

3.4 Wilderness

3.4.1 Introduction

Maintaining Wilderness characteristics, regulations, and management objectives within this Project Area is a priority in all management decisions.

Select sections of the proposed BST alignments pass through the Mount Olympus, Twin Peaks, and Lone Peak Wilderness areas (see figure 12). Mount Olympus and Twin Peaks are managed by WCNF while Lone Peak is jointly managed with the Uinta National Forest (UNF). Use is extremely high all year long, primarily coming from day visitors to the area (USDA 2003). Because of its adjacency to urban development, these Wilderness areas offer critical wildlife habitats, watersheds, and recreational opportunities for the Salt Lake area.

Methodology

Best available information from a variety of sources was compiled for this report, including:

- USDA Forest Service. 2003. Final Environmental Impact Statement Wasatch-Cache National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- USDA Forest Service. 2003. Wasatch Cache National Forest - Forest Plan.
- The Wilderness Act of 1964.

GIS data was provided by WCNF and Utah AGRC. Other information sources used to describe the proposed actions, impacts, and Wilderness status are referenced in the respective discussions and listed in Chapter 5: References Cited.

Wilderness Issues

The primary concerns for this proposal within designated Wilderness areas center on the compatibility and consistency with Wilderness characteristics, regulations, and management objectives.

Issues to be analyzed in this report have been identified from public meetings, the public scoping process, from other agencies, and the Forest Service interdisciplinary team. Relevant Wilderness management issues listed in the WCNF FEIS include:

1. **Biological Diversity of Wilderness.** Concerns were expressed about potential effects on water quality, vegetation, wildlife and fisheries, fire, insects and disease, and undesired species.
2. **Recreation Use in Wilderness.** A primary concern is the increased use of Wilderness visitors impacting both popular sites, as well as pristine areas. Recreation use in Wilderness is increasing and can affect Wilderness values and resources, naturalness, wildness, and solitude.
3. **Future Trends.** In addition to increased recreation use in Wilderness, there continues to be public interest and opposition to adding to the National Wilderness Preservation

System. Furthermore, more areas are incorporating permit systems, designated sites, and use restrictions for the purpose of preserving wilderness character.

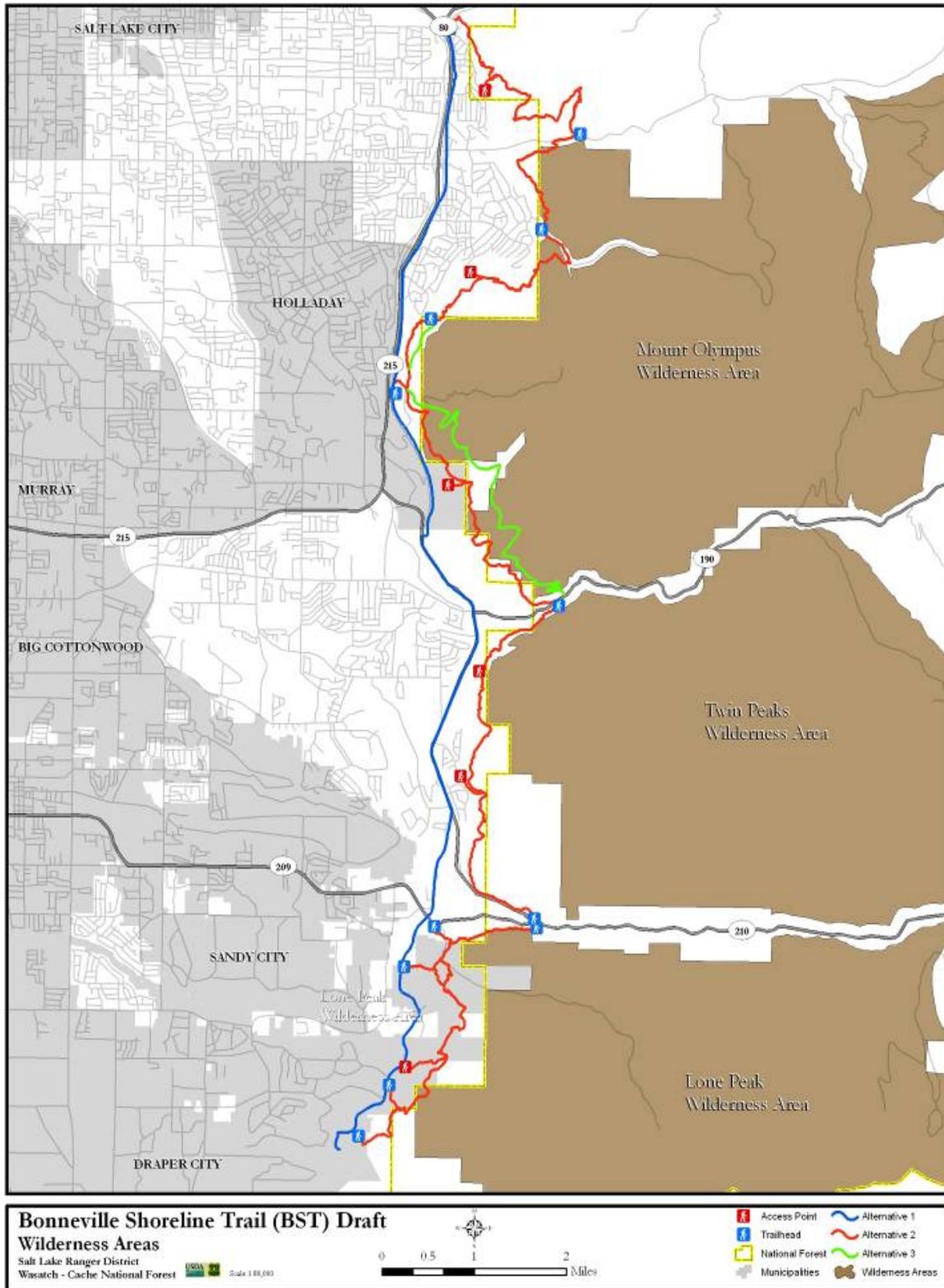


Figure 12. Wilderness Areas Within the Project Area.

Laws, Regulations, and Guidelines

The WCNF Forest-wide goal of designated Wilderness is to “maintain Wilderness ecosystems and character, primarily influenced by the forces of nature, to provide opportunities for public use, enjoyment, and understanding of Wilderness, and to preserve a high quality Wilderness resource for present and future generations. Manage Wilderness to sustain wild ecosystems for values other than those directly related to human uses.”

The sub-goal of Wilderness is to recognize differences in population proximity and to provide Wilderness experiences for more people.

Wilderness areas would continue to be managed in accordance with the Wilderness Act of 1964 and the Utah Wilderness Act of 1984. In addition, Wilderness would be managed to allow ecosystems to function naturally.

The following acts describe relevant history and management guidelines pertaining to the project’s Wilderness areas:

- **The Wilderness Act (1964):** The National Wilderness System was created by the Wilderness Act of 1964. Wilderness areas are managed by the Federal Agency in ownership of the land prior to its establishment as Wilderness. Wilderness areas are administered for the use and enjoyment of the American public while leaving Wilderness unimpaired for the future use, to preserve the Wilderness character, and for the gathering and dissemination of information regarding their enjoyment and use as Wilderness (Wilderness.net 2006).
- **Endangered American Wilderness Act of 1978 (PL 95-237):** Includes the designation of Lone Peak as a Wilderness area and some watershed protection requirements for that area.
- **Utah Wilderness Act of 1984 (PL 98-428):** designated Mount Olympus and Twin Peaks areas, among 10 other Wilderness areas (Wilderness.net 2006). Also includes some requirements for grazing in Wilderness, State water allocation authority, prohibition on buffer zones, and mineral resources.

3.4.2 Affected Environment: Wilderness

Wilderness is defined by Congress as “an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.” In general, Wilderness areas are Federally-owned undeveloped lands that retain their primeval character and influence, without permanent improvements of human habitation. Further, Wilderness areas have been unaffected by man’s imprint, have outstanding opportunities for solitude or primitive and unconfined recreation, and are at least five thousand acres or of a sufficient size as to make practicable preservation and use in an unimpaired condition. Finally, Wilderness areas may contain ecological, geological, or other features of scientific, educational, scenic, or historical value (Wilderness.net 2006).

There are three existing Wilderness areas in the Project Area which contain proposed segments of the BST (see figure 12). The three Wilderness areas are Mount Olympus, Twin Peaks, and Lone Peak. Lone Peak is jointly managed with the Uinta National Forest while the other two are

managed by WCNF. The total acreage of these three Wilderness areas is approximately 36,464 acres. Table 18 summarizes total acreage by Wilderness area in the WCNF.

Table 18. Summary of Wilderness Acreage by Wilderness Area in the WCNF.

Wilderness Area	Year Established	Acres (Approximate)
Mount Olympus	1984	15,292
Twin Peaks	1984	11,496
Lone Peak	1978	9,746*
Total		36,464

* Lone Peak total acreage equals 30,088 of which 20,342 are in UNF and 9,746 are in WCNF.

- Mount Olympus Wilderness** is characterized by narrow canyons and rugged terrain varying from moderate to severe. Mount Olympus reaches an elevation of 9,793 feet. Large basins and bare rocky ridges occupy the higher elevations while lower elevations are composed of dense mountain brush mixed with sagebrush and grass. There are 12 system trails in the area totaling approximately 37 miles. Visitor use is high, especially during the summer and on weekends, though many trails receive year-round use. The western side of the Wilderness near the urban-forest interface is often free of snow much of the winter and receives substantial hiking use. The higher elevations receive much of their winter use by backcountry and Nordic skiers, as well as snowshoers. The Mt. Olympus Wilderness generally has the greatest use of the three Wilderness areas due to its proximity to the urban center, larger trail system, and number of accessible year-round access points. The southern side of this Wilderness area is within the Salt Lake City Watershed (see figure 11) and has numerous restrictions including dogs, horses, and swimming (Wilderness.net 2006).
- Twin Peaks Wilderness** is directly south of and has similar characteristics to Mount Olympus Wilderness. Elevation ranges from approximately 5,000 feet to 11,319 feet. The area has about five system trails totaling approximately 12 miles. Visitor use is high, especially during the summer and on weekends, though many trails receive year-round use. Most of the winter use occurs at higher elevations as backcountry and Nordic skiing and snowshoeing. Most of the Wilderness area is within the Salt Lake City Watershed and has numerous restrictions, including dogs, horses, and swimming (Wilderness.net 2006).
- Lone Peak Wilderness** is just south of Twins Peak Wilderness and is jointly managed with WCNF and UNF. Little Matterhorn (11,326 ft) and Lone Peak (11,253 ft) are the highest peaks in the area. Vegetation includes Douglas fir, subalpine fir, and aspen, with dense mountain brush at lower elevations. There are four recreational system trails within the WCNF portion of the Lone Peak Wilderness area, totaling approximately four miles. Visitor use is high, especially during the summer and on weekends, though many trails receive year-round use. Most of the winter use occurs at higher elevations as backcountry and Nordic skiing and snowshoeing. Due to the limited number of trails and more difficult access, the Lone Peak Wilderness generally has less use than the Twin Peak or Mt. Olympus Wildernesses.

3.4.3 Effects of the Alternatives: Wilderness

Effects of Alternative 1: No-Action

This alignment uses existing streets and sidewalks located in urban areas. No new trails would be built. This alignment does not occur within the Forest Service boundaries and compliance with WCNF Forest Plan standards and guidelines would not be applicable.

Although the No-Action Alternative has no direct effect on Designated Wilderness areas, several secondary, indirect impacts are likely to occur based on current and projected use. As adjacent populations grow, user-created trails and trail proliferation are expected to increase. User-created trails and trail proliferation may cause minor adverse effects to wilderness character, biological diversity, and overall recreation experience in Wilderness. Since no new trail construction would occur in Designated Wilderness areas under this alternative, it is likely to have the least overall impact to wilderness.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Implementing the BST proposed alignment in this segment may result in the following effects: minor adverse short- and long-term, beneficial, and direct and indirect. Lengths of disturbance are described in table 19.

Table 19. Effects of Alternative 2 on Segment 1.

Segment	Total Segment Length (Miles)	Built	Proposed
1	1.17	0.12	1.05

Minor short-term adverse effects may include disturbance during trail construction. Long-term adverse effects may occur through significant increase of human use in Wilderness areas, consequently, taking away from the Wilderness character. Beneficial effects may occur by satisfying the WCNF sub-goal of recognizing differences in population proximity and providing Wilderness experiences for more people. Direct effects would be short-term and specific to trail construction. Indirect effects may include growth, inducing visitor use in Wilderness both in the short- and long-term.

The Proposed Action would be consistent with Wilderness regulations and the WCNF Revised Forest Plan, though Alternative 1 would be the most consistent in maintaining wilderness character, biological diversity, and overall recreation experience since no new trail construction in Designated Wilderness would occur. Alternative 1 is more compatible with Wilderness regulations and the WCNF Revised Forest Plan. The WCNF Revised Forest Plan states that no additional trails would be built into the Wilderness except to facilitate short segments of the BST and only where absolutely necessary to minimize resource impacts or to better manage visitor use. The plan further states that the creation of additional user-created trails would not be allowed. Major emphasis would also be placed on user education because of high visitor use and adjacency to urban populations.

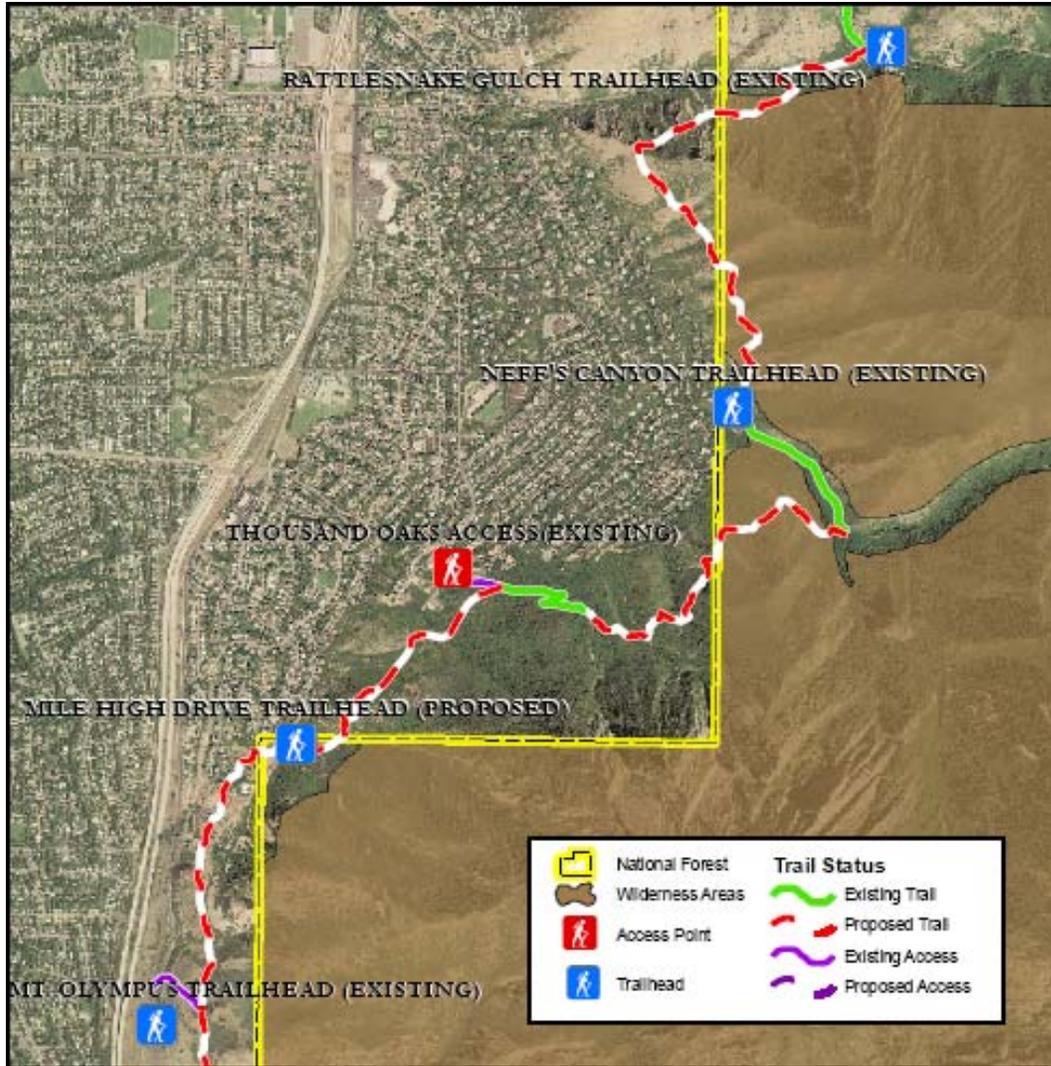


Figure 13. Effects of Alternative 2 on Segment 1.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Impacts of implementing this alternative would be similar to those described under Segment 1 of Alternative 2. Lengths of disturbance are described in table 20.

Table 20. Effects of Alternative 2 on Segment 2.

Segment	Total Segment Length (Miles)	Built	Proposed
2	1.29	0.00	1.29

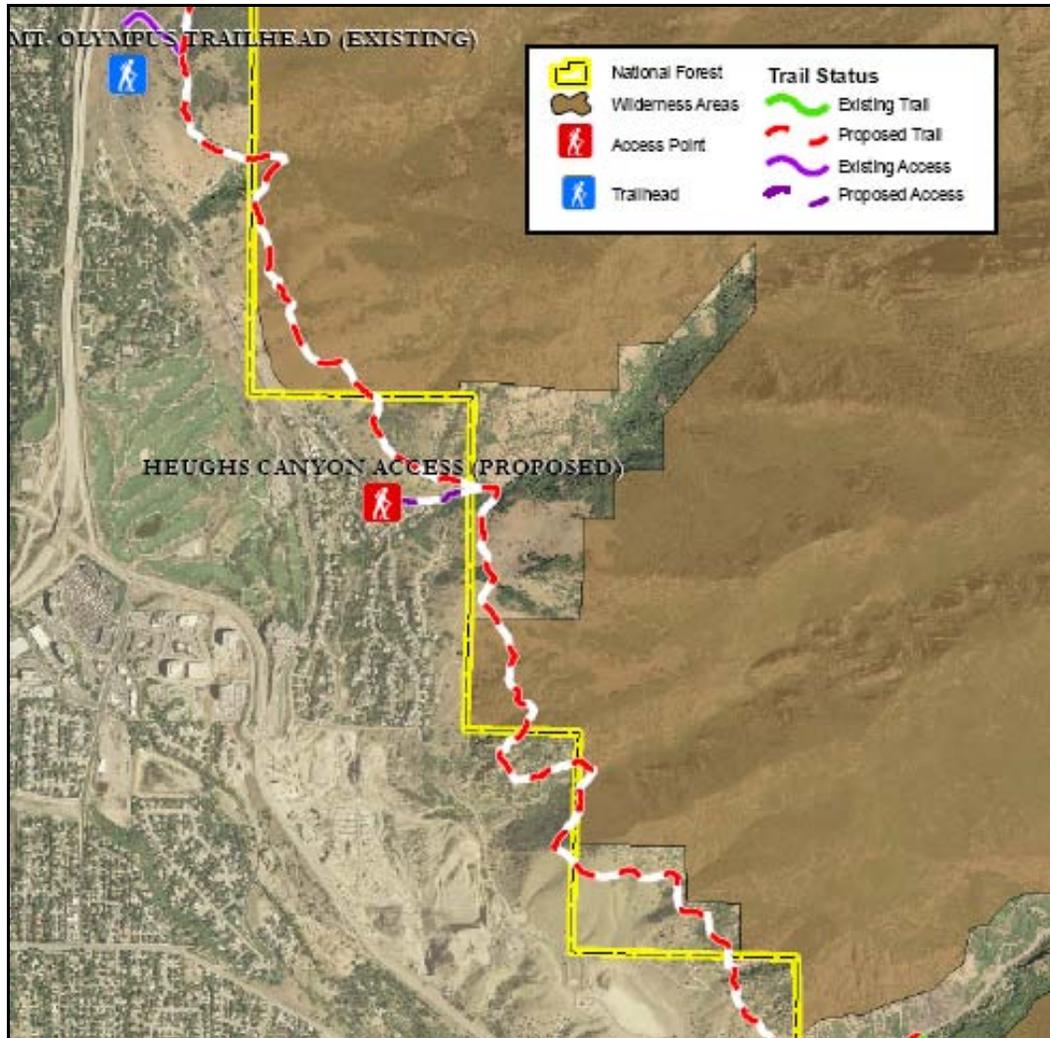


Figure 14. Effects of Alternative 2 on Segment 2.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

This segment of the trail does not traverse designated Wilderness.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Impacts of implementing this alternative would be similar to those described under Segment 1 of Alternative 2. Lengths of disturbance are described in table 21.

Table 21. Effects of Alternative 2 on Segment 4.

Segment	Total Segment Length (Miles)	Built	Proposed
4	1.29	0.00	1.29

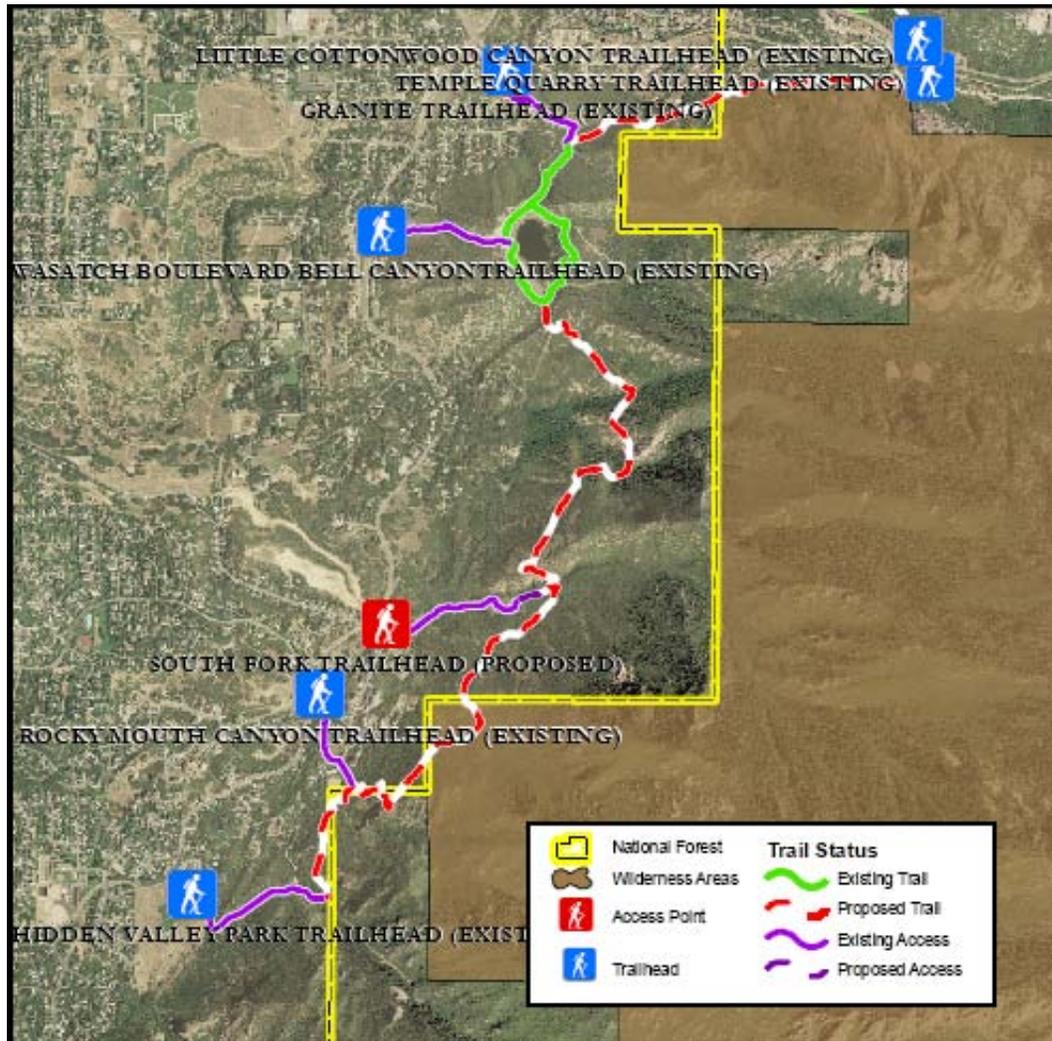


Figure 15. Effects of Alternative 2 on Segment 4.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

Segment 1: Parley’s Canyon to Mount Olympus Trailhead

This segment of the trail does not traverse designated Wilderness.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

This segment occurs almost entirely on Wilderness. Impacts of implementing this alternative would be similar to those described under Segment 1 of Alternative 2. Lengths of disturbance are described in table 22. Impacts related to Segments 3 and 4 are the same as those described for Alternative 2.

Table 22. Effects of Alternative 3 on Segment 2.

Segment	Total Segment Length (Miles)	Built	Proposed
2	3.68	0.09	3.59

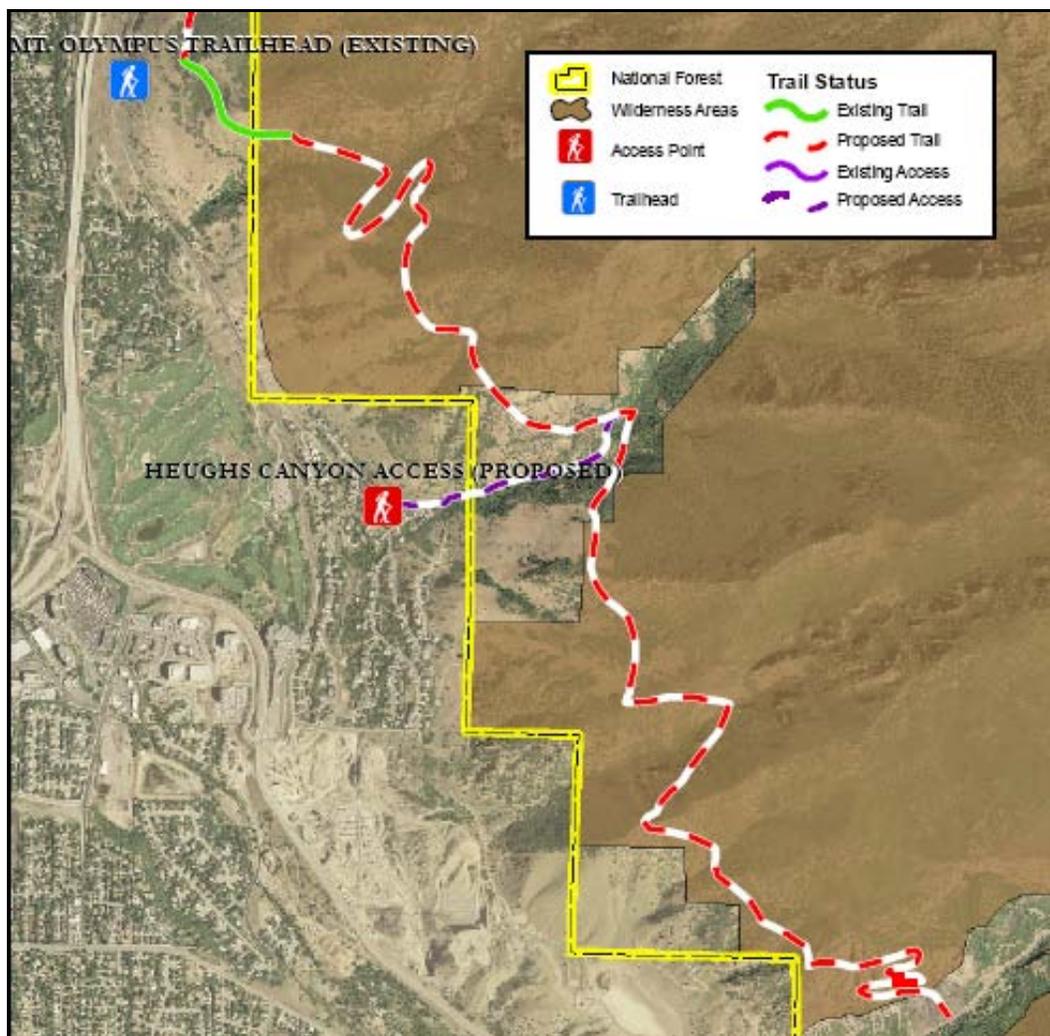


Figure 16. Effects of Alternative 3 on Segment 2.

3.4.4 Cumulative Effects

Past, Present, or Reasonably Foreseeable Future Actions

The cumulative effects of additional trail on Wilderness areas involve assumptions and uncertainties. The Project Area's close proximity to urban areas strongly suggests an increase in use regardless of alternative. Any action decision on designated Wilderness must comply with the Wilderness Act of 1964 and Forest Plans.

Past Actions

Past actions include designation of the Wilderness areas, various types of recreation use (hiking, dog walking, and others) on short segments of designated and user-created trails, and trail proliferation.

Present Actions

Present actions in the project area include continuing recreational use on designated and user-created trails, trail proliferation, urban encroachment on NFS land, a large construction project at the mouth of Big Cottonwood Canyon, a water tank project at the mouth of Little Cottonwood Canyon, and existing gravel mining at the mouth of Big Cottonwood Canyon.

Because these present actions occur within close proximity or within Wilderness boundary, they all may potentially impact Wilderness character, including biological diversity, naturalness, wildness, and solitude.

Reasonably Foreseeable Future Actions

Actions that may occur in the reasonably foreseeable future include increased recreation activities within and around Wilderness, urban encroachment on Wilderness, and construction projects such as the potential Neff's Canyon detention basin. These actions will also likely affect Wilderness values, biological diversity, naturalness, wildness, and solitude.

The WCNF Revised Forest Plan states that no additional trails would be built into the Wilderness except to facilitate short segments of the BST and only where absolutely necessary to minimize resource impacts or to better manage visitor use (USDA 2003a). The plan further states that the creation of additional user-created trails would not be allowed. Major emphasis would also be placed on user education because of high visitor use and adjacency to urban populations.

Approximately 2.74 miles of proposed trail would be built on Wilderness under Alternative 2 while Alternative 3 would have approximately 5 miles of proposed trail. Effects are considered to be minor based on the user restrictions set forth in the Wilderness Act and Forest Plan. Also, the segments of proposed trail are considered to be minor when compared to the entire Wilderness area (approximately 36,464 acres).

As use continues to increase, permit systems, designated sites, and use restrictions may be incorporated in order to preserve Wilderness characteristics.

Cumulative Effects of the Alternatives

Cumulative effects of each of the alternatives are listed below in table 23.

Table 23. Cumulative Effects of the Alternatives.

Resource Issue	Alternative 1	Alternative 2	Alternative 3
Wilderness	No direct effects. Indirect effects include potential change in Wilderness character through minor increased use and user-created trails.	Impacts include increased access to and use of Wilderness areas and 2.74 miles of proposed trail traversing Wilderness. Visitor use is expected to increase, but user-created trails and trail proliferation would be reduced.	Increased access to Wilderness areas and 5.24 miles of proposed trail traversing Wilderness. Additional impacts are similar to Alternative 2.

3.5 Open Space, Scenery Management, and Aesthetics

3.5.1 Introduction

Scenery is an important natural resource of the WCNF and the surrounding area. It has been shown that high-quality scenery can enhance people's lives and benefit society, particularly natural scenery such as is associated with National Forests (USDA 1995). It is primarily through their visual sense that most visitors perceive the Forest and its interrelated components. Benefits derived from scenic settings include identity, self-image of communities and individuals, and enhanced quality of life. Sight-seeing, driving for pleasure, and outdoor photography are among the nation's leading recreational activities. And as demand continues, the need to preserve high quality scenic resources would also increase.

The proposed additions to the BST would increase the public's ability to enjoy the high-quality scenery available on the WCNF by improving access while providing sufficient protection for the area's valuable visual resources. However, the construction of new trail sections, trailheads, access points, signage, and bridges are expected to have a minor adverse impact on scenic integrity of the viewed landscape.

Methodology

Sources of existing information on scenic resources came from the following:

- Forest Plan (USDA 2003a)
- USDA, Agriculture Handbook Number 701, Landscape Aesthetics: A Handbook for Scenery Management (USDA 1995)
- BST Alignment Plan for Salt Lake County (BST 2005)

The WCNF has used the Scenery Management System (SMS) *Landscape Aesthetics A Handbook for Scenery Management; 1995 Agriculture Handbook # 701* (USDA 1995) since the late 1990s as a management tool to describe, allocate and provide direction for arranging, planning, and designing landscape attributes relative to the appearance of places and expanses in outdoor settings. SMS is one of four management direction elements with maps and descriptions in this Revised Forest Plan, the others being Management Prescription Categories (MPC), Winter Recreation Classes, and summer Recreation Opportunity Spectrum (ROS). SMS is a guideline intended to assist managers and help the public understand the scenic resource management framework for project-level decisions and larger area analyses. The system is applied in combination with other management direction such as desired future conditions, standards, guidelines, goals, and objectives to define expectations about management of a particular area of the forest (USDA 2003a).

Effects upon the visual environment are defined as changes to the visual environment that would not be in accordance with existing scenery. Impact evaluations for visual and scenic resources were based primarily on a determination of the anticipated change in the character of the existing

landscape, in comparison with existing conditions and observations made during the site visit in April of 2007. The amount of area disturbed, the resulting landscape character at the site of disturbance, and the ability to reclaim/revegetate disturbed areas were used as indicators of the level of impacts on the visual and scenic resources along proposed routes for the BST. The impact categories represented in table 24 are used in the analysis.

When assessing impacts to scenic resources, there are three distance zones that are commonly used by the Forest Service: foreground (0 to ½ mile), middleground (½ mile to 4 miles), and background (4 miles to horizon). Because most people who are concerned about the scenic impacts of the proposed trail will be viewing the trail from the valley, the middleground distance zone will be used in assessing the scenic impacts of the trail.

Table 24. Impact Category Descriptions.

Impact Category	Definition
Beneficial Effect	An action that would improve scenic resources compared with current conditions.
Negligible or No Effect	An action that would have a low risk of causing degradation of scenic resources. Such an action would not result in degradation of landscape character.
Minor Adverse Effect	An action that would result in only minor impairment of scenic resources or minor changes to landscape character.
Moderate Adverse Effect	An action that represents an intermediate risk to the scenery of the Project Area. Such an action might result in moderate degradation of the natural scenery and landscape character along the proposed routes for the BST.
High Adverse Effect	An action that would have a high risk of resulting in considerable degradation of scenic resources. Such an action would result in major changes to the nature and character of the Project Area.
Short-Term Effect	An action that would result in the change of a scenic resource's condition, use, or value lasting less than one year.
Long-Term Effect	An action would result in the change of a scenic resource's condition, use, or value lasting more than one year and probably much longer.

Scenery Management: Laws, Regulations, and Guidelines

WCNF Forest-wide Sub-goals for scenery management include:

- Recognize and manage for the importance of scenic forest landscapes to overall recreation settings as well as to the quality of life for communities adjacent to the Forest.
- Restore, maintain, or enhance landscape scenic integrity across the variety of landscape character themes found on the Forest (USDA 2003a).

Standards for scenery management include:

- Management actions that would result in a scenic integrity level of Unacceptably Low are prohibited in all Landscape Character Themes (USDA 2003a).

Guidelines for scenery management include:

- Manage Forest landscapes according to Landscape Character Themes, and Scenic Integrity Objectives (SIOs) as mapped.

- Resource management activities should not be permitted to reduce Scenic Integrity below Objectives stated for Management Prescription Categories.
- For management activities viewable from Concern Level 1 (defined site-specifically):
 - Scenic Byways (viewshed corridors 0-4 miles) and use areas, travelways, and Scenic Backways (viewshed corridors <1/2 mile) apply the Landscape Character Theme in which the management activity occurs and apply a SIO of high.
 - For management activities viewable from Concern Level 2 (defined site-specifically):
 - Use areas and travelways (viewshed corridors <1/2 mile) apply the Landscape Character Theme in which the management activity occurs and apply a SIO of at least moderate.
- Duration of visual impacts to allow for herbaceous and woody plants are established would be determined during project planning by the following criteria:
 - Capability of the landscape to recover
 - The relationship of management activity to the seen area of sensitive use areas and travel ways.
- Establishment of herbaceous vegetation may extend to 3 years after project completion for foreground and middle ground in Concern levels 1 and 2 use areas and travel ways. Consider immediate initiation of reseeded in these areas where natural recovery is questionable (USDA 2003a).

3.5.2 Affected Environment: Open Space, Scenery, and Aesthetics

The proposed route of the BST is located along the foothills of the Wasatch Mountains in Salt Lake County. Salt Lake County is the most populous county in the State and the foothills area already contains a large amount of housing and other development. Therefore, visual quality is already significantly compromised along the proposed BST route. However, the proposed route follows closely along the border of the WCNF, which has an increasingly natural scenic quality as one travels higher in elevation, beyond the development in the foothills. The landscape affected by the proposed trail is a transition area between the forest and the local communities.

The scenic environment of the WCNF varies by location and is largely influenced by existing natural features, including vegetation, water, landforms, and geology. Scenic resources are important to the Forest and help maintain the WCNF's popularity as a recreation destination. The natural setting, of which aesthetics is a key component, can influence the quality and effectiveness of the recreation experience. Natural settings and cultural features are valued for their ability to stimulate the senses and nurture the mind (USDA 1995). Common recreational uses in the area are directly related to the quality of scenic resources. The most popular activities identified by visitors, general use to escape urban lifestyles and viewing natural features, are dependent upon preserving the natural landscape of the WCNF and the surrounding area.

The WCNF and the surrounding area provide a balance of diverse landscapes and natural settings. The scenic environment within the forests ranges from landscapes with high scenic quality displaying little or no evidence of management activities, to landscapes with different

scenic quality that have dominant visible evidence of management activities. The high scenic quality in areas of outstanding value, and other highly used recreation areas and corridors are protected or enhanced (USDA 2003a).

The scenery of the Central Wasatch Management Area is a valuable and pleasurable natural backdrop for the urban area. Views up and within the canyons of natural and developed areas are carefully managed to sustain scenic resources. Views from the Scenic Byways in Emigration, Big Cottonwood, and Little Cottonwood Canyons are managed for their recognized values. Guidelines for scenery management are applied to project undertakings (USDA 2003a). The following landscape character themes would be found along the proposed trail route:

- Natural Evolving
- Natural Appearing

Segment 1

The first segment of the proposed trail begins at the mouth of Parley's Canyon and ends at the Mount Olympus trailhead. The Forest's Landscape Character for this area is Natural Evolving and the Scenic Integrity Objective (SIO) for this area is Very High. "The natural evolving landscape character originates primarily from natural disturbances and succession of plants, with subtle changes due to indirect human activities. The existing landscape character generally continues to change gradually over time through natural processes." Very High SIO means "the valued landscape character is intact with only subtle if any deviations. The Natural Evolving landscape character and sense of place is expressed at the highest possible level." The Very High SIO allows for trails and rustic signing within immediate foreground.

Segment 2

The second segment of the proposed trail begins at the Mount Olympus trailhead and ends at Big Cottonwood Canyon. The Forest's Landscape Character for this area is Natural Evolving and the SIO for this area is Very High. The Very High SIO allows for trails and rustic signing within immediate foreground.

Segment 3

The third segment of the proposed trail begins at Big Cottonwood Canyon and ends at Little Cottonwood Canyon. The Forest's Landscape Character for this area includes both Natural Evolving and Natural Appearing. The SIOs for these Landscape Characters are Very High and High, respectively. The Very High SIO allows for trails and rustic signing within immediate foreground.

Natural appearing means the "landscape character has been influenced by both direct and indirect human activities, but appears natural to the majority of viewers. Natural elements such as native trees, shrubs, grasses, forbs, rock outcrops, and streams or lakes dominate the views. While there is evidence of human influence from historic use, campgrounds, small organization camps, rustic structures, and management activity, it is part of the valued built environment in the landscape to the majority of viewers." The High SIO applies to "landscapes where the valued landscape character appears intact. Deviations may be present but must repeat the form, line, color, texture, and pattern common to the landscape character so completely, and at such scale, that they are not evident." Cultural features allowed in these areas include parking lots, roads,

trailheads, bridges, campgrounds, and restrooms, so long as these amenities appear to be part of the natural appearing landscape by eliminating the geometry of the built feature upon the landscape.

Segment 4

The fourth segment of the proposed trail begins at Little Cottonwood Canyon and ends at Hidden Valley. Part of this segment crosses land categorized with “Natural Evolving” Landscape Character, for which the SIO is Very High. The Very High SIO allows for trails and rustic signing within immediate foreground.

3.5.3 Effects of the Alternatives: Open Space, Visual Quality, and Aesthetics

Effects of Alternative 1: No-Action

Under the No-Action Alternative, the BST would remain in its current management state and no new sections of trail would be constructed. Therefore, there would be no effect on the scenery of the area.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Where possible, the proposed trail alignment follows existing trails and uses existing trailheads and access points. However, impacts to scenery would result from the construction of the new trail sections proposed in the Salt Lake County Proposed Alignment. The new trail sections would average three feet in width and would be consistent with USFS trail construction standards. These new trail sections may be visible from areas within the valley and from higher elevations. Scenic impacts would also be caused by the construction of new trailhead areas, signage, and bridges.

Primary forms in the proposed project area are the foothills and mountains of the central Wasatch Range. The Wasatch Range exhibits strong angled lines throughout the project area. Roadways and development below the project area also exhibit strong horizontal and vertical lines. The color variety in the proposed project area includes the various greens, grays, and browns of different vegetation types, as well as the grays and browns of rock outcrops. There are also areas that are brown because of exposed soil.

Where new trail is cut, the line it makes across the landscape would be visible in certain areas. This visibility would be most pronounced immediately following the trail’s construction, since it would take time for the vegetation to grow back and provide a more natural appearance along the trail. There would also be a distinct color difference between the trail and the greener vegetated areas that the trail passes through in places. Again, this color difference would be most pronounced immediately following construction of the trail, before revegetation has created a more natural appearance.

Segment 1: Parley’s Canyon to Mount Olympus Trailhead

New trail construction would take place in several places along the Salt Lake County Proposed Alignment. A small section of trail would be constructed near the Parley’s Canyon Trailhead. A series of switchbacks would be built to connect the BST to Mexican Ridge. A section of trail would also be built from Mexican Ridge to the Pipeline Trail. New trail would be constructed from Mill Creek Bridge to South Ridge Mill Creek Canyon, and then to Neff’s Canyon. Trail

construction would continue from Neff’s Canyon to “Z” Trail, and then to Mile High Drive. New trail would then be constructed from Mile High Drive to the Bonneville Bench. This section of the BST would actually pass below houses on the Bonneville Bench.

Along with the scenic impacts caused by new trail construction in Segment 1, there would also be impacts from new trailheads, signage, and areas for parking. This would include parking near Water Tank Road on Teton Drive, a trailhead at Rattlesnake Gulch, parking at Neff’s Canyon Trailhead, parking at a cul-de-sac on Thousand Oaks Drive, and a trailhead and parking at the end of Mile High Drive. Some examples of what the new parking areas and trailheads may look like can be seen in figures 17–19. These photos are of existing parking areas and trailheads that are already being used for the trail.



Figure 17. Granite Trail Head.



Figure 18. Mt. Olympus Trail Head.



Figure 19. Bell Canyon Trail Head.

The Forest's Landscape Character for this area is Natural Evolving and the SIO is Very High. Examples of activities and modifications allowed in this Landscape Character and SIO include the construction of trails, rustic signing, and livestock grazing. The landscape that this segment passes through includes quarry areas, open grassy slopes, areas heavily wooded in oak and maple, rocky outcrops, and scree slopes.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. However, the proposed trail segment would follow existing roads (e.g., Power Line Road, Mill Creek Road, Neffs Canyon water tank road), trails (e.g., Pipeline Trail, Rattlesnake Trail, Mount Olympus Trail), and ridgelines where this is feasible. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

New trail construction, signage, and access points would cause minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing a change in the landscape's overall natural appearance. Therefore, the Natural Evolving Landscape Character of this area would be left intact and the Very High SIO would be met.

Examples of what the proposed trail may look like when viewed from the trail itself, and from lower elevations, can be seen in figures 20–24. These photos are of existing portions of the BST. Notice that the thick vegetation makes it very difficult to see the trail in the two photos taken from a lower vantage point.



Figure 20. Hidden Valley Park Trail Head.



Figure 21. Segment of Hidden Valley Park Trail.



Figure 22. Segment of Hidden Valley Park Trail.



Figure 23. **Golden Oaks Access (Proposed).**



Figure 24. **Aqueduct Access (Proposed).**

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

A significant portion of the trail from Mount Olympus trail to Heughs Canyon would cross through the Mount Olympus Wilderness Area. The section of trail from Heughs Canyon to Big Cottonwood Canyon would also cross a 40-acre parcel of the Mount Olympus Wilderness Area as well.

Proposed trailheads and access points in this segment include a trailhead at Heughs Canyon, an access point at Dry Hollow, parking on Oak Canyon Drive, and a trailhead at the Oak Ridge picnic area.

Bridges are proposed to be constructed across the creek in Tolcats Canyon and Heughs Canyon Creek. These bridges would likely cause minor adverse impacts to the natural appearance of the area.

The Forest's Landscape Character for this area is Natural Evolving and the SIO is Very High. Examples of activities and modifications allowed in this Landscape Character and SIO include the construction of trails, rustic signing, and livestock grazing. The landscape that this segment passes through includes areas heavily wooded in tall oak and maple brush, groves of conifers, rocky outcrops, quarry areas, mahogany groves, and various brush and grasses.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. However, the proposed trail segment would follow existing paths (e.g., the Granite Aqueduct, a footpath next to a stream in Heughs Canyon, and the power line corridor) and ridgelines where it is feasible. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

It is believed that the new trail construction, signage, and access points would cause only minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing a change in the landscape's overall natural appearance. Therefore, the Natural Evolving Landscape Character of this area would be left intact and the Very High SIO would be met.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

A section of trail would be constructed from Big Cottonwood Canyon to Ferguson Canyon Trail to Deaf Smith Canyon, and then to the Temple Quarry Trailhead in Little Cottonwood Canyon.

Proposed access points in this segment include parking on Golden Oaks Drive and the Aqueduct access point.

Bridges are proposed to be constructed across Deaf Smith Canyon Creek and Little Cottonwood Creek. These bridges would likely cause minor adverse impacts to the natural appearance of the area.

The Forest's Landscape Character for this area includes both Natural Evolving and Natural Appearing and the SIOs for this segment are Very High and High, respectively. Examples of activities and modifications allowed in the Natural Evolving Landscape Character and Very High SIO include the construction of trails, rustic signing, and livestock grazing. Examples of modifications allowed in the Natural Appearing Landscape Character and High SIO include parking lots, roads, trailheads, bridges, campgrounds, and restrooms, so long as these amenities appear to be part of the natural appearing landscape by eliminating the geometry of the built feature upon the landscape. The landscape that this segment passes through includes heavily wooded areas, talus slopes, grassy slopes, and tall oak and maple brush.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. However, the proposed trail segment would follow existing trails (e.g., Ferguson Canyon Trail), roads (e.g., Ferguson Canyon water tank road, old mine road, aqueduct road), and ridgelines where it is feasible. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

It is believed that the new trail construction, signage, and access points would cause only minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing a change in the landscape's overall natural appearance. Therefore, the Natural Evolving and Natural Appearing Landscape Characters of this area would be left intact and the Very High and High SIOs would be met.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

A section of trail would be constructed from Little Cottonwood Creek to Upper Corner Canyon Road. The part of this new section of trail that is constructed from South Fork Dry Creek to Big Willow Canyon would cross the Lone Peak Wilderness Area.

BST signs would be posted at Little Cottonwood Canyon, and a trailhead is proposed on a cul-de-sac in the Corner Canyon subdivision. Another trailhead is proposed at South Fork. Most of the BST would be a primitive trail located in natural areas. Therefore, signs would be simple and unobtrusive, but strategically placed to provide trail users with confidence in their location and direction of travel.

Bridges are proposed to be constructed across South Fork Dry Creek and Little Willow Canyon Creek. These bridges would cause a minor adverse impact to the natural appearance of the area.

Part of this segment crosses land categorized with Natural Evolving Landscape Character, for which the SIO is Very High. Examples of activities and modifications allowed in the Natural Evolving Landscape Character and Very High SIO include the construction of trails, rustic signing, and livestock grazing. The landscape that this segment passes through includes wooded areas, rocky outcrops, and some of the steepest descents along the proposed route.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. However, the proposed trail segment would follow existing trails (e.g., Bells Canyon Trail and the existing BST), roads (e.g., the water company access road), and ridgelines where it is feasible. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

It is believed that the new trail construction, signage, and access points would cause only minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing

a change in the landscape's overall natural appearance. Therefore, the Natural Evolving Landscape Character of this area would be left intact and the Very High SIO would be met.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

Because two of the four trail segments are the same, the Forest Service Alignment would have many of the same scenic impacts as Salt Lake County Proposed Alignment. The proposed trailheads and access points for Segments 1 and 2 are the same as those proposed in the Salt Lake County Proposed Alignment, but the proposed routes for the trail remains on Forest Service land.

The Forest's Landscape Character for this area is Natural Evolving and the SIO is Very High. Examples of activities and modifications allowed in the Natural Evolving Landscape Character and Very High SIO include the construction of trails, rustic signing, and livestock grazing.

Because of the thick vegetation surrounding this trail segment in many spots, as well as the existing development below much of the proposed trail route, it may be difficult for people to see the trail from the valley. It may be easier for people to see the trail in the areas where it cuts further upwards, including areas where switchbacks are constructed. Also, reclamation and revegetation of user-created trails and old four-wheel-drive roads would be carried out concurrently with trail construction to embellish natural environments by improving forage and cover for wildlife habitat and to enrich the visual aesthetics for trail users.

It is believed that the new trail construction, signage, and access points would cause only minor adverse impacts on the scenery of the area, with most viewers and recreational users not noticing a change in the landscape's overall natural appearance. Therefore, the Natural Evolving Landscape Character of this area would be left intact and the Very High SIO would be met.

3.5.4 Cumulative Effects

Significant alteration of the natural landscape has already occurred as a result of development along the foothills of the Wasatch Mountains. Therefore, the relatively minor alterations of the landscape resulting from implementation of Alternatives 1, 2, and 3 would not be anticipated to have significant cumulative effects on the area's scenery.

The proposed trail would likely have a beneficial effect on the scenic resources of the area through the revegetation and reclamation of disturbed areas such as old four-wheel-drive routes and user-created trails. This task would take place concurrently with new trail construction. The proposed trail would also have a positive impact on scenic resources by focusing recreational activity on one trail rather than allowing user-created trails to proliferate across the mountainside as people attempt to hike from one trail to another.

Past, Present, or Reasonably Foreseeable Future Actions

Past and present development along the proposed BST route has caused significant alteration of the visual quality of the natural landscape. Possible future development in the area is reasonably foreseeable as well. Although it is unlikely that future development would occur on nearby Forest Service lands, it is reasonably foreseeable that development would continue to occur on private lands below the proposed BST route. This development would likely affect the scenery of the area.

Cumulative Effects of the Alternatives

Cumulative effects of each of the alternatives are listed below in table 25.

Table 25. **Cumulative Effects of the Alternatives.**

Resource Issue	Alternative 1	Alternative 2	Alternative 3
Open Space, Scenery Management, and Aesthetics	No direct effects. Trail is in highly urbanized area. No new facilities would be constructed. Indirect effects include potential change in visual quality through increased user-created trails.	Minor, adverse effects caused by the new sections of trail in addition to existing effects.	Same as for Alternative 2.

3.6 Soils and Erosion

3.6.1 Introduction

The purpose of this analysis is to describe the current resource conditions for soil resources within the Project Area. This analysis also evaluates effects for a range of alternatives on soil resources as required by NEPA, NFMA, other applicable laws and regulations, Forest Service directives, and the Forest Plan.

Restoration and maintenance of soil resources is a priority in all management decisions. Desired future conditions of soil resources as outlined in the Forest Plan (USDA 2003a) are listed below. It should be noted that these desired future conditions are not meant to be part of the trail system.

- Most soils have at least minimal protective ground cover, soil organic matter, and coarse woody material.
- Soils have adequate physical properties for vegetative growth and soil-hydrologic function.
- Physical, chemical, and biological processes in most soils function similarly to soils that have not been harmfully disturbed.
- Degradation of soil quality and loss of soil productivity is prevented.
- Soil-hydrologic function and productivity in riparian areas is protected, preserving the ability to serve as a filter for good water quality and regulation of nutrient cycling.
- Soil productivity, quality, and function are restored where adversely impaired and contributing to an overall decline in watershed condition.

Soils and geology are an integral component of watersheds and ecological groupings. They influence vegetation, watershed condition, mineralogy, and land uses. Soils and geology have been used to determine the suitability of forestlands for timber sales and the effects that land management projects may have on watersheds (USDA 2003).

Methodology

Analysis of Project Area soils includes a 50-foot corridor in which the proposed trail would be located. Based on soil properties of soils found within the Project Area, it was determined that highly erodible soils are found on slopes greater than 30 percent. Information for this report was gathered mainly from the following major sources:

- USDA Forest Service. 2003. Final Environmental Impact Statement Wasatch-Cache National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- USDA Forest Service. 2003. Revised Forest Plan Wasatch-Cache National Forest. Wasatch-Cache National Forest. Salt Lake City, Utah.
- United State Department of Agriculture Soil Conservation Service. 2002. Soil Survey of Summit Area, Utah, parts of Summit, Salt Lake, and Wasatch Counties.

- United State Department of Agriculture Soil Conservation Service. 1974. Soil Survey of Salt Lake Area, Utah.

Laws, Regulations, and Guidelines

Numerous legal directions pertain to soil and water resources on Federal, State and private lands in the United States (USDA 2003). Those most applicable to National Forest Lands include:

The Organic Administration Act (1897): Recognizes watersheds as systems that have to be managed with care to sustain their hydrologic function. It states that one purpose for establishing national forests is to secure favorable conditions of water flow.

The Federal Water Pollution Control Act (1972): Commonly known as “The Clean Water Act”, an act and series of amendments passed to maintain and restore the chemical, physical, and biological integrity of the nation’s waters. It requires compliance with State and Federal pollution control measures; no degradation of in stream water quality needed to support designated uses; control of non-point sources of water pollution through conservation or “best management practices;” Federal agency leadership in controlling non-point source pollution from managed lands; and rigorous criteria for controlling pollution discharges into waters of the United States.

The National Forest Management Act (1976): Directs national forests to protect watershed conditions from irreversible damage and to protect streams and wetlands from detrimental impacts. Amended RPA by adding sections that stressed the maintenance of productivity and need to protect and improve the soil and water resources, and avoidance of permanent impairment of the productive capability of the land. Fish habitat must maintain viable populations of existing and desired non-native vertebrate species.

The Forest and Rangeland Renewable Resources Planning Act (RPA)(1974): Requires an assessment of the present and potential productivity of the land. Regulations are to specify guidelines for land management plans developed to achieve the goals of the program that ensure “...that timber will be harvested from NFS land only where...soil, slope, or other watershed conditions will not be irreversibly damaged.”

The Endangered Species Act (1973): Requires Federal agencies to conserve threatened and endangered species and the ecosystems they depend on, including riparian and aquatic ecosystems.

The Safe Drinking Water Act (1976): Requires Federal agencies having jurisdiction over any Federally owned or maintained public water system to comply with all authorities respecting the provision of safe drinking water. The State of Utah has primary enforcement responsibility through its drinking water regulations.

Executive Orders 11988 and 11990: Direct Federal agencies to avoid to the extent possible the impacts associated with the destruction or modification of floodplains and wetlands. Agencies are directed to avoid construction and development in flood plains and wetlands whenever there are any feasible alternatives.

Forest Service Manual (Section 2500): Provides additional laws and executive orders as well as agency policy pertaining to watershed management.

Forest Service Manual, Soil Management Handbook (FSH R4 Supplement 2509.18- 95-1): Provides direction for the protection and monitoring of long-term soil productivity through the establishment of soil quality standards.

R1/R4 Soil and Water Conservation Practices Handbook (FSH 2509.25): Provides standards that must be followed.

3.6.2 Affected Environment: Soils and Erosion

The objective of soil resource management is to improve or maintain inherent long-term soil productivity. Soil productivity is the inherent capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. In order to improve or maintain long-term soil productivity, soil disturbance should be kept to a minimum and adequate measures need to be implemented to protect the surface soil, keep the soil in place, reduce compaction, and maintain nutrient and organic matter levels.

The soils of the Forest provide the medium for all plant growth and the support base for all other activities that occur in the Forest. Maintenance of soil productivity is required to achieve the Forest Goals. Sustainable commodities can only be achievable if the key component, soil productivity, is maintained. This section discusses the affect on the soil resource. The alternatives are listed with a prediction as to which would have the most and least effects on the soil resource.

Soil formation is an ongoing process, and erosion, with its subsequent deposition, is a natural process associated with geologic weathering. Erosion constantly occurs, although the amount depends upon the nature of the soil and the type and amount of vegetation. Natural levels of erosion and gully formation can be increased by natural causes. Changes in weather patterns can lead to an increase in erosion and gully formation. Several years of drought, for instance, can reduce vegetative ground cover. If the drought is followed by intense spring rains, increases in erosion and gully formation can be expected.

Thirty-six soil types are found within the Project Area (figure 25). Select properties of these soils are included in table 26. Within the Project Area, the most erosive soils are typically found on slopes greater than 30 percent (USDA 1974, USDA 2002). The hazard of erosion on roads and trails on these soils is classified as "Severe". All analysis is based on Natural Resource Conservation Service Soil Survey of Salt Lake Area, Utah (USDA 1974) and Soil Survey of Summit Area, Utah, parts of Summit, Salt Lake, and Wasatch Counties (USDA 2002).

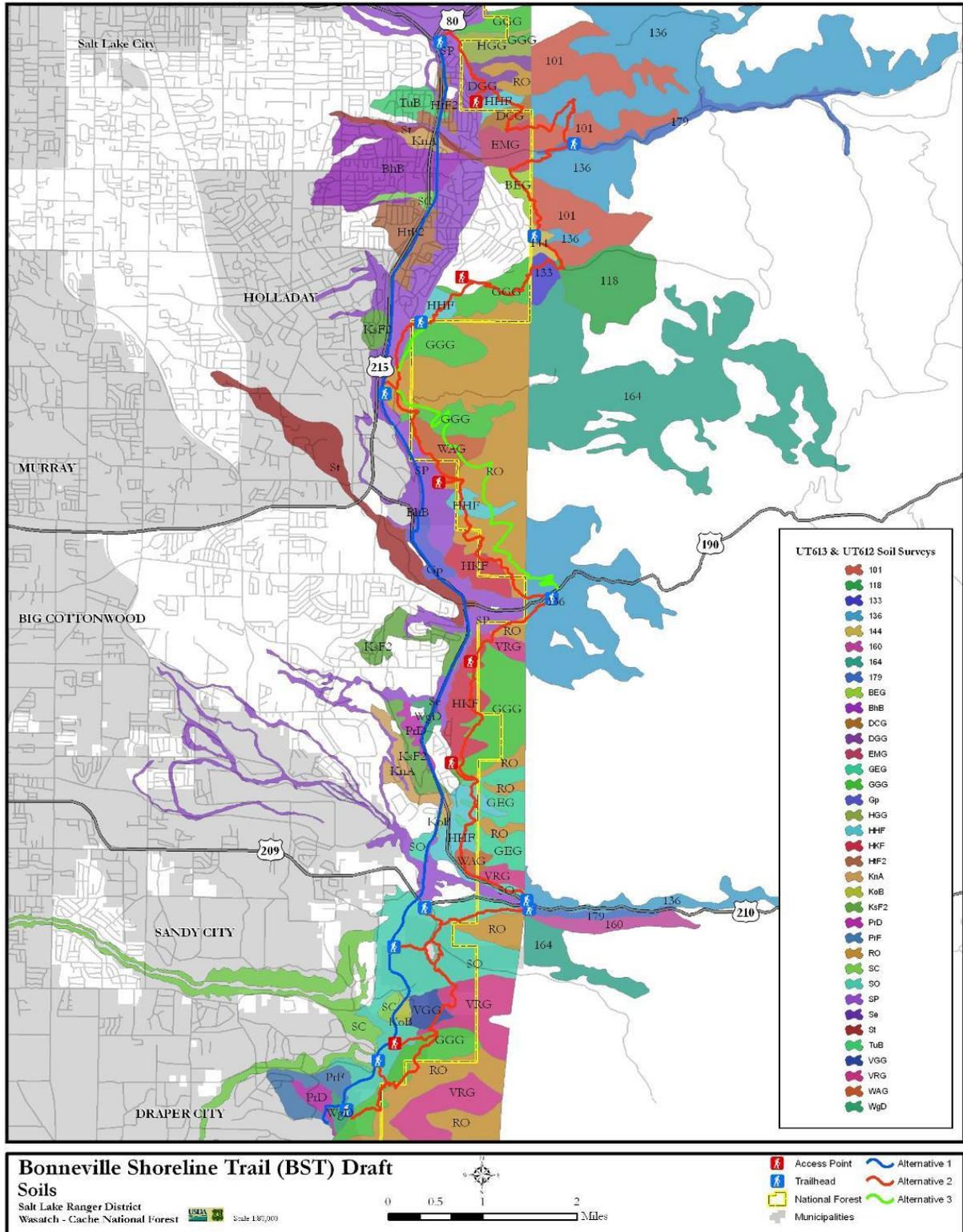


Figure 25. Project Area Soils.

Table 26. Project Area Soil Units and Properties.

Soil Unit Number/Symbol	Soil Unit Name	Percent Slope	Hazard of Erosion on Roads and Trails
BEG	Bradshaw-Agassiz association	40-70	Severe
BhB	Bingham gravelly loam	3-6	Slight
DCG	Deer Creek loam	30-60	Severe
DGG	Deer Creek-Picayune association	30-60	Severe
EMG	Emigration very cobbly loam	40-70	Severe
GEG	Gappmayer very cobbly loam	30-60	Severe
GGG	Gappmayer-Wallsburg association	30-60	Severe
Gp	Gravel pits	N/A	N/A
HGG	Harkers-Wallsburg association	6-40	Severe
HHF	Harkers soils	6-40	Severe
HKF	Henefer-Harkers association	10-40	Severe
HtF2	Hillfield-Taylorville complex	6-30	Severe
KnA	Knutsen coarse sandy loam	1-3	Slight
Kob	Knutsen gravelly coarse sandy loam	1-6	Slight
KsF2	Knutsen-Preston complex	10-30	Severe
PrD	Preston sand	1-10	Moderate
PrF	Preston sand	10-30	Severe
RO	Rock land	N/A	N/A
SC	Sandy terrace escarpments	N/A	N/A
Se	Sandy borrow pits	N/A	N/A
SO	Stony land	N/A	N/A
SP	Stony terrace escarpments	N/A	N/A
St	Stony alluvial land	N/A	N/A
TuB	Timpanogos loam	3-6	Moderate
VGG	Van Wagoner gravelly sandy loam	40-70	Severe
VRG	Van Wagoner extremely rocky sandy loam	40-70	Severe
WAG	Wallsburg very cobbly loam	30-70	Severe
WgD	Wasatch loamy coarse sand	1-10	Moderate
101	Agassix-Rock outcrop complex	30-70	Severe
118	Dromedary-Rock outcrop complex	30-70	Severe
133	Fewkes-Hades complex	30-60	Severe
136	Hades-Agassiz-Rock outcrop complex	30-70	Severe
144	Horrocks-Cutoff complex	15-30	Severe
160	Parkcity-Dromedary gravelly loams	30-70	Severe
164	Rock outcrop	N/A	N/A
179	Wanship-Kovich loams	0-3	Slight

N/A: Not Applicable.

User-developed trails are a common feature within many portions of the Project Area. Erosion associated with these trails already exists. Erosion is also currently found throughout the Project Area in areas with steep slopes and on highly erosive soils.

3.6.3 Effects of the Alternatives: Soils and Erosion

Effects of the Alternatives: Soil Erosion

Soil erosion is the detachment and transport of soil particles by wind, water, and gravity. When soil is disturbed or compacted and the vegetative cover is removed, erosion increases, infiltration is reduced and site productivity declines.

Soil formation is an ongoing process, and erosion, with its subsequent deposition, is a natural process associated with geologic weathering. Erosion constantly occurs, although the amount depends upon the nature of the soil and the type and amount of vegetation. Natural levels of erosion and gully formation can be increased by natural causes. Changes in weather patterns can lead to an increase in erosion and gully formation.

Within the Project Area, the most erosive soils are typically found on slopes greater than 30 percent (USDA 1974, USDA 2002). The hazard of erosion on roads and trails on these soils is classified as “Severe”. Impact analysis in this document is based upon these criteria. Adverse impacts to soil productivity through soil erosion could occur under Alternatives 2 and 3 if mitigation measures are not implemented. The greatest impacts from soil erosion through trail construction and use are directly proportional to the number of disturbed acres. Alternatives, in descending order of acres to be impacted, are Alternatives 3, 2, and 1.

Effects of Alternative 1: No-Action

Under this alternative, new trail would not be constructed within the Project Area. Therefore, there would be no effect to soil erosion within the Project Area in relation to the construction of the BST.

However, the population adjacent to the Project Area is still increasing. With this increase in population, increased use on improved trails and dispersed recreation on user-created trails will occur. Indirect, long-term, adverse effects include increased soil erosion because use of the Project Area will increase on user-created trails.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Segment 1: Parley’s Canyon to Mount Olympus Trailhead

Within this segment, 1.3 acres of soil would be disturbed during construction and use of 2.65 miles of trail. Table 26 indicates that 21 soil units within the Project Area are classified with severe trail erosion hazards. Therefore, soil erosion may occur from trail construction and use. Implementation of the 2003 Revision for the WCNF Plan (USDA 2003), including Best Management Practices (BMP), would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, 1.23 acres of soil would be disturbed during construction and use of 2.54 miles of trail. Therefore, soil erosion may occur from trail construction and use. Implementation of the 2003 Forest Plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

Within this segment, 0.52 acres of soil would be disturbed during construction and use of 1.08 miles of trail. Therefore, soil erosion may occur from trail construction and use. Implementation of the forest plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Within this segment, 0.61 acres of soil would be disturbed during construction and use of 1.25 miles of trail. Therefore, soil erosion may occur from trail construction and use. Implementation of the forest plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect effects include loss of soil nutrients as a result of soil erosion.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Within this segment, 1.3 acres of soil would be disturbed during construction and use of 2.65 miles of trail. Soil erosion may occur from trail construction and use. Implementation of the forest plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, 2.30 acres of soil would be disturbed during construction and use of 4.75 miles of trail. Therefore, soil erosion may occur from trail construction and use. Implementation of the forest plan would result in little soil erosion for short distances. Adverse effects to soil erosion related to the trail would be reduced to minor through maintenance or reconstruction in conjunction with implementation of mitigation measures.

Indirect adverse minor effects include loss of soil nutrients as a result of soil erosion.

Segments 3 and 4

Within segments 3 and 4, direct and indirect effects would be the same as those listed in each of the respective segments in Alternative 2.

Effects of the Alternatives: Soil Compaction and Soil Nutrients

Soil compaction is a rearrangement of soil porosity (decreases amount of larger pore spaces to smaller pore spaces) that may result in an overall decrease of soil porosity. Compaction leads to poor aeration and decreased water infiltration, which reduces moisture available to plants and reduces root penetration through the soil, and often results in reduced long-term rates of tree growth. To the degree that soil compaction reduces vegetative growth, there are likely to be increases in soil erosion and water runoff, leading to reductions in soil productivity.

Loss of soil nutrients lowers site productivity. Nutrients are added to the soil by atmospheric contributions (mostly from snow and rain) and by the decomposition of vegetation (leaves, needles, slash, logs, etc.). Nutrient loss occurs when the organic matter on the ground is removed, the surface soil layer is removed, or the standing vegetation is removed. The surface layers of soil contain the most nutrients, and these nutrients (often because of mycorrhizal associations with plants) are in a form that is readily available for plant uptake. The deeper soil horizons also contain some nutrients in a chemical form that are less available for plants to use. Nitrogen, which is the one nutrient that is in most demand by vegetation, is only found in the soil's surface layers.

Adverse impacts to soil productivity through soil compaction and soil nutrient loss could occur under any of the Action Alternatives. These impacts are a by-product of the Forest Service Trail System. The greatest impacts from soil compaction and nutrient loss through trail construction and use are directly proportional to the number of disturbed acres. Alternatives, in descending order of acres to be impacted, are Alternatives 3, 2, and 1.

Effects of Alternative 1: No-Action

Under this alternative, new trail would not be constructed within the Project Area. Therefore, no effects to soil compaction or nutrient loss within the Project Area would occur in relation to the construction of the BST.

However, the population adjacent to the Project Area is still increasing. With this increase in population, increased use on improved trails and dispersed recreation on user-created trails will occur. Indirect, long-term, adverse effects include increased soil compaction and nutrient loss because use of the Project Area will increase on user-created trails.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Within this segment, 1.3 acres of soil would be disturbed and compacted during construction and use of 2.65 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term, adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, 1.23 acres of soil would be disturbed and compacted during construction and use of 2.54 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

Within this segment, 0.52 acres of soil would be disturbed and compacted during construction and use of 1.08 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Within this segment, 0.61 acres of soil would be disturbed and compacted during construction and use of 1.25 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Within this segment, 1.3 acres of soil would be disturbed and compacted during construction and use of 2.65 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, 2.30 acres of soil would be disturbed and compacted during construction and use of 4.75 miles of trail. Therefore, soil compaction and nutrient loss would occur from trail construction and use. Long-term adverse effects to soil through nutrient loss and compaction are anticipated as they relate to human use of the trail.

Indirect, adverse minor effects include a minor increase in soil erosion and water runoff.

Segments 3 and 4

Within segments 3 and 4, direct and indirect effects would be the same as those listed in each of the respective segments in Alternative 2.

Effects of the Alternatives: Landslides and Slope Failures

According to the surficial geology of the Project Area, landslides and slope failure hazards exist within the Project Area (Personius and Scott 1992). Landslide and slope failure hazards are predominantly found on slopes greater than 40 percent.

Because trails can have the potential effect of slumping or slope failure if trail alignment crosses unstable slopes, effects from landslides and slope failures are directly proportional to the amount of trail being constructed and used. Alternatives, in descending order of miles of trail to be constructed and used, are Alternative 3, 2, and 1.

Effects of Alternative 1: No-Action

Under this alternative, new trail construction would not occur within the Project Area. Therefore, landslide and slope failure potential within the Project Area would not be affected and remain unchanged.

Effects of Alternative 2: Proposed Action (Salt Lake County Proposed Alignment)

Segment 1: Parley's Canyon to Mount Olympus Trailhead

Within this segment, landslide deposits have been mapped in the area of the proposed trail north of Neffs Canyon (Personius and Scott 1992). Landslide and slope failure hazards created by trail construction within these deposits would be mitigated through the implementation of the forest plan. Specific mitigation measures include limiting trail construction activities to areas (1) with slopes less than 40 percent, and (2) where risk to soils is low. This would result in minor adverse effects to landslide and slope failure hazard for a short period of time.

Indirect adverse minor effects include increased soil erosion in soil units with a high potential for landslides and slope failures, and minimal loss of soil nutrients due to soil erosion in these soil units.

Segment 2: Mount Olympus Trailhead to Big Cottonwood Canyon

Within this segment, landslide deposits have been mapped in the Heughs Canyon area (Personius and Scott 1992). Landslide and slope failure hazards created by trail construction within these deposits would be mitigated through the implementation of the forest plan. Specific mitigation measures include limiting trail construction activities to areas (1) with slopes less than 40 percent, and (2) where risk to soils is low. This would result in minor adverse effects to landslide and slope failure hazard for a short period of time.

Indirect adverse minor effects include increased soil erosion in soil units with a high potential for landslides and slope failures, and minimal loss of soil nutrients due to soil erosion in these soil units.

Segment 3: Big Cottonwood Canyon to Little Cottonwood Canyon

Although landslide deposits have not been mapped within this segment, mitigation measures described in Segments 1 and 2 would be implemented when constructing trail on steep slopes to minimize the possibility of causing slope failure.

Segment 4: Little Cottonwood Canyon to Hidden Valley Park

Although landslide deposits have not been mapped within this segment, mitigation measures described in Segments 1 and 2 would be implemented when constructing trail on steep slopes to minimize the possibility of causing slope failure.

Effects of Alternative 3: NFS right-of-way near Mile High Drive Trailhead in Segment 1; All NFS in Segment 2

The effects of Alternative 3 would be the same as for Alternative 2.

3.6.4 Cumulative Effects

Alternatives can be evaluated based on the amount of soil disturbed through trail construction activities. Analysis of Project Area soils includes a 50-foot corridor in which the proposed trail will be located. All Action Alternatives have a potential for adverse effects on the soils within the Project Area. The amount of disturbed soil for each Action Alternative would differ according to the amount of trail constructed. The Action Alternatives which include the most trail construction would disturb a greater amount of soils. However, mitigation measures would be implemented, and the overall effect of trail activities on soils through erosion, landslides, and slope failures is expected to be minimal for a short period of time. The overall effect of trail activities on soils through compaction and nutrient loss are expected to be adverse, long-term effects.

Past, Present, or Reasonably Foreseeable Future Actions

User-created trails have existed, currently exist, and will continue to exist within the Project Area. These past, present, and future actions associated with soil resources will affect the Project Area.

Cumulative Effects of the Alternatives

Soil Erosion

Cumulative effects of each alternative from soil erosion within the Project Area include minor soil erosion for short periods of time from trail construction and use on Forest and non-Forest lands, minor soil erosion that currently exists within the Project Area, and a minor loss of soil nutrients as a result of soil erosion.

Soil Compaction and Soil Nutrients

Cumulative effects of each alternative from soil compaction and soil nutrient loss within the Project Area include soil compaction and nutrient loss from trail construction and use on Forest and non-Forest lands, a minor increase in soil erosion and runoff, and the soil compaction and soil nutrient loss that currently exists within the Project Area.

Landslides and Slope Failures

Cumulative impacts include (1) minimal landslide and slope failure hazard for a short period of time from trail construction, (2) minimal increased soil erosion in soil units with a high potential for landslides and slope failure, (3) minimal loss of soil nutrients due to soil erosion in these soil units, and (4) the landslide and slope failure hazard that currently exists within the Project Area.

Cumulative effects of each of the alternatives are listed below in Table 27.

Table 27. Cumulative Effects of the Alternatives.

Issue	Alternative 1	Alternative 2	Alternative 3
Soils and Erosion	No effect to minor adverse effect. Since no new trail would be constructed, there would be no new disturbance of soils. Existing use and proliferation of user-created trails could increase. These types of uses are generally not constructed to FS standards and in areas that are susceptible to erosion.	Minor, adverse effect. Total new acres of disturbance on NFS lands would be 3.65. Mitigation measures would reduce soil erosion, soil compaction and subsequent loss of soil nutrients.	Minor adverse effect. Effects would be slightly higher than Alternative 2 since total new acres of disturbance on NFS lands would be 7.6 acres. As with Alternative 2 impacts would be reduced with proper implementation of mitigation measures.
Landslide and Slope Failures	No effect to minor adverse effect. Since no new trail would be constructed, there would be no new disturbance. Existing use and proliferation of user-created trails could increase causing a potential increase in landslide and slope failures.	Total new acres of disturbance on NFS lands would be 3.65. Mitigation measures would reduce the probability of landslides and slope failures.	Minor adverse effect. Implementing Alternative 3 would have more impacts since it would be constructed on steeper slopes and would disturb more acres on NFS lands (7.6).