# Trail Development Strategy Plan

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## *Introduction*

Trails serve multiple purposes including exercising, walking, jogging, hiking, cycling, mountain biking, bird-watching, and equestrian use. They also provide safe, alternative, non-motorized transportation routes to destinations such as places of employment, education facilities, commercial establishments, and recreation locations. They provide connectivity to other modes of transportation supporting "green" lifestyles. Trails within Fairfax County parks are designed to fit into the larger context of a countywide trail system and to support the overarching connective network that includes sidewalks, bike routes and mass transportation nodes outside of our parks.

The 2004 Needs Assessment Survey for the Fairfax County Park Authority found that 65% of the respondents use trails, making trails the most widely used type of recreational facility in the County. Although a deficiency was identified in the Needs Assessment it could not be quantified due to the linear nature of trails and the lack of data regarding their usage. Instead, an emphasis on logical connections for park trails was recommended. In addition, the study identified planned trail routes that were not implemented. In 2004 it was estimated that about 100 miles of trail needed to be built to complete the planned stream valley trail system including the Cross County Trail. There was potential for approximately 200 additional miles in the form of trail connections and internal park trails. In response, the Park Authority Board approved a contribution level of building 75 miles of new trail in a ten year period to partially but significantly address the deficiency. Additionally, the Park Authority Board approved the formation of the Trails Team in the Planning and Development Division to support the effort to meet this goal. The Trail Development Strategy Plan has been created by the Trails Team to guide trail development and devise a plan for increasing the availability of trails to the public.

In 2006 the Trails Team undertook the first phase of this plan which required an inventory of all known trails and pathways on parkland. This inventory, completed in 2008, was conducted in the field using Global Positioning Systems (GPS). The field data was loaded into the Fairfax County Geographic Information System (GIS) and integrated into the County's Tririga based facilities inventory. With the confidence of an accurate inventory, the Project Team for this Strategy Plan was able to analyze existing conditions and create a strategy for future trail development.

This Trail Development Strategy Plan represents the second phase of the work of the Trails Team to comprehensively create a trails program. The Trail Development Strategy Plan is an internal Park Authority document created to examine the issues surrounding trail development, collect and analyze the relevant data concerning trail projects, and devise the best process for objectively evaluating and prioritizing trail projects. This plan consists of trail definitions and standards, an analysis of the data, discussions of trail project prioritization criteria and how to apply them, tools for trail planning and construction, and a strategy for planning future trail projects. A compilation of trail miles completed and a list of potential new projects are kept by Park Authority staff and are available upon request.

## *Analysis*

Creation of this Strategy Plan required analysis and quantification of the existing facilities and plans. The Strategy Plan Team performed analysis to establish a definition and standards in response to the question, "What is a trail?" The team completed project studies of existing facilities to determine how many miles of trail the Park Authority was capable of annually constructing and to determine the most effective methods of project delivery. They also looked at design, construction and maintenance costs for trail projects to compare life cycle costs for different types of trail facilities. With that information a set of project prioritization criteria was established to evaluate and plan potential future trail projects.

## DEFINITION AND STANDARDS

Park Authority trails are maintained, mapped, and signed corridors for non-motorized transportation and recreation that generally provide connectivity between destinations or other trails. Trails need to be distinguished from casual footpaths, which appear in many of our parks, but are not maintained and exhibit varying degrees of permanence. To define a trail the following minimum standards must be met:

- The term "trail" refers to the entire linear facility in the corridor, most importantly the horizontal travel-way on the ground, but also the envelope that makes up the corridor, its natural and cultural resources, stream crossings, drainage improvements, benches and site furnishings, and signage.
- A trail should have definitive start and end points, such as a residential neighborhood, business, school, park, or other trail. Some trails are stand alone facilities and form loops without destination points although they may have nodes along their corridors. Many larger trail systems are developed in sections or phases in which case it may take a number of years to assemble all the pieces needed to make a meaningful trail connection.
- A trail shall be developed such that it can be regularly maintained by Park Staff using standard Park Authority maintenance vehicles or equipment, to a condition that it is generally safe, comfortable and passable for a majority of trail users. When developed as new facilities, trails shall be located and designed so the corridors and surfaces are sustainable thus requiring minimum maintenance to retain their designed purpose and utility. It is recognized that some designed natural surface single-track trails may not be accessible by Park Authority vehicles and therefore cannot meet the above standard for maintainability. In this case, a dedicated volunteer group must be available to adopt the

trail for maintenance purposes. Some trail surfaces may need to be hardened to be self sustaining as the amount of traffic on the trail is increased.
- A trail shall be mapped in the Park Authority trail database.
- A trail shall be signed in such a way that it can be navigated with reasonable ease and comprehension by the great majority of trail users

Although the following criteria are not vital to trail definition, they are highly desirable trail attributes:

- Whenever feasible, the trail should be separated from vehicular traffic, except for regulated Park Authority uses such as maintenance and emergency access.
- Trails shall be compliant with guidelines for accessibility to the greatest extent possible.

The Park Authority's goal is to provide the public with a trail network that is safe, enjoyable, flexible, maintainable, and environmentally responsible.

## TRAIL PROJECT PRIORITIZATION CRITERIA

The primary goal for prioritizing trail projects is to be able to select projects that have the greatest potential for increasing the overall availability of trails to trail users, the least amount of development impact, and the least amount of resulting maintenance. Within each of these three categories, named User Value, Development Impact, and Sustainability, the team developed criteria for evaluating trail projects that take into account need, demand, Park Authority mission, site conditions and resources. Under User Value, the criteria are service level, connectivity, and stakeholder interest. Under Development Impact the criteria are technical challenges, environmental and cultural resources, and initial unit cost. Under Sustainability the criteria are sustainability, and maintenance unit cost.

The following sections discuss in detail the criteria that were selected by the team and explain how they will be applied to projects for prioritization purposes.

### User Value

1. **Service Level** - The service level identifies the potential number of people who could reasonably be expected to use a trail facility. In its most simplistic form, service level can be determined by the number of people who live within walking distance of a trail head. Barriers, such as highways, major streams, private property, and dangerous roads with no pedestrian accommodations would preclude neighborhoods that might otherwise be considered within a reasonable service area. Service levels do not take into account the desirability of the trail or the increased usage that would result from having attractive destinations: these are accounted for in the connectivity criteria.

Most of the information needed to determine potential service level including population, location with respect to roads and streams, and existing sidewalks can be found in the County's Geographic Information System.

2. **Connectivity** - Connectivity is a measure of the increased recreational potential of a trail that provides greater uninterrupted distances and increased transportation usefulness by connecting people to desired locations. From a connectivity standpoint, even small new segments of trail that link two systems to provide extended recreational use or provide a pedestrian connection to a desirable location can vastly increase appeal and usefulness of a trail facility, destination, or system to the public. Desirable destinations include parks, schools, bus stops, train stations, retail centers, convenience stores, landscape features, or cultural sites.

   For the purpose of evaluation, trail systems and destinations are divided into major and minor categories. The 5 mile threshold for a major system was chosen based upon perusal of the existing trail systems within the County. Other than several regional trails and the Cross County Trail, which extends nearly 41 miles, the Park Authority's largest trail systems are in the stream valleys. At present, a medium sized stream valley trail system such as Sugarland Run contains about five miles of trail, therefore five miles was selected as a reasonable threshold between a major and minor trail system.

   Destination thresholds were selected based upon the potential number of people who would visit that destination in a day.

3. **Stakeholder Interest** - Stakeholder interest and citizens' requests for specific trails are often a key factor in determining whether or not the political will and funding are present to build a trail. User groups, such as equestrians, mountian bikers and distance hikers are powerful proponents of trail systems and their civic activism and volunteer efforts have helped create many new trails.

   Citizen opposition is the other side of the coin from citizen requests. Citizen opposition usually involves a small number of citizens whose property borders the parkland where the trail is proposed. Loss of privacy, anxiety about security, and concerns about parking, are likely to be their main issues.

## Development Impact

1. **Technical Challenges** - Examples of technical challenges to trail design and construction include trail corridors on lands that are too steep, prone to serious flooding, require major stream, highway, or railroad crossings, lack reasonable construction access, or require land acquisition. The presence of any one of these conditions can increase the cost of the project. Some factors can affect the schedule of a project, for example, permitting requirements for working in wetlands and floodplains, and easement or land acquisition deals can delay reasonable progress on a project for months and even years. Most trail projects have at least one of the factors mentioned above, but some contain projects contain many more.

2. **Environmental and Cultural Resources** - Resource protection is a key issue in the development and maintenance of trails. The mission of the Park Authority to protect natural

and cultural resources must be carefully considered with trail routing. Routes are selected to minimize the impact on the environment and to avoid cultural resource damage but at the same time provide a pleasant experience for the trail user. Trails can cause erosion and disrupt hydrology. Trails open areas up to invasive species, and the presence of people and pets disturbs wildlife. On the other hand, defined trails can direct the behavior of users to stay within a defined corridor and reduce "braiding" throughout an entire area which is often more disruptive to existing resources. They can provide access to beautiful wild places, which, in conjunction with proper controls and education, can increase public awareness of the need for conservation and public appreciation of natural resources. Trails provide a means of maintenance access for land managers for maintenance and other activities.

Some trail projects, such as trail re-routes that move the trail to a more stable and sustainable location, are aimed towards solving environmental issues and would earn a high score for this criteria, At the other end of the spectrum, a trail might traverse a highly sensitive area, or the construction access may have the potential to damage natural resources.

3. **Initial Unit Cost** - Initial unit cost is a rough estimate of the cost of the project based upon the average cost of a number of Park Authority trail projects completed between 2006 and 2009. Total cost is then divided the total number of linear feet of trail and multiplied by 100 to give a cost per 100 linear feet of the project. Project costs include design, permitting, construction, and administrative costs plus auxiliary trail items such as culverts and signs. Stream crossings, such as bridges or fair-weather crossings increase the unit cost of the project. Other factors, such as difficult construction access, or the need to avoid sensitive resources, are not taken into account in this criterion.

## Sustainability

1. **Sustainability** - As new trails are added to the Park Authority network, funding to maintain those trails is not necessarily added to the Park Operations budget; therefore ease of maintenance, or sustainability, is an important trail project consideration. Sustainability is affected by the surface material and width of a trail as well as the location. In general, hard surfaced trails such as asphalt and concrete require less frequent maintenance than soft surfaced types such as gravel or stone dust trails. Natural surface trails need the most frequent attention of all.

   Location is critical to trail sustainability. Trails that are frequently inundated, such as those in active floodplains, need far more maintenance than trails that are in well-drained areas. Trails that do not allow access by Park Authority maintenance vehicles are more difficult and expensive to maintain than those that have easy access. Natural surfaced single-track trails, desired by equestrians, mountain bikes, and hikers, are narrow by definition, and are best suited to the side slopes of hills where access by Park Authority maintenance vehicles is impossible. In that case, organized volunteer groups can be used to provide the hand labor needed to maintain the trails so that they remain safe, comfortable and generally passable.

   Projects that are well located and will be able to be maintained using standard Park Authority practices will be rated with high sustainability, trails that are designed to be sustainable and have a reasonable assurance of a dedicated volunteer group for maintenance will receive moderate sustainability, and all others will rate low sustainability.

2. **Maintenance Unit Cost** - Maintenance unit cost is an important consideration in trail project prioritization because some trails are much more difficult to maintain than others. Factors affecting maintenance include surface type, ease of access, and number of bridges or other stream crossings. The annual maintenance costs including labor and materials for various trail facilities are from Park Operations Maintenance Costs. The unit cost per 100 linear feet for a project is calculated by figuring the total cost which is then divided by the total number of linear feet of trail and multiplied by 100.

In conclusion, these eight reasonably objective criteria in three categories will allow stakeholders, staff, and Board Members to evaluate and understand the prioritization of potential projects. The next phase in the implementation of the Trail Development Strategy Plan will be to confirm the draft project list and evaluate the projects on the list by applying the prioritization criteria to each project. As noted above, approximately one third of new trail miles are provided on an opportunistic basis through the developer proffer system. As those trails sections are built, we expect that new connection opportunities will be created for existing projects and their priorities may need to be updated accordingly. With that information, appropriate projects can be identified for funding in future bonds and placement on the Work Plan.

## *Implementation Tools*

Tools available for the development of trails include the Countywide Trail Plan, a GIS trail database, various construction contracting mechanisms, and volunteer organizations interested in trails. This plan includes suggestions for additional tools to aid in project prioritization and to potentially reduce the funding, time, and staff effort needed to develop trails.

Trail development tools are divided into two groups: planning tools and development tools.

## PLANNING TOOLS

1. **Countywide Trails Plan** – The Countywide Trails Plan is a component of the County Comprehensive Plan and is a primary reason for the existence of the extensive trail network that exists today. Adopted in 1972, the location of a trail route on the plan becomes the enforcement tool when a land parcel is proposed for development along that trail route. Land developers are required to design and build the trails that appear on the Trails Plan when they prepare Site Plans for development and gain their site development permits. Additionally, developers with land parcels proposed for new land uses through the rezoning process frequently offer to build park trails if a trail route is shown in the vicinity of a project. These agreements are formalized through proffers. A significant portion of the Park Authority trail system was built by land developers as a result of these two processes. In the past three years, more than four miles of trail have been added to the Park Authority trail network through private land development activities at no cost to the Park Authority.

2. **GIS Database** – The GIS trail database allows the Park Authority to accurately locate trails within the framework of aerial photos, property lines, water systems, sewer systems and other County infrastructure that is included in the GIS data layers. The initial mapping and inventory of the existing trails was completed in the spring of 2008 using handheld GPS units. The GIS database includes the following information about each trail segment in addition to its location:

- Trail surface type
- Trail width
- Owner / maintenance responsibility
- Length of segment
- Data source
- Date of data collection
- Location of stream crossing and dimensions and type of stream crossing
- Culvert location, dimensions, and type
- Signage location and type
- Tririga ID number

Other trail attributes will be added as standards are evaluated, including:

- Trail name
- Whether or not the trail meets ADA guidelines
- Whether or not the trail includes signage
- User restrictions
- Level of Difficulty

This tool is used for planning, mapping, and maintenance purposes. The ability to locate our trails in the GIS database lays the foundation for evaluating potential service levels and connectivity ratings for new trail projects and providing a starting place for determining opportunities and constraints when conceptually planning trail projects.

## DEVELOPMENT TOOLS

1. **Volunteer Organizations** – Volunteers are capable of designing, building and maintaining natural surface trail systems and some groups, such as Mid-Atlantic Off-road Enthusiasts (MORE) and Fairfax Trails and Streams (FTAS) have become quite sophisticated in their techniques. Volunteer groups are essential partners for development and maintenance of natural surface trails and it is imperative that we maintain a large, self-perpetuating volunteer base. The Park Authority Trail Coordinator meets with volunteers on a regular basis to help focus and organize their efforts and set up venues such as the Trail Caucus to recognize their accomplishments and express the Park Authority's gratitude for their time and labor. At present, volunteers can perform any tasks that do not require power equipment. Among other roles they play, volunteer trail groups:

    - Join Park Authority staff to plan, site, and develop routes for new trails
    - Supply labor for clearing and grading to create the trails.
    - Adopt trail sections or entire trails and monitor them routinely and report problems to Park Operations staff.
    - Survey trail damage and report after storms and other severe weather events.
    - Participate in relocations and help manage the use of existing trails
    - Educate trail users about trail etiquette and encourage involvement of a larger portion of users in the maintenance and repair of trails, helping to make our natural surface trails more sustainable.

2. **Hybrid Organizations** - The International Mountain Bicycling Association has sponsored professional trail building firms that use a combination of paid and volunteer labor to design and build sustainable natural surface trails. These trails are generally high in quality and relatively inexpensive to build – about 5% of the total cost of a paved trail. The volunteers who help build the trail are encouraged to take ownership in the sense that they will help with maintenance activities and encourage stewardship among their user group. Currently, to obtain the services of one of these firms, the Park Authority contracts with an existing open-end vendor offering similar services who in turn subcontracts with this organization. Development of an open end contract for design, construction and maintenance of this type of trails would be extremely helpful to the Park Authority.

   Many of the trails built this way are not suitable for maintenance vehicle access. The current Park Authority practice for such trails is that they must maintained by volunteer organizations. Staff expects that the number of miles of trails of this type will increase and that care should be taken to ensure that we don't exceed the capacity of the volunteer organizations to do that maintenance. Specialized trail equipment for these conditions should be made available to Park Maintenance crews for their use to supplement volunteer labor.

3. **Conventional Design-Bid-Build construction contracts** - Traditional competitively bid contracts – Competitively bid construction contracts remain the vehicle of choice for very large and complicated trail projects requiring critical structures such as major bridges and retaining walls.

4. **Open End** (Indefinite Quantity Indefinite Delivery) Professional Services and Construction Contracts - Open end contracts are more efficient than competitively bid contracts in that they bypass the bidding process, and have proved useful for smaller projects that have time limitations attached to them

5. **In-house construction crews** – Many trail projects are small and do not require large equipment or significant quantities of materials. The largest costs in such work are contracting administration for both the contractor and the Park Authority and mobilization costs. These projects can be most efficiently designed and constructed using in-house resources. Typical savings can be more than 200% of contracted cost even including project payment of all labor and material. The Mobile Crew in the Park Operations Division is capable of building many small trail projects, including minor stream crossings. A primary limitation is lack of ownership of some of the appropriate mechanical equipment. This type of new capital construction work constructed by the Park Operations Division is presently not a priority of the Park Authority due to lack of staff and other resources.

## PROPOSED TOOLS

Several new tools could enhance the Park Authority's ability to plan, design, and construct new trails and maintain and improve existing trails. The new tools would reduce the amount of staff time needed to manage trail projects, decrease the cost of the projects, and enable more volunteer-based help. This would allow development of more or better trails with the same amount of resources.

1. Develop the capability to monitor use levels on existing trails. The ability to determine numbers of users on existing trail sections would be useful in tracking our progress in increasing our service levels on our trails. This could be accomplished either through implementing manual surveys or by use of mechanical trail user detector systems.

2. Execute an Open End (Indefinite Quantity, Indefinite Delivery) unit price-based contract with a construction firm skilled in natural surface trail construction in order to allow us to contract directly to build sustainable natural surface trail systems.

3. Enhance in-house capabilities for trail construction and maintenance by Park Authority staff by purchasing small-sized paving and maintenance equipment better suited for construction in poor soil environments and access into constrained areas and narrow trail corridors.

4. Gain approval of master permits for permission for construction of trail facilities on park land. One successful example of this is the Masterfile Permit for fiberglass bridges which allows faster processing for building permitting of fiberglass framed pedestrian bridges which are effectively used on small stream tributaries and drainage swales.

5. Establish an agreement with volunteer groups to grant them permission to use power tools under certain circumstances when they are building and maintaining trails. Presently volunteers are not allowed to use power tools on County parkland, which limits their usefulness in trail maintenance activities.

6. Allow Stash Boxes of tools for volunteer organizations to be placed in easily accessible locations to assist their efforts with trail construction and maintenance projects.

The Park Authority currently owns and maintains over 300 miles of trails which are embedded within the County's larger network. New trail connection opportunities will continue to arise as new land is acquired by the Park Authority and also as other trails are developed through the proffer system and on land outside of park property. Long term planning is key to the management of the expansion of this complex network. Using this strategy plan, trail projects will be evaluated for their merit in terms of service level, connectivity, stakeholder interest, technical challenge, environmental and cultural resource impact, initial cost, sustainability, and maintenance cost and prioritized based upon how . This process will allow for efficient allocation of resources and ensure that the greatest possible number of County residents will be able to enjoy the use of trail facilities.