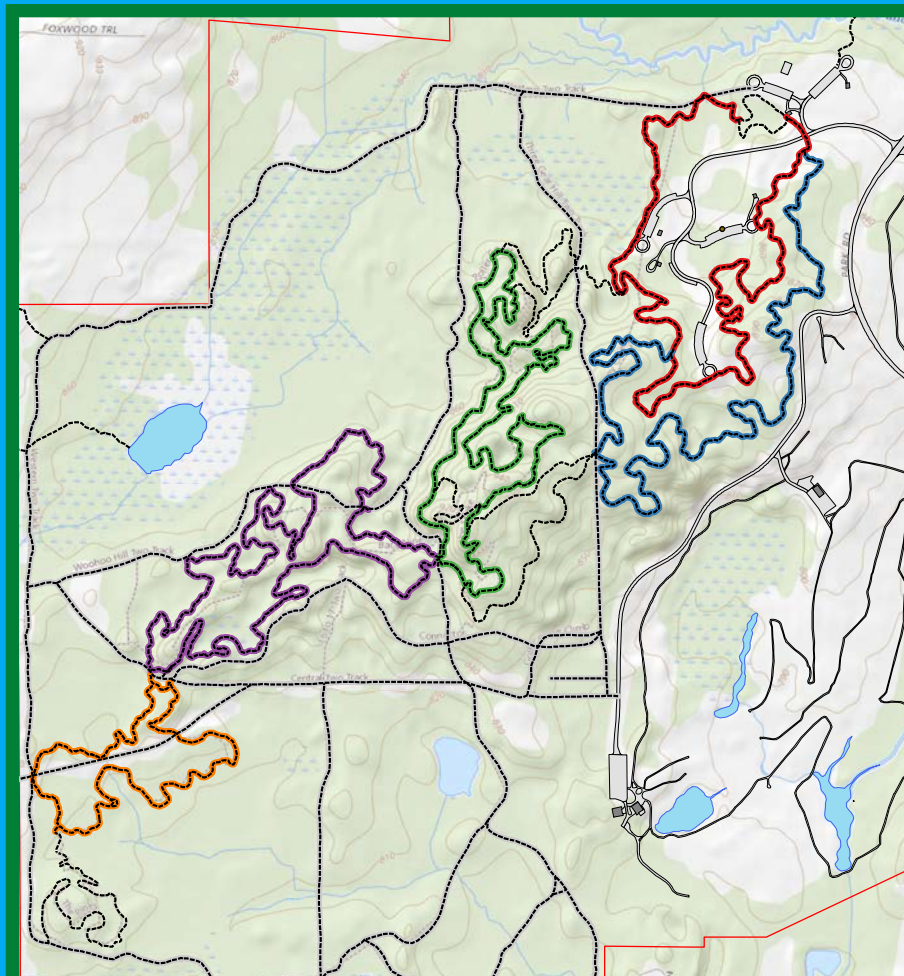


# HURON-CLINTON METROPARKS

## STONY CREEK METROPARK SHARED-USE TRAIL DESIGN



MAY, 2019



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# SCOPE OF WORK



In April, 2019, Applied Trails Research undertook the field-based redesign of the Shelden Hill trail system. The goals of the redesign process were to:

- Replace existing unsustainable trail alignments with routes that would remain durable over time with minimal maintenance,
- Design trails with specifications that maximize physical sustainability, protect natural resources, minimize potential user conflicts, and increase navigability,
- Design single direction loops utilizing existing trails, where available, to create a diverse, stacked loop trail system that offered additional riding and recreational opportunities for newer riders/hand cycles inexperienced trail users (hike/bike/run), as well as more experienced trail users, and also made it possible to remove the need for mountain bikes to ride of riding on the wider, winter trails.
- Provide connectivity to picnic/pavilion areas, the hike-bike path near the lake, gated neighborhood access to the west and Stony Creek Ravine Nature Park to the north of Stony Creek MetroPark, and
- Increase the single track mileage of the system.

The redesign process was successful, adding nearly six new miles of singletrack and a resulting approximately 11.5-mile single track system, mostly in loops (individual loop mileage shown in the table below), providing the connectivity desired, and providing a system that can function with the removal of unsustainable trail segments.

In the pages that follow, the existing trail system (summer and winter) are depicted, followed by maps for the:

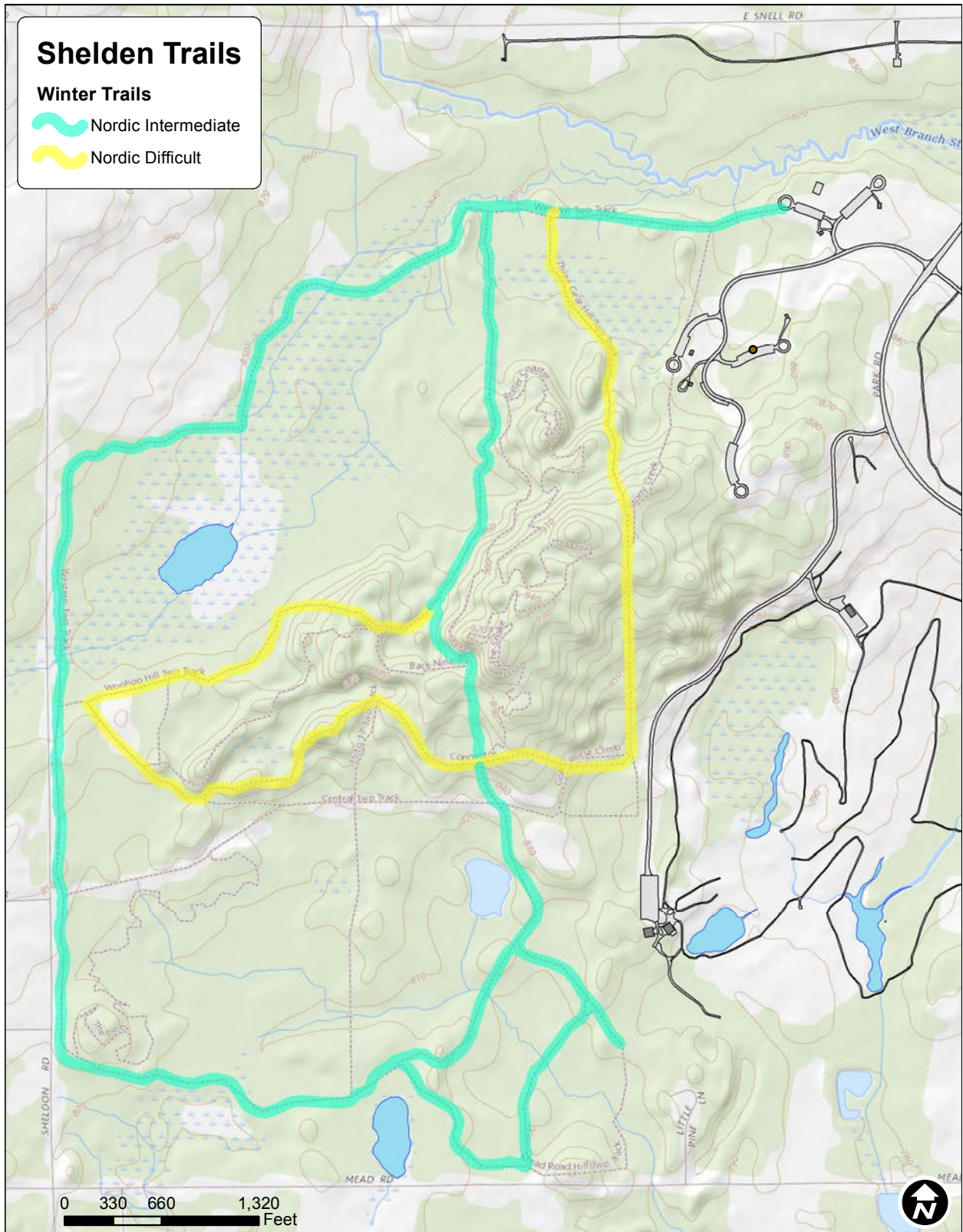
- Redesigned system,
- Actions necessary (i.e. new trail construction and existing trail closure and restoration) to create the redesigned trails, and
- Resultant trails by difficulty level.

First, the redesigned trail system is depicted in its entirety. Following, smaller zone insets of the trail system are broken out to provide additional detail.

Finally, cost estimates and recommended phasing and construction technique (i.e. professional trail contractor, volunteer, or hybrid contractor-volunteer) are presented.

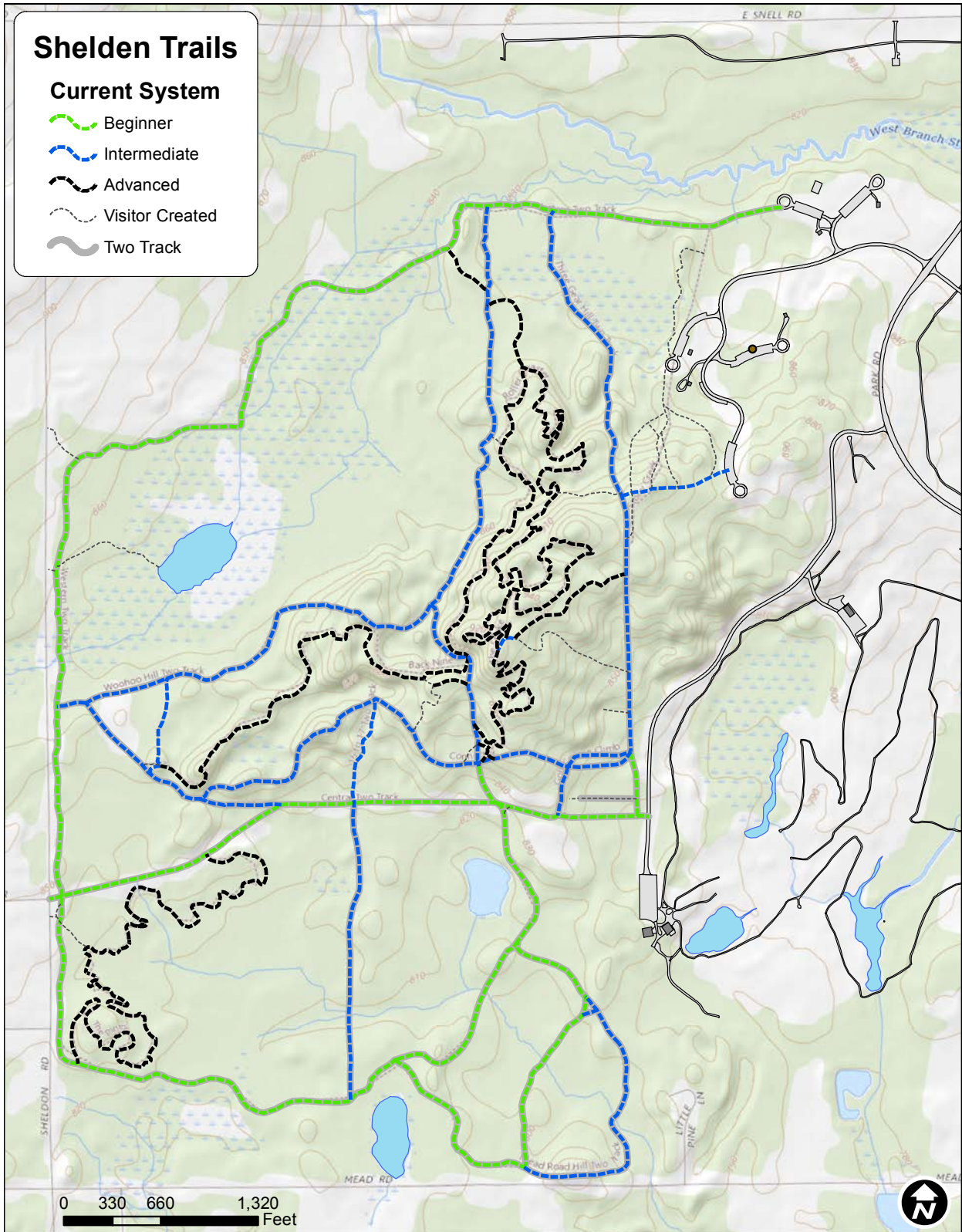
Loop Lengths		
	Feet	Miles
<b>A</b>	10,153	1.92
<b>B</b>	9,198	1.74
<b>C</b>	12,745	2.41
<b>D</b>	11,717	2.22
<b>E</b>	5,870	1.11
North Connector	3,356	0.64
Singletrack Connectors	3,787	0.72
Two-Track, etc	44,584	8.44
The Pines (south)	3,192	0.60
<b>Total</b>	<b>104,602</b>	<b>19.81</b>

# WINTER TRAIL SYSTEM- EXISTING





# SUMMER TRAIL SYSTEM- EXISTING



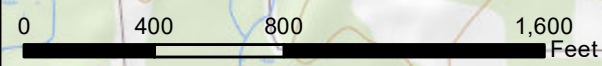
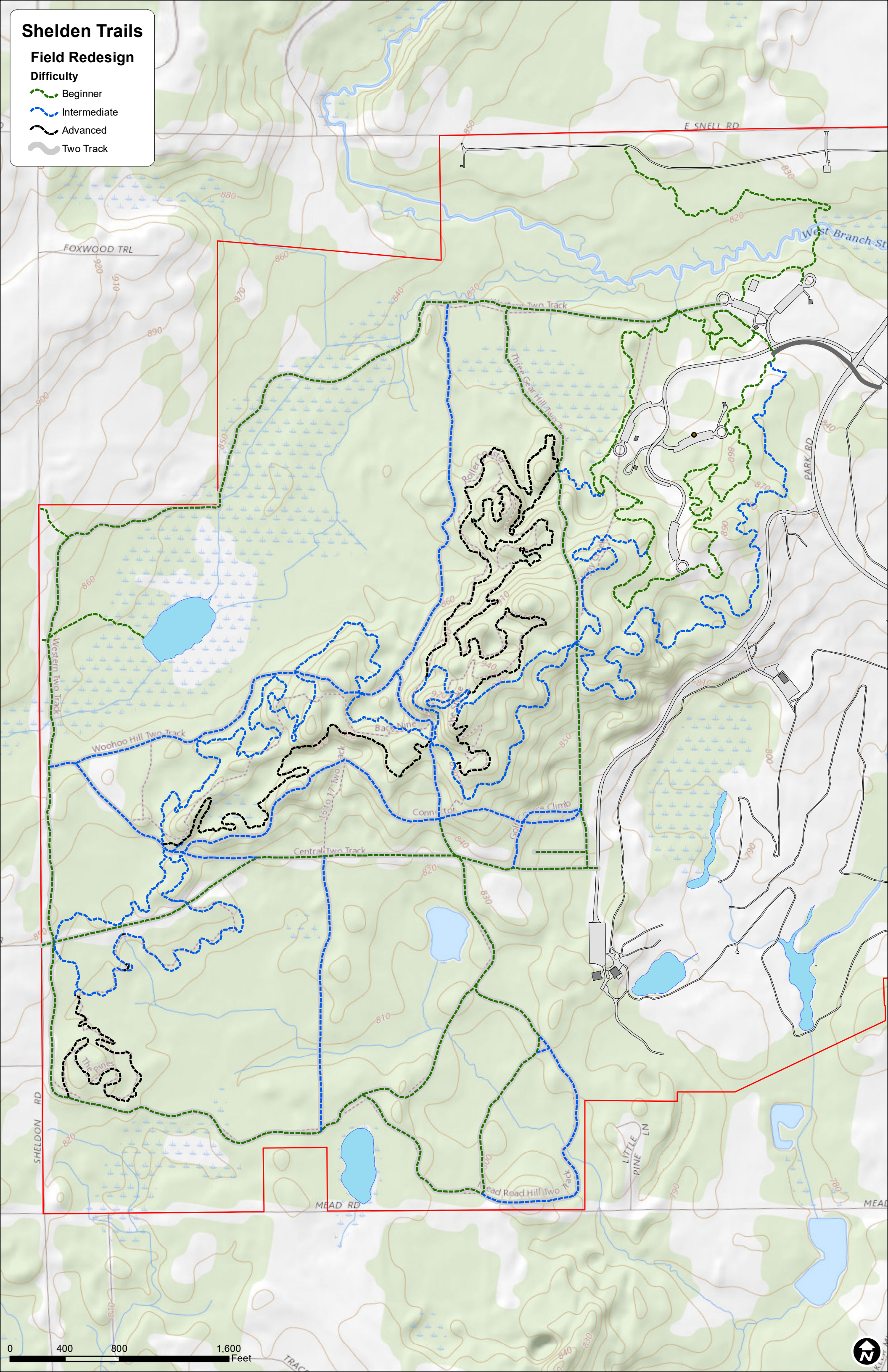


# Shelden Trails

## Field Redesign

### Difficulty

- Beginner
- Intermediate
- Advanced
- Two Track





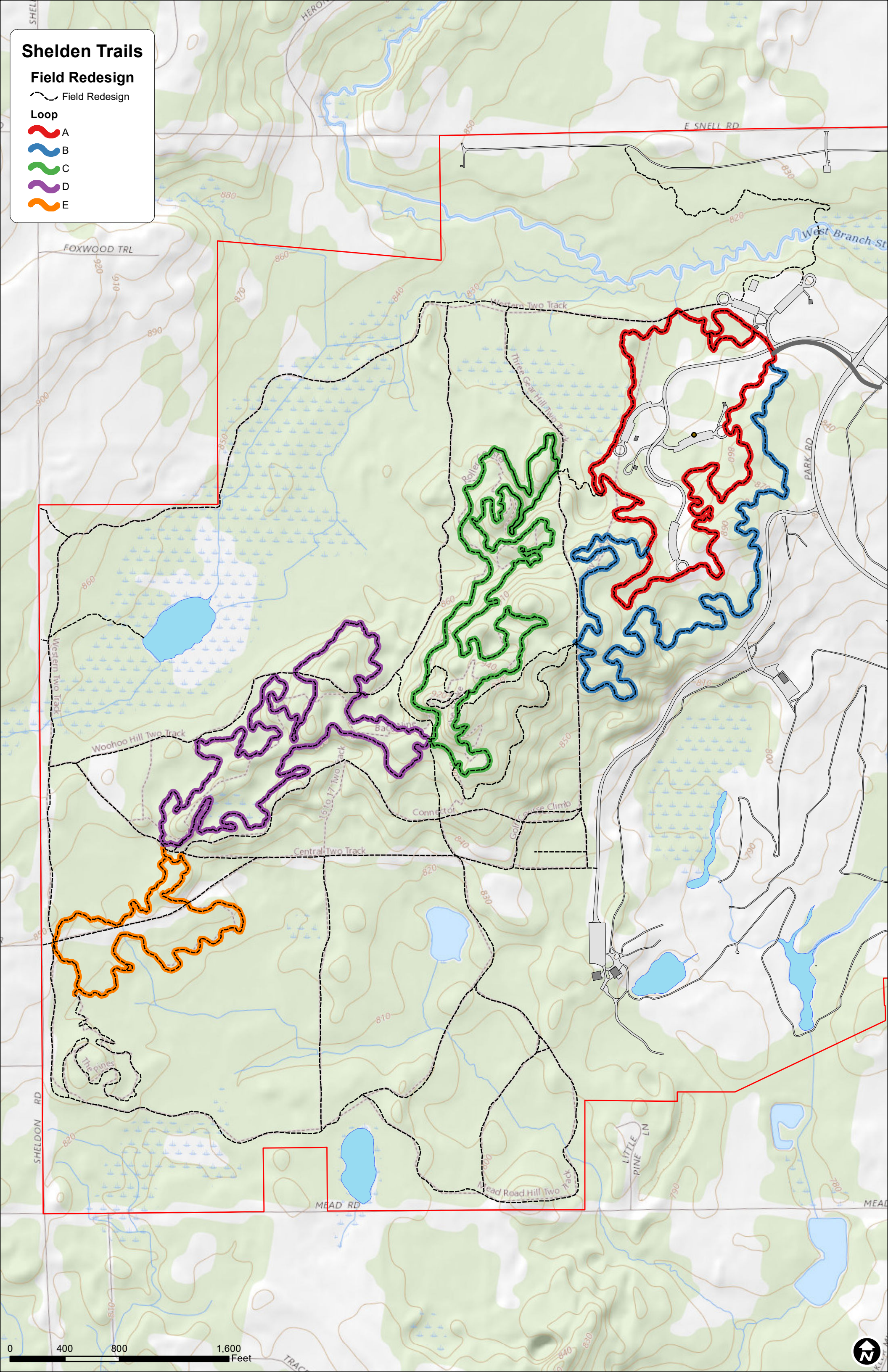
# Shelden Trails

## Field Redesign

Field Redesign

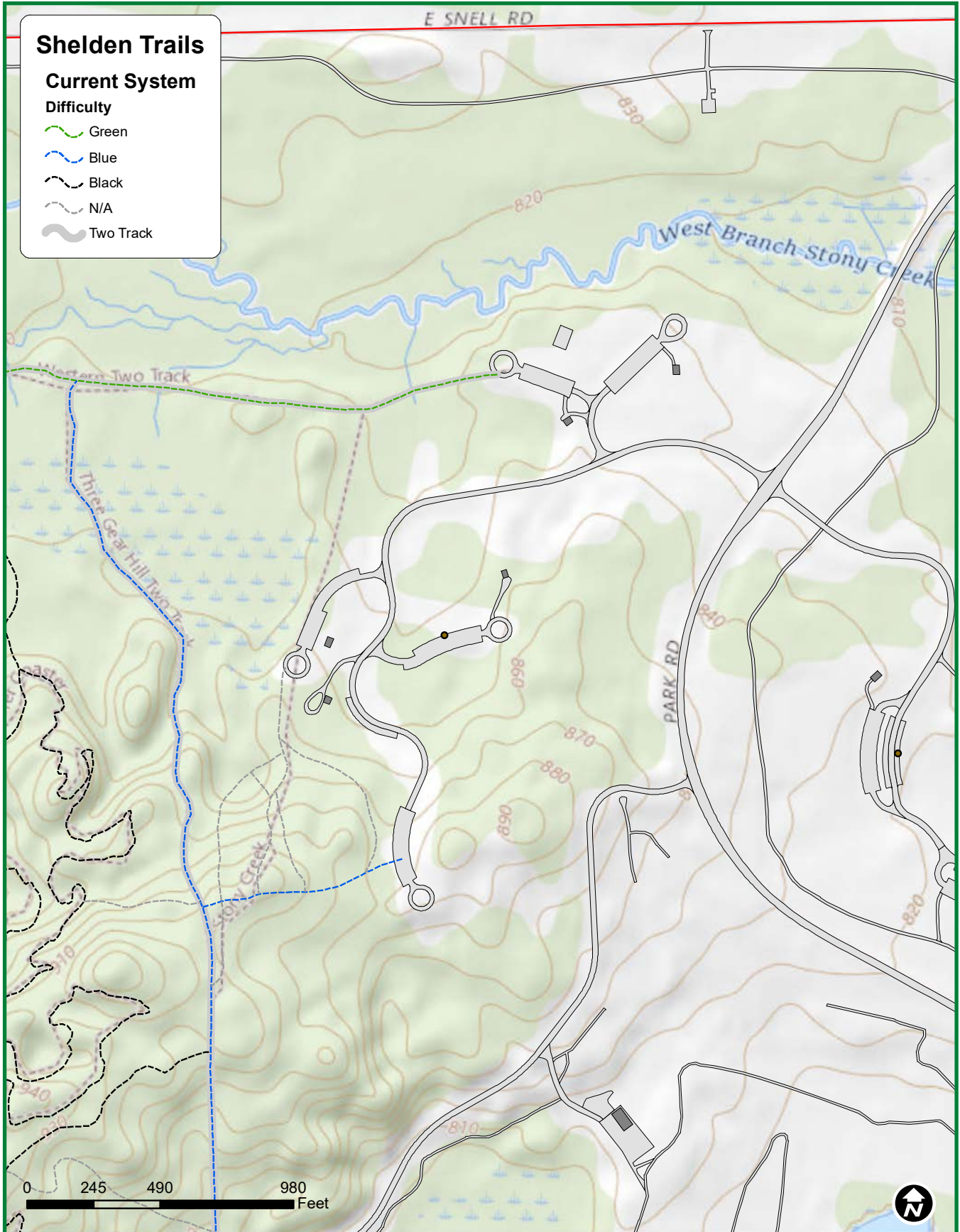
## Loop

-  A
-  B
-  C
-  D
-  E



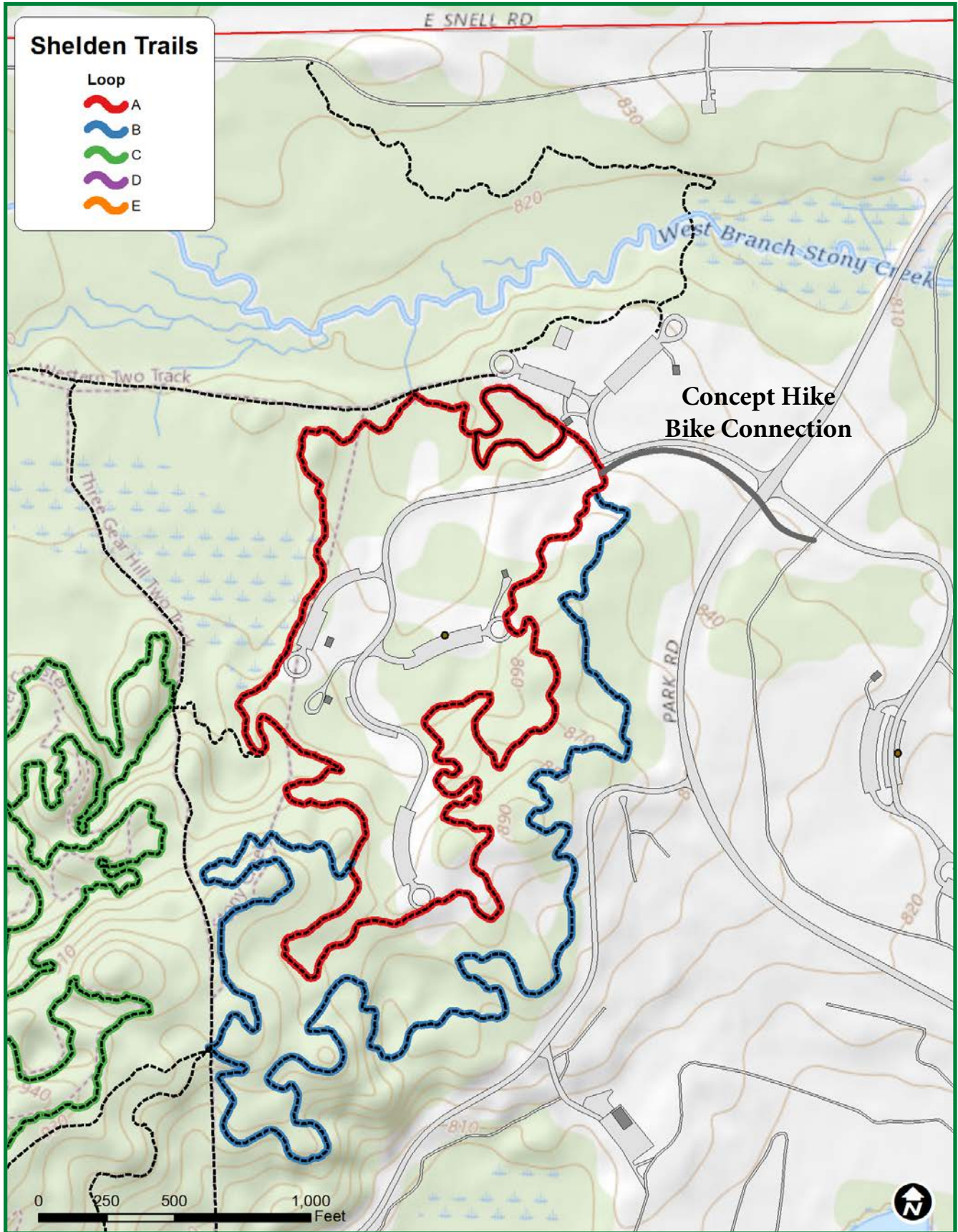


# LOOP A & B- EXISTING



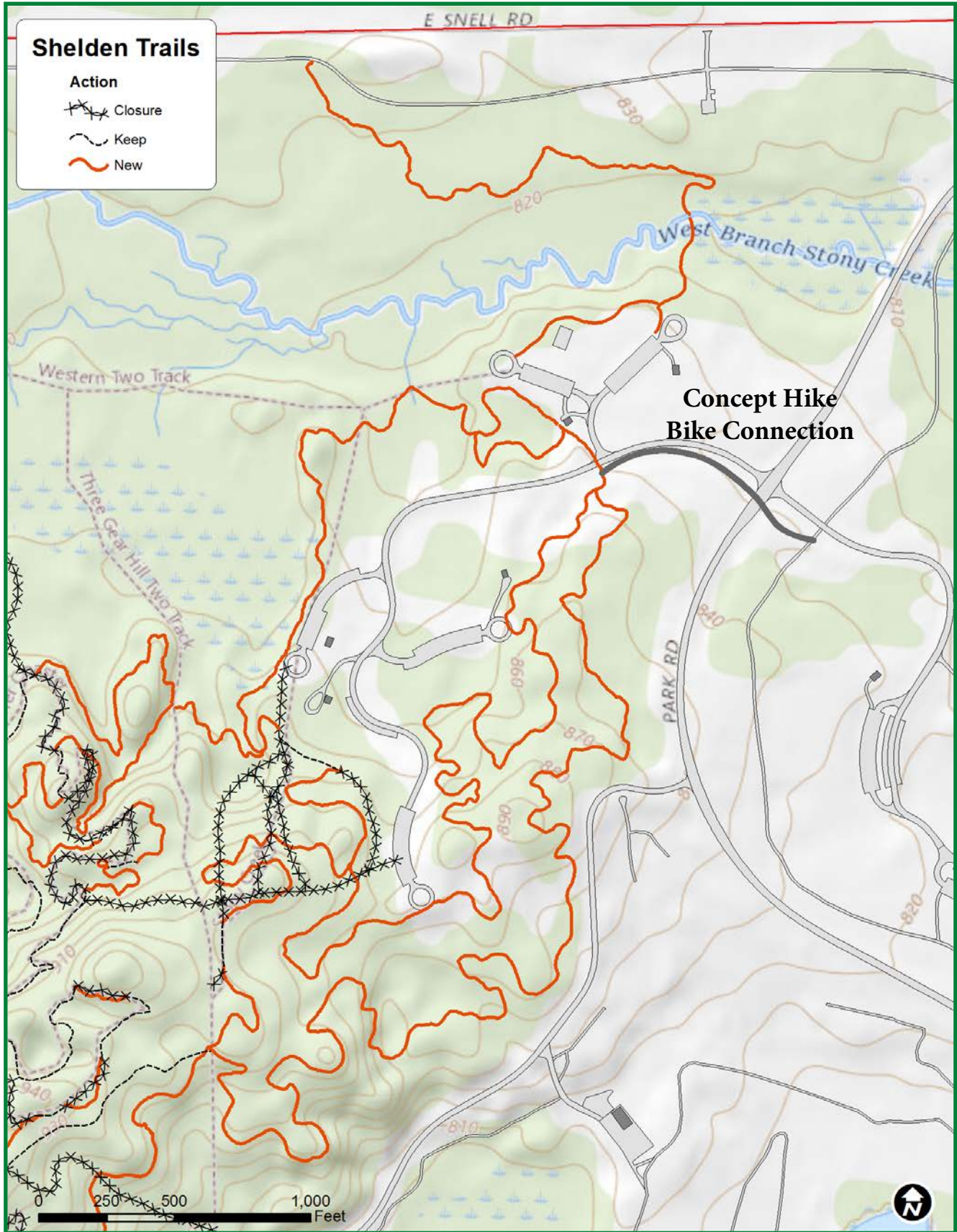


# LOOP A & B- FIELD DESIGNED



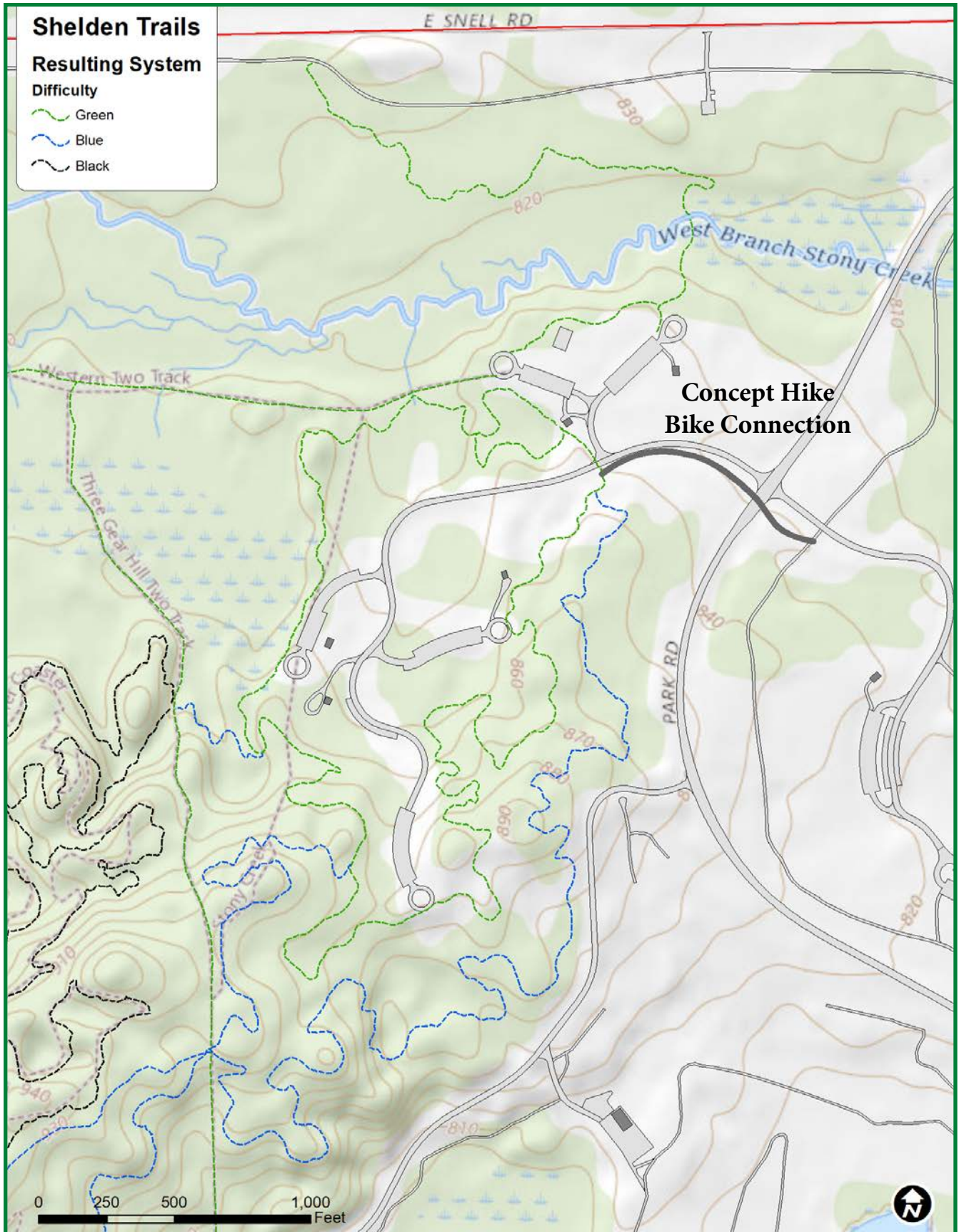


# LOOP A & B- ACTIONS



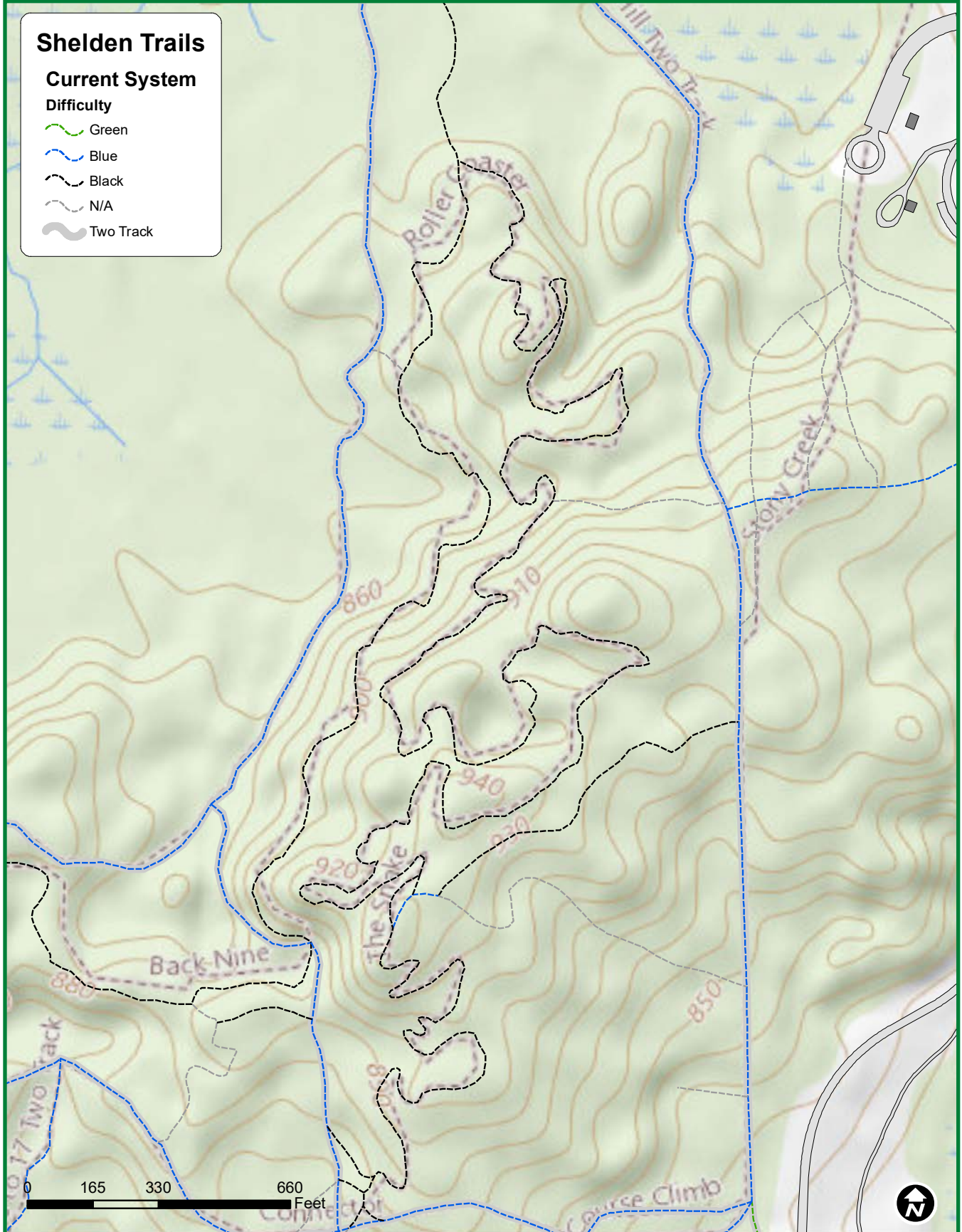


# LOOP A & B- RESULTING TRAILS

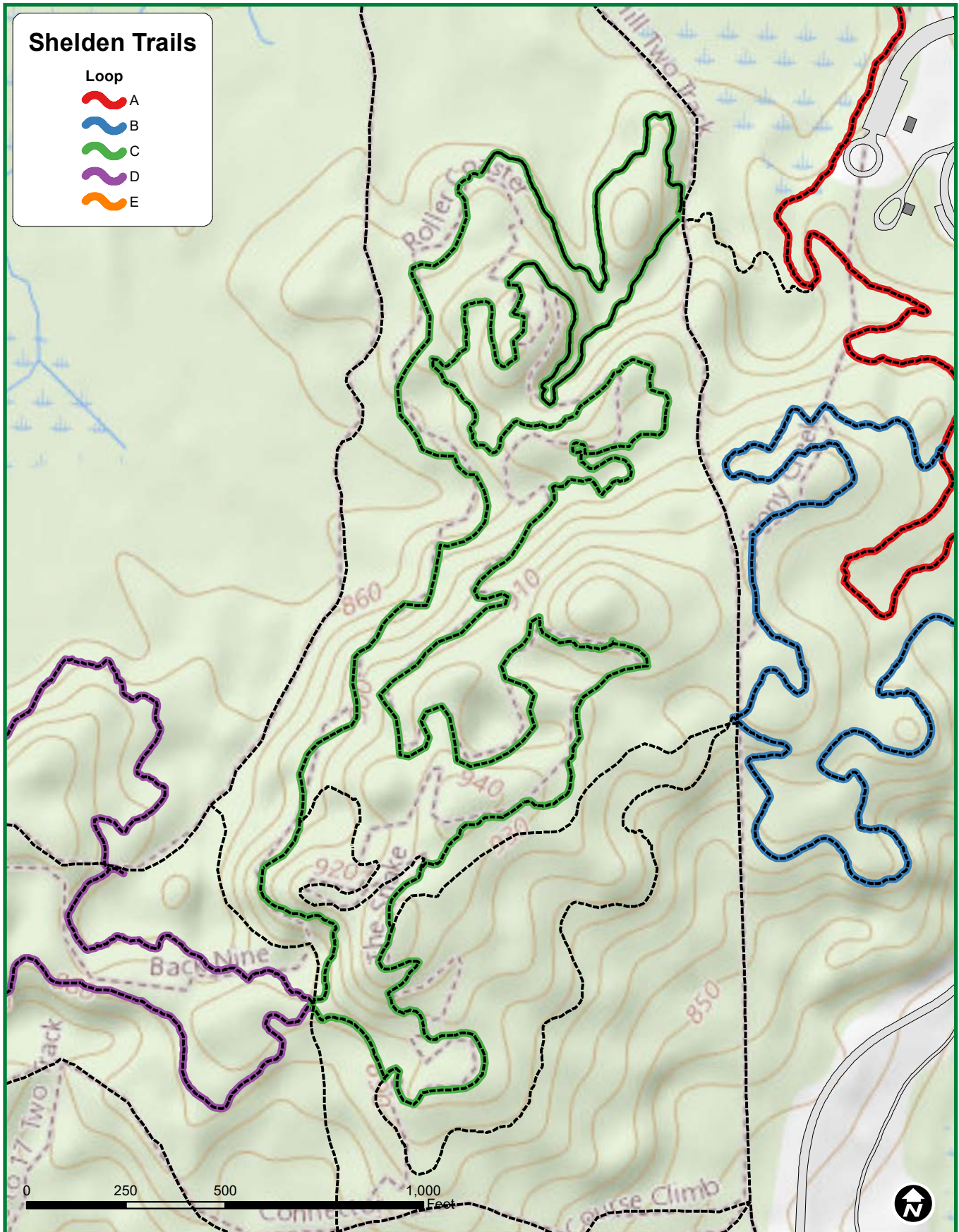




# LOOP C- EXISTING

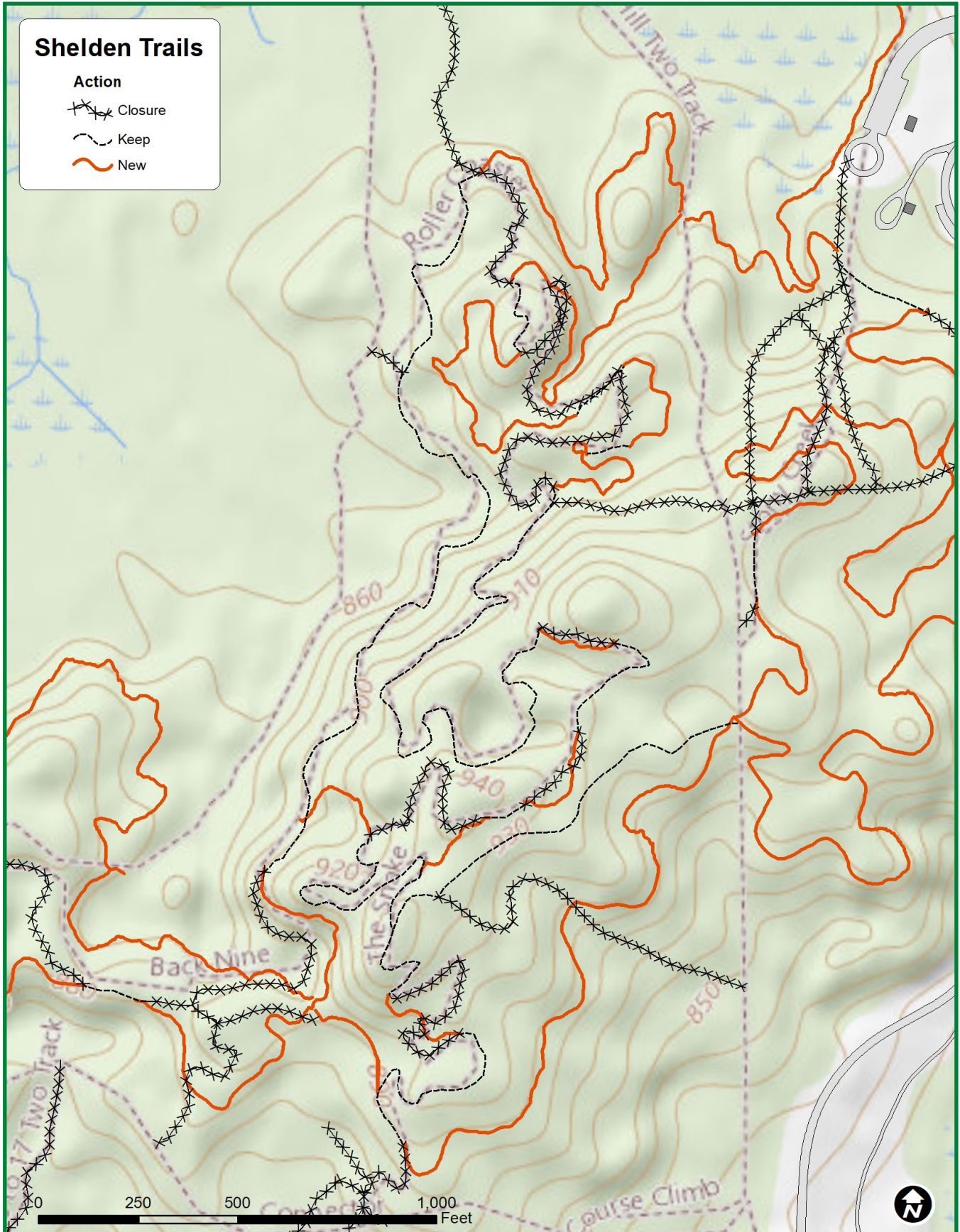


# LOOP C- AS DESIGNED



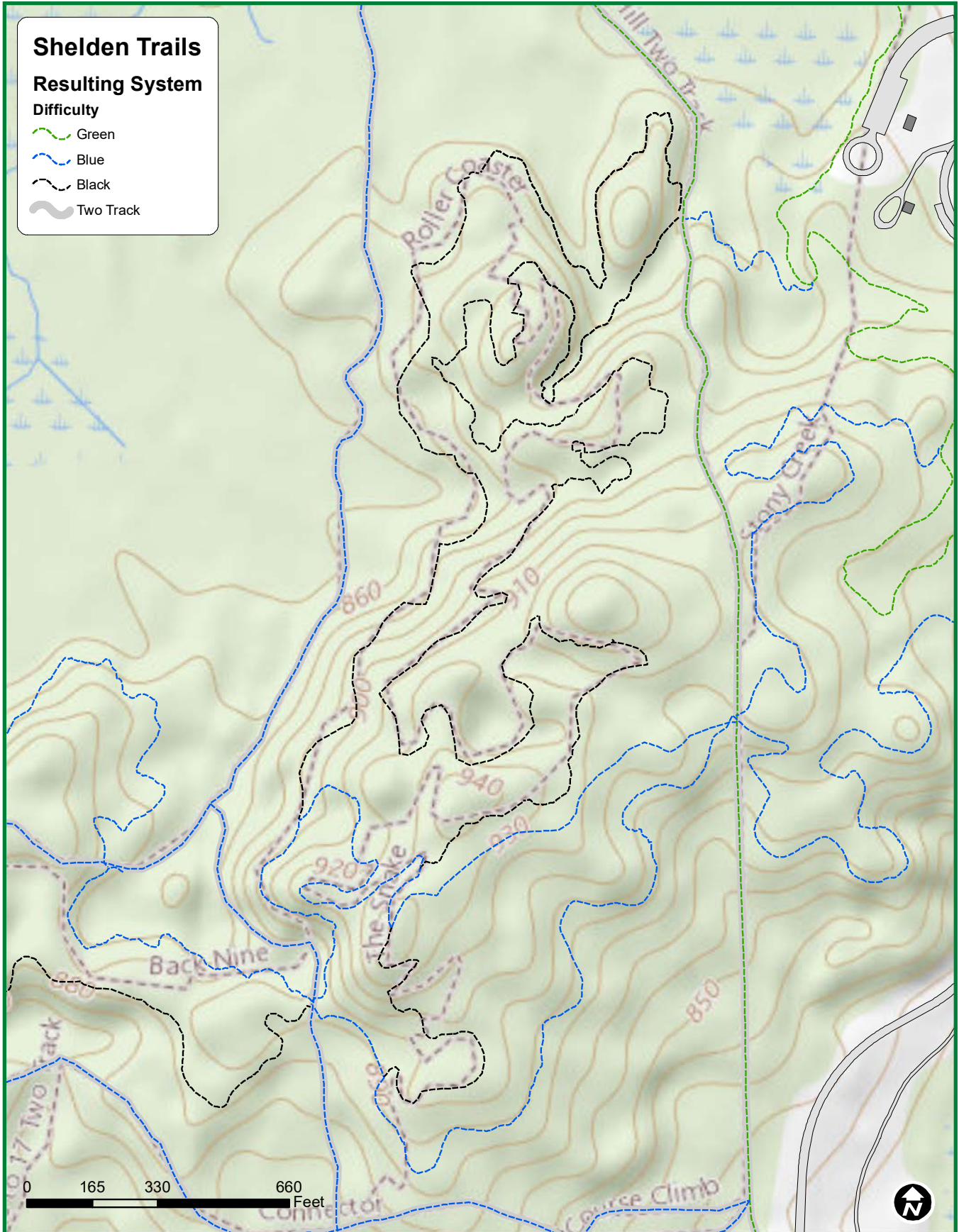


# LOOP C- ACTIONS



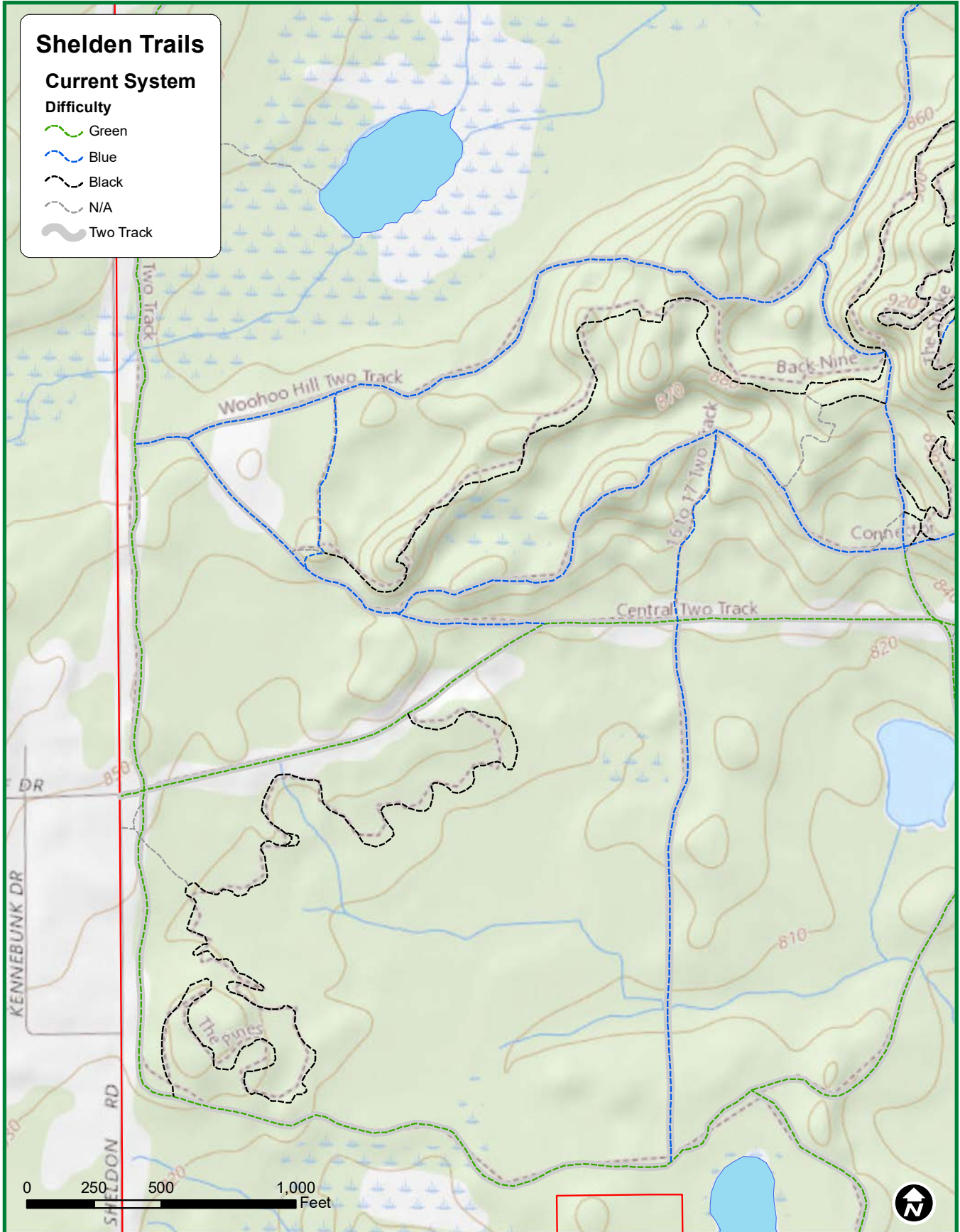


# LOOP C- RESULTING TRAIL

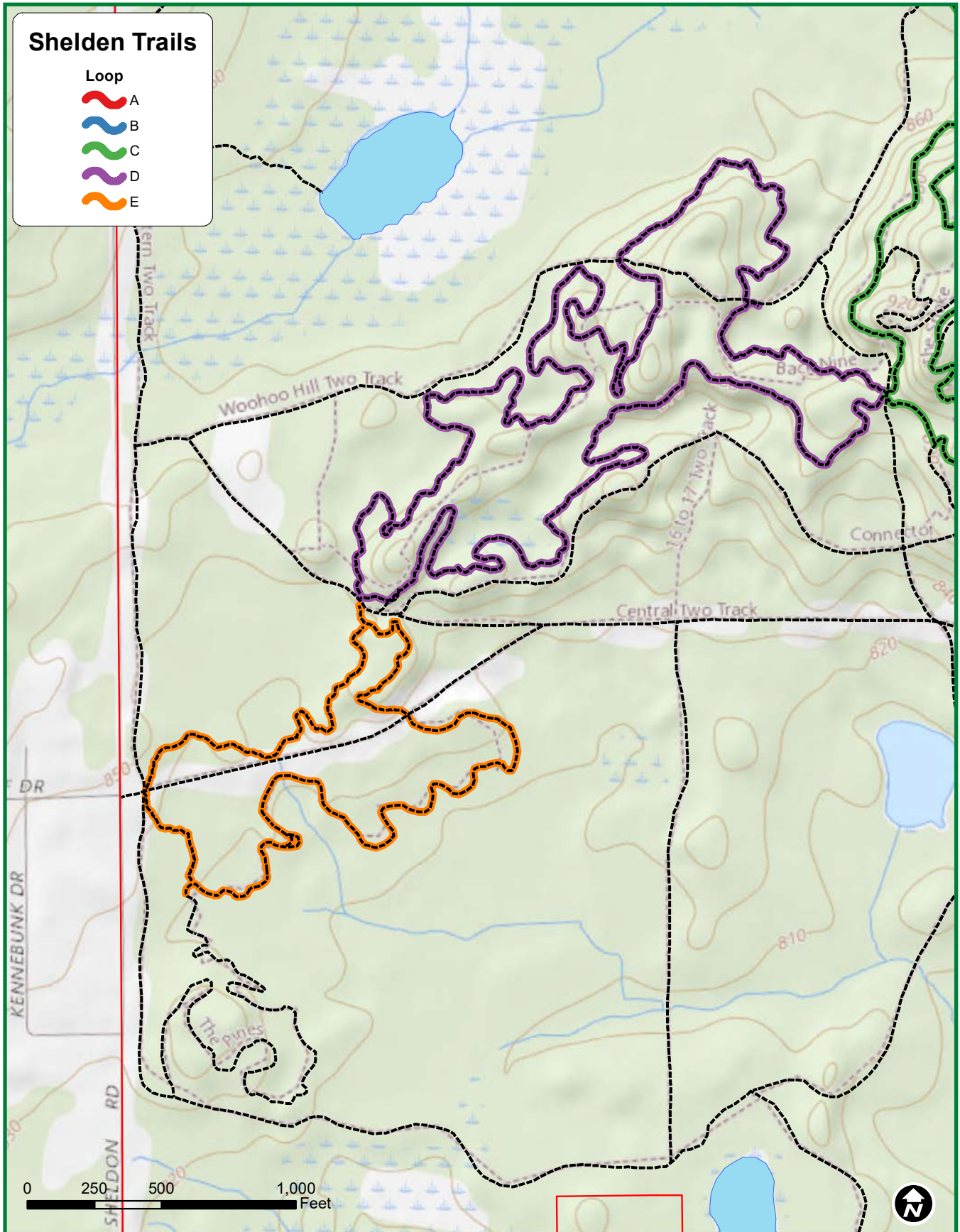




# LOOP D & E- EXISTING

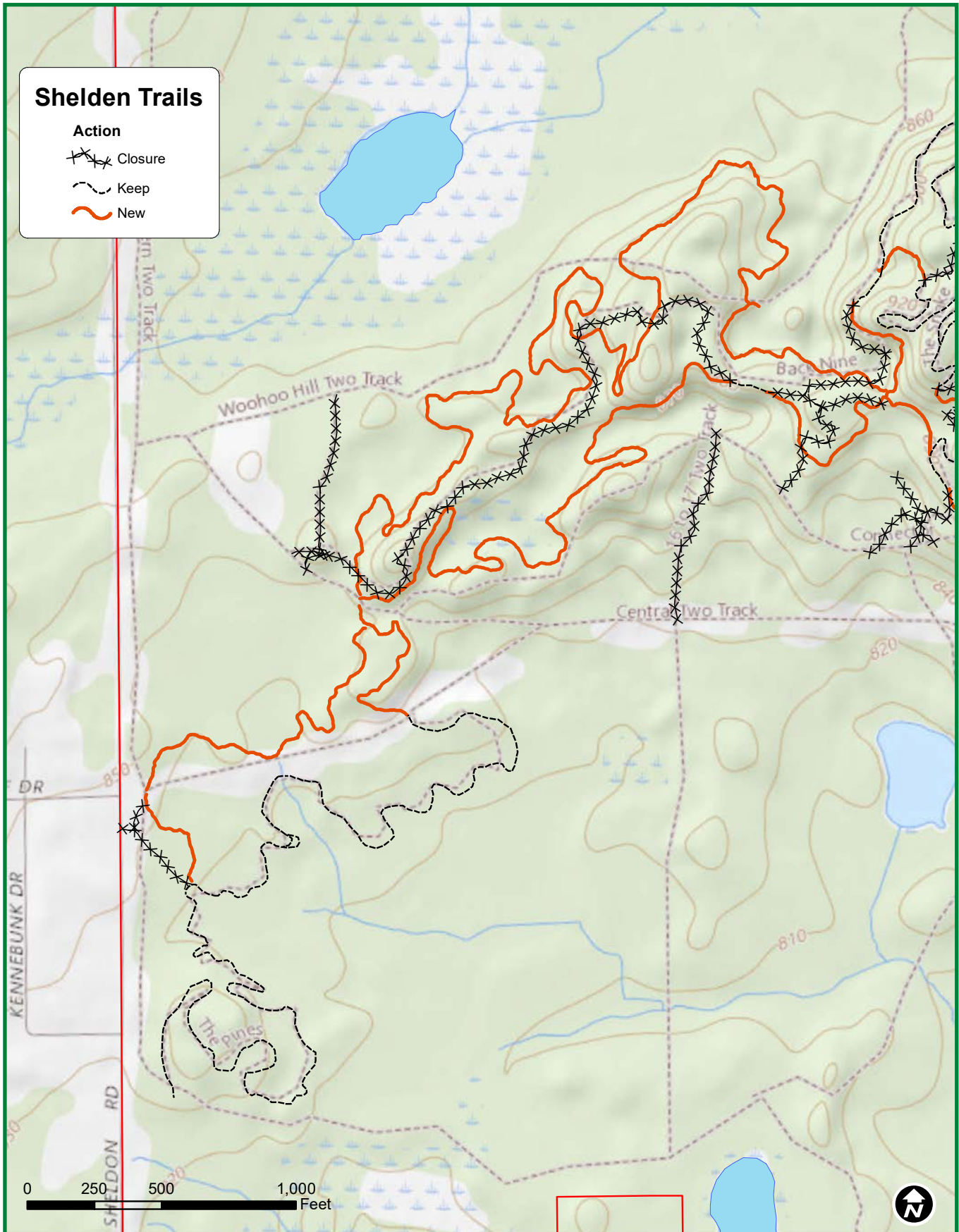


# LOOP D & E- DESIGNED



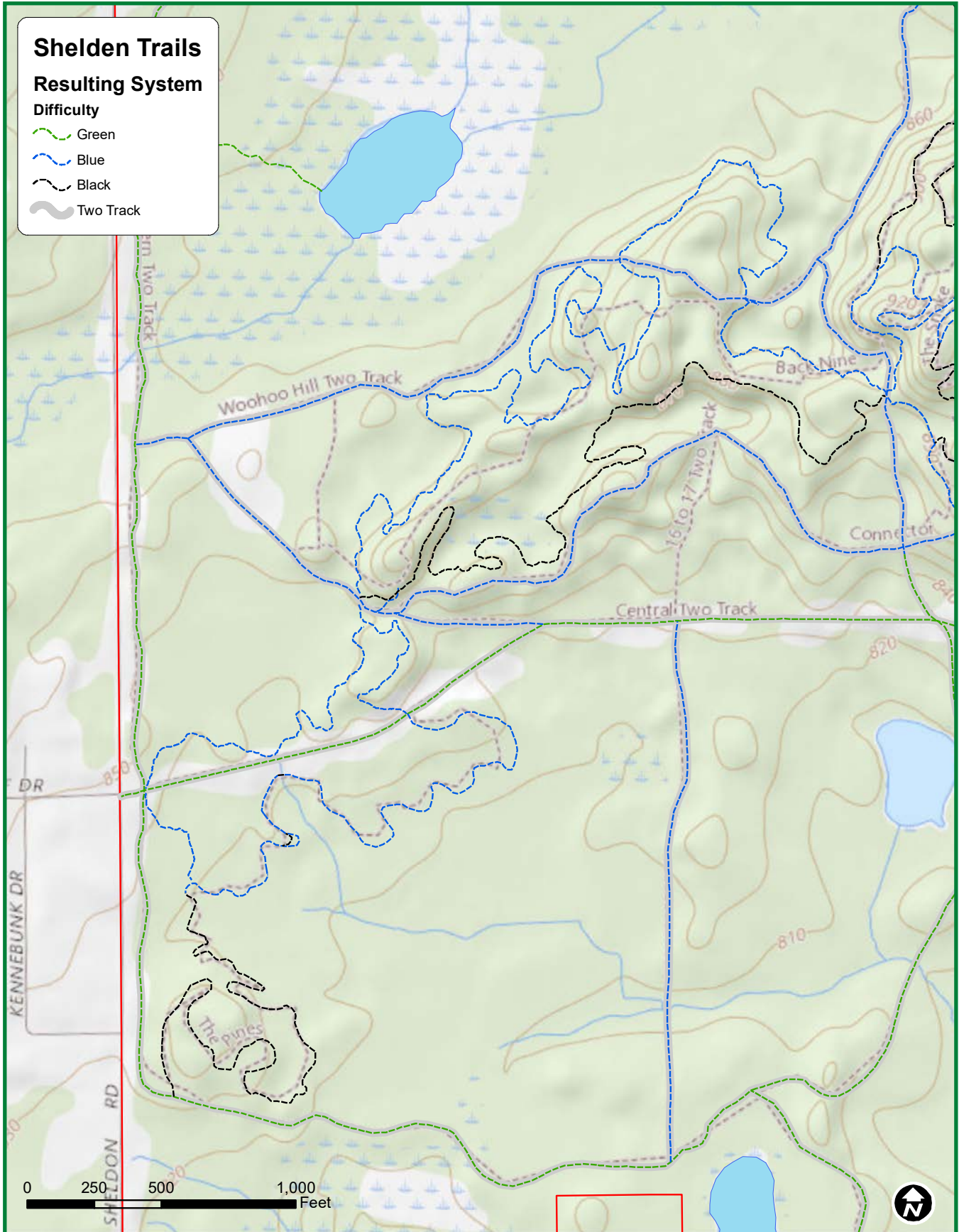


# LOOP D & E- ACTIONS





# LOOP D & E- RESULTING TRAILS





# COST ESTIMATE- OVERALL



Applied Trails Research has developed the cost estimate below based on the assumption of the vast majority of the trail construction and closure/restoration being completed by a professional trail contractor. The estimate below provides an upper limit for capital redevelopment and fundraising. In that framework the proposed complete redevelopment of the Shelden Hill trails would require approximately \$425,000 to complete.

The redevelopment of the system into loops allows for a phased redevelopment of the trail system that can be undertaken over a number of years or lumped into larger redevelopment activities as funding allows. Volunteer-led redevelopment or hybrid trail contracting (with volunteers providing labor assistance to professional contractors and cost savings to the funding entity) can reduce the overall capital needs for the redevelopment, but depend on additional project planning and management by MetroParks staff and a larger group of trained stewards than is currently present.

Cost estimates that follow for the individual loops better delineate where:

- The best options are for volunteer stewardship interactions and cost savings, and
- The recommended phase of each of these individual sub-projects.

The intention of this break out by individual loops/areas is to aid in fundraising and project management planning for an orderly redevelopment of the trail system.

<b>Stony Creek Shelden Trails Redevelopment Estimates</b>				
<b>Overall</b>				
	<b>Footage</b>	<b>Miles</b>	<b>Est Unit Cost</b>	<b>Est Total Cost</b>
Beginner/Family Singletrack	13228	2.505303	\$35,000.00	\$ 87,685.61
Intermediate Singletrack	22622	4.28447	\$27,750.00	\$118,894.03
Advanced Singletrack	9578	1.814015	\$62,500.00	\$113,375.95
Heavy Maintenance	12205	2.311553	\$10,500.00	\$ 24,271.31
Closure/Restoration	15905	3.012311	\$15,000.00	\$ 45,184.66
Features		12	\$ 3,250.00	\$ 39,000.00
<b>Total</b>				<b>\$428,411.55</b>



# COST ESTIMATE/PHASE- A & B



## Trail System Improvements

Loops A and B are nearly entirely new, with two very short segments of existing, informal trail to be updated. The loops will provide enhanced connectivity to the main and secondary existing trail heads and multiple direct connections to the parking areas in the picnic/pavilion areas. The development of these loops will allow for the closure and restoration of the most unsustainable, eroding informal trails that exist in and adjacent to the power line. The sidehill-oriented nature of the trail design will allow the development of rolling contour trails that naturally manage runoff and maintain natural watershed hydrology.

## Intended Experiences

Loops A and B have been designed with specifications to provide a wider, smoother experience than is currently present in the single track trails. Combined with alternative skills development features (engineered metal-wood on Loop A and natural wood and rock on Loop B), these trails will provide the opportunity for newer users to build the skills and confidence to utilize narrower and longer trails further from the trailheads. The width, grade, sinuosity, and undulation of the trails will allow for hand cycle use and provide a flowing, rolling contour trail experience.

## Recommended Phase/Development Style

This should be the initial redevelopment activity. This action would immediately add mileage and accessibility, providing increased diversity to the trail system and additional access when the main trailhead parking area is full. Due to the amount of dirt moving required to build 4-5'-wide trail and the needs to relatively tightly control grade and turn/undulation radii, this sub-project should be developed solely by professional trail contractors.

Loop A				
	Footage	Miles	Est Unit Cost	Est Total Cost
Beginner/Family Singletrack	9872	1.869697	\$35,000.00	\$ 65,439.39
Intermediate Singletrack	0	0	\$27,750.00	\$ -
Advanced Singletrack	0	0	\$62,500.00	\$ -
Heavy Maintenance	265	0.050189	\$10,500.00	\$ 526.99
Closure/Restoration	0	0	\$15,000.00	\$ -
Features		12	\$ 3,250.00	\$ 39,000.00
				<b>\$104,966.38</b>

Loop B				
	Footage	Miles	Est Unit Cost	Est Total Cost
Beginner/Family Singletrack	0	0	\$35,000.00	\$ -
Intermediate Singletrack	9590	1.816288	\$27,750.00	\$ 50,401.99
Advanced Singletrack	0	0	\$62,500.00	\$ -
Heavy Maintenance	193	0.036553	\$10,500.00	\$ 383.81
Closure/Restoration	2822	0.53447	\$15,000.00	\$ 8,017.05
				<b>\$ 58,802.84</b>





### Trail System Improvements

Loop C is a reconfiguration of the existing singletrack trails on Shelden Hill. Short reroutes and closures along the existing volunteer developed trail corridors address issues associated with trail widening, erosion, braiding and tread creep. Additional connectivity at the bottom of the trails improves access from the trailheads, and allows for longer trail based experiences. An additional set of connections (blue loop) provide alternative routes for less skilled users to access and descend Shelden Hill.

### Intended Experiences

Loops C has been designed with specifications that will retain the flavor and character of the existing volunteer built single track. Intermediate and advanced trail users will utilize these trails to engage with the system, complementing the addition of beginner and family friendly trails in loops A and B. The redevelopment seeks to retain the feel of the space while enhancing connectivity of this loop with trailheads and other single track trail.

### Recommended Phase

Much of Loop C redevelopment of advanced singletrack has the potential to be undertaken by skilled volunteers working to develop short sections of new trail and associated short closures. The scale of these sections can be matched to volunteer resources and implemented piece-meal until all are complete. The development of the blue loop on Shelden Hill and several of the larger closure segments (north end of Loop C connecting to “two track”) is recommended for professional contracting.

Loop C				
	Footage	Miles	Est Unit Cost	Est Total Cost
Beginner/Family Singletrack	0	0	\$35,000.00	\$ -
Intermediate Singletrack	2853	0.540341	\$27,750.00	\$ 14,994.46
Advanced Singletrack	5366	1.016288	\$62,500.00	\$ 63,517.99
Heavy Maintenance	8507	1.611174	\$10,500.00	\$ 16,917.33
Closure/Restoration	7512	1.422727	\$15,000.00	\$ 21,340.91
				<b>\$116,770.69</b>



# COST ESTIMATE/PHASE- D, E, OTHER



## Trail System Improvements

Loops D and E add looping opportunities to the western end of the system. Extensive relocation in Loop D provide intermediate and advanced trail connectivity between the pines and the base of Sheldon Hill. Loop E further enhances connectivity with the pines and semi-formal access location along Sheldon Road. Extensive closure along the current ridge trail is needed to create Loop D.

## Intended Experiences

Loops D and E are intended to provide similar singletrack experiences as Loop C, but with the addition of skills features. The result would be a continuous, narrow singletrack route that takes advantage of both the central hills and the low-lying pine flats.

## Recommended Phase

The significant sideslope on much of Loop D and the need to provide a raised tread on Loop E to provide continually dry trail tread create the need for professional contracting on these sub-projects. With increased volunteer capacity developed through the Loop C improvements, there may be the opportunity to hybrid contract for cost efficiency. Unless a trail system to the north, off MetroPark land, is developed in the short term, the connector trail most likely would be developed in this phase.

Loop D				
	Footage	Miles	Est Unit Cost	Est Total Cost
Beginner/Family Singletrack	0	0	\$35,000.00	\$ -
Intermediate Singletrack	7361	1.394129	\$27,750.00	\$ 38,687.07
Advanced Singletrack	4212	0.797727	\$62,500.00	\$ 49,857.95
Heavy Maintenance	168	0.031818	\$10,500.00	\$ 334.09
Closure/Restoration	5126	0.970833	\$15,000.00	\$ 14,562.50
				<b>\$103,441.62</b>

Loop E				
	Footage	Miles	Est Unit Cost	Est Total Cost
Beginner/Family Singletrack	0	0	\$35,000.00	\$ -
Intermediate Singletrack	2818	0.533712	\$27,750.00	\$ 14,810.51
Advanced Singletrack	0	0	\$62,500.00	\$ -
Heavy Maintenance	3072	0.581818	\$10,500.00	\$ 6,109.09
Closure/Restoration	445	0.08428	\$15,000.00	\$ 1,264.20
				<b>\$ 22,183.81</b>

Other Trails (northern connector)				
	Footage	Miles	Est Unit Cost	Est Total Cost
Beginner/Family Singletrack	3356	0.635606	\$35,000.00	\$ 22,246.21
Intermediate Singletrack	0	0	\$27,750.00	\$ -
Advanced Singletrack	0	0	\$62,500.00	\$ -
Heavy Maintenance	0	0	\$10,500.00	\$ -
Closure/Restoration	0	0	\$15,000.00	\$ -
				<b>\$ 22,246.21</b>








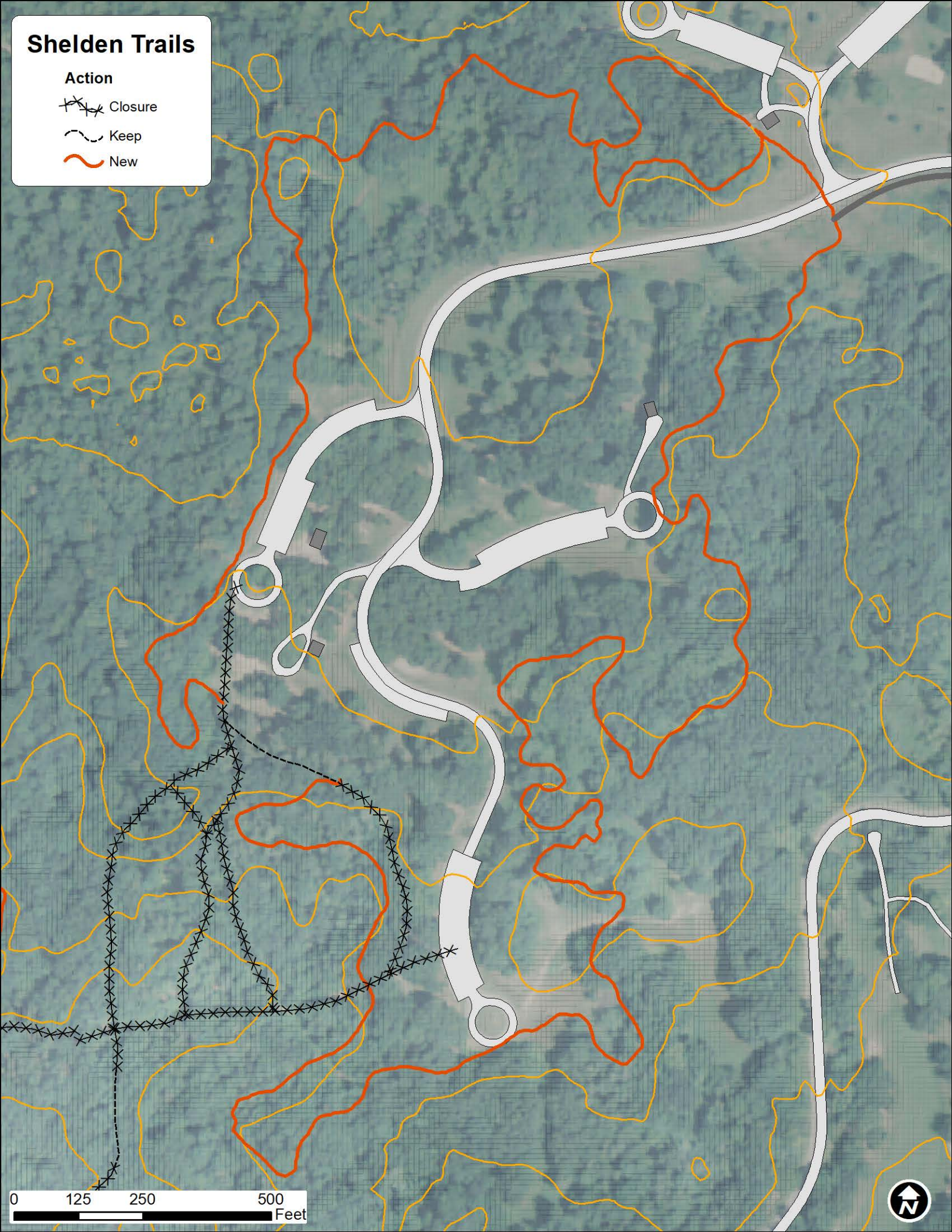
## Loop A & Overall Action Maps



# Shelden Trails

## Action

-  Closure
-  Keep
-  New



0 125 250 500 Feet

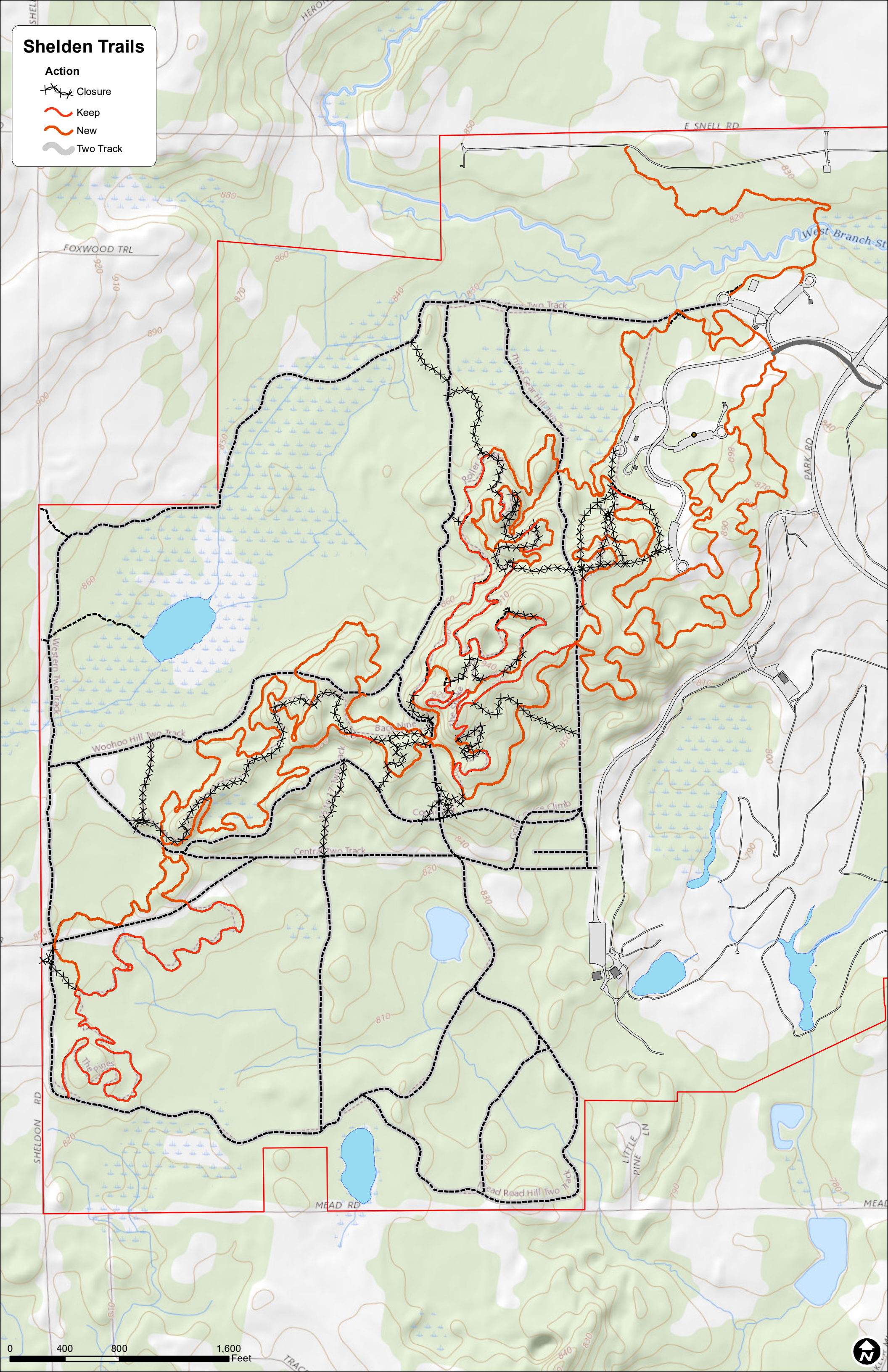




# Shelden Trails

## Action

-  Closure
-  Keep
-  New
-  Two Track







## Trail Specifications

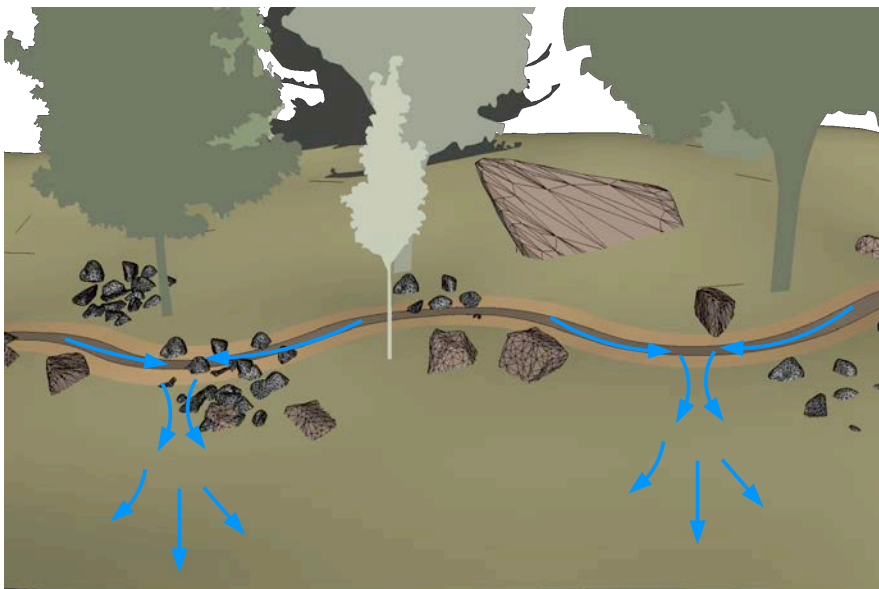


# TRAIL SPECIFICATIONS

All new trails will be developed with rolling contour alignment, relatively low trail gradients, and regular reversals in grade to better manage runoff and minimize soil erosion and deposition. Construction will be full bench cut in nature within a corridor as narrow as possible to allow for the specified trail width. Large trees will not be cut down (except diseased individuals or nuisance species), but instead used to “anchor” the trail.



**Typical 1.1: Rolling Contour Trail**



**Typical 1.2: Grade Reversals**

# TRAIL SPECIFICATIONS

**Trail Type Name:** Green Cross Country (one- and two-way), Hand Cycle-Accessible

**Difficulty Rating:** Less Difficult/Green Circle

**Typical Tread Width:** 36" - 48"

**Typical Corridor Width:** 48" - 72"

**Tread Rugosity:** Relatively smooth, some roots or rocks, protrusions <6" above trail tread

**Average Gradient:** <7%

**Maximum Sustained Grade:** 10%

**Maximum Grade:** 15%

**Typical Tread Materials:** Native mineral soil and rock materials. Excavated material, free of rocks, to be used to create small rollers and insloped turns

**Sideslope Steepness:** Flat to 45%

**Turn Radius:** Wide and open, superelevated (< 2') with grade reversals before and after

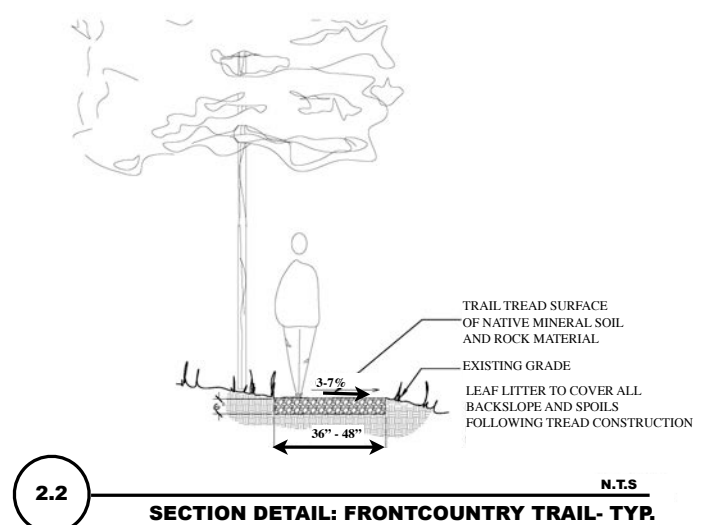
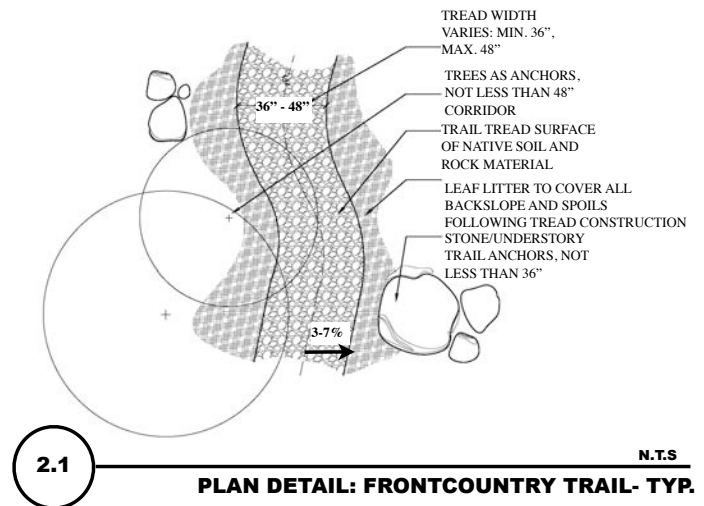
**Trail/Structure Formality:** Formal, 48" width

**Wet Area Crossing Formality:** Formal bridges for minor/major crossings, 60" minimum width

**Duty of Care:** Moderate

**Intended Experience:** This trail type will be developed with a constantly reversing grade and relatively low sinuosity. Excavated soil material will be utilized to form small rollers, slightly insloped trail segments on outside turns, and low superelevated turns. The trail tread will be well defined and contain avoidable obstructions that can be easily rolled over without advanced bike handling skills.

The resulting trail will provide a "frontcountry" style experience with a relatively smooth trail tread that is wide enough to inspire confidence by beginner trail users and hand cyclists. Durably constructed challenge features will be located adjacent to the trail to provide skills progression options and interest in the trail.





# TRAIL SPECIFICATIONS

**Trail Type Name:** Intermediate and Advanced Cross Country (one- and two-way)

**Difficulty Rating:** More Difficult/Blue Square or Most Difficult/Black Diamond

**Typical Tread Width:** 12" - 36"

**Typical Corridor Width:** 36"-48"

**Tread Rugosity:** Uneven, with regular rock and root protrusions, <12" above trail tread

**Average Gradient:** < 10%

**Maximum Sustained Grade:** 15%

**Maximum Grade:** 30%, with armored tread

**Typical Tread Materials:** Mostly natural surface (native soils) with some rock armoring

**Sideslope Steepness:** Flat to 75%

**Turn Radius:** Tight turns with possible switchbacks

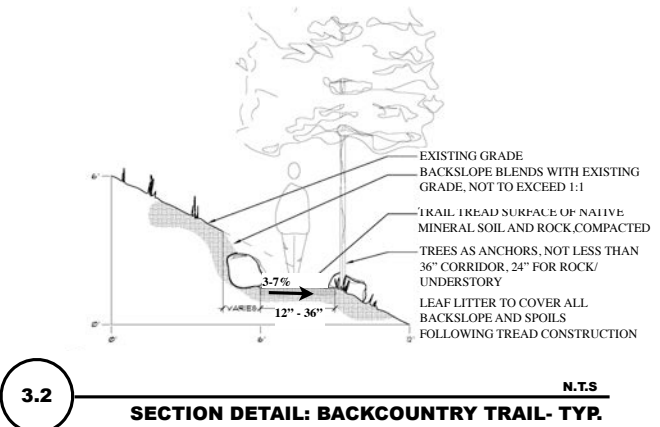
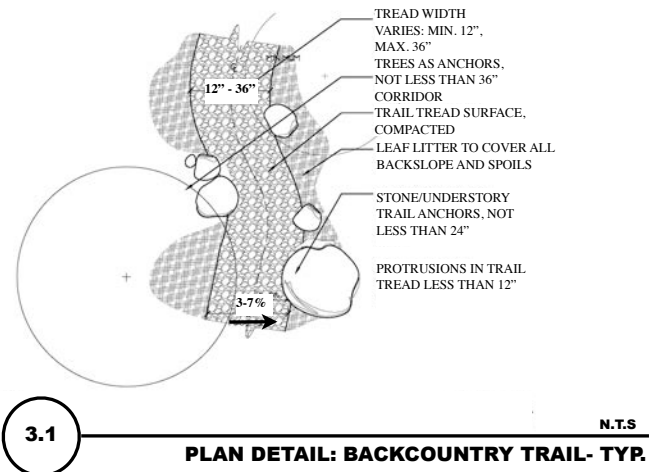
**Trail/Structure Formality:** Low formality, 36" minimum width

**Wet Area Crossing Formality:** Armored crossings at grade where possible, bridges less formal with low level engineering

**Duty of Care:** Low

**Intended Experience:** The trail type will be developed with provide a constantly reversing grade and moderate sinuosity. Tread will be well-defined by a narrower cleared corridor and presence of native rock material. Trail should be developed with constructed natural features of wood and rock which will be enhanced for riding and require moderate to advanced bike handling skills, but will not include large rollers, insloped or superelevated turns.

The resulting trail will provide a "backcountry" type of experience of narrow singletrack and somewhat rough tread.



# TRAIL SPECIFICATIONS

**Trail Type Name:** Mountain bike flow trail  
**Difficulty Rating:** Most Difficult/Black Diamond

**Tread Width:** 24-72"+ (active tread, fill for features will be wider)

**Corridor Width:** 72"-96"+

**Tread Rugosity:** Varies based on trail type specification and terrain

**Average Gradient:** 3-10%

**Maximum Sustained Grade:** 10%

**Maximum Grade:** 15%

**Typical Tread Materials:** Natural surface, full bench cut. Maximum lift and tilt use of cut/spoil materials for trail feature development. Where adequate amounts or quality of soil are not present, borrow pits within 25' of the trail center line employed. All constructed features compacted in 6" lifts  
**Sideslope Steepness:** Flat to 45%

**Turn Radius:** Broad radius, super elevated

**Trail/Structure Formality:** High formality, 36" minimum width, width minimum of 2X maximum height

**Wet Area Crossing Formality:** Armored crossings at grade, opportunity for constructed bridge riding feature

**Duty of Care:** Moderate

**Intended Experience:** These mountain bike-optimized, one-way trails will be oriented for directional use. Grade reversals will be larger and enhanced as rollers or roller tables with excavated or borrow materials. Sinuosity of the trail will be optimized for higher speeds. All turns will be insloped or superelevated to keep riders on the trail and sized accordingly.

## Typical Constructed Trail Features

