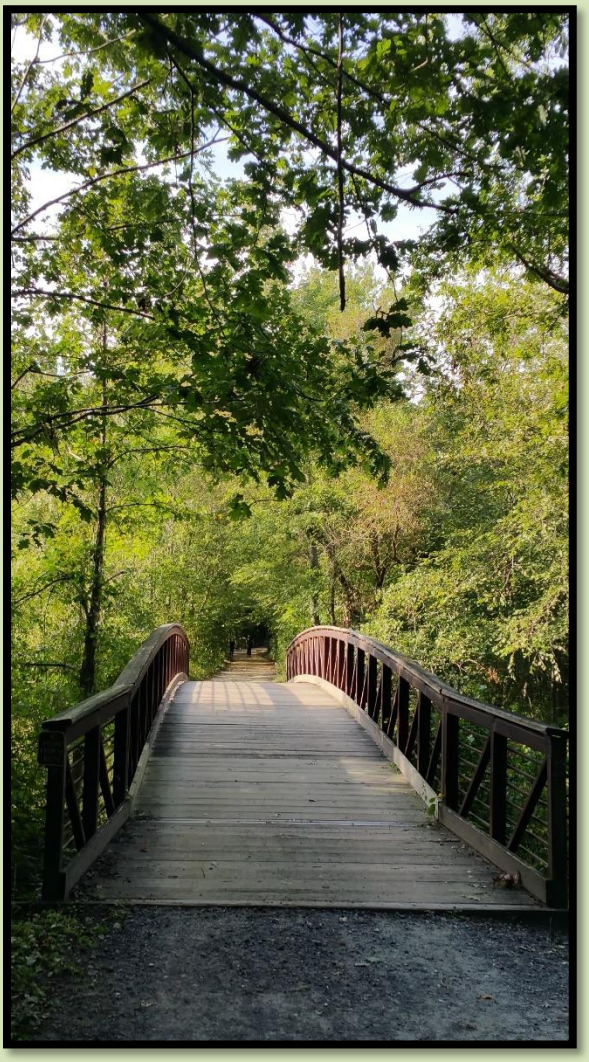
Killens Pond State Park
Trail Plan



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Acknowledgements

Killens Pond State Park Trail Plan was guided and developed by the Division of Parks and Recreation's Trail Committee.

Division personnel with expertise in park management and operations, administration, enforcement, programming, environmental education, natural and cultural resource stewardship, trail construction, and planning led the process for the 2019 Killens Pond State Park Trail Plan. The following staff collaborated in the development of the Killens Pond Trail Plan: David Bartoo, Ashley Kroon, Chris Bennett, Daren Lawson, Jim Hall, Bob Ehemann, Mike Bloom, Eric Dawson, Bill Miller, John McCarthy, Jim Hall, Eileen Butler, Matt Chesser, Keith Betts, Matt Ritter, Greg Abbott, and Ray Bivens, Gary Focht, and Jeff Moore.

Public participation was a core component in developing this plan. A Stakeholder Working Group, representative of trail and park user groups, was assembled to participate in open discussions regarding the trail plan. Thanks to all the folks on the Working Group that participated in learning about the park's natural and cultural assets and recreational trail uses; learning about the Division's evaluation and planning process; and engaging in discussions that led to specific outcomes in the trail plan. The Working Group provided key input for current and future alignments, surfaces, and uses represented in this plan. The public members of the Working Group were Larry Pegg, Wendy and Ken Aycoth, Rachel Argo, Susan Moerschel, Stewart Crouch, George and Pat Mayer, and Craig Lukezic.

Also, thanks to the Council on Greenways and Trails and the Recreational Trails Program Advisory Group for your review and feedback.

Participation, engagement, and constructive dialogue contributed to a successful planning process and helped shaped this trail plan. We extend our sincere appreciation to the Stakeholder Working Group who provided input. The future of trails in Killens Pond State Park is bright because of your participation.

Executive Summary

Killens Pond State Park and the associated recreational opportunities play a substantial role in creating a community that promotes exercise and makes access to the natural environment easier. The adoption of this trail plan will help lead the way to doubling the miles of trail that will be available to the public for recreation, highlighting the importance of the state park as an integral component to an expanding regional equestrian, pedestrian, and bicycle trail network that will change how the greater community and visitors to the region spend time and live healthier lifestyles.

During the trail planning process for the 2019 trail concept plan, existing natural and cultural resources were assessed and played an integral part in determining best trail locations resulting in alignments to achieve the following:

- Providing a trail system that is safe;
- Minimize impact to high quality habitats;
- Support pedestrian and biking;
- Support environmental education;
- Providing technical trail challenge.
- Reduce trail erosion;
- Protect natural and cultural resources;
- Expand the trail system as an integral part of wider regional trail network;
- Enhance diverse recreational experiences for all non-motorized trail visitors;
- Expand accessible trail experiences; and
- Consider the essential experiences for the park.

Appendix A, Maps 1-8 highlight the existing conditions for the park in 2019. Based on the existing natural and cultural resources, including areas with wet soil conditions, and social science data, changes to the existing trail system are needed to address trail objectives. Making recommendations for updating trail alignments, the DNREC Trail and Stakeholders Teams considered the following variables and conditions; trail safety; community connections; soil types; topography; hydrology; plant and animal distribution; current and future use; habitat fragmentation; erosion; accessibility; experience; trail use trends; anticipated regional land use growth; park staffing levels; maintenance practices; challenge; and trail sustainability. The planned trail system changes are highlighted in Appendix A on Maps 10-17.

Planned Trail changes will increase over-all park mileages from the current 7.4 miles to 15.5 miles. This change will result in an increase in mileage for pedestrians and bikers. The change in mileage for all users is related most directly to additions of new trails and will overall account for an increase of 8.1 miles of trail.

A Summary of the planned trail changes are as follows:

- Existing 7.4 mile trail system will be increase 8.1 miles to 15.5 miles
- Existing 0.9 miles of single track trail will be increased by 5.6 miles to 6.5 miles through the addition of new trail segments
- Double track will increase from 6.5 miles to 9.0 miles or 2.5 miles
- All-weather hardened surface trails will increase from 3.4 miles to 7.8 miles or 4.4 miles of new trail
- 3.4 miles of designated Pedestrian Only trails will decrease 1.0 mile to 2.4 miles
- 4.0 miles of shared used trail (pedestrian and biking) will increase by 9.1 miles to 13.1 miles
- Accessible trails will increase from 4.0 to 8.1 miles or 4.9 new miles of accessible trail

Public Participation

The Division began a public participation process with a series of trail user stakeholder meetings in 2016. Division personnel with expertise in park management and operations, administration, enforcement, programming, environmental education, natural and cultural resource stewardship, trail construction and design, and park planning led the public participation component – a core exercise in developing the Killens Pond State Park Trail Plan.

Comments from the trail user community, advisory councils and public agencies were valuable in shaping this trail plan. In total there were 5 field visits with park staff, 4 Division Trail Team meetings, 6 stakeholder meetings (includes internal and external members and covered all the trail user groups and several state Councils), and one public open house (specific to the Trail Plan). Use of the Delaware's government web site for posting planning maps, information, and announcements made information more widely available for public review. On March 28, 2018, a public Open House was held at the Killens Pond Nature Center to review the trail concept plan. Twenty eight people attended the Open House and 30 responses to the draft concept trail plan were submitted via an online comment form, email, and letter correspondence. Below is a summary of the responses (See Appendix G for a full review of the survey questions and analysis).

- 96% of the respondents supported the plan as proposed.
- 71% of the respondents used trail information such as trail markers maps, and information kiosks (most important amenities).
- 93% of the respondents live in Delaware
- 66% of the respondents use the park each month (23% each week).
- Seeking natural, narrow, challenging, and biking trails were reoccurring themes for many respondents.

Following the March 2018 Open House and comment period, the Division of Parks and Recreation Trail Committee evaluated all public comments to consider the following:

- How comments met Trail Plan objectives
- How comments fit into a larger regional trail system
- How potential recreational alternatives might contribute to regional recreation diversity

Regional and Local Trail Context

Killens Pond State Park (KPSP) is located in the center of the state midway between the Delaware Bay and the Chesapeake Bay. See Map 9 in Appendix A for regional context. It falls within the Atlantic Coastal Plain physiographic region – a region covering ninety five percent of the State. Coastal Plain geomorphology is characterized by flat, sandy, and in some locations, swampy terrain. CHSP hosts a variety of ecosystems including wooded uplands, freshwater and saltwater wetlands, and dunes. Surrounding the park are small towns and rural farm lands. Dover, the state capital, is the closest city (26 miles north of the park).

Although quite rural, Killens Pond State Park's location places it close to major urban and suburban populations of the Philadelphia, Baltimore, and Washington DC metropolitan region- more than 200,000 thousand people live within 20 miles of the park. Expanding out to 100 miles from the park, more than 3 million people live within that two hour driving distance, making these public lands key a recreational trail site both locally and regionally.

Trail Users and Uses

There was an estimated 240,130 visitors to Killens Pond State Park in 2018. Evidence shows that trail related recreation is one of the most popular activities in the park. From 2010 to 2018 (estimate), the population of Kent County grew from 322,310 to 178,550 residents, an increase of 10.0%. This increase and population projections for the next 30 years, place a high demand on Park resources in the future.

Below is a summary of the potential trail users in the Park.

- Pedestrians

The term pedestrian includes walkers, hikers, nature watchers, cross-country skiers, geo-cashers, and trail runners.

- Bicycle Riders

There are a number of sub groups that fall into this category. A few examples are road riders, commuters, competitors, mountain bikers, and general bicyclists who cruise paved pathway through town or at the beach.

- Equestrians

Equestrians include riding, mounted orienteering, endurance riding, carriage rides, and cross country jumping to name a few.

- 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. More recent guidance is available for recreation facilities including trail widths of 3 feet or greater, grades of 12% and less, limited obstacles (no staircases or steps, or large roots or rocks), firm stable surfaces, and cross slopes 5% or less. Federal agencies (Forest Service and Park Service) are required to use these guidelines. The Delaware Division of Parks and Recreation has adopted and uses the outdoor recreational accessible guidance. The guideline can be referenced at http://www.fs.fed.us/recreation/programs/accessibility/

Park Setting

Killens Pond State Park surrounds the mill pond created in the late 18th century by John Craig, a Maryland farmer who was one of the earliest European settlers in central Kent County. The Murderkill River (corrupted from the Dutch for Mother Creek), not only supplied water power, but was also was an important trade route across the Delmarva for Native people for thousands of years. Exotic stone tools associated with a religious complex called the Adena Complex made their way through the Park to Delaware Bay from the Midwest. Native people also made extensive use of the Oak-Hickory forests that still dominate the uplands surround the pond. Farms were established on the well-drained uplands, including one owned by Charles Tilton, a Black freeman, whose family prospered at the turn of the 19th century on lands now part of the park. Today, park visitors enjoy the peaceful woods and pond vistas, boating and fishing, and lively fun at the Water Park.

2019 Trail System Condition Assessment

In the park today there are a variety of activities that impact trails and trail corridors. Trail location and park activities such as trail maintenance, ranger patrol activities, or trail users on foot or bike will impact the landscape and soils. Soil disturbance is expected in the development and use of trails, however better trail design and management can drastically reduce widespread trail impacts and erosion.

Today, the trail system at Killens Pond State Park is comprised of 7.4 miles of trail that serve hikers, walkers, runners, mountain bikers, bicyclists, and other non-motorized trail users. This represents 5% of the total miles across the Delaware State Park trail system (see Appendix B, Table 1). Of those 7.4 trail miles in Killens Pond, 3.4 are designated as pedestrian-only and 4.0 miles designated for pedestrians and bikers (see Table 2 below). Table 3 below outlines trail characteristic by categories –surface, widths, permitted uses, and accessibility and the percent that each characteristic represents in the trail system as assessed in 2019. All existing conditions assessments are depicted in Maps 1 through 8 (see Appendix A).

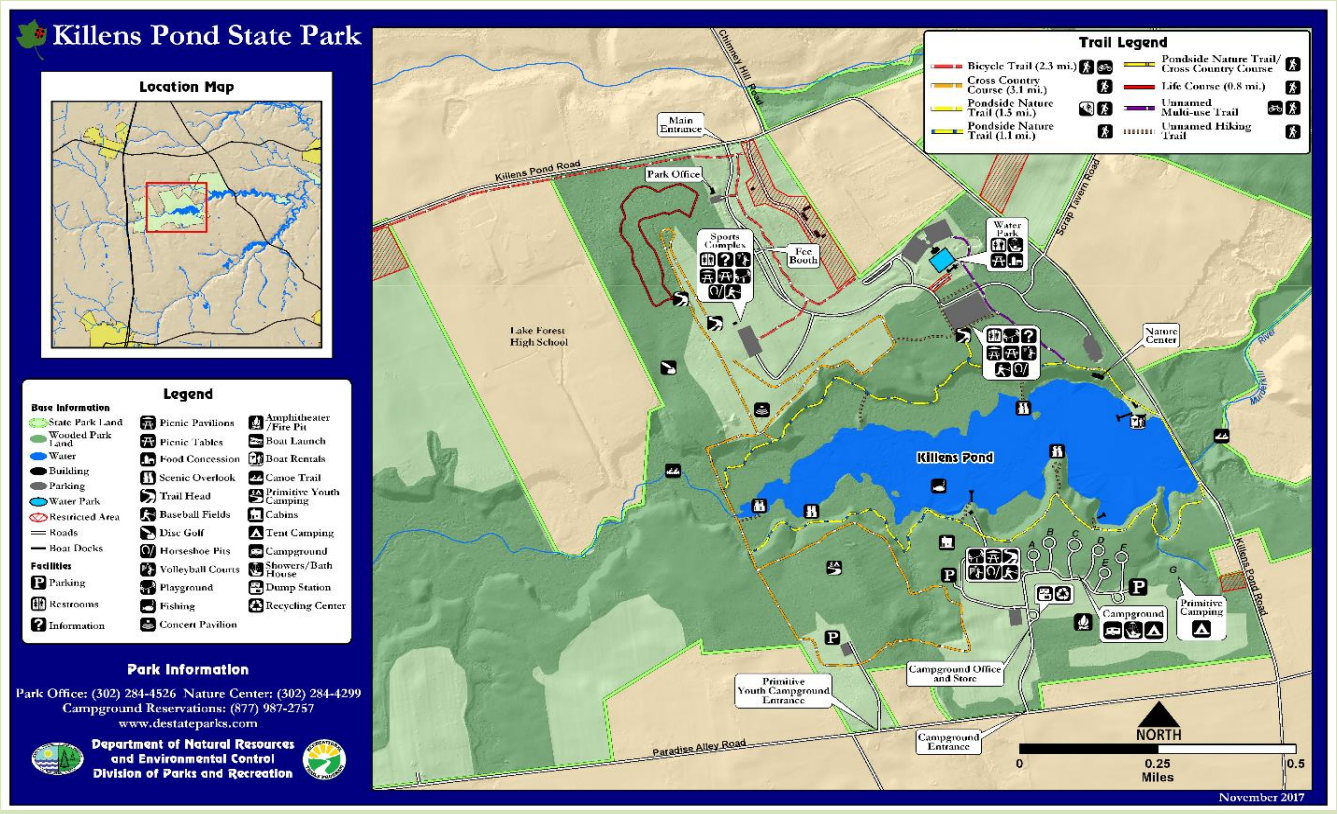
Table 2 - 2019 Trail Uses

2019 Trail Uses	Mileage
Total Trails	**7.4**
Pedestrian Only	**3.4**
Pedestrian/Bike	**4.0**
Pedestrian/Bike/Equestrian	**0**

Table 3 - Current Trail Characteristics

Trail Characteristics	2019 Trail Mileage	Percentage of Park System
	Total Mileage 7.4	**100%**
Sustainability		
Good	**6.9**	**93**
Fair	**0.2**	**3**
Poor	**0.3**	**4**
Surface		
Natural	**4.0**	**54**
Hardened	**3.4**	**46**
Width		
Single Track	**0.9**	**12**
Double Track	**6.5**	**88**
Permitted Use		
Pedestrian Only	**3.4**	**46**
Pedestrian/ Bike	**4.0**	**54**
Pedestrian/ Bike/Equestrian	**0**	**0**
Accessibility		
Accessible	**3.2**	**43**
Not Accessible	**4.2**	**57**

Map 1 - 2019 Killens Pond Trail System On-line Maps



Trail Descriptions

Access to the trail system is available from several trailhead parking areas and nearby communities. There are eight named trails in the park – the trails are highlighted below.

- Bike Trail
  The 2.3 mile paved and stone surface shared-use trail is suitable for hiking, biking, and strollers. The bike trail links the park office, nature center, sports complex, and Water Park.

- Pondside Nature Trail
  The 2.4 mile trail begins at the main parking lot and circumnavigates Killens Pond, linking the nature center and campground.

- Life Course
  A pedestrian experience that provides visitors with exercise stations along a flat 0.8 mile trail.

- Cross Country Course
  3.1 mile running course that starts and finishes at the Sports Complex Area.

See Table 4 for a listing of the major existing trails, mileage, and allowed uses.

Table 4- Existing Trails, Miles & Uses

Trail	Length in Miles	Pedestrian	Biking	Equestrian
Bike	2.3	√	√	
Pondside*	2.4	√	√	
Life Course	0.8	√		
Cross Country	3.1	√		

*some segments are pedestrian use only

A series of trail maps depicting existing condition characteristics of the Killens Pond State Park's trail network were developed to highlight specific trail attributes. Trail characteristics maps include existing 2019 trail system, trail environmental sustainability, permitted uses, width, trail surfaces, and accessibility (See Appendix A Map 1-8). In 2019 the trail system was comprised of 7.4 miles of officially recognized trail (Map 1). Permitted uses on park trails included pedestrian and biking – equestrian use is permitted on the beach seasonally. Additionally, trails fall into two width categories – single and double track. In 2019 the trail system was comprised of 6.5 miles of double track (defined as widths greater than 36 inches) and 0.9 trail miles of single track (widths 36 inches or less).

Trail Infrastructure

Trail infrastructure includes bridges, trail wayfinding markers, information boards, and parking (See Appendix A Map 8). Currently visitors access Killens Pond State Park predominately by car. Three main parking lots serve the majority of trail users.

Trail wayfinding starts at the trailheads. Trailhead parking lots typically have an information board and state park map. Four-by-four posts with plastic over-sleeves or other sign types are installed along trails at intersections where there are directional trail choices. These trail marker posts contain information such as trail names, use, destinations, and latitude and longitude. Trail names have a color coding that corresponds to the same color used on park maps to highlight the specific trail. Maps are located at trailheads and on the Delaware State Park web site at https://destateparks.com/Trails .

Typical Trail Bridge

Typical Trailhead Information Board

Typical Trail Marking Post

Trail Plan

Assessment Process

In analyzing and assessing Killens Pond State Park existing trail system, the Division evaluated changes made since the 1998 comprehensive trail data collection effort and determined progress made in achieving trail-related objectives. Geographic Information System (GIS) and field evaluations were used to assess factors and conditions that characterize Killens Pond State Park. GIS technology is valuable in evaluating trails within landscapes and habitats and in decision making for diagnosis to prevention, mitigation and enhancement of trails.

GIS analyses, combined with field reviews, have revealed trail segments that are prone to erosion and limit access. Habitat and natural heritage findings identified by both the Division's Stewardship Program and DNREC Natural Heritage and Endangered Species Program (NHESP) were examined within the context of the existing trail system. Trail relationships to forested blocks, ranked habitat quality, and natural heritage data revealed site specific impacts. Other analyses quantified the scale of trail system overlap with fall-line, floodplain, flat area and hydric soil conditions. Known and potential cultural resource sites were analyzed for their relationship to both the existing and planned trail system.

Analyses and recommendations outlined in this trail system plan for Killens Pond State Park are based on the principles of sustainable trail design and development and trail best management practices (See Appendix C). Using GIS tools and field review, resource experts determined impacts to natural resources, cultural resources, and to unsustainable trail conditions (fall-line, hydric soils, etc.) Subsequent Trail Plan sections outline the locations of new trail alignments to achieve the objectives outlined within this plan.

Sustainability

Designing and constructing *sustainable trails* is paramount to protecting natural and cultural resources, providing great trail experiences, providing diverse recreational opportunities, and maintaining the life span of a trail system (see Appendix C). Trail sustainability is defined as the location of any given trail segment and how the segment relates to contours, drainage, and soil types, and, how well a trail segment withstands the impacts of Climate, weather, and recreational use over time. The better a trail segment withstands these impacts, the more sustainable it is. Reducing impacts to natural resources such as native vegetation and wildlife and cultural resources are key Division objectives in trail planning. The use of natural surface trails during wet trail conditions impacts sustainability and can dramatically reduce the trail life span. Proper and continued education for park visitors on use etiquette are a sustainability necessity.

Many trail management problems, erosion and user conflict for example, stem from poor trail planning, design, construction, or management. Ignoring best management trail design, construction, and management practices results in accelerated trail degradation leading to an increase in maintenance costs and tasks as well as reduced trail user safety and enjoyment. While all trail users affect the trail surface and surrounding environment, user impacts rise more often when trails are poorly planned and constructed. The Division of Parks and Recreation adopted the principles of sustainable trail design and construction to ensure that trails remain accessible to users, valuable resources are protected, and future maintenance costs are minimized.

Current trail sustainability principles prescribe that all present and future impacts will not burden social, economic and environmental systems. Killens Pond State Park's trails currently fall within an acceptable level of sustainability - although there is room for improvements. The analysis of the Killens Pond State Park shows that of the current 7.4 total trail miles, about 4% (1.1 miles) is in need of some degree of change or enhancement to achieve a higher level of sustainability and environmental protection.

Designing a sustainable trail and trail system 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
- Quality of ecosystems
- Natural drainage
- Topography, slope and grade changes
- Ease of access from control points such as trailheads
- User safety
- Characteristics of trail users
- Accessibility
- Provide interesting experiences across the landscape.

Trails constructed over the past ten years in Delaware State Parks were planned according to sustainability objectives. Current practices adopted by the Division have proven that this planning method is very effective in minimizing the environmental effects of trails.

Objectives

Healthy lifestyles and livable communities are key considerations in the planning process. Walkability and bikeability play a role in how trails are planned and constructed. Creating diverse opportunities for more people and connecting trails to people is critical in helping to turn around the trend of declining number of kids, and adults who participate in outdoor recreation and help mitigate obesity and other health issues.

All State Park trail plans, including Killens Pond State Park, have objectives that recommend:

- A trail system that is safe;
- Changes to the trail system that meet socially, environmentally and culturally sustainable principles;
- Minimize habitat fragmentation;
- Enhancing habitat quality through sustainable trail planning and design;
- Supporting environmental education opportunities;
- Supporting pedestrian, biking, and equestrian activities;
- Supporting a cross country running program;
- Providing a diversity of accessible experiences;
- Considering existing and future recreational trends;
- Integrating the park's trail system as part of wider regional network of existing and future trail opportunities and makes community connections;
- Adapting to future land conservation measures;
- Reducing costly unsustainable trail maintenance achieved by holistic and sound trail planning, construction and innovative trail maintenance techniques;
- Utilizing the best scientific data and research available such as state-wide GIS data layers, user surveys (SCORP), and trail research (such as best practices, erosion, and recreational impacts);
- Enhancements including trail realignments, bridges, trail uses and trail enhancements within sustainable trail standards;
- Providing a diverse recreational appeal;
- Having a visual environmental quality;
- Including opportunities to enjoy a great diversity of physical settings;
- Providing visitors with a dynamic mix of interesting experiences that range from easy to challenging;
- Considering climate change
- Providing safe trail links between the east and west side of the Killens Pond; and
- Providing technical trail challenge

Technical Trail Challenge

National and state recreational use trends indicate adventure sports, including triathlon, adventure racing, backpacking, mountain biking, and climbing (to name a few), showing significant growth in the past several years (Adventure Racing up 28% *Outdoor Foundation Topline Reports*). A reoccurring and increasing trend is the interest of users from all trail related activities seeking a challenge. There are various ways to incorporate "challenge" into a trail experience. Integrating tread obstacles and/or maintaining narrow widths are two options for increasing the technical nature of a trail. Creating more technical options along a trail corridor, utilizing man-made or natural features such as logs or rocks, can provide additional interest and challenge to an otherwise easy trail.

Technical rock added as options alongside accessible trail in Redd Park-City of Newark

Planned Trail System

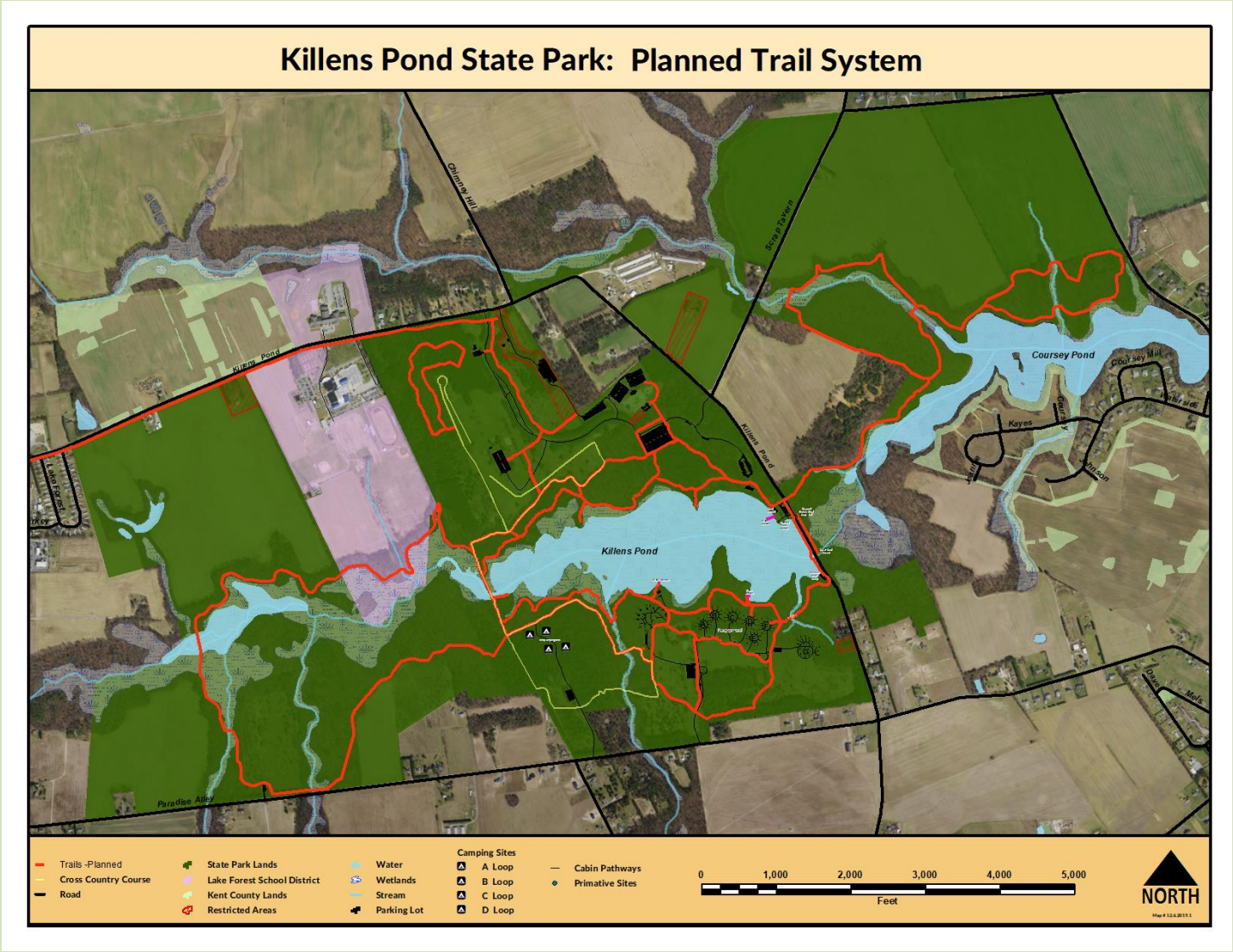
The Division Trail and Stakeholders Working Group considered the following variables and conditions in making recommendations for new trail alignments: current trail alignments; trail safety; community connections; soil types; topography; hydrology; plant and animal distribution; current and future use; challenge; accessibility; experience; trail use trends; anticipated regional land use growth; park staffing levels; maintenance practices; and trail sustainability.

Final trail alignment recommendations account for natural resource protection, erosion, hydric soil avoidance, sea level rise, and expansion of trail recreational opportunities. Trail additions will account for an increase of 8.1 miles of trail, the overall changes will improve access, sustainability, accessibility, and experience of the trail system.

Final trail alignment decisions were based on reviewing a number of alignment alternatives. Map 10 depicts 15.5 mile planned trail system for Killens Pond State Park. Maps 10 - 17 address planned trail system, sustainability, use, widths, surfaces, accessibility, and infrastructure (see Appendix A).

Pondside Trail

Map 10 - Planned Trail System



Summary: Overall the existing 7.4 mile trail system will be increased by 8.1 miles.

Trail Characteristics

Trail characteristics includes measureable trail conditions such as sustainability, surface, width, permitted uses, and accessibility. Table 5 provides a summary of all current trail characteristics and the planned changes (see Map 15 for planned accessible trails).

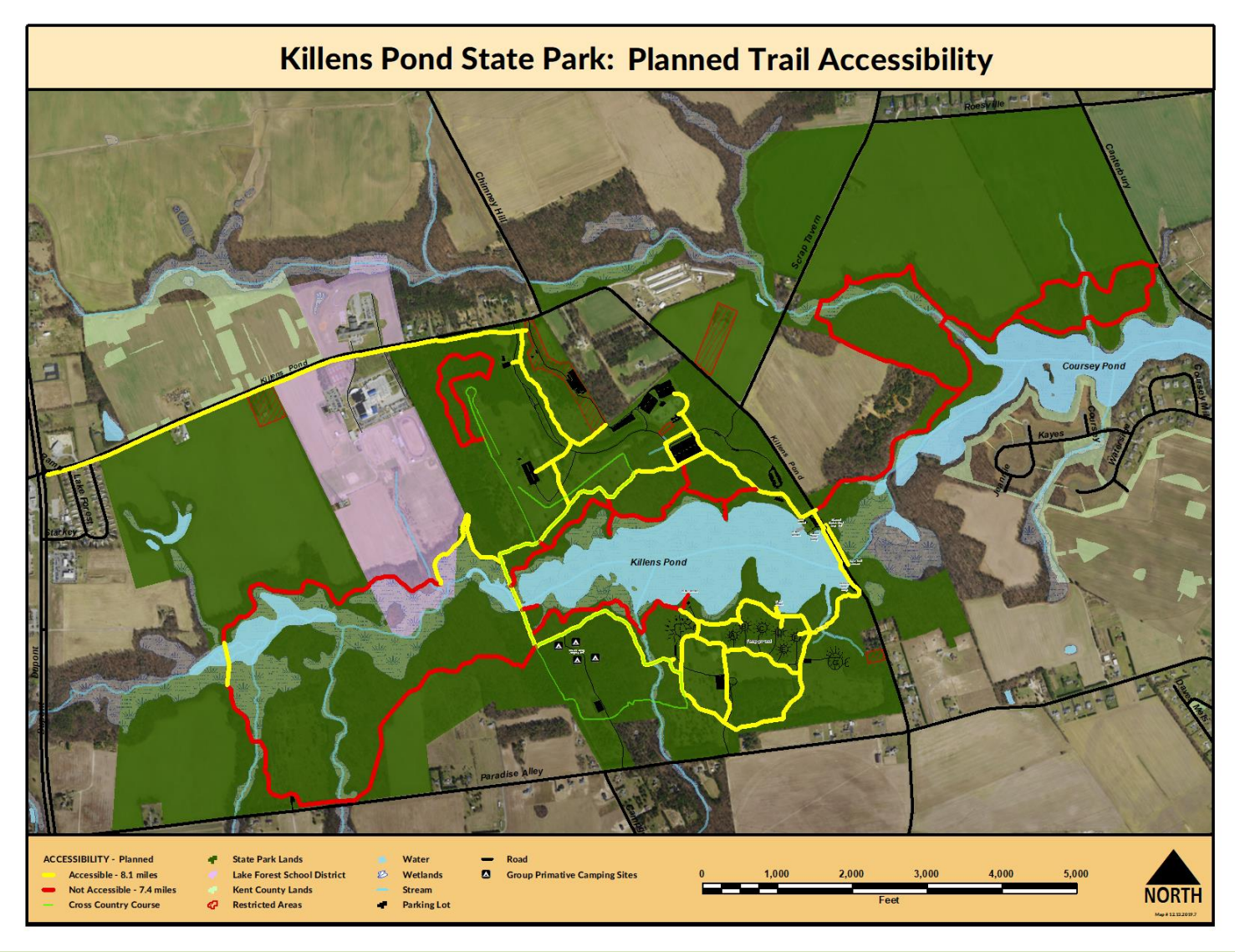
Table 5 – Current and Planned Trail Characteristics

Trail Characteristics	Current Trail System	Planned System	Change in Mileage	Percent of Planned System
Total Mileage	7.4	15.5	Increased 8.1	
Sustainability				
Good	6.9	15.3	Increased 8.4	98
Fair	0.2	0.2	No Change	2
Poor	0.3	0.0	Reduced 0.3	0
Surface				
Natural	4.0	7.7	Increased 3.7	50
Hardened	3.4	7.8	Increased 4.4	50
Width				
Single Track	0.9	6.5	Increased 5.6	42
Double Track	6.5	9.0	Increased 2.5	58
Permitted Use				
Pedestrian Only	3.4	2.4	Reduced 1.0	15
Pedestrian /Bike	3.0	13.1	Increased 9.1	85
Accessibility				
Accessible	3.2	8.1	Increased 4.9	52
Not Accessible	4.2	7.4	Increased 3.2	48

Accessibility

This plan includes opportunities for improving access for all visitors including those with disabilities. Currently Killens Pond State Park offers 3.2 miles of accessible trail opportunities. Delaware State Parks is committed to providing more accessible trails throughout the statewide trail network. See Map 15 for planned accessible trails.

Map 15 - Planned Trail Accessibility – shows the planned hardened surface portion of the trail system that will meet or exceed Federal trail accessibility guidelines.



Trail Safety

Providing the safest user experience possible is linked to good trail planning and construction, performing needed maintenance, and providing the right information for the users. Safety can be broken into two perspectives – user and agency. From the trail user perspective, where to park, what activities are allowed, how to navigate, what type of users one can expect, how wide, long, and steep is the trail, trail etiquette, and how to seek help are some items that must be addressed to keep trails safe. Not everyone will feel the same level of safety for all the different trail experience such as narrow vs. wide trail, single use vs. shared use, or smooth vs. rough tread surface. Providing the right information for the users is critical in allowing the users to make informed decisions on what experiences are right for them. Trail access and wayfinding information is a critical component to trail safety.

From a managing agency perspective, good planning, construction, and maintenance is required. An understanding of the landscape design challenges, breadth of trail experiences being offered, types of users, volume of users, maintenance needs, and required signage and information to best guide the trail visitors are all key components to safe trail experiences.

Trail Infrastructure

Trail infrastructure includes trail wayfinding markers, information boards, and bridges. Table 7 shows bridge infrastructure – existing, new, replacements, and removals (see Table 7 notes). This trail plan provides general trail wayfinding guidelines. Signage for any park 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 providing clear direction and safely guide visitors through the trail system back to their point of origin or to their intended destination. An additional layer of wayfinding is a numbering system for marker posts and bridges and graphically representing that numbering system on the park maps.

Park user navigation aids are in the top five of the most used and sought after trail amenity –such as trail maps and markers. Information Centers should be located at all trailhead parking areas (see Map 3) and will include maps, trail use designations, etiquette, and accessibility information.

State Park trailhead maps exhibit all the official trails – trails constructed and maintained by Delaware State Parks. Maps include trail names, permitted uses, as well as trail width, length and average grade, markers, and bridges. Trail line colors coincide with trail marker colors. For example, the Pinelands Nature Trail is depicted by a blue line on the Park map and with blue way finding markers on posts along the trail. Marker posts are located at trail and road intersections and include trail name (color coded to match map), permitted trail uses, and post number. Posts also contain destination/facility information with directional arrows.

Plan Implementation

Trail Plan implementation in Killens Pond State Park will occur in phases over time. System wide trail projects fall into two main categories 1) projects handled by park staff and volunteers or 2) large contract projects requiring engineering and construction companies. Prioritizing projects will be guided by available funding, park planning priorities, public demand, health and user safety, and trail plan objectives. Objectives include: user safety, accessibility, community linkage, improve sustainability, alternative pedestrian biking transportation corridor, potential or existing level of use, shared use, available funding, available work force, engineering needs, targets key activity, links other key areas of the park, trails, or other regional trail systems. See Table 6.

Table 6 - Planned Trail Changes: the following tables summarizes planned trail changes for existing and new trail widths, surface, uses, and what might trigger the trail system changes.

Table 6a - Planned Trail Maintenance - Existing Trail

Trail	Trail Type	Width Avg.	Current Trail Users	Future Users	Change Required	Trigger
Bike	Double Track	8 feet	Pedestrian Bicycles	(No Change)	• Signs	• User Safety • Funding
Pondside*	Double & Single Track	4 feet	Pedestrian Bicycles	Expansion of Bike/Ped	• Signs • Reroutes	• Habitat Protection • User Safety • Funding
Life Course	Double Track	8 feet	Pedestrian Bicycles	(No Change)	• No Change	
Cross Country	Double Track	8 feet	Pedestrian Bicycles	Expansion of Shared Use	• Tread Stabilization • Signs	• Funding
Road to Trail	Double Track	10 feet	Pedestrian Bicycles	Pedestrian Bicycles	• Stone Surface • Signs	• Funding

*some segments are pedestrian use only

Table 6b - Planned Trail Changes - New Trail

Trail	Trail Type	Width Avg.	Current Trail Users	Future Users	Change Required	Trigger
Campground Loop	Double Track	5 feet	NA	Pedestrian Bicycles	• New Trail	• Funding
Murderkill	Single Track	3 feet	NA	Pedestrian Bicycles	• New Trail	• Funding
Coursey Pond	Single Track	3 feet	NA	Pedestrian Bicycles	• New Trail	• Funding
Killens Pond Spillway	Double Track	12 feet	NA	Pedestrian Bicycles	• New Trail	• Funding
Kayak Access	Double Track	5 feet	NA	Pedestrian	• New Trail	• Funding

Action Items

Protection of existing natural and cultural resources and providing recreational opportunities in state designated resource areas is of primary concern. Recreation at Killens Pond State Park falls into two major categories, active (such as disc golf) and passive recreation (trail activities like hiking and biking). Lands that fall within the active areas should continue to take the brunt of recreational impact. Lands that fall within the passive areas should be protected to the fullest with limited additional infrastructure added. In response to an internal assessment of the state of the trails at Killens Pond, a list of action items have been established that will improve upon the existing infrastructure.

Action items that will provide safer, consistent trail access to and within the park:

- Stabilize trails where needed to meet sustainability and accessibility goals
- Provide more information to visitors on trail characteristics (width, use, surface, accessibility), and etiquette
- Provide more information to visitors on wayfinding
- Replace, repair, remove, or install new bridges
- Create accessible single track trail experiences.
- Provide additional accessible trail experiences

Action items for long term protection:

- Close all trail segments not included in the trail plan and block off access as required
- Monitor degraded areas for natural recovery
- Promote native plant re-colonization
- Analyze access sites as they pertain to hunting in protected resource areas

Priority Project List

The following project priorities listed below fall into either the short, mid, or long-term category. Short-term priorities should be accomplished in the first few years after official adoption of the plan. Mid-term priorities should be undertaken within three to five years. Long-term projects are at least five years out. Trail project priorities may change from year to year and may be triggered by one or more of the following: park planning priorities, resource protection, user safety, funding, and accessibility.

Short Term:

- Update way-finding system including trail names. See Map 17
- Rebuild bridges 3-7. See Table 7
- Rebuild and extent bridges 4 and 5
- Close down select use corridors.
- Upgrade surface of service road to trail corridor. See Map 11

Mid Term

- Construct Murderkill Trail (new trail loop west of main park)
- Construct Campground Loop (south of main camping area)

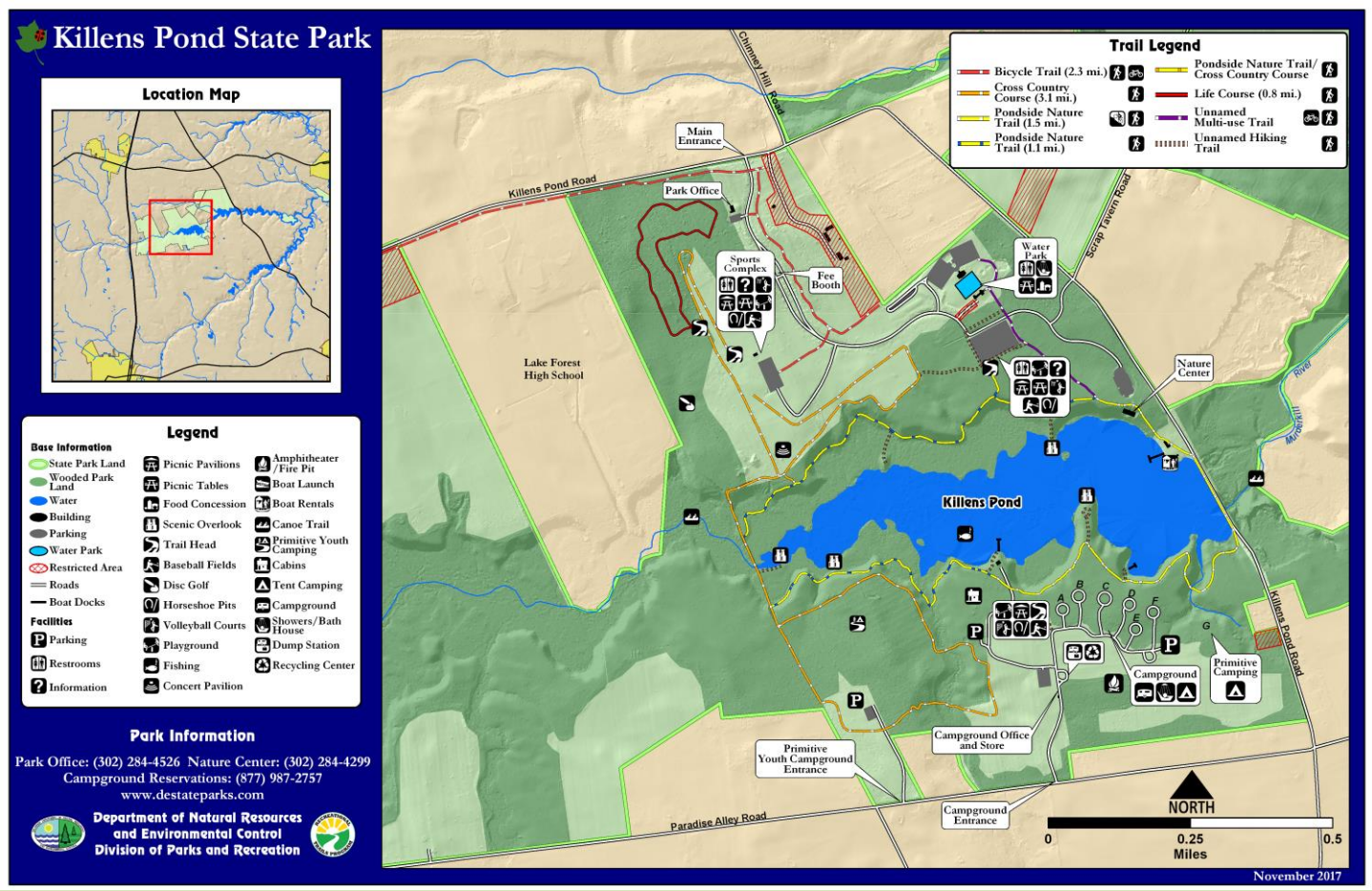
Long Term

- Construction Coursey Pond Trail (new trail east of main park)

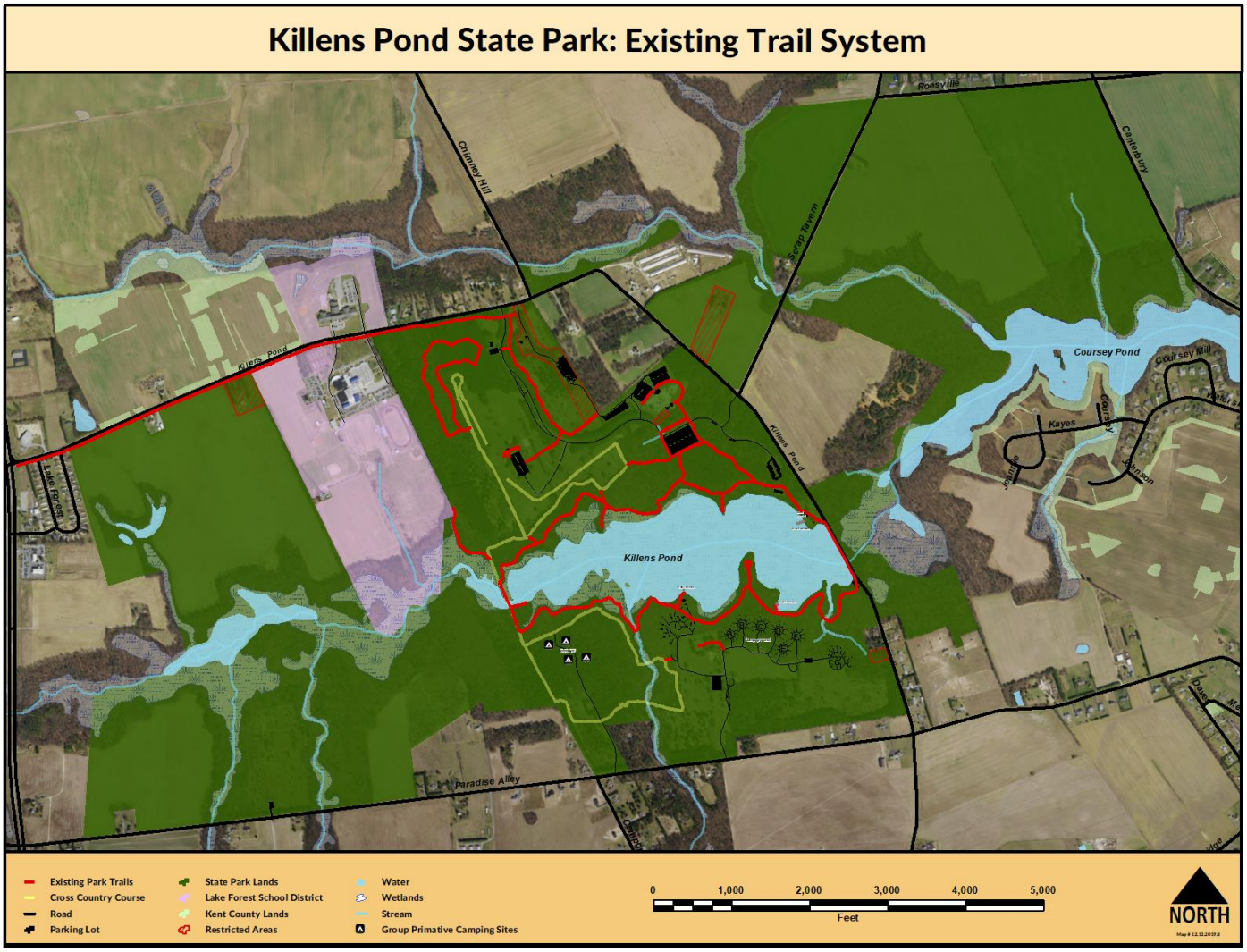
Appendix

Appendix A: Existing and Planned Condition Maps

Map 1 - Killens Pond State Park - Current On-line Trail Map

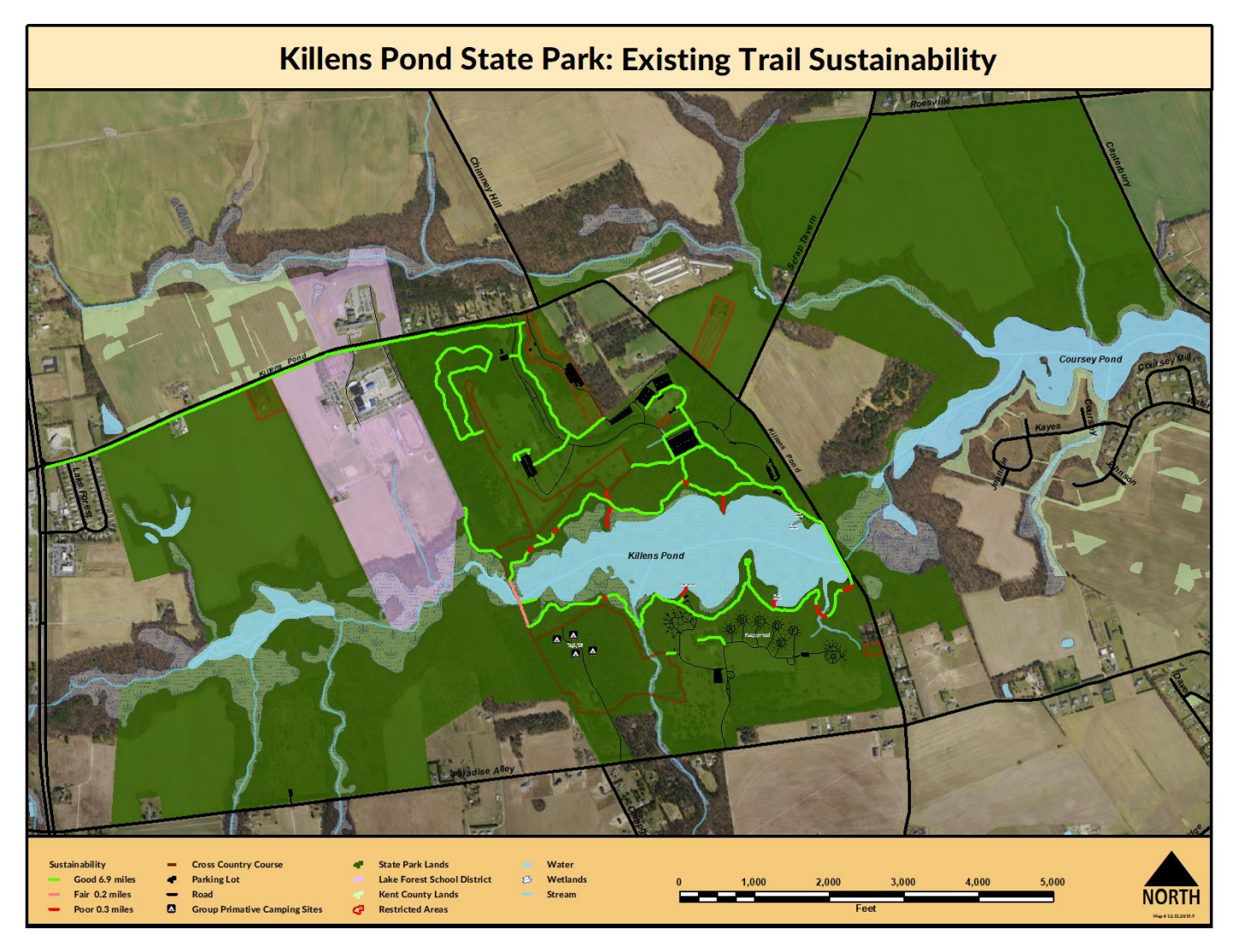


Map 2 - Existing Trail System



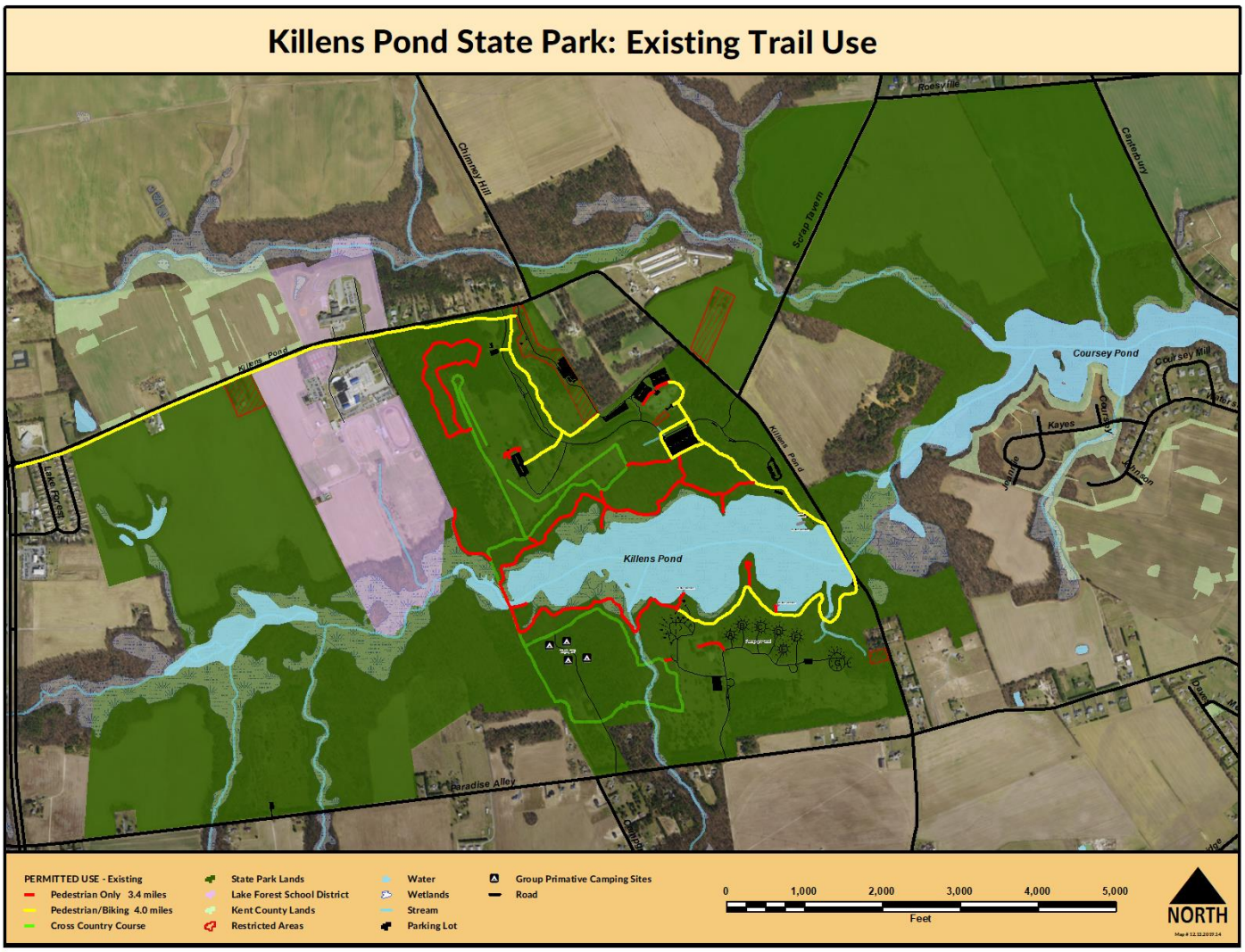
Summary: current trail mileage is: 7.4 miles of official trail.

Map 3 – Existing Sustainability



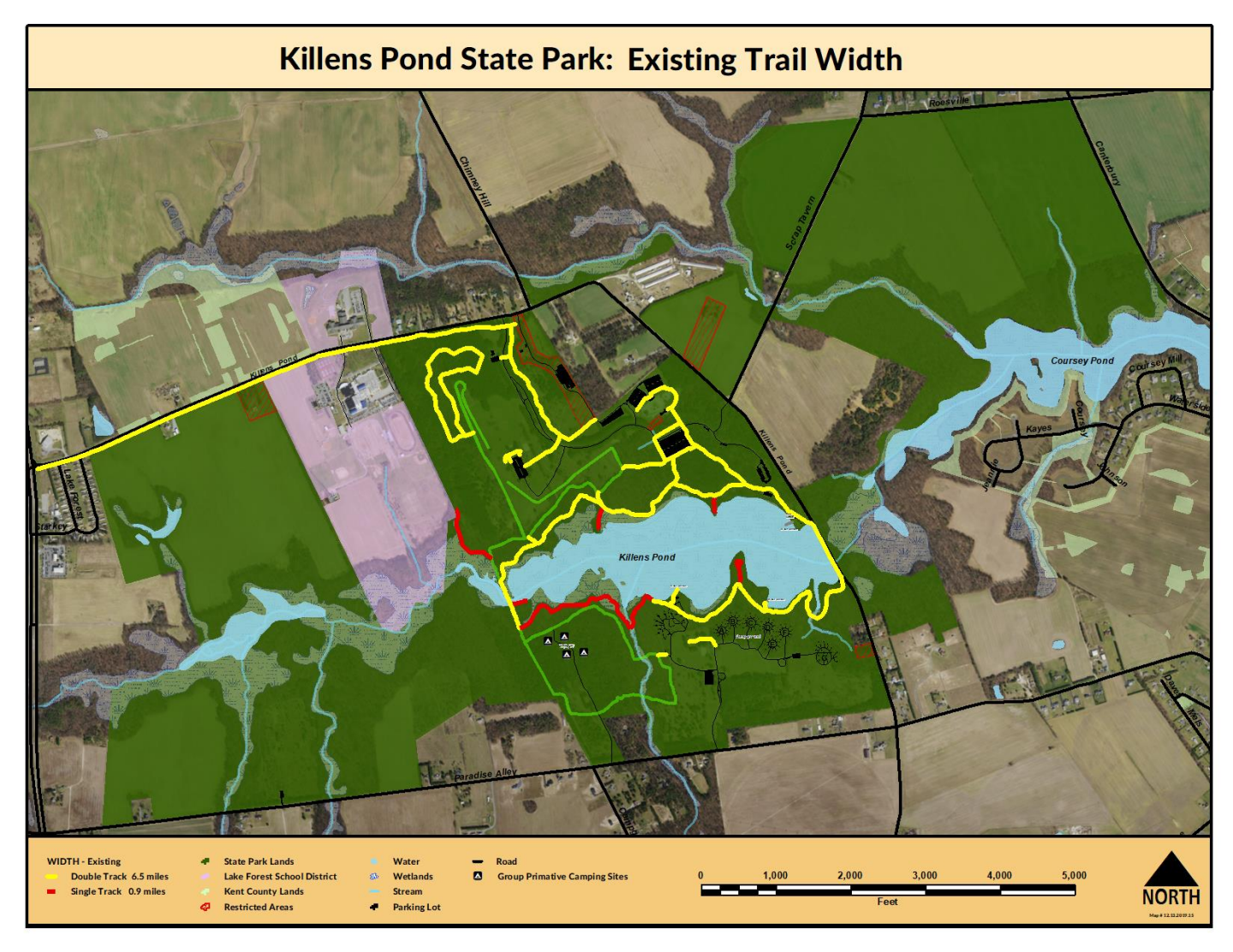
Summary: current sustainability metrics are: 0.3 miles of Poor trail, 0.2 miles of Fair trail, and 6.9 miles of Good trail.

Map 4 - Existing Permitted Trail Uses



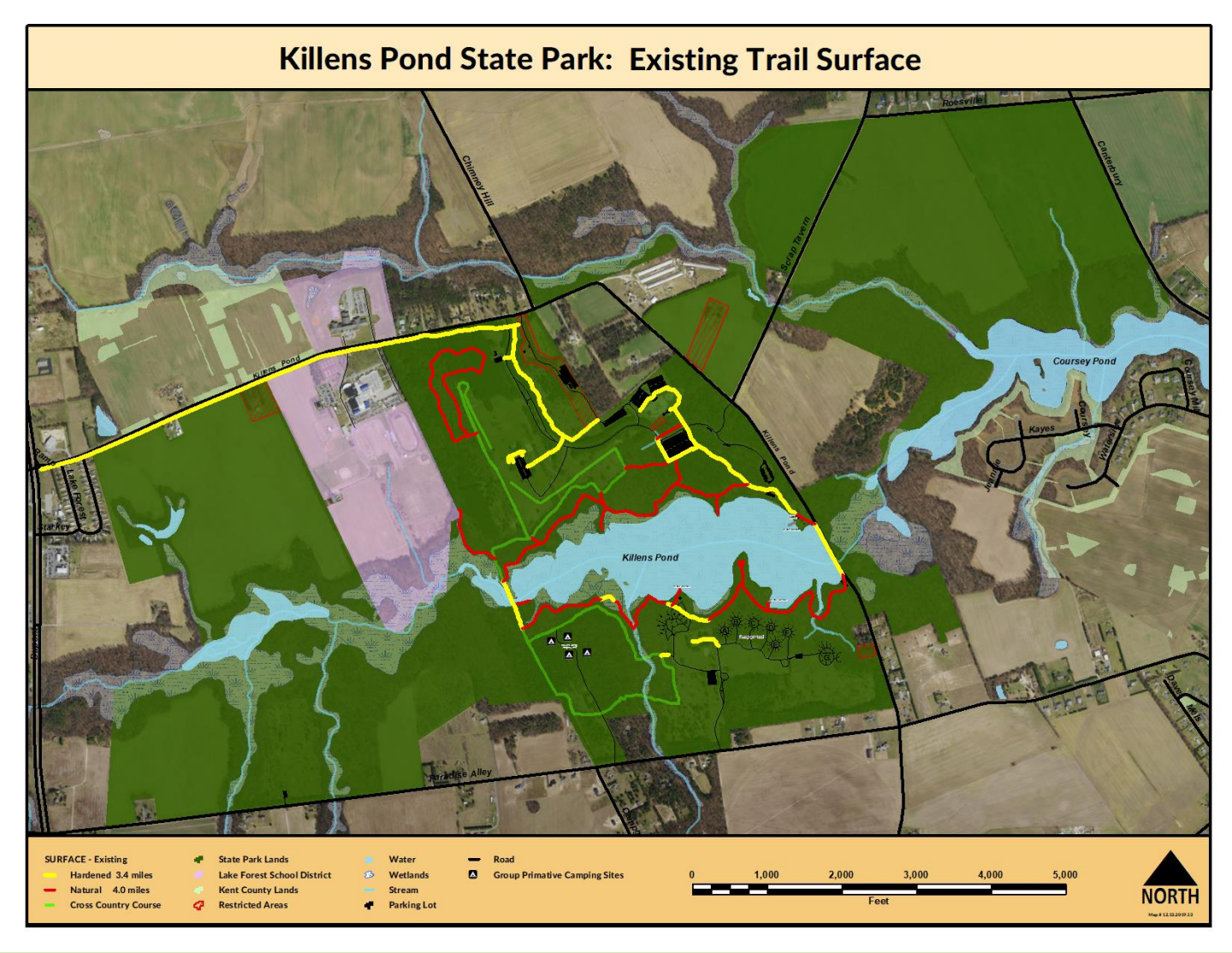
Summary: current permitted uses by mileage are: pedestrian only 3.4 miles; 4.0 pedestrian and biking; 0 miles of equestrian use.

Map 5 - Existing Trail Width



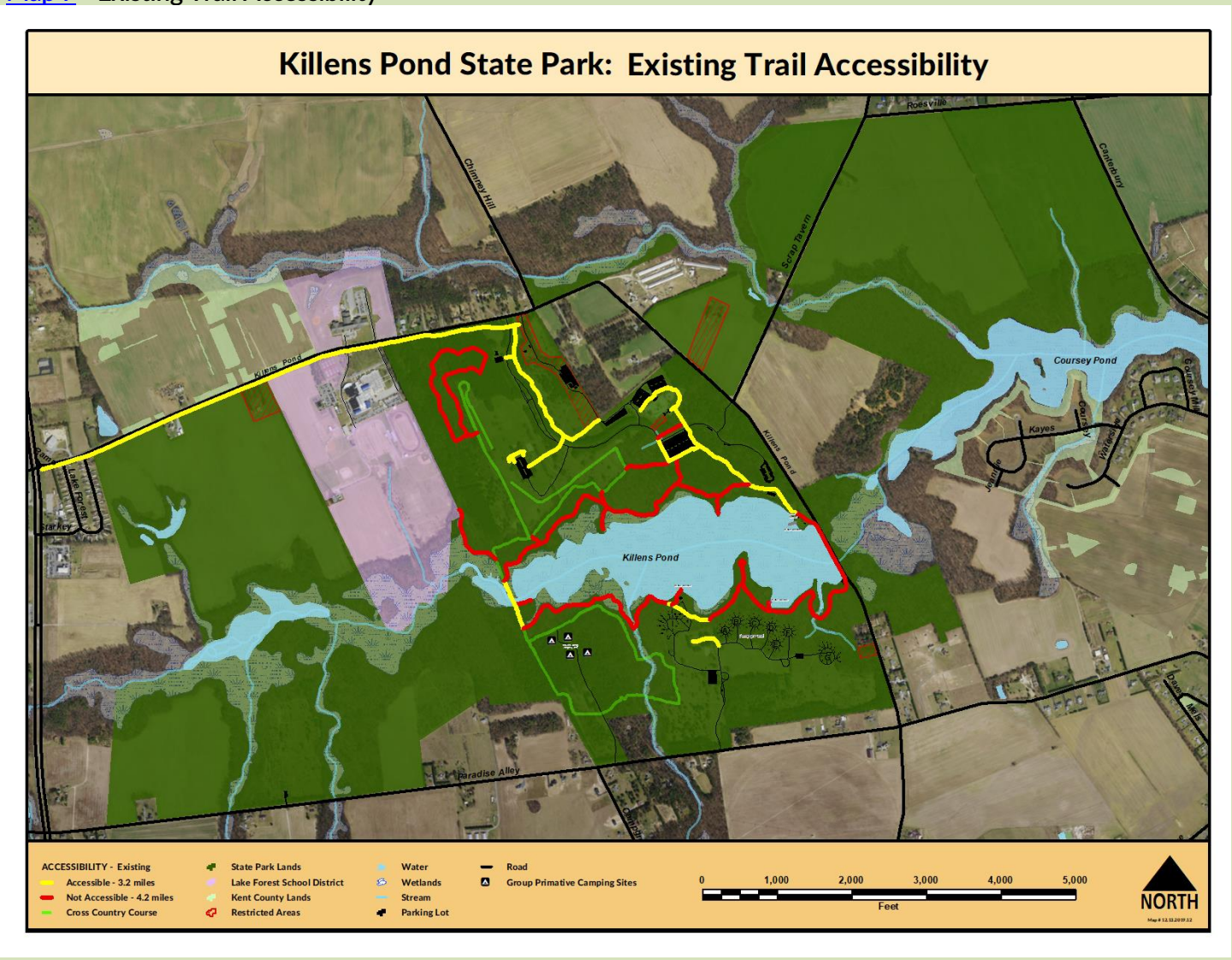
Summary: current trail widths by mileage are: single track 0.9 miles; double track 6.5 miles

Map 6 - Existing Trail Surface



Summary: current trail surfaces by mileage are: natural surface 4.0 miles; hardened surface 3.4 miles

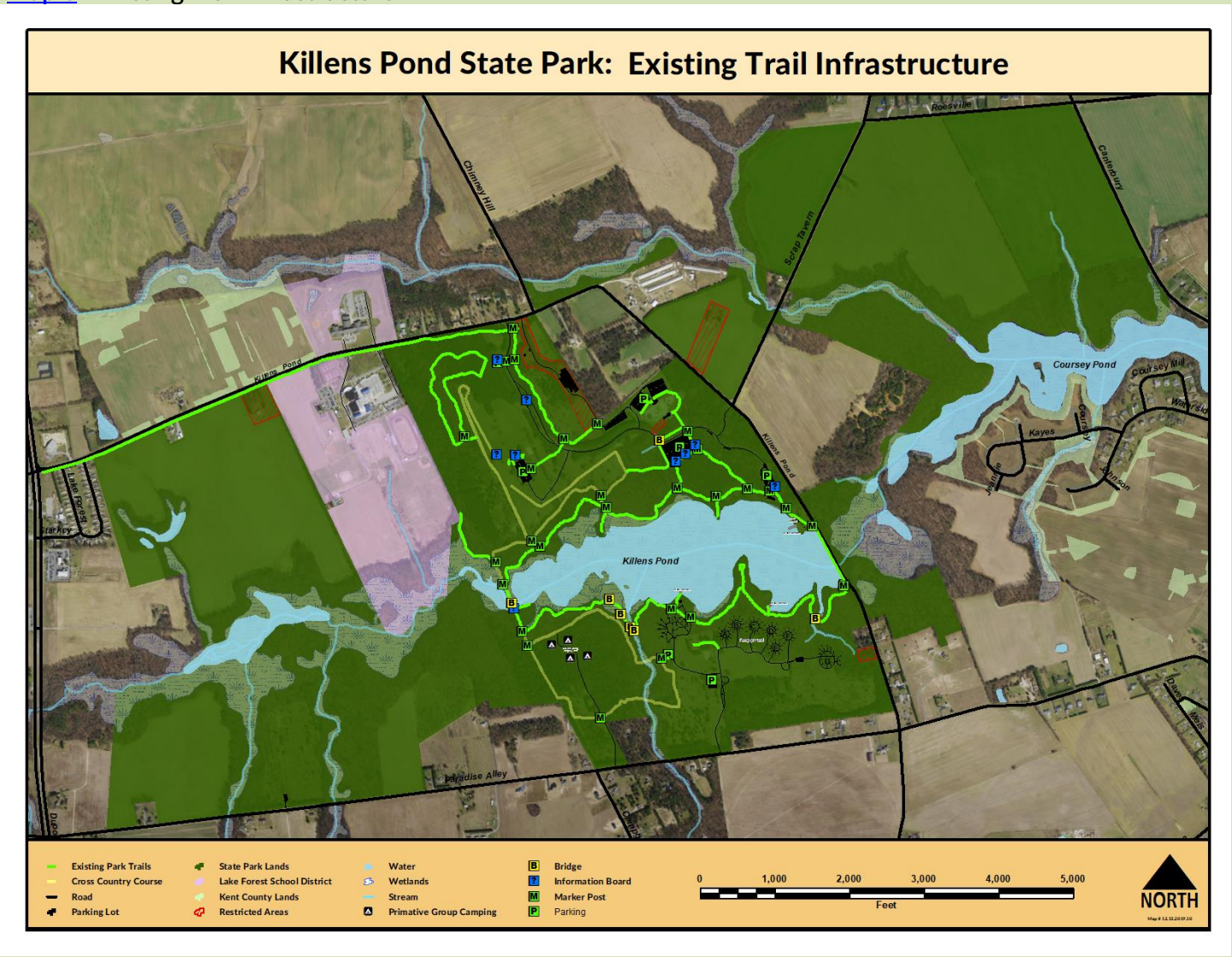
Map 7 - Existing Trail Accessibility



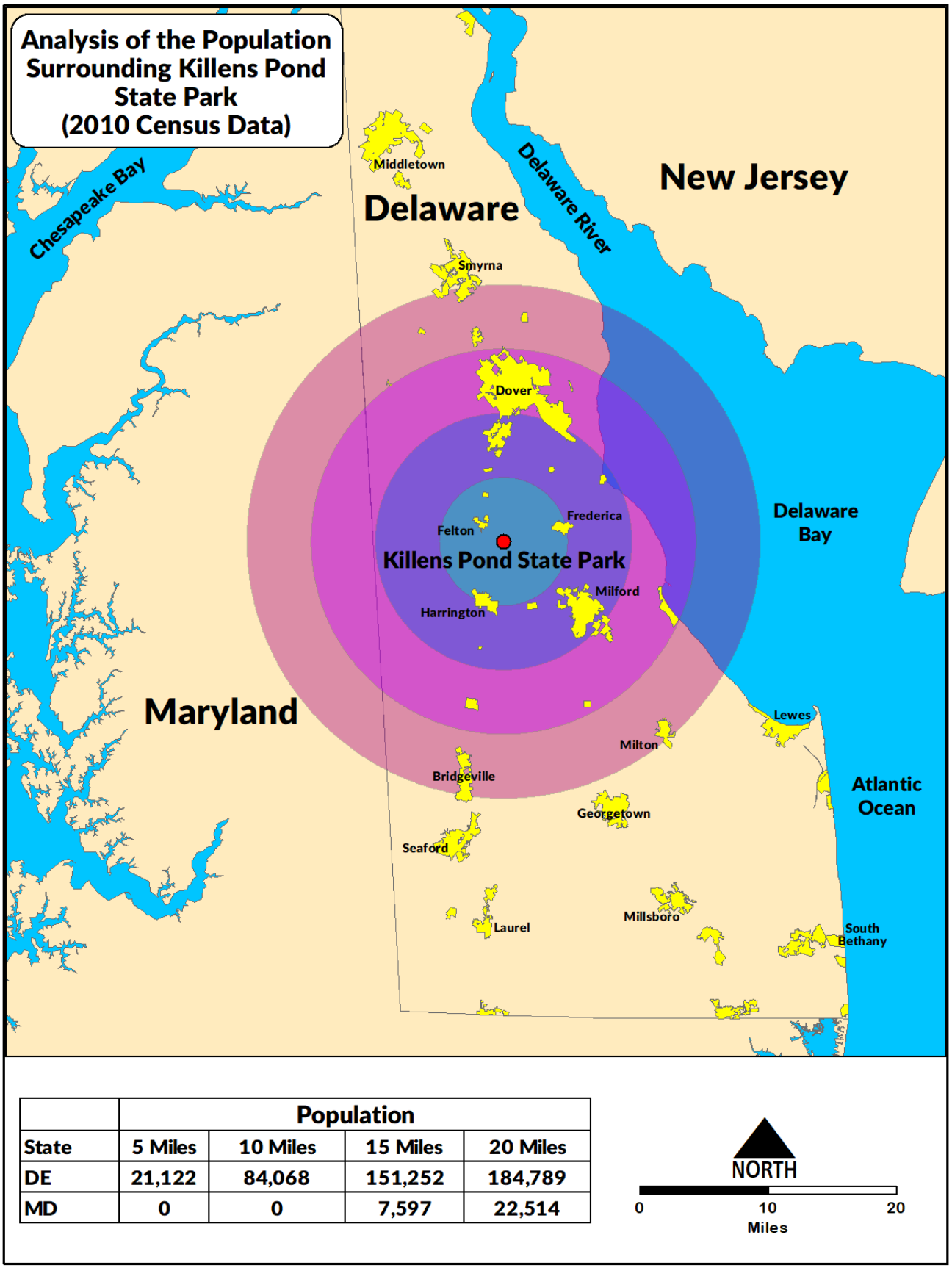
Summary: current trail accessibility by mileage are: accessible 3.2 miles; not accessible 4.2 miles

Map 8 shows locations of trailhead parking lots, information boards, bridges, and trail markers within the existing Killens Pond State Park trail system. All parking areas for trail access are depicted with the P icon. Access to the trail system is available via four main parking lots or trailheads.

Map 8 - Existing Trail Infrastructure

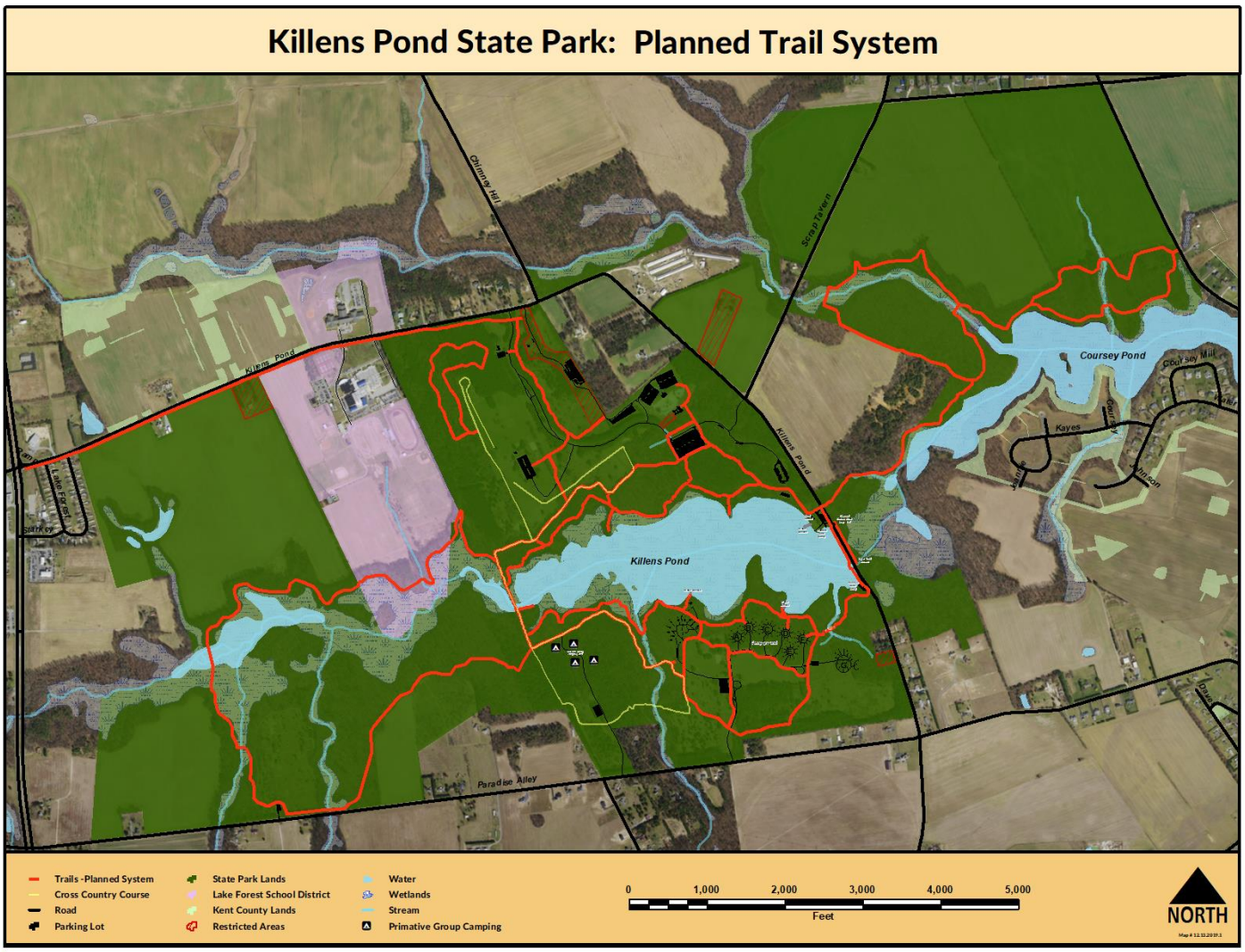


Map 9 – Killens Pond State Park Regional Context



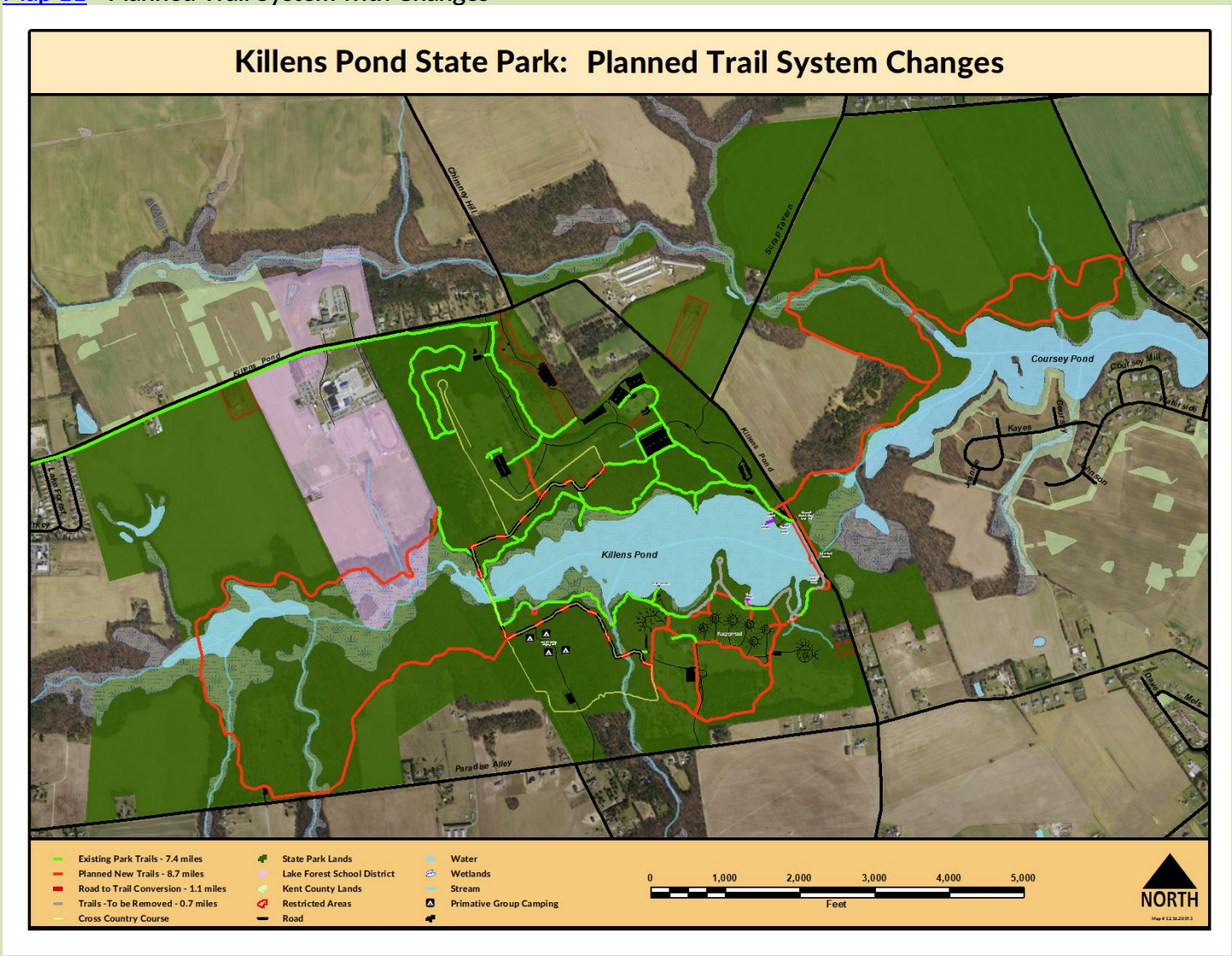
	Population			
State	5 Miles	10 Miles	15 Miles	20 Miles
DE	21,122	84,068	151,252	184,789
MD	0	0	7,597	22,514

Map 10 - Planned Trail System



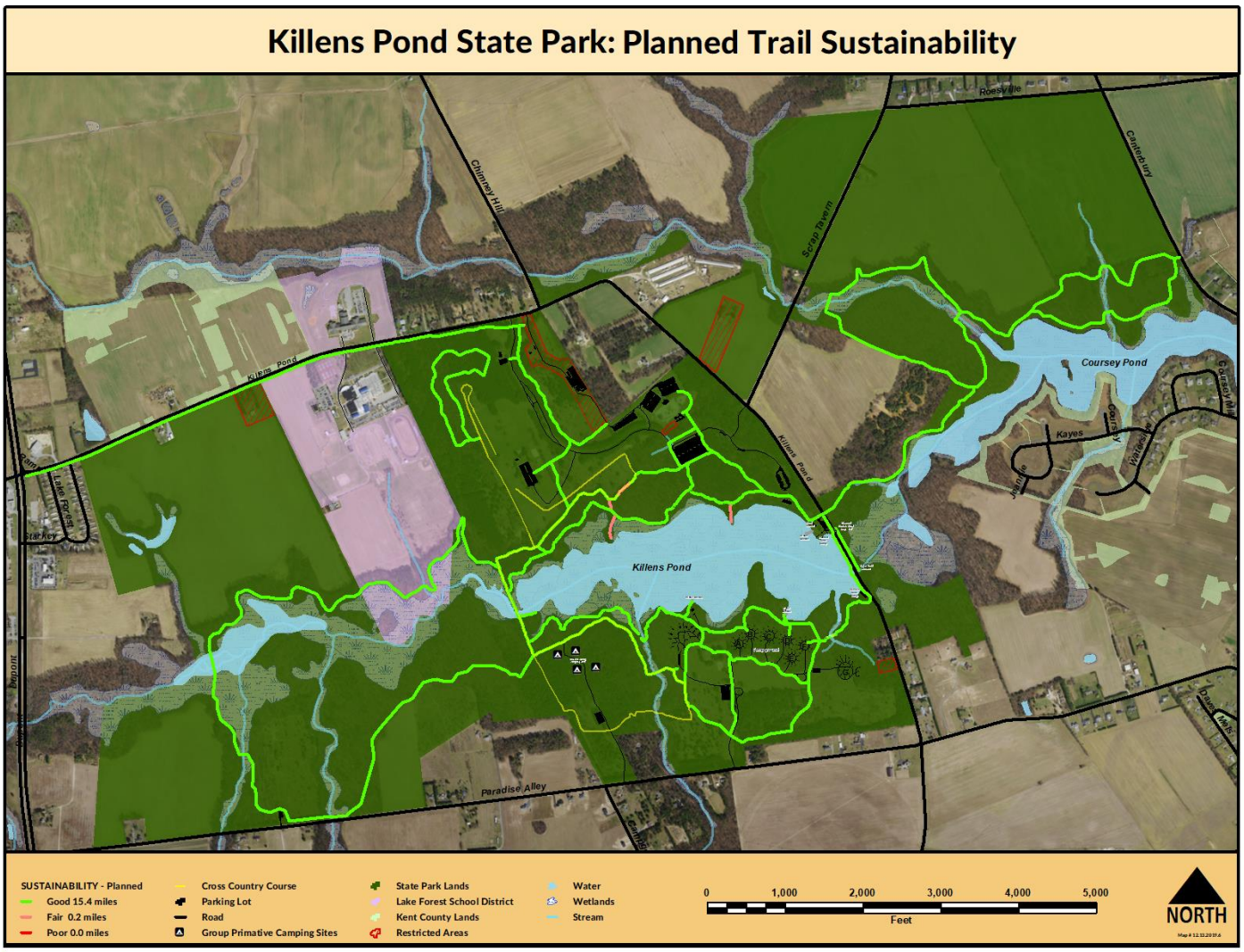
Summary: Overall the existing 7.4 mile trail system will be increase by 8.1 miles resulting in 15.5 miles of trail overall.

Map 11 - Planned Trail System with Changes



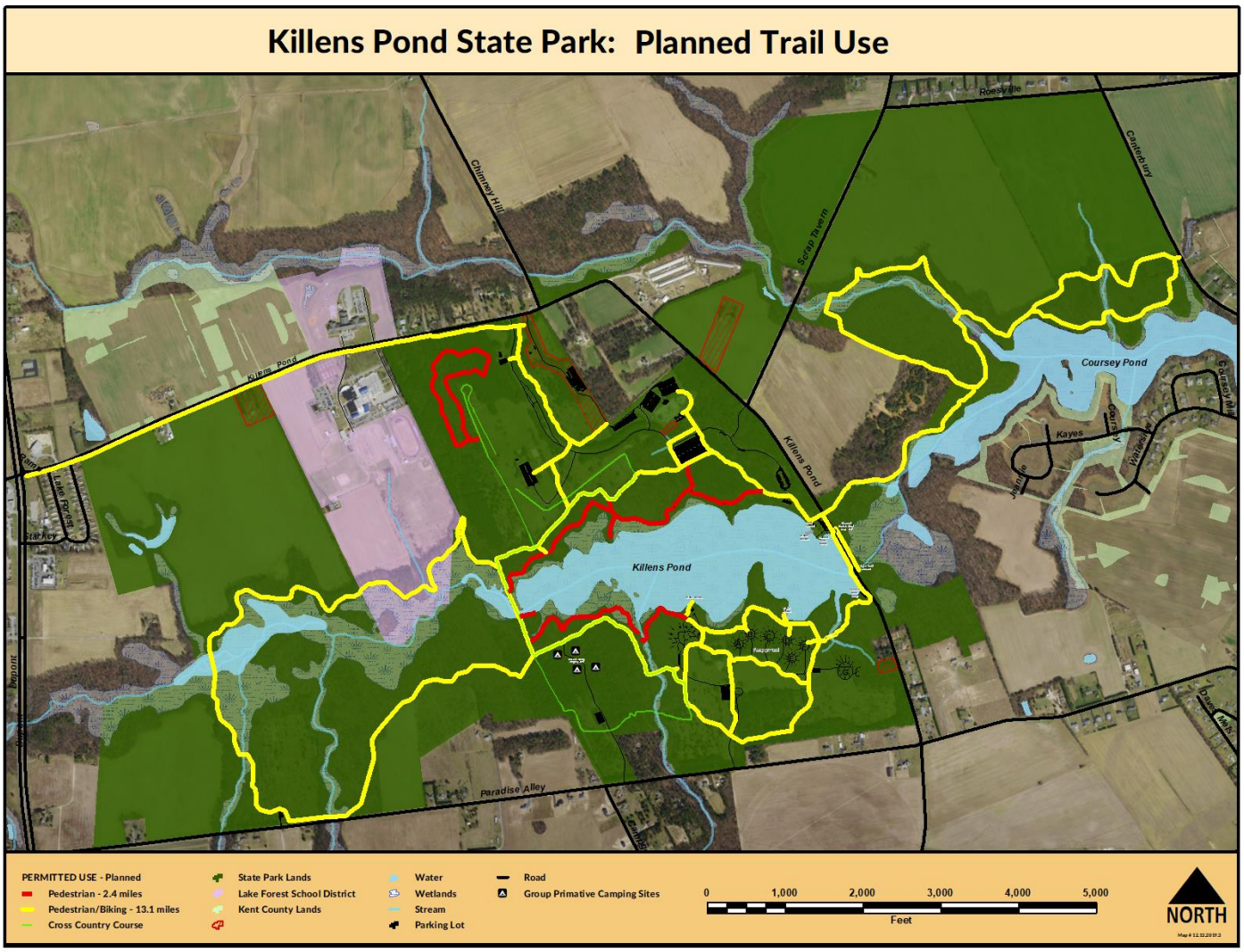
Summary: Overall the existing 7.4 mile trail system will be increase by 8.1 miles resulting in 15.5 miles of trail. Of the 15.5 miles, 0.7 miles will be removed from the system, 1.1 miles will be converted from internal service road to trail, and 8.7 miles will be new trail.

Map 12 - Planned Trail Sustainability



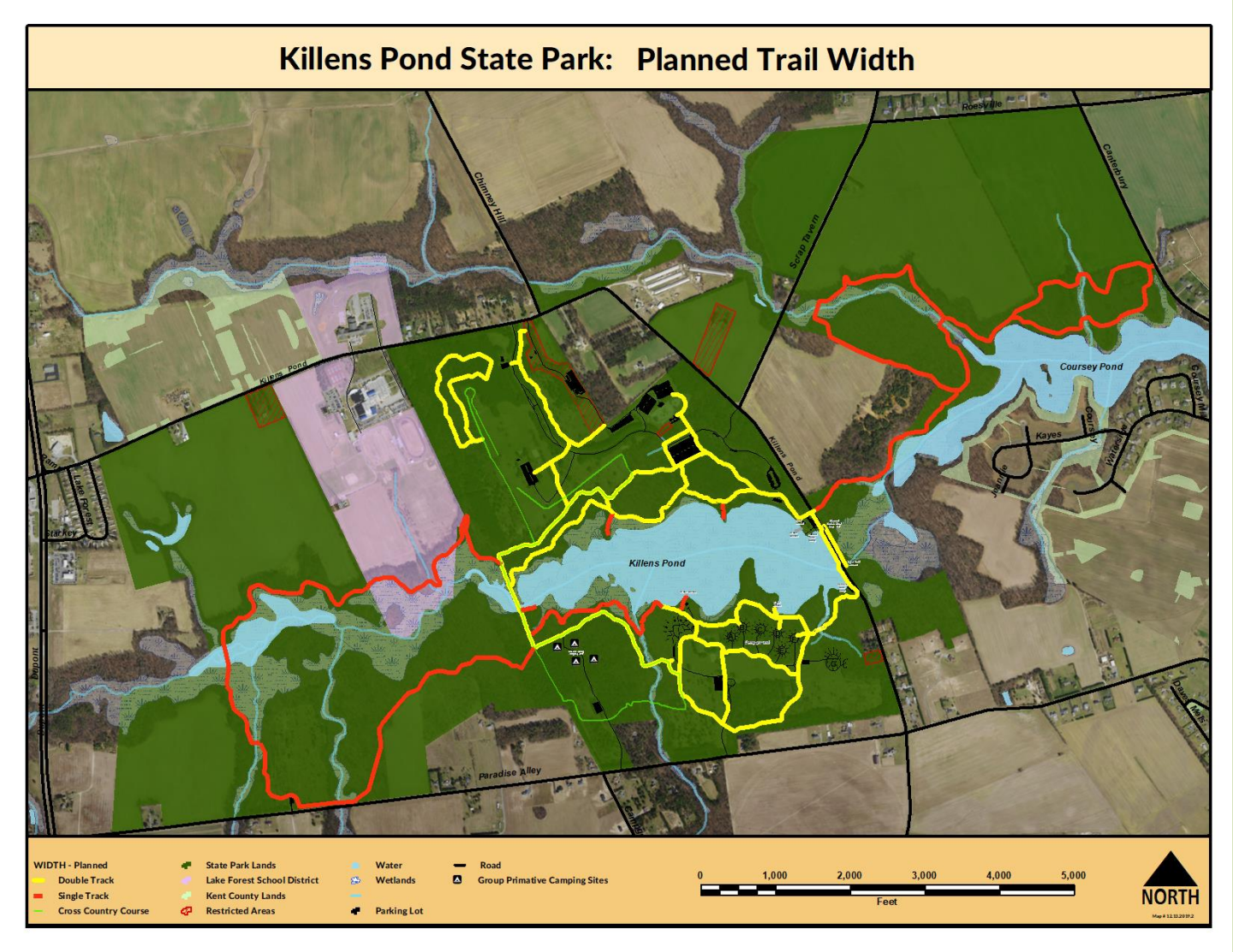
Summary: Overall with realignments and enhancements and new construction techniques, the existing 0.3 miles of trail categorized as “poor sustainability” will be eliminated.

Map 13 - Planned Trail Use



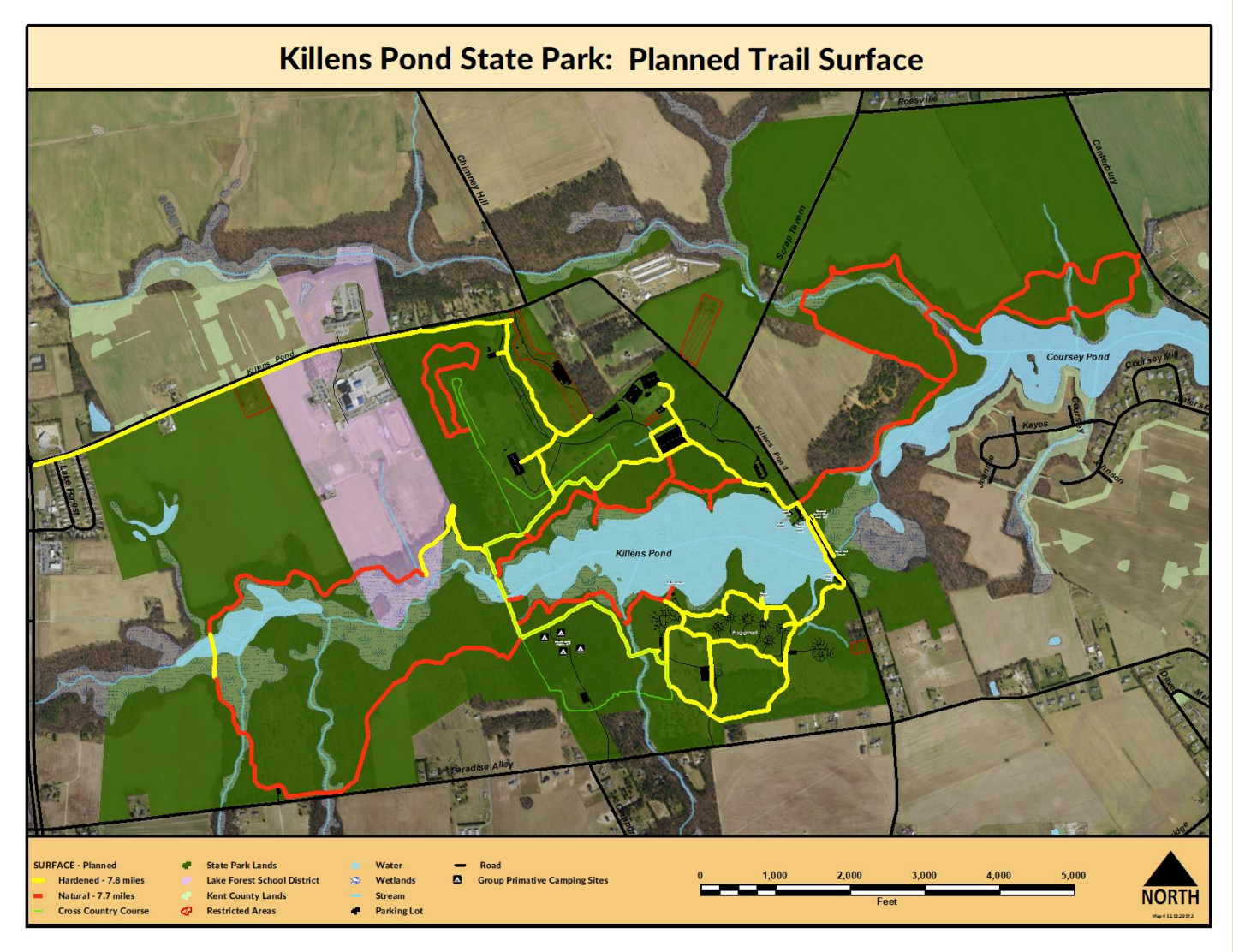
Summary: Overall with realignments and enhancements the existing 7.4 miles of trail increased to 15.5 miles. Current 3.4 miles of pedestrian only trail will decrease to 2.4 miles; Current 4.0 miles of pedestrian and biking trail will increase to 13.1 miles.

Map 14- Planned Trail Width



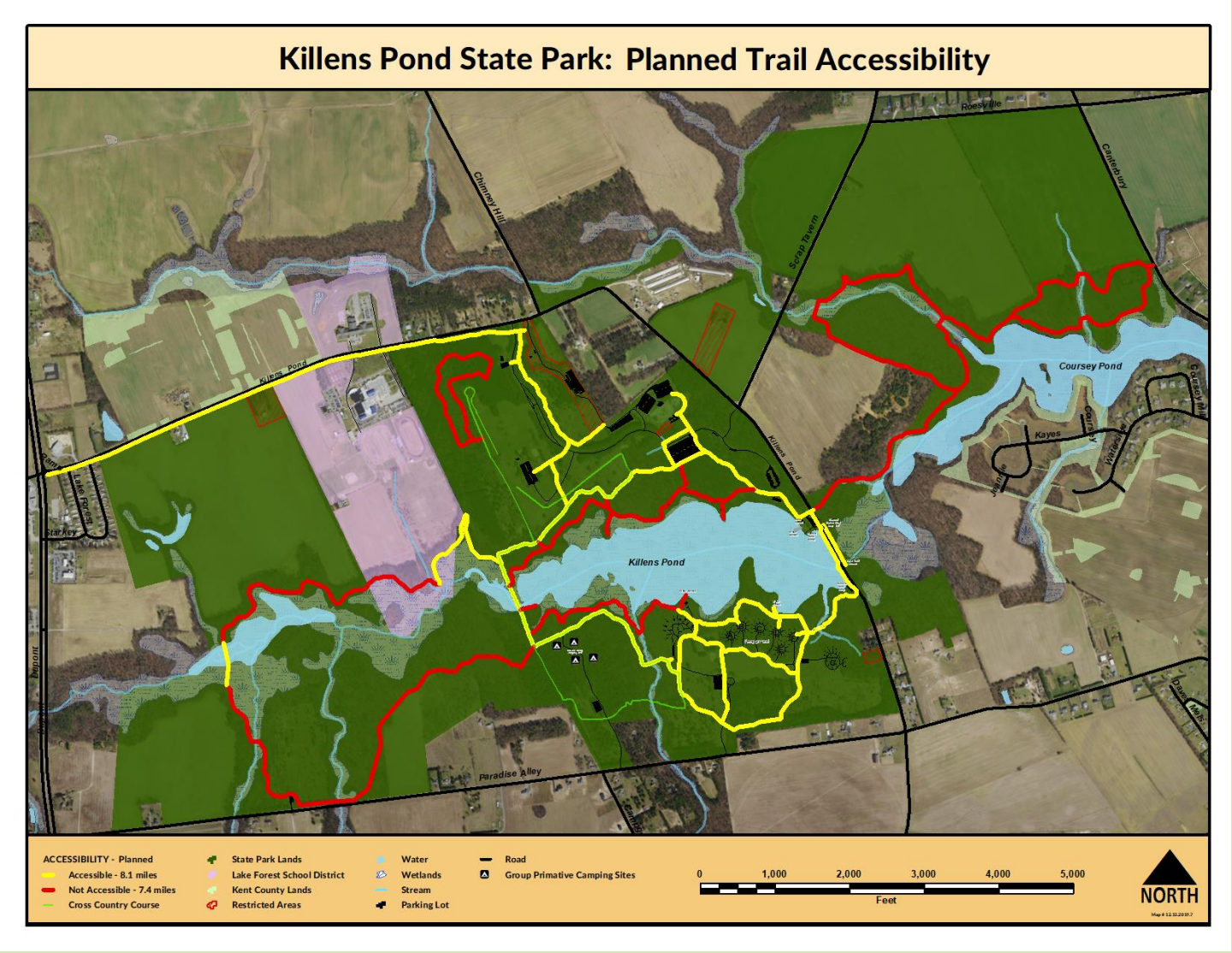
Summary: Overall, existing 0.9 miles of single track trail will be increased to 6.5 miles. Double track trail will increase from 6.5 miles to 9.0 miles.

Map 15- Planned Trail Surfaces



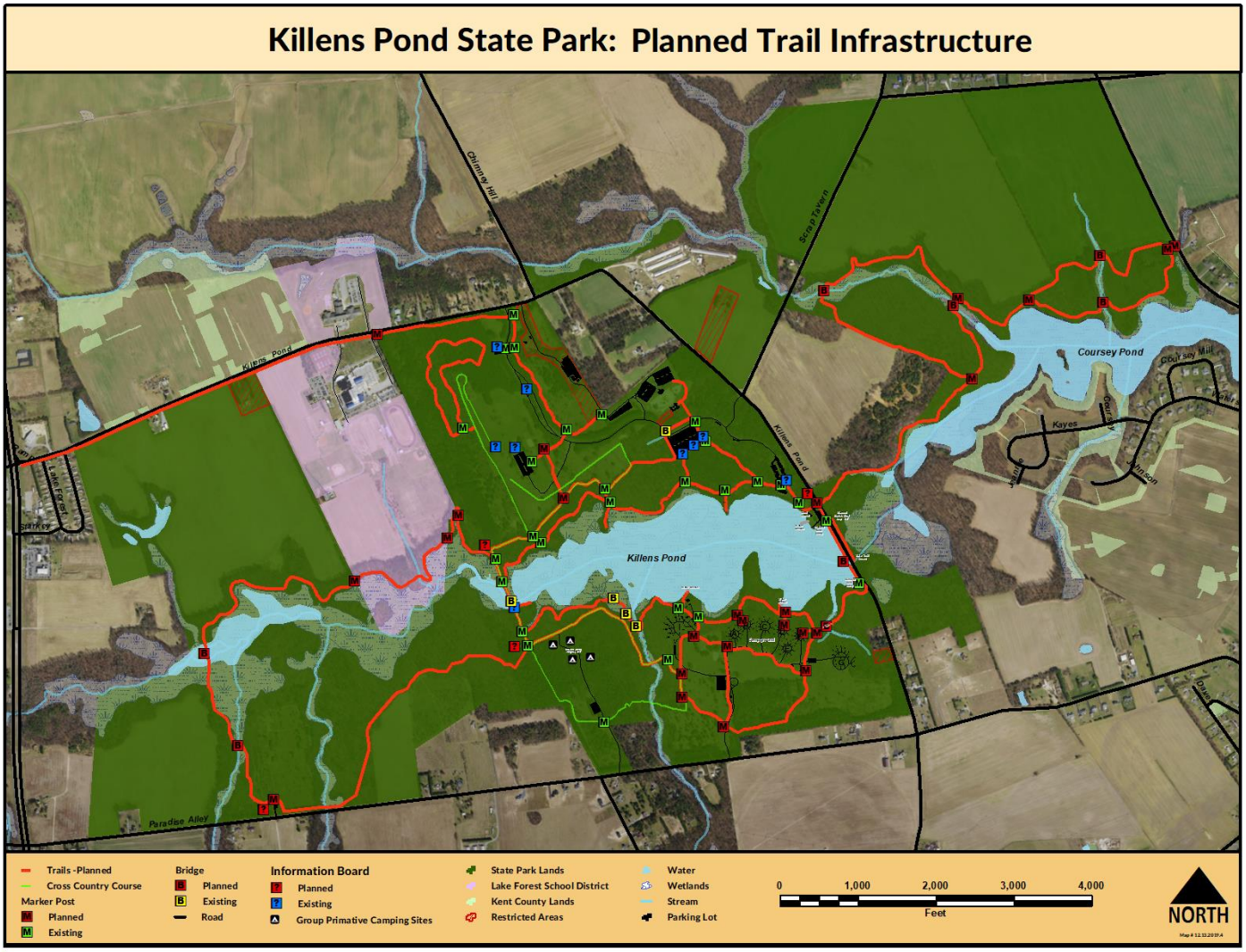
Summary: Overall the existing 3.4 miles of hardened surface trail will increase to 7.8 miles. Current 4.0 miles of natural surface trail will be increase to 7.7 miles.

Map 16 - Planned Trail Accessibility – shows the planned hardened surface portion of the trail system that will meet or exceed Federal trail accessibility guidelines.



Summary: Overall the existing 3.2 miles of accessible surface trail will increase to 8.1 miles. Current 4.2 miles of trail not accessible will be increased to 7.4 miles.

Map 17 - Planned Trail Infrastructure



Appendix B: Tables

Table 1, Statewide Trail Distribution Analysis, provides an overview of the State Park trail systems.

Table 1 – State Park Trail Distribution Analysis

County	State Park	Miles	Percent of Total Trail Miles	Total Miles	Percent Total Trail Miles Per County	Percent State Population
New Castle	Alapocas Run SP	6.5	4%	103.1	67%	59%
	Auburn Heights NP	3.9	3%			
	Bellevue SP	9.7	6%			
	Brandywine Cr SP	16.6	11%			
	Flint Woods NP	2.4	2%			
	Fort DE SP	0.8	1%			
	Fort DuPont SP	1.3	1%			
	Fox Point SP	2.3	1%			
	Lums Pond SP	17.5	11%			
	White Clay Cr SP	38.6	25%			
	Wilmington SP	3.5	2%			
Kent	Killens Pond SP	7.4	5%	8.4	5%	18%
	Fork Branch NP	1	1%			
Sussex	Barnes Woods NP	0.8	1%	43.1	28%	23%
	Cape Henlopen SP	19.3	12%			
	DE Seashore SP	9	6%			
	Fenwick Is SP	0	0%			
	Holts Landing SP	2.4	2%			
	Trap Pond SP	11.6	8%			
	Total	154.6	100%	154.6	100%	100%

	Trail Usage (miles)		Trail Width (miles)		Trail Surfacing (miles)	
County	Shared Use	Single Use (Pedestrian Only)	Double Track	Single Track	Natural Surface Tread	Hardened Surface Tread
New Castle	73.1	30	56.8	46.3	63.4	39.7
Kent	4.4	4	6.4	2	3.5	4.9
Sussex	35.2	7.9	39.3	3.8	16.8	26.3
Total	112.7	41.9	102.5	52.1	83.7	70.9

Table 2 - 2019 Trail Uses

2019 Trail Uses	Mileage
Total Trails	**7.4**
Pedestrian Only	**3.4**
Pedestrian/Bike	**4.0**
Pedestrian/Bike/Equestrian	**0**

Table 3 - Current Trail Characteristics

Trail Characteristics	2019 Trail Mileage	Percentage of Park System
	Total Mileage 7.4	**100%**
Sustainability		
Good	**6.9**	**93**
Fair	**0.2**	**3**
Poor	**0.3**	**4**
Surface		
Natural	**4.0**	**54**
Hardened	**3.4**	**46**
Width		
Single Track	**0.9**	**12**
Double Track	**6.5**	**88**
Permitted Use		
Pedestrian Only	**3.4**	**46**
Pedestrian/ Bike	**4.0**	**54**
Pedestrian/ Bike/Equestrian	**0**	**0**
Accessibility		
Accessible	**3.2**	**43**
Not Accessible	**4.2**	**57**

Table 4- Existing Trails, Miles & Uses

Trail	Length in Miles	Pedestrian	Biking	Equestrian
Bike	**2.3**	**√**	**√**	
Pondside*	**2.4**	**√**	**√**	
Life Course	**0.8**	**√**		
Cross Country	**3.1**	**√**		

*some segments are pedestrian use only

Table 5 – Current and Planned Trail Characteristics

Trail Characteristics	Current Trail System	Planned System	Change in Mileage	Percent of Planned System
Total Mileage	7.4	15.5	Increased 8.1	
Sustainability				
Good	**6.9**	**15.3**	**Increased 8.4**	**98**
Fair	**0.2**	**0.2**	**No Change**	**2**
Poor	**0.3**	**0.0**	**Reduced 0.3**	**0**
Surface				
Natural	**4.0**	**7.7**	**Increased 3.7**	**50**
Hardened	**3.4**	**7.8**	**Increased 4.4**	**50**
Width				
Single Track	**0.9**	**6.5**	**Increased 5.6**	**42**
Double Track	**6.5**	**9.0**	**Increased 2.5**	**58**
Permitted Use				
Pedestrian Only	**3.4**	**2.4**	**Reduced 1.0**	**15**
Pedestrian /Bike	**3.0**	**13.1**	**Increased 9.1**	**85**
Accessibility				
Accessible	**3.2**	**8.1**	**Increased 4.9**	**52**
Not Accessible	**4.2**	**7.4**	**Increased 3.2**	**48**

Table 6a and 6b - Planned Trail Changes – Existing and New Trails: the following tables summarizes planned trail changes for existing and new trail widths, surface, and uses, and what might trigger the trail system changes. Triggers determine when any potential project gets moved to an active funded project. For example: A storm causing a tree to fall and destroy a bridge would trigger a bridge replacement project to keep the trail open and safe

Table 6a - Planned Trail Maintenance - Existing Trail

Trail	Trail Type	Width Avg.	Current Trail Users	Future Users	Change Required	Trigger
Bike	Double Track	8 feet	Pedestrian Bicycles	(No Change)	• Signs	• User Safety • Funding
Pondside*	Double & Single Track	4 feet	Pedestrian Bicycles	Expansion of Bike/Ped	• Signs • Reroutes	• Habitat Protection • User Safety • Funding
Life Course	Double Track	8 feet	Pedestrian Bicycles	(No Change)	• No Change	
Cross Country	Double Track	8 feet	Pedestrian Bicycles	Expansion of Shared Use	• Tread Stabilization • Signs	• Funding
Road to Trail	Double Track	10 feet	Pedestrian Bicycles	Pedestrian Bicycles	• Stone Surface • Signs	• Funding

*some segments are pedestrian use only

Table 6b - Planned Trail Changes - New Trail

Trail	Trail Type	Width Avg.	Current Trail Users	Future Users	Change Required	Trigger
Campground Loop	Double Track	5 feet	NA	Pedestrian Bicycles	• New Trail	• Funding
Murderkill	Single Track	3 feet	NA	Pedestrian Bicycles	• New Trail	• Funding
Coursey Pond	Single Track	3 feet	NA	Pedestrian Bicycles	• New Trail	• Funding
Killens Pond Spillway	Double Track	12 feet	NA	Pedestrian Bicycles	• New Trail	• Funding
Kayak Access	Double Track	5 feet	NA	Pedestrian	• New Trail	• Funding

Table 7 Existing Trail Bridge or Structure Condition

Trail Bridge Number	2019 Condition	Year Built	Planned Action
2	Fair	Unknown	None
3	Poor	Unknown	Replace
4	Poor	Unknown	Replace
5	Poor	Unknown	Replace
6	Poor	Unknown	Replace
7	Poor	Unknown	Remove
8	Fair	Unknown	None

Appendix C: Sustainable Trail Best Management Practices

Designing, constructing, and properly maintaining trails for sustainability is of paramount importance to preserving the designed experience, health, and life span of the trail system. Many trail management problems, ranging from erosion to user conflicts, stem from poor trail planning and design, management, and use. A poorly designed trail, no matter how well it is built, will degrade at a faster rate and cause more problems for managers and trail users.

User type and volume impacts are most notable on natural surface trails. Over the years there have been a number of studies that have examined the relationship between users and the trail. The ability to loosen or displace (move short distances) tread materials will help determine the sustainability of any given trail. Although the "footprint" may look different, the foot and the tire exhibit about the same amount of wear and tear on the trail-pounds per square inch on the tread are actually lower for a bike. The equestrian, at least four times the weight, can have a more dramatic effect on compacting or loosening the tread. Once tread materials are loose they become more susceptible to displacement and/or erosion. Depending on soil conditions, user type and volumes, trail width, canopy cover, and slopes, the amount and distance of displacement or erosion will vary. In general the distance for displacement will not exceed one or two feet. Erosion on the other hand is not confined to short distances; in fact soil may be carried hundreds if not thousands of feet by water.

Site conditions all being equal, the heavier horse will loosen and displace many times more tread material than either the pedestrian or biker. However, sheer numbers of any one user type can overwhelm just a few of another. The impact of twenty hikers in a muddy area far exceeds the impact of one horse. Nor are a handful of hikers going through a stream comparable to the impact of ten bikers splashing across at speed. All trail users affect the trail surface and surrounding environment, especially when trails are poorly planned and constructed. The impacts are intensified when trail activities occur during fragile environmental times - such as when natural surface trails are soft (winter freeze thaw cycle, heavy or prolonged rain events). Soft trails are more susceptible to soil compaction, displacement, and erosion, or vegetation loss or trampling when users avoid puddles or soft tread areas.

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, and continuation, 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:

- Incorporate contour trail design
- Maximize natural and cultural resource protection
- Support current and future use
- Minimize adverse effects on plant or animal life in the area
- Avoid disruption of the natural hydrology
- Minimize adverse effects on tread surface erosion or displacement
- Minimize future rerouting and long-term or recurring maintenance
- Minimize or eliminate recurring trail maintenance costs.

In essence, greater level of sustainability relates directly to water and user management. Adopting these principles ensures a more accessible and sustainable trail system for the future.

Designing a sustainable trail system 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, soils, slope and grade changes; ease of access

from control points such as trailheads; user type and volume; and user safety. A sustainable trail system will offer trail users interesting experiences in varying landscapes.
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 (grade reversals) 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. Using ATVs or gators instead of trucks to access trails, or small mowers replacing large tractors with brush mowers will minimize impacts to the trail. 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.

Trail Construction and Maintenance Best Management Practices General Guidelines:

- Obtain permits or notifications first.
- Before beginning any trail construction, install necessary measures to minimize and prevent erosion.
- Stabilizing slopes, creating natural vegetation buffers, diverting runoff from exposed areas, controlling the volume and velocity of runoff, and conveying that runoff away from the construction area all serve to reduce erosion.
- Ensure low environmental impact during construction and maintenance- based on seasonal conditions, soils, slope, and vegetative cover.
- Use the proper size tool for the job.
- Minimize the amount of soil disturbance.
- Construct trails during the dry months when soil saturation and water levels are at their lowest.
- Stabilize trail construction areas.
- Install temporary erosion control measures such as hay bales before construction begins. Keep them in place and maintained during construction and remove them only after the site has been stabilized.
- Trails through wet areas should be avoided or bridged.

Historic Fort Miles (Killens Pond State Park)

Appendix D: Natural and Cultural Resources

Natural Environment

Killens Pond hosts a variety of ecosystems including: upland and bottomland forest, non-tidal fresh water wetland, pond and stream aquatic habitats and early succession scrub-shrub and meadow. Killens Pond forested habitats, especially young forest, currently have a moderate level of invasive species cover in the shrub and herbaceous layer. Bottomland forest and wetland habitats are only lightly invaded.

As noted elsewhere in this plan, trails can be sources of erosion, compaction and of habitat division and disturbance. But the greatest impacts of trails upon the park's natural resources are as avenues of incursion for non-native invasive plant species into native habitats. This occurs because of the constant soil disturbance and 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 in Delaware's forested landscapes. These plants are not just a nuisance; they can alter and degrade the local ecology. Even the cocoons (containing eggs) of invasive earthworms can be moved this way. Introduction of these invasive plants and animals are the greatest threat to intact native forest habitat throughout our park system. Regular annual monitoring (and treatment if required) is necessary along all trails: existing and abandoned.

Cultural Landscape

Although archaeologists are not yet certain exactly when the first human occupation of Delaware took place, we can say with certainty that people were living in the area 12,000 years ago. These earliest inhabitants fished, hunted large game such as mastodons, mammoths, and other Pleistocene megafauna, and gathered plant foods – all linked to resource availability. During this early period until the Historic Period, the ecotone between the streams or wetland and the forests provided an attractive setting for game and a variety of food plants. It was in these areas during prehistoric times where small bands would have camped for short periods, especially in sheltered forested locations overlooking low order streams or tidal wetlands.

It now appears that maize agriculture was never an important focus for the prehistoric peoples of the Delmarva, unlike along the large rivers further inland. However, multi-family groups occupied seasonal camps allowing them to more fully exploit native foods, thus increasing the likelihood of evidence left behind. The biggest change occurred during the Historic Period.

Killens Pond surrounds a mill pond created in the late 18th century by John Craig, a Maryland farmer who was one of the earliest European settlers in central Kent County. The Murderkill River, not only supplied water power, but was also was an important trade route across the Delmarva for Native people for thousands of years. Exotic stone tools associated with a religious complex called the Adena Complex made their way through the Park to Delaware Bay from the Midwest. Native people also made extensive use of the Oak-Hickory forests that still dominate the uplands surround the pond. Farms were established on the well-drained uplands, including one owned by Charles Tilton, a Black freeman, whose family prospered at the turn of the 19th century on lands now part of the park.

Appendix E: 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 2018 - 2022 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.

In August 2011, 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 are the foundation of the SCORP. For purposes of planning and projecting outdoor recreational facility needs, the State was divided into five regions for reporting. Killens Pond State Park falls in Region 1. Within Region 1, 84% of telephone survey respondents expected a member of their household to participate in walking or jogging; 59% participate in bicycling; 60% in hiking; 30% in mountain biking; and 23% in horseback riding. Based on a comparison of findings (from the previously published 2013-2018 SCORP), the trend for trail-related activities continues to be popular among the recreating public.

Delaware is home to diverse population centers, landscape types, and varying development patterns, regional variations in outdoor recreation needs are to be expected. However, 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. Therefore more linear facilities should be constructed to keep pace with the population growth and the public's participation.

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) for relaxation, 3) to be with family and friends , 4) to be close to nature and, 5) for mental well-being.

Appendix F: Minimizing Resource Impacts Utilizing Sustainable Trail Design

Minimizing impacts on natural and cultural resources is critical. The intersection of recreational trails, trail use, and resource protection leads to the most effective way to minimize impacts-sustainable trail design, construction, and maintenance principles. What is a sustainable trail? Although there are many elements that determine whether a trail is sustainable, there are four main trail goals that help determine how sustainable a trail will be; resistance to erosion; fulfills the user's needs; requires little maintenance; and mitigates conflicts between different users. The more successful one is in meeting these goals, the more sustainable a trail is. By far, the biggest threats to non-paved trail sustainability are erosion and soil compaction and displacement.

Erosion is the natural process by which soil and other material is transported by wind or water. If left unchecked, erosion can quickly cause serious damage to trails and the very resources we are charged to protect. Soil compaction and displacement is a localized issue directly related to trail use that can impact a foot to several feet of trail, but can have devastating effects.

Trail erosion and soil compaction and displacement can be accelerated by seasonal conditions, weather patterns, trail use, use volume, use type, terrain, vegetative cover, and gravity to name a few. Depending on the combination of the listed conditions above, tread material susceptibility will vary. However, one can only mitigate trail erosion through the utilization of sustainable trail principles.

Sustainable trail principles work together and when applied will create contour trails that will effectively manage erosion, provide high quality low maintenance trails that are fun to use, and help to reduce environmental impact, risk, and user conflicts. The main two goals of these principles are to manage water and users. Success is measured by keeping water off the trail and users on the trail. The following is a list of the main principles of trail sustainability.

Trail Sustainability Elements

- Trail location: along hillsides or on flat well-draining soils are best
- Trail alignment: along contours
- Trail grades: keep grades 10% or less on average on steep terrain
- Grade reversals: incorporate *frequent* drainage throughout trail system
- Outslope: slope tread toward downhill side to encourage sheet flow across trail
- Adaptive trail design: consider trail design change as soil texture, vegetation cover and other site characteristics change
- Minimize soil displacement: design must take into account type of users
- Prevent user created trails: close all unofficial trail created by users
- Maintain trails: perform regular maintenance

Trail layout and design must take into account the natural and cultural resources of the site. The highest quality habitats and sensitive cultural sites should be avoided to minimize the impact of trail construction on rare species and habitats and archaeological sites. As recreational demands continue to increase, sustainable trail design and construction are critical for the protection of natural and cultural resources. Whenever possible, locating trails on well-drained soils will keep the surface dry, firm and stable. Evaluating impacts is ongoing especially in high quality areas.

Appendix G: 203.2-2018 Public Participation and Analysis

The Division began a public participation process with a series of trail user stakeholder meetings in 2016. Division personnel with expertise in park management and operations, administration, enforcement, programming, environmental education, natural and cultural resource stewardship, trail construction and design, and park planning led the public participation component – a core exercise in developing the Killens Pond State Park Trail Plan.

Comments from the trail user community, advisory councils and public agencies were valuable in shaping this trail plan. In total there were 5 field visits with park staff, 4 Division Trail Team meetings, 6 stakeholder meetings (includes internal and external members and covered all the trail user groups and several state Councils), and one public open house (specific to the Trail Plan). Use of the Delaware's government web site for posting planning maps, information, and announcements made information more widely available for public review. On March 28, 2018, a public Open House was held at the Killens Pond Nature Center to review the trail concept plan. Twenty eight people attended the Open House and 30 responses to the draft concept trail plan were submitted via an online comment form, email, and letter correspondence. Below is a summary of the responses.

- 96% of the respondents supported the plan as proposed.
- 71% of the respondents used trail information such as trail markers maps, and information kiosks (most important amenities).
- 93% of the respondents live in Delaware
- 66% of the respondents use the park each month (23% each week).
- Seeking natural, narrow, challenging, and biking trails were reoccurring themes for many respondents.

Following the March 2018 Open House and comment period, the Division of Parks and Recreation Trail Committee evaluated all public comments to consider the following:

- How comments met the Trail Plan objectives
- How comments fit into a larger regional trail system
- How potential recreational alternatives might contribute to regional recreation diversity

Below is the public comment form. Limited feedback for some questions did not provide enough data for analysis but are included to provide a full record.

Delaware State Parks
We're saving a place for you

Killens Pond State Park
Proposed Trail Plan

Open House - - March 28, 2018
Comment Form

In developing the proposed Trail Plan for Killens Pond State Park, the Division of Parks & Recreation has established objectives, evaluated natural and cultural resources, assessed current trail conditions, and weighed constraints and opportunities. You are invited to share observations, insights and comments on the proposed Trail Plan. The Division will further evaluate alternatives for long-term development, management, sustainability and accessibility of Killens Pond's trails for current and potential new users as an integral part of a larger regional trail system. Comments you provide will be carefully assessed and evaluated in finalizing a trail plan for the park.

1. How often do you use the trails at Killens Pond State Park? (circle one)

Daily Weekly Monthly Few times per year Never

2. How often do you use trails *<u>other than</u>* at Killens Pond? (circle one)

Daily Weekly Monthly Few times per year Never

3. What is your primary trails use? (Primary =1 Secondary =2)

___Walking ___Running ___Bicycling

___Mountain Biking ___Dog walking ___Wildlife observation/bird watching

4. What trail amenities do you use most often? (Primary =1 Secondary =2, etc.)

___Information boards ___Maps ___Trail markers

___Interpretive panels ___Restrooms ___ Benches

5. Are there trail amenities that you would like to see added to the Killens Pond trail system? Please list and describe where you would like to see them.

6. **Are there trail connections or segments that should be added or eliminated from the Killens Pond trail system?**

7. **Please indicate your level of support for the proposed Killens Pond Trail Plan.** (circle one)

Strongly Support Moderately Support Neutral Do Not Support

8. **Do you have additional comments?**

Please provide your zip code: _____

Please provide an email if you would like trail planning updates: _____

Visit the project website at destateparks.com/Killens-Pond-Trail-Plan

Return Comments by April 30th 2018 to:

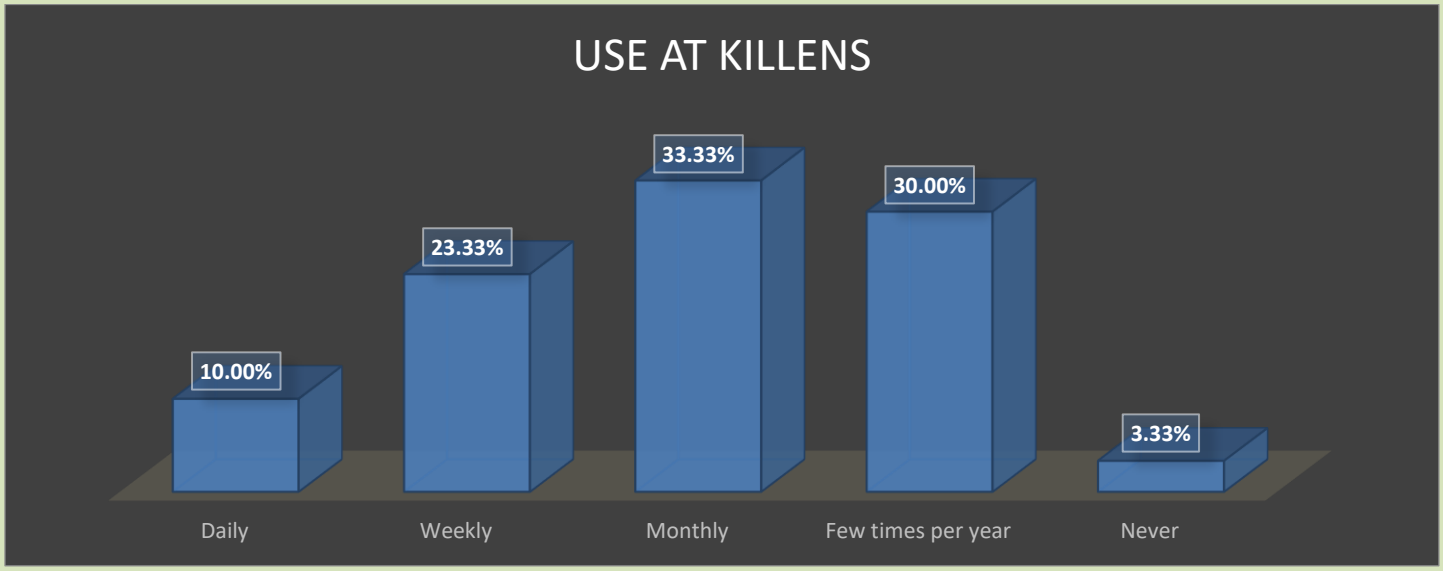
Park Resource Office
Division of Parks & Recreation
89 Kings Highway
Dover, DE 19901
Attn: David Bartoo

Results from the Online Survey

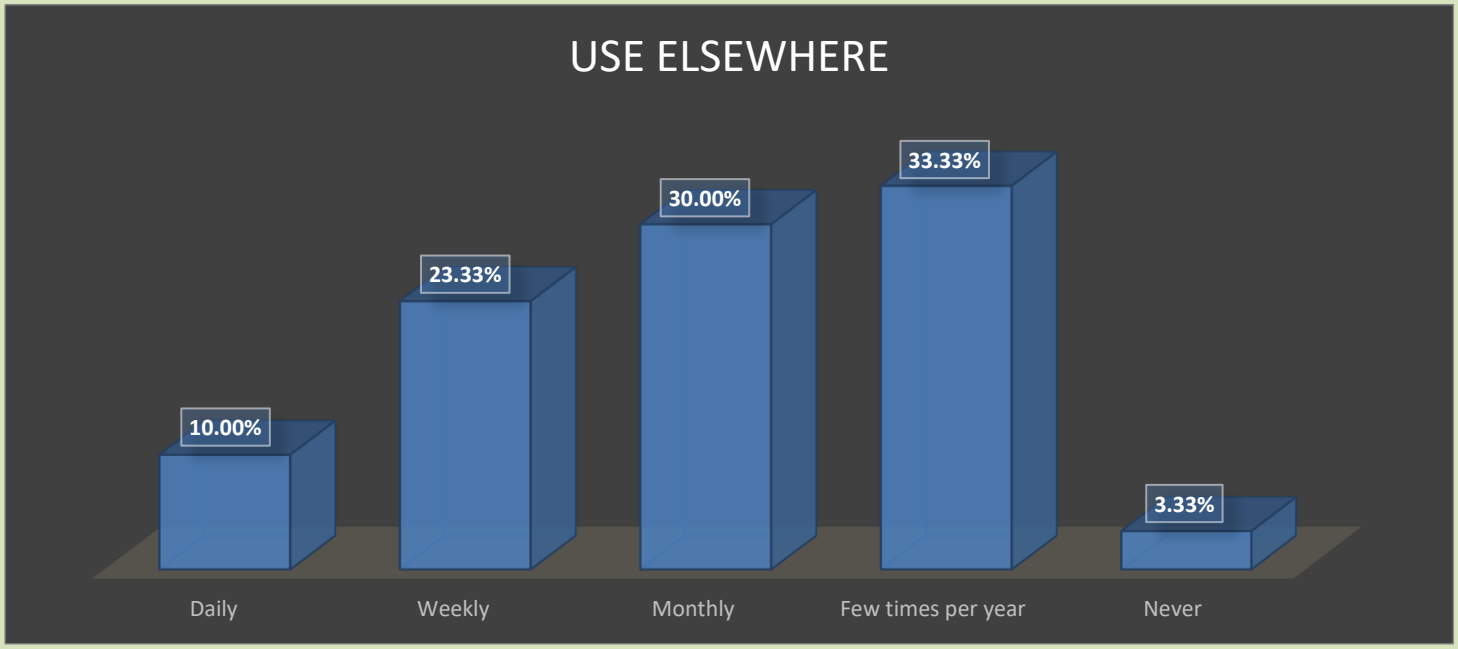
April 2018
62 Completed Surveys

This document presents data that has been compiled and generalized or categorized to protect the confidentiality and anonymity of respondents. Individual responses are intentionally not presented.

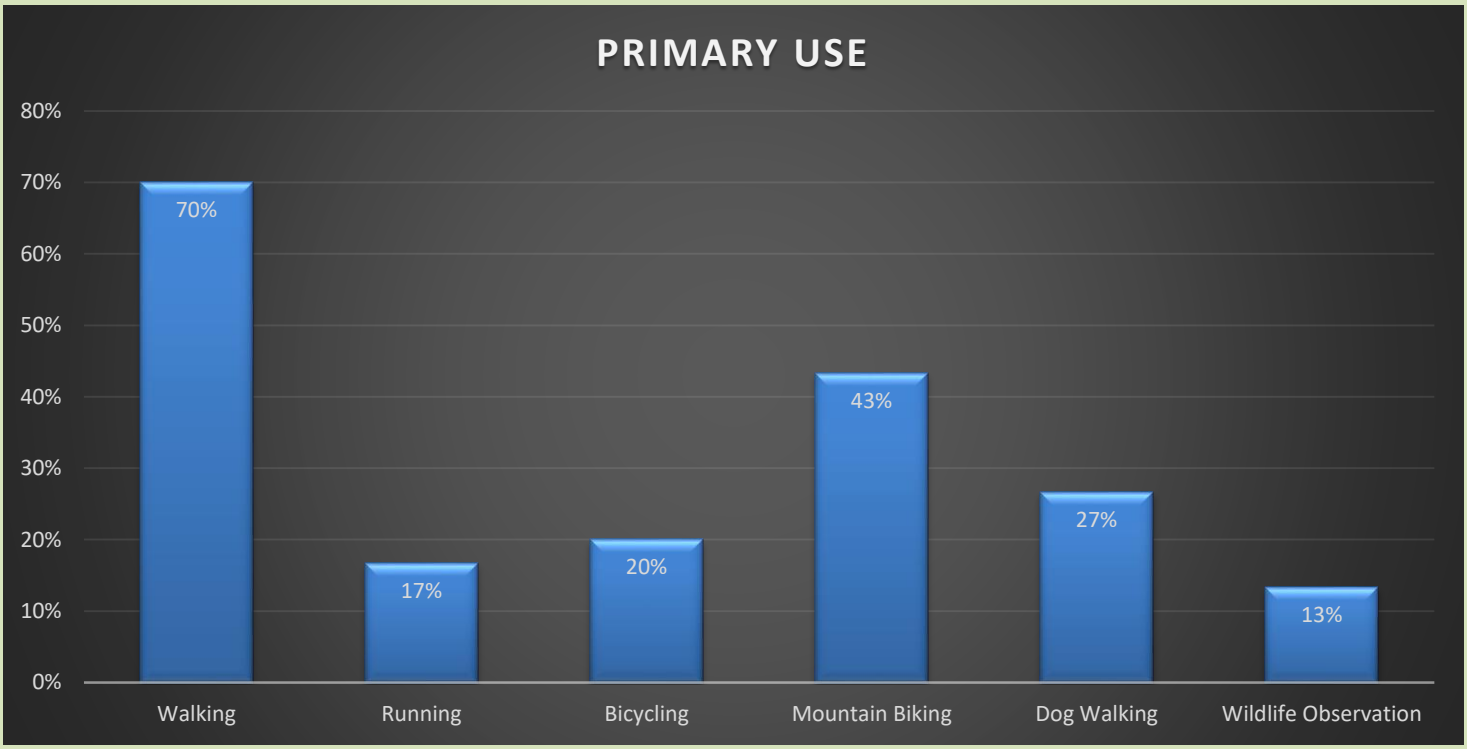
1. How often do you use the trails at Killens Pond State Park?



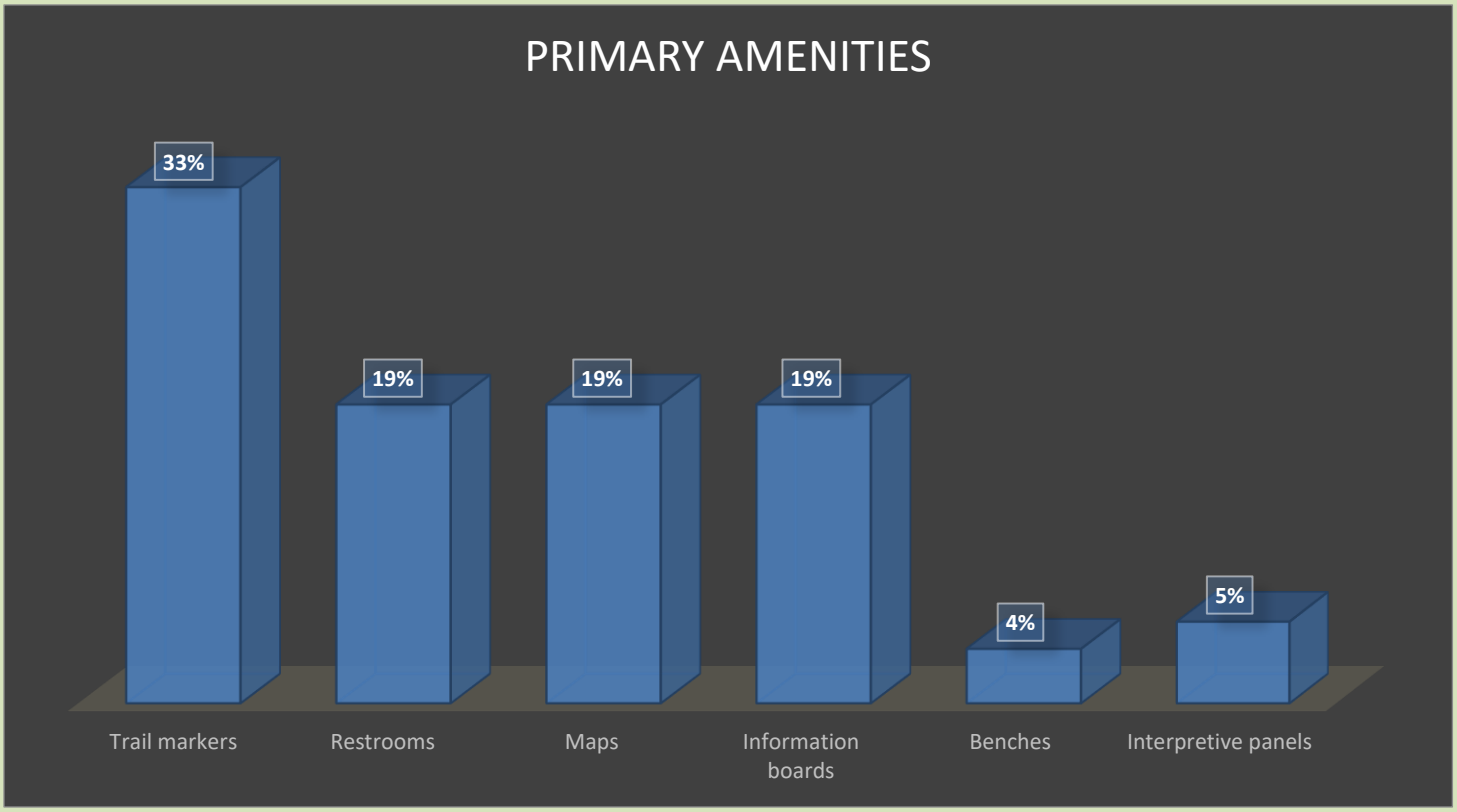
2. How often do you use trails *<u>other than</u>* at Killens Pond?



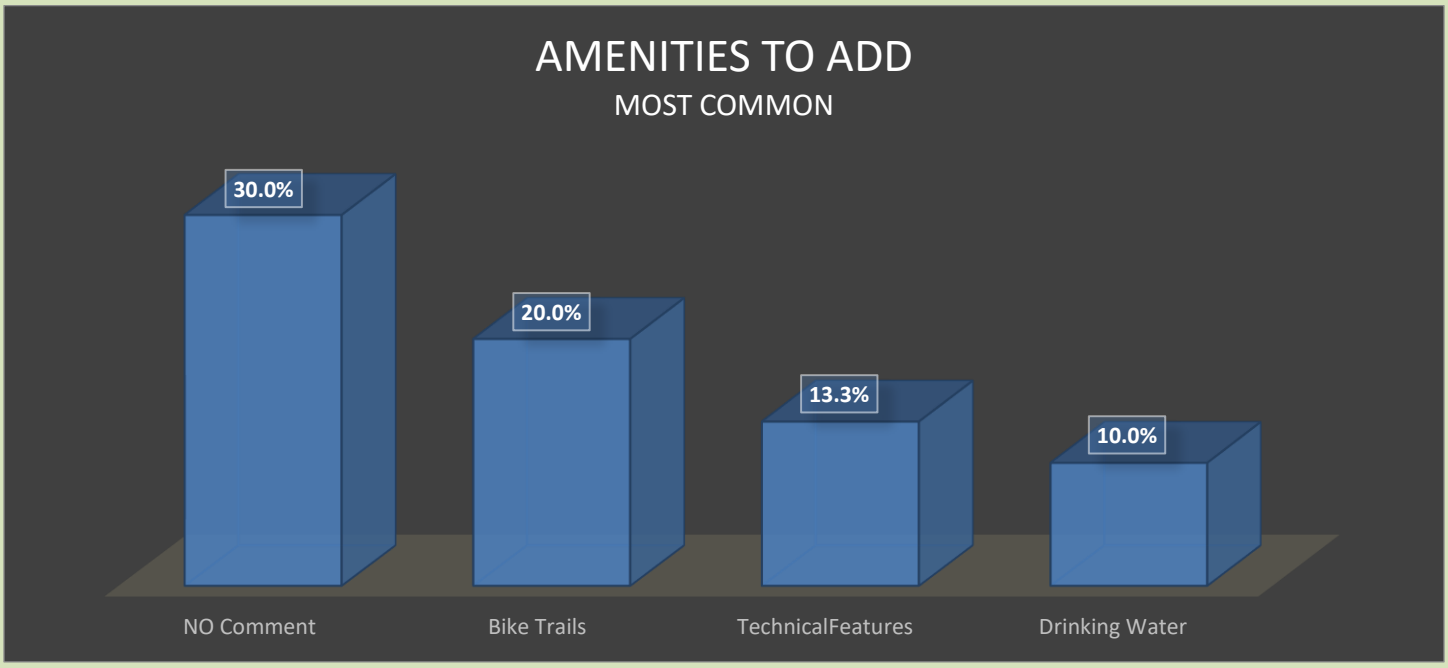
3. What is your primary trails use?



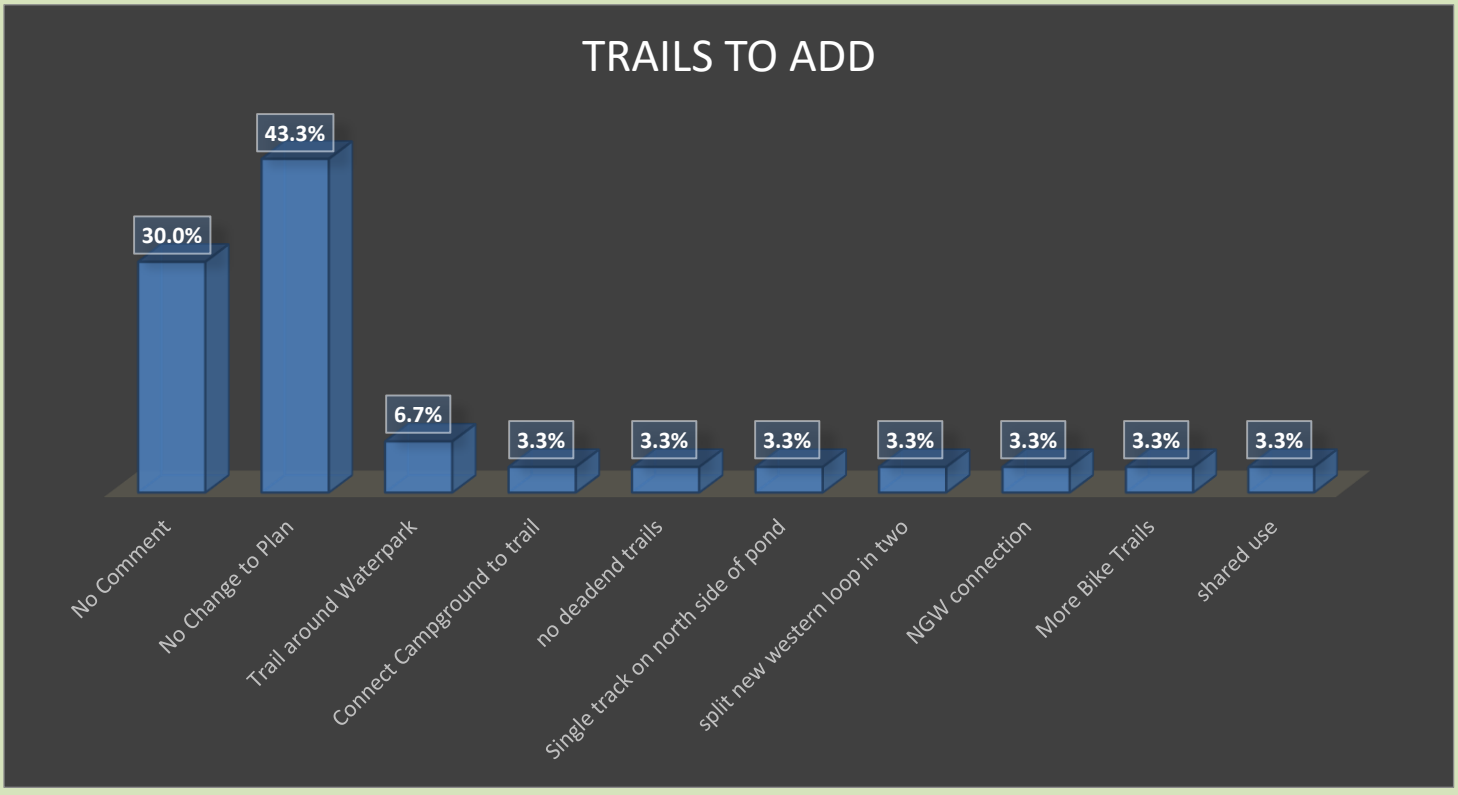
4. What trail amenities do you use most often?



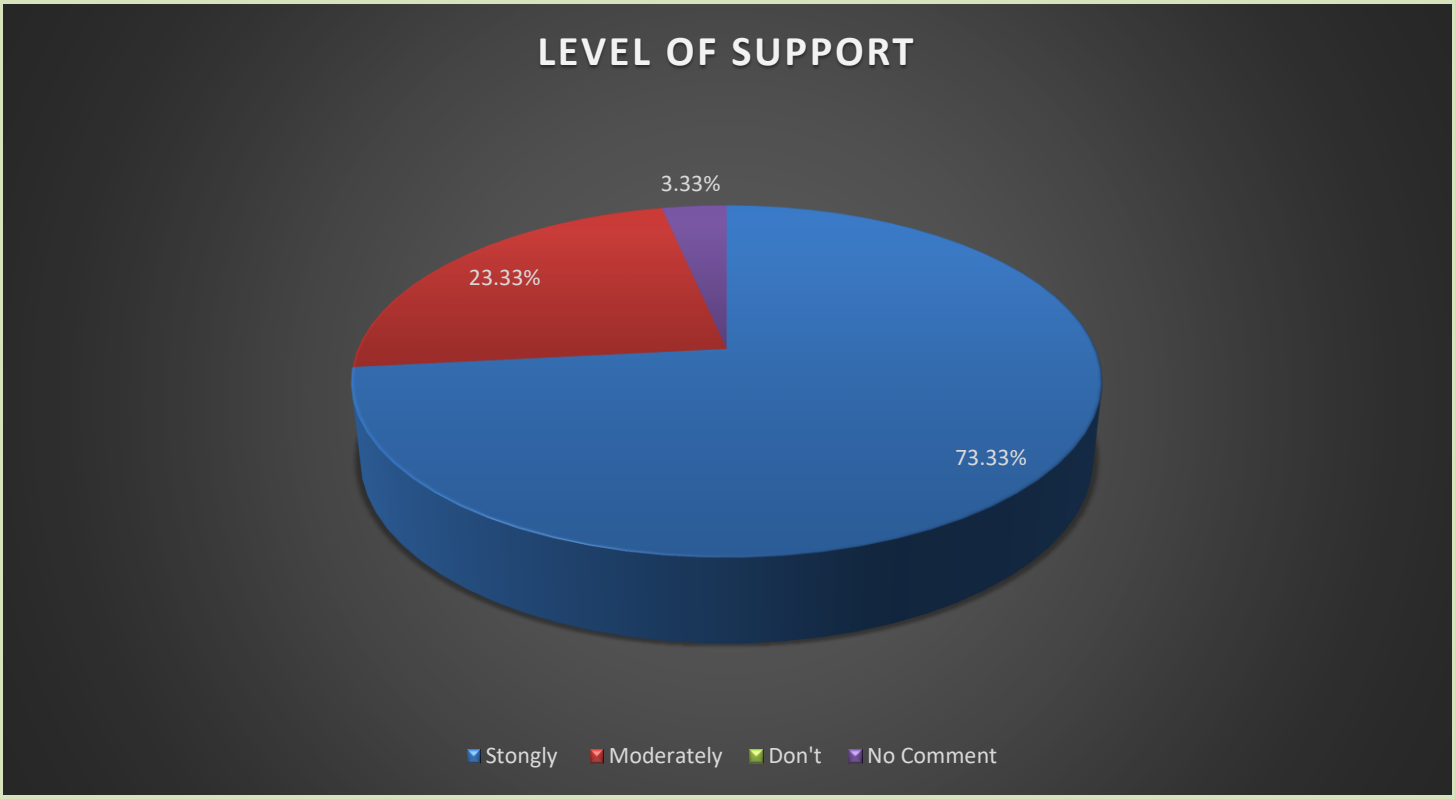
5. Are there trail amenities that you would like to see added to the Killens Pond trail system? Please list and describe where you would like to see them.



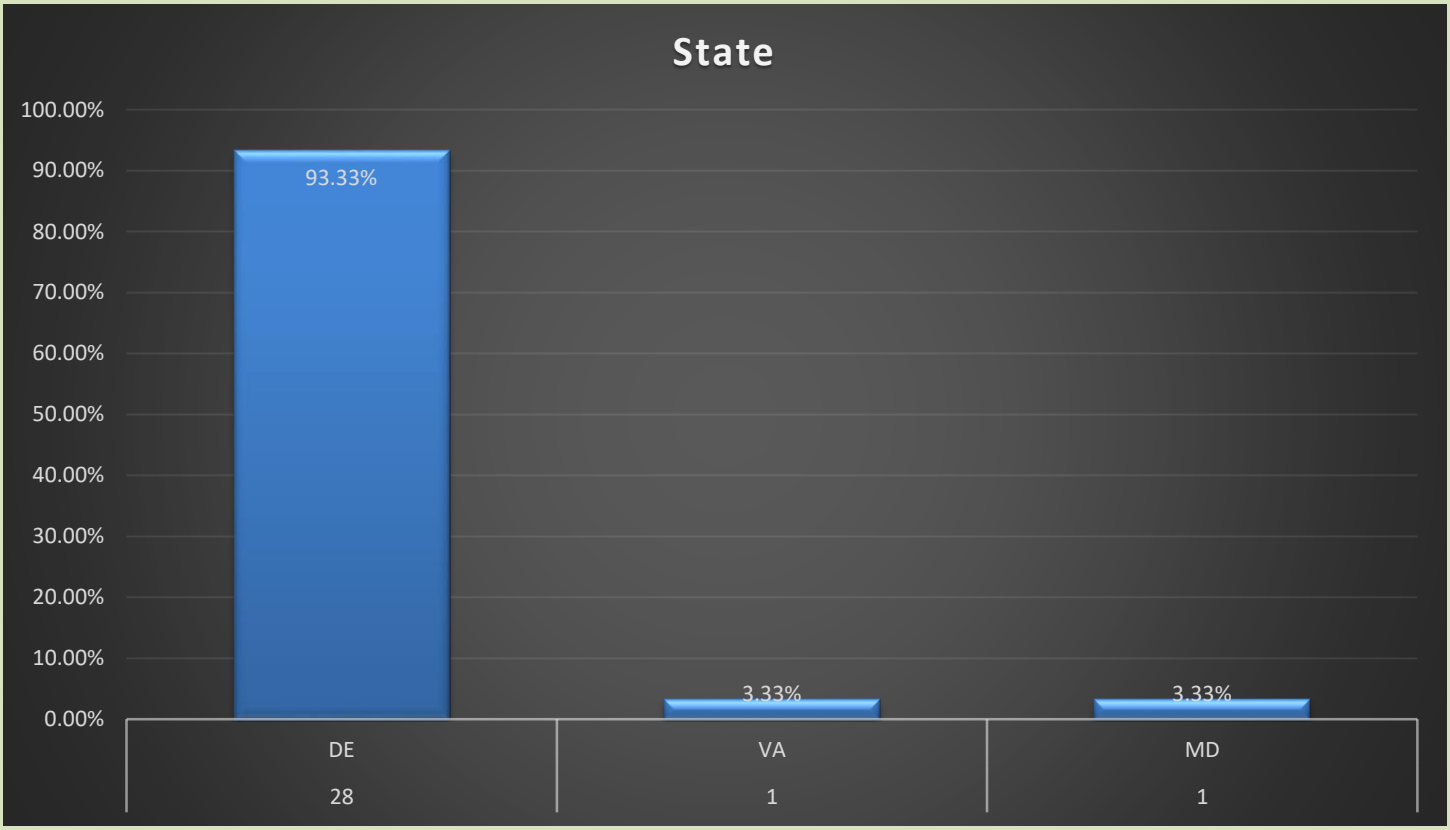
6. Are there trail connections or segments that should be added or eliminated from the Killens Pond trail system?



7. Please indicate your level of support for the proposed Killens Pond Trail Plan.



8. Zip Codes.



Appendix I: Glossary of Terms

Accessible Trail – A trail that complies with the Americans with Disabilities Act (ADA) and follows federal accessibility guidelines.
Bridge – Structures used to transport trail users over obstacles like ravines, bogs, creeks, or rivers.
Contour Trail – A trail constructed such that it follows a contour or a constant elevation.
Double-Track Trail – A trail wide enough to easily allow passing or allow trail users to recreate side by side: wider than 36".
Drainage – Methods of getting water off the trail.
Economic Sustainability – Any trail alignment that supports current and future use as it relates to the cost/benefit of that trail to the public.
Ecoregion_ – A major ecosystem defined by distinctive geography and receiving uniform solar radiation and moisture
Erosion – The natural process of wearing down and removing rock and soil by wind and water. One of the main processes that impact level of trail sustainability.
Essential Experience – A theme that is critical to the park's story and shares the natural and cultural importance that makes each park special for visitors. The essential experiences are the landscapes, structures (natural and historic), resources, and interactions within the park that connects with the visitor to evoke passion, care, commitment, and investment to the greater good of the park as a whole, the life of the individual, and future generations to come.
Fall line – Direction water flows downhill (path of least resistance). A trail that runs on the fall line will channel water down the trail.
Geographic Information System – Software system used to display data allowing for the visualization and analyzation of that data.
Geomorphology – The study of the physical features of the surface of the earth and their relation to its geological structures
Global Positioning System (GPS) – a system used to map trails and other infrastructure locations using satellites and portable receivers.
Habitat Fragmentation – The emergence of discontinuities (fragmentation) in a plant or animal's preferred environment.
Hardening – The manual, mechanical, or chemical action that results in a harder less erosive trail surface
Hydric Soil – Soil that forms under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part
Percent of Grade – The method of measuring how steep a trail or slope is. (10 percent = a rise or fall of 10 feet per 100 linear feet of trail.)
Reroute – new section of trail that replaces and existing section.
Shared Use Trail – Trails that are designed and built for more than one possible user. For example: hikers, bikers and equestrians using one trail.
Single-Track Trail – Trails only wide enough for travel in single file: Usually 12-36" wide.
Single Use Trails – Trails that are designed and built for only one intended user.
Slope – The natural (or created) shape of the land. Change of elevation shown on contour maps. The term is generally used to refer to the hill, not the trail.
Social trails – Unplanned/unauthorized trails developed informally from users and are not recognized or maintained by managing agency.
Social Sustainability – Any trail alignment that supports current and future use as it pertains to the public's acceptance and use of that trail
Sustainable Trail – 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; requires little or no rerouting or minimal long-term maintenance.

Tight and Technical – A type of trail design that allows for tight turns, slow speeds, and can take fuller advantage of natural features.
Trail Corridor – Area including the tread and trim zone on either side of the tread.
Trail Construction – Any new trail or trail segment that is not a replacement or a reroute for an existing trail.
Trail Maintenance – Any routine trail work within an existing trail corridor including, but not limited to, filling ruts, holes, and low spots, deberming, nicking, vegetative management, obstacle removal. Also included are more advanced maintenance needs such as trail structure repair or replacement, resurfacing, and repairing any trail section that has been damaged by uprooted trees, erosion, or wet conditions. It also includes reroutes 50' or less that are needed to mitigate any unsustainable or climate related condition such as erosion, wet areas, steep grades, uprooted trees, etc.
Trail Network – A grouping of trail systems on a regional, state, national, or global scale
Trail Reconstruction – Any trail work within an existing trail corridor including, but not limited to, significant rebuilding, enhancing, or modifying unsustainable, failing, severely damaged, or unsafe trail segments. Also included are reroutes exceeding 50' in length needed to mitigate any unsustainable trail condition such as erosion, wet areas, steep grades, etc.
Trail Surface – surface of any give trail. Examples include sand, grass, dirt, stone, asphalt, and concrete.
Trail System – A set of connected Trails
Trail Use – type of recreation use designed or managed for any given trail (such as hiking, biking, equestrian, motorized, etc.).
Trail Width – width of a trail. Designed width often based on location, terrain constraints, and type or volume of use of a trail.