



Herriman Hills

OHV Feasibility Study



Herriman Hills OHV

Feasibility Study



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Prepared for: Herriman City

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HERRIMAN OHV

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INTRODUCTION

INTRODUCTION

DESCRIPTION AND PURPOSE

PROJECT DESCRIPTION

Herriman City is home to an active community that often enjoys the mountainous terrain within the City and surrounding area referred to as Herriman Hills. As the popularity of Herriman Hills increases, so does the pressure to appropriately manage its use. Herriman City has staff, volunteer groups, and other interested stake holders, including elected and appointed officials that continuously work to facilitate citizen use of the area while maintaining the native character of the mountainous terrain.

For the past few years, there have been requests from various groups to allow for planning, design, construction, code allowance, and general use of Off-Highway Vehicles (OHV). No formal recommendation or study has been completed to date to guide Herriman City to make a decision either for or against such requests.

PURPOSE

The purpose of this feasibility study is to give the city council independent information and analysis to help them determine whether OHV use should be permitted in Herriman Hills. This study considers all relevant items pertaining to the physical, economic, social, and environmental feasibility of motorized OHV use in this area.

INTRODUCTION

PROJECT PROCESS

A specific process was developed to conduct the feasibility study. It involved: establishing a purpose for the study; performing a thorough inventory of existing site characteristics and conditions; identifying the positive (opportunities) and the negative (constraints) affects of the inventory items as they relate to the proposed use (OHV); and analyzing other critical impacts that could occur as a result of combined site conditions. The final step was to express our professional opinions and recommendations regarding how to proceed. The following descriptions provide more detail on the process used.

INVENTORY

This process consisted of gathering and categorizing data and information on existing natural and human features in the proposed study area.

- ◆ **Review Guidelines** - Reviewed State and Federal OHV guidelines. Gather pertinent BMP information as it pertains to this specific site. Sources include:
 - * Designing Sustainable Off-Highway Vehicle Trails: An Alaska Trail Manager's Perspective, U.S. Department of Agriculture, U.S. Forest Service Technology and Development Program, U.S. Department of the Interior National Parks Service, U.S. Department of Transportation Federal Highway Administration, November 2013
 - * Natural Management Strategy for Motorized Off-Highway Vehicle Use on Public Lands, USDA Bureau of Land Management, January 2001
 - * Utah Off-Highway Vehicles Laws and Rules, Utah State Parks, July 2019
 - * For additional information see the References section at the end of this report.
- ◆ **Site Inventory** – Gathered site-specific data from the project area to provide context and direct descriptions of site characteristics that may influence its ability to accommodate the proposed OHV use. This included:
 - * Land use
 - * Zoning
 - * Existing trails and trailheads
 - * Slope
 - * Soils
 - * Vegetation
 - * Noise
 - * Commercial Resources
 - * Access

INTRODUCTION

PROJECT PROCESS (continued)

Some information was gathered in person during site visits, while other data was obtained from state and local Geographic Information System (GIS) databases. GIS was then used to map some of the site inventory findings.

ANALYSIS

This was the process of evaluating and making judgments regarding features on the site, and how those features interact with each other and the proposed uses. Opportunities and constraints of each element were evaluated and synthesized.

- ◆ **GIS Mapping** – Using GIS technology, J-U-B reviewed and evaluated the data collected during the inventory phase of work.
- ◆ **Analysis** – Opportunities and constraints were then evaluated, other important site considerations identified, and provided conclusions in a draft report. These findings are summarized as follows:
 - * Erosion Potential
 - * Riding Safety
 - * User Conflicts
 - * Construction Impacts
 - * Connectivity
 - * Potential Fire Danger
 - * Emergency Vehicle Issues
 - * Revenue Generation
 - * Overall Site Stability/Fragility
 - * Non-Binding Opinion of Liability

FINAL RECOMMENDATIONS

After pulling together the final analysis and inventory, final recommendations were formalized for the Planning Commission and City Council.

INTRODUCTION

GENERAL OHV REQUIREMENTS

Because OHVs require trails with more refined designs than those that serve pedestrians, they also require more forethought and planning before implementation. Although each trail location has a unique character and set of challenges, there are specific design guidelines to assist in the creation of trails that are safe for both OHV users and the environment that accommodates them. Listed below are basic considerations, design parameters and sustainable guidelines that influence the final OHV trail design. The following information was taken from the publication Designing Sustainable Off-Highway Vehicle Trails: An Alaska Trail Manager's Perspective (See references at the end of this report).

SUSTAINABLE TRAIL GUIDELINES

A primary objective to help managers of OHV trails is to develop and maintain sustainable trails. A sustainable trail is one that has been designed and constructed to such a standard that it does not adversely impact natural and cultural resources, can withstand the impacts of the intended user and the natural elements while receiving only routine cyclic maintenance, and meets the needs of the intended user to a degree that they do not deviate from the established trail alignment. With this definition in mind, the following set of integrated sustainable OHV trail design guidelines have been recommended.

1. **Contour curvilinear alignment** – align the trail so it runs along the natural contour of the terrain.
2. **Controlled grade** – Strive for a design trail grade of 10 percent or less and a maximum sustainable trail grade established based on local soil and terrain conditions. Limit the length of trail segments with a maximum grade to less than 100 feet and their combined length to less than 5 percent of the total trail length.
3. **Integrated drainage** – integrate water control in the design and construction of the trail using outslope, grade reversals, and grade dips to maintain the terrain's natural drainage patterns.
 - ◆ **Outslope:** When the trail tread is shaped with a slight (5 to 10 percent) slant to the outside of the tread.
 - ◆ **Grade reversals/dips:** a short, distinct grade change in grade from ascending to descending (followed by a return to ascending). If used, try to place them every 75-125 feet.

INTRODUCTION

GENERAL OHV REQUIREMENTS (continued)

4. **Full bench** – Construct a full bench by cutting the full width of the tread into the hillside on native, undisturbed material and casting the excavated soil as far from the trail as possible.
 - ◆ Full-bench construction requires more excavation and leaves a larger back-slope than partial-bench construction, but the trail bed will be more durable and require less maintenance. This should be used whenever possible.
5. **Durable tread** – Provide a durable tread surface of compacted mineral soil, imported capping material, bedrock, or a hardened tread surfacing.
6. **Appropriate maintenance** – Conduct routine maintenance and periodic project work to ensure that the trail remains within its original design specifications.

TRAIL DESIGN CONSIDERATIONS

The three factors that comprise the recommended design of trails are: use characteristics, site conditions, and climate/weather. All of these factors will help determine the actual dimensions and slope of the finished trail. These factors are as follows:

1. **Use Characteristics:** define the potential use and expected wear and tear on the trail tread and associated trail features.
 - ◆ Types of use (hiking, biking, motorized, etc.)
 - ◆ Volume and intensity of use
 - ◆ Season of use
 - ◆ User satisfaction, preferences, and expected behavior
2. **Site Conditions:** determine the sites natural ability to support trail use changes and whether trail design and construction methods may need to be modified to reflect those changes.
 - ◆ Slope, aspect, elevation
 - ◆ Vegetation Cover
 - ◆ Surface soil and subsoil character
 - ◆ Hydrology
3. **Climate and Weather:** influence trail design in order to accommodate the fluctuations in temperature and precipitation levels specific to the area.
 - ◆ Seasonal variations
 - ◆ Extreme weather events
 - ◆ Climate change

INTRODUCTION

GENERAL OHV REQUIREMENTS (continued)

TRAIL DESIGN FUNDAMENTALS

The four fundamental concepts that comprise the recommended design of trails are: trail type, trail class, managed use, and designed use. All of these factors will help determine the actual dimensions and slope of the finished trail. The following are a few things to think about when designing an OHV trail:

1. **Trail Type:** reflects the predominate trail surface and general mode of travel to be accommodated by a particular trail.
 - ◆ Trail Types: Standard/Terra Trail, Snow Trail, Water Trail
 - ◆ One type per trail
 - ◆ OHV trails are considered Standard/Terra Trails.
2. **Trail Class:** Prescribed scale of development, representing its intended design and management standards. Only one trail class per trail or trail section.
 - ◆ Trail Class 1 - Minimally developed
 - ◆ Trail Class 2 - Moderately developed
 - ◆ Trail Class 3 - Developed
 - ◆ Trail Class 4 - Highly developed
 - ◆ Trail Class 5 - Fully developed
3. **Managed Use:** A mode of travel that is actively managed and appropriate on a trail and encourages a specific type of trail use. A trail may have more than one managed use, meaning that different trail users may share the same trail
4. **Designed Use:** The specific managed use that requires the most demanding design, construction, and maintenance parameters and that, in conjunction with the applicable Trail Class, determines which design parameters will apply to that trail.
 - ◆ A trail may only have one designed use
 - ◆ Sometimes the design use may be readily identified, as in the case where ATV and motorcycle are both allowed. ATV is the design use because of its wider tread and turning radius requirements.
 - ◆ Sometimes the design use is harder to identify, as in a trail for hikers, pack and saddle, and bicycle use. In this case, pack and saddle may be the design use because it likely has the most limiting design requirements.
 - ◆ Design parameters may need to be adjusted to accommodate other shared uses.
 - ◆ Typical Design Use Types: hiker/pedestrian, pack and saddle, bicycle, motorcycle, ATV, 4-wheel drive vehicle >50 inch wide, cross country ski, snowshoe, snowmobile, motorized watercraft, and non-motorized watercraft.

GENERAL OHV REQUIREMENTS (continued)

- 5. Design Parameters:** Design parameters are defined after the design fundamentals listed previously have been taken into consideration and before trail implementation. They direct new construction and guide maintenance. Parameters include:

[illegible]

INVENTORY

INVENTORY

LAND USE

Most of the following information comes from the Herriman City General Plan which was adopted July 10, 2014. Herriman is currently undergoing an adjustment to their master plan, but for the purposes of this report we will use the adopted plan and numbers.

OBSERVATIONS

EXISTING LAND USES*

Rural Residential.....	3.1%	Mixed-Use.....	0.1%
Low Density Residential.....	19%	Parks.....	1.4%
Medium Density Res.....	1.4%	Pocket Parks and Paths.....	0.9%
High Density Res.....	0.2%	Open Space.....	24.8%
Public:.....	1.4%	Resort/Recreational.....	0.3%
Quasi-Public.....	2.1%	Military Operational.....	3%
School.....	0.1%	Vacant/Agricultural.....	41.7%
Commercial.....	0.3%		

*More land has been developed since these numbers were generated. The information does, however, show a general breakdown of how the land is used throughout the City.

TOP 3 LAND USES

- ◆ Vacant/Agricultural: 41.7%
- ◆ Open Space: 24.8%*
- ◆ Low Density Residential: 19%

*Most of the open space listed is located within the Herriman Hills OHV study area.

ADJACENT LAND USE: DIRECTLY SURROUNDING OPEN SPACE

- ◆ Salt Lake County Rose Canyon Recreation Area (area to the west; OHV strictly prohibited from this area).
- ◆ Low-density residential (area to the north).
- ◆ Vacant/Agriculture (future low-density residential development to the southeast).
- ◆ Military Operation (Camp Williams to the south).

INVENTORY

LAND USE (continued)

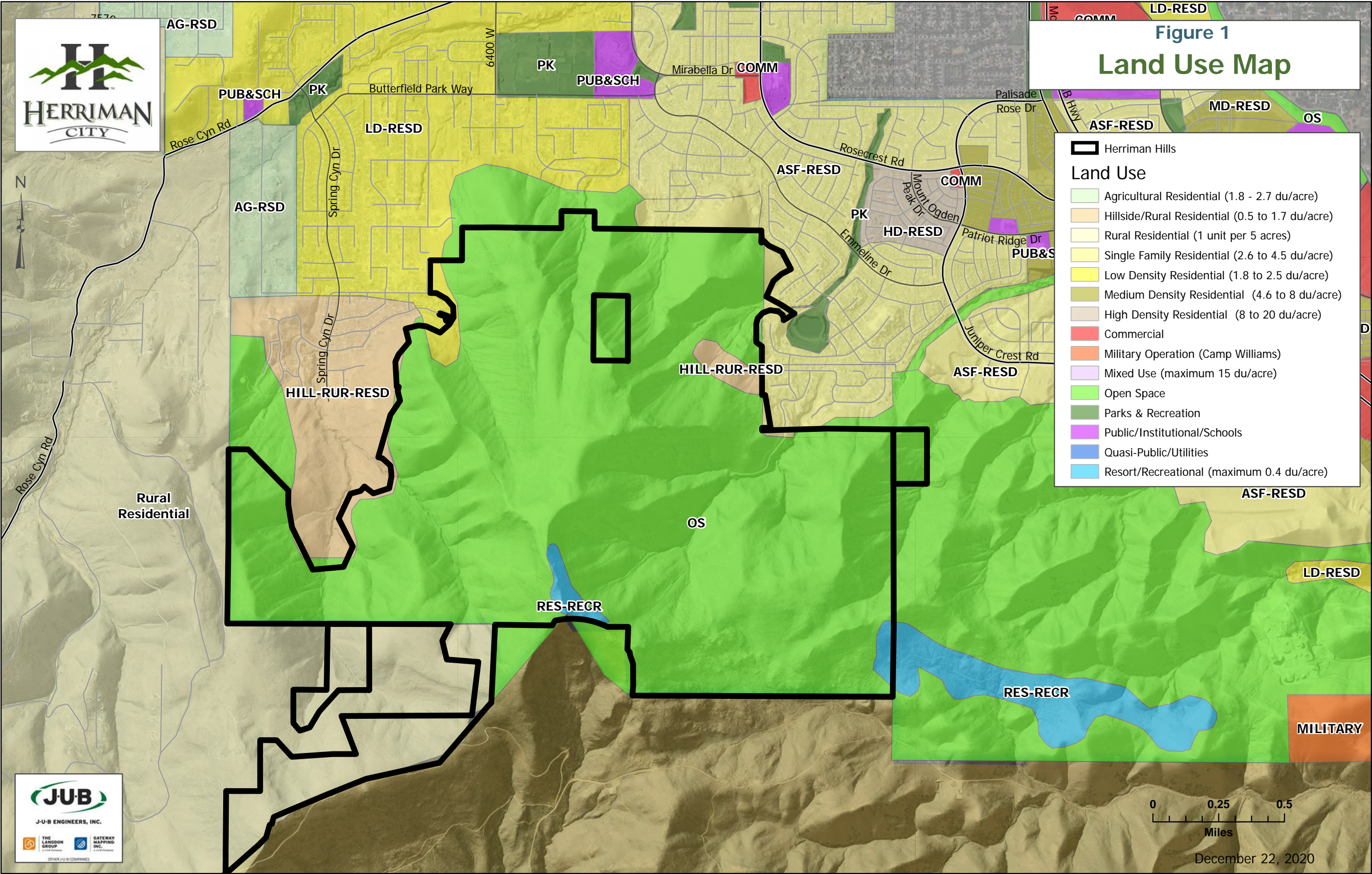
OPPORTUNITIES

- ♦ The undeveloped land/future low-density housing area to the southeast may be a good option for a future trailhead.

CONSTRAINTS

- ♦ The Herriman Hills Open Space is completely surrounded and isolated by land uses that are incompatible with OHV use.
- ♦ Current residential areas adjacent to Herriman Hills bought properties with the assumption that OHVs aren't allowed in the hills above their homes.

LAND USE MAP - FIGURE 1



INVENTORY

ZONING

The Herriman Hills area is currently zoned open space. As such, its intended uses include: natural open space, hillsides, trails and resource protection areas. Envisioned amenities include: parks; multi-purpose trails for pedestrians, cyclists, ATV and equestrian users; cultural/recreation centers; gun ranges; etc. In addition to these uses, the overall goals for the same area include protection of environmentally sensitive areas, permanently protected open space for both natural purposes and active recreation uses, greenway corridors for preserving natural features and allowing trail connections.

OBSERVATIONS

- ◆ The land within the OHV study area is zoned as Forestry Recreation. This zone “allows sensitive and creative development that permits continued enjoyment and protection of such natural areas vital to the attractiveness and economic viability of the City”. It also allows for single family residences, but they will be subject to all other engineering development requirements. These may be very difficult to meet in the Herriman Hills area.
- ◆ The land on 3 sides of the OHV study area is zoned for single family residences:
 - * R-1-15: Residential – single family on 15,000 sq. ft. min.
 - * A-1: Agricultural – single family/animals allowed on 1 acre min.
 - * A-0.25: Agricultural - single family on 10,000 sq. ft. min.
- ◆ There are 3 small areas within the forestry recreation area that are designated as Resort Community Zones (see Zoning Map). “The purpose of the Resort Community Zone is to permit development areas for resort, recreation, and other uses to the extent such development is compatible with protection of natural and scenic resources of these areas for the continued benefit of future generations” Herriman City Code 10-11-1.

INVENTORY

ZONING (continued)

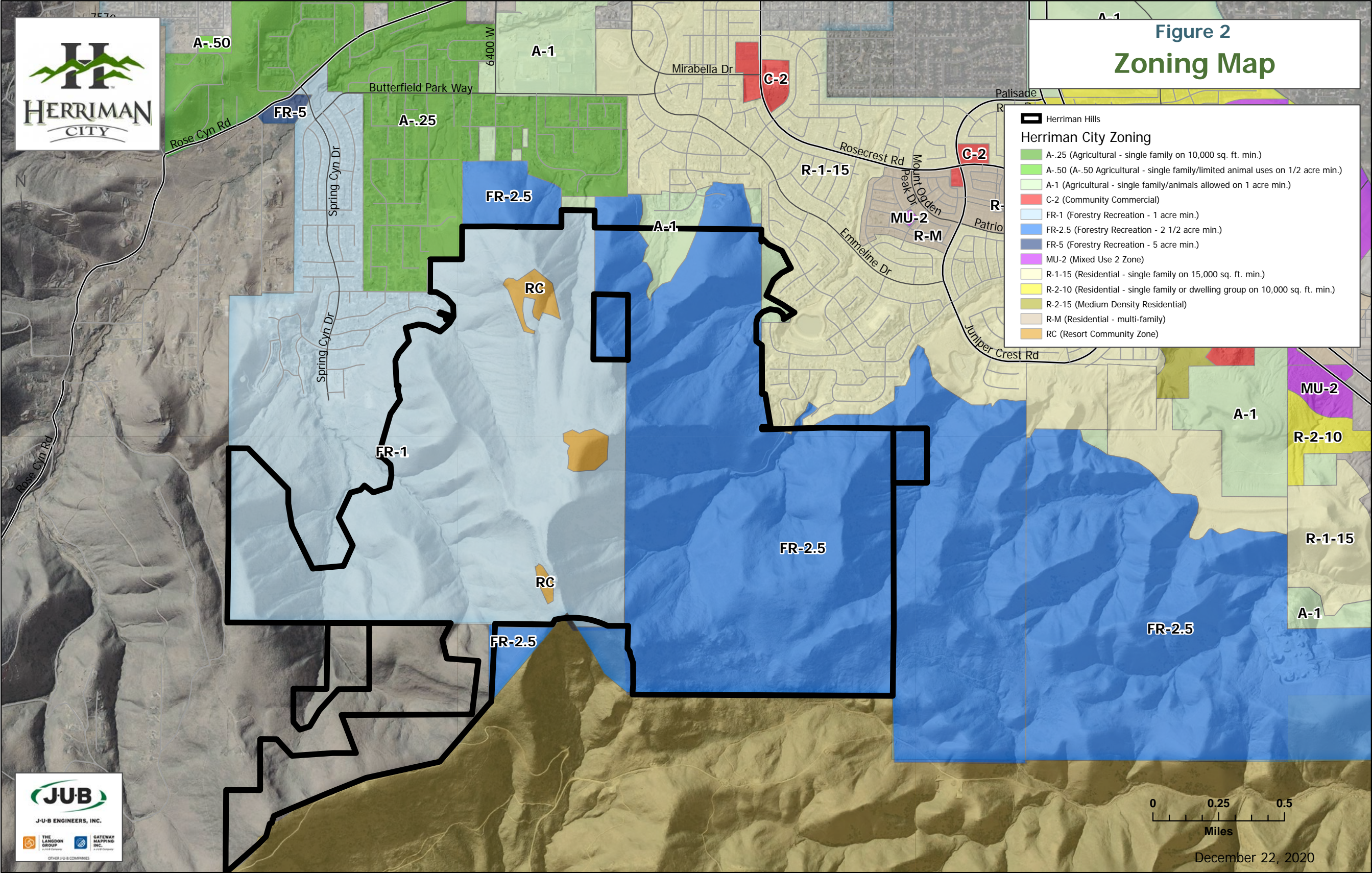
OPPORTUNITIES

- ◆ The Herriman Hills district is already zoned appropriately to accommodate foot trails, equestrian trails and OHV trails.
- ◆ The zoning of the area does not present conflicts.

CONSTRAINTS

- ◆ The proximity of Residential zoning and the Forestry Recreation zone with additional use of OHVs may present some compatibility conflicts.
- ◆ All stated future amenities for open space listed above may not be compatible with this particular site.

ZONING MAP - FIGURE 2



INVENTORY

EXISTING TRAILS AND TRAILHEADS

Understanding where existing trails and trailheads are located and how they connect with each other is important when deciding to add another managed use to the system. It significantly influences where the new trail can go, where it should run, and what potential conflicts with existing facilities will have to be resolved.

OBSERVATIONS

TRAILS

- ◆ Herriman currently has 16.8 miles of “primitive trails” according to the Park Master Plan.
- ◆ There are 60.7 miles of “primitive trails” planned for the Herriman Hills area.
- ◆ 8.5 miles of the proposed “primitive trails” are for a motorized firebreak trail.
- ◆ The longest paved trail connection goes from Rose Creek Park to the Friendship Trail Access.
- ◆ The other paved connection extends from Leila Ln. to the Blackridge trailhead.

TRAIL ACCESS

- ◆ There are no direct routes to the trailheads.
- ◆ Little to no parking exists for vehicles at the trailheads. The only option in many locations is on-street parking.
- ◆ Blackridge Reservoir has a larger parking lot, but during warmer, sunny days that parking is taken by those using the reservoir for water and beach activities.
- ◆ All routes require driving through multiple neighborhoods.
 - * The roadways are narrow (residential roads vs. major collector or arterial streets). When cars are parked on both sides of the street there is not much of a drive lane left. This could create unsafe situations for visitors and residents.
- ◆ One or more trail access points are placed in a narrow easement between two existing homes. There are 2 “urban trail” connections to the “primitive trails.”



Eric's Trail (Near Water Tank)



Blackridge Trailhead



Friendship Trail Access

INVENTORY

EXISTING TRAILS AND TRAILHEADS (continued)

TRAILHEADS

There are 4 existing trailheads or access points around the City. Herriman's only official developed trailhead with access to Herriman Hills is at Blackridge Reservoir. There are several other trail access points (none of the typical trailhead amenities, i.e. signs, restrooms, parking, etc.). The access points including current and future trailheads are listed below in no particular order (some access points are proposed future trailhead locations according to the Master Plan):

- ♦ Wide Hollow Access (future trailhead)
- ♦ Friendship Access
- ♦ Blackridge Reservoir Trailhead
- ♦ Juniper Crest Access

OPPORTUNITIES

- ♦ There are already several proposed trails and trailheads. If they are developed, they will help provide better access to Herriman Hills.
- ♦ The proposed trailheads can be converted to accommodate OHVs before construction. This would save the money and time required to modify existing trailheads.

CONSTRAINTS

- ♦ Connected "urban" and "paved" trails may accidentally encourage OHV riders to continue/extend their ride on the paved urban system.
- ♦ OHV users who transport their vehicles using truck and trailers will take up large amounts of on-street parking space. This will increase neighborhood road congestion issues.
- ♦ There is little room for trailhead expansion, either for parking or trail widening.
- ♦ The owners of the homes may not appreciate heavy machinery accessing the adjacent trail.
- ♦ Visitors with the larger vehicles and trailers could find navigating the neighborhood roads difficult and/or annoying.
- ♦ Increased traffic due to the introduction of OHVs may be a nuisance to existing neighbors and residents.



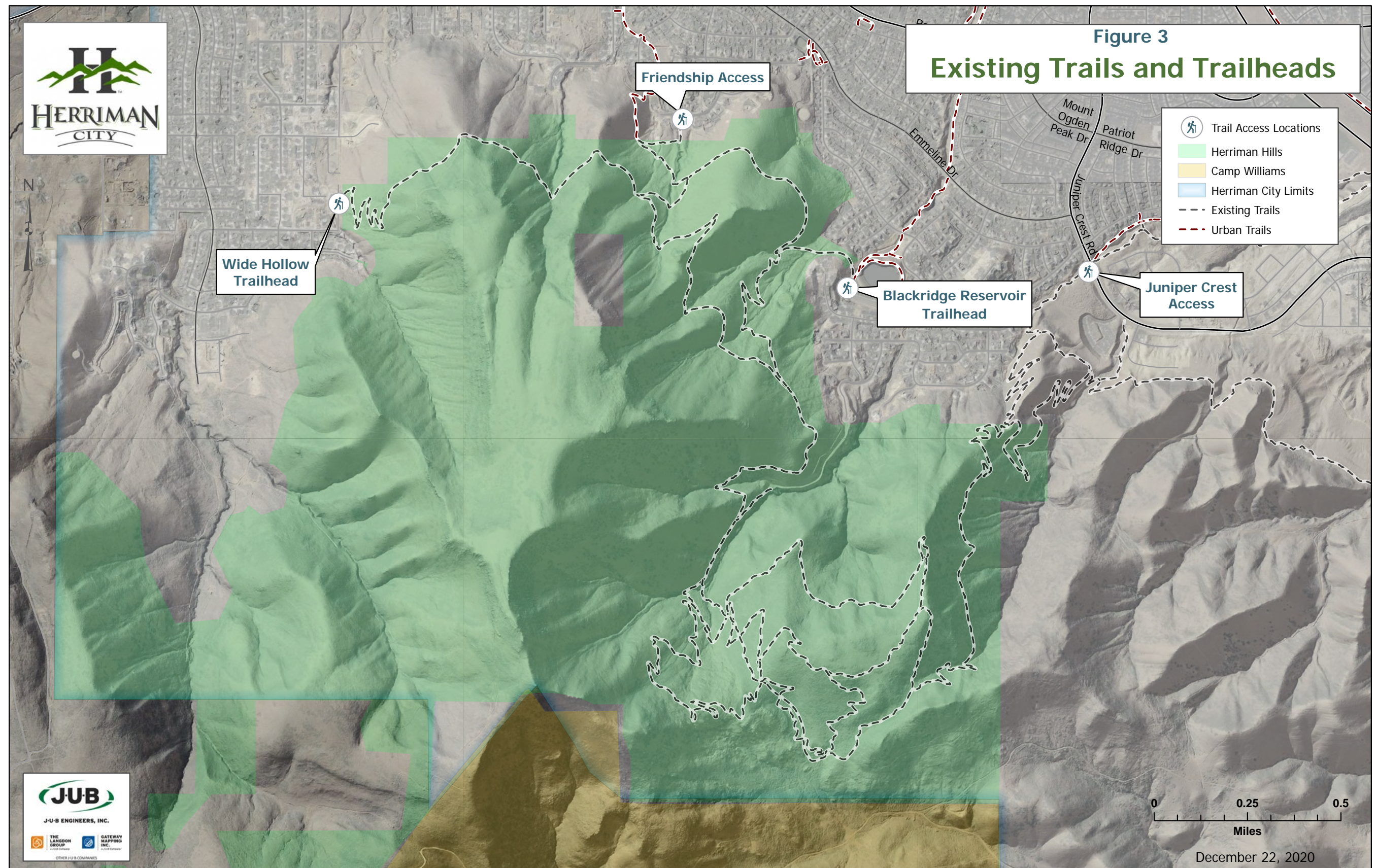
Wide Hollow Trail Access



No Parking Sign at Wide Hollow Access

INVENTORY

EXISTING TRAILS MAP - FIGURE 3



INVENTORY

SLOPE

Slope or the steepness of the land which constitute Herriman Hills is one of the main factors that contribute to the character of that place. Because the slope is constantly changing, both in steepness and direction, numerous land form variations have been created, each with their own peculiar micro-climate and physical conditions. These affect how water moves over them, how soils form and accumulate there, and how the forces of nature choose to react with the land.



Eric's Trail

Generally speaking, small increases in slope angle above 30° translates into large increases in landslide erosion as the stress of gravity exceeds the strength of the bedrock. In an area where trails for foot and bicycle traffic are to be carved into the land and maintained, slope must be carefully examined to avoid undesirable complications. This is even more important if the addition of vehicular access is being considered.



Steep Slopes near Eric's Trail

OBSERVATIONS

- ◆ Current trails for both hiking and biking are relatively narrow, averaging 2' – 3' in width.
- ◆ The trails closest to the base of the mountains see higher frequency of use due to their proximity to adjacent neighborhoods and, for the most part, their gradual grade change.
- ◆ The higher trails navigate the steeper slopes using numerous switchbacks in order to remain a grade at or below 8%.
- ◆ The switchbacks of the current trail system add length and increase accessibility to the community.
- ◆ The majority of the slopes exceed 15-30% percent.

OPPORTUNITIES

- ◆ The lower slopes within the study area are already 15 percent grade or lower.
 - * Trails here would need little additional grading to meet design standards.
- ◆ The grade variation could allow for varying levels of difficulty for OHV riders.

INVENTORY

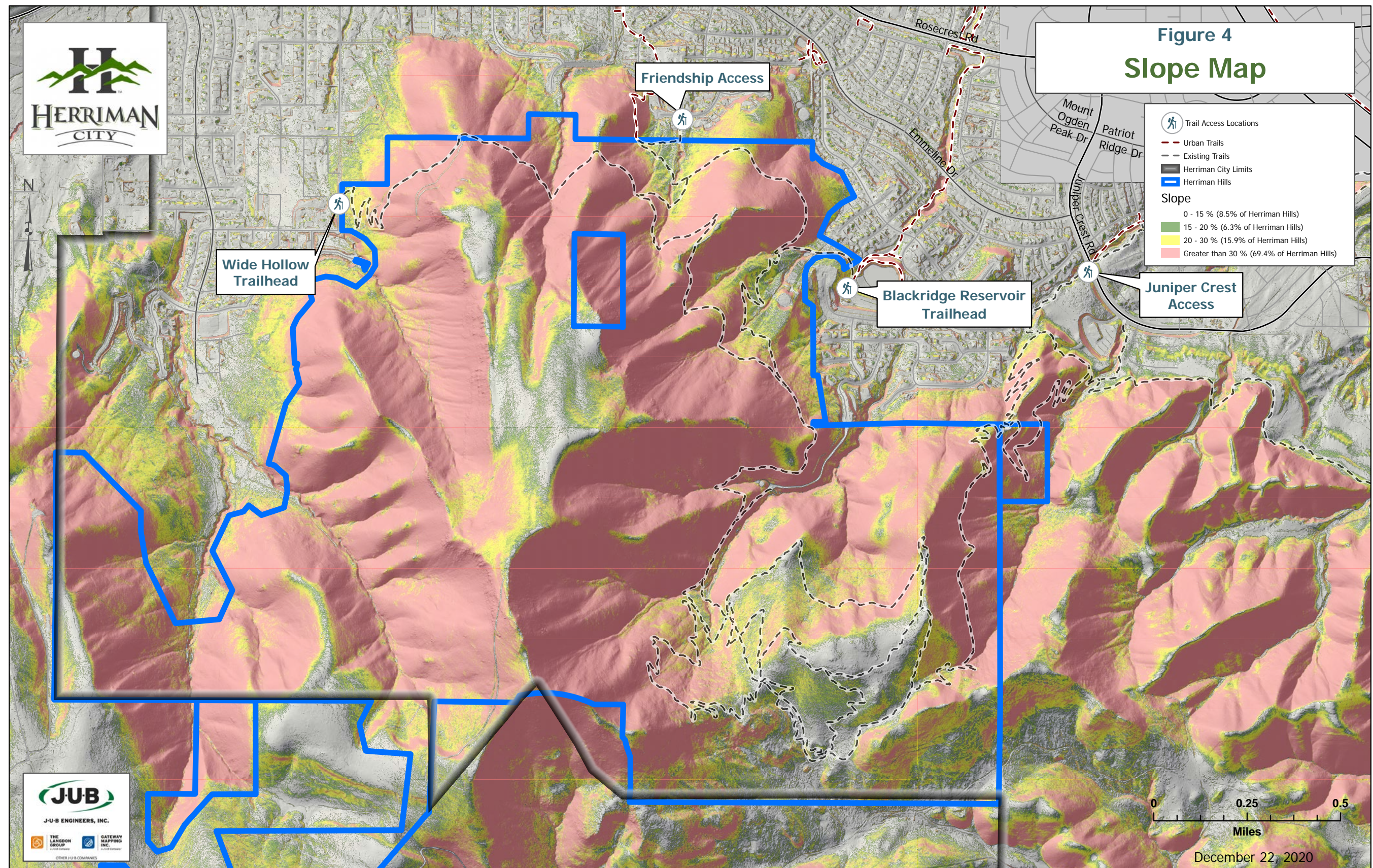
SLOPE (continued)

CONSTRAINTS

- ◆ The width of OHV trails will be considerably wider than those for hiking and biking. OHV trails have widths typically recommended from 4' to 6' and should be full bench construction. This requires more excavation and leaves a larger backslope than other methods. It also has significantly more visual impacts.
- ◆ The turning radius for the switchbacks could affect the maneuverability of OHVs.
- ◆ Possible areas of conflict on the lower slopes between pedestrians and OHV users.
- ◆ Steep slopes impede the speed of OHVs. Maximum grades are recommended to range between 3 and 10 percent, with a maximum short pitch of 15 percent.
- ◆ Slower OHV speeds would be safer for pedestrians but might discourage OHV riders from using the trails.
- ◆ The steeper the grade the more potential for soil erosion to occur.

INVENTORY

SLOPE MAP - FIGURE 4



INVENTORY

SOIL

Soil type is an important factor in determining the stability or fragility of a given site. Every soil is characterized by the aggregates it forms. Aggregates are groups of soil particles that bind to each other more strongly than to adjacent particles. These aggregates range in size, and when the proportion of large (>2-5 mm) to small (< 0.25 mm) aggregates increases, soil quality generally increases. It is more stable and able to resist movement. Aggregate stability is critical for infiltration, root growth, and resistance to water and wind erosion.

OBSERVATIONS

- ◆ All trails, new and old, exhibit exposed stones and cobbles.
- ◆ The older/frequently used trails show significantly higher amounts of exposed stone and weathering.
- ◆ The little topsoil that exists has an extremely fine texture.
- ◆ The higher slopes have large areas of exposed bedrock even where there are no existing trails.



Rocky Soil - Exposed Bedrock

EXISTING DATA AND RESEARCH

- ◆ Utah soils are generally considered fragile.
 - * What are fragile soils? They are most vulnerable to degradation by water and wind.
 - * Characteristics of fragile soils:
 - Low organic matter.
 - Low water stable aggregates.
 - Absence of structure.
 - On sloping ground.
 - In arid and semiarid regions.
 - Have sparse plant cover.
 - Low biodiversity.
- ◆ There are 3 main soil types in the study area: 8010, BFF, and HWF (WSS)
 - * 8010: Melling-Tickville-Beefhollow Complex*
 - **Parent material:** colluvium/alluvium derived from andesite**
 - **Slope:** 15-50%
 - **Typical Profile:** 0-15" is very cobbly (clay) loam. Bedrock starts between 15-25" below the surface



Volcanic Rock Formations

INVENTORY

SOIL (continued)

- * BFF: Butterfield
 - **Parent material:** colluvium/residuum
 - **Slope:** 5-50%
 - **Typical Profile:** 0-30" is extremely cobbly (clay) loam. Bedrock starts 30-40" below the surface.
- * HWF: Horrocks
 - **Parent material:** colluvium/residuum
 - **Slope:** 5-50%
 - **Typical Profile:** 0-40" is extremely stony/cobbly loam
 - Bedrock starts at 40-50" below the surface.

* Complex refers to the subcategories within the soil type: i.e. Melling, Tickville, Beefhollow, etc. They may vary slightly on the parent material or depth to bedrock, but overall, they are very similar. The data presented represents the subcategory that makes up the highest percentage of the overall soil type.

** Andesite: extrusive igneous rock

- ◆ All the soils within the area of study are rated as "very limited" for motorcycle trails as well as pedestrian trails. (WSS)
 - * This rating is based in the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. The properties are: stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.
- ◆ Basic/common effects of OHV activity on soils (Environmental Effects)
 - * Altered soil structure (i.e. soil compaction) which limits/prohibits plant growth.
 - * Destruction of soil crusts (which causes more erosion)
 - * Erosion



Existing Soil Erosion



Rocky Soils - near Eric's Trail



Rocky Soils - near Eric's Trail

INVENTORY

SOIL (continued)

OPPORTUNITIES

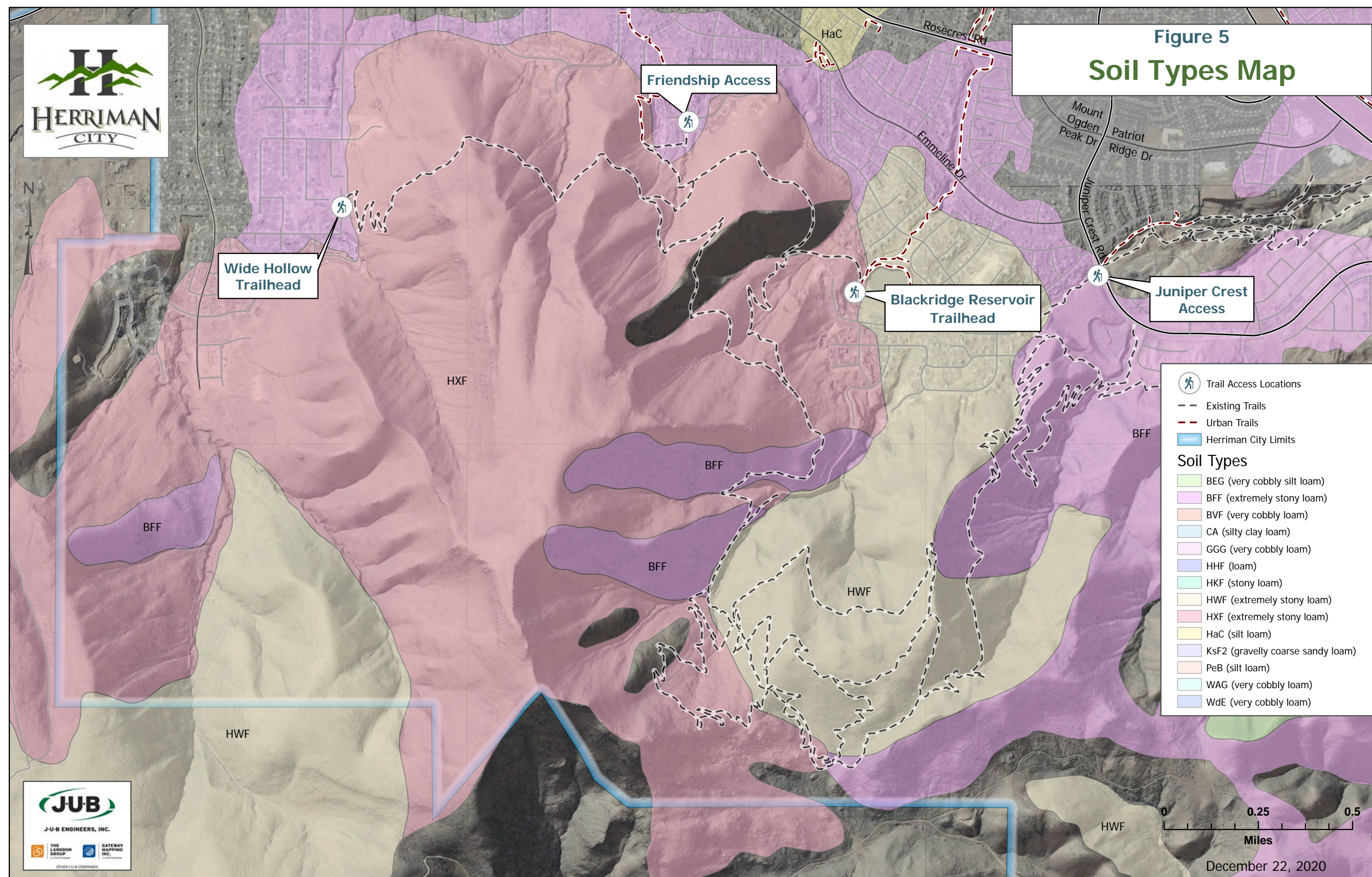
- ◆ Because the soils are mostly comprised of large stones and little topsoil, drainage should not be a major issue.
- ◆ All trails require maintenance in one form or another. A common issue mentioned throughout all of the reference material literature was drainage and how to deal with large quantities of water. This would not be a major issue for this area.

CONSTRAINTS

- ◆ The bedrock's proximity to the surface indicates the creation of topsoil is slow and maintaining it is difficult. Once the soil is eroded it will take a significant amount of time to generate new topsoil.
- ◆ The large rocks in the soil could present safety issues for both pedestrians and OHVs once the topsoil is worn away.
 - * There is a tripping hazard for pedestrians and could cause mountain bikers to crash.
 - * The rocks could damage the undercarriage of the OHVs or even cause them to destabilize/crash.
- ◆ OHV trails would require more frequent maintenance than the current foot trails.
- ◆ It will likely be necessary to cut through bedrock in order to create the new OHV trails.
 - * Special equipment is required to cut through bedrock, which could significantly increase the cost of trail construction.
 - * The large equipment could cause significant disturbance and damage to the soil structure along new OHV trail routes.

INVENTORY

SOIL MAP - FIGURE 5



INVENTORY

EXISTING VEGETATION

One of the most noticeable features of a given site is its vegetative cover (or lack thereof). The amount and type of plant material that grows on a property provides its aesthetic character and facilitates practically all of the biological functions that take place there: production of oxygen, wildlife habitat, contributions to soil productivity and stability, biodiversity in plants and animals, and a host of other functions. Understanding the specific role that vegetation plays in Herriman Hills is crucial in determining the affects that the use of OHVs may have on the site.

OBSERVATIONS

- ◆ The shrubs and trees in this location include mostly Scrub Oak and Junipers.
- ◆ There appears to have been a fire at some point, due to the uniform growth and height of the scrub oak.
- ◆ Even in May/June the grasses are dry.
- ◆ There is more vegetative diversity in the canyon/watershed areas.
- ◆ The higher slopes have little vegetation other than grass and cacti.

EXISTING DATA AND RESEARCH

- ◆ USDA Recommendations (A Comprehensive Framework for Off-Highway Vehicle Trail Management)
 - * Do not locate routes in areas that have sensitive, threatened, or endangered plant species.
 - * Do not locate routes where there are unique plant communities i.e. aspen stands, bogs, riparian areas, etc.
- ◆ OHV Effects (Environmental Effects)
 - * Soil compaction prohibits plant growth.
 - * Dust raised by OHV traffic can disrupt photosynthetic processes, which suppresses plant growth.
 - * If native vegetation cover is reduced it can allow invasive species to move in.
 - * Disruption of vegetative cover could increase the soil erosion and water runoff.
 - * New or fresh disturbance along the edges of existing and new trails frequently results in noxious weed growth, particularly thistle.

INVENTORY

EXISTING VEGETATION (continued)

OPPORTUNITIES

- ◆ Trails strategically located will disturb relatively little vegetation because of its scarcity.
- ◆ There is enough vegetative diversity to provide some wildlife habitat and may accommodate a small collection of bird species to see.
- ◆ The small canyons and draws where water would tend to congregate show the most vegetative variety and density. These areas are also the most attractive for habitat and human use.

CONSTRAINTS

- ◆ Because of the lack of moisture throughout the year, vegetation is relatively sparse over much of the site. It consists of grasses, cacti, herbaceous plants, and sagebrush.
- ◆ There are areas of stunted tree cover, most of which is all the same height (6-10 feet). This would indicate some event that knocked the tree growth back (a fire) and basically reset the growth patterns.
- ◆ Because of the type of vegetation found on the site, the threat of wildfire is relatively high.

INVENTORY

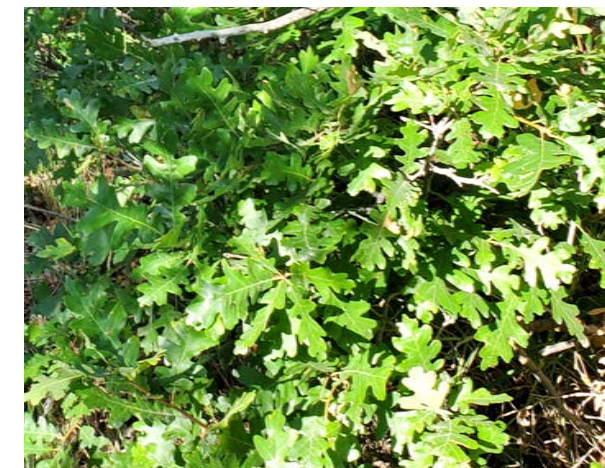
VEGETATION - VISUAL IMAGE INVENTORY 1



Above: Overall texture of the existing vegetation on the Herriman hills.



Common name: Rocky Mountain Juniper
Latin Name: *Juniperis scopulorum*



Common name: Gambel Oak
Latin Name: *Quercus gambelii*



Common name: Golden Currant
Latin Name: *Ribes aureum*



Common name: Big Sagebrush
Latin Name: *Artemisia tridentata*



Common name: Oregon Grape
Latin Name: *Mahonia repens*



Common name: Common Snowberry
Latin Name: *Symphoricarpos albus*



Common name: Sego Lily
Latin Name: *Calochortus nuttallii*



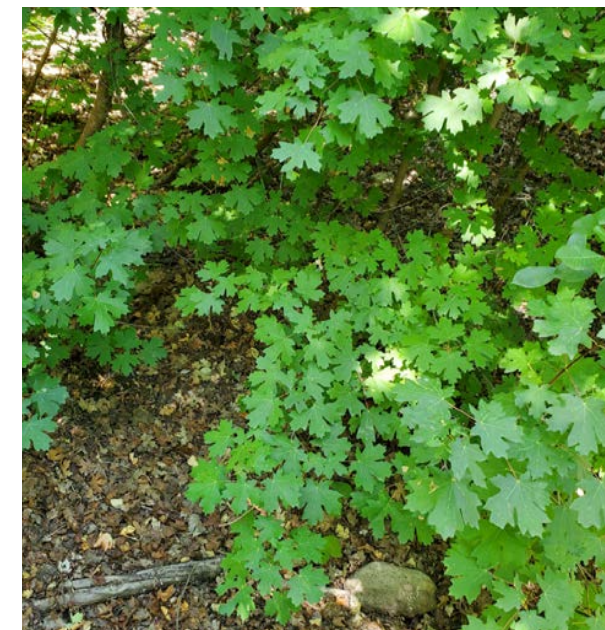
Common name: Bitterbrush
Latin Name: *Persia tridentata*

INVENTORY

VEGETATION - VISUAL IMAGE INVENTORY 2



Common name: Western Aster
Latin Name: *Symphyotrichum spatulatum*



Common name: Big Tooth Maple
Latin Name: *Acer grandidentatum*



Common name: Prickly Pear Cactus
Latin Name: *Opuntia*



Common name: Long Leaf Arnica
Latin Name: *Arnica longifolia*



Common name: Yellow Rabbitbrush
Latin Name: *Chrysothamnus vicidiflorus*



Common name: Curl Leaf Mountain Mahogany
Latin Name: *Cercocarpus ledifolius*

INVENTORY

NOISE

J-U-B performed on-site visits and collected several decibel readings of existing conditions using a cell phone app decibel meter. Later we returned to the same locations to collect readings while a City-authorized OHV drove the adjacent trails. We also looked into existing research and found the following source: Basic Acoustics for OHV Noise Control U.S. Forest Service, Robin T. Harrison, P.E.

OBSERVATIONS

- ◆ The only noticeable noise comes from the highway or other hikers' conversations.
- ◆ Sound carries well in the canyon areas.
- ◆ Wind contributes to the amount of perceptible noise. The wind on the face of the mountain made it difficult to hear the background noise.

DECIBEL LEVEL EXAMPLES

- ◆ A soft whisper 5 feet away or a forest with no wind - 40 dBA.
- ◆ Normal conversation three feet away - 60 dBA.
- ◆ Heavy truck at 50 feet away - 80 dBA.
- ◆ Lawn mower at three feet away - 85 dBA.
- ◆ Sounds louder than 85 dBA begin to cause human hearing damage.
- ◆ Most ATVs are equipped to limit their sound output to 96-100 dBA.
- ◆ For the sake of reference, sound pressure roughly doubles for every 3 decibels. That means a decibel reading of 102 is 4 times as loud as a reading of 96 dBA.

EXISTING REGULATIONS

- ◆ Existing Regulations: As of the year this document was published, little to no regulations were in place in Utah for OHV noise control. The regulations listed below act more as suggestions or examples for what has been done in other places.
 - * California has enacted legislation limiting the amount of sound produced by any OHV operating on public lands to 96 dBA.
 - * Oregon allows a maximum of 99 decibels for ATVs.
 - * Currently (as of 2004) no environmental noise regulations in place for National Forest lands.
 - * U.S. EPA suggests motorcycles make no more than 80-82 dBA. Though there is no current U.S. EPA noise regulation for all-terrain vehicles, all ATV manufacturers voluntarily comply with similar noise limits.

INVENTORY

NOISE (continued)

DECIBEL LEVEL IMPACTS

- ◆ OHV Noise Effects (Environmental Effects)
 - * Wildlife is directly affected by excessive noise. It can cause stress or encourage animals to avoid the area altogether.
 - * The noise alone had been shown to cause other possible recreators to avoid the area where OHVs are permitted.
- ◆ Several of the provided data resources mentioned noise as a major area of conflict when it comes to complaints from the neighboring homes or the pedestrians/mountain bikers. Recommendations included the consideration of noise dampening strategies.
 - * "Acoustical scientists have proposed what is known as the equal energy hypothesis. This says that people are affected equally by sounds containing equal energy." Essentially, people will be equally annoyed by hearing twice as loud a sound for half as long, or half as loud a sound for twice as long.
 - * "Annoyance with the sound of OHVs, especially by residents who live nearby, is clearly the most serious problem from OHV operation." This means the connotation of the noise, or the activity that the noise suggests, and not the noise itself causes the annoyance that people experience. If people already consider OHV noise as an irritation, it does not matter how loud or quiet the noise actually is, they will still be irritated. It would seem prudent to survey residents to see how they feel about OHV noise.

SOUND TEST

- ◆ A sound test was conducted on the site to determine how well a motorized vehicle (trail bike) could be heard from various locations along the perimeter of the site. Decibel readings were taken from several locations both on site and on the perimeter and recorded.
- ◆ On a subsequent visit, a Yamaha TW200 (200 cc) motorcycle was driven away from those locations along the existing biking trails. Readings were taken as the motorcycle reached various distances away from the original reading spot. The results were surprising (see decibel readings shown in Figure 6). Essentially the results indicated that:
 - * The noise dissipated rather quickly as the motorcycle moved away from the meter.
 - * At 200 yards the motorcycle noise was virtually undetectable.
 - * Virtually no motorcycle noise was detected at the perimeter where homes were located once the motorcycle reached 200 yards away.

INVENTORY

NOISE (continued)

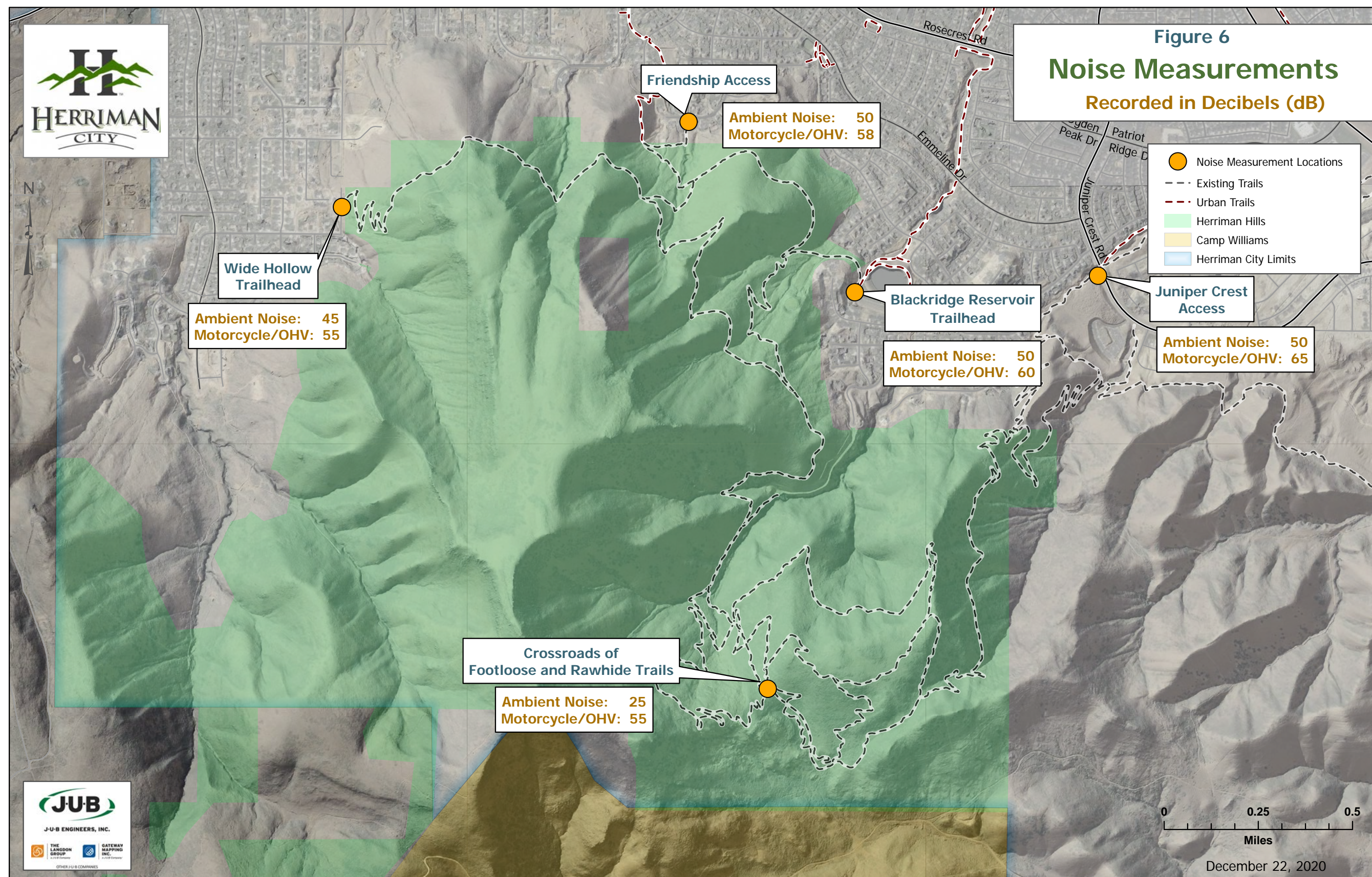
OPPORTUNITIES

- ♦ The site is configured such that vehicular noise appears to be undetectable once it moves a short distance away from the perimeter (i.e. residential areas).

CONSTRAINTS

- ♦ If people have an aversion to OHV noise, any sound attributed to them (whether loud or soft) will be interpreted as an irritation. Just like a mosquito buzzing around one's head, it's annoying no matter how soft or loud it gets.

NOISE MEASUREMENTS MAP - FIGURE 6



INVENTORY

COMMERCIAL RESOURCES

The economic impact of OHV trails in a city is dependent on the type of commercial resources the city has and the potential of future growth and expansion of commercial opportunities. J-U-B's inventory includes only commercial businesses listed on Herriman's economic development website as of July 14th, 2020. The following numbers are a snapshot of the types of businesses most likely to see any positive economic impact from allowing OHV use. J-U-B acknowledges that since the list will likely change as new businesses appear and current ones disappear.

OBSERVATIONS

EXISTING COMMERCIAL RESOURCES

- ◆ Hotels: There are no hotels within Herriman City limits.
- ◆ Restaurants/Drinks/Food Establishments:
 - * 18 restaurant/fast food businesses.
 - * 9 Coffee, Bars, Snow Cone Shacks, Dessert/Bakery, and smoothie businesses.
 - * 2 Grocery Stores.
 - * There are several restaurants, food and drink businesses just outside the City limits in Riverton.
- ◆ Gas stations/Convenience Store/Pharmacy:
 - ◆ 6 gas stations/convenience stores.
 - ◆ 2 pharmacies/convenience stores.

INVENTORY

COMMERCIAL RESOURCES (continued)

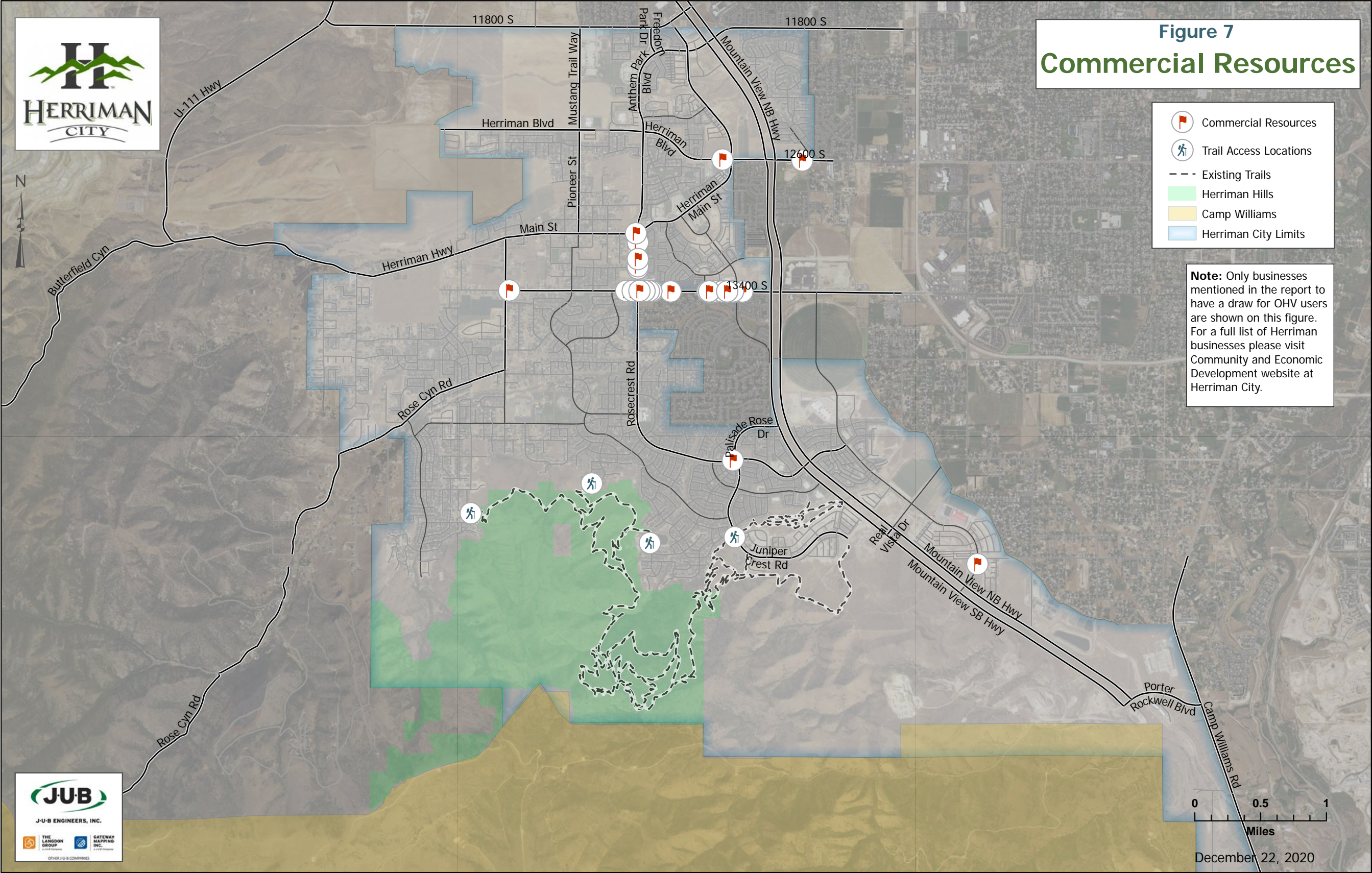
OPPORTUNITIES

- ◆ Most of the increased tax revenue will be generated by people outside of Herriman coming to use the OHV trails and stopping at any of the above listed businesses. While any business could see an increase in revenue, those that are located on the routes used to access the trails will likely see the greatest positive impact.
- ◆ Gas stations in particular may see an increase in sales from both City residents and from OHV visitors.

CONSTRAINTS

- ◆ The increased traffic to stores would likely be limited to the roads that have the most direct route to the trailheads. Outside visitors will not venture far from those roads unless necessary.
- ◆ If there are not sufficient types and choices of food establishments within the City that are on the way to or from the trails, people will not seek out City businesses but will make their purchases in neighboring communities where access is more convenient.

COMMERCIAL RESOURCES MAP - FIGURE 7



INVENTORY

ACCESS

Access is a major concern for those using the trails, but perhaps an even greater concern is access for emergency vehicles and emergency response teams. Through both on-site observations and GIS mapping of routes, J-U-B has discovered the following with regard to emergency access to the Herriman Hills area.

OBSERVATIONS

- ◆ Most of Herriman Hills Open Space is accessible only through residential neighborhoods.
- ◆ Parking for trail access is on-street only. Blackridge Trailhead is the only parking lot with access to the trail system.
- ◆ According to Herriman Standard Details, a “Local” road right-of-way is between 53-60’ and the travel lane pavement width is between 24-26’. This leaves 12-14’ travel lanes in each direction.
- ◆ When cars are parked on both sides of a local road, travel lane widths are reduced. This may decrease the ease of access for emergency vehicles.
- ◆ Some neighborhood Home Owner Associations (HOA) have installed speed bumps on a few of their roads, but these are not required or installed by Herriman City.
- ◆ Emergency and Medical Resources
 - * Emergency Vehicle/Fire Stations for Herriman City are provided under the Unified Fire Authority (UFA).
 - * UFA has two stations in Herriman City Boundaries:
 - Station #103 Herriman – Located on Main street
 - Station #123 Rose Crest – Located on the Corner of River Chase Rd. and Patriot Ridge Dr.
 - * Riverton’s IHC Hospital is the nearest emergency room to Herriman City.



Eric's Trail Access - Secret Canyon Circle



Friendship Trail Access - Friendship Dr.

INVENTORY

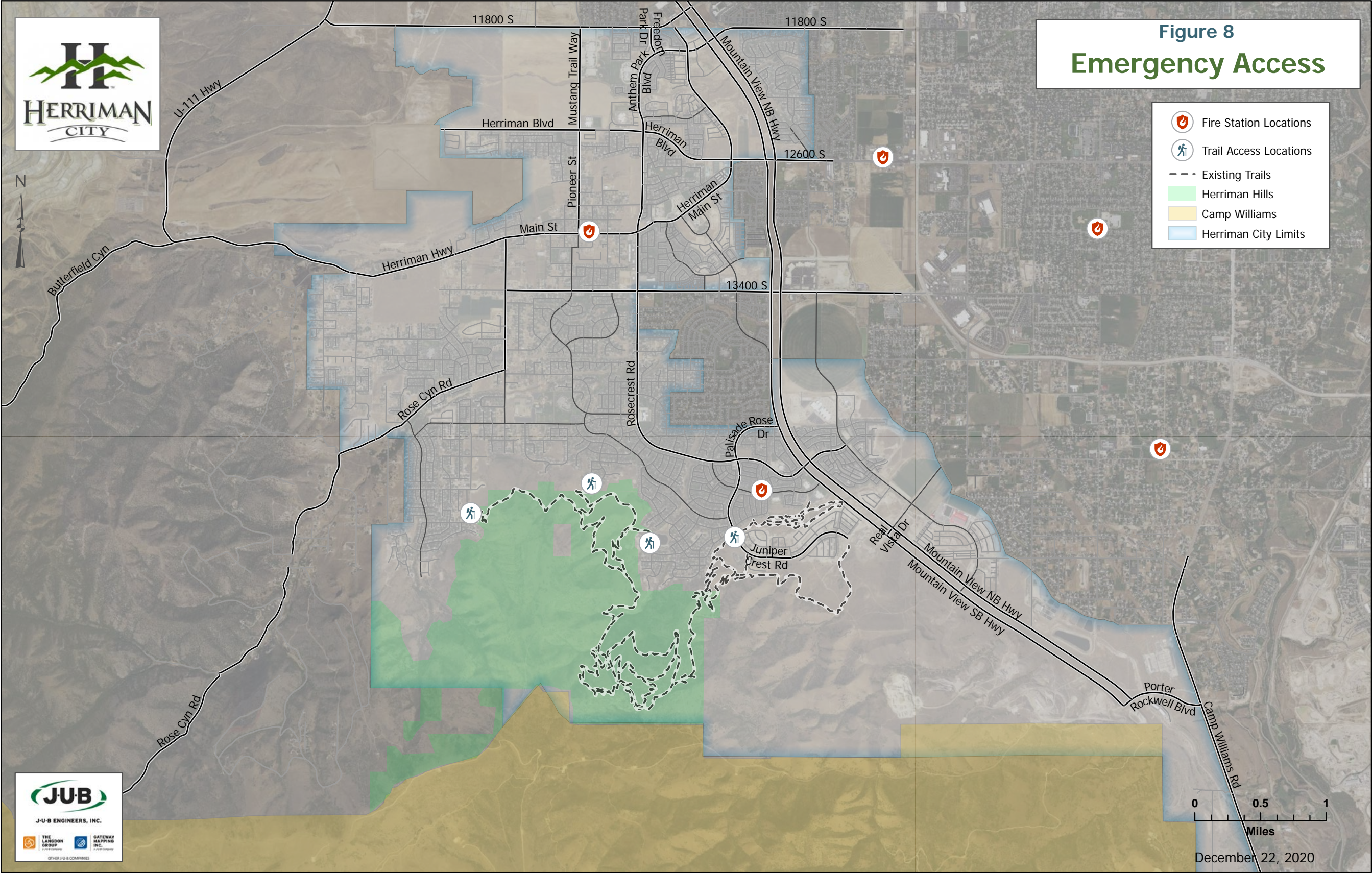
ACCESS (continued)

OPPORTUNITIES

- ◆ Put up no parking signs on narrow streets in strategic locations to help with on-street parking congestion and emergency vehicle access.

CONSTRAINTS

- ◆ In the event of an accident/fire, emergency vehicles will have limited space to park and can only go as far as the trailhead or trail access point.
- ◆ Should emergency vehicles be parked in the street during an incident, traffic may be partially blocked and congestion will be a significant problem until the emergency vehicle(s) leave the scene.
- ◆ HOA Speed-bumps and other local traffic calming methods may be a nuisance to an emergency vehicle trying to respond quickly to a fire or injury.



ANALYSIS

ANALYSIS

EROSION POTENTIAL

The land within the study area is at high risk for erosion potential due to several factors, including vegetative cover, slope, and soil type. Currently all three factors remain in stasis, but altering one or more factors increases the probability of accelerated erosion. In order to decrease the amount of erosion potential, whether from regular OHV use or from OHVs going off trail, the trails would require frequent observation and maintenance.

VEGETATION

- ◆ The existing vegetation helps contain the topsoil by acting as a windbreaker and supplying stabilizing root networks to hold the soil in place. OHVs alter the soil structure (break it down) and limit plant growth through soil compaction. The areas where vegetation is disturbed or uprooted will see the erosion of existing topsoil accelerated.
- ◆ If the natural vegetation is disturbed there is a possibility for invasive species to move in and significantly impact the landscape. This is particularly true for Cheatgrass. For this location, the disturbance of the thin topsoil layer is of greater concern than the possible appearance of invasive species.

SLOPE

- ◆ The soil stability is adversely impacted by the existing steep slopes. Once the soil is disturbed, gravity or wind will tend to move the soil down the mountainside.
 - * The damage to the vegetation and soil from the trail construction process will extend several yards outside the allotted space for the trails. The average disturbance zone for a new trail may extend between 15 to 25 feet beyond the trail.
 - * If OHVs stayed on the trails, then the erosion of the surrounding soil would, for the most part, be limited to the construction phase of the project. However, due to the comparatively short lengths of the OHV trails, users are likely to explore off path and disturb larger areas of soil and vegetation.
- ◆ The depth of topsoil decreases as the grade increases on the site. If the OHV trails were located on the higher slopes in order to decrease conflict with hikers, more erosion would likely occur and there would be a greater environmental impact to the site.

ANALYSIS

EROSION POTENTIAL (continued)

SOIL

- ♦ All soil types within the area have between 15-40" of very stony loam with an extremely fine texture. The lack of a thick topsoil layer shows the large amount of time required to obtain and maintain a healthy topsoil layer.
 - * Erosion in this location is already prevalent, but once the environment is disturbed by OHVs, erosion will likely increase. The topsoil layer will not be able to readily replenish itself.

OVERALL ANALYSIS

The soils in this area appear unable to maintain their stability if too many new variables are introduced. This does not mean that the area is completely unusable (the existing foot trails show that). However, excessive erosion, especially as a result of constructing OHV trails and continued OHV use, can create significant scars on the site. Recovery will be extremely slow (decades) due to the erosion of topsoil and the time required to regenerate new substantial vegetation.

ANALYSIS

RIDING SAFETY

For OHV use to be considered feasible on a particular site, it must be safe to ride without the threat of vehicle damage and/or personal injury; and without destroying or seriously degrading the environment. The activities proposed must be especially suited to the environment's ability to accommodate its demands. The activities must be appropriate. Other specific design and site characteristics that should be considered important to riding safety include:

TRAIL DESIGN

- ◆ According to the USDA recommendations, route grades should be kept to minimum and should not exceed a 15% grade.
- ◆ Trails should have a destination, with a variety of landscapes throughout the ride.

DISTANCE

- ◆ Although there are no specifications for how long an OHV trail can or should be, the existing OHV riding locations in Utah boast between 50 to 300 miles* of trails.
- ◆ The length of OHV trails for this study area would be significantly shorter, in the range of 2-3 miles.
- ◆ Greg Hilbig of Draper pointed out the cost comparative to other recreational user groups by the resources required to meet one hour of travel:
 - * Pedestrian/Hikers - 3-4 miles
 - * Mountain Bikers - 6-10 miles
 - * Motorized Vehicles - 10-40 miles

*Note: These are a combined total of trails within an area, not just one route.

- ◆ With the absence of long riding distances and a variety of terrain/scenery, the tendency for riders is to increase speed. Higher speeds on steep terrain is cause for concern about accidents and injuries.

SLOPE STEEPNESS

- ◆ Increased slope steepness leads to a greater use of switchbacks to mitigate the trail grades.
- ◆ Increasing the trail grades at Herriman Hills also increases the possibility of OHVs over-running the trail (especially at switchbacks). This may lead to accidents with possible vehicle damage and/or injuries.

SWITCHBACKS

- ◆ Whether or not any existing trails are used in the design of new OHV trails, switchbacks will be necessary. The existing slope of the mountains is too steep for the majority of riders.

ANALYSIS

RIDING SAFETY (continued)

Switchbacks allow for a wider range of participants because they help decrease the steepness of new OHV trail grades.

- ◆ Switchbacks interfere with the two main goals of OHV riders: “go fast and go far” (preferably to a specific destination).
 - * The switchbacks will slow riders down considerably as they navigate the 180 degree turns.
 - * Although switchbacks will add a little to the total length of the trail, the addition will be imperceptible to OHV riders because they will repeatedly traverse a comparatively small area of land.
- ◆ The sharp turns of the switchbacks could have positive and negative consequences. Cautious riders will slow down in order to safely navigate turns. Careless or inexperienced riders could easily run off the trail if their speed is too high. This is especially concerning because of the instability of an OHV machine on steep slopes. Since the riders will not be able to travel long distances, they will be tempted to compensate by moving at higher speeds.

OVERALL ANALYSIS

Adding OHV trails to Herriman Hills would create a greater diversity of trails for the City. Although Herriman has an extensive 49.2 mile network of paved and primitive trails, with over 100 miles more planned, the majority are paved and run through the City rather than on the mountainside. City trails generally do not have to consider slope steepness or switchbacks. However, adding OHV trails to the Herriman Hills area, which is practically all mountainous, will require relatively wide trails that are placed on steep terrain, on thin and somewhat unstable soils, and the use of multiple switchbacks to keep the trail grades within a safe range.

Due to the limited size of the property and the abundance of steep grades throughout the site, OHV use in this location presents significant difficulties in ensuring rider safety. If OHV use is allowed, measures must be taken to build trails that meet acceptable design standards (grade, pitch, full bench, etc.). These measures will likely be costly due to the steep slopes on the site. Excavation on steep slopes, along with shallow depth to bedrock, will likely result in large scars on the landscape. These affect both the visual or aesthetic character of the site as well as the immediate site environment (vegetation, soils, etc.).

With respect to trail length and variety of landscape through which to ride, neither of these can be rectified due to the size of the site, its inability to connect with adjacent properties to allow for longer trail rides, or to change the scenery to any significant degree. Herriman Hills is what it is, including its limitations on OHV use.

ANALYSIS

USER CONFLICTS

In an area as defined and confined as Herriman Hills, there are bound to be different user groups that, when on the site at the same time, will have the potential to be in conflict with one another. Each group has its own specific interests and use requirements peculiar to them, and these are not always mutually inclusive. In this case, hikers, equestrians, mountain bikers (which we will call Group 1) and OHV riders (Group 2) each have different objectives and space requirements necessary to their purpose. Potential compatibility issues will arise.

TRAIL SIZE

- ◆ Although Group 2 trails (OHV) can accommodate Group 1 (hikers, equestrians and mountain bikers), Group 1 trails cannot accommodate Group 2 users. Required trail width alone makes this impossible. Only a specialized widened trail will allow for OHV use.

NOISE

- ◆ The noise and speed of an OHV does not mix with horses, bikers, and hikers. Nor does it mix with other activities in which Group 1 may be participating (i.e. birding, physical exercise, fresh air, quiet, etc.).
- ◆ When horses encounter OHVs on a trail, especially when that encounter is abrupt and sudden, the noise is usually disturbing to the horse and often causes some type of reaction that the rider may or may not be able to control. This reaction depends on the horse, its experience around OHVs, and the skill of the rider.

ACCESS POINTS

- ◆ The proposed access points for OHVs are the existing trailheads shared by all other user groups. The plan is a great way to save space when it comes to designing the OHV entrances, but the space is not available to accommodate trailer rigs that may be used to bring OHVs to the site. Traffic bottlenecks are certain to occur, as will conflicts with neighborhood parking. This would be a major issue where the trail rights-of-way are very small (i.e. placed between two houses).

ANALYSIS

USER CONFLICTS (continued)

SHARING THE SLOPES

- ◆ The allocation of specific user groups to certain parts of the Herriman Hills mountains could also cause some serious issues.
 - * If the OHVs are allocated to the lower slopes there will be major conflict with foot traffic because that is where the majority of users on foot tend to stay.
 - * If the OHVs are limited to upper slopes, they must still cross paths with user Group 1. These crossings become significant points in trail design to allow sufficient room to pass, to view oncoming traffic and ample room to maneuver on the trail leading to and from these crossing points.
- ◆ People, whether they are riders or on foot, will generally go where it is easiest. If the easiest location is the same for both parties, tensions can rise and often one or the other will take over the route.

USER EXPERIENCE

- ◆ Hiking, mountain biking and horse riding serve as ways to reconnect with nature and disconnect from the stresses of everyday life. The fear of getting run over by a machine will negatively impact that experience.
- ◆ The OHV user's experience will also be affected by the presence of other traffic because they will have to be watchful and make sure they aren't endangering others. This will force them to either slow down or stop frequently.
- ◆ The noise of the OHV machines could also drive away user Group 1.
 - * Based on a study done by Robin T. Harrison entitled Basic Acoustics of OHV Noise Control, the actual measured amount of noise does not matter if the noise itself is already perceived as annoying. People who dislike engine noise (especially in places where they do not expect to find it; i.e. in nature) have the tendency to be annoyed even if they can barely hear it.
- ◆ The addition of OHVs would impact trail conditions. Without regular maintenance, OHV trails can wear down quickly and become more difficult for other groups to use them.
- ◆ Experience has shown that OHV riders tend to stray from designated OHV trails. "Sporting their machines" by going off-trail to attempt more exhilarating riding feats is not uncommon.

ANALYSIS

USER CONFLICTS (continued)

- ◆ The safest and most effective way to negate any of these conflicts between user Group 1 and Group 2 is to provide separate trails.
 - * This significantly limits the potential conflicts between the two user groups.
 - * Having two sets of separate trails prevents both Groups from enjoying the full amenities and experiences that Harriman Hills may offer.
 - * OHV trails require substantially more space and stricter grade standards than do the trails for Group 1. This results in higher construction and installation costs.

OVERALL ANALYSIS

Potential conflicts between user groups is relatively high. Because of the limiting affects that each will have on the other, the pressure of both trail types in relatively close proximity to each other will likely escalate conflicts and increase polarization between Group 1 (hikers, bikers, and equestrian) and Group 2 (OHV riders). There will likely be very few middle-ground opinions.

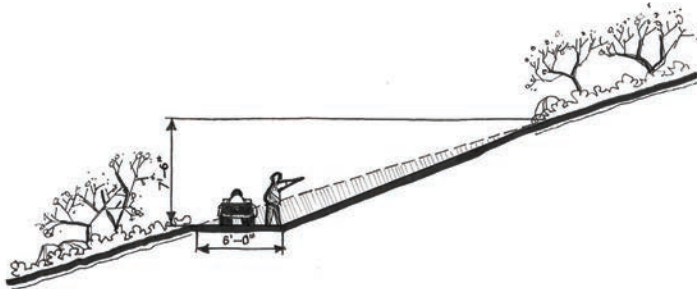
ANALYSIS

CONSTRUCTION IMPACTS

Scars from trail building has already been alluded to in this study. It has been shown that building new trails specifically designed to accommodate OHVs will have a significant impact on Herriman Hills. Not only will the physical integrity of the site be affected, but its aesthetic character will also be influenced. Specific aspects to consider include the following:

SOIL FRAGILITY

- ◆ As noted in the soils and slope inventory, the soils of Herriman Hills are extremely fragile and exhibit bedrock at or near the surface. Constructing OHV trails on these soils and slopes may cause extensive and



Bench Cut Example

long-lasting damage to the mountainside as the topsoil and bedrock is removed and/or disturbed.

BEDROCK

- ◆ OHVs operate more safely on bench trails (not cut and fill balanced) at least six feet wide and with a cross slope that is eight percent or less. In order to construct this type of trail, bedrock may have to be excavated when encountered. The excavation may be minor or even quite extensive. Because the slope of the mountains range from fifteen to thirty percent, cuts of ten feet or more into the mountain may be required.
- ◆ The cuts cannot be vertical but will require a backslope of at least 2:1 (horizontal to vertical). On steep slopes such cuts will be rather large and cover a lot of area. They will be distinctly visible from a distance and will likely require some type of restoration treatment to stabilize the slope.
- ◆ If large sections of a proposed trail are cut through bedrock, the cost and amount of time to complete the project will increase dramatically.
- ◆ The scarring from carving out bedrock would be virtually permanent even if vegetation were able to grow on the trails should they be abandoned. The mountain already struggles to maintain any amount of usable topsoil and establishing a new topsoil layer naturally of any significant depth would require decades. Importation of topsoil would be impractical and cost prohibitive.

ANALYSIS

CONSTRUCTION IMPACTS (continued)

CONSTRUCTION EQUIPMENT

- ◆ Heavy-duty equipment may be required to cut through bedrock. Access for this equipment may require between ten to fifteen feet on at least one side of the trail (maybe both sides) for maneuverability. Because the mountain sides are so steep, there is a high probability that contractors will have to alter those areas as well in order to remain upright.
- ◆ The construction will not only disturb the vegetation in the area, but also disturb the soil and cause it to erode quickly.
- ◆ Spoils from any excavation will likely have to be disposed of on site. The usual technique is to place the spoiled material downslope from their original location and feathered in to the existing terrain. It will frequently not be compacted, and will disturb any existing vegetation over which it is placed.

AESTHETIC APPEAL

- ◆ As previously observed, the construction scars will be visible from a long distance away. The existing foot trails are already easy to pick out (but not overbearing due to their relatively narrow footprint). The new OHV trails that would be double or triple the size and glaringly apparent.
- ◆ Depending upon location, a new OHV trail may be somewhat unnoticeable from the City if it were beyond the front ridge of the mountains. It will be very visible once people travel further into the interior of the site. Most of it will be visible to anyone who gets near the higher elevations and can look down on the site from the south looking in any direction.
- ◆ If OHV trails were located near the front part of the site closest to the City (lower elevations), the backdrop from the City of Herriman looking south would be mountains covered with scars rather than the fairly untouched mountains they currently have. Herriman's logo reflects the importance placed on their mountains and harming the adjacent mountain appearance may be unacceptable to residents.

OVERALL ANALYSIS

Any scarring of the mountainside caused by trail construction will be readily seen from close up to a fair distance away. The scars could be significant and have lasting impacts on the aesthetic appeal of the area as well as the ability of the immediate environment. This challenges the natural systems in trying to repair themselves and will require years to recover. Mitigation efforts may help shorten that time, but they will not soon disappear. The very character of the site may be permanently altered.

ANALYSIS

CONNECTIVITY

Key features of a successful OHV trail are its ability to take people to other destinations on a variety of paths that extend for relatively long distances. Riders frequently choose to make a day of their riding rather than an hour or so on a short circular route. The latter is harder to make the effort to hitch up the trailer or load the truck. Locals are more likely to do that than visitors to the City.

COMMON TRAIL CHARACTERISTICS

- ◆ OHV riders expect to go long distances with a variety of landscapes and sites, or to have a main destination to look forward to. A good example of this is Moab, where there are miles and miles of trails or places to explore. The same can be said for the Monte Cristo area in Weber, Cache and Rich counties.
 - * The hills in Herriman do not have a main destination or long trails with a variety of landscapes to draw most OHV users to the site. It is too small in and of itself, and connects to no adjacent properties that will extend their riding experience.

ZONING

- ◆ Herriman Hills is zoned as forestry recreation, but the surrounding areas are zoned for new housing developments, military operations for Camp Williams, and Salt Lake County Rose Canyon Recreation. All three of these zones are incompatible with OHV trail expansion.
 - * Residential areas do not allow OHVs to access their paved roads and will likely dislike their presence on the adjacent hillsides.
 - * Camp Williams, like all military installations, does not tolerate unidentified visitors on their property. They cannot open up for anyone to access when they do not know what their full intentions are or where they will go. They also care about the safety of others and inviting civilians onto their land puts their safety at risk.
 - * Salt Lake County Rose Canyon Recreation Area explicitly states that OHVs are not allowed on their land, and they currently are not looking to make exceptions Salt Lake County wants to promote their area as calm and close to nature. Hikers, mountain bikers, and equestrians are their prime users and welcomed.

ANALYSIS

CONNECTIVITY (continued)

CURRENT RESIDENTS

- ♦ The adjacent low-density housing that has already been developed also presents a problem. The current residents bought their homes under the assumption OHVs were not allowed on the mountains. Introducing OHVs may cause contentions with the existing landowners.

OVERALL ANALYSIS

Herriman Hills has virtually no adjacent properties onto which an OHV trail can be placed. This keeps any trails within the boundaries of Herriman Hills. They will be relatively short, circular or looped in layout, and have numerous switchbacks due to steep slopes.

ANALYSIS

POTENTIAL FIRE DANGER

Fire risk and prevention needs to be a serious consideration when integrating OHVs in Herriman Hills. Fires started from thrown sparks and OHVs parked on or near dry vegetation are the most pressing danger for this location.



Image from Machine Gun Fire, 2010. Image from Salt Lake Tribune

EXISTING CONDITIONS

- ◆ The low growing, sparse and, for most of the year, very dry vegetation could easily ignite when it comes into contact with exhaust/hot undercarriage from OHVs or sparks from metal on rock. Although very few fires are started by the heat/exhaust of a vehicle, the study area has the perfect conditions for this to occur.
 - * Although the trails themselves lack much vegetation on them, they will not be wide enough to protect the vegetation on the edges of the trail from the heat of a vehicle parked off to the side.
 - * There is no guarantee that OHV users will stay on the trail, which only increases the risk of starting a fire.

ANALYSIS

POTENTIAL FIRE DANGER (continued)

- * Sparks thrown from an OHV are the most probable cause of a fire on the mountain side. With large amounts of pre-existing exposed rock and bedrock, or rocks uncovered during the construction, the chance for sparks to fly off a vehicle when it strikes rock and land in dry vegetation is relatively high.
- * Whether sparks come from the undercarriage of an OHV scraping bottom, a dragging chain or another piece of equipment, they don't have to travel far to hit dry vegetation.

SEASON OF USE

- ♦ Due to the dry vegetation, the threat of fire could exist for the entire period the trails are accessible to the public.
 - * Utah's dry period with little to no precipitation often lasts from June to September.
 - * The same period of time is also the preferred window of use for OHVs because the snowpack has melted and the temperatures are more comfortable for outdoor activity.

FIRE RESPONSE

- ♦ Should a fire start, there is little protection for the neighborhoods below and no way to easily access the fire's location on the mountain to fight it. In areas with high fire risk, the implementation of fire breaks or other methods of fire management seem advisable.
 - * The fire station is approximately 0.5 miles from the nearest trailhead (Juniper Crest) and about 1.5 miles from Secret Canyon Circle (through residential neighborhoods).
 - * The fire fighting equipment/vehicles can only reach the trail heads for access by traveling through residential neighborhoods with sometimes very narrow streets. Once at the trail heads, these access points put the equipment and fire fighters at the base of the mountain. They still have to get up the mountain to be where the actual fire may be located.
 - * Aerial drops of water and/or fire suppression chemicals could be used to battle fire, but the majority of work will require fire fighters on the ground.

OVERALL ANALYSIS

As seen in the accompanying photo, fire can sweep across the site with little impediment. Access to get fire fighters and equipment in the mountain is a significant challenge. Preventing fire from starting is by far the safest control, and introducing OHVs that may unintentionally start fire seems inconsistent with that approach.

ANALYSIS

EMERGENCY VEHICLE ISSUES

EMERGENCY RESPONSE ON THE SLOPES OF USE

- ◆ A common design recommendation/standard for OHV use areas is to create a large access road for emergency vehicles and/or various other large equipment.
 - * Although an access road on the southern edge of the site boundary is proposed in the city master plan, the road would not be able to service the area where OHVs would be located. Building a service road with the necessary capacity and proper location for accessing the OHV area would not only negatively impact the landscape but also be difficult to make safe for large vehicles to navigate.
 - * Immediate and quick access to the mountains via the trailheads is currently impracticable. In the event of a major OHV accident, there is the risk that amount of time required to get the injured party down the mountain may be a determining factor in successful treatment of injuries.
 - * The actual emergency vehicle response time to a given trailhead may be low, but that does not eliminate the difficulty for accident victims to reach the trailhead.
 - * The only ways to reach victims on the slopes would be to send up foot rescue teams or another OHV and carry them down on a stretcher, or provide life-flight type services. In rugged terrain, the latter may also be impracticable.

OVERALL ANALYSIS

Similar to the case with fire potential, a major concern for responding to an emergency on the mountain is adequate access by first responders. They can reach trailheads in relative short order, but getting beyond there and to any accident scene will require fast teams. A single wheel emergency hand cart may prove useful but not much more could be used. Even with the continuation of an OHV trail, emergency vehicles must remain at the trailheads. Often OHVs could also be sent up, but that makes for a crowded trail situation and likely a rough ride down.

ANALYSIS

REVENUE GENERATION

It is unlikely Herriman will see significant revenue generation from the addition of OHVs to Herriman Hills. This statement is based on multiple factors, from the physical characteristics of the site, to its location within the city.

DRAW FOR OUTSIDE VISITORS

- ◆ One of the main factors influencing potential revenue generation by OHVs coming to Herriman Hills is that this area will not be enough of a draw for people outside of Herriman to visit. There are other locations close by that have more trails with longer lengths, multiple levels of riding challenges, and varying landscape types to see.
- ◆ There are very few reasons for people to visit the mountain for more than a day (or even an afternoon) to fully explore all riding options. This would indicate that there would be no reason to purchase more than one meal, two at the most.

DRAW FOR RESIDENTS

- ◆ For residents of Herriman, the trails could become a place where families can spend an afternoon together. In so doing, there may be some revenue generated for gas and snacks, perhaps a meal as part of the experience.
- ◆ If primarily residents were to use the mountain, there still would not be any new revenue generated for the City. Since they already live in the area they will likely not go out to eat with any more frequency than before OHVs are introduced. They will have little need for any other amenities other than fuel.

OVERALL ANALYSIS

- ◆ Herriman hills appears to be an unlikely OHV draw for out-of-town visitors. For the people who do come to visit, the highest revenue generation would occur on the roads that have the most direct routes to the trailheads. If there are not any businesses located on those routes, visitors will go to a more convenient location in another town before they explore the City for food or supplies for their trip.
- ◆ The biggest revenue generation comes from visitor use of hotels and restaurants. If Herriman does not have these facilities, then the nearest town that does will receive the financial benefit. Since the City has relatively few of these services, not much new money will flow through City businesses.

ANALYSIS

OVERALL SITE STABILITY/FRAGILITY

Based on the inventory findings of slope, soils, and existing vegetation. J-U-B's professional opinion is that the Herriman Hills area is a relatively fragile environment. The following conditions exist:

- ◆ 69.4% of the area has slopes that exceed 30% (no building on these slopes).
- ◆ 85.3% of the area has slopes that exceed 20%
- ◆ The site soils are considered fragile due to shallow topsoil depths, bedrock relatively close to the surface in most area, low organic matter, and fine texture of the soil aggregates.
- ◆ In many places across the site (except in draws and canyon-like bottoms) there is little vegetative cover, especially woody plants. Most of the cover is grasses and small forbes. These are not long-lasting stands of vegetation (annual) and rely on reseeding for propagation.

OVERALL ANALYSIS

When these factors are combined, the potential for erosion, fire danger, and construction disturbance is relatively high. Any significant scar on the land created by any of these three elements can have lasting effects and may require years to correct or heal.

NON-BINDING OPINION OF LIABILITY

Liability lawsuits are always a possibility when a municipality provides a public amenity. Accidents and injuries sustained while using a public facility or amenity frequently end up in court. This puts the burden of public safety squarely on the back of the municipality. It must ensure its amenities meet current safety codes and requirements at all times.

Adding OHV use to Herriman Hills would bring a new type of liability to the City. The OHV trails would have to be designed according to new standards specifically related to OHV use. Trail maintenance would be required to keep new trails up to these standards. This level of trail construction and maintenance will exceed those currently provided for hikers, bikers, and equestrians.

The City's legal department, along with Risk Management, should carefully examine these new liabilities and determine whether the benefits of OHV use outweigh the risk and responsibilities the City could face. Adequate insurance to cover the risk may also be a consideration.

J-U-B Engineers, Inc. does not provide legal council on these matters, nor are the opinions expressed above to be considered legally binding. These are merely opinions that should be thoroughly vetted and verified by legal experts.

CONCLUSION

CONCLUSION

FINAL RECOMMENDATIONS

J-U-B has visited the site, made note of the conditions observed and researched specific aspects of the site characteristics as well as the basic programming needs for OHV trail design and use. J-U-B then evaluated the opportunities and constraints based on these exercises, J-U-B now presents its professional recommendations with respect to adding OHV use to the Herriman Hills area.

J-U-B does not recommend adding OHV use to the Herriman Hills site. Specific reasons for this recommendation include the following:

1. Herriman Hills has a unique but relatively fragile character. This environment is not at a stable stage in its development and will likely require a long period of time before it reaches a mature and unchanging state. Proper OHV trail construction will likely set the site's stability back significantly.
2. Because of several site characteristics (including steep slopes, vegetative cover, soils), there is an increased potential for fire, erosion and trail construction damage. If any of these disturbances occur in a major way, the site will require a long period of time to recover. OHV use increases the potential for these disturbances to occur.
3. The physical characteristics of Herriman Hills are not compatible with the design and management requirements of OHV trail building and use. OHV trails may be forced upon the land, but they will not blend with the environment nor compliment its inherent nature.
4. With hikers, bikers, and equestrians currently using the property, OHVs will bring use conflicts that may not be reasonable without serious compromises to the enjoyment of the existing user groups. Close proximity between hikers, bikers and equestrians and OHV riders is not recommended.
5. Access to Herriman Hills is already at a stressing point due to lack of space at trailheads. This is only compounded by adding OHV use (with accompanying trucks and trailers driving through residential areas to reach access points).

There are other reasons for not recommending OHV use for Herriman Hills (virtually no economic benefit to the City, liability issues, complications of trail construction, aesthetic impacts, to mention a few), but the five listed above are significant. Again, J-U-B's recommendation is to not provide OHV trails and OHV riding in Herriman Hills.

CONCLUSION

REFERENCES

The following references were used as source material for the creation of this feasibility study:

Effects of All-Terrain Vehicles on Forested Lands and Grasslands *United States Department of Agriculture, U.S. Forest Service, National Technology and Development Program, December 2008*

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National Management Strategy for Motorized Off-Highway Vehicle Use on Public Lands *U.S. Department of the Interior, Bureau of Land Management , January 2001*

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Rose Canyon and Yellow Fort Canyon Master Plan *Salt Lake County Parks and Recreation December 2009*

Basic Acoustics for OHV Noise Control *U.S. Forest Service, Robin T. Harrison P.E., 2004*

Designing Sustainable Off-Highway Vehicle Trails: An Alaska Trail Manager's Perspective *U.S. Department of Agriculture, U.S. Forest Service Technology and Development Program, U.S. Department of the Interior National Parks Service, U.S. Department of Transportation Federal Highway Administration, November 2013*

So You Want to Build an All Terrain Vehicle Trail *Wisconsin Department of Natural Resources, 2005*

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Harmful Noise Levels *Healthwise, Inc., 1995-2020.*

