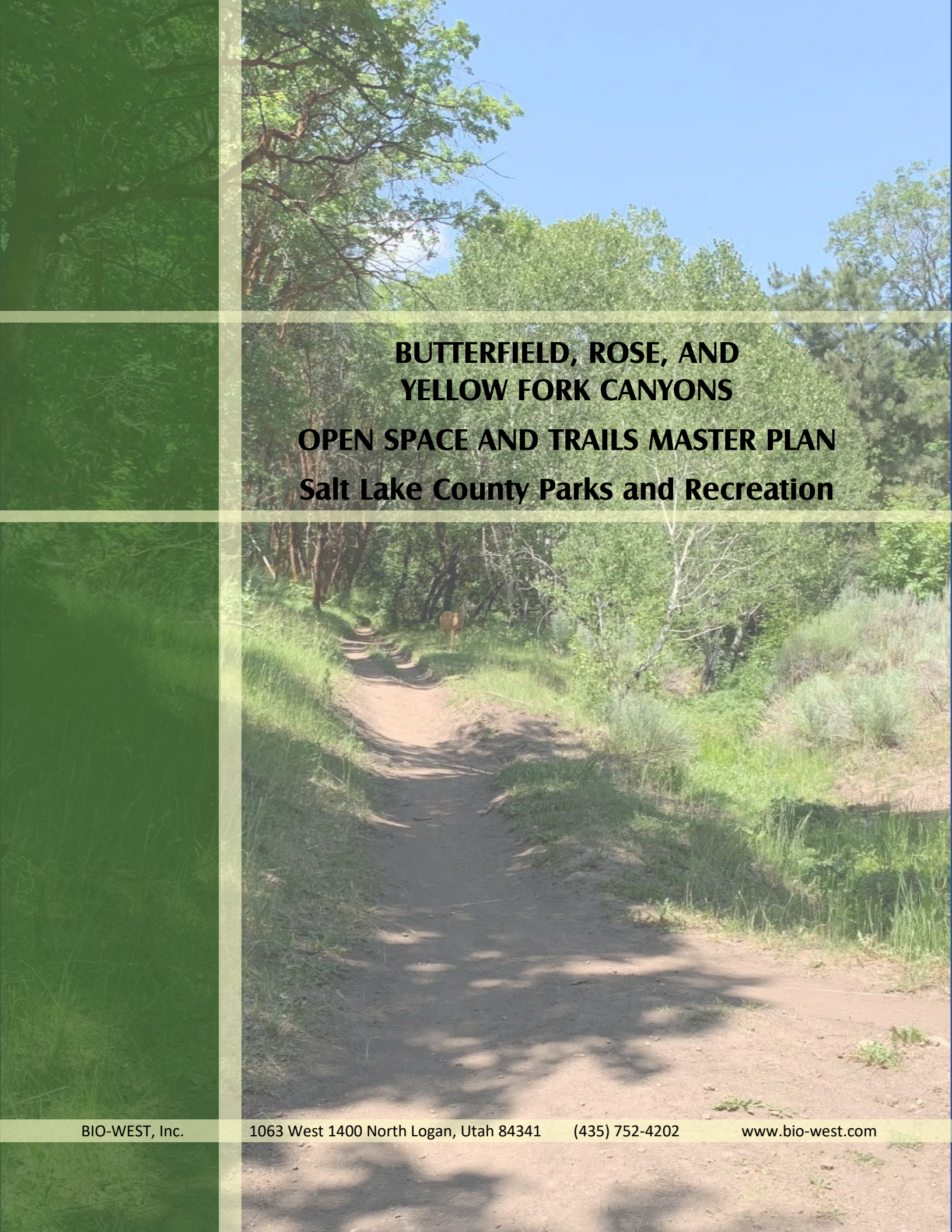

BUTTERFIELD, ROSE, AND YELLOW FORK CANYONS

OPEN SPACE AND TRAILS MASTER PLAN

Salt Lake County Parks and Recreation

BIO-WEST, Inc. 1063 West 1400 North Logan, Utah 84341 (435) 752-4202 www.bio-west.com

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CHAPTER 1:
BACKGROUND

Introduction

Located in the mountainous southwest corner of Salt Lake County, there lies just over 10,000 acres of public and private open space lands known locally as Butterfield Canyon, Rose Canyon, and Yellow Fork Canyon (Figure 1). Encompassing 4,062 acres or approximately 40 percent of this open space, the publicly owned properties consist of four distinct management areas: (1) 1,509 acres of U.S. Bureau of Land Management (BLM) land; (2) 809 acres of Salt Lake County land known as the Yellow Fork Canyon Regional Park; (3) 1,692 acres of Salt Lake County open space land known as Rose Canyon Ranch; and (4) 52 acres of Salt Lake County property known as the Butterfield Canyon Trailhead (see Figure A-1 in Appendix A). This Master Plan document is intended to guide Salt Lake County, the BLM, and other key stakeholders in joint management of this regionally significant complex of open space lands. The remaining approximately 6,000 acres within the analysis area are private lands held primarily by Rio Tinto (1,620 acres or 16 percent of the study area), Herriman Irrigation Company (614 acres or 6 percent of the study area), Camp Williams (576 acres or 6 percent of the study area), and other private individuals (3,223 acres or 32 percent of the study area).

The southwest portion of Salt Lake County, including Herriman City, has experienced tremendous residential and commercial growth over the last decade. As more people come to reside in this rural area of the County, the need for community open space and recreational amenities increases. Through the collective efforts of stakeholders, citizens, and agency partners, this Master Plan document presents management direction for development and use of the Butterfield Canyon, Rose Canyon, and Yellow fork Canyon properties to meet the diverse needs of this growing area and County residents overall.

History of the Master Plan Project

In 2011, Salt Lake County adopted the first master plan created for the Rose Canyon and Yellow Fork Canyon open space properties. A collaboration between the BLM and Salt Lake County, the master plan outlined needed investments in maintenance activities, management staffing, wildfire management, land acquisition, education and interpretation, signage, fencing and gates, law enforcement, parking and access, and trails and trailheads. Since that time, the County has implemented one of the two identified large-scale parking areas and trailheads (the Yellow Fork Canyon Parking Area and Trailhead), new fencing and gate access improvements (particularly along Rose Canyon road), and new trail signage.

In 2019, local citizens came together to design and promote additional investments in new and existing trails with an emphasis to bring competitive mountain biking into the Butterfield Canyon portion of the study area. A Steering Committee was formed to help guide development of the master plan program, provide input on issues and solutions, and determine the suitability of project area lands for particular uses. A Trails Subcommittee of the Steering Committee was also formed to focus on trail management and development within the project area, including identification of trail design standards and guidelines, trail uses and exclusions, trailheads, and trail closures. The collective efforts of these citizens, stakeholders, land owners, land management agencies, and County staff has resulted in this update to the 2011 master plan document.

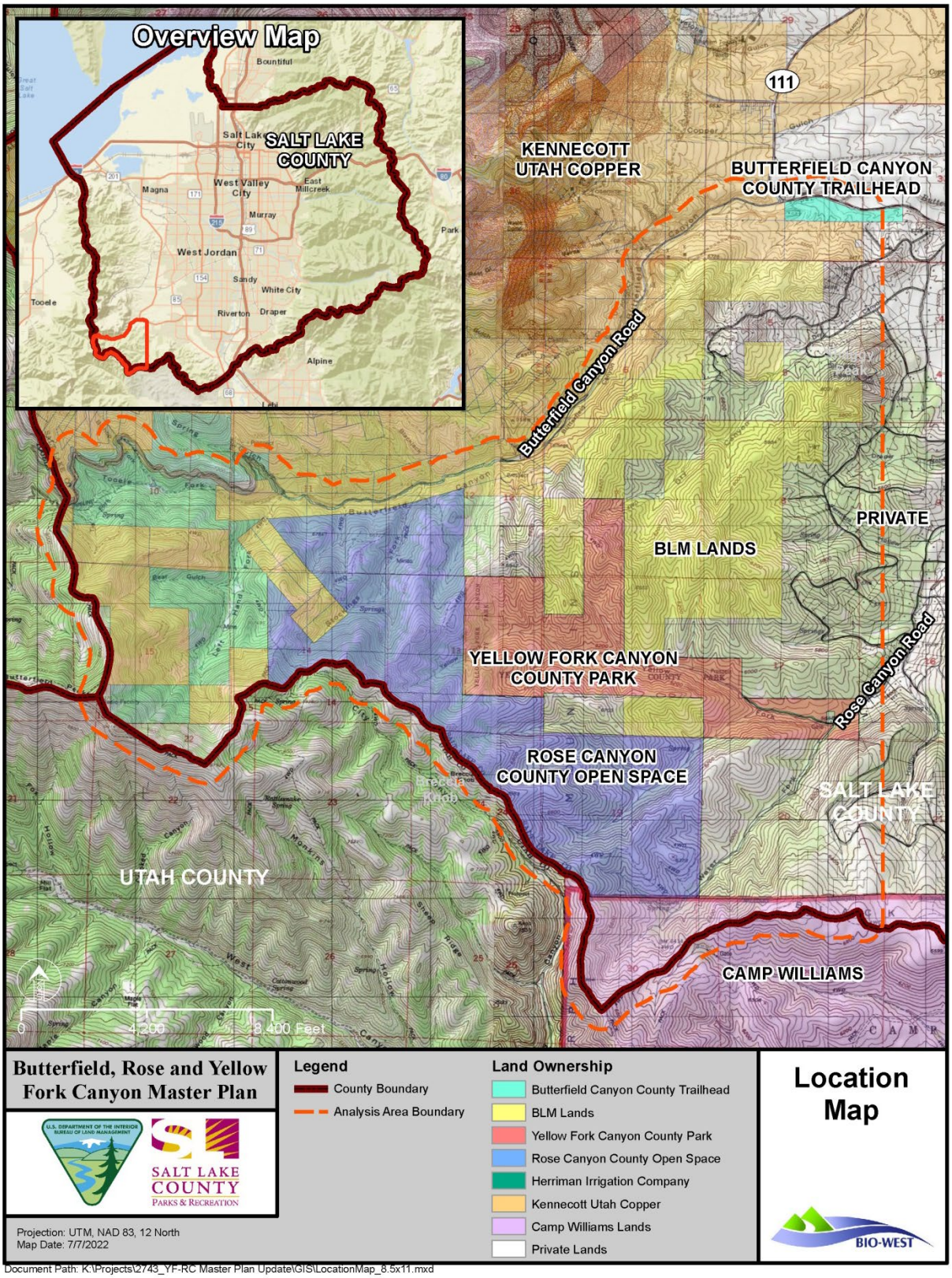

Figure 1. Butterfield, Rose, and Yellow Fork Canyons Master Plan Location Map.

Collaboration with Stakeholder Partners

Management of resources and uses on BLM public lands, which encompass approximately 15 percent of the study area, is guided by the Pony Express Resource Management Plan (BLM 1990). The plan covers management of resources such as lands, minerals, water, soil, range, wildlife, and recreation. In June of 2020, the BLM initiated the preparation of an Environmental Assessment (EA) for the development of non-motorized trails on BLM-managed lands within the Butterfield, Rose, and Yellow Fork Canyons. The project is intended to facilitate the expansion of non-motorized trail systems that support hiking, biking, horseback riding, and other human-powered recreational uses on their lands. Up to 15 miles of trails would be authorized on BLM-managed lands within the study area under a right-of-way to a municipal government or other partner organization, and/or may be constructed with BLM and volunteer labor, subject to the protective measures identified in the EA. The EA was completed in December 2020 and a final decision approving the proposed action was completed in April 2021.

On March 17, 2022 the BLM approved a right-of-way (ROW) grant, serial number UTU-95550, which authorizes the use of public land for a trails network (BLM 2022). The ROW grant permitted up to 20 miles of trails, including 5 miles of existing trails and 15 miles of new trail development, that are non-motorized and unpaved for the use of mountain biking, equestrian, and hiking uses. The ROW is 10 feet wide, 105600 feet long, and contains approximately 24.24 acres. The ROW grant is for a term of 30 years until December 31, 2051 and may be renewed. A list of special stipulations provided with the ROW grant address such items as construction activities, dust control, fencing, gates, access for vehicles, stream crossings, soil erosion prevention, revegetation, invasive species control, discovery of cultural resources, fire prevention, migratory birds, and sensitive wildlife species. Additionally, the BLM requires that the County secure a Special Recreation Permit (SRP) for any commercial, competitive, or organized uses on public lands. The BLM further determined that the County is exempt from monitoring fees and rent because of its status as a local government, and the fact that the ROW is for governmental purposes benefitting the general public.

On March 30, 2022 Kennecott Utah Copper LLC (Rio Tinto) executed a lease agreement with the County to construct, maintain, repair, and operate a series of trails for biking, hiking, equestrian, and related recreational purposes (Rio Tinto 2022). The lease agreement allows for the development and use of approximately 7 miles of existing and proposed trails within a 20 foot wide corridor and involving approximately 17.1 acres of land. Additionally, the County may enter into agreements with third-party invitees to permit the planning and occurrence of events and activities, including but not limited to, mountain biking events, races, and competitions. The term of the lease agreement is for a period of 20 years with an option to renew and extend the term for an additional 20-year period. The lease agreement stipulates that the County will pay an annual rent of $3,500 plus appropriate escalations over the period of the term as defined in the agreement. The lease agreement also contemplates future annexation and development of portions of the parcels involved by Rio Tinto. And lastly, the County acknowledges through the lease agreement

that portions of the leased lands are located within Operable Unit 3 of the Kennecott South Zone Superfund Site and that the County will fully comply with all applicable Environmental Obligations associated with a soil management plan that will be implemented during trail construction.

Relationship with Salt Lake County Land Use Planning

Nearly all of the study area is within the unincorporated portion of Salt Lake County and therefore is currently governed by the Southwest Community Land Use Plan (Salt Lake County 2008). This document shows the entire study area land use as "Open Space – Regional Park." To the north of the study area, lands are designated for "Industrial Mining" uses (i.e., Kennecott Copper Mining Operations), while to the south lands are designated for "Military" uses (i.e., U.S. Military Camp Williams Reserve). To the west of the study area, land uses are designated as "Mountain Residential" (i.e., residential density is less than one dwelling unit per 5 to 20 acres), while to the east land uses are designated as Mountain Residential and "Foothill Residential" (i.e., residential density is less than one dwelling unit per 2.5 acres or larger).

Recently (2022), the County purchased several parcels at the north end of the study area along Butterfield Canyon Road known as the Bastian Properties. These properties were purchased with the intent to develop a future trailhead and potential regional park at this location. The three parcels encompass approximately 50.3 acres or 0.5 percent of the study area and were recently annexed into Herriman City. The City's current General Plan (Herriman City 2013) does not address the future uses of these parcels. However, the City is currently developing a new General Plan that identifies these parcels as part of a future Planned Community (Herriman City 2021). The City's Planned Community designation contemplates a future large-scale planned community for the area that includes a mix of residential, commercial, and civic uses. According to the City's current Zoning Map, these parcels do not have a specific zoning designation at this time.

The County is currently in the process of updating their long-range plan that covers the study area known as the West General Plan (Salt Lake County 2022). The purpose of the West General Plan is to address the present and future needs of the County regarding growth and development of the land within this portion of the County. The Parks, Trails, and Recreation Vision identified in the West General Plan includes a goal to *"Increase outdoor recreation opportunities in the Oquirrh and Traverse Mountains"* and a strategy to *"Focus on near-term opportunities in Butterfield Canyon."* Another goal identified in the plan includes *"Plan and develop robust trail systems for current and future generations"* with associated strategies to *"Expand current plans and trail opportunities in Yellow Fork and Rose Canyons to include nearby Butterfield Canyon, BLM lands, and areas buffering Camp Williams"* and *"When and where appropriate, develop key destination trailheads with parking, restrooms, and other facilities to accommodate public use."* Proposed future land uses within the study area identified in the West General Plan include Recreation Conservation (RC), Rural Residential (RR), Mountain Multi-Use (MM), Master Planned Communities (MPC), Military (ML), and Agriculture (AG).

County zoning for the study area has been primarily designated as Forestry and Recreation

Zone with a 20-acre minimum parcel area (FR-20). The purpose of this zone is to permit the development of the foothill and canyon areas of the County for forestry, recreation, and other specified uses to the extent that such development is compatible with the protection of the natural and scenic resources of these areas for the continued benefit of future generations. Permitted uses within this zone include single-family dwelling, accessory structures, agriculture, and wireless telecommunication facilities. Examples of conditional uses that may be allowed in the FR-20 zone include bed and breakfast establishments, commercial and private recreation facilities, horses and other livestock for family food production, logging and lumber processing, mineral extraction and processing, planned unit developments, short-term rentals, and ski resorts. Large areas to the northwest of the study area are zoned M-2 Industrial for mining activities, while a smaller area to the immediate north of the study area is zoned FR-5 (Forest and Recreation). A major area along the east boundary of the study area is zoned FA-2.5 (Foothill Agriculture), while other smaller areas to the east and west of the study area boundary are zoned FA-5 (Foothill Agriculture).

The Transportation Plan for the Southwest Community (Salt Lake County 2007a) indicates that the primary County roads that provide vehicular access to the study area are designated as “Collector” roads within a 50-foot right-of-way. Butterfield Canyon Road provides access along the northern and western portions of the study area while the Rose Canyon Road provides access to the eastern and southern portions of the study area (see Figure 1). A narrow length of private land, primarily owned by Rio Tinto, separates the Butterfield Canyon Road from County and BLM lands along the western portion of the study area. Rose Canyon Road provides direct access to public facilities at Yellow Fork Canyon including the primary trailhead, picnic areas, and parking area. The Yellow Fork Canyon Trailhead was expanded and improved by the County to include equestrian parking in 2014. Currently there are a series of locked gates controlling vehicular access to County lands within the study area from both Rose Canyon and Butterfield Canyon roads.

Public and Agency Involvement

Several methods of public and agency involvement were utilized to gain input from those who are potentially affected by the plan. These methods included working closely with Key Landowner Stakeholders, formation of a project Steering Committee, and coordinating with a project Trails Focus Group. Key Landowner Stakeholders included BLM staff and Rio Tinto staff who represent the primary landowners and land management entities within the study area.

The project Steering Committee was formed to broadly represent all stakeholders who have an interest in the planning process. The Steering Committee helped to prepare issue statements, identify proposed solutions to issues, recommend future trail and trailhead facilities, and review the preliminary draft master plan document. Steering Committee members were solicited by Salt Lake County to participate throughout the planning process. To date, the Steering Committee has convened a total of five times to provide strategic input during the planning process. Stakeholders that were represented on the Steering Committee are shown in the side bar at right.

- Bureau of Land Management
- Rio Tinto
- Draper City
- Herriman City
- South Jordan City
- High Country Estates
- Back Country Horsemen
- Tracy Aviary
- Utah High School Cycling League
- Millerberg Foundation

The project Trails Focus Group was established as a subcommittee of the larger Steering Committee. The group is made up of experts in trail design, construction, and maintenance, as well as representatives of different trail user groups (e.g., hikers, mountain bikers, equestrians). The Trails Focus Group met several times over the course of the planning process to help design and finalize proposed Phase 1 and Phase 2 trail alignments throughout the study area.

Key Issues

During the planning process the County solicited stakeholders to provide a list of concerns or issues that need to be addressed in the master plan document. Key issues were identified by the project Steering Committee at their meetings. Many of the comments focused on conflicts between user groups (e.g., bicycles verses equestrians) and recreation access (e.g., trailhead locations). A number of comments concerned the lack of parking and developed facilities within the study area. Concerns about the protection of resources (e.g., vegetation, wildlife, water quality) were also expressed by those who submitted comments. The list of primary issues that citizens and stakeholders feel need to be addressed in the master plan document are shown in the side bar at left. A more detailed description of the issue statements is provided in Appendix B.

- Issue 1: Public Access and Parking
- Issue 2: Butterfield Canyon
- Issue 3: Property Acquisition
- Issue 4: Minerals Development
- Issue 5: Motorized vs. Non-motorized Uses and User Conflicts
- Issue 6: Camp Williams
- Issue 7: Signage
- Issue 8: Wildfires
- Issue 9: Former BLM Wild Horse and Burro Center
- Issue 10: Segregation of Uses
- Issue 11: Wildlife Habitat and Hunting
- Issue 12: Law Enforcement
- Issue 13: Stakeholder Cooperation
- Issue 14: User Fees
- Issue 15: Invasive Species
- Issue 16: Fencing
- Issue 17: Recreational and Trail Head Facilities

CHAPTER 2:
EXISTING RESOURCE CONDITIONS

This chapter describes the current conditions of natural resources of interest within the Butterfield, Rose, and Yellow Fork Canyons Master Plan study area. Resource conditions were identified by on-site inspections, literature searches, contact and coordination with agency and stakeholder personnel, and public involvement. The conditions of the resources described below existed as of 2021, during the planning process.

Geology

The study area is located on the western fringe of the Salt Lake Valley which is on the eastern edge of the Great Basin, a part of the Basin and Range Province. The Great Basin is comprised of north-south trending, closed-basin valleys and associated fault block mountain ranges. The valleys are filled with alluvial fan and pluvial lake deposits (Hintze 1988). More specifically, the Salt Lake Valley is bordered by the Wasatch Mountains Range to the east and the Oquirrh Mountains Range to the west.

The study area consists of mountainous terrain on the eastern edge of the Oquirrh Mountains Range. Topographical elevations in the study area range from approximately 5,400 feet in the northeast portion to approximately 7,900 feet in the southwest portion. The overall topography of the Project Area has a steep to moderate very gradual slope to the north and east.

The geology of the study area consists primarily of Tertiary aged deposits of volcanic lava flows and block and ash flow tuffs. These deposits are the result of Tertiary volcanic eruptions associated with the Bingham Intrusive Complex to the north of the study area. Minor deposits of the Pennsylvanian aged Butterfield Peaks Formation, part of the Oquirrh Group, are also located in the study area (Biek et al. 2007). These deposits consist of interbedded fine grained, sandstone and limestone deposits.

Quarternary aged alluvial deposits consisting of gravel, sand, silt, and clay are located in the stream channels and flood plains within the canyons located throughout the study area (Biek et al. 2005).

The study area is located within the primary groundwater recharge zone for the principal aquifer in the Salt Lake Valley. Groundwater in the area generally flows east towards the Jordan River (Anderson et al. 1994).

Soils

According to the Soil Survey for the Salt Lake City Area (SSURGO 2022), there are twenty-nine (29) soil types located within the study area (Figure A-2 in Appendix A). None of the soil types in the study area are flooded or ponded and they all have a natural drainage class of well drained. Table 1 provides a summary of soil type characteristics relevant to the master plan. Brief descriptions of the distinguishing characteristics of each soil type are provided in Appendix C.

Table 1. Summary of Soil Type Properties Relevant to Trail and Trailhead Construction.

Soil Series and Map Symbol	USDA Texture	Soil Properties Significant to Engineering			
		Steepness of Slope (Percentage)	Depth to Bedrock (Inches)	Permeability (Inches)	Shrink-Swell Potential
Datemark-Podmor Moist-Rock Outcrop (14A)	Very Cobbly Loam	30 - 70	20 – 40	0.06 – 0.27	Low
Podmor-Onaqui-Rock Outcrop (47)	Very Cobbly Loam	20 - 60	20 – 40	0.2 – 4.0	Very Low
Baird Hollow Loam (BAG)	Loam	30 - 70	>60	0.2 – 5.2	Moderate
Bradshaw-Agassiz Association (BEG)	Loam	40 - 70	>60	0.2 – 3.0	Low
Butterfield Extremely Stony Loam (BFF)	Very Stony Loam	5 - 50	12 – 20	0.2 – 2.5	Low
Butterfield Association (BVF)	Very Cobbly Loam	5 - 20	>60	0.2 – 2.0	Low to Medium
Broadhead Loam (BnD)	Loam	3 - 25	>60	0.2 – 3.0	Low to Medium
Calpac-Agassiz Complex (CbF)	Very Cobbly Loam	30 - 70	40 - 60	0.2 - 4.0	Low to Moderately High
Dry Creek-Copperton (DPD)	Silt Loam	4 - 15	>60	0.2 – 5.2	Moderate
Dry Creek Soils (DRD)	Silt Loam	3 - 15	>80	0.2 – 6.0	Moderate
Dumps (Du)	N/A	N/A	N/A	N/A	N/A
Fitzgerald Gravelly Loam (FGG)	Very Gravelly Loam	40 - 70	>80	0.2 – 4.0	Moderate to High
Flygare Loam (FbF)	Loam	30 - 70	>80	0.2 – 4.0	Moderate to High
Gappmayer Very Cobbly Loam (GEG)	Very Cobbly Loam	30 - 60	>80	0.2 – 3.8	Moderate to High
Gappmayer-Wallsburg (GGG)	Very Cobbly Loam	30 - 70	>80	0.2 – 3.0	Moderate to High
Harkers-Dry Creek (HDF)	Loam	6 - 40	>80	0.2 – 5.2	Moderate to High
Harkers Soils (HHF)	Loam	6 - 40	>80	0.2 – 5.3	Moderate to High
Henefer-Harkers (HKF)	Stony Loam	10 - 60	>80	0.2 – 5.2	Moderate to High
Henefer-Horrocks Complex (HNF)	Stony Loam	5 - 50	>60	0.2 – 4.7	Moderate
Horrocks Extreamely Stony Loam (HWF)	Very Stony Loam	5 - 50	12 – 20	0.2 – 3.7	Moderate
Horrocks-Little Pole Association (HXF)	Stony Loam	5 -50	12 – 20	0.2 – 3.0	Low
Kearns Silt Loam (KaB)	Silt Loam	1 - 3	N/A	0.2 – 6.7	Moderate
Lucky Star Gravelly Loam (LSG)	Gravelly Loam	40 - 60	>60	0.2 – 3.9	Low
Parkay-Rock Outcrop Complex (PeF)	Very Stony Loam	30 - 70	40 – 60	0.2 – 6.0	Low to Moderate
Red Rock Silt Loam (Re)	Silt Loam	1 - 3	>80	0.2 – 6.7	Moderate
Stony Terrace Escarpments (SP)	Stony Terrace	Steep	N/A	N/A	N/A
Wallsburg Very Cobbly Loam (WAG)	Very Cobbly Loam	30 - 70	12 – 20	0.2 – 1.5	Moderate
Wallsburg-Rock Outcrop Complex (WcF)	Very Cobbly Loam	25 - 70	12 – 20	0.2 – 2.0	Low to Moderate
Wallsburg-Yeates Hollow Complex (WdE)	Very Cobbly Loam	25 - 40	10 – 20	0.2 – 2.0	Low

Source: USDA 1984; SSURGO 2022.

Slopes

When developing recreational amenities such as trails and trailheads, it is important to consider the gradient or steepness of the land (i.e., the slope of the land). This information is particularly important since infrastructure such as parking lots at trailheads become more difficult and expensive to construct and maintain in areas steeper than 10 percent slope. In addition, steeper slopes are more prone to hazards such as landslides, rock falls, and erodible soils. Information about slopes across the study area is provided in Figure A-3 in Appendix A. Slopes were grouped into four categories: 0 - 10 percent; 10.1 – 20 percent; 20.1 – 30 percent; and greater than 30 percent. Table 2 provides a summary of the study area slopes.

Table 2. Summary of Slope Categories.

Slope Percentage Category	Area	Percent of Study Area
0.0 percent – 10.0 percent	1,400 acres	14 percent
10.1 percent – 20.0 percent	3,863 acres	38 percent
20.1 percent – 30.0 percent	3,800 acres	38 percent
Greater Than 30.0 percent	980 acres	10 percent

Hydrology and Water Quality

Water within the study area is scarce, and most surface flow and groundwater recharge result from winter precipitation. There are two spring-fed perennial streams within the study area that generally drain towards the north and east, and ultimately to the Jordan River in the middle of the Salt Lake Valley. Butterfield Creek drains much of the northern and western half of the study area while Rose Creek drains the southern and eastern half.

Summer thunderstorms can produce intense rainfall of short duration, which quickly infiltrates the well-drained soils within the study area. As a result of the semi-arid climate, most of the study area drainage channels convey little or no streamflow for long periods of time during the year. Downstream of the study area, much of the natural drainage channels for Butterfield and Rose Creeks have been interrupted or eliminated due to agricultural and community development.

Both Rose Creek and Butterfield Creek are given the 2B, 3D beneficial use classification by default since they are not specifically listed by the State of Utah. The 2B classification is for infrequent primary contact recreation such as wading, hunting, and fishing. The 3D classification protects waterfowl, shore birds, and other water-oriented wildlife not identified in classes 3A-3C, as well as the aquatic organisms in their food chain (Salt Lake County 2007b). Neither stream is on the State 303(d) list of impaired water bodies.

Rose Creek drains an area that is primarily open space or undeveloped areas within Salt Lake County. Therefore, potential water quality issues would generally be limited to sediment, temperature, and dissolved oxygen problems. Butterfield Creek nears a portion of active mining operations north and west of the study area. The creek flows through the Kennecott South Zone CERCLA Operable Unit 3 (OU3) creating the potential for pollutant contamination. Soils within OU3 have the potential to contain lead and arsenic concentrations from historical mining operations that are above the Recreational Land Use Standard for these constituents (Kleinfelder 2022). Water quality data within the study area are only available for Butterfield Creek. Data from two STORET sites near the study area (#4994450 and #4994440) indicate that some samples for total phosphorus have exceeded the 0.05 mg/L numeric criteria. However, the State of Utah has not identified the stream as impaired by phosphorus. All other data indicate that the stream meets water quality standards for the constituents sampled (NWQMC 2022).

There are three water rights actions on Rose Creek within Salt Lake County. The Rose Creek Irrigation Company claims water from Rose Creek and all of its tributaries (water right

number 59-3444). Of the remaining two water rights applications, one is being protested and the other is currently unapproved. Water rights on Butterfield Creek are primarily held by the Herriman Irrigation Company. The other water right is held by a private citizen. According to the State of Utah, these are approved water rights (UDWRi 2022).

Vegetation

The study area has been classified into a series of vegetation cover types based on information and data contained in the Southwest Regional GAP analysis Project (USGS 2004). Vegetation cover types are determined through identification and classification of plant species found in a particular area. The plant species in each cover type will vary depending upon soil type, slope, soil moisture, aspect, and elevation. There are five native vegetation cover types found within the study area (Figure A-4 in Appendix A), which are described in detail below. Other cover types shown on Figure A-4 include agriculture and disturbed areas. Because slope aspect generally determines vegetation types within the study area, a slope aspect map can be found as Figure A-5 in Appendix A.

Alpine and Subalpine

Alpine and subalpine vegetation cover types occur at upper elevations within the western portion of the study area, encompassing approximately 13.3 percent (1,242 acres) of the study area. These forested areas typically have 30 percent forest cover, of which 70 percent or more is made up of conifers. The common plant species found within the alpine or subalpine vegetation cover types vary depending upon aspect and soil moisture. The moderately dense vegetative cover ranges from 60 to 90 percent. Species in this cover type include Douglas fir, mountain snowberry, timber oatgrass, and yellow columbine.

Bigtooth Maple and Gambel Oak Woodlands

The bigtooth maple and Gambel oak woodlands vegetation cover types occur in the upper foothills and lower montane areas throughout the study area, encompassing approximately 37.0 percent (3,462 acres) of the study area. The bigtooth maple woodlands areas typically occur on north-facing slopes that have a higher soil moisture content. Gambel oak woodlands are found on drier west- and south-facing slopes. The vegetative cover in these woodlands ranges from moderate to dense. Bigtooth maple woodland areas, which are the densest, range from 65 to 90 percent vegetative cover. Species in this cover type include Gamble oak, big sagebrush, Wheeler blue grass, and mountain bluebells.

Pinyon and Juniper Woodlands

The pinyon and juniper woodlands vegetation cover types occur primarily in the lower elevations of the eastern half of the study area, encompassing approximately 34.8 percent (3,257 acres) of the study area. These woodlands occur on warm, dry sites on mountain slopes and ridges in narrow bands between the sagebrush shrubland and grassland and bigtooth maple and Gamble oak woodland vegetative cover types. Species in this cover type include Utah juniper, rubber rabbitbrush, Great Basin wildrye, and scarlet globemallow.

Riparian Woodlands and Shrublands

The riparian woodlands and shrublands vegetation cover type is found in narrow corridors along stream channels, encompassing 1.3 percent (120 acres) of study area lands. Critically important to wildlife, these areas are dominated by trees and have a diverse shrub

understory. Species in this cover type include Fremont cottonwood, chokecherry, desert saltgrass, and fire chalice.

Sagebrush Shrublands and Grasslands

The sagebrush shrublands and grasslands vegetative cover type is found primarily along the mountain ridgelines throughout the study area, encompassing approximately 11.9 percent (1,114 acres) of the study area. They occur on dry, well-drained slopes that consist of deep non-saline soils. The vegetation cover in these areas ranges from moderate to moderately dense (50 to 75 percent cover). Species in this cover type include Wyoming big sagebrush, Indian ricegrass, Sandberg bluegrass, and Wasatch penstemon.

Wildlife

Generally, the study area lies within the Intermountain Semi-Desert and Desert ecological province as described by Bailey (1995). This ecoregion is typically characterized as a sagebrush semi-desert with a pronounced drought season and a short humid season. Most precipitation falls during the winter months despite a peak during the month of May.

The study area and the Oquirrh Mountains provide crucial big game habitat. The Rocky Mountain Elk Foundation and the Utah Division of Wildlife Resources have identified the approximately 750 elk in the area as a critical herd. The Utah Partners in Flight, (Parrish 2002) indicates that several priority avian species also use the area for nesting.

Large mammals likely to occur within the study area include mule deer, antelope, elk, mountain lion, bobcat, coyote, and badger. Habitat within the study area has been defined as crucial summer, winter, and year-long habitat for mule deer and as substantial spring, summer, and year-long habitat for elk. Generally, the most common species to be found within the study area include small mammals such as ground squirrels, jackrabbits, kangaroo mice, wood rats, and fox.

Bird species likely to be found within the study area range from the burrowing owl to habitat specialists including the sage sparrow and sage thrasher. Other bird species include black-throated gray warblers, bushtits, gnatcatchers, oak titmouse, ravens, accipiters, vultures, buteos, and house wrens. Raptor species likely to be found include the American kestrel, golden eagle, and ferruginous hawk. Turkey have been introduced to the surrounding area by the state, in partnership with Rio Tinto and the National Wild Turkey Federation, and can be found throughout the study area in large numbers.

A total of 28 special status wildlife species potentially occur in Salt Lake County, including three federally listed species and one candidate federally listed species (Table 3), as well as 24 state listed species (Table 4). Based on Salt Lake County specific threatened, endangered, or otherwise sensitive species lists obtained from the US Fish and Wildlife Service (USFWS) Environmental Conservation Online System (USFWS 2021) and the Utah Division of Wildlife Resources (UDWR) Conservation Data Center (UDWR 2021), no federally protected threatened, endangered, or candidate species are likely to be found within the study area due to a lack of suitable habitat.

For the 24 aquatic and terrestrial wildlife species that are listed as sensitive in Salt Lake County by the State (UDWR 2021), fourteen of these species are birds, three are mammals, two are mollusks, two are fishes, two are amphibians, and one is a reptile. Tables 3 and 4 identify if appropriate habitat for a given species is present within the study area and the likelihood of occurrence of that species based on its habitat requirements and known distribution. No state or federal listed species have been observed on site while performing field work during the master planning process and the study area is unlikely to contain the preferred habitat for the majority of these species.

Table 3. Federally listed threatened and endangered species occurring in Salt Lake County.

Common Name	Scientific Name	Status	Suitable Habitat in the Survey Area	Species Occurrence in the Study Area
Ute Ladies' Tresses	*Spiranthes diluvialis*	Threatened	Absent	Not present based on literature review and lack of suitable habitat.
Monarch Butterfly	*Danaus plexippus*	Candidate	Absent	Not present based on literature review and lack of suitable habitat.
June sucker	*Chasmistes liorus*	Endangered	Absent	Not present based on literature review and lack of suitable habitat.
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Absent	Not present based on literature review and lack of suitable habitat.

Table 4. State listed sensitive wildlife species occurring in Salt Lake County.

Common Name	Scientific Name	Status	Suitable Habitat in the Survey Area	Species Occurrence in the Study Area
American three-toed woodpecker	*Picoides dorsalis*	SPC	Absent	Potential to occur within riparian corridor.
American white pelican	*Pelecanus erythrorhynchos*	SPC	Absent	Unlikely to occur due to lack of open water or gravel bars.
Bald eagle	*Haliaeetus leucocephalus*	SPC	Yes	Potential to occur within larger trees.
Black swift	*Cypseloides niger*	SPC	Absent	Unlikely to occur.
Bobolink	*Dolichonyx oryzivorus*	SPC	Absent	Unlikely to occur.
Bonneville cutthroat trout	*Oncorhynchus clarkii*	CS	Absent	Unlikely to occur.
Burrowing owl	*Athene cunicularia*	SPC	Absent	Potential to occur within disturbed areas.
California floater	*Anodonta californiensis*	SPC	Absent	Unlikely to occur.
Columbia spotted frog	*Rana luteiventris*	CS	Absent	Unlikely to occur.
Ferruginous hawk	*Buteo regalis*	SPC	Yes	Potential to occur within larger trees.
Grasshopper sparrow	*Ammodramus savannarum*	SPC	Absent	Unlikely to occur.
Greater sage-grouse	*Centrocercus urophasianus*	SPC	Absent	Unlikely to occur.
Kit fox	*Vulpes macrotis*	SPC	Absent	Potential to occur within riparian corridor or surrounding habitat.
Least Chub	*Iotichthys phlegethontis*	CS	Absent	Unlikely to occur.
Lewis's woodpecker	*Melanerpes lewis*	SPC	Absent	Unlikely to occur.
Long-billed curlew	*Numenius americanus*	SPC	Absent	Unlikely to occur.
Lyrate mountainsnail	*Oreohelix haydeni*	SPC	Absent	Unlikely to occur.
Northern goshawk	*Accipiter gentilis*	CS	Absent	Potential to occur within the riparian corridor.

Common Name	Scientific Name	Status	Suitable Habitat in the Survey Area	Species Occurrence in the Study Area
Short-eared owl	*Asio flammeus*	SPC	Absent	Potential to occur within the riparian corridor.
Smooth greensnake	*Opheodrys vernalis*	SPC	Absent	Potential to occur within riparian corridor or surrounding habitat.
Spotted bat	*Euderma maculatum*	SPC	Absent	Unlikely to occur.
Townsend's big-eared bat	*Corynorhinus townsendii*	SPC	Absent	Unlikely to occur.
Western pearlshell	*Margaritifera falcata*	SPC	Absent	Unlikely to occur.
Western toad	*Anaxyrus boreas*	SPC	Absent	Unlikely to occur.

SPC = Wildlife species of concern; CS = Species receiving special management under a Conservation Agreement in order to preclude the need for Federal listing (USDI 2018).

Recreation and Scenery

The study area is becoming increasingly popular with recreationists despite the lack of on-site developed recreational facilities. Butterfield, Rose, and Yellow Fork Canyons are well known by equestrian and mountain bike users who have created numerous trails throughout the analysis area over the years. Both single-track trail and primitive roads are used by recreationists to provide a variety of loop opportunities for trail users of varying capabilities. There are over 70 miles of documented trails within the study area, including over 32 miles of existing two-track trail and over 37 miles of single track trail (see Figure A-6 in Appendix A). Many of the trails lack erosion control and water management features, and very little maintenance is being performed to minimize resource damage as a result of erosion and off-trail uses. Access to two-track trails (Primitive Roads) is controlled by locked gates in Butterfield, Rose, and Yellow Fork Canyons.

Currently, there is only one small paved parking area that can accommodate 12 passenger cars and a larger equestrian parking area nearby that can accommodate 24 trucks with trailers (or another 48 passenger cars) at the trailhead for Yellow Fork Canyon along the Rose Canyon Road in the eastern portion of the study area. The Yellow Fork Canyon Trailhead also includes a vault-type restroom for visitors. Numerous other undeveloped and unauthorized parking areas exist along the Butterfield Canyon Road in the west and north portions of the study area on Rio Tinto lands. Some resource damage has occurred due to vegetation trampling and soil erosion at each of these sites from unconfined parking and uncontrolled off-highway vehicle (OHV) uses.

Vehicles are currently not allowed on the unpaved dirt road up Yellow Fork Canyon, which provides access to the existing picnic areas found in this portion of the study area. Picnic tables and hitches for equestrian users are provided at the existing picnic area locations. Motorized vehicles are currently prohibited from all other lands within the study area. However, despite numerous locked gates and fences on the many primitive roads that provide access to the study area from adjacent private property, OHV and motorbike users continue to trespass onto study area lands by vandalizing or circumnavigating these barriers.

The study area provides great opportunities to view the characteristic natural landscape within its boundaries, as well as opportunities to view surrounding landscapes from higher elevation vistas. In particular, views from the high-elevation ridge along the southwestern portion of the study area provide grand vistas of Rio Tinto's mining operations to the north and west, the entire Salt Lake Valley to the north and east, and much of Utah Valley to the south.

Although some localized disturbances are apparent at high-use areas, the vast majority of the study area can be viewed in its natural condition. A variety of native habitats can be explored, and the diverse vegetation cover types within the study area provide vibrant colors for viewing in the Fall season.

Mineral Rights

Portions of the Rose Canyon and Yellow Fork Canyon study area contain mineral rights that are not owned by the County. There are unpatented Federal mineral claims within the study area that are administered by the BLM and that could be developed in the future. The unpatented mineral lands include approximately 1200 acres in the Rose Canyon Ranch portion of the study area, 940 acres in the BLM portion of the study area, and another 80 acres in the Yellow Fork Canyon Park portion of the study area. In addition, there are approximately 400 acres of BLM lands that do not currently have mineral claims. These Federal mineral rights are open to acquisition, appropriation, and development under various Federal laws.

In 2014, Salt Lake County made application to the BLM to acquire these Federal mineral rights. Rio Tinto subsequently located unpatented mining claims on the same lands. Pursuant to an agreement between Rio Tinto and Salt Lake County (2015), the County put its application on hold while Rio Tinto proceeded with a phased mineral exploration process to assess the mineral potential of these lands. At that time, Rio Tinto was unable to identify the presence of an economic mineral deposit of interest and the agreement expired in 2016. Rio Tinto does not plan to pursue acquiring mineral rights within the study area in the future.

There are also two State mineral claims within the study area that are administered by the School and Institutional Trust Lands Administration. One of these encompasses approximately 40 acres within the Yellow Fork Canyon Park portion of the study area and does not show a current mineral lease. The other encompasses approximately 50 acres within the Rose Canyon Ranch portion of the study area and is subject to a metalliferous mineral lease in favor of Kennecott Exploration Company issued in October, 2007. All other lands within the study area, approximately 1,300 acres, contain private mineral rights. The various categories of mineral rights within the study area are shown in Figure A-7 in Appendix A.

Existing Utilities and Easements

There are a number of utilities that traverse or are located on study area lands. Most notable is a 20-inch high pressure Dominion Energy gas line that traverses the County owned properties along Utah 111 at the northern end of the study area. At the west end of the County properties, the pipeline transitions to a 16-inch high pressure gas line at a Dominion Energy owned regulatory station property and then follows Butterfield Canyon Road over to Tooele County. The gas pipelines themselves are located within easements through these properties.

There are also a variety of other easements or right of way's throughout the study area located on County, BLM, and private lands. Most of these easements grant access to existing utility infrastructure or through subject properties. For example, there are approximately six right of ways on BLM lands that were granted for a variety of reasons including water facility infrastructure for High Country Estates and communication sites, power supply, and access roads for Rio Tinto.

CHAPTER 3:
PROPOSED LAND USES

Salt Lake County envisions that the study area would be utilized for low intensity public recreation purposes. Public uses of the property are intended to be subordinate to preservation of the natural character of the landscape. This master plan recommends that low intensity recreation uses be defined as equestrian, hiking, mountain biking, cross- country skiing, snowshoeing, picnicking, nature study, and wildlife viewing. Recreational facilities that would support these uses include natural surface trails, paved or gravel parking areas, trailhead facilities, non-obtrusive signs for orientation and interpretation, graded and gravel roads where vehicle use is permitted, trail bridges, non-obtrusive gates and fencing, public restrooms, drinking water, picnic tables, and picnic pavilions. The lone exception to these restricted land use purposes would be on the recently acquired Bastian Properties that the County purchased, which may include development of a future Regional Park adjacent to a major trailhead.

This master plan further recommends that a number of activities be prohibited such as off-road motorized vehicles, paint ball games, camping, disturbance or removal of plants or animals, livestock or pets out of the physical control of their owners, sports fields or BMX courses, travel off of established trails, hunting, trapping, and commercial activities. However, the development of sports fields, BMX courses, or other developed amenities could be considered at the future Regional Park along Butterfield Canyon Road on the recently acquired Bastian Properties. Currently, hunting is allowed on BLM lands within the study area according to UDWR regulations, but is prohibited on County owned lands according to County ordinances. Because the nature of recreation changes over time, it will be necessary for Salt Lake County to review and determine if proposed recreational activities conflict with the intended preservation of study area natural resources.

As more people in the Salt Lake Valley discover the beauty and serenity of the Butterfield Canyon, Rose Canyon, and Yellow Fork Canyon area, it will be necessary for the community to take an increasingly active role in using the area responsibly and respecting private property. Currently, trespassing violations and destruction of public and private property occur regularly. All users and residents must be committed to preserving these natural resources which are so close to the urbanizing area and adjacent rural neighborhoods, as well as one of the State's largest employers, Rio Tinto.

Future developed facilities at the study area would help to control access and contain motorized uses on a relatively small portion of the subject properties. Developed access points would largely be on the periphery of the study area. Most facility development should be in the form of trails and trailheads that will accommodate access within the interior of the study area. The visitor experience should include exposure to nature, scenic viewing, relative solitude, passive recreational activity, natural resource education, and healthy exercise. Most of the land within the study area has significant value for wildlife and important habitat areas should be identified, protected, and improved where necessary. Damaged or disturbed areas should be repaired, and care should be taken to design low-impact facilities. Proposed land uses and facilities are described below in more detail. Proposed trailhead facility development locations are shown on Figure A-6 in Appendix A.

Parking and Access

As Salt Lake County and BLM move forward with any improvements to access via parking and trailheads, it is imperative to coordinate and negotiate all potential improvements with neighboring property owners, including Rio Tinto, Camp Williams, Herriman Irrigation Company, and High Country Estates. The options listed in this document are for discussion purposes only, and should not be construed as guaranteeing public access at identified future locations.

Trailheads are envisioned to be developed at each of the four existing or proposed parking areas that provide access to the study area. Each trailhead should provide kiosks for visitor information and orientation, picnic areas, and vault-type restrooms. The parking areas are proposed to have a paved or gravel surface with defined parking stalls, including those for horse trailers. Fencing should also be provided to control access and prevent trespass at all trailhead and parking area locations.

All parking areas and trailhead facilities should be designed to provide accessibility for users of all abilities. Making these facilities accessible involves removing barriers and providing gentle grades for parking lots, picnic areas, restrooms, and walkways. While not every facility must be accessible in a recreation area, a person with mobility impairment should be able to park, leave their car, travel to a picnic site or pavilion, travel to and read interpretive exhibits, travel to and experience a scenic overlook, and travel to and use a restroom. Paved trails may be needed to connect these facilities at existing and proposed trailheads.

It will be important to manage the study area in a way that prevents motor vehicles from leaving established roadways and designated parking areas. Parking along Rose Canyon and Butterfield Canyon roads should be prohibited for safety and resource protection reasons. In particular, parking along Butterfield Canyon Road should be prohibited to prevent the transport of contaminated soils off-site. Existing undeveloped parking areas should have barriers installed to prevent future use and those areas that have been disturbed should be rehabilitated. The following sections discuss those future parking and access locations that should be developed as part of implementation of this master plan.

Lower Butterfield Canyon Parking Area and Trailhead

A proposed parking area should be developed just down canyon from the existing gate that closes Butterfield Canyon Road (see Figure A-6). The gate is closed seasonally to motor vehicles to protect and preserve the road surface from damage, and to minimize maintenance during winter. The existing gate allows for pedestrians and OHV's to bypass the gate when it is closed. When the gate is closed, recreationists are parking indiscriminately along the roadway which is causing vegetation disturbance along Butterfield Creek and uncontrolled erosion to occur.

A large, relatively flat area that is currently managed for agricultural uses on private land known as the Bastian Properties would readily accommodate this proposed use. This location is ideal for connecting to the future Bonneville Shoreline Trail and serving as an important trailhead facility for the study area. The Bastian Properties were recently acquired by the County to accommodate the proposed uses at this location. The Bastian Properties will likely serve as both a major trailhead and a future County Regional Park.

Water Fork Canyon Parking Area and Trailhead (seasonal)

This proposed parking area would be developed in close coordination with adjacent landowners under an agreement with the County, if necessary. Because of steep terrain and important riparian areas along the Water Fork tributary of Rose Creek, the ideal location for development of a new parking area at the terminus of Rose Canyon Road would be on Salt

Lake County property (see Figure A-6). A large, relatively flat, area of sagebrush shrubland and grassland is of sufficient size to accommodate this proposed use just beyond the County's property boundary. This location is ideal for connecting to the future Bonneville Shoreline Trail and the current trail system at higher elevations within the study area. The parking area may have a paved or gravel surface and would be open only seasonally.

Development of a parking area at this location would require some improvements to Rose Canyon Road. A gate was installed near the Yellow Fork Canyon trailhead to prevent vehicular access onto this unpaved portion of the road during winter and spring conditions to preserve the road surface and adjacent riparian habitats (i.e., similar to the current seasonal restrictions on Butterfield Canyon Road). Improvements to the road should include re-grading and re-alignment where necessary, as well as paving the road if deemed appropriate based on use. In addition, fencing may be required along the road to prevent trespass onto adjacent private property.

Upper Butterfield Canyon Parking Area and Trailhead (seasonal)

This location coincides with an existing gated access to the study area. Butterfield Canyon Road becomes narrow and steep beyond this point, restricting use by certain vehicle sizes and trailers. This proposed parking area would be closed seasonally by Salt Lake County as part of the closure in lower Butterfield Canyon. The ideal location is owned by Rio Tinto on a relatively flat area that would be suitable for this use (see Figure A-6).

Recreational Trails

All trails within the study area should be designed for non-motorized uses. Primary uses include hiking, running, mountain biking, and horseback riding. The International Mountain Bike Association (IMBA) multi- use trail standards should guide design of current and future trails. Depending on safety, location, and characteristics of the trail, some trails may need to be limited to specific uses to prevent conflicts.

An inventory of the location of existing trails within the study area was completed during the master planning process. This inventory was helpful in determining which trails should remain and which ones should be closed. However, information on the current condition or maintenance needs of these trails was not collected during the inventory. A more thorough inventory would help to address future trail needs, as well as maintenance, repair, and reroute issues.

Both single track trails and two-track maintenance roads within the study area are used as trails by recreationists. Primitive roads within the study area should be managed for trail uses, as well as for Salt Lake County maintenance access, utility infrastructure maintenance access, and for fire breaks. The Unified Fire Authority should be consulted regarding maintenance of primitive roads for fire breaks.

The Bonneville Shoreline Trail (BST) is proposed to be located through the study area. A proposed route for the BST has been identified and is shown on Figure 6. The proposed BST route follows existing primary and secondary trails through the study area and should require only limited new trail construction to complete the alignment. The BST requires directional signs and use of the BST logo, and should accommodate equestrians, hikers, and mountain bikers.

Winter Recreation

There has been some interest in winter recreation opportunities within the study area. Because both Butterfield Canyon and Rose Canyon roads will continue to be closed during the winter, winter recreationists will need to access the study area from either the Lower Butterfield Canyon or Yellow Fork Canyon parking areas. Winter recreation uses will be limited to non-motorized activities such as cross-country skiing and snow shoeing.

CHAPTER 4:
PROPERTY MANAGEMENT

Natural Areas Land Management Plan

In December 2007, Salt Lake County completed its *Natural Areas Land Management Plan Standards and Operations Manual* (Salt Lake County 2007c) to guide maintenance and management activities at natural areas under its stewardship. The purpose of the manual is to assist County Parks and Recreation staff in identifying, monitoring, and maintaining properties under their jurisdiction that are to remain primarily in a natural state. Natural areas are remnants of Salt Lake Valley's pre-settlement landscapes that contain rich, diverse plant and animal communities and are minimally developed. The manual establishes standards and guidelines for classifying natural areas by landscape type, planning for and performing maintenance and monitoring activities, and rehabilitating or restoring degraded and disturbed areas. It will be used by County Parks and Recreation staff to guide maintenance and management activities on study area lands.

Natural Areas Maintenance

Maintenance of study area lands will focus on maintaining healthy native vegetation communities, stabilizing soils in disturbed areas, minimizing disturbance related to recreational activities, and reducing noxious weed infestations. The *Natural Areas Land Management Plan Standards and Operations Manual* addresses maintenance activities such as weed management, erosion control, and revegetation of disturbed areas. The manual provides information on weed identification and various control methods, erosion control practices and installation techniques, and revegetation planning and implementation techniques. It will be used by County Parks and Recreation staff to guide maintenance and management activities within the study area.

Trail maintenance will be an important management activity on study area lands. Established standards for the design and maintenance of hiking, mountain biking, and equestrian trails should be used by the County throughout the study area. Trails within the study area should be designed, constructed, and maintained using standards developed by the U.S. Forest Service (USFS), the IMBA, and the Bonneville Shoreline Trail Alignment Plan (BSTC 2005). Basic trail construction standards from these and other sources are provided in Appendix D. County Parks and Recreation staff will use these resources to guide trail construction and maintenance activities within the study area.

Management Staffing

The Rose Canyon and Yellow Fork Canyon properties will require management capabilities that are different from the typical developed park management and maintenance activities. The size of the study area, limited accessibility, dispersed facilities, varying public uses, extensive trail systems, and neighboring land uses all contribute to the unique staffing and equipment demands that are anticipated. One full-time County staff member will manage day to day operations and supervision of study area lands and will handle regular maintenance activities, develop project budgets, oversee development projects, implement restoration and weed control projects, coordinate with law enforcement, program recreational and

educational activities, organize and direct volunteer projects, help coordinate special events, and serve as the liaison to Herriman City and adjacent unincorporated property owners.

Wildfire Management

Wildfire management on study area lands will be an important priority for managing and maintaining the Butterfield, Rose, and Yellow Fork Canyons properties. The entire study area is part of the "urban-wildland interface," where suburban residential areas are adjacent to and/or intermixed with wildlands or undeveloped areas. Wildfire is an important natural process that is often necessary to maintain healthy ecosystems, but it also presents a significant hazard to residents and properties within the urban-wildland interface. Management strategies within the study area should include management and maintenance of vegetation and fire breaks, as well as public education, to mitigate some of the wildfire hazards.

To begin the process of wildfire management on study area lands it will be necessary for the County to conduct a wildfire hazard assessment. The County Parks and Recreation staff should coordinate with personnel from the County Unified Fire Authority and the BLM to foster communication of wildfire risks and mitigation plans between all agencies involved. The purpose of the assessment is to identify fire-prone vegetation, fuel breaks, properties at risk, emergency access locations, water sources, and wildfire mitigation strategies. Wildfire mitigation strategies should include fuels modification, guidelines for fire response and evacuation routes, and homeowner education.

Collaboration with Stakeholders Partners

Cooperation and collaboration with agency, special user group, and community partners will be essential to the successful implementation of the Butterfield, Rose, and Yellow Fork Canyons Master Plan. Both Salt Lake County and BLM staff will provide the primary oversight and management of study area lands. Other critical partnerships should be established and continue with adjacent property owners such as Rio Tinto, Camp Williams (Utah National Guard), Herriman City, and High Country Estates to deal with access and parking area developments and improvements, as well as wildfire management. Additional partnerships should be established with user groups such as the Bonneville Shoreline Trail Coalition, the Utah Chapter of the International Mountain Bicycling Association, and equestrian users to assist the County with trail design, construction, and maintenance activities.

Potential Land Acquisition

A number of undeveloped properties exist within and immediately adjacent to study area lands that are suitable for acquisition (see Figure A-8 in Appendix A). As opportunities arise and funding becomes available, the County should work towards the acquisition of key properties with its stakeholder partners. Potential acquisitions should be prioritized based on criteria such as securing access to study area lands, eliminating in-holding areas, ecological importance, and community support. The County should also advocate and support the transfer of study area BLM lands to County ownership in order to consolidate and simplify

management activities as opportunities arise or as requested. The transfer of federal lands will take significant time to implement and will require Congressional approval.

Education and Interpretation

The Butterfield, Rose, and Yellow Fork Canyons study area provides significant opportunities for education and interpretation. Environmental education and outdoor recreation topics are numerous and proper locating of interpretive facilities throughout the study area would enhance visitor enjoyment. The extensive trail system provides linkages to various habitat types and scenic overlooks. Interpretive facilities could include kiosks at trailheads, wayside exhibits at interesting features, brochures with plant and animal lists, and trail guides. Trailhead facilities would provide for distribution of interpretive materials. The County and BLM should also work with local school districts to provide outdoor classroom opportunities for students and school groups. Additionally, Rio Tinto is interested in educating the public about mining activities and the history of mining in the area with interpretive signage and kiosks.

Law Enforcement

One of the keys to the successful implementation of this master plan is the presence of law enforcement officials. With increases in the local population and more interest in public uses within the study area, there will be an even greater need for rules and regulation enforcement to provide for public enjoyment of the study area and to ensure public safety. The Salt Lake County Sheriff and BLM law enforcement officers are responsible for law enforcement on their respective study area lands. In addition, the Utah Division of Wildlife Resources is responsible for enforcing hunting regulations on BLM lands. Herriman City currently has a contract with Salt Lake County for law enforcement. The County should pursue an agreement with BLM for joint law enforcement of study area lands, which would enable both entities to monitor each other's lands. The County and BLM should also engage volunteer user groups to help patrol and monitor study areas lands as appropriate.

Fencing and Gates

Uniform fencing and gate materials should be developed and used to assist with access control and trespass issues. Fencing will be necessary at parking areas and trailheads to define use areas and to restrict vehicular travel off established roads. Fencing at these locations should have a rustic look that blends with the landscape, such as buck and rail or other wood-type fencing. Boundary fencing may also be needed at key locations, such as adjacent to residential subdivisions and along major roads, to prevent encroachment and resource damage. Wildlife friendly t-post and wire fencing would be appropriate at these locations. Gates will be required at each trailhead and parking area, as well as at maintenance access locations, to prevent off road travel by motorized vehicles and to enforce operational closures. Gates should accommodate passage of horses, mountain bikers, and hikers. The County and BLM will coordinate installation of fencing and gates with adjacent property owners.

Signage

Appropriate signage should be developed and installed at key locations throughout the study area. A uniform sign system using standard County and BLM sign materials should be developed and used to assist with visitor

orientation and management. Parking areas and trailheads should contain much of the needed signs, though smaller signs to help visitors with way finding along trails will also be needed. Signs will also be needed at key locations along the study area boundary to prevent trespass and motorized access. Kiosks at trailheads should include information panels with interpretive messages, orientation maps, park rules, emergency contact numbers, trail descriptions, announcements of park events, etc. The County recently (2021) installed signage at the Yellow-Fork Trailhead Kiosk that provides trail maps with trail names, as well as carsonite signs along individual trails identifying the trail name and any trail-specific restrictions.

Pets and Working Animals

Pets and working animals used within the study area, such as dogs, horses, and llamas, must be under the physical control of their owners. This follows existing County ordinances and is necessary to prevent conflicts with other park users on the trails and in recreation areas. Watering of pets and pack animals should be accomplished by providing appropriate water sources at study area trailheads.

Trail User Conflicts

(pending)

CHAPTER 5:
IMPLEMENTATION AND PHASING

Determining priorities for completion of proposed facilities and management studies is a function of both opportunity and necessity. In general, projects that provide for public health and safety, or that secure the protection of study area property, should receive a high priority for funding and scheduling. In actual practice, the availability of a specific funding source, the opportunity to form a beneficial partnership, the availability of resources for implementation, the interdependency of projects, or other factors may have the greatest influence on the order in which proposed projects are accomplished. Because funding will come from a variety of sources, it is possible that several projects could be under way simultaneously. The following discussion attempts to address priorities for implementation.

Proposed Project Investments

This section provides approximate quantity and cost information for the capital improvement projects identified as part of the master planning process. These estimates are for materials and installation costs only and are in no particular order. Implementation of these capital improvement projects will entail expenses for site-level plan design, engineering, permitting, and monitoring in addition to the costs provided below. These additional expenses may add 20 to 30 percent to the costs presented depending on the complexity of the project. Additionally, it is anticipated that quantities and approaches may vary once site-specific design work is initiated for a given project. All cost estimates are given in 2021 dollar values. An inflation factor should be applied when considering future projects.

Maintain Existing Trails and Trailheads

There are over 70 miles of existing two-track and single track trail within the study area boundary on both Salt Lake County lands and other leased lands properties. In addition, there is the existing Yellow Fork Canyon Trailhead, as well as fencing and signage throughout the study area that must be maintained. Estimated costs for annual maintenance of these facilities and associated infrastructure: $110,000.

Install Appropriate Access Control and Security Fencing in Butterfield Canyon

There is a need to control public access in Butterfield Canyon to prevent trespass onto private property and to minimize resource degradation from off-road activities. Future trail development within the study area can provide for future limited access to public lands east of Butterfield Canyon Road. There is no public access allowed to Rio Tinto lands west of Butterfield Canyon Road. Recommended fencing should fit into the natural vernacular of the area. More decorative fencing types, such as split rail wooden or three-rail wood post fencing, should be considered. Vinyl coated chain link fabric can be added to these fencing types to provide additional security without compromising attractiveness. Estimated costs for installing fencing along approximately 8 miles (4 miles each side) of the Butterfield Canyon Road: $2,112,000.

Purchase or Accept Land Donations from Willing Neighbors

There are over 1,080 acres of private land within and immediately adjacent to existing public lands across the study area that is not owned by Rio Tinto or Herriman Irrigation Company (see Figure A-8). Some of these landowners may be willing to donate or sell their properties to the County in the future. Strategic acquisitions of these lands would help prevent trespass in these areas, as well as help

make public property boundaries more logical and enforceable. The County and Key Stakeholders should work collaboratively with property owners in these areas to help achieve these objectives. Estimated costs for these strategic land acquisitions are unknown and will be dependent on a case by case basis.

Develop New Trailheads

A total of three new trailhead parking areas are proposed to be constructed to meet the needs of current and future recreationists. These include the Lower Butterfield Canyon Trailhead, the Upper Water Fork Canyon Trailhead, and the Upper Butterfield Canyon Trailhead. The Lower Butterfield Canyon Trailhead will have the capacity for approximately 100 permanent passenger vehicle spaces, 50 permanent equestrian spaces, and a 750-vehicle overflow parking area to accommodate special events. Additional amenities will include flush-type restrooms, picnic pavilions, trailhead signage, and access control. This project will also require close coordination with the Utah Department of Transportation and Herriman City to address future road widening along Butterfield Canyon Road and the re-alignment of State Highway 111 (U111). Estimated costs for constructing the Lower Butterfield Canyon Trailhead: $2,000,000.

Both the Upper Water Fork Canyon and Upper Butterfield Canyon Trailheads would have a similar design capacity. They will each have the capacity for approximately 25 permanent passenger vehicle spaces, vault type toilets, picnic tables, trailhead signage, and access control. Estimated costs for constructing each of the Upper Water Fork and Upper Butterfield Canyon Trailheads: $250,000 each ($500,000 total for both). As parking needs arise, the County will partner with Rio Tinto to locate other trailheads that may be warranted.

Develop New Trails and Obliterate Unsustainable Trails

Properly constructed trails are essential to the long-term quality of trail conditions. Many of the existing trails within the study area were not properly constructed and suffer from erosion issues, short-cutting, and lack of maintenance. This master plan identifies the need for up to 40 miles of additional single-track trails within the study area. These new trails have been identified as either Phase 1 or Phase 2 trail segments. There are approximately 12 miles of Phase 1 trails in the Lower Butterfield Canyon area and 28 miles of Phase 2 trails in the Upper Butterfield Canyon area identified in the master plan. Estimated costs for 12 miles of Phase 1 Single Track Trail: $315,000. Estimated costs for 28 miles of Phase 2 Single Track Trail: $760,000.

The master plan also identifies the closure and rehabilitation of unauthorized and duplicate trails throughout the study area. Closure of these trails would include implementing the necessary pedestrian traffic controls to prevent re-use, such as boulders, brush piles, signage, and fencing (if necessary). Any required fencing should fit the context of the location. Rehabilitating the landscape would include grading, drainage, seeding, planting, and mulching activities. There are a total of approximately 7.4 miles (39,000 linear feet) of trails recommended for closure and rehabilitation within the study area. Estimated costs for trail closure and rehabilitation: $40,000.

Design and Implement Signage Plan

Trail directional signage and interpretive signage are needed in the study area. Comprehensive directional signage is needed to

help guide trail users through the study area and back to trailheads. Interpretive signage is needed to help provide educational opportunities for visitors to learn about the natural and cultural amenities within the study area. Quality constructed and well maintained signs are important to providing a positive experience for visitors to the area. A comprehensive signage plan is needed to guide implementation of these amenities. Estimated costs for a Comprehensive Signage Plan: $30,000. Estimated costs for implementation of the Comprehensive Signage Plan: $150,000.

Create and Implement a Wildlife Habitat Management Plan

The study area includes a variety of native riparian, foothill, and mountain habitat types that provide for a wide range of game and non-game wildlife species. These habitat types have significant value for wildlife and important habitat areas should be identified, protected, and improved where appropriate. Damaged or disturbed areas should be restored, and recreational facilities and activities should avoid important habitat areas. A wildlife habitat management plan is needed to help guide management of game species where hunting is allowed, restoration of disturbed areas, and protection of high-value habitat areas. The only study area land where hunting is allowed is on BLM properties. County and Rio Tinto properties prohibit hunting. Estimated costs for preparation of a Wildlife Habitat Management Plan: $50,000.

Prioritization and Phasing of Proposed Facilities and Projects

Both the Phase 1 Trails and Lower Butterfield Canyon Trailhead are the highest priorities (i.e., 1 to 2 years) for funding and implementation. Due to the lack of developed facilities at these locations, current uses are resulting in resource damage and trespassing within the study area. Restoration of damaged areas should happen concurrently with implementation of the new facilities. With the continued seasonal closing of upper Butterfield Canyon and Rose Canyon roads, the existing Yellow Fork Canyon Trailhead and the Lower Butterfield Canyon Trailhead facilities would be utilized year-round by visitors to the study area. New access controls and associated fencing will be required at the trailhead to prevent unauthorized motorized access.

Improvements to Yellow Fork Canyon road and its associated picnic areas are also a high priority.

The Yellow Fork Canyon road, which provides for maintenance vehicle access to a series of four picnic areas, is currently in very poor condition which limits accessibility. Grading, drainage, and road width issues need to be addressed to allow for safe maintenance vehicle access. The lower picnic area should also be designated for group activities, and a picnic pavilion and vault-type restroom should be considered for development at this location.

Both the Upper Water Fork Canyon and Upper Butterfield Canyon Trailheads are medium priorities (i.e., 3 to 5 years) for funding and implementation. These two parking areas and trailhead facilities would be open seasonally in coordination with the seasonal road closures. Because the Upper Butterfield Canyon Trailhead is located on non-County property (i.e., Kennecott Utah Copper), close collaboration and agreements with Rio Tinto is essential to implementation of this trailhead.

Construction of Phase 2 Trails within the study area is also a medium priority (i.e., 3 to 5 years)

for funding and implementation. Salt Lake County and BLM should work with trail user groups to phase and implement individual Phase 2 Trail projects. A more thorough inventory of trail conditions is necessary as a beginning point for this effort. Equestrian, mountain biking, and hiking organizations, including the Bonneville Shoreline Trail Coalition, should be enlisted to help implement needed trail improvements, perhaps including adoption of trail segments for maintenance.

Potential Funding Sources and Opportunities

Implementation of public facilities and management activities discussed in this master plan deserves the support of Herriman City and Salt Lake County citizens. Potential grants, individual donations, County and BLM appropriations, and contributions from partnerships with non-profit organizations and local, state, and federal government agencies are the likely funding sources for implementation of recommended facilities and activities. The principal partnership for development and management of the study area is between Salt Lake County and the BLM, who will jointly allocate resources and capabilities to be shared on an annual basis. Individual projects can be potentially matched by a variety of grant sources at the local, state, and federal levels. Some of these potential funding sources include:

- Federal Recreational Trail Program (RTP) Funds
- State of Utah Outdoor Recreation Grant (UORG) Funds
- Salt Lake County Zoo Arts and Parks (ZAP) Funds
- Private Corporate Recreation and Conservation Grants (e.g., REI, IMBA, PowerBar)
- 4th Quarter Transportation Choice Funds (TCF) – paved trails and trail heads
- Tourism, Recreation, Culture, and Convention (TRCC) Funding

Annual Assessment Monitoring and Work Plan Development

The study area should be monitored jointly at least once annually by both BLM and County staff. Aerial photographs should be used to document information describing study area problems and issues.

Additional on the ground photographs should be taken and used for documentation. Upon the completion of the annual monitoring visit, an annual work plan should be used to direct specific efforts that are required to address any problems or issues discovered. The work plan should include the specific locations, actions, time of year, and labor and funding needs for each item. Annual work plans should incorporate anticipated facility development projects that receive funding.

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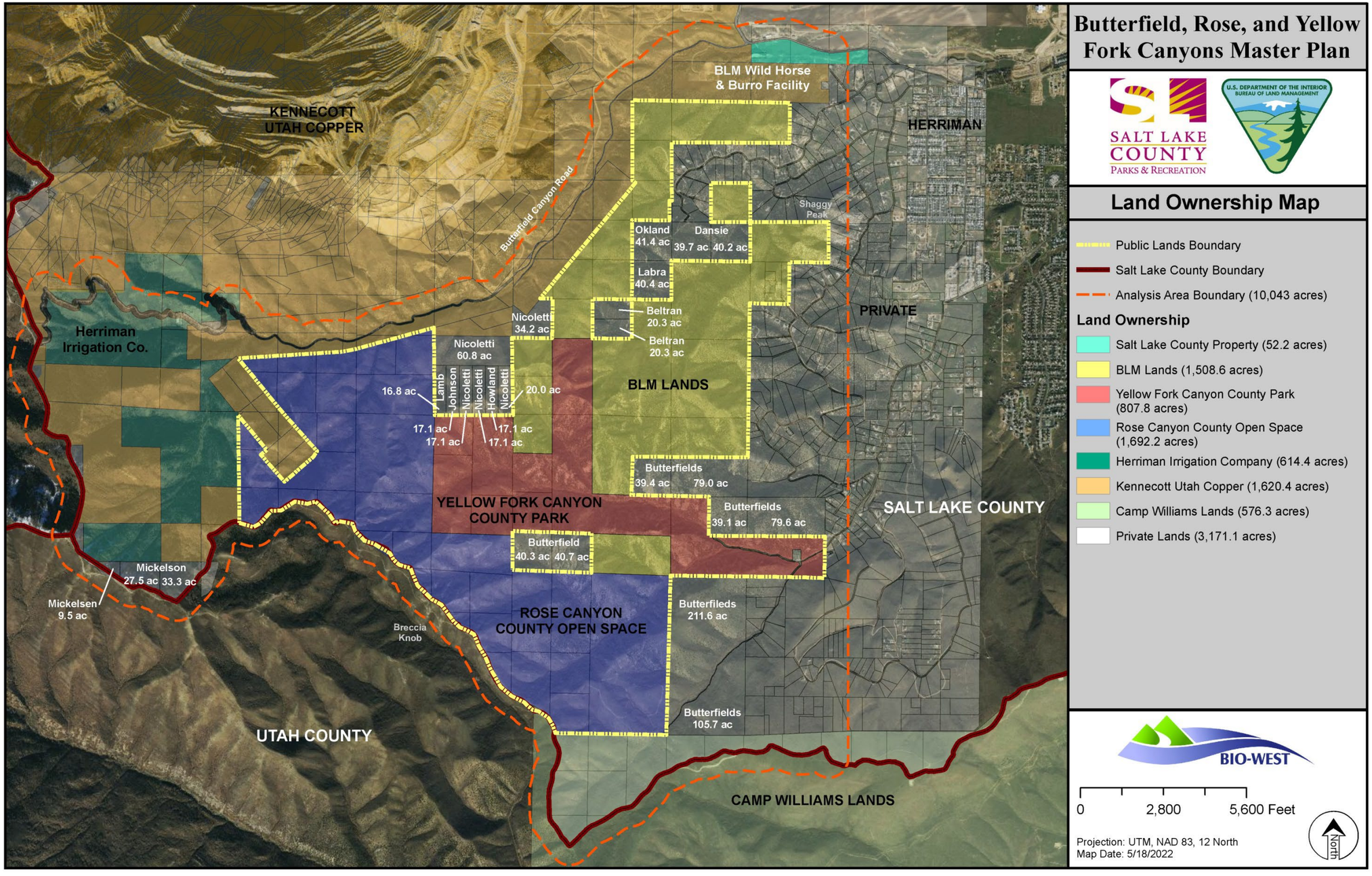
Appendix A
Maps

Appendix A: Maps



Butterfield, Rose, and Yellow Fork Canyons Master Plan

SALT LAKE COUNTY PARKS & RECREATION

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

Land Ownership Map

- Public Lands Boundary
- Salt Lake County Boundary
- Analysis Area Boundary (10,043 acres)

Land Ownership

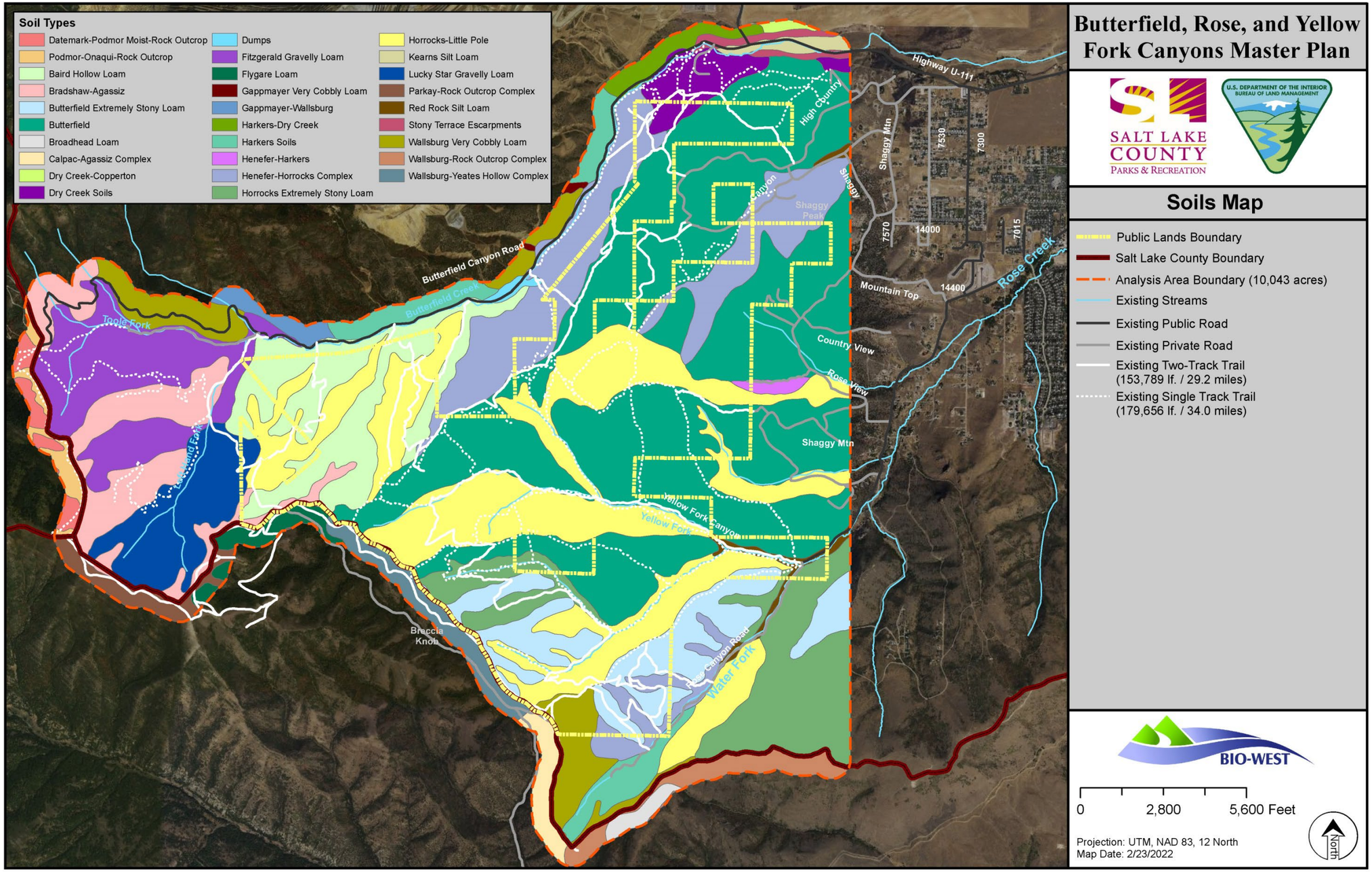
- Salt Lake County Property (52.2 acres)
- BLM Lands (1,508.6 acres)
- Yellow Fork Canyon County Park (807.8 acres)
- Rose Canyon County Open Space (1,692.2 acres)
- Herriman Irrigation Company (614.4 acres)
- Kennecott Utah Copper (1,620.4 acres)
- Camp Williams Lands (576.3 acres)
- Private Lands (3,171.1 acres)

BIO-WEST

0 2,800 5,600 Feet

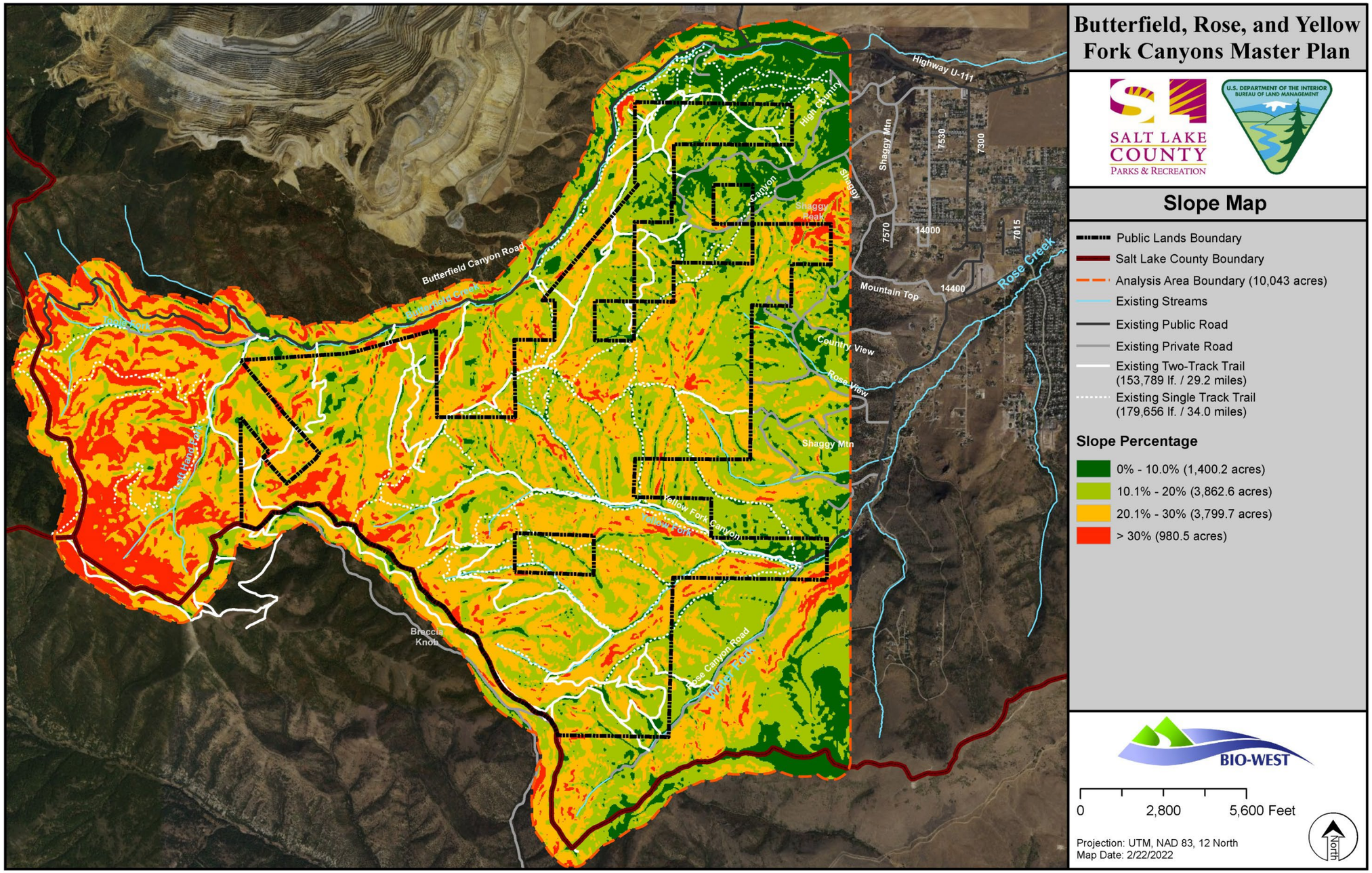
Projection: UTM, NAD 83, 12 North
Map Date: 5/18/2022

North



Butterfield, Rose, and Yellow Fork Canyons Master Plan

Soils Map



Butterfield, Rose, and Yellow Fork Canyons Master Plan

SALT LAKE COUNTY PARKS & RECREATION

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

Slope Map

- Public Lands Boundary
- Salt Lake County Boundary
- Analysis Area Boundary (10,043 acres)
- Existing Streams
- Existing Public Road
- Existing Private Road
- Existing Two-Track Trail (153,789 lf. / 29.2 miles)
- Existing Single Track Trail (179,656 lf. / 34.0 miles)

Slope Percentage

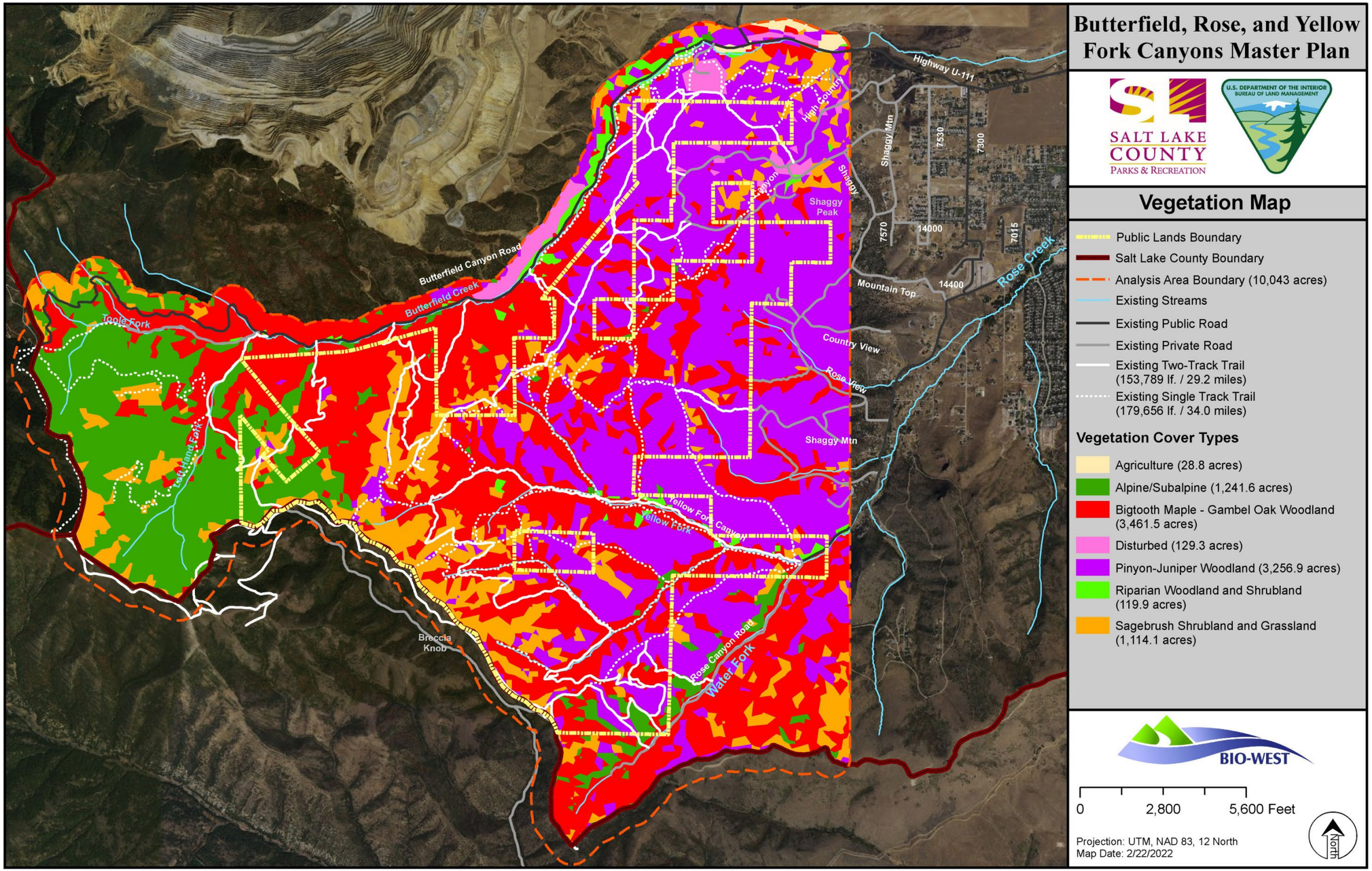
- 0% - 10.0% (1,400.2 acres)
- 10.1% - 20% (3,862.6 acres)
- 20.1% - 30% (3,799.7 acres)
- > 30% (980.5 acres)

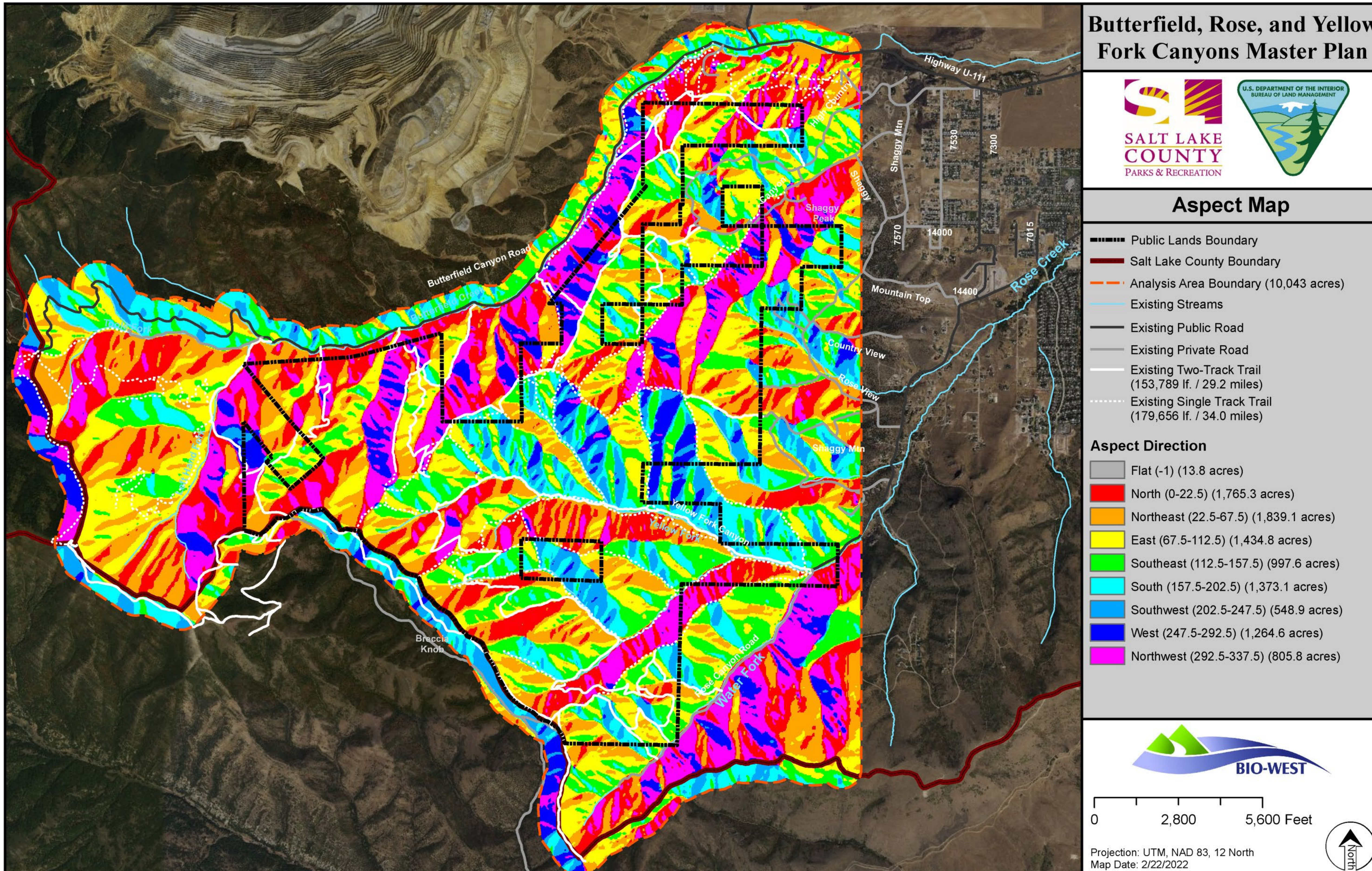
BIO-WEST

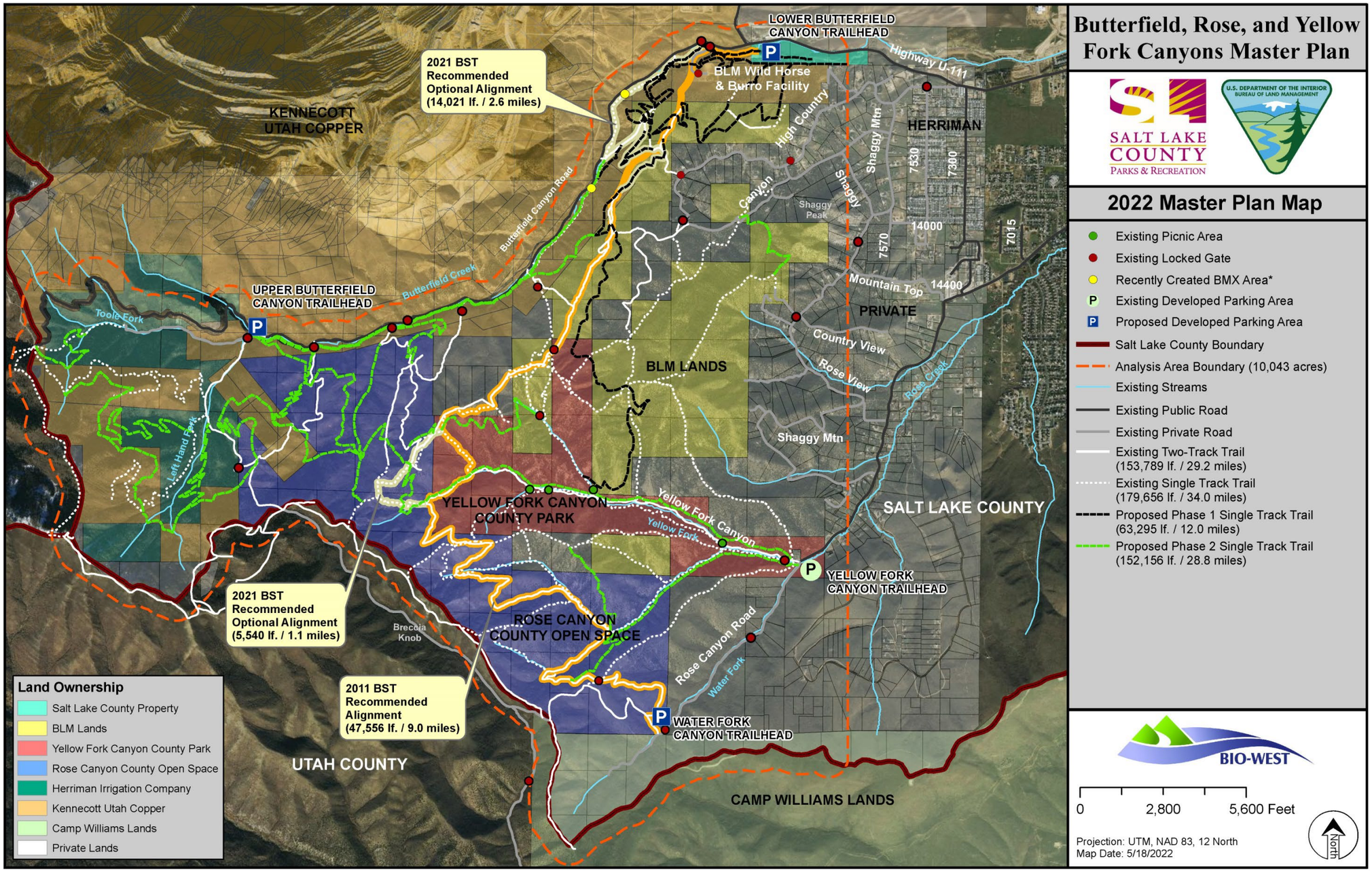
0 2,800 5,600 Feet

North

Projection: UTM, NAD 83, 12 North
Map Date: 2/22/2022


Butterfield, Rose, and Yellow Fork Canyons Master Plan
SALT LAKE COUNTY PARKS & RECREATION
U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT
Vegetation Map
Public Lands Boundary
Salt Lake County Boundary
Analysis Area Boundary (10,043 acres)
Existing Streams
Existing Public Road
Existing Private Road
Existing Two-Track Trail (153,789 lf. / 29.2 miles)
Existing Single Track Trail (179,656 lf. / 34.0 miles)
Vegetation Cover Types
Agriculture (28.8 acres)
Alpine/Subalpine (1,241.6 acres)
Bigtooth Maple - Gambel Oak Woodland (3,461.5 acres)
Disturbed (129.3 acres)
Pinyon-Juniper Woodland (3,256.9 acres)
Riparian Woodland and Shrubland (119.9 acres)
Sagebrush Shrubland and Grassland (1,114.1 acres)
BIO-WEST
0
2,800
5,600 Feet
North
Projection: UTM, NAD 83, 12 North
Map Date: 2/22/2022
Butterfield Canyon Road
Butterfield Creek
Toole Fork
Left Hand Fork
Yellow Fork
Yellow Fork Canyon
Rose Canyon Road
Water Fork
Breccia Knob
Shaggy Mtn
Shaggy Peak
Shaggy Canyon
High Country
Highway U-111
Mountain Top
Country View
Rose View
Rose Creek
7530
7300
7570
14000
14400
7015


Butterfield, Rose, and Yellow Fork Canyons Master Plan
SALT LAKE COUNTY
PARKS & RECREATION
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Aspect Map
Public Lands Boundary
Salt Lake County Boundary
Analysis Area Boundary (10,043 acres)
Existing Streams
Existing Public Road
Existing Private Road
Existing Two-Track Trail (153,789 lf. / 29.2 miles)
Existing Single Track Trail (179,656 lf. / 34.0 miles)
Aspect Direction
Flat (-1) (13.8 acres)
North (0-22.5) (1,765.3 acres)
Northeast (22.5-67.5) (1,839.1 acres)
East (67.5-112.5) (1,434.8 acres)
Southeast (112.5-157.5) (997.6 acres)
South (157.5-202.5) (1,373.1 acres)
Southwest (202.5-247.5) (548.9 acres)
West (247.5-292.5) (1,264.6 acres)
Northwest (292.5-337.5) (805.8 acres)
BIO-WEST
0
2,800
5,600 Feet
Projection: UTM, NAD 83, 12 North
Map Date: 2/22/2022
North
Highway U-111
Shaggy Mtn
7530
7300
Shaggy Peak
14000
7570
7015
Rose Creek
Mountain Top
14400
Country View
Rose View
Butterfield Canyon Road
Yellow Fork Canyon
Yellow Fork
Breccia Knob
Water Fork



Butterfield, Rose, and Yellow Fork Canyons Master Plan

SALT LAKE COUNTY PARKS & RECREATION

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

2022 Master Plan Map

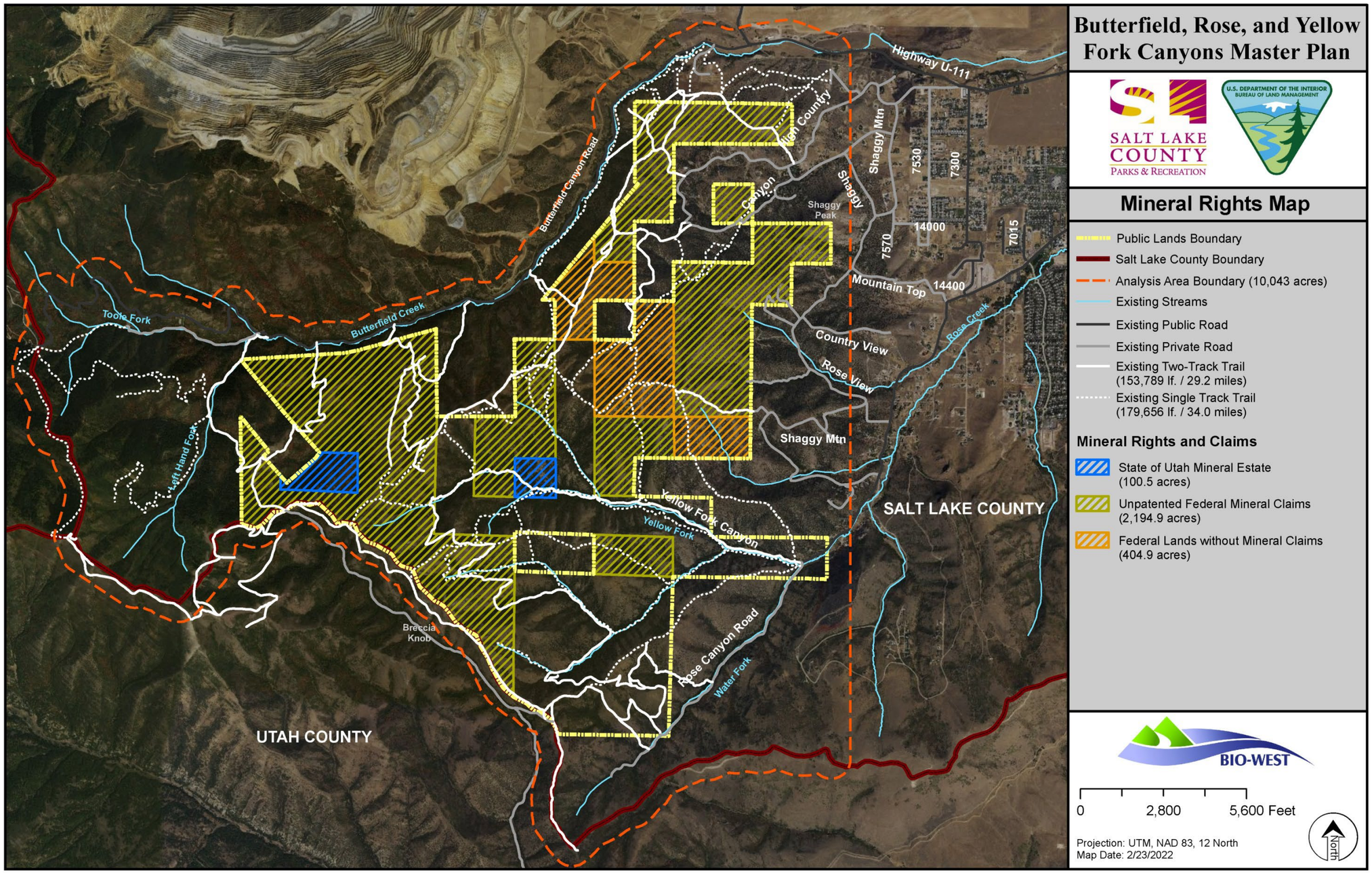
- Existing Picnic Area
- Existing Locked Gate
- Recently Created BMX Area*
- Existing Developed Parking Area
- Proposed Developed Parking Area
- Salt Lake County Boundary
- Analysis Area Boundary (10,043 acres)
- Existing Streams
- Existing Public Road
- Existing Private Road
- Existing Two-Track Trail (153,789 lf. / 29.2 miles)
- Existing Single Track Trail (179,656 lf. / 34.0 miles)
- Proposed Phase 1 Single Track Trail (63,295 lf. / 12.0 miles)
- Proposed Phase 2 Single Track Trail (152,156 lf. / 28.8 miles)

BIO-WEST

0 2,800 5,600 Feet

Projection: UTM, NAD 83, 12 North
Map Date: 5/18/2022

North



Butterfield, Rose, and Yellow Fork Canyons Master Plan

SALT LAKE COUNTY PARKS & RECREATION

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

Mineral Rights Map

- Public Lands Boundary
- Salt Lake County Boundary
- Analysis Area Boundary (10,043 acres)
- Existing Streams
- Existing Public Road
- Existing Private Road
- Existing Two-Track Trail (153,789 lf. / 29.2 miles)
- Existing Single Track Trail (179,656 lf. / 34.0 miles)

Mineral Rights and Claims

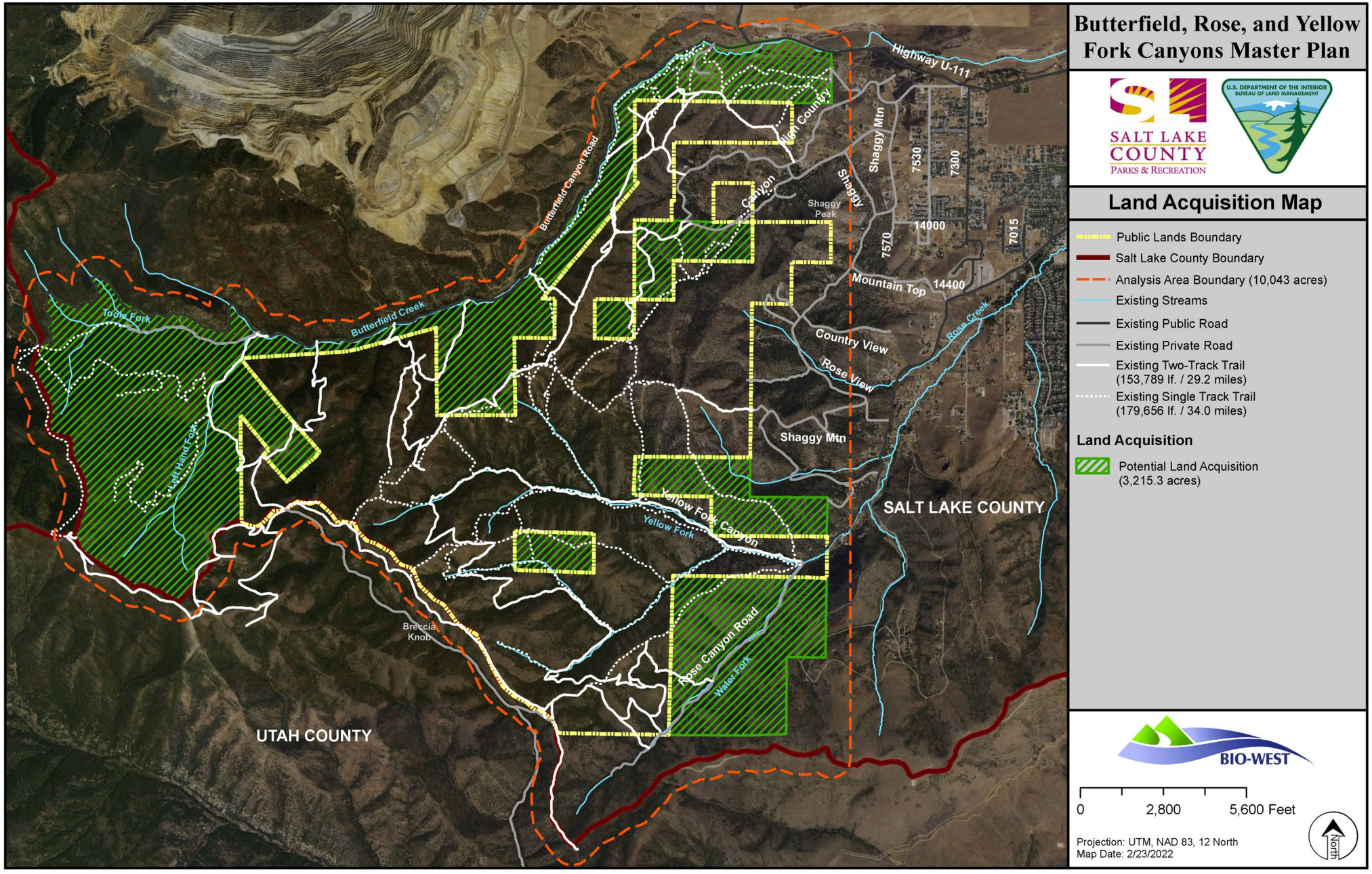
- State of Utah Mineral Estate (100.5 acres)
- Unpatented Federal Mineral Claims (2,194.9 acres)
- Federal Lands without Mineral Claims (404.9 acres)

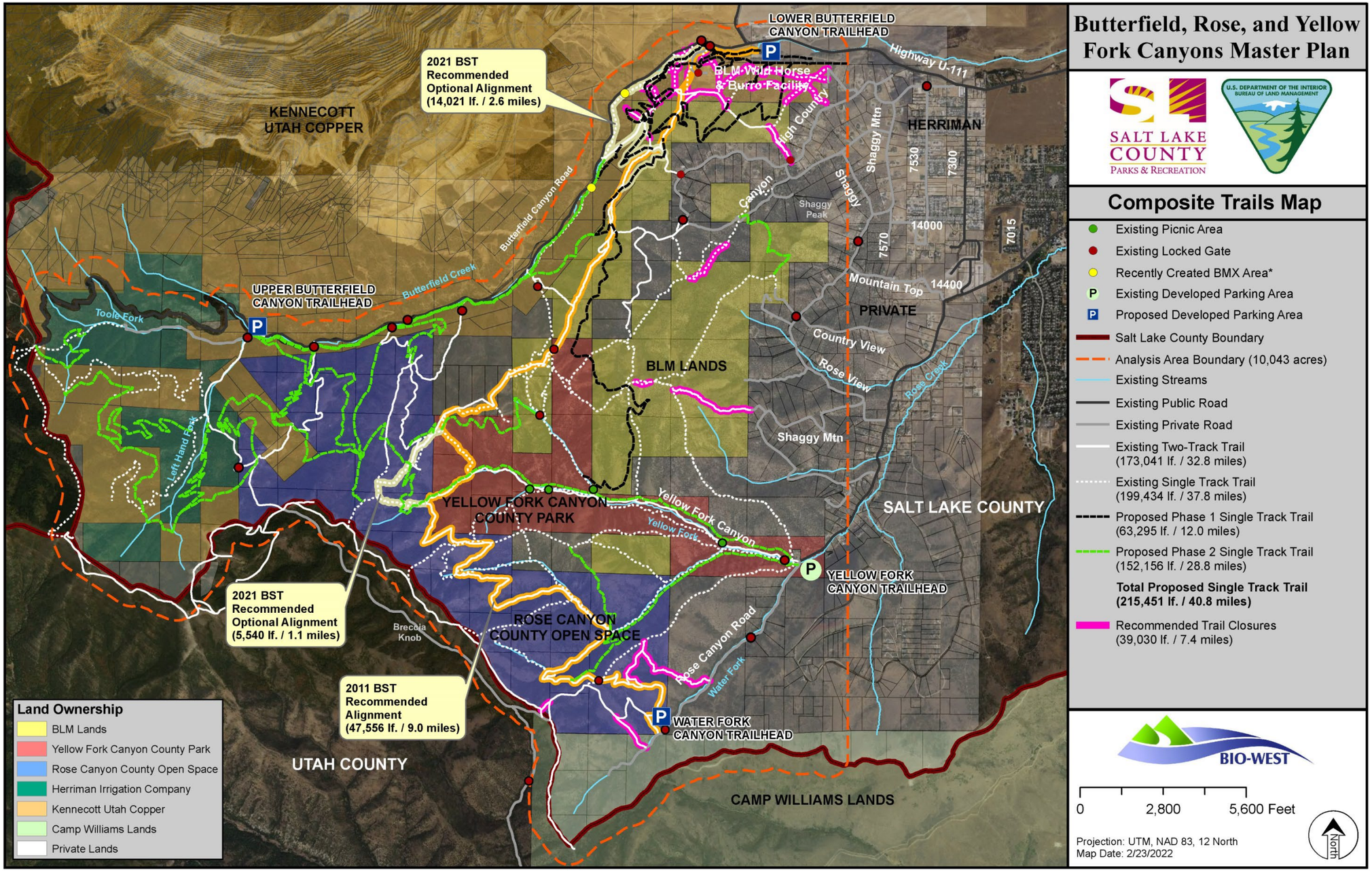
BIO-WEST

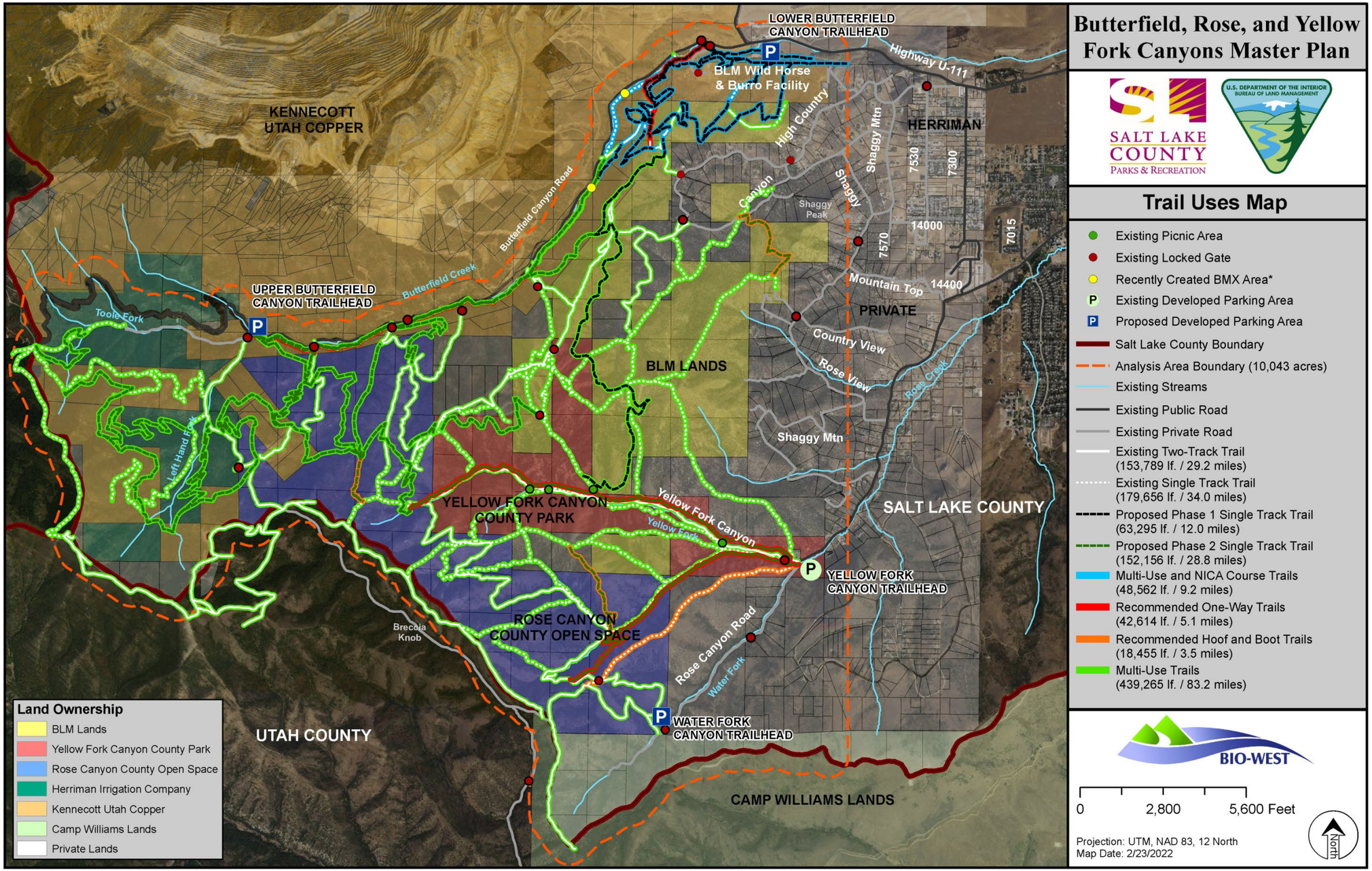
0 2,800 5,600 Feet

Projection: UTM, NAD 83, 12 North
Map Date: 2/23/2022

North


Butterfield, Rose, and Yellow Fork Canyons Master Plan
SALT LAKE COUNTY PARKS & RECREATION
U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT
Land Acquisition Map
Public Lands Boundary
Salt Lake County Boundary
Analysis Area Boundary (10,043 acres)
Existing Streams
Existing Public Road
Existing Private Road
Existing Two-Track Trail (153,789 lf. / 29.2 miles)
Existing Single Track Trail (179,656 lf. / 34.0 miles)
Land Acquisition
Potential Land Acquisition (3,215.3 acres)
BIO-WEST
0
2,800
5,600 Feet
North
Projection: UTM, NAD 83, 12 North
Map Date: 2/23/2022
Highway U-111
Butterfield Canyon Road
Iron Country
Shaggy Mtn
Shaggy Canyon
Shaggy Peak
7530
7300
7570
14000
7015
Mountain Top
14400
Butterfield Creek
Tooele Fork
Country View
Rose Creek
Rose View
Shaggy Mtn
Left Hand Fork
Yellow Fork Canyon
Yellow Fork
SALT LAKE COUNTY
Breccia Knob
Rose Canyon Road
Water Fork
UTAH COUNTY


LOWER BUTTERFIELD CANYON TRAILHEAD
2021 BST Recommended Optional Alignment (14,021 lf. / 2.6 miles)
BLM Wild Horse & Burro Facility
Highway U-111
KENNECOTT UTAH COPPER
HERRIMAN
Butterfield Canyon Road
Shaggy Mtn
7530
7300
Shaggy Peak
14000
7570
7015
Mountain Top
14400
UPPER BUTTERFIELD CANYON TRAILHEAD
Butterfield Creek
Toole Fork
PRIVATE
Country View
Rose View
Rose Creek
BLM LANDS
Left Hand Fork
Shaggy Mtn
YELLOW FORK CANYON COUNTY PARK
Yellow Fork Canyon
Yellow Fork
SALT LAKE COUNTY
YELLOW FORK CANYON TRAILHEAD
2021 BST Recommended Optional Alignment (5,540 lf. / 1.1 miles)
Brecola Knob
ROSE CANYON COUNTY OPEN SPACE
Rose Canyon Road
Water Fork
2011 BST Recommended Alignment (47,556 lf. / 9.0 miles)
WATER FORK CANYON TRAILHEAD
UTAH COUNTY
CAMP WILLIAMS LANDS
Land Ownership
BLM Lands
Yellow Fork Canyon County Park
Rose Canyon County Open Space
Herriman Irrigation Company
Kennecott Utah Copper
Camp Williams Lands
Private Lands
Butterfield, Rose, and Yellow Fork Canyons Master Plan
SALT LAKE COUNTY PARKS & RECREATION
U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT
Composite Trails Map
Existing Picnic Area
Existing Locked Gate
Recently Created BMX Area*
Existing Developed Parking Area
Proposed Developed Parking Area
Salt Lake County Boundary
Analysis Area Boundary (10,043 acres)
Existing Streams
Existing Public Road
Existing Private Road
Existing Two-Track Trail (173,041 lf. / 32.8 miles)
Existing Single Track Trail (199,434 lf. / 37.8 miles)
Proposed Phase 1 Single Track Trail (63,295 lf. / 12.0 miles)
Proposed Phase 2 Single Track Trail (152,156 lf. / 28.8 miles)
Total Proposed Single Track Trail (215,451 lf. / 40.8 miles)
Recommended Trail Closures (39,030 lf. / 7.4 miles)
BIO-WEST
0
2,800
5,600 Feet
Projection: UTM, NAD 83, 12 North
Map Date: 2/23/2022
North


LOWER BUTTERFIELD CANYON TRAILHEAD
BLM Wild Horse & Burro Facility
Highway U-111
KENNECOTT UTAH COPPER
High Country
Shaggy Mtn
HERRIMAN
7530
7300
Butterfield Canyon Road
Shaggy Peak
Canyon
Shaggy
14000
7570
7015
UPPER BUTTERFIELD CANYON TRAILHEAD
Butterfield Creek
Toole Fork
Mountain Top
14400
PRIVATE
Country View
Rose View
Rose Creek
BLM LANDS
Left Hand Fork
Shaggy Mtn
YELLOW FORK CANYON COUNTY PARK
Yellow Fork Canyon
Yellow Fork
SALT LAKE COUNTY
YELLOW FORK CANYON TRAILHEAD
Brecoia Knob
ROSE CANYON COUNTY OPEN SPACE
Rose Canyon Road
Water Fork
WATER FORK CANYON TRAILHEAD
UTAH COUNTY
CAMP WILLIAMS LANDS
Land Ownership
BLM Lands
Yellow Fork Canyon County Park
Rose Canyon County Open Space
Herriman Irrigation Company
Kennecott Utah Copper
Camp Williams Lands
Private Lands
Butterfield, Rose, and Yellow Fork Canyons Master Plan
SALT LAKE COUNTY PARKS & RECREATION
U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT
Trail Uses Map
Existing Picnic Area
Existing Locked Gate
Recently Created BMX Area*
Existing Developed Parking Area
Proposed Developed Parking Area
Salt Lake County Boundary
Analysis Area Boundary (10,043 acres)
Existing Streams
Existing Public Road
Existing Private Road
Existing Two-Track Trail (153,789 lf. / 29.2 miles)
Existing Single Track Trail (179,656 lf. / 34.0 miles)
Proposed Phase 1 Single Track Trail (63,295 lf. / 12.0 miles)
Proposed Phase 2 Single Track Trail (152,156 lf. / 28.8 miles)
Multi-Use and NICA Course Trails (48,562 lf. / 9.2 miles)
Recommended One-Way Trails (42,614 lf. / 5.1 miles)
Recommended Hoof and Boot Trails (18,455 lf. / 3.5 miles)
Multi-Use Trails (439,265 lf. / 83.2 miles)
BIO-WEST
0
2,800
5,600 Feet
Projection: UTM, NAD 83, 12 North
Map Date: 2/23/2022
North

Appendix B
Issue Statements

Appendix B: Issue Statements

The Butterfield, Rose, and Yellow Fork Canyons (BRYFC) Master Plan Issue Statements present the issues and opportunities, identified through public and stakeholder scoping that will be addressed and solved through the course of the planning process. Although the Issue Statements provide a necessary foundation for the master plan by representing both public and stakeholder opinions, some of the statements may reflect "perceptions" rather than factual data. The Issue Statements are intended to clarify the scope of each concern and to provide the foundation for the development of the master plan.

The contents of these Issue Statements were based on comments received (1) from a Steering Committee Meeting held on July 14, 2020; (2) from a meeting with BLM staff held on May 5, 2020; (3) from a meeting with Rio Tinto staff held on August 3, 2020; and (4) from the general public at the Public Workshop held on XX, 2022, in Herriman City, Utah. The Steering Committee is comprised of approximately 30 individuals who represent nearby residents, management agencies, conservation organizations, and recreational user groups that have a significant interest in the future management and use of the BRYFC Master Plan study area. The Steering Committee has provided the primary input for the development of the following Issue Statements that are in no particular order.

Issue 1: Public Access and Parking

Currently, public access and parking within and adjacent to the study area is limited. In 2014, the Yellow Fork Canyon trailhead was re-designed and expanded to allow for appropriate use by horse trailers and other vehicles. However, the number of parking and access areas needs to be increased throughout the study area to help disperse use, especially in Butterfield Canyon where optional access locations to existing trails are currently fenced and gated. Input from stakeholders included suggestions to improve and widen Rose Canyon and Butterfield Canyon roads and to consider a major trailhead development at the soon to be abandoned BLM Wild Horse and Burro Facility on Rio Tinto owned lands (see Issue 9). Salt Lake County has jurisdiction (i.e., ownership and maintenance responsibilities) over both Rose Canyon and Butterfield Canyon Roads. Both roads are classified as "local" roads within a 50-foot right-of-way. Currently, there are no major improvements planned for either road.

Issue 2: Butterfield Canyon

Private property owners, especially Rio Tinto, are concerned about trespass, vandalism, illegal dumping, and other criminal activities that have occurred on their properties in Butterfield Canyon. Rio Tinto has created robust land buffers over the last 30 years that they want to maintain between active mining operations and the public. The situation is made worse by poor cell phone coverage and minimal law enforcement presence in this area. An on-going source of governance is needed in Butterfield Canyon. Abandoned mines and mining operations also remain a safety concern for this portion of the study area.

Additionally, Rio Tinto has spent millions of dollars to clean up contaminated areas along Butterfield Creek and monitoring is ongoing. The creek is intermittent and does not support a fishery. However, there are numerous at-grade vehicle crossings of the creek that are damaging the associated riparian environment. Suggestions for improvements have included fencing stream segments to protect their riparian values and installing culverts or bridges at potential trail or vehicular access crossings.

Issue 3: Property Acquisition

Acquisition of private in-holdings and surrounding lands to expand the current boundaries of parks and open space lands is an issue that should be addressed in the master plan document. Many feel Salt Lake County should acquire adjacent and in-holding

properties to expand the current open space and park boundaries. Consideration should be given to public safety, funding, maintenance, access, and environmental issues in all land acquisition proposals. Some adjacent landowners have previously approached the County about selling their land, but currently the county does not have designated funding to support these efforts.

Issue 4: Minerals Development

There is U.S. Government owned minerals that are unpatented within the study area that could be developed in the future. The unpatented mineral lands include approximately 1200 of the 1700 acres in the Rose Canyon Ranch portion of the study area and another 80 acres in the Yellow Fork Canyon Park portion. The federal minerals were open to appropriation under the applicable federal laws, and pursuant to which Kennecott holds rights to the federal minerals within the study area. An agreement between the County and Kennecott in 2015 provided for phased mineral exploration to assess the mineral potential of these lands. This agreement expired at the end of 2016. Any further development of mineral resources is contingent upon the presence of economically viable mineral deposits.

Issue 5: Motorized vs. Non-motorized Uses and User Conflicts

Salt Lake County regulations currently prohibit motorized uses on County lands while the BLM currently allows for motorized uses on BLM lands on existing designated roads and trails. There is some interest from local residents to allow for off highway vehicle (OHV) access to the study area, while others have suggested that the entire study area be designated as non-motorized. In order to close the area to motorized uses, the BLM would need to modify their current Pony Express Resource Management Plan. Currently there are no officially designated roads or trails on BLM lands within the study area. However, hiking, biking, equestrian, and OHV use has been documented on BLM lands.

Issue 6: Camp Williams

The Utah Army National Guard's Camp Williams shares a common boundary with the southern portion of the study area. Some of the land within the study area used to be part of the Camp Williams property. Recently, a boundary fence between the study area and Camp Williams was constructed to help prevent trespass. There have been instances of unexploded ordnance from Camp Williams being found in the study area. The Army National Guard has undertaken studies in the recent past to determine the nature and extent of munitions and explosives of concern across the study area and to evaluate potential treatments for performance and costs. Public safety is of primary concern and signage at trail heads warning of this potential has been suggested. Currently Camp Williams is in the process of securing easements on specific lands surrounding their properties to prohibit development within areas of concern. These include study area lands where appropriate.

Issue 7: Signage

There is a need for trail signs, trail maps, and trail names at all primary access locations. In addition, on-site interpretive signage would be helpful for educational purposes. Implementation of a comprehensive signage master plan has been recommended to address this issue.

Issue 8: Wildfires

Wildfire is a concern to nearby residents whom live down-slope from the study area. Historically, wildfires have ignited south of the study area and moved northward. The BLM has previously implemented a number of fuel reduction projects (e.g., juniper removal) on land within the study area. In addition, Camp Williams has implemented fuels reduction projects along the south study area boundary.

The Utah FFSL, High Country Estates, Camp Williams, Cedar Fort, and the BLM have been working together in the past to address wildfire mitigation issues in the surrounding area. The County needs to join these partners in fuel management on study area lands to reduce the potential for catastrophic wildfire conditions. The nearest fire station is in Herriman City, within approximately 5 miles from the study area.

Issue 9: Former BLM Wild Horse and Burro Center

The BLM currently leases land from Rio Tinto for the Wild Horse and Burro center located at the north end of the study area. The lease has an approximate 30-year term and expires at the end of 2023. Currently, the BLM is not using the center and there are no plans to renew the lease. This area has been mentioned as a possible major access point and trailhead for the study area since 2010. Significant interest has also been expressed for developing a competitive mountain biking facility at this location, along with substantial expansion of mountain biking trails within the study area on adjacent BLM lands. However, more recently Rio Tinto has announced their intention to master plan this area for future development opportunities.

Issue 10: Segregation of Uses

Keeping hiking, mountain biking, equestrian, and motorized uses separate is of high concern to reduce conflicts. Segregation of uses may become necessary with the increase in users. There is a high possibility of conflicts intensifying in the future with population growth in the area and increased use of the study area for recreation.

Issue 11: Wildlife Habitat and Hunting

There is a healthy deer herd and large number of wild turkeys found in the study area. A portion of the study area is crucial winter range for deer. Hunting within the study area is regulated by the Utah Division of Wildlife Resources. Some county residents would like to hunt within the study area, especially bow hunters. Hunters can utilize BLM lands for hunting purposes following state regulations. However, firearms and hunting are currently prohibited on County owned lands. Allowing hunting in the study area would require a change in the County ordinance. Many residents feel that the study area is not large enough to allow hunting and they are concerned about safety. Off-leash dogs that accompany visitors are also a concern for their effect on wildlife within the study area.

Issue 12: Law Enforcement

The Salt Lake County Sheriff and BLM law enforcement officers are responsible for law enforcement on their respective lands, but many complain that law enforcement within the study area is lacking. With increased public use of the project area, there will be an even greater need for rules and regulation enforcement to provide for public use, enjoyment, and safety. One of the keys to the successful implementation of this master plan project is the presence of law enforcement officials. Some have suggested collaborating with volunteer user groups to help patrol the study area.

Issue 13: Stakeholder Cooperation

Several key stakeholders have ownership or management responsibilities on different portions of the study area (i.e., Salt Lake County, BLM, Utah Division of Wildlife Resources, High Country Estates, Herriman Irrigation Company, and Rio Tinto). This situation sometimes results in discrepancies between land management activities and how regulations are enforced or how resources are managed between different jurisdictions. Communication between resource management agencies, land owners, stakeholders, and recreational users needs to

be consistently maintained. Implementing consistent rules and regulations across the study area would be helpful to visitors. Ultimately an agreement between the major land owners will be needed to implement consistent rules and regulations.

Issue 14: User Fees

Currently there are no fees charged for access to study area lands or use of existing facilities. If facilities are provided (e.g., parking, restrooms, picnic pavilions, day camps), some have suggested fees be charged for their use. Many residents do not want fees charged for use of study area lands while others have suggested a fee to park in designated areas. These fees could be used to maintain and upgrade facilities, or used as support for additional law enforcement. The Mill Creek Canyon user fee program has been recommended as a successful example of recreational fees and how they can work to achieve multiple objectives. Organizing volunteer groups and using existing volunteer organizations to implement management or maintenance projects within the study area have also been suggested as ways to help reduce costs.

Issue 15: Invasive Species

The introduction and spread of noxious and invasive weeds and pests within the study area are major concerns, especially regarding wildfires. An Integrated Pest management Plan is needed to address the control of problematic plant and animal species within the study area.

Issue 16: Fencing

There is a significant need for installing fencing to help control access to public and non-public lands. Reports of trespassing, vandalism, and other illegal activities indicate the need for improved access control where appropriate, especially in Butterfield Canyon. Constructed in key areas, fencing could help limit access to sensitive areas and prevent resource damage. Different types of fencing should be considered including security fencing, decorative fencing, and restoration fencing.

Issue 17: Recreational and Trail Head Facilities

Appropriate facilities at designated trail heads need to be provided, as well as accessible facilities for visitors of all abilities. The proposed master plan should determine what recreational facilities are needed for public access, picnicking, hiking, mountain biking, and equestrian activities. There are also suggestions for posting trail use, access, and safety signage for study area users at all trailhead locations.

Appendix C
Soil Type Descriptions

Appendix C: Soil Type Descriptions

According to the Soil Survey for the Salt Lake City Area (SSURGO 2021), there are 29 soil types located within the study area (see Figure A-2 in Appendix A). None of the soil types in the study area are flooded or ponded and they all have a natural drainage class of well drained. The following briefly describes the distinguishing characteristics of each soil type.

Datemark-Podmor Moist-Rock Outcrop (14A)

Located in the western portion of the study area Datemark-Podmor Moist-Rock Outcrop very cobbly loam soil type, represents approximately 0.6 percent of the total study area. Slopes range from 30 to 70 percent, which are considered steep mountain slopes. The parent material consists of colluvium over residuum weathered from limestone. Depth to bedrock is 20 to 40 inches and the shrink- swell potential is low. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 3 percent.

Podmor-Onaqui-Rock Outcrop (47)

Located in the western portion of the study area Podmor-Onaqui-Rock Outcrop very cobbly loam soil type, represents approximately 0.6 percent of the total study area. Slopes range from 20 to 60 percent, which are considered steep mountain slopes. The parent material consists of colluvium derived from quartzite and/or residuum weathered from quartzite. Depth to bedrock is 20 to 40 inches and the shrink- swell potential is very low. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 3 percent.

Baird Hollow Loam (BAG)

Located in western portion of the study area consists mostly of Baird Hollow loam soil type, which represents approximately 5.5 percent of the total study area. Slopes range from 30 to 70 percent, which are considered steep mountain slopes. The parent material consists of colluvium derived from andesite over residuum weathered from andesite. Depth to bedrock is greater than 60 inches and the shrink- swell potential is moderate. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 6 percent.

Bradshaw-Agassiz Association (BEG)

The Bradshaw-Agassiz soil association is found in the western portion of the study area, representing approximately 4.5 percent of the total study area. This soil type is found on steep mountain slopes that range in steepness from 40 to 70 percent. The parent material consists of colluvium derived from limestone, sandstone, and shale. Depth to bedrock is greater than 60 inches and the shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 4 percent.

Butterfield Extremely Stony Loam (BFF)

The Butterfield soil is an extremely stony loam encompassing approximately 5 percent of the total study area, mostly located in the southern portion. This soil type is found on mountain slopes ranging from 5 to 50 percent in steepness. The parent material consists of colluvium and/or residuum. Depth to bedrock is 12 to 20 inches and the shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 2 percent.

Butterfield Association (BVF)

The Butterfield soil association encompasses approximately 29 percent of the total study area and is found on moderately steep mountain slopes ranging from 5 to 20 percent.

The parent material consists of residuum weathered form igneous rock. Depth to bedrock is 12 to 20 inches and the shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 2 percent.

Broadhead Loam (BnD)

Located in the southern portion of the study area Broadhead Loam is a loam soil type, and represents approximately 0.3 percent of the total study area. Slopes range from 3 to 25 percent. The parent material consists of colluvium derived dominantly from andesite, basalt and quartzite. Depth to bedrock is 60 inches or more and the shrink- swell potential is low to medium. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 3 percent.

Calpac-Agassiz Complex (CbF)

Located in the southern portion of the study area Calpac-Agassiz Complex very cobbly loam soil type, represents approximately 0.8 percent of the total study area. Slopes range from 30 to 70 percent, which are considered steep mountain slopes. The parent material consists of colluvium derived from limestone and sandstone and/or colluvium derived from quartzite. Depth to bedrock is 40 to 60 inches and the shrink- swell potential is low to moderately high. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 3 percent.

Dry Creek-Copperton (DPD)

Located in the northern portion of the study area Dry Creek-Copperton silt loam soil type, represents approximately 0.1 percent of the total study area. Slopes range from 4 to 15 percent. The parent material consists of fine montmorillonitic mesic typic palexerolls. Depth to bedrock is 60 inches or more.

Dry Creek Soils (DRD)

The Dry Creek soils encompass approximately 1.5 percent of the study area and are found on moderately steep mountain slopes ranging from 3 to 15 percent and on alluvial fans. The parent material consists of alluvium derived from limestone, sandstone and shale. Depth to bedrock and water table is more than 80 inches.

Dumps (Du)

Located in the central-north portion of the study area Dumps, represents approximately 0.1 percent of the total study area. Dumps are commonly called landfills or sanitary landfills. They consist mostly of trash from residential and commercial areas. The trash is largely composed of paper, cans, plastic, and bottles and is covered daily with soil material. The older parts of some dumps were commonly burned but not covered with soil material. A few dumps include industrial waste, tree stumps, car bodies, concrete, and debris from demolished buildings.

Fitzgerald Gravelly Loam (FGG)

Located in the western portion of the study area Fitzgerald Gravelly Loam soil type, represents approximately 5 percent of the total study area. Slopes range from 40 to 70 percent, which are considered steep mountain slopes. The parent material consists of colluvium derived from limestone, sandstone, and shale and/or residuum weathered from limestone, sandstone, and shale. Depth to bedrock is more than 80 inches and the shrink- swell potential is moderate to high. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is not specified.

Flygare Loam (FbF)

Located in the southwest portion of the study area Flygare Loam soil type, represents approximately 0.8 percent of the total study area. Slopes range from 30 to 70 percent, which are considered steep mountain slopes.

The parent material consists of colluvium derived from limestone and sandstone and/or colluvium derived from quratzite. Depth to bedrock is more than 80 inches and the shrink-swell potential is moderate to high. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is not specified.

Gappmayer Very Cobbly Loam (GEG)

Located in the central-north portion of the study area Gappmayer Very Cobbly Loam soil type, represents approximately 0.07 percent of the total study area. Slopes range from 30 to 60 percent, which are considered steep mountain slopes. The parent material consists of colluvium derived from limestone, sandstone, and shale and/or residuum weathered from limestone, sandstone, and shale. Depth to bedrock is 80 inches or more and the shrink-swell potential is moderate to high. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is not specified.

Gappmayer-Wallsburg (GGG)

Located in the northwest portion of the study area Gappmayer-Wallsburg very cobbly loam soil type, represents approximately 0.5 percent of the total study area. Slopes are specified as very steep. The parent material consists of colluvium derived from limestone, sandstone, and shale and/or residuum weathered from limestone, sandstone, and shale. Depth to bedrock is more than 80 inches and the shrink-swell potential is moderate to high. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is not specified.

Harkers-Dry Creek (HDF)

Located in the northern portion of the study area Harkers-Dry Creek loam soil type, represents approximately 0.7 percent of the total study area. Slopes range from 6 to 40 percent. The parent material consists of colluvium derived from limestone, sandstone, and shale and/or residuum weathered from limestone, sandstone, and shale. Depth to bedrock is more than 80 inches and the shrink-swell potential is moderate to high. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is not specified.

Harkers Soils (HHF)

Located in the central-north portion of the study area Harkers Soils loam soil type, represents approximately 2 percent of the total study area. Slopes range from 6 to 40 percent. The parent material consists of colluvium derived from limestone, sandstone, and shale and/or residuum weathered from limestone, sandstone, and shale. Depth to bedrock is more than 80 inches and the shrink- swell potential is moderate to high. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is not specified.

Henefer-Harkers (HKF)

Located in the eastern portion of the study area Henefer-Harkers stony loam soil type, represents approximately 0.2 percent of the total study area. Slopes are specified as moderately steep. The parent material consists of colluvium and/or rsidujm. Depth to bedrock is more than 80 inches and the shrink- swell potential is moderate to high. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is not specified.

Henefer-Horrocks Complex (HNF)

The Henefer-Horrocks complex soil type makes up approximately 8 percent of the study area and is found on mountain slopes ranging in steepness from 5 to 50 percent. The parent material consists of colluvium and/or residuum. Depth to bedrock is greater than 60 inches and the shrink-swell potential is moderate. There is no zone of water saturation within a depth of

72 inches and the organic matter content in the surface horizon is about 4 percent.

Horrocks Extremely Stony Loam (HWF)

The Horrocks Extremely Stony Loam soil type makes up approximately 6 percent of the study area and
is found on mountain slopes ranging in steepness from 5 to 50 percent. The parent material consists of colluvium and/or residuum. Depth to bedrock is 12 to 20 inches and the shrink-swell potential is moderate. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 4 percent.

Horrocks-Little Pole Association (HXF)

The Horrocks-Little Pole soil association makes up over 15 percent of the study area and is found
on ridges and mountain slopes ranging in steepness from 5 to 50 percent. The parent material
consists of colluvium and residuum. Depth to bedrock is 12 to 20 inches and the shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 4 percent.

Kearns Silt Loam (KaB)

Located in the northern portion of the study area Kearns Silt Loam soil type, represents approximately 0.4 percent of the total study area. Slopes range from 1 to 3 percent. The parent material consists of mixed alluvium from sedimentary and igneous rocks. Depth to bedrock is not specified.

Lucky Star Gravelly Loam (LSG)

The Lucky Star gravelly loam makes up 3 percent of the study area and is found on mountain slopes ranging in steepness from 40 to 60 percent. The parent material consists of colluvium derived from limestone, sandstone, and shale and/or residuum weathered from limestone, sandstone and shale. Depth to bedrock is greater than 60 inches and the shrink-swell potential is low. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 8 percent.

Parkay-Rock Outcrop Complex (PeF)

Located in the southwest portion of the study area Parkay-Rock Outcrop Complex very stony loam soil type, represents approximately 1 percent of the total study area. Slopes range from 30 to 70 percent, which are considered steep mountain slopes. The parent material consists of colluvium and residuum derived from quartzite, sandstone and limestone. Depth to bedrock is 40 to 60 inches and the shrink- swell potential is low to moderate. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 3 percent.

Red Rock Silt Loam (Re)

The Red Rock silt loam soil type encompasses approximately 0.6 percent of the study area and is found on mountain slopes ranging in steepness from 1 to 3 percent. The parent material consists of alluvium. Depth to bedrock is more than 80 inches.

Stoney Terrace Escarpments (SP)

Located in the Northern portion of the study area Stoney Terrace Escarpments, represents approximately 0.5 percent of the total study area. Slopes are steep and the terrace escarpments consist of long, narrow, rocky areas that rise abruptly from the mean.

Wallsburg Very Cobbly Loam (WAG)

The Wallsburg very cobbly loam soil type encompasses approximately 3 percent of the study area and is found on mountain slopes

ranging in steepness from 30 to 70 percent. The parent material consists of colluvium and/or residuum. The depth to bedrock is 12 to 20 inches and the shrink-swell potential is moderate. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 3 percent.

Wallsburg-Rock Outcrop Complex (WcF)

Located in the southern portion of the study area Wallsburg-Rock Outcrop Complex very cobbly loam soil type, represents approximately 1 percent of the total study area. Slopes range from 25 to 70 percent. The parent material consists of colluvium and/or residuum. Depth to bedrock is 12 to 20 inches and the shrink-swell potential is low to moderate. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 3 percent.

Wallsburg-Yeates Hollow Complex (WdE)

Located in the central-south portion of the study area Wallsburg-Yeates Hollow Complex very cobbly loam soil type, represents approximately 1.5 percent of the total study area. Slopes range from 25 to 40 percent. The parent material consists of alluvium derived from limestone and sandstone and/or alluvium derived from quartzite. Depth to bedrock is 10 to 20 inches and the shrink- swell potential is low. There is no zone of water saturation within a depth of 72 inches and the organic matter content in the surface horizon is about 3 percent.

References

(SSURGO] Soil Survey Geographic Database. 01/21. Soil Survey Geographic (SSURGO) database for Salt
Lake Area, Utah. Location: http://soils.usda.gov/survey/.

Appendix D
Trail Standards

Common Trail Standards and Guidelines for Hiking, Biking, and Equestrian Uses

- Provide simple and accurate trail signs.
- Trail loops are more appealing than dead-end trails.
- Rolling contour trails are preferred and include gentle grade reversals, undulations, and outsloped tread.
- Avoid fall-line trails (the same path that water flows). Use the "half rule" to avoid fall-line trails. The "half rule" provides that the trail grade does not exceed half the grade of the hillside, otherwise it is considered a fall-line trail.
- Avoid flat areas (trails can become water collectors).

Hiking Trail Standards and Guidelines

- An average overall trail grade of 10% or less is preferable. Maximum trail grades of 15% to 25% for short distances (>100 feet) are okay.
- American Trails Organization: All efforts should be made to avoid switchbacks. Ideally, switchbacks are located in dense brush or through other obstacles to prevent trail users from shortcutting the switchback. Avoid short switchback sections of less than 500 feet. Grades can be increased up to 20% for short distances entering and exiting the switchback to increase the elevation change and broaden the distance between the upper and lower trails.
- nps.gov: The trail should be cleared to a minimum height of 8 feet. On a hiking segment in a rural area, the total clearing width would be the 24-inch tread plus 12 inches on each side for a total width of 48 inches.
- nps.gov: To avoid erosion, the slope should normally be less than 10% even in steep terrain. Grades less than 7% in all soils are ideal, but in sandy soils are almost a necessity to prevent erosion. In flatter areas, the trail should be located so that there is some grade to provide for proper drainage. A grade should undulate gently to provide natural drainage and to eliminate monotonous level stretches and long, steep grades that are tiring to trail users.
- Hiking trails may be classified into three general categories: Low, Medium and High usage. Hiking trails, where use is projected to be low, should be kept to a minimum width in more sensitive, natural and rural settings. Medium and high volume trails should be designed wider and more stable to prolong the life of the trail. High volume use requires a different trail design and could incorporate paved and/or natural surface trails through parks, neighborhoods or activity centers. The following trail design specifications are only guidelines:
  - Tread Width for Low Volume Use = 1 to 2 Feet.
  - Tread Width for Medium Volume Use = 2 to 5 Feet.
  - Tread Width for High Volume Use = > 5 Feet.
  - Trail Horizontal Clearance = 1 foot minimum on each side of tread. Additional clearance should be provided in hazardous areas (e.g. road crossings, sharp drop offs, or tripping hazards).
  - Trail Vertical Clearance = 8 foot minimum clearance.
  - Desirable Trail Grades = 0 to 10%; Maximum grade for extended slope = 10%; Maximum grade for shorter slope = 15%; Steps and water bars will be needed for trails >15%.
  - Length of Hike: Short Hike = 1 to 3 miles; Half-day to One Day Hike = 3 to 9 miles.

Equestrian Trail Standards and Guidelines

- Prefer to have access to water.
- Require longer distances than hikers for a valued experience.

- Good sight lines on equestrian trails help to minimize conflict.
- American Trails Organization: Horses and mules are most comfortable in the track that other stock have trod. They favor the outer edge of a tread, especially if this ground is less densely packed. Having a 2-foot shoulder of non-tread material or a downslope defines the edge to the animal and rider. From the rider's perspective, trails must have enough room so their mount feels at ease. Stock tend to stay a comfortable distance away from other trail users and from walls or fences they cannot see through or over, sometimes even moving to the far side of the trail to avoid them. Accommodate this behavior by widening the trail, routing it away from disturbing objects or activity, locating the horse tread on the far side of the trail corridor, providing a physical separation or visual screen, installing barriers, or increasing the horizontal distance--also called the shy distance--from the discomfort.
- Typical equestrian vertical clearance is 10 feet with the preferred being 12 feet.
- Equestrian trails usually occur on natural and unpaved surfaces and are designed for a horse and rider traveling in single file to achieve a “backwoods experience,” thus facilitating a closeness with nature. Any site considering equestrian trails should have access to sufficient land to develop or connect to at least five miles of trail.
    - Tread Width = 18 inches minimum.
    - Horizontal Clearance = Two feet on each side of the tread width. Additional clearance should be provided in hazardous areas (e.g. road crossings, sharp drop offs, tripping hazards).
    - Vertical Clearance = 10 foot minimum clearance overhead.
    - Desirable Grades = 0% to 10%; Maximum grade for extended slope = 18%; Maximum grade for shorter slope = 25%.
    - Length of Ride: Short to half-day = 0 to 16 miles; Full day = 17 to 32 miles; Overnight trip = Over 32 miles.
    - Water: Access to water should be provided every 5 to 10 miles along trail.

Mountain Bike Trail Standards and Guidelines

- Mountain bikers crave singletrack and interconnected singletracks.
- An average overall trail grade of 10% or less is preferable. Maximum trail grades of 15% to 25% for short distances are okay.
- Use chokes or gateways to control speed.
- Use trail filters or gateway at the beginning of advanced trails. A filter is a high-skill-level, low consequence obstacle that demonstrates the difficulty of the upcoming trail.
- Provide optional lanes around a technical features.
- Provide adequate fall zones.
- Use corral/anchor objects to define the sides of the trail to reduce trail widening, control speed, prevent shortcutting.
- Backcountry bicycle trails should have a turning radius from 2 to 6 feet. The turning radius may be constrained by natural obstructions such as trees, water, rocks, or environmentally sensitive areas.
- Freeriding (advanced level mountain biking with stunts such as rock drops or ladder bridges) is becoming more popular, but the speed and on-the-edge elements of freeriding do not mix well with hiking and horseback riding.
- Use the IMBA Trail Difficulty Rating System (IMBA.com). This will help trail users make informed decisions.
- Off-road Cycling Trails: These guidelines address only those bicycle trails that are unpaved.
    - Tread Width = 18 inches minimum.
    - Horizontal Clearance = One foot minimum on each side of tread. Additional clearance should be provided in hazardous areas (e.g. road

crossings, sharp drop offs, encroaching vegetation, limited sight distances).
  - Vertical Clearance = Eight foot minimum (Except to allow for the occasional natural obstruction which enhances the experience, but does not prevent passage).
  - Grades – 0% to 25% (0% to 5% at approaches to intersections).

Program Elements for Competitive Mountain Biking

- Provide a practice area.
- Develop a comprehensive signage system for the course and program elements.
- Design 4 to 6 Mile Loops. Riders will complete multiple laps.
- Combination of single track and wider trails (double track or two-track roads) is best.
- Need ample passing opportunities.
- Provide 300 to 600 feet of climbing per lap.
- Avoid high speed descents.
- Total race time:
  - Freshman and Sophmore boys and girls, Junior Varsity girls: 45–90 minutes.
  - Junior Varsity Boys and Varsity Girls: 60–100 minutes.
  - Varsity Boys: 90–120 minutes.
- Venue Criteria
  - **Start/Finish:** Provide room to spread out before single track.
  - **Uphill Finish:** Need not be long or steep; Safety and scoring issue; Area for passing in the final 200-500 meters of the race.
  - **Staging Area:** riders wait for their start; 4 to 6 riders across in lanes, open field, or two-track road.
  - **The Pit Zone:** Space where teams can set up tents, tables, chairs, mechanics, trainers, etc. Should be near the start/finish area, with nearby vehicle parking. Each team gets a "Pit" (20'x25' per team); Plan for 20 teams; Approximately 10,000 square feet.
  - E**mergency Vehicle Access:** Plan for the worst case scenario, which include emergency crews accessing the course. Are there sections of the course where evacuation would be extremely difficult? How far is the venue from a hospital? Is "life-flight" available in the area?
  - **Parking:** Plan for up to 200 cars. Large leagues plan for 500+ cars. Parking should be near the Pit Zone.
  - Ideally, provide access to water, electricity, restrooms and nearby camping.

Program Elements for BMX Pump Track

- **At the moment pump track design seems to have settled into 3 types of designs:**
  - A free form skate park influenced design, where every surface is a potential feature.
  - A BMX track inspired loop design (often featuring a defined start and finish point and directional traffic).
  - A head to head competition type track.
- **A Pump Track** requires a regularly shaped area with modest cross slopes between 3% and 5%. While the track itself does not require a cross slope, a modest cross slope facilitates proper drainage. Since most tracks are constructed of imported materials, a level site can be outsloped as part of construction. Sites with cross slopes greater than five percent can be used as long as the track area is brought to proper cross slope grade during construction. Depending on the characteristics of local soils, a leveling operation could generate all of the materials required for construction. Sizes of tracks can vary significantly. Smaller tracks can be 2 to 5 acres. With good size tracks expanding to approximately 6 to 20 acres depending on lengths of tracks. Parking would also have to be included.
- **BMX Track:** Lengths and sizes of tracks can vary. Approximately 1.5 – 3.5 acres needed plus parking. Courses are generally around 400 meters in length and can

accommodate up to eight competitive riders. Obstacles can vary as well in sizes and difficulty. Tracks can be constructed of compacted and groomed dirt or gravel surfaces, concrete, asphalt, or wooden ramps. Concessions, eating areas, bleachers, shade trees and other features are recommended for BMX courses.

- Other bike park facilities such as bike-optimized singletrack are trail-based and have similar requirements to general sustainable natural surface trails, the primary difference being that side slopes greater than 40 percent are undesirable. While the "golden window" for traditional trails is 20 to 60 percent, bike park trails avoid steeper slopes and flat areas with no slope. Side slopes around 20 percent are ideal. It is possible to create facilities on flatter landscapes, with heavy manipulation of the terrain, using fill during construction (either borrowed onsite or imported). This is required to create fun and playful terrain.
- **Size:** Depending on the range of facilities desired, a bike park can be sited on as little as 10,000 square feet to as much as 40 acres and up. Successful pump tracks can be created on modest parcels, but it is important that the parcel be regularly shaped (i.e. not a narrow strip) to avoid compromising the flow of riders through the facility. Larger parks combine a range of slopes to host a variety of facility types.
- **Soil:** The foundation of every bike park, no matter the facility type, is shaped ribbons of dirt. The right soil is essential for successful construction and maintenance.
- **Shade:** Shade is a desirable characteristic for both bike park tracks and trails, as well as users.
- **Water:** Proper soil moisture is a requirement for construction and effective park maintenance. Much like a potter working his wheel to make a new creation, water is the catalyst that makes it possible to transform mere piles of dirt into a berm or a jump.
- **Provide for the Following Design Elements:**
  - Entrance area with shade shelter and restrooms.
  - Beginner, intermediate, and future advanced pump track options.
  - Progression jump zone.
  - Perimeter singletrack trail with skills feature option lines and adjacent walking trail (bike skills trail).
  - Perimeter recreation path.
  - Landscaping, irrigation, shade structures, and access to water.
  - A beginner's pump track = a continuous loop of hills and berms which allows cyclists to perfect their riding skills.
  - A progressive jump zone for mountain bike and BMX riders of all skill levels.
  - Intermediate and advanced jump lines to provide non-linear, varied options and routes for riders.
  - A bicycle work station with basic bike repair tools available for public use.

BMX Track:

http://www.uci.ch/mm/Document/News/News/18/23/58/UCIBMXTrackGuide2017_English.pdf

http://www.uci.ch/mm/Document/News/News/18/50/40/UCIBMXTrackGuide-DevelopingBMX_English.pdf

BMX Tacks in Utah: Rad Canyon BMX, South Jordan:

https://www.usabmx.com/tracks/0126

Virgin BMX:

https://www.usabmx.com/tracks/1861

Bike Park:

https://www.imba.com/resource/bike-parks-imbas-guide-new-%03school-trails

http://sfrecpark.org/wp-content/uploads/1520-MBP-BidTechSpecs2016-0830.pdf

http://alpinebikeparks.com/service/construction-documentation

https://www.progressivebikeramps.com/park-features/

Bike Parks in Utah: Ogden Bike Park

https://www.facebook.com/ogdenbikepark

Riverdale Bike Park:

www.riverdalecity.com/departments/recreation/Bike/Bike_Park.html

https://www.facebook.com/RiverdaleBikePark/

http://www.standard.net/Recreation/2015/05/13/Riverdale-bike-park-an-all-ability-level-pump-track