

# **1. Introduction**

## **1.1 Scope of Project**

Richard Edwards of IMBA Trail Solutions was retained by the Western New York Mountain Bicycling Association (WNYMBA) and the Western Chapter of the New York State Horse Council to provide a trail assessment of Hunters Creek Park. The scope of the trail assessment was limited to one week of fieldwork and meetings, a presentation, and a written summary of the findings.

During the week of November 17-22, 2002 Mr. Edwards performed the following activities. All trails in the park were covered at least once, and many more than once. To provide information on the location of the trails and known trail problems, he was guided at the beginning of this period by representatives of WNYMBA, the Horse Council, and long time local hikers associated with Friends of Hunters Creek. The mixed-use team of equestrians, hikers, and cyclists gave valuable input on current user perceptions, seasonal trail conditions, and historical information. Every trail segment in the park was examined to determine its sustainability and resource impact. The review period was a wet week with heavy rain before and during the last day. These days demonstrated the poor drainage in many areas and illustrated clearly where there were water based trail erosion or ponding problems.

Five days spent at the park was sufficient to examine all the trail sections and develop recommendations. However, it was not enough time to completely inventory the trail system with a distance log. For that reason a trail log is not included in this assessment. Also, there was insufficient time to flag recommended reroutes. The potential corridors were assessed, however more detailed design and flagging will need to be completed before rehabilitation commences.

Mr. Edwards made a presentation was made to representatives of the County Departments of Environment and Planning and Parks, Recreation, and Forestry, as well as the county's planing consultants, Parsons, on November 20, 2002. This presentation provided general information about sustainable natural surface trail design and trail system management as well as specific information concerning the opportunities for a sustainable trail system at Hunter's Creek. A copy of this presentation is provided on the attached CD-ROM.

The information collected in the survey was compared with soil maps and further local input was gathered from the before mentioned team. Keeping the recommendations of the draft master plan in mind, a series of recommendations to improve the sustainability, safety, and user experience of the trails were developed. Protecting the natural resources of the park was the primary design criterion. The recommendation categories for long-term management are maintenance, rerouting, reclamation, abandonment, and monitoring. These recommendations were then prioritized based on their potential for resource impact. A series of general management recommendations including signage and seasonal closure were also developed, including developing a one to one-and-a-half mile hiking/equestrian-only trail pursuant to Master Plan recommendations.

## **1.2 Summary of Findings**

Based on this review, approximately 70% to 75% of the trail segments at Hunters Creek are, or could be readily made, sustainable. About half of this group of trails is in good shape as currently existing, while the other half requires some relatively minor maintenance work and/or minor reroutes. The other approximately 25% to 30% of trails pose greater challenges and require greater maintenance efforts or closure. Where needed to complete a logical trail loop or connector, these trails should be repaired. Otherwise closure is recommended. A total of about

15 to 20 trail segments (depending on how the segments are defined) are recommended for closure.

A total of 103 individual trail segment recommendations were made. These recommendations were nearly equally split into high priority, medium priority, and low priority recommendations.

## **2. Background Information**

### **2.1 Sustainable Trails**

*“Sustainability: the ability of the travel surface to support current and anticipated appropriate uses with minimal impact to the adjoining natural systems and cultural resources. Sustainable trails have negligible soil loss or movement and allow the naturally occurring plant systems to inhabit the area, while allowing for the occasional pruning and removal of plants necessary to build and maintain the trail. If well built, a sustainable trail minimizes seasonal muddiness and erosion. It should not normally affect fauna adversely nor require re-routing and major maintenance over long periods of time.”*

-USDI National Park Service, Natural Resources Management Guideline, 1997

Sustainable trails provide a stable trail surface that withstands current and future use with minimal maintenance. Preventing trail erosion and trail widening, which both damage the surrounding ecosystem, are two primary goals of sustainable trails.

Erosion: Erosion is the natural process of wearing and moving rock and soil by wind and water. Trail erosion is caused by a combination of users, water and gravity. Trail users loosen soil, especially on steeper grades. Water damages the trail surface by removing soil when it flows down the trail. The steeper and longer the grade, the more velocity and power the water has to

move material downhill. A trail is prone to erosion when its layout on the land encourages water to use it as drainage. Trail users will increase this erosion potential by loosening the surface of the tread and making it easy for water to scour it away. As the tread degrades users will often start to avoid the trail surface and create adjacent trails having unnecessary impact on the forest.

The most important factor in creating sustainable trails is good design that prevents water from traveling on the trail tread. In order to prevent erosion, it is critical to prevent water from flowing along the direction of the trail. The most direct route down a slope, following the steepest grade, is called the fall line. When a trail is aligned along the fall line it will channel the water flow and cause erosion. To prevent this, the trail must be designed on the contour instead of the fall line and/or incorporate frequent grade reversals and drains.

A **contour trail** gently traverses a hill or sideslope at less than half the grade of the fall line. It is characterized by a gentle grade and a tread that **outslopes** slightly toward the low side. These features minimize tread erosion by encouraging sheet flow of water *across* the trail. Subtle undulations in a trail create **grade reversals** and **grade dips** that also defend against water damage. These features diminish erosion by redirecting water off the trail. The time spent in design and layout is critical to the sustainability and success of the trail.

Trail Widening: At some locations at Hunters Creek Park, trails suffer not from erosion problems, but rather from the completely opposite condition. Trails that lie in flat, poorly drained areas do not allow water to run off the trail in any direction. Although water does not flow down the trail causing erosion, it does not sheet across the trail either. This leads to the formation of muddy sections. Typically, trail users will detour around wet areas. This leads to trail widening, and consequent impacts on the adjacent flora.

To alleviate trail widening problems, it is again most appropriate to route trails along the contour on adjacent sideslopes. Where this is not possible due to the presence of park boundaries and other topographical limitations, efforts need to be made to raise the trail tread above the surrounding flat areas. Because this sometimes requires more effort and money to accomplish, it is best applied to those segments where the trail is needed to provide critical links between important sections of the park or to complete trail loops mainly consisting of inherently sustainable topography.

*“Any other feature of construction may be improved from month to month or from year to year, but if the grade is not properly established the trail must in time be abandoned. Thus not only may time and money be wasted, but the trail while in use will be unsatisfactory.”*

*-USDA Forest Service, *Trail Construction in the National Forests*, 1915*

The trail experience is directly related to sustainability. Users will stay on the trail if it meets their needs. A trail that fails to provide the expected experience is more likely to encourage users to go off trail.

Another aspect of sustainable trails design is the consideration of user capacity. Well-built, well-designed trails can withstand more than 2,000 user passes a week and show negligible impact. It is important not to design a trail for current use, but for future expected use. As Erie County grows and outdoor activities increase, trail use will increase as well. A heavily used trail should not be seen as a problem, but as a success. The goal is to provide users with the best possible trail experience and what better way to measure trail satisfaction than high user numbers.

## 2.2 Hunters Creek Park Historical Context

Hunters Creek Park was purchased by Erie County in the 1970s as a location for a future park. Originally, Erie County envisioned more intensive development similar to Chestnut Ridge or Emery Parks. However, when populations did not increase as projected, the park remained undeveloped.

Aside from a gravel pipeline access road, trails in the park were limited to two or three trails laid out in the 1970s by volunteer groups authorized by the county. These trails were laid out for cross-country skiing purposes, and were not routed to handle wet conditions in spring, summer, and fall. A section of the Conservation Trail was also routed through the park. The Conservation Trail is a long distance trail that continues north and south of the park on private property.

Because the park was undeveloped, it received little use. However, use began to increase dramatically starting in 1992 with the publication of the book "50 Hikes in Western New York", which listed Hunters Creek as the first hike in the book and the one closest to Buffalo. The park remained open to the public until 1994 when it was officially posted closed to all users because it was undeveloped and unstaffed. However, this closing was never enforced and the park remained popular. In the mid-1990s, a nearby resident established a larger network of trails, which in turn led to further increased use of the park.

In the late 1990s, due to concern over the popularity of the park, the proliferation and condition of trails, and the continued lack of attention to the park by the parks department, members of local hiking, bicycling, and equestrian groups met to establish the "Friends of Hunters Creek". This group proposed to mark existing trails to help users from getting lost, and to eventually perform trail maintenance activities. However, complaints about

park use from nearby residents lead the county in 2001 to begin enforcing the 1994 park closure.

In 2000, new leadership in the parks department brought a fresh look to the Erie County Parks System and initiated a master planning process. Hunters Creek Park received a significant amount of attention during the system-wide planning process. A draft of the master plan was released in November 2002, and a full Draft Final version was released in March 2003. The master plan is a comprehensive document that covers a wide variety of management elements. Among its recommendations, the plan calls for opening the park to the public, and requires that the park trails network consist of sustainable trails. The plan calls for trails to be generally available for shared, non-motorized use, with approximately 1 to 1.5 miles of trail to be restricted to hiking and equestrian use only. Cycling and Equestrian groups commissioned this study to provide park-specific information on trail sustainability as a tool to assist the county in the implementation of the master plan.

### **2.3 Environmental Setting**

A complete review of the environmental setting of Hunters Creek Park is beyond the scope of this study. However, environmental aspects relevant to trail sustainability were reviewed and are summarized below. Hunters Creek Park is approximately 750 acres in size. The main portion of the park is centered on the gorge of Hunters Creek, a tributary to Buffalo Creek. A section of the park extends to the northeast, leaving the gorge area, but rejoining the creek after it leaves the gorge, shortly before its confluence with Buffalo Creek.

The north/south Hunters Creek gorge is located in the center of the main portion of the park. Land to the east and west of the gorge is characterized by several unnamed tributaries, forming smaller creek valleys. The presence of the gorge and these

tributaries provides a significant portion of the park with good topographic relief. This topographic relief provides many opportunities for contour trails designed to shed water by sheeting action, contributing to trail sustainability, as discussed in Section 2.1.

Further away from the gorge and tributaries, the land is much flatter. The area between the central and northeast portions of the park is the zone furthest from the gorge and has historically presented the greatest challenges to water management on the trails.

Soil type is also important for evaluating the ability to adequately manage water on the trails. Soils were evaluated using the Soil Survey Geographic (SSURGO) database soil data from the US Department of Agriculture Natural Resources Conservation Service. The data in this database were filtered with respect to several parameters relevant to trail sustainability using Arcview® geographical information system (GIS) software. The SSURGO data were combined with Arcview® shapefiles of existing trail locations compiled by WNYMBA. Metadata for the trails locations were not provided; trails locations were identified by a combination of aerial photography, Geographical Positioning System (GPS) data, and manual field checking, and may contain some errors. A cursory review of the SSURGO data suggests that data along the main Hunters Creek gorge area may be presented less circuitously than actually present, and thus may misidentify soils on some creek bend peninsulas. The rest of the soil type extent data matches well with topographic and wetland data where appropriate.

Erie County soils mainly comprise various forms of silt loams, including silt loam, silty clay loam, and channery silt loam (together about 75% of non-urban soils). A summary of all soil series found at Hunters Creek is presented in Figure 2-1. Figures 2-2 and 2-3 simplify these data by providing the surface

soil texture and overall soil texture, respectively for park soils. These figures show that soils consist primarily of silt loams and channery silt loams.

Of primary concern for trails development is the ability of these soils to manage water. Among the data in the SSURGO database, the hydric soils and drainage parameters relate most directly to on-trail water management. Figure 2-4 shows that hydric soils are found in six segments of the park. Hunters Creek itself is mapped as hydric, although much of the creek bed consists of shale bedrock of the Angola Shale member of the West Falls group and is mostly devoid of unconsolidated material. Aside from the creek bottom, a small floodplain to the west of Hunters Creek near the southern boundary of the park, and another near the northern boundary of the park are also considered hydric. The other three hydric areas are all located along the park boundary. Two of these areas are in roughly the same areas as the two NYSDEC wetlands in the park: HO-3 along the south side of the eastern lobe of the park, and EA-22 along the northern edge of the western lobe of the park.

The drainage data (Figure 2-5) rate soils on a scale from “excessive” to “very poor”. The hydric soils described above are considered poorly or very poorly drained. These areas represent a very small proportion of the park, especially when the shale creek-bottom areas are eliminated from consideration. At the other extreme, small sections in the north and south portions of the park are designated as well drained. The majority of the park, however, comprises soils that are moderately well to somewhat poorly drained. A review of Figure 2-5 shows that with the exception of some trails near the western border of the park and trails located in the flat section between the gorge area and the northeastern portion of the park, most current trail locations are in areas designated as moderately well drained.

The Erie County SSURGO data were digitized from the USDA NRCS “Soil Survey of Erie County”, published in December 1986. This printed survey contains additional attributes that are not included in the SSURGO database. One such attribute is a rating for paths and trails. This rating, assigned by soil type, rates soils as slight, moderate, or severe. *Slight* means generally favorable for trails, *moderate* where limitations can be overcome or alleviated by planning, design, or special maintenance, and *severe* where soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures. Moderate and severe ratings are further broken down into categories of wetness, slope, and stones. Of these limitations, only wetness is a true major limitation for the backcountry-type trails appropriate for Hunters Creek Park. For such trails, stones are considered a natural component of the environment, and slopes can be considered beneficial because they allow construction of sustainable contour trails. Soil ratings for trails are shown in Figure 2-6. This figure shows that only small areas of the park are unfavorable (severe) for trails because of wetness. The trail segments that pass through these areas will require closure or significant efforts (e.g. boardwalks) to allow sustainability. While only a small percentage of the park rates favorable (slight), a significant percentage of trail miles are located on soil that is rated moderate due to the presence of stones or because of slopes. Neither of these properties detracts from sustainability, since stones provide additional structure and strength to the trail tread, and slopes allow construction of contour trails. Some trails, most notably those located in the west central portion, the east central meadows, and areas immediately north and west of the “severe: wetness” soils of wetland HO-3, are located on soils rated moderate for wetness. Trails in these locations require proper planning, design, and/or maintenance to maintain sustainability. As is presented in Section 3, trails in these areas are frequently

identified for special maintenance requirements or closure based on the on-trail review.

In summary, the topographic relief and moderately well drainage over much of the park provides good opportunity for sustainable trail development. The structure of clay minerals in silt loam soil that covers most of the park (typically 8% to 30% depending on soil type) is disturbed by freeze-thaw cycles during winter and spring. However, once allowed to dry, these soils compact to a hard surface that allows precipitation to readily sheet off of properly constructed trail tread surfaces, promoting sustainable trails.

Significant sections of the park are located further from creeks and tributaries, and are characterized by somewhat poorly draining soils. In general these areas are less suitable for sustainable trail development. In some cases, however, trails in these locations are located near minor topographical features (not reflected on these figures) that allow for adequate surface water drainage. Where these smaller topographical features are absent, the soil is less likely to dry and sustainable trails are more difficult to establish. Where trails are desired in these regions, for example to complete loops with other more inherently sustainable trails, special construction techniques are required to raise the tread so that the trail remains dry. The findings of this soil analysis have been used in the formulation of the specific trail segment recommendations presented in the next section.

### 3 Recommendations

#### 3.1 Specific Trail Segment Recommendations

Based on the November 17-22 2002 review of the trails, and review of published soil properties, 103 recommendations were made. In general, the majority of the existing trail network is located where it is, or can easily be made to be, sustainable. However, up to about 25% of the trail mileage is more problematic due to layout, or more frequently, soil drainage limitations. Figure 3-1 shows a complete map of the trails at Hunters Creek Park, including minor traces and little used trails. The locations corresponding to the 103 recommendations are indicated by numbers that generally trend spatially from the southwest to the northeast. These numbers do not represent priority for action or importance of recommended work.

The recommendations are divided into three categories according to priority of work. The priority rating is based on potential for damage to adjacent vegetation or sedimentation concerns. Amount of expected use, property line concerns and the current and future resource impact are factors used to determine the trail segment priority rating. For each segment discussed, recommended actions fall into one or more of the following categories:

**Maintenance:** Perform actions such as rebenching or rock armoring to increase sustainability. For some segments, minor trail realignments required.

**Reroute:** Move longer sections of tread within a short distance to more appropriate area. This action is only recommended where the soil and/or topography of the proposed new tread is more suitable; where problems of the original tread will not reoccur upon use.

**Monitor:** Assess condition of trail segment twice a year using comparative photos and tread width and depth measurements.

**Abandon:** Remove from system maps, camouflage blazes

**Close:** Remove from system maps, camouflage blazes, obstruct and camouflage entrances.

**Reclaim:** Obstruct tread with up right downfall, cover tread with organic matter, camouflage entrance, possible post temporary signage that explains actions. If eroded gully then check dam and fill with organic matter. It's possible to transplant certain species from nearby trail construction. This is an excellent time to remove any invasive species. Remove from map.

Recommendations for a few trail segments do not fit cleanly into any single category and are described as a combination of these actions, or by unique approaches (e.g. inclusion into emergency access route).

### 3.1.1 High Priority Recommendations

**3: Description:** Sgt Mark trail west of service road

**Concern:** 30%+ fall line section after stream crossing. Potential for erosion and sedimentation entering creek is high

**Recommended action: Reroute.** Reroute this 40' section onto a contour bench cut heading east and turn back to the trail on the top of the nose.

**4: Description:** Sgt Mark Trail from current parking area to planned new parking lot.

**Section a:**

**Description:** This trail should be rerouted or otherwise improved. The master plan calls for continued access from the intersection of Vermont Hill and Centerline and, as such, this trail

provides good access to the old parking lot and will be a primary access trail for the new parking area.

**Concern:** 10% fall line section leaving parking area. There are several drainage structures on this section already. This section will need steady maintenance to keep from eroding. After the trail turns onto the contour there are no major problems

**Recommended action: Reroute**

#### **Section b:**

**Description:** unmarked trail from Sgt Marks to new trail head parking.

**Concern:** This trail is wet and in an area of 5% or less grade. As this trail sees use the tread will compact and hold water. This will be one of the primary access trails into the park and so should be built to withstand heavy use.

**Recommended action: Maintenance.** Build up the trail bed and harden with a 6"+ layer of compacted aggregate outsloped at 5%.

#### **Section c:**

**Description:** New trail head parking area

**Recommended action:** Install a kiosk with positive signage explaining the proper behavior at Hunter's Creek Park. Include:

- A map showing the trail system with explanations about loops and seasonal areas.
- A map/info on other riding and hiking areas in the region would help disperse use on busy days.
- Emergency info
- How to volunteer to help out with the park.

The trail segments closest to this area will see more use than any other trails in the park. It is critical to improve these sections so that they will hold up. Another way to disperse use and avoid congestion near the trail head is to use the bike lane proposed in the master plan for Centerline and Vermont Hill Road . A spur

could extend across the bridge to the FLT and up to the entrance to trail segment 68. This would allow cyclists to park in the lot and access the park trails from two other trailheads.

**21. Description:** drainage crossing on pink trail

**Concern:** trail descends 15' at over 25% on both sides of the stream. The ravine slopes are eroding and sediment entering the stream.

**Recommended action: Reroute** along the drainage and cross the stream in the field at its head. The head of the stream cut is marked by yellow tape in the field. This new crossing might also be an intersection leading to the new trailhead.

**23. Description:** Pink Trail crossing stream onto floodplain

**Concern:** The trail is in a low area and uses a wide ford to cross. Trail is located in soils mapped as poorly drained, although problems are reported only in spring.

**Recommended action: Reroute.** Relocate the trail on the hillside above the stream and cross later, possibly with a bridge.

**33. Description:** Blue trail west of segment 12. The corridor is tight and the current stream crossing is acceptable. However, soils just west of stream crossing are poorly drained.

**Concern:** Trail leads off property onto power line corridor and passes through area of poor drainage.

**Recommended action: Reroute.** Relocate as detailed in segment 34. Armor tread in poorly drained area just west of creek crossing.

**34. Description:** Blue trail traveling north south on pipeline

**Concern:** Trail is not on County property

**Recommended action: Reroute.** Relocate trail before the trail leaves the property. There is decent sideslope at this point. The trail should then head northeast and then east. This will also replace the current boundary trail segment 35

**35: Description:** Blue boundary trail

**Concern:** Adjacent to property owner who has voiced concerns about trespassing in the past; trail crosses a listed wetland

**Recommended action: Close/Reroute.** Continue the reroute from segment 34 south of the wetland. This segment may require some boardwalks to allow travel during wet seasons.

**36: Description:** Short section northeast of north end of Mirkwood loop.

**Concern:** crosses the stream/drain for the nearby wetland

**Recommended action: Maintenance.** boardwalk across the wet area. There is also the potential for interpretive signage describing wetlands and wetland plants.

**37: Description:** Blue boundary trail and unmarked parallel trail to the south

**Concern:** Current blue trail is adjacent to the property line, and leads to segment 35 which is proposed to be closed/rerouted.

**Recommended action: Reclaim.** Remove the blue route keep the existing trail to the south to connect with segment 36. Reclaim the old trail bed and corridor.

**39: Description:** Blue Boundary trail adjacent to private and Kenneglen property.

**Concern:** Adjacent to private property

**Recommended action: Reroute.** Reroute the trail away from the property line when near the private resident's property, but bring it close to the Kenneglen property line. There is the potential for future pedestrian trail access in the Kenneglen property and keeping the trail close to the line will facilitate a future connector trail.

**46: Description:** Red Trail descending from saddle with Sky Ridge. Trail creates a loop with segment 47 that descends to the flat above the bend in the river and then climbs up again.

**Concern:** Over 30% and in some sections fall line. The current alignment will not hold up under heavy use. The flat above the river has been mentioned as a popular scenic area of the park. It is very picturesque and opposite the highest rock cliff in the park. However reaching it via a loop trail creates difficulties.

**Recommended action: Reroute.** Attain a 15% or less average grade, avoiding any grades greater than 20%. Also, construct a contour trail to gas line ford to replace current eroding trail. The gas line ford connects with segment 82 and creates summertime access to the east side of Hunter's Creek. This is a popular crossing that is unlikely to remain closed.

**47: Description:** Red trail that descends from saddle of Sky Ridge down to flat above river.

**Concern:** Trail descends down the fall line to the flat at over a 30% grade. This section of trail is noticeably wider and more eroded than others in this area. More use will intensify this problem.

**Recommended action: Reclaim.** Promote access to creek via segment 46. Because of the wide open nature of the hemlock forest, closure and reclamation of this segment will be difficult. Recommend signage to explain closure.

**50: Description:** Fall line trail leading from service road to creekside picnic area

**Concern:** Fall line trail.

**Recommended Action: Abandon and monitor.** Popularity of this trail and openness of the woods will make it difficult to effectively close. Closure may lead to pressure to illegally build "replacement" trail elsewhere in the park. Although this trail will not be sustainable, it does not discharge sediment into surface water. Consider active closure/reclamation based on monitoring results.

**52: Description:** Red trail climbs up to cabin ruins.

**Concern:** Trail is entrenched and goes up the fall line

**Recommended action: Reroute.** Reroute trail onto the sideslope to the south. An average grade of 15% should be possible.

**54: Description:** Two sections of southern red loop.

**Concern:** Both sections have sections over 30% and have some drainage crossing concerns, including fall line drops into creek gullies. Two parallel trails are occupying the same section of side slope. The existing trails come within 30' of each other.

**Recommended action: Option A: Maintenance.** In order to stabilize the drainage crossing and maintain visual separation of the two legs, bridges will be required. Using bridges will allow the trail to be relocated to increase sustainability and improve separation. **Option B: Reclaim.** Combine the two legs into one trail. This would allow for optimal drainage crossings without bridges. However this creates an out and back trail unless the bridge described in 55 is constructed. The preferred course of action depends somewhat on the selected solitude trail route, as discussed in section 3.2.

**55: Description:** Drainage crossing

**Concern:** a steep ravine 20' deep and 30' across with unstable side slopes. Currently users are scrambling down to the river and then scrambling up the bank on the other side of the drainage. This is leading to erosion from the banks next to the river.

**Recommended action: Maintenance:** Construct a bridge 30' x 4' with handrails. A pre-fabricated or site constructed bridge could be used. The proximity of the service road on the north side creates easy access to this site.

**58: Description:** FLT from road to 1<sup>st</sup> drainage crossing. This section offers impressive views and a powerful sense of exposure.

**Concern:** While the design is on the contour, the trail needs to be rebenched in several locations and could be widened to a 24" standard. It is likely that users deterred by the narrowness of the

tread or suffering from vertigo would use the parallel trail to the east.

**Recommended action: Maintenance:** Rebench to 24-36" tread.

**60: Description:** Drainage crossing on FLT

**Concern:** Steep banks are eroding

**Recommended action: Maintenance:** Armor banks with large stones

**61a: Description:** Southeast trail head

**Concern:** This will be an access point to the park. Local cyclists, walkers, and equestrians will use this to access trails.

**Recommended action: Maintenance:** Develop bike lane on Centerline Rd. Improve trail head entrance with dip or DOT specified culvert. This will be one of two alternate trailheads along Centerline Rd to relieve congestion on the trails nearest to the main parking area.

**67: Description:** trail along fence line

**Concern:** Several access points along this trail are being used by ATVs to access the Hunter's Creek property and adjacent private property.

**Recommended action: Reclaim:** Close these access ways and installed signage indicating property ownership and allowed uses.

**69: Description:** Drainage crossing

**Concern:** Wet soft crossing. Likely to widen with use and encourage off trail travel

**Recommended action: Reroute.** Move crossing downslope into the trees and develop sustainable crossing in rocky area.

**70: Description:** blue trail and two parallel unmarked trails

**Concern:** Trail density and the fence line trail have the same trespassing issues as segment 67.

**Recommended action: Maintenance/Reroute/Abandon.**

Combine these 3 trails into one trail that stays 100'+ from property line. Farther north where the blue trail uses the property line corridor the trail should be moved back from the property line as far as possible. The area just north of the property corner is very poorly drained. Either the existing trail or a new contour reroute to the FLT will need to be armored or built up. It appears firewood is being harvested inside the park boundary at this location.

**90: Description:** FLT passing through a wet area

**Concern:** Trail is wet, confirming soils data showing poor drainage and suitability for trails. Although some areas have been boardwalked they are not continuous and there is evidence of uses avoiding, likely due to its width.

**Recommended action: Maintenance.** Complete closure of this trail is unfeasible because it would remove the only viable link to the northern part of the park. Combine this segment of the FLT with an emergency access trail suitable for ATVs, as called for by the draft master plan. A causeway would need to be constructed 5' wide. Good trail aesthetics can be obtained by laying out a sinuous route that follows the highest ground possible. Rather than using culverts prone to clogging use armored dips to allow cross drainage.

The causway would be constructed on a raised bed 5-6' wide. Excavate down to mineral soil. Use large stone 6-12" to create a 12-24" deep bed with a 6" cap of 1/2" to dust aggregate. In certain wet areas the rock bed may need to be much deeper. As a raised causeway is also a dam the drainage patterns will be changed. Use drainage dips to avoid any pooling on the upslope side of the causeway.

**93: Description:** FLT - ok location, fair condition

**Concern:** The trail, while having good sideslope is slightly entrenched.

**Recommended action: Maintenance/Reroute.** Ensure good drainage in the upper section with a series of rolling grade dips at the top. Lower down where it is steeper, reroute the trail to snake it across the hillside with three climbing turns to lessen the grade and improve drainage.

**100: Description:** Pink trail next to ravine-very scenic, top part is in good location

**Concern:** one section is fall line and likely to continue eroding

**Recommended action: Reroute.** Reroute trail on old unmarked trail turn on top of a small nose and then contour back to the pink trail

**101: Description:** Pink trail drainage crossing

**Concern:** steep banks and soft bottom at current crossing.

**Recommended action: Reroute.** Relocate trail to contour up the stream valley and cross at a better crossing.

**102: Description:** Pink trail – drainage crossing

**Concern:** poor location to cross drainage

**Recommended action: Reroute.** Relocate trail to contour up the stream valley and cross at a better crossing.

**103: Description:** Pink Trail following stream valley back to trail head.

**Concern:** At one point the trail travels within 5 ' of the stream. This area is wet and unsuitable for a sustainable trail.

**Recommended action: Maintenance/reroute.** Move the trail further up the bank from the stream.

### 3.1.2 Medium Priority Recommendations

**8: Description:** Two fords over the drainages that pass under the service road in culverts.

**Concern:** Sedimentation and erosion into two of the larger drainages in the park. Trail redundancy.

**Recommended action: Abandon**

**10: Description:** Yellow trail leading north from Sgt Marks on west of service rd.

**Concern:** North section of trail is in a flat low lying area.

**Recommended action: Reroute.** Relocate trail 20-30' up the sideslope to improve drainage. This trail and the Pink boundary trail might be combined.

**13. Description:** Old Double track road with 10-15' corridor

**Concern:** Several large mud holes(5' wide, 3' deep) increasing in size partially due to ATV traffic.

**Recommended action: Maintenance.** Fix holes with rock. There is easy mechanized access to this segment. Some short reroutes and turnpike would fix the wet areas.

**17: Description:** The north arm of the Sgt Mark loop

**Concern:** Two short wet sections

**Recommended action: Maintenance.** Two drainages need improvement with raised tread.

**20: Description:** Three trail segments in close proximity including the end of the Sgt Mark loop

**Concern:** All three segments have short fall line sections. Two are badly eroded and widening.

**Recommended action: Reclaim.** Close and reclaim two or three segments and a construct a contour reroute.

**20a: Description:** Fall Line segment on same hillside as three trails described in 20.

**Concern:** Fall section shows significant erosion

**Recommendation: Reclaim.** Actively close this section of trail.

**22: Description:** Pink trail descending from ridge to floodplain

**Concern:** The descent is steep and deeply entrenched, however while walking it in a heavy rain no water was evident and the trail shows no sign of erosion. However the drainage the trail crosses at the bottom did have a large amount of water

**Recommended action:** none on steep slope, bridge across drainage.

**27: Description:** West arm of Mirkwood between service rd and pipeline

**Concern:** Generally in good shape, short sections are over grade and follow the fall line. These sections be the first to show erosion and are located on the southern end of the segment.

**Recommended action: Reroute.** Reroute to maintain contour alignment.

**29: Description:** Yellow trail between Mirkwood and Green trail

**Concern:** The trail descends directly down the fall line at over 15%

**Recommended action: Reroute.** Close and reroute onto contour

**32: Description:** blue connector to blue boundary trail

**Concern:** ford has eroded banks and leads to low wet area

**Recommended action: Maintenance.** Locate a better crossing and armor banks with rock. A bridge would also be an option at this point.

**41: Description:** North end of Mirkwood loop. This trail segment provides an excellent streamside experience.

**Concern:** The majority of this trail is fine condition, however there are drainage crossings that should be armored

**Recommended action: Maintenance.** Armor drainage crossings

**42a: Description:** Eastern Mirkwood loop at pipeline.

**Concern:** Two wet sections exist: one at pipeline intersection, and one where segment 42 meets Mirkwood.

**Recommended action: Maintenance.** Armor drainage issue at pipeline intersection. Divert water flowing from 42 onto Mirkwood. Currently, this water runs along tread. Regrade tread to divert.

**45: Description:** Sky Ridge trail. Perched on a narrow ridge this is visually stunning location.

**Concern:** At the lower end of the segment the trail descends steeply to a saddle. The trail is wider and showing signs of erosion.

**Recommended action: Maintenance.** Armoring this section of trail with a stone pitched tread next to a log or stone staircase. In order to keep users on the trail the staircase and the rock tread must appear inviting. The remainder of the ridge section is excellent and is a destination within the park.

**51: Description:** Red trail loop north

**Concern:** Both legs of this loop area 80% ok, however they have short fall line sections and drainage crossing problems.

**Recommended action:** Minor reroutes on both legs and improved drainage crossing locations would improve the sustainability of these sections. In order to have two parallel trails in this tight a corridor it might be necessary to bridge certain drainages to allow flexibility in design. Another option is to combine sections of these two trails with reroutes to create one sustainable trail.

**56. Description:** Unmarked trail leading from future trailhead to paved road and bridge crossing.

**Concern:** the descent down the road embankment is over 30% and eroding.

**Recommended action: Reroute.** Reclaim old route. Replace with a contour bench cut trail.

**59: Description:** Unmarked trail descends to flat next to river, offers water fall views in stream.

**Concern:** Steep (30%+) fall line descent will cause erosion issues

**Recommended action: Maintenance.** As this is an out and back trail to show of the stream cascades two options are available. 1. Construct steps down the hillside. The steps must be more inviting than the surrounding hillside or users will avoid them. 2. Construct a contour bench cut trail down to the flat.

**61b: Description:** Meadow trail and boundary trail. Heading north from the road the trail passes an enormous willow.

**Concern:** The two trails are close together and have problems where they cross the first drainage.

**Recommended action: Maintenance.** 1. Eliminate the unmarked spur 2. Reroute the crossing on the boundary to a sustainable location. 3. Remove the entrance to the meadow trail from the FLT and it connects to the boundary trail near the old homestead. 4. Install interpretive signage at the homestead explaining history of the land.

**62: Description:** FLT north of 1<sup>st</sup> drainage crossing

**Concern:** The majority of this trail is fine, however there are two short fall line sections that should be replaced.

**Recommended action: Maintenance.** Replace fall line sections with contour trail alignments.

**66: Description:** Trail borders ravine.

**Concern:** Drainage could be improved

**Recommended action: Maintenance.** Divert water flow through grade dips or relocate trail onto edge of ravine to improve outslope.

**71: Description:** Poor Bridges Trail

**Concern:** The trail is in good condition; however the trail's drainage and stream crossings could be improved

**Recommended action: Maintenance.** Armor drainages with rock to prevent sedimentation or install short bridges. Clear large deadfall. Improve drainage with grade dips and by building up low areas.

**76: Description:** Green trail – fall line to river

**Concern:** Steep grade and fall line design create an erosion prone trail.

**Recommended action: Reroute.** Reroute section below FLT onto the contour and reclaim old trail bed. Monitor section above FLT.

**77: Description:** FLT generally good location and condition

**Concern:** One section is steep and runs down the fall line.

**Recommended action: Maintenance.** Relocate the fall line section onto the contour and rebench any sections of tread to 24" standard.

**78: Description:** FLT stream crossing

**Concern:** Entrances to ford on either side are steep and slipping.

**Recommended action: Maintenance.** Rebuild entrances that descend on the contour. This may require crib walls and some rock armoring to negotiate the existing trees.

**84: Description:** FLT – good location and condition

**Concern:** One drainage crossing is causing erosion issues

**Recommended action: Maintenance.** Improve drainage crossing by armoring or bridging

**85: Description:** FLT crossing wet area

**Concern:** Potential for reoccurring wet areas

**Recommended action: Maintenance.** Boardwalk wet sections.

**86: Description:** FLT crossing wet area

**Concern:** Potential for reoccurring wet areas

**Recommended action: Maintenance.** Possible short reroute above drainage area.

**87: Description:** Old roadbed passes through wetland and then out to road. Overgrown and wet.

**Concern:** Unless the tread was raised and hardened this trail would be wet much of the year.

**Recommended action: Abandon.** Leave trail off maps

**91: Description:** Old road – poor location and design

**Concern:** Lack of drainage has created large mud holes and unstable tread.

**Recommended action: Reclaim**

**92: Description:** Blue trail next to property line

**Concern:** Close to property line, drainage problems at top of slope.

**Recommended action:** Two options. 1) **Reclaim.** Close and reclaim trail. 2) **Reroute.** Improve drainage with minor relocations and grade reversals tie into FLT below wet area. The second option does nothing to help any property boundary issues.

**94: Description:** Old road, very wet, part of recommended emergency access route

**Concern:** Very poorly drained. Large mudholes (cubic yard+). Poorly drained surroundings

**Recommended action.** Incorporate as part of emergency access route. Build a raised causeway 5' wide with a rock bed. See segment 90 recommendation.

**95: Description:** Two-track leading from parking lot to stream crossing – poor location, ok condition

**Concern:** 20%+ and fall line design make this certain to erode under constant use.

**Recommended action: Reroute.** Relocate the route onto the sideslope taking a contour route to the old trailhead entrance and incorporate as part of the emergency access route. This will require at least 2 climbing turns or switchbacks.

**98: Description:** Pink trail – drainage crossing

**Concern:** Possible sedimentation

**Recommended action: Maintenance.** Armor with rock

**99: Description:** Pink trail – short fall line section

**Concern:** Poor design channels water

**Recommended action: Maintenance.** Short reroute to stay on contour

**102: Description:** Pink trail – drainage crossing

**Concern:** Poor location to cross drainage

**Recommended action: Reroute.** Relocate trail to contour up the stream valley and cross at a better crossing.

### 3.1.3 Low Priority Recommendations

**1: Description:** Overgrown trail west of current parking area.

**Concern:** The trail passes through a very wet section and where it is depressed below ground level it holds water. It is also within 20' of the property boundary and unacceptably close to the old schoolhouse on Centerline rd.

**Recommended action: Abandon.** This trail will grow in quickly

**2: Description:** A very twisty pink blazed trail. The tightness of the corridor and convoluted nature of the trail make it less attractive to equestrians and walkers.

**Concern:** There is a section next to the stream where the bank is undermined and needs to be rebuilt or relocated. There are some wet sections, however the trail is not wider in these places.

**Recommended action: Maintenance.** Minor drainage work and possible some stone added to the wet areas to harden them.

**5: Description:** Pink trail east of service rd to second drainage crossing. Trail follows the side of the hill and then the edge of the ridge. Well drained.

**Concern:** No major concerns. Very short relocations within 10' of the existing trail would reduce erosion in two locations. Sections along edge of ridge are excellent.

**Recommended action: Maintenance,** possibly including 30-foot reroute

**6: Description:** Yellow trail between Sgt Mark trail and Pink trail. Fall line connector trail

**Concern:** Increased erosion, trail redundancy.

**Recommended action: Reclaim**

**7: Description:** Pink trail descending to drainage and yellow trail ascending to Pink trail (#5). Short section of trail that leaves the ridge and provides a view of a small cascade.

**Concern:** none

**Recommended action: Maintenance.** Blaze as spur trail to Pink trail (#5)

**9: Description:** Yellow trail crossing service rd between segment #8 and Sgt Mark trail. Streamside trail that parallels two other trail segments

**Concern:** Trail density, however the section of trail between the rd and Sgt Marks is in good shape and follows a decent alignment.

**Recommended action: Abandon/monitor.** Let the public determine by its use level if it is a desired trail.

**11. Description:** Pink Boundary trail

**Concern:** Runs along the property line, however it is next to farmland not residences and a thick vegetative screen exists.

**Recommended action: Monitor.** If buffer zone problems arise, consider combining with segment #10, although drainage is worse on that alignment.

**12: Description:** Blue extension of Segment #11. Narrow poorly drained singletrack

**Concern:** Has some wet areas, close to property line

**Recommended action: Abandon or Maintenance.** Because of poor drainage in this area, this trail is a good candidate for abandonment. However, connectivity with segment #11 may make abandonment difficult and much of alignment is currently narrow. Maintenance is an option, but this may require the use of small machines to effectively transport material needed to build up tread and that might change the character of the tread. Local volunteers have offered the use of their small tractor. To make this trail fully sustainable a raised causeway on a bed of rock with a cap of 1/2" to dust would be recommended. The adjacent property has no residences and a thick vegetative screen.

**14: Description:** Blue trail parallel to, north of the service road

**Concern:** Ok condition, part of trail on raised dike. Small wet sections through spruce grove. Has water flowing on trail, however the grade is 5% or less, so no noticeable erosion. Some redundancy with service road and segment #15.

**Recommended action: Abandon/monitor**

**15: Description:** Pink trail – thick spruce stand

**Concern:** Trail runs fall line but is less than 5%, and has adequate drainage to adjacent swale.

**Recommended action: Monitor**

**16: Description:** Yellow trail through fields converting to forest

**Concern:** some low wet spots. The trail has water running on sections.

**Recommended action: Maintenance.** Grade dips and drainage

**18: Description:** Short connector trail between the Sgt Mark loops

**Concern:** Fall line and over 15% grade

**Recommended action: Abandon**

**19: Description:** unblazed connector between Sgt Mark loops

**Concern:** Fall line and over 15% within sight of the previous trail

**Recommended action: Closure and Reclaim**

**25: Description:** Unmarked trail south of service rd. Passes through a brushy field.

**Concern:** Low lying and wet

**Recommended action: Abandon**

**26: Description:** Pink dot trail and southern end of the west side of Mirkwood.

**Concern:** Two trails in very close proximity. The yellow trail has more problematic grades

**Recommended action:** Option 1. **Close** both sections and develop a **rerouted** contour trail replacing these two sections. Option 2. **Abandon** yellow segment and use pink.

**28: Description:** East arm of Mirkwood between service rd and pipeline

**Concern:** This trail has seen a lot of work in armoring the tread and building it up above the stream. However there are still some wet areas. In some places it is closer to the stream than usually recommended, however that provides a unique experience as one can feel the humidity and listen to the water flowing over the rocks.

**Recommended action: Maintenance.** Continue to armor any wet sections with rock.

**30: Description:** Green Trail on top of ridge

**Concern:** the entrance to the trail off the service rd goes up the nose of the ridge quite steeply, however it is a short section. The ridge top section is in fine shape, however near the intersection with segment 42 there are wet holes.

**Recommended action: Monitor/Reroute** entrance if erosion worsens. **Maintenance:** Armor wet area with rock. Stone would need to be imported, however the service road and gas line provide good truck access.

**42: Description:** blue trail south of power lines from segment 12 to top of ridge.

**Concern:** This segment of trail appears wet and has several mud holes.

**Recommended action: Option 1 Maintenance:** Repair the existing tread by adding rock and building up. See segment #30 for suggestions. **Option 2. Abandon** this section. There is already a travel corridor on the gas line and the nearby boundary trail that would take users to the same area.

**48: Description:** Red trail between Sky Ridge saddle and split

**Concern:** Has one steep section and passes through a low area

**Recommended action: Maintenance:** relocate the trail slightly up the sideslope to avoid low area.

**53: Description:** Red dot trail descending to river. This trail leads down to the river and a picturesque flat.

**Concern:** The trail is steep, over 30%, and shows signs of erosion.

**Recommended action: Reclaim:** remove blazes and reclaim trail

**57: Description:** trail from FLT to ford on river

**Concern:** This trail descends down to the fall line and then crosses the soft floodplain. The steep fall line section is unsustainable and the ford crossing has eroded banks

**Recommended action: Abandon.** If use keeps the trail open then actively reclaim the trail. Unblazing and reclaiming the trail segments near #22 will help keep the ford from seeing use. Developing a bike/walking lane along Centerline Rd would will also help divert use.

**63: Description:** The meadow trail follows an old rock pile on the edge of the meadow and the forest.

**Concern:** Parallel trail just in the field

**Recommended action: Abandon** one trail or the other based on user input and/or where feasible, combine into one trail.

**64: Description:** Old road through center of meadow

**Concern:** Appears to channel water

**Recommended action: Abandon/Monitor**

**65: Description:** ATV track through meadow

**Concern:** Unneeded trail in summer, wet where it crosses drainage

**Recommended action: Abandon** during summer, possible use for winter recreation.

**72: Description:** Indian Ridge trail, blazed red and white

**Concern:** Trail is close proximity to trails on both side, tread is almost hidden due to lack of use.

**Recommended action: Abandon,** paint over blazes

**79: Description:** FLT –good location, trail sloughing

**Concern:** Trail sloughed in and tread creeping, rough drainage crossing

**Recommended action: Maintenance.** Rebench this section of trail, improve and armor drainage crossing

**80: Description:** FLT on top of bluff with outstanding views into river valley. Fair condition

**Concern:** Flat corridor on top of bluff and numerous surface roots are causing trail widening.

**Recommended action: Maintenance:** Minor relocations to improve trail flow by avoiding turns over roots and keeping the trail on the sideslope to improve drainage.

**81: Description:** unmarked trail leading to pipeline

**Concern:** none

**Recommended action: Abandon.** leave unblazed and off maps

**82: Description:** unmarked trail leading to gas line and ford.

**Concern:** Descends down fall line and leads to desirable ford. Erosion prone alignment and wet area before crossing should be avoided.

**Recommended action: Reroute.** There is good sideslope available and the trail should be relocated on to the contour. Reclaim the old trail

**83: Description:** unmarked trail

**Concern:** Duplicate trail and has wet sections

**Recommended action: Abandon.** Leave unblazed and off maps

**88: Description:** Poor Bridges trail crossing meadow

**Concern:** poor drainage

**Recommended action: Maintenance.** Weaving the trail up the slope using grade reversals to ensure that water doesn't run down the trail. There is a large pile of fieldstone that the trail could be brought by. This would make a good location for an interpretive sign about the farming history of the area.

**89: Description:** blue trail next to property line-poor condition and location

**Concern:** Poorly drained, very wet in sections, within 30' of heavily blazed property line.

**Recommended action: Reclaim.** Unblaze, close and reclaim trail

**96: Description:** FLT just before crossing drainage

**Concern:** Short section of steep fall line likely to erode

**Recommended action: Reroute.** Relocate onto the contour

**97: Description:** Unmarked trail

**Concern:** Duplicate trail

**Recommended action: Close**

### 3.1.4 Summary of Major Trail Relocation/Closure Recommendations

Most of the 103 recommendations presented above suggest relatively minor trail improvements, including minor trail realignments to improve drainage. Several recommendations suggest trail closure, abandonment, or major reroutes. Figure 3-2 illustrates these more substantial recommendations. This figure shows the major recommended trail relocations, the planned route of a new emergency vehicle access route from the north parking lot, trails that are suggested to be abandoned (which may continue to see low levels or usage) and actively closed/reclaimed trails.

## 3.2 Hiking/Equestrian-only Trail

The draft master plan called for approximately 1 to 1.5 mile section of trail to be called a tranquility or solitude trail where usage is expected to be less. This trail would be open only to pedestrians and equestrians as a mechanism to reduce use. As part of the trail review, options for locating the hiking/equestrian trail were identified and reviewed.

The master planning process set baseline specifications for the hiking/equestrian trail as follows:

- 1 to 1.5 mile length
- Accessible directly from parking lot
- Accesses Hunters Creek, namesake of the park

The initial draft of the master plan released in November 2002 suggested a hiking/equestrian loop in the southern portion of the trail, partially consisting of segments of shared-use trails. The draft final master plan has not released a planning map at time of this report's publishing, but the planning consultants indicated that a specific route would not be recommended.

Based on the review of trails and in consideration of the location specifications, three alternatives were identified for possible hiking/equestrian trail location. These three locations are shown on Figures 3-3, 3-4, and 3-5 (these figures also incorporate the suggested major changes shown in Figure 3-2).

The three options we provided are:

1. A route similar to the one provided in the draft plan
2. A route from the southern trailhead with fewer intersections, and
3. A route from the northern trailhead with still fewer intersections.

Route (1) (Figure 3-3) is similar to the draft master plan, with a few minor variations, including a few adjustments to the trail intersections shown in Figure 3-2. This option mixes hiking/equestrian-only sections with shared-use sections, and includes many intersections between the hiking/equestrian trail and other trails, including sustainable trails that may be difficult to block off that would dead-end (from a cyclist's perspective) at the hiking/equestrian trail. The ideal hiking/equestrian trail would have few of these intersections because multiple intersections makes it difficult to enforce its designated use, and may limit the ability of the trail to meet its objectives for the user.

For this reason, an alternate route (2) from the southern trailhead was considered (Figure 3-4). This alternate route does not proceed onto the access road near the cabin site, but instead returns along the upper of the two red-blazed trails along the creek valley. This significantly cuts down on the number of trail intersections. The middle trail may otherwise need to be entirely removed (and in fact this is so shown on the route (1) map) because otherwise it would merge with the solitude trail near where the a bridge would have to go (see recommendation 55), which may cause conflict, especially since the down-sloping wide open terrain where the south end of the bridge would go does not lead itself to easy trail layout.

While Route (2) reduces the number of intersections, a third route was also developed that may even be a better fit (Figure 3-5). Both routes (1) and (2) require a significant amount of work to bring trails to specifications, especially if they are meant to be "family" trails, easy to walk. In addition to the big bridge location, at least two other areas may need bridges (see recommendation 54) to make this an easy family trail. Also, if the trail were to be designated for equestrian use an bridges would need to meet specifications that would allow for a horse and rider crossing. Therefore, route (3) was identified which places the

hiking/equestrian loop at the northern parking lot. The advantages of this loop are:

- Only one intersection to sign no bikes and tempt users to go where prohibited
- It is in a low traffic area of the park and less likely to attract other users.
- Those users that wish to avoid cyclists would be able to park in a separate area that is not as crowded

This loop also requires less upgrade work, although some switchbacks are proposed on the western part of the loop to avoid some fall line sections.

### **3.3 Trail Work Cost Estimates**

The vast majority of the 103 recommendations are minor projects that require physical labor to increase drainage, provide adequate benching, and other similar trail improvement activities. These activities can readily be performed by adequately trained volunteers. Costs for these actions are minimal and can usually be borne by the volunteer organizations.

The more expensive projects are causeway construction (for emergency vehicle access), boardwalk construction, and bridge installation.

To provide for emergency access in the northern and eastern portions of the park, a new causeway trail is envisioned. This trail would also provide a secondary benefit of providing a sustainable route through a section of the park that is not well suited for trails due to flat topography and somewhat poorly draining trails.

The steps for construction of a causeway are as follows:

1. Layout a sinuous route that follows the highest topography.
2. Excavate down to mineral soil 5' wide.
3. Lay down bed of rip-rap (6"-12") rock. Fill holes and gaps with smaller rock by hand.
4. Lay down screenings (1/2"-dust) this may be mixed with native soil to improve cohesion.
5. Compact with roller or plate tamper.
6. Use rock armored dips to allow cross drainage rather than culverts.
7. Finish by dressing edges with excavated organic matter.

Construction of a five-foot wide causeway, suitable for allowing emergency ATV access, is estimated to cost approximately \$30 per linear foot. These costs are based on locally available material quotations of \$10 per cubic yard of screenings and \$12 per yard of rip-rap. Material costs represent over 80% of the estimate. The length of the causeway from the northern parking lot to the pipeline is about 3,800 feet, requiring a capital cost of about \$120,000 for this section. If the causeway construction is extended further along the pipeline itself, then costs would increase commensurately.

Boardwalks are recommended at locations 35, 36 (reroutes), and 85. These would be used where the trail crosses wet areas in order to complete loops or connect major segments. These boardwalks would be more substantial than the current boardwalk located along the FLT, and would be wide and strong enough to support equestrian traffic. Currently, a reliable estimate of trail distance requiring boardwalk is not available, and thus total capital required for boardwalk construction can not be estimated.

The cost of bridges is highly variable depending on the length of the bridge, access available for bringing in bridge materials, and availability of solid natural anchoring locations. The largest bridge required would be at location 55 where a span of at least 30 feet would be required. A cost estimate has not been developed for this bridge. Smaller bridges are required as detailed in recommendation 54. Bridges along this route would be smaller, but suffer from less accessibility. Budgetary costs for these smaller bridges are about \$25 per square foot.

## 4 Summary and Conclusions

Hunters Creek Park is a spectacularly beautiful parcel of land that will make an excellent addition to the Erie County Parks system. Because the park has not been actively managed in the past some work is needed on many trails to make them sustainable in the long term. Despite a lack of a concerted trail planning focus at Hunters Creek, many of the trails are located appropriately, where adequate slope is available to allow routing along the contour and water to sheet off. However, some trail locations are in poorly drained areas or along fall line alignments. Recommendations are made for repairing, rerouting, or closing these sections.

Constructing the northern emergency access route (which would double as a sustainable route through a poorly drained area) and construction of bridges would be the most expensive of the recommendations. Boardwalks are recommended in three short sections, which will also require capital expenditures. In several places, short sections of trail need to be built up with rock, which may need to be imported depending on location in the park.

The list of recommendations is long because this assessment was intended to comprehensively review the condition of all trails in the park. The amount of work involved with each recommended action varies quite a bit, from causeway construction for the emergency access route to minor drainage improvements. Many of the recommendations call for simply monitoring or trail abandonment. For many of the recommendations, volunteers led by well-trained trail work leaders would be able to address more than one item in a single workday. Correct implementation of the recommendations would result in long-term sustainability of the trails, without the need to repeatedly address the concerns raised.