

Introduction: Alternative Transport

The goal of this project is to propose an alternative transportation network as the first step in developing a greenway system for the SouthShore. There are two forms of non-motorized transport that we shall focus on: bikeways and hiking trails. Bikeway and trail networks provide several benefits, such as:

- Providing a local transport system to reduce or replace vehicular traffic, reducing congestion and pollution.
- Providing opportunities for recreation and experience of nature through outdoor activity.
- Promoting general fitness through exercise.

Hiking trails are generally a less effective alternative to vehicular transportation than bikeways. However, because of their ability to go where bikeways may not be able to (over rough terrain, up steep slopes, etc.) they can also provide better opportunities for experience of nature and outdoor education.

Other forms of non-motorized transport (e.g., sidewalks, bridle paths) are not dealt with here because they are either limited in applicability to the general population or more appropriate to heavily urbanized areas where the ecological aspects of greenway development are limited.

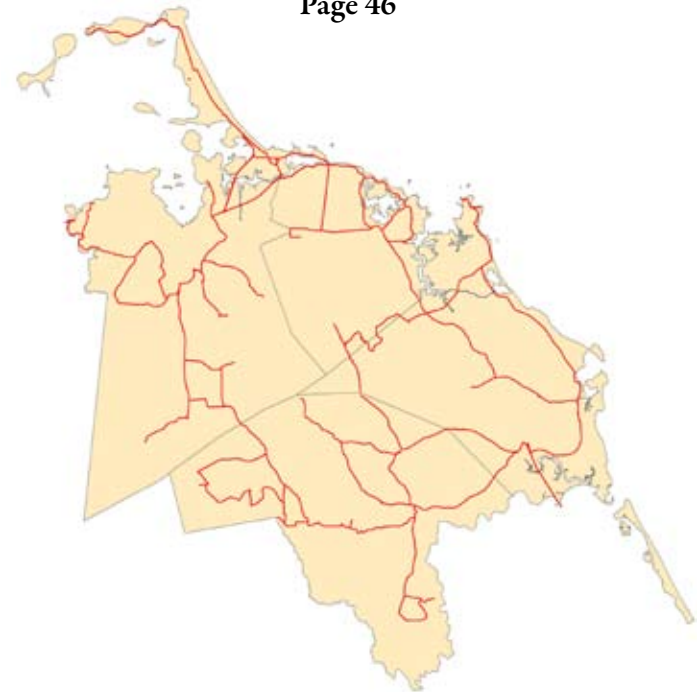
General recommendations for laying out both bikepaths and hiking trails include:

- Use existing infrastructure where possible to reduce costs, limit impervious surfaces, and facilitate implementation.
- Provide safe routes away from heavy traffic or busy intersections to promote use of the system by people of all ages and levels of experience and ability.
- Connect to other alternative transportation networks, particularly to mass transit, to allow multi-modal transport.
- Respond to suggestions from the public to ensure that popular destinations are served and preferred routes used.
- Form a continuous network to allow long distance travel over multiple routes.

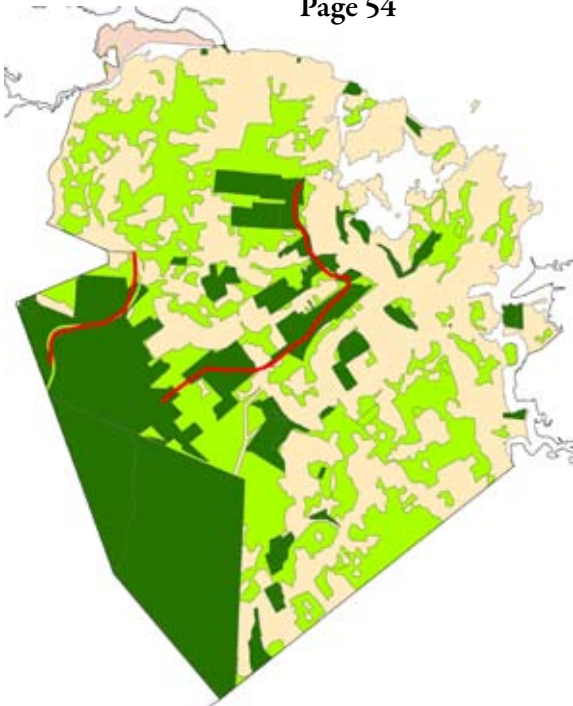
- Provide scenic vistas where possible to encourage use. Ecological considerations also require the following:
- Minimize construction in ecologically sensitive areas. Where construction is necessary, use environmentally sensitive materials and techniques.
- Identify areas where existing route infrastructure conflicts with ecological considerations and work to reduce that conflict.
- Provide opportunities for nature experience to promote education and environmental understanding.

The specific implications of these general criteria will vary with the network (cycling or trails) and will be dealt with in those sections.

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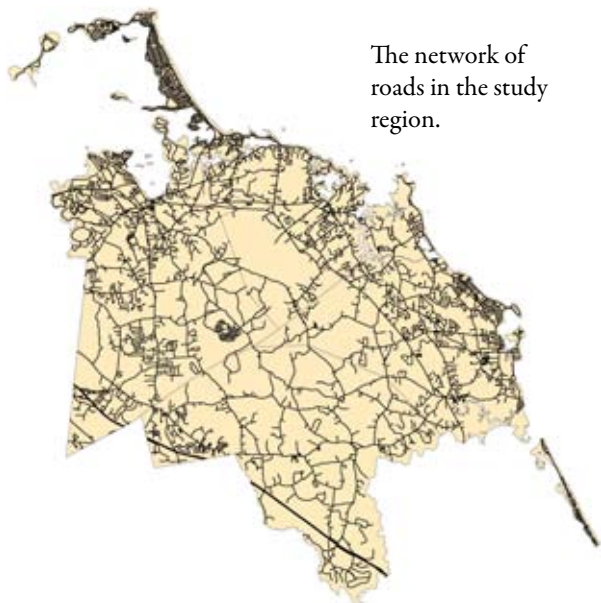


Bikeway Criteria

Transportation

1. Use existing infrastructure where possible to reduce costs, limit impervious surfaces, and facilitate implementation.

Roads connect most popular destinations and, in a highly developed region like the study area, often provide the only easily available connection between them. They also avoid intruding into areas that are perceived as private. Thus roads should be used for the bikeway when not in conflict with other criteria.



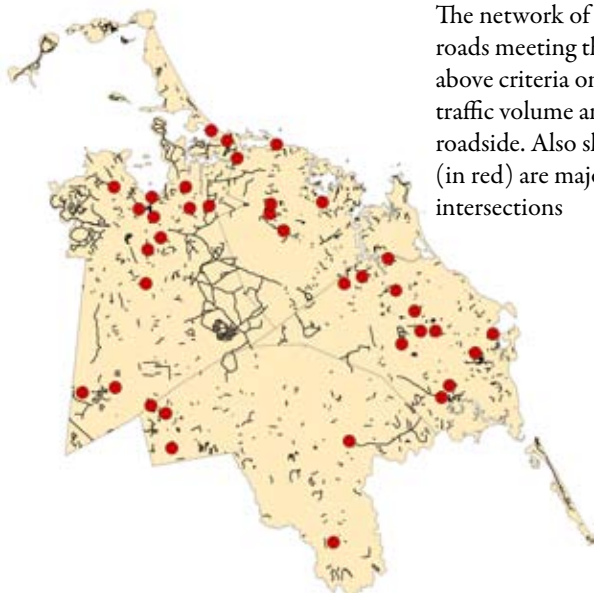
The network of roads in the study region.

2. Provide safe routes away from heavy traffic or busy intersections to promote use of the system by people of all ages and levels of experience and ability.

To provide safe routes, the bikeway should avoid automotive traffic where possible. This implies using off-road bike paths where available, avoiding major intersections, and only using in-traffic routes where vehicular volume is small (less than 100 vehicles per day).

United States Department of Transit guidelines for mixed-use paths are for two travel lanes, each four feet across. This allows sufficient room for two user groups (e.g., pedestrians and cyclists) to avoid conflict. To separate these paths from traffic, an additional two feet minimum is required to provide room for a vegetated buffer. This buffer will provide additional security by screening road debris and visually separating between automotive and non-automotive traffic. Thus a minimum of ten feet of roadside (the difference between the width of the right-of-way and the road width) is required.

Two feet is a fairly small separation and sufficiently safe only on roads with a traffic volume of less than one thousand vehicles per day. On roads with greater traffic volumes (up to ten times higher), the required separation should be increased to twelve feet to provide greater safety. Above a traffic volume of ten thousand vehicles per day, roads are unsafe for cycling regardless of the width of any buffers.



The network of roads meeting the above criteria on traffic volume and roadside. Also shown (in red) are major intersections

3. Connect to other alternative transportation networks, particularly to mass transit, to allow multi-modal transport.

Ferry terminals and train stations form important destinations on an alternative transportation network, providing access to suburb-to-city transportation. The bikeway should connect to them whenever possible.



Existing train and ferry routes in the study region.

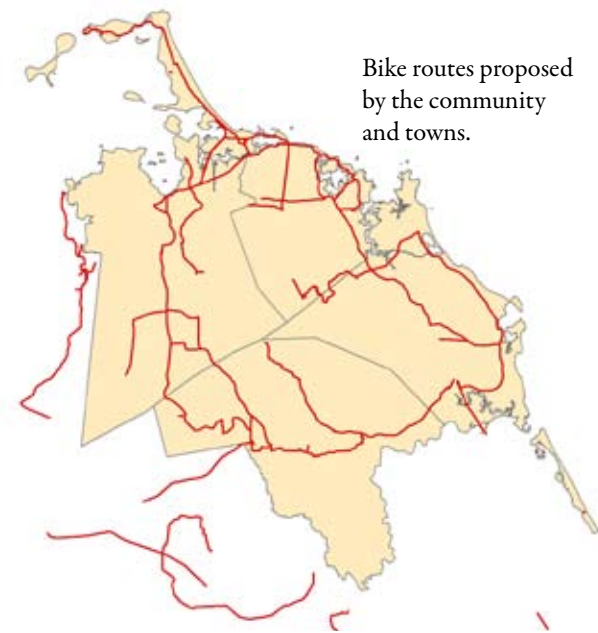
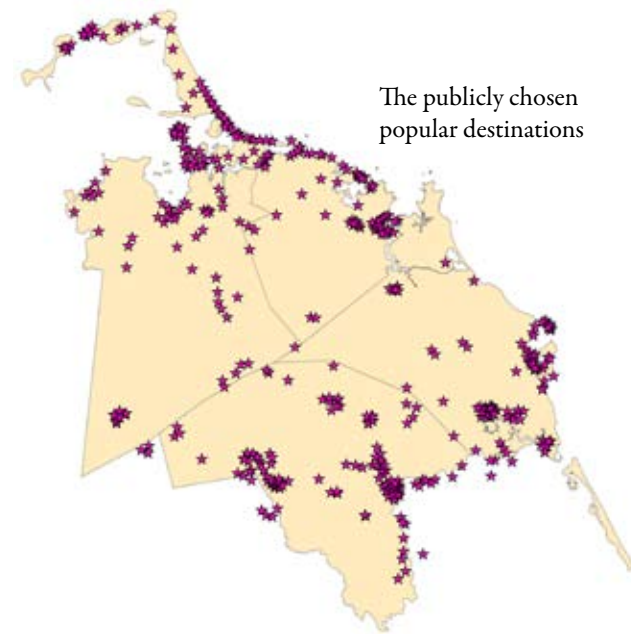
Planned routes should also connect to other alternative transportation networks at a variety of locations. By connecting to Wompatuck State Park and other open spaces, bike routes will connect to existing trail networks. They should also connect to bike-racks at existing sidewalk networks to facilitate pedestrian/cyclist interchange.

4. Respond to suggestions from the public to ensure that popular destinations are served and preferred routes used.

Bike routes should be designed to connect popular destinations as obtained from the first public forum.

Routes suggested by participants at the second public forum should be evaluated for their suitability and, where possible, prioritized for inclusion in the overall network.

There are two very short existing bike routes in the study region and its immediate vicinity. (the Hingham-Hull trail at 1.2 km and the Back River Trail in Quincy at 3.3 km). There are also, several proposed routes developed by town governments and community groups. These should also be evaluated for inclusion in the plan.



5. Form a continuous network to allow long distance travel over multiple routes.

Loops should be prioritized over dead-ends to provide flexibility and enhanced their attraction for physical exercise.

6. Provide scenic vistas where possible to encourage use.

The region is rich in beautiful views, historic town centers, large beaches, waterfronts, harbors, and conserved open space. As such almost all possible routes are judged to have scenic merit with the exception of heavily developed strips along major highways. These should be avoided where possible.

Ecological Considerations

7. Minimize construction in ecologically sensitive areas. Where construction is necessary, use environmentally sensitive materials and techniques.

This goal is achieved by using roads where possible. If off-road bike trails are required they should be limited to previously disturbed areas such as disused rail beds. Where construction is required, recycled materials and porous surfaces should be used.

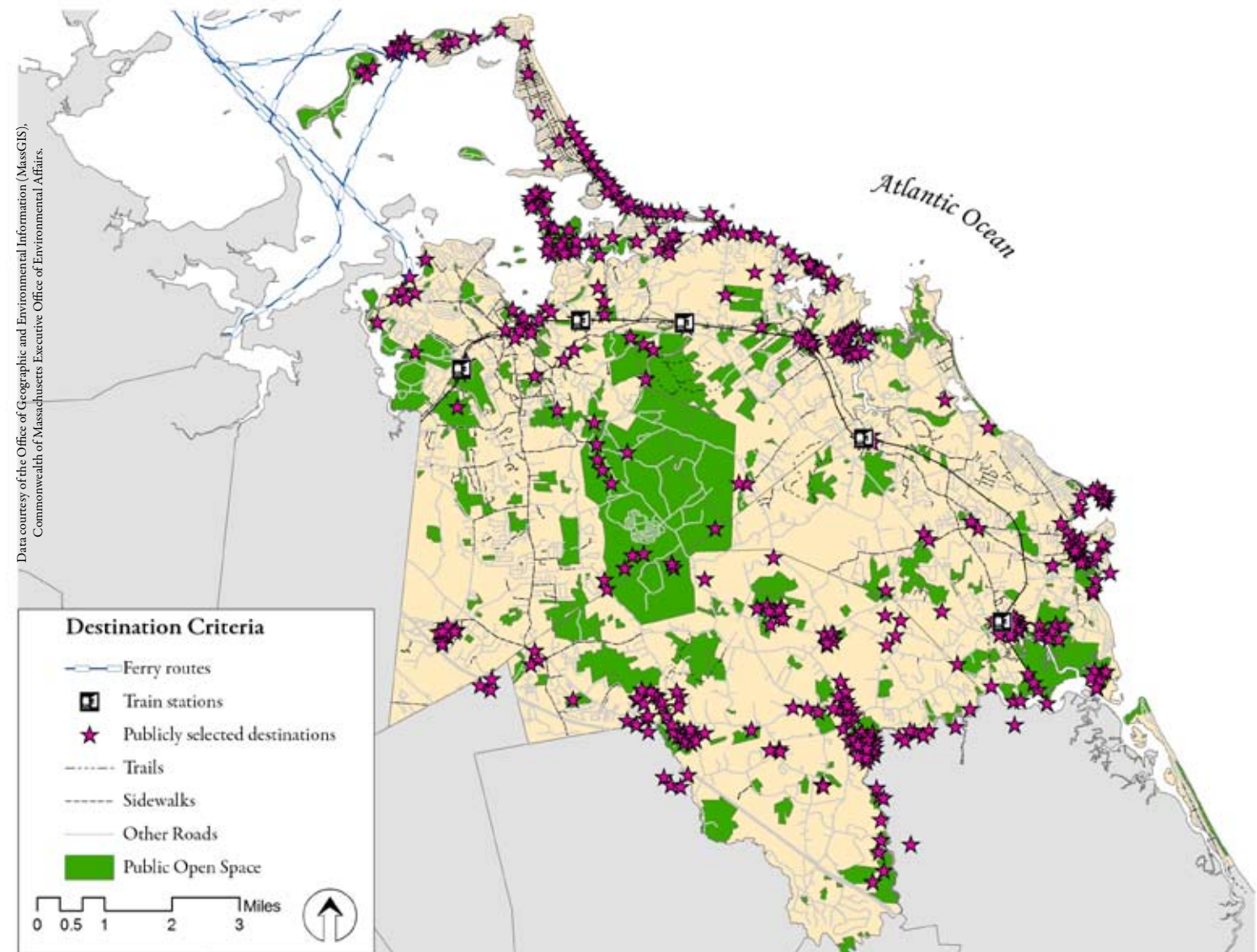
8. Identify areas where existing route infrastructure conflicts with ecological considerations and work to reduce that conflict.

Conflicts with sensitive areas such as Natural Heritage and Endangered Species Program (NHESP) habitats or proximity to Areas of Critical Environmental Concern should be identified and assessed. Routes can then be redirected or appropriate construction recommended to ameliorate negative impact.

9. Provide opportunities for nature experience to promote education and environmental understanding.

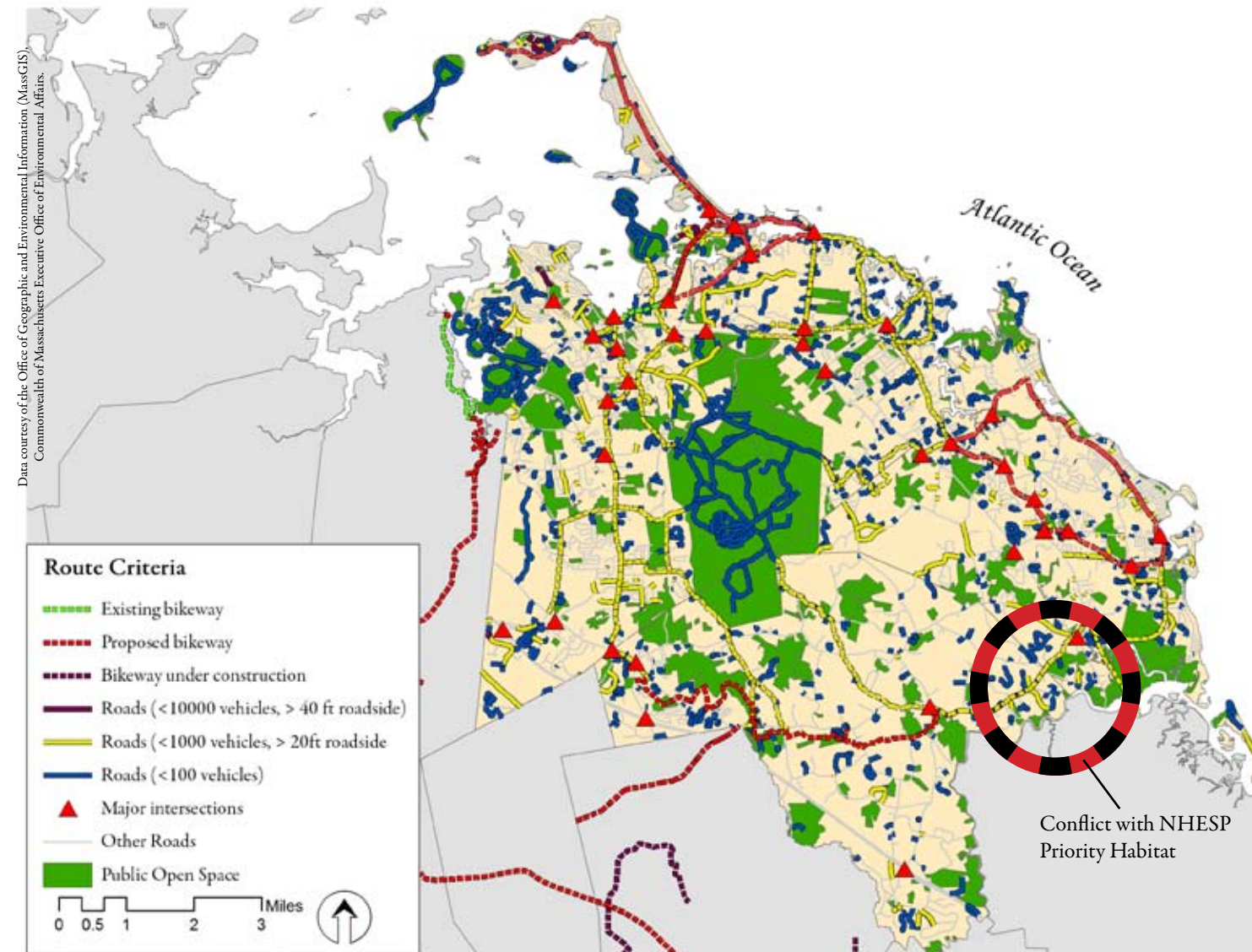
Routes through existing conservation land and other natural areas should be provided with interpretative signage. Connection between diverse ecosystems such as estuaries and uplands, particularly on off-road routes, provide exposure to varied ecological and environmental communities and further reinforce educational goals.





The destination criteria are:

- Connect to existing sidewalks and trails.
- Connect to rail stations and ferry terminals.
- Connect to public open space.
- Connect popular destinations as defined in public forums.



Summary Bikeway Criteria

The two maps to the left summarize the previously discussed bikeway criteria in terms of destinations and existing or proposed route infrastructure. Also identified on the route criteria map is a conflict area where Route 123 in Norwell traverses an NHESP Priority Habitat.

Additional ecologically-oriented directives are:

- Use roads where possible.
- Identify conflicts with environmentally sensitive areas and work to mitigate or eliminate the conflict.
- Provide opportunities for nature experience.

It is apparent that no one route or network exists using the above criteria. Instead a bikeway network will have to use roads outside of the developed criteria or require substantial off-road sections.

The existing or proposed route infrastructure criteria are:

- Use existing and community-proposed bike routes, including those developed in public forums.
- Use roads with less than 10,000 vehicles per day and an available roadside greater than 40 feet.
- Use roads with less than 1000 vehicles per day and an available roadside greater than 20 feet.
- Use roads with less than 100 vehicles per day.
- Avoid major intersections.

Alternatives for Route 123 in Norwell

Three alternatives were considered for the section of the bikeway that runs from Norwell center to the Scituate town line shown circled below and for which there a potential conflict. These alternatives are shown on the right.



Option A avoids heavy traffic but requires on-road cycling along roads where there is an insufficient right-of-way to achieve safe separation from traffic flow. It would be the cheapest to implement.

Option B would involve new construction in a resource area. It would allow access to the scenic North River but require routing across private land. Because of this it would be the most expensive and slowest option to implement.

Option C uses Route 123 where there is heavy traffic but a wide enough right-of-way to allow safe separation. It is also more direct. Installation of a vegetated buffer would provide limited habitat and the opportunity to address water quality issues arising from impervious surfaces in an environmentally sensitive area. This section of road is also under planning for redevelopment and thus offers a timely opportunity to carry out the required construction planning. Accordingly, it was the final selection for the proposed route.



Option A

Routing north along minor roads.



Option B

Using a combination of on-road and off-road routes along the North River.



Option C

Using Route 123

Jerusalem Road, Cohasset

A scenic route past several historic homes, Jerusalem Road offers beach access and expansive views of the ocean and Boston skyline. It was both a popular destination and route suggested in the two public forums.



Due in part to substantial outcroppings of ledge (shown above), however, pedestrian and cycle traffic is forced to share the road with cars. Traffic volume is greater than one thousand vehicles a day.

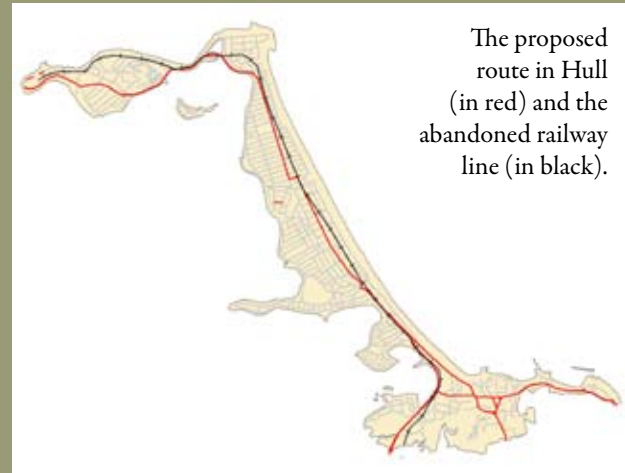
Despite these unsafe conditions Jerusalem Road was included in the proposed route due to the outstanding scenic value it offers. Signage and striping should be installed to make drivers aware of pedestrian and foot traffic.

In addition, Jerusalem Road is recommended as one-way on Sundays from mid-April to mid-November to provide more room for cyclists, pedestrians, in-line skaters, and other non-motorized road to avail themselves of this outstanding resource.

Such a program would be in keeping with others in many communities across the country and the world. In particular, Boston has been closing a section of Memorial Drive to traffic on Sundays for thirty years. A recent proposal by the Charles River Conservancy would extend this by also making Storrow Drive one-way on Sundays, allowing the other lane to be used for cycling and skating.

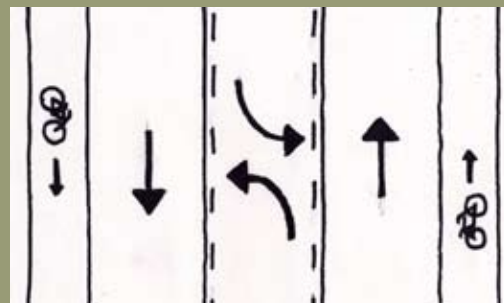
Alternatives in Hull

An abandoned rail line runs the length of Hull offering the opportunity for rail-to-trail conversion.



On-site inspection, however, revealed that the rail line has been heavily encroached upon by abutting landowners. Because of likely resistance to reclamation of this right-of-way, the bikeway was routed along existing streets. However, because it offers the possibility of a bikeway and trail separated from vehicular traffic, a detailed feasibility study, should be carried out to evaluate use of the rail line for a multi-use pathway.

An additional option exists in the form of George Washington Boulevard, a four-lane road in lower Hull. Four lane roads can be converted to three-lane roads in a process known as "road diet." The middle lane is used as a turning lane and the space freed by removing one travel lane used to provide multi-use paths on each side of the highway. Such alterations generally result in lower accident rates on roads that have been converted. A feasibility study is needed to evaluate this option.



A four-lane road after a "road diet."

Bikeway Discussion

As noted above, application of the criteria developed for bikeways does not result in a clear and obvious network. In some locations criteria are in conflict. Examples include: using the easternmost section of Route 123 in Norwell where it passes through an NHESP Priority Habitat; destinations nominated at public forums that are in low-lying coastal regions and thus prone to future flooding as discussed in Chapter 2; the value of connecting to an existing bikeway outside the region (in Quincy to the immediate west of Hingham) despite the necessity of traversing a very busy intersection to do so; and publicly nominated routes that pass through avoidable major intersections or use unsuitable roads. To develop a final proposal, these conflicts must be individually examined and resolved, either through rerouting the network to avoid conflict or, where this is not possible, selecting a route that balances the relative importance of competing criteria. Examples of such a process are shown to the left.

Case Study: The Bay State Greenway



Released in October 2007 by the Massachusetts Executive Office of Transportation and Public Works, the Draft 2007 Massachusetts Bicycle Transportation Plan proposes a statewide bicycle network, known as the “Bay State Greenway,” (BSG), consisting of a 740 mile statewide network of seven primary corridors of on-road routes (545 miles) and shared-use paths (195 miles). Reasons given for improving cycling in the state included: improving safety for existing cyclists; promoting cycling to reduce automotive congestion, parking problems, and pollution; improving health; providing affordable transportation options to low-income groups; promoting tourism in the state; and improving demographics through making the state a more attractive place to live.

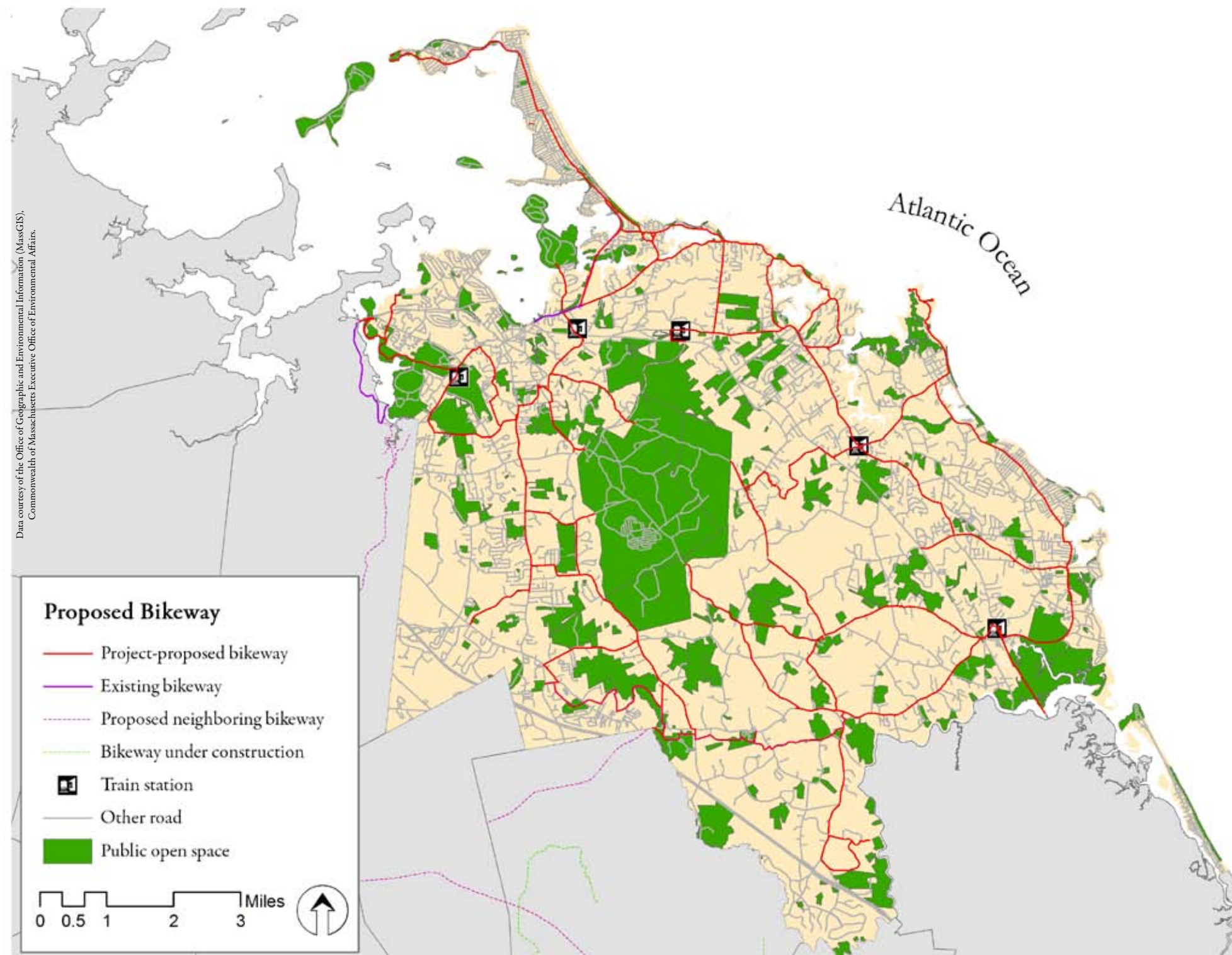
In addition to the above, the plan made four other recommendations:

- Better identify state roads and bridges where bicycles are legally permitted but do not accommodate bicycles today
- Expand the “Share the Road” signs and outreach programs
- Developing bicycle tourist publications through the Massachusetts Office of Travel and Tourism (MOTT)
- Improve safety through education and enforcement initiatives and facility performance measurement.

A Proposed Bikeway

A proposed route makes extensive use of existing open space and specially of Wompatuck State Park where many different paths intersect and connections to trail-systems can occur. It connects to all train stations and ferry terminals in the area to facilitate multimodal alternative transport. Town centers, harbors and estuaries are linked and several spurs allow direct access to the North River. Extensive use of the shoreline and rivers is made to maximise the scenic potential. Links are made to bike routes outside the study region to promote a more extensive network.

The route traverses NHESP Priority Habitat where it uses Route 123 in eastern Norwell and skirts Areas of Critical Environmental Concern around the Weir and Weymouth estuaries in the northwest. Water quality and wildlife habitat are especially important in these areas and construction techniques that address these issues must be used in these locations. Where connections are made to other transportation networks (trails, sidewalks, and train stations) covered bike stands should be provided to facilitate change between transportation modes.



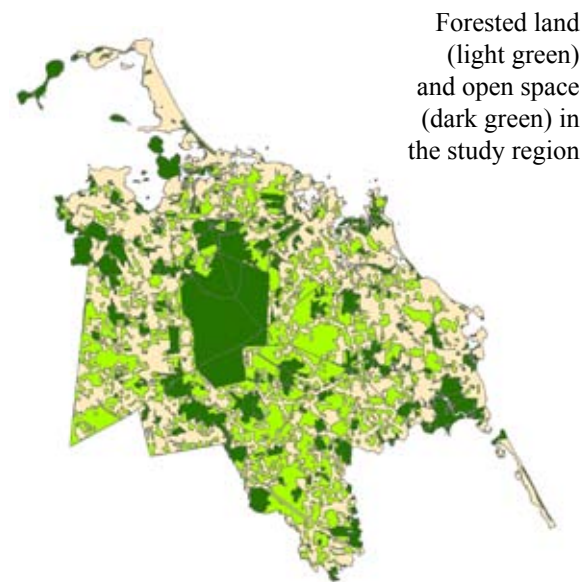
Hiking or Off-Road Trail Criteria

The previous sections considered implementing a bikeway as part of an overall greenway strategy. Because the bikeway uses existing infrastructure to a large extent, it can be developed in the near future. A longer-term proposition is the extension of existing trail networks, currently limited to conservation land in the region. This section considers such extension using the same general criteria as for the bikeway.

Transportation

1. Use existing infrastructure where possible to reduce costs, limit impervious surfaces, and facilitate implementation.

Many of the conserved open spaces in the area already have extensive trail networks. Because these areas are separated, however, those trail networks are fragmented. To increase the extent and complexity of trails in the region, these separated open spaces should be connected by additional conserved land through which paths can be routed.



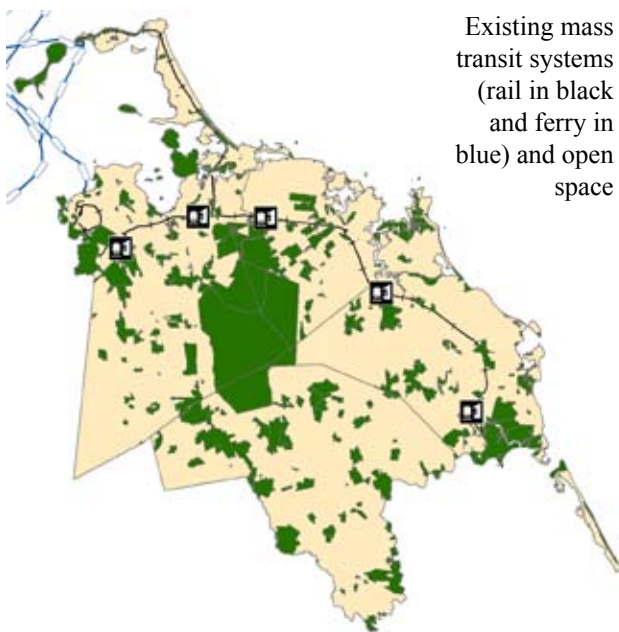
In identifying land for conservation, only those parcels that are undeveloped should be considered. In the study area, these are primarily lots that are entirely forested. Agricultural could also be considered for conservation but is minimal in the study region.

Trails can also make use of existing sidewalks where required,

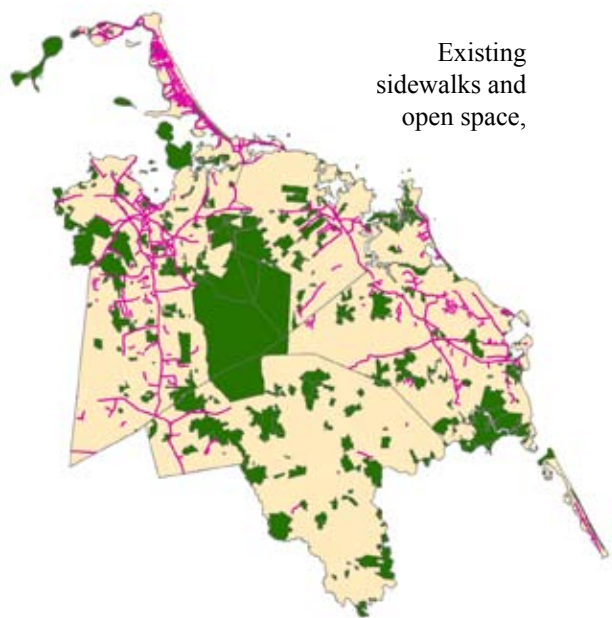
2. Provide safe routes away from heavy traffic or busy intersections to promote use of the system by people of all ages and levels of experience and ability.

Trails confined to conservation land will tend to meet these criteria. Where they have to cross major streets, bridges or pedestrian crossings must be provided. When routed along streets a sidewalk or multi-use path must be present, preferably with a significant separation from the road.

3. Connect to other alternative transportation networks, particularly to mass transit, to allow multi-modal transport.



There are two ferry terminals in the regions, in Hingham and Hull. Neither is near open space and trail networks. Three of the five train stations in the region, however, are near significant extents of conserved land (West Hingham to Bare Cove Park, Cohasset to Whitney and Thayer Woods, and Greenbush to the Rivermoor Habitat Park) and should be connected to trail networks, allowing hikers and other recreational users from Boston and surrounding communities to access the trail system without need of automotive transport.



Trail networks that use conservation land will connect to bike routes that use the same open space. Where sidewalks are close to conservation land, trails should be extended to meet them.

4. Respond to suggestions from the public to ensure that popular destinations are served and preferred routes used.

Trails were not a high priority in the public forums, No significant public input was received on this subject.

5. Form a continuous network to allow long distance travel over multiple routes.

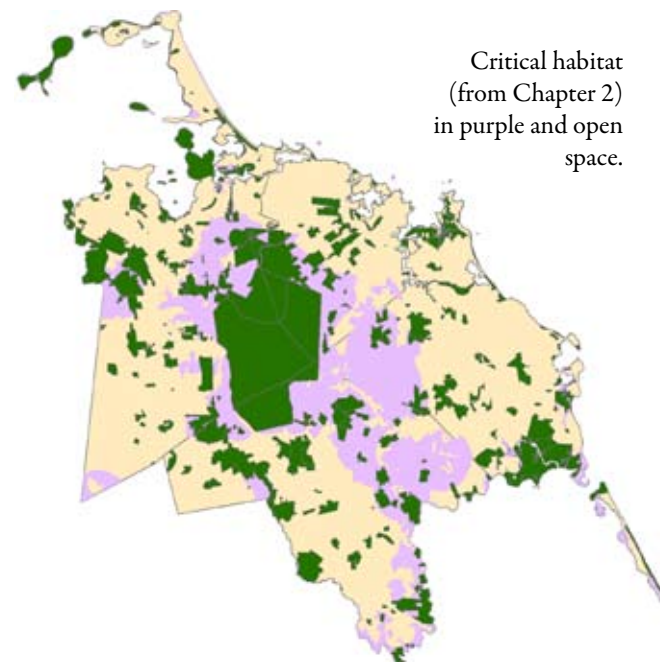
Separated open spaces should be connected to link existing trail networks and provide longer trail opportunities. Opportunities for larger loops are, however, limited due to the distribution of conserved open space in the study region.

6. Provide scenic vistas where possible to encourage use.

Trails limited to conserved land will fit this criteria. The use of sidewalks should be limited to areas of aesthetic value such as historic town centers.

Ecological Considerations

7. Minimize construction in ecologically sensitive areas. Where construction is necessary, use environmentally sensitive materials and techniques.



Almost all conserved land in the region is in ecologically valuable areas. Undeveloped land outside of these areas is also likely to serve as habitat to a variety of species. Thus any new trail construction will be in conflict with this criterion. New routes should avoid particularly sensitive sites and steps should be taken to minimize the impact of construction through the use of appropriate materials and techniques such as porous surfaces.

8. Identify areas where existing route infrastructure conflicts with ecological considerations and work to reduce that conflict.

Trail impact is generally small when appropriate design considerations are used and this criterion is de-emphasized here.

9. Provide opportunities for nature experience to promote education and environmental understanding.

Educational signage along trails will provide opportunities for education and instruction in ecological issues including species habitat, forest succession, and the role of water in the environment.

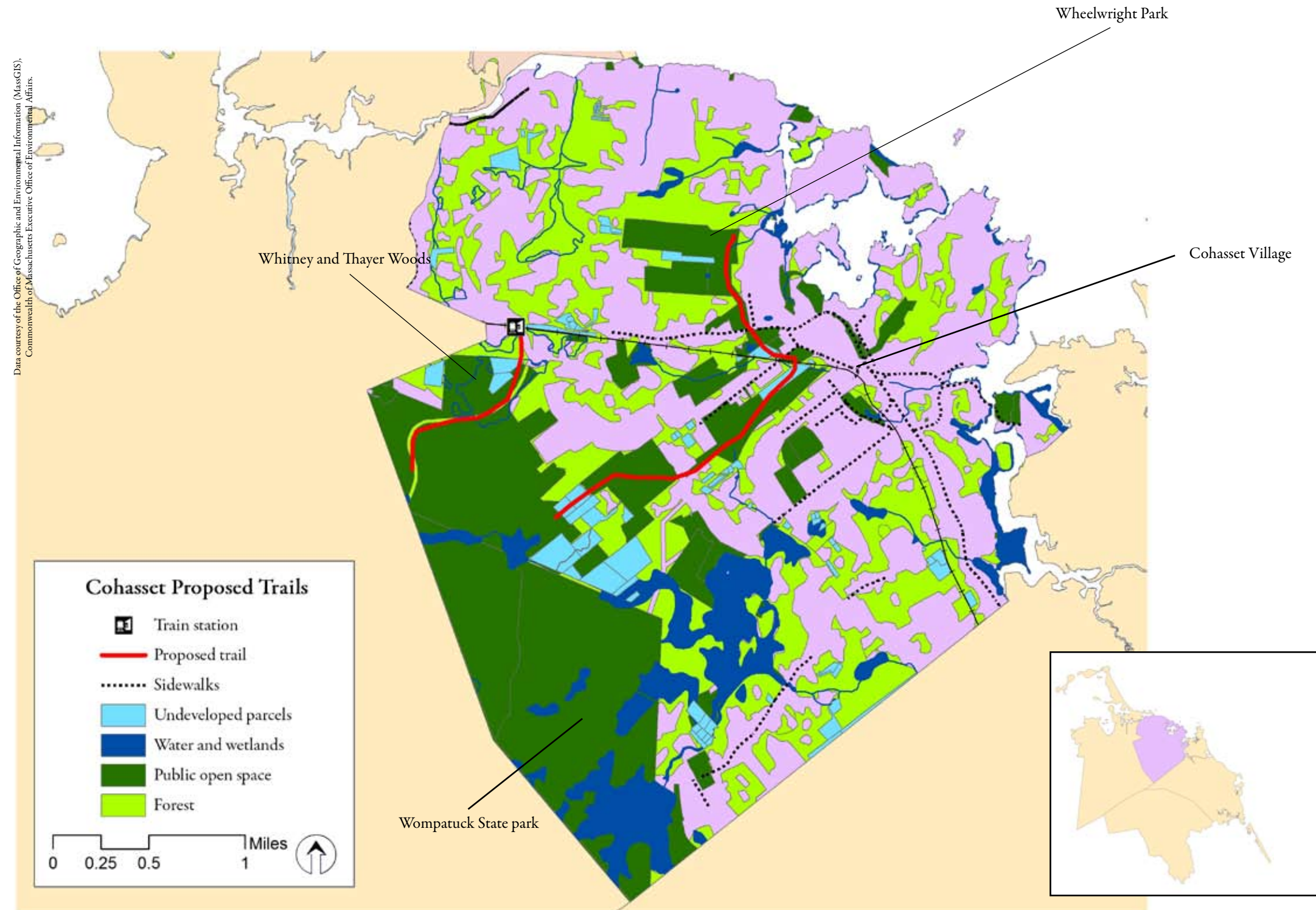
Proposed Hiking Trail Routes

To determine possible trail routes, parcel lots that are entirely forested, and thus probably undeveloped, were examined. There are no undeveloped parcels available in Hull available for trail development. This approach could not be applied to Scituate as at this time there is no available digital map of parcels for the town. Problems with data also mean that this analysis could not be completed for Norwell though the town has posted its own map of proposed trails at http://www.townofnorwell.net/Public_Documents/NorwellMA_Planning/Recreation%20-%20Priorities.pdf. The town of Hingham is heavily urbanized (second only to Hull in this region) and no opportunities for extending the trail network were found. Cohasset was the only community where opportunities for extending a trail network were found.

By targeting for acquisition and conservation parcels that are completely forested and thus unlikely to have been developed, the town of Cohasset can construct a trail that connects Whitney and Thayer Woods (and thus Wompatuck State Park) to Wheelwright Park in northern Cohasset. The proposed trail intersects existing sidewalks at two locations, allowing pedestrian access from the trail to Cohasset Village and the harbor area.

A second proposed trail connects Whitney and Thayer Woods to the Cohasset train station along a disused railway spur.

It should be noted that the land use data (i.e., whether or not a parcel is forested and thus probably undeveloped) used here was obtained in 1999. On-site observation is needed to verify the current status of parcels.



Conclusion and Recommendations

The bikeway and trails proposals developed in this chapter represent the initial phase in developing an extensive greenway network for the South Shore. As such, they should prioritize environmental sensitivity wherever possible. Detailed evaluation of local conditions including proximity to ecologically sensitive areas, traffic volume, road condition, accessibility, land use, and so forth is required along the proposed routes to evaluate the practicality of implementation. Changes to the proposals in response to conditions determined from detailed on-site inspection will likely be required.

Key recommendations emerging from this chapter’s analysis are:

- An abandoned rail line exists in Hull. Though effectively encroached upon by local residents, the town should evaluate this rail line as an alternative to an on-road bikeway in the town.
- George Washington Boulevard in Hull should be evaluated for conversion to a three-lane road with neighbouring multi-use paths on each side.
- Mixed-use (cycle and pedestrian) paths with wide vegetative buffers and storm water management systems should be installed along both sides of Route 123 in Norwell when it is redeveloped. These will both provide important links from Norwell town center to mass transit at the greenbush station in Scituate, and mitigate the impact of a busy road in an environmentally sensitive area.
- Jerusalem Road should be converted to one-way traffic on Sundays to allow residents and visitors alike to use this road for cycling.
- Where the bikeway connects to other transportation networks (trails, sidewalks, and train stations) covered bike stands should be provided to facilitate transfer between transportation modes.
- Trails linking Whitney and Thayer Woods to Cohasset train station and to Wheelwright Park near Cohasset harbor should be developed.