

# Lums Pond State Park Trail Plan



**Division of Parks & Recreation  
Department of Natural Resources & Environmental Control**



Delaware State Parks

**Drafted: December 2007  
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# Lums Pond State Park Trail Plan

## Table of Contents

<b>Acknowledgements</b>	<b><u>4</u></b>
<b><u>Trail Plan Objectives</u></b>	<b><u>4</u></b>
<b><u>Background &amp; History</u></b>	<b><u>6</u></b>
Regional Context	
<b><u>Public Demand for Trail Opportunities</u></b>	<b><u>6</u></b>
<b><u>Existing Trail System Overview &amp; Assessment</u></b>	<b><u>7</u></b>
Trail Descriptions and Existing Conditions	<u>9</u>
Impacts to the Trail System	<u>16</u>
Trail Users	<u>16</u>
Pedestrians	
Mountain Bikers	
Equestrians	
Special Needs Populations	
Access Points and Signage	<u>17</u>
<b><u>Natural Resource Assessment</u></b>	<b><u>18</u></b>
Natural Environment	<u>18</u>
Flora	<u>18</u>
Fauna	<u>19</u>
Invasive Species	<u>19</u>
Nature Preserve	<u>20</u>
Soils	<u>22</u>
Natural Resources and Implications Trail Development & Maintenance	<u>23</u>
<b><u>Cultural Resource Assessment</u></b>	<b><u>24</u></b>
Cultural Resources	<u>24</u>
Cultural Resources and Trail Development	<u>26</u>
<b><u>Trail Use &amp; Sustainability Assessment</u></b>	<b><u>27</u></b>
Recreational Activities & Interactive Outcomes	<u>27</u>
<b><u>Trail System Plan</u></b>	<b><u>30</u></b>
Trail Changes	<u>30</u>
Permitted Trail Uses, Miles & Widths	<u>33</u>
Phased Reconstruction	<u>37</u>
Cross Country Course Changes	<u>40</u>
Signs & Markers	<u>42</u>
Trail Signs	
Cross Country Course Markers	
Access Point Improvements	<u>44</u>
Campground Area	<u>45</u>
External Connections	
Community & Regional Connections	<u>46</u>

<a href="#"><u>Conclusion</u></a>	<b>44</b>
<a href="#"><u>Agreements</u></a>	<b>45</b>
<a href="#"><u>Appendix</u></a>	<b>46</b>
<a href="#"><u>Appendix A: Trail Maintenance Plan</u></a>	
<a href="#"><u>Appendix B: Principles of Sustainable Trail Design &amp; Development</u></a>	
<a href="#"><u>Appendix C: Statewide Trail System Overview</u></a>	
<a href="#"><u>Appendix D: Trail Standards</u></a>	
<a href="#"><u>Appendix E: User Conflicts</u></a>	
<a href="#"><u>Appendix F: Naming the Little Jersey Trail</u></a>	
<a href="#"><u>Appendix G: Lums Pond Woods Nature Preserve</u></a>	

## Maps

Map 1. Park and Regional Orientation Map.....	<u>6</u>
Map 2. Existing State Park Trail System Analysis.....	<u>9</u>
Map 3. Existing Trail System 1999.....	<u>11</u>
Map 4. Existing Trail System 2009.....	<u>12</u>
Map 5. Existing Trail Uses .....	<u>14</u>
Map 6. Existing Trail Widths .....	<u>15</u>
Map 7. Existing Cross-Country Course.....	<u>16</u>
Map 8. Existing Trail Access and Sign Information.....	<u>19</u>
Map 9. Nature Preserve.....	<u>22</u>
Map 10. Soils.....	<u>23</u>
Map 11. Hydric Soils.....	<u>24</u>
Map 12. Cultural Resources.....	<u>26</u>
Map 13. Planned and Existing Trails.....	<u>32</u>
Map 14. Planned Final Trail Alignments.....	<u>33</u>
Map 15. Planned Trail Uses.....	<u>36</u>
Map 16. Planned Trail Widths.....	<u>37</u>
Map 17. Trail Development Phases.....	<u>38</u>
Map 18. Planned Cross Country Course.....	<u>41</u>
Map 19. Planned Signs.....	<u>43</u>
Map 20. Cross Country Sign Plan.....	<u>42</u>
Map 21. Campground Area .....	<u>45</u>
Map 22. Equestrian Camping.....	<u>45</u>
Map 23. Community Connections.....	<u>46</u>

## Tables

Table 1. Trail Miles and Current Uses .....	<u>9</u>
Table 2. Interaction Types.....	<u>28</u>
Table 3. Existing Trail Uses.....	<u>28</u>
Table 4. Recreation Activity Compatibility.....	<u>29</u>
Table 5. Trail Use Compatibility.....	<u>29</u>
Table 6. Trail Uses with Trail Mileage.....	<u>33</u>
Table 7. Planned Trail Widths and Uses.....	<u>33</u>
Table 8. Miles Planned for Each User Group.....	<u>34</u>
Table 9. Trail Changes Phases 1-5.....	<u>38</u>
Table 10. Trail Changes Phases 6-15.....	<u>39</u>

# Lums Pond State Park Trail Plan

## Acknowledgements

This plan was developed with the full involvement of state park staff through the Trail Committee. Existing trail conditions and natural and cultural resources were assessed. Using information derived from the assessments, this trail design plan was developed identifying new trail alignments and reroutes that achieve social, natural and cultural sustainability. Trail enhancements have been identified that include improved accessibility, fewer impacts to hydric soils, signage, and information centers. As this plan was developed, it was done so to reduce impacts to natural and cultural resources, but to reduce trail maintenance costs and staff time necessary to perform maintenance that has been problematic within the park.

Staff participating in the development of the Lums Pond State Park Trail Design Plan includes the following people: David Bartoo, Susan Moerschel, Cara Blume, Rob Line, Chris Bennett, Mike Felker, Mike Moyer, Becky Webb, Scott Carrow, Ray Bivens, and Paul Nicholson. Additional support was provided by Mike Krumrine and Matt Chesser. We are grateful to John Martin, Watershed Assessment Branch, who provided assistance and training on soils identification and interpretation and Mike Krumrine for producing soil maps and guidance on what it all means.

## Trail Plan Objectives

This Trail Plan analyzes the existing trail system and natural and cultural resources in the Park. Data and findings gathered for the trail assessment provide the science for recommendations outlined in this plan. In this analysis connections to existing facilities and adverse impacts to environmentally and culturally sensitive areas is deemed critical. Analyses and recommendations are based on the principles of sustainable trail design and development. These principles are outlined in detail in Appendix A. The Plan set out to do the following:

- Determine trail segments that do not meet socially, environmentally and culturally sustainable trail principles.
- Recommend changes to the trail system that meet socially, environmentally and culturally sustainable principles.
- Recommend a system that will sustain and support environmental educational opportunities.
- Recommend a system that supports the existing equestrian trail riding concession operation.
- Recommend a system that reduces costly trail maintenance tasks.
- Recommend trail system enhancements including trail realignments and closures, bridges, trail uses and trail enhancements within accepted trail standards.
- Recommend a system that supports the existing high school cross country running program.

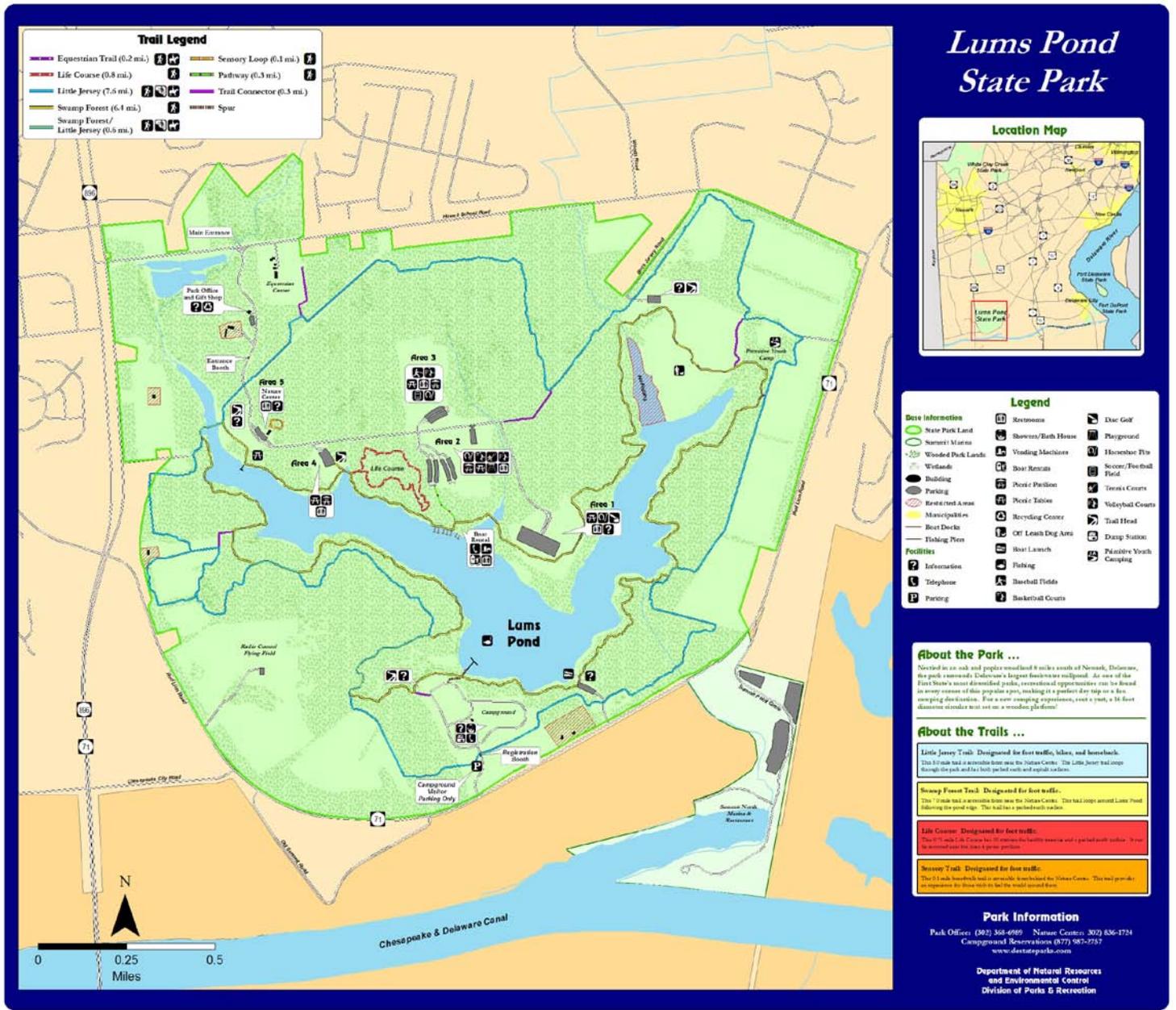
## Background/History

On October 24, 1966 312 acres were purchased and thus began what is known today as Lums Pond State Park. Four decades later the park comprises 1,792 acres surrounding the largest freshwater pond – 200 acres - in Delaware. Located between Route 40 and the Chesapeake and Delaware Canal, and Routes 71 and 896, in a setting that was once predominantly agriculture, today the park is nearly surrounded by residential development. Park land acquisition began in 1969 with the most recent acquisition in 1999. Recreation facility development is reflected in sports play fields, camping, boat rentals, boat launch, picnic facilities and trails.

Lums is located at what were the headwaters of St. Georges Creek, a tidal stream flowing to the Delaware River. Before the pond existed, St. Georges Creek flowed through a hardwood forest

and was the site of several Native American hunting camps. The creek was dammed in the early 1800's when the Chesapeake and Delaware (C&D) Canal was built. Water from the pond was used to fill the locks of the canal and power a small mill.

### Park and Regional Orientation Map – Map 1



## Lums Pond State Park



Data Information		Legend	
State Park Land	Restrooms	Showers/Bath House	Disc Golf
Seasonal Mammals	Vending Machines	Picnic Tables	Playground
Wooded Park Lands	Boat Rentals	Horseback Riding	Soccer/Flag Football Field
Building	Picnic Pavilion	Tennis Courts	Volleyball Courts
Parking	Recycling Center	Trail Head	Dump Station
Boat Rental Area	Off-Leash Dog Area	Boat Launch	Primitive Youth Camping
Boat Docks	Fishing	Baseball Fields	Basketball Courts
Fishing Piers	Information	Telephone	Parking

**About the Park ...**  
 Nestled in an oak and poplar woodland 8 miles south of Newark, Delaware, the park surrounds Delaware's largest freshwater fullpond. As one of the first State's most diversified public recreational opportunities, you'll be amazed in every corner of this popular spot, making it a perfect day trip or a fun camping destination. For a new camping experience, rent a 16-foot aluminum canoe to use on a wooden platform!

**About the Trails ...**  
**Little Jersey Trail** Designed for foot traffic, bikes, and horseback. This trail has a scenic view over the Nature Center. The Little Jersey trail runs through the park and has both paved and gravel sections.

**Swamp Forest Trail** Designed for foot traffic. This trail has a scenic view over the Nature Center. The trail runs around Lums Pond following the pond edge. The trail has a paved section.

**Life Course** Designed for foot traffic. This trail has a scenic view over the Nature Center. The trail provides an experience for those who wish to feel the earth around them.

**Sensory Trail** Designed for foot traffic. This trail has a scenic view over the Nature Center. The trail provides an experience for those who wish to feel the earth around them.

**Park Information**  
 Park Office: (302) 568-6985    Nature Center: 302) 636-1734  
 Campground Reservations: (302) 567-7737  
[www.delstateparks.com](http://www.delstateparks.com)  
 Department of Natural Resources and Environmental Control  
 Division of Parks & Recreation

## **Regional Context**

Lums is on the fall line between both the Coastal Plain and Piedmont physiographic regions. Over the past decade, land uses surrounding Lums Pond State Park have changed dramatically from agricultural to residential uses. The US Census estimated that the New Castle County population had increased 5.1% from 500,265 to 525,587 between April 2000 and July 2006. The County is expected to have a 19% increase in population by 2030. Lands west, north and east of the park have seen a 100% change in population growth. Generally, lands between the Route 40 corridor and Middletown have experienced from a 50% to 100% increase in population and its associated pressures of development and traffic. See [http://stateplanning.delaware.gov/information/dpc\\_projections.shtml](http://stateplanning.delaware.gov/information/dpc_projections.shtml) for additional information.

The park lies south of the Route 40 corridor and north of Chesapeake & Delaware Canal within easy reach of the I-95 Interstate corridor. Nearby, New Castle County manages the 300-acre Glasgow Park located at Route 40 and 896. The US Army Corps of Engineers owns the 4,986 acres along the C&D Canal which in turn are leased to the Delaware Division of Fish & Wildlife and managed as a Wildlife Area. Hunting, dog-training, and fishing are the predominant recreational activities in the Canal. A full-service marina is developed on a former Canal channel cut.

Restructuring of the Aberdeen Proving Grounds military base to develop a full spectrum of military research, testing and evaluation facility will bring thousands of new employees over the next five years. Net growth to Hartford and Cecil Counties (Maryland) will increase; New Castle County can expect to see community growth to accommodate personnel assigned to Aberdeen.

## **Public Demand for Trail Opportunities**

Trail-related activities are the number one outdoor recreation activities in Delaware to fulfill public needs and trends. These findings were documented in the 2003 - 2008 Statewide Comprehensive Outdoor Recreation Plan (SCORP), a 5-year plan outlining both the demand and need for outdoor recreation facilities. The Plan then projects facilities that will fulfill gaps in outdoor recreation opportunities that meet the public's recreational needs. (See [www.destateparks.com/SCORP/SCORP\\_2-2-04.pdf](http://www.destateparks.com/SCORP/SCORP_2-2-04.pdf))

In May and June 2008, the Division of Parks and Recreation conducted a telephone survey of Delaware residents to gather information and trends on outdoor recreation patterns and preferences as well as other information on their landscape perception. These findings will be the foundation of the 2008-2011 update of the Statewide Comprehensive Outdoor Recreation Plan. For purposes of planning and projecting outdoor recreational facility needs, the State was divided into five regions for reporting results taken during public participation phase of the Plan's development. Lums Pond State Park falls in Region 2. Updated SCORP research of 402 Delaware households within Region 2 found that 88% of telephone survey respondents expected a member of their household to participate in walking or jogging; 67% participate in bicycling; 50% in hiking; 24% in mountain biking; and 22% in horseback riding. Based on a comparison of findings (from the previously published 2003-2008 SCORP), the trend for trail-related activities continues to be popular among the recreating public.

Priority outdoor recreation facility needs are projected that best fulfill the public's foreseen activities based on research and findings from the public opinion survey. Because Delaware is home to diverse population centers, landscape types, and varying development patterns, regional variations in outdoor recreation needs are to be expected. A common thread in all regions is the need for linear facilities, such as trails, and paved pathways, that accommodate walkers, joggers, hikers, bicyclists and horse riders. These activities ranked high in every region,

as well as among different ethnic groups and age categories, meaning that more linear facilities should be constructed to keep pace with the population growth and the public's participation.

Results of the 2003-2008 statewide facility needs analysis are presented in Tables 5.1 to 5.6 of the SCORP (SCORP, pages 5-2 through 5-7). Table 5.3 - Region 2 Facility Needs - place walking/jogging and biking paths as highest priorities for outdoor recreation facilities. Results from the 2008 public opinion telephone survey indicate walking/jogging and biking paths as well as hiking trails continue to be high priority facility needs for this region. Furthermore, SCORP identifies major issues of outdoor recreation and conservation concern. In response to the 2008 SCORP telephone survey, 72% of respondents living in Region 2 reported that bike and pedestrian facilities should be a very important funding priority.

The SCORP survey queried participants on several aspects of their recreational lifestyles. When asked why they participate in outdoor recreation, telephone survey respondents gave these top four answers: 1) for physical fitness, 2) to be with family and friends, 3) for relaxation, and 4) to be close to nature.

### **Existing Trail System Overview & Assessment**

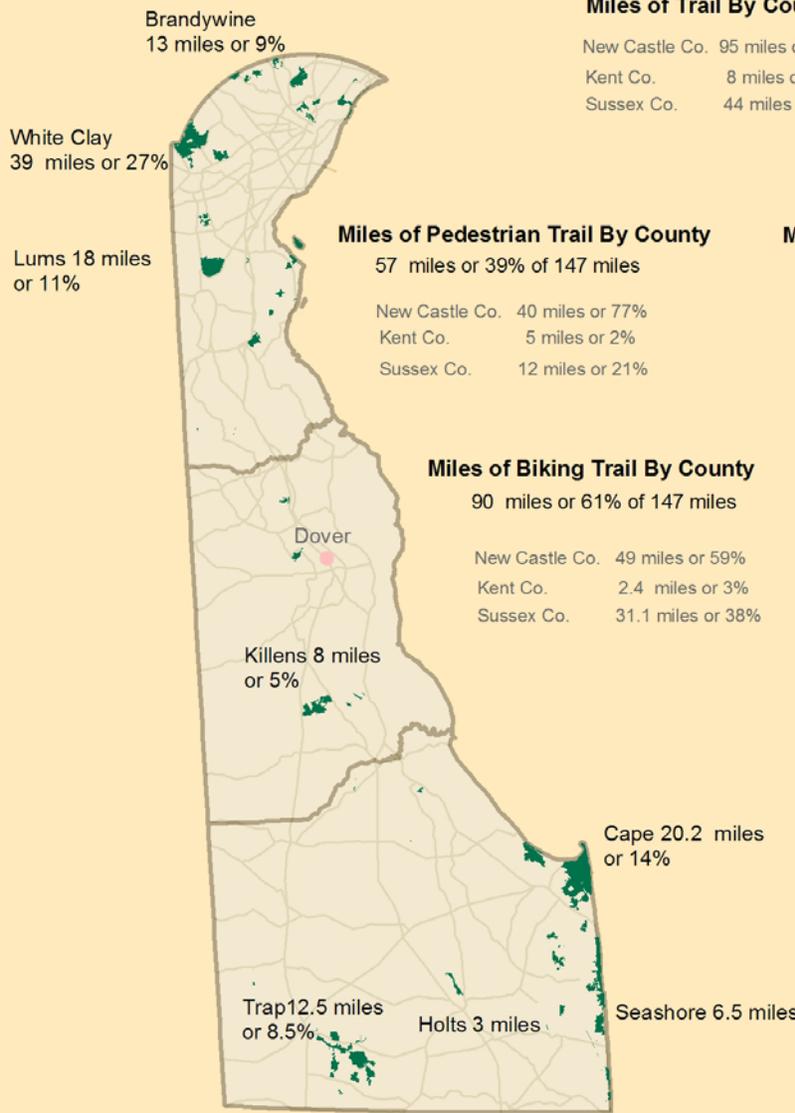
Within Delaware State Parks, there are 147 miles of trail that serve hikers, walkers, runners, mountain bikers, bicyclists, equestrians, and snowmobile users. Of this total, 57 trail miles are designated pedestrian only; this represents 39% of the total trail miles. Ninety trail miles are shared-use for non-motorized trail uses - pedestrian, mountain biking and equestrian – representing 61% of the total trail miles in Delaware State Parks. Map 2, Statewide Trail Analysis, provides an overview of trail miles by park with an analysis of trail use types.

# State-Wide Trail Distribution Analysis State Parks



## 147 Total Trail Miles Throughout the State

57 miles single use (Pedestrian only) or 39%  
90 miles shared use or 61%



### Miles of Trail By County

New Castle Co. 95 miles or 65%  
Kent Co. 8 miles or 5%  
Sussex Co. 44 miles or 30%

### Miles of Pedestrian Trail By County

57 miles or 39% of 147 miles  
New Castle Co. 40 miles or 77%  
Kent Co. 5 miles or 2%  
Sussex Co. 12 miles or 21%

### Miles of Shared Use Trail By County

90 miles or 61% of 147 miles  
New Castle Co. 55 miles or 61%  
Kent Co. 3 miles or 3%  
Sussex Co. 32 miles or 36%

### Miles of Biking Trail By County

90 miles or 61% of 147 miles  
New Castle Co. 49 miles or 59%  
Kent Co. 2.4 miles or 3%  
Sussex Co. 31.1 miles or 38%

### Miles of Equestrian Trail By County

90 miles or 61% of 147 miles  
New Castle Co. 14.7 miles or 54%  
Kent Co. 0 miles or 0%  
Sussex Co. 12.3 miles or 46%

### Miles of DoubleTrack Statewide

97 miles or 66% of 147 miles  
New Castle Co. 56 miles or 59%  
Kent Co. 6.5 miles or 7%  
Sussex Co. 34.5 miles or 34%

### Miles of SingleTrack Statewide

50 miles or 34% of 147 miles  
New Castle Co. 39 miles or 78%  
Kent Co. 1.5 miles or 2%  
Sussex Co. 9.5 miles or 20%

### **Trail Descriptions & Existing Conditions**

There are 17.9 miles of existing trail (not including the Cross Country Course) in Lums Pond State Park. Of these 17.9 miles, 8.3 miles are designated as pedestrian only and 8.7 miles are designated as shared-use covering pedestrians, bicycles, horses and snowmobile use. Shared segments of overlapping trail allow the existing trail system to exist. The total number of trail miles is less than all individual trail miles added up due to the overlaps. Access to the trail system is available via seven parking areas dispersed throughout the park. There are five trails in the park. Table 1 – Trail Miles and Uses - is a summary of the trail system with lengths and current permitted trail uses. Map 3 depicts the trail system as it existed in summer 2008. Map 4 and 5 show existing uses and widths of the trails.

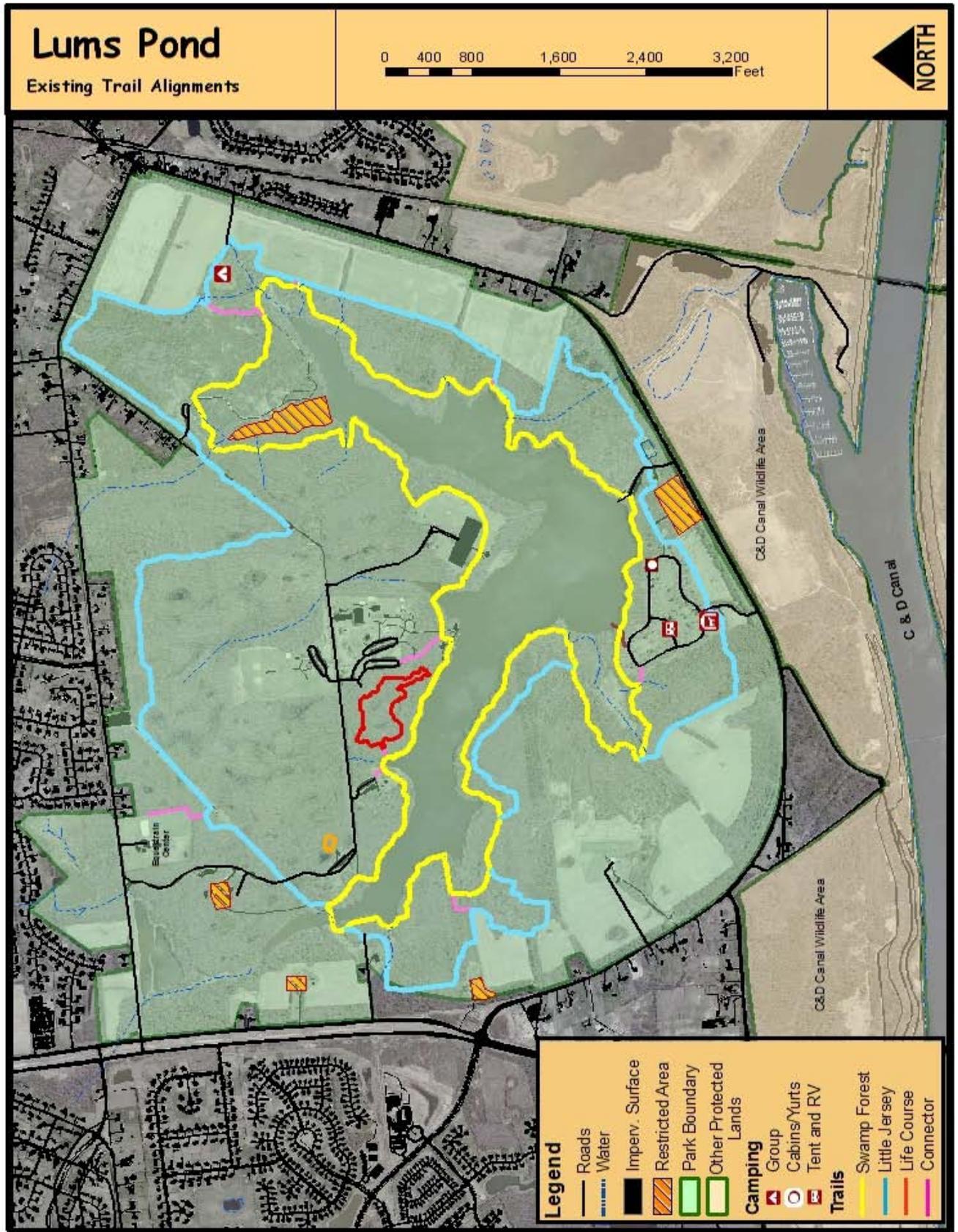
**Trail Miles and Uses - - Table 1**

<b>Trail</b>	<b>Length (Miles)</b>	<b>Pedestrian</b>	<b>Mountain Biking</b>	<b>Equestrian</b>	<b>Snowmobile</b>
<b>Swamp Forest</b>	<b>7.4</b>	√			
<b>Little Jersey</b>	<b>8.7</b>	√	√	√	√
<b>Sensory</b>	<b>0.1</b>	√			
<b>Life Course</b>	<b>0.7</b>	√			

Existing Trail System 1999 - - **Map 3**



Existing Trail System 2009 - - **Map 4**



The **Swamp Forest Trail**, a 7.4 mile long single track trail (3 feet in width) closely traces the shoreline of Lums Pond. The trail is designated as pedestrian only. Because it links major day use areas, the campground, boat ramp and the park's main parking lot, the trail likely sees the highest use of all the park's trails.

Existing Condition: 38 percent of the trail is located on hydric soils. These wet and poorly drained soils have led to years of trail maintenance challenges and resulted in environmental protection concerns. In efforts to remedy wet trail locations over the years, park staff has filled low wet trail areas with stone. This practice has had poor long-term results, which over time, becomes wet again as fill material sinks.

At 8.7-miles long, the **Little Jersey Trail** forms an outer loop around the park. This double-track trail is classified as shared-use permitting pedestrian, mountain biking, equestrian, and snowmobile uses.

Existing Condition: 42 percent of the trail falls on hydric soils causing environmental concerns and creating trail maintenance challenges.

A 0.8-mile long **Life Course Trail** has its main access near the Area 4 parking lot of the park. Outdated exercise stations are spaced along this natural surface double track trail. The trail is designated as pedestrian only.

Existing Condition: 15 percent of this trail falls on hydric soils. Numerous exposed roots and wet area create ongoing safety and maintenance challenges.

Located adjacent to the Nature Center, the **Sensory Trail** is a raised boardwalk situated over freshwater wooded wetlands. The trail was designed and built to bring people closer to a wetland ecosystem and to educate visitors about human senses and the natural environment. The trail is designated as pedestrian only.

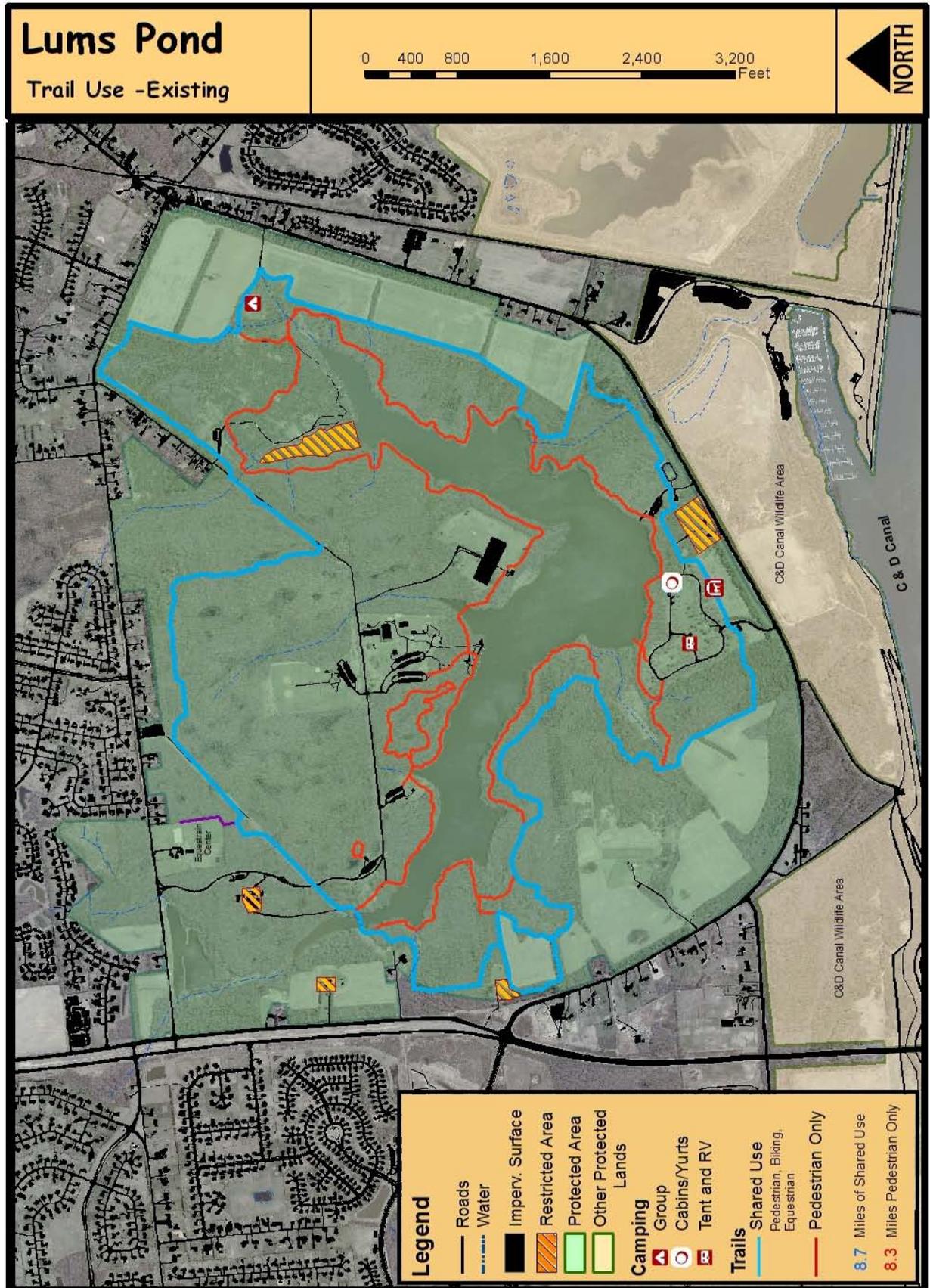
Existing Condition: 100 percent of this trail falls on hydric soils. Constructed decades ago, this boardwalk system is in critical need of replacement.

A **Cross Country Course**, currently marked as 3.1 miles long, goes from Area 1 to Area 3. This course utilizes existing trail and open meadow to fulfill course length requirements. All trail used throughout has a minimum trail width of five feet or more. The field in Area 1 is used as the start and finish, and the trail segment connecting Area 1 to Area 3 serves as two legs of the course, and the Life Course Trail rounds out the course. Except for the field used in Area 1, the course utilizes some of the most active areas of the park.

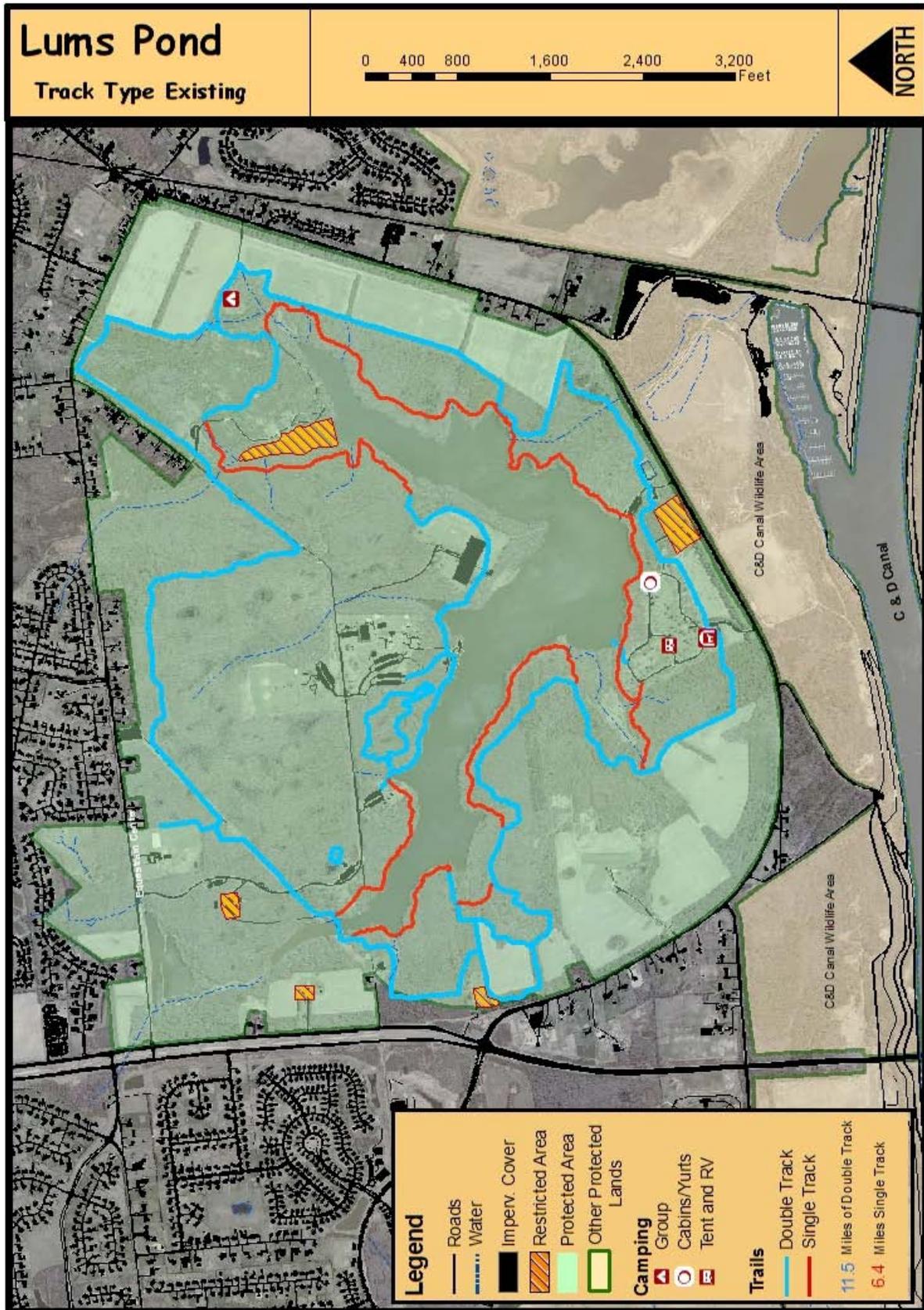
The trail surface of the cross country course varies from packed earth, crushed stone, to mowed grass. The Life Course Trail section (shown in blue) is comprised of packed earth, has numerous exposed roots, and is located on hydric soils- runner safety is most troublesome in this section. The middle section of trail (shown in red) that connects Area 1 with Area 3 has a stable firm trail surface. The grass surface at the course start and finish (shown in green) allows the regulation space needed for beginning and ending races. Of three local schools that use course, Middletown is the largest school. The course is used about six to twelve times a season.

Maps 4 and 5 follow with specific data relative to the Lums Pond State Park trail system. These maps depict trail locations, lengths, permitted uses, access areas, and trail type. The Cross-Country Course is shown in Map 6.

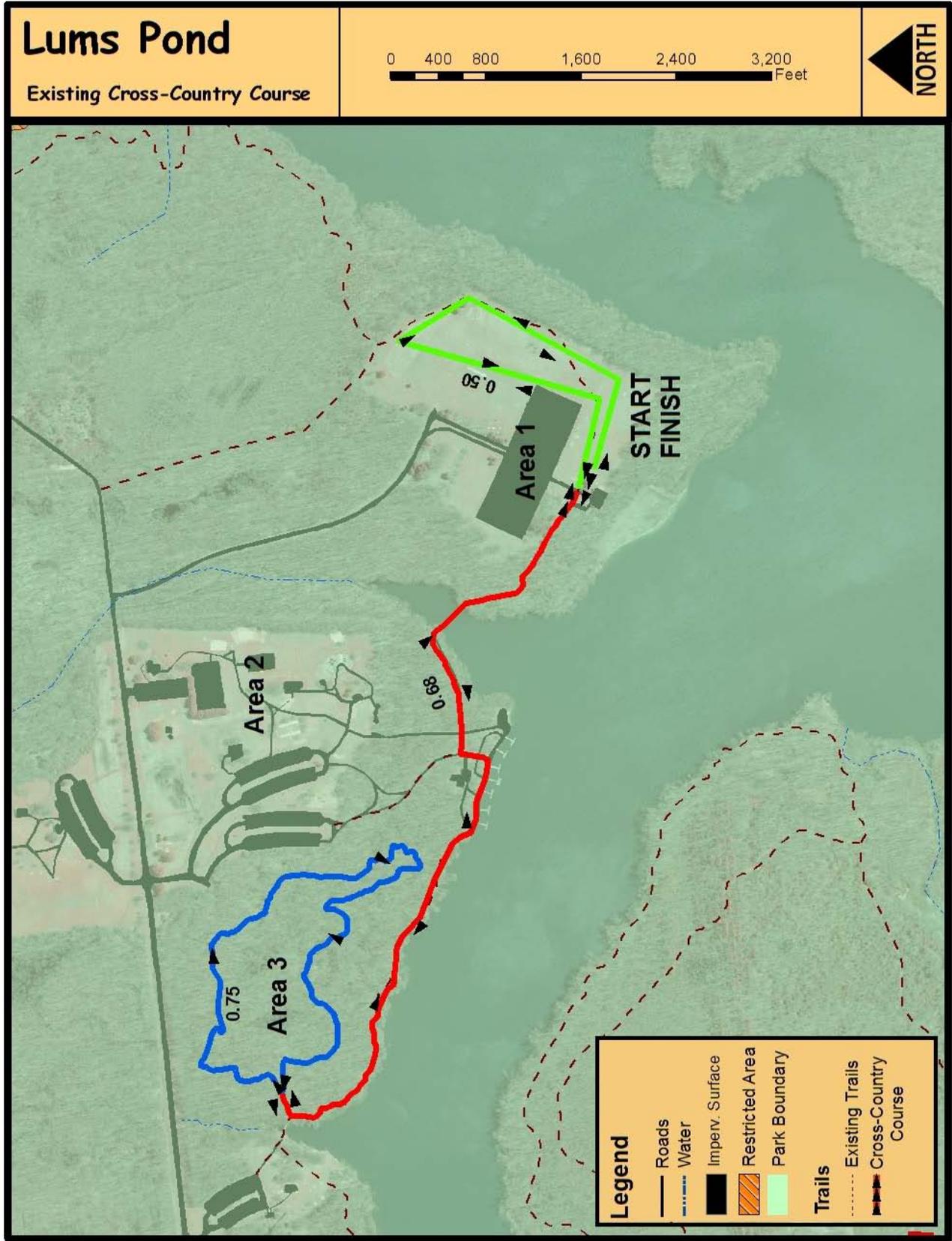
Existing Trail Uses - - **Map 5**



Existing Trail Widths - - **Map 6**



Existing 2008 Cross-Country Course - - [Map 7](#)



### **Impacts on the Trail System**

In the park today there are a variety of activities that impact trails and trail corridors. Park staff activities such as trail maintenance or patrol, or visitors on the trails using their feet, bike, horse or snowmobile will have some influence on the landscape. Some soil disturbance is expected in the development and use of trails. As is the case in Lums Pond, many miles of trail are currently located in hydric soil zones. When trails are located in areas with a high water table, poor drainage or across organic rich soils that hold moisture, tread muddiness and exposed roots can become a persistent problem. Soil compaction and displacement can create or exacerbate problems with standing water and mud due to the creation of cupped treads that collect and hold water.

In Lums Pond, existing trails located in hydric soil zones have reduced trail utility and created costly on-going maintenance. Muddy and wet conditions renders trails less usable and aggravates tread widening, additional soil compaction, and associated vegetation loss as visitors and staff seek to circumvent mud holes and wet soils. These conditions also diminish the visitor experience.



The image above is a typical result of trail and ancillary trail damage that occurs when trails are built on wet soils. As trail users avoid wet areas, they widen the trail resulting in loss of vegetation, habitat alteration and soil disturbance.

## **Trail Users**

For purposes of this Trail Plan, the Division did not gather characteristic profiles of the current trail users. However, below is a summary of general preferences within varying trail users groups based on input from Division recreation experts.

### **Pedestrians**

The term pedestrian encompasses a variety of users, including walkers, hikers, nature watchers and trail runners. Walkers usually are interested in exercise, spending time with family friends and pets. Walkers tend to prefer loop or destination trails. Hikers tend to be more familiar with the outdoor environment, often prefer or seek a more strenuous and adventurous experience. Nature watchers are generally more interested in opportunities to spot wildlife and to observe natural surroundings. Runners may prefer a wide variety of trail experiences or trail configurations, although the main focus is exercise.

### **Mountain Bikers**

Skill sets among mountain bikers are diverse which lead to making choices between singletrack and doubletrack, steeper trail grades, climbs and descents, rough and smooth terrain, or open and flowing to tight technical trail. Mountain bikers tend to prefer connection to nature, ride for exercise and to improve their riding abilities. They prefer to customize their experiences by linking trails together in a series of segments and loops and across varying landscapes, features, distance and degree of difficulty.

### **Equestrians**

Equestrians, like other trail user groups, have diverse trail interests. Rider skill, trail diversity and being close to nature are variables that determine the experience sought. Riders and mounts are the heaviest and tallest of non-motorized of trail users and require trail wider than 3 feet to accommodate safe passage. Not only do trails need to be designed to take the dimensions of mounts and their riders into consideration, trail tread must be extremely durable to withstand the pounding of rider and mount while providing for the needs, abilities, and heightened sensitivities of horses and mules. Paved and hard surfaces – asphalt, concrete, metal, and loose stone – offer little or no traction to a shod animal.

### **Special Needs Populations**

The Americans with Disabilities Act is a 1990 federal law that helps people with a disability gain equal access to public facilities. Trail widths of 3 feet or greater, grades of 5% and less, no obstacles (no staircases steps, roots or rocks), and cross slopes 2% or less will be more accommodating to more people.

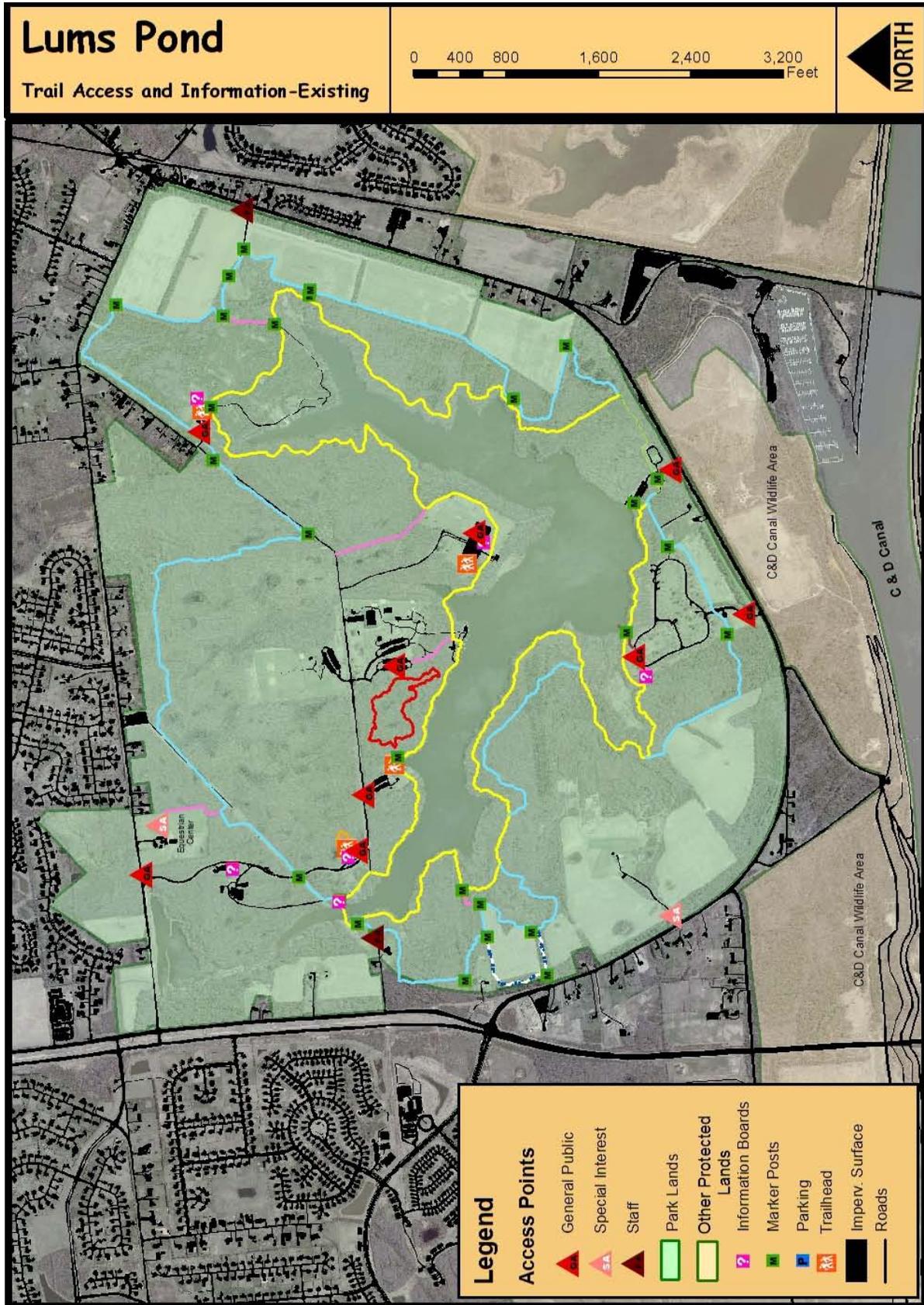
### **Motorize Use**

The Little Jersey Trail at Lums Pond is currently open to snowmobile use when there is at least 6” of snow on the ground. Infrequently used due to minimal snow accumulation, the Little Jersey Trail also has little to offer a trail user typically looking for a much longer trail experience.

### **Access Points and Signage**

Map 7 shows access points to the existing Lums Pond State Park trail system. The map shows locations of trailheads, parking lots, and trail markers throughout the park.

Existing Trail Access and Sign Information - - Map 8



## **Natural Resource Assessment**

### **Natural Environment**

As recently as 1937 the area that today comprises the 1792 acre Lums Pond State Park was largely an agricultural landscape with one large forest block and a few narrow fringes of trees along the edge of Lums Pond. In the seven decades since that time much of the agricultural land has been allowed to revert to some stage of successional woodland or has been developed for recreational purposes.

### **Flora**

Of the 1792 acres within the park today, approximately 1014 acres are forested, or in some stage of woodland succession, more or less 233 acres are still in some form of agricultural production, 11 acres are emergent or scrub-shrub wetland and the remaining 330 acres are managed for recreational uses, and the 200 acre Lums Pond. Within the forested areas of the park north of the pond are at least 12 Coastal Plain Seasonal Ponds totaling approximately 3 acres.

While forest (or some stage of forest succession) covers nearly 60 percent of the park, a large majority of this forest is of relatively poor quality. The relatively poor quality is due primarily to three factors. Much of the forest is dominated by young, even-aged stands of trees with very little species diversity. Within these young forests the understory and ground layers tend to contain a large component of non-native invasive species. Substantial areas of the forest south of the pond are pine plantations, planted primarily with loblolly pine which does not naturally occur in this part of Delaware.

However, good quality forest does exist within the park's boundaries. Forest is considered of good quality if it maintains "a closed canopy of mature trees over a shrub and herb layer consisting of predominantly native species" (DNHP 2002). A single 160 acre tract of good quality mature forest is located north of the main park road and is bounded on the west, north and east by the multi-use trail. Several narrow forested areas comprised of mature trees occur along the southern edges of the Pond. Two forest communities occur in the park. The Mesic Coastal Plain Mixed Hardwood Forest is the most common upland forest type on the coastal plain of Kent and New Castle Counties. It is rarely dominated by any one species, but usually contains a mix of oaks, American beech, hickories, tuliptree and sweetgum. Several other tree species including red maple, blackgum, shadbush and sassafras also commonly occur. A second forest community, Pin Oak – Red Maple Floodplain Depression also occurs within the park. This community typically occurs in depressions within alluvial floodplains. The canopy is dominated by pin and willow oak, red maple and sweetgum. This community occurs throughout the state.

At least twelve Coastal Plain Seasonal Ponds occur within the park. All but one is located within the 160 acre tract of good quality forest. The only seasonal pond not within this tract is located a few hundred feet south of the man-made wetland along the northern edge of the park along Howell School Road. These ponds typically occur as shallow depressions within upland forest that normally are flooded with groundwater for much of the year and dry out in late summer as groundwater levels recede. Coastal Plain Seasonal Ponds often contain uncommon and rare plant species. However, during the only Heritage Inventory of the park in 2000, above average rainfall amounts caused the ponds to remain flooded for all of that year. As a result botanical surveys were not conducted, and no data exists on the plants that occur in these ponds.

In addition to the Coastal Plain Seasonal Ponds two other wetland community types occur in the park. A Mixed Shrub-Herbaceous Wetland occurs at the point where St. Georges Creek flows into Lums Pond. This wetland is dominated by smooth alder, swamp rose, silky dogwood and buttonbush along with a mix of tussock and three-way sedge, arrow-leaved tearthumb and other

herbaceous species. This wetland also contains robust occurrences of the invasive reed canary-grass and Japanese stiltgrass. A second wetland community occurs along the western edge of the pond where a small stream flows into the pond near the campground. This wetland is a swamp dominated by red maple in the canopy with a dense shrub layer composed of sweet pepperbush, poison sumac and arrowwood. The non-native invasive multiflora rose and Japanese honeysuckle are abundant in this wetland. The herbaceous layer is composed of a diverse mix of species.

### **Fauna**

Few systematic surveys of the fauna of Lums Pond State Park have been conducted. During the Heritage Survey conducted in 2000 a brief avian survey was conducted on 11 May. Forty-one species of birds were encountered during that survey. Thirty-one of those species were potential breeding species. A more complete picture of the parks avifauna should result from Delaware's second Breeding Bird Atlas (BBA) project which will start in 2008 and continue for five seasons. One aspect of the BBA will be bird lists generated for all state owned lands in the state, including Lums Pond State Park.

The Division of Fish and Wildlife conducts annual fish surveys in Lums Pond. The 2005 – 2006 Angler Survey conducted by the Delaware Division of Fish and Wildlife (DFW) indicated that Lums Pond is the second most popular fishing pond in the state. Due to its importance as a recreation fishing destination the DFW conducts annual electroshocking surveys of the pond to determine the overall health of the fish population. Thirteen species of fish have been recorded in Lums Pond. Of these, seven are native. The remaining six species are game species which have been introduced into Delaware.

Dr. Hal White, a professor of Chemistry and Biochemistry at the University of Delaware , and chairperson of the education committee of the American Entomological Society has conducted odonate (dragonfly and damselfly) surveys at Lums Pond State Park annually since 1972. He has identified sixty-two species of odonates at the park during that time period. Five of these species are considered Species of Conservation Concern in Delaware.

Jim White and Mick McLaughlin have conducted periodic Herpetilon surveys in the park. Twenty-one herp species (9 amphibians, 12 reptiles) have been recorded within the park. An additional six species (4 amphibians, 2 reptiles) have been recorded just outside the park's boundary. Two Species of Conservation Concern, Spotted Salamander and Eastern Ribbon Snake occur in the park.

### **Invasive Species**

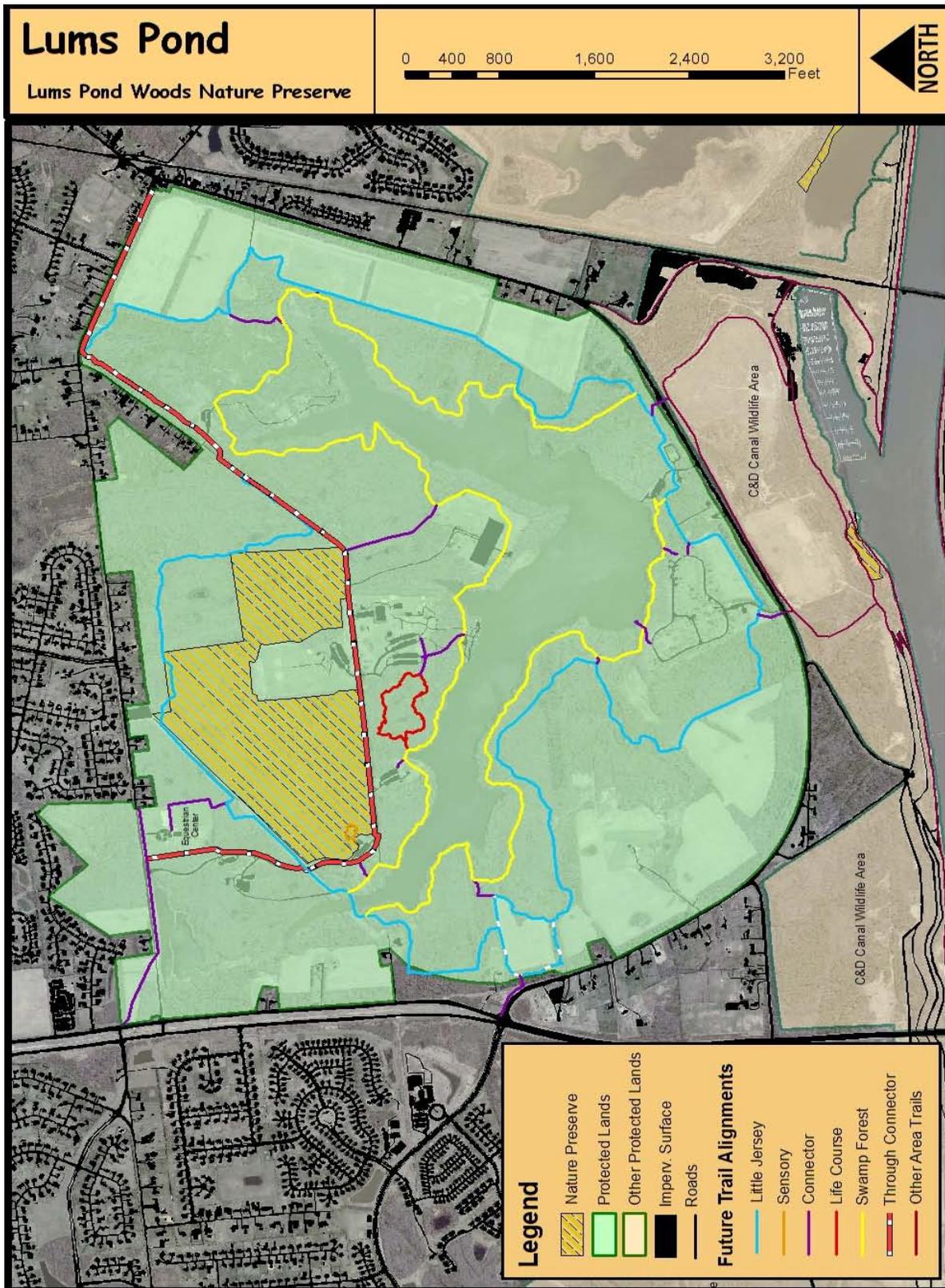
Due to the recent agricultural history of the lands within the park, the subsequent abandonment and succession of much of this agricultural land back to forest compared to the surrounding urban and suburban development, non-native invasive plants are common in the park. While no comprehensive survey of invasive species has been conducted at the park, a large percentage of the invasive species known to occur in Delaware occur in Lums Pond State Park. Autumn olive, Japanese honeysuckle, Japanese stilt grass and multiflora rose are common and dominate in some upland areas of the park. Aquatic invasives that pose a threat to the parks wetland communities include common reed, reed canary-grass, purple loosestrife and creeping primrose.

### **Nature Preserve**

A single 160 acre tract of high quality mature forest located north of the main park road is bounded on the west, north and east by the multi-use trail. This tract, also known as the Felker Tract (map 8), has been listed for many years as a high quality natural area, and had its status

elevated to nature preserve and was dedicated as such in 2007. The appendix holds full details of the nature preserve management plan for the Felker Tract.

**Nature Preserve - - Map 9**

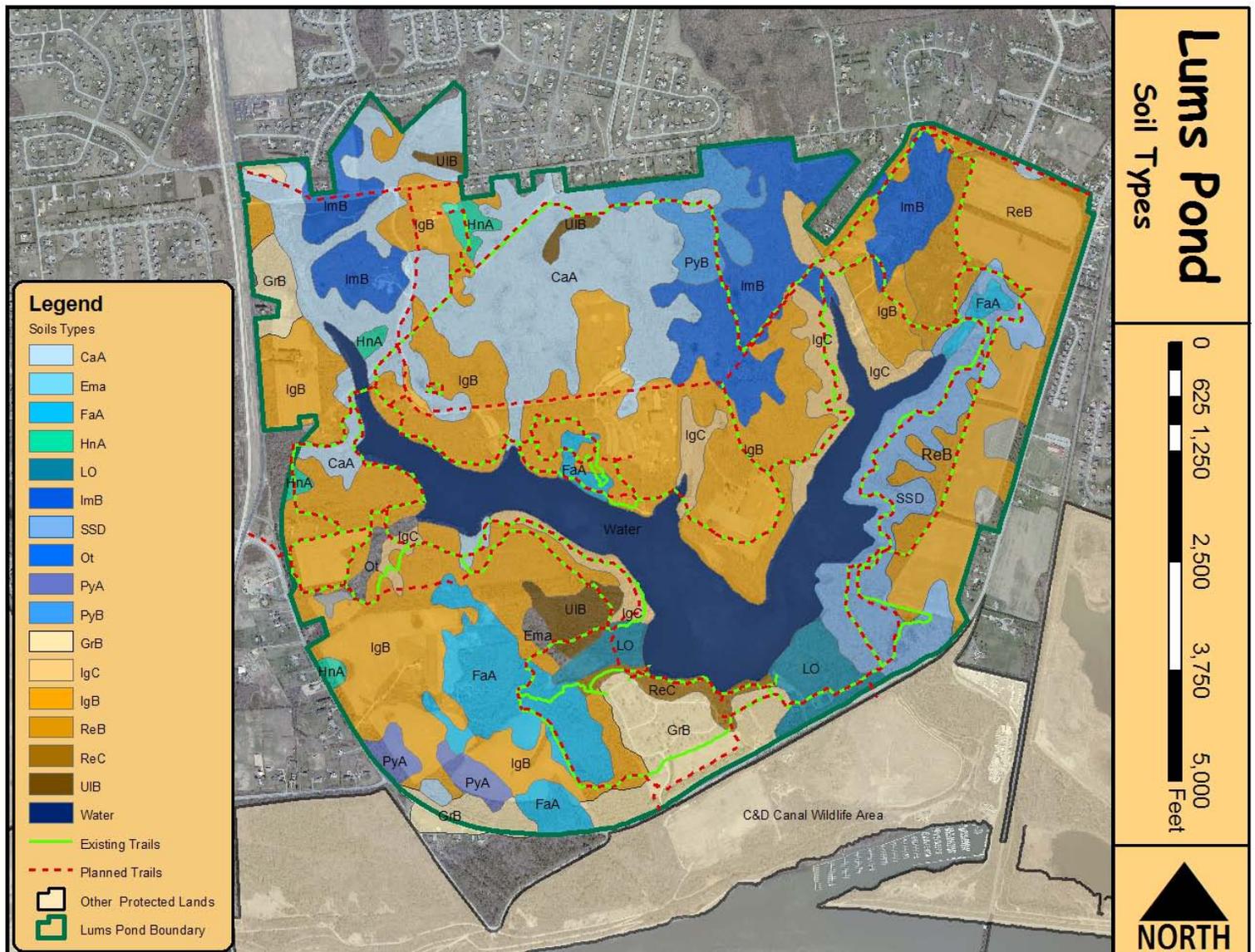


## Soils

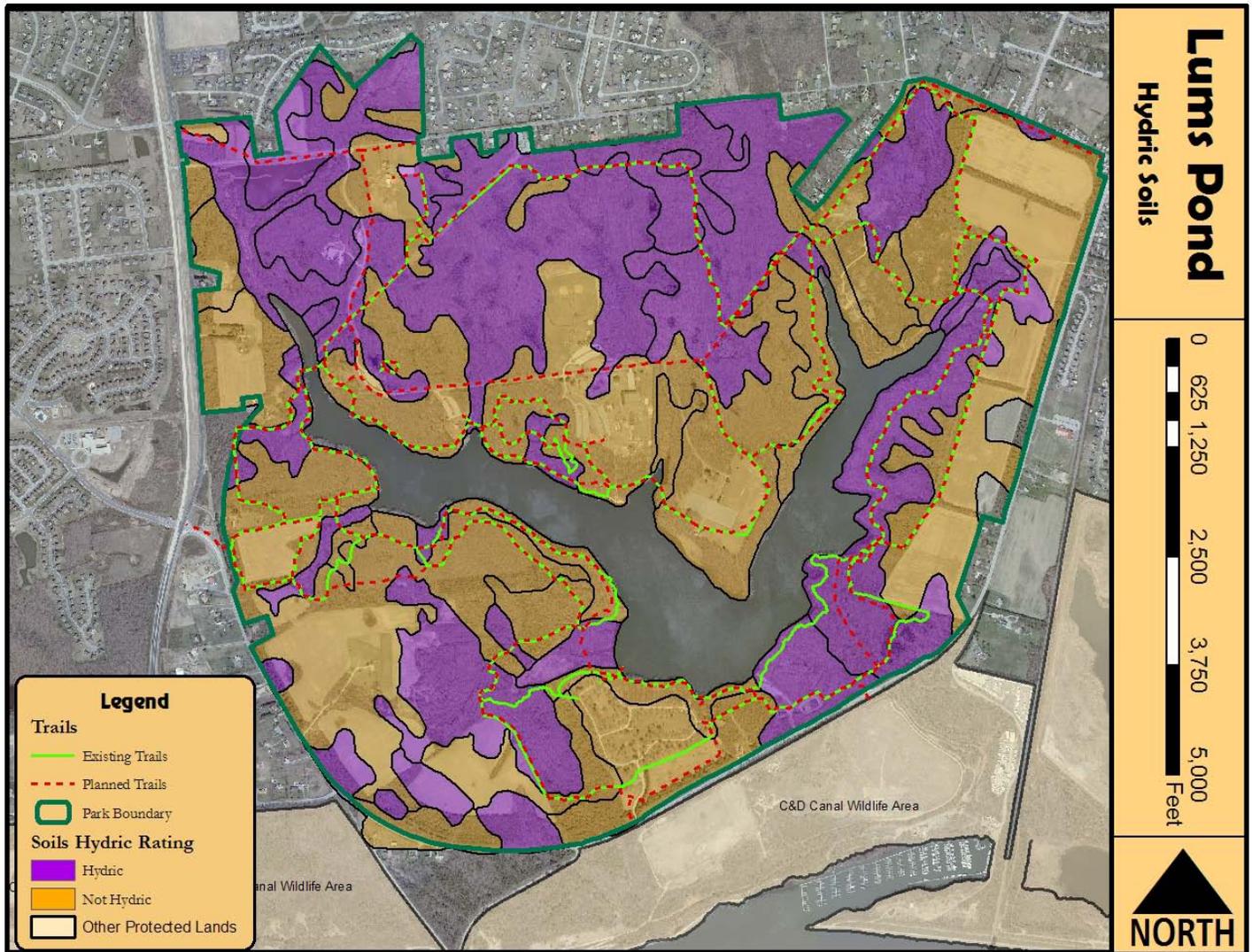
Soil characteristics vary within the park ranging from sandy to well draining loam to poorly draining perennially wet (hydric) soils. Maps 9 & 10 illustrate Soil Types and Hydric Soil variables in Lums. Carmichael, Fallsington, Indiantown, Longmarsh and Sassafras are the dominate soils types and are all classified as hydric soil.

U.S. Department of Agriculture, Natural Resources Conservation Service published Soil Characteristic Limitations for Pathways, Trails and Other Facilities on October 27, 2006. Based on the report, hydric soils comprise over 55% of Lums Pond. These soils have limitations for and are generally not suitable for trails or other development.

### Soils Types - - Map 10



## Hydric Soils - - Map 11



### Natural Resources and Implications for Trail Development and Maintenance

#### Minimizing Trail Impacts Upon Natural Resources

Trail layout and design must take into account the natural resources of the site. The highest quality habitats must simply be avoided. Efforts to do this have been met with success and failure at Lums Pond State Park, but overall, the experience has engendered a better approach to minimizing the impact of trail construction on rare species and habitats. As ongoing trail design and recreational needs intersected with protection of natural and cultural resources at the park, the problem of identification, conflict and resolution of the challenges faced has led to a more sustainable trail system. We can do better, but this was a great start. Keeping trails dry required using the steeper slopes above the pond that had not been historically farmed. These slopes were the best remaining upland habitats left in the park near the pond. Using these steeper slopes to avoid hydric soil trail issues led to a direct conflict between trail location and natural resource biodiversity protection. Many species found in these older growth steep slope habitats are not commonly found in younger habitats that dominate the park. Subtle changes in the trail alignment reduced much of the potential impact, but not all. Lessons learned include requiring trail planning to extend over at least one growing season increasing the likelihood that

protected plants or animals will be located and identified allowing evaluation to determine true natural resource impact and ultimate avoidance.

As noted elsewhere in this plan, trails can be sources of erosion, compaction and of habitat division and disturbance. But the greatest impact of trails upon the park's natural resources is the opportunity for the intrusion of non-native invasive plant species into native habitats. This occurs because of the constant soil disturbance and increased sun exposure that is typical of even lightly used trails. The passing of humans, no matter whether by foot, horse, bike or maintenance vehicle, is a persistent source of seed dispersal of some of the most highly invasive plants on Delaware's forested landscapes: Japanese stiltgrass and garlic mustard. These plants are not just a nuisance, they can alter local ecology. Even the cocoons (containing eggs) of invasive earthworms can be moved this way. This is the greatest threat to intact forested habitat with a closed canopy in the park. Regular yearly monitoring (and treatment if required) is necessary along all trails: existing and abandoned.

In the younger forest areas and successional habitats that dominate Lums Pond State Park this problem has been exacerbated. In these areas where the trail corridor is wider, long sinuous 'edges' (one on each side of the trail) have been created that can extend through miles of successional habitat. There are frequent, and sometimes permanent, canopy gaps established, creating increased light exposure to trail edges. As a result the establishment of causing or maintaining particularly harmful invasive species: multiflora rose, wineberry, autumn olive, bush honeysuckles, Japanese honeysuckle and many others. This is the typical trail in Lums Pond, a constant and unattractive management war zone where we are perpetually battling plants from over-running the trails. This rampant spread of fast growing noxious plants has led to the use of large mowing machines in an effort to keep pace, which in turn has only contributed to accelerating the spread of these invasive plants and fostered unsustainable trail maintenance practices. Aside from the diminishing role these plants have on user experience, the seeds from these plants are easily spread unwittingly throughout the park by visitors and maintenance activities alike.

The answer is to manage all trails for long-term maintenance goals that will reduce maintenance costs while increasing habitat health and biodiversity is to increase forest canopy coverage thus reducing available sunlight to the understory and the invasive components. Shade is our friend. But we frequently re-create and maintain the gaps with the indiscriminate use of heavy equipment. This is viewed as the quick and cheap way to maintain the trails when in fact it's like constantly ripping a scab off of a wound. Goals for maintaining the trail must include maintaining or restoring habitats along the edges as well. If we are successful, the trails at Lums Pond will become stable with much lower maintenance costs over time and be more attractive to visitors. The Environmental Stewardship Program is developing a maintenance guide (including setting priorities techniques and parameters) to accomplish this objective.

## Cultural Resource Assessment

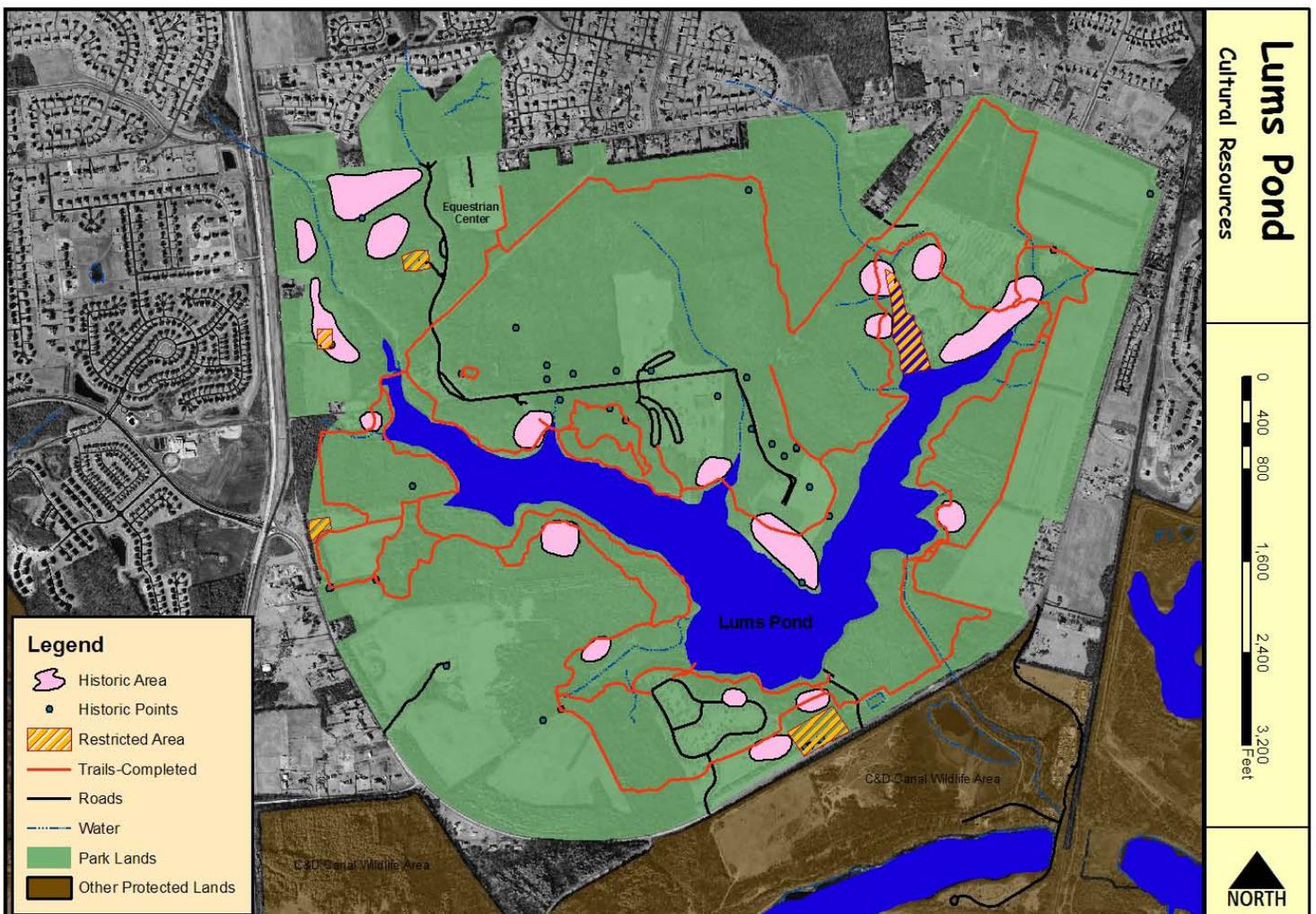
### **Cultural Resources**

A Cultural Resource Management Plan was completed in 1983 for the park. The Plan is based on field study conducted in 1982 that documents a total of 29 historic sites. Of these, 11 prehistoric sites and 8 potential prehistoric sites were identified. The management plan outlines the steps to be taken in order to minimize damage to cultural resources or ensure adequate data recovery when development is proposed within the park. Map 11 depicts cultural resource areas of concern.

The link to the Cultural Resource Management Plan completed in 1983 is:

<http://intranet5.dnrec.state.de.us/sites/Parks/CARS/Shared%20Documents/CRM%20Plans/Lums%20CRM%20Plan.pdf>

### **Cultural Resources - - Map 12**



## **Cultural Resources and Trail Development**

**Potential Impact High Incident Areas:** The construction of **stone surface trail** has the greatest potential for disturbance of archaeological deposits because the construction requires the removal of approximately 6 inches of soil. Based on proposed new trail alignments, there are several locations in which known American Indian archaeological sites and the projected location of a mid- to late-nineteenth century free African-American (or possibly American Indian) sites may be impacted. Area 1 and 3 are two such locations. These sites are potentially significant, although they may have suffered some disturbance during the construction of park facilities in the area.

**Recommendations for High Incident Areas:** Shovel-testing (test holes) should be conducted along the length of stone surface trail to determine whether there will be any impact. One section of the trail centered on the projected location of the S. Wright farmstead should be shovel tested. If the shovel testing in any locations produces cultural material, the excavation of soil in preparation for placing the stone should be monitored in those locations during construction.

**Potential Impact for Lower Incident Areas:** The relocation of **earthen surface** trail sections to higher, better drained soils has some potential to impact American Indian archaeological sites. However, the new trail alignments appear to be located downslope from these most likely site locations. Trails constructed on slopes less than 8% have been determined to cause minimal disturbance to archeological sites. Additionally, trails constructed on slopes greater than 8% have been determined to cause minimal disturbance to archeological sites as it is unlikely these sites are on slopes that steep or greater.

**Recommendations for Lower Incident Areas:** When final new segment locations for earthen trails have been more firmly marked, the potential for impact should be reviewed, and limited shovel-testing conducted, if appropriate.

**Potential Impact for Bridge and Overlook Areas:** Typically the impact of bridges and overlooks has little potential to affect any archaeological resources. Never-the-less, evaluation during construction planning, should be conducted if it is determined to be appropriate. The newest construction methods used for anchoring such structures (helical anchors) are unlikely to cause any significant soil disturbance due to the installation method-screwing the anchors into the ground. However, if post-holes are dug and dirt removed for placing the supports for structures, impact should be reviewed and limited shovel-testing conducted, where appropriate.

**Recommendations for Bridge and Overlook Areas:** When final locations for bridges and overlooks have been firmly marked just before construction, the potential for impact should be reviewed. Limited shovel-testing should be conducted where appropriate.



## **Trail Use and Sustainability Assessment**

Trail sustainability is paramount in protecting the natural and cultural resources, managing the costs of development and maintenance projects, and providing trail facilities that are appealing to many. A dynamic approach to trail management is critical in maintaining or improving the health of our protected landscapes and the trails that flow across them. Trail sustainability is linked directly to trail use designations, interactions between visitors, experience sought, and trail design, location and conditions. Trail sustainability covers three main areas: environmental, social, and economic.

**Environmental Sustainability** - Any trail alignment that supports current and future use with minimal impact to the natural resources; does not adversely affect the plant and animal life; recognizes that pruning or removal of certain plant species may be necessary for proper maintenance; produces negligible soil loss or movement.

**Economic Sustainability** - Any trail alignment that supports current and future use as it relates to the cost/benefit of that trail to the public.

**Social Sustainability** - Any trail alignment that supports current and future use as it pertains to the public's acceptance and use of that trail.

Although one might want to view sustainability as a static set of guidelines, it is quite the opposite. Site and trail characteristics and visitor base play an important role in determining whether or not a trail is sustainable. Visitor base, terrain, park location, available facilities are a few characteristics that might influence who and how a particular park or trail is used. A park superintendant may hear few complaints about a trail system that gets little visitation, but on the other hand may get a lot of negative feedback about a popular trail. User designation and trail type may be the same, but terrain and location may play the deciding role on whether or not a park or trail see a much higher volume of use. Understanding these variables and using them in the planning process will help increase the sustainability of any trail.

### **Recreational Activities and Interaction Types**

The trails at Lums Pond are presently designated for various uses which include pedestrians, bikers, equestrians and snowmobilers. Trail activities interact in a variety of ways. Much depends on each individual visitor and their breadth of experiences and how they like to recreate. Some activities positively impact one another and are complementary. Other recreation activities are merely compatible, having a neutral impact on another recreation activity and are called supplementary. Many activities, however, experience some form of conflict when encountering other activities. Users from different groups may experience conflicts over competition for space, trail infrastructure, viewsapes, and soundscapes. In minor cases, these conflicts are called competitive interactions. In more extreme cases, two activities may be completely incompatible and interactions between them are described as antagonistic. Table 2 from the Wisconsin Statewide Comprehensive Outdoor Recreation Plan (SCORP) shows the different interaction types and the expected outcome from those interactions. Examples of complementary and antagonistic recreational activities are provided. The use of this information is an important aspect in determining future trail use designations for the park. Table 3 depicts existing permitted uses on each trail in Lums Pond State Park.

**Interaction Types and Their Recreational Outcomes - - Table 2**

<b>Interaction Type</b>	<b>Key Characteristic</b>	<b>Outcome</b>	<b>Example</b>
Complementary	Increasing compatibility with increased use	No conflict	Camping and hiking
Supplementary	Neutral interaction – no impact on compatibility	Minor conflict	Wildlife watching and hiking
Competitive	Decreasing compatibility with increased use	Conflict	Hiking and mountain biking
Antagonistic	Activities completely incompatible	Strong conflict	Wildlife watching and hunting

Source: Wisconsin SCORP 2005

**Existing Trail Uses - - Table 3**

<b>Trail</b>	<b>Pedestrian</b>	<b>Mountain Biking</b>	<b>Equestrian</b>	<b>Snowmobile</b>
Swamp Forest	√			
Little Jersey	√	√	√	√
Sensory	√			
Life Course	√			

Also from the Wisconsin SCORP is Table 4 which attempts to predict levels of conflict among typical park activities. Table 4 uses ratings to reflect the perceived level of conflict from the perspective of different types of users listed in the vertical Y axis (labeled as Primary Use). Ratings indicating a user’s level of perceived recreation conflict should therefore be read horizontally across rows.

Table 5 is a review of the entire trail system in Lums Pond State Park and the trail uses that would be compatible for each trail.

## Average Land-Based Recreation Activity Compatibility - - Table 4

PRIMARY USE:	INTERACTS:										
	ATV Riding	Hunting	Snow-mobiling	Horseback Riding	Mountain Biking	Cross-Country Skiing	Linear Trail Biking	Hiking	Wildlife Watching	Camping	Average Compatibility
ATV Riding	X	5.3	6.5	5.1	5.5	4.9	5.5	6.1	6.9	7.5	6.0
Hunting	3.3	X	3.7	4.7	4.3	5.3	5.7	5.4	6.0	6.3	5.0
Snowmobiling	4.3	4.0	X	4.0	4.8	4.3	5.8	5.3	6.3	7.2	5.1
Horseback Riding	2.2	3.5	3.0	X	3.8	4.9	4.5	6.3	7.3	7.7	4.8
Mountain Biking	3.1	3.6	4.7	4.8	X	5.7	8.1	6.1	7.4	8.0	5.7
Cross-Country Skiing	1.8	3.6	2.6	3.3	4.2	X	5.6	4.9	8.1	8.5	4.7
Linear Trail Biking	2.6	3.9	5.5	5.3	8.2	7.1	X	7.4	8.0	8.7	6.3
Hiking	2.4	3.5	3.5	5.7	4.7	6.1	6.5	X	8.9	9.2	5.6
Wildlife Watching	2.2	3.2	2.9	6.4	5.2	7.6	6.8	8.6	X	8.3	5.7
Camping	3.9	4.1	5.0	7.5	7.8	8.2	8.2	8.9	8.5	X	6.9
Average Compatibility	2.9	3.9	4.2	5.2	5.4	6	6.3	6.6	7.5	7.9	

Ratings below 4.0 are highly competitive or antagonistic.      Ratings between 4.0 and below 7.0 are moderately to mildly competitive.      Ratings 7.0 and above are supplementary or complementary

Source: Wisconsin SCORP 2005

## Trail Use Compatibility - - Table 5

Trail	Swamp Forest	Little Jersey	Sensory	Life Course	Community Connections
Hikers	√	√	√	√	√
Trail Running	√	√		√	√
Dog Walkers	√			√	√
Wildlife Watching	√	√	√	√	√
Geo-cachers	√	√			
Mountain Biking	√				√
Freeriding	√				
Bicycling	√				√
Equestrian		√			
ATV					
Snowmobile					

## **Trail System Plan**

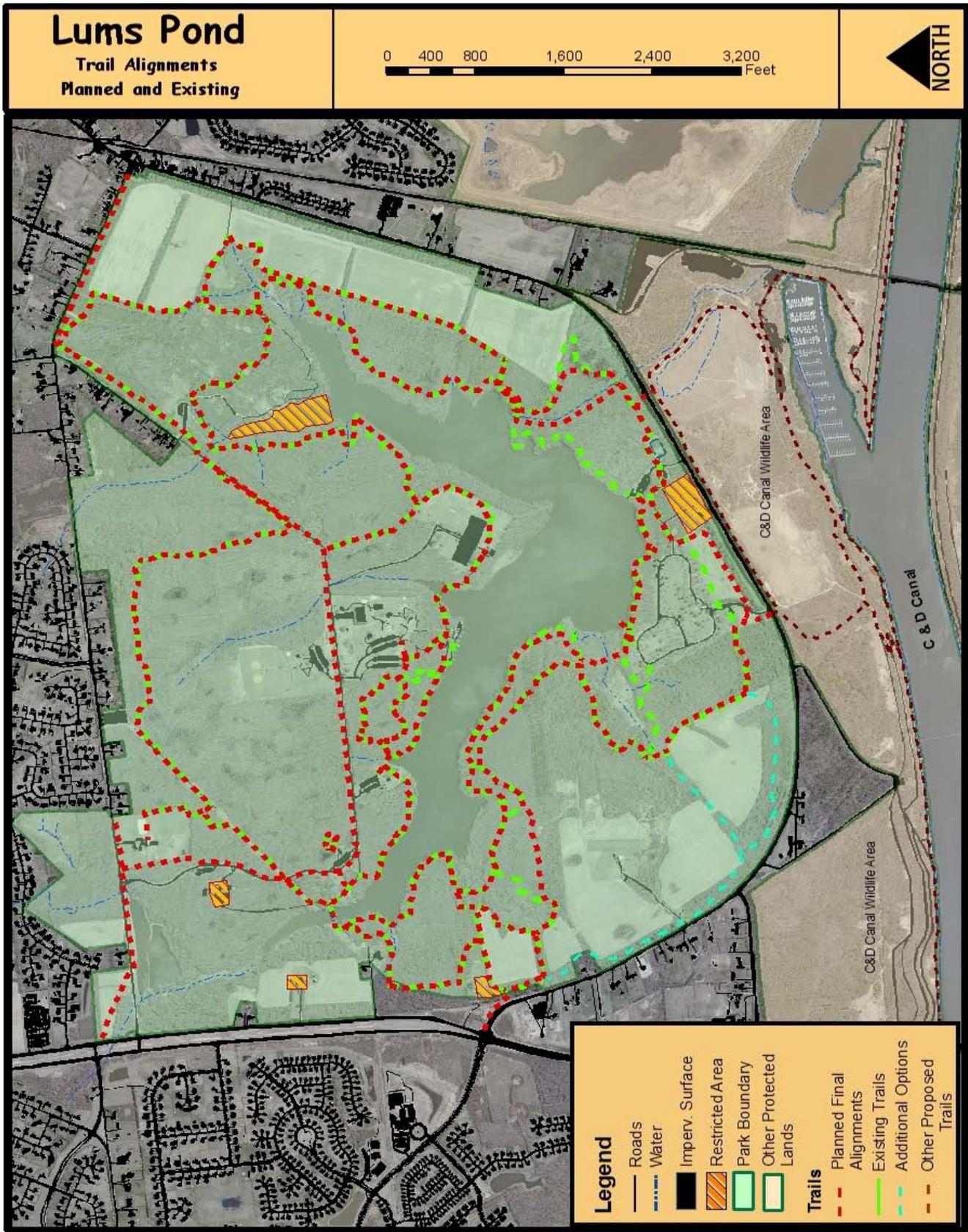
### **Trail Changes**

Based on the existing natural and cultural resources including the very preclusive soil conditions, and social science data, significant changes to the existing trail system are needed for Lums Pond State Park. The Trail Committee considered natural and cultural resources, and variables and conditions in making the recommendations for new trail alignments. Those factors include the following: current trail alignments; trail safety; soil types; topography; hydrology; plant and animal distribution; historic and archaeological resources; current and future use; trail use trends; anticipated regional land use growth; park staffing levels; maintenance practices; and sustainability.

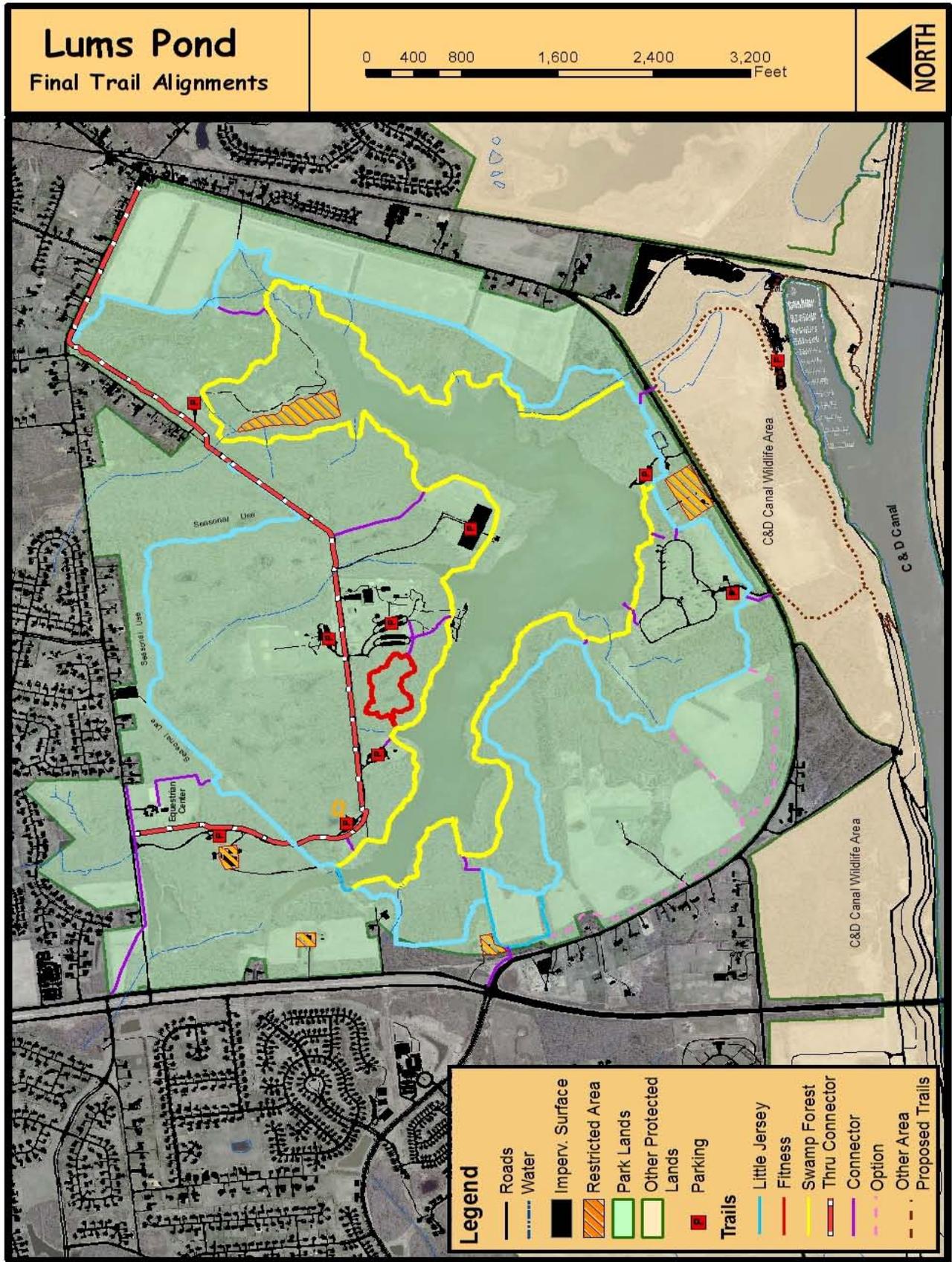
Based on present day sustainability principles, which dictate that in order for a trail to be sustainable, all impacts present and future, must not burden social, economic and environmental systems, the trails at Lums Pond do not meet those criteria and are therefore unsustainable . The analysis of the Lums Pond State Park shows that of the 17.9 total trail miles 75% are in need of some degree of change or enhancement to bring them into compliance.

Final alignment changes account for hydric soils and natural and cultural resource avoidance. Map 12 depicts planned trail alignment recommendations as they compare with existing alignments. Map 13 depicts the Lums Pond State Park trail system alignments if recommendations are adopted and implemented.

Planned and Existing Trails - - Map 13



Planned Final Trail Alignments - - Map 14



### Permitted Trail Use

Park use, site evidence and professional opinion suggest that there are small clusters of heavy trail use surrounding key areas of Lums Pond State Park. The equestrian center, the equestrian trail, the campground, and trails immediately adjacent to large parking areas on the north side of the pond receive the heaviest use. It is strongly encouraged that trail use and volume data be gathered to better support this trail plan. Table 6 shows existing and planned trail miles with current trail designated uses. Table 7 outlines recommended trail widths for specific trail uses. Table 8 summarizes total number of planned miles for each user group. Map 14 depicts recommended trail uses and Map 15 outlines recommended trail widths.

**Existing Trail Uses with Trail Mileage - - Table 6**

Trail	Present Miles	Planned Miles	Pedestrian	Mt. Biking	Equestrian	Snowmobile	Trail Running
Swamp Forest Trail	7.4	6.3	√	√			√
Little Jersey Trail	8.7	7.5	√		√	√	√
Sensory Trail	0.1	0.1	√				
Fitness Trail	0.8	0.6	√				√
Community Connections	.4	1.2	√	√	√		√

**Planned Trail Widths and Uses - - Table 7**

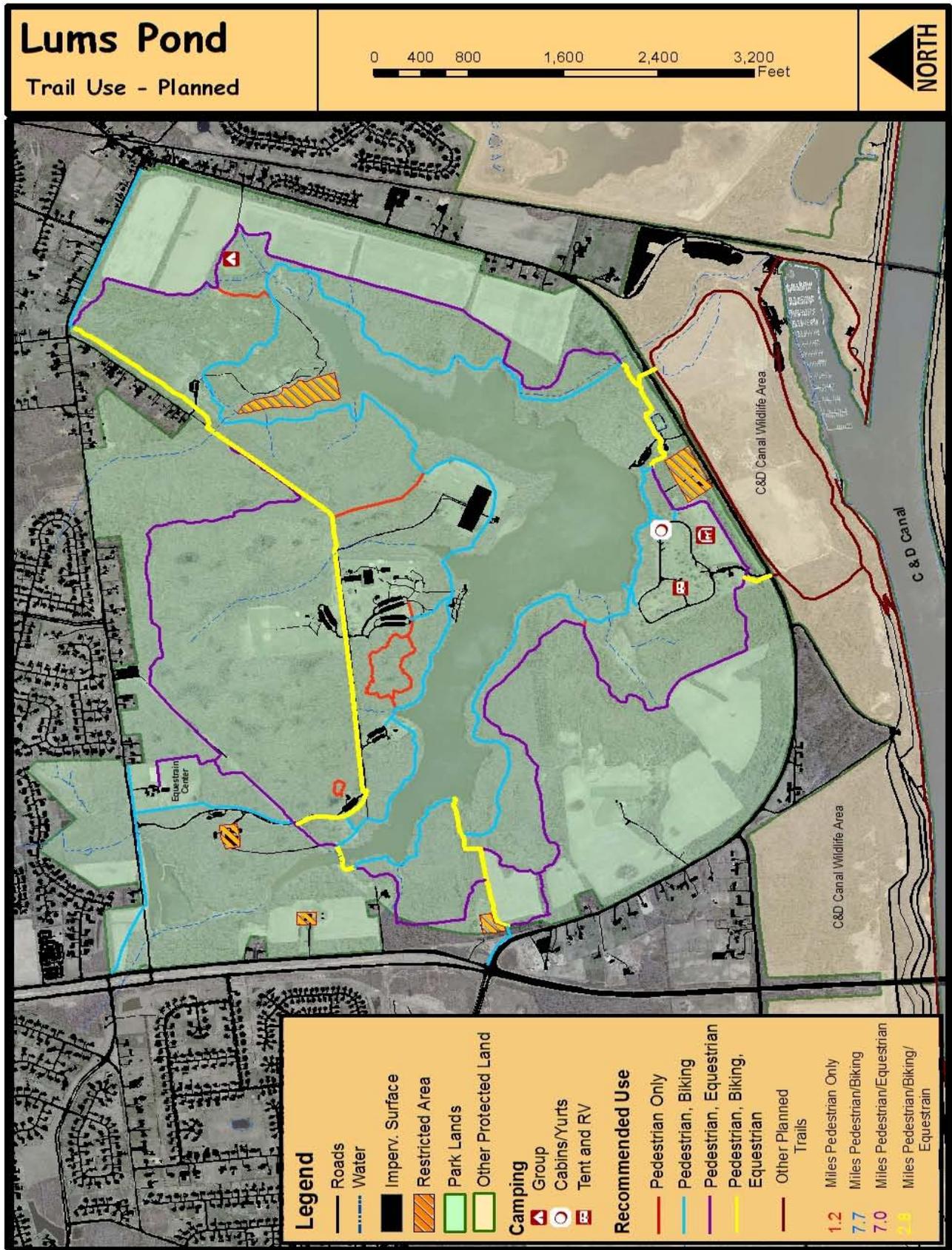
Trail	Trail Width	Width Avg.	Current Trail Users	Recommended Users	Suitable Trail Users
Swamp Forest	Singletrack	3 feet	Pedestrian only	Pedestrian, Mountain Bikers	Pedestrian, Mountain Bikers
Little Jersey	Doubletrack	6 feet	Pedestrian, Mountain bikers, Equestrian, snowmobile	Pedestrian, Equestrian	Pedestrian, Mountain Bikers, Equestrian
Life Course	Doubletrack	6 feet	Pedestrian only	Pedestrian only	Pedestrian only
Sensory	Doubletrack	6 feet	Pedestrian only	Pedestrian only	Pedestrian only
Community Connections	Doubletrack	6 feet+	None	Pedestrian, Bikers	Pedestrian, Bikers

**Total Park Trail Miles Planned for Each User Group - - Table 8**

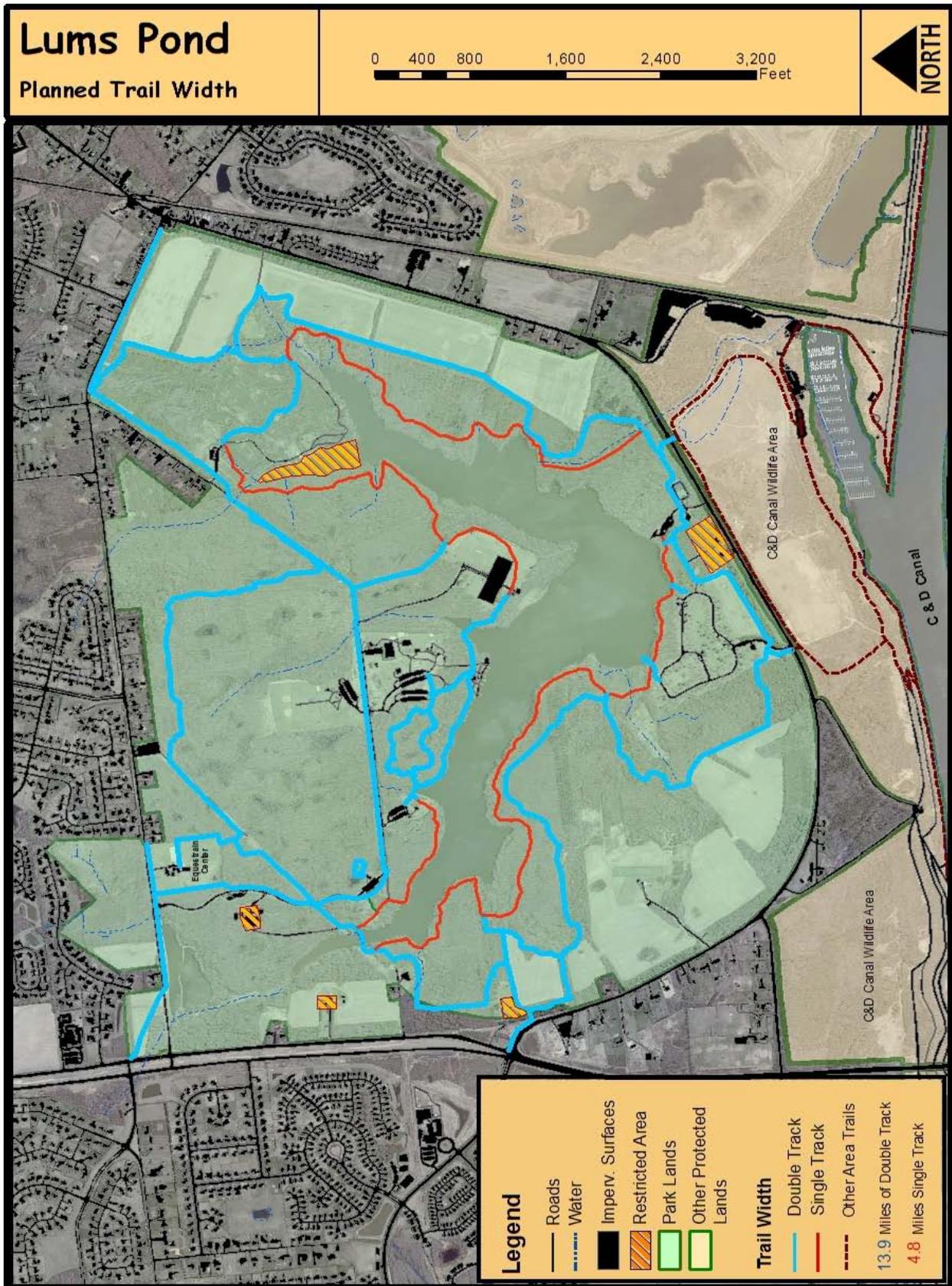
<b>Trail Use by Type</b>	<b>Miles</b>	<b>% of Total Miles</b>
Pedestrian	18.7	100
Biking	9.0	48
Equestrian	9.5	45
Total Miles	18.7	



Planned Trail Uses - - Map 15



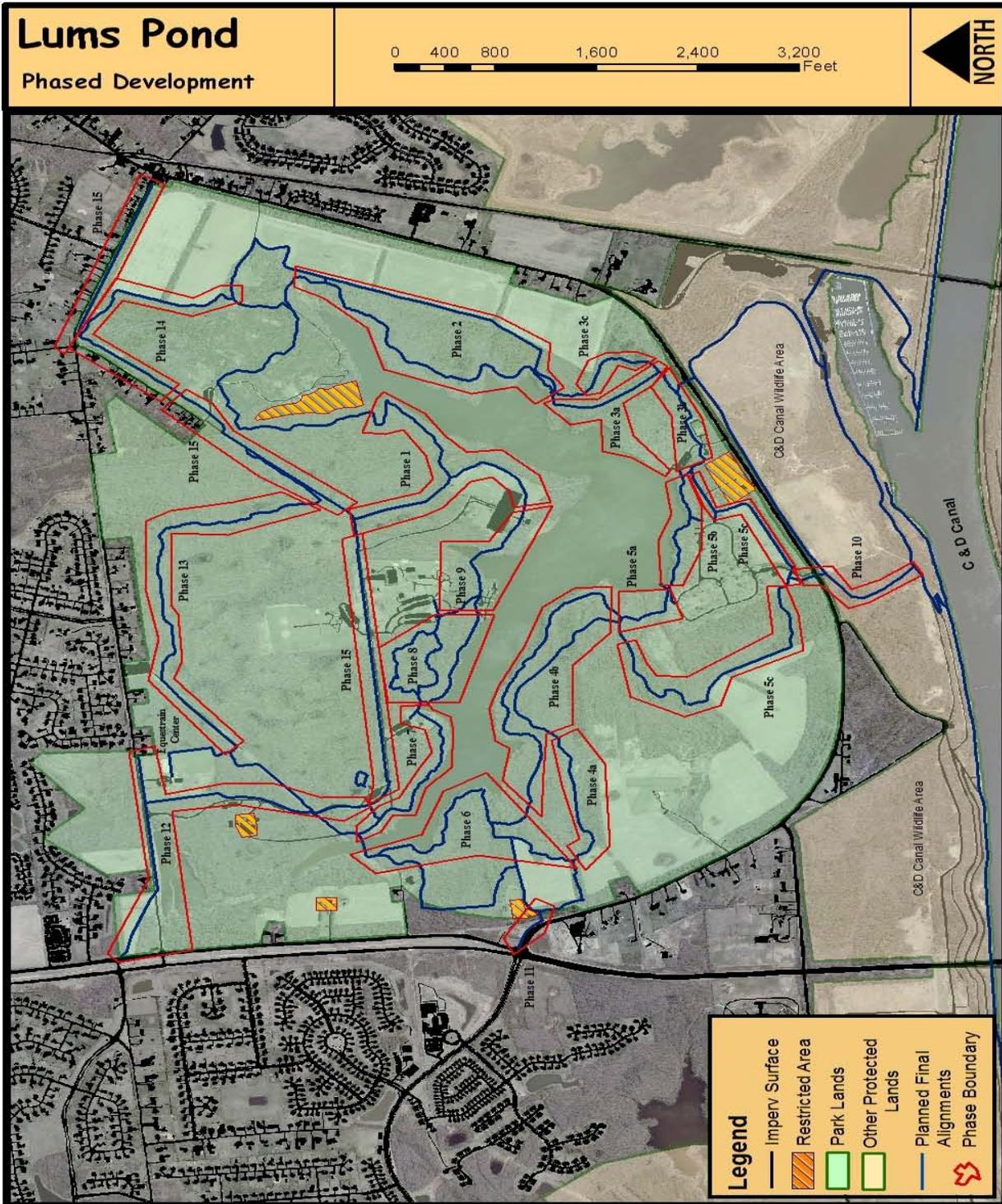
Planned Trail Widths - - Map 16



## Phased Reconstruction

The new trail alignment reconstruction would occur in phases. Those phases are depicted on Map 16. Tables 9 and 10 summarize recommendations by trail phase given existing trail conditions. Phased work is divided for purposes of in-depth analysis and trail alignment and supporting infrastructure such as way-finding systems, signs, information boards, and other basic visitor needs.

## Trail Development Phases – Map 17



**Trail Changes Phases 1-5 - - Table 9**

<b>Trail Phase</b>	<b>Current Trail Conditions</b>	<b>Proposed Action</b>
1a	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; sensitive habitat adversely impacted.	Close trail segment and replace with new alignment.
1b	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; sensitive habitat adversely impacted; trail and disc golf in conflict.	Close trail segment and replace with new alignment.
2	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; sensitive habitat adversely impacted.	Close trail segment and replace with new alignment.
3a	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; sensitive habitat adversely impacted; separate Swamp Forest and Little Jersey Trails; trail flow poor design.	Close trail segment and replace with new alignment
3b	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; sensitive habitat adversely impacted	Harden trail segment to crushed stone trail
4a	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; separate Swamp Forest and Little Jersey Trails	Close trail segment and replace with new hardened alignment
4b	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; sensitive habitat adversely impacted	Close short trail segments and reroute
5a	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; sensitive habitat adversely impacted.	Close trail segment and replace with new alignment.
5b	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; trail flow design and connections to campground poor.	Close short trail segments and reroute; Develop proper connections to campground; develop trailhead area and water access.
5c	Hydric soils do not permit trail to drain; trail location poor.	Close trail segment and replace with new alignment.

**Trail Changes Phases 6-15 - - Table 10**

<b>Trail Phase</b>	<b>Current Trail Conditions</b>	<b>Proposed Action</b>
6	Hydric soils do not permit trail to drain; trail users widen trail to get around wet areas; continual maintenance needed; sensitive habitat adversely impacted.	Close short trail segments and reroute
7	Poor tread condition and delineation	Cover roots, add signage, define trail
8	Sections of fall-line trail	Close short trail segments
9	Poor route flow and delineation	Add signage, define trail, short reroutes
10	Lacks connection to community	Add connection
11	Lacks connection to community	Add connection
12	Lacks connection to community	Add connection
13	Hydric soils do not permit trail to drain; trail users Widen trail to get around wet areas; continual maintenance needed; sensitive habitat adversely impacted.	Close trail or place seasonal restrictions
14	No change	No change
15	No existing trail	Design & construct new trail

## **Cross Country Course Changes**

Based on input from cross country coaches, park development visitor uses, soil composition, other natural resource conditions, and natural obstacles it is recommended that the current location of the 3.1 mile-long course be abandoned (Area 1 to the Life Course in Area 3). Cross Country runner safety, eliminating two-way runner traffic, greater passing zones during races, user conflict mitigation, parking, and course appeal are paramount in selecting a new course layout. Moving the course out of the park's busiest day use areas is preferred.

Area 1 continues to offer parking and is an excellent location to begin and end a race thus making Area 1 a control point in planning a new cross country trail alignment. Looking east toward and beyond the dog park area offers a safe and varied course away from main visitation sites. In addition, this realignment will allow multiple areas for spectators to view the race.

**Start and Finish Area**, shown in light green and purple on Map 17, must meet National cross country regulations standards. Area 1 provides an area that exceeds the National regulations for width and length for the course start and finish while providing the ability to avoid other users, specifically planning must avoid the cricket field and its use. Infrequent use, time, and day of use of the cricket field should minimize competition between the two activities for that space. Regular seasonal mowing keeps this area open and easily accessible. Large field size also allows for changes in course start and end locations if needed.

**Course Segment 1** recommended changes, shown in dark green on Map 17, include establishing a new 8 feet wide, natural surface corridor that is 1200 feet long between Area 1 and closed portion of Buck Jersey Road. This new corridor would utilize high ground on more stable soils and traverse through young, less environmentally sensitive habitat. The majority of the segment is comprised of open forest with a scattering of native and non native plants which would require limited clearing to establish a corridor. At the south end of the segment there is old construction debris that needs to be removed. Although a portion of the disc golf course is in the area there should be enough separation to avoid any conflict.

**Course Segment 2**, shown in yellow on Map 17, would utilize the abandoned Buck Jersey Road or adjacent natural surface trail. This segment of the course would continue for 2000 feet on or along the 14' wide asphalt surface road. Ditches line the road on both sides for almost the entire length. There exists a 6' mowed strip on the north side of the road for approximately 60% of the total distance. Beyond the mowed strip is existing trail and forest. Although not recommended due to the ditch location, this grassy mowed strip may provide an alternative surface to the asphalt. Forest on the south side of the road grows up to the road eliminating opportunity for a natural surface alternative but would provide some shade to this segment.

**Course Segment 3**, shown in red on Map 17, utilizes approximately one mile of the Little Jersey Trail. This portion of the course is natural surfaced with a width of 10-12 feet. The Little Jersey Trail is designated for pedestrian, biking and equestrian use. The remainder of the segment utilizes a short section of the Swamp Forest Trail characterized by a six foot wide crushed stone surface designated as pedestrian only. This segment adds another piece of wide trail which expands the total length of double track trail to over two miles before narrowing down for the final segment of single track. Use volume on this portion of the trail system is low.

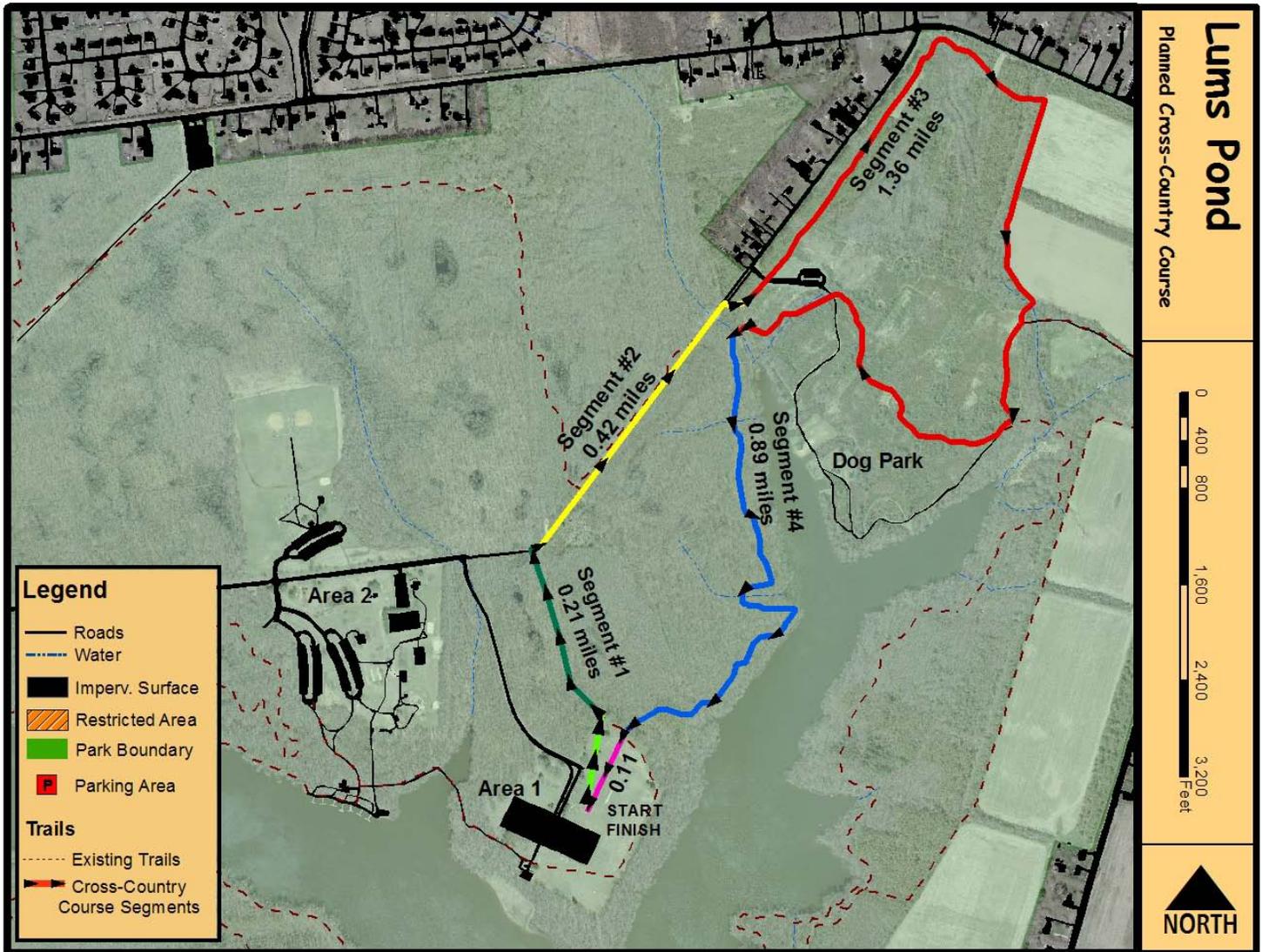
**Course Segment 4**, as shown in blue on Map 17, utilizes approximately .89 miles of the Swamp Forest Trail. This single track section of trail has a natural surface, is entirely shaded, is on rolling terrain, and has a minimum width of 36 inches. This final leg is the most challenging.

As shown on the map, the proposed changes would allow for a loop course to be created, thus eliminating two-way traffic on all course segments, and providing extended double track trail for racers giving them ample opportunity to pass. In addition, the proposed course would provide

racers generous distance (two miles) to space out before hitting the narrower final segment (shown in blue on the map) of single track trail. Course tread would be firm and stable and free of obstacles throughout.

In order for this new course to be opened for use, trail work will be needed. Establishing a 1200 foot corridor for segment 1 will require clearing; 2000 feet of segment 2 requires removal of some leaf litter and other debris; mud holes along segment 3 need filling; and segment 4 requires widening of 2000 feet of trail and foot bridges. In addition, course markers need installing.

### Planned Cross Country Course - - Map 18



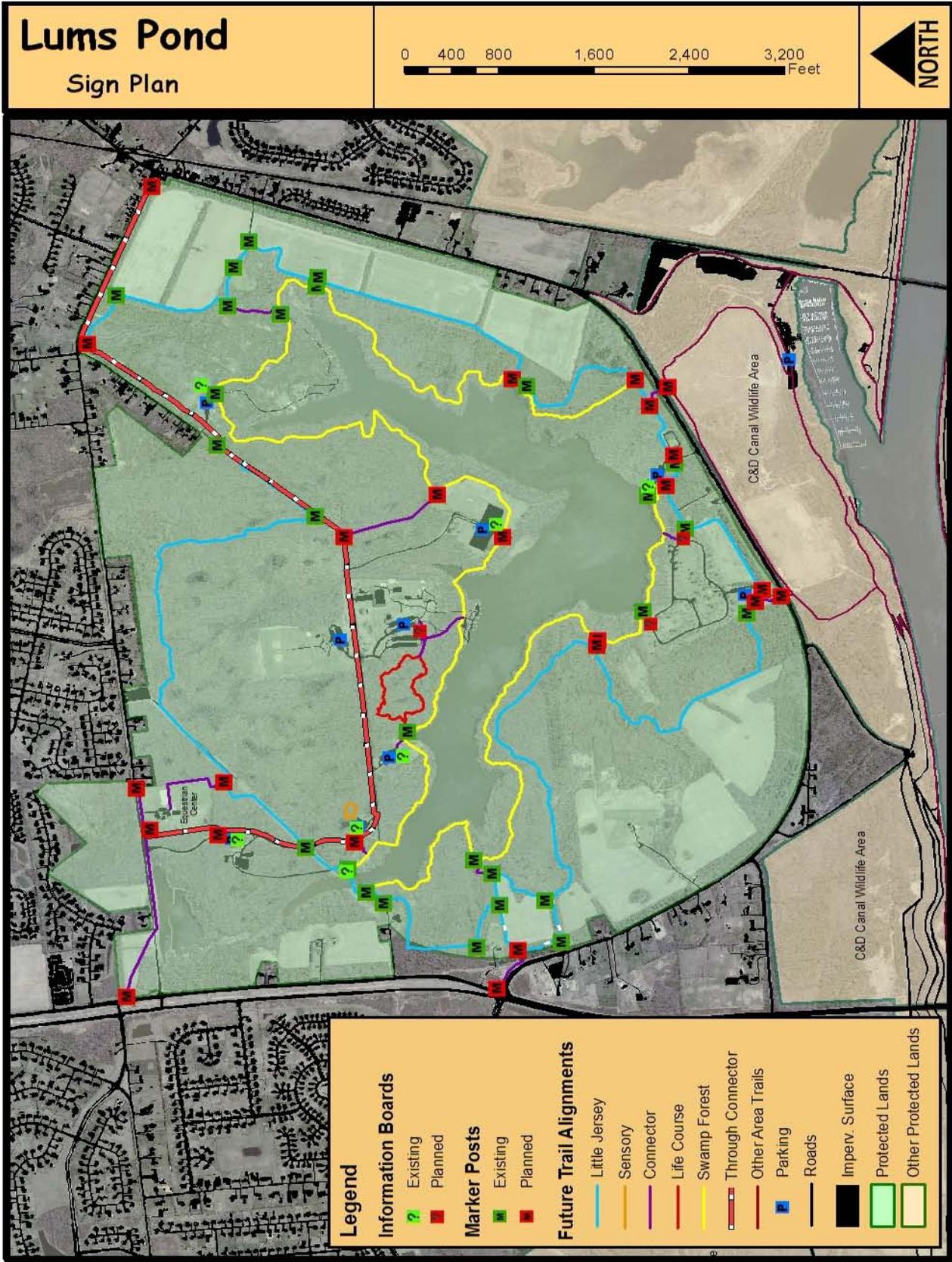
## **Signs and Markers**

The inclusion of a sign plan is an integral part of a comprehensive trail plan. A sign plan should include roadside directions to trailheads or major trail access points throughout the park; trailhead information such as mapping and trail characteristics; and clear trail markings throughout the system that will provide clear direction and safely guide visitors through the trail system.

It is recommended that all major parking lot trail access points have tackboards that provide visitors with a trail map, trail use designations, trail etiquette, universal accessibility information (see appendix), and additional park information. Mapping will show the trail system within the park and have trails color coded such that the coding matching the trail markers. See appendix for information tackboard detail. All access points will be clearly labeled on maps.

Each trail needs to be marked at all access points and at every trail intersection using the standard marking post (See appendix D for marker post detail). Minimum signage on each post will include trail name with directional arrow. Additional information may include designated use, intersecting trail names, and destinations. Trail markers will correspond with trail color coding as seen on trail maps. Additional signs may be added to cover special seasonal activities (such as hunting or cross country) or to enhance target areas that warrant additional guidance to visitors. Map 18 shows the existing and planned signage for the trails system.

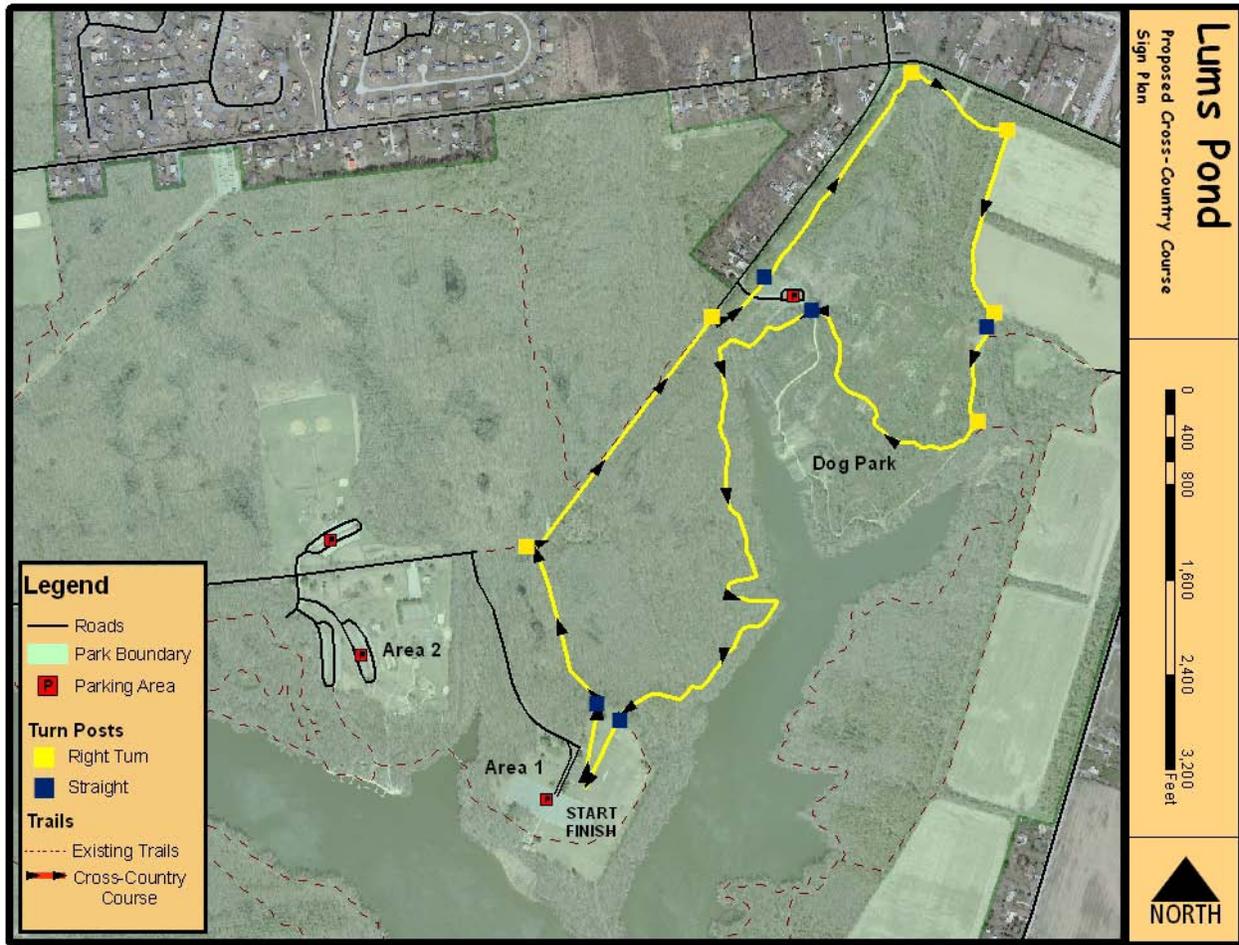
Trail Sign Plan - - [Map 19](#)



## Cross County Course Markers

Cross country courses throughout the state have employed permanent marking posts. The posts are wooden 4x4 pressure treated post with the tops painted the appropriate color for course navigation guidance. Map 19 shows the locations to properly mark the course.

### Cross Country Course Marker Plan - - [Map 20](#)



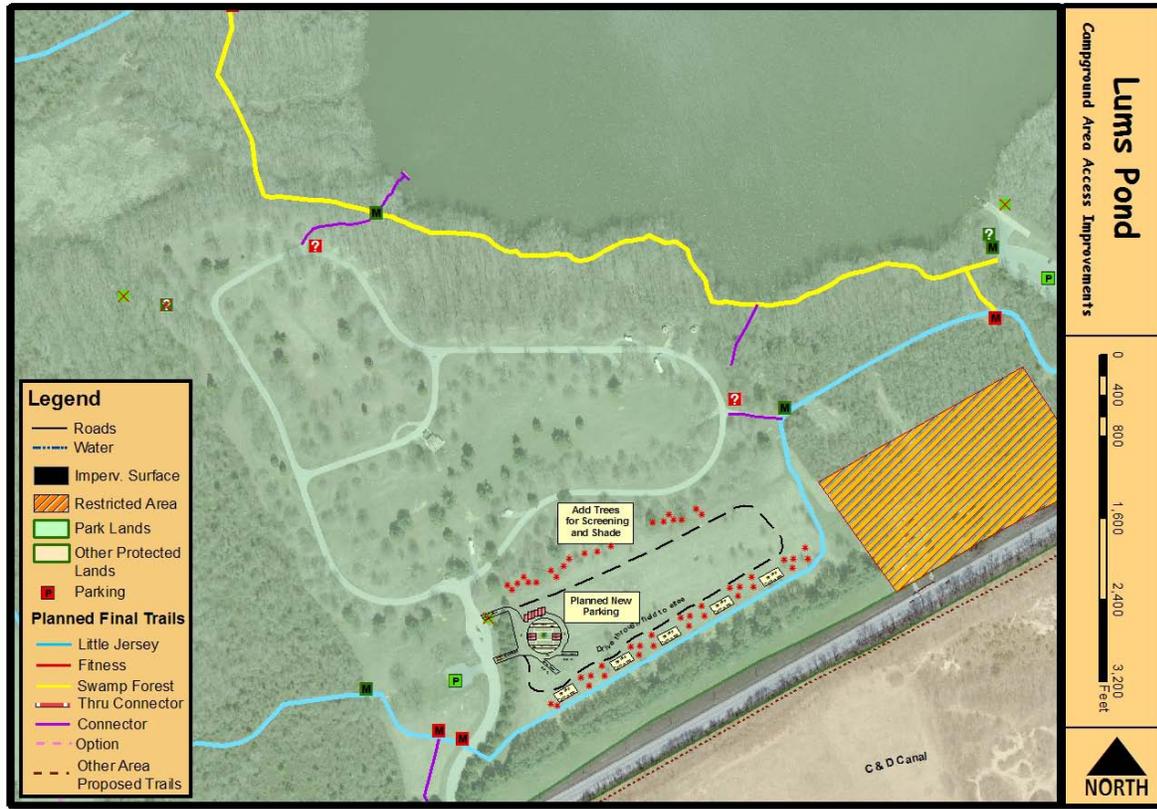
## Access Point Improvements

### Campground Area Access

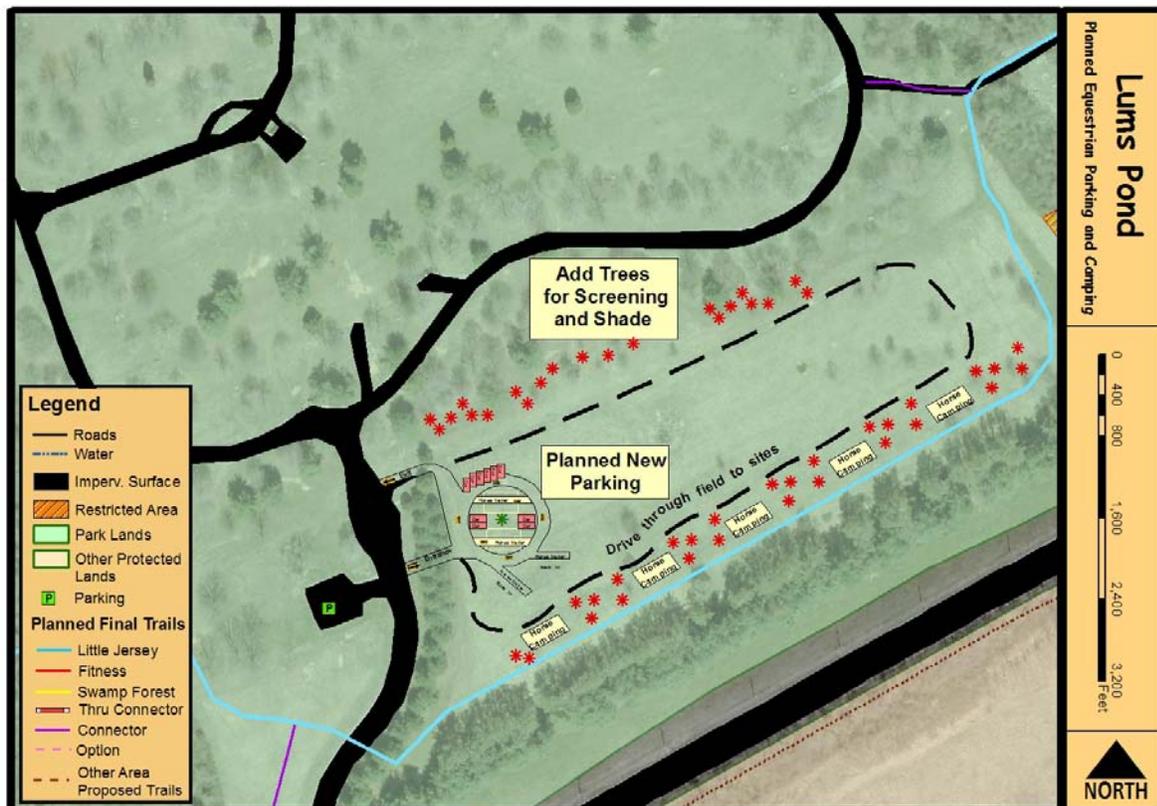
Presently the campground area lacks an official entry point to the trail system and good access to the pond. The development of two official trailhead points of entry to both land trails and the water from the campground is recommended. Safe access to the water and the trails is critical for resource protection and visitor enhancement, especially in this heavily used area. For improved access the area just east of camp site 37 and the existing access route to the pond there is one of two areas targeted. The area just east of site 37 should provide a firm stable surfaced trail to a new pier and provide easy access to the water for paddle craft. The other location is at the east end of the campground between site 15 and 16. It is recommended that both locations be fitted with large tackboards to display a map and other critical trail and park information. Map 20 provides detail of these improvements.

Additionally there is a need to expand and improve parking, camping and safer access for equestrians. Map 21 details that plan.

## Campground Area Access Improvements - - [Map 21](#)



## Equestrian Camping and Access Improvements - - [Map 22](#)



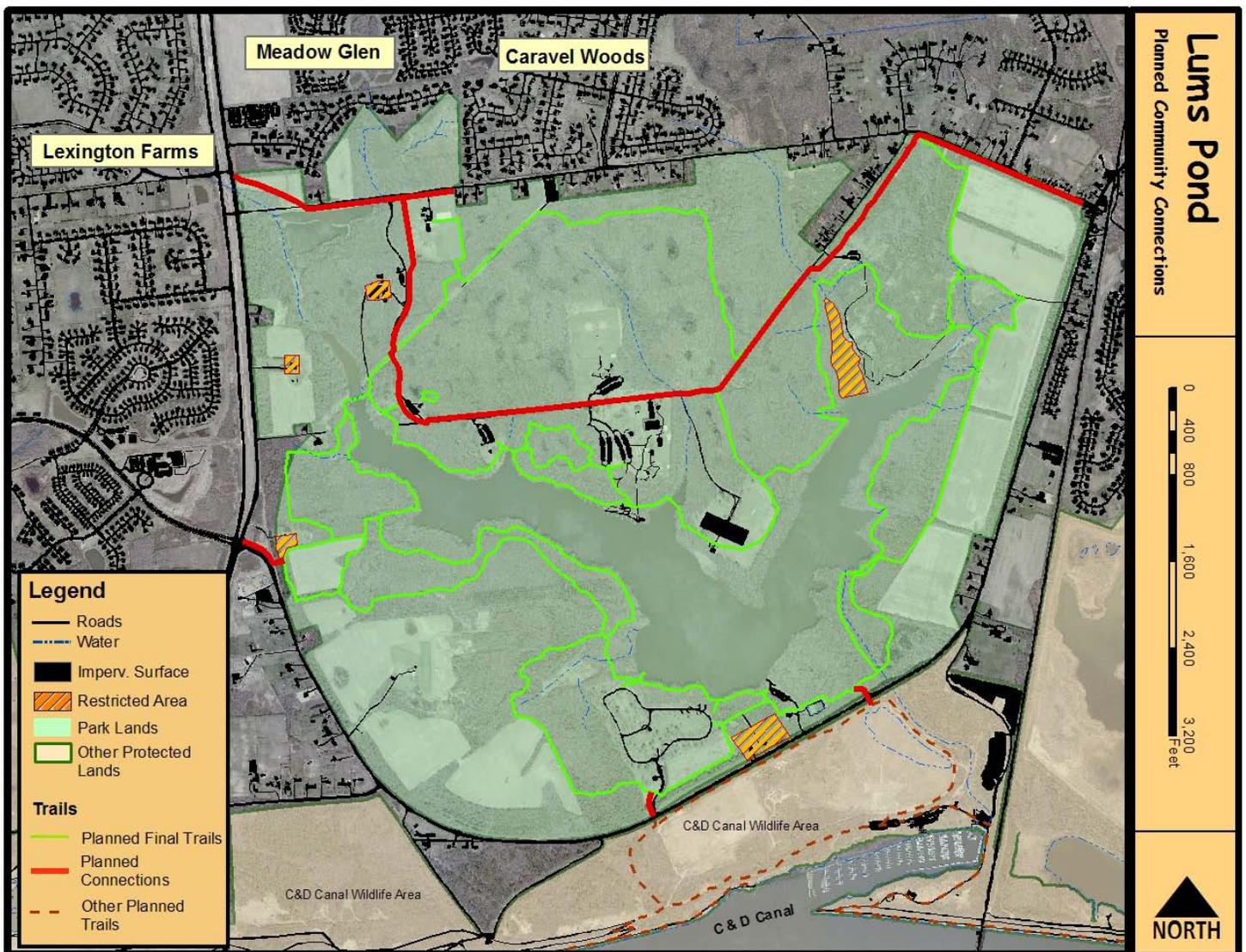
## External Connections

### Nearby Community & Regional Connections

Presently there are no direct trail connections linking residential communities to Lums Pond State Park or to a trail that would better link visitors to major activity areas in the park. However, opportunity exists for several potential connections to provide bicycle and pedestrian access to and through the park. This could potentially increase non-motorized park visitation from the surrounding communities. Map 22 details potential connections to nearby communities and links to the C&D Canal.

A potential connection could be made from the Meadow Glen and Caravel Woods subdivisions that are located north of Howell School Road. This is likely to occur with the future DelDOT planned upgrades and realignment of Howell School Road. DelDOT plans sidewalk/pathway connections east from Caravel Woods and west from a new Meadow Glen subdivision entrance to the park's entrance. Once inside the park, bicyclists and pedestrians could continue on a separated trail parallel to the main park access road further into the park.

### Community Connections -- Map 23



Additionally, another connection could be made along the western end of Howell School Road where it intersect route 71 to Buck Jersey Road and then connecting to existing trails.

Adjacent and south of Lums Pond State Park is the C&D Canal. In 2006, the US Army Corps of Engineers in partnership with DNREC, New Castle County, Delaware City, Chesapeake City and others, proposed the construction of a 15.6-mile long trail within the C&D Canal lands. Phase 1, on the north side of the Canal from Delaware City to Chesapeake City is currently in design development. This trail will be located primarily on Tier 1, currently a service road lowest in elevation and closest to the Canal waterway. Hiking, bicycle and equestrian uses will direct trail design and access points. Parking at four locations is planned. Trail operation and maintenance will be assigned to the Corps of Engineers.

It is anticipated that construction of the C&D Canal Trail will draw users from Delaware and from the Mid-Atlantic region. When completed, the trail will become the longest continuous trail in the State. Furthermore, Delaware State Parks can expect visitation at Lums Pond to increase because associated trail use at the C&D Canal.

a connection to the proposed C&D Canal Trail, nearing design development completion in December 2008, is desirable and will introduce Canal Trail users to amenities in Lums Pond State Park. Map 21 shows how the C&D Canal Trail and the trail system in Lums Pond State Park could connect.

Looking regionally, WILMAPCO has developed a Bicycle-Pedestrian Greenway Trail Plan for New Castle County. While it is not yet complete, the plan identifies bike-ped connections south of Route 40 through Mansion Farms and Caravel Woods with a link to Lums Pond State Park. For maps visit the WILMAPCO web site and select <http://www.wilmapco.org/nccpathways/index.htm>.

## **Conclusion**

Final trail alignments as outlined on Map 12 have the least impact to hydric soils, provide for a varied trail experience, and provide access for many different user groups. This approach will provide a sound foundation for the most sustainable trails. Realign and reconstruct trails away from hydric soil zones will provide for the highest protection of species of concern, and will in turn provide the best site conditions for sustainable trail alignments. Where alignments cannot be shifted away from hydric soil zones, build boardwalks using helical anchor piles and other sensitive construction methods avoiding unnecessary impacts on natural and cultural resources, and to eliminate costly on-going maintenance.

Utilizing best practices for design, construction and maintenance will better provide and enhance diverse recreational experiences for visitors, reduce costly and frequent maintenance, and mitigate conflict between users. Constructing trail linkages to neighboring communities will provide non-motorized access to and through the park that will promote health and exercise as part of a healthier lifestyle.

## Agreements

\_\_\_\_\_  
**Park Superintendent                      Date**

\_\_\_\_\_  
**Stewardship Manager                      Date**

\_\_\_\_\_  
**Operations Administrator                      Date**

\_\_\_\_\_  
**Cultural Resources Manager                      Date**

\_\_\_\_\_  
**PPD Administrator                      Date**

\_\_\_\_\_  
**Env. Education Manager                      Date**

\_\_\_\_\_  
**Division Director                      Date**

\_\_\_\_\_  
**Trail Planner                      Date**

## Appendices

### Appendix A: Trail Maintenance Plan

This document is to establish guidelines and principals to maintain all trails within Lums Pond State Park. The guidelines are to establish a means of maintaining the trails that utilize the best industry practices available while providing the optimal experience for hikers and minimize risk for visitors and park staff and maximize environmental protection. This is not a “How To” narrative- for detailed guidance on trail maintenance, refer to the Trail Maintenance Handbook.

### **Trail Designations and Tread Widths**

<b>Trail</b>	<b>Trail Type</b>	<b>Width Avg.</b>	<b>Current Trail Users</b>	<b>Recommended Users</b>	<b>Suitable Trail Users</b>
Swamp Forest	Singletrack	3 feet	Pedestrian only	Pedestrian, Mountain Bikers	Pedestrian, Mountain Bikers
Little Jersey	Doubletrack	6 feet	Pedestrian, Mountain bikers, Equestrian, snowmobile	Pedestrian, Equestrian	Pedestrian, Mountain Bikers, Equestrian
Life Course	Doubletrack	6 feet	Pedestrian only	Pedestrian only	Pedestrian only
Sensory	Doubletrack	6 feet	Pedestrian only	Pedestrian only	Pedestrian only

### **Minimize Environmental Impact**

The trails need to be located in less environmentally sensitive ecosystems as approved by the Division’s Stewardship Program to minimize environmental impact. All maintenance activities **will** follow trail maintenance guidelines and practices that will support low environmental impact and provide an assortment of recreational opportunities.

### **Minimize Conflict**

Posting trail use designation, appropriate signage, and using best maintenance practices will minimize conflict.

### **Trail Characters and Infrastructure**

- Widths- all single use and shared use single track trail will be maintained at 36” of cleared tread with an additional 12” of **selective** trimming on each side of the tread. All double track trails will be maintained at 72” of cleared tread with an additional 12” of selective trimming on each side of the tread unless otherwise specified.
- Height- Trails open to hiking and biking will have a maintained height of no less than 78” and no more than 88”. Trails open to equestrian use will have a maintained height of no less than 96” and no more than 120”.
- Surface- the tread will be firm and stable and maintained to provide a safe smooth surface (unless otherwise noted), free of obstacles and erosional features such as washouts, gullies, and mud holes, and is well draining.
- Signage- Signage will be provided at trailheads or major access sites to the trail to provide users information about the nature of the trail.

Trail markers will be placed at all trail intersections to guide the user through the trail system.

### **Inspection/ Maintenance**

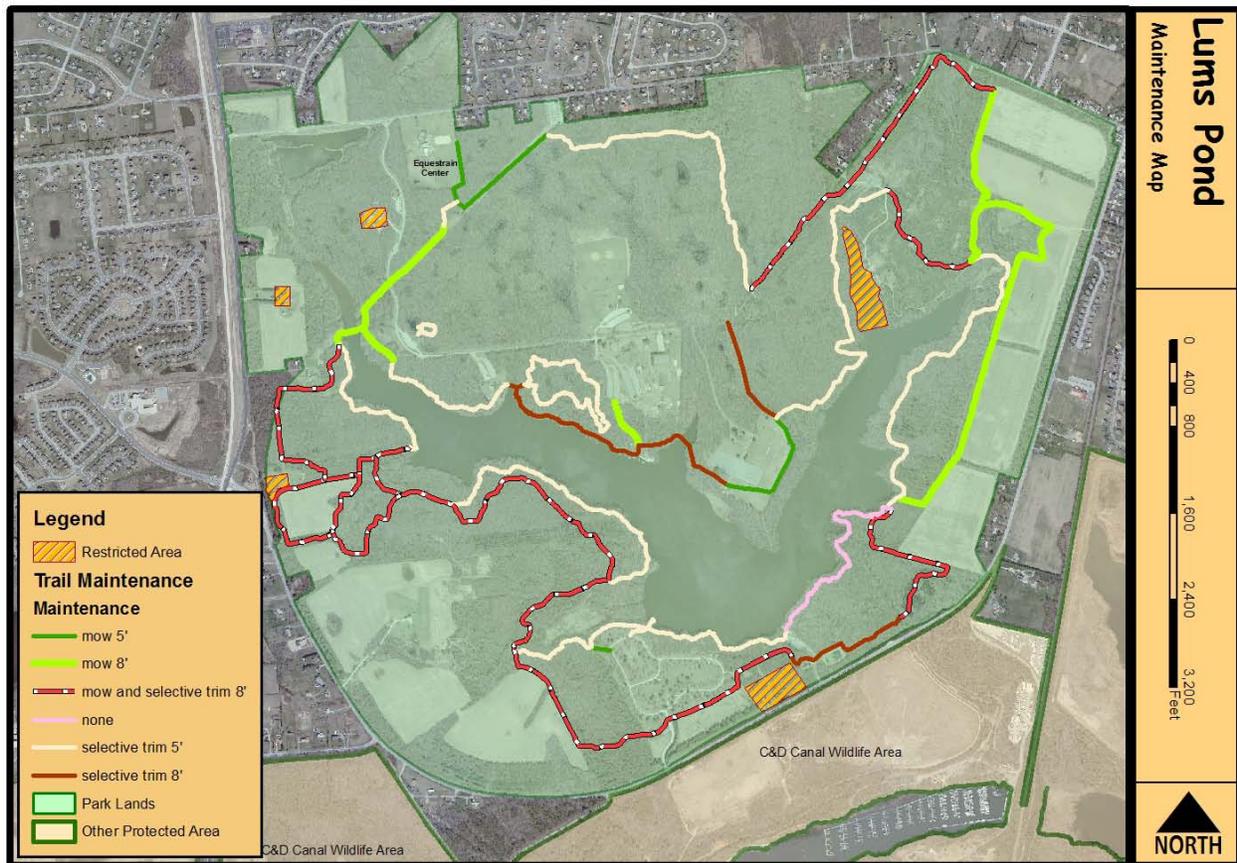
All trails and trail features are to be inspected on a monthly basis. Each inspection will be logged. If a trail is in need of maintenance or infrastructure is in need of repair it is to be repaired as quickly as possible and if repairs cannot be made immediately and there is a safety risk to visitors the trail is to be closed down until said repairs occur.

Examples of unsafe infrastructures include but are not limited to: loose boards on bridges and boardwalks, protruding nails/ bolts, loose rocks in rock armored sections, excessive erosion, trees blocking trail passage, encroaching patches of poison ivy, and large areas of muddy or flooded trail.

### **General Principles**

- **Minimize** impact whenever possible- in **all** phases of maintenance
- **Only use** approved equipment outlined in the maintenance plan.
- **Any** trail maintenance **will only** take place when soil conditions are firm.
- **Do not** use equipment on trails when soils are prone to displacement and compaction.
- **Only** use and maintain open designated trails.
- **Do not** create short cuts or service corridors.
- **Avoid** maintenance activities during wet weather or when the ground is saturated
- **Know** the nature of the project and the materials and tools being used.
- **Check** marker posts and report any missing markers.
- **Check** trail information signs for damage or outdated maps and other trail information.

## Maintenance for Specific Trail Segments – map 23



### **Appendix B: Principles of Sustainable Trail Design, Development & Maintenance**

Designing and constructing sustainable trails is of paramount importance to health and life span of the trail system. Many trail management problems, from erosion to user conflict, stem from poor trail planning and design. A poorly designed trail, no matter how well it is built, will almost always degrade and cause problems for managers and trail users. All trail users affect the trail surface and surrounding environment, especially when trails are poorly planned and constructed. Those impacts range from vegetation loss to erosion, water quality problems, and disruption of wildlife.

The increase of knowledge and understanding of the inner workings of the natural environment and how trail activities impact and interact with local site conditions, has reshaped how the Division approaches trail planning/design, development, and maintenance. It has been the accumulation of this knowledge that has led to a broader and more in-depth approach to the planning process.

The basic principles of sustainable trails include the following: maximize natural and cultural resource protection; support current and future trail use; no adverse affects on plant or animal life in the area; require little future rerouting and long-term or reoccurring maintenance; and reduce staff time and funds spent on trail maintenance. Adopting these principles ensures a more accessible and sustainable trail system for the future.

Designing a sustainable trail and trail systems requires the analysis and evaluation of the following elements and factors: cultural resources; endangered or sensitive plant and animal species; occurrence and health of native plants and animals; mature growth forests; natural drainage; topography, slope and grade changes; ease of access from control points such as trailheads; user safety; use type; users volume; and providing interesting experiences within the landscape. A sustainable trail and system will offer trail users landscape and experiential variety.

All of the current research suggests that the most effective way to minimize the environmental effects of trail uses is to build environmentally sustainable trails. A sustainable trail balances many elements including location, expected trail use, construction methods, grade changes and employing quality construction techniques and material.

Maintaining trails to be sustainable will mean that park operations may need to be conducted differently than had been in the past- ATVs or gators replace trucks to access trails; small mowers replace large tractors with brush mowers; or bikes or foot travel replace motorize vehcles. Park volunteers are enlisted in Trail Patrols to educate visitors and help pick up small branches and other debris. Volunteers also help out by reporting downed tree locations or other unsafe trail conditions or maintenance situations that must be carried out by park staff.

**Appendix C: Statewide Trail System Overview**

There are currently 147 miles of trail within State Parks. Of this total, 57 miles (39% of the total miles) are for hiking only while 90 miles (61% of the total) is shared-use trail activity. Two standards have been adopted for trail widths: single track (36”) and double track (36” +). Below are summaries defining the State Park trail system.

**Trail Summary by County (miles and % of total)**

New Castle	95	(66%)
Kent	8	(6%)
Sussex	44	(23%)
<b>Total</b>	<b>147</b>	<b>miles</b>

	<b><u>Single Track Trails (miles)</u></b>	<b><u>Double Track Trails (miles)</u></b>
New Castle	39	56
Kent	1.5	6.5
Sussex	9.5	34.5
<b>Total</b>	<b>50</b>	<b>97</b>

**Appendix D: Trail Standards and Guidelines**

Trail standards and guidelines comprise two main groups, trail characteristics and structures. Trails characteristics such as configurations, types, width, and surface, and grade are measurable values for a trail that will guide use and experience, but also take into account environmental impact. Trail structures include information boards, bridges, signage, access points, and parking. Delaware’s State Park system hosts examples within each category.

**Trail Configurations**

Within any trail system there could be several types of trail configurations -loops, stacked loops, destination, connector, and “spine” trails. Loops are simple trails of various lengths that offer variety and have the advantage of returning the visitor to the beginning without repeating any section of trail. Stacked loops refer to a series of loops connected to each other. Stacked loops

offer visitors multiple opportunities of experiences, distances, or difficulty with the convenience of parking at a single location.

Destination, connector and spine trails provide a means for visitors to travel to points of interest or connect to other trail systems, parks and even neighborhoods or cities. Unlike the loop system, one must travel back to the starting point using the same trail.

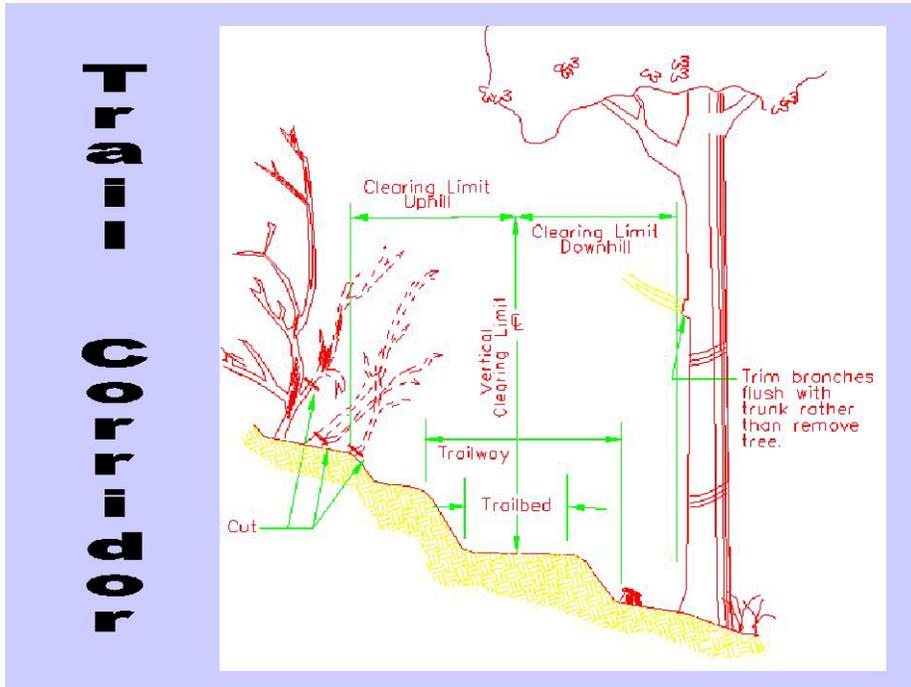


Diagram - - Typical trail corridor

### Trail Widths

Although trail widths may vary greatly, there are two basic categories- single track (36" tread) and double track (greater than 36"). Several factors – anticipated traffic volume; type of use; site conditions; experience desired; construction and maintenance costs; and environmental protection – are used to determine the optimal width of a trail. Trail widths in the park are classified as follows: 5.4 miles of single track and 12.5 miles of double track.

### Trail Type

Trail type indicates the intended use, difficulty, or direction. Examples of trail type include the following: single use, shared use, one-way, open and flowing, and technical. Providing a diverse system of trail types ensures meeting the needs of the spectrum of trail users.

### Trail Surfaces

There is a vast array of surfaces a trail user may encounter in the park. By far the most prevalent is compacted native soil, but crushed stone and asphalt is also present. Trail surfaces in the park are classified as follows: 15.7 miles of packed earth (native soil) and 2.2 miles of wooden boardwalk, stone or asphalt. In determining the appropriate trail surface type, the following factors are considered: type and volume of traffic; durability; experience; site conditions; construction and maintenance costs; and continuity. Soft surfaces are less sustainable than firm ones.

### Trail Grade and Cross-Slope (maximum and average)

Grade and cross-slope are extremely important for drainage, sustainability, and accessibility. Trail grade is measured down the length of the trail and is the change in elevation between two points over a given distance measured in percent. Maximum grade is defined as the steepest section of trail and average grade is the steepness of trail over the entire length. As a general rule average grade should not exceed 8% and maximum grades should not exceed 15% over 10 feet.

Cross-slope, also measured in percent, is the change in elevation from the inside of the trail to the outside. The trail surface can be flat, insloped, or outsloped. Tread grading that leaves the outside edge of the trail lower than the inside is considered outsloped. For best drainage the tread should be outsloped 3-7%.

### Bridges

A new bridge design was first tested and installed in White Clay Creek State Park on the Chestnut Hill Trail of the Judge Morris Estate property. The need to standardize a bridge style was recognized in order to provide sustainability, continuity within the state park trail system, reduce design time and increase the ease at which structures could be built, repaired or replaced.

Sustainability is of highest priority when choosing building materials. Today, the primary materials used are pressure treated woods and galvanized fasteners. New products, such as fiberglass bridge structures, are starting to be used and as other new products are developed the use of those products may be incorporated to increase sustainability of new structures, reduce costs, and reduce construction time.



Typical bridge design

### Trail Signage and Maps

Signs provide trail users with various types of information and give land managers a means of communicating with park visitors. There are several types of signs including directional, regulatory, educational, and warning/safety. Trail and other park information is displayed on maps in information boards located throughout the park.

Trail markers, also detailed in Appendix B, should be placed at the trailhead and at trail intersections. Markers will include the following standard information: trail name, directional arrow, and direction to nearby park facilities (For example, a marker post may include the direction to restrooms or parking lot) if appropriate.

Interpretative Waysides – will be installed at key locations determined by CARS or qualified appointed staff.

### Maps and Information Boards

Maps of each park are developed and available in two formats. A small version sometimes referred to as handout maps, display park boundaries, roads, buildings such as nature centers, park offices, and restrooms, trails, camping and visitor services. These maps are available in park offices, nature centers and on-line. For a sample map go to [www.destateparks.com/wccsp/wccspmap.pdf](http://www.destateparks.com/wccsp/wccspmap.pdf).

Larger format maps, displaying the same information as the smaller formatted version, are placed throughout the park system at information boards. These maps show the park's regional location, include a park overview, and descriptions of major trails. Trails are depicted in different colors and these colors correspond to the colors used on the trail marking system.



Information board in Lums Pond State Park

Tackboards are constructed of cedar and they are not painted or stained which minimizes maintenance. Tackboards are installed at locations such as parking lots in day use areas, at trail heads, campgrounds, nature centers, and park offices. They serve to provide the visitor with information such as trails, nature programs, and rules. Detailed drawings are available

### Trail Markers

A comprehensive trail marking system was first tested and installed in White Clay Creek State Park and at Killens Pond State Park. Round markers are embedded in 4x4 posts and provide specific information to inform and help direct trail users. A trail name marker color corresponds to lines on park maps representing trails. For example, the Swamp Forest Trail marker is yellow and is depicted on the map at the trailhead in yellow. Cross country markers are white posts with turn colors on the top portion. Blue indicates straight, red indicates left turns, and yellow indicates right turns.

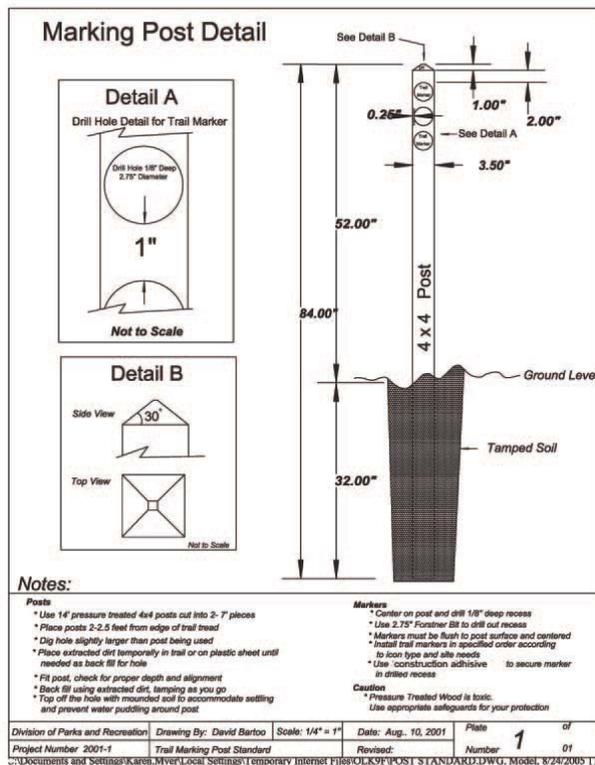


Typical trail marker



Typical cross country course marker

In addition to trail names, markers include directional arrows to aid navigation; designate permitted uses such as hiking or mountain biking or equestrian; destination place names; and direct trail users to visitor services and park facilities such as nature centers, parking, and information. Markers are installed at trail intersections.



Detail of Marker Post

## **Appendix E: User Conflicts**

User conflict is a complicated issue. Conflicts result from both direct and indirect interactions between same and different user groups. Complaints can be broken out into three main categories: environmental; safety; and social.

Environmental complaints focus on the perception that one activity has more impact on the landscape than another. There is no question that hiking, mountain biking, and riding horses has an effect on the environment. Studies have shown that hiking and biking are on par with each other and are much less significant than impacts from equestrians (WI 2005 SCORP). On trails that host both hiking and biking, the greatest impact is not from the mode of travel but from trail design, construction, maintenance and use volumes. Trails open to equestrians see far more impact due to mode of travel. Four hooves supporting a heavy animal easily loosen and displace tread material that becomes displaced and then more prone to erosion.

Safety complaints focus on the perception that one user group threatens the safety of another. There are real safety concerns when comparing modes of travel, speed differences, and the ability for people to recreate responsibly. Riding skittish untrained horses, riding a bike too fast, hiking or riding with headphones on, and failing to yield courteously to other users are all examples of poor choices that can lead to an undesirable interaction between users.

Social complaints focus on the perception that one user group has goals or values that do not match others. A perception that one group cares more about the environment or is seeking a different experience may raise tension between users.

There are a number of factors that can exacerbate conflict: poor trail design; trail use designation; and poor maintenance practices. However, the one factor that exacerbates conflict across all categories is user volume. Higher trail volume increases user interactions and can thus lead to conflict.

Eliminating conflict is impossible, but reducing or mitigating it is not. Regardless of perception versus reality, conflict exists on our trails. Good trail planning and design, educating the public and providing information, posting park regulations and trail etiquette, involving volunteers and encourage partnership are all components that must be adequately addressed to mitigate existing and possible user conflict.

## **Appendix F: Naming the Little Jersey Trail**

Little Jersey Trail (mid-19th century African-American and Indian community in LPSP)  
Little Jersey was a small community of farm laborers, canal workers and small farmers of African-American and Native American descent that lasted from about 1830 until after World War I. The community consisted of a cluster of small houses along Buck Jersey Road, which is now the main road serving Lums Pond State Park. The earliest settler here was probably John Wiley, a freed slave. John and his mother Alice were among the eleven slaves owned by Joshua Clayton, the first governor of Delaware, at his death in 1799. They were both freed following the death of Clayton's wife Rachel in 1820. John Wiley appears in Pencader Hundred by 1830, and within a few years was joined by other families, at least a few of which bore last names associated with

Delaware's remnant Native American communities. Land was set aside for a church by 1833, and by 1868 at least 16 families lived in the community. Several of these households acquired landholdings, ranging in size from houselots of less than one acre to small farms of about 40 acres. Before the Civil War, the majority of men in the community were farm laborers, but after the Civil War, many were employed by the Chesapeake and Delaware Canal Company. As the importance of the C & D Canal as a transportation route declined beginning in the 1880's, so did the population of Little Jersey. When the mules that towed the barges were replaced by steam powered tug boats in 1902, many Little Jersey residents lost their jobs as draymen, and by the end of World War I, little canal work remained. The community gradually disappeared as residents moved away and homes were abandoned. Today, the only visible remains of Little Jersey are an occasional stone foundation or an ancient espalliered fruit tree that marks the location of a now vanished garden.

### **Appendix G: Lums Pond Woods Nature Preserve**

The purpose of the following restrictions is to ensure that Lums Pond Woods will be managed and maintained as a Nature Preserve. The function of a Nature Preserve is to protect important features of the natural and cultural heritage of Delaware and guarantee their existence for future generations. The Department of Natural Resources and Environmental Control of the State of Delaware, and specifically the Office of Nature Preserves within said Department, agrees to administer and to monitor the following restrictions to aid in the protection and maintenance of the Nature Preserve.

The Department reserves the right to impose regulations upon the use of the Nature Preserve by the general public; provided that such regulations are reasonably related to (a) ensuring the safety and health of persons utilizing the Nature Preserve, (b) ensuring natural and cultural resources located on the Nature Preserve are not materially and adversely affected by use by the general public, and/or (c) ensuring use of the Nature Preserve by the general public conforms with the requirements of law. Any use by the general public is limited to those areas designated for public use such as designated nature trails.

Any activity on or use of the Nature Preserve inconsistent with the following restrictions is prohibited. Without limiting the generality of the foregoing, the following restrictions are placed on the Felker Tract of the Lums Pond Woods Nature Preserve in perpetuity.

1. Construction or placing of buildings, improvements, facilities, or other permanent structures on, above or under the ground is prohibited.
2. There shall be no signs, billboards or outdoor advertising structures except for a reasonable number of signs for resource protection, safety, boundary identification, or interpretation.
3. Construction of utilities, roads or other public works structures is prohibited except for those associated with existing utility rights-of-ways.

4. No substance or material as landfill, trash, waste or unsightly or offensive materials shall be placed or dumped on the Nature Preserve.
5. No loam, peat, gravel, soil, rock, sand, or other material shall be deposited or placed on the Nature Preserve. There shall be no change in the general topography of the land except for approved materials associated with current agricultural crop production; habitat enhancement activities; designated nature trails; and activities related to public health and safety.
6. There shall be no excavation, dredging, or removal of loam, peat, gravel, soil, rock, sand, or other material nor any change in the general topography of the land, except for archaeological investigations authorized solely by the Delaware Division of Historical and Cultural Affairs or undertaken pursuant to Federal law, for habitat enhancement activities or for activity related to public health and safety.
7. The removal or destruction of trees, shrubs or other vegetation is prohibited except as may be necessary for control of diseases, pests and undesirable species; for safety purposes; for the proper management of species and natural communities of special concern; or for the maintenance of approved trails.
8. Intentional introduction of non-native plant and animal species is prohibited. If the natural balance of the area is seriously upset, control measures may be employed that are compatible with the maintenance of other natural features.
9. Collecting of plant and animal material, fossils, or minerals, shall be for scientific and nature study only and shall be subject to State and Federal regulations and permits.
10. Hunting, fishing, and trapping and habitat management may be permitted.
11. No other acts or uses shall be allowed which adversely affect the plant and animal species or the preservation of land or water areas or cultural resources on the Nature Preserve.
12. Location and type of existing and/or future trails will be determined through an internal trail planning process approved by the Office of Nature Preserves and the Division Director.
13. No use of motorized vehicles; except for enforcement and emergency uses. For such uses, motorized vehicles will be no larger than the size of an ATV.
14. No mowers are permitted within the boundaries of the Nature Preserve.
15. All trail construction, maintenance, or emergency activity must utilize official trail corridor.

16. For maintenance and/or construction purposes, any motorized vehicles should be less than 5'-wide and preferably tracked. Follow Trail Maintenance Plan guidelines.
17. Recreational, educational and scientific activities shall be passive in nature and primarily limited to trail areas and consistent with maintaining the character of the Nature Preserve. All activities are subject to approval.
18. No other acts or uses shall be allowed that may adversely affect the plant and animal species or the preservation of land or water areas on the Nature Preserve.
19. All exceptions and allowances are subject to the approval of the Office of Nature Preserves.
20. A site-specific Nature Preserve Management Plan shall be developed, reviewed and approved by the Natural Areas Advisory Council and the management agency responsible for the Nature Preserve. This management plan shall guide all future management actions on the Nature Preserve.

All recreational, educational and scientific programs shall be conducted in a manner that will not negatively impact Coastal Plain Pond communities.

Bollards and State Nature Preserve signs will be installed at the entry points along Little Jersey Trail. At this same location flip signs will be used to indicate when the trail is closed due to wet conditions. Park staff will be responsible for ensuring the trail is closed during such times, and then re-opened once the trail is dry enough for human traffic.

[Back to Top](#)