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*Estimate**

Multi-site Feasibility Study for New Mountain Bike Recreation Area Construction

Prepared for: **Town of Newburyport, MA**

Scope

- Work in conjunction with the town of Newburyport administration to determine suitable sites for consideration
- Assess 3-5 sites for suitability of a Bike Park installation including, but not limited to, a pump track, skills practice facilities, and freeride zone.
- Conduct Soil analysis, environmental overview, and determine possible limiting factors of each site
- Compare and contrast sites to develop order of preference

Cost Estimate

\$1150 per site 3 – 5 sites

\$1150 x 3 sites = \$3450

\$1150 x 4 sites = \$4600

\$1150 x 5 sites = \$5750

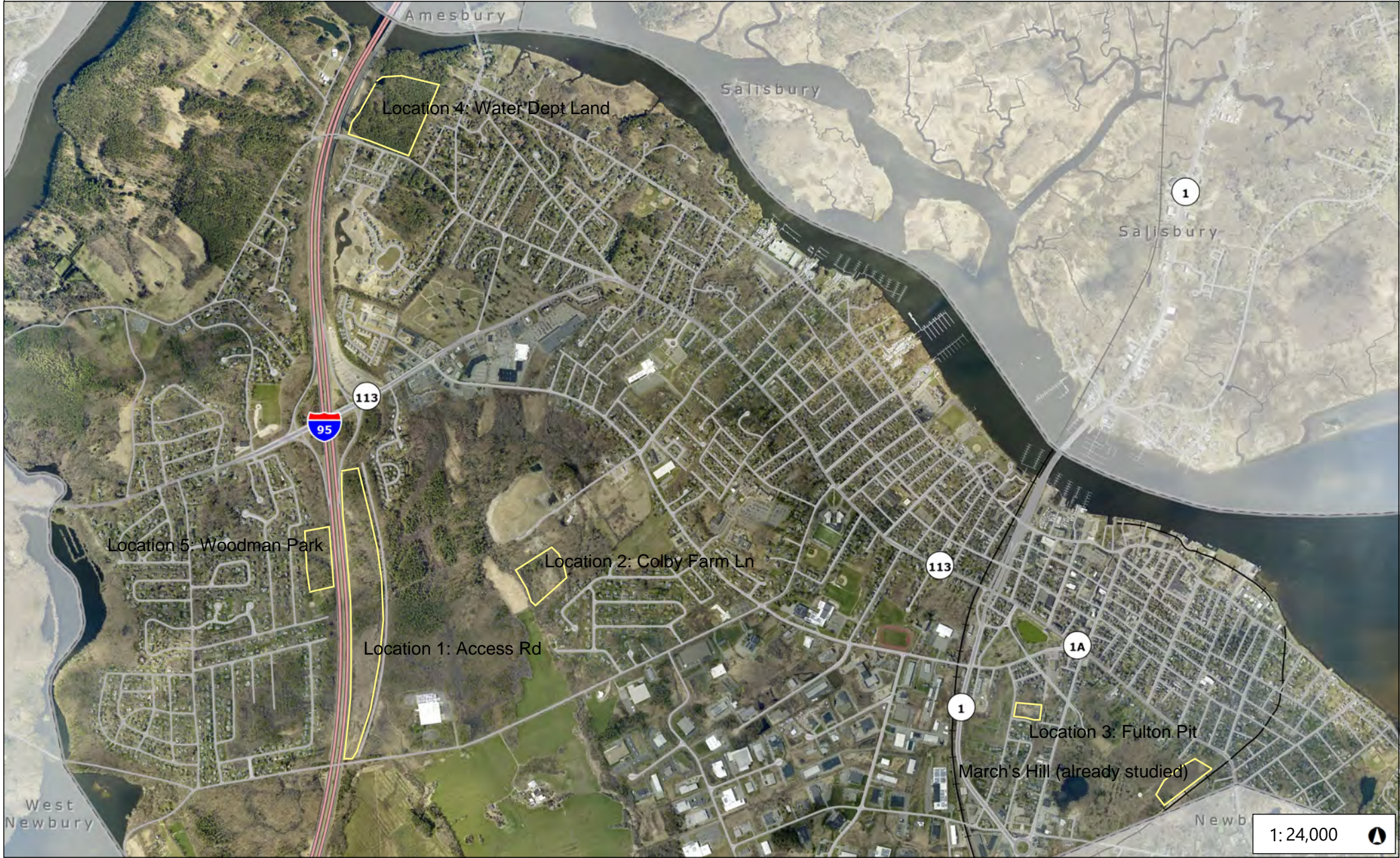
Timeline

3 – 4 weeks *(from date of contract signing)*

**estimate subject to change at any time prior to completion of binding agreement*

City of Newburyport

6/6/2023



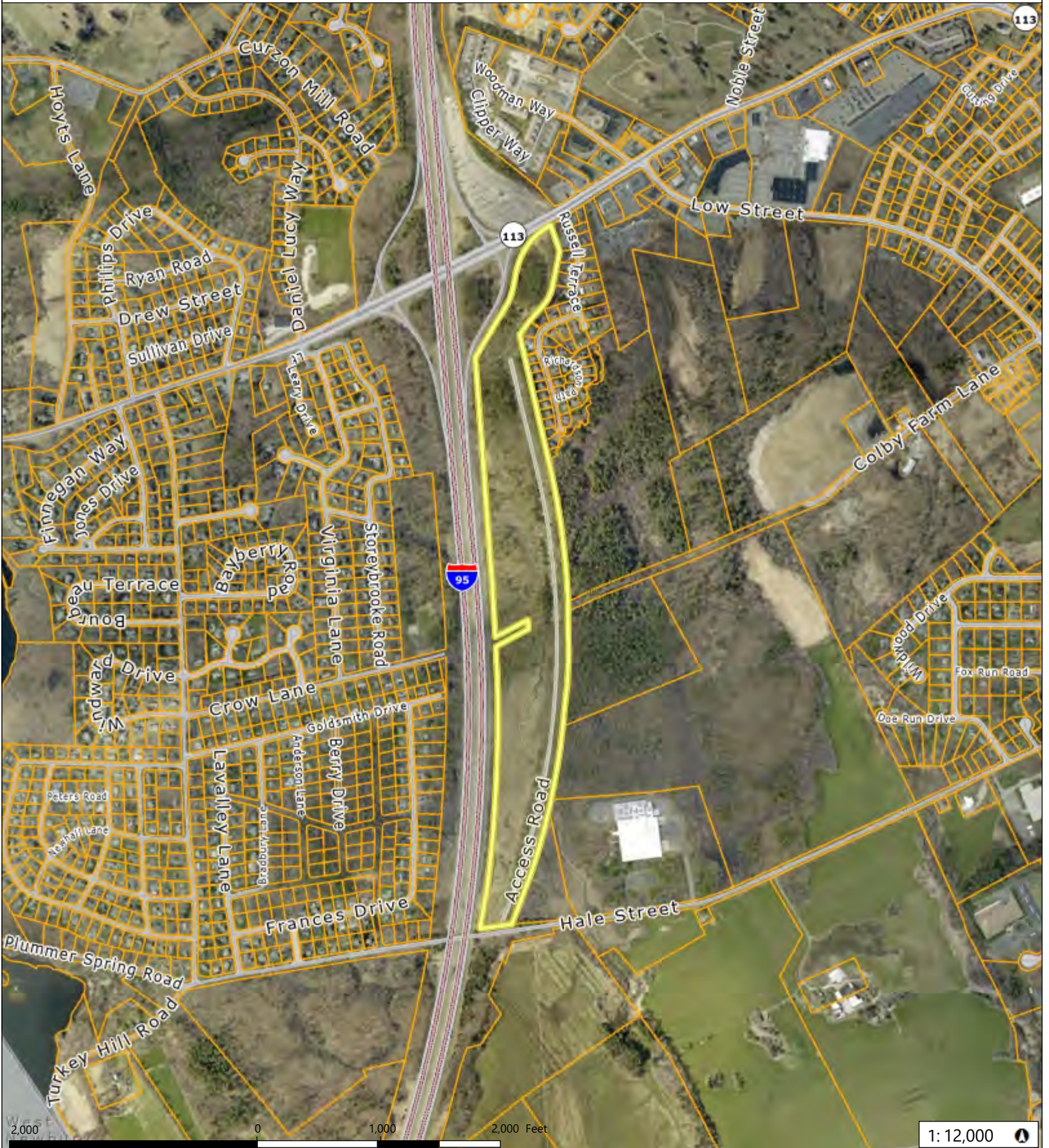
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- | | | | | | | |
|--------------------|---------|------------|------------|------------|----------|-------------------|
| Municipal Boundary | Roads | Interstate | Major Road | Local Road | Railroad | Road Right of Way |
| Paved | Unpaved | | | | | |



City of Newburyport

05/13/2023



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Legend					
Municipal Boundary	Roads	Interstate	Major Road	Local Road	Railroad
Parcels	Road Right of Way	Paved	Unpaved		

Location 1: 95 Access Rd



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Legend					
Municipal Boundary	Roads	Interstate	Major Road	Local Road	Railroad
Parcels	Road Right of Way	Paved	Unpaved		

Location 2: Colby Farm Ln



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Legend	
Municipal Boundary	Interstate
Parcels	Paved
Roads	Major Road
Road Right of Way	Unpaved
	Local Road
	Railroad

Location 3: Fulton Pit



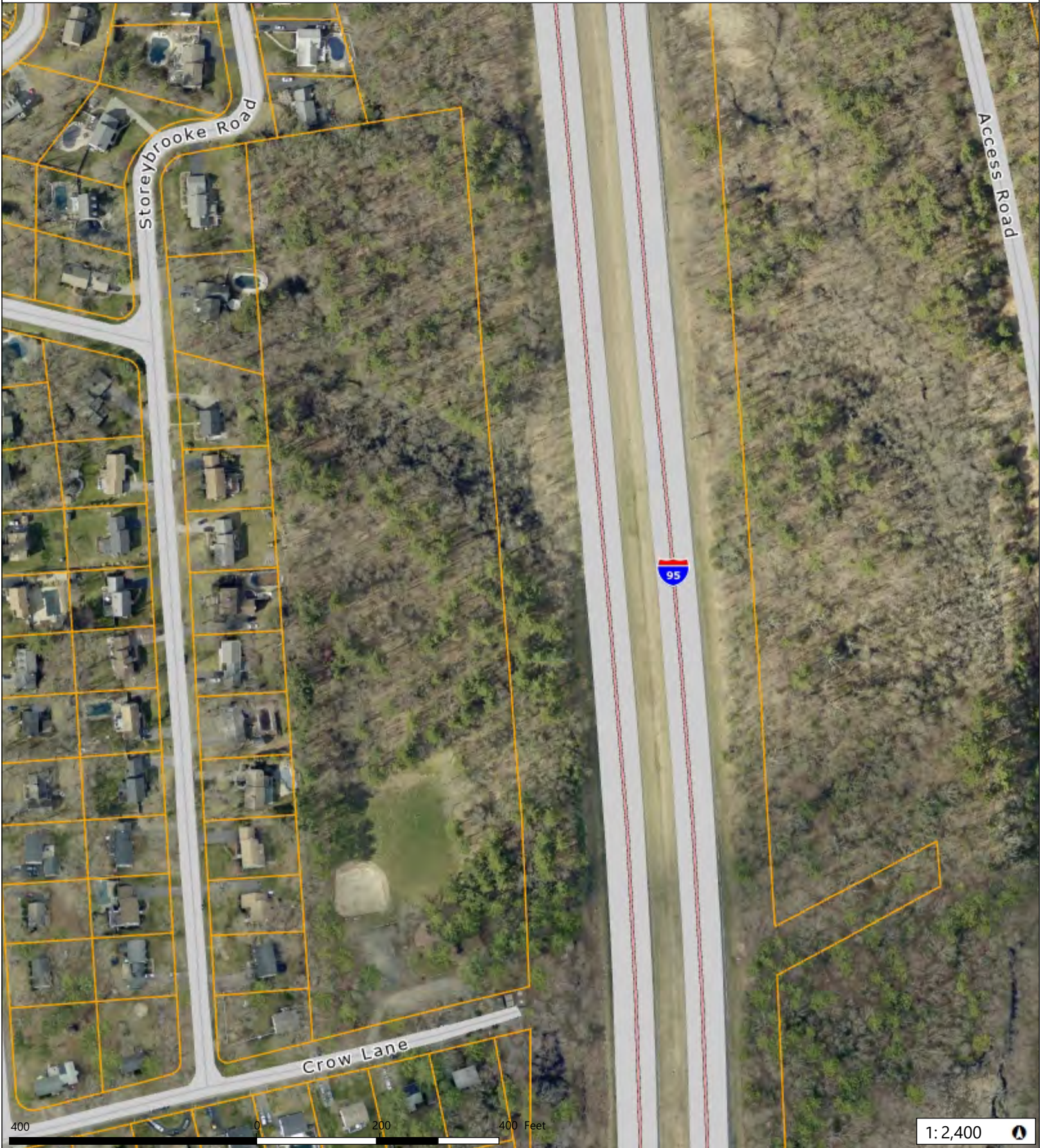
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<ul style="list-style-type: none"> Municipal Boundary Parcels 	<ul style="list-style-type: none"> Roads Road Right of Way 	<ul style="list-style-type: none"> Interstate Paved 	<ul style="list-style-type: none"> Major Road Local Road Railroad
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Legend

Location 4: Water Dept Land



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Legend					
Municipal Boundary	Interstate	Major Road	Local Road	Railroad	
Parcels	Paved	Unpaved			
Roads	Road Right of Way				

Location 5: Woodman Park



MARCH'S HILL BIKE PARK CONCEPT PLAN

Revised 10/19/2022

Prepared By:

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Introduction

- 1.1. Powder Horn LLC was contacted by interested parties in the town of Newburyport, MA to conduct an analysis of existing facilities and determine suitability of a single site for the installation of a public bike park.
- 1.2. Powder Horn LLC conducted an initial assessment of the site within the scope of its business, recreational facilities, to make recommendations and estimate the cost and resources of such an installation.

Site Analysis: General Information

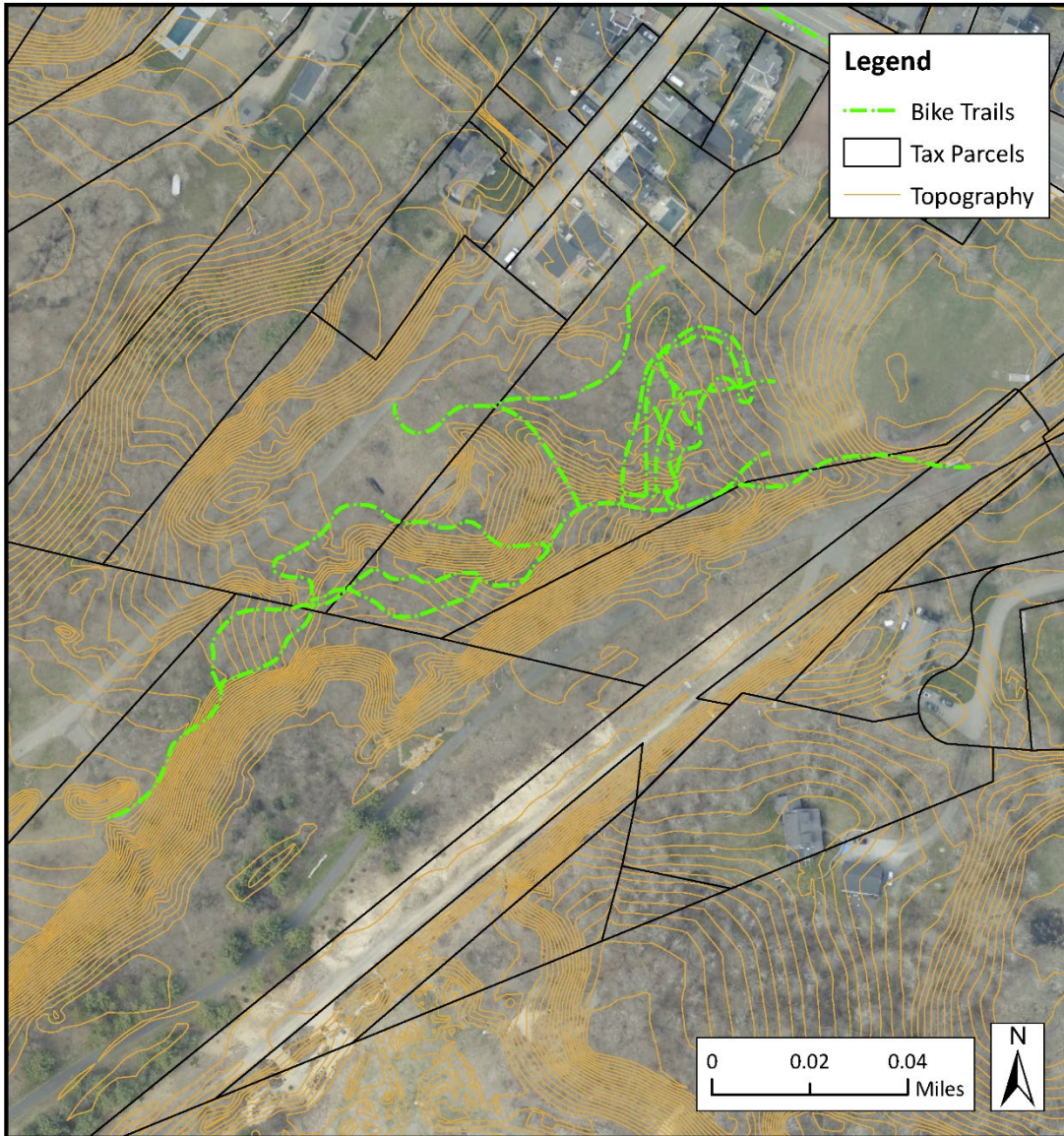
Description

The Area of Scope (AOS) is referred to as March's Hill Park in the town of Newburyport, MA. The property is located at High St. at Bromfield ST., parallel to the Rail Trail running NE-SW.

Usable Area:	Roughly 2 Acres
Total Elevation Change:	+/- ~25'
Wetlands present:	No
Zoning Class:	A/C, DCOD (need clarification)

Site Analysis: Current State & Activities

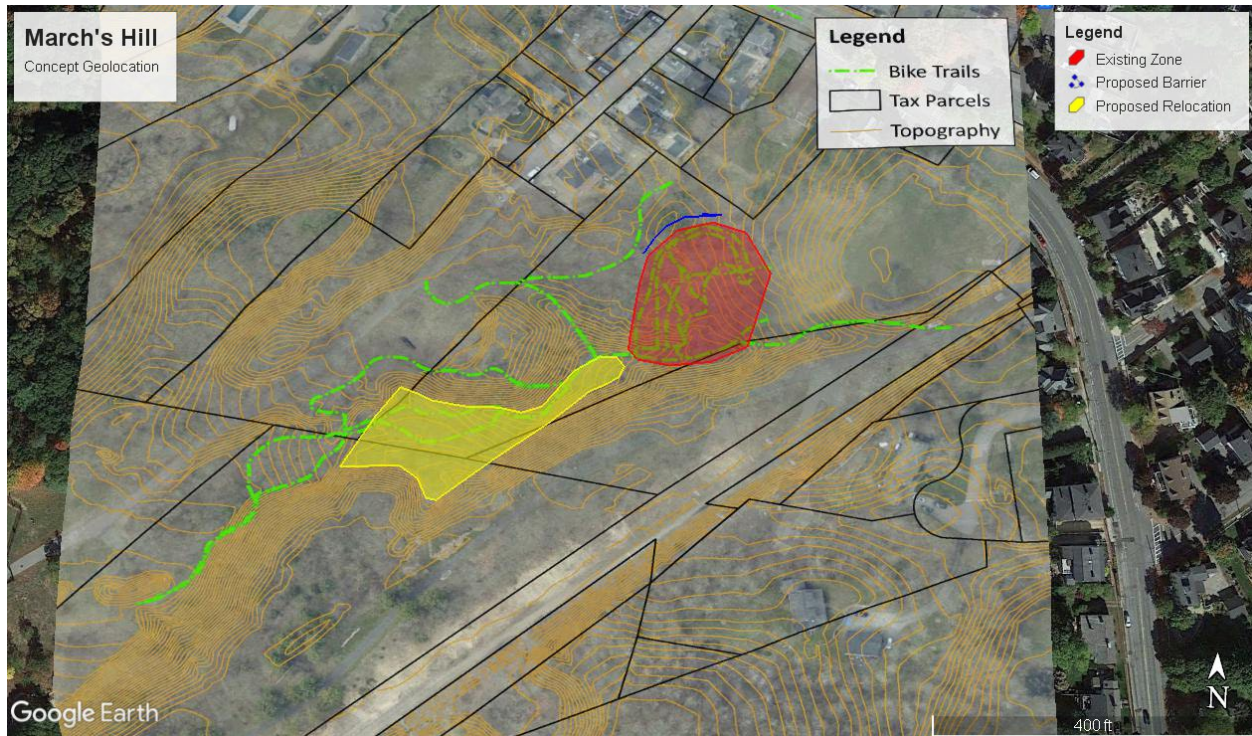
In its current state, the Area of Scope has seen increased mountain bike usage and trail building activities in the last several years. Community members who expressed interest in creating a mountain bike jump zone approached the Town Administration and were granted verbal permission to construct trails & features. Conflict has arisen over the scope, location, and size of features that have been installed. Remedial attention is recommended to balance the needs of abutters, users, and Town Administration.



Possible Solutions (order does not reflect recommendations):

1. Installation of barrier on existing facility to block noise and views from abutting property
 - a. Tall fence
 - b. Organic barrier (tall shrubs, trees, or vegetative buffer)
2. Re-location of Mountain Bike Facility to another section of the property

3. Removal of existing facility & revegetation of area.



It is recommended that combination of these items be utilized to create a location that is **Safe, Fun, and Sustainable**.

- **Safe:** The facility needs to adhere to industry standards & best practices to protect users from unnecessary harm. While threat of injury or death is an inherent risk of participating in the sport of mountain biking, minimizing risk, and resulting liability should be a priority for stakeholders.
 - **Safer Design:** Currently there are several features in the park that have mandatory gaps and airs – this is only acceptable in certain situations on advanced sections of the facility. Most features installed should be ‘table-top’ style, meaning that the middle of the jump is filled in to minimize risk of injury to riders.
 - **Maintenance:** Increased oversight of the facility will be needed to ensure cleanliness, notify users of features that are closed for service or rebuilding, and prevent unauthorized changes. Organizing volunteer days to keep the community involved is a great way to strengthen bonds between users and stakeholders. Storage facilities for tools and materials are also recommended to ensure site cleanliness.
- **Fun:** The park should include features of progressive difficulty levels to ensure enjoyment by participants of all ages and ability levels. Size & cost limitations may place boundaries on the amount of features installed, however consideration should be taken in the design phase to maximize the range of offerings.
- **Sustainable:** A broad term that applies to multiple facets of the project.

- **Environmental Sustainability:** Care must be taken during the design and planning phases to ensure that the desired result is achieved without unnecessary harm to the surrounding ecosystem. At a minimum Stormwater control, vegetation removal, and revegetation plans should be in place prior to construction. Local and state regulations may apply based on area classification and presence of sensitive areas.
- **Functional Sustainability:** The facility must be designed with proper grade angles, drainage, and surface quality. Neglect of installation guidelines will result in rapid surface degradation and the inability to use the facility without an overburden of maintenance. Improper drainage can lead to pooling, erosion, and loss of grade angles. In addition, it is recommended that a maintenance plan be in place prior to installation.
- **Communal Sustainability:** The most successful mountain bike parks & facilities have a large volunteer corp. and the guidance of one or more experienced builders. The symbiotic relationship between the stakeholders and users is most often successfully achieved by partnering with a local bike club, bike shop, or mountain-bike specific non-profit to organize volunteer days, maintenance schedules, and communicate the needs of users to stakeholders.

Soil Analysis



	to 25 percent slopes		
600	Pits, gravel	12.4	72.7%
Totals for Area of Interest		17.1	100.0%

Conclusions from Soil Survey:

- The area of concern related to the scope of this project is entirely contained within the classification of “Gravel Pits”, indicating that the area is previously disturbed by industrial use.
- No sensitive areas, wetlands, or highly unfavorable classifications of soil appear to exist within the scope of the areas in question, based on publicly available mapping resources.
- Low to average annual rainfall and a moderately weak frost season mean decreased maintenance, less erosion, and increased tread stability.

Environmental

Categories of consideration:

- **Wetland conservation**
 - There are no delineated wetland boundaries within or proximal to the project scope. Any seasonal/temporary pools or streams will be observed and, if necessary, avoided until drained or bridged and realigned.
- **Stormwater runoff and erosion control**
 - Area of Scope boundaries exceed the baseline riparian buffer (50 ft) size surrounding any permanent or semi-permanent stream, brook, or waterway.
 - Urban landscaping and development exists between the park and any permanent or semi-permanent stream or brook, further reducing the risk of a detrimental stormwater discharge to any waters of the city.
 - Standard erosion control measures should be taken in order to minimize general soil loss and movement.
- **Wildlife impact and habitation**
 - Typical wildlife considerations would include locating and preserving den sites (Fox, Bear, Coyote, etc.), presence of endangered species, predator sighting, or aviary habitat (elevated hawk & owl nests)
 - There are no official records or common sightings of endangered species, seasonal breeding grounds, or pristine environments within the scope of the project.
 - Wildlife habitation is fluid, and it is recommended to the contractor to be aware of how to spot dens, nests, or endangered species in order to prevent any future debilitation.
- **Observation of endangered or invasive species of Plantae**
 - There are no publicly recorded endangered species of plant life within the project boundary.

Design Concepts



Screenshot from Powder Horn LLC's design of the Keene Bike Park in Keene, NH

Municipal Bike parks typically contain the following Zones:

Pump Track (All Skill Levels)

Skills Training Zone (Beginner/Intermediate)

Freeride Zone (Intermediate/Expert)

These zones together meet the interests of large portions of modern riders, on many different types of bicycles. It is critical to offer zones for riders of ALL skill levels, from Beginner through Expert. While the focus of this park is to offer riders a fun place to practice their skills, there is an ever-growing number of expert riders in New England and around the globe that are interested in advanced-level riding.

Pump Track

A pump track is a closed loop circuit installed on a level surface, containing features such as rollers, banked corners, table-tops, and start/rest areas. This type of zone is designed for short-travel bikes such as BMX, hardtail MTB, and slopestyle bikes. The intention is for the rider to 'pump' the rollers and corners to gain speed and carry momentum without pedaling. This creates an exhilarating, yet non-intimidating experience that delivers an incredible cardio workout, advances motor skills and reaction time in all ages, and



develops fundamentals essential skills for all styles of riding.

Toddler/Beginner Pump Track Characteristics:

- 12-18” Rollers
- 30-degree continuous banked corners
- Simplified oval design with minimal variation
- Separated from larger pump track to ensure comfortable environment for young children and first-time riders

Intermediate/Expert Pump Track Characteristics:

- 16-24” Rollers
- 45 Degree and steeper banked corners containing rollers
- Variations, doubles, tabletops, and wall rides
- Designed to allow intermediate riders to challenge their skills and improve cornering, jumping, and pumping skills

Pump Tracks can be constructed with several different material types. The (3) main surface types are:

- Natural earthen surface (dirt, clay, earthen mix)
 - Prefabricated (concrete or composite surface)
 - Asphalt
- See ‘Surface Types’ on page 18 for details*



Skills Training Zone

Skills Training zones are designed for beginners who look to learn the fundamentals of riding varied terrain features. The features in this zone are designed to imitate those that the rider will find on the trail, in the pump track, or at other bike parks; the intent is to familiarize beginner riders with all different surface types and shapes. Rollers, rock gardens, wooden bridges, drops, table-tops, and banked corners are all included in this type of zone.

Nessy

Item	Height	Length	Width 18"	Width 24"	Width 30"	Width 36"
Nessy 2 Bumps (2'P, 1'V)	2'	31.7'	\$3,393.47	\$3,817.66	*\$4,241.84	\$4,666.02
Nessy 3 Bumps (2'P, 1'V)	2'	44.7'	\$4,963.10	\$5,583.49	\$6,203.88	\$6,824.27
Nessy 4 Bumps (2'P, 1'V)	2'	57.7'	\$6,532.74	\$7,349.33	\$8,165.92	\$8,982.51



Split Decision

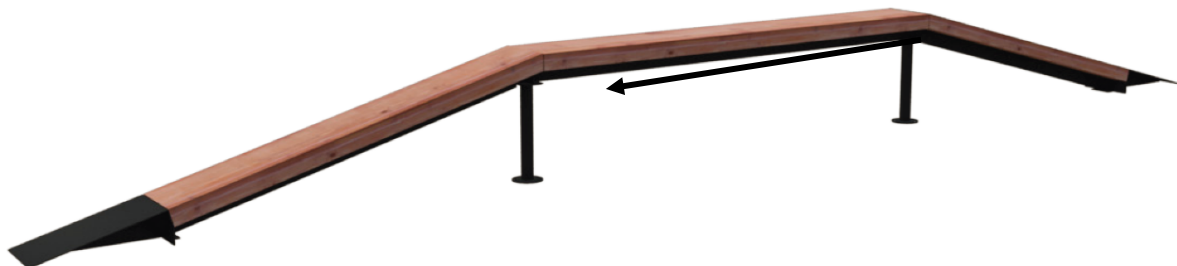
Item	Height	Length	Width 18"	Width 24"	Width 30"	Width 36"
Split Decision	2'	48.8'	\$5,885.63	\$6,621.34	*\$7,357.04	\$8,092.74

(Left layout shown. Orders need to specify left or right layout.)



Straight Ladder

Item	Height	Length	Width 8"	Width 12"
Straight Ladder (3.5 Deg)	1'	27.7'	\$1,892.38	\$2,102.64
Straight Ladder (15 Deg)	1'	15.4'	\$1,315.01	\$1,461.12
Straight Ladder (11 Deg)	2'	27.7'	\$1,918.58	\$2,131.76
Straight Ladder (15 Deg)	2'	22.9'	\$1,747.87	*\$1,942.08



Features sourced from Progressive Bike Ramps© LLC

Freeride Zone



Freeride, Flow, or Jump Zones are often the main attraction of a bike park, where many intermediate and advanced riders will seek to hone their skills on advanced features such as jumps, table-tops, gaps, drops, hips, wall-rides, and bridges. In most cases these types of zones are what generate popular content and draw riders from far away. Well-built flow zones are often recognized world-wide, and there are examples of these that have garnered extraordinary exposure through the social media & YouTube channels of professional and well-known riders. While there is increased amplitude in advanced riding features, the associated skill level of the participating riders means no real increase in risk.

Design Recommendations

Based on the site survey & analysis, the following concepts are recommended

1. Access Routes
 - Current hiking trails exist to provide access for users on foot as well as mountain bike riders. It is recommended that the access trail be expanded to better accommodate all users, or a separate MTB-only access trail be installed.
2. Beginner Skills Zone
 - Proximity to parking areas means ease of access for families and young children who need supervision
3. Freeride Zone
 - Large open areas allow for creative freedom and maximizing use of space
4. Hub Areas
 - Bike Park & Trail Hub
 - Rules & Etiquette sign located here, along with maps and directional signage to inform & guide users to each zone
 - Serves as the main access point to reduce cross-traffic and unwanted merges
 - Parking/ Access Hubs
 - Existing parking areas will likely be sufficient to handle the volume of park users, with the highest strain on parking coming during special events or in conjunction with events happening nearby.

Signage

1. Access Points:
 - Rules & Etiquette
 - Informational maps & directional signs
 - MTB only vs. Multi-use vs. Hike only explanation
2. On- Trail:
 - Trail/zone difficulty level

- Intended user (MTB vs. Hike-only)
- Caution & Warning (merge, exit, etc.)

Cost & Timeline Projection*

Design (MTB infrastructure only)

\$6-8,000

1-2 months

Construction

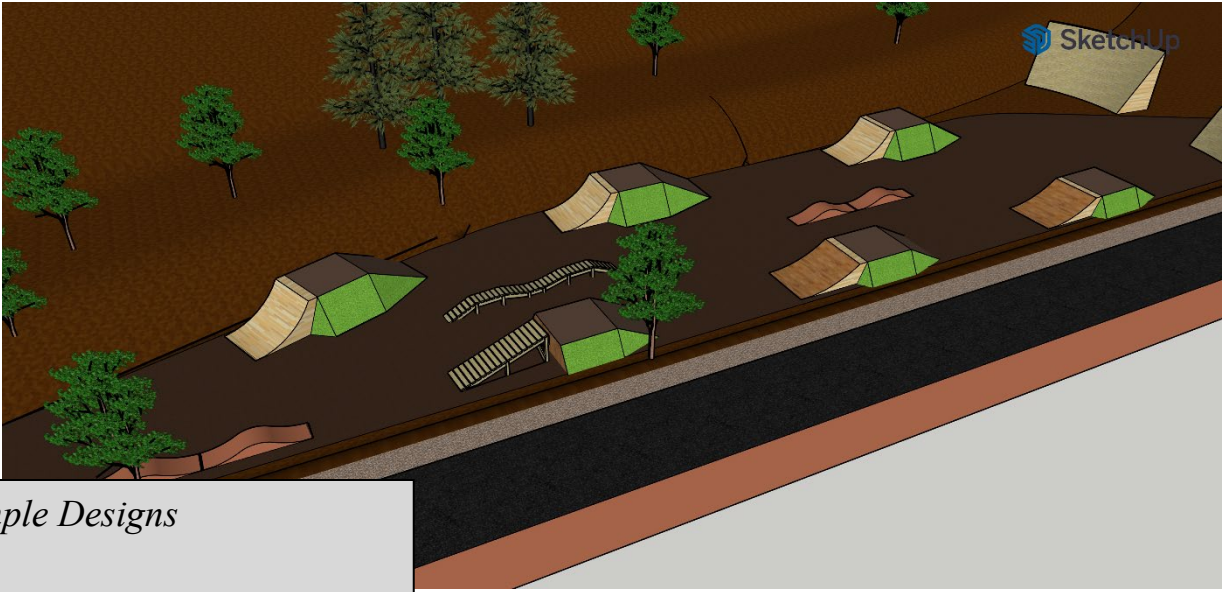
Skills Zone & Jump Lines

\$60-100,000+ 4-6 Weeks

Removal & revegetation of existing facilities (if required)

\$15,000-\$18,000 1-2 weeks

*Cost Projection is designed to give rough numbers for reference, not an official estimate.



Sample Designs
Powder Horn LLC ©



Exhibit A: Sample Construction Plan & Surface Types

A. Site Clearing & Preparation

First, the area is outlined and enclosed per OSHA regulations with signage, fencing (if necessary) and gates to ensure a safe and secure job site.

Vegetation and surface organics are removed from the work area. Timber is either staged to mill or chipped and stacked for later use. Turf, surface organics, and loam are staged to be used in the landscaping process or exported for disposal.

B. Design Layout

Once the work area is prepared and compacted to the foundation level, the track dimensions and utility/drainage additions are located and marked. Any necessary erosion control measures are installed (silt fence, matting, hay booms, etc.).

C. Drainage, Utilities, & Sub-base

Material Staging & Sorting Imported aggregate is staged and moved as close as possible to the work area. If possible, any imported material is unloaded directly into the work area to minimize shuttling time. Aggregate generated on-site is processed as needed and staged as close as possible to final location.

D.

With the area surveyed and marked, excavation begins on the drainage system. Silt collection areas and pipes are installed with the necessary material, and all systems are measured to ensure proper slope and outflow distribution of storm water. Conduit, foundations, and bases of permanent structures are also excavated and installed (i.e. concrete bases for lights, footings for support structure, etc.). All riding areas are checked to ensure ground material stability, and if necessary are modified to meet structural requirements.

E. Base Shaping

First layer of track material is moved into position, compacted, and shaped in preparation for the surface material. Different types of riding surface will require different types of base material (see Asphalt Construction)

F. Surface Application

The high-quality surface material is deposited onto the pre shaped base. This material will be the final layer and the surface that is ridden on. This material can be either screened dirt, or asphalt depending on the design choice. This material is precision-shaped by a combination of machines and hand laborers, then compacted to a smooth and consistent finish.

G. Landscaping & Finishing

All non-riding areas are backfilled to specification in the design. Grade on the non-riding surface is brought up to match the grade of the riding surface to eliminate any sudden drops or inconsistencies that may cause difficulties if a rider mistakenly goes off-track. These non-riding areas are revegetated with grass or turf to eliminate erosion and create a sharp, detailed look

Surface Types

Dirt / Aggregate

As implied, this method uses the native or imported material that has been screened clean of stone and other unwanted particles to create a homogeneous mix. Typically, mineral soil or a high clay content is desired to help sustain the final shape of the track. While easy to change and repair, dirt surfaces have the highest levels of required maintenance and typically need an annual overhaul. Untreated dirt is also the option with the lowest cost.

Treated Earth

This method uses the same material as option #1, but is treated with an organic, non-toxic solution to harden and increase the durability of the surface material. There are several different brands of solution that are made specifically for this purpose; “DirtGlue” brand solution was used in our construction of the Keene pump track with positive results.

Asphalt

Asphalt surfaces are the costliest, yet most sustainable option. Asphalt requires little to no maintenance for years after the original construction if applied properly. This surface type has been popularized in recent years by several global construction companies (i.e. Velosolutions). Using asphalt is highly recommended for its low maintenance levels, traction while riding, and clean finished look.

Prefabricated

Prefabricated pump tracks can be made of precast concrete, or timber-framed with a hard composite molded surface. These options, while somewhat restrictive in design flexibility, provide a fantastic balance between maintenance / lifespan and cost. While less expensive than an asphalt hard surface track that allows full design customization with a hard surface, prefabricated pump tracks are leaps and bounds more durable than earthen surfaces and require very little maintenance. Ease of installation is also a plus.

POWDER HORN
TRAIL COMPANY

Bike Feasibility Study



Bike Feasibility Study: brief history

- Fall, 2020: in reaction to the COVID-19 pandemic, a group of resident children asked the Parks Commission to use existing trails at March's Hill for biking.
- May, 2021: access granted, uptick in biking at March's Hill, Woodman Park and Atkinson Common.
- Summer, 2021-Summer 2022: Youth looking for challenging dirt trails to balance, jump and create with dirt and natural materials. Parents and others encouraged their ingenuity but abutters concerned about expansion of activity, safety, noise and environmental impact.
- Summer, 2022: Parks Commission hired consultant to assess the trails at March's Hill and explore options for developing and potentially relocating some trails in a low-impact manner, abutters asked Commission to look at other locations.
- December, 2022: Parks Commission submitted CPC request to hire consultant to review alternative locations.

Bike Feasibility Study: scope

- Assess 3-5 locations for suitability for a biking facility: pump track, skills practice and/or free riding.
- Assess soils, environment, accessibility and safety.
- Identify and rank where activity is best suited, how to better manage it, and how to proceed.
- Cost: \$5,750



Bike Feasibility Study: public benefit

- Provide youth with opportunities for biking recreation that offers multiple levels of challenge, ability to socialize in the outdoors, and become stewards of/connect with the environment.
- OSRP Goal 2: “To maintain and improve high quality parks and recreational areas which are safe, attractive and **provide a range of active and passive recreational opportunities** for all residents.”
- Help the Commission and the community reach consensus on this issue.

