865 SHIN POND ROAD · CONCEPTUAL TRAILS PLAN

PATTEN, ME

JANUARY 2023

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ACKNOWLEDGMENTS

PREPARED FOR:

ELLIOTSVILLE FOUNDATION, INC.

PREPARED BY:

INTERNATIONAL MOUNTAIN BICYCLING ASSOCIATION (IMBA)
TRAIL SOLUTIONS PROGRAM

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IMBA TRAIL SOLUTIONS

IMBA Trail Solutions (TS) is the international leader in developing trails, with experience in over 750 projects in North America, Europe, and Asia. Our staff excels at planning, design, and construction of trail systems that provide high-quality experiences for local riders and destination visitors while simultaneously minimizing environmental impacts.

Trail Solutions is a fee-for-service based arm of the International Mountain Bicycling Association (IMBA), a 501(c)(3) nonprofit organization. IMBA's mission is to create, enhance, and protect great places to ride mountain bikes. Based in Boulder, Colorado, and with staff distributed across the country and the world, IMBA meets its goal to create great mountain bike experiences through its Trail Solutions program. Trail Solutions employs approximately twenty professional trail planners and builders. In addition to being industry professionals and exceptional mountain bike riders, Trail Solutions staff hold a broad base of applicable skills and knowledge from planning, landscape architecture, and environmental sciences to GIS systems, CAD, and graphic design.

Our wealth of experience has allowed us to develop the gold standard guidelines for the creation of both sustainable and enjoyable singletrack trails. These guidelines have influenced all major federal land management agencies and a large number of state and local parks departments. We pride ourselves on the positive experiences Trail Solutions has provided to the millions of active trail users around the world and on the economic independence that communities have achieved through the development of destination trail systems.

PROJECT BACKGROUND

Project Background

The Elliotsville Foundation, Inc. (EFI) partnered with IMBA Trail Solutions (TS) to assist in planning efforts of natural surface trails throughout their 856 Shin Pond Road property. TS conducted a site visit in July 2022 and met with EFI staff and local advocates to get an understanding of site conditions, community goals, and other planning efforts. A community meeting was held during this time to inform the public about the planning process and gather input on their needs, interests, and goals.

This report outlines the planning work for the property, covering opportunities and constraints, site visit findings, and implementation recommendations. This plan will help ensure close to home recreation opportunities and support fun healthy activities for residents of all ages and ability levels. It introduces a variety trail experiences for riders, hikers, and runners and creates new opportunities for area youth to engage in trail based activities.

Patten

Patten, Maine is located in Penobscot Country and is home to nearly 900 residents. The town is 25 miles northeast of Mount Katahdin, Maine's highest mountain, and it serves as the northern gateway to Baxter State Park. Patten is a 3.5-hour drive north of Portland, Maine along I-95 with its town center situated on Route 11. Across the international border, Canadian cities including Saint George, New Brunswick and Québec City, Québec are within a 3- and 5.5-hour drive drive respectively.

Given its proximity to expansive forests and river systems, the Patten community was formed around lumbering and agriculture. Local streams have historically been vital for transporting lumber to nearby cities such as Bangor, and rich soils lent themselves to productive farmland. Mills, workshops, farms, and downtown stores have supported the town's economy over the years.

Scenic byways leading to the Katahdin Woods & Waters represent the beginnings of increased tourism in the area. Relicts of Patten's history preserved through the Lumbermen's Museum, Bradford Farm Historic District, and other historic buildings provide an engaging way for visitors to explore the town. The decline of lumbering and agriculture in the region has emphasized the importance of the town's continued efforts to expand tourism and outdoor recreation opportunities.

Elliotsville Foundation, Inc.

Elliotsville Foundation, Inc. (EFI) is a nonprofit in Maine with a mission focused on conservation and recreation. EFI is most notable for their work in conserving and donating over 87,000 acres to the National Park Service as the Katahdin Woods and Waters National Monument (KWW) in 2016.

EFI has land holdings in many locations across Maine and is an instrumental conservation partner for many. EFI has a special interest in human-powered recreation and seeks to selectively open and program their lands through campsites, boat put ins, and non-motorized trails.

Photo Credit: Gregory Rec, 2014 Portland Press Herald

Regional Trails

Patten and the northern Katahdin region are blessed with copious open space and stunning landscapes. Maine has a rich history of outdoor recreation that spans decades. The vast majority of recreation in the region has been traditional forest activities such as hunting, fishing, and motorized trail use. The ATV/snowmobile scene is robust and provides hundreds of miles of trails, with connectivity that spans across state lines. Guiding services are plentiful and help continue the traditional Maine lodge experience. Passive recreation is largely limited to hiking, and the trail opportunities are mostly on older paths which often do not meet contemporary goals of sustainability or experience.

Baxter State Park is widely known as the end of the Appalachian Trail and home to Maine's highpoint, Katahdin. With over 250 miles of hiking trails, Baxter provides everything from simple short nature walks to rugged alpine scrambling.

Outside Baxter, public land is in short supply and much of Maine's traditional recreation occur on privately owned active forest lands. The generosity of private land owners to allow public recreation is a hallmark of Maine's north woods.

The Katahdin Woods and Waters National Monument (KWW) is a newly formed public land administered and managed by the National Park Service (NPS). KWW stretches along the East Branch of the Penobscot River with two main parcels. The larger primary parcel offers a scenic driving loop, numerous hiking trails including the International Appalachian Trail (IAT), and camping. The smaller "Grondin" parcel is closest to Patten. The "Grondin" parcel abuts Lower Shin Pond in the north and Waters Road in the east. Currently the "Grondin" parcel offers hiking or bike riding on the existing road system, with plans for more recreation development.

Patten is home to a new pumptrack, developed with the assistance of the Bicycle Coalition of Maine and local volunteers. The pumptrack is located at the Patten Recreation Area, where a playground, ball fields, and basketball courts are also provided.

The closest mountain bike-optimized trails are found an hour north and south, at the Nordic Heritage Center (NHC) and in Millinocket respectively. NHC provides about 20 miles of stacked loops for pedestrians and mountain bikers, as well as Nordic skiing and snowshoeing in the winter. Millinocket has a number of new trail projects underway, including the Hammond Ridge system with its bike-optimized singletrack and modern Nordic ski trails.

Photo Credit: Gregory Rec, 2014 Portland Press Herald

PROJECT GOALS

1 Develop trails and bike facilities that deliver high-quality experiences to the community

Patten is a gateway to the traditional Maine north woods where a variety of recreational opportunities exist, but the town is lacking in easily accessible natural surface trails close to home. Access and transportation are issues for some community members with more opportunities needed for area youth that are within walking or biking distance of homes and schools. EFI has a dedicated interest in helping provide more close-to-home non-motorized recreation. The area of interest is located outside of downtown Patten, but relatively close to many considering the existing recreation options. This proximity offers a unique opportunity within the community to provide a range of trail experiences for biking, walking, running, snowshoeing, and skiing. The trail network design considers the needs and desired experiences of a range of user groups and looks to complement and enhance the area's plans. This trail plan will be a first for the community and will help foster healthy lifestyles and provide access to fun and engaging activities for people of all ages and ability levels.

2 Introduce progressive mountain bike experiences, skills development, and bike amenities with a focus on beginner trail experiences

An important factor for a successful community trail system is its capacity to support a range of ability levels and provide opportunities for progressive skills advancement. Today's mountain biker is looking for purpose built trails that optimize the riding experience. Bike optimized trails are constructed with features

to enhance that experience. Features may include rock gardens, berms, grade reversals, cambered turns, and modest jumps. They should be designed for a range of users from beginner to advanced skill levels. In order to progressively build skills necessary for more difficult trails, cyclists are looking for features to increase bike handling and balancing skills. Technical trail features (TTFs), such as wooden rollers, bridges, log skinnies, etc. provide the challenge and skill-building opportunities that cyclists are seeking. These features can be located on a designated skills trail or can be provided on the side of trails as optional features. Adequate space must be provided to allow riders to exit the feature and gradually merge with the main trail and other riders. Many of the planned traditional cross country style trails will have the required space and ideal grades to locate optional technical trail features.

The focus of this design is to create a system allow beginners to learn and advance their bike handling skills while also providing intermediate and advanced riders an engaging riding experience that they will enjoy riding repeatedly.

3 Create a working laboratory and education facility to build local capacity in trails development

EFI has a distinct goal of building local and regional capacity around outdoor recreation. Currently EFI is building a learning facility at the 856 property with goals to provide a gear library and educational space for training. EFI also intends to offer up the 856 facility to nonprofits with a need for summits, conferences, or gatherings. These groups would benefit from high-quality recreation such as mountain bike trails, Nordic ski trails, and disc golf.

By creating a venue adequate for classroom teaching and working off of this concept plan for field training, EFI could position itself and the 856 property as a flagship site for the northern Katahdin region.

Maine is experiencing a trail renaissance much like the rest of the country, with more and more agencies and foundations supporting trail development. However, nationally and certainly statewide, there is a lack of qualified designers, builders, and volunteers.

EFI has identified this shortcoming and is making strides towards creating a capacity building program for everyone from weekend warriors seeking more knowledge on how to steward their local trails to individuals seeking to break into the professional industry.

The 856 property provides an excellent venue to implement these trainings and workshops and this concept plan outlines a significant amount of trail which could be phased with curriculum to offer up meaningful educational opportunities.

BIKE FACILITIES & TRAILS

The types of mountain bike trails and facilities considered in this feasibility study are explained below. These narratives are meant to provide a brief description of the envisioned experience, intended user, construction considerations, and approximate ranges of construction costs. The construction costs reflect the cost of retaining a professional trail contractor and are provided for financial planning purposes only. The cost ranges do not include planning, design, and permitting needed to develop the facilities, typically estimated at 10-20% of construction costs. It is important to consider ongoing maintenance costs of trails and bike facilities; these can range from 5-25% of the installation cost.

Trail Types

Modern trail systems use specific trail types as a way of managing users and providing them with the best possible visitor experience. Extensive planning and design should be dedicated to the goal of maximizing a visitor's trail experience while simultaneously balancing the demands of physical, environmental, and social sustainability. This list is not exhaustive.

Traditional Shared-Use Singletrack

These trails can serve walkers, hikers, runners, cyclists, and equestrians. Trails should be constructed and maintained according to sustainable trail construction practices and employ techniques that minimize user conflict. Multiple user types travel these routes; therefore, care should be taken to avoid obstacles such as jumps or water bars which may lead to undesirable trail experiences for some. Turns are constructed sustainably, but are generally not cambered like bike-optimized turns that improve cornering traction. Keeping trail grades within certain ranges ensures both a positive trail experience for users and enables proper stormwater drainage with minimized erosion. Depending on soil conditions, these trails may need surface hardening techniques to provide a durable four-season trail.

Approximate Construction Costs: $40,000-$70,000 per mile

Mountain Bike-Optimized Singletrack

These trails are purpose-built to optimize the experience of riding a mountain bike. The trails can either be unidirectional or bidirectional depending on the type of trail, preferred circulation of users, and management decisions. This type of trail is constructed with features such as rock gardens, berms, grade reversals, cambered turns (typically wider than turns on traditional singletrack trails), and modest jumps. These trails should make use of gravitational forces and, where possible, be managed to enhance trail flow for descending riders. These trails may need surface hardening to provide a durable four-season trail. They should be designed for a range of users from beginner to advanced skill levels. Optional advanced features can be located along the side of the trail to provide challenges for intermediate and advanced riders. This allows many skill levels to experience the full trail mileage, while providing for skill progression within a smaller trail footprint.

- Approximate Construction Costs: $50,000-$100,000 per mile

Tot Track and Bicycle Playground

A tot track is designed for smaller bicycles and beginner ability level users. The track is comprised of reduced-sized rollers as well as low-angle bermed turns that can accommodate balance bicycles as well as regular bikes with short wheelbases. These are essentially small versions of pump tracks, both of which can be constructed with dirt or hardened surfaces. Asphalt is the recommended surface material for tot tracks. Asphalt is more expensive to install, but greatly reduces maintenance costs. Most importantly, asphalt provides a consistent high-quality experience for the users.

Bicycle playgrounds incorporate play features such as prefabricated structures, rocks, berms, tunnels and other challenges to create a fun loop for children to practice skills and improve bike handling. The bicycle playground can range in size and configuration to best fit the site and desired features.

Approximate Construction Costs:

- $10-$30 per square foot (tot track)
- $9-$13/linear foot for trail surface (bicycle playground)
- $1,000 - $5,000 for prefabricated features (bicycle playground)

Bike Parks

The features explained to this point are designed and optimized for bike-based experiences. A bike park combines all or a selection of these features to create an amenity that appeals to a wide range of riders and ability levels. The type and scale of features will be dependent on the community interest, ridership needs, goals of the project, the site's opportunities and constraints, and available funding. Bike parks range from small parks at 1-2 acres, medium sized parks of 5-15 acres in size, to larger parks over 15 acres. Bike parks serve local, regional, and destination ridership by offering a hub of activity to the cycling community by providing progressive facilities that are designed for riders to build skills and confidence while promoting a healthy, active lifestyle.

Mountain Bike Skills Trail

These are trails that have been specially designed for mountain bikers to develop the skills necessary for enjoying more challenging trails. This type of trail is built with different routes and features for a range of skill levels, allowing users to progress their skills with repetition and experience over time. Beginner riders and kids are especially fond of this type of purpose-built bike facility. They are typically constructed on nearly flat or gently sloping terrain and take up relatively little space. Features may include rocks, bridges, drops, rollers, and more. Typically, installed features include a mix of prefabricated structures and those built on-site with locally sourced materials.

Approximate Construction Costs:

- $9-$13/linear foot for trail surface
- $1,500 - $10,000 for prefabricated features

Pump Track and Pump Parks

A pump track is designed to encourage cyclists of all skill levels improve their riding skills in a manner that is fun and repetitive. Pump Tracks are typically a bidirectional closed circuit or series of closed circuits made up of rollers and berms. Pump parks have an open design with a larger area of hard surfaces that allow users to create their own multidirectional routes through the rollers, berms, and jump features. A pump park will foster more organic and creative riding that stimulates both novice and skilled riders. Riding these facilities is an extremely anaerobic activity, so it is recommended that suitable seating and shade structures be installed for users to rest between sessions. Like the tot track, pump tracks and pump parks are recommended to have asphalt surfaces. With an asphalt surface, the track will allow users to enjoy year-round. Contracting with a specialty designer and builder for the pump track is strongly recommended to ensure the quality and enjoyable riding experience of the track. With all pump tracks, necessary drainage infrastructure is necessary.

- Approximate Construction Costs: $25-40/square foot

Adaptive Mountain Bike Trails

Adaptive mountain bike trails are natural surface trails that feature specific design parameters to accommodate adaptive mountain bikes (aMTBs) while providing a high-quality experience for "different-abled" riders. Adaptive mountain bikes are equipped with the proper positioning and geometry to allow the millions of Americans have a mobility disability to enjoy the outdoors. The bikes have three wheels (trikes) or four (quads) and may position the riders in a laid back, recumbent position for most crosscountry style bikes or face-forward with the riders back to the sky which is common for all-mountain style bikes. The style and make of the bikes vary, but all are wider, larger, and heavier than traditional mountain bikes which results in significant changes to acceleration, deceleration, and the ability to change direction and corner.

Adaptive mountain bike trails combine an appropriate combination of width, radius, and grade to create an accessible layout and design of the trail. In general, the adaptive mountain bike trails must be wider, uphill gradients decreased and less abrupt, turning radius increased, bridges and trail features widened, and access to trails must be barrier free with low grade climbs. Riders are positioned lower to the ground which must be accounted for when creating clear sightlines. When a trail traverses steep slopes, the tread width should be increased and tread outslope must be greatly lessened or removed to uphold clear passage in landscapes with high exposure. Rollers and undulations in the trail must be gradual and require adequate spacing between each to allow riders to coast through without pedaling. Pull-outs along the side of the trail should be installed to allow riders to rest along the trail and allow other riders to pass. Trails must free of obstacles for easy (green) aMTB trails, but can feature obstacles, such as rocky sections, on more advanced trails.

Planning and designing for these trails at the beginning of a project is necessary to create trail specifications and a layout that delivers the intended experience. Due to the tread width of aMTB trails, the most feasible way to build these trails is with the assistance of machines.

Winter Fat Biking

Winter Fat Biking is enjoyed on frozen ground or a groomed/packed snow surface over existing natural surface trails, frozen lakes and ponds, or other winter trail network used for Snowshoeing and Nordic skiing. Fat Bikes use wide tires and low tire pressure to distribute a riders wight over a larger surface area that allows them to travel across soft surfaces such as snow and sand. Wide forks are used to accommodate the oversized rims and tires. Tires are typically 3.5 – 5 inches wide and run with lower tire pressure, usually under 8 psi and at times during very loose conditions riders have pressures set at 2-3 psi.

Winter Fat Bike trails offer similar riding experiences to those found on other traditional cross country and bike-optimized trails. Trails can be gravity oriented and include features such as berms, rollers, and jumps. Not all singletrack trails are optimal for winter use, additional considerations are needed to accommodate the type of grooming equipment being used to set the track. Tread width, turning radii, bridge widths, tree spacing, steep grades, and off camber sections all factor into the design. Beginner singletrack and bike-optimized trails with their wider tread and gentle grades often make good winter trails. Trails can be constructed specifically for winter use only or they can overlap with existing singletrack or other winter trail networks. Winter trail systems often function best with trails dedicated to fat bike use or shared bike/snowshoe options. Shared-use access to Nordic trails has had mixed success as user conflicts can arise. Thoughtful layout of shared corridors, parallel trails, and carefully located intersections have made for successful Nordic trail network use by Winter Fat Bike operations.

Ideal conditions are generally cold and dry with consistent temperatures and snowfall, the ground needs to be frozen with only a few inches of fresh snow to begin creating a base of compacted snow. A compacted trail surface is important to keep tires from sinking in too far. Wallowing in deep fresh powder, plowing through wet slushy snow, or on an unconsolidated base is an incredibly challenging experience and is generally frowned upon as it creates ruts in the trail surface. General guidelines are if your tire is sinking more than an inch the snow is too soft to ride or the riders tire pressures are too high (reduce pressure and reassess).

Like ski and snowmobile trails, groomers are needed to maintain a consistent snow surface for a quality riding experience. The grooming equipment used will vary depending on the needs of the system and trail widths but are usually much smaller than the snowcats used on ski trails. Grooming equipment for narrow singletrack has evolved from simply packing out the trails with snowshoes and tire dragging to trail specific machines. Many types of equipment exist such as tow behind rollers and drag mats that can be hooked up to snowmobiles, ROKON's (small two wheel drive motorcycle), or ATV's. Custom machines like the SnowDog and Trail Tamer were designed specifically for fat bike trail grooming and are usable on trails that are too tight for most other machines.

It is not recommended to allow Fat Bike access on Snowmobile trails due to the large speed differentials.

NICA Training and Racing Facilities

NICA, the National Interscholastic Cycling Association, develops mountain biking programs for student-athletes and coaches across the United States. Over 19,000 student-athletes in junior high and high-school participate in 31 state and regional leagues supported by over 9,000 volunteer coaches and 10,000 additional volunteers. Participant numbers continue to grow. In the last ten years, student-athlete participation has averaged 48% annual growth, and coach participation has averaged 75% annual growth.

The league's mission is to build strong minds, bodies, character, and communities through cycling with the values of fun, inclusivity, equity, respect, and community. Unlike some youth programs, there are no bench warmers. Every athlete participates, and the league offers a multitude of benefits: getting kids outside; promoting healthy lifestyles; exposing kids to cycling and outdoor advocacy; and providing social interaction, leadership opportunities, and life lessons such as self-awareness, discipline, success, failure, empathy, humility, and sportsmanship. In 2018, NICA launched GRiT (Girls Riding Together), a program focused on engaging more girls and women as student-athletes, volunteers and coaches. They also updated their Teen Trail Corps advocacy program to promote stewardship of the trails. Some leagues include Elevate programs for student-athletes with mental and physical challenges, making the sport more inclusive and integrated than many other high school activities. NICA is also helping to fuel more collegiate varsity cycling programs and clubs.

Beyond the many benefits for student-athletes, NICA leagues provide significant economic stimulus to their communities. As participation grows, so does the demand for trails and bike amenities. Teams need trails for training and racing. NICA racecourses require 4- to 6-mile loops of combined singletrack and double track with 300–600 feet of climbing per lap. Throughout the country, communities are building NICA racecourses from scratch or modifying existing trails. Along with the trails, the racecourses require venues that can accommodate, in some cases, thousands of spectators and participants who generate business in lodging, travel, restaurants, bikes stores, and other retail sales and services. This economic activity can support jobs, provide sustainable growth in rural communities, and produce tax revenue. The bottom line: Growth in NICA leagues doesn't seem to show any signs of slowing down, and that means an abundance of benefits for individuals and communities.

Lifted and Tilted Tread Type

A new trail construction method, "lift and tilt," is a way of raising the tread above the existing grade while simultaneously lowering the grade of areas off the trail that act as natural drains. This enhances tread drainage while increasing the fun factor for mountain bikers. Borrow basins are dug to harvest suitable mineral soil to lift and tilt the tread. Woody debris is used to replace the soil taken from the borrow basins, which are then masked and blended with organics to create natural-looking low points for drainage. This technique holds the rider on the trail while directing water off the tread into the basins.

This method can be implemented on any scale, using smaller machines to provide a singletrack feel or larger machines to create wide trails with a true bike park flow. Visitor numbers, rainfall, and soil type may require the use of culverts and sumps to keep trails ridable while providing drainage. The trail can have an increased emphasis on fun, flow, and airtime depending on the designated trail user. For shared-use trails, which generally cater to beginning riders, the dial can be turned down with mellower grades, less undulation, and feature frequency. For advanced trails, the dirt features can be more dynamic with larger rollers and jumps, bigger drops, and steeper banked turns, giving riders play in the vertical plane. Flatter areas that may have been avoided in the past can now be designed to provide an exciting riding experience. The lift and tilt method is often used for pump tracks, flow trails, jump trails, and other bike-optimized amenities.

EXPERIENCE ZONES & PREFERRED-USE TRAILS

Experience zones and preferred-use trails are showing up in trail systems around the world. Experience zones divide management areas into special-use zones designed around specific activities: one zone may be preferred for mountain biking and another for accessible, interpretive trails. Implementation of such zones can provide a variety of visitor experiences and recreational opportunities that reduce conflict between differing user groups while providing sustainable, long-lasting trails.

Single use challenges the notion that all trails must be all things to all people. In this case, land managers designate certain trails as "preferred" for certain activities. For example, a trail that is single use for mountain bikers might be designed to be fast and flowing through open terrain, with swooping turns and dips. Hiking-preferred trails, meanwhile, may be more about travel efficiency with stairs, tight switchbacks, short distances, or other qualities that would be less attractive to bikers and equestrians. Visitors will be drawn to routes that match their desired experience.

Each trail system should, of course, include a variety of trails. One way to include numerous types of trails is to have shared-use trails at the beginning of the network near parking lots, with preferred-use trails branching off farther along. The number of trails designated for each mode of travel should be based on the habits and needs of the user groups being managed.

EXISTING CONDITIONS

There are two distinct parcels to the area of interest, 881 Shin Pond Road and 856 Shin Pond Road. They are adjacent and contiguous. 881 is small 50 acres and contains a home for EFI staff, small pond, extensive lawn, existing disc golf course, and Tentrr campsite.

The 856 property is 250 acres of mixed forest. Near Shin Pond Road and the future trailhead the property is largely flat hardwood forests. Slopes are gentle and soils are adequate for trail development. Moving west to east the property slopes down with approximately 150-feet of elevation relief. A small hill in the southern section of the parcel, often referred to as Buck's Hill, provides excellent views west towards Baxter State Park and Katahdin. Here the elevation relief is 200-feet from the hilltop to valley bottom.

The property is bisected from north to south by Peavey Brook, a large watercourse with abundant floodplain and riparian corridors. The far eastern side of the property is similar to the far western, mostly flat and dominated by hardwoods. Pockets of wetlands exist outside the riparian corridor. Spruce forests are intermingled in much of the property. In total, about 60 acres of the site is unsuitable for trail development due to wet conditions.

An existing ATV and snowmobile trail network crosses the property. The most active motorized trail is a corridor from Shin Pond Road, crossing a bridge over Peavey Stream, and teeing into a motorized trail on the eastern side of the property. The trail on the eastern side runs north-south connecting to private property. Prior to the Peavey Stream crossing a spur trail leads to the aforementioned view and connects back to Shin Pond Road directly across from Barleyville Road.

RECOMMENDATIONS AND CONCEPT PLAN

Overview

This concept plan seeks to provide the framework for creating a new system of natural surface trails at the EFI owned properties in Patten. Utilizing this report and the associated maps, EFI staff and community leaders can seek funding, facilitate design, begin construction, and create a stewardship culture to redefine Patten's non-motorized trails scene.

The site assessed during this project could provide meaningful opportunities to develop up to 8 miles of new singletrack trails and 4.3 miles of Nordic ski trails. By dispersing trails across the site based upon landscape features and trail planning standards this system grows into significant option for locals and visitors to experience the outdoors. The range of trail types and difficulty levels should appeal to a variety of trail users, increasing the carrying capacity of the site. Furthermore, the diversity of trails recommended mean the educational goals of EFI could be met by offering a series different trainings and workshops.

The following sections of recommendations are described in zones. Zones are areas of interest that have similar landscape characteristics, helping define and explain the trail development concepts.

TRAILS CONCEPT PLAN - OVERVIEW

PATTEN
MAINE, USA
January 2023

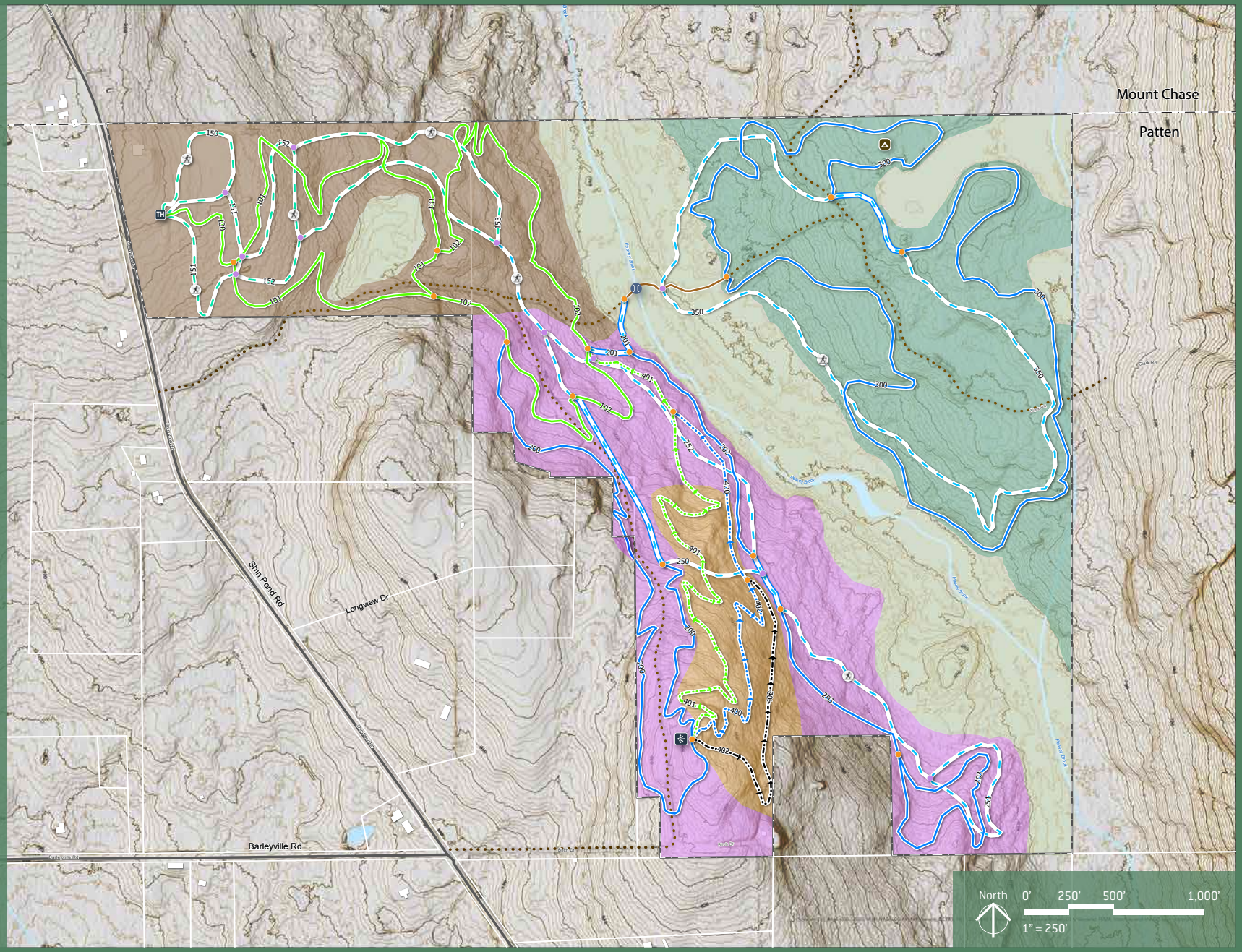
Legend

Existing Site
- Buildings/Structures
- Water Bodies
- Wetlands
- Township Boundary
- Concept Plan Boundary
- Roads
- ATV Trails
- TH Trailhead
- Viewpoint

Proposed Concept
- Beginner Zone
- Core Shared-use Zone
- Gravity Zone
- Sidecountry Zone
- Connectivity Trail
- Beginner Trail
- Beginner Gravity Trail
- Intermediate Trail
- Intermediate Gravity Trail
- Advanced Gravity Trail
- Intermediate Nordic Trail
- Beginner Nordic Trail
- All-Season Trail
- Bike Hub/Junction
- Nordic Hub/Junction
- Campsite

Prepared by:
TRAIL SOLUTIONS IMBA

Note: This map is intended for planning purposes only. Property boundaries are Approximate. Do not use for design development or construction estimates.



Beginner Zone

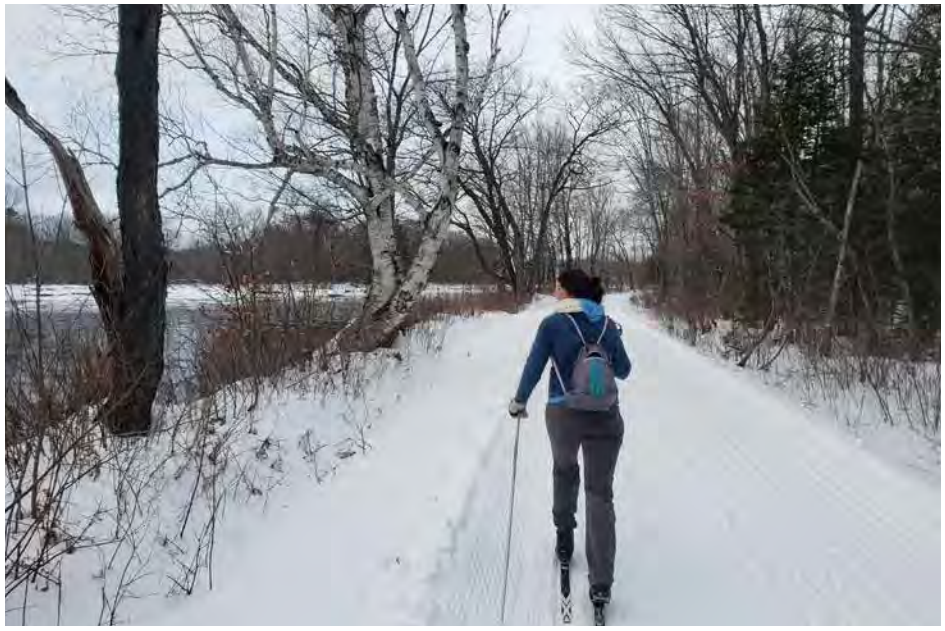
The Beginner Zone is the small 35 acres of upland directly adjacent to the proposed 856 Shin Pond Road Education Center. The slopes rarely exceed 30% and the soils in this zone are similar to the entire site, with a sandy loam that is excellent for natural surface trail construction.

This area is dominated by a cut-over mixed forest. The recent forestry management has left numerous skidder trails with some interspersed mature trees. Regrowth is mainly thick American Beech and other hardwood saplings such as maple or birch. Black Spruce and Eastern Hemlock pockets abound, especially on the edges of wet areas.

This zone is bisected east-west by the existing ATV/snowmobile trail, with the Bucks Hill connector intersection on the border of the Core Shared-use zone. The beginner zone contains a small wet area and ends just above the wet riparian corridor along Peavey Stream.

Utilizing some of the well-defined skidder roads as Nordic ski trails with key drainage improvements and short new connectors creates a great introduction to skiing. The zone would support a novice figure eight with an additional beginner loop farther down the slope, all accessible directly from the future gear library and trailhead. Interlaced in these non-motorized doubletracks should be a stacked loop of beginner mountain bike-optimized singletrack. This trail can use some of the sliver of property on the far side of the ATV/snowmobile trail. The final loop should cross the ATV/snwowmobile trail and connect to the Core Shared-use zone and across the existing Peavey Stream bridge to the Sidecountry zone.

Both winter and summer beginner loops build in length as one moves away from the trailhead and deeper onto the property. The singletrack offer ample opportunity for progression optional features. These can help riders gain new skills in a low-risk environment, as well as excite more advanced riders visiting the system.



With 1.5 miles of novice Nordic ski trails and just over 2 miles of beginner bike-optimized singletrack, this zone will support a variety of new trail visitors. The beginner zone is planned to provide great programmatic scenarios and allow for a higher carrying capacity of users with its numerous loop options.

Core Shared-use Zone

Staying on the western side of Peavey Stream and moving south on the EFI property one encounters the 65 acres of Core Share-use zone. This zone provides the greatest elevation relief on site with Bucks Hill and the scenic view rising over 200 feet above Peavey Stream and its riparian floodplain.

The Bucks Hill connector motorized trail runs north-south, connecting the main ATV/snowmobile trail down to the end of a private driveway and on to Barleyville Road. The majority of the site is good regenerating mixed hardwood forest, with the only truly wet and unbuildable terrain along Peavey Stream. The far southern section of proposed trails squeeze between the stream's expanding wetland and private property.

Similar to the beginner zone, stacked loops of Nordic skiing and mountain bike singletrack trails make up this zone. About 1.5 miles of intermediate cross-country skiing is planned, using some old skidder roads and some new construction to create an enjoyable loop along the toe of the hillside.

Intermediate singletrack uses more terrain and connects to the top of Bucks Hill where the planned Gravity zone makes use of the abundant slopes. Over 2 miles of more-difficult singletrack loop through this zone, providing options to climb to the scenic view or meander along the floodplain. To make the best use of space, some of the Nordic ski trails in this zone should be signed for summer use, and potentially showcase "trail-within-a-trail" techniques.

Gravity Zone

A small 18-acre zone was identified within the Core Shared-use zone to capitalize on contemporary trail needs and design as well as the unique existing terrain features. The zone begins with a gravity hub, or major intersection, just off the Bucks Hill scenic view. The purpose for staggering the gravity hub and viewpoint are to minimize social conflicts between a busy group of mountain bikers seeking a thrill and others wanting to enjoy the scenery. Slopes from the highpoint east are the steepest on site, with an average slope of 35% and numerous pockets of 50% and greater. Along with rock outcroppings and 200 feet of vertical relief, the landscape is primed for directional bike-only trails.

The benefits of single-use single-direction trails within a shared-use network include the chance to dial the design and construction in order to provide a very high-quality specific experience. These trail types also allow visitors, in this case mountain bikers, an opportunity to indulge in feelings like speed, flow, and airtime.

From the gravity hub three descents are planned to provide a spectrum of difficulties. While the Core Share-use zone connects to the gravity hub with an intermediate singletrack, the Gravity zone should offer a beginner trail. Directional bike-specific trails are new to the region and many community members and visitors are likely confident on intermediate singletrack, but may be new to flow and jump style trails. Offering a rolling, flowy, beginner trail with pumpable features and sweeping berms is an easy way to win over many new riders and help them build skills. This green gravity trail can stretch almost 0.75 miles and tie back into the Core Shared-use/Beginner zone merger.

An intermediate gravity trail should provide steeper grades, more jumps, and additional technical features. About a half mile of trail is planned, dropping under the beginner gravity trail and eventually tying into it with a merger. This lets intermediate gravity riders return to the cross-country style trails easily or loop back for another run.

The final descent is the only advanced trail planned in the system. Offering a most-difficult gravity run will be a way to draw more visitors to the trails and provide meaningful progression opportunities for residents. Kids especially will value having a challenging trail to build up to. Utilizing the steepest slopes and natural rock this trail should drop 0.3 miles before merging into the intermediate gravity run. By having the gravity trails merge riders gain a bit more length and the exits are minimized to one outlet. Having a singular exit from the gravity system means only managing visitor's speeds in one spot, allowing for plenty of traffic-calming techniques and signage to let riders adjust to being back on shared-use trails.

Sidecountry Zone

The Sidecountry zone represents the largest area of development at over 75 acres. The Sidecountry zone is on the eastern side of Peavey Stream, accessed by sharing the motorized trail's bridge and trail for a short bit. The Sidecountry zone is similar to the Core Shared-use zone with more intermediate singletrack trails, but offering a more remote setting for visitors.

This zone is largely rolling mixed hardwood forest with a large wet area and small stream. The lack of large elevation relief or interesting focal points helps support the use of this zone for traditional trail loops. For both winter and summer use large loops are planned, providing longer options for visitors and helping define a more secluded feeling.

The loops interlace with a few intersections but in general make a circuit of the useable upland terrain. With a 1.3 mile Nordic ski loop and 2-mile bike-optimized trail, this zone provides more options for all visitors. The singletrack trail should incorporate optional features as possible, to add spice and flavor to rides.

Trailheads and Amenities

The planned trail system is very front country in nature, with dense loops of trails on a relatively small property. The 856 Shin Pond Road site is ideal as a single point-of-entry system utilizing the future EFI Education Center. This building will host a gear library as well as information for trail users. The unique vision of EFI is to provide high-quality non-motorized recreation along with a space for trainings and workshops. This trailhead should provide parking for up to 20 cars, ideally 30 cars can fit at the site to avoid conflicting with ongoing workshops or the private residence at 881 Shin Pond Road.

Providing a changing place and restroom help entice visitors and allow locals an easy option for recreation. With the new facility it may be possible to have snacks or concessions on-site, helping draw tourists. The site is ideal for future programs such as led group rides, skills clinics, charity races, and educational workshops.

The trailhead may be staffed at times, which helps educate visitors on rules, etiquette, and conditions. However, it's unlikely to be staffed at all hours or all during all seasons. A trailhead kiosk at the proposed trailhead will be important to provide visitors with information about the trail network. An interpretive kiosk with trail maps should be provided and include route finding information, necessary safety information, user etiquette, and rules. Wayfinding signage is recommended to guide users along the trails and include information on the different trail types, skill difficulty levels, directionality, and allowed user types. It is also recommended that technical Trail Features be marked with warning signs. Please see the "Signage" section included in the Appendix for more information on recommended sign types.

Campsites

Campsites require certain amenities and landscape features to adhere to sustainability guidelines and reduce impacts on natural resources. Commonly, access to clean water and a flat dry location are the paramount criteria for a tent site. Beyond these basic requirements are others that tend to elevate the camping experience. These may include privacy from other campers and trail users, scenic views, or strategic location considering typical overnight use patterns.

EFI could provide a meaningful close to home camping experience at the 865 property. The community engagement meeting encouraged this idea, especially

for school groups and youth. A campsite in the Sidecountry zone that gave the impression of remote camping, but is within a short distance of the trailhead via the ATV trail. The ATV trail could provide easy maintenance and supply access, allowing large groups to use the trails to access the campsite and enjoy nature.

Regional Opportunities

Beyond the identified areas of interest for this project, IMBA TS briefly noted future opportunities for both Patten and the northern Katahdin region. To assist the community with continuing to expand non-motorized trails these potential future areas of interest are described briefly below. These properties require more in-depth and formal planning to truly assess their value and feasibility as trail development zones.

Patten Lumberman's Museum and Downtown

IMBA TS provided a brief assessment of the Patten Lumberman's Museum site under a different contract while in Patten. The site provides some areas suitable for trail development close to downtown Patten.

The newly formed Patten Area Outdoors group (PAO) is seeking to develop more trails close to town. PAO should partner with a qualified trail planner to create a concept plan for the entire town.

Neighboring Private Property

During the site visit EFI staff expressed that some neighbors were amenable to trail development on their private lands. Further discussions should be sought to define the opportunities and constraints for this type of expansion. Some neighboring parcels contain terrain suitable for trail development and if designed alongside the 856 project, could provide more mileage and variety of trails.

Katahdin Woods and Waters – Grondin Parcel

Patten is a local community with a robust population for the area. Connecting Patten to Mt. Chase and other communities is a lofty goal. The distances are quite far and should be broken up with trail systems that are useable by most.

KWW's Grondin parcel presents a unique and important opportunity. As a relatively new public land KWW could be assessed and planned for a wide variety of natural

surface trails. Creating longer backcountry singletrack loops would draw visitors from a day or more away due to the lack of these experiences in the northeast. Efforts should be made to investigate the feasibility of connecting Patten to KWW, which would offer closer recreation than many trails.

Mt. Chase

Numerous existing hiking trails are on privately managed forest lands. Mt. Chase is the most obvious for the region. This site represents an extremely great opportunity for more passive recreation in the area.

The most inspiring and breathtaking landscape within close proximity to Patten is Mt. Chase itself. The mountain boasts four distinct peaks and an amazing 360-degree view from its namesake bald summit. The elevation relief, rugged terrain, and stunning views are a few of the reasons why Mt. Chase should be conserved.

Protecting Mt. Chase and opening up a contemporary, well-planned trail system would bring immense benefits to the communities. In terms of hiking, there are few if any modern sustainable trails in the region, meaning this opportunity could showcase contemporary best practices. For mountain bikers, the elevation and landscape size are unmatched in Maine currently. Developing a shared-use trail network would draw visitors from a day and more away, and alone would provide three to five days' worth of recreation for most. Combined with other initiatives Mt. Chase would be the hallmark of a new recreation economy in the northern Katahdin region which would appeal to a wide range of visitors and result in many community benefits.

Photo Credit: Alice Sheppard

PRIORITIZATION & COST OPINION

To provide sound financial investment and continue to build visitor excitement over time, a phased approach to construction is recommended. The trails should be constructed in phases to both allow access and help the community build their skills to enjoy more challenging segments.

IMBA TS provides the following prioritization for the concept plan based upon staff and local feedback, professional guidance, and anticipated next steps. The phases are a recommend sequencing, and can be combined or split up as needed.

Priority 1 – Beginner Zone (2023-2024)

This zone provides direct access to the remaining trail zones, therefore it must be developed first. Beyond the need for connectivity, the beginner zone should be first in order to offer up easiest trail experiences to community with little to no non-motorized trails currently. By offering accessible trails to start, EF ensures visitors can enjoy themselves while building their skills for future phases.

It is recommended the Nordic ski trails in this zone be developed first as they will be a limiting factor in singletrack design and construction. This also provides doubletrack alternatives during summer months for those not seeking singletrack trails to begin. In the winter, these trails will function as an accessible and approachable venue for folks to try their hand at cross-country skiing.

Priority 2 – Core Shared-use Zone (2024-2026)

Following the beginner zone expansion into the core shared-use zone should be next. This is a logical next step as the core shared-use zone provides the next set of access to the gravity and sidecountry zones. The core shared-use zone provides the bulk of trail mileage and offers up a few loops for development.

Focus should be on connecting the beginner zone to the view and future gravity zone, then expanding the cross-country offerings further. Similar to the beginner zone, Nordic ski trails should be constructed early on as they provide connectivity or create barriers to the singletrack network.

Portions of this zone could wait until later phases of development, such as the far southern loop. This will help continue to build excitement amongst visitors while allowing EF staff to focus on diversifying the trail experiences with gravity trails.

Priority 3 – Gravity Zone (2025)

The gravity zone is small and contains three identified trail corridors. These trails should only be developed once a loop to and from the viewpoint is established as well as the lower share-use trails needed as collectors for the end of the gravity runs. This provides visitors with a way to access the trails, return to the trailhead after riding a descent, and the upper loop at the top means riders to get to the view and decide they do not want to ride downhill do not need to retrace their route.

Because these are single-use, directional trails, their demand is much smaller than the shared-use singletrack. Creating these trails as a later phase after a few miles of cross-country trails are developed means visitors and community members have more time to grow their skills and feel prepared for the new experience.

It is recommended the green/easiest descent be the first gravity trail developed. It is unlikely EF will need to build all the gravity trails are once, and instead should phase them in at one per year. This will help not only with skill development and risk management, but will also allow the educational series to grow with trail implementation.

Not all of the gravity trails need to be built before moving on to the sidecountry zone. Ideally, the green/easiest and blue/intermediate descents are built before moving on. To ensure good diversity in offerings and a progression for those seeking to develop more downhill riding skills.

Priority 4 – Sidecountry Zone (2027)

As the most remote of the zones on the 856 site the sidecountry trails should be developed last. This zone provides one Nordic skiing loop and one singletrack loop. Both of these are longer experiences and will take the most time to construct compared to shorter segments in previous zones.

This zone is only accessible by sharing the ATV/snowmobile trail and Peavey Brook bridge, coordination will be required with the local ATV/snowmobile club. The sharing of a motorized trail will require additional signage and educational outreach to all trail users to decrease risks.

Similar to other zones, the Nordic ski loop should be early on, either before or in tandem with the singletrack construction.

IMPLEMENTATION & NEXT STEPS

Community Engagement and Visioning

Local Planning Engagement to Date

During the 2022 field visit, EFI and IMBA TS facilitated a meeting with adjacent land owners, and local interested residents. These citizens represented groups with a vested interest in area trails, such as local school leaders. EFI has also engaged with a number of area organizations prior to and during the planning process, including: Katahdin Area Trails (KAT), Katahdin Higher Education Center (KHEC), Katahdin Tourism Partnership (KTP), Northern Forest Center (NFC), and Outdoor Sports Institute (OSI).

Future Engagement Recommendations

The concept plan reflects the identified suitable locations for trails and supporting facilities. The proposed locations work in tandem with existing recreational amenities within the areas of interest. Trails are located based upon the assessment of landscape opportunities and constraints, nearby supporting infrastructure, and existing amenities. The concept plan is preliminary at this point in the planning process. Public outreach, such as community and stakeholder meetings, are necessary to gather input and feedback on the concept plan. This outreach is paramount to ensure local residents are engaged during this process. Outreach will continue to generate excitement and support for the plans by providing information and data around their importance and potential. Outreach will also strengthen the stewardship base of future trail users and create a sense of ownership and pride of the trails and facilities.

Since many of the contemporary trail facilities presented in this study would be a new type of recreational amenity to the area, the facilities and their benefits may be unfamiliar to residents, stakeholders, and community leaders. Continued education, through community meetings, field trips to trails and bike facilities, and demonstration projects will help residents understand the potential of these facilities and generate support for future projects.

It is recommended that EFI continue engaging the local partners discussed in "Local Planning Engagement to Date". Honing in on the partners who offer the most assistance with next steps is advised. Important partners to the next steps of trail development include the KAT, KHEC, KTP, NFC, OSI, and area schools. These organizations are interested parties who should be engaged to provide meaningful feedback on design, construction, and continued management of the planned trail system.

Design

This concept plan serves as a guiding vision for the development of trails at 856. This plan looks at conceptual opportunities but will require refinement and detailed design. We recommend consulting with a professional trail designer/builder to finalize the layouts and designs for each trail and feature.

Design is vital to a successful trail system. Beyond ensuring sustainable trail principles are implemented in the trail layout, qualified designers will engage staff and the community to identify detailed management and visitor goals. Professional trail layouts will minimize resource impacts and maximize visitor experience. During design a professional will identify all permitting and compliance needs, as well as provide a more detailed cost breakdown for construction.

Trail design should occur in a phased fashion similar to construction. Trail layout typically includes field flagging, these site markings will breakdown over time and weather and animals are known to remove flagging. Field layout should occur no more than two years before anticipated construction for most projects.

Due to the educational goals of EFI, design should be assessed as part of a future curriculum. Workshops for sustainable trail design could be instrumental in developing more capacity in the region as well as preparing the data needed for construction.

Permitting and Compliance

All construction projects are subject to regulatory requirements. This section provides a brief breakdown of anticipated permitting needs to implement this plan. The list is general in nature and is intended only to provide high-level planning for future trail development phases.

Obtaining proper permits can ensure that work follows local, state, and federal laws as this trails concept plan is implemented. At least as important, working under permits can help trailbuilders – and visitors – to be good stewards of the land. Permitting needs can be affected equally by landscape features and funding sources. Both should be identified during the design phases to ensure relevant permitting is completed.

People use trails for all kinds of reasons – but a chief motivator among visitors is to enjoy the outdoors. Ground disturbance and uncontrolled erosion and sedimentation can negatively impact our environment, water quality, and flora and fauna. These impacts are also unsightly and, if not quickly mitigated, can rapidly increase maintenance costs and ultimately create trails that visitors no longer want to visit.

National Pollutant Discharge Elimination System (NPDES)

Construction General Permit (CGP)

Clean Water Act 404

Clean Water Act 401

Environmental and Cultural Review

Depending on funding sources, various levels of review may be required. For instance, Recreational Trails Program (RTP) grants will require environmental and historical reviews compliant with the National Environmental Policy Act due to use of Federal Highway Administration funds. Reviews may be for federal- or state-listed threatened and endangered species, in conjunction with state

historical preservation offices or for other unidentified reasons. Other grants or funding sources may require similar, less, or more review during the design phases prior to construction. It is possible that consultation with United States Fish and Wildlife Service will be required depending on final funding source and scope of construction.

Utility Locate

It is against state law to excavate or grade without a utility location. It is extremely important that contractors notify the applicable organizations in a timely fashion for utility location services prior to construction.

Construction

Most of the recommended trails require extensive mechanized construction which in turn requires experience and knowledge. IMBA TS recommends the alignments be constructed by a mix of volunteers and professional trail builders. The Professional Trailbuilders Association (PTBA) maintains a list of quality trail builders, this list is not exhaustive and does not include all qualified trail builders.

A qualified trail professional should be retained to construct all bike-optimized facilities, and provide oversight and training for EFI staff and volunteers on all trail projects. Hybrid style implementation is advantageous primarily as a means to build excitement in the community and develop skilled volunteers for future stewardship. It is recommended a professional trail builder provide oversight and management of volunteers to ensure the trail meets the design and goals of the project.

When retaining a professional trail building contractor for construction services, we recommend engaging a qualified construction manager experienced with mountain bike trail development as a client's representative to provide oversight during the construction progress, perform inspections, and provide quality assurance services.

All of these recommendations tie into the goal of providing capacity building through field training on the 856 site. Utilizing professional contractors as instructors and embracing a hybrid style implementation fits well with the educational model.

Maintenance and Stewardship

The 856 trails will total over 12 miles with the full implementation of this plan. EFI should begin considering maintenance and operations manual and program. In addition, as EFI and the community move forward with this plan, a full-time maintenance person or crew may be necessary to ensure the trails remain sustainable and fun for all visitors.

The trails will be implemented over time, meaning maintenance capacity can be ramped with trail development.

In lieu of hybrid style instruction and training, a part-time staff trails manager should be considered as this plan is implemented. This position could provide oversight and management of a crew, and additionally manage a local volunteer effort. Other responsibilities may include fundraising, budgeting, off-season planning,

and winter grooming. Local nonprofit Katahdin Area Trails (KAT) has had recent success in Millinocket and with their new focus on Patten and Shin Pond, they may provide beneficial support for maintenance.

As trails are developed throughout the Patten region the addition of seasonal part-time staff would be an excellent way to employ local youth and keep the trails in their best condition. Millinocket and central Maine both have youth crews that are successfully employing area teens, providing them meaningful training, and improving local trails through quality maintenance programs.

A seasonal, typically spring-fall, position could be tailored for college students home on break and local high schoolers. This sort of arrangement not only keeps the trails maintained, meaning more of the community and visitors will appreciate and use them, but it also gives employment to local residents. By employing locals, the trails further help provide real economic benefits to Patten.

Education

EFI has a vested interest in developing local capacity for an outdoor recreation economy. This includes getting those who want to pursue full-time careers the resources to achieve that dream as well as ensuring the local volunteer force is well-trained and efficient.

Utilizing the unique space at 856 Shin Pond Road as a training grounds is recommended. Coupled with the implementation of this trails plan training could provide real-world experience for years to come. With 5 miles of Nordic ski trails and 8 miles of bike-optimized singletrack there is plenty of opportunity for on-site education. The trail plan was laid out and intended to provide a variety of experiences, not just to form a cohesive contemporary recreation network but to guarantee a diversity of construction for future students.

EFI should pursue education in a phased approach similar to the trail construction. Since design precedes building, design courses may make the most sense early on. Education does not prioritize efficiency in construction, EFI should be prepared for slower than normal build out for any trails undertake by students. Utilizing professional contractors for some segments may prove helpful by getting some good examples of trails on the ground and giving locals a taste of modern trail recreation.

It is recommended EFI start slow, offering one or two courses in 2023 that provide basic theory and sustainability guidelines to begin building a local knowledge base. An advanced design course could coincide with some trail layout. While the appeal of jumping into a mechanized trail offering is high, EFI should remember there are very few qualified trail builders locally and even fewer with credentials or expertise in education. It is recommended EFI work with organizations like Outdoor Sport Institute (OSI) who are thoughtfully approaching outdoor leadership education in a manner that while slower, will yield much better results. Crafting a curriculum that builds on itself and offers unique educational opportunities in the state is key to success. The 856 Shin Pond Road site is ideal as a training grounds, but trailbuilding education needs to be approached with the same careful intention that trail planning has so far.

CONCLUSION

Patten has the potential to grow and enhance their recreational offerings with high-quality and close-to-home trails, becoming the flagship community in the northern Katahdin region for trails. The 856 property presents the opportunity to create a network of purpose-built trails. Providing accessible beginner friendly trails mean more children and families will be able to enjoy mountain biking and trails. A small gravity zone would be appealing to many youth and visitors, offering new and unique experiences not found nearby. Lumping these efforts together with a robust and well-planned educational offering would bolster EFI's presence in the region and help set it apart as a one-stop shop for recreational outings and learning.

APPENDIX A: CONCEPT MAP

TRAILS CONCEPT PLAN - OVERVIEW

PATTEN
MAINE, USA
January 2023

Legend

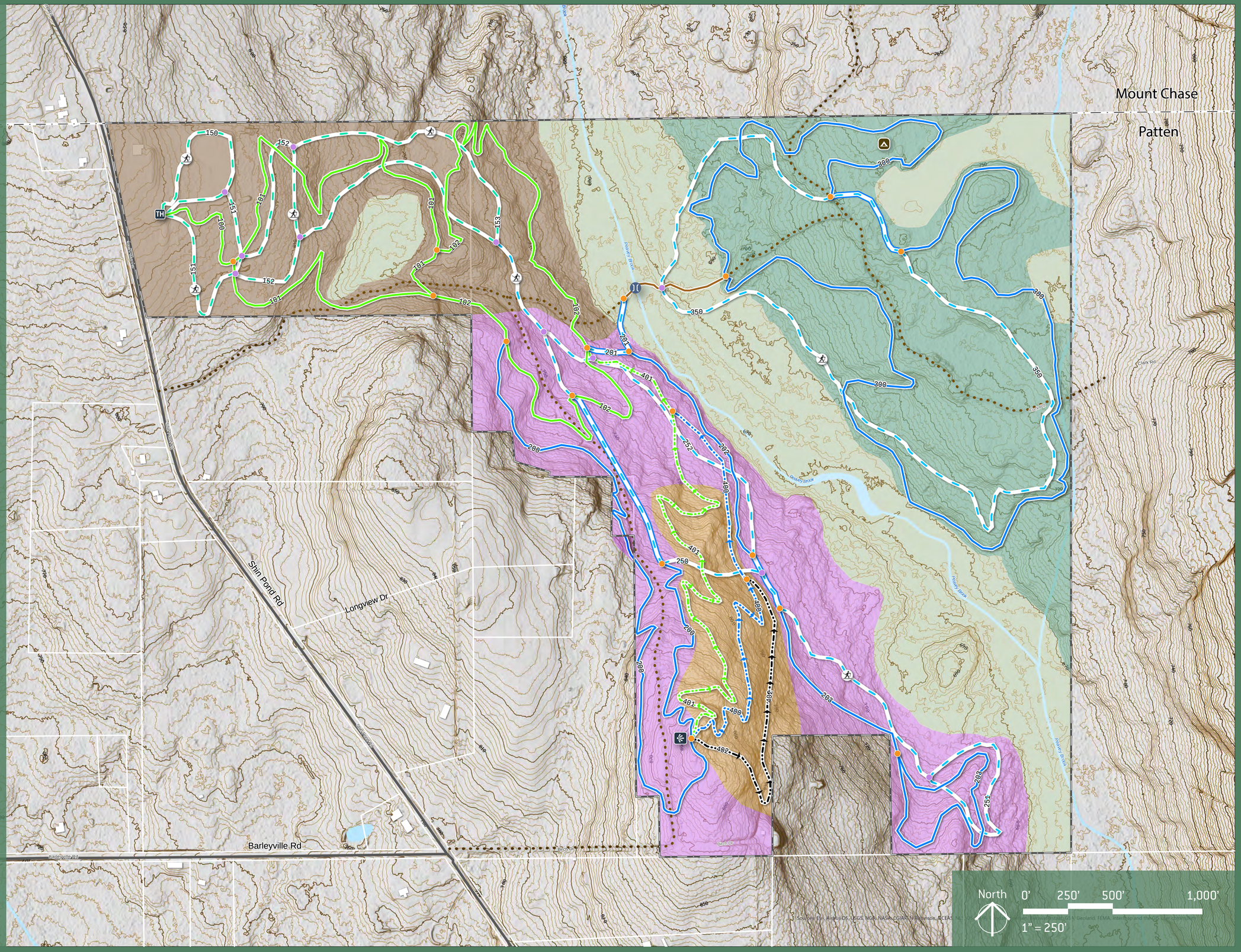
Existing Site
- Buildings/Structures
- Water Bodies
- Wetlands
- Township Boundary
- Concept Plan Boundary
- Roads
- ATV Trails
- TH Trailhead
- Viewpoint

Proposed Concept
- Beginner Zone
- Core Shared-use Zone
- Gravity Zone
- Sidecountry Zone
- Connectivity Trail
- Beginner Trail
- Beginner Gravity Trail
- Intermediate Trail
- Intermediate Gravity Trail
- Advanced Gravity Trail
- Intermediate Nordic Trail
- Beginner Nordic Trail
- All-Season Trail
- Bike Hub/Junction
- Nordic Hub/Junction
- Campsite

Prepared by:

TRAIL SOLUTIONS IMBA

Note: This map is intended for planning purposes only. Property boundaries are Approximate. Do not use for design development or construction estimates.



APPENDIX B: TRAIL TABLES

Patten Trail Concepts - Zone Cost Opinion

				Design Cost Range		Construction Cost Range		Signage Cost Range		Total Cost	
Zone	Priority	Timing	Miles of Trail	Estimated Cost Low ($1200.00 per mile)	Estimated Cost High ($2400.00 per mile)	Estimated Cost Low	Estimated Cost High	Estimated Cost Low ($500 per mile)	Estimated Cost High ($1000 per mile)	Total Cost per Zone Low	Total Cost per Zone High
Beginner Zone	High	2023-2024	3.60	$4,325.98	$8,651.95	$257,779.38	$319,292.27	$1,802.49	$3,604.98	$263,907.85	$331,549.20
Core Shared-use Zone	Medium-High	2024-2026	3.58	$4,297.81	$8,595.61	$255,282.58	$316,292.63	$1,790.75	$3,581.51	$261,371.13	$328,469.74
Gravity Zone	Medium	2025	1.69	$2,030.99	$4,061.98	$110,011.92	$135,399.28	$846.25	$1,692.49	$112,889.15	$141,153.75
Sidecountry Zone	Medium	2027	3.43	$4,115.64	$8,231.28	$242,836.70	$301,057.60	$1,714.85	$3,429.70	$248,667.19	$312,718.58
Totals			12.31	$14,770.41	$29,540.82	$865,910.57	$1,072,041.77	$6,154.34	$12,308.68	$886,835.32	$1,113,891.27

Notes: Cost opinions are for planning purposes only. This conceptual cost opinion provides ranges for the cost of construction and serves as a tool for planning purposes only. The cost opinion does not serve as a bid and does not include cost of permitting, construction documents, and contractor mobilization or contingency.

Patten Trail Concepts - Segment Cost Opinion

Segment ID	Route Type	Zone	Style	Skill	User	Priority	Direction	Length (Mile)	Unit Cost Low	Unit Cost High	Estimated Cost Low	Estimated Cost High
100	Singletrack	Beginner Zone	Traditional	Beginner	Shared-Use	1	Bidirectional	0.15	$55,000.00	$70,000.00	$8,062.01	$10,260.74
101	Singletrack	Beginner Zone	Traditional	Beginner	Shared-Use	1	Bidirectional	0.91	$55,000.00	$70,000.00	$50,113.31	$63,780.57
102	Singletrack	Beginner Zone	Traditional	Beginner	Shared-Use	1	Bidirectional	1.06	$55,000.00	$70,000.00	$58,278.55	$74,172.70
150	Nordic	Beginner Zone	Traditional	Beginner	Shared-Use	1	Bidirectional	0.26	$95,000.00	$115,000.00	$24,976.07	$30,234.19
151	Nordic	Beginner Zone	Traditional	Beginner	Shared-Use	1	Bidirectional	0.27	$95,000.00	$115,000.00	$25,996.85	$31,469.87
152	Nordic	Beginner Zone	Traditional	Beginner	Shared-Use	1	Bidirectional	0.36	$95,000.00	$115,000.00	$34,071.94	$41,244.98
153	Nordic	Beginner Zone	Traditional	Beginner	Shared-Use	1	Bidirectional	0.59	$95,000.00	$115,000.00	$56,280.66	$68,129.22
200	Singletrack	Core Shared-Use Zone	Traditional	Intermediate	Shared-Use	2	Bidirectional	1.07	$55,000.00	$70,000.00	$58,702.60	$74,712.40
201	Singletrack	Core Shared-Use Zone	Traditional	Intermediate	Shared-Use	2	Bidirectional	0.10	$55,000.00	$70,000.00	$5,657.14	$7,199.99
202	Singletrack	Core Shared-Use Zone	Traditional	Intermediate	Shared-Use	2	Bidirectional	0.27	$55,000.00	$70,000.00	$15,089.25	$19,204.50
203	Singletrack	Core Shared-Use Zone	Traditional	Intermediate	Shared-Use	2	Bidirectional	0.68	$55,000.00	$70,000.00	$37,371.57	$47,563.81
250	Nordic	Core Shared-Use Zone	Traditional	Intermediate	Shared-Use	2	Bidirectional	0.80	$95,000.00	$115,000.00	$75,566.42	$91,475.14
251	Nordic	Core Shared-Use Zone	Traditional	Intermediate	Shared-Use	2	Bidirectional	0.29	$95,000.00	$115,000.00	$27,156.04	$32,873.10
252	Nordic	Core Shared-Use Zone	Traditional	Intermediate	Shared-Use	2	Bidirectional	0.38	$95,000.00	$115,000.00	$35,739.57	$43,263.69
300	Singletrack	Sidecountry Zone	Traditional	Intermediate	Shared-Use	4	Bidirectional	2.07	$55,000.00	$70,000.00	$114,104.10	$145,223.40
350	Nordic	Sidecountry Zone	Traditional	Intermediate	Shared-Use	4	Bidirectional	1.36	$95,000.00	$115,000.00	$128,732.60	$155,834.20
400	Singletrack	Gravity Zone	Gravity	Intermediate	Bike	3	Down	0.53	$65,000.00	$80,000.00	$34,476.78	$42,432.96
401	Singletrack	Gravity Zone	Gravity	Beginner	Bike	3	Down	0.80	$65,000.00	$80,000.00	$51,818.46	$63,776.56
402	Singletrack	Gravity Zone	Gravity	Advanced	Bike	3	Down	0.36	$65,000.00	$80,000.00	$23,716.68	$29,189.76
Total								12.31			$865,910.57	$1,072,041.77

Notes: Cost opinions are for planning purposes only. This conceptual cost opinion provides ranges for the cost of construction and serves as a tool for planning purposes only. The cost opinion does not serve as a bid and does not include cost of permitting, construction documents, and contractor mobilization or contingency.

APPENDIX C: GENERAL TRAIL PLANNING AND DESIGN GUIDELINES

The following are guidelines for the construction and maintenance of trails. The natural environment is dynamic and unpredictable. The nature of recreational trails and roads, the desired user experience, and the constant forces acting on natural surface trails and roads make strict standards untenable and undesirable. As such, the guidelines below are simply that: best management practices that should be followed within environmental constraints.

Trail System Design

Mountain Bike-Optimized Trails and Preferred Direction Trails

Mountain bike-optimized singletrack trails are designed and constructed to enhance trail experiences specifically for mountain bikers. Mountain bike-optimized trails might differ from traditional trails in several ways: enhanced tread shaping, directional or one-way travel, and the addition of man-made technical trail features (TTFs). Bicycles move differently along a trail than other modes of transportation. The movement of the wheel, the use of gravity and friction, the transfer of energy from the rider to the wheel – these offer both opportunities and constraints for trails and trail features that may differ from those of other users.

Mountain bike-optimized and one-way trails that harness gravity are a growing area of interest for mountain bikers. These trails can be designed and built at any level, from beginner friendly flow trails to extremely difficult race-oriented downhill trails. Riders cherish the feeling of flight that a bicycle provides while coasting through a succession of bike-optimized features from top to bottom. A consistent trail is not necessarily a boring or easy trail (though it can be), it's one that is designed such that a preceding section of trail prepares users for the subsequent sections. This is a hallmark of flow trails and can be particularly important for beginner trails, as well as for higher speed trails with gravity features, such as jumps and drops.

As trail systems grow and become congested, one-way trails help to take the pressure off popular shared-use trails. Riders looking for speed, thrill, and challenge will have their own designated areas, and users traveling at slower speeds will have their own trails. Well-designed mountain bike-optimized singletrack and gravity singletrack are exciting for mountain bikers but are also designed to help manage risk and minimize user conflict

Rolling Contour Design

Providing consistent climbs and extended descents is a design priority. Trails may contour gently up or down for consistent lengths to maximize climbs and descents. This is known as rolling contour design. All shared- use trails should be of rolling contour design to minimize impact and sedimentation in the watershed.

Stacked Loops

A stacked-loop system is a series of loops somewhat like links in a chain. The loops can vary in length and difficulty. In a stacked-loop system, the loops that are closest to the trailheads are more inviting to novice riders, and the loops further out cater to more advanced riders. This creates a progression of experiences and challenges as users explore the trails in more depth.

Progressive Hubs and Clusters

A trail system of hubs and clusters looks more like spokes radiating out from a central junction and intersecting at various points. A trailhead or major intersection is a hub. A cluster is a concentration of trails radiating out from the hub. Like a stacked loop system, hubs and clusters are designed with skill level progression in mind. Hubs and clusters give users more trail options for varying skill levels at each hub, allowing for skill level diversity. At many intersections, riders have the option to change trail difficulty or continue on the same difficulty level.

With progressive trail features, a mountain biker may become a better rider by gradually moving up in trail difficulty. This practice also spreads out visitors and helps reduce trail user conflict. This is also a proven risk management tool. Signage shows difficulty levels at every hub and wherever necessary in the trail system to help users choose trails based on their skill levels and desired experience. Giving riders the option to warm up before hitting more technical segments provides a level of safety in the system.

Loops and clusters are often favored over out-and-back routes because they offer variety. People love the adventure of starting down one path and returning to the same point by way of a different trail. With loops or clusters in a trail system, visitors can choose a short route, a combination of routes, or a long outer route.

Progressive design and construction also allow users of different levels to ride the trails in the same system, so families and groups can enjoy being together in one place and riders can find a trail that matches their skills and progress.

Trail Difficulty Rating System

In order for a trail system to provide the varied riding experiences and skill progression which trail users seek, the trails must be built to provide relatively specific challenges and riding characteristics. For the purposes of this conceptual trail plan, the difficulty rating system has been simplified into three levels:

- Easiest Trails, Green Lines (green circle) – For beginners, these trails have a smoother and wider tread, lower trail grades, and less exposure.
- More Difficult, Blue Lines (blue square) – For intermediate riders, these trails can be steeper, more technically difficult, or longer.
- Very to Extremely Difficult Trails, Red Lines (black diamond or double black diamond) – For advanced riders, these trails offer a combination of difficult trail tread, technical features, and long distances for those looking for challenge and endurance-oriented experiences. Generally, they have significant exposure and have less predictable surfaces.

This system was adapted from the International Trail Marking System used at ski areas throughout the world. Many trail networks use this type of system, most notably resort-based mountain biking trail networks. The system applies well to mountain bikers and is also applicable to other visitors such as hikers and equestrians. These ratings should be posted on trail signage and in all maps and descriptions. Following is a summary of criteria to be considered when implementing a trail rating system.

Tread Width

The average width of the active tread or beaten path of the trail.

Tread Surface

The material and stability of the tread surface is a determining factor in the difficulty of travel on the trail. Some descriptive terms include hardened (paved or surfaced), firm, stable, variable, widely variable, loose, and unpredictable.

Trail Grade (maximum and average)

Maximum grade is defined as the steepest section of trail that is more than approximately 10 feet in length and is measured in percent with a clinometer. Average grade is the steepness of the trail over its entire length. Average grade can be calculated by taking the total elevation gain of the trail, divided by the total distance, multiplied by 100 to equal a percent grade.

Natural Obstacles and Technical Trail Features

Objects that add challenge by impeding travel. Examples of natural obstacles include rocks, roots, logs, holes, ledges, drop-offs. The height of each obstacle is measured from the tread surface to the top of the obstacle. If the obstacle is uneven in height, measure to the point over which it is most easily ridden. Technical trail features are objects that have been introduced to the trail to add technical challenge. Examples include rocks, logs, elevated bridges, teeter-totters, jumps, drop-offs. Both the height and the width of the technical trail feature are measured.

IMBA Trail Difficulty Rating System

	EASIEST WHITE CIRCLE	EASY GREEN CIRCLE	MORE DIFFICULT BLUE SQUARE	VERY DIFFICULT BLACK DIAMOND	EXTREMELY DIFFICULT DBL. BLACK DIAMOND
TRAIL WIDTH	72" (1,800 mm) or more	36" (900 mm) or more	24" (600 mm) or more	12" (300 mm) or more	6" (150 mm) or more
TREAD SURFACE	Hardened or surfaced	Firm and stable	Mostly stable with some variability	Widely variable	Widely variable and unpredictable
AVERAGE TRAIL GRADE	Less than 5%	5% or less	10% or less	15% or less	20% or more
MAXIMUM TRAIL GRADE	Max 10%	Max 15%	Max 15% or greater	Max 15% or greater	Max 15% or greater
NATURAL OBSTACLES AND TECHNICAL TRAIL FEATURES (TTF)	None	Unavoidable obstacles 2" (50 mm) tall or less Avoidable obstacles may be present Unavoidable bridges 36" (900 mm) or wider	Unavoidable obstacles 8" (200 mm) tall or less Avoidable obstacles may be present Unavoidable bridges 24" (600 mm) or wider TTF's 24" (600 mm) high or less, width of deck is greater than 1/2 the height	Unavoidable obstacles 15" (380 mm) tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" (600 mm) or wider TTF's 48" (1,200 mm) high or less, width of deck is less than 1/2 the height Short sections may exceed criteria	Unavoidable obstacles 15" (380 mm) tall or less Avoidable obstacles may be present May include loose rocks Unavoidable bridges 24" (600 mm) or narrower TTF's 48" (1,200 mm) high or greater, width of deck is unpredictable Many sections may exceed criteria

Trailheads

Well-placed trailheads and parking lots contribute to a successful trail system. Trailheads should be located in areas of lower elevation, as most trail users prefer outbound climbs with inbound descents back to the parking area. This also helps mitigate risk by allowing fatigued riders an easier route back to their starting point. This is especially true for mountain bikers, and necessary for families and beginners. Trailheads should offer information useful for the trail users, including trail maps, location information, emergency contact details, and volunteer information.

Sustainable Trails

A sustainable trail balances many elements and is designed to have little impact on the environment. Sustainable trails resist erosion through proper design, construction, and maintenance and blend with the surrounding area. A sustainable trail also appeals to and serves a variety of users over many years. It is designed to provide enjoyable and challenging experiences for visitors by managing their expectations effectively. Following sustainable trail design and construction guidelines allows for high-quality trail and education experiences for users while protecting the land's sensitive resources. For additional trail design, construction, and maintenance techniques, refer to Trail Solutions: IMBA's Guide to Building Sweet Singletrack. These guidelines are appropriate for any hike, bike, or equestrian trail.

Signage

The development of a mountain bike trail network requires the development of a comprehensive system of signs. Signs are the most important communication tool between land managers and trail users. A well-implemented and maintained signage system enhances the user experience by helping visitors navigate the trail network and providing information about the area. Signage also plays a critical role in managing risk and deploying emergency services.

Recommended signage for the trails should be simple, uncluttered, and obvious with a sign at every major intersection to help users stay on track. Signs should meet the needs of all users, from the daily trail user to someone who is experiencing the trails for the first time. In order to serve the variety of visitors, sign placement should be strategic and frequent. Because signs can intrude on the natural outdoor experience, too much signage can be unsightly. Balancing competing interests is key to developing a successful signage program.

Sign Types

A variety of signs can be created to help users identify trails and their location, select routes, remain confident in their trail choices, find destinations and key points of interest, and understand regulations and allowed uses. Signage can also be interpretive, helping visitors learn about responsible recreation, trail etiquette, and resource protection, as well as how to reduce risk and hazards.

Informational signs

Usually positioned at the trailhead and major intersections, informational signs provide details such as trail length and difficulty. These include signs that identify a trailhead from a road, signs at a trailhead kiosk, trail intersection signs, waymarks, difficulty rating signs, and trail length or elevation gain and loss signs.

Regulatory signs

These types of signs delineate rules, such as prohibited activities, direction of travel, or other restrictions.

Directional signs

Directional signs provide navigational information.

Warning signs

Often incorporating highly visible designs, these signs warn trail users of upcoming hazards or risks. These include visitor rules and regulations, allowed activities, road and trail intersections, and emergency signs.

Educational signs

Educational signs can provide a variety of information for trail users, such as guidelines for responsible recreation, descriptions of natural or cultural resources, trail etiquette, and bike skills

APPENDIX D: BENEFITS OF MOUNTAIN BICYCLING TRAILS

Promoting Active and Healthy Lifestyles

The benefits of mountain biking may start on the trails, but they don't end there. Learning to ride a bike is a rite of passage. Bikes and the sport of mountain biking provide a multitude of opportunities to teach children valuable lessons that will carry into adulthood.

Obesity is at a high, while activity levels among Americans are plummeting. With its progressive nature and way of stimulating the senses, mountain biking is appealing, especially to youth, and provides an excellent form of recreation for reversing the trend toward poor health. Since riding a bike provides excellent cardio conditioning, improves strength and coordination, and burns several hundred calories an hour, it is an activity as appealing to parents as it is to kids.

The unstructured play that mountain biking provides inspires people to explore and appreciate the natural world, leading to positive associations with outdoor activities and exercise.

Mountain biking allows individuals to advance at their own pace, so kids looking for a challenge can have just as much fun as children who are more interested in exploring the scenery. Riding in nature provides an environment where children can work on their skills, have fun, and pedal their bikes without parents having to worry. Mountain biking is a cross-generational endeavor, accessible to all ages and levels of physical fitness. Going for a trail ride is an excellent way for parents to do more than support their children's activities, it's a way to share the experience. Every ride is an opportunity to create a healthy lifestyle and pass on lessons that are best learned through experience.

Several studies on physical activity have indicated that proximity to recreational facilities, such as trails, is a predictor for physical activity. Simply put, if there are walking and biking trails nearby, then residents are more likely to use them and therefore be healthier. Physical health and exposure to nature also benefit mental health, reducing stress and increasing happiness. In addition, individual and community health translate to economic benefits by decreasing health care costs.

Contributing to Economic Growth

A well-designed trail system can stimulate economic growth by increasing activity within the local population as well as attracting visitors from outside. Trails can generate business in retail sales and services, support jobs, provide sustainable growth in rural communities, and produce tax revenue. Access to trails also correlates to a higher quality of life, thus making the community more desirable and capable of attracting new businesses and workers to an area.

IMBA assists local communities in increasing mountain bicycling tourism as a sustainable, renewable source of economic development. A mountain biking destination is one that attracts tourists to an area for the benefits of the mountain biking experience; provides visitors with all of the amenities needed to compliment, ease, and enhance their visit; and in turn creates word of mouth about the community that will draw new and repeat visits.

According to the Outdoor Industry Alliance, mountain bicyclists represent approximately 3.4% of the U.S. population, or nearly 10.6 million participants.

IMBA's own research indicates that enthusiasts, who represent a portion of this overall number, travel extensively within a four-hour range and will typically devote one week per year specifically to travel to reach mountain bicycling destinations. Same-day visitors spend approximately $35 per day in local communities while destination visitors spend closer to $193 per day (due in part to lodging and increased meal purchases).

While mountain bicyclists are certainly willing to travel to ride, they will only do so if their destination contains a key ingredient: high-quality trails. These trails must be of a sufficient length and contain a variety of experiences, such as traditional singletrack, bike-optimized singletrack, bike parks, and shuttle options. The competition for these destination-quality locations is slowly increasing over time

A case study in Cable, Wisconsin, clearly illustrates how a community can benefit from offering a world-class bicycling experience. Construction of new bicycle trails in Cable resulted in:

- Increased property values.
- Increased spending on bicycle related goods.
- 35 jobs created annually, adding $523,000 to total employee compensation.
- Nearly $1.3 million impact related to spending from mountain bicyclists.

Fostering Community Pride and Identity

Involving community members in the planning, building, and maintaining of trails fosters community pride. In order to maintain sustainable trails, care of the trail system should be managed by local enthusiasts and rely on an organized membership base. Volunteering to help with trails provides an opportunity for area residents to connect with each other and with the terrain and land that surround them. IMBA members donate nearly one million volunteer hours to trails throughout North America every year, making volunteerism a large part of mountain bike culture.

Trails and parks also provide informal opportunities for people to meet and interact with others in a natural setting. Connection to nature is paramount to maintaining the health of the environment and making the outdoors relevant and accessible to all. Trails serve a diverse population and cultivate unity and stewardship in the community. Trails can even revitalize blighted areas, for example, turning landfills into bike parks or gravel pits into trailheads.

Preserving Open Space

Trails make communities better places to live by preserving and creating open spaces for recreation. Greenways function as hands-on environmental classrooms for people of all ages, providing opportunities to enjoy nature close up. With its abundant plant life, open spaces can decrease pollution, protect water quality, and reduce soil erosion. Economic growth and property values are also tied to open space as buyers are generally willing to pay more for property located close to parks and open space. The recreation, health, economic, and environmental benefits of trails can contribute to an overall enhanced quality of life in nearby communities.

Encouraging Positive Recreation Use to Displace Negative Use

Without a plan, undeveloped areas are often haphazardly transformed by users creating unauthorized sites to suit their personal wants. Purposefully designing trail systems can help create diverse recreational opportunities, encourage safe use, and meet the needs of the entire community. Unauthorized trail building and dumping or other unacceptable activities can damage ecology, cause safety hazards, and leave behind debris that is both unsightly and illegal. The best way to encourage positive use is to displace negative use. A well-planned trail system can discourage and displace destructive activities with healthy recreational use that attracts visitors of all ages.

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