Wagon Hill Farm

Trails and Bridges Assessment

By

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INTRODUCTION

The 139-acre Wagon Hill Farm, owned and managed by the Town of Durham, is located on Route 4, three miles east of the center of town. The property consists of 99 acres on the south side of Route 4 and 40 acres on the north side of the highway. The "North 40" is accessed via Watson Road.

The Town of Durham acquired the Chesley Homestead Farm on September 15, 1989 from the Estate of Mary H. Tirrell. This followed a public hearing, special town warrant, and Council approval in the summer of 1989. The Town purchased the property for $3.1 million dollars in bond funds "*to preserve its scenic vistas, provide for future municipal purposes and preserve open space in order to provide for healthful and attractive outdoor environment for work and recreation, and to conserve land, water, forest and wildlife resources.*" The Town officially named the property Wagon Hill Farm.

The southern 99-acre parcel has an extensive and well used trail network that winds through the fields and forests and along the shore of Little Bay. Other amenities include a community garden, sledding hill, benches, picnic tables, and parking areas for up to 37 vehicles. The fields are mowed once a year in the fall to maintain habitat for monarch butterflies and other wildlife and to maintain the scenic vista. Dog walking is popular, and visitors can walk dogs off leash between dawn and 10 AM.

In 2019, the Town of Durham, in partnership with UNH, NH Department of Environmental Services, and others, initiated a Living Shoreline project to halt erosion and restore salt marsh habitat. The first phase--completed last year--included approximately 300 feet of salt marsh/shoreline restoration, fencing, upland plantings, rain gardens to slow runoff, and a new observation pier and boardwalk. The partners recognize that this saltmarsh restoration requires a parallel effort to build sustainable trails along the shoreline and to minimize the human footprint on the shore due to the sensitivity of the site to compaction, erosion, and habitat loss.

In addition to the sensitivity of the shoreline, the soils on much of Wagon Hill Farm are Buxton silt loams, which consist of clayey soil that have a slow rate of water infiltration. This means that during wet seasons and rainy periods the clay soil, if disturbed through extensive trail use, becomes slick and mucky. This results in trail users making wider and wider paths to get around the muddy sections. In contrast, during dry periods the soil becomes hardpacked.

Wagon Hill Farm is a gateway property to Durham with spectacular views across the open fields and out across Little Bay. As such, the trails and bridges should be built to welcome and sustain year-round access by the public. In addition, the increasing popularity of the Wagon Hill Farm trails, especially during the COVID-19 pandemic, has put more pressure on these trails and bridges. As part of the Land Stewardship Subcommittee's work on assessing town properties and planning and building more sustainable trails, an assessment of the Wagon Hill Farm trails and bridges was initiated in 2020. This report includes the assessment and recommendations.

This report does not include assessment and recommendations related to other stewardship issues such as public uses, access, habitat management, forestry and related topics.

MAPS and PHOTOS

The attached Map shows the sites (#1-8) of recommended trail and bridge improvements for Wagon Hill Farm; with corresponding photos attached (#1-20). Photos #21-24 show some of the recent trail improvements as part of the Living Shoreline Project. Photos #25-28 show some of the signage related to dogs and sensitivity of the shoreline.

TRAILS

The more than 3 miles of trails at Wagon Hill Farm are popular year-round. The most popular activities include hiking, dog-walking, snowshoeing, as well as sledding on the hill by the iconic wagon. Visitors enjoy picnicking or sitting on benches in the clearing near the shore and in the old apple tree clearing. During the growing season, the Department of Public Works (DPW) mows the trails through the fields every 7 to 14 days from May to October. A gravel road leads from the parking lot down to the grassy opening that borders the waterfront. This road provides management access and serves as a main access for the public to reach the scenic shoreline. The other trails have a grass tread (through the fields) or natural soil tread (woodland), with some boardwalks or bridges (discussed below).

The sensitivity of the soils and shoreline habitats, the Living Shoreline Project, and increased use of Wagon Hill Farm, necessitates a review of the trail network at this time. To preserve the investment in shoreline restoration and to prevent new erosion problems, trails need to be kept back from the shore. Some areas will also benefit from trail re-routes to avoid excessively wet areas, which will protect habitat and provide more sustainable and enjoyable visitor experiences.

Trail issues result from high traffic on Buxton soils that result in ever-widening paths created by visitors to avoid mud and standing water, especially during late winter and spring. Although some of this resolves itself once conditions dry out, there are 2 to 3 months or more when the trails are not ideal for many visitors. And some areas are slippery when muddy causing people to fall. In addition, these trail conditions result in soil compaction in some places, degrading the ecological integrity of the fields, forests, and wetlands at Wagon Hill Farm.

Several options are available to improve the trails so that these conditions are avoided, some in combination with building or re-building bridges and boardwalks:

- Re-route some sections of trails
- Add hardpack gravel to bridge approaches
- Use hardpack instead of wood chips where exposed roots or mud are an issue, especially on woodland trails
- Add boardwalks level with the ground (if in the field)

It is also critical that visitors stay on the designated trails and not create new trails nor walk down to the shore or allow their dogs to venture there. The shoreline is extremely susceptible to erosion. A kiosk with a trail map near the parking lot and another near the shore may be helpful in reminding visitors of how to tread lightly.

BRIDGES and BOARDWALKS

A distinction is made between bridges, which cross a wetland or stream, and boardwalks, which elevate a trail tread above roots or mud. Both types of crossings are found on Wagon Hill Farm and were built over many years, using different materials, with repairs as needed or as time has allowed, often completed by the Department of Public Works. Some of the bridges and boardwalks are in disrepair and need attention as soon as possible.

In 2019, as part of the Living Shoreline Project, several improvements were made to trails near the shore, including a new boardwalk and hardpack gravel walkway, a decked boardwalk at the end of the maintenance road to the clearing, fencing, and an observation platform at the old pier (see photos 20-23). These improvements will reduce compaction and erosion, provide more stable walking surfaces, keep visitors off the sensitive shoreline, and offer scenic observation points.

To ensure that new or repaired bridges and boardwalks are sustainable and provide improved visitor experience, while protecting sensitive soils, habitats, and water quality, the materials and design of the structures should be well-planned.

- Pressure-treated lumber is the preferred lumber for bridges and boardwalks as it is long-lasting
- Hardpack (3/4 gravel with fines or similar) is preferred over wood chips for trail treads and bridge approaches as needed
- Bridge abutments may include recycled granite slabs or pressure-treated lumber; If the latter, layer gravel under the PT to ensure a longer life
- All bridges and boardwalks should have ramps or be level with the ground to allow for ease of walking and skiing

SPECIFIC TRAIL and BRIDGE/BOARDWALK RECOMMENDATIONS
(See the map for site locations and corresponding photos)

1. **SITE 1: RE-BUILD BRIDGE, ADD GRAVEL APPROACHES, ADD BOARDWALK (PHOTOS 1-3)**
   This existing 16-foot long by 60" wide bridge is in disrepair. It crosses a small drainage as shown on the map. The bridge is undersized and broken in places. The approaches are muddy.
   - Re-construct the bridge by installing granite slabs as abutments.
   - Extend length of bridge to cover more ground….perhaps another 2 feet on each side
   - Use PT stringers and PT decking; add 2x4 railing raised off deck with 2x4 blocks
   - Cut back some of the downstream shrubby vegetation
   - Add hardpack gravel to the approaches
   - Install 20 to 30 feet of ground level boardwalk across muddy/seep section of trail south and west side of the bridge

2. **SITE 2: RE-ROUTE THE "RED" TRAIL (PHOTOS 4-6)**
   This trail runs along the edge of the field and shrub/woodlands. The tread is sloped or at the bottom of the field, which results in wide muddy sections during spring and dips in the trail due to runoff/erosion. Moving the trail upslope 10 to 20 feet should provide a more level tread. This can be done simple by mowing a new path and letting the old path recover. This would also provide more buffer between the lower field and the shoreline, where visitors should not venture.

3. **SITE 3: RE-BUILD AND RE-ROUTE BRIDGE (PHOTOS 7-11)**
   This path and bridge are a mish-mash of materials, design, and angles. It is causing erosion along the drainage and is unsafe. The paths that lead to this crossing are also muddy and slippery. A re-route will bypass several existing problem areas and connect directly to an existing boardwalk that leads to the clearing by the shoreline.
   - Ask Wetlands Scientist Mark West to evaluate proposed re-route to determine if a wetlands permit is needed
   - Flag the proposed re-route
   - Develop design specs: new box steps on the east side, PT stringers and decking (40-inch wide deck should suffice), connect to existing boardwalk. Prepare an RFP for bids on design and construction
   - Restore the area of the discontinued sections of trail once new bridge/trail is completed

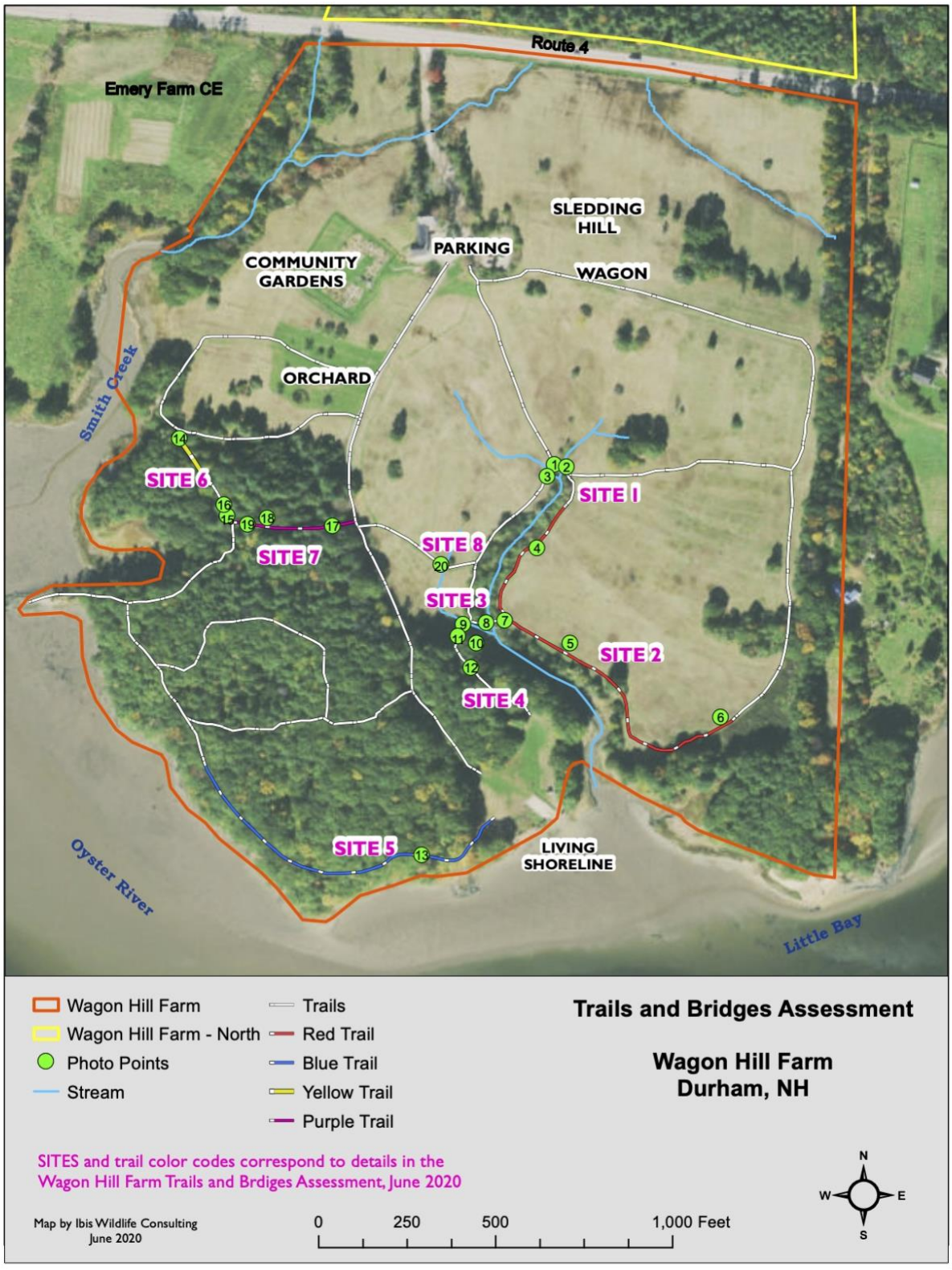
4. **SITE 4: REPAIR BOARDWALK (PHOTO 12)**
   This boardwalk is approximately 167 feet long and is made of KD decking that needs to be replaced with pressure treated lumber. This boardwalk receives heavy traffic and will connect to the re-routed and rebuilt bridge at Site 3.
   - Replace rotten boards OR replace entire run with hardpack gravel if suitable as a more sustainable alternative
   - Consider adding ramps at each end of the boardwalk to provide smooth access for skiers rather than a step up or down.
   - Once the bridge at Site 3 has been re-built, this boardwalk should tie into that new route

5. **SITE 5: RE-LOCATE the "BLUE" TRAIL INLAND (PHOTO 13)**
   This trail runs west from the newly built boardwalk by the pier about xxx hundred feet along the shoreline. This section of trail is proposed to be moved inland about 20 feet to prevent further shoreline erosion. The existing trail becomes extremely muddy and wet along the entire length. The topography here is flat and soils are prone to becoming muddy over time. When the trail is relocated, it will be important to assess the trail use impacts the first year to determine if boardwalk or hardpack gravel is needed to sustain the tread.
   - Ask Wetlands Scientist Mark West to evaluate the proposed re-route to determine if wetlands or hydric soils are an issue
   - Flag new proposed trail route
   - Brush out trail – this could be done by volunteers
   - Close existing section of trail
   - Install signage to guide visitors about trails and dos and don'ts

6. **SITE 6: REPAIR BOARDWALK AND IMPROVE the "YELLOW" TRAIL ROUTE (Photos 14-16)**
   This 77-foot long boardwalk needs repairs. The addition of hardpack gravel on the approaches would provide a smoother transition. Just beyond this boardwalk the trail dissolves into a threaded network, where visitors have sought a less muddy route through the woods. The best route needs to be selected and brushed out and then evaluated for installation of additional boardwalk and/or hardpack.
   - Repair the boardwalk
   - Add hardpack to the approaches
   - Select a route for the "yellow" trail. Evaluate tread for sustainability: build boardwalk or add hardpack as needed

7. **SITE 7: IMPROVE TRAIL TREAD ON THE "PURPLE" TRAIL (Photos 17-19)**
   The clay soils on this trail become muddy, with an ever-wider trail in spring. A series of existing boardwalks help on some stretches of this trail. Another 100 feet of boardwalk or hardpack or some combination is needed to improve this trail. The trail is becoming a little overgrown at the west end and the two benches here are also overgrown.
   - Build another 100 feet of boardwalk or combination of boardwalk and hardpack
   - Add ramps (wood or gravel) to all boardwalks
   - Brush back the vegetation along the trail
   - Remove trees and invasive shrubs around the benches

8. **SITE 8: BUILD GRADE LEVEL BOARDWALK, WITH CULVERT OR ROCK UNDERNEATH (Photo 20)**
   This trail connector crosses another drainage in the field, which is very wet and muddy during spring.
   - Build ~20 feet of boardwalk with culvert or rock for drainage underneath


Route 4
Emery Farm CE
SLEDDING HILL
PARKING
COMMUNITY GARDENS
WAGON
ORCHARD
Smith Creek
SITE 6
SITE 1
SITE 7
SITE 8
SITE 3
SITE 2
SITE 4
SITE 5
LIVING SHORELINE
Oyster River
Little Bay
Wagon Hill Farm
Wagon Hill Farm - North
Photo Points
Stream
Trails
Red Trail
Blue Trail
Yellow Trail
Purple Trail
Trails and Bridges Assessment
Wagon Hill Farm
Durham, NH
SITES and trail color codes correspond to details in the
Wagon Hill Farm Trails and Brdiges Assessment, June 2020
Map by Ibis Wildlife Consulting
June 2020
0
250
500
1,000 Feet
N
W
E
S