

# Greater Goose Pond Forest

## Trail Assessment and Design Plan

*This plan is part of the Greater Goose Pond Stewardship Plan*



**Submitted to the:**

*City of Keene  
Planning Department  
3 Washington Street  
Keene, NH 03431*

**August 22, 2018 by:**





# Greater Goose Pond Forest

## Trail Assessment and Design Plan

### Table of Contents

#### Part One

**Introduction**

#### Part Two

**Trail Planning Maps**

#### Part Three

**Segment 1: Proposed Accessible Trail - Trail Log and Photopages**

#### Part Four

**Segment 1: Entrance Path - Trail Log and Photopages**

#### Part Five

**Segment 1: Pond Loop Trail - Trail Log and Photopages**

#### Part Six

**Segment 1: Lower Green on White Trail - Trail Log and Photopages**

#### Part Seven

**Segment 1: Upper Green on White Trail - Trail Log and Photopages**

#### Part Eight

**Segment 1: Shortcut to Green on White Trail - Trail Log and Photopages**

#### Part Nine

**Segment 1: Upper Blue on White Trail - Trail Log and Photopages**

#### Part Nine

**Segment 1: Lower Blue on White Trail - Trail Log and Photopages**

#### Part Ten

**Segment 1: Wild Thing - Trail Log and Photopages**

#### Part Eleven

**Segment 1: Outback - Trail Log and Photopages**

#### Part Twelve

**Segment 1: Labyrinth - Trail Log and Photopages**



**Part Thirteen**

**Segment 2: Far Side - Trail Log and Photopages**

**Part Fourteen**

**Segment 2: Red on White - Trail Log and Photopages**

**Part Fifteen**

**Segment 3: Rope Tow to Lower Drummer Hill - Trail Log and Photopages**

**Part Sixteen**

**Construction Specifications**

**Part Seventeen**

**Kiosk Designs**

**Part Thirteen**

**Timber & Stone, LLC Supporting Documents**

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## **Greater Goose Pond Forest Trail Assessment and Design Plan**

**City of Keene, NH**



### **Introduction**

The trails of the Greater Goose Pond Forest provide recreational experiences within every aspect of a classic New England forest. Visitors can enjoy rambling over rocks, meandering along a pond's edge, or exploring dense stands of mature trees. Given its multiple points of access, proximity to downtown Keene, NH, and its ability to showcase signs of historical use, the Greater Goose Pond Forest trails are able to provide an unparalleled recreation opportunity to all who choose to visit.

During the fall and early winter of 2017, Timber & Stone, LLC thoroughly explored the woods of the Greater Goose Pond Forest with the goal of assessing the trails that exist within the 1,044 acre parcel. This standalone document covers a trails assessment and design plan as part of the Greater Goose Pond Stewardship Plan. Please see main document prepared by Moosewood Ecological, LLC regarding stewardship planning for forest and wildlife resources. This work was achieved while analyzing the current trails with an eye towards improving, closing, or maintaining them. In total, the crew hiked and analyzed over 10 miles of trails, which is not the total amount offered within the property. This report's scope of work was limited to a formal analysis of 8.5 miles. This amount proved to be an accurate view of the property's trail status and allowed for the realization of consistent management suggestions.

The result of the assessment process was a thorough inventory of the trail conditions, level of use, presence of signage, and overall state of sustainability and safety. It is our pleasure to report that, overall, the trails of the Greater Goose Pond Forest are in good shape. This is due in part to the ongoing maintenance by the City of Keene, the stewardship by the New England Mountain Biking Association (NEMBA,) and the fortunate presence of well-draining soils throughout most of the property. It is our strong recommendation to follow the suggested tasks outlined in the accompanying trail logs and photopages to upgrade the status of the trails in both safety and sustainability. It is also recommended to initiate new management practices that will help to present the Greater Goose Pond Forest's trail system with a more unified approach. This will enable visitors to be welcomed, informed, and prepared to enjoy what the property has to offer from the moment they park their car until they return and drive away.

This document summarizes findings and recommendations for all three segments of the Greater Goose Pond Forest. All sections of this document work in unison to provide detailed information on the layout of the trails and the construction guidelines for each linear foot of the trails assessed.

## **General Management Suggestions**

During our time exploring the trails of Greater Goose Pond Forest, we developed themes related to the maintenance and management of the trail system. Our detailed analysis of the trails can be found in the sections below. The following is a summary of our recommendations for upgrading and improving the management of the property by way of a more unified and cohesive approach.

### **A. Kiosk Installation**

Included in this trail report are designs for primary kiosks to be located at trail heads and large trail intersections. The existing kiosks should be removed as they are either rotting or inconsistent with a unified City presence of signage within the property. The kiosks should prominently display a revised trail map and provide use guidelines for all trail users. Kiosks also serve as a way of



educating the public on upcoming events, health awareness bulletins (ticks, hunting, etc.) or as means of tracking use through sign in sheets. The absence of these at the main kiosk at East Surry Road is a missed opportunity for engaging and educating trail users.

## **B. Trail Blazing and Signage**

Many of the highly used trails are located on pre-existing logging roads or access paths to the pond. Overall, these trails are well trodden and obvious. There are, however, many trails that do not have trail blazes or signs. This, combined with the myriad of trails available on the property, leaves new visitors with one option: an out and back trail walk so as to stay on the same trail.

We recommend reblazing all trails within Greater Goose Pond Forest. This will involve the creation of a unified trail naming system and the installation of plastic trail blazes with the City of Keene's logo. The blazes should be affixed to healthy trees with an aluminum nail. The current blazes were painted many years ago and have faded or are simply missing. In addition to helping orient trail users, trail blazes increase a visitor's sense of place and connection to the property.



Currently, the trails of Greater Goose Pond Forest are either named Green on White, Blue on White, Labyrinth, or Wild Thing. These are a mix of names from previous City managers and New England Mountain Bike Association designations. Our recommendation is to rename most, if not all, trails to fall within an agreed theme for the property. The use of "Green on White" leads to confusion as the blazes have either faded or disappeared, whereas trail names such as "Wild Thing" may be limited in their appreciation to the single track biking community. Trail names that are rooted in the natural history of the area may help increase connection while also educating visitors what can be found on the property. A singletrack trail named "Acorn Drop" or a meandering walking path named "Coyote Run" could be inviting and appreciated by all trail users.

### **C. Improved Partnership with New England Mountain Biking Association (NEMBA)**

NEMBA has created an impressive network of trails within the Greater Goose Pond Forest. The trails link all segments of the property and provide challenging mountain biking for all users to enjoy. Old Gilsum Road can be used as a quick entrance or exit along the border of the property with many trails dropping down steep terrain and eventually leading to Goose Pond. Many of the trails were laid out and constructed with thought and in line with sustainable construction guidelines.



During planning meetings, we noted a need for improved communication between the City of Keene and NEMBA in regards to the creation of trails and the installation of signage. It is possible that the City is not aware of the full volume of trails present on the property and the installation of what could be over dozens of homemade trail signs. Although the signage helps to guide users, they are only located along the NEMBA specific trails and are not present along the Pond Loop Trail or other general use trails. Additionally, the blazes are installed at a level most appreciated by a biker with their head down. This furthers their “use specific” intent.

Although the tread of the NEMBA trails was constructed with sustainability in mind, it is recommended to encourage a similar attention to detail on the bridge structures. A bridge was installed by the lower pond that has a drop of 8 feet with no railings. Additionally, many of the smaller bridges are built within active waterways with high flows that can and have displaced the bridges. As noted in the Construction Specifications at the end of this document, we recommend using non pressure treated lumber for the decking as pressure treated lumber becomes quite slippery when wet. Additionally, and where possible, anchoring the bridge sills to base stones will help them remain in place during high water events.



#### **D. Installation of a Multi-Use Pathway**

The City of Keene plans on installing a 12 car parking lot off East Surry Road as part of its effort to improve parking and access to Goose Pond. Additionally, a maintenance road will be installed to provide access to the dams for any scheduled maintenance event. Given that the road will need to be built in a manner to sustainably support trucks, we recommend further transforming this road into a multi-use bike path.

Currently, the only biking available at Greater Goose Pond Forest is along the NEMBA bike trails. Most of those trails are located along steep terrain. In order to open the property to more visitors with varied biking abilities, the maintenance road could easily be left in a state that would be welcoming to family bikers. This concept is further described in the Lower and Upper Green Trail assessments found in this document.

#### **E. Installation of an Accessible Trail**

Currently, no portion of the Greater Goose Pond Forest is accessible to wheelchairs or those with limited mobility. This puts a significant limitation to the potential users of the property and highlights the need for more diverse trail conditions. During our assessment of the trails at Goose Pond, we noted a location where an accessible trail could be incorporated. The trail would begin adjacent to the new parking area off East Surry Road and would access the lower pond. Although short in length, the trail will provide excellent views and an unparalleled opportunity to enjoy the woods, wetlands, and diverse tree species of Greater Goose Pond Forest.



Specific conditions of this particular trail are described below as are the specifications for an accessible trail. Given the site conditions, this trail would be fiscally responsible to construct. In the end, a trail open to all users would be created with modest expenditure and limitless community impact.

#### **F. Maintenance of Existing Trails**



As mentioned above, the overall condition of the Greater Goose Pond Forest trail system is good. With some exceptions, most trails only require brushing of the trail corridor, installation of trail blazing, and removal of berms that are capturing standing water. There are some actions, suggested in this report, that require more extensive effort to bring the trails to a more sustainable level. This would include replacement of existing trail bridges, rerouting a trail to a more reasonable location, and the reconstruction of the entrance trail off East Surry Road. In the end, the work described in this report is aimed at improving the safety and sustainability of the Greater Goose Pond Trails. The following sections provide more detailed descriptions of the work prescribed for the three segments that make up Greater Goose Pond Forest.



Similar to the myriad of trails that weave within Greater Goose Pond Forest, stone walls and foundations cover the landscape. These sites offer great perspective into the property's history of use.

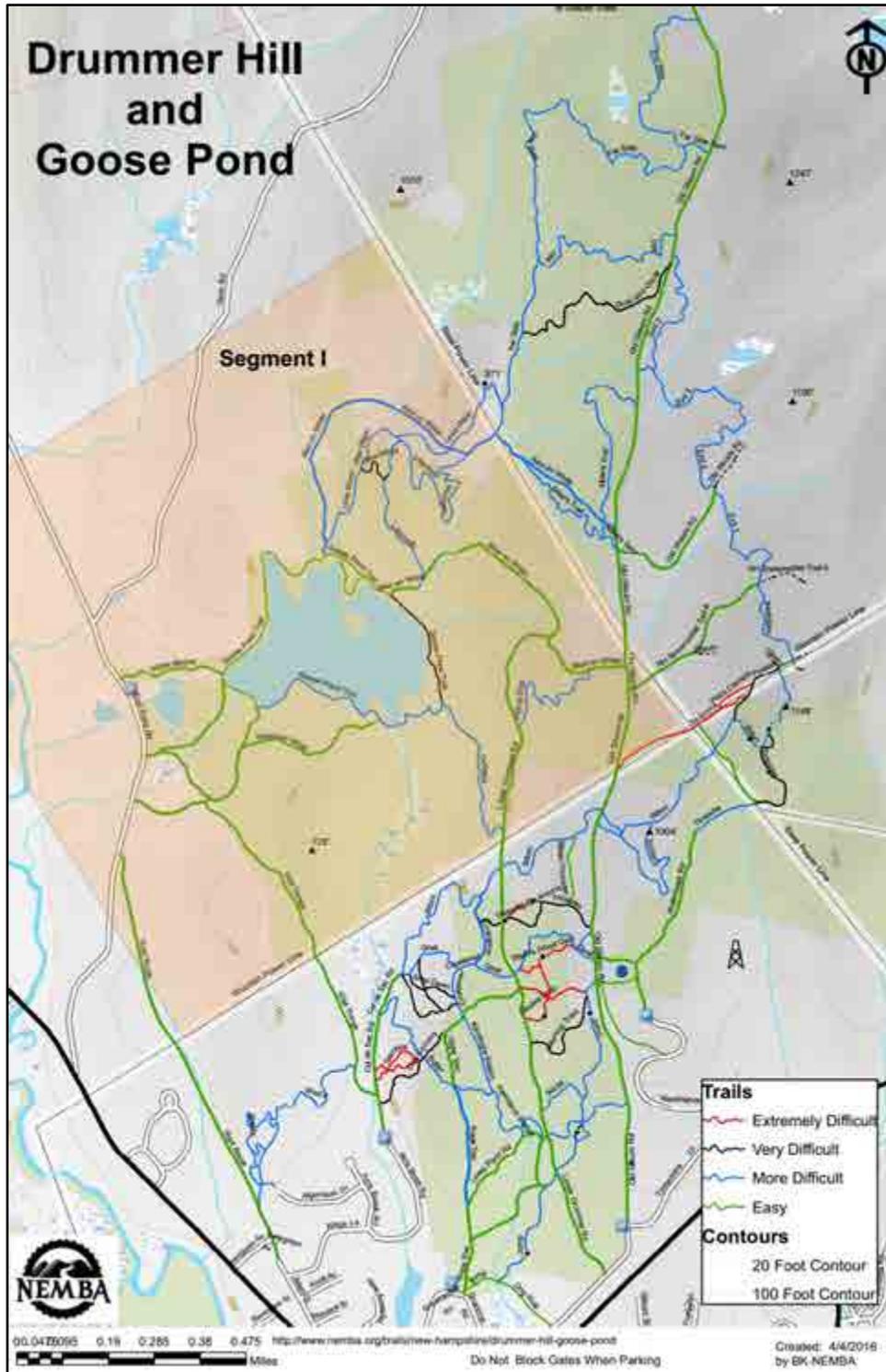
## **Segment I – Southwest Region of Greater Goose Pond Forest**

### **Part 1: Description**

This segment of the Greater Goose Pond Forest is likely the most visited. It is located in the eastern section of the forest and is bordered by East Surry Road and a power line corridor to the East and South. The presence of Goose Pond and the parking area on East Surry Road makes it the most traveled portion of the property.

The trails of this segment are largely traveled by those seeking to experience the pond. This involves parking at East Surry Road and hiking the “White Blaze Trail” to the “Goose Pond Trail.” Dog walkers were the highest volume of trail user that we observed while in the field. Many trail users hike to the pond and then return to their car. Some hike or run around the pond whereas many simply enjoy the vistas along the edge.

This segment can also be used to access the upper segments, but many of those trails can only be accessed by crossing private property.



Segment one, shaded in orange, is the most visited portion of the Greater Goose Pond Forest trail system. The main access point is the parking lot off East Surry Road. Trails are varied in their width and character. Suggested improvements include replacement of trail bridges, small reroutes, signage, and the incorporation of an accessible trail with a view of the lower wetland area.

## Part 2: Trails Assessed

The following trails, found within Segment I of the Greater Goose Pond Forest, were assessed for their level of safety and sustainability. General maintenance and upgrade tasks are described below, whereas a specific foot by foot analysis can be found in the following sections of this report.

### 2.A Entrance Trail (White Blazes) –

Currently, there are two entrance trails that eventually merge and lead to Goose Pond. The original trail leaves the left hand corner of the parking lot and climbs up steep slopes over exposed roots and marches on towards the pond. Timber & Stone, LLC strongly suggests closing this trail due its unsafe and unsustainable condition.



The Entrance Trail, marked by White Blazes, introduces users to the property by way of rotted timbers, exposed rebar, steep grades, and a failing kiosk. Roots have been exposed due to years of use and erosion. Given the layout of the parking lot, it is suggested to relocate this trail to the other side of the parking lot. This report encourages moving the entrance trail to the right hand side of the parking lot and upgrading its condition to include stone steps, a curvilinear design, and a new kiosk. These tasks are outlined in the attached Trail Log and Photopages.

This new approach to the entrance trail has gentler grades, is more welcoming, and is currently the path most trail users choose for accessing the property. Additionally, there is an ideal spot for the kiosk that is more visible to all users.



## 2.B Pond Loop Trail (Goose Pond Trail) -



The Pond Loop Trail explores the perimeter of Goose Pond and is one of the most traveled trails on the property. As it travels clockwise, the trail begins as a 6-8' wide pathway with views of the pond. Eventually, it transitions to a singletrack walking trail which rambles over rocks and small streams. Our assessment of the Pond Trail includes replacing two trail bridges, clearing the trail corridor to a consistent height and width, and installing one trail reroute to align the trail to a more sustainable location. Trail blazing is encouraged along the trail as is the installation of secondary trail kiosks at all trail intersections.

### **Timber Construction**

Where the trail needs to cross intermittent or perpetual wet areas, a boardwalk or bridge may need to be installed or replaced. Timber structures along the Pond Loop Trail should comply with 5' tread width.<sup>i</sup> This allows for a limited impact on wetlands, continuity of character, assures users of the ability to safely pass one another on the structure, and provides ample room for users to stop and enjoy the vistas that boardwalks and bridges can provide.

When considering timber structures along the Pathway, it is imperative to design the structure to fit in with the surrounding environment. Boardwalks and bridges become destinations for users. They provide a meeting point and a deviation from the naturally surfaced trail. They also provide an opportunity to interact and educate within wetland communities.

Similar to choosing a consistent trail blaze or surfacing color, it is important to consider a bridge design that is consistent throughout the trail. Not only does this allow users to feel they are part of a unified trail experience, but the consistent construction becomes exceptionally efficient.

### **Wood Species**

It is imperative to use rot resistant and structurally sound wood species to construct the bridges along the trail system. The wood must be able to withstand heavy use and ever changing weather conditions.

In order to maximize cost effectiveness of the boardwalks as well as longevity of the structures, it is recommended to use both Pressure Treated Southern Yellow Pine and Black Locust during construction. Specifically, the Pressure Treated wood will be used as framing members whereas the Black Locust will be used as decking and curbing.

### **Bridge Decking**

The decking of the bridges is a critical component to the construction process. The Pond Loop Trail accommodates a wide variety of users including bikers, hikers, and runners. It is important to use a decking material that is dense, rot resistant, and structurally sound.

It is recommended to use Black Locust (*Robinia pseudoacacia*) as the decking and hand rail material. This specie boasts unique qualities that allow it to rival other options as a construction material. As opposed to Pressure Treated Lumber, Black Locust will not become slippery with age. This is best achieved by using rough sawn finishing on the exposed edge of the deckboards.

Please refer to **Tables 3, 4, and 5** for detailed information on Black Locust<sup>ii</sup>:



### Table 3 – Black Locust Descriptions

- Natural durability and rot resistance
- Strength values that exceed those of oak.
- The drying takes place very slowly. Due to deviation of fibers and growth tensions
- Planed surfaces are tight and flat, and can be processed further without problems.
- All connections with nails, screws or adhesives are very durable. However, pre-drilling is required.
- Stainless steels connections are recommended for mounting.
- The heartwood has high natural resistance against wood destructive fungi and insects
- Locally sourced from nearby Vermont locations.

**Table 4 – Black Locust Details**
**Color**

1. Black Locust characteristically ages in the elements into darker grays.
2. Fresh cut color is a yellowish tan with brown streaks or areas.
3. During the first few weeks in the elements Black Locust turns a golden brown.
4. In 6 to 12 months the wood transitions to a light then to a darker gray patina.

**Decay Resistance**

1. Black Locust has remarkable biological decay resistance.
2. High concentration of antioxidants, which in turn slows oxidation (decay.)
3. Black Locust creates a hostile environment for bioorganisms that typically feed on the cellulose.
4. Only the heartwood of Black Locust is decay resistant.
5. Black Locust is an exceptionally dense wood that is mechanically resistant to decay.

**Table 5 – Black Locust Properties**

<b>Construction Material Properties</b>								
Physical Properties Comparison								
	Ipe	Black Locust	Northern Red Oak	Alaskan Yellow Cedar	Pinus	Concrete	Steel	Trex
specific gravity	0.92	0.69	0.63	0.42	0.40	NA	NA	0.91 to 0.95
density (Lbs/ft <sup>3</sup> )	64	43	47	30	27	145	490	-
max tensile strength (perpendicular to grain) (psi)	3,680	1,700	1,010	500	580	0	40,000	854
max crushing strength (psi)	13,010	10,800	6,760	7,520	5,320	7,500	40,000	1,806
modulus of rupture (psi)	22,600	19,400	14,300	11,354	9,427	4,000	39-30 million	1,423
modulus of elasticity (MPa)	21,600	14,100	12,500	11,000	8,900	21,720	200,000	1.7
decay resistance 1 - very resistant 2 - resistant 3 - moderately resistant	1	1-2	3	3-1	3	1	1	1
manufacturing and delivery process	logging, milling, and shipping	logging, milling, shipping, air and kilndrying	logging, milling, shipping, air and kilndrying	logging, milling, shipping, air and kilndrying, bush	logging, milling, shipping, air and kilndrying, slash	sourcing and making materials for mixture of portland cement, fly ash, slag cement, aggregate, water and chemical admixture	intensive process of sourcing and smelting of iron and carbon	producing a composition of 50% wood and 50% plastic fibers

## 2.C Green on White Trail (Lower and Upper) –



This trail is slated to be an access road for the maintenance of the Goose Pond dams. Prior to learning of that fate, Timber & Stone, LLC had assessed the trail with an intent of suggesting it be turned into a multi-use pathway for bikes and pedestrians. This would allow for visitors to park at the new parking area to be built off East Surry Road and bike to the pond along this 2/3 mile trail. Given that it will be used for maintenance, it is our suggestion to construct and leave the road with the intent of having it be a multi-use bike pathway. Characteristics of that trail are found below:

### **Tread Width**

The Green on White Trail will be a multi-use trail that is open to a wide range of users. At any one point, the trail can play host to bikes, walking families with strollers, or joggers. This variety of use defines the trail's width and the extent of corridor clearing that is appropriate.

A trail's tread is the surface on which the users walk or bike. Whereas a trail encompasses all of the physical attributes of the entire experience, the tread is the specific surface that users recreate on. To accommodate the wide range of users and to ensure that the trail is both safe and comfortable, it is important for the trail to maintain an 8 foot width whenever possible. This specification is derived due to the following conditions<sup>iii</sup>:

- Bikers will be passing each other and traveling in both directions.
- Walkers may be either in groups or pushing strollers or with children on bikes.
- The trail will be a destination for groups of people looking to walk or ride side by side.

In addition to these factors, multi-use bike trails suggest a site line distance of 120-150'. This is to ensure safe passing of bikes and adequate room for avoiding other users. A wider trail allows the trail to maintain sufficient site line distance and provide gradual turns instead of abrupt turns that can affect user experience<sup>iv</sup>.

Ideally, the Recreation Pathway should maintain a consistent width throughout. This width defines the character of the trail, allows for continuity of user experience, and assures users that there is ample room for travel and passing. These factors work in unison to provide a safe and enjoyable experience for all users.

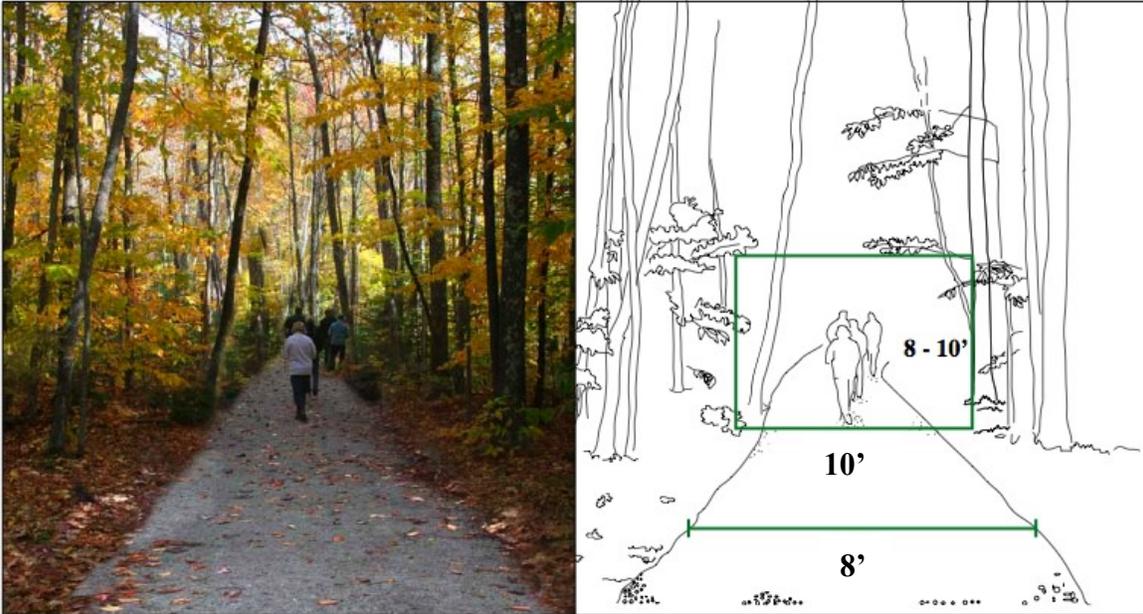
### **Trail Corridor**

A trail's corridor is the zone that surrounds the trail tread. It entails the environmental buffer through which the user walks, bikes, or walks on the trail tread.

The trail will travel through a variety of environmental zones. As such, some sections of the trail are located in wide open areas where trail corridor clearing will never be an issue. In most areas, the corridor will need to be maintained to prevent encroachment of branches and bushes.

The corridor of the trail should be maintained to be 8-10 feet wide and 8-10 feet high. This is achieved by selectively removing branches or sections of branches that grow into the corridor zone. The task of clearing a corridor, typically done as the first step in trail construction, should be accomplished with a purposeful and careful hand. The clearing of the corridor should take into account the following:

- All limbs should be cut close to the trunk, but not beyond the bark ridge or the branch collar.
- Select branches should be left to allow an overhead canopy for the trail.
- The clearing of the corridor should frame the experience for users and is to be done specifically and not liberally.



The tread and corridor are integral components of a trail. The Green on White trail should maintain an 8' wide tread wherever possible and a corridor that is 10-12' wide and 8-10' high. Note the importance of the trees alongside the trail that add structure and character to the trail experience. Not all trees need to be removed in order to maintain an adequate trail corridor.

## 2.D Green on White Spur Trail –



This trail veers left off the first intersection along the Lower Green and White Trail. We encourage the closing and rehabilitation of this trail corridor due to its steep grades, heavy erosion, and unsafe condition. With the use of the Lower and Upper Green and White trail as a multi-use pathway, this trail will become obsolete.

## 2.E Blue on White Trail -



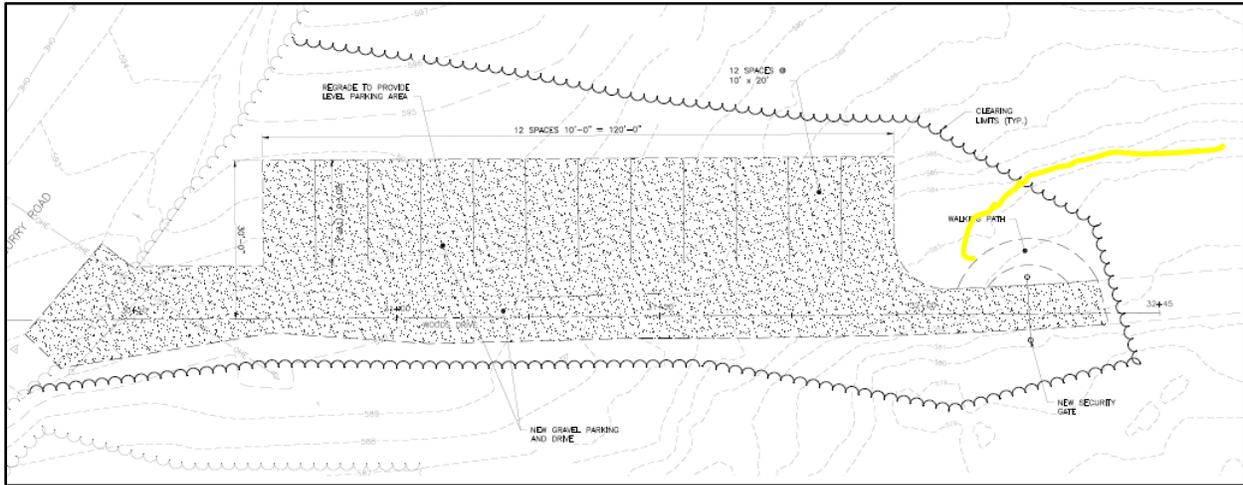
The Blue on White Trail connects the Pond Loop Trail to Old Gilsum Road. The trail is steep at points and crosses multiple brooks and waterways. This trail provides a great connection as access to other Segments of the property, but requires replacement and installation of small boardwalks. Similar to the rest of the Forest, signage and blazing will help unify this trail within the entire system and allow users to feel more comfortable exploring beyond the pond.

## 2.F Labyrinth -



Labyrinth appears to be one of many NEMBA sanctioned singletrack trails that exist on the property. Of all the trails, this one's level of construction is not as impressive as the others. The alignment is steep and the pathway is vague. That said, it does provide access and connection to the upper segment of the Forest and travels through a dense stand of Hemlocks with views towards the Pond. Greater Goose Pond Forest's high draining soils allows the tread to remain intact, but our impression is that this trail should be assessed by the City for its relevance to the property's management goals.

## 2.G Greater Goose Pond Forest Accessible Trail –



The twelve car parking area proposed as a new access for the Forest also provides access to the lower pond and wetland. A 300' accessible pathway would allow all visitors to enjoy the Forest, no matter their physical ability.

The trail's alignment ends with a view of the lower pond and a proposed location for a picnic table or bench.



In order for the trail to be compliant as an accessible trail, construction specifications cited in the attached Trail Log and found at the end of this document should be followed. Overall, the trail's characteristics should include the following:

### Outslope and Cross Grade

To ensure proper drainage of the accessible trail, the trail should be consistently outsloped. The outslope refers to the subtle outward slope that is perpendicular to the trail. This allows water to travel across the trail in a sheetflow pattern. The potential for erosion is highly reduced by outsloping the trail. If the trail is left flat, the water will find a way to develop a channel which will lead to erosion issues. The % grade of the outslope, known as cross grade, should strive to be 2%.<sup>v</sup> When installed, the outslope can be between 3-5%. Over time the trail will compact and develop into a consistent 2%.



This Accessible Pathway was constructed to be curvilinear in design, similar to what is proposed for the Greater Goose Pond Forest Accessible Trail.

Mature trees are left to allow the trail meander between them while maintaining a naturalistic experience to visitors. The trail will maintain a consistent 5' width throughout.

### **Running Grade**

The running grade of a trail refers to the percent grade of the trail in the direction of travel. This is an essential detail to pay attention to while constructing trails. The acceptable range of running grade relates to the trail type. The Greater Goose Pond Forest Accessible Trail is a multi-use trail that will also comply with Accessible Trail Guidelines for undeveloped areas. Running grades should be kept to a minimum to match the abilities of the intended user, prevent surficial erosion, and maintain a consistent character. During the assessment of the trail, all sections attained a running grade of 0-8%. This was achieved by using a clinometer to measure grades during the field work.



Outslope is an essential component of sustainable trail construction. This figure outlines the cross section of a naturally surfaced trail. After the initial excavation and installation of 6-10" of crushed stone as needed, non-woven geotextile fabric is installed. This prevents the migration of surfacing into the crushed stone. The 3/8" minus crushed stone surfacing is installed to a 4-6" depth. The surfacing is then graded using a 4' wide landscape rake to attain a 3-5% outslope. Compaction of the surfacing with a vibratory roller will reduce the outslope to an acceptable 2%. As seen in the figure, the running grade and outslope is checked using a digital smartlevel.

**Accessible Grades**

The Greater Goose Pond Forest accessible trail will have running grades that are compliant with the Accessible Guidelines for Trails Built in Undeveloped Areas. The table below <sup>vi</sup> can be referred to when determining the layout and construction of a section of trail that is to be Accessible.

Running Grade of Trail	Trail Length
0-5%	Trail can travel over any distance.
8.3%	Resting intervals required every 200 feet.
10%	Resting intervals required every 30 feet.
12%	Resting intervals required every 10 feet.

## **Segment II – Northeast Region of Greater Goose Pond Forest**

### **Part 1: Description**

This region of the Greater Goose Pond Forest is separated from the other segments by two corridors of power line. The trails that exist on the property appear to be primarily constructed by NEMBA. Old Gilsum Road runs along the east edge of the segment and provides upper access to the trails that drop downhill towards Segment I and Goose Pond.

Similar to prior observations, this segment is in need of signage, blazing, and kiosks. This will help to inform trail users of where they are and likely encourage more exploration. The terrain is varied, multiple water flows are present, and there is a small pond near the northern edge of the segment. All these qualities make for a great place to explore. These singletrack trails are used by bikers, hikers, and trail runners. The attached trail logs and construction specifications work together to provide guidance on the intended maintenance strategies.

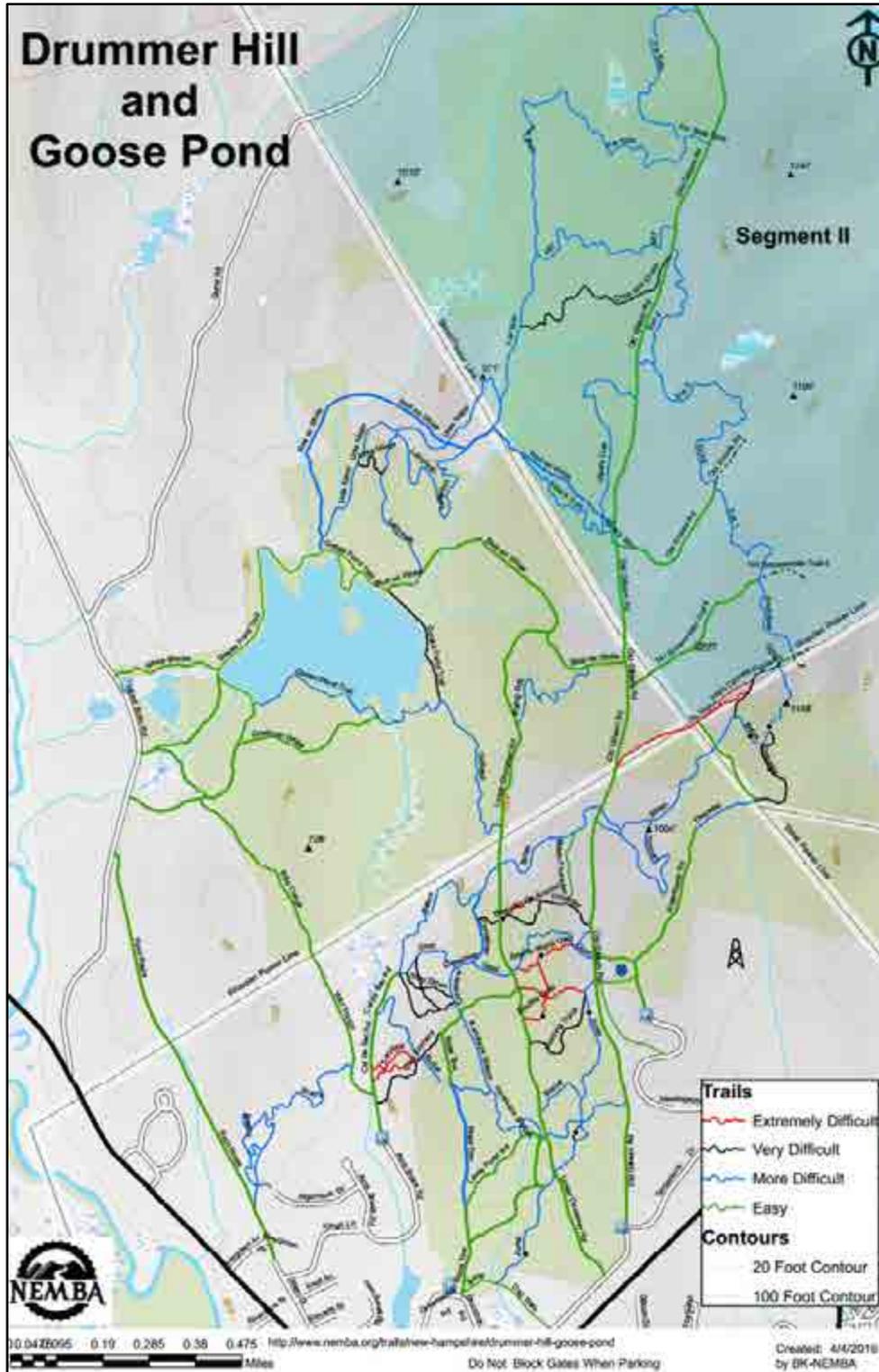
### **Part 2: Trails Assessed**

The following trails, found within Segment II of the Greater Goose Pond Forest, were assessed for their level of safety and sustainability. General maintenance and upgrade tasks are described below, whereas a specific foot by foot analysis can be found in the following sections of this report.

#### **2.A Far Side**

This trail is one of the longest found within the property. It begins at the intersection with the Red on White trail under the power line corridor and extends northward until its terminus along the Old Gilsum Road. This trail should be maintained as both a hiking and biking trail. Many crossings along the trail are in need of improved stone pitching and/or trail bridges. The trail's alignment is sustainable and enjoyable for a variety of users. With signage and blazing, it will receive more use.





Segment two, shaded in blue, receives less visitation than the other two segments. Dense stands of Oak trees and exposed ledges are among the many natural features worth exploring.

## 2.B Red on White



This trail provides connection from the intersection with Far Side up to Old Gilsum Road. Ultimately, the Red on White trail connects Old Gilsum Road with Goose Pond Trail. But, a majority of the trail is located on private land and has an impressive level of erosion and challenging terrain. The trail log and photopages found in this document focus on the upper section that is found within Segment II.

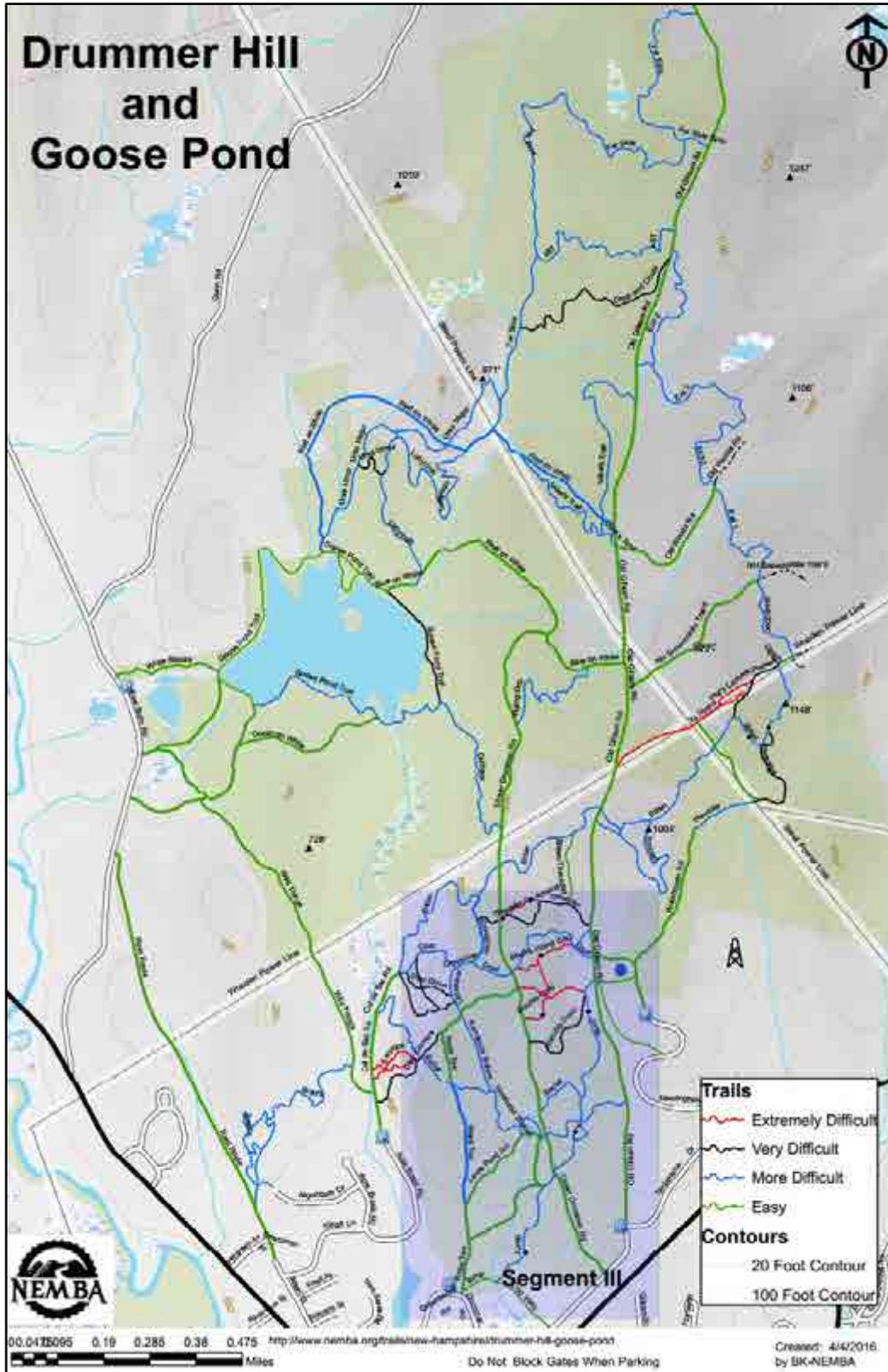
This trail provides a good connection along a preexisting road that may have been used for farming and logging at one point. As such, it does need drainage swales installed to maintain the tread. These structures, as prescribed in other trails within the property, may not be appreciated by mountain bikers as they can prove to be bothersome when traveling downhill.

## **Segment III – Southern Region of Greater Goose Pond Forest**

### **Part 1: Description**

This segment of the property extends northward from Drummer Road and is bordered on both sides by power line corridors. Given its proximity to downtown, a small parking area, and a kiosk with an accurate map of the biking trails, this segment receives a lot of use. Additionally, there are a maze of NEMBA trails found within this segment.

It is our recommendation that the City and NEMBA collaborate on the closure of some of the trails and the end of new trail construction within this segment. Given the high volume of trails, the area has reached its carrying capacity for trail infrastructure.



Segment III, shaded in purple, is frequently accessed by the current Drummer Road, the original Drummer Road, and a parking area at Timberlane Drive.

### Part 3: Trails Assessed

The following trails, found within Segment III of the Greater Goose Pond Forest, were assessed for their level of safety and sustainability. General maintenance and upgrade tasks are described below, whereas a specific foot by foot analysis can be found in the following sections of this report.

#### 3.A Rope Tow to Lower Drummer Hill

This trail starts at the Drummer Road parking area and extends northward. It begins as Rope Tow, then joins Drummer Hill, and extends into Segment I. Given its length and connectivity, we surveyed the entire length of this trail as one unit instead of limiting it to just what lies within Segment III.



Similar to other trails on the property, this one shares the corridor of old logging and farming roads. Most of the trail repairs involve brushing the trail and removing the downhill berm to improve drainage. This trail provides connectivity towards Goose Pond for those who do not wish to use Old Gilsum Road.



This bridge located in Segment III was constructed on railroad tracks and is perched over 8 feet above ground on the downhill side.

Without railings and with pressure treated decking, it poses a significant safety risk. We would recommend removing and replacing the bridge with structurally sound material.

## Part VI – The Use of This Document

This document is exceptionally field focused. The field work was conducted with an eye towards providing the reader with an ability to walk the trail and visualize what structures are needed and what they will look like. To use this document efficiently, please consider the following guidelines:

### 1. Use a Rolatape:

- This measuring wheel serves as a vital link to the trail log that documents each linear foot of the trail system. The rolatape guides the user of this document around the trail system. Please visit: <http://www.rolatape.com/> to learn more about this tool.

### 2. Trail Log Accuracy

- The Trail Log begins at set points along the trail system. Be sure to start the wheel at 00 while standing at the correct point described on the document.
- Each beginning and end point of the trail log is expected to change, depending on who is using the rolatape. Be prepared for the points to have a variance of 5-10 feet.
- The Trail Log cites reference points to help indicate where certain Design Directives are located. These reference points could change slightly over time due to the expected change of a forest's composition.

### 3. Analysis Sequence

- a) **Identify a Site:** Arrive at a proposed work site using the rolatape wheel.
- b) **Reference the Map:** The Trail Planning Maps gives a sense as to the trail's shape and location of intersections.
- c) **Check the Reference Point:** Look for the reference point to make sure you are at the right point
- d) **Realize the Design Directive:** The directive will identify the proposed solution to the work site.
- e) **Check the Sitework Photopage:** Cross reference the photo number with the correct photo page for more detailed information on the work site.
- f) **Review the Construction Specification:** Most work sites have an associated Construction Specification Number. This number (ie: A, B) relates to the attached documents that outline how to construct a crib wall or causeway.

## **Conclusion**

The trails of the Greater Goose Pond Forest provide a unique recreation experience to the City of Keene and its surrounding communities. By maintaining and managing the trails as outlined in this document, they will endure the use of visitors while remaining intact. Most importantly, the users will enjoy the trail with little knowledge of the work that lies underfoot.

Respectfully Submitted,

Joshua D. Ryan  
Principal  
Timber & Stone, LLC

## Works Cited:

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<sup>i</sup> Parker, Troy S. 1993. Open Space and Trails Program, Pitkin County, Colorado: Trails Design and Management Handbook. Boulder, CO: Natureshape. (pg 2-55 thru 2-60)

State of Minnesota, Department of Natural Resources, 2007. Trail Planning, Design, and Development Guidelines. Trails and Waterways Division, 500 Lafayette Road, St. Paul, MN. (pg 6.56 thru 6.59)

<sup>ii</sup> Black Locust Lumber: A Sustainable Alternative San Diego, November 1, 2011

Michael Van Valkenburgh from Michael Van Valkenburgh Associates, Inc., Landscape Architects, PC

<sup>iii</sup> Parker, Troy S. 1993. Open Space and Trails Program, Pitkin County, Colorado: Trails Design and Management Handbook. Boulder, CO: Natureshape. (pg 2-1 thru 2-7)

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Rails to Trails Conservancy, 2001. Trails for the Twenty First Century, 2<sup>nd</sup> Edition. Washington, D.C.: Island Press. (pg 51 thru 68)

<http://www.access-board.gov/outdoor/draft-final.htm#3>

<sup>iv</sup> Parker, Troy S. 1993. Open Space and Trails Program, Pitkin County, Colorado: Trails Design and Management Handbook. Boulder, CO: Natureshape. (pg 2-2)

<sup>v</sup> State of Minnesota, Department of Natural Resources, 2007. Trail Planning, Design, and Development Guidelines. Trails and Waterways Division, 500 Lafayette Road, St. Paul, MN. (pg 6.11)

<sup>vi</sup> <http://www.access-board.gov/outdoor/draft-final.htm#3>

**Project:** Greater Goose Pond Forest**Location:** Keene, NH**Proposed Accessible Trail****Note:** Trail begins at the site of the future parking lot, 200' inside the yellow gate off East Surry Road.

Begin	End	Length	Photo #	Reference Point	Design Directive	Spec #
0	0	0	1	Trail begins at edge of old road, future parking area to left.	Install kiosk to right of alignment and begin to excavate tread to 5' width.	D, G, K
0	75	75	2	Align trail on existing benching from old logging road, pond on right.	Clear brush and trees as needed, continue to excavate trail to 5' width, install surfacing	D, G, K
75	95	20	3	Pine deadfall across alignment, hemlock on left and stonewall on right.	Clear brush and trees as needed, continue to excavate trail to 5' width, install surfacing	D, G, K
95	139	44	4	16" White Pine on right.	Clear brush and trees as needed, continue to excavate trail to 5' width, install surfacing	D, G, K
139	197	58	5	40" White pine on right, saplings in alignment.	Clear brush and trees as needed, continue to excavate trail to 5' width, install surfacing	D, G, K
197	232	35	6	View of pond to right, low area of alignment.	Continue to excavate trail to 5' width, large aggregate may be needed to elevate tread.	D, G, K
232	274	42	7	Coppice pine on left.	Clear brush and trees as needed, continue to excavate trail to 5' width, install surfacing	D, G, K
303	340	37	8	Clear view of pond to right.	Continue to excavate trail to 5' width.	D, G, K
340	373	33	9	Small trees in alignment.	Clear as needed and continue to excavate trail to 5' width.	D, G, K
373	373	0	10 and 11	View of pond to right.	Overlook location (10'x10'), install bench or picnic table and clear view of pond.	D, G, K

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**

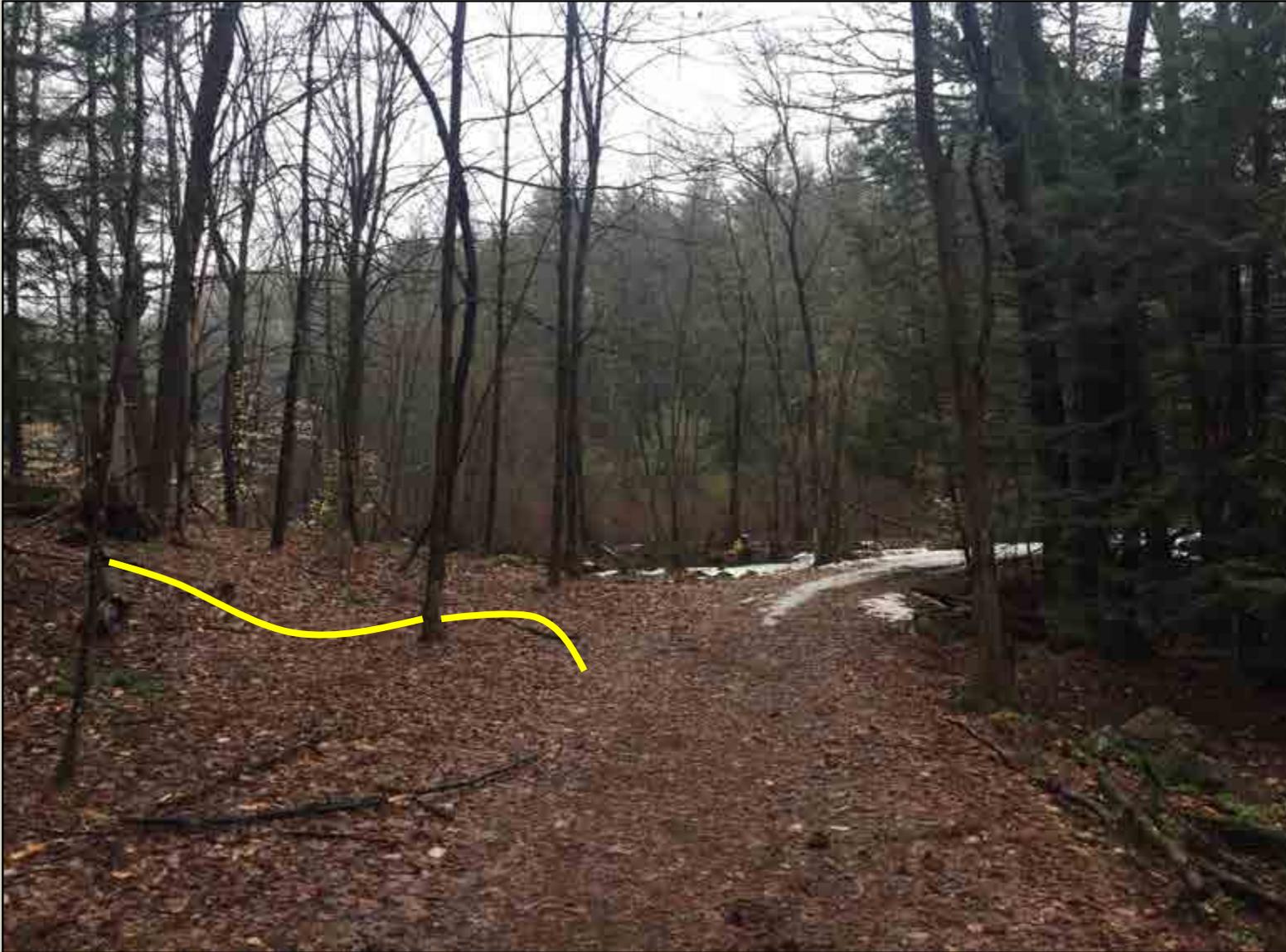


Photo 1

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 2

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 3

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 4

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 5

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 6

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 7

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 8

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 9

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 10

**Greater Goose Pond Forest – Accessible Trail  
Keene, NH**



Photo 11

**Project:** Greater Goose Pond Forest

**Location:** Keene, NH

**Entrance Pathway**

**Note:** Trail begins at main parking area on East Surry Road.

Begin	End	Length	Photo #	Reference Point	Design Directive	Spec #
0	0	0	1	Trail begins at corner of parking lot and heads uphill.	Install kiosk to right of alignment.	See Kiosk Design
0	27	27	2	Large stone to right of alignment.	Align trail to left of stone and begin climb, remove roots as needed.	D
37	100	63	3	Alignment climbs steeply, row of White Pines to right.	Install stone steps up incline. Note: 21 Steps, 3-5 steps in a run, 5 landings at 5' minimum.	A, L
100	145	45	4	Align trail through pine gateway and to right of large boulder.	Bench tread through gateway on cross slope to right of old alignment.	D, E
145	221	76	5	Alignment climbs steeply.	Install stonesteps up incline. Note: 22 Steps, 5-6 landings at 5' minimum.	A, L
221	392	171	6	Alignment crests hill.	Clear corridor, bench tread, and drain to right.	A, D, E
392	392	0	7	Alignment crosses existing trail.	Align trail through Pine gateway and across existing trail.	D, E
392	439	47	8	Alignment sweeps to right.	Continue benching trail, clear corridor, and out slope tread.	E
439	489	50	9	Alignment re-crosses existing trail.	Continue benching trail, clear corridor, and out slope tread.	D, E
489	547	58	9	Alignment sweeps to left.	Continue benching trail, clear corridor, and out slope tread.	D, E

Begin	End	Length	Photo #	Reference Point	Design Directive	Spec #
547	592	45	10	Trail crosses low wet area.	Install boardwalk over wet area (45' long)	I
592	620	28	11	Alignment climbs and rejoins existing tread.	Continue benching trail, clear corridor, and out slope tread. Rejoin existing tread.	D, E
620	678	58	12	Alignment follows existing trail.	Clear corridor and roots as needed, otherwise good tread	D, E
678	678	0	13	Junction with trail to waterfall on right.	Install secondary kiosk.	
678	747	69	13	Trail follows existing alignment.	Clear corridor and roots as needed, otherwise good tread	D
747	890	143	14-15	Trail begins rocky accent, 36" White Pine and stone wall on left.	Clear rocks and level treadway.	
890	945	55	15	Existing cobble pitching, seep running left to right.	Install stone turnpiking across wet area.	J
945	980	35	16	Top of steep section, trail veers right away from stone wall.	Clear corridor and roots as needed, otherwise good tread	D
985	1004	19	17	Seep running left to right, existing stone pitching, 20" Oak on right.	Install stone turnpiking across wet area.	J
1004	1332	328	18	Alignment follows existing trail, 20" Pine on left.	Clear corridor and roots as needed, otherwise good tread	D
1332	1332	0	19	18" Oak on left.	Remove berm on right of treadway, otherwise good tread,	E
1332	1468	136	19	Alignment follows existing trail.	Clear corridor and roots as needed, otherwise good tread	D
1468	1468	0	20	View of pond ahead, small decent to junction with Pond Loop Trail.	Install four stone steps down decline and signage at junction.	L

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 1

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 2

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 3

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**

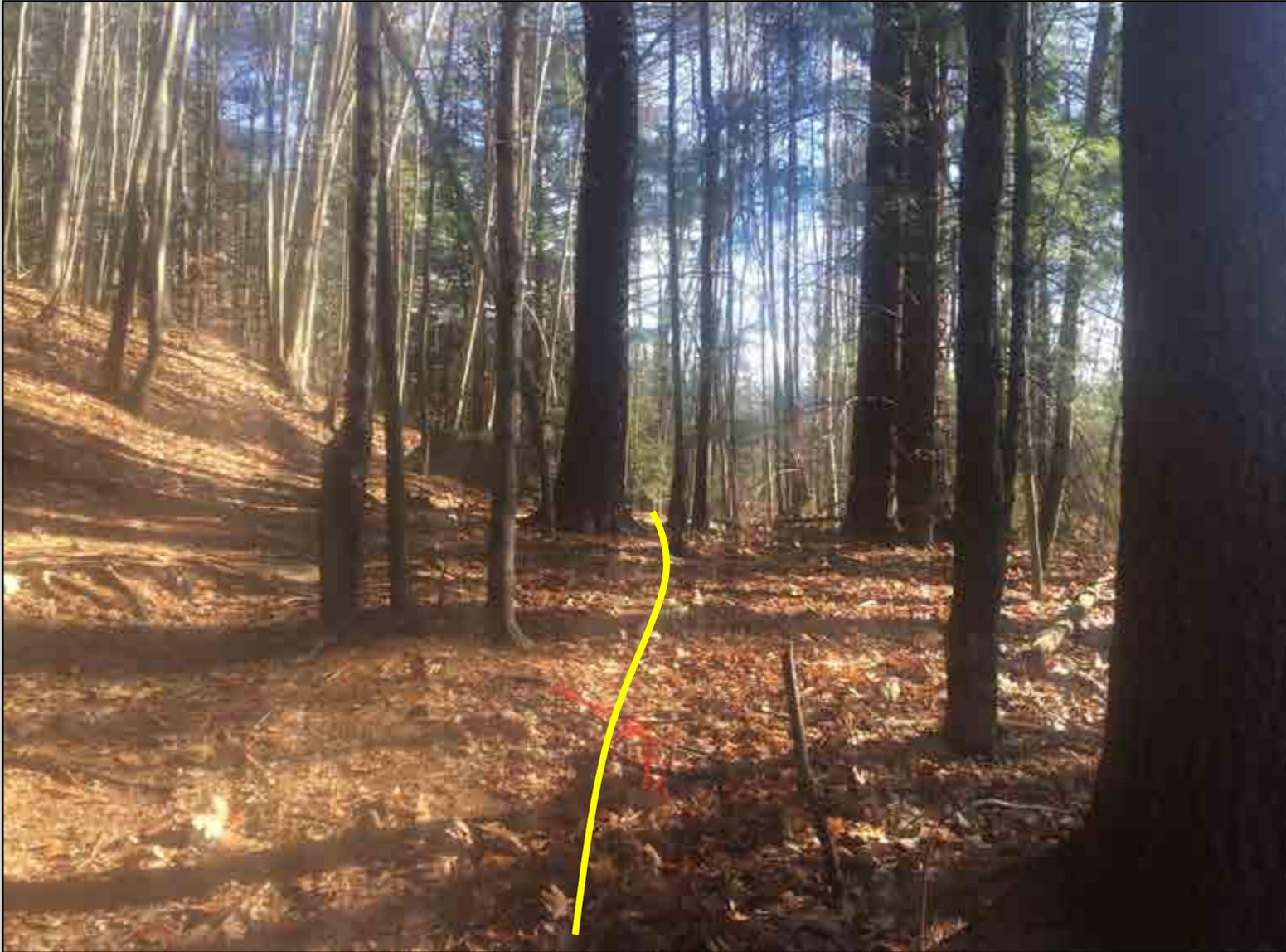


Photo 4

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 5

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 6

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 7

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 8

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 9

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 10

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 11

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 12

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 13

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 14

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 15

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 16

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 17

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 18

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 19

**Greater Goose Pond Forest - Entrance Path  
Keene, NH**



Photo 20

**Project:** Greater Goose Pond Forest

**Location:** Keene, NH

**Pond Loop Trail**

**Note:** Trail begins at intersection with access trail at edge of Goose Pond and proceeds clockwise around pond

<b>Begin</b>	<b>End</b>	<b>Length</b>	<b>Photo #</b>	<b>Reference Point</b>	<b>Design Directive</b>	<b>Spec #</b>
0	0	0	1	Intersection with Trail to parking area, view of pond to right.	Remove roots from treadway.	D
221	283	62	2	Wet area of tread due to seep from left of trail.	Turnpike tread with uphill ditching and two culverts to drain water.	D, J,
283	404	121	3	Large stone to left of tread and 12" Oak on right	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
404	404	0	4	Beaver lodge on right	Remove stumps from tread and clear corridor.	D
671	807	136	5	Hemlock branches hanging in corridor.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
807	807	0	6 and 7	Access to water on right.	Potential pause point and bench location. Clear corridor, otherwise good tread.	D
807	1323	516	6 and 7	Trail tracks along shoreline.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
1323	1355	32	8	Stone on right, compacted soils, trail curves to right toward water.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
1355	1355	0	9	24" hemlock on right and junction with rustic trail to left.	Good location for a secondary kiosk and blazing.	
1427	1454	27	10	Stream crosses tread.	Install large stepping stones or boardwalk to formalize crossing	I

Begin	End	Length	Photo #	Reference Point	Design Directive	Spec #
1454	1565	111	11 and 12	Stone wall to left of tread and 24" Pine to right.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
1657	1657	0	13	Standing water in tread.	Flatten downhill edge and create grade-reversal to shed water from trail.	D, H
1892	1892	0	14	Side trail to point on right and 10" Red Oak on left.	Potential site of secondary kiosk.	
1983	1983	0	15	Small access trail to water.	Clean out grade reversal and out slope tread.	D, H
1983	2079	96	15	6" White Birch to left	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
2079	2,122	43	16	Alignment passes through break in stone wall, fallen hemlock in trail.	Clear slash, trim roots and out slope as needed, otherwise good tread.	D
2122	2,141	19	16	Existing grade reversal	Clear grade reversal and out slope tread	D, H
2141	2178	37	17	Stream crosses tread.	Install large stepping stones or boardwalk to formalize crossing	I
2329	2329	0	18	Junction with trail to left. Stone in center of intersection and double blazed tree in center of	Reroute tread just to left of double blazed tree.	
2347	2347	0	19	Begin reroute just left of blazed tree.	Reroute will avoid wet area of tread and arrive at a better crossing location at stream.	
2347	2500	153	19	16" Hemlock to left of alignment.	Clear treadway and bench new alignment through uneven terrain.	D, K
2500	2520	20	20	Alignment crosses stream.	Install bridge over stream and drill and pin to stones on bank	B, D
2520	2610	90	21 and 22	20" Red Oak on right	Clear treadway and bench new alignment through uneven terrain. Install turnpiking as needed	D, J, K

Begin	End	Length	Photo #	Reference Point	Design Directive	Spec #
2673	2903	230	23	Alignment rejoins existing trail, 24" white pine on right.	Align trail on existing tread. Clear corridor, trim roots and out slope as needed, otherwise good tread.	D, K
2903	2903	0	24	Low and wet area.	Raise tread to allow water to exit trail.	H
2903	3022	119	25 and 26	Exposed ledge on left.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
3170	3170	0	27	View of lake to right. Ahead trail becomes less refined.	Good location for a pause point and bench.	
3261	3,261	0	28	Low and wet area.	Raise tread and create functioning grade reversal.	H
3261	3,325	64	29	Trail continues through Hemlock stand.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
3325	3325	0	29	Junction with "Labyrinth" bike trail to left.	Install secondary kiosk.	
3509	3840	331	30 and 31	24" White Pine on right.	Trail narrows and less refined. Clear corridor and roots as needed.	D, E
3840	3860	20	32	Existing bridge across stream.	Remove 16' bridge and replace with a higher 20' bridge approximately 5'	I
3860	3936	76	33-35	Trail follows shore closely and is eroding to right.	Install 1'-2' high cribbing to elevate tread and reduce erosion of trail into lake.	A, D, E
3936	4,414	478	36	Rerouted trail to left of double blazed pine and away from shore.	Clear corridor, trim roots and out slope as needed. Define tread.	D
4420	4,420	0	37	Small stream crossing.	Move stepping stones to make crossing easier.	
4498	4498	0	38	Small stream crossing.	Move stepping stones to make crossing easier.	

Begin	End	Length	Photo #	Reference Point	Design Directive	Spec #
4627	4679	52	39	Dead tree next to alignment.	Clear hazard tree and define treadway.	D
4679	4689	10	40	Small stream crossing.	Clear corridor and install cribbing and stepping stones to define tread.	A, D, E
4811	4,826	15	41	Small stream crossing.	Install cribbing and stepping stones to define tread.	A, D, E
4929	4,929	0	42	Junction with "Outback" bike trail.	Clear corridor, trim roots and out slope as needed. Define tread.	A, D, E
5112	5112	0	43	Junction with original trail and end of reroute.	Rejoin original trail alignment.	D
5112	5144	32	44	Low and wet area.	Install puncheon boardwalk (two 3x10" side by side) through wet area.	I
5218	5253	35	44	Low and wet area.	Install puncheon boardwalk (two 3x10" side by side) through wet area.	I
5406	5554	148	45	Hair-pin turn with view of pond to right.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
5554	5,760	206	46	Trail follows top of earthen dam.	Maintain existing alignment, good tread.	D
5760	5,904	144	47	Alignment re-enters woods.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
5904	5904	0	48	Trail forks with both trails marked with white blazes.	Signage needed. Possible trail closure needed.	
6138	6169	31	49	Rock wall to right and pink flags to left. Alignment is low and wet.	Install puncheon boardwalk (two 3x10" side by side) through wet area.	I

Begin	End	Length	Photo #	Reference Point	Design Directive	Spec #
6242	6242	0	50	Hazard tree to left.	Remove hazard tree and continue to clear corridor.	D
6517	6517	0	51	Junction with alternate trail that followed shore.	Mark alternate route with different colored blazes.	
7068	7,068	0	52	View of pond to right.	Potential pause point and bench location. Clear corridor, otherwise good tread.	D
7387	7,445	58	53	Low and wet area.	Install puncheon boardwalk (two 3x10" side by side) through wet area.	I
7570	7598	28	54 and 55	Low and wet area.	Install puncheon boardwalk (two 3x10" side by side) through wet area.	I
7629	7629	0	56	Trail crosses stone wall.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D
7644	8069	425	57 and 58	Trail follows top of earthen dam.	Maintain Treadway.	D, H
8069	8208	139	59, 60	Island at center of dam with Parks and Rec sign.	Secondary kiosk location.	
8208	8,492	284	61 and 62	Junction with beginning of Pond Loop and trail to parking lot.	Clear corridor, trim roots and out slope as needed, otherwise good tread.	D, E

**Greater Goose Pond Forest – Pond Loop  
Keene, NH**



Photo 1

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Photo 2

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Photo 3

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Keene, NH**



Photo 14