

# CONCEPTUAL TRAIL PLAN

TOUCH OF NATURE ENVIRONMENTAL CENTER SOUTHERN ILLINOIS UNIVERSITY MAKANDA, ILLINOIS DECEMBER 2016



- PREPARED FOR: Southern Illinois University Touch of Nature Environmental Center
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### INTRODUCTION



In December 2016, IMBA Trail Solutions was contracted by Southern Illinois University (SIU) to create a conceptual trail plan for their Touch of Nature (TON) Environmental Center. The center lies 9 miles south of Carbondale, Illinois where the main campus of Southern Illinois University is located. The university has around 15,000 students, making up a significant percentage of the city's population of nearly 27,000 people.

Despite the fact that the Southern Illinois region has a broad offering of outdoor activities, mountain bike trails are in short supply. The hills and valleys of the region are home to a number of state parks, natural areas, and national forests. These places attract bird watchers, hikers, boaters, rock climbers, equestrians, and trail runners just to name a few. Unfortunately the mountain bikers in the region are vastly underserved and must drive long distances to find a quality trail experience.



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The TON property consists of over 3000 acres of rolling hill country that has been put to many uses over the years. Much of the land was used for agriculture and resource extraction during the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. After being acquired by SIU, most of the parcels have either gone back to nature, been developed into an aquaculture facility, or used by the Environmental Education and Therapeutic Recreation programs as an outdoor classroom and research area

SIU is interested in making TON an outdoor resource that the public can enjoy. One of the potential ways to bring the public in is with trails. The staff at TON have experimented with trailbuilding on the site. At first these trails were just wide mown paths, but recently a narrow sustainable singletrack was built along the shore of Little Grassy Lake, on the western edge of the property and it demonstrates what a perfect place for trails that TON is. Because of the paucity of MTB trails in the region, an interest in providing a place for mountain bikers to ride became a priority. This drive resulted in the contracting of IMBA's Trail Solutions (TS) program to visit Touch of Nature, survey the terrain, create a conceptual trail plan, and design some of the first trails. Two staff from TS arrived onsite and spent 5 days performing fieldwork and designing just under 5 miles of trail corridor. This report is the output of that fieldwork.

# METHODOLOGY

This plan was developed by following these strategies:

- Key stakeholders were interviewed to provide a better understanding of how a mountain bike trail system could be integrated with and expand Touch of Nature's offerings.
- The designed trail corridors were hiked and flagged with intermittent plastic flagging ribbon. These corridors were recorded with a GPS and key points were noted and recorded.
- The terrain and surroundings were surveyed on foot and digital mapping files were analyzed with GIS software.
- Conclusions regarding development recommendations were made using industry best practices, sustainable trails guidelines, and available economic data.



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# **OBJECTIVES**

# OBJECTIVE: FOSTER ECONOMIC GROWTH BY CREATING A TRAIL EXPERIENCE THAT ATTRACTS VISITORS FROM OUTSIDE AREAS.

The economic benefits of outdoor recreational tourism are significant. Outdoor recreation contributes \$646 billion to the U.S. economy annually, while mountain bicycling contributes \$82 billion to the national economy annually. Of that \$82 billion, \$11 billion is related directly to bicycling gear sales and services and \$71 billion is related to bicycling triprelated expenditures. In addition, mountain bicycling supports nearly



2.5 million jobs across the U.S. and generates \$5 billion in annual federal tax revenues and \$5.6 billion in state tax revenues. This data shows that mountain bicycle trail building provides sustainable growth in rural communities.

High-quality singletrack trails will attract mountain bicyclists, hikers, and trail runners, which will boost the economic health of the region. The development of *model trails* and other high demand trail types will create experiences that draw visitors to the area and establish it as a mountain biking destination

Through careful planning, design and construction, this trail network can become a critical component of the economic engine that sustains the community. It is critical to attract and satisfy visitor's desires with the full range of experiences for which they are looking. An inexperienced or not physically fit visitor may be forced to turn back if they encounter a mandatory obstacle on an otherwise "green"-rated trail. Similarly, a high level rider may not bother to visit a destination that lacks the physically challenging and technically demanding trails that an established location such as Sedona, AZ, is famous for.





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.

Another study in British Columbia provides interesting facts about their visitors and the potential economic benefits from mountain bicycling tourism:

Percentage of visitors who				
are visiting from out of the area	75%			
listed mountain bicycling as the primary motivator for their trip	96%			
have a college degree	40%			
have a Masters or PhD	10%			
have a technical degree	22%			
stay in a campground	36%			
stay in a hotel	22%			
stay in a resort	16%			
travel with children	22%			
report \$100,000 in annual income	50%			
report over \$150,000 in annual income	22%			
will visit the national park	37%			
will go for a hike	28%			
plan on riding for 3 days	85%			
plan repeat visits in the same season	51%			





### **OBJECTIVE: CREATE A MORE VARIED RIDING EXPERIENCE**

In order for this 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.

#### **TRAIL TYPES**

Mountain Bike Optimized (MO) singletrack trails are designed and constructed to enhance trail experiences specifically for mountain bikers. Mountain Bike Optimized trails might differ from traditional (TR) trails in several ways: enhanced tread shaping, directional or one-way travel, and through addition of



man-made technical trail features (MMTFs). Bicycles move differently along a trail than other modes – the movement of the wheel, the use of gravity and friction, the transfer of energy from the rider to the wheel – offer both opportunities and constraints for trails and trail features that may differ from those of other users. This conceptual plan utilizes 2 trail types:

• Traditional Singletrack (TR)

These natural surface trails will be built using sustainable trail construction techniques. Routes will be constructed and maintained using techniques that will minimize user conflict and maximize a natural surface texture and trail corridor. This type of trails should be narrower than 75cm to reduce speed. All user types will use these routes so care should be taken to avoid obstacles that might exclude an allowed user type such as jumps, rollers, or water-bars. Turns will be constructed sustainably but will not be cambered to optimize cornering traction.

• MTB Optimized Singletrack (MO)

These natural surface trails are built using sustainable trail construction techniques. They should be purpose-built for MTB users. This type of MTB-optimized trail is constructed with features such as rock areas, berms, larger





grade reversals, wider cambered turns and skill level appropriate jumps. These trails should make use of gravity and are managed primarily for descending riders to provide a more enjoyable experience. This type of trails should be narrower than 100cm.

#### PREFERRED DIRECTION AND USER TYPE

Mountain bike-optimized and one-way trails that harness gravity are growing in popularity in trail systems. These trails can be provided at any scale, from beginner friendly "Flow Trails" to extremely difficult race-oriented downhill trails. Riders cherish the "feeling of flight" that a bicycle gives 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 to subsequent sections. This aspect is a hallmark of flow



trails and can be particularly important for beginner trails, as wells as for higher speed and/or gravity features, such as jumps and drops, on more advanced trails.

As trail systems grow and become congested, one-way trails help to take the pressure off of popular shared-use trails. Riders looking for speed, thrill, and challenge will have their own designated areas, and fewer user interactions with all users traveling in the same direction. 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.

#### SKILL LEVEL AND TRAIL DIFFICULTY

The trails outlined in this concept have been given a target skill level that will help to guide the construction of these features.





The ridership within each category can be divided into the following groups: beginner, intermediate, advanced, and expert. Using a basic bell curve distribution it can be assumed the majority of mountain bicyclists in any category and as a whole are intermediate/advanced riders.

The TON trail system should utilize a consistent rating system. This will provide for a safer and more predictable experience for users. The Trail Difficulty Rating System is a basic method used to categorize the relative technical difficulty of recreation trails and should for the basis for a rating system at TON.

The Trail Difficulty Rating System can:

• Help trail users make informed decisions



- Encourage visitors to use trails that match their skill level
- Manage risk and minimize injuries
- Improve the outdoor experience for a wide variety of visitors
- Aid in the planning of trails and trail systems

(The following chart will indicate a single "Black" diamond for very difficult advanced trails But, for the purpose of creating easy to read maps, these will appear as "Red" lines on maps while extremely difficult trails will be "Black".)





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	Typically 3% or less	Typically 5% or less	Typically 8% or less	Typically 12% or less	Typically 15% or less
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







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 to mountain bikers best, 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 include: rocks, roots, logs, holes, ledges, drop-offs, etc. 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, etc. Both the height and the width of the technical trail feature are measured.





### **OBJECTIVE: CONSERVATION, EDUCATION, AND RECREATION**

Sustainable singletrack trails are one of the best ways for Touch of Nature to satisfy its

core mission. Singletrack trails "fit" the landscape, weaving through the forested hills, valleys, and lake shore. Purposefully designed trails take visitors to the experiences and interpretive sites that staff want to highlight, all along routes chosen to protect natural resources. Singletrack trail loops provide maximum trail recreation capacity for the given footprint and satisfy the broad base of human-powered modalities by minimizing speed differentials. This meshes seamlessly with the mission of Touch of Nature:



"The mission of Touch of Nature Environmental Center is to enhance learning, promote professional development, encourage personal and interpersonal development, and increase environmental awareness."







# **EXISTING CONDITIONS AND OPPORTUNITIES**

### TERRAIN

The property on which TON is located has a broad variety of terrain for trails. The property is bounded on the east by Little Grassy lake. Its rocky shores with large stone shelves are ideal for trails. Unfortunately trail development in this area has been pushed back for this area (identified as areas B and C on the large map). The terrain becomes less attractive at the southern boundary where it meets up with Giant City State Park (GCSP), but still there is suitable ground for trails. Indian Creek begins on the southern property line (Area A on the large map) and flows north for a bit before curving to the northwest, crossing under Giant City Road and continuing off to the property's NW corner. The slopes of the river valley have the most potential for building quality trails. Rock outcrops have eroded out of the hills and provide for challenging trail opportunities. The terrain on the slopes north of





Indian Creek are the most ideal for trails, but some concern has been expressed to create fewer trails there. Further north is the Aquaculture site, this area must be avoided to prevent disruption of the facility's work. Across Indian Creek, on the southern slopes there is still good terrain. Because this area is north facing, it will not dry out as quickly after rain or snow. South of these slopes the terrain can become less than ideal. Flat plateaus were created for farming the ridgetops. Now that the farms are abandoned, the land has been reclaimed by thick vegetation and small tress. This type of terrain should be avoided when possible but it does need to be crossed occasionally to provide access to good terrain at the edge of Giant City State Park.

### SOILS & GEOLOGY

The soils are relatively silty and will move readily if left unprotected by leaf matter. Trails will need to be built using sustainable trail guidelines to avoid erosion. With proper construction, good compaction can be achieved. Trails should be located on side-slopes to promote cross drainage. Whenever possible, rocks and slabs should be incorporated into the trail surface to increase challenge.

#### INFRASTRUCTURE

Touch of Nature has been running a camp type facility for many years. This has given them time to amass a broad range of facilities which includes: parking, cabins, administration office, conference rooms, and canoes among many other things. Some of the essential items for developing trails and running a trail system are on-site. The trail system will however need better crossings of Giant City Road. Vehicles travel at highway speeds and the existing crossing at the main gate has very poor visibility. New crossings should be striped and have good signage to warn drivers.

#### EXISTING USES

The primary use for TON is education. Students of all ages attend gatherings, classes, and camps. These visitors would also make use of a new trail system. Adding mountain biking as an activity would broaden the opportunities for visitors to see and interpret the center. However planning should take into account that some parts of the camp may need to be off limits to trail users at certain times. There may also be an opportunity to add trail building, design, and maintenance to the curriculum. This would reduce trail expenses and provide a high quality course offering.





# TRAIL SYSTEM SUMMARY

In this concept plan, the trail system is envisioned as a new offering of beginner through expert level traditional and mountain bike optimized trails. An interconnected system of trails, providing access from a new trailhead at the main entrance outwards. Adoption of this trail plan, as outlined in this document, will provide a new offering of the trails that MTB users demand. It will also create new singletrack and hiking opportunities, while reducing the potential for conflict between MTB users and other users.

#### TRAIL NARRATIVE

Riders starting from the trailhead will pedal along a wide shared use path as they approach the Touchdown Bike Park, built on the old football pitch. As they arrive they will have a chance to watch their children ride in the Kid's Pumptrack & Play Area. If they're interested in trying out a pumptrack themselves, they'll find one up ahead in the bike park. After taking a few pumping flowing laps, riders will decide between a progressive jump line, technical skills course, or



slopestyle features before heading out onto the trails. Beginner trails will lead them to the Pump n Jump Trails with a full range of flow trail progressions and a drop zone. For a bit more adrenaline they can pedal a lap and check out the steep and rocky Mini DH trails.

Once a rider is warmed up they're ready for the next step, heading across the road and hitting the beginner loops that hug the lake shore. A combination of TR and MO trails will create loop options that can be interchanged for variety. From here the beginner rider will need to head back to the trailhead. But for intermediate to expert riders it's just getting started. As they roll south and cross the Aquaculture Road the slopes it steeper and the trails become more challenging. Many of these trails are shared with hikers and trail runners who also enjoy the open tree canopy and rock features. Swooping along on narrow trails, riders will splash across Indian Creek and maybe stop to check out the rock overhangs and verdant moss before climbing towards the plateau to the south. The vegetation thickens and the trail squeezes the riders up and over the plateau to cruise down the other side. Rock outcrops come into view as riders catch glimpses of Giant City





State Park. The Trails get difficult out here, with mostly advanced and expert lines creating loops or swooping MO descents back down to Indian Creek. Now it's decision time. Do you climb from the creek and do some more exploring to the south? Or maybe it's time to head back up the scenic lake, catch the sunset, and cruise back to the trail head? A good ride.

#### TOUCHDOWN BIKE PARK AND KID'S PUMPTRACK



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#### **BEGINNER TRAILS AND PUMP N JUMP TRAILS**



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#### **SCENIC LAKE TRAILS**



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#### **ADVENTURE TRAILS**



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# **NEXT STEPS**

- 1. Prioritize, and secure funding for top projects. Refer to "Phase" prioritization within the Trail Index.
- 2. Obtain design and construction approval.
- 3. Hire a bike park design and construction expert to create a design for the park's features, jumps, pumptracks, and trails.
- 4. Hire a trail design and construction expert to design and build Phase 1.
- 5. Establish and train a corps of trail maintenance staff.
- 6. Track economic impact data to document success.





# APPENDIX A. — MAP



Please refer to larger maps or GIS data for more detailed views.





### APPENDIX B. — TRAIL INDEX

						Length
Route ID	Phase	Trail Type	Difficulty	Status	User Type	(mi)
TN01	1	TR	Green	Flagged	Shared	0.09
TN02	1	TR	Green	Flagged	Shared	0.34
TN03	1	MO	Green	Flagged	Shared	0.52
TN04A	1	MO	Blue	Flagged	MTB	0.13
TN04B	1	TR	Green	Flagged	MTB	0.04
TN05A	1	TR	Green	Flagged	Shared	0.46
TN05B	1	TR	Blue	Flagged	Shared	0.20
TN06A	1	TR	Blue	Flagged	Shared	1.05
TN06B	1	TR	Blue	Flagged	Shared	0.17
TN06C	1	TR	Red	Flagged	Shared	0.15
TN06D	1	TR	Blue	Flagged	Shared	0.44
TN07	1	TR	Blue	Flagged	Shared	1.15
TN08	1	TR	Blue	Conceptual	Shared	0.64
TN09	1	TR	Blue	Conceptual	Shared	0.29
TN10	1	TR	Green	Conceptual	Shared	0.45
TN11	1	MO	Green	Conceptual	MTB	0.66
TN12	1	TR	Blue	Conceptual	MTB	0.49
TN13	1	MO	Green	Conceptual	Shared	0.13
TN14	1	TR	Blue	Conceptual	Shared	0.04
TN15	1	MO	Blue	Conceptual	MTB	0.41
TN16	1	MO	Green	Conceptual	MTB	0.11
TN20	1	MO	Green	Conceptual	MTB	0.18
TN21	1	TR	Green	Conceptual	MTB	0.94
TN22	1	MO	Red	Conceptual	MTB	0.04
TN23	1	MO	Black	Conceptual	MTB	0.04
TN24	1	TR	Blue	Conceptual	MTB	0.08
TN25	1	MO	Blue	Conceptual	MTB	0.04
TN26	1	MO	Red	Conceptual	MTB	0.04
TN27	1	MO	Black	Conceptual	MTB	0.05
TN28	2	TR	Blue	Conceptual	Shared	1.17
TN29	2	MO	Red	Conceptual	MTB	0.46
TN30	2	MO	Green	Conceptual	MTB	0.21

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TN31	2	TR	Green	Conceptual	Shared	0.48
TN32	2	MO	Blue	Conceptual	MTB	0.17
TN33	2	TR	Green	Conceptual	Shared	0.33
TN34	2	TR	Green	Conceptual	Shared	0.04
TN35	2	TR	Green	Conceptual	Shared	0.12
TN36	2	MO	Green	Conceptual	MTB	0.28
TN37	2	TR	Blue	Conceptual	Shared	1.18
TN38	2	MO	Red	Conceptual	MTB	0.55
TN39	2	TR	Blue	Conceptual	Shared	0.67
TN40	2	TR	Blue	Conceptual	Shared	0.40
TN41	2	MO	Blue	Conceptual	MTB	0.90
TN42	2	MO	Black	Conceptual	МТВ	0.23
TN43	2	MO	Blue	Conceptual	MTB	0.42
TN44	2	MO	Red	Conceptual	MTB	0.10
TN45	2	MO	Red	Conceptual	MTB	0.15
TN46	2	MO	Green	Conceptual	МТВ	0.42
TN47	3	MO	Red	Conceptual	MTB	0.49
TN48	3	MO	Red	Conceptual	МТВ	0.54
TN49	3	MO	Black	Conceptual	MTB	0.94
TN50	3	MO	Red	Conceptual	МТВ	0.40
TN51	3	TR	Black	Conceptual	MTB	0.33
TN52	3	MO	Black	Conceptual	MTB	1.34
TN53	3	TR	Black	Conceptual	MTB	0.82
TN54	3	MO	Black	Conceptual	MTB	0.32
TN55	3	TR	Blue	Conceptual	Shared	0.49
TN56	3	TR	Red	Conceptual	Shared	0.54
TN57	3	MO	Red	Conceptual	MTB	0.72
TN58	3	TR	Blue	Conceptual	МТВ	0.11
TN59	3	MO	Red	Conceptual	MTB	2.26
TN60	3	MO	Black	Conceptual	МТВ	0.30
TN61	3	MO	Black	Conceptual	МТВ	0.51
TN62	4	TR	Black	Conceptual	Shared	0.19
TN63	4	TR	Red	Conceptual	Shared	0.11
TN64	4	TR	Blue	Conceptual	Shared	0.28
GSP01	1	TR	Blue	Existing	Equestrian	0.51
GSP02	1	TR	Red	Conceptual	Equestrian	0.16

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GSP03	1	TR	Red	Conceptual	Foot	0.18
GSP04	1	TR	Red	Conceptual	Shared	0.16

### TRAIL MILEAGE BY DIFFICULTY LEVEL

Trail Difficulty	Mileage
Green	5.8
Blue	11.44
Red	7.06
Black	5.08
All	29.39

