTB in areas where the local rules are unclear. Ride legally and only on authorized trails to show that mountain bikers are responsible trail users.
- » When in doubt, ask your local land manager about access to specific trails. Local land rules change frequently.

CONNECTICUT'S E-BIKE LAW FOR TRAILS

- » LOCAL: Consult your local land management agency.
- » STATE: The Connecticut State Parks Division allows Class 1 e-bikes on multi-use trails. Contact the department for the most up to date information. PeopleForBikes is monitoring this policy and will update this document as needed.
- » FEDERAL: On federal lands, eMTBs are considered motorized vehicles and have access to motorized trails. However, Connecticut has minimal federal lands and fewer, if any, where mountain biking is allowed.

CHECK OUT

- » A map of great eMTB rides at peopleforbikes.org/emtb
- » eMTB "Adventures" at peopleforbikes.org/e-bikes

GREAT eMTB RIDES IN CONNECTICUT

- » Pachaug State Forest
Preston City | 25 miles
- » Thomaston Dam OHV Trails
Thomaston | 4 miles

With an e-bike, bicyclists can ride more often, farther, and for more trips.

Electric bicycles are designed to be as safe as traditional bicycles, do not compromise consumer safety, and benefit bicyclists who may be discouraged from riding a traditional bicycle due to limited physical fitness, age, disability or convenience.

In many states, e-bikes are regulated under antiquated laws primarily aimed at combustion engine vehicles such as mopeds or scooters. PeopleForBikes is clarifying state laws governing the use of e-bikes in the U.S. Every state's law is different, but the objective is to ensure that low-speed e-bikes are regulated similarly to traditional, human-powered bicycles.



Learn more at PeopleForBikes.org/e-bikes

- » Blogs and webinars
- » E-bike laws around the country
- » E-bike statistics and research
- » Buying guide
- » Retailer materials
- » eMTB management resources

PeopleForBikes.org



peopleforbikes

Appendix B: Street Furniture and Amenity Style Guide

Some continuity of design will help ensure a continuity of user experience, but ultimately, the trail design, design of amenities and choice of street furniture will ultimately be the decision of each municipality along the trail. This “Style Guide” is being presented to document the types of street furniture and amenities that are in use on open sections of NRG Trail, and to highlight the design choices that have been made on those sections. In some cases, examples from other nearby trails have also been included. This guide is intended to provide a framework for decision making as future sections of trail are being designed.

Benches

Derby



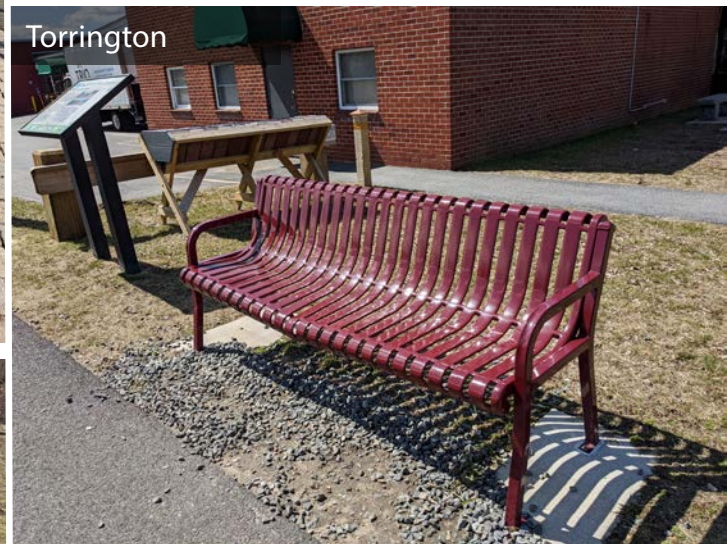
Ansonia



Naugatuck



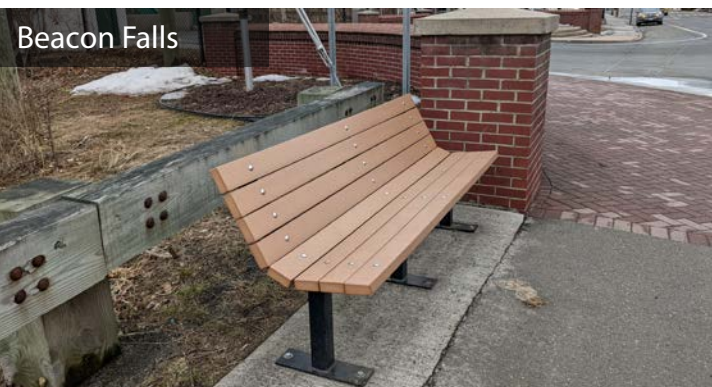
Torrington



Beacon Falls



Beacon Falls



Ansonia



Bike Racks



Bridges

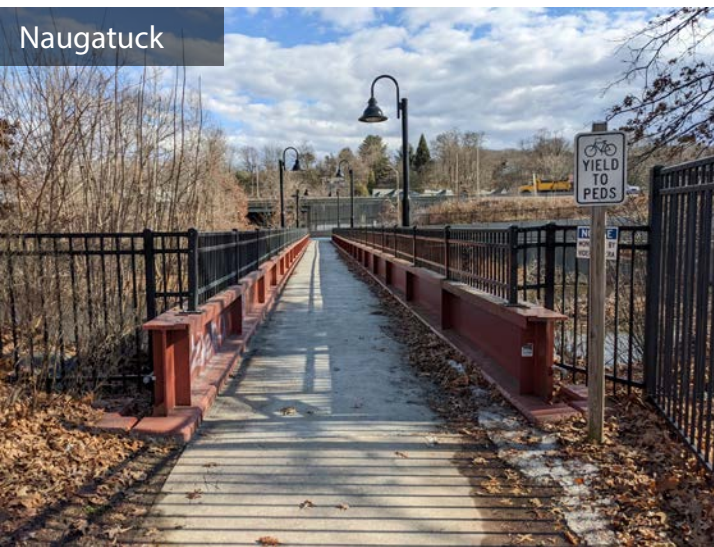
Ansonia



Derby



Naugatuck



Derby



Derby



Waterbury



Derby



Ansonia



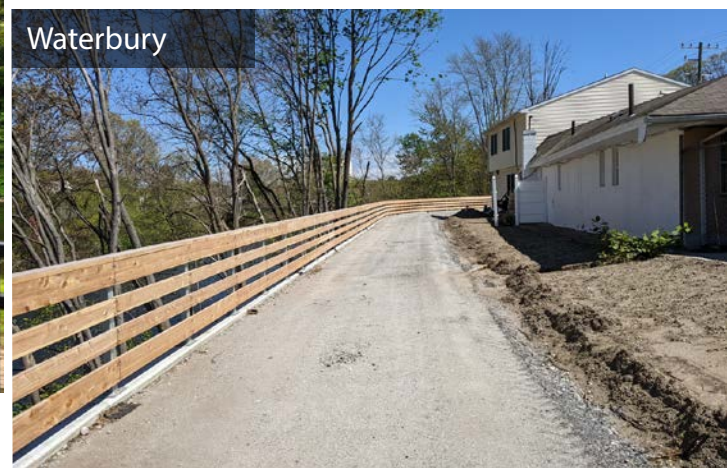
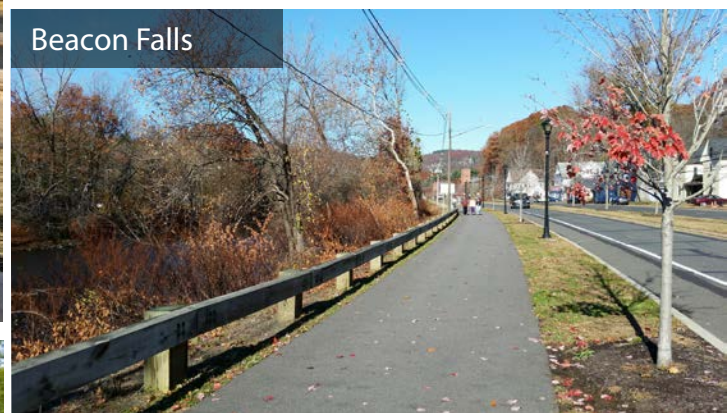
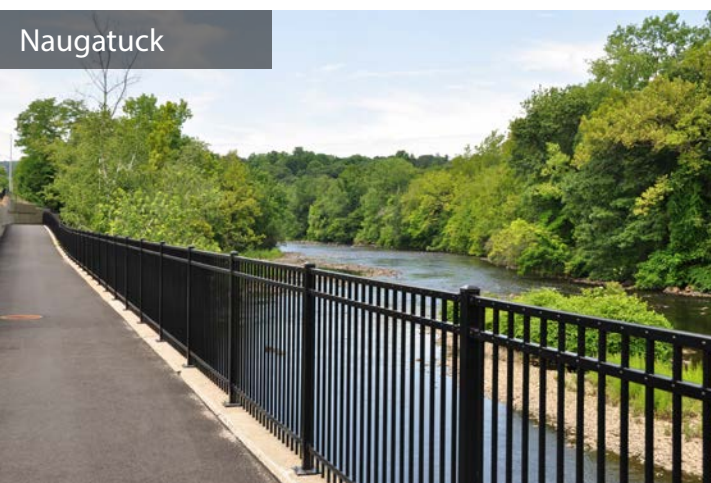
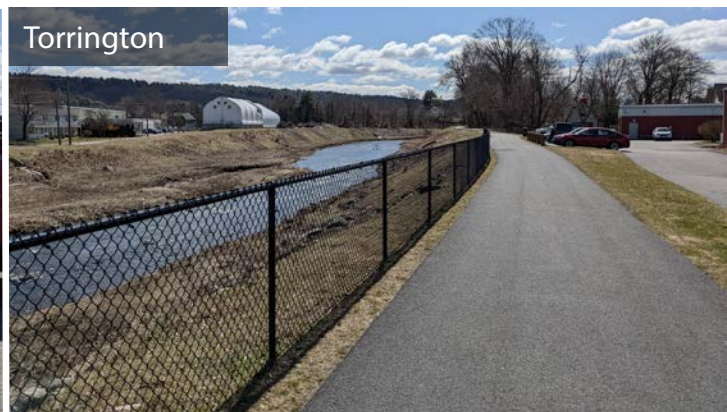
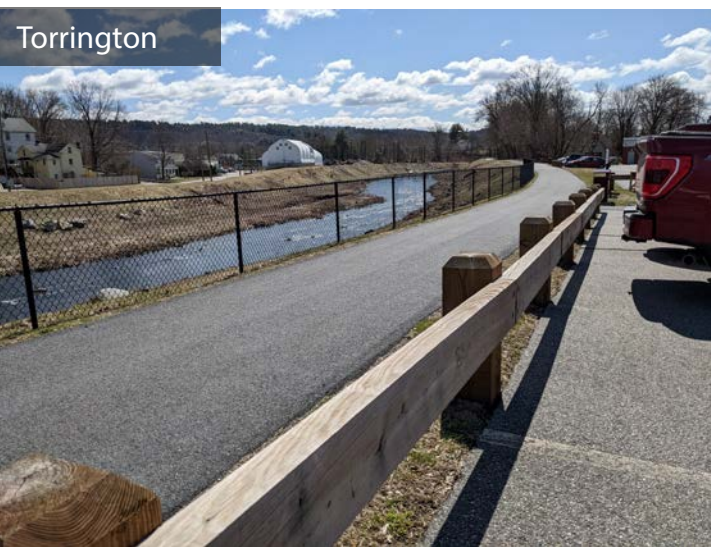
Waterbury



Comfort Stations



Fencing



Lighting

Seymour



Torrington



Naugatuck



Ansonia



Beacon Falls

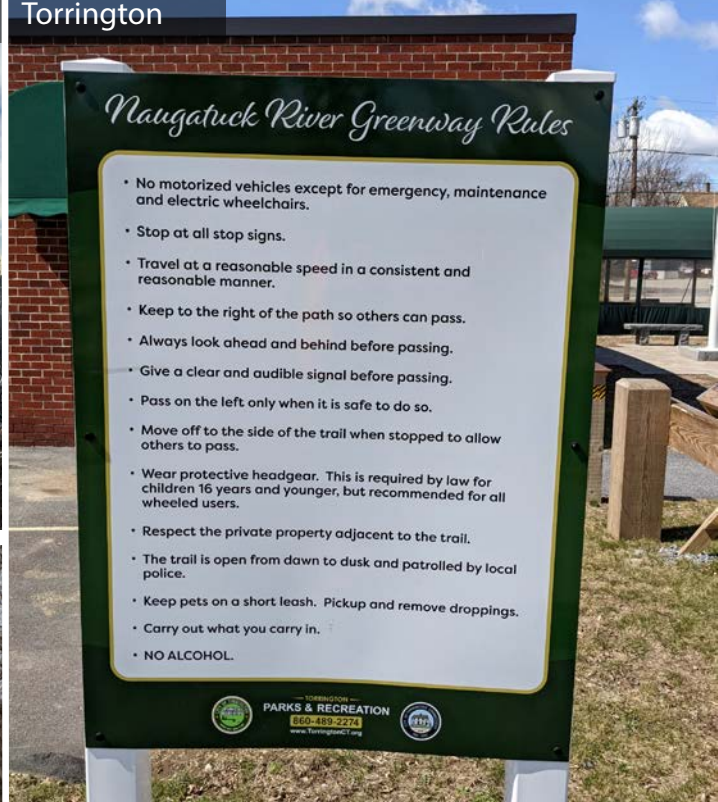


Posted Rules

Derby



Torrington



Riverbend Park, Beacon Falls



Farmington Canal Trail, Cheshire



Sue Grossman Trail, Torrington



Trash Receptacles

Seymour



Ansonia



Torrington



Beacon Falls



Naugatuck



Derby



Miscellaneous

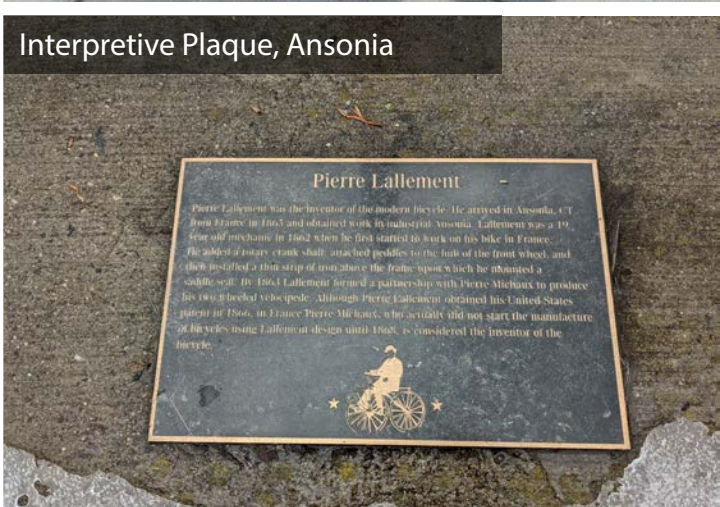
Planter/ Bench, Torrington



Drinking Fountain, Watertown



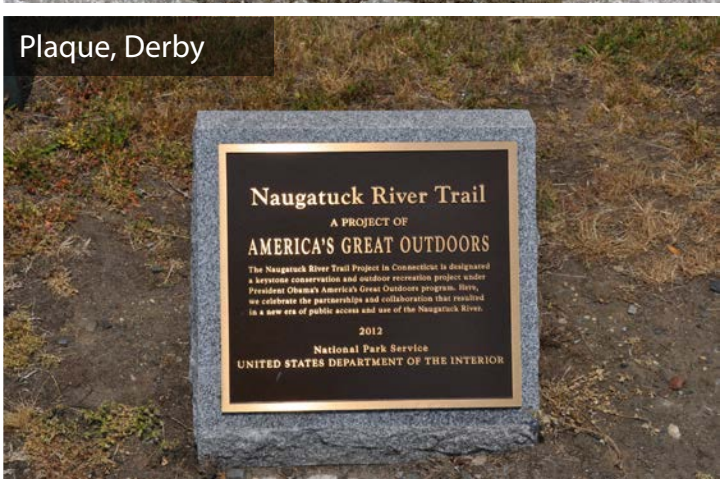
Interpretive Plaque, Ansonia



Rest Shelter, Ansonia



Plaque, Derby



Miscellaneous (Continued)

Seating Area With City Seal, Ansonia



City Seal, Ansonia



Fountain and Hall of Fame, Derby



Decorative Compass, Ansonia



Interpretive Sign, Naugatuck



Picnic Shelter, Waterbury





For a physical copy, contact the
Naugatuck Valley Council of Governments:

49 Leavenworth Street, 3rd Floor
Waterbury, CT 06702
nvcogct@nvcogct.gov • (203) 757-0535
www.nvcogct.gov