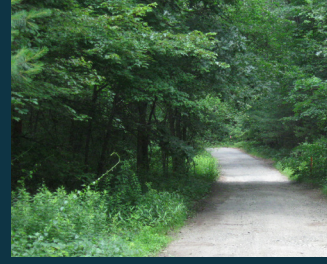


Executive Summary



Assabet River National Wildlife Refuge

Transportation Study Report

Submitted to
Eastern Federal Lands Highway Division
21400 Ridgetop Circle
Sterling, VA 20166-6511

Submitted by
 *Vanasse Hangen Brustlin, Inc.*



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Assabet River National Wildlife Refuge Transportation Study Report

Prepared For: Federal Highway Administration
Eastern Federal Lands Highway Division

U.S. Fish and Wildlife Service
Northeast Region

Prepared By: Vanasse Hangen Brustlin, Inc.

January 2013



INTRODUCTION

This study presents a plan of near-term and long-term projects to improve access to, and mobility within, the Assabet River National Wildlife Refuge.

The need for the study arises from several factors. One is to best accommodate the growing amount and changing type of visitation experienced since the opening of the refuge in 2005 and the Visitor Center in 2010. Another reason is that many of the then existent trails, roads and travelways in the refuge were in disrepair at the time the property was transferred in 2000 by the U.S. Army to the U.S. Fish and Wildlife Service, and the roadway surfaces have deteriorated further since. In addition, the refuge lands were isolated from the surrounding communities in the decades they were used by the Army and there are opportunities for better connectivity to the adjacent neighborhoods and communities.

Data collection and the evaluation of existing conditions at the refuge began during the fall of 2011. The assessment of existing conditions included a public open house to introduce the project and gather feedback on how visitors experience the refuge, what issues they might have, and what ideas they have. The review of existing conditions also included input from a group of key stakeholders. These stakeholders included representatives from the host communities of Maynard, Stow, Sudbury, and Hudson Massachusetts; representatives of conservation groups, and federal and state, agencies with abutting parcels; and the Friends of the Assabet River National Wildlife Refuge. The findings regarding existing conditions are presented in the *Assabet River National Wildlife Refuge Transportation Study Existing Conditions Report*, finalized in April 2012.

The development of potential transportation improvement and enhancement projects involved participation by the public and the stakeholders. A public involvement meeting was held to introduce the potential projects that were developed in response to the initial public and stakeholder comments and the refuge's issues and challenges identified during the existing conditions assessment. Several stakeholder meetings were held, during which additional participants included representatives from rail trail organizations and regional planning agencies. The *Assabet River National Wildlife Refuge Transportation Study Preliminary Candidate Alternatives Report*, finalized in September 2012, presents details of the initial screening of potential projects.

A more detailed evaluation of candidate projects, and the prioritization of recommended projects, was conducted during the summer and fall of 2012. The results are included in the *Assabet River National Wildlife Refuge Transportation Study Report*, finalized in January 2013.



Visitor Center at the Assabet River National Wildlife Refuge



REFUGE OVERVIEW

The Assabet River National Wildlife Refuge (ARNWR) is located in the western suburbs of Boston, Massachusetts, in the communities of Hudson, Stow, Maynard and Sudbury. The refuge is relatively new. The property had been under the control of the U.S. Army since 1942 until it was transferred to the U.S. Fish & Wildlife Service in 2000. It first opened to the public in 2005. The refuge was established for the purpose of having “particular value in carrying out the national migratory bird management program.”

Figure 1 depicts the two primary areas comprising the Assabet River National Wildlife Refuge. The north tract is approximately 1,900 acres in size and the south tract is approximately 300 acres. The north tract contains an extensive system of trails, the Visitor Center, parking areas, a canoe launch, and a fishing area. The south tract of the refuge is undeveloped and has only walking trails.

Much of the refuge is adjacent to several state, municipal and private-organization conservation properties. Other adjacent land uses are several single-family residential neighborhoods and two institutional properties. The institutional properties are a Federal Emergency Management Agency facility at refuge’s East Entrance, and the Massachusetts Department of Fire Services campus located adjacent to the refuge’s Main Entrance on Hudson Road in Sudbury.

Habitat and Cultural Resources

In the 18th and 19th centuries, the refuge lands were dominated by farms and pastures. Since then most of those lands have succeeded back to forest. Only a few meadow areas remain. Much of the refuge, particularly in the north tract, is forested and emergent wetland habitat.

The refuge is home to more than 135 bird species, 25 mammals, 20 reptile species, and 20 fish species, as well as over 650 different plant species. Large sections of the refuge are designated as Priority Habitats of Rare Species under the Massachusetts Department of Fisheries and Wildlife’s Natural Heritage & Endangered Species Program. The entirety of the Assabet River National Wildlife Refuge is designated as a Massachusetts Important Bird Area due to the habitat it provides to breeding, wintering and migratory birds.

Although no buildings remain, the historic period of European settlements dating from the mid-1600s through the mid-1900s is evident in the many stone walls running throughout the refuge and the occasional building foundation or chimney remnants.

Most buildings and facilities from the military period have been removed, but the military period from 1942 through 2000 is readily apparent in the network of roadbeds and rail beds that remain. The most visible of all the historic resources are the 50 World War II era ammunition bunkers once served by the former rail network. Some of the bunkers are opened occasionally for public tours.

Activities

The Assabet River National Wildlife Refuge is open daily, from sunrise to sunset. The Visitor Center is open from 10:00 am to 4:00 pm Thursday through Sunday. The 5,000 square foot Visitor Center houses interactive educational exhibits and is used for a variety of refuge-sponsored events throughout the year. Educational outreach programs are an important and growing element of the refuge’s visitation. There are programs for schools, scouting groups, and similar organizations.



TRANSPORTATION STUDY ASSABET RIVER NATIONAL WILDLIFE REFUGE

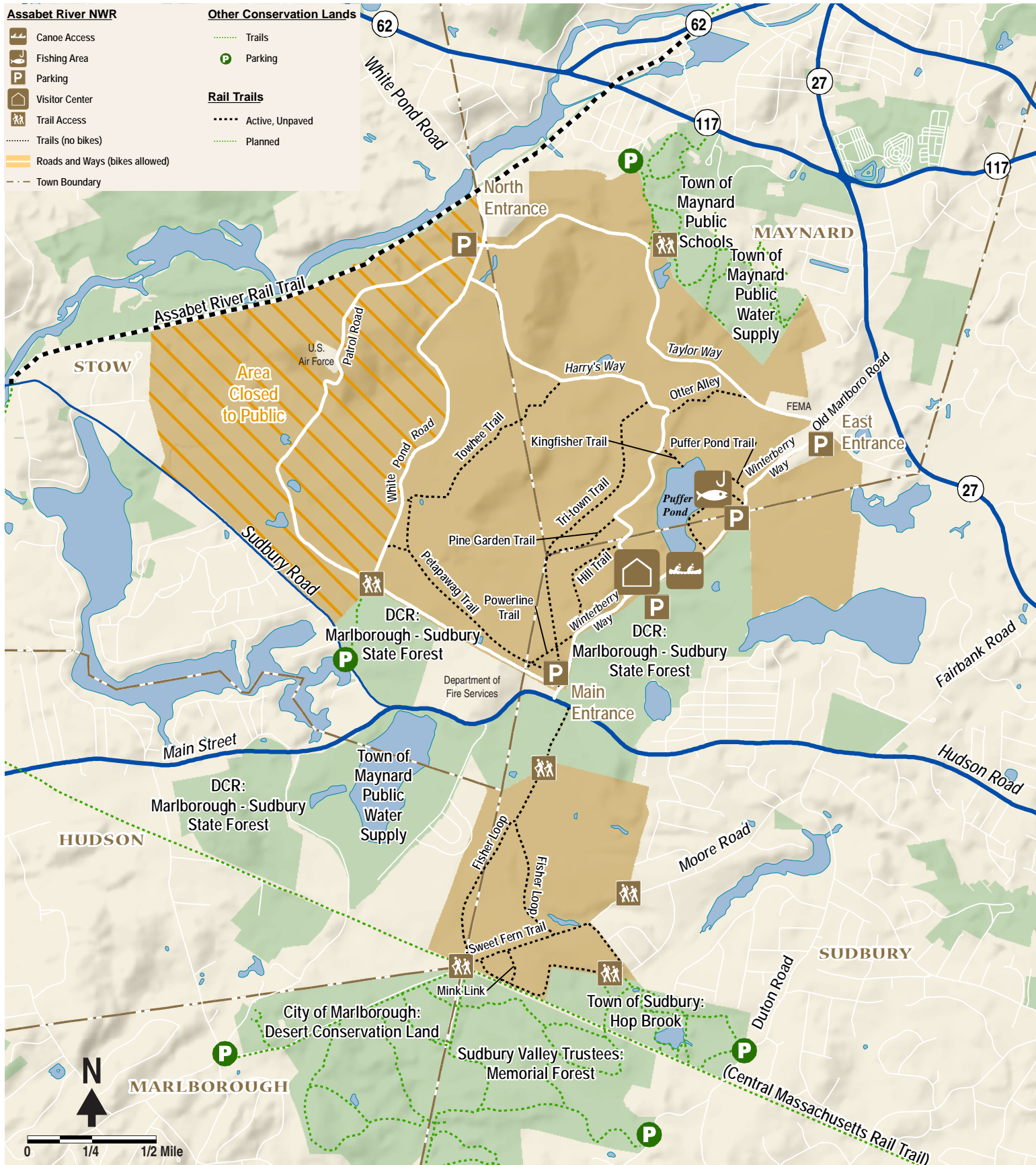


Figure 1
Study Area





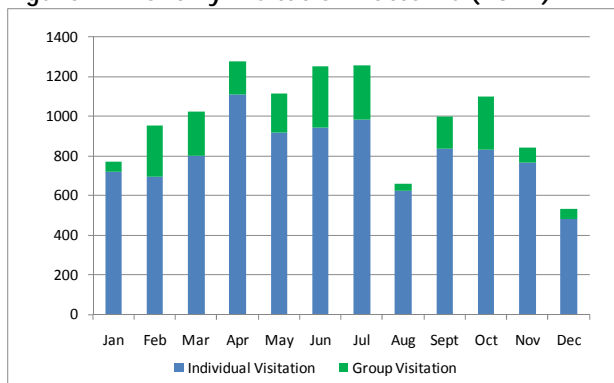
The refuge has more than 15 miles of trails. The trails are principally along the roads and rail beds developed by the U.S. Army. Most of the trails, about 12 miles of them, are located in the north tract. Bicycles are permitted in the north tract of the refuge, along about eight miles of designated roads and ways. There are about three miles of walking trails in the south tract of the refuge. Bicycles are not permitted in the south tract.

Canoeing and kayaking is allowed on Puffer Pond, as is catch-and-release fishing. Seasonal hunting is allowed in much of the refuge, including a westerly section of the north tract not otherwise open to the public.

Visitation

Visitation at the Visitor Center in calendar year 2011 was 9,717.¹ April was the busiest month, with May, June and July all above average. Included among the 9,717 visitors are 2,051 attendees among 81 events and group visits.

Figure 2: Monthly Visitation Patterns (2011)



Source: USFWS, ARNWR Visitor Center counts

¹ Actual visitation levels at the refuge are undoubtedly higher than the visitation recorded at the Visitor Center. The Visitor Center counts include only people who enter the Visitor Center, which is only open Thursdays through Sundays from 10:00 am to 4:00 pm. Yet, the refuge is open from dawn to dusk seven days a week. In addition, even on days when the Visitor Center is open many visitors simply walk or bicycle among the trails and never enter the Visitor Center.

EXISTING TRANSPORTATION CONDITIONS

The proximity of the refuge to neighborhoods and rail trails allows many visitors to access the refuge by foot or bicycle, in addition to by car. There is no public transit access to the refuge.

Counts done over the course of a three-day Columbus Day weekend at the refuge’s three principal entrances show that private automobiles are the dominant travel mode, used by about 72% of visitors. Bicycle and pedestrian travel mode shares of, respectively, 17% and 11% are notable for a suburban destination.

Table 1: Visitor Travel Mode

	No. of Visitors	Access Mode		
		Car	Bike	Walk
Main Entrance	460	377	51	32
North Entrance	100	48	36	16
East Entrance	65	24	21	20
	625	449	108	68

	No. of Visitors	Access Mode		
		Car	Bike	Walk
Main Entrance	460	82%	11%	7%
North Entrance	100	48%	36%	16%
East Entrance	65	37%	32%	31%
	625	72%	17%	11%

Source: Data collected by VHB on October 8-10, 2011 from 6:30 am to 6:30 pm.

Vehicle Access and Circulation

The primary vehicle access is via the Main Entrance (Winterberry Way), off Hudson Road in Sudbury. Hudson Road is a minor arterial roadway heavily used (9,600 vehicles per day) by commuters on weekdays and also well used (5,600 vpd) on weekend days. There are an average of about 125 trips into and out of Winterberry Way each weekday and about 225 trips on weekend days.



There are five designated public parking areas within the refuge providing a total of 111 parking spaces. All have been constructed within the past three years and are in excellent condition. There is parking along Winterberry Way at three locations – near the Main Entrance, at the Visitor Center, and at the northerly end near Puffer Pond. There are also parking lots at the North Entrance and the East Entrance. The small (9-space) parking lot at the Main Entrance fills to capacity on some busy days. The parking at the Visitor Center sometimes fills during large events. There are no parking capacity issues at the other parking areas.

The refuge has 1.3 miles of roads that are open to public vehicles. This consists of a 0.3-mile section of White Pond Road that provides access to the parking area at the North Entrance and the 1.0-mile Winterberry Way. Winterberry Way was constructed in 2009/2010 and is in excellent condition. The segment of White Pond Road was noted in a 2010 FHWA study as “poor” and in need of rehabilitation.

Pedestrian/Bicycle Access and Circulation

There is generally good pedestrian access to the refuge. The pedestrian routes to the east, north, and main entrances are also used by bicyclists. More regional bicycle access will be available once nearby rail trails are fully constructed.

There are neighborhoods in both Stow and Maynard near the North Entrance. From Stow, the refuge can be reached via White Pond Road. There are no sidewalks along the road but traffic volumes are low and people routinely walk along the road. Pedestrian access from Maynard to the North Entrance is via a section of the Assabet River Rail Trail. The rail trail extends directly to downtown

Maynard, one mile away, and passes through several established neighborhoods.

The East Entrance has pedestrian access from the small neighborhood along Old Marlboro Road. Other, larger neighborhoods are located north the Old Marlboro Road/Route 27 intersection, but there are currently no sidewalk connections.

The Main Entrance for the refuge is located on Hudson Road. There is a considerable amount of single-family housing in Sudbury starting about a half-mile east of the Main Entrance. There is an extensive sidewalk network in those neighborhoods and there is a paved path along the south side of Hudson Road that terminates at the refuge.

South Tract

The principal pedestrian access to the south tract is the trail from Hudson Road through the state forest. Residents from nearby Sudbury neighborhoods can access the trail directly from the path along the south side of Hudson Road. Refuge visitors can walk from the north tract to the south tract via an unsignalized crosswalk on Hudson Road.

The south tract of the refuge has an entrance at Moore Road that is accessible to pedestrians. Moore Road does not have any sidewalks but there are few vehicles on the road. Other pedestrian connections are via the trails among the municipal and private-organization conservation properties abutting the southern boundary of the south tract.

Rail Trails near the Refuge

The Assabet River Rail Trail (ARRT) runs along the northwest boundary of the refuge. Currently, a six-mile segment from Marlborough to Hudson is complete. The trailhead nearest to the refuge is almost five miles from the North Entrance and four miles from the Main Entrance. A one-mile section



between the North Entrance and downtown Maynard is currently unpaved but is maintained and is actively used by bicyclists and walkers. This section of the ARRT provides direct and convenient access to the refuge from most parts of Maynard. An easement for the ARRT through Stow, from the refuge’s North Entrance to Sudbury Road, has been obtained. The trail is unpaved but usable, and provides a connection between the refuge and some low-density residential areas.

There are two proposed rail trails near the refuge. The Central Mass Rail Trail (CMRT) alignment travels along the south edge of the refuge’s south tract. Initial environmental permitting the eastern segment of the CMRT is underway. The Central Mass Rail Trail will intersect with the Assabet River Rail Trail at the trailhead in Hudson. The CMRT would also provide bicycle access to the refuge from neighborhoods in Sudbury to the east.

The Bruce Freeman Rail Trail is proposed to follow a north-south route through Sudbury, about three miles east of the refuge. It would connect with the Central Mass Rail Trail and thus provide additional connectivity to the refuge for bicyclists.

Refuge Trail System

The refuge contains 15.4 miles of trails open to the public, including 7.7 miles on which bicycles are allowed. Bicyclists are allowed on the trails designated as “roads” and “ways”, most of which are remainders of the military-era road network. Some of the roads and ways are used occasionally by vehicles of other federal agencies that have easements along those roads, and all of the trails are routinely used by USFWS vehicles for administrative and maintenance purposes.

Table 2: Walking Trails in the ARNWR

Name	Length (miles)	Shared with Bicycles	Shared with Cars*
North Tract			
Winterberry Way	1.5	No	No
Taylor Way	1.8	Yes	Yes
Harry’s Way	1.9	Yes	No
White Pond Rd	1.7	Yes	No
Patrol Road	0.8	Yes	Yes
Puffer Pond Trail	0.4	No	Yes
Carbary’s Trail	0.1	No	No
Petapawag Trail	0.9	No	No
Towhee Trail	1.0	No	No
Otter Alley	0.3	No	No
Powerline Trail	0.2	No	No
Sandbank Trail	0.1	No	No
Tebassa Trail	0.1	No	No
Tri-Town Trail	1.2	No	No
Pine Garden Trail	0.3	No	No
Hill Trail	0.4	No	No
Total North Tract	12.7		
South Tract			
Fischer Loop	2.3	No	No
Mink Link	0.1	No	No
Sweet Fern Trail	0.3	No	No
Total South Tract	2.7		
Total	15.4		

* Refers to cars associated with easements held by FEMA and the U.S. Air Force. There is no private vehicle access on these trails. USFWS vehicles use all trails occasionally for management purposes.



The paved surfaces of trails that are along old roadbeds have not been maintained since before the refuge was established. The paved surfaces are heavily cracked, often heaved and rutted, and sometimes potholed. All of them have drainage problems. The crowning of the surface has deteriorated and there are usually ruts that retain stormwater. This not only inconveniences those walking on the trail, it also hastens the deterioration of the trail surface.

The unpaved surfaces on most of the trails are rutted and uneven due to the impact of vehicles and bicycles during wet conditions. Trails are generally at least 10 feet wide, which is typical of a multiuse path, but the rutting and other trail conditions sometimes makes it difficult for bicyclists to pass walkers without the walkers stepping aside.

Handicap Accessibility

The refuge provides many opportunities for those who are mobility impaired, albeit in a limited area of the refuge. The Visitor Center is handicapped accessible; the one-mile path parallel to Winterberry Way is accessible and travels along woods and offers views of Puffer Pond; and there is a section of Harry's Way that provides an accessible route from the Visitor Center to one of the ammunition bunkers.

On the other hand, while the pier at the Barron Fishing Access site is fully accessible, the 500' path to it is not. Nor is the canoe launch at Puffer Pond handicap accessible.

IMPROVEMENT AND ENHANCEMENT PLAN PROJECTS

The stakeholder and public input processes were used to develop, evaluate, and refine near-term and long-term transportation enhancements and improvements to address the major transportation issues and challenges at the Assabet River National Wildlife Refuge.

All projects included in the recommended plan list are consistent with the mission of the National Wildlife Refuge System to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. This includes supporting the six wildlife-dependent recreational uses defined as priority public uses of refuge lands – hunting, fishing, environmental education, environmental interpretation, wildlife observation, and wildlife photography.

The list of projects are also consistent with policies set forth in the refuge's Comprehensive Conservation Plan and other planning documents. For example, the refuge's system of roads, trails and ways was carefully developed during earlier planning efforts. Accordingly, the projects focus on enhancing mobility among the existing travelways rather than constructing new trails.

Near-term Project Opportunities

The recommended list of near-term project opportunities is presented in **Table 3**. The locations of the projects are shown on **Figure 3**. Near-term projects are targeted to be implemented within five years. They do not require extensive planning, do not have significant physical impacts on the refuge habitats, and do not involve extensive partnership coordination. The near-term projects are as follows:



Advance entrance signage on Hudson Road:

Reflective signs notifying drivers of the upcoming entrance turn would be installed on both approaches along Hudson Road, and a sign would be installed at the Winterberry Way driveway. This project is an important initial step to address safety concerns at the refuge’s Main Entrance related to through-traffic drivers on Hudson Road being unprepared for vehicles slowing to turn left into the refuge.

Improve visibility of Hudson Road crosswalk:

The crosswalk is used by visitors walking or bicycling to the refuge from Sudbury and by visitors traveling between the refuge’s north and south tracts. The project is to trim vegetation near the crosswalk to make people waiting to cross more visible to approaching drivers, and to use an in-street pedestrian crossing sign on busy days.

Vehicular wayfinding signage to the refuge:

There has never been any wayfinding signage external to the refuge. Installation of appropriate wayfinding signs will provide better guidance for first-time visitors, as well as market the refuge to passing drivers. The project consists of some 30 signs providing wayfinding from local roads to the ARNWR Main Entrance and wayfinding from regional highways to the ARNWR Main Entrance as well as signs marking the refuge’s secondary entrances.

Procure electric shuttle vehicle: The shuttle would be used to expand access to sites in the refuge for visitors who have mobility impairments, transport school groups to learning sites within the refuge, and provide tours for other groups. It could also be used as a parking shuttle during larger events. The preferred vehicle would not require special charging infrastructure and would have fewer than 16 seats so as to not require special driver licensing.



Example of electric shuttle vehicle

Encourage use of existing state forest parking:

A short walk from the lot through the state forest property leads to the interior of the refuge. Not only does the parking provide the most convenient access to part of the refuge, use of the lot by refuge visitors may defer the need to construct additional parking near the Main Entrance gate.

Support rail trail connections: Completion of the Assabet River Rail Trail through Maynard will improve connectivity with the area of highest population density near the refuge. The proposed Central Mass Rail Trail is promising for its connection to Sudbury neighborhoods and to the trailhead for the Hudson section of the Assabet River Rail Trail. Although the Bruce Freeman Rail Trail is not adjacent to the refuge it does connect with the Central Mass Rail Trail and would thus expand connectivity to the refuge for bicyclists.

The refuge can take a more active role in advocating efforts to move the rail trail projects through the state planning, design, and funding process. As the trails progress, the refuge can market how the trails provide access to the refuge.



Kiosk at northern end of Winterberry Way:

Kiosks are located at the parking lots near the three vehicle entrances to the refuge, but some visitors travel directly to the terminus of the public vehicle access (paved) section of Winterberry Way, especially when the Visitor Center is closed.

Signage at Main Entrance Gate: An issue regarding uncertainty by first-time visitors as to whether they should proceed through the gate on Winterberry Way or park in the adjacent parking lot was identified through the study process. The issue arises from the Visitor Center not being visible from the gate and concern as to when the gate will be closed at the end of the day. Project elements to address this issue include more explicit signage directing to the parking and trails at the Visitor Center, and signs indicating when the gate will close that day.

Expand Parking Lot at the Main Entrance:

The parking lot at the Main Entrance is a popular location for visitors who are walking or biking on the trail networks. The parking lot is usually full at some point during busy days. This project expands the existing parking area by 10 parking spaces.

Maintenance of Sandbank Trail Canoe Launch:

Installation of a block mat system would address ongoing erosion problems.

Vehicle, bicycle and pedestrian traffic counters:

Visitation data are collected only at the Visitor Center, which is only open Thursday through Sunday. The use of portable counters will provide useful information not only on total visitation to the refuge, but also the utilization of specific trails, roads, and parking areas.

Electronic kiosk at Visitor Center: This project will provide visitors information when the Visitor Center is closed, will collect information about

visitor characteristics, and help manage hunting activities at the refuge.

Electric vehicle charging station: An electric vehicle charging station is in keeping with the education mission of the refuge. The ARNWR is well suited for an electric vehicle charging station due to the demographics of the gateway communities and the typical duration of visit to the refuge.

Long-term Project Opportunities

There are many larger project opportunities that would benefit the ARNWR and its visitors, both current and future. These large-project opportunities involve substantial construction efforts, have high financial cost, and are therefore targeted for implementation long range, perhaps as long as 10 to 20 years. The recommended list of long-term project opportunities is presented in **Table 4**.

Reconstruct the North Entrance access road

(White Pond Road): The roadway is in extremely poor condition and the project would widen the road from 14 to 18 feet to better accommodate the mix of walkers, bicyclists, and drivers who use it.



The recent project to construct a new parking lot at the North Entrance did not include repair of this 1,000-foot long roadway leading to the parking lot.



Add accessible canoe launch at Barron Fishing

Access Site: The most practical means of providing an accessible canoe launch is to provide it at the Barron Fishing Access Site located at the end of Carbury's Trail. The dock could be expanded to include additional dock platform and an accessible transfer system. If the project were to be implemented Carbury's Trail would need to be made accessible.

Improve handicapped accessibility along

Carbury's Trail: Reconstructing Carbury's Trail would provide an accessible trail from the parking at the end of Winterberry Way to the Barron Fishing Access Site. Although the fishing pier is handicap accessible, there is currently no accessible route to the fishing pier.

Improve handicapped accessibility along Puffer

Pond Trail: This is an opportunity to enhance the experience at the refuge for all those who are mobility impaired. Making both Carbury's Trail and Puffer Pond Trail handicapped accessible creates an accessible trail along the water, something not now available in the refuge. The project would construct the accessible path along the section of Puffer Pond Trail to the south of Carbury's Way.

Reconstruction of Roads and Ways: White Pond Road, a section of Patrol Road, Harry's Way, and Taylor Way are the principal trails in the refuge and are used by bicyclists and walkers. The road surfaces have not been maintained since long before the refuge was established. Paved surfaces are deteriorated and unpaved surfaces are rutted. The general priority for addressing the roads and ways is White Pond Road, then Patrol Road, followed by Harry's Way and Taylor Way.

- **White Pond Road.** This paved road is 1.7 miles long and used by bicyclists and walkers. It is the most popular bicycle route in the

refuge. Most of the roadway pavement is in "failed" condition and the remainder is in "poor" condition. The project would reconstruct the paved roadway.

- **Patrol Road,** between Winterberry Way and White Pond Road: This 0.8-mile section of paved roadway is used not only by bicyclists and walkers, but it also provides primary administrative vehicle access to the west section of the refuge. This project would add an overlay to the existing pavement.
- **Harry's Way:** This trail is used by bicyclists and walkers. It is 1.9 miles long, of which 1.5 miles is gravel and 0.4 miles is paved. The paved section runs from the Visitor Center to some of the ammunition bunkers. The project would extend the paved section about a quarter-mile to Kingfisher Trail and would maintain the remainder of Harry's Way as a gravel surface.
- **Taylor Way:** This 1.8-mile gravel trail is used by bicyclists and walkers. The project would reconstruct the trail with a gravel surface.

Create an eastbound left-turn lane pocket at the Hudson Road entrance driveway:

Widening Hudson Road to provide a left-turn lane would allow through traffic to pass cars waiting to turn into the refuge. This is one of several projects considered to address safety concerns related to sometimes high-speed through traffic drivers not anticipating the occasional vehicle slowing to turn into the refuge. It is the preferred choice among the construction options, but the project to install ARNWR signs along Hudson Road in advance of the driveway is the first step in addressing the safety concerns.



Table 3: Transportation Improvement and Enhancement Plan Projects: Near Term Opportunities

Map ID	Description	Benefits of Implementation	Partners	Implementation Cost	Annual O&M Cost	Comments
1	Provide advance entrance signs on Hudson Road Install ARNWR sign at entrance and advance signs on road	Improved safety at entrance. Fewer sudden turns by vehicles entering refuge. Reflective signs make it easier to see entrance at night.	Sudbury, Stow	\$2,000	Negligible	High priority
2	Improve visibility of the Hudson Road crosswalk Trim vegetation and use in-street pedestrian sign	Provide a safer environment for pedestrians.	Sudbury, DCR	\$300	\$300	High priority
3	Provide wayfinding signage to refuge Install directional signs on area roadways	Provide better guidance for first-time visitors. More awareness of the refuge for other drivers.	Sudbury, Stow, Hudson, Maynard	\$10,200	\$100	High priority
4	Procure electric shuttle vehicle Purchase accessible electric vehicle for on-refuge use	Provides option for mobility assistance. Enhances opportunities for educational outreach to school groups.		\$32,000	\$500	High priority
5	Encourage use of state forest parking on Sudbury Road to access the refuge Mark trail connection to Patrol Road/White Pond Road intersection. Note parking on refuge maps.	Quick access to the interior of refuge. Lessens need to construct parking.	DCR	<\$500	<\$500	High priority
6	Support rail trail connections - Assabet River Rail Trail Advocate for construction of ARRT in Maynard and Acton. Market access via existing (unpaved) sections.	Facilitates non-motorized access. Connectivity with downtown Maynard and South Acton.	Acton, Maynard, ARRT friends group	Negligible	Negligible	Immediate action item
7	Support rail trail connections - Central Mass Rail Trail Advocate for planning, design and construction of CMRT in Sudbury	Facilitates non-motorized access. Connectivity with Sudbury neighborhoods to east. Link to ARRT trailhead parking in Hudson.	Sudbury, Stow, Hudson, CMRT friends group	Negligible	Negligible	Immediate action item
8	Support rail trail connections - Bruce Freeman Rail Trail Advocate for planning, design and construction of BFRT in Sudbury and Framingham	Facilitates non-motorized access. Connectivity with Central Mass Rail Trail.	Sudbury, Framingham, BFRT friends group	Negligible	Negligible	Immediate action item
9	Kiosk at the northern end of Winterberry Way Construct standard information kiosk	Provides visitor information at key location.		\$2,000	\$100	Low cost, near-term action
10	Modify signage at Main Entrance gate Replace existing signs. Install new ARNWR sign.	Reduces visitor confusion at gate. Better awareness of Visitor Center and trail opportunities.		\$4,800	Negligible	Low cost, near-term action
11	Expand parking lot at Main Entrance Add second row of parking spaces	Additional parking capacity (10 spaces) in busy area of refuge.	Sudbury	\$31,000	\$500	Opportunistic, pursue as funding is identified
12	Maintenance of Sandbank trail canoe launch Install block mat system	Maintenance issue eliminated.	Sudbury	\$15,000	Negligible	Opportunistic, pursue as funding is identified
13	Vehicle, bicycle, and pedestrian count system Software and 10 portable counters	Provides information on magnitude and pattern of use for trails, parking, and roads. Provides more accurate count of visitation.		\$6,000	\$200	Opportunistic, pursue as funding is identified
14	Electronic kiosk at Visitor Center Install i-Sportsman system	Provides visitors information when Visitor Center is closed, collects information about visitor characteristics, and helps manage hunting activities.		\$15,000 - \$40,000	\$1,500	Opportunistic, pursue as funding is identified
15	Install electric vehicle charging station at Visitor Center Charging station for visitor vehicles	Encourages visitation, provides educational opportunity, and is consistent with USFWS goals to reduce carbon footprint.	Maynard	\$11,6000	Negligible	Opportunistic, pursue as funding is identified

DCR = Massachusetts Department of Conservation & Recreation



Table 4: Transportation Improvement and Enhancement Plan Projects: Large-project Opportunities

Map ID	Description	Benefits of Implementation	Partners	Implementation Cost	Annual O&M Cost	Comments
16	Reconstruct North Entrance access road Complete reconstruction and widening of road from entrance to parking area (1,000')	Improved access to parking area. Better accommodation of bicyclists, walkers, and vehicles.	Sudbury, Maynard	\$235,000	\$4,000	Highest priority among large projects. As funding is identified
17	Improve handicap accessibility along Carbury's Trail Construct 10' wide permeable concrete path	Expands the refuge experience for visitors who are mobility impaired.	Maynard	\$85,000	\$600	Priority, pursue as funding is identified
18	Improve handicap accessibility along Puffer Pond Trail Construct 6' wide permeable concrete path	Expands the refuge experience for visitors who are mobility impaired.	Maynard, Sudbury	\$150,000	\$1,100	Priority, pursue as funding is identified
19	Accessible canoe launch at Barron Fishing Access Site Add dock and EZ Launch system to existing fishing dock	Expands the refuge experience for visitors who are mobility impaired.	Maynard	\$31,000	\$100	Priority, pursue as funding is identified
20	Reconstruction of Roads and Ways - White Pond Road Reconstruct 1.7-mile paved road	Maintains usability for bicyclists.	Stow	\$670,000	\$20,000	Priority among roads and ways reconstruction projects. Pursue as funding is identified
21	Reconstruction of Roads and Ways - Harry's Way Reconstruct paved (0.4 mile) and gravel (1.5 mile) segments separately	Maintains usability for bicyclists.	Stow, Maynard, Sudbury	\$580,000	\$35,000	Pursue as funding is identified
22	Reconstruction of Roads and Ways - Patrol Road Reconstruct 0.8 miles of paved road at reduced width	Maintains usability for bicyclists. Maintains vehicle access to Air Force parcel.	Stow, Sudbury	\$280,000	\$11,000	Pursue as funding is identified
23	Reconstruction of Roads and Ways - Taylor Way Reconstruct 1.8-mile gravel road	Maintains usability for bicyclists.	Maynard	\$480,000	\$38,000	Pursue as funding is identified
24	Create eastbound left-turn land pocket at entrance road driveway Widen Hudson Road and create turn lane	Allows through traffic on Hudson Road to bypass vehicles turning into refuge.	Sudbury, DCR, DFS	\$155,000	None	Potential follow on project after evaluation of effectiveness of "Provide advance entrance signs on Hudson Road" project

DCR = Massachusetts Department of Conservation & Recreation

DFS = Massachusetts Department of Fire Services



TRANSPORTATION STUDY
ASSABET RIVER NATIONAL WILDLIFE REFUGE

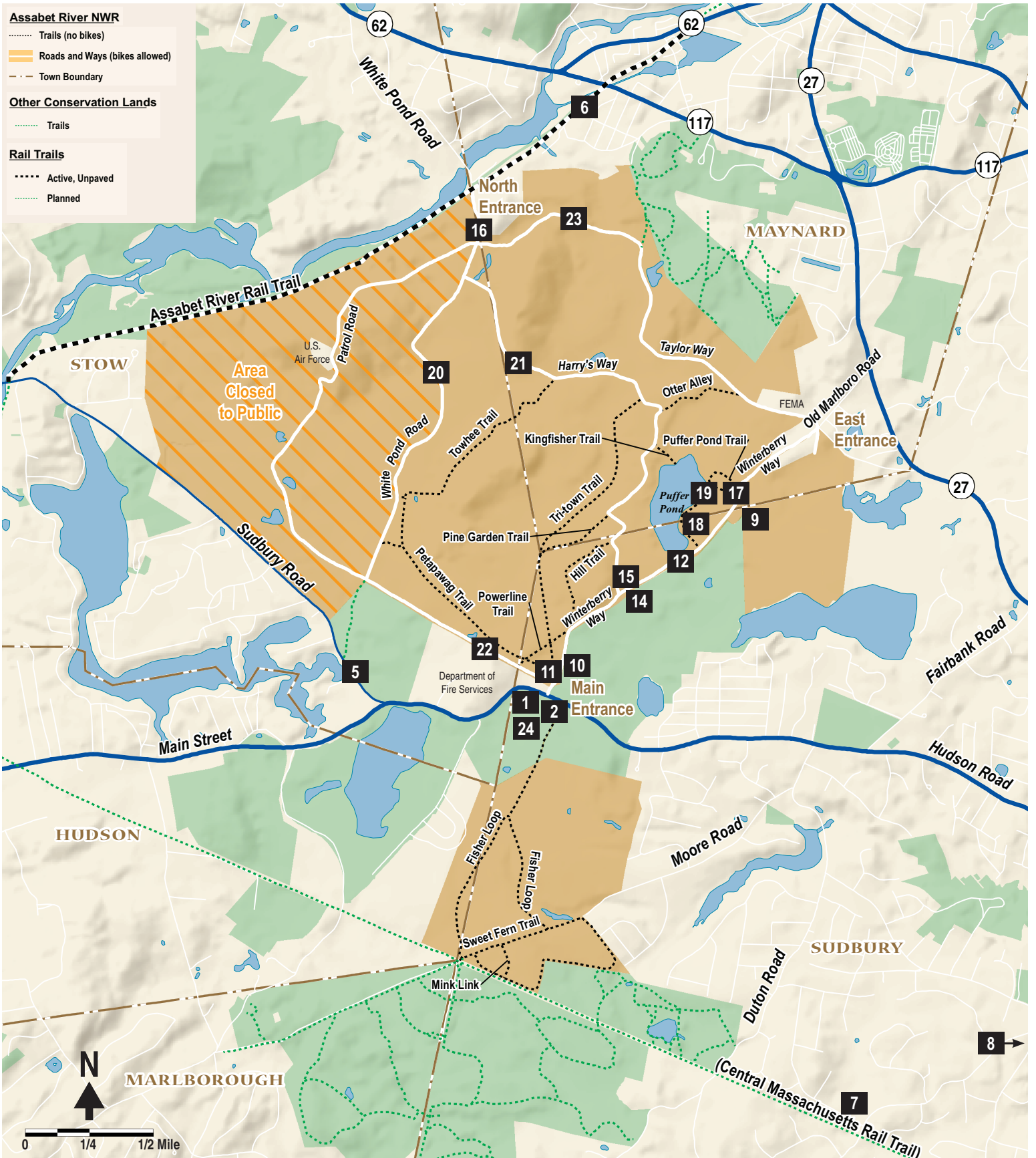


Figure 3
Project Locations



