Marin County Department of Parks and Open Space

Stafford Lake Bike Park Feasibility Study

Northern Portion of Proposed Bike Park Location

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1.0 Summary

The results of this study indicate the development of a bike park facility at the proposed site within Stafford Lake County Park would be highly feasible, and further that the site could be developed as the premiere public bike park facility in Marin County.

The proposed site offers dynamic natural terrain, substantial elevation, and a natural environment ideal for the development of a bike park that could be enjoyed by a wide range of riders and their families. At 14.1 acres, the proposed site is large enough to support the development of a full spectrum facility that could provide progressive opportunities and experiences for riders of all ages and skill levels- beginner through expert, to participate in positive, healthy, and active outdoor recreation.

A full spectrum bike park would be a tremendous resource for the local riding community in Marin County, who have very limited options for bike park style riding experiences that provide safe, controlled environments for riders to learn how to ride, practice and hone riding skills, receive professional coaching and instruction, participate in riding camps and clinics and compete in local, regional, and national levels races, competitions and events. Currently, there are no comparable public riding opportunities in the County.

The sites' main limitation, not being more centrally located within Marin County, is also one of its greatest strengths as Stafford Lake County Park (Stafford Lake) has been developed as a "destination" regional park with many amenities including parking, restrooms, BBQ areas, electrical hook ups, etc. built specifically to accommodate large scale festivals, music concerts and events. Impacts from the development and operation of a full spectrum bike park facility would be minimal to other park users and park neighbors, and would provide an additional recreational opportunity to complement the existing low impact activities currently offered in the park including volleyball, hiking, and disc golf.

A bike park facility at Stafford Lake could be developed quickly and at a reasonable cost due to the accessibility of the site, moderate terrain, minimal vegetation and rock intrusions, promising soil profiles, existing infrastructure and supporting amenities. The bike park could become the most unique public riding

venue in Marin County with the capacity to run camps, coaching and instruction programs, races, competitions, and special events that would provide many opportunities to generate revenue to support bike park operations.

There would be many opportunities to work with the enthusiastic local riding community and committed volunteer builders to offset the costs of both the construction and ongoing maintenance and operations of the park. There would also be many opportunities to partner with local bike companies, bike shops, event promoters, coaches, instructors, and professional riders to help fund park construction, sponsor work parties, host special events and provide programs that would support the park on an ongoing basis.

Our recent experience developing bike park projects for the cities of Elk Grove, CA, Lafayette, CA and Redmond, WA gives us an indication of the level of interest and need for the development of these facilities. The public meetings for each of these projects were the largest public meetings in the history of each of these City Parks Departments.

Perhaps more than any other location in the country, Marin County with its great number of riders, rich cycling history as the birthplace of the mountain bike, dedicated and proven local bike clubs, advocates and volunteers, exploding high school mountain biking and youth programs, and involved local bike shops and bike companies suggest that the need for a bike park facility is huge and that the opportunity to develop a facility that could become a premiere bike park in Marin County is tremendous.

2.0 Introduction

Community members in the County of Marin have expressed a need and interest in having bike park facilities locally. The Marin County Department of Parks and Open Space (County) has responded to this demand by: 1) educating themselves on the different types of bike park facilities and amenities, 2) searching for available land within existing County parks and outside County Parks where a bike park potentially could be located, and 3) hiring Hilride, a professional bike park design and planning company to work in coordination with the County on a bike park feasibility study.

The County's preliminary vetting process for bike park site selection was based on the following criteria:

1. Available land of more than 1-acre in size to support the development of a destination bike park facility.
2. Limited potential environmental impacts from the construction, maintenance and ongoing use of the bike park.
3. Infrastructure available on-site for public access, construction and ongoing park maintenance.
4. Limited conflicts with other park uses and users.

Based on these criteria, the County's internal site selection vetting process concluded with the identification of a 14.1-acre portion of Stafford Lake as the most promising site for the development of a bike park facility. The goal of this feasibility study is to objectively assess and evaluate the feasibility of the proposed site at Stafford Lake for the development and operation of a bike park facility.

2.1 Overview of Bike Parks

A typical bike park facility generally includes a mix of riding elements for beginner, intermediate, advanced and expert level riders including: pump tracks, dirt jumps, flow trails, elevated trails and specific riding features such as drop progressions, wall rides, radar dishes, box jumps, etc. to provide riders with exciting and challenging riding experiences. Bike parks may also include kids areas, short track cross-country loops, observed trials areas, speed trials areas and more. The design of the bike park and what type of features might be

included in the design depend on agency goals, facility size, available funding, and community input. The overall size of the facility, the types of riding features and elements, and the design of the park will determine the type and number of riders that will use the park. Typically, peak use for most bike parks is after school on weekdays and all day on weekends. Depending on the number of riders in the local community, proximity and access to the park, average daily ridership for a small park (1-2 acres) could range from 1-50 riders per weekday and up to 150 riders per weekend. Ridership at a larger park (5+ acres) may be between 1-100 riders per weekday with weekend ridership increasing to 150-300 riders.

2.2 Elements of a Bike Park

Elements: Progressive Dirt Jumps

Dirt Jumps- Dirt jumps are one of the most desired bike park elements. Riders in every community across the country seek out opportunities to gain experience riding dirt jumps and developing their jumping skills. Providing dirt jumps in a formalized bike park facility allows for the creation of safer “table top” style jumps and a logical progression from smaller to larger sized jumps for riders to gain experience and build their skills in an incremental way. Typically, a dirt jump area will include a start hill, multiple small medium and large jump lines, and a return trail to get back to the top of the start hill. Riding dirt jumps takes a tremendous amount of concentration and skill, riders typically ride or “session” dirt jumps for hours at a time working on perfecting specific skills or tricks. More advanced dirt jump lines that are spaced closer together are called “rhythm sections”. The closer spacing of the jumps in a “rhythm section” allow a rider to use the momentum from the landing of one jump to carry speed into the next one and execute a series of jumps in sequence.

Beginner Pump Track – Intermediate Pump Track

Pump Tracks- Pump tracks are currently one of the fastest growing types of bike park features in popularity. Many parks even have separate pump tracks for beginner, intermediate and advanced levels riders. Pump tracks usually include a start hill, a series of rollers or pumps that flow into deep 90º and 180º berm turns, with various roller style jumps, table top jumps and sometimes wall rides. Pump tracks provide a very unique type of riding experience that appeals to a wide range of riders. Riding a pump requires a tremendous amount of focus, concentration and intensity, as riders do not actually pedal their bikes. A rider generates forward momentum by shifting their weight for and aft on the bike "pumping". Technically, riders are taking advantage of the "force of angular momentum". The high quality workout and the skill development that riding a pump track provides, in a low risk format, makes these features one of the best ways to practice, train and develop new skills.

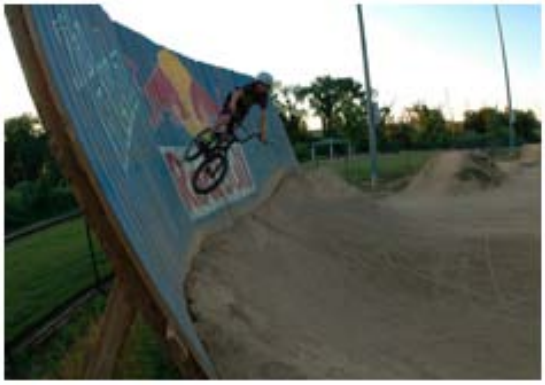
Flow trails in Woodward Mountain Bike Park.

Flow Trails- In larger parks, flow trails provide riders with a more extended trail type experience. Flow trails typically include a start hill, flowing berm turns,

rollers, jumps, rhythm sections, drops, wall rides and more. Flow trails provide riders with the opportunity to develop a wide range of skills such as pedaling, jumping, turning, pumping, and trail riding skills.


Elevated trails area in Woodward Mountain Bike Park.

Elevated Trails- Elevated trails provide riders with technical challenges that require precise, slow speed bike handling skills; balancing, pedaling, turning, braking, and accelerating. Elevated trails that provide a range of progression for beginner through advanced level riders are the most successful. Elevated trails can be designed to have a tremendous amount of technical difficulty with very low risk when they are kept low to the ground.




Wall Rides in Folsom Bike Park and Green River Bike Park.


Drop progression in Green River Bike Park, observed trials area in Woodward Bike Park.

Additional Riding Features- Additional integrated riding features can include: wall rides, drop progressions, teeter totters, suspension bridges, etc.


Parents teaching their children to ride at Woodward Bike Park and Green River Bike Park.

Kids Learn-To-Ride Skills Area- Kids learn-to-ride areas provide novice riders, parents, and coaches with a focused area to learn, and practice basic bike riding skills; balance, pedaling, turning, and stopping.


NorCal High School League skills camp in Marin, Green River High School Mountain Bike Class

High School Mountain Bike Team Skills Areas- High School Mountain Bike Team and Programs that introduce novice riders to mountain biking benefit from having facilities to teach and learn new skills in a safe and controlled environment.


Practice skills area in Green River Bike Park father and son, sisters.

Skills Zones- Skills zones provide focused areas, and specific features to practice and develop riding skills. Skill zones allow for opportunities to watch and learn from other riders.


Easy Loop Trail – Practice Loop Trail with optional skills features

Loop Trails- Loop trails should provide an easy way for riders, especially first time visitors to the park, to navigate and preview each of the different riding areas and warm up before they start their day of riding. For beginner level riders, the loop trail should provide the easiest, most approachable experience in the park.


Beginner Level Skill Feature – Expert Level Table Top Jump

Full Spectrum Bike Parks- Full spectrum bike park facilities provide many diverse riding elements and specific riding features that provide positive riding experiences for a wide range of riders- from first timers, kids and adults to pro bmx, dirt jumpers, cross-country mountain bikers, downhill and freeride mountain bikers, observed trials riders, etc. A full spectrum facility provides a range of these riding elements with integrated, progression based beginner, intermediate, advanced, and expert level options that allow riders to incrementally practice and hone their skills in each discipline.

3.0 Objectives for the Bike Park

County staff stated the following goals for the facility:

- Skill levels - riding elements should be provided for beginner, intermediate, advanced and possibly expert level riders.
- Low maintenance – the facility should be designed to require minimal amounts of staff time to maintain. Significant volunteer partnership is envisioned for the construction and ongoing maintenance of the facility.
- Revenue Generation – the bike park should be designed to support special events such as races, competitions, demonstrations, festivals, etc. and specific programming, such as skills clinics, coaching, training and instruction, that have the potential to generate revenue for the County via permit and parking/gate fees.

The study proceeds with the assumption that the bike park would not be staffed by County employees.

4.0 Feasibility Study Approach

4.1 Site Assessments

On September 28, 2009 Nat Lopes and Rachael Lopes of Hilride met with County staff at Stafford Lake to take a preliminary look at the potential location for the bike park and learn about how the park is currently used and managed. Once a proposed boundary for the bike park was determined, Hilride performed a follow-up site assessment, which they conducted on March 13, 2010.

4.2 Bike Park Feasibility Study Matrix

Hilride used a site selection criteria matrix (Appendix 1) to evaluate the proposed project site. The evaluation addressed critical factors for successful bike park development including environmental conditions, terrain, accessibility, site safety, development status, etc.

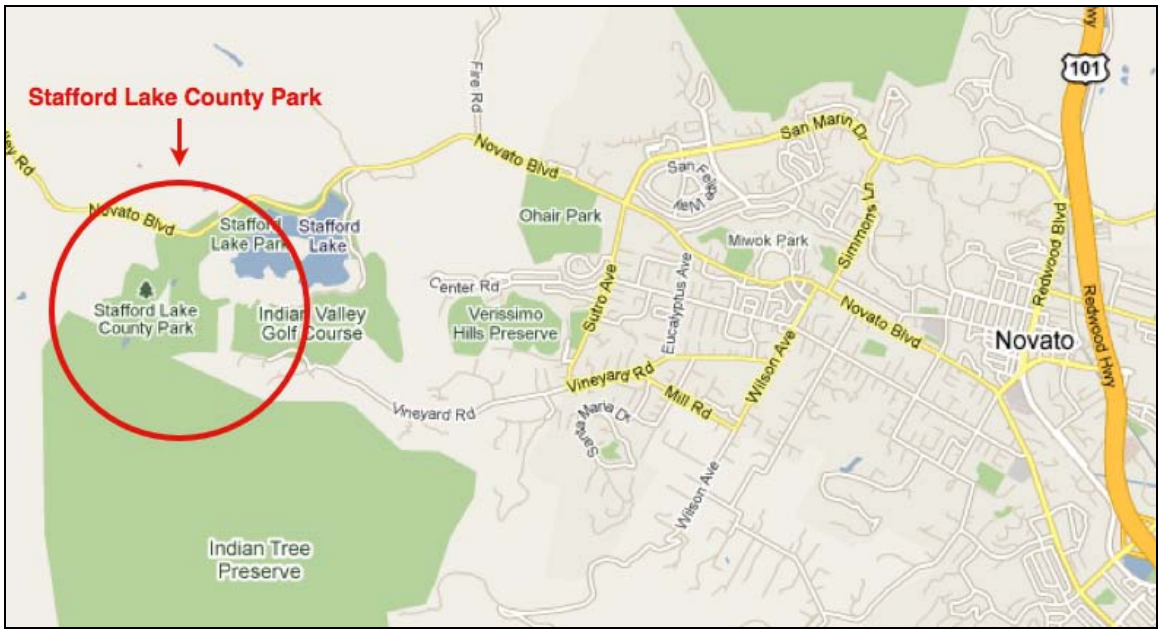
5.0 Site Analysis and Feasibility

The following assessment breaks down critical criteria in order to evaluate the feasibility of the proposed bike park at Stafford Lake. The conclusions from this analysis are found in Section 6.0.

Proposed Bike Park Site in Fall

Proposed Bike Park Site in Spring

5.1 Site Description



Location map of proposed bike park relative to the community of Novato and Highway 101.

Stafford Lake County Park is situated in the northern area of Marin County approximately 3-miles west of the city of Novato and Hwy 101. Road access to

the park is on heavily used two and four lane roads. Separated bike paths or bike lanes are present along 90% of the route to the park from Novato. The 139-acre park provides recreation including hiking, fishing, group picnic areas that can accommodate up to 500 people, a children's play structure, ball fields, volleyball, horseshoe courts and a disc golf course. The park is also used for large-scale events, music concerts and festivals as large as 1,200 cars and 5,000 people. The main park entrance located on 3549 Novato Blvd. is gated and requires an entrance fee. The fee in the winter is $5 per vehicle. During the summer, weekday fees are $5 per vehicle. Weekend fees (Friday, Saturday and Sunday) are $10 per vehicle. There is a $2 fee for walk/ride-ins year round. There is an additional pedestrian access via the bike path in the east end of the park. Park hours are 7:00am to 7:00pm in the summer and 8:00am to 5:00pm in the winter. There is no on street parking on Novato Blvd. There is no current master plan guiding facility development at Stafford Lake.

Location map of proposed bike park site within Stafford Lake County Park.

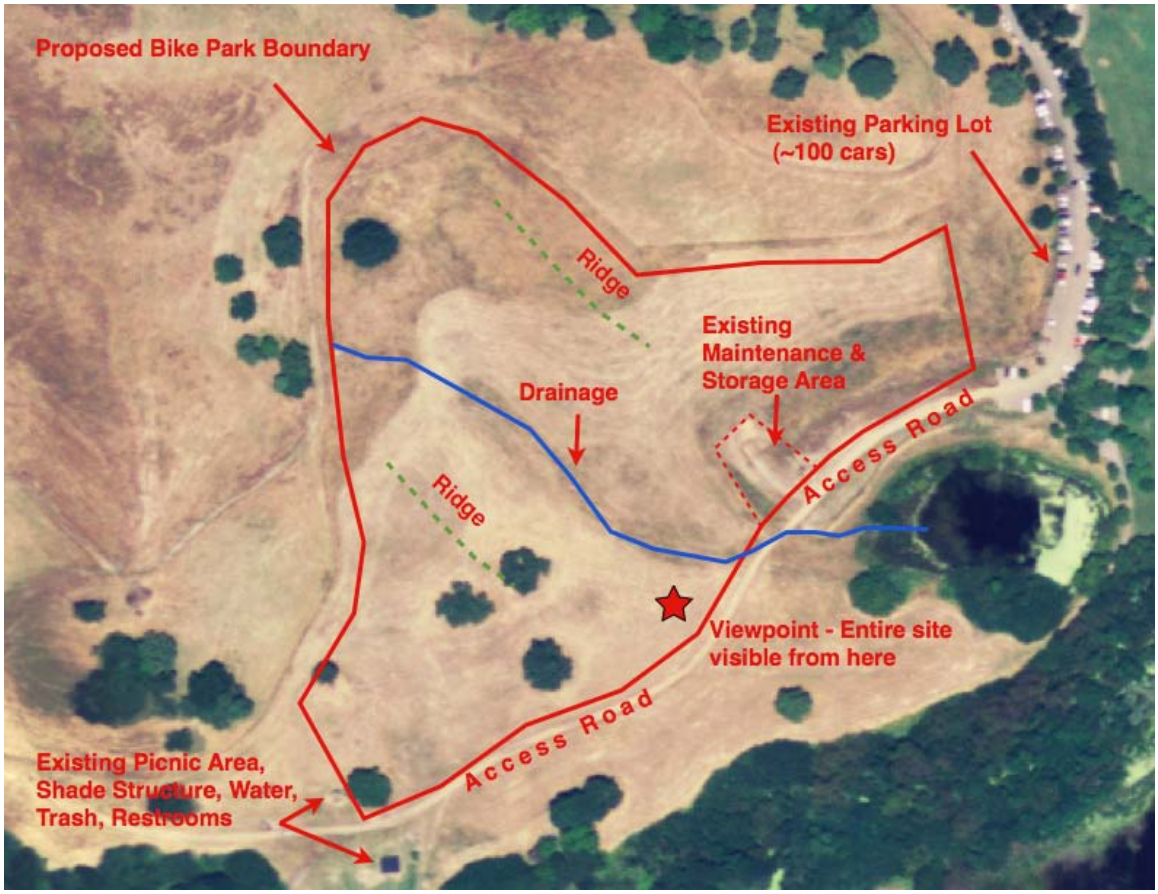
The approximately 14.1-acre area within the Stafford Lake County Park that was evaluated for the proposed bike park is centrally located within the park. The site is bounded on one side by an existing parking lot of approximately 100 spaces and a dirt access road. The Stafford Lake park boundary bounds the other side of the site. The park boundary is fenced and the private property adjacent to the site is actively used for cattle grazing. The proposed bike park site has been disturbed through the years – it's disked and seeded regularly for hay, it's grazed, it's been used as a Renaissance Faire location, and it's the site of the annual Stafford Lake Bike Invitational.

Materials storage area and water spigot in the middle of the site.

In the middle of the site there is a staging area for park maintenance operations, which includes a vehicle pull out area, waste storage area and a water spigot with hose running off of a 2” water line.

Group BBQ and picnic area and pit toilets on west end of site.

On the west end of the site there is a group BBQ and picnic area, with pit toilets, volleyball court, horse shoe pit, drinking fountain and shade structure. The group picnic area is showing signs of wear after many years of use. Staff indicated that there is an existing functional water fountain that is tied into a ½” water line that could be upgraded to a 2” diameter line and be extended to the site to provide water for construction and maintenance. On the east end of the site (within 1,000 ft.) there are parking lots, restrooms, water fountains, group BBQ sites, a ball field and a volleyball court.



Detail map of proposed bike park site.

Predominately open grassland, with almost no exposed rock or rock outcroppings, the site has roughly a half dozen mature Valley Oak trees distributed across the landscape. The terrain gently slopes from the northwest to the southeast with the lower elevations ranging from 5%-10% in grade and gives way to steeper slopes in the higher elevations reaching grades of up to 40%. The site at its lowest point is around 200’ elevation and at its highest point close to 300’ elevation.

Photo showing drainage with restored landscape and from the middle of the site.

A minor drainage, restored with vegetation and tree plantings, bisects the site. Looking at the site from the existing access road, to the west of the drainage, there is an unobstructed view of the entire site. A subtle ridge runs parallel to the drainage and creates a visual barrier that otherwise limits visibility to one half of the site or the other. The entire site is currently mowed in the dry months for fuel management and does not include any developed recreational facilities.

Panoramic photo of lower elevation areas and higher elevation areas.

Overall, the lower areas of the site with very moderate slopes lend themselves to the construction of pump tracks, skills areas, dirt jumps and kids learn-to-ride zones. The undulating slopes and moderate elevation gain in the upper areas of the site lend themselves to the construction of gravity fed, contour flow trails and dirt jump lines. The minimal exposed rock, overall soil profiles and interspersed trees make the site ideal for the construction of the dirt trails and features with minimal impact to the existing mature trees and vegetation. Locating the main staging area at the termination of the central ridgeline would provide unobstructed views over the entire site for spectators, parents, riders, park staff, law enforcement and emergency services.

5.2 SWOT Analysis

SWOT analysis is used to evaluate the Strengths, Weaknesses, Opportunities, and Threats for the proposed bike park at Stafford Lake. This qualitative analysis characterizes and identifies specific factors that are favorable or unfavorable to achieving project objectives. This analysis along with the results of the site selection criteria matrix, inform the final recommendations in Section 6.0.

Strengths

- Size- The size of the proposed site is large enough to create a full spectrum facility that would be a draw for riders from around the county and service a large riding population.
- Natural Area- The quality of experience in the open natural area park with excellent views of the surrounding hills and Stafford Lake itself make the site location very desirable.
- Current Use- There is no current use of the site as a recreational facility and the proposed use would not conflict with any other users of the other park facilities.
- Compatibility- The proposed use of the site as a bike park would complement the existing parks facilities and provide additional activities for existing park users.
- Supporting Infrastructure- The existing water lines, restrooms, parking, BBQ and picnic facilities onsite would support the development of a dynamic destination bike park.
- Ownership- Stafford Lake County Park and the proposed bike park site are owned by the County.
- Proximity- The distance to the nearest local community is less than 2-miles and Highway 101 is less than 3-miles away.
- Visibility- The site is not visible from the surrounding area and does not impact the viewsheds of adjacent residences.
- Venue Amenities- The large scale parking areas, water lines, electrical, and sanitary facilities could accommodate small to large events that could generate revenue for the County.
- Access- Bike path or lane exists for the majority of the route connecting the local community to the park.
- Terrain- The topography and elevation of the site would support the design of a dynamic facility that could accommodate users of all skill levels.

- Timeframe- The estimated timeframe for development could be relatively quick, approximately 1 year.
- Emergency Services- Novato Community Hospital and Sutter Terra Linda Health Plaza are located only 7-miles and 13-miles away respectively and offer urgent medical care.
- User Group and Community- Proximity to bike industry, professional riders and organized bike clubs will result in volunteer labor and possibly financial support for the development and ongoing maintenance of the bike park.
- No Dogs Allowed- No dogs are currently allowed in Stafford Lake County Park, which reduces the need for exclusionary fencing to keep dogs out.

Weaknesses

- Location- the remote location of Stafford Lake County Park will require the majority of the users drive to the park.
- Accessibility- the disconnected bike path that leads to the park requires users to walk or ride along the edge of Novato Blvd. in some areas, which is fast, narrow and has no shoulder.
- Exposure- the proposed site is very exposed with minimal natural shade and little protection from the wind. Additional native tree planting and shade structures would greatly enhance the riding experience in the summer.
- Limited Cell Service- the limited cell service in the area is a drawback for young riders and parents to stay in touch, and communicate with emergency services if necessary. At least two pay phones are currently available within the park.
- No Bike Trail Network- the lack of an extended network of bike trails to explore the rest of Stafford Lake Park limit riding opportunities to the bike park only, which will limit the number and type of riders that would visit both the bike park facility and the larger Stafford Lake Park.

Opportunities

- Access to soil- The North Marin Water District (NMWD) is actively seeking a way to reduce sediment levels in Stafford Lake and will need to identify a means by which they will handle and dispose of soils resultant from dredging operations. The NMWD is willing to release soils for use in the

bike park project provided the project meets all the water district standards and permitting requirements.

- Events- the ability to have large events in the park is very unique in the region and provides a tremendous opportunity for revenue generation.
- Venue- the size of the venue and the wide range of venue amenities make the site very unique and enhance its appeal as a destination bike park facility.
- Service Area- the proposed site being in northern Marin County will service out-of-county bicycle communities including Petaluma and Santa Rosa and would likely draw riders from San Francisco and the East Bay as well resulting in a tremendous opportunity for revenue generation.
- Volunteer Support- the group BBQ and picnic areas would provide a unique opportunity to have large-scale volunteer days to help with the construction and maintenance of the park.
- Local Rider Development- the size and scale of the facility and the opportunity to create a dynamic progressive park will provide the opportunity for young riders to become highly skilled and likely produce many professional level riders in the long term.
- Digging In the Dirt- the opportunities for young people to take an active part in building a park that they will use on a daily basis is a powerful experience. Further, as has been discussed in great length in recent years even the opportunity for our young people to just be outside in a natural environment and dig in the dirt creates a powerful connection with the natural environment and the outside world.

Threats

- Proximity and Local Rider Visits- The distance to the site from the local community could limit the number and frequency of rider visits.
- Water- Access to and cost of water for ongoing maintenance.
- Fees- The entrance/parking fee required will limit the number and frequency of rider visits to the park. This is mitigated somewhat by the opportunity to purchase annual permits ($75/year).
- Proximity and Local Volunteer Builders- The distance to the location may limit volunteer maintenance in the long-term.
- Size- the size of the site will require a considerable amount of maintenance for a volunteer group and will require a strong program and a strong stewardship commitment.

SWOT Analysis Summary

Stafford Lake contains the most important criteria for the development of a successful bike park. The 14.1-acre site offers dynamic terrain substantial elevation, in natural parkland environment. The size alone creates an opportunity to offer a variety of bike park features to service a range of ages and abilities while allowing dispersal of users within the site. The existing park amenities including parking, restrooms and water gives this site the ability to be developed relatively quickly and at a reasonable cost. A drawback to the site's northern location within the County is that most bike park users will drive rather than ride to the park. The bike park will be a draw within the region and will be capable of generating revenue for the County. However, the lack of bike accessible trail opportunities throughout the larger Stafford Lake County Park will somewhat limit its potential to service the full spectrum of bicycling enthusiasts.

5.3 Risk Management Analysis

Risk Management Signage

The County has embraced recreation as evidenced by its skatepark, swimming pool and ball fields. The County has certain immunities as outlined in the California Government Code, Particularly Section 831.7 (See Appendix 2). As the facility is envisioned to be an unstaffed, public use, at risk facility the most important elements of risk management would be a comprehensive signage program, a progression-based bike park design offering optional experiences for beginner through advanced riders, a comprehensive construction and maintenance program, and a program for the enforcement of park rules and regulations including, helmet usage, codes of conduct and rider etiquette.

The County should comply with the following recommended risk management guidelines:

- Engineered in general compliance with best practices for the design and operation of a bike park facility.
- Design and operation plan reviewed and approved by County risk manager.
- Park has appropriate safety barrier between participants and spectators.
- Park is signed according to government Code §831.7
- The County adopt the appropriate mechanism to enforce park rules, set hours of operation and required use of safety apparel.
- All organized events are supervised and the County assures purchase of liability insurance for all organized events through the sanctioning event body.
- The park is routinely inspected and maintained, and such activity is documented.
- Protocol for periodic law enforcement patrol of park.

5.4 Soil Attributes

According to the Natural Resources Conservation Service Marin County, California (CA041) Soil Data (Version 5, Dec 10, 2007) there are two soil complexes in the proposed bike park site dependent on slope steepness. The shallow 2 to 5 percent slopes at the lower portions of the proposed site consist of the Blucher-Cole Complex. This complex is predominantly found in basin floors and alluvial fans and is somewhat poorly drained. The Blucher soil profile is a silt loam in the top 23 inches and is a clay loam from 23 to 60 inches. The Cole soil profile is made up of clay loam in the top 5 inches, a silty clay loam from 5 to 14 inches below surface, a silty clay from 14 to 60 inches and it reaches a restrictive feature below 80 inches deep. Within the steeper slopes of the site the Los Osos-Bonnydoon Complex exists, which is predominantly (60%) composed of Los Osos soil type, is found on hills and is well drained. The Los Osos soil type is a Loam within the top 15 inches, clay from 15 to 30 inches deep where is hits weathered bedrock. The Bonnydoon soil type is a gravelly loam in the top 11 inches and weathered bedrock from 11 to 15 inches. A complete description of these soil complexes can be found in Appendix 3.

These results indicate that the majority of the site has deep, moderately well drained clay loam soils that would be very well suited for the construction of the dirt structures in the bike park that would resist erosion caused both by use, and environmental conditions such as wind and rain. Further soil testing on the site is recommended to identify the best areas for construction.

The project will need to include erosion control and implementation measures to reduce the potential for sedimentation into the park and Stafford Lake, a domestic drinking water supply and protection of the unnamed creek entering the lake. Mitigation would likely include but not be limited to landscaping and re-vegetation (grasses and tree plantings) on the non-riding surfaces.

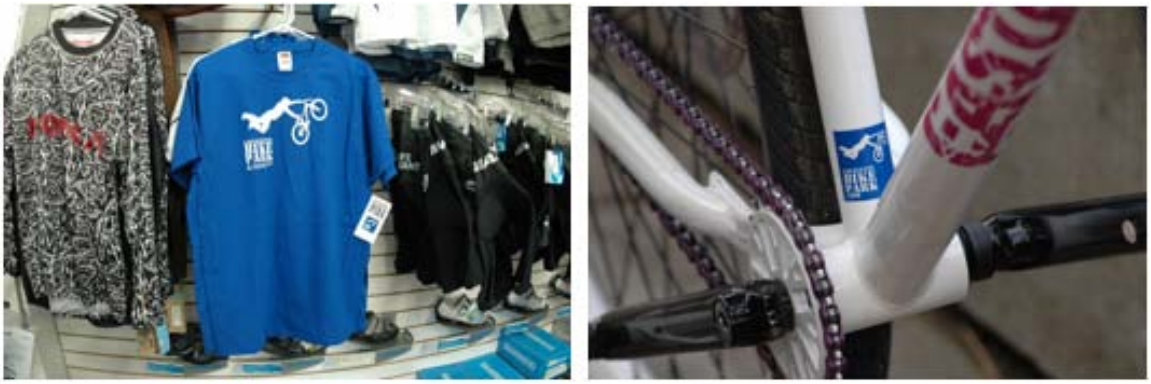
5.5 Community Outreach

Elk Grove Bike Park community design charretts and community outreach meetings.

Conducting a series of design workshops to gain input on the design of the bike park from the local riding community will be critical. Understanding the demographics, styles of riding, experience levels etc., of the local riders is important in designing a park that will prove to be successful and sustainable in the near and long terms. It is also crucial to gain input from the immediate neighbors and other park user groups as they know the park intimately, its usage patterns, environment, etc.

Elk Grove Bike Park and Lafayette Bike Park project websites.

A successful method for community outreach is to develop a project website and facebook page to easily share information regarding upcoming public meetings, design development, construction progress, volunteer days, builder trainings, events and more. Once a website it developed, it is very easy to disseminate consistent project information to community members including riders, neighbors, bike shops, local businesses, schools, bike clubs, news media, etc.



Integrated mini-marketing campaign Lafayette Bike Park t-shirt with sticker on hang tag.

Creating a mini-marketing campaign to promote the project website with a sticker, t-shirt and poster creates tremendous awareness and buzz in the local community. Posting fliers at local businesses, schools, bike shops will encourage attendance at design workshops and participation in the construction and maintenance of the park.

5.6 Programming Opportunities


Professional Coaching and Instruction MMR Coaching Clinic, Marla Streb Skills Camp

There are many opportunities for programming at the bike park, from youth rider camps, to professional coaching, instruction and training programs, special events such as bike demos, races, jump jams, competitions, festivals, etc. Based on the number and frequency of bicycle related special events and programs that currently exist within the County, it is anticipated that the bike park would be in high demand and highly valued as a venue.

5.7 Funding, Revenue and Sponsorship Opportunities

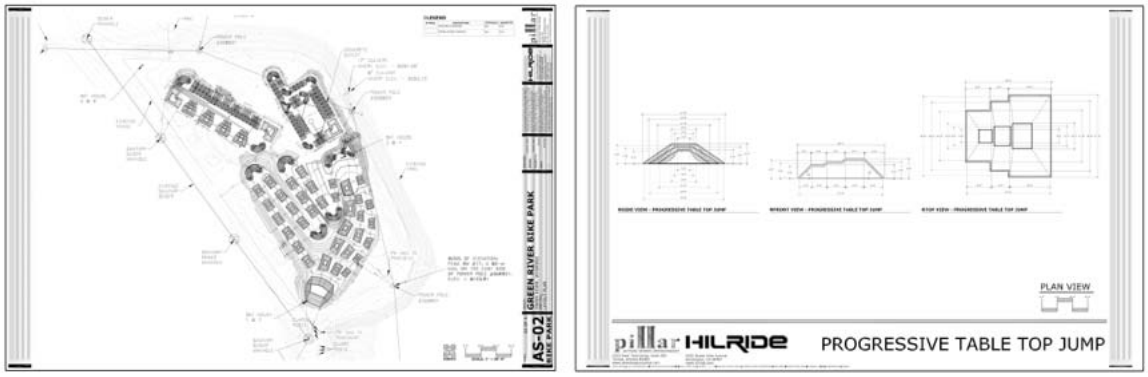

Andrew Taylor Invitational Pro Dirt Jump Competition, Kona Demo Bike Tour

There is a significant opportunity to generate funding, revenue and sponsorship support for the proposed bike park based on the scale of the facility, and the limited number of competing facilities in the region. Funds can be raised through a combination of direct sales for special events and branded merchandise, individual donations and corporate sponsorships from local businesses, bike

shops, and the bike industry, and grants from non-profit foundations such as Bikes Belong, IMBA, etc. Revenue from programming and special event permits would provide additional funding for the ongoing maintenance and operation of the park. Onsite sponsorship opportunities typically include a donors/sponsors plaque at the entrance of the park, donor/sponsor plaques on bike park amenities such as benches, bike racks, tool stations, interpretive signage, shade structures, etc. Website sponsorship opportunities include a sponsors page, newsletter listing and can include much more. Typically project websites tend to be less conflicting with County signage standards and sponsorship standards, which often don't allow for company logos on signage or facility amenities.

5.8 Capital Budget

Below is a preliminary costing estimate of the initial capital investment required to develop a large-size (10+ acres) facility like the one in Figure 1. These costs are based on our recent experience with projects of similar size and scale. With a strong community building effort and push for donated materials, some of these costs could be dramatically reduced.



Green River Bike Park construction documents and detail drawings.

Pre-construction (soft costs / design costs):

Design Development: [Community Design Development Program (design workshops, project website, project marketing materials), Design Master Plan, Risk Management, Maintenance and Signage Plans]: $20,000 - $30,000

Surveys, Construction Drawings: $60,000 - $80,000

Permitting and Environmental Compliance: $30,000 - $50,000

Construction (hard costs / build costs):	
Contractor:	$75,000 - $95,000
Soil, lumber, etc.	$60,000 - $80,000
Fencing, Entrances, Gates:	$10,000 - $15,000
Irrigation:	$20,000 - $30,000
Planting	$5,000 - $8,000
Amenities (shade structure, benches, bike racks)	$10,000 - $20,000
Signage Printing:	$3,000 - $5,000
Subtotal:	$293,000 - $413,000
Contingency 15%:	$43,950 - $61,950
Total:	$336,950 - $474,950

A strong volunteer effort could reduce contractor fees and project costs by as much as $25,000 - $75,000. Donations of soil and lumber could reduce project costs by as much as $30,000 - $50,000.

5.9 Maintenance Budget

There are a number of options for bike park maintenance plans. Maintenance can be conducted by:

- Volunteers
- Contractor
- District Staff
- Hybrid

Parks Department staff working with volunteers to construct the Green River Bike Park.

The County has expressed the need for volunteers to perform the bulk of the required ongoing maintenance for the bike park. For this to be successful, it is recommended that the county implement a comprehensive bike park builder program that include volunteer builder training sessions, a volunteer builder waiver and volunteer builder maintenance protocols. If this is not possible or is not viable in the long-term the County may explore hiring a part time contractor to provide regular, ongoing maintenance on a weekly basis at approximately 20 hours per week. This contractor could oversee and manage volunteer efforts as well, if desired. The ideal candidate for this position would be a dependable, local rider who is experienced in bike park building and maintenance and someone who has the capacity to manage volunteers.

Parks Department staff working with volunteers to maintain the Green River Bike Park.

Typical maintenance tasks include but are not limited to watering, compacting, shaping and otherwise maintaining the dirt features including the trails, jumps

lines and pump track, etc. In addition, inspecting signage, clearing potentially hazardous debris from fall zones, inspecting and repairing any damaged hardware on wooden structures, inspecting rock and wood features for structural integrity, would also be part of the regular maintenance activities. Typically, once construction is completed most of the day to day maintenance work can be done with hand tools, however seasonal maintenance efforts would likely benefit from the use of mechanized equipment. Here is a preliminary estimate of the ongoing costs required to maintain a facility like the one in Figure 1 with a part time contractor.

Contractor: 20 hours/week @ $20/hr= $1,600/month ($19,200/year)

6.0 Conclusions

The need for a bike park facility in Marin County has been identified by local riders and bicycle organizations in the community and echoed by the County. The 2008 US Census data estimates the population for Marin County is 248,794 people. According to the Outdoor Foundation's 2009 Outdoor Recreation Participation Report, participation in mountain biking and bmx by Americans ages six and older is equivalent to 3.4% of the population or 8,500 riders. The size of the Marin County community, the estimated size of the local riding population and the limited number of public and accessible bike park facilities and riding opportunities suggest that the need for a bike park facility that provides varied experiences for a wide range of riders is significant.

Based on the Bay Area Census data from 2008, which states the population of the San Francisco Bay Area to be nearly seven million, an estimate of the total number of mountain bike and BMX participants is approximately 238,000.

Marin County has the opportunity to develop a bike park at Stafford Lake that would meet the County's objectives. Based on the criteria evaluated it is evident that a bike park at Stafford Lake would be a regional draw servicing the entire County, and would have the potential to generate revenue for the park. Additionally, a bike park at this location would be compatible with other park uses, could have near term implementation and leverage existing park infrastructure to lessen the impact on County resources.

7.0 Recommendations

The following recommendations rely on the County's preliminary site selection vetting process, which concluded that there are no other suitable locations for a large-scale bike park closer to the more heavily populated areas of Marin County.

The proposed site at Stafford Lake would support a large bike park facility and would be well suited for the needs of the community. The bike park facility would be ideal if it included a mix of riding elements such as pump tracks, dirt jumps, flow trails, beginner trails, skills features, etc. that would accommodate a large range of riders of multiple skill levels.

The enclosed Preliminary Schematic Bike Park Design Plan (Figure 1) illustrates what the general layout of a bike park could look like at the proposed Stafford Lake site.

8.0 References

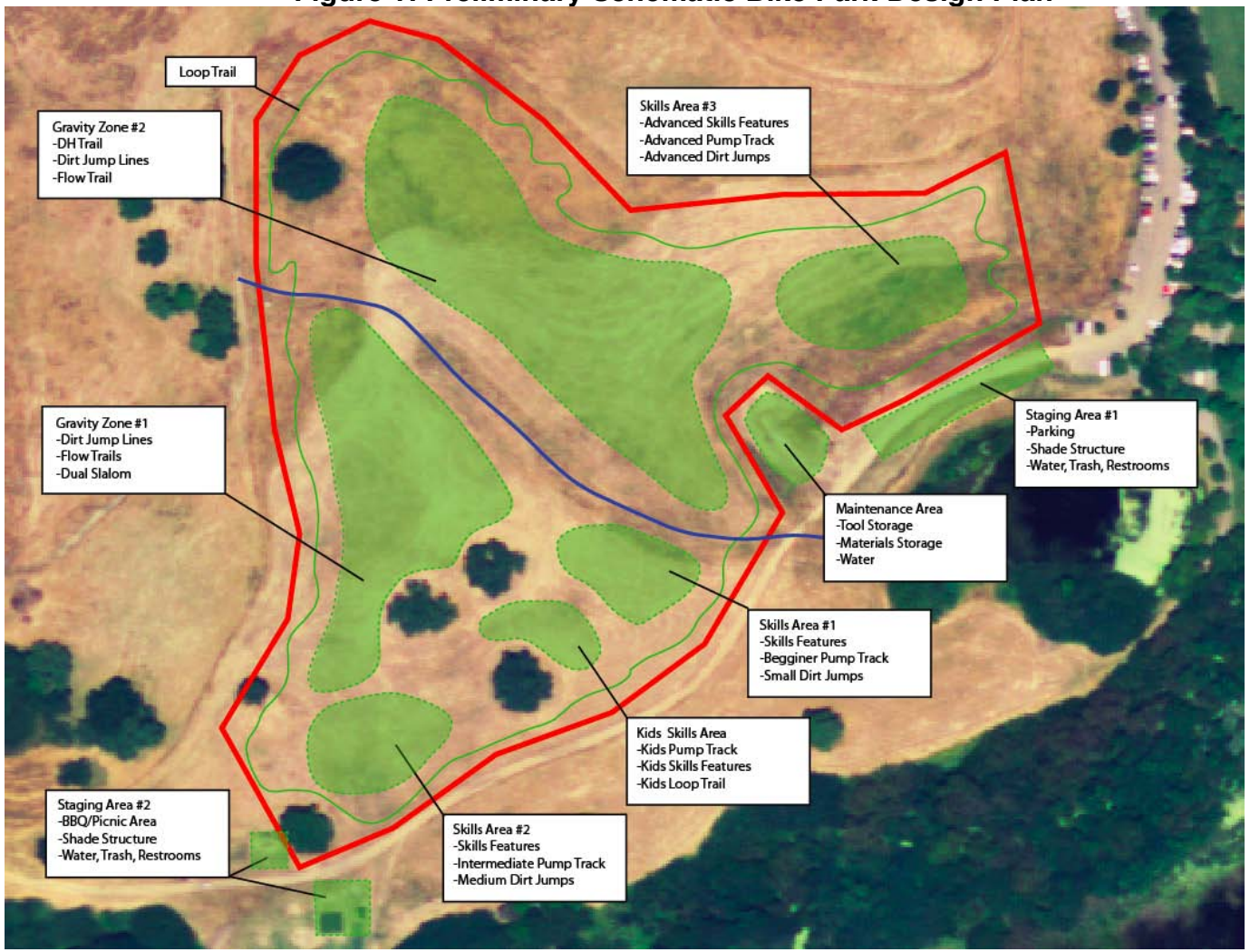
Bay Area Census. 2008. Total Population of the San Francisco Bay Area. Available at http://www.bayareacensus.ca.gov/bayarea.htm

California Government Code 831.7.

Natural Resources Conservation Service (NRCS). 2007. *Marin County, California (CA041) Soil Data (Version 5, Dec 10, 2007).*

Outdoor Foundation. 2009. The Outdoor Recreation Participation Report.

Figure 1: Preliminary Schematic Bike Park Design Plan



Appendix 1: Bike Park Feasibility Study Criteria Checklist

Stafford Lake County Park - Bike Park Feasibility Criteria Checklist

CRITERIA	DESCRIPTION	SCORE
Location		
Acreage	Small Site =1 Medium Site=3, Large Site=5	5
Maintenance Accessiblity	Poor Access=1, Good Access=5	5
Permanenancy of Location	Temp <2 Years=1, Temp Location <5 years=2, Temp <7=3 Temp Location <10=4 years, Permanent=5	5
Facility Expandability		4
Proximity to Service Area		3
Proximity to Residences	Shared Boundary (0 feet)=1, Street Separation (<50-feet)=3 Park/Open Space(>50-feet)=5	5
Shared Boundary with Residences	100% Shared Boundaries=1, 75%=2, 50%=3, 25%=4 No shared Boundaries=5	5
Proximity to Schools		4
Connectivity	Poor Connectivity=1, Good Connectivity=5	3
Current Use	No Use=1, Current Activity Specific Illegal Use=5	1
Anticipated Use	Large increase in use=1, Some increase in use=3,No increase in use=5	2
User Capacity	Low Capacity=1, High Capacity=5	5
Compatibility with other park users	Not Compatible=1, Very Compatible=5	5
Compatibility of use with Land Use Plan	Not Compatible= 1, No LUP= 3 Compatible=5	3
Congestion	Definite Impacts=1, Unknown= 3, None=5	3
Relation to other park facilities	Not Compatible=1, Very Compatible=5	5
Land Ownership and Management	Privately Owned=1, Partner Agency=3, Agency=5	5
Natural Boundary		5
Subtotal		***73.0***
Bike Park Specific Criteria		
Topography		5
Terrain		5
Elevation		5
Shade		2
Vegetation		4
Soil Type Onsite		4
Drainage		4
Grading Required for Site	Extensive Grading=1, Minimal Grading=5	3
Water main/meter/hookup for Construction / Maintenance	No Infrastructure=1, Minimal=3, Existing=5	5
Drinking Fountain	No Infrastructure=1, Minimal=3, Existing=5	5
Proximity to Bicycle Retailers		3
Bike Accessible Gates		5
Bike Racks	No Infrastructure=1, Minimal=3, Existing=5	3
Maintenance, Equipment and Tool Storage	No Infrastructure=1, Minimal=3, Existing=5	3
Trash/Recycling	No Infrastructure=1, Minimal=3, Existing=5	5
Restroom	No Infrastructure=1, Minimal=3, Existing=5	5
Fencing	Requires Substancial Fencing=1, Partial Fencing=3, No Fencing Required=5	4
Programming Opportunities	No Opportunties= 1, Definite Opportunities=5	
Opportunity for Youth Programming		5
Opportunity for Events		5
Proximity to Sancitoned Bike Parks	Less than 1-miles=1, Less than 10-miles=2, 50-miles=3, 100-miles=4, More than 200-miles=5	4
Subtotal		***84.0***
Risk Management, Security, Safety		
Proximity to Emergency Medical Facility	Far=1 (>50-miles), Close=5 (w/in 0.5 mile)	4
Security Patrol Access	No Accessibility=1, Highly Accessible=5	5
Security Visibility	Low Visibility=1, High Visibility=5	5
Subtotal		***14.0***

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Stafford Lake County Park - Bike Park Feasibility Criteria Checklist

CRITERIA	DESCRIPTION	SCORE
Traffic, Parking and Accessibility		
Proximity to Parking		5
Parking Capacity		5
Overflow		5
ADA Accessiblity/ Potential for Accessibility	Less Feasible=1, Highly Feasible=3, Existing=5	5
Bike Accessibility / Potential for Accessibility (path, trail, lane)	Less Feasible=1, Highly Feasible=3, Existing=5	3
Transit Accessibility	Poor Access=1, Good Access=5	2
Subtotal		***25.0***
Community Support, Public Opinion	Opposition=1, Neutral=3, Favorable=5	
General Community Support		3
Bicycle Community Support		5
Subtotal		***8.0***
Development Status		
Development Complexities	High Compleity=1, Low Complexity=5	4
Development Timeframe	Long Term=1, Mid-Term=3, Short Term=5	5
Subtotal		***9.0***
Funding	No Funding=1, Potential=3, Identified Source=5	
Construction Funding		5
Maintenance Funding		2
Subtotal		***7.0***
Existing Site Documentation	No=1, Yes= 5	
Topographic Survey Available		1
Geotechnical Study Available		1
Master Plan	Master Plan w/ No Bike Specification=1, No Master Plan=3, Master Plan w/ Bike Facility Specification=5	3
Subtotal		***5***
TOTAL SCORE	***Total points possible=280***	***225***
Percentage of Total Score		80%

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Appendix 2: California Government Code 831.7

831.7. (a) Neither a public entity nor a public employee is liable to any person who participates in a hazardous recreational activity, including any person who assists the participant, or to any spectator
who knew or reasonably should have known that the hazardous recreational activity created a substantial risk of injury to himself or herself and was voluntarily in the place of risk, or having the ability to do so failed to leave, for any damage or injury to property or persons arising out of that hazardous recreational activity.

(b) As used in this section, "hazardous recreational activity" means a recreational activity conducted on property of a public entity which creates a substantial (as distinguished from a minor, trivial, or insignificant) risk of injury to a participant or a spectator.

"Hazardous recreational activity" also means:

(1) Water contact activities, except diving, in places where or at a time when lifeguards are not provided and reasonable warning thereof has been given or the injured party should reasonably have known that there was no lifeguard provided at the time.

(2) Any form of diving into water from other than a diving board or diving platform, or at any place or from any structure where diving is prohibited and reasonable warning thereof has been given.

(3) Animal riding, including equestrian competition, archery, bicycle racing or jumping, mountain bicycling, boating, cross-country and downhill skiing, hang gliding, kayaking, motorized vehicle racing, off-road motorcycling or four-wheel driving of any kind, orienteering, pistol and rifle shooting, rock climbing, rocketeering, rodeo, spelunking, sky diving, sport parachuting, paragliding, body contact sports (i.e., sports in which it is reasonably foreseeable
that there will be rough bodily contact with one or more participants), surfing, trampolining, tree climbing, tree rope swinging, waterskiing, white water rafting, and windsurfing. For the purposes of this subdivision, "mountain bicycling" does not include
riding a bicycle on paved pathways, roadways, or sidewalks.

(c) Notwithstanding the provisions of subdivision (a), this section does not limit liability which would otherwise exist for any of the following:

(1) Failure of the public entity or employee to guard or warn of a known dangerous condition or of another hazardous

recreational activity known to the public entity or employee that is not reasonably assumed by the participant as inherently a part of the hazardous recreational activity out of which the damage or injury arose.

(2) Damage or injury suffered in any case where permission to participate in the hazardous recreational activity was granted for a specific fee. For the purpose of this paragraph, a "specific fee" does not include a fee or consideration charged for a general purpose such as a general park admission charge, a vehicle entry or parking fee, or an administrative or group use application or permit fee, as distinguished from a specific fee charged for participation in the specific hazardous recreational activity out of which the damage or injury arose.

(3) Injury suffered to the extent proximately caused by the negligent failure of the public entity or public employee to properly construct or maintain in good repair any structure, recreational equipment or machinery, or substantial work of improvement utilized in the hazardous recreational activity out of which the damage or injury arose.

(4) Damage or injury suffered in any case where the public entity or employee recklessly or with gross negligence promoted the participation in or observance of a hazardous recreational activity.
For purposes of this paragraph, promotional literature or a public announcement or advertisement which merely describes the available facilities and services on the property does not in itself constitute a reckless or grossly negligent promotion.

(5) An act of gross negligence by a public entity or a public employee which is the proximate cause of the injury.

Nothing in this subdivision creates a duty of care or basis of liability for personal injury or for damage to personal property.

(d) Nothing in this section shall limit the liability of an independent concessionaire, or any person or organization other than the public entity, whether or not the person or organization has a contractual relationship with the public entity to use the public property, for injuries or damages suffered in any case as a result of the operation of a hazardous recreational activity on public property by the concessionaire, person, or organization.

Appendix 3: Natural Resources Conservation Service – Project Area Soil Attributes

Marin County, California

105—BLUCHER-COLE COMPLEX, 2 TO 5 PERCENT SLOPES

Map Unit Setting

Elevation: 0 to 500 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 210 to 290 days

Map Unit Composition

Blucher and similar soils: 40 percent
Cole and similar soils: 30 percent
Minor components: 30 percent

Description of Blucher

Setting

Landform: Basin floors, alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread, talf
Down-slope shape: Concave, linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone, granite, or shale

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability (nonirrigated): 3w
Ecological site: CLAYEY BOTTOMLAND (R015XC025CA)

Typical profile

0 to 7 inches: Silt loam
7 to 23 inches: Silt loam
23 to 60 inches: Clay loam

Description of Cole

Setting

Landform: Basin floors, alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Concave

Across-slope shape: Linear
Parent material: Alluvium derived from shale, sandstone, or granite

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability (nonirrigated): 3w
Ecological site: CLAYEY BOTTOMLAND (R015XC025CA)

Typical profile

0 to 5 inches: Clay loam
5 to 14 inches: Silty clay loam
14 to 60 inches: Silty clay

Minor Components

Clear lake

Percent of map unit: 10 percent
Landform: Depressions
Landform position (two-dimensional): Backslope

Cortina

Percent of map unit: 10 percent

Slopes less than 2 percent

Percent of map unit: 10 percent

Data Source Information

Soil Survey Area: Marin County, California
Survey Area Data: Version 5, Dec 10, 2007

Marin County, California

142—LOS OSOS-BONNYDOON COMPLEX, 30 TO 50 PERCENT SLOPES

Map Unit Setting

Elevation: 200 to 1,200 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 270 to 320 days

Map Unit Composition

Los osos and similar soils: 60 percent
Bonnydoon and similar soils: 20 percent
Minor components: 20 percent

Description of Los Osos

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability (nonirrigated): 6e
Ecological site: FINE LOAMY CLAYPAN (R015XC032CA)

Typical profile

0 to 15 inches: Loam
15 to 30 inches: Clay
30 to 34 inches: Weathered bedrock

Description of Bonnydoon

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave

Across-slope shape: Convex
Parent material: Residuum weathered from shale, or sandstone

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.4 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability (nonirrigated): 6e
Ecological site: SHALLOW GRAVELLY LOAM (R015XC037CA)

Typical profile

0 to 11 inches: Gravelly loam
11 to 15 inches: Weathered bedrock

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Slumps

Percent of map unit: 3 percent

Tocaloma

Percent of map unit: 3 percent

Yorkville

Percent of map unit: 3 percent

Unnamed deep

Percent of map unit: 3 percent

Slopes more than 50 percent

Percent of map unit: 3 percent

Data Source Information

Soil Survey Area: Marin County, California
Survey Area Data: Version 5, Dec 10, 2007

Appendix 4: Terms

Jumps

Mountain Bike (Downhill and Freeride) Dirt Jumps- Mountain bike jumps for 26" wheeled bikes with front and rear suspension, a full range of gears, and powerful brakes require more speed, gravity and room to complete maneuvers. Riding surfaces themselves can be more varied as the full suspension systems soak up vibration. Mountain bike jumps are typically less steep on the takes offs and landings, use more elevation and might vary from individual features to more intensive rhythm sections.

Mountain Bike (Hardtail) Dirt Jumps- Hard tail dirt jumpers typically ride 26" wheeled dirt jumping specific or dual slalom style hard tail bikes that are equipped with front suspension and high powered brakes. The design of the jumps themselves will be very similar except that you might find a bit more elevation change.

BMX Dirt Jumps- BMX style dirt jumps are generally rhythm sections that have steep take offs and landings and are almost always gapped (as riders prefer the aesthetic, the minimal construction and material requirements, and the "natural filtering of less skilled riders" away from the jumps which reduces congestion, and maintenance). BMX dirt jumps are usually meticulously groomed, raked and packed with all of the rocks and debris removed from the riding surfaces to provide a very smooth line (as BMX riders run very high pressure tires and do not have suspension). BMX style dirt jumps typically start out smaller building in size with each jump in sequence as the momentum and speed of the rider increase pumping from one jump to the next. Typically BMX style dirt jumps are built in areas with little elevation change as riders are also more likely to be riding without brakes.

Anatomy of a Dirt Jump Line- Typically a jump line or trail will include a start hill or area where riders begin their runs. There might be single or a series of rollers at the start of the line to provide pump for riders to gain speed for the first jump. The jumps typically increase in size through the sequence with the biggest jumps coming at the end of the line when riders are going the fastest and carrying the most momentum. There is typically a return berm, wall ride, step up or some other type of feature at the end of the sequence that finishes the line and slows the rider down. A return trail at the end of the line provides a fast an efficient way for rider to get back up to the top of the jump line.

Dirt Jump Start Hill- A start hill provides gravity, speed and momentum for riders dropping into a jump sequence. Generally people like to congregate on the top of the start hills to rest, watch other riders, and socialize, designing the start hill to be large enough to accommodate this makes for a more positive experience. The start hill should also be designed to be able to easily climb and ride back to the top of it. If it is too steep it will be difficult to climb and the amount of user wear and erosion will be increased. A start hill might range in size from (5-15ft.) depending upon the style of the jump line.

Rhythm Section- A dirt jump line might consist of a series or sequence of jumps that allow riders to maintain speed and momentum from one jump to the next one without having to pedal. This is called a rhythm section. The experience of rhythm jumping is the highest level of dirt jumping and feels the best.

Return Trail- A return trail provides riders with the most direct route back to the start of the line or trail. Ideally, riders are able to watch other riders and scout out their lines as they return to the start area.

Jump Line- Refers to a series of jumps that can be ridden in sequence.

Jump Trail- Refers to an extended jump line that allows for a longer experience.

Jump Area- An area that has been intensively developed with many take offs and landings merging together to provide line variations and opportunities to transfer from line to another.

Flow Trails- A type of trail that incorporates rollers, roller style tabletop and camel back jumps, big 90º and 180º berm turns.

Anatomy of a Dirt Jump- A dirt jump is sculpted out of dirt and consists of a take off area and a landing area. Dirt jumps in general can be built in several different styles including gapped or coffin jumps, table topped jumps, camel backed jumps, and roller style jumps.

Gap Jumps- A gap jump consists of a take off and a landing with a gap in between. This type of jump is generally the most desired by hard core dirt jumpers because of the aesthetic, the minimal amount of soil required to construct gap style jumps, and the filtering effect these type of jumps have (as they are often unrideable by less skilled riders). Hard core riders have generally spent large amounts of time building, maintaining and riding gap style jumps. This type of jump requires the highest skill level to ride because of the potential consequences of not making it successfully over the gap. Typically injury rates for gap jumps are higher than for other style jumps and they generally are less durable and erosion resistant because the have more surface area exposed to the elements.

Table Top Jumps- A solid jump feature with no gap in between the take off and the landing lips. This type of jump requires a lower level of skill and lower

consequences as riders are able to ride over the entire jump. Riders are able to slowly increase speed until they successfully transition from the take off to the landing.

Progressive Jump Pack- A series of small, medium, and large jumps stacked next to each other to provide progressively larger jump options.

Camel Back Jumps- A camel back style jump has a subtle depression between the take off and the landing to allow riders that are rolling over the top of it to be able to pump and increase speed more than on a table top style jump.

Roller Jumps- A roller style jump typically has rolled take off and landing lips that allow riders to more easily roll off the jump features.

Step Up Jumps- A jump where the landing is higher than the take off.

Step Down Jumps- A jump where the landing is lower than the take off.

Hip Jumps- A jump where the angle of the landing is offset from the take off.

Spine Jumps- A jump where the landing and take off is only offset by a foot.

Kicker Jumps- A jump that has a more defined take-off than landing area.

Drop Features

Drop- A drop is a feature that riders roll off and land on a steep transition.

Rollable Drop- A drop that can be rolled over without requiring a rider to catch air (ie. does not require the rider to ever have two wheels off the ground).

Gapped Drop- A drop that requires free falling through the air between the take off and the landing.

Drop Progression- A series of drops increasing in size that provides a progressively more challenging experience.

Turns

Flat Turn- A turn with no built up berm or lip around it.

90º Berm Turn- A turn with a built up berm wall that allows rider to turn 90º.

180º Berm Turn- A turn with a built up berm wall that allows riders to turn 180º.

360º Berm (Toilet Bowl)- A circular berm that rider are able to enter and exit from any direction. 360º berms are a great way to dissipate speed at the end of a jump run.

Berm Press- A feature that incorporates a 90º berm with a hip jump that allows riders to press off the berm and pump off the lip of the hip jump.

Pump Tracks

Anatomy of a Pump Track- A basic pump track generally consists of a small start hill, and a series of roller pumps, jumps, and berm turns that create a circuit. The tracks can generally be ridden in both directions and might have multiple line options, multiple lanes or both to provide lots of variation in a compact riding area.

Pump Track Start Hill- A pump track start hill is generally less than (5) feet, as the speed of the pump track itself is limited by the ability to generate speed through pumping the terrain. The start hill should be large enough to accommodate several riders at the same time as riders will tend to socialize, rest and queue up on the start hill area. The start hill area should also provide an area for interpretive signage that explains to riders how to properly ride the track.

Pump Track Rollers- A roller is a mound of dirt that is smoothed and shaped to create a rounded roller/pump. Riders are able to generate forward momentum by pumping over the roller features taking advantage of "the force of angular momentum". Smaller rollers might be (6-12") and larger rollers close to (3-4') in height. Spacing between rollers can vary from (10-20') depending upon the style of the track. Generally a 1' high roller allows a rider to roll 10' forward.

Pump Track Jumps- A pump track jump is generally a bit smaller than a dirt jump as the speed of a pump track is generally slower than a jump line. Pump track jumps are generally roller style table top or camel back style jumps that allow riders to either jump or pump over them providing more options.

Pump Track Berms- A pump track berm can vary in radius, steepness, and height depending on the style of the track. Generally beginner pump track berms are wider diameter and less steep than the berms in more advanced tracks. As the tracks get more advanced, they get faster and the berms become steeper and tighter allowing riders to pump through them and generate even more speed and power. Wider diameter berms can be designed with high centers to provide additional pumping opportunities and speed. Roll in roll out berms allow riders to ride the berm as a turn or roll the berm as a roller.

Types of Pump Tracks- Pump tracks can be designed to accommodate a wide range of riders and skill levels from beginners to pros. They can be designed for side-by-side competition and linear racing or they can be designed more like dirt skate parks with vert, transition and multiple line options.

Beginner Level Pump Tracks- Beginner pumps tracks might consists of smaller pumps, spaced wider apart with wider diameter turns, fewer line options and a more linear feel to accommodate beginner level riders.

Intermediate Level Pump Tracks- As riders develop better pump track skills the track design can be varied to include bigger pumps, bigger jumps and tighter berms that produce more speed and air and require a higher level of skill.

Advanced Level Pump Tracks- As riders develop better skills they are able to pump faster and more efficiently and they are able to generate more power which allow for more complex moves such as hip jumps, gap jumps, wall rides, etc.

Pro Level Pump Tracks- Pro level pump tracks might have multiple line options, which require the ability to jump and pump in a tight rhythm. Many of the lines might not be accessible to less skilled riders as they are only ride able if the rider is able to generate enough speed and power to get "in the rhythm" over the roller and jump features.

Competition Pump Tracks- Competition pump tracks are designed to provide spectator viewing, timing stations, multiple lanes and line options to accommodate head to head action.

Pump Park- A pump park generally consists of a start hill and a series roller pumps, jumps, wall rides, berm turns, spine jumps etc. that can generally be ridden in any direction as a non-linear series of connected features similar to a skate park.

Pump Trail- A pump trail generally refers to a trail like experience with a series of extended pump rollers, jumps and berm turns.

Technical Features (TF)

Technical Features (TF)- A technical feature is a specific type of feature built for a specific type of riding experience, requiring a specific type of riding skill.

Technical Trail Feature (TTF)- A technical trail feature is a feature that is built at the main line or as an optional line along a trail that provides a specific riding experience and demands a specific type of riding skill to complete it.

Wall Ride- A wall ride refers to a constructed wall that is positioned at 75º or so and allows rider to either smoothly transition or jump onto the wall and jump back off.

Radar Dish- A radar dish refers to a wall ride that is positioned at less of an angle and is also curved providing a more dynamic riding surface and the ability to pump off of it.

Box Jump- Refers to a wood box with take off and landing ramps.

Teeter Totters- Similar to classic teeter-totter found in playgrounds, riders roll over the tetter-totter entering on one side, pivoting over the center and exiting on the other side.

Suspension Bridges- A suspension bridge is a dynamically moving bridge platform that allows for a minor amount of movement as a rider passes over providing an interesting and challenging opportunity.

Elevated Trails (North Shore Trails)- Trails that are elevated above the surface of the ground and provide a technically challenging experience are considered elevated trails, north shore style trails, or technical trails interchangeably.

Anatomy of an Elevated Trail- Elevated trails generally consist of an entry that takes the rider from the dirt surface onto the structure, an extended elevated surface and an exit.

Log Rides- A log ride is a technical trail feature that uses a natural timber or log as the riding surface to provide a challenging riding experience.

Rock Lines- A rock line is a technical trail feature that uses natural rock as the riding surface.