



Wister Woods TRAIL FEASIBILITY ASSESSMENT

November 2023

Produced for:



Proposed Wister Woods Bike Trails
Attn: Sahlee Brown
Philadelphia Parks and Recreation

Produced by:



Gravity Logic, Inc.
7470 Ambassador Crescent
Whistler, BC V0N 1B7
www.whistlergravitylogic.com

About this Document

Copyright and Proprietary 2023.

Cover photo: Department of Special Collections, Connelly Library, La Salle University

Table of Contents

1.	Executive Summary	4
2.	Plan Objectives.....	6
3.	Situation Analysis	7
3.1	Location.....	7
3.2	Terrain Attributes.....	8
4.	Existing Trails /Other Uses	11
5.	Vision.....	12
6.	Market	15
6.1	Market Segmentation	15
6.2	Market Trends.....	16
7.	Approach.....	17
7.1	Operational Considerations.....	19
8.	Stakeholder Considerations.....	21
9.	Potential Barriers	22
10.	Other Benefits.....	24
11.	Capex.....	26
12.	Next Steps	27

1. Executive Summary

After exploring Wister Woods, Wakefield Park, and the adjacent green spaces, Gravity Logic is confident that a high-quality bike-specific trail network could be constructed in this area. **Through careful design, there is room to construct upwards of 7 miles of modern, bike-specific trails, including both excavated and singletrack trail types. There is also room for a family area, a large asphalt pump track, and a large dirt jump park.** This trail network could provide a wide variety of riding opportunities that would be accessible to riders of any skill level and on any type of bike. A properly designed and constructed modern trail network would benefit the local community and could provide health, social, and economic stimulus to the residents of Germantown as well as the surrounding communities.

If the general trail concept as proposed in this document is accepted, Gravity Logic's expert team would work alongside residents in the design and construction phase to transfer valuable skills to the local community that will allow them to maintain the trail network and provide skills that can be used in other employment opportunities. The Wister Woods trails could support a variety of community-based programs to introduce kids to recreational riding and competition.

Trails would be designed and constructed such that they would be accessible for riders of all ages and skill levels with certain parts of the trail network being designed specifically for families with young children. Other parts of the trail network would be designed to allow beginner riders to learn new skills and for advanced and expert riders to progress their skills as well. Philadelphia's youth - who currently ride their bikes in the busy city streets - will gain a purpose-built trail network where they can enjoy riding their bikes away from the dangers of city traffic.

In addition to providing a new healthy recreational opportunity to residents of all ages, the students of Central High School, Widener Memorial School, The Philadelphia High School for Girls, and La Salle University would all benefit from a trail network near their campuses. These trails would be appropriate for community groups to introduce new riders to the sport. The trail network could also be used for bike clubs and race teams to use for skill development and race training. Finally, the trail network could also host bike races and competitions of various types.

The proposed trails would bring vibrancy to the underused green spaces in Wister Woods and Wakefield Park. Construction of bike-specific trails in this area would provide access, visibility, and instill a greater sense of community pride – all contributing to help clean up green spaces that are currently becoming overgrown with invasive plants and littered with trash.

Kathy Paulmier grew up playing touch football in Wister Woods Park. As an adult, this self-proclaimed "bush-whacker" often follows deer trails as she pushes her way through the overgrown forest so she can fully appreciate what she calls "a tree museum," a wide variety of enormous trees including beech, tulip, and different

types of oak. She's enjoyed gatherings at what locals call the "family reunion field" and seen countless groups picnic here.

But she's also noticed a few things that concern her. The forest is being overwhelmed by invasive vines and an ever-growing amount of poison ivy. Trash can pile up on Belfield Avenue and other park borders. While the park's sports fields and open spaces are well-loved, the woods are inaccessible to many because there are no designated paths or trail markers.

<https://myphillypark.org/connections-wister-woods/>

This trail network would become a source of pride for residents and help to foster community bonds by providing a safe place for community members to recreate and experience nature amid an otherwise very developed urban environment.

This trail network could serve as a cornerstone for a larger trail network that takes advantage of other underutilized green spaces and abandoned rail grades in Philadelphia to increase recreational opportunities in the city. This larger trail network would continue to increase economic stimulus to the areas the trails are built by providing employment opportunities during the construction phase and bringing visitors to the areas after the trails are complete. Finally, adding more trails - and more bike-specific trails - to the city's trail inventory will also help alleviate pressure and user group conflicts on Philadelphia's existing trail networks.

2. Plan Objectives

The objectives of this plan are to:

- To examine, through on-the-ground proofing, the potential (in terms of capacity, scale, and scope) of the Wister Woods, Wakefield Park and other nearby green spaces as the site of a modern mountain bike trail network.
- To meet with staff of Philadelphia Parks and local mountain bike riders to determine the types of riding experiences that city staff and local riders are seeking.



Photo courtesy of Jarvso Bike Park

3. Situation Analysis

3.1 Location

Wister Woods and Wakefield Park, located in the Germantown neighborhood of Philadelphia, is a pocket of tree-covered land surrounded by dense development on all sides. To the north and east of Wister Woods is the campus of La Salle University, including student dorms and sports facilities. To the south and west of Wister Woods are residential neighborhoods.

Nearby Wakefield Park is bordered on the east by the La Salle campus. To the north of Wakefield Park are Central High School, Widener Memorial School, and the Philadelphia High School for Girls. To the south and east of Wakefield park are more residential neighborhoods.

The location of Wister Woods and Wakefield Park are ideal to provide recreational opportunities to the surrounding neighborhoods. The residents of Germantown would gain access to a nearby trail network that would allow families and residents to take part in healthy outdoor activities without the need to travel long distances. The variety of trails and riding experiences that Gravity Logic is proposing would include trails that are accessible for riders of all ages and skill levels, from toddlers on children's bikes to teenagers and adults of any skill level. This trail network would give the youth and young adults an opportunity to take their bikes off of the crowded city streets and into a properly built trail network where they could develop their bike skills safely without interacting with traffic.

The nearby high schools could use this new trail network to support physical education and environmental studies. La Salle University could likewise make use of the trail network to support a variety of areas of study. The high schools and universities could initiate mountain bike programs to foster bike skills in their students. The trail network would be appropriate for the training of mountain bike teams and for hosting races as well.

3.2 Terrain Attributes

The following terrain observations were made:

The study area consists of 7 forested areas and green spaces separated by city streets and rail lines. The area is generally flat with some of the tree covered areas having sloping ground. The forested sections are a mix of large deciduous trees and minimal undergrowth. Some areas are choked with vines and brambles. Other areas have flat grassy fields. The soils are a mix of mineral soils and small rocks with minimal bedrock. Based on our observations of nearby excavations, the mineral soils are of a type that compact well. These soils will be of excellent quality for the building of high-quality bike trails. **The good soils, lack of bedrock, lack of watercourses, and the lack of undergrowth in most of the study area indicates that construction cost of trails would be below our North American average.**

In general, each of these smaller areas is suitable to host a small trail network. Gravity Logic is confident that through a careful planning process, the entire area taken together could support over 7 miles of bike specific trails. This would include a family zone with trails for young children and beginner riders, several miles of excavated trails and singletracks, a variety of excavated jump trails, a large asphalt pump track, and a jump park including jump options from beginner to expert.



Area 1

Area 1 is bordered to the north by West Clarkson Avenue, to the east by North 20th Street, to the south by Belfield Avenue, and to the west by Wister Street. Area 1 is flat and open bordering Belfield Avenue,

with a short steep forested slope leading to an upper plateau bordering North 20th Street. This area would have an intermediate excavated perimeter loop trail and hand-built singletracks of various difficulties.

Area 2

Area 2 is bordered to the north and east by an active rail line, to the south by houses along Rubicam Street and the Woodford Tennis Club, and to the west by Wister Street. This area is flat and forest covered. Unpaved parking lots adjacent to the tennis club could provide parking for the proposed trail network. This area would have an excavated intermediate perimeter loop trail and sections of hand-built singletrack of various difficulties.

Area 3

Area 3 is bordered to the north and east by Belfield Avenue, to the south by Logan Street, and to the north by an active rail line and Wister Street. Area 3 is the largest area with the largest vertical in the project area. The entire area is forest covered, with the high ground adjacent to the rail line, sloping down towards Belfield Avenue. Street parking on Belfield Avenue could be used by visitors to the trail network. This area would have an excavated perimeter loop trail, hand-built singletracks, and excavated jump trail of various difficulties.

Area 4

Area 4 is bordered to the north by North 20th Street and La Salle University's McCarthy Stadium. To the east is La Salle University's dorms and other facilities. To the south is Logan Street, and to the west is Belfield Avenue. This area is entirely forest covered, and gently sloping from east to west. A short steep bank on the north and east border descends to a plateau in the middle of the area, and then a gentle slope towards Belfield Avenue. As previously mentioned, street parking is available on both sides of Belfield Avenue as well as one side of North 20th Street. There is a flat grassy park and BBQ area along Belfield Avenue at the southern end of this area that is well used by residents. No trails will be built in this BBQ area. This area would have an excavated perimeter loop trail, an excavated jump trail, and hand-built singletrack trails of various difficulties.

Area 5

Area 5 is bordered to the north by La Salle University's Hank DeVincent Field and Central High School. To the east is Ogontz Avenue. To the south is Lindley Avenue, and to the west are La Salle University's dorms and other facilities. This irregularly shaped parcel contains a flat grassy field on the southern end with an abandoned baseball diamond. A patch of brambles and forest surrounds the CubeSmart Self Storage facility and connects to Central High School. The grassy field in Area 5 would have a large asphalt pump track suitable for riders of all ages and skills. This grassy field would also have a series of dirt jumps, offering jumps of various sizes for riders of all skill levels. The gentle slopes between the baseball field and the CubeSmart Self Storage facility would be the location for the family zone. The Family Zone would

be a series of short beginner and intermediate trails appropriate for families with young children and beginner riders. Excavated intermediate trails and hand-built singletracks behind the CubeSmart Self Storage facility would connect to Central high school.

Area 6

Area 6 is bordered to the north by West Somerville Avenue, to the east by North 16th Street, to the south by West Fisher Avenue, and to the west by Ogontz Avenue. This area is completely forest covered, with a gentle slope from west to east. This area would have an excavated intermediate perimeter loop trail and several hand-built singletrack of various difficulties.

Area 7

Area 7 is bordered to the north by West Fisher Avenue, to the east by North 16th Street, to the south by Lindley Street and to the west by Ogontz Avenue. The eastern side of Area 7 area bordering North 16th Street has a grassy field and sparse trees. This open space is already used by residents, and, for this reason, no trails will be built in this area. The western side of Area 7 is forest covered and gently sloping towards Ogontz Avenue. There is a historic building ruin in the southern end of Area 7. This area would have an excavated intermediate perimeter loop trail, and a hand-built singletrack with a variety of wooden features.



4. Existing Trails /Other Uses

Other than a few faint deer paths and undermaintained, unsigned, and unofficial walking paths, the study area has no existing trails. Large amounts of trash are present in certain areas, especially adjacent to roads, showing that this area is commonly used for dumping. The lack of existing trails in the study area is somewhat surprising given the density of the population adjacent to the area. However, this lack of trails makes this an ideal location to design and build carefully planned network of curated trails. Without any existing trails, there is less likely to be conflict with existing users of the areas.

Notably, in Area 4, the Wisteria Woods BBQ area has been identified by Philadelphia Park staff as an area that is already busy and heavily used by local residents. For that reason, no trails would be designed or built in this area. Nearby trails in Area 4 would be built in the unused forested areas to the east of this area to reduce conflicts with users of the BBQ area. Please see attached maps for further clarification.

In Area 7, the east side of this green space was identified by Philadelphia Park staff as an area that is frequently used by nearby residents for dog walking and other uses. For that reason, no trails would be designed and built in this area. Nearby trails in Area 7 would be built in the unused forested lands to the west. Please see attached maps for further clarification.



5. Vision

Gravity Logic's vision for this trail network is to construct a variety of bike specific trails throughout the study area. The trail network would be broken down into individual areas that can be ridden individually, or linked together to allow for longer rides connecting multiple areas. Riders would be able to enter the trail network from a number of trailheads. Each trailhead would have maps and liability signage. This would include an entrance from the local high schools, multiple entrances from the La Salle University campus, and multiple other entrances from residential neighborhoods. To maximize the amount of trail that can be built, each area would have a perimeter trail, with more trails inside the perimeter. Each area would be designed to act as its own contained mini trail network. The exact location, length and type of trail would be determined during the trail design phase of the project. For this feasibility study, trail lengths and locations have been approximated. The trail network would be designed so that riders can connect from one area to the next by using existing pedestrian crossings.

Each area can be thought of as its own contained mini trail network, and each individual area will connect logically to the next to allow for longer rides. The overall trail network would contain a wide variety of trail types and difficulty levels that will provide riding opportunities for riders of any age and experience level, and on any type of bike. The majority of the trails will fall into the intermediate range. To accommodate specific types of riding experiences, some areas will contain specific types of trails. For example, Area 5 would have a section of trails specifically designed for beginners and families, and Area 3 would have an area dedicated to advanced and expert riders looking for properly constructed modern bike jumps.

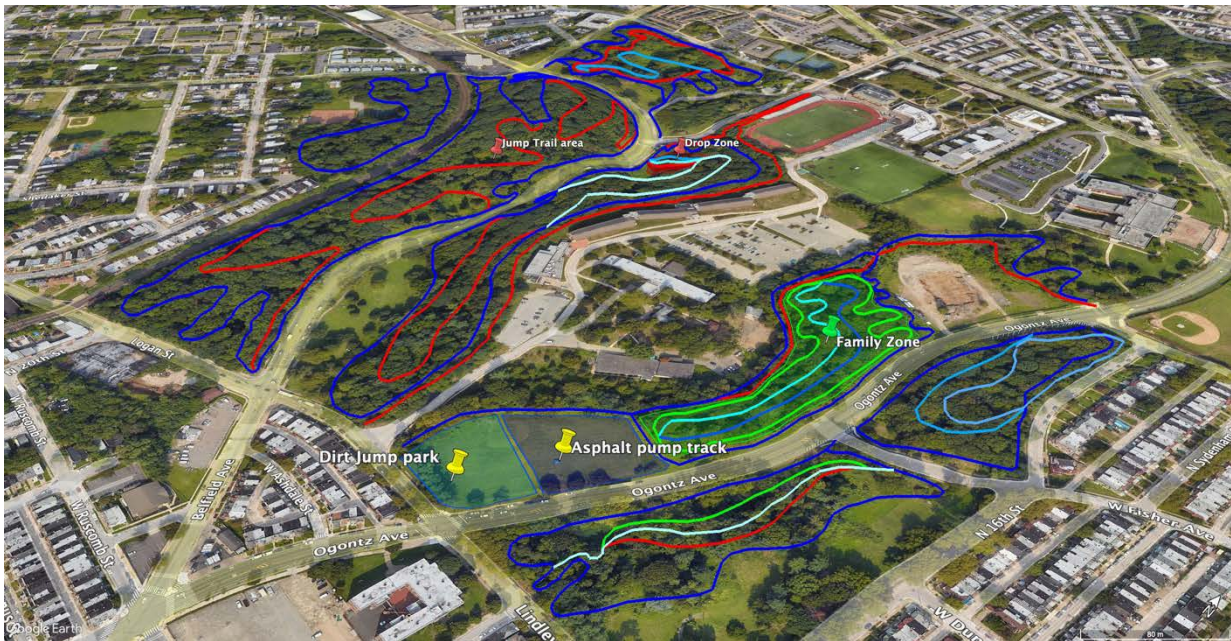
BEGINNER TRAILS: THE "FAMILY ZONE"

Area 5 would contain the "family zone". A self-contained network of short, family friendly trails would be constructed to make use of the vine and bramble filled hillside adjacent to the CubeSmart Self Storage facility. This would include an excavated uphill beginner trail, an excavated downhill beginner flow trail, and several beginner and intermediate hand-built singletrack trails. These trails would be self-contained and separate from the rest of the trail network so parents could ride with their children, or watch their children ride from a distance. The excavated flow trails would be built with a small excavator. They would be between 2 and 3 feet wide with gently rolling terrain, wide bridges, and slightly bermed corners. The singletrack trails would be hand-built, between 1 and 2 feet wide, containing a variety of natural trail surfaces appropriate for beginner riders.

INTERMEDIATE TRAILS

Intermediate trails would form the majority of the trail network. These excavated trails would form the perimeter of each area, and would be built with a small excavator. They would be between 1 and 3 feet wide with smooth riding surfaces, rolling terrain, slightly elevated bridges and bermed corners. Intermediate singletrack trails will also be present in the trail network. These hand-built trails would be

between 1 and 2 feet wide with a variety of riding surfaces appropriate for the intermediate rider including roots and rocks. Area 3 will contain intermediate jump trails. Similar to the excavated perimeter trails, these excavated jump trails will be built with a small excavator. They will be between 2 and 4 feet wide with bermed corners, rollers, and jumps appropriate for intermediate riders.



ADVANCED TRAILS, EXPERT TRAILS, AND JUMP TRAILS

To satisfy the advanced and expert rider, sections of trail will be built to a more difficult standard. This will include advanced and expert singletracks. These hand-built singletracks will be between 1 and 2 feet wide, with sharp corners, narrow bridges, and a variety of riding surfaces appropriate for advanced and expert riders, including roots, rocks, jumps and drops. Additionally, Area 3 will contain advanced and expert jump trails. These excavated trails will be built with a small excavator. They will be between 2 and 4 feet wide with steep bermed corners, rollers, and jumps appropriate for advanced and expert riders. Specific liability signage, similar to signage at municipal skateboard parks will warn riders of the risks associated with these trails.

DROP ZONE

Located in Area 4, the drop zone is an area where riders can practice the specific skill of jumping their bikes off of wooden drops. The drops in this area would progress in size to allow riders of varying skills to use them.

PUMP TRACK

The large grassy field in Area 5 would have an asphalt pump track, similar to the image below. Asphalt pump tracks such as these are increasingly popular around the world. They can be used by riders of any

age and skill level, from beginner to expert. They can also be enjoyed on any type of bike. These pump tracks can also be used by scooters or skateboards. These pump tracks require a large flat area for construction. The abandoned baseball field in Area 5 would be the ideal location for this facility. This pump track could be as large as space and funding allows. A similar world class facility recently opened in Inglewood, California and has instantly become beloved and heavily used by local residents and visitors alike.

<https://www.inglewoodpumptrack.org/>



DIRT JUMPS

Another feature in Area 5 would be a set of dirt jumps, similar to what is pictured below. This area would include jumps of various sizes that would be appropriate for riders of all skill levels including children and beginner riders. Slightly larger sets of jumps would be appropriate for intermediate and advanced riders. There largest set of jumps would be suitable for expert riders.



6. Market

6.1 Market Segmentation

Market Segment Opportunities

Segment	Description
Families	Multi-generational families with kids as young as 3 years old. Very similar demographic to the skiing family segment.
Committed Core	People who identify as mountain bikers. This segment covers a broad range of ages—and skews towards the highest end of the ability spectrum—who share a passion for mountain biking that goes deeper than recreation. This group will ride several times per week, have the latest equipment (or know about it) and travel to destinations for the purpose of riding.
On The Cusp	This segment includes experienced riders, covering ages from young adults to empty nesters, who ride regularly. Riders in this segment own their own equipment but may need to upgrade/rent for bike park riding. Generally, riding abilities skew intermediate trending to expert. They will spend most of their time riding locally and take their mountain bikes with them while travelling.
New & Improving	This segment includes riders who are new to the sport and more likely to ride local trails. This rapidly growing segment experienced exponential growth during the pandemic when people were seeking outdoor experiences. This is a diverse segment in terms of age, ethnic background, and riding experience. As their skills and commitment to sport increases, these riders will migrate into other market segments.
Leisure Tourist	At the opposite end of the mountain biking spectrum from the Committed Core segment, this group comprises tourists visiting Philadelphia for reasons other than mountain biking. A portion of this group will be participating in active experiences including mountain biking.
Mountain Bike Industry	This market segment deserves special attention. Attracting industry visitation is a powerful way to create brand awareness. Develop specific strategies to attract athletes, filmmakers, key influencers, retail shop employees, and industry manufacturers and suppliers.

6.2 Market Trends

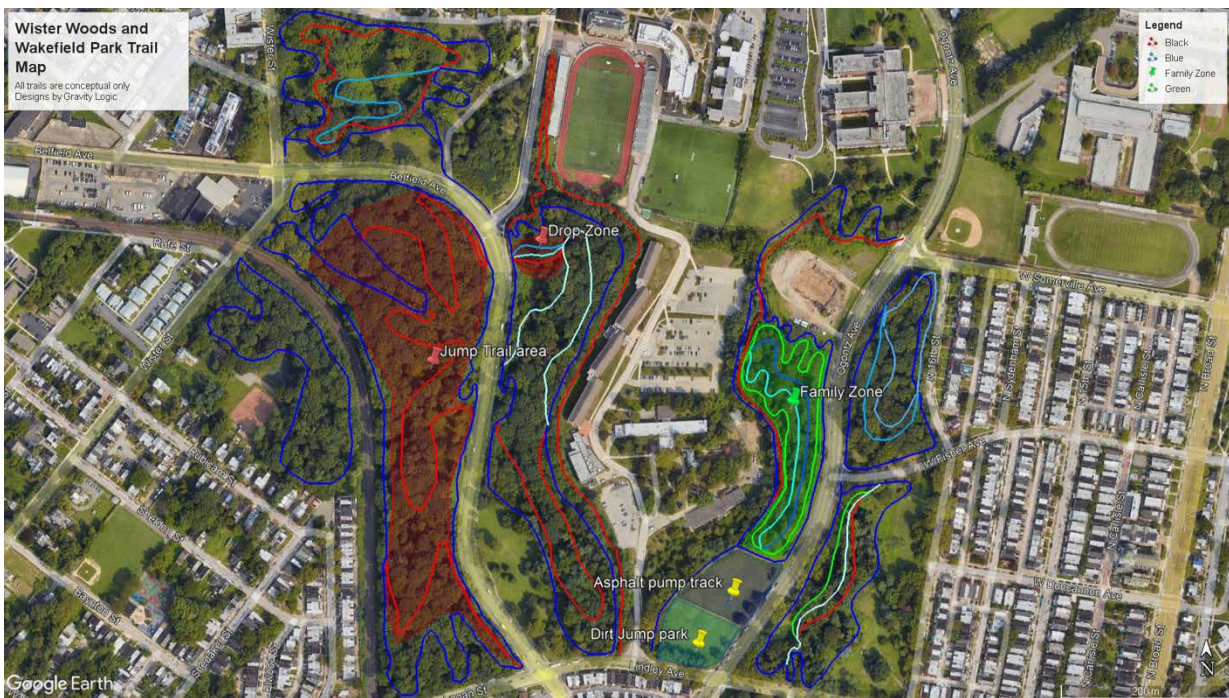
- **Families:** Mountain biking is in the early stages of attracting more and more families with children as young as 3 years old. It is anticipated that this trend will continue and provide decades of growth from this important market segment.
- **Mountain Bike Tourism:** Increasingly people and families are booking vacations that are centered around mountain biking. It is anticipated that this trend will continue similar to families booking winter ski vacations.
- **E-biking:** The e-mountain bike market was valued at around USD 5 billion in 2020, and it is expected to reach over USD 10 billion by 2026, projecting a CAGR of more than 12% during the forecast period (Source: Mordor intelligence). Every significant bike manufacturer is committed to growing this segment in the US.



7. Approach

The proposed Wister Woods trail network has the potential to create a diverse collection of high-quality riding experiences carefully designed to meet the needs of its target market segments. It is essential that the natural and physical resources are well planned and designed based on a clear vision for success. Any successful mountain bike park must pay careful attention to the layout and design of the trail network. Some of the trails—designed to accommodate a wide spectrum of riders—will need to be built by machine. Other trails may incorporate Technical Trail Features (TTF) that are designed appropriately for the level of difficulty (i.e., Green, Blue, and Black). All of the mountain bike trails on the conceptual plan have been designed with approximately 5–14% average grade over the length of the trail. A 10% grade is generally considered sustainable in terms of resistance to erosion and damage. Moderately graded trails (<10%) work with most soil types, minimize erosion, and allow for flexibility of design.

The conceptual trail corridors have been identified in the images below. Further field studies (ground-proofing during design) will identify positive and negative control points to refine exact trail locations and incorporate positive flow and transitions between trail segments. Control points identify specific areas along the trail that should be connected (positive-viewpoints, terrain benches, unique geography, etc.) or avoided (negative-watercourses, user conflict, construction challenges, wildlife habitat, etc.)



There are several resources available that outline and illustrate specific trail construction techniques. It is important that Wister Woods' proponents present any construction documentation as concepts and

guidelines rather than final trail plans and set standards. Flow trail design and construction is unique in that the goal is to create a sustainable surface with minimal impact to the environment. The goal is to use the microtopography of the land (where possible) rather than excavating or importing large amounts of material. Many resources quote the size of the material to be used, the degree of compaction required, the minimum turn radius, and the slope. Not only is this not practical for lighter-on-the-land trail construction, but it can work against the natural flow of the landscape. While Gravity Logic follows the generally accepted sustainable methods of construction, mountain biking is a relatively new pursuit. Trail construction techniques are quickly evolving to accommodate the different types of bikes, riding styles, evolving bike designs and technologies, and the volume of riders. While many of the fundamentals of trail construction are similar to trail building techniques used since the beginning of time, there are a few key differences, particularly with in-sloping trails and water management. Generally, Gravity Logic-built excavated trails are in-sloped (the bench of the trail is canted back towards the hill). This forces water to run to the inside of the trail bench and through culverts. The water flows into a small sediment trap and through the culvert if the volume exceeds the ability of the sump. The added retention time created by the sump allows sediment to fall out of suspension. Sumps should be cleaned regularly as part of ongoing trail maintenance. Designing trails with frequent grade reversals is another way to minimize erosion. Based on observations made during Gravity Logic's feasibility study, the soils at Wister Woods appear to be generally stable. However, even the most stable soils can quickly erode due to sediment recruitment caused by a combination of excessive volumes and velocities of water. Long uninterrupted downhill trail segments can quickly channel an amount of water that will invariably lead to scouring and trenching. A fundamental part of our design process is to incorporate frequent grade reversals to minimize the volume and velocity of water captured by any individual trail segment. Grade reversals have the added benefit of creating a roller-coaster effect for riders.

Additional techniques that Gravity Logic uses during trail construction include:

- Limiting forest clearing in the proposed trail corridors as much as possible within the parameters of the design.
- Grubbing trail corridors (i.e., clearing organic materials) for the trail surface to consist solely of quality mineral soil. Grubbed organics may be used to re-vegetate disturbed off-trail areas.
- Avoiding watercourses or spanning necessary crossings with bridges. Bridges are built using a combination of treated and untreated wood, with galvanized fasteners. Wet and/or boggy areas are crossed, if necessary, using a combination of raised mineral soil causeways, ditching, and/or raised wooden boardwalks. In watercourses where seasonal flow is expected, but permanent water is not present, culverts (min. 30 cm) or bridges are used. In any areas where water is not expected, but possible, culverts (min. 15 cm) are used.

DESIGN GOALS

The following goals connect how the strategic recommendations will help Philadelphia Parks achieve the proposed vision.

- **Design Diligence:** Ensure that the inventory of riding experiences meets the needs of all targeted market segments while using the available terrain as efficiently as possible. Spend the time upfront on design and planning. Getting this right, the first time, will be a critical step in cementing and protecting the Wister Woods brand.
- **Experiential Density:** Create riding experiences that optimize the number of features and “moves” per meter of trail.
- **Stretch the Envelope:** Explore creative approaches to sub-optimal terrain.
- **Surface Management:** Design and develop trail surfaces that are smooth and sustainable.
- **Progression:** Create an environment for the progression of riding skills across a wide range of riding styles and abilities

7.1 Operational Considerations

RISK

Similar to other recreational opportunities such as skateboarding, there is an ongoing risk of injury to staff and the riding public which can result in legal action. With this in mind, a proactive risk management plan is essential to mitigate/minimize risk in this area. Gravity Logic can provide specific recommendations in this regard if required.

FIRE AND RESCUE CONSIDERATIONS

Regardless of the size of the trail network that would be built, the City of Philadelphia needs to establish a plan for how injured riders will be accessed and evacuated from the trail network. This rescue plan would likely mirror existing protocols for responding to injured riders in the Wissahickon, Fairmont Park, and Pennypack Park trail networks. If these existing protocols are incomplete or outdated, this project may serve as a catalyst to update these procedures as well. Gravity Logic has the expertise to assist in this process if required.

HOSPITAL INTERFACE CONSIDERATIONS

The City of Philadelphia will need to establish procedures with local health care facilities and ambulance services. Trail design should include emergency access locations, some of which can be accessed by four-wheel drive vehicles. As part of its standard operating procedures, the City of Philadelphia should consult with the appropriate emergency services on the locations of these access points. Gravity Logic has the expertise to support developing these critical procedures.

TRAIL MAINTENANCE CONSIDERATIONS

The importance of planning for adequate maintenance resources is often overlooked. A well-maintained trail network compared to a poorly maintained trail network can mean the difference between success and failure. Trail maintenance is, quite likely, the single most important component of a mountain bike trail network. The Wister Woods project could serve as the catalyst to update the trail maintenance procedures for Philadelphia's existing trail networks.

A well-maintained trail network:

- reduces rider injuries;
- reduces exposure to liability;
- reduces erosion;
- reduces damage to resident's bikes; and
- encourages repeat and increased visitation from visiting riders.

We generally suggest that municipalities with trail networks budget 10% of the cumulative capital expenses for trail maintenance. This number might vary based on terrain, trail type, and expected rider numbers. We also suggest diligent documentation of maintenance to assist with ongoing operational budgeting / planning and loss prevention. Maintenance might include any or all the following types of maintenance.

Types of Maintenance

TYPE	DESCRIPTION
Spot Maintenance	Identifying and dealing with a minor issue such as a fallen tree, a large hole, or a collapsed turn.
Safety Maintenance	Identifying a section of trail that is producing a significant number of injuries and then determining the cause (e.g., too much speed leading into a small jump) and fixing the problem (e.g., rerouting the trail to reduce speed or adjusting the size/landing of the jump).
Routine Maintenance	Closing a trail for a day or for multiple days for a minor overhaul (e.g., filling holes, repairing berms, removing loose rocks, trimming branches, cleaning ditches, and inspecting/repairing wooden structures).
Overhaul	After a few years, a trail might require a partial or complete rebuild. At a significantly lesser expense than new trail construction, a trail overhaul (e.g., eliminating/adding features/jumps, rerouting, resurfacing) can breathe new life into a trail.

8. Stakeholder Considerations

CITY OF PHILADELPHIA AND THE CITY OF PHILADELPHIA PARKS DEPARTMENT

The City Of Philadelphia and The City of Philadelphia Parks Department would likely need to fund the design, construction and maintenance of this trail network. This project would provide employment opportunities for residents of Philadelphia who would work alongside Gravity Logic employees during the construction of the trail network. Once completed, these employment opportunities would continue in the form of ongoing maintenance of the trail network.

LASALLE UNIVERSITY, CENTRAL HIGH SCHOOL, WIDENER MEMORIAL SCHOOL, AND THE PHILADELPHIA HIGH SCHOOL FOR GIRLS

All of the nearby educational facilities would benefit from the construction of this trail network. The trail network could be designed with trail segments that link directly to the nearby campuses. Obviously, having professionally designed and built trail networks close to the schools will provide an opportunity for students to enjoy the trails when they are not in school. Additionally, these schools will have the opportunity to develop programming that takes advantage of the trail network as part of their school curriculums, bike clubs, and race teams.

LOCAL COMMUNITY

The local neighborhoods directly surrounding this new trail network would gain direct access to a world class trail network right on their doorsteps. This would increase healthy recreational opportunities for the local people of all ages. Community groups and not for profit organizations could also make use of the trail network for a variety of programs. The “family zone” trails would be an ideal place for parents to take their young children to play outside in a safe and contained area. The variety of trails that could be constructed would allow young riders to start on beginner trails and progress on to the more difficult trails as they get older and their skills increase. Local business owners would benefit from increased traffic to their businesses from riders travelling to their neighborhoods to ride the trails.

9. Potential Barriers

COST

A trail network of this scope comes with significant capital costs, as well as ongoing maintenance costs. The exact cost of the trails would be determined during the trail design phase, but our preliminary estimates suggest the costs of over 2 million USD. Based on our recommendation for annual maintenance budgets of 10% of total capital costs, it should be anticipated that an annual budget of 200,00 USD will be required to maintain the trail network. Without an appropriate capital investment in design and construction, the trail network will likely be subpar and will not attract sufficient rider visits to create the economic benefits of a well-built trail network. Failing to budget sufficient funds for maintenance of the trail network will lead to deteriorating trails that will result in increased accident rates and reduced visitation. Gravity Logic has the expertise to design and build this trail network. Our track record for building world class trails is well established. We also have the inhouse expertise to help develop appropriate maintenance plans to support the trail network.

INJURIES AND LIABILITY

Even the most well designed and constructed trail networks will inevitably lead to a certain number of accidents and injuries. This will generate an increased workload for whatever agency would be tasked with responding to these injured riders. This will increase the workload for the Philadelphia Parks Department, local ambulance services, and local medical facilities. Gravity Logic has the inhouse expertise to help develop rescue response plans to support the trail network.

Given the litigious nature of our society, it is likely that a portion of the injuries generated by this trail network will result in lawsuits. This is similar to any public recreation facility such as skateboard parks, basketball courts, and swimming pools. This liability can be mitigated through appropriate maintenance to the trail network and proper liability signage similar to what is found at public skateboard parks. Gravity Logic has the inhouse expertise to assist in this area.

LOCAL BUY-IN

For a variety of reasons, it should be anticipated that a certain portion of the local population will not be in favor of a trail network being built near their homes. Some residents will prefer the empty forest as it is. Some residents will not want outside visitors in their neighborhoods. Some may complain about increased use of the limited parking in the area. Others will be resistant to the extra disruptions and noise generated by construction and use of the trail network. Some residents who have no experience with this type of trail network will be resistant to the idea simply because they do not want change in their neighborhoods. It is our experience that this resistance can be overcome by engaging with the community in the planning phase to explain the goals of the project and to address their concerns.

Normally, once the trails are constructed and the finished product is being used by the community, the resistance to the idea greatly decreases.

ACTIVE RAIL LINE

An active rail line runs through Wister Woods. For obvious safety reasons, if a trail network is constructed in this area, it will be necessary to construct a fence along both sides of the rail line to protect riders from passing trains.

PARKING

As in any dense urban area, parking in the study area is a limited resource. Construction of a trail network would inevitably bring more vehicles to the area. Fortunately, there is ample street parking available in the area, including underutilized street parking on both sides of Belfield Avenue.

WISTERIA WOODS BBQ AREA

During Gravity Logic's visit to the area, we heard from city Park staff that the Wisteria Woods BBQ Area is a popular and well used area. Nearby bike trails have the potential to create conflict between these user groups. Users of this area will not want bike riders crossing through the area, and bike riders will not want to encounter BBQers on their trails either. Gravity Logic is confident that through thoughtful trail design and some extra signage, these conflicts can be avoided by routing nearby bike trails away from this already well used area.

ABANDONED BASEBALL DIAMOND ON OGONTZ AVENUE

Much of the proposed trail network would be constructed in unused forested areas. The notable exception would be the abandoned baseball diamond and adjacent grassy field in Area 5 fronted by Ogontz Avenue. The plan for this area includes the construction of a large asphalt pump track, dirt jumps, and other trail features in this open area. While the baseball diamond is no longer in operation, it should be anticipated that there are likely local community members who use this grassy field for, and that these residents will be resistant to the change in use of this area that we are proposing.

10. Other Benefits

There is no doubt that local bike riders, residents, and students would benefit from a new high-quality trail network in Wister Woods and Wakefield Park. However, the benefits of this trail network would extend to the whole economy of Germantown and Philadelphia. Numerous studies throughout North America and around the world have established that mountain biking can be an important economic driver for communities that have trail networks. Well designed and constructed trail networks have proven to attract visitation from riders from significant distances. Beyond just bike specific businesses, businesses of all types can benefit from riders coming to visit and enjoy the trail network. Links to all of the articles mentioned in this section of the report can be found below.

There are proven American successes in using mountain bike trail construction to stimulate economic growth in an area:

In Bentonville, Arkansas, a concerted effort to add mountain bike trails began in 2007. This trail development triggered a rise in property values and new home starts in areas near the mountain bike trails. In this case, the funding for the trail development has come from private sources. However, what is clear is that the addition of a well-designed mountain bike trail network has financially benefited the adjacent communities. As of 2023, Bentonville lists over 100 miles of purpose-built mountain bike trail.

-from "Walmart defined Bentonville, Arkansas, for decades. Now the small town is ready to rebrand itself as a tourist destination for the young and outdoorsy", Business Insider

Next, a 2019 report by the Rails to Trails conservancy found that:

“Public investment in trails, walking and biking infrastructure in America delivers economic benefits in excess of 138 billion dollars annually. These benefits include health cost saving, climate protection, as well as direct economic impacts of the trails.” –

-from “Active Transportation Transforms America”, Rails-to-Trails Conservancy

With Philadelphia’s extensive rail network, both active and decommissioned, the potential to envision a large-scale trail network that connected existing green spaces and trail networks is an exciting prospect.

<https://www.businessinsider.com/how-bentonville-arkansas-rebrand-walmart-tourist-destination-2022-8>

<https://www.railstotrails.org/resource-library/resources/new-research-finds-public-investment-in-trails-walking-and-biking-infrastructure-delivers-potential-economic-benefits-of-1385-billion-annually/>

<https://www.americantrails.org/resources/the-business-of-trails-a-compilation-of-economic-benefits>

11. Capex

A project of this scale will require a significant amount of investment not just for the trails (as estimated below) but also for supporting infrastructure. The scope and scale of these additional investments (parking, fencing, water, washrooms, signage, crosswalks, etc) in addition to the exact timing of the required capital and phasing of the development will need to be considered carefully once the concept, in principle, gains support from stakeholders. These extra considerations and costs are beyond the scope of this report.

It is Gravity Logic's recommendation that if this trail network is to be built, the entire project should be constructed in no more than two years, with most of the construction taking place in the first year.

TRAIL	LENGTH (metres)	LENGTH (feet)	AVERAGE GRADE (%)	COST/METRE (USD)	COST/FOOT (USD)	TRAIL COST	DESCRIPTION
Green excavated loop trail (Family Zone)	776	2545	5	\$100.00	\$328.00	\$77,600.00	single directional trail for families and beginners
Blue excavated flow 1 (Family Zone)	327	1073	7	\$100.00	\$328.00	\$32,700.00	single directional trail for families and beginners
Blue singletrack 1 (Family Zone)	315	1033	10	\$70.00	\$229.60	\$22,050.00	single directional trail for families and beginners
Green singletrack feature trail (wood)	210	689	n/a	\$120.00	\$393.60	\$25,200.00	single directional trail with easy wooden features
Blue singletrack feature trail (wood)	263	863	n/a	\$120.00	\$393.60	\$31,560.00	single directional trail with intermediate wooden features
Black singletrack feature trail (wood)	198	649	n/a	\$120.00	\$393.60	\$23,760.00	single directional trail with expert wooden features
Blue jump 1	462	1515	7	\$120.00	\$393.60	\$55,440.00	single directional trail with excavated berms and jumps
Blue singletrack 2	346	1135	n/a	\$70.00	\$229.60	\$24,220.00	multi directional trail. Hand built
Blue singletrack 3	420	1378	n/a	\$70.00	\$229.60	\$29,400.00	multi directional trail. Hand built
Blue excavated flow 2	248	813	7	\$100.00	\$328.00	\$24,800.00	single directional trail. Excavated berms and rollers
Blue excavated 1	1130	3706	6	\$100.00	\$328.00	\$113,000.00	multi directional perimeter trail around tree island
Blue excavated 2	2400	7872	6	\$100.00	\$328.00	\$240,000.00	multi directional perimeter trail around tree island
Blue excavated 3	807	2647	6	\$100.00	\$328.00	\$80,700.00	multi directional perimeter trail around tree island
Blue excavated 4	1350	4428	6	\$100.00	\$328.00	\$135,000.00	multi directional perimeter trail around tree island
Blue excavated 5	859	2818	6	\$100.00	\$328.00	\$85,900.00	multi directional perimeter trail around tree island
Blue excavated 6	578	1896	6	\$100.00	\$328.00	\$57,800.00	multi directional perimeter trail around tree island
Blue excavated 7	769	2522	6	\$100.00	\$328.00	\$76,900.00	multi directional perimeter trail around tree island
Blue excavated 8	511	1676	6	\$100.00	\$328.00	\$51,100.00	multi directional perimeter trail around tree island
Black singletrack 1	1040	3411	n/a	\$70.00	\$229.60	\$72,800.00	multi directional trail. Hand built
Black singletrack 2	619	2030	n/a	\$70.00	\$229.60	\$43,330.00	multi directional trail. Hand built
Black singletrack 3	522	1712	n/a	\$70.00	\$229.60	\$36,540.00	multi directional trail. Hand built
Black singletrack 4	521	1709	n/a	\$70.00	\$229.60	\$36,470.00	multi directional trail. Hand built
Black jump 1	592	1942	9	\$120.00	\$393.60	\$71,040.00	single directional trail with excavated berms and jumps
Black jump 2	387	1269	9	\$120.00	\$393.60	\$46,440.00	single directional trail with excavated berms and jumps
Black jump 3	529	1735	9	\$120.00	\$393.60	\$63,480.00	single directional trail with excavated berms and jumps
Drop Zone	n/a	n/a	n/a	n/a	n/a	\$50,000.00	various sized wooden drops with excavated trail
asphalt pump track	n/a	n/a	n/a	n/a	n/a	\$500,000.00	Velosolutions pump track
Dirt Jump park	n/a	n/a	n/a	n/a	n/a	\$250,000.00	full set of dirt jumps
Additional trail segments and infill	n/a	n/a	n/a	n/a	n/a	\$100,000.00	as required to complete the trail network
TOTAL	12614	41374			Total Cost	\$2,110,500.00	

12. Next Steps

Wister Woods, Wakefield Park, and the surrounding green spaces have the necessary natural and infrastructure assets to build an excellent urban trail network. Gravity Logic would be pleased to discuss the findings of this report and any questions that might arise.

Should the City of Philadelphia decide to move forward with this trail network, the next step would be detailed trail design. The designs in this report are conceptual only. The trail design phase would include Gravity Logic employees spending several weeks designing and GPS'ing the exact location and alignment of each trail to be constructed. The trail design phase would further solidify the trail costs associated with the project. Following the trail design phase, the following phase of the project would be trail construction. Gravity Logic has the staff and the expertise to undertake and manage the construction phase of the project as well. Additionally, Gravity Logic is also able to provide more detailed planning and assistance with community programming, trail maintenance, risk management, as well as rescue planning.

About Gravity Logic

20+ YEARS OF BUILDING WORLD- CLASS TRAILS.

Gravity Logic is recognized for having designed and built some of the world's best, most ridden and time-tested trails. Beyond the dirt, we are a bike resort development company with proven operational experience, and staff who have worked closely with the most successful bike resorts in the world. A clear understanding of rental, retail, programming, and day-to-day operations are just as important as the trails that support them.

Gravity Logic has worked with clients in more than 20 countries and 15 states across the USA

- We are the team behind the development of the Whistler Mountain Bike Park – No. 1 Bike Park in the world
- Clients include ski resorts, land managers, private landowners, and bike clubs

SERVICES

Design and Planning:

- Trail inventory and trail mapping
- Terrain inspection and feasibility assessment
- Construction / development costs and ROI projections
- Lift requirements
- Operating plans
- Staffing plans
- Visit and revenue forecasts
- Five-year financial plan

Development and Construction:

- Project management plans
- Detailed construction budgets
- Trail design
- Trail construction
- Maintenance budgets and schedules
- Future development identification

Rental / Retail Consulting:

- Implementation consultation
- Corporate liaising and pricing reviews
- Sustainability programming
- Program / rental product packaging
-

Safety and Risk Management:

- Risk management audits
- Signage consultation
- Waiver and release of liability formulation
- Techniques for creating safer trails and features

