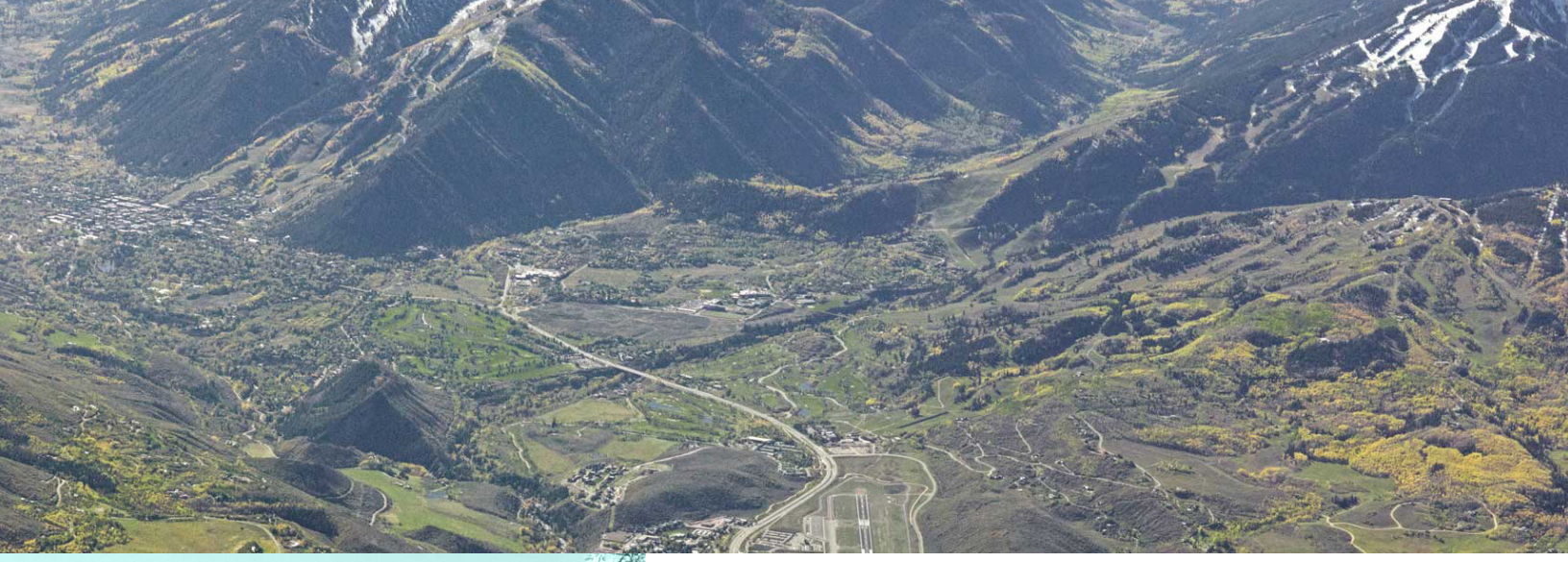

2021

RIPARIAN AREA ASSESSMENT AND PLAN

CITY OF ASPEN

CITY OF ASPEN:

RIPARIAN AREA ASSESSMENT AND PLAN

Prepared for The City of Aspen
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May 2021

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CITY OF ASPEN

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Definitions

Riparian Area - The zone of interface between the land and a river or stream. The land located immediately adjacent to the Roaring Fork River and its tributaries. This area is often referred to in the Land Use Code as the floodplain (100 year and/or flood hazard area) or stream margin.

Riparian Buffer - A vegetated area (a "buffer strip") near a stream, usually forested, which helps shade and partially protect the stream from the impact of adjacent land uses through physical, biological, ecological functions, and important social benefits.

Riparian Corridor - A geographic description of unique biotic community consisting of the vegetation, soils, and ecological functions that occurs adjacent to a body of water. A linear description of the "riparian area."

Wetland - Areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.

Water Quality - Describes the condition of the water, including chemical, physical, and biological characteristics, usually with respect to its suitability for a particular purpose such as drinking or ecological impact.

Ecological Integrity - The ability of an ecosystem to support and maintain ecological processes and a diverse community of organisms.

Turbidity - A measure of the degree to which the water loses its transparency due to the presence of suspended particulates. The more total suspended solids in the water, the murkier it seems and the higher the turbidity.

1. INTRODUCTION

The riparian corridor and Roaring Fork River are integral to the identity and aesthetic character of Aspen. Many of the City's iconic views, parks, trails, and other amenities can be found along the river corridor. Riparian areas support delivery of critical ecosystem goods and services to the local community. The benefits provided by healthy riparian areas include:

- Improved water quality by slowing and filtering overland flows
- Nutrient cycling and pollutant assimilation
- Stream bank stabilization and erosion control
- Flood risk abatement
- Water and sediment storage
- Wildlife habitat and high levels of biodiversity
- Cultural benefits such as recreation, aesthetics, tourism and strengthened community identity and sense of place

Development of commercial and residential real estate in close proximity to the Roaring Fork River and protecting the critically important riparian ecosystem can be divergent goals. Aspen's historical patterns of residential and commercial development and the locations of numerous open space parcels and parks along the Roaring Fork River are the physical manifestation of these goals. Effective management of riparian areas within Aspen requires balancing the cultural demands on the riparian resources while protecting of vital ecosystem functions. The Aspen Riparian Area Assessment and Plan (ARAAP) intends to provide a prioritized list of projects and actions to protect and restore the riparian areas in Aspen. Improving the functional condition of the riparian ecosystem through Aspen will provide significant local benefits, including the protection and enhancement of water quality in this urban environment.

THE **RIPARIAN AREA** IS THE LAND LOCATED IMMEDIATELY ADJACENT TO THE ROARING FORK RIVER AND ITS TRIBUTARIES. THIS AREA IS OFTEN REFERRED TO AS THE FLOODPLAIN (100 YEAR AND/OR FLOOD HAZARD AREA) OR STREAM MARGIN

THE BOUNDARY OF THE **RIPARIAN AREA**, THE ADJOINING UPLANDS, AND AQUATIC ECOSYSTEMS IS GRADUAL AND RARELY SHARPLY DEFINED. RIPARIAN AREAS ARE UNIQUE FROM THE UPLANDS AND AQUATIC AREAS; CHARACTERIZED BY HIGH LEVELS OF SOIL MOISTURE, FREQUENT FLOODING, AND A SPECIALIZED ASSEMBLAGE OF PLANT AND ANIMAL COMMUNITIES.

THROUGH THE INTERACTION OF THEIR SOILS, HYDROLOGY, AND BIOTIC COMMUNITIES, RIPARIAN AREAS MAINTAIN MANY IMPORTANT PHYSICAL, BIOLOGICAL, ECOLOGICAL FUNCTIONS, AND IMPORTANT SOCIAL BENEFITS.

Figure 1: A residence in close proximity to the Roaring Fork River. Native vegetation has been cleared in this area to visually connect the residence to the stream and increase the amount of lawn area.

Figure 2. Riparian areas in and around Aspen exhibit varying degrees of impact from human activities. Intact riparian corridors (left) exist above and below the City. In many other areas, development has eliminated riparian forests (center) or modification of streambanks (right) limits their extent and functional condition.

The headwaters of the Roaring Fork River flow northwest, down Independence Pass and through Aspen. The riparian complex along the river varies in character and health as the river makes its way to its confluence with the Colorado River in Glenwood Springs. Nearly 75% of streams studied in the Roaring Fork Watershed have moderately modified to severely degraded riparian habitat[1.] Nearly 20% of the riparian habitat and more than 15% of instream habitat in the Upper Roaring Fork sub-watershed section that includes Aspen, was previously classified as "severely degraded" while the areas upstream and downstream of Aspen were ranked as "high quality" or only "slightly modified"[2].

The evidence of the degradation to riparian habitat can be readily witnessed, even by a non-expert observer. Areas upstream and downstream of Aspen such as Northstar Nature Preserve and the confluence of Castle Creek, are heavily vegetated and are locations where wildlife and birds are frequently seen. In contrast, many areas along the Roaring Fork through Aspen have been obviously modified by humans and riparian vegetation is not as abundant or continuous. These disparities are not uncommon or necessarily negative considering the urban nature of the Roaring Fork River through Aspen. However, through thoughtful planning, creative solutions and a dedication to river stewardship the quality of the riparian areas through Aspen can be improved. In turn, water quality, wildlife habitat, and aesthetic and recreational values of the river corridor can be enhanced.

PROJECT GOALS

TO PRESERVE, RESTORE AND CREATE IMPORTANT RIPARIAN AREAS THAT PROVIDE VALUABLE ECOSYSTEM SERVICES, CULTURAL AMENITIES, RECREATION, ECONOMY, AND HIGH QUALITY OF LIFE IN ASPEN.

TO IDENTIFY SPECIFIC, PRIORITIZED PROJECTS WITHIN THE RIPARIAN CORRIDOR IN ASPEN THAT WILL REDUCE IMPACTS FROM URBAN POLLUTANTS AND STORM WATER RUNOFF, STREAM BANK DEVELOPMENT, HABITAT AND ECOSYSTEM DEGRADATION, AND ALTERED HYDROLOGICAL CONDITIONS WHILE MAXIMIZING CITY EFFORTS, BUDGET AND IMPLEMENTATION STRATEGY.

[1] Roaring Fork Watershed Plan, 2012 Ruedi Water and Power Authority, Roaring Fork Conservancy, Clarke, Sharon, et al,

PLANNING PURPOSE

The overarching goals of the project were to:

1. Conduct a systematic assessment of riparian quality through Aspen and identify conditions that affect the water quality, ecological integrity, recreational amenities, and aesthetic values of the riparian area.
2. Use the data collected and analyzed during the assessment to identify and prioritize areas for preservation or restoration.
3. Work with stakeholders to identify priority geographies, methods, and preferences for conservation, preservation or restoration strategies.
4. To create a prioritized list of management actions for implementation by the City of Aspen.

Figure 3: Jennie Adair Regional Stormwater Quality Project – "A constructed wetlands basin is a shallow retention pond that has a continuous base flow which promotes the growth of rushes, willows, cattails and reeds. The shallow pond, along with vegetation, slows down runoff and allows time for sedimentation, filtering, and biological uptake. Wetlands greatly improve water quality while at the same time providing natural aesthetic areas, increasing wildlife habitat, and providing erosion control. Constructed wetlands are engineered to mimic natural wetlands which can be viewed as the "kidneys" of the hydrologic cycle due to their filtering and cleansing capabilities.[2]" These important areas in Aspen are both innovative and critical. These areas of green infrastructure treat urban runoff creating better conditions for the rest of the riparian area which maintain aesthetic, habitat and cultural values.

[2] https://www.cityofaspen.com/334/Best-Management-Practices

PLANNING MOTIVATIONS

The riparian corridor through Aspen was degraded by resource extraction and land use change over the previous 150 years. Throughout Aspen reach, channelization, developmental encroachment, alteration and generalization of native vegetation, soil degradation, changes to flow regimes and hydrology have significantly altered the character and functionality of riparian areas. Historical aerial images indicate that areas covered by roadways, sidewalks, lawns, and structures doubled in near-stream areas between from 1951 and 2016 (Figure 4). Conversion of significant areas from grasses to trees and shrubs during that same period reflect the progressive recovery of the river corridor from the heavy impacts evident in late 19th-century photographs. While some recovery of riparian vegetation is evident, recent observations indicate continuing impacts from urban land uses and development patterns within Aspen. These cumulative impacts are expected to diminish overall ecosystem quality and, potentially, make the river environment more susceptible to negative impacts associated with future development, wildfire, or climate change.

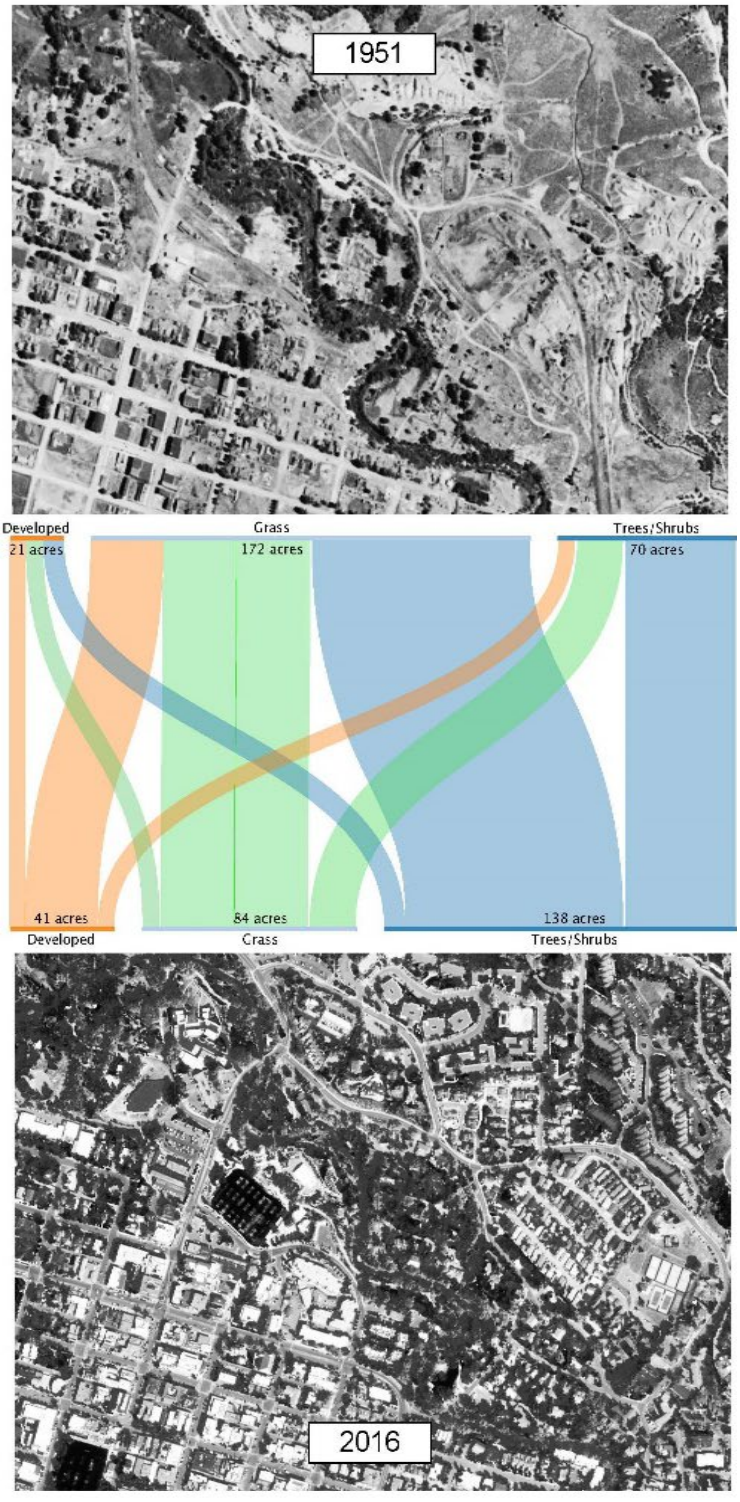

Figure 4. Land cover changes within 500 feet of the river corridor through Aspen observed in aerial images collected in 1951 and 2016. At the turn of the 20th century much of Colorado, including the Aspen area was deforested. Excellent gains in vegetative cover have occurred since then. To restore and enhance the riparian corridor there is still work to be done. The graphic in the center of the figure shows change in vegetation and cultural cover over time, and how those changes have occurred geographically. For instance, in 1951 21 acres of Aspen were developed. Roughly a third of those areas are still developed today while a third have been converted to grass coverage, and a third to tree and shrub coverage. Today, 41 acres of Aspen is developed, representing over a 50% increase in development in the last 65 years, that has occurred mostly through the change of grass coverage to developed area.

Impacts from a wide variety of land and water development activities may result in stream and riparian area degradation. Some of these impacts include:

- Pollutant loading:
  - Sediments and chemical pollutants transported from impervious areas to riparian zones as sheet runoff or through the stormwater collection systems
  - Fertilizers and pesticides from lawns and gardens entrained in runoff and shallow ground water
  - Sediment from construction sites and hillslope erosion
- Loss of riparian vegetation and habitat:
  - Simplification of riparian community composition and structure due to landscaping or invasive species
  - Clearing riparian forests to make way for commercial or residential development
- Altered floodplain and riparian hydrology:
  - Bank armoring with rip-rap or concrete
  - Channel modification
  - Streamflow alteration by trans-basin diversions, reservoir operations, and surface water diversion

Urban development and land use within Aspen and the surrounding watershed contribute to changes in stream hydrology, stream morphology, stream water quality and aquatic ecology[3]. All of these factors have a profound impact on the ecological integrity of the riparian corridor and the ecological services it provides. Water quality problems in the Roaring Fork River likely related to riparian degradation include turbid water, nutrient enrichment, bacterial contamination, increases in organic matter loads, metals, salts, oil/grease, pesticides, herbicides, temperature increases and increased trash and debris transported by storm water runoff (Figure 5). Critically, the State of Colorado recently listed the Roaring Fork River through Aspen, as an Impaired Waterway under the Clean Water Act due to observations of unhealthy aquatic macroinvertebrate communities[4].

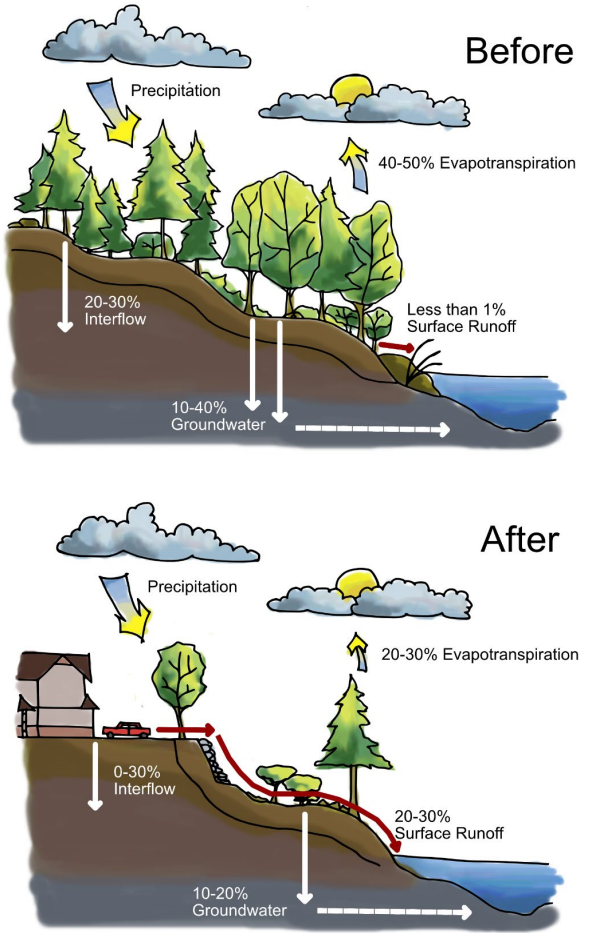

Figure 6: Urban development reduces infiltration and increases surface runoff through near-stream areas.

Particular organisms that occupy a specific environment or environmental niche can be good indicators of the relative health of that ecosystem. These organisms reflect the chemical, physical, and biological conditions in which they evolved. Biological community changes and human impacts can be studied by evaluating these organisms. The presence of species that are intolerant of pollutants or habitat distresses, or the presence of communities dominated by native taxa are generally thought to

[3] Urban Runoff Management Plan: A Guide to Stormwater Management in the City of Aspen Revised, 2014. City of Aspen, Update to April 2010 Version Prepared by City of Aspen Engineering Department

[4] Department of public health and environment Water quality control commission 5 ccr 1002-93 Regulation #93 Colorado's section 303(d) list of impaired waters and monitoring and evaluation list

indicate positive relative health of that environment. Absence of sensitive forms, dominance by tolerant species, or complete absence of certain organisms may indicate degraded conditions and ecosystem stress. In Aspen, the condition of the macroinvertebrate communities indicates that there is ecosystem stress in the Roaring Fork River through Aspen.

Impairment of macroinvertebrate health observed in the Roaring Fork River through Aspen in recent years may be due, in part, to degradation of riparian areas. The degradation within the riparian corridor also impacts fish and wildlife, bank stability, aesthetics, flooding and recreation. Many of the impacts to the river are from non-point source pollutants, meaning the origin of the pollutants is difficult to establish due to their wide distribution across the local landscape.

Table 1: Results from Previous Studies Examining Riparian Health

Impact	Effects
Increased impervious area such as; roads, driveways, patios, parking lots, building footprints and roofs.	Increased runoff and decreased infiltration lead to degradation within the watershed by greatly reducing base stream flow while increasing the stream temperature and runoff velocities which can lead to more severe and frequent localized flooding, erosion and impaired aquatic conditions. These areas also lead to the transportation of large pollutant loads downstream without the opportunity for natural filtering by the soil. There is also research that concluded that impervious surfaces contribute to the urban heat island effect[5].
Urban runoff resulting in the addition of pollutants to the landscape and waterways such as; petroleum byproducts, pathogens, pesticides/ herbicides and fertilizer, hazardous waste etc.	Pollutants noted to be present by the 2008 State of the Watershed report within the COA include iron, lead, selenium, cadmium, pH, nitrite, total phosphorus and dissolved Oxygen. Many of these pollutants come from basic human activities such as driving gasoline vehicles and fertilizing lawns. Sources of metals in runoff include vehicular traffic areas including roads and parking areas, atmospheric deposition, and historic mining activities. These pollutants impact water quality, habitat vitality, wildlife and human health.
Construction, land disturbance such as grading, street sands, exposed soil, dirt roads and driveways, and eroded channels.	Sedimentation profoundly effects water quality and stream life. Discharged sediment to the Roaring Fork River has detrimental effects including "smothering" of aquatic habitat, increased turbidity/decreased light penetration, increased temperatures, oxygen depletion and impacts to fish. Mineral soil particles and eroding sediments may transport other substances such as plant and animal wastes, nutrients, pesticides, petroleum products, metals, and other compounds that can cause water quality problems[6]. The 2008 State of the Watershed Report identified excessive sedimentation as a primary source of impacts to the Roaring Fork River. Primary sources of sediment in runoff include erosion from steep slopes, sand from winter application, sediment from construction sites, urban runoff from impervious areas where particulates accumulate and natural "background" sources of sediment.
Clearing of native vegetation and/or planting of non-native species in lawns and gardens	This impact results in a massive decrease in the diversity and ecosystem composition of the Roaring Fork River's riparian area. This change in landscape composition results in a loss of biodiversity and habitat, reduced tree canopy and shade, potentially reduced water filtering and infiltration capacity.

[5] Connors, John Patrick, et al. "Landscape Configuration and Urban Heat Island Effects: Assessing the Relationship between Landscape Characteristics and Land Surface Temperature in Phoenix, Arizona." Landscape Ecology, vol. 28, no. 2, 19 Dec. 2012, pp. 271–283, link.springer.com/ article/10.1007/s10980-012-9833-1, 10.1007/s10980-012-9833-1. Accessed 9 Oct. 2019.

[6] Klapproth, Julia C. and Johnson, James E. Understanding the Science Behind Riparian Forest Buffers: Effects on Water Quality, Virginia Cooperative Extension, Virginia Tech and Virginia State University. 2009

In addition to providing aesthetic, social, and habitat values and services in urban settings, riparian forests naturally provide key water quality treatment and protection services for surface waters due to their landscape location between developed environments and streams (see figure 6). In this way riparian areas act as "buffers" between developed areas and streams. Healthy functioning buffers reduce stormwater loads by promoting infiltration before runoff, removing or attenuating sediment and other contaminants, maintaining bank stability during high flows, and providing base food chain inputs to aquatic and terrestrial life. Proper design, placement, and protection of vegetative buffers serves as an efficient and sustainable long-term solution to mitigating urban water quality impacts to receiving streams.[7]

Critical factors like width, orientation, plant species composition, management practices, and landscape location should be considered in buffer protection, planning, and design.[8] The width of vegetated buffers is a primary determinant of their ability to protect streams against impacts of upland land use activities. Buffer width is most often measured as the horizontal distance from the high-water mark (or vegetation line) of a stream channel to the upland edge of the vegetated zone. Research identifies a variety of effective buffer widths according to the ecosystem service of interest.

For water quality protection, EPA recommends a minimum buffer width of either 100 feet, or the extent of 100-year floodplain plus 25 feet, on both sides of a stream, whichever is greater.[9] Although individual streams and locales may exhibit varying floodplain and hillslope geomorphology as well as native vegetation community types, this generalized distance aims to integrate best-available science and promote straightforward delineation of important zones to ease implementation and enforcement of land use restrictions by decision makers. While broadly supported by scientific literature, the reality in downtown Aspen and similar urban settings is that streamside property is desirable, often commanding a market premium, and many locations have already experienced extensive development intensities prior to the mid-nineteenth century advent of current US environmental law and modern urban planning.

To maximize water quality protection while acknowledging human uses, principles of the 3-zone buffer system can guide land use planning and decision making in near-stream areas. The 3-zone system delineates vegetated areas in three nested zones parallel to the channel. Each zone performs one or more important water quality protection functions and is characterized by unique optimal widths, vegetative target, and management objectives. [10] Highlighting individual functions of each zone allows land managers to efficiently maximize desired benefits of the buffer.[11] Zone 1, the *overbank zone*, protects the physical and ecological integrity of both the stream channel natural environment and near-stream human infrastructure. Riparian vegetation and wetlands slow the movement of water across the landscape, reducing pollutant loading via biological uptake or chemical transformation. Zone 2, the *transitional zone*, contains the major transition from frequently inundated areas to dryer uplands. Zone 2 extent varies strongly with stream size, channel geometry, and local topography, including bank steepness. It generally includes the 100-yr floodplain, connected slopes, and connected wetlands. Within the urban context, its key function is to cushion and shield the stream from various effects of upland development. Zone 3, the *upland zone*, acts as the "buffer's buffer", extending an additional distance from Zone 2's edge and providing important protections against sediment entrained in urban runoff. Functional effectiveness of the vegetated buffer is promoted by varying classes of land use restrictions for each zone, providing an operational framework for managers to protect and improve water quality.

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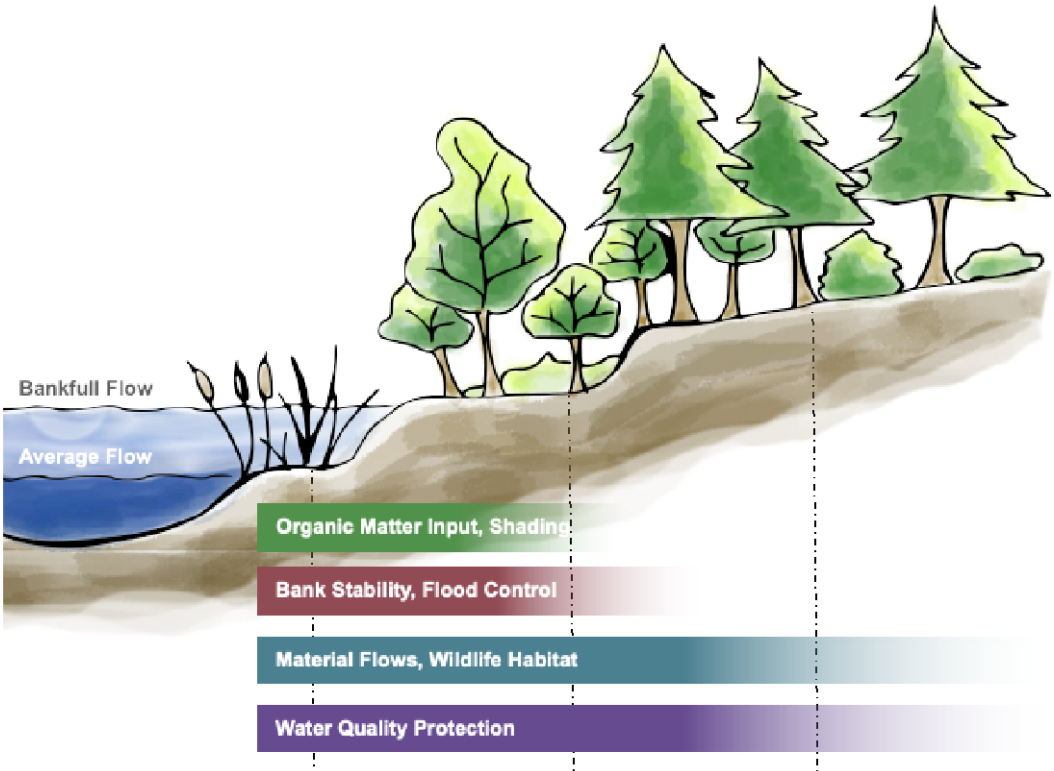
[7] National Research Council (NRC). 2002. Riparian Areas: Functions and Strategies for Management. National Academies Press, Washington, DC.

[8] Ibid.

[9] USEPA. 2005. Riparian Buffer Width, Vegetative Cover, and Nitrogen Removal Effectiveness: A Review of Current Science and Regulations. EPA/600/R-05/118

[10] USDA. 1998. Stream corridor restoration. Revised August, 2001. www.usda.gov/stream_restoration

[11] Hawes, E., & Smith, M. 2005. Riparian buffer zones: Functions and recommended widths. Eightmile River Wild and Scenic Study Committee, 15, 2005.



	Zone 1	Zone 2	Zone 3
Function	Bank stability, pollutant uptake and storage, wildlife habitat (terrestrial & aquatic)	Pollutant uptake, sediment control, runoff reduction via infiltration	Runoff reduction, sediment control, prevents encroachment prevention
Preferred Minimum Width	25' from high water mark	Zone 1 + 50'	Zone 2 + 25' or 100-yr floodplain + 25'

Recommended Land Uses			
Vegetation	Undisturbed, mature riparian forest and overbank vegetation	Managed, mature native forest and vegetation	Native upland shrub, tree or grass species
Use Restrictions	**Highly Restricted.** Uses limited to: footpaths, stormwater facilities, and roadway crossings.	**Restricted to Low Impact Uses:** only a limited amount of tree clearing is allowed, native vegetation and no-mow zones. no impervious surfaces/septic/UST permitted.	**Restricted to Moderate Impact Uses.** No/little impervious surfaces rec. Lawn, garden, compost, yard wastes, and most stormwater BMPs are permitted.

Existing Land Uses Along All Streams Within Aspen City Limits			
Total Area (acres)	39.3	74.8	36.2
# Encroaching Structures	34	146	153
Impervious Coverage (acres)	1	6.5	5.2
Open Space Zoning (acres)	14.9	27.8	12.5
Residential Zoning (acres)	17.6	34.8	17.1
Commercial Zoning (acres)	1.6	2.5	1.4

Existing Land Uses along the Roaring Fork River in the City of Aspen			
Total Area (acres)	21.8	39.7	19.1
# Encroaching Structures	25	117	126
Impervious Coverage (acres)	0.5	4.5	4.1
Open Space Zoning (acres)	4.4	6.8	2.6
Residential Zoning (acres)	11.4	22.1	10.7
Commercial Zoning (acres)	1.4	2	1.1

Figure 6: Function of Riparian Buffers

Table 2. Riparian widths recommended for protection of various resource attributes (Adapted from Hawes and Smith, 2005).

Source	Buffer Width (ft.) Recommended for Attribute Protection					
	Habitat for aquatic life	**Temperature moderation**	**Retain/decrease nutrients**	**Sediment control**	**Bank stabilization**	**Pesticide retention**
Wegner (1999)	-	33 - 98	50 -100	82 - 328	-	> 49
US Army Corps (1991)	98	33 - 66	52 - 164	33 - 148	49 - 98	49 - 328
Fisher and Fischenich (2000)	> 98	-	16 - 98	30 - 200	30 - 66	-
Broadmeadow and Nisbet (2004)	33 - 164	49 - 230	16 - 98	49 - 213	-	-
Range of recommended widths	**33 - 164**	**33 -230**	**16 - 98**	**30 -328**	**30 - 98**	**49 - 328**

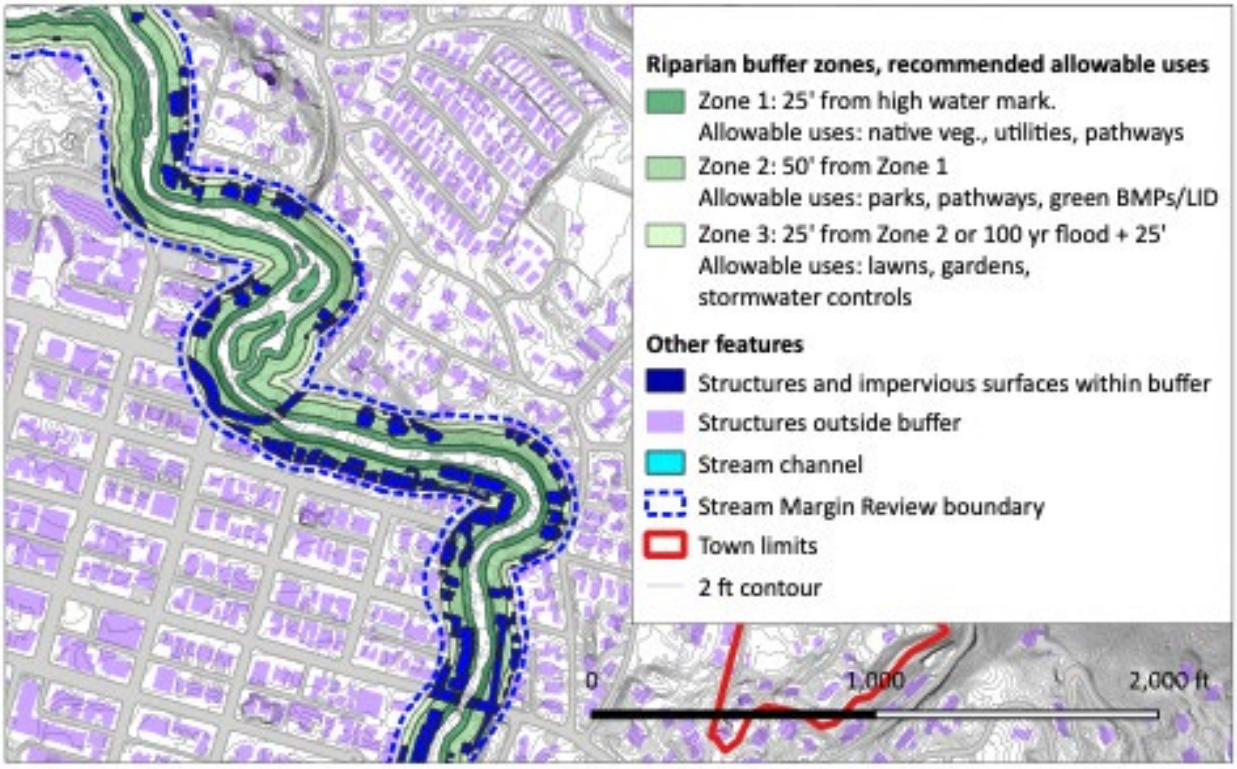


Figure 7. EPA's three-zone riparian buffer framework provides for analysis of structural and impervious area encroachment in high water quality impact areas. The number of existing structures and acreage of impervious surfaces (structures, driveways, roads) are reported for each buffer zone on the Roaring Fork and other major streams within Aspen's city limits

Table 3. Riparian buffer zone analysis summary statistics for City of Aspen streams, grouped by city zoning class.

Stream/Zone	Land Use Designations Within the 3-Zone Buffer (Acres)						
	Commercial (acres)	Lodging/ Recreation (acres)	Multi-Family Residential (acres)	Open Space (acres)	Residential (acres)	Not Assigned (acres)	Total (acres)
Roaring Fork River	**4.5**	**9.0**	**6.2**	**13.8**	**44.3**	**2.7**	**80.6**
Zone 1	1.4	2.3	1.3	4.4	11.4	0.9	21.8
Zone 2	2.0	4.4	3.1	6.8	22.1	1.3	39.7
Zone 3	1.1	2.3	1.8	2.6	10.7	0.5	19.1
Castle Creek	**1.0**		**0.1**	**7.2**	**21.2**		**29.4**
Zone 1	0.3	-	0.0	1.9	5.5	-	7.6
Zone 2	0.5	-	0.0	3.6	10.6	-	14.7
Zone 3	0.2	-	0.1	1.7	5.1	-	7.1
Hunter Creek		**0.01**	**1.5**		**2.9**		**4.4**
Zone 1	-	0.00	0.3	-	0.7	-	1.0
Zone 2	-	0.01	0.8	-	1.5	-	2.3
Zone 3	-	0.00	0.4	-	0.7	-	1.1
Maroon Creek			**0.1**	**34.2**	**1.2**		**35.4**
Zone 1	-	-	0.0	8.6	0.0	-	8.6
Zone 2	-	-	0.0	17.4	0.6	-	18.0
Zone 3	-	-	0.1	8.2	0.6	-	8.8
All streams/zones	**5.5**	**9.0**	**7.9**	**55.2**	**69.5**	**2.7**	**149.8**
Zone 1	1.6	2.3	1.7	14.9	17.6	0.9	39.0
Zone 2	2.5	4.4	3.9	27.8	34.8	1.3	74.7
Zone 3	1.4	2.3	2.3	12.5	17.1	0.5	36.1

PROJECT PROCESS

This assessment and report were completed in three steps. First a conditional assessment of the riparian areas within Aspen was conducted. This multipronged assessment used various types of data and assessment methods to characterize the current condition of riparian areas (Section 2). Second, a review of existing studies pertaining the Roaring Fork's riparian areas and a detailed review of City codes and regulations was conducted (Section 3). Third, data from the assessment and reviews was collated and presented to both a stakeholder group and to the public for feedback and input. Finally, the recommendations and input from stakeholders and the public was used to create a prioritized and actionable list of projects, policies and plans for the City to implement in order to improve and protect local riparian areas (Section 4).

2. CONDITIONAL ASSESSMENT OF RIPARIAN AREAS

The condition of riparian areas within Aspen was evaluated using the Ecological Integrity Assessment (EIA) methodology developed by the Colorado Natural Heritage Program at Colorado State University[12]. This method has been used extensively throughout Colorado's river basins. The EIA measures overall

[12] Lemly, J., L. Gilligan and C. Wiechman (2016). Ecological Integrity Assessment for Colorado Wetlands. Field Manual, Version 2.1, Colorado Natural Heritage Program. Colorado State University. Fort Collins, CO 80523.: 116 pp.

wetland and riparian habitat condition and places an emphasis on biological integrity. By focusing on biological integrity, the EIA method can be used to track changes in vegetation species composition and structure over time or after completion of restoration activities. At the highest level, the EIA divides riparian integrity into three primary Rank Factors: Landscape Context, Condition, and Size. Within each of these Rank Factors, the EIA identifies one or more Major Ecological Factors essential to ecosystem integrity. These metrics include landscape fragmentation, buffer width and condition, native plant species cover and composition, woody species regeneration, hydrological functioning, soil condition, water quality, and overall size. The final EIA outputs include a ranking of riparian condition on an academic grading scales as presented in the table below.

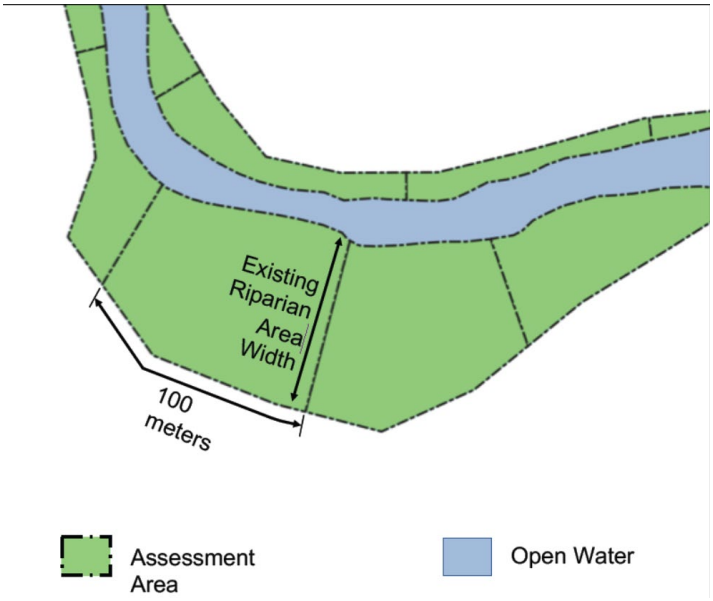
Table 4: EIA Rating Descriptions

Rating	Degree of Deviation from Reference Condition	Ecological Factors contributing to Riparian Integrity
Excellent (A)	Reference Condition (No or Minimal Human Impact)	• Riparian area functions within the bounds of natural disturbance regimes. • The surrounding landscape contains natural habitats that are essentially fragmented with: o Little to no stressors such as point of erosion o Vegetation structure and composition are within the natural range of variation o Nonnative species like Kentucky bluegrass are essentially absent o A comprehensive set of key species like macroinvertebrates are present o Soil properties and hydrological functions are intact • Management should focus on preservation and protection.
Good (B)	Slight Deviation from Reference	• Riparian area predominantly functions within the bounds of natural disturbance regimes. • The surrounding landscape contains largely natural habitats that are minimally fragmented with few stressors: o Vegetation structure and composition deviate slightly from the natural range of variation o Nonnative species and noxious weeds are present in minor amounts o Most key species are present o Soils properties and hydrology are only slightly altered • Management should focus on the prevention of further alteration.
Fair (C)	Moderate Deviation from Reference	• Riparian area has a number of unfavorable characteristics. • The surrounding landscape is moderately fragmented with several stressors: o The vegetation structure and composition are somewhat outside the natural range of variation o Nonnative species and noxious weeds may have a sizeable presence or moderately negative impacts o Many key species are absent o Soil properties and hydrology are altered • Management would be needed to maintain or restore certain ecological attributes.
Poor (D)	Significant Deviation from Reference	• Riparian area has severely altered characteristics. • The surrounding landscape contains little natural habitat and is very fragmented: o The vegetation structure and composition are well beyond their natural range of variation o Nonnative species and noxious weeds exert a strong negative impact o Most key species are absent o Soil properties and hydrology are severely altered • There may be little long-term conservation value without restoration, and such restoration may be difficult or uncertain.

Photo examples of riparian areas along the Roaring Fork River exibiting A-D ratings.	
	
Example of an Excellent (A) rating. This area displays connectivity within the vegetation, floodplain connectivity, and a diversity of riparian species.	Example of a Good (B) rating. This area displays connectivity within the vegetation, and minimal bank scouring. Note the non-native lawn grass in the center right of the photograph.
	
Example of a Fair (C) rating. This area displays riparian vegetation that has been impacted by trails and human access. Non-native species are present and the river has been channelized.	Example of a Poor (D) rating. This area is highly impacted by residential developments, lawn, channelization of the river leading to scoring and the removal of riparian vegetation.

The project team chose this method over other similar assessment methods because the EIA method is ecologically based. This approach allowed the project team to address a wide array of system wide processes and interactions, as well as seamlessly integrate other data such as wildlife data and historical conditions analysis. The CNHP EIA method has the following benefits:

- Colorado specificity with wide applicability,
- The ability to target specific sites for restoration/preservation,
- Pinpoints ecological stressors, and
- Provides a framework for post-project monitoring and evaluation



Individual Assessment Areas (AAs) were delineated by segmenting the existing riparian corridor into polygons that shared similar dimensions along their outside edges. Polygon sized was determined by first determining where the historic or expected extents of the riparian area would be. This was done through field surveys and GIS modeling based on contour and watershed data, discussed in depth further on in this section. This information created the outside edge, offset from the river. This new polygon that represented the historic or expected riparian area was then divided into 100-meter-long sections on the outside edge. 100 meters was chosen as a "Goldie Lock's" dimension. This created large enough areas that the data is robust and not too small of areas so that collection and review data would be burdensome.

To establish individual assessment areas, the existing riparian zone was first hand digitized in a Geographic Information System (GIS) by cross-referencing vegetation communities evident in six-inch resolution aerial photos, digital elevation models derived from Pitkin County LiDAR images, and flood modeling inundation boundaries generated by the City of Aspen's hydraulic model for delineating floodways. The riparian polygon was then split into river-right and river-left segments by clipping it to the bounds of the Roaring Fork River. The outside edges of these -right and -left segments were dynamically segmented into 100-meter lengths. Lines were extended from the start and end of each line, back to the edge of the Roaring Fork River. These lines were oriented roughly perpendicular to the river bank and formed the upstream and downstream bounds of each AA. Each AA was given a unique identification code that indicated the adjacent water body, the approximate river mile stationing as defined by the Colorado Water Conservation Board's Source Water Route Framework, and whether the AA fell on the right or left side of the river when looking downstream

WHAT IS ECOLOGICAL INTEGRITY?

Ecological integrity can be defined as "the structure, composition and function of an ecosystem operating within the bounds of natural or historic disturbance regimes". Ecological integrity has also been defined as "the summation of chemical, physical, and biological integrity" or the ability of an ecosystem to support and maintain a full suite of organisms with species composition, diversity, and function comparable to similar systems in an undisturbed state. High ecological integrity is generally regarded as an ecosystem attribute where expected structural components are complete, and all ecological processes are functioning optimally. To have integrity, an ecosystem should be relatively unimpaired across a range of characteristics and spatial and temporal scales.

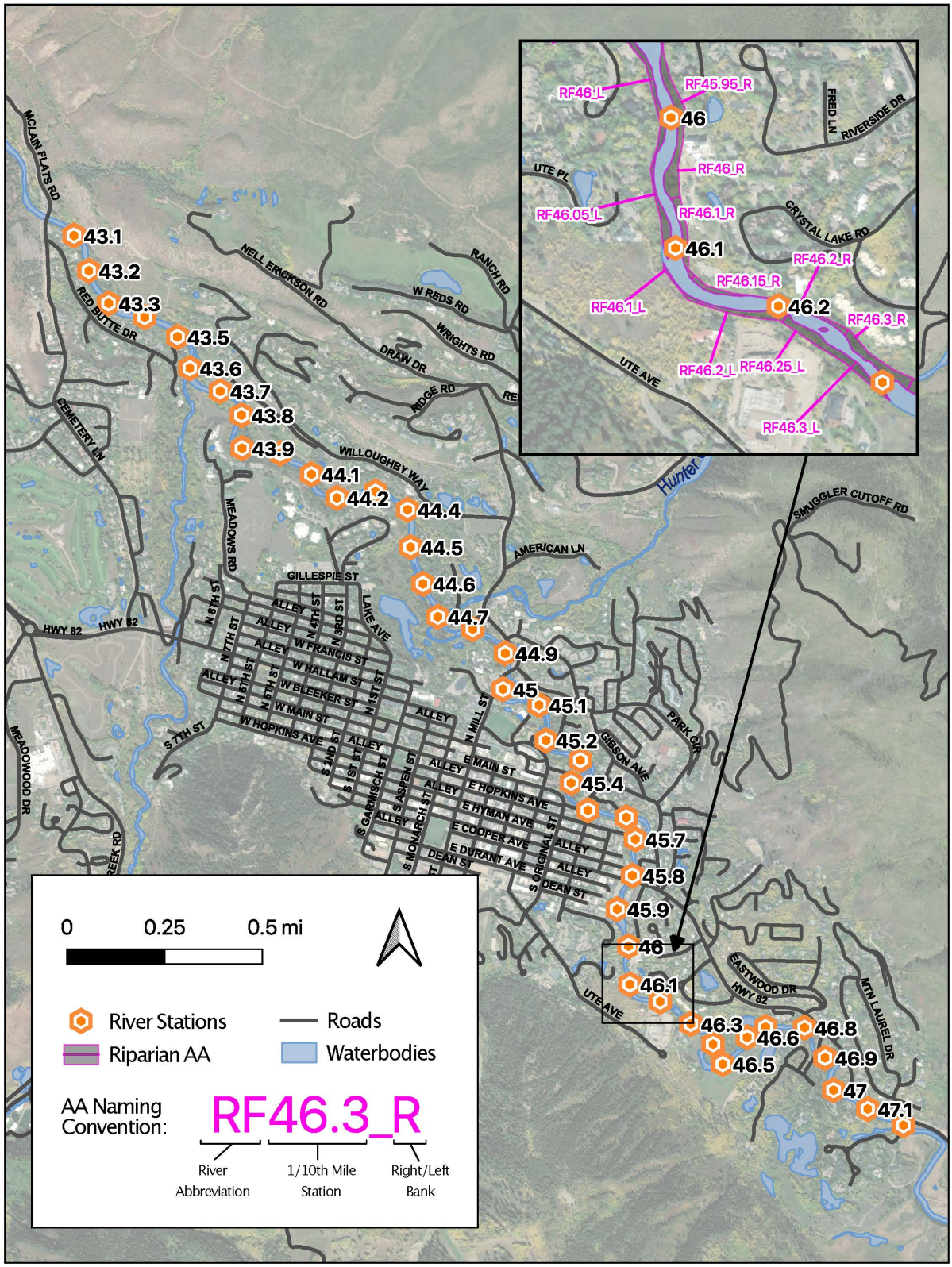


Figure 8. River stationing, Assessment Area (AA) delineations, and naming conventions used in this planning effort intend to help stakeholders map assessment results back to local geographies.

Once the assessment areas were established, the project team preformed a Level 2 EIA assessment on riparian zones delineated within the planning area. A modified version of the EIA protocol (Appendix C) was used to evaluate conditions in each AA. Modification of the EIA protocol was made necessary by the adjacency and linear orientation of the AAs and unique conditions produced by the urban environment. Notably, an assessment of wildlife and habitat values of each AA was included as an additional protocol. The assessment specifically considered the Major Ecological Factors and Metrics presented in the table below. A score was developed for each metric and these scores from each AA were combined to communicate an aggregated condition. Results are presented in both maps and tabular format in Appendix C. A stressor checklist accompanied the EIA results for several metrics. These checklists should help stakeholders identify the most pressing stressors faced by riparian areas in the City.

Table 5: EIA Evaluation Criteria

Rank Factor	Major Ecological Factor	Metric
Landscape Context (L)	Landscape	L1. Contiguous Natural Land Cover
		L2. Land Use Index
	Buffer	B1. Perimeter with Natural Buffer
		B2. Width of Natural Buffer
Condition (C)	Vegetation	V1. Native Plant Species Cover
		V2. Invasive Nonnative Plant Species Cover
		V3. Native Plant Species Composition
		V4. Vegetation Structure
		V5. Regeneration of Native Woody Species
		V6. Coarse and Fine Woody Debris
	Hydrology	H1. Water Source
		H2. Hydro period
		H3. Hydrologic Connectivity
	Physio chemistry	S1. Soil Condition
		S2. Surface Water Turbidity / Pollutants
Size (S)	Size	Z1. Comparative Size
		Z2. Change in Size

EIA ASSESSMENT RESULTS

Results of the Level 2 EIA showed that, at present, the riparian corridor through Aspen is in good condition. There are areas within the riparian corridor that could be improved in a manner that would positively impact water quality, wildlife habitat and other important ecological characteristics. Notably, the riparian and water quality projects currently undertaken by the City of Aspen appear in the data to have a positive influence on the EIA scores.

Major Ecological Factor Results

Landscape (L1, L2)

The evaluation of land use and land cover characteristics in the local drainage areas associated with each AA showed a high fraction of impervious cover and extensive residential and commercial development. In other words, roads, parking lots, driveways and patios were very prevalent. There are few areas within Aspen where contiguous natural land cover extends a great distance from the riparian zone. Scores for

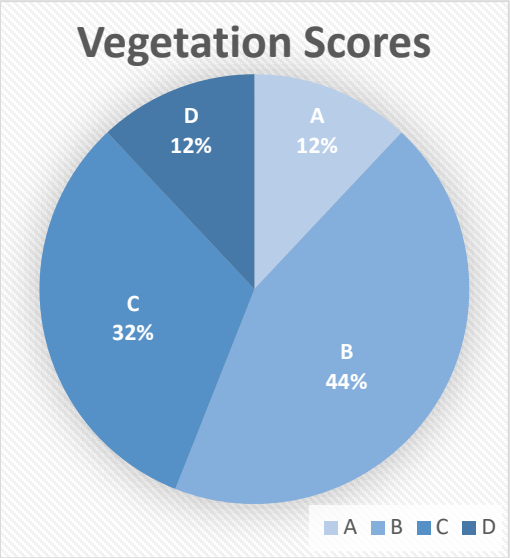
landscape metrics are low throughout the planning area but tend to decrease with increasing proximity to the urban core.

Buffer (B1, B2)

This assessment considered the width of the vegetated buffer adjacent to riparian areas. This buffer area plays an important role in protecting riparian zones from the impact of upland land use activities. Assessment results for buffers tended to reflect the scores for local landscape condition. Vegetation communities adjacent to riparian zones are highly fragmented and exist in a largely modified condition within Aspen (B1 - Perimeter). AA perimeters surrounded by 100% natural land cover received an A-grade while AAs with >25% natural buffer received a D-grade. The width of contiguous 'natural' vegetated buffers is constrained by roads, trails, lawns, and structures (B2 - Width). AAs surrounded by at least 100 meters of natural land cover received a A-grade while AAs with <25 meters of natural buffer width received a D-grade. The width of contiguous 'natural' vegetated buffers is constrained by roads, trails, lawns, and structures. Scores for the condition of buffer areas tend to decrease with increasing proximity to the urban core.

Vegetation (V1, V2, V3, V4, V5, V6)

Results indicate varying degrees of impact to riparian areas throughout Aspen (Appendix D).



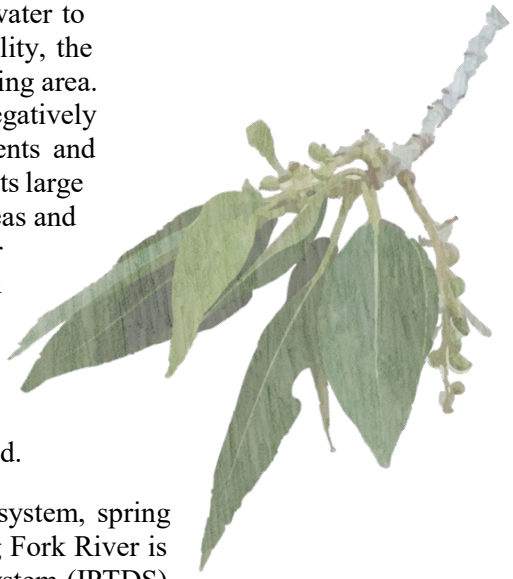
Of the 41 AAs analyzed:

Those AAs which received an A rating exhibited a relatively healthy and diverse riparian compositions and structure typically dominated by an over story of narrow leaf cottonwood and blue spruce with native shrubs such as redosier dogwood, twinberry honeysuckle, thinleaf alder, river birch, Rocky Mountain maple, chokecherry and several species of willows. Regeneration of native woody species and woody debris was present at some level. The herbaceous component of these areas was comprised of native upland and wetland species such as: bluejoint reedgrass, fringed brome, water sedge, beaked sedge, fowl mannagrass, Baltic rush, fowl bluegrass, largeleaf avens, false Solomon seal, bog orchids, meadowrue, field horsetail, souringrush and roundleaf wintergreen. The AA's with this species cover, composition and structure had the highest scores. AA's with vegetation that deviated from the reference condition (A Rating), were rated lower due to one or more of the following; less native species cover and more invasive non-native species cover (V1, V2), a less diverse composition of species (V3-percentage of various species), a less diverse species structure (V4-number of distinct species).

The vegetation composition is by no means pristine; all of the AAs supported some contain non-native naturalized species. The most common being redtop and reed canarygrass. In addition, noxious weeds were frequently encountered, the most abundant being ox-eye daisy, Canada thistle, common tansy, and plumeless thistle.

In general, those AAs with lower scores showed little to no riparian shrub (woody understory) component or the shrub layer appeared to have been replaced by non-native pasture grasses such as smooth brome, timothy, and orchardgrass; bluegrass lawns; or other landscaping (V5). These areas also have a lack of woody debris (V6). The most significantly degraded sites also lacked a mature overstory of narrowleaf cottonwood or willows and instead were dominated by non-native pasture grasses and weeds (V1,V2). Finally, some of the AAs received lower scores due to the composition and structure of the vegetation's which was highly effected by the relatively narrow dimension of the riparian zone and close proximity to existing commercial and residential development and/or recreational trails (V3, V4).

Hydrology (H1, H2, H3)



Source water (H1) that comes from precipitation and groundwater to the Roaring Fork River within Aspen tends to be of high quality, the river is the primary water source for riparian zones in the planning area. Episodic inputs of urban drainage sheet flow are expected to negatively impact riparian zones throughout the City during rainfall events and snowmelt runoff. The City's stormwater system collects and treats large quantities of stormwater before it is discharged into riparian areas and the river. However, numerous small and untreated stormwater outfalls continue to discharge stormwater to riparian zones in some areas. The Water Source metric was scored at a 'B' ranking in most locations due to the impact of urban runoff on the Roaring Fork River during snowmelt runoff and summer precipitation events. In where untreated stormwater appears to discharge directly into riparian areas, a 'C' ranking was assigned.

The Hydroperiod (H2 - or seasonal influx of water into the system, spring through fall) of flows entering riparian zones from the Roaring Fork River is altered by the Independence Pass Transmountain Diversion System (IPTDS) and several in-basin surface water diversion. The operation of the IPTDS alters the magnitude of floods—and the corresponding flood inundation extents—that occur every 5-10 years. The reduction in 5-10-year flood magnitudes is hypothesized to reduce the extent of riparian vegetation over time. The impact to local peak flows resulted in the assignment of a 'C' ranking for the Hydroperiod metric throughout the planning area.

Hydrological connectivity (H3) between the Roaring Fork River and adjacent riparian areas is also likely impacted by channel and streambank alteration, levees, dikes, and other infrastructure. The Roaring Fork River is moderately entrenched through glacial deposits and does not exhibit large native floodplains. The degree to which structural modifications alter the timing and frequency of overbank flows in riparian areas appears low to moderate throughout Aspen. Most locations received at 'A' ranking for this metric.

Physiochemistry (S1, S2)

The ecological response to urbanization is influenced by runoff entering stream channels. The characteristics of runoff is controlled by quality and quantity of impervious land cover and stormwater infrastructure. The chemical and hydrological characteristics of this runoff effect the flow regime, habitat structure, and biological processes in streams. These changes can be measured in chemical and physical environment of the stream. Losses of biological diversity or changes in assemblage composition and structure (i.e. Disturbance) are indicators of changes to the soil condition (S1) and surface water turbidity/pollutant load (S2) can be indicators of negative impacts to ecological health influenced by runoff.

Soil condition (S1) across the AAs was measured for the degree which human impact has disturbed the natural soil or substrate. These disturbances have to potential to impact the hydrology or the riparian area and disrupt soil process like organic accumulation. The AA's were largely graded a 'C' due to widespread impacts associated with development, compaction, or diffuse recreational use. Some locations received 'D' rankings. due to high levels of human activity and observable impacts to soils within the riparian area (e.g. extensive social and fishing trails).

Recent observations of degraded aquatic macroinvertebrate community conditions resulted in placement of the Roaring Fork River through Aspen on the list of Impaired Waterways under the Clean Water Act. Data collection between 2010-2012 indicated a gradient of degradation, starting at the upstream end of the city boundaries and progressing to the confluence with Maroon Creek. Data collected in 2015 and 2018 suggest that conditions may be improving but the river remains on the list of Impaired Waterways. The geographic

alignment of water quality impacts and urban land uses suggests that degradation of macroinvertebrate communities may be related to pollutants sourced from urban activities. Riparian areas typically act as water quality buffers, filtering out a wide variety of pollutants before water makes its way to the river. Historical degradation of riparian areas may, thus, be a partial control on water quality conditions in the Roaring Fork. Unfortunately, the resolution of water quality does not support identification of specific locations or land use activities that drive the degradation signal. Therefore, all AAs within the planning area initially received a 'C' ranking for pollutants and AAs receiving water from stormwater outfalls were downgraded to a 'D' ranking for the S2 ranking.

Size (Z1, Z2)

Each AA was assigned a ranking for relative size based on a ranked value list of acreages. In this manner, a ranking of 'D' was assigned to the smallest AAs in the planning area and a ranking of 'A' was assigned to the largest AAs (Z1). Low scores do not characterize any degree of impact, only a small relative size. To normalize this data, the existing size of each AA was then compared to an approximated area extent of the native riparian zone in that location. The approximated natural extent was determined through combination of historical aerial imagery and hydraulic modeling results. Outcomes indicate the degree to which historical land use activities have encroached on riparian vegetation (Z2). The Roaring Fork River is entrenched along many sections of the river corridor through Aspen. Historical and existing riparian areas are largely restricted to steep streambanks very close to the river. The largest encroachments on riparian areas occur in flat, low-lying areas where overbanking flows supported broad riparian forests. Many of these areas are now occupied by lawns, gardens and homes.

Wildlife

While many of the AAs are significantly compromised by residential, commercial, and/or infrastructure development, a few are important to wildlife. The EIA system does not generally incorporate wildlife as a rating category. For this study wildlife values were rated across the AA's because wildlife protection and preservation is an important issue within Aspen, and because the Roaring Fork River corridor provides critical wildlife habitat within Aspen. Some AAs are valuable because they contain relatively intact plant communities which provide effective habitat, others are notable due to their adjacency to important habitat or conservation lands and provide access to the riparian corridor and the Roaring Fork River, and some provide both effective habitat, are adjacent to conservation lands, and provide wildlife access to the corridor and the river.

Table 6: Wildlife Values

Riparian AA	Wildlife Value
RF43_R – RF43.1_R	Effective narrowleaf cottonwood riparian habitat; Adjacent to mule deer/elk transition habitat, black bear fall concentration habitat; River access
RF43_R	Meadow/old hayfield or pasture; Adjacent to mule deer/elk transition habitat, black bear fall concentration habitat; Restoration opportunity; River access
RF43.2_R – RF43.45_R	Effective narrowleaf cottonwood-blue spruce riparian habitat; Adjacent to mule deer/elk transition habitat, black bear fall concentration habitat; River access
RF43.5_R	Effective narrowleaf cottonwood riparian habitat; Good water source; Adjacent to mule deer/elk transition habitat, black bear fall concentration habitat
RF43.65_L	Very good candidate for wildlife habitat restoration to benefit many species including deer, bears, migratory birds
RF43.7_L	Effective narrowleaf cottonwood riparian habitat; High structural and species diversity; Tent trail reduces effectiveness
RF46.4_L – RF46.5_L	Currently used by elk, deer, moose, riparian & wetland birds, diverse small mammals; Adjacent to Stillwater Ranch OS & Richmond Ridge; Excellent restoration candidate to benefit many species
RF46.48_L – RF46.5_L	Stillwater Ranch OS; Currently used by elk, deer, moose, riparian & wetland birds, diverse small mammals; Adjacent to WRNF (Richmond Ridge); Adjacent to mule deer/elk transition habitat, black bear fall concentration habitat; Provides connectivity between the river and mule deer /elk summer range & elk winter range; Excellent restoration candidate to benefit many species
RF46.6_L – RF46.8_L	Relatively wide spruce dominated with aspen & narrowleaf cottonwood regeneration; Used by elk & mule deer with good structural diversity at east end
RF46.4_R – RF46.6_R	Disturbed but recovering; Connectivity to Stillwater Ranch OS; Heavy deer use; Good potential restoration site to benefit all riparian species plus elk, deer, moose

Aggregated Results

The EIA methodology provides a weighting scheme for aggregating scores from individual metrics into rankings for the following Factors: Landscape, Condition, and Size. Up to eighteen different EIA metrics were evaluated for each of the 132 separate AAs included in the planning area. Aggregate rankings were computed for each AA using the approach recommended in the EIA manual.[13] Overall rankings for ecological integrity of each AA was computed by weighting the rankings from the three Factors. The EIA system for overall rankings weight the vegetation metrics most heavily because in non-urbanized settings these metrics yield the most data about the ecologic condition of the resource. As a result, the overall scores for the riparian area is Aspen fall between C- and B+ throughout the planning area. Assessment results show persistent and widespread degradation of the metrics associated with the *Landscape* and *Buffer* EIA Factors. Degradation of vegetation community structure is evident near the urban core and impacts to physiochemistry are expected to exist in locations where stormwater discharges to riparian zones. Degraded vegetation is more pervasive on the left side of the river, reflecting the greater concentration of urban development right of the Roaring Fork River.

Aggregated results for the Landscape Context rank factor are presented in the following pages in map form. This rank factor was selected for display in maps (Figures 10-13) because it was most relevant to project identification in subsequent planning steps and major goals to improve water quality in the context of the

[13] Lemly, J., L. Gilligan and C. Wiechman (2016). Ecological Integrity Assessment for Colorado Wetlands. Field Manual, Version 2.1, Colorado Natural Heritage Program. Colorado State University. Fort Collins, CO 80523.: 116 pp.

Roaring Fork through Aspen. This data set could be combined in a multitude of different ways to draw out different factors or to attempt to isolate a specific set of ecological or policy needs/issues[14]. The landscape context scores were deemed most enlightening for informing about the types of policies, projects and programs that the City might implement to improve riparian area conditions and the water quality of the Roaring Fork River. The focus on Landscape Context provides the most actionable and relevant information to project identification/prioritization and commercial and residential development and redevelopment decision-making in the City of Aspen.

Maps are presented in a downstream to upstream sequence and are followed by a table of rankings that include both aggregated EIA values and the individual scores for each metric in each AA (See page 28). See Appendix D for detailed discussions of assessment results.

Assessment activities performed during this planning effort indicate that some of largest impacts to riparian function include:

1) The reduction in the width of vegetated buffers that separate riparian zones from urban land uses,
2) The high degree of fragmentation of the vegetated buffers that persist, and
3) The expectation that large portions of the riparian zone receive untreated urban runoff during storm events and snowmelt.

These issues are not unique to Aspen, rather, they are a typical outcome where urbanization occurs along river corridors. Impacts of development on riparian areas is widely recognized. Unique to Aspen is the political capitol and community desire to effect change in these areas. Meaningful policies, programs and projects can be developed to impact these issues. Proposed actions are discussed in detail in Section 6: Recommendations.

[14] The GIS data set is available through the City of Aspen Engineering Department

EIA Overall Score

Roads
River Stations
Waterbodies

EIA Overall Score
A+
A-
B+
B-
C+
C-
D

0 0.25 0.5 mi

W REDS RD
NELL ERICKSON RD
DRAW DR
RIDGE RD
BENNETT BENCH RD
MAGNIFICO RD
RED BUTTE DR
SAGE CT
OVERLOOK DR
WILLOUGHBY WAY
PITKIN WAY
MTN VIEW DR
SILVER KING DR
SNOWBUNNY LN
SIERRA VISTA DR
CEMETERY LN
BONITA DR
MEADOWS RD
SNEAKY LN
HARBOUR LN
HWY 82
W HALLAM ST
ROARING FORK RD
N 3RD ST
GILLESPIE ST
ALLEY
W NORTH ST
W SMUGGLER ST
N 8TH ST
N 7TH ST
N 6TH ST
N 5TH ST
N 4TH ST
W FRANCIS ST
W HALLAM ST
W BLEEKER ST
W MAIN ST
W HOPKINS AVE
LAKE AVE
N 3RD ST
N 2ND ST
N 1ST ST
S 3RD ST
S 2ND ST
S 1ST ST
W HYMAN AVE
S 7TH ST
Castle Creek
Hallam Lake
Roaring Fork River
PLACER LN
HUNTER CREEK RD
AMERICAN LN
SHADY LN
Hunter Creek
N GARMISCH ST
S GARMISCH ST
E HALLAM ST
E BLEEKER ST
E MAIN ST
E HOPKINS AVE
E HYMAN AVE
E COOPER AVE
E DURANT AVE
DEAN ST
S ASPEN ST
S MIDNARCH ST
S MILL ST
N MILL ST
PUPPY SMITH ST
N SPRING ST
RIO GRANDE PL
S BALEM ST
S HUNTER ST
S SPRING ST
S WEST END ST
S ORIGINAL ST
WILLIAMS WAY
SPRUCE ST
VINE ST
LONE PINE RD
RACE ST
GIBSON AVE
OAK LN
MAPLE LN
AJAX AVE
PARK CIR
SILVERLODE DR
BROWN LN
NEALE AVE
KING ST
PARK AVE
DAYLIGHT AVE
ARDMORE DR
SKIMMING LN
MCSKIMMING RD
S RIVERSIDE AVE
RIVERSIDE DR
WATERS AVE
S ALPS RD
UTE PL
UTE AVE
ASPEN MTN CUTOFF RD
SMUGGLER CUTOFF RD
WILKINSON LOWER RD
WESTVIEW DR
ROARING FORK DR
EASTWOOD DR
NORTHWAY DR
W LUPINE DR
E LUPINE DR
MTN LAUREL DR
STILLWATER DR
STILLWATER LN
MAROLT PL
CASTLE CREEK RD
MEADOWOOD DR

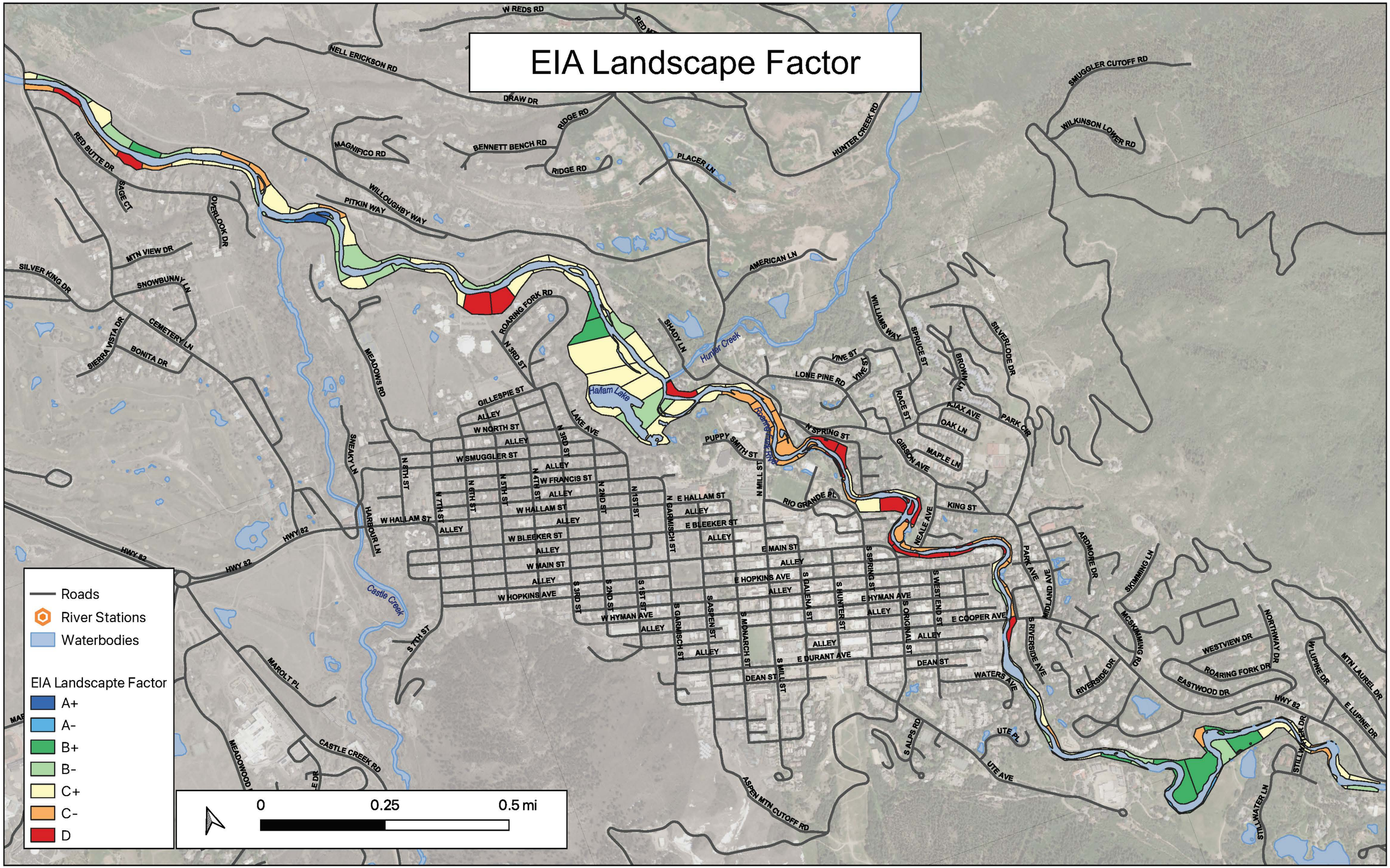
EIA Condition Factor

Roads
River Stations
Waterbodies

EIA Condition Factor
A+
A-
B+
B-
C+
C-
D

0 0.25 0.5 mi

EIA Landscape Factor



EIA Size Factor

Roads
River Stations
Waterbodies

EIA Size Factor
A+
A-
B+
B-
C+
C-
D

0 0.25 0.5 mi

W REDS RD
NELL ERICKSON RD
DRAW DR
RIDGE RD
BENNETT BENCH RD
MAGNIFICO RD
RED BUTTE DR
SAGE CT
OVERLOOK DR
WILLOUGHBY WAY
PITKIN WAY
PLACER LN
HUNTER CREEK RD
SMUGGLER CUTOFF RD
WILKINSON LOWER RD
AMERICAN LN
MTN VIEW DR
SILVER KING DR
SNOWBUNNY LN
SIERRA VISTA DR
CEMETERY LN
BONITA DR
MEADOWS RD
ROARING FORK RD
N 3RD ST
GILLESPIE ST
ALLEY
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N 4TH ST
N 2ND ST
N 1ST ST
S 3RD ST
S 2ND ST
S 1ST ST
LAKE AVE
SNEAKY LN
HARBOUR LN
HWY 82
Castle Creek
S 7TH ST
MAROLT PL
MEADOWOOD DR
CASTLE CREEK RD
Hallam Lake
Roaring Fork River
Hunter Creek
SHADY LN
N GARMISCH ST
S GARMISCH ST
N ASPEN ST
S ASPEN ST
S MONARCH ST
S GALENA ST
S HUNTER ST
S SPRING ST
S ORIGINAL ST
S WESTEND ST
S MILL ST
E HALLAM ST
E BLEEKER ST
E MAIN ST
E HOPKINS AVE
E HYMAN AVE
E COOPER AVE
E DURANT AVE
DEAN ST
WATERS AVE
PUPPY SMITH ST
N SPRING ST
RIO GRANDE PL
MEALE AVE
KING ST
GIBSON AVE
MAPLE LN
OAK LN
AJAX AVE
PARK CIR
RACE ST
VINE ST
LONE PINE RD
WILLIAMS WAY
SPRUCE ST
SILVERLODE DR
BROWN LN
PARK AVE
MIDLAND AVE
RIVERSIDE AVE
RIVERSIDE DR
ARDMORE DR
SKIMMING LN
MCSKIMMING RD
WESTVIEW DR
NORTHWAY DR
ROARING FORK DR
EASTWOOD DR
W LUPINE DR
E LUPINE DR
MTN LAUREL DR
STILLWATER DR
STILLWATER LN
S ALPS RD
UTE PL
UTE AVE
ASPEN MTN CUTOFF RD

Ecological Integrity Assessment Results for Riparian Areas in the City of Aspen

3. REVIEW OF REGULATIONS, PROJECTS, AND BEST MANAGEMENT PRACTICES

Sections of Aspen's municipal code were evaluated in the context of EPA's National Management Measures to Control Nonpoint Source Pollution from Urban areas to identify existing regulations that may respond in part or in whole to riparian lands preservation, aquatic environments protections, and surface water quality protection.[15] The regulations concerning development and changes within the riparian corridor are comprised of two main sets of codes set by the City of Aspen, land use codes, and municipal codes. The following table summarizes the City of Aspen land use and municipal codes which pertain to floodplain areas and stream margin setbacks. The table also summarizes the accompanying documents which have been adopted by these codes. See Appendix A for these sections of code in their entirety.

Table 7:City of Aspen Land Use and Municipal Codes Pertaining to Riparian Areas

Codes and Adopted Plans/Documents	Summary
City of Aspen Land Use Code: Title 8, Building and Building Regulations, Chapter 8.20 International Building Code, Section 1612.3. Establishment of Flood Hazard Areas.	Flood hazard areas are based on a series of federal maps.[16] This international standard has been adopted by the City of Aspen. The hundred-year floodplain area is the most commonly referenced area in the existing regulations. The purpose of these regulations is to control the alteration of the natural floodplains; prevent or regulate the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas; restrict or prohibit uses which may result in damaging increases in erosion or in flood heights or velocities; protect and preserve the natural riparian corridor; and to control filling, grading, dredging, and other development which may increase flood damages[17].
City of Aspen Municipal Code: Title 28, Stormwater and Mudflow	This title was developed to "protect, maintain and enhance the health, safety, and welfare of the watersheds and public residing in watersheds within this jurisdiction by establishing minimum requirements and procedures to control the adverse effects mudflow and of increased effects of post-development stormwater runoff and non- point source pollution associated with new development and redevelopment." The title applies to all construction or development activity unless the project is granted an exemption by the City of Aspen. The title relies on the Urban Runoff Management Plan (Manual) summarized below. Impervious surface creation has the option of being mitigated by fee as opposed to by detention at the discretion of the City Engineer.

[15] U.S. Environmental Protection Agency (EPA). (2005). National Management Measures to Control Nonpoint Source Pollution from Urban Areas.
[16] Federal Emergency Management Agency in an engineering report entitled "The Flood Insurance Study for City of Aspen," dated June 4, 1987, as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map 28 (FBFM)
[17] Urban Runoff Management Plan: A Guide to Stormwater Management in the City of Aspen Revised, 2014. City of Aspen, Update to April 2010 Version Prepared by AMEC and the City of Aspen Engineering Department

City of Aspen Land Use Code: Title 26, Chapter 26.435 Development in Environmentally Sensitive Areas (ESA). §26.435.040. Stream Margin Review	Stream margin development is regulated by type, amount and effect of proposed development. Review of stream margin development applies to all proposed work within 100 feet of the high water line of the Roaring Fork River and its tributaries and to all development within the Flood Hazard Area (hundred-year floodplain). Activities regulated by this code include but are not limited to, building or enlarging a structure, remodeling or improving a structure, the placement of a manufactured home, mining, dredging, filling, grading, paving, excavating, and drilling. A Floodplain Development Permit Application must include detailed results from a hydraulic analysis in accordance with FEMA guidelines, that: » Determines the effects of the proposed improvements on the 100-year flood elevation » Documents any necessary revisions to the floodplain delineation » Compares pre-project and post-project conditions Development that is exempt from review includes many "soft" improvements such as public trails, practical structures such as those for access, improvements essential for public health and safety which cannot be practically relocated elsewhere and in small remodels of existing structures. Development that complies with stream margin review standards may be approved by the community development director. Requirements include that structures do not increase the base flood elevation, comply with adopted regulatory plans, dedicate historic public use/access with fisherman's easements, vegetation and existing grade is protected, and only approved native vegetation is planted within 15 feet of top of slope or high waterline among other restrictions. These regulations are enforced through the permit process including opportunities for appeals and special reviews.
City of Aspen Municipal Code: Title 2. Administration. Sec. 2.12.140. Stormwater Fees	Fee-in-Lieu of Detention Fee is calculated per cubic foot of detention. The fee is based on the full (100%) cost of constructing a detention facility on site. Required detention storage is calculated at the rate of 6.20 cubic feet per 100 square feet of impervious area. The city engineer can require applicants to provide cost and storage estimates at their discretion.
City of Aspen Urban Stormwater Management Plan (Manual) 2014	This comprehensive document outlines best management practices for improving water quality through urban stormwater management. The focus of the manual is the removal of sediment from stormwater. There are requirements set forward by the manual for best management practices.
The Roaring Fork River Greenway Plan	Plans adopted by the board which have bearing within the riparian area include: The Rio Grande Trail Management Plan, the North Star Management Plan and the Roaring Fork Gorge Management plan

Table 8: City of Aspen Stormwater Best Management Practices

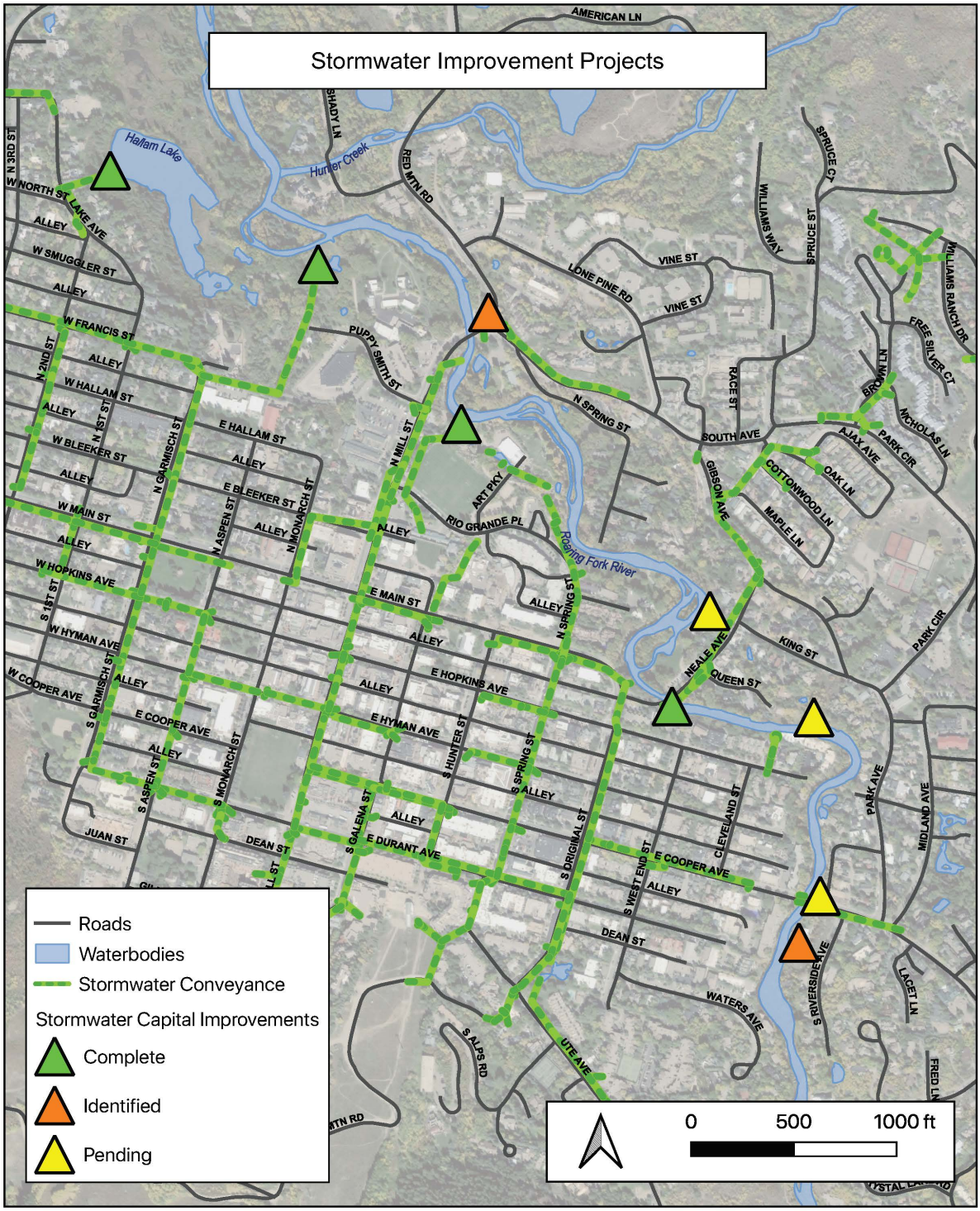
Project Name	Summary
Street Sweeping	The City of Aspen conducts regular street sweeping to help keep pollutants out of stormwater. Debris, dirt, sand and silt collect in gutters and along the sides of streets are routinely collected and deposited in the Pitkin County landfill.
Stormwater Vaults	The City of Aspen uses stormwater vaults to separate trash, sand, and oils out of stormwater before it discharges into riparian areas and the Roaring Fork River. Vaults above the Jenny Adair wetlands treat stormwater collected from the majority of town west of Mill Street. A vault underneath the parking area in the Rio Grande Recycle Center treats stormwater collected from the east and middle portion of town as well as drainage from Copper and Spar gulches on Aspen Mountain. Additional vaults include the Mill Street Vault, Drywell in Monarch, and the Contech Vault at Prockter.
Bioengineered Wetlands	The City of Aspen utilizes bioengineered wetlands to treat storm water at Prockter Open Space, John Denver Park and Jenny Adair Park. These facilities improve water quality of stormwater collected from large portions of the urban core before it is discharged into the Roaring Fork River. These wetlands fall adjacent to or within the riparian corridor and provide aesthetic and wildlife benefits in addition to reducing the negative impacts of urban drainage.

The City of Aspen has completed several large stormwater control and treatment projects in recent years to reduce urban-runoff related water quality impacts to the Roaring Fork River. The table below summarizes some of those completed projects and indicates additional projects identified by City staff but not completed.

Table 9: City of Aspen Stormwater Control and Riparian Corridor Projects

Project Name	Status	Description
Hallam Lake Outfall Improvement Project	Completed	Outfall improvement project at Gillespie Street outfall to Hallam Lake (360 Lake Ave). Pipe improvements in Lake Ave. To reduce bank erosion, restore bank stability and enhance native vegetation.
Jenny Adair Wetlands	Completed	Constructed natural wetlands to partially treat stormwater before it enters riparian areas and the Roaring Fork River
Mill St and Gibson Ave Water Quality Improvement Project	Identified Future Opportunity	Design will take place in 2020.

Project Name	Status	Description
Rio Grande Stormwater Improvements (John Denver Sanctuary)	Completed	Constructed wetlands, bioswales, water quality ponds and sand filter treatment systems. Completed overflow outfall improvements. Installed Rio Grande Recycle Center debris/trash removal vault.
Newbury Park Riparian Restoration Project	Pending	TBD
Prockter Open Space Wetlands/Vault	Completed	Constructed wetlands to partially treat stormwater before it enters riparian zones and the Roaring Fork River. Installed Contech CDS or Stormceptor vault
Garrish Park Water Quality Improvement Project	Pending	TBD
East Hopkins Avenue Riparian Restoration Project	Pending	Partnership with Aspen Valley Land Trust to restore riparian area and complete stormwater outfall improvements.
Anderson Park Stormwater Improvement Project	Identified Future Opportunity	Partnership opportunity with Parks Department to remove pollutants from Highway 82 stormwater runoff.


Stormwater Improvement Projects
Hallam Lake
Hunter Creek
Roaring Fork River
AMERICAN LN
SHADY LN
RED MTN RD
LONE PINE RD
VINE ST
WILLIAMS WAY
SPRUCE CT
SPRUCE ST
WILLIAMS RANCH DR
FREE SILVER CT
BROWN LN
NICHOLAS LN
AJAX AVE
PARK CIR
OAK LN
COTTONWOOD LN
MAPLE LN
GIBSON AVE
SOUTH AVE
RACE ST
N SPRING ST
PUPPY SMITH ST
N MILL ST
ART PKY
RIO GRANDE PL
W NORTH ST
LAKE AVE
ALLEY
W SMUGGLER ST
W FRANCIS ST
N 2ND ST
W HALLAM ST
N 1ST ST
W BLEEKER ST
N GARMISCH ST
E HALLAM ST
E BLEEKER ST
N ASPEN ST
N MONARCH ST
W MAIN ST
W HOPKINS AVE
S 1ST ST
W HYMAN AVE
W COOPER AVE
S GARMISCH ST
E MAIN ST
N SPRING ST
E HOPKINS AVE
E HYMAN AVE
E COOPER AVE
S ASPEN ST
S MONARCH ST
S HUNTER ST
S SPRING ST
JUAN ST
DEAN ST
S GALENA ST
E DURANT AVE
S ORIGINAL ST
S WEST END ST
CLEVELAND ST
KING ST
QUEEN ST
NEALE AVE
PARK AVE
MIDLAND AVE
S RIVERSIDE AVE
LACET LN
WATERS AVE
UTE AVE
S ALPS RD
Roads
Waterbodies
Stormwater Conveyance
Stormwater Capital Improvements
Complete
Identified
Pending
0
500
1000 ft

REVIEW RESULTS

Opportunities for riparian and aquatic ecosystem preservation, mitigation, or enhancement for the specific objective of water quality protection do exist within various sections related to floodplain development, tree removal, development in sensitive lands (Stream Margin Review), and the Urban Runoff Management Plan. However, they generally do not form an explicit or cohesive strategy identifying water quality protection as an additional objective of city code. In addition, protections remain subject to a wide variety of interpretations dependent on the particular makeup or motivation of approval bodies like planning/zoning committees or town councils, rather than being institutionalized in code bodies in order to buffer changing short term social or political influences.

Floodplain protections are primarily concerned with safety and financial damage, i.e. prevention of loss of life or property, and make little or no direct reference to water quality protection goals. The Stream Margin Review process provides a number of non-specific regulatory powers during project approval, but overall appears more to target concerns with the aesthetics of near-stream development, lacking explicitly stated water quality protection objectives. Management measures targeting site hydrology and pollutant generation of new construction exist in the Urban Runoff Management Plan, but in some cases are stated as guidelines, without explicitly enforceable or monitorable elements.

In addition, typical landscaping treatments in suburban and urban settings (i.e. herbicide/pesticide and fertilizer treatments for turf and shrub/tree plantings) regularly utilize complex organochlorine chemical groups and other compounds known to be highly toxic and detrimental to aquatic life communities. Aspen city code, like many municipalities, largely refrains from specifying desired land use practices on private lands, which may promote continuing significant negative impacts to sensitive montane waterways like the Roaring Fork River and Castle Creek within city limits.

Figure 9: Finding balance between the ecological health and services the river provides and its cultural allure and use will take thoughtful policy decisions and potentially more stringent regulation.

4. OPPORTUNITIES FOR CITY ACTION

The City of Aspen received recommendations for projects, policies and management actions for enhancing or protecting riparian areas from the following documents and plans:

- Upper Roaring Fork River Management Plan (Draft)
- Municipal Water Efficiency Plan: City of Aspen, Colorado (2015)
- Rio Grande Trail Management Plan (2015)
- Urban Runoff Management Plan (2014)
- Upper Roaring Fork River Aquatic Life Use Assessment (2013)
- Northwest Colorado Council of Governments 208 Regional Water Quality Management Plan: Roaring Fork Watershed Plan (2012)
- Roaring Fork Watershed Plan (2012)
- Catalog of Stream and Riparian Habitat Quality for the Roaring Fork River and Tributaries, Central Colorado: Roaring Fork River, Segment 3: Tagert Beaver Ponds to the Slaughter House Bridge, Aspen (2007)

A compiled list of recommendations from each of these documents is summarized in Appendix E. Specific recommendations responded to the need for protection or improvement of vegetated buffers along the river corridor. The primary means for improving and protecting riparian zones as identified by previous studies include the following:

1. **Control Access Points**
    - Numerous areas of the riverbank are trampled and degraded by unregulated human use. Limit or eliminate social trails which are vectors for noxious weeds. Provide designated fishing access points.
2. **Promote Action on Private Property**
    - Educate and incentivize property owners to preserve, protect and enhance the native riparian shrub understory in lieu of converting them to of bluegrass lawns, impervious surfaces or other landscaping. Educate homeowners about noxious weeds like common tansy that may degrade riparian ecosystems.
3. **Control Land Uses in Riparian Corridor**
    - Strengthen and/or clarify regulations meant to protect the integrity of existing riparian zones.
4. **Implement Riparian Restoration Projects**
    - Develop and implement plans to restore degraded riparian areas on City-owned/managed property, favoring those areas expected to receive large amounts of stormwater discharge or non-point source urban runoff.
5. **Acquire and Protect High Value Riparian Areas**
    - Protect high-quality riparian areas through targeted property acquisition.
6. **Reduce Impacts from Stormwater Discharge**
    - Continue to improve stormwater discharge quality through development of biological treatment facilities. Include a riparian area restoration component when and where new facilities are developed.

The full list of proposed actions falling within each of the above categories is presented in Appendix E.

5. STAKEHOLDER PROCESS

A diverse group of stakeholders were invited to participate in this process. Collective involvement helped to ensure that 1) the programs recommended for implementation by the planning effort have wide impact, 2) diverse community interests are party to the promotion of specific planning recommendations, and 3) benefits from recommended projects and programs are both maximized and sustainable. Stakeholders represented the following organizations and constituencies:

- City of Aspen, Engineering, Environmental Health, and Parks Departments
- Roaring Fork Conservancy
- Aspen Center for Environmental Studies
- Pitkin County Open Space & Trails
- Local Flyfishing Outfitter
- Local Landscape Architect

The list of recommendations contained in previous plans or reports was integrated into a list of proposed projects, policies and program actions developed during this planning effort. The project team worked with stakeholders to organize recommendations into three primary categories of action: *policy*, *programs* and *projects*.

Policy

Policy actions are those regulatory actions, which the City would enact to enforce, limit, plan development and use within the riparian area, as well as preserve, protect and plan for critical areas within the corridor. Examples of these types of actions are changes to enforcement of streambank setback regulations and creation of planning documents such as a sediment management plan. The three subcategories of these policy actions are:

- Preservation
- Enforcement
- Planning

Programs

Programs are actions that the city would undertake to incentivize best practices within riparian areas and educate the public about riparian areas. Programs have the potential to catalyze public action and help the City promote a more robust, connected and healthy riparian area. Program actions fall into two broad categories:

- Incentives
- Education

Projects

Projects include the “shovel in the dirt” variety action items. These projects fall into five categories based on: ecosystem context, level of degradation, adjacent land uses, and locations of storm water outfalls and treatment infrastructure. These project types are:

- Preservation (i.e. conservation easements, acquisition)
- Enhancement (limited restoration activities such as seeding and planting in areas that are of good quality)

- Creation (installing riparian communities where they have been eliminated or would be expected to occur. Especially those locations where these installations would have measurable impacts to city goals)
- Restoration (repairing degraded areas with ecological based projects including interventions such as planting, seeding, erosion control, bank stabilization etc.)
- Stormwater Control and Treatment

Stakeholders were asked to rank each proposed action according to its perceived feasibility and effectiveness. Importantly, the stakeholder group supported the planning efforts but did not have any meaningful fiscal oversight or the ability to make decisions on behalf of the City Council or staff regarding budgeting or prioritization of actions for implementation. Activities of the stakeholder group included the following:

- Screened recommended actions for political, social, financial, land ownership, location, and logistical constraints. Specifically, the advisory group considered:
    - Project scope and costs – Is the project scope actionable and cost effective?
    - Ease or practicality of implementation action – Can the project be readily acted upon? Should implementation priority be advanced due to unique circumstances (e.g. land ownership, access, timeliness of action)?
    - Leveraged opportunities - Are there other stakeholders? Is there volunteer potential? Are multiple owners championing the action? Does the action enhance visibility of the greater restoration and protection effort within the community?
    - Potential for project success – Is our expected measure of success reasonable and does the project further the purpose of the Plan?
- Provided feedback to city staff regarding implementation timelines for work.
- Provided guidance for overcoming anticipated problems associated with specific recommended actions or groups of actions.
- Provided a forum for local stakeholders to share opinions and expertise.
- Championed the goals of the plan and provided political support for recommended actions.

The stakeholder process relied on a three-tier system to rank and prioritize recommended actions. This process was completed using a survey and through discussion during a virtual meeting (see Appendix F: Stakeholder Survey, Survey Results and Summary Presentation). Stakeholders considered the anticipated effectiveness and feasibility of implementing each recommended action based on legal, socio-political or budgetary constraints. Ranking recommendations according to the three Effectiveness Levels discussed below indicated the anticipated impact of a proposed action on improving riparian conditions:

- Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through Aspen.
- Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through Aspen.
- Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through Aspen.

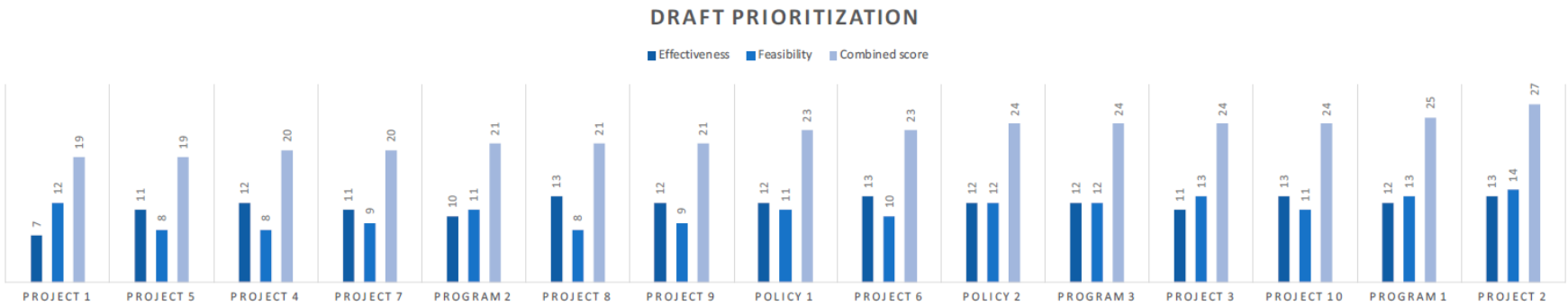
Ranking recommendations according to the three Feasibility Levels discussed below indicated the anticipated feasibility of a proposed action given a broad array of expected constraints:

- Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.

- Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

Evaluation of anticipated effectiveness and feasibility for all recommendations identified by the plan helps guide City staff toward successful implementation of the most productive set of actions for meeting stated planning goals. Summing stakeholders perceptions of effectiveness and feasibility rankings provided a qualitative prioritization system where the lowest scores indicated those actions simultaneously expected to provide the greatest improvements to riparian areas and present the lowest barriers to implementation (see Prioritization Graph, next page). The projects, policies, and programs identified are ranked in order from greatest improvements/lowest barriers to lesser improvements/high barriers to implementation. For example PROJECT 1 was considered by the stakeholder group to provide the greatest improvement with the lowest barrier for implementation in contrast to PROJECT 2 at the other end of the priority scale.

Coupling expectations for the relative effectiveness of each recommendation with the feasibility assessments presented here will help City staff, elected officials, and members of the community identify and implement the most practical and compelling actions first while building support for those actions with more uncertain outcomes or requiring a greater degree of financial and/or political support.



PROJECT 1: Public and private restoration partnerships; in order to create a larger and more robust riparian buffer and connect high value habitat and ecosystem services, the City should consider targeted property easements and partnerships that further the goal of connectivity of the riparian area through Aspen.

PROJECT 5: Newberry Park Enhancement

PROJECT 4: John Denver Park - Kayak Channel and Armored Bank Restoration

PROJECT 7: Garrish Park Restoration and Mine Drainage

PROGRAM 2: Incentivize restoration, enhancement, or mitigation opportunities.

PROJECT 8: Anderson Park and Land Trust Parcel

PROJECT 9: Aspen Club Hydrologic Enhancements

POLICY 1: More-explicitly institutionalize water quality projection as a goal/objective in city code segments pertaining to riparian lands uses and protections.

PROJECT 6: Herron Park Enhancement

POLICY 2: Strengthen riparian buffer protections on existing undeveloped locations with functional condition vegetation

PROGRAM 3: Fee – In – Lieu. At sites where improvements still remain practically infeasible due to topography, parcel size, etc., provide opportunities for in-basin mitigation via fee-in-lieu or other mechanisms to support off-site work that still provides water quality benefits directly to the Roaring Fork River system.

PROJECT 3: Jenny Adair - Stormwater Control Facility

PROJECT 10: John Denver Park - Vegetation Management & Cattail Control

PROGRAM 1: Educating property owners on how to maintain naturalized riparian buffers. Highlight importance of a zoned approach to landscaping and structure development near riparian areas.

PROJECT 2: Mill Parcel Restoration

6. PLANNING RECOMMENDATIONS

Policy, program and project recommendation categories are of equal importance. The City should work to implement recommendations from each category in concert. This multi-pronged approach to improving the condition of the riparian area in Aspen will have the greatest impact. The stakeholder-indicated evvectiveness and feasibility rankings for each action are presented in Appendix F. The following high-priority actions are recommended for implementation by the City of Aspen:

Policy

The policies below were nearly equal in anticipated effectiveness and feasibility by the stakeholder group. An important distinction is that the first policy action relates to goal setting and the second policy action is the implemented regulation of that goal.

1. **More-explicitly institutionalize water quality protection as a goal/objective in city code segments pertaining to riparian lands uses and protections**

   Rationale: The current iteration of the City's Steam Margin Setback does not explicitly state water quality or riparian protection as a goal. The original intent of the code to protect view sheds and aesthetics does not encompass the functional values of the riparian areas in Aspen. In future iterations of city code, more-explicitly state water quality protection as an objective in code sections that target use and development of floodplains, wetlands, riparian buffers, or specific site development patterns. Institutionalizing water quality protections will make development project reviews and stream impacts less subject to influences by temporary social and political positions.

2. **Strengthen riparian buffer protections on existing undeveloped locations with functional condition vegetation**

   Rationale Protecting existing locations with functional riparian buffers and preventing further loss is more cost-effective than fixing or restoring sites once degradation has occurred. In short, it is better to protect and enhance areas in relative good condition than to restore areas that have been impaired. Maintaining or increasing riparian buffer, vegetation, and floodplain development restrictions for remaining parcels with undeveloped and naturally vegetated stream-adjacent locations responds strongly to the 'ounce of prevention is worth a pound of cure' approach to water quality protection and land use planning.

   Implementation of this policy could take significant political capitol. Importantly, this policy should not preclude development but guide where and how development occurs.

Programs

Through providing a "carrot," rather than a "stick" the City can incentivize homeowners to make impactful changes to their landscapes that will benefit the wider community. These improvements could be in conjunction with a redevelopment or building project or undertaken as a singular project by the residential owner. The stakeholder group found the first program to be the most effective and feasible due to the already robust regulatory process for development in Aspen. Educational programs were deemed to be less effective by far, but still worthy endeavors to undertake. Significantly, the stakeholder group recommended that action on private property as a high priority. Without effecting change in these areas the other work done by the City was considered less effective overall.

1. **Incentivize restoration, enhancement, or mitigation opportunities**

   Rationale Many negative water quality impacts in Aspen occurred during earlier development periods which either pre-dated modern water quality law (pre-1970s) or where characterized by differing social values regarding streams and rivers than current times. Directly fixing impacts accrued at these sites remains logistically problematic or prohibitively expensive.

   During redevelopment opportunities the City can incentivize property owners or project proponents to improve or enhance degraded conditions by increasing stream setbacks, restoring native vegetation, modernizing stormwater treatment BMPs, and implementing increased Green Infrastructure/Low Impact Design concepts in development plans (e.g. decrease connected-impervious surfaces, increase on-site groundwater infiltration, decrease runoff, etc.).

   The socioeconomic landscape of Aspen includes private property owners who are relatively price insensitive. The scale of financial incentives the City can accommodate may be limited. Other attractive incentives for private property owners include breaks or increases for; floor area ratio (FAR), Renewable Energy Mitigation Program (REMP), accessory buildings, and transferable development rights.

   Additionally, to preserve the investments in these improvements the City should explore adding incentivized improvements to the parcel data so that improvements are retained through changes in ownership and over time.

2. **Fee – In – Lieu:**

   Rationale Properties not undergoing redevelopment and where improvements are practically infeasible due to topography, parcel size, etc., provide opportunities for in-basin mitigation via fee-in-lieu or other mechanisms. Fee-in-lieu is also an option for nonconforming structures, where the nonconforming structure removal impacts outweigh the benefits of its removal. Fee-in-lieu supports off-site work that still provides water quality benefits directly to the Roaring Fork River system. The City's already robust permitting process is a promising avenue for effecting these changes.

3. **Educate property owners on how to maintain naturalized riparian buffers. Highlight importance of a zoned approach to landscaping and structure development near riparian areas.**

   Rationale Although land use practices on individual residential parcels typically do not supply large pollutant loads, collectively, the relative percentage of residential parcels bordering waterways in Aspen means these land uses are capable of supplying significant total contaminant inputs. Stream-friendly land use practices in riparian areas can generate significant water quality

benefits long term. Practices include avoidance of non-native, ornamental, or maintained landscaping designs that include impervious surfaces and require regular chemical fertilization and pesticide/herbicide treatments. Instead, promotion of native vegetation communities, non-hardened/pervious surfaces, avoidance of structures, no-mow zones, and preservation of natural site topography and hydrologic characteristics will inculcate stream-friendly land uses and mentalities in riverfront property owners.

Educational outreach opportunities encourage stewardship of the riparian area in Aspen by home owners through building community support and individual action. Educational outreach could take many forms from online "how-to" guides, seminars, pop up events, demonstration landscapes, social media outreach and paper fliers and/or mail. This type of program works to enhance the health of riparian systems and the associated water quality in Aspen by working to build awareness within the community that will lead to individual action. Program components should cover a wide array of educational components including:

- Building awareness and sensitivity to the riparian areas and their associated challenges
- Growing knowledge and understanding of the riparian areas and their associated challenges
- Shifting attitudes of concern for the riparian area and enhancing motivation to improve or maintain quality
- Teaching skills to identify and help resolve challenges within the riparian area
- Providing opportunities for participation in activities that lead to the resolution of challenges

Educational outreach is time and financially intensive. Private entities can be difficult to reach and require substantial time investments. The voluntary nature of this program would necessitate that significant resources be devoted to the program in order to see an impact at scale.

Projects

Projects enjoyed support across the board. Similar to the policy and program sections, projects that address private land were seen as the most impactful.

1. **Public and Private Restoration Partnerships**

   Rationale The mosaic of property ownership and quality of riparian areas throughout the Aspen presents a dilemma to creating large swaths of healthy riparian forest. In order to create a larger and more robust riparian buffer and connect high value habitat and ecosystem services, the City should consider targeted property easements, conservation easements, and partnerships that further the goal of connectivity of the riparian area through Aspen. Working with community organizations, members of the public and land trusts, the City can work to accomplish the goal of connectivity through agreements and easements. This project potentially has the benefit of greater community support and buy in. Although partnerships are difficult to establish and maintain this ongoing program could have significant impact and benefit to the riparian area in Aspen.

PROJECT RECOMMENDATION:
NEWBERRY PARK

ANTICIPATED BENEFITS:

- Improved channel function
- More desirable aesthetics
- Greening infrastructure
- Increased vegetation diversity

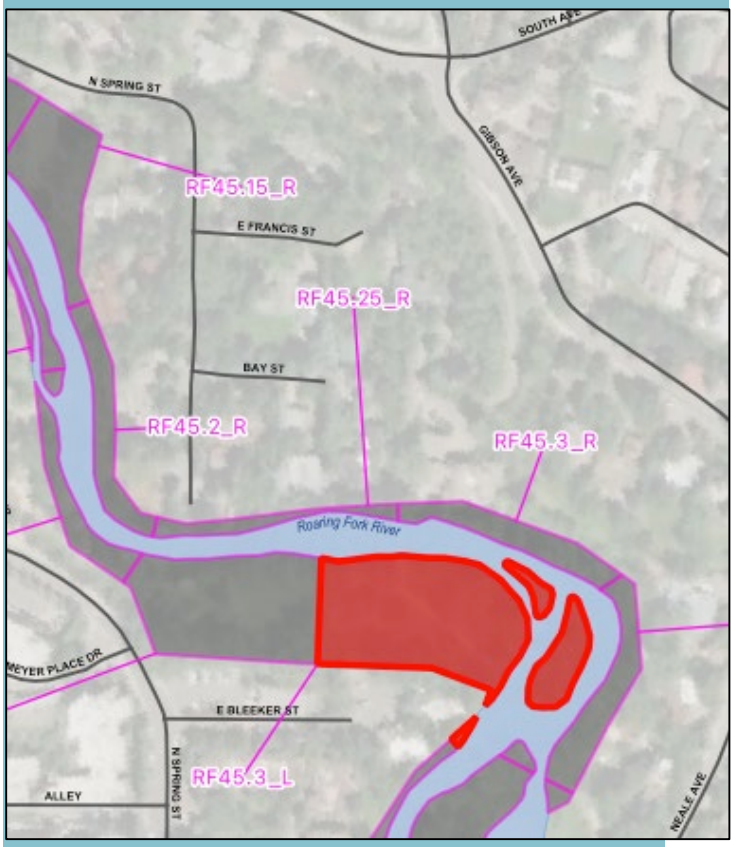
ASSESSMENT RATING:

OVERALL: C+

LANDSCAPE: D

CONDTION: C+

SIZE: A+



Objectives:
Remove old bridge pier from streambed to support natural sediment transport dynamics and promote healthy channel function.

Increase vegetation diversity though targeted vegetation management.

Tie natural hydrology into bank to extend the riparian corridor.

Rationale:

The old bridge pier is abandoned infrastructure likely alters patterns of sediment movement along the streambed in this section of the Roaring Fork River. The result may be simplification of some aquatic habitat features. The concrete in the riverbed is also highly visible and aesthetically undesirable.

Additionally, the section of vegetation between the trail and the river has become a monoculture. Targeted vegetation management would increase vegeration structural diversity and character.

PROJECT RECOMMENDATION:
JOHN DENVER PARK | KAYAK CHANNEL AND ARMORED BANK

ANTICIPATED BENEFITS:

- Temperature improvements
- Riparian and wetland function
- Habitat creation
- Recreation opportunities
- More desirable aesthetics
- Greening infrastructure

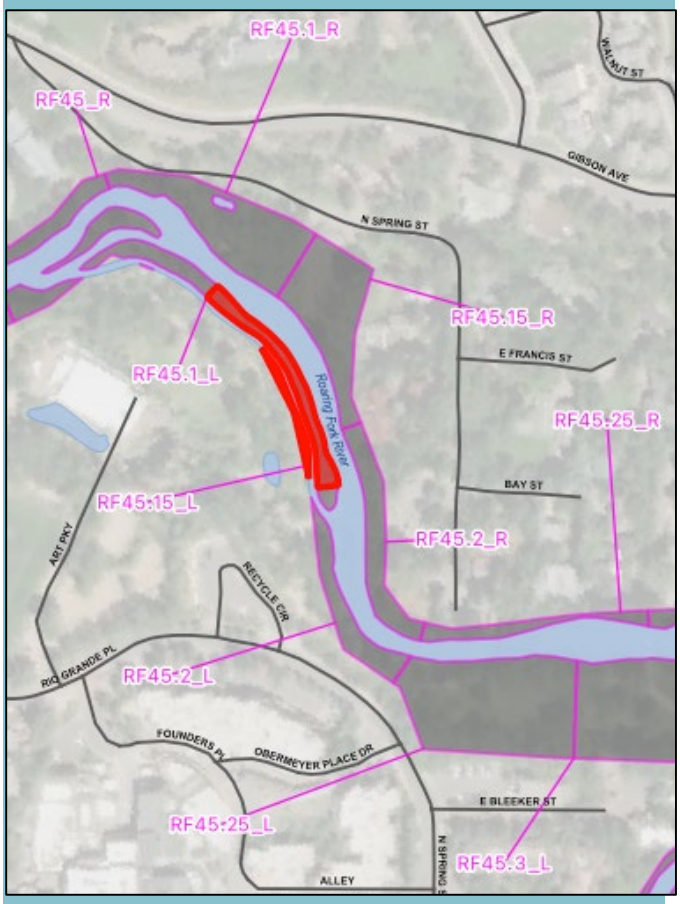
ASSESSMENT RATING:

OVERALL: C-

LANDSCAPE: D

CONDTION: C+

SIZE: C-



Objectives:
To improve natural channel processes and encourage establishment of streamside vegetation.

Rationale:

The narrow kayak channel was originally developed as a recreational ammenity and as an important improvement to utilize and maintain water rights. Numerous opportunities exist to promote establishment of streamside vegetation. This project may be confined to planting native riparian vegetation in bare areas and between boulders or may be extensive and include reducing the elevation of the mid-channel island and replanting that area with native vegetation. The latter project scope would help the full channel width activate at high flows, adding or maintaining capacity for conveyance of water and sediment and improving aquatic and riparian habitat complexity. Several site limitations exist that would need to be addressed. These include the large amounts of rip-rap placed along the banks to create recreational features and the heavy foot traffic along some portions of the riverbank. Any work conducted at the site would have significant interpretation opportunities.

Immediately upstream of the kayak channel, there are opportunities to enhance the armored bank with targeted planting strategies. This would have the benefit of adding biologic stabilization and ehancing the aestetics of the bank.

ANTICIPATED BENEFITS:

- Water temperature improvements
- Streambank soil de-compaction.
- Improved channel function
- More desirable aesthetics
- Greening infrastructure

ASSESSMENT RATING:

OVERALL: C+

LANDSCAPE: C-

CONDTION: B-

SIZE: B+

Objectives:

To improve water quality in mine drainage before it enters the Roaring Fork River

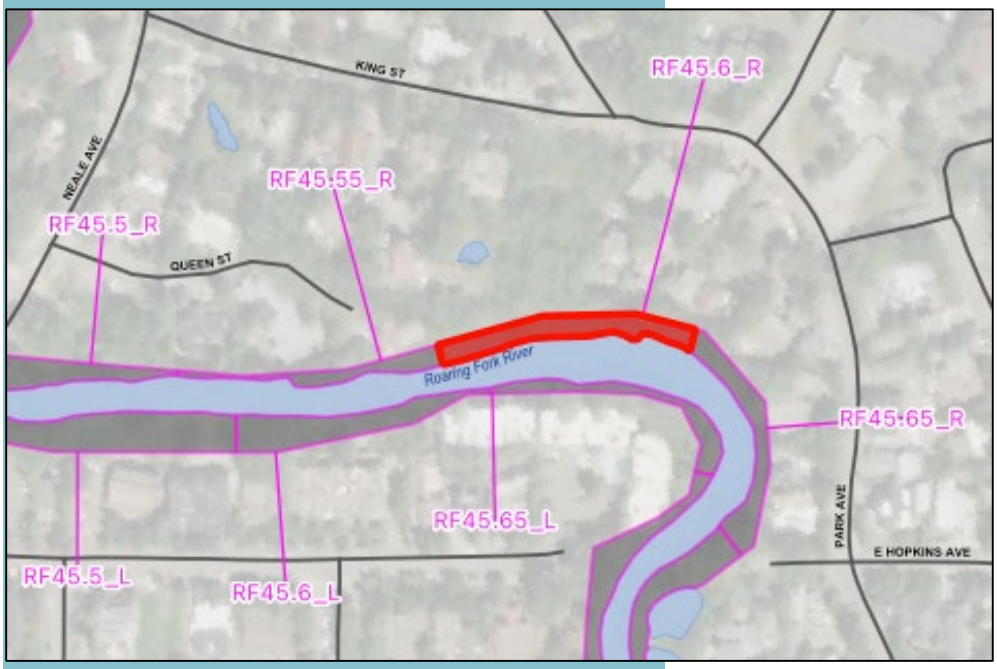
To implement riparian restoration and management strategies that conform to the principles of the "3-Zone Buffer System".

Restrict the number and use of social trails.

Install educational and interpretive facilities targeted at daily users and adjacent property owners.

Rationale:

Restoration and ongoing management according to the principals of the "3-Zone Buffer System" at this highly-visible location would also provide the City of Aspen with an opportunity to draw attention to the importance of healthy functioning riparian zones. Treating mine drainage through a series of artificially-created wetlands may help reduce water quality impacts to the Roaring Fork River.



PROJECT RECOMMENDATION:
ASPEN CLUB

ANTICIPATED BENEFITS:

- Improved channel function
- Water quality improvement
- Water temperature improvement
- Habitat connectivity
- Wetland creation
- Improved aesthetics
- Greening infrastructure
- Partnership opportunity

ASSESSMENT RATING:

OVERALL: C+

LANDSCAPE: C+

CONDTION: C+

SIZE: B+

Objectives:

To create a side channel on the left bank to increase diversity of river morphology.

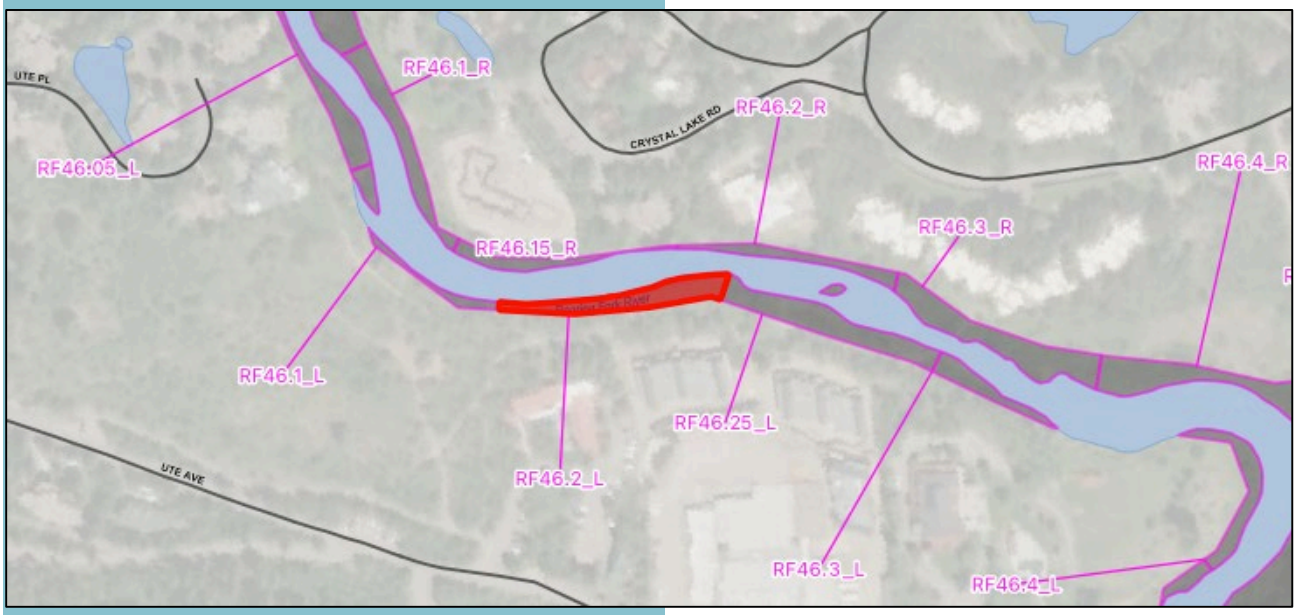
Narrow artificially large channel to reconnect floodplain and encourage overbank flow onto riparian benches.

Create a private/public partnership opportunity.

Improve wheeler ditch diversion to promote/enhance vegetation of a mid-channel bar.

Rationale:

The Roaring Fork River through the Aspen Club property zone consists of cleared riparian corridor, infrastructure (trails/bridges) and other improvements. The opportunity to increase riparian improvements in this zone would be highly beneficial and include a fairly easy implementation process. This zone is also a large stretch of publically owned riparian zone with good connectivity to privately owned riparian zones, which provides good opportunity for partnerships.



PROJECT RECOMMENDATION:
ANDERSON PARK & LAND TRUST PARCEL

ANTICIPATED BENEFITS:

- Water temperature improvements
- Streambank soil de-compaction.
- Improved channel function
- More desirable aesthetics
- Greening infrastructure

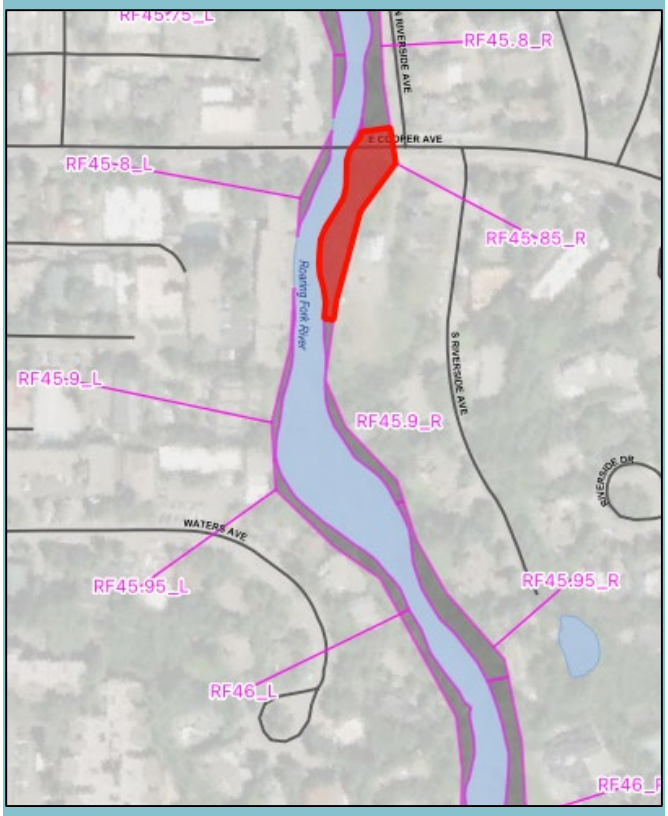
ASSESSMENT RATING:

OVERALL: C+

LANDSCAPE: D

CONDTION: C+

SIZE: A-



Objectives:

To implement a riparian enhancement strategy targeted at:

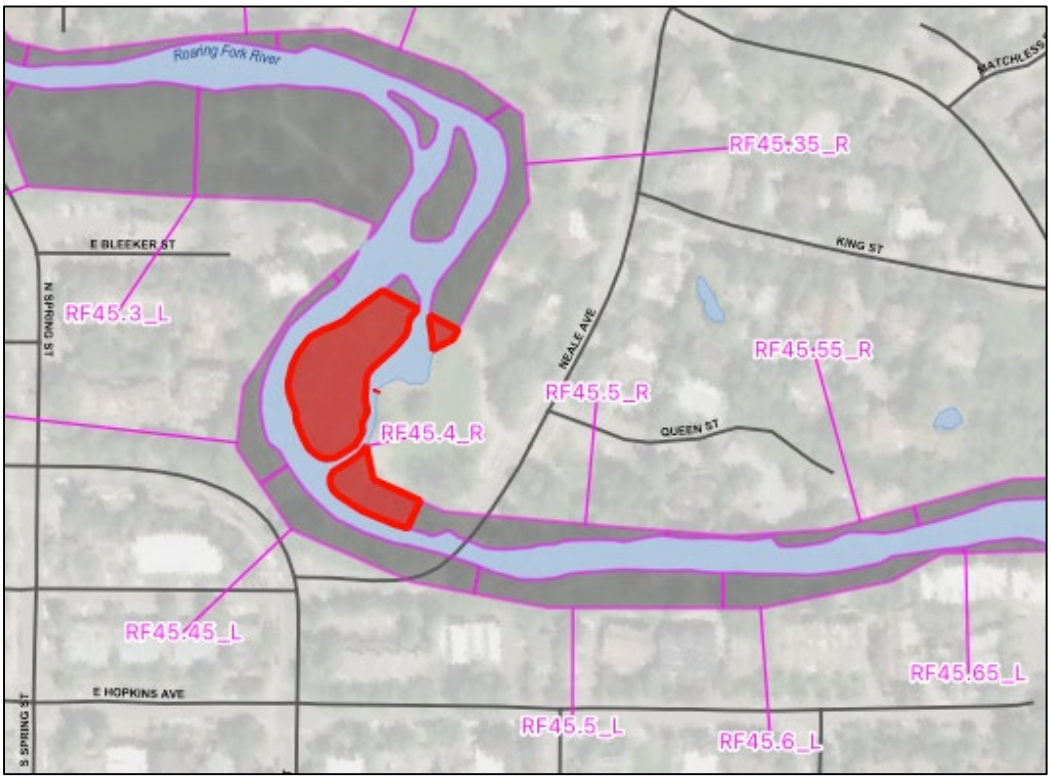
- Native woody riparian area age diversity
- Native woody riparian species diversity
- Improved habitat in narrow band

Rationale:

The riparian corridor on this City of Aspen owned property consists of a southern bank that has a very narrow gallery cottonwood over story. Although the north bank is constrained with a development at the river edge, there is significant opportunity to increase age class diversity, species diversity, and flood plain connectivity through this specific zone of Roaring Fork River corridor in a very dense, urban setting.

Directly downstream of Anderson Park, the smaller Land Trust Parcel includes much less linear length of riparian corridor. However, there is good opportunity here to employ the same strategies used at Anderson Park. There are benefits to looking at this project as a holistic approach, rather than as two separate projects. Mainly in cost of mobilization, design and implementation, but also in the ecological benefit of impacting a larger area.

PROJECT RECOMMENDATION: HERRON PARK



Objectives:

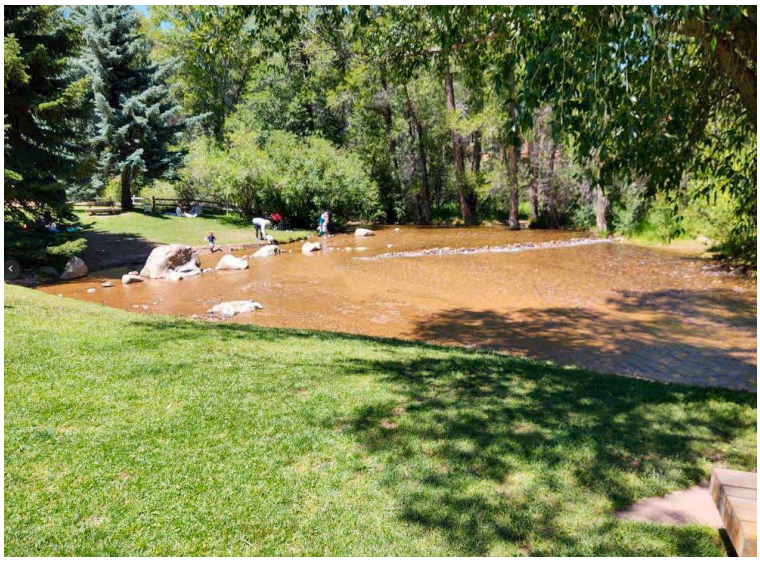
To implement riparian restoration and management strategies that conform to the principles of the "3-Zone Buffer System".

Restrict the number and use of social trails.

Install educational and interpretive facilities targeted at daily users and adjacent property owners.

Rationale:

Restoration and ongoing management according to the principals of the "3-Zone Buffer System" at this highly-visible location would also provide the City of Aspen with an opportunity to draw attention to the importance of healthy functioning riparian zones.



ANTICIPATED BENEFITS:

- Water temperature improvements
- Streambank soil de-compaction.
- Improved channel function
- More desirable aesthetics
- Greening infrastructure

ASSESSMENT RATING:

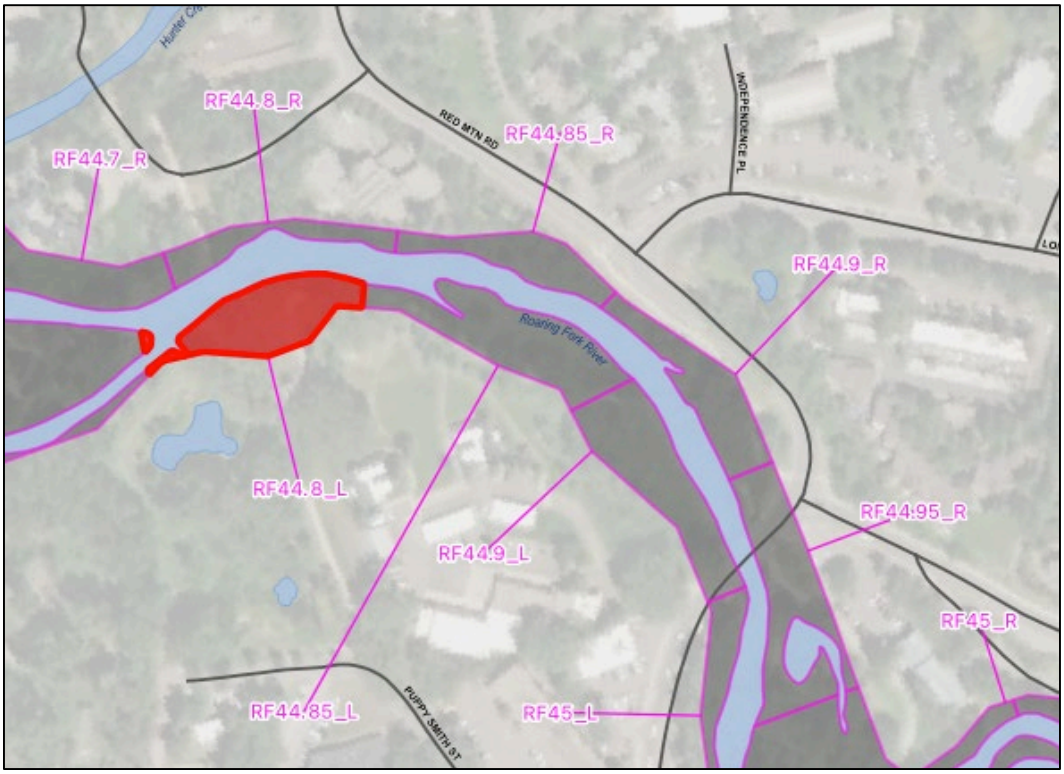
OVERALL: B-

LANDSCAPE: C-

CONDTION: B-

SIZE: A+

PROJECT RECOMMENDATION: JENNY ADAIR - STORMWATER CONTROL FACILITY



Objectives:

To further improve the water quality of storm water exiting the Jenny Adair storm water control facility.

Adaptively manage the evolving system to continue the high quality of water treatment.

Examine the flow routing and ponded water depths within the facility.

Riparian vegetation restoration through planting various wetland shrubs, forbs, and sedges.

To improve hydrological connectivity with the Roaring Fork River through structural modification of site topography.

Rationale:

Built in 2007, Aspen's Jenny Adair Regional Stormwater Quality Project is an excellent example of green infrastricure. The artificial wetlands area reduces pollutants entering the Roaring Fork River by channeling stormwater runoff through a series of filters. The goal for stormwater treatment areas is for them to have the highest level of water quality function possible. The value of these naturalized systems is that the provide high quality filtering of water in concentrated areas, which means that the rest of the riparain area is less impacted by urban runnoff.

Opportunities exist to adaptively manage these features. As this important storm water treatment system has evolved over time, there are important opportunities to improve riparian health as the system has matured. Vegetation treatments, age class diversity improvements, and physical water course and pond edge manipulations could be considered to allow for continuing riparian health and improvements. The existing pond could be modified to function as a wetland feature, further facilitating pollutant reduction and stormwater filtering.

ANTICIPATED BENEFITS:

- Water quality improvement
- Water temperature improvement
- Wildlife habitat connectivity
- Fragmentation reduction
- Wetland creation
- Infrastructure improvement and greening.
- More desirable aesthetics

ASSESSMENT RATING

OVERALL: B-

LANDSCAPE: C+

CONDTION: B+

SIZE: C+

ANTICIPATED BENEFITS:

- Water quality improvements
- Biological diversity
- Habitat value
- Adaptively managing infrastructure
- Education and outreach

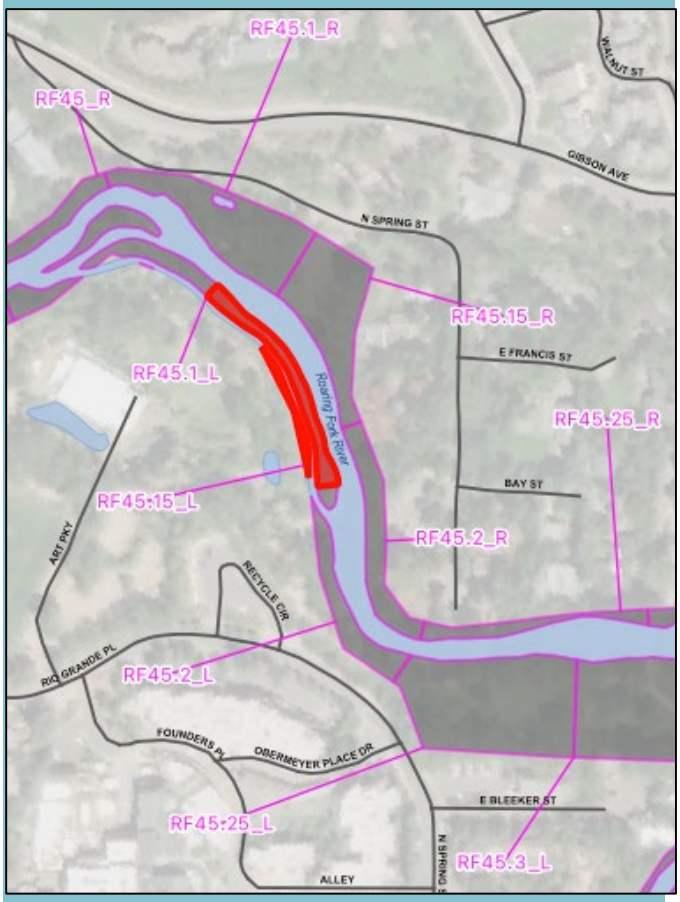
ASSESSMENT RATING:

OVERALL: C-

LANDSCAPE: D

CONDTION: C+

SIZE: C-



Objectives:

To maintain and enhance vegetation community diversity in the John Denver Park Storm Water Facility.

To mitigate water eutrophication through adaptive management practices.

Rationale:

Opportunities exist to encourage the functionaility and aesterics of the park through non-desirable invasive wetland species management. Species like Cattails (Typha sp). will likely take over as the dominant species in large sections of the John Denver Park Storm Water Facility unless they are actively managed. The city could choose to remove some cattails and replant desirable wetland vegetation. Regularly cutting of cattails could be conducted until Replaced with native vegetation establish.

Storm water in the lower conveyance appears eutrophic and receives the smallest amount of treatment of any of the water flowing into the John Denver constructed wetland complex before it empties into the Roaring Fork River. Vegetating the channel bed (variously) would promote pollutant uptake/storage and some downstream water quality improvement. Vegetation could be cut and hauled off routinely to remove nutrients from the system.

The artificial wetlands area reduces pollutants entering the Roaring Fork River by channeling stormwater runoff through a series of filters. The goal for stormwater treatment areas is for them to have the highest level of water quality function possible. The value of these naturalized systems is that the provide high quality filtering of water in concentrated areas, which means that the rest of the riparain area is less impacted by urban runnoff. Adaptive management stratetegies are suggested to maintain the high quality and effectiveness of these systems.

PROJECT RECOMMENDATION:
MILL PARCEL

ANTICIPATED BENEFITS:

- Improve natural channel function
- Restore floodplain bench
- Improve fish and macroinvertebrate habitat
- Improve stream shading
- Education and outreach

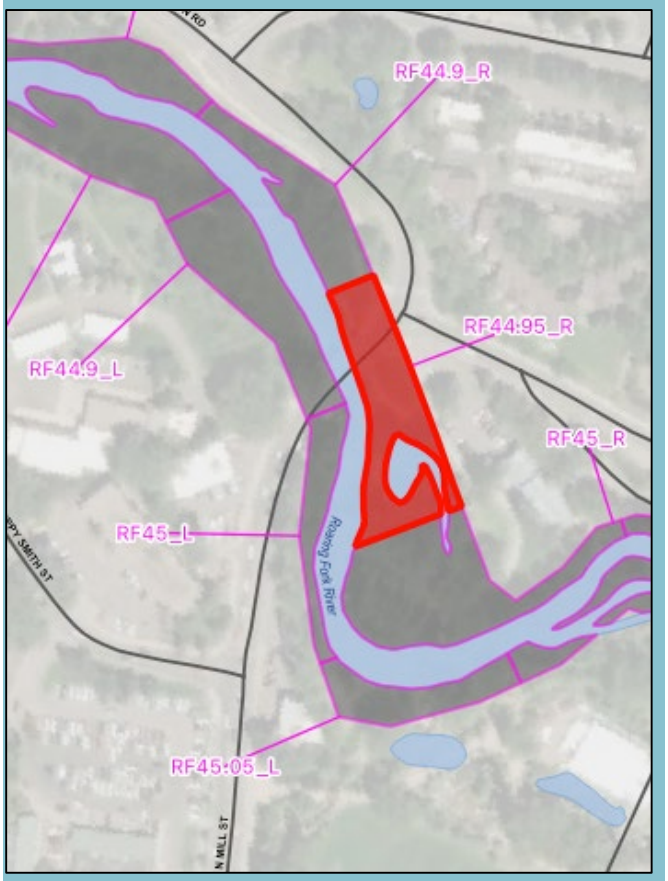
ASSESSMENT RATING

OVERALL: C+

LANDSCAPE: C-

CONDTION: B-

SIZE: C+



Objectives:
To restore the native vegetation community along the floodplain bench on the northwest side of Mill Street.

To control invasive species along the streambanks on the southern side of the road crossing.

Enhance the habitat and water quality of the pond near the ACRA.

Modify site topography and plant various native wetland species to improve the habitat characteristics of the pond's vegetated fringe.

Enhance the internal forest's diversity in age class and structure.

Maintain the parcel's water rights and fisheries use.

Rationale:

This park features art, the powerhouse building, restroom facilities, trail access, and river access. The riparian forest in this area is heavily impacted by foot traffic which has compacted the soil and led to a loss of vegetative diversity. Additionally, the river channel here has been altered by development and could be restored to improve functionality both for hydrologic flows and fish habitat. Lastly, the lack of riparian trees along the southern bank contribute to increased stream temperature. Restoration of woody vegetation would aid shading, and contribute organic detritus to this stretch. Restoration at this highly-visible location would also provide the City of Aspen with an interpretive opportunity on the importance of healthy functioning riparian zones.

7. CONCLUSIONS

Addressing the health of the riparian area in Aspen requires a creative and multi-prong approach. The City should carefully weigh actions that address short-term, localized, acute issues such as storm water discharge points and wider city-wide goals that look towards the future and guide the continued development of Aspen. The identity, aesthetic character and function health of Aspen are tied to the river corridor. The benefits provided by healthy riparian areas numerous and contribute to a thriving community and ecosystem. Development of commercial and residential real estate in close proximity to the Roaring Fork River and protecting the critically important riparian ecosystem do not have to be contradictory goals. Effective management of riparian areas within Aspen will balance the cultural demands on the riparian resources while protecting of vital ecosystem functions.

It is imperative that the City work to protect high quality functioning riparian areas in Aspen. This action is paramount in reaching the goals outlined in this plan. Protection is the number one tool in the kit of parts presented in these pages; it has greater cost and ecological effectiveness than restoration. Additionally, partnering with private parties, and incentivizing and regulating private development in the riparian area is critical to move the needle on the health of the riparian system. The size, scale, connectivity and relationship of the riparian area is a major driver in the overall condition of the ecosystem. Finally, projects and programs on City owned land remain an important and valuable contribution to the ecosystem health, function and water quality in Aspen. The innovative storm water treatment systems implemented by the City are examples of excellence in bioengineering and commitment to holistic ecosystem health. Utilizing the same goals, principles, political capitol and planning that made those projects a reality can be used to improve the functional quality of publically owned land in Aspen through adaptive management and restoration activities.

References

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Regional Water Efficiency Plan Roaring Fork Watershed, Colorado Prepared for Ruedi Water & Power Authority. Prepared by: Element Water Consulting and Water DM Demand Management

S.K. Mason Environmental, LLC and Timberline Aquatics, Inc. 2012 Upper Roaring Fork River Aquatic Life Use Assessment 2013 Sponsor: Roaring Fork Watershed Plan Lead Consultant: Roaring Fork Conservancy

2012 208 Regional Water Quality Management Plan and 2012 Roaring Fork Watershed Management Plan. Sponsor: Northwest Colorado Council of Governments

City of Aspen Urban Runoff Management Plan Updates 11/2014

City of Aspen Land Use Code Part 400

Urban Runoff Management Plan A Guide to Stormwater Management in the City of Aspen Revised. 2014.

Storm Drainage Master Plan for The City Of Aspen, Colorado Prepared for The City Of Aspen, Colorado Prepared By: WRC Engineering, Inc.2001.

Malone, Delia, and John Emerick. Catalog Of Stream and Riparian Habitat Quality for the Roaring Fork River and Tributaries, Central Colorado Prepared by the Roaring Fork Stream Health Initiative. 2007.

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Neubaum, Daniel. Ecological Research Assessment for the Roaring Fork Watershed, Colorado. 2007.

Gardner-Smith, Brent. “Upper Roaring Fork River Management Plan.” Documentcloud.Org, 2018, www.documentcloud.org/documents/4568271-Upper-Roaring-Fork-River-Management-Plan.html. Accessed 27 Aug. 2019.

Appendix A: City of Aspen Riparian Area Rules and Regulations

City of Aspen Land Use Code: Title 8, Building and Building Regulations, Chapter 8.20 International Building Code, Section 1612.3. Establishment of Flood Hazard Areas

To establish flood hazard areas , the applicable governing authority shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency in an engineering report entitled "The Flood Insurance Study for City of Aspen," dated June 4, 1987, as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.

City of Aspen Land Use Code: Title 26, Chapter 26.435 Development in Environmentally Sensitive Areas (ESA). §26.435.040. Stream Margin Review

A. Applicability. The provisions of the stream margin review shall apply to all development within one hundred (100) feet, measured horizontally, from the high water line of the Roaring Fork River and its tributary streams and to all development within the Flood Hazard Area, also known as the 100-year flood plain.

B. Exemptions. The Community Development Director may exempt the following types of development within the stream margin review area:

1. Construction of pedestrian or automobile bridges, public trails or structures for irrigation, drainage, flood control or water diversion, bank stabilization, provided plans and specifications are submitted to the City engineer demonstrating that the structure is engineered to prevent blockage of drainage channels during peak flows and the Community Development Director determines the proposed structure complies, to the extent practical, with the stream margin review standards.

2. Construction of improvements essential for public health and safety which cannot be reasonably accommodated outside of the "no development area" prescribed by this Section including, but not limited to, potable water systems, sanitary sewer, utilities and fire suppression systems provided the Community Development Director determines the development complies, to the extent practical, with the stream margin review standards.

3. The expansion, remodeling or reconstruction of an existing development provided the following standards are met:

a) The development does not add more than ten percent (10%) to the floor area of the existing structure or increase the amount of building area exempt from floor area calculations by more than twenty-five percent (25%). All stream margin exemptions are cumulative. Once a development reaches these totals, a stream margin review by the Planning and Zoning Commission is required; and

b) The development does not require the removal of any tree for which a permit would be required pursuant to Chapter 13.20 of this Code.

c) The development is located such that no portion of the expansion, remodeling or reconstruction will be any closer to the high water line than is the existing development;

d) The development does not fall outside of an approved building envelope if one has been

designated through a prior review; and

e) The expansion, remodeling or reconstruction will cause no increase to the amount of ground coverage of structures within the 100-year flood plan.

C. Stream margin review standards. No development shall be permitted within the stream margin of the Roaring Fork River unless the Community Development Director makes a determination that the proposed development complies with all requirements set forth below:

1. It can be demonstrated that any proposed development which is in the Special Flood Hazard Area will not increase the base flood elevation on the parcel proposed for development. This shall be demonstrated by an engineering study prepared by a professional engineer registered to practice in the State which shows that the base flood elevation will not be raised, including, but not limited to, proposing mitigation techniques on or off-site which compensate for any base flood elevation increase caused by the development; and

2. The adopted regulatory plans of the Open Space and Trails Board and the Roaring Fork River Greenway Plan are implemented in the proposed plan for development, to the greatest extent practicable. Areas of historic public use or access shall be dedicated via a recorded easement for public use. A fisherman's easement granting public fishing access within the high water boundaries of the river course shall be granted via a recorded "Fisherman's Easement;" and

3. There is no vegetation removed or damaged or slope grade changes (cut or fill) made outside of a specifically defined building envelope. A building envelope shall be designated by this review and said envelope shall be designated by this review and said envelope shall be recorded on a plat pursuant to Subsection 26.435.040.F.1; and

4. The proposed development does not pollute or interfere with the natural changes of the river, stream or other tributary, including erosion and/or sedimentation during construction. Increased on-site drainage shall be accommodated within the parcel to prevent entry into the river or onto its banks. Pools or hot tubs cannot be drained outside of the designated building envelope; and

5. Written notice is given to the Colorado Water Conservation Board prior to any alteration or relocation of a water course and a copy of said notice is submitted to the Federal Emergency Management Agency; and

6. A guarantee is provided in the event a water course is altered or relocated, that applies to the developer and his heirs, successors and assigns that ensures that the flood carrying capacity on the parcel is not diminished; and

7. Copies are provided of all necessary federal and state permits relating to work within the 100- year flood plain; and

8. There is no development other than approved native vegetation planting taking place below the top of slope or within fifteen (15) feet of the top of slope or the high waterline, whichever is most restrictive. This is an effort to protect the existing riparian vegetation and bank stability. New plantings (including trees, shrubs, flowers and grasses) outside of the designated building envelope on the river side shall be native riparian vegetation as approved by the City. A landscape plan will be submitted with all development applications. The top of slope and 100- year flood plain elevation of the Roaring Fork River shall be determined by the Stream Margin Map located in the Community Development Department and filed at the City Engineering Department; and

9. All development outside the fifteen (15) foot setback from the top of slope does not exceed a height

delineated by a line drawn at a forty-five (45) degree angle from ground level at the top of slope. Height shall be measured and determined by the Community Development Director using the definition for height set forth at Section 26.04.100 and method of calculating height set forth at Section 26.575.020 as shown in Figure "A"; and City of Aspen Land Use Code

10. All exterior lighting is low and downcast with no light(s) directed toward the river or located down the slope and shall be in compliance with Section 26.575.150. A lighting plan will be submitted with all development applications; and

11. There has been accurate identification of wetlands and riparian zones.

D. Appeal of Director's determination. An appeal of a determination in regards to a stream margin application or in regards to the top of slope determination made by the Community Development Director, shall be reviewed as a special review pursuant to Section E, below. In this case, the Community Development Director's finding shall be forwarded as a recommendation and a new application need not be filed.

E. Special review. An application requesting a variance from the stream margin review standards or an appeal of the Stream Margin Map's top of slope determination, shall be processed as a special review in accordance with common development review procedure set forth in Chapter 26.304. The special review shall be considered at a public hearing for which notice has been published, posted and mailed, pursuant to Subsection 26.304.060.E.3 Paragraphs a, b and c. Review is by the Planning and Zoning Commission. A special review from the stream margin review determination may be approved, approved with conditions or denied based on conformance with the following review criteria:

1. An authorized survey from a Colorado professionally licensed surveyor shows a different determination in regards to the top of slope and 100-year flood plain than the Stream Margin Map located in the Community Development Department and filed in the City Engineering Department; and

2. The proposed development meets the stream margin review standard(s) upon which the Community Development Director had based the finding of denial.

F. Building permit submittal requirements. Prior to receiving a building permit for a property within the stream margin review area, the following must be submitted:

1. The applicant shall record a site improvement plat with topography prepared by a Colorado licensed professional surveyor showing the building envelope determined by the Community Development Director based on the Stream Margin Review Map located in the Community Development Department.

2. Site sections drawn by a registered architect, landscape architect or engineer shall be submitted showing all existing and proposed site elements, the top of slope and pertinent elevations above sea level.

3. The building envelope shall be barricaded prior to issuance of any demolition, excavation or building permits. The barricades shall remain in place until the issuance of certificates of occupancy.

(Ord. No. 45-2001, § 3; Ord. No. 52-2003, § 13; Ord. No. 3-2012, §9)

Editor's note—Ord. No. 45-2001, § 2, repealed former § 26.435.040, pertaining to Stream Margin Review and Ord. No. 45-2001, § 3, enacted a new § 26.435.040 as herein set out. Former § 26.435.040 was derived from Ord. No. 47-1999, § 3; Ord. No. 52-2003, § 13.

Principal	Objective	Additional EPA Guidance	Municipal Code Section	Code Provision
Protect areas that provide important water quality benefits or are particularly susceptible to erosion and sediment loss.	Incorporate appropriate pollution prevention practices into site development and use.	Ensure that sediment is not tracked onto public streets or washed into storm drains.		*Not reviewed*
		Immediately cover and stabilize exposed soils and soil stockpiles.		*Not reviewed*
		Stabilize and cover soil stockpiles at the end of each workday.		*Not reviewed*
		Stabilize the entire site using a heavy mulch layer (or another method that does not require germination to control erosion) at the close of the construction season.		*Not reviewed*
		Ensure that potential pollutant sources are located away from steep slopes, water bodies, and sensitive areas.	URMP 6.5.1 Storage of Materias	*It is prohibited to store hazardous or floatable/movable materials in the floodplain. These materials have the potential to create public health, environmental or safety risks. For example, materials stored in the floodplain may become dislodged and roll and/or float downstream to cause culvert or bridge blockages and resulting overtopping of roadways which can create hazards for vehicles and pedestrians. Materials stored in the floodplain may also cause diversion of flood waters out of the floodplain where damage is possible or may cause undesirable erosion or sedimentation in the floodplain. Storage of some materials in the floodplain and floodway may be permitted based on approval by the Floodplain Administrator.*
		Do not allow cement and concrete to be mixed onsite. Insist that it be stored away from water bodies and storm drains and discharged only into the sanitary sewer.		*Not reviewed*
		Require perimeter and wind erosion controls to be installed to retain sediment on site.		*Not reviewed*
	Establish site plan review and conditional approval processes to ensure the preservation of environmentally sensitive areas and areas necessary for maintaining natural hydrology.	Examine all aspects of an individual site, including soil types, slopes, and location of environmentally sensitive features suchs as wetlands, forests, and meadows should be to indentify areas that should be preserved or restored.	Title 26: 26.435 Development in Environmentally Sensitive Area, 25.435.040 Stream Margin Review	*The Stream Margin Review Process process seeks to prevent property loss by flood while ensuring natural and unimpeded flow of watercourse. Priority is placed on low impact uses such as recreation paths, but does not categorically prohibit higher impact uses, dependent on successful review.*
		Establish restrictions that leave wetlands, significant wildlife habitats, and woodlands undeveloped.	Title 26: 26.435 Development in Environmentally Sensitive Areas	*The Stream Margin Review Process process seeks to prevent property loss by flood while ensuring natural and unimpeded flow of watercourse. Priority is placed on low impact uses such as recreation paths, but does not categorically prohibit higher impact uses, dependent on successful review.*
		Leave well-drained soils undeveloped so that they can be used to treat wastewater.	*No applicable language found*	
		Prohibit development within the 100-year flood plain and establish an additional 50 – 100 foot setback.	URMP 6.3.1, Title 26: 26.435 Development in Environmentally Sensitive Areas	*Developments in 100 yr plain require a Floodplain Development permit (sets criteria, but is not an unconditional prohibition on development). Developments in this zone are also likely to require a Stream Margin Review process. The SMR prrocess seeks to prevent property loss by flood while ensuring natural and unimpeded flow of watercourse. Priority is placed on low impact uses such as recreation paths, but does not categorically prohibit higher impact uses, dependent on successful review.*
		Buffer unconfined aquifers with vegetation and conserve them as open space.	*No applicable language found*	
		No person should be granted a site development permit for land-disturbing activity that would require the uncovering of 10,000 or more square feet without the approval of an Erosion and Sediment Control Plan.	*No applicable langauge found*	
		Confirm that the Erosion and Sediment Control Plan (ESC) uses topographic and vicinity maps	*URMP*	The Urban Runoff Management Plan addresses many of these concerns, although exact specifics were not anlayzed for 1:1 attainment of these recommendations. Among other requirements, the URMP specifies developers to create and obtain approval from the city of the following: Landscape and Grading Permits, Building Permit, Grading and Drainage Plan/Report; Construction Management Plan, Excavation Stabilization Plan, floodplain requirements, and mudflow analysis.
		Confirm that the ESC includes a site development plan and construction schedule, including stripping and clearing, rough grading; construction of utilities, infrastructure, and buidlings; and final grading and landscaping. Sequencing should identify the expected date when clearing will begin, the estimated duration of exposure of cleared areas, areas of clearing, intallation of temporary erosion and sediment control measures, and the establishment of permanent vegetation.	*URMP*	The Urban Runoff Management Plan addresses many of these concerns, although exact specifics were not anlayzed for 1:1 attainment of these recommendations. Among other requirements, the URMP specifies developers to create and obtain approval from the city of the following: Landscape and Grading Permits, Building Permit, Grading and Drainage Plan/Report; Construction Management Plan, Excavation Stabilization Plan, floodplain requirements, and mudflow analysis.
		Confirm that the ESC contains drawings illustrating the control plan.	*URMP*	The Urban Runoff Management Plan addresses many of these concerns, although exact specifics were not anlayzed for 1:1 attainment of these recommendations. Among other requirements, the URMP specifies developers to create and obtain approval from the city of the following: Landscape and Grading Permits, Building Permit, Grading and Drainage Plan/Report; Construction Management Plan, Excavation Stabilization Plan, floodplain requirements, and mudflow analysis.
		Confirm that the ESC provides design calculations for control structures.	*URMP*	The Urban Runoff Management Plan addresses many of these concerns, although exact specifics were not anlayzed for 1:1 attainment of these recommendations. Among other requirements, the URMP specifies developers to create and obtain approval from the city of the following: Landscape and Grading Permits, Building Permit, Grading and Drainage Plan/Report; Construction Management Plan, Excavation Stabilization Plan, floodplain requirements, and mudflow analysis.
		Confirm that the ESC contains a vegetation plan detailing seeding mixtures and rates, types of sod, method of seedbed preparation, expected seeding dates, type and rate of lime and fertilizer application, and kind/quality of mulching for both temporary and permanent vegetative control measures.	*No applicable langauge found*	
		Confirm that the ESC includes a natural resources map identifying soils, forest cover, and protected resources.	*No applicable langauge found*	
		Require the scale of the map submitted with the ESC to be equal to, or greater than, 1" = 100 feet	*No applicable langauge found*	

Principal	Objective	Additional EPA Guidance	Municipal Code Section	Code Provision
	Develop and implement inspection and maintenance procedures to ensure that landscapes are maintained to avoid water quality impacts.	Require ESC applicants to file a faithful performance bond, letter of credit, or other improvement security to cover all costs of improvements, landscaping, maintenance of improvements, and engineering and inspection costs to cover the cost of failure or repair of improvements installed on the site. (Amount and time frame to be determined by agency).		*Not reviewed*
		See that the ESC plan includes provisions for maintenance of control facilities, including easements and estimates of the cost of maintenance.		*Not reviewed*
		Require a certified contractor to be on site on all days when construction or grading activity takes place.		*Not reviewed*
		Conduct a post-construction review to ensure compliance with original ESC and Stormwater management plans		*Not reviewed*

Town regulations do not generally reflect or include EPA or NWCCOG guidance	Town regulations partially include or reflect or include EPA or NWCCOG guidance	Town regulations reflect or include EPA or NWCCOG guidance

Principal	Objective	Additional EPA Guidance	Municipal Code Section	Code Provision
Preserve natural systems including in-stream habitat, riparian areas, and wetlands	Manage vegetated buffers, including wetlands and floodplains, in a manner that enhances and maximizes the value of the resource(s).	Design vegetated buffers that consist of a forested strip of land extending along both sides of a stream and its adjacent wetlands, floodplains, or slopes.	*Title 26: 26.435 Development in Environmentally Sensitive Area, 25.435.040 Stream Margin Review*	*Stream Margin Review required for all development within 100 feet of the high water line of Roaring Fork River and tributaries, and to all development with the Special Flood Hazard Area. SMR includes a variety of criteria. Relevant items include the specification that "3. There is no vegetation removed or damaged or slope grade changes (cut or fill) made outside of a specifically defined building envelope." "8. There is no development other than approved native vegetation planting taking place below the top of slope or within fifteen (15) feet of the top of slope or the high waterline, whichever is most restrictive. This is an effort to protect the existing riparian vegetation and bank stability. New plantings (including trees, shrubs, flowers and grasses) outside of the designated building envelope on the river side shall be native riparian vegetation as approved by the City. A landscape plan will be submitted with all development applications."*
	Adjust the width of the vegetated buffer to include contiguous sensitive areas, such as steep slopes or erodible soils, where development or disturbance may adversely affect water quality, streams, wetlands, or other waterbodies.	Begin the forest buffer at the edge of the stream bank of the active channel.	*Title 26: 26.435 Development in Environmentally Sensitive Area, 25.435.040 Stream Margin Review*	*Stream Margin Review required for all development within 100 feet of the high water line of Roaring Fork River and tributaries, and to all development with the Special Flood Hazard Area. SMR includes a variety of criteria. Relevant items include the specification that "3. There is no vegetation removed or damaged or slope grade changes (cut or fill) made outside of a specifically defined building envelope." "8. There is no development other than approved native vegetation planting taking place below the top of slope or within fifteen (15) feet of the top of slope or the high waterline, whichever is most restrictive. This is an effort to protect the existing riparian vegetation and bank stability. New plantings (including trees, shrubs, flowers and grasses) outside of the designated building envelope on the river side shall be native riparian vegetation as approved by the City. A landscape plan will be submitted with all development applications."*
		Require that vegetated buffers have a base width of at least 100 feet.	*No applicable langauge found*	
		Require that vegetated buffers encompass the entire 100-year floodplain and a zone with a minimum width of 25 feet beyond the edge of the floodplain.	*Title 26: 26.435 Development in Environmentally Sensitive Area, 25.435.040 Stream Margin Review*	*Development in the 100 year floodplain requires a Floodplain Development Permit. Stream Margin Review required for all development within 100 feet of the high water line of Roaring Fork River and tributaries, and to all development with the Special Flood Hazard Area. SMR includes a variety of criteria. Relevant items include the specification that "3. There is no vegetation removed or damaged or slope grade changes (cut or fill) made outside of a specifically defined building envelope." "8. There is no development other than approved native vegetation planting taking place below the top of slope or within fifteen (15) feet of the top of slope or the high waterline, whichever is most restrictive. This is an effort to protect the existing riparian vegetation and bank stability. New plantings (including trees, shrubs, flowers and grasses) outside of the designated building envelope on the river side shall be native riparian vegetation as approved by the City. A landscape plan will be submitted with all development applications."*
	Expand buffer widths to incorporate variations in stream order, percent slope, the 100-year floodplain, and wetlands or critical areas.	In third-order and higher streams, add 25 feet to the required base width of the vegetated buffer.	*No applicable langauge found*	
		Adjust the vegetated buffer width if steep slopes are within close proximity to the stream and/or drain into the stream system.	*Title 26: 26.435 Development in Environmentally Sensitive Area, 25.435.040 Stream Margin Review*	*8. There is no development other than approved native vegetation planting taking place below the top of slope or within fifteen (15) feet of the top of slope or the high waterline, whichever is most restrictive. This is an effort to protect the existing riparian vegetation and bank stability. New plantings (including trees, shrubs, flowers and grasses) outside of the designated building envelope on the river side shall be native riparian vegetation as approved by the City. A landscape plan will be submitted with all development applications.*
		When wetland or critical areas extend beyond the edge of the required buffer width, adjust the buffer to include the extent of the wetlands plus a 25-foot zone extending beyond the wetland edge.	*No applicable langauge found*	
	Develop setback and buffer ordinances that restrict vegetation and soil disturbance, and reduce the potential for contamination.	Limit development within 25 feet of the watercourse to footpaths, utility right of ways, flood control structures, and roadway crossings.	URMP 6.4.2. Permitted Uses	*Permitted uses in the floodplain are considered carefully by the Floodplain Administrator so they do not create barriers to flood waters such as fences, walls, berms or other obstructions may create. Based on careful review, possible allowable uses may include; golf courses, bike paths, parks, open spaces, nature areas, greenspace, public stormwater management facilities, and other similar uses. If these uses include cut and fill they will be addressed from the standpoint of their impact on the floodplain.*
		Restrict development within 75 feet of the watercourse to biking and hiking paths, stormwater management facilities, roadway crossings, and recreational uses.	URMP 6.4.2. Permitted Uses	*Permitted uses in the floodplain are considered carefully by the Floodplain Administrator so they do not create barriers to flood waters such as fences, walls, berms or other obstructions may create. Based on careful review, possible allowable uses may include; golf courses, bike paths, parks, open spaces, nature areas, greenspace, public stormwater management facilities, and other similar uses. If these uses include cut and fill they will be addressed from the standpoint of their impact on the floodplain.*
		Prohibit installation of septic systems, permanent structures and impervious covers within 100 feet of the watercourse.	URMP 6.4.3. Uses Not Permitted	*Parking lots and sport courts with fences or netting are not permitted uses in Special Flood Hazard Areas*
		Bury utility crossings at least 3 feet below channels invert elevation.	*No applicable language found*	
		Use ponds located within a buffer for runoff control only.	*No applicable language found*	
		Store hazardous substances at least 150 feet from any stream or waterbody.	URMP 6.5.1 Storage of Materias	*It is prohibited to store hazardous or floatable/movable materials in the floodplain. These materials have the potential to create public health, environmental or safety risks. For example, materials stored in the floodplain may become dislodged and roll and/or float downstream to cause culvert or bridge blockages and resulting overtopping of roadways which can create hazards for vehicles and pedestrians. Materials stored in the floodplain may also cause diversion of flood waters out of the floodplain where damage is possible or may cause undesirable erosion or sedimentation in the floodplain. Storage of some materials in the floodplain and floodway may be permitted based on approval by the Floodplain Administrator.*
		Locate any aboveground or underground petroleum storage facilities at least 150 feet from any stream or water body.	URMP 6.5.1 Storage of Materias	*It is prohibited to store hazardous or floatable/movable materials in the floodplain. These materials have the potential to create public health, environmental or safety risks. For example, materials stored in the floodplain may become dislodged and roll and/or float downstream to cause culvert or bridge blockages and resulting overtopping of roadways which can create hazards for vehicles and pedestrians. Materials stored in the floodplain may also cause diversion of flood waters out of the floodplain where damage is possible or may cause undesirable erosion or sedimentation in the floodplain. Storage of some materials in the floodplain and floodway may be permitted based on approval by the Floodplain Administrator.*

Principal	Objective	Additional EPA Guidance	Municipal Code Section	Code Provision
		Limit tree clearing within 75 feet of stream or water body.	Title 13. Health and Quality of Environment. 13.20. Tree Removal Permits. 13.20.020 Removal of trees; permit required; valuation.	*Removal of woody shrub vegetation (Gambel oak Red maple, Serviceberry, Chokecherry) 3" or more or conifer 4" or more, deciduous trees 6" or more require approval. Manager of Parks and Recreation may deny removal permits if retention of trees necessary to 'minimize flood or landslide hazards' or 'prevent excess water runoff or otherwise protect the watershed.*
		Clearly mark buffer boundaries on local planning maps.	*No applicable language found*	

Town regulations do not generally reflect or include EPA or NWCCOG guidance	Town regulations partially include or reflect or include EPA or NWCCOG guidance	Town regulations reflect or include EPA or NWCCOG guidance

Principal	Objective	Additional EPA Guidance	Municipal Code Section	Code Provision
Preserve natural drainage features and vegetation to the extent possible.	Protect and retain existing vegetation to decrease concentrated flows, maintain site hydrology, and soil erosion.	Protect natural vegetation with fencing, tree armoring and retaining walls, or tree wells.	*Title 26: 26.435 Development in Environmentally Sensitive Area, 25.435.040 Stream Margin Review, C3*	*Stream Margin Review required for all development within 100 feet of the high water line of Roaring Fork River and tributaries, and to all development with the Special Flood Hazard Area. SMR includes a variety of criteria. Relevant items include the specification that "3.There is no vegetation removed or damaged or slope grade changes (cut or fill) made outside of a specifically defined building envelope."*
	Use natural hydrology as a design element, and avoid alteration, modification, or destruction of natural features.	Prohibit the clearing and grading of forests and wetlands except when in compliance with all erosion and sediment control ordinances.	*URMP 8.2 Water Quality Low Impact Design Requirements, Step 4.*	*Step 4: Reduce runoff rates and volumes to more closely match natural conditions. (This is not an enforceable code provision, but rather a 'strongly-recommended' design consideration of the city for developers.*
	Design sites to preserve vegetated or natural buffers adjacent to receiving waters.	Restrict drainage by ditching, underdrains, or other systems within 75 feet of the stream.	*Title 26: 26.435 Development in Environmentally Sensitive Area, 25.435.040 Stream Margin Review*	*Stream Margin Review required for all development within 100 feet of the high water line of Roaring Fork River and tributaries, and to all development with the Special Flood Hazard Area. SMR includes a variety of criteria. Relevant items include the specification that "3. There is no vegetation removed or damaged or slope grade changes (cut or fill) made outside of a specifically defined building envelope." "8. There is no development other than approved native vegetation planting taking place below the top of slope or within fifteen (15) feet of the top of slope or the high waterline, whichever is most restrictive. This is an effort to protect the existing riparian vegetation and bank stability. New plantings (including trees, shrubs, flowers and grasses) outside of the designated building envelope on the river side shall be native riparian vegetation as approved by the City. A landscape plan will be submitted with all development applications."*
	Reforest areas within the same watershed in proportion to the acreage cleared of trees.		*No applicable langauge found*	

Town regulations do not generally reflect or include EPA or NWCCOG guidance	Town regulations partially include or reflect or include EPA or NWCCOG guidance	Town regulations reflect or include EPA or NWCCOG guidance

Appendix B: City of Aspen Stormwater Treatment Requirements

City of Aspen Municipal Code: TITLE28. Stormwater and Mudflow

TITLE 28. STORMWATER AND MUDFLOW
Chapter 28.01

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INTRODUCTION

Sec. 28.01.010 Introduction

It is hereby determined that:

Construction and development activities, and their associated changes to land cover, alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, which in turn increase flooding, stream channel erosion, and sediment transport and deposition;

Construction and development activities also contribute to increased nonpoint source pollution and degradation of receiving waters;

The impacts of development-related stormwater runoff quantity and quality can adversely affect public safety, public and private property, drinking water supplies, recreation, fish and other aquatic life, property values and other uses of lands and waters;

These adverse impacts can be controlled and minimized through the regulation of stormwater runoff quantity and quality from new development and redevelopment, by the use of both structural facilities as well as nonstructural measures;

Localities in the State of Colorado are required to comply with a number of both State and Federal laws, regulations and permits which require a locality to address the impacts of stormwater runoff quality and nonpoint source pollution these include the Federal Water Pollution Control Act, the Federal Water Quality Act, and the Colorado State Water Quality Standards;

Therefore, the City of Aspen establishes this set of stormwater management policies to provide reasonable guidance for the regulation of stormwater runoff for the purpose of protecting local water resources from degradation. It is determined that the regulation of stormwater runoff discharges from construction and development activities and other construction activities in order to control and minimize increases in stormwater runoff rates and volumes, soil erosion, stream channel erosion, and nonpoint source pollution associated with stormwater runoff is in the public interest and will prevent threats to public health and safety.

Sec. 28.01.020 Purpose

The purpose of this Title is to protect, maintain and enhance the health, safety, and welfare of the watersheds and public residing in watersheds within this jurisdiction by establishing minimum requirements and procedures to control the adverse effects mudflow and of increased effects of post-development stormwater runoff and nonpoint source pollution associated with new development and redevelopment. It has been determined that proper management of stormwater runoff and mudflow will minimize damage to public and private property and infrastructure, safeguard the public health, safety, environment and general welfare of the public, and protect water and aquatic resources.

This Title seeks to meet that purpose through the following objectives:

(1) Minimize increases in stormwater runoff from any development in order to reduce flooding, erosion, non-point source pollution and increases in stream temperature, and maintain the integrity of stream channels and aquatic habitats;

(2) Minimize increases in nonpoint source pollution caused by stormwater runoff from development which would otherwise degrade local water quality;

(3) Minimize the total annual volume of surface water runoff which flows from any specific site during and following development to not exceed the pre-development hydrologic regime to the maximum extent practicable; and

(4) Reduce stormwater runoff rates and volumes, soil erosion and nonpoint source pollution, wherever possible, through stormwater management controls and to ensure that these management controls are properly maintained and pose no threat to public safety.

(5) Minimize the impact of a mudflow event to the maximum extent practicable.

Sec. 28.01.030 Applicability

This Title shall be applicable to all construction or development activity, including but not limited to subdivision, building permit, or site plan applications, unless eligible for an exemption or granted a waiver by the City of Aspen. The Title also applies to construction or development activities that are smaller than the minimum applicability criteria if such activities are part of a larger common plan of development that meets the following applicability criteria, even though multiple separate and distinct construction or development activities may take place at different times on different schedules. In addition, all plans must also be reviewed by City staff to ensure that stormwater management measures and controls will be maintained during and after development of the site.

Sec.28.01.040 Compatibility with Other Permit and Code Requirements

This Title is not intended to interfere with, abrogate, or annul any other municipal code, rule or regulation, stature, or other provision of law. The requirements of this Title should be considered minimum requirements, and where any provision of this Title imposes restrictions different from those imposed by any other ordinance, rule or regulation, or other provision of law, whichever provisions are more restrictive or impose higher protective standards for human health or the environment shall be considered to take precedence.

Chapter 28.02

STORMWATER AND MUDFLOW DESIGN MANUAL

Sec. 28.02.010. Adoption of Urban Runoff Management Plan.

Pursuant to the powers and authority conferred by the Charter of the City, there is hereby adopted and incorporated herein by reference as if fully set forth those regulations contained in the Urban Runoff Management Plan (Manual), as may be amended from time to time by the City Engineer. At least one (1) copy of the aforementioned Manual shall be available for public inspection at the Community Development Department and Engineering Department.

Sec. 28.02.020. Use of Urban Runoff Management Plan

The City of Aspen shall use the policies, criteria and information including specifications and standards in the latest edition of the Urban Runoff Management Plan (Manual) for the proper implementation of the requirements of this Title. The Manual may be updated and expanded periodically, based on improvements in science, engineering, monitoring, and local maintenance experience.

The Manual shall include a list of acceptable stormwater treatment practices, including the specific design criteria for each stormwater practice. The Manual also includes criteria for managing mudflows. The Manual may be updated and expanded from time to time, at the discretion of the local review authority, based on improvements in engineering, science, monitoring and local maintenance experience. Stormwater treatment practices that are designed and constructed in accordance with these design and sizing criteria shall be presumed to meet the minimum water quality performance standards.

Sec. 28.02.030. Applicability.

The Urban Runoff Management Plan, as adopted pursuant to Section 28.02.010, shall apply to all construction, development or redevelopment activity within the City; provided, however, that the City Engineer may waive one (1) or more specific provisions of the Urban Runoff Management Plan. Requests for waivers and any waivers granted by the City Engineers shall be in writing.

Chapter 28.03

Stormwater Fees

Sec. 28.03.010. Definitions.

For the purposes of this Chapter, certain words or phrases are defined as follows:

(a) Development. The proposed development creates at least one-thousand (1000) square feet of new impervious area.

(b) Redevelopment. The proposed development disturbs at least one-thousand (1000) square feet of the existing impervious area.

Sec. 28.03.020. Fee-in-Lieu of Detention.

(a) A stormwater fee-in-lieu of detention shall be established which shall be applied and available as an alternative to the construction of on-site detention as required by Sec. 28.02.010 to all properties within the boundaries of the City of Aspen at the time of development or redevelopment of the property. The basis of this fee is set forth in Section 2.12.140.

(b) A developer will not have the option to pay a fee-in-lieu of constructing a stormwater detention facility if, in the opinion of the City Engineer, undetained runoff from the development may materially adversely exacerbate an existing problem or may adversely impact a downstream property.

(Ord. No. 15-2011 §4)

City of Aspen Municipal Code: Title 2. Administration. Sec. 2.12.140. Stormwater Fees

Fee-in-Lieu of Detention Fee (per cubic foot of detention req.) $78.78

(a) The fee is based on 100 percent of the estimated cost of constructing a detention facility on-site. The City Engineer at his/her sole discretion may require a certified cost estimate for construction of detention meeting the standards contained in the Urban Runoff Management Plan (Manual) established in Sec 28.02.010 and may accept at his/her sole discretion this amount to be paid in-lieu-of detention.

(b) Required detention storage shall be calculated at the rate of 6.20 cubic feet per 100 square feet of impervious area. The City Engineer at his/her sole discretion may require a certified storage volume estimate for construction of detention meeting the standards contained in the Urban Runoff Management Plan (Manual) established in Sec 28.02.010 and may accept at his/her sole discretion this amount to be used for detention volume storage requirements.

(Ord. No. 40-2008; Ord. No. 27-2009§11; Ord. No. 29-2010§11; Ord. No. 15-2011§2; Ord. No. 29- 2012; Ord. No. 48-2013; Ord. No. 36-2014; Ord. No. 43-2015; Ord. No 36-2016; Ord. No 30-2017; Ord. No 40-2018)

Table 1.1 General Requirements for Minor and Major Projects

Project Type*	Area added OR disturbed	Project Classification	General Requirements
Disturbing less than 200 sq ft	< 200 square feet	--------	No requirements
Landscaping or grading only, and No hardscape, and no change to drainage pattern	200 – 1000 square feet	---------	No requirements
Landscaping or grading only that might include hardscape or change in grade or drainage pattern, small additions, small scrape and replace	200 – 1000 square feet	**Minor**	• WQCV or drain to green space for the impervious (hardscape) area • CMP
Refinishing a driveway only (retaining or decreasing impervious area square footage)	Limited to the exact footprint of the existing driveway	**Minor**	• CMP if greater than 1000 square feet • WQCV or drain to green space for the impervious (hardscape) area
Interior work only	< 50% demolished	**Minor**	CMP if greater than 400 square feet of work
Interior work only, Pre-project lot coverage of 0-50%	> 75% demolished (< 75% is still a minor)	**Major**	• CMP • WQCV for the entire area • Conveyance of major flows • Detention to the historic undeveloped rate or FIL for the entire area, unless discharging directly to the City's stormwater system depicted in Figure 1.1. • Requires Professional Engineer

Interior work only, Pre-project lot coverage of 50-100%	> 50% demolished	**Major**	• CMP • WQCV for the entire area • Conveyance of major flows • Detention to the historic undeveloped rate or FIL for the entire area, unless discharging directly to the City's stormwater system depicted in Figure 1.1. • Requires Professional Engineer
Landscaping, grading, installing or disturbing hardscapes, additions to structures, etc.	> 1000 square feet and < 25% of the entire site	**Major**	• CMP • WQCV for the new impervious area • Conveyance of major flows • Detention to the historic undeveloped rate or FIL for the disturbed or added area, unless discharging directly to the City's stormwater system depicted in Figure 1.1. • Requires Professional Engineer
Landscaping, grading, installing or disturbing hardscapes, additions to structures, scrape and replace, interior remodel combined with exterior work, etc.	> 1000 square feet and > 25% of the entire site	**Major**	• CMP • WQCV for the entire area • Conveyance of major flows • Detention to the historic undeveloped rate or FIL for the entire area, unless discharging directly to the City's stormwater system depicted in Figure 1.1. • Requires Professional Engineer

Notes:

1 Special Circumstances: *Any* work, regardless of amount or size, performed on historic properties, in environmentally sensitive areas, geologic hazard areas, in jurisdictional or non-jurisdictional floodplains, or work that impacts trees may be required to submit information for permit review and may be required to provide a more detailed drainage analysis and design than suggested in the table above.

2 The de minimis threshold for minor projects applies only to a single addition on a given piece of property. If cumulative additions on a property over a three-year period after the CO is issued increase the impervious area by more than 1000 square feet, "major" project requirements and evaluations will apply to all impervious areas that are in addition to the "baseline" imperviousness determined from the 2008 aerial photography.

3 Pre-project lot coverage is determined by dividing the total hardscape footprint on the lot (house, driveway, patios, sidewalks, etc.) by the total lot area. Interior demolition is measured by the square footage of the room renovated/modified divided by the total square footage of the structure.

Appendix C: Ecological Integrity Assessment Protocols and Methodologies

ASSESSMENT AREA DELINEATION

Individual Assessment Areas (AAs) within the project bounds were delineated by segmenting the existing riparian corridor into polygons that shared similar dimensions, roughly 100 meters, along their outside edge farthest from the Roaring Fork . The existing riparian area was first hand digitized in a Geographic Information System (GIS) by cross-referencing vegetation communities evident in six-inch resolution aerial photos, digital elevation models derived from Pitkin County LiDAR images, and flood modeling inundation boundaries generated by the City of Aspen's hydraulic model for delineating floodways. The riparian polygon was then split into river-right and river-left segments by clipping it to the bounds of the Roaring Fork River. The outside edges of these -right and -left segments were dynamically segmented into 100m lengths. Lines were extended from the start and end of each line, back to the edge of the Roaring Fork River. These lines were oriented roughly perpendicular to the river bank and formed the upstream and downstream bounds of each AA. Each AA was given a unique identification code that indicated the adjacent water body, the approximate river mile stationing as defined by the Colorado Water Conservation Board's Source Water Route Framework, and whether the AA fell on the right or left side of the river when looking downstream.

DATA ANALYSIS

As discussed in the body of the report, the project team preformed Level 1 and Level 2 EIA assessments on riparian zones delineated within the planning area. A modified version of the EIA protocol was used to evaluate conditions in each AA. Notably, an assessment of wildlife and habitat values of each AA was included as an additional protocol. The assessment specifically considered the Major Ecological Factors and Metrics presented in the table below. The discussion presented below focuses on areas where the protocol employed for this project deviates from the protocols spelled out in the EIA Field Manual (citation). A score was developed for each metric and these scores were combined for each AA to communicate an aggregated condition. Results were presented in both maps and tabular format. A stressor checklist accompanied the EIA results for several metrics. These checklists should help stakeholders identify the most pressing stressors faced by riparian areas in the City.

EIA EVALUATION CRITERIA		
Rank Factor	Major Ecological Factor	Metric
Landscape Context (L)	Landscape	L1. Contiguous Natural Land Cover
		L2. Land Use Index
	Buffer	B1. Perimeter with Natural Buffer
		B2. Width of Natural Buffer
		B3. Condition of Natural Buffer
Condition (C)	Vegetation	V1. Native Plant Species Cover
		V2. Invasive Nonnative Plant Species Cover
		V3. Native Plant Species Composition
		V4. Vegetation Structure
		V5. Regeneration of Native Woody Species
		V6. Coarse and Fine Woody Debris
	Hydrology	H1. Water Source
		H2. Hydroperiod
		H3. Hydrologic Connectivity
	Physiochemistry	S1. Soil Condition
		S2. Surface Water Turbidity/Pollutants
Size (S)	Size	Z1. Comparative Size
		Z2. Change in Size

LANDSCAPE

A Level 1 assessment of landscape quality was performed using aerial imagery and other digital data sets in a GIS. Although the EIA method calls for evaluating landscape quality within a 500-meter radius of each AA, this approach was deemed inappropriate due to the high number of adjacent AAs in the planning area. Instead, we delineated local watersheds ('drainage wings') expected to contribute flow to each AA. We then clipped these drainage wings to within 500-meters of the AA boundaries. Drainage area delineations were carried out in a GIS using 2016 LiDAR imagery published by Pitkin County. Two landscape metrics were assessed to determine the overall quality of the landscape contributing to the riparian AAs. Landscape quality metrics included Contiguous Natural Land Cover (L1) and Land Use Index (L2).

L1. CONTIGUOUS NATURAL LAND COVER

Contiguous natural land cover area was manually digitized in a GIS using 1-meter resolution National Agricultural Imagery Program (NAIP) imagery collected in 2015. The area of continuous natural land cover adjacent each AA was then divided by the total area of the drainage wing contributing flow to that AA. A letter grade was assigned based on the relative percentage of contiguous natural versus developed land cover adjacent to each AA. AAs embedded in >90% natural landscape received an 'A' ranking, while AAs embedded in <20% received a 'D' ranking.

L2. LAND USE INDEX

Land use mappings across the study area were derived from 2016 National Land Cover Dataset (NLCD) imagery. Land use classifications were recoded based the scoring protocol outlined in the EIA method (Table 9, Lemly et al., 2016) and clipped to each AA's drainage wing. A letter grade was assigned based on the intensity of human-dominated land uses within the contributing watersheds of the AAs. AAs with a score > 9.5 received an 'A' ranking, while AAs scoring less than 4.5 received a 'D' ranking.

BUFFER

Buffer metrics assess the overall condition and area of the natural buffer immediately surrounding each AA. Natural buffers are vegetated areas surrounding riparian areas that are free from intensive management or land use alteration. EIA Buffer metrics include Perimeter with a Natural Buffer (B1) and Width of Natural Buffer (B2).

B1. PERIMETER WITH A NATURAL BUFFER

A letter grade was assigned based on the percent of each AA that is immediately surrounded by natural land cover. Natural land cover area was delineated from 2015 NAIP imagery. The length of each AA perimeter surrounded by natural land cover was divided by the total AA perimeter to produce a relative measure of perimeter with a natural buffer. AA perimeters surrounded by 100% natural land cover received an A-grade while AAs with >25% natural buffer received a D-grade. Assessment results for riparian buffers tended to reflect the scores for local landscape condition. Vegetation communities adjacent to riparian zones are highly fragmented and exist in a largely modified condition.

B2. WIDTH OF NATURAL BUFFER

This metric quantifies the width of the natural area surrounding each AA. The EIA method calls for drawing lines in every direction from the centroid of the AA and measuring the width of the natural land cover. However, this approach assumes geometrically consistent AAs. Because our AAs were irregularly shaped and were contiguous, we drew lines outward from the centroid of each AA perpendicular to the river centerline and measured the width of the natural buffer surrounding each AA. AAs surrounded by at least 100 meters of natural land cover received a A-grade while AAs with <25 meters of natural buffer width received a D-grade. The width of contiguous 'natural' vegetated buffers is constrained by roads, trails, lawns, and structures. Scores for the condition of buffer areas ten to decrease with increasing proximity to the urban core.

VEGETATION

A Level 2.5 EIA Assessment was used to evaluate the vegetation ecological integrity of 41 Assessment Areas (AA) along the Roaring Fork River within the City of Aspen, Pitkin County, Colorado. The field work was conducted by Rea Orthner of Peak Ecological Services LLC and one field assistant on August 20 and September 18, 2019.

These AAs were determined by using the five (5) broad-scale AAs as initially provided by DHM and then breaking those down into finer-scale units based on similar vegetation composition and structure. At each AA, metrices V1 through V6 were rated according to the Field Manual. In addition, a Stressor Checklist was evaluated for each AA. As per established protocol, each stressor was designated with a severity and scope rating, indicating the intensity of the stressor and percent of the AA or landscape that it affects. Stressor checklists from a single site can help managers evaluate which stressors they can manage for (and potentially improve wetland condition) and which are beyond their control. A sample EIA Vegetation Metric Scorecard that was used in the assessment is attached to this memo and each vegetation metric is explained below. After field reconnaissance, the data forms were digitized into GIS showing the rank for each of the six vegetation metrics, photo numbers, and general notes. In addition, we averaged the six individual vegetation scores into a composite vegetation score. See the attached Excel spreadsheet for the composite score calculations.

VEGETATION METRICS

V1. Native Plant Species Cover – A letter grade was assigned based on the percent relative cover of native species with an A-grade having >99% of native species and D having <60% relative cover of native species.

V2. Invasive Nonnative Species Cover – A letter grade was assigned based on the percent absolute cover of invasive non-natives with A having no non-native invasive plants and E having an abundance of noxious weeds (>30% cover).

V3. Native Plant Species Composition – A letter grade was assigned for this metric depending on whether the native plant species composition is within expected natural conditions (A grade) down to native plant species composition with severely disturbed conditions (D grade).

V4. Vegetation Structure. Is the Analysis Area is characterized by a complex array of nested or interspersed patches (letter grade A) or is the AA is characterized by one dominant zone and several expected structural patches or vertical strata are missing (letter grade D).

V5. Regeneration of Native Woody Species. For this metric a letter grade of A indicates - All age classes of native woody species present. Native tree saplings /seedlings and shrubs common to the type present in expected amounts and diversity. While a letter grade of D would indicate native woody species predominantly consist of decadent or dying individuals.

V6. Coarse and Fine Woody Debris. Is the AA characterized by moderate amount of coarse and fine woody debris, relative to expected conditions (letter grade A) ? Or does the AA lacks woody debris, even though inputs are available (letter grade D)?

HYDROLOGY

Hydrology metrics evaluate the degree to which alteration of source water quality or periodicity of inundation impacts riparian area vitality. Healthy riparian areas are, generally, well-connected to high-quality water sources. EIA Hydrology metrics include Water Source (H1), Hydroperiod (H2), and Hydrological Connectivity.

H1. WATER SOURCE

Source water to the Roaring Fork River within the City of Aspen tends to be of high quality. The river is the primary water source for riparian zones in the planning area. Episodic inputs of urban drainage sheet flow are expected to impact riparian zones throughout the City during rainfall events and snowmelt runoff. The City's stormwater system also collects and treats large quantities of stormwater before it is discharged into riparian areas and the river. However, numerous small and untreated stormwater outfalls continue to discharge stormwater to riparian zones in some areas. Scores for this metric were assigned subjectively. The Water Source metric was scored at a 'B' ranking due to expected inputs of urban runoff. In cases where stormwater appears to discharge into riparian areas, a 'C' ranking was assigned.

H2. HYDROPERIOD

The Hydroperiod of overbanking flows from the Roaring Fork River that inundate riparian zones is altered by the Independence Pass Transmountain Diversion System (IPTDS) and several in-basin surface water diversion. The operation of the IPTDS alters the magnitude of floods—and the corresponding flood inundation extents—that occur every 5-10 years. The reduction in 5-10 year flood magnitudes is expected to reduce the extent of riparian vegetation over the long term. Additional discussion of flow modification on the Roaring Fork River can be found in the Roaring Fork Management Plan (citation). The impact to local peak flows resulted in the assignment of a 'C' ranking for the Hydroperiod metric throughout the planning area.

H3. HYDROLOGICAL CONNECTIVITY

Hydrological connectivity between the Roaring Fork River and adjacent riparian areas may be reduced by channel and streambank alteration, levees, dikes, and other infrastructure in localized areas. The Roaring Fork River is moderately entrenched through glacial deposits through much of the City of Aspen. Therefore, the river corridor tends not to exhibit large native floodplains. Field visits and aerial photographs were reviewed for evidence of channel and streambank alterations that might decrease hydrological connectivity. The degree to which structural modifications alter the timing and frequency of overbank flows in riparian areas appears low to moderate throughout the City of Aspen. Scores for this metric were assigned subjectively. Initially, all AAs were assigned an 'A' ranking for Hydrological Connectivity. AAs adjacent to or containing bridge crossings were assigned a 'B' ranking. Those AAs where rip-rap or other streamside infrastructure appear to connectivity were assigned a 'C' ranking.

PHYSIOCHEMISTRY

Recent observations of degraded aquatic macroinvertebrate community conditions resulted in placement of the Roaring Fork River through the City of Aspen on the list of Impaired Waterways under the Clean Water Act. The geographic alignment of water quality impacts and urban land uses suggests that degradation of macroinvertebrate communities may be related to pollutants sourced from urban activities. Riparian areas typically act as water quality buffers, filtering out a wide variety of pollutants before water makes its way to the river. Historical degradation of riparian areas may, thus, be a partial control on water quality conditions in the Roaring Fork. To metrics were evaluated to characterize Physiochemistry: the condition of Soils (S1), and the presense of Pollutants (S2).

S1. SOILS

Physiochemical metrics assess the integrity of the soil or predominant substrate along with water quality within the wetland, both in terms of turbidity and pollutants and in terms of algal growth. Soils play a key role in overall ecological integrity. Many of the biogeochemical processes integral to wetland functioning take place within the soil. Disturbance to the soil surface can disrupt these processes, hindering plant growth, slowing or increasing decomposition rates, and altering hydrologic flow paths.

As part of the existing conditions analysis, DHM Design Ecological Services staff conducted field data collection for soil resources throughout the corridor. Utilizing the EIA rating method, visual observations were made within the identified assessment areas to evaluate and assess the degree to which human impacts have disturbed the natural soil or substrate. The rating rank, score and state (qualitative assessment quantifiers) are described included below:

QUALITATIVE ASSESSMENT QUANTIFIERS - SOILS		
Rank	**Score**	**State**
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare. No pugging, soil compaction, or sedimentation.

QUALITATIVE ASSESSMENT QUANTIFIERS - SOILS		
Rank	Score	State
Good (B)	3	Minimal soil disturbance within AA. Some amount of bare soil, pugging, compaction, or sedimentation present due to human causes, but the extent and impact are minimal. The depth of disturbance is limited to only a few inches and does not show evidence of altering hydrology. Any disturbance is likely to recover within a few years after the disturbance is removed.
Fair (C)	2	Moderate soil disturbance within AA. Bare soil areas due to human causes are common and will be slow to recover. There may be pugging due to livestock resulting in several inches of soil disturbance. ORVs or other machinery may have left some shallow ruts. Sedimentation may be filling the wetland. Damage is obvious, but not excessive. The site could recover to potential with the removal of degrading human influences and moderate recovery times.
Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times

Using a handheld gps unit, GIS data points were collected in all areas with a fair and poor rating and Photographic documentation and additional notes were also recorded. Areas where soils were intact and adequately included adequate vegetation were noted and rated accordingly. Additionally, GIS data points were collected for all observed discharge locations, or locations where potential sedimentation or liquid discharges could occur. These included drainages, ditch returns, exposed piping, trails (established and social) or areas significantly void of vegetation where sever erosion was taking place.

Common sources of disturbance included: fill or sediment dumping (natural and unnatural); human recreation, either foot traffic of motorized vehicles and developed areas where impermeable surfaces may exist which can alter the riparian hydrology and disrupt soil process like organic accumulation.

S2. POLLUTANTS

Unfortunately, the resolution of water quality on the Roaring Fork River does not support identification of specific locations or land use activities that drive the observed macroinvertebrate degradation signal. Only sparse qualitative data is available to indicate the presence of trash or other pollutants in riparian zones. Scores for the Pollutants metric were assigned subjectively. All AAs within the planning area initially received a 'C' ranking for pollutants due to expected urban runoff inputs. Those AAs receiving water from stormwater outfalls were downgraded to a 'D' ranking.

SIZE

The size of riparian areas throughout the river corridor is directly related to their functionality as wildlife habitat, aesthetic components of the landscape, and important water quality buffer zones. The current and historical size of AAs in the planning area were evaluated by reviewing aerial imagery for the City of Aspen from 1951 and 2015. The EIA Size metrics assessed include Comparative Size (Z1) and Change in Size (Z2).

Z1. COMPARATIVE SIZE

Each AA was assigned a ranking for relative size based on a ranked value list of acreages. In this manner, a ranking of 'D' was assigned to the smallest AAs in the planning area and a ranking of 'A' was assigned to the largest AAs. AAs of intermediate size received intermediate rankings. Low scores do not characterize any degree of impact, only a small relative size.

Z2. CHANGE IN SIZE

The existing size of each AA was then compared to an approximated areal extent of the native riparian zone

in that location. The actual native riparian extent through the City of Aspen cannot be known due to the long history of land use change in the area and the lack of a long-term photographic record of the entire river corridor. The approximated natural riparian extent was determined through combination of historical aerial imagery and hydraulic modeling results. These extents were compared directly to the digitized bounds of existing riparian areas. Outcomes indicate the degree to which historical land use activities have encroached on riparian vegetation. The Roaring Fork River is entrenched along many sections of the river corridor through the City of Aspen. Historical and existing riparian areas are largely restricted to steep streambanks very close to the river. Therefore, many areas received an 'A' ranking for this metric. The largest encroachments on riparian areas occur in flat, low-lying areas where overbanking flows supported broad riparian forests. Many of these areas are now occupied by lawns, gardens and homes. Scoring for this metric followed the recommended EIA protocol. It is important to note that this metric is sensitive to the dimensions of riparian corridor at any given location. A 5' reduction in riparian width for an AA that is currently 10' wide will score much lower than a 20' reduction in riparian width for an AA that is currently 100' wide. It follows, then, that digitization errors will affect scores for small AAs more significantly than for large AAs.

WILDLIFE

In order to prepare for field surveys, CWS reviewed available background documents and previous studies and conducted a desktop GIS evaluation of the Assessment Areas (AAs) using the 2018 Pitkin County orthophotographs. A CWS biologist then conducted transects within most of the AAs following the procedures of the USDA Forest Service Terrestrial Visual Encounter Survey (TVES) protocol[1] on September 24 and October 3, 2019. AAs absent of effective wildlife habitat due to residential or commercial development paralleling the river were not surveyed. All wildlife or wildlife sign detected along the transect including beds, pellets, nests, fur or feathers, burrows, dens, latrines, prey remains, vegetation browse, food caches, and markings on the ground or on tree bark, and birds identified by both direct observation and indirectly via song and call was used to assess wildlife value and use. Wildlife habitat type, quality, and extent was documented for each AA surveyed. AAs that provided connectivity between effective upland habitat beyond the AA and the riparian corridor were noted as well.

Given that the plant communities within the AAs comprise the existing wildlife habitat, CWS used the plant community descriptions and GIS mapping produced by Peak Ecological to provide the resulting wildlife habitat data. CWS described the wildlife habitat for each AA, the species detected (or suspected to occur based on habitat affinity) within that AA, and noted important features of the AA and the potential for habitat improvement or restoration. This information was added to the attribute tables of the GIS shapefiles created by Peak Ecological. Georeferenced photos of characteristic habitat were taken within most AAs and added to the GIS attribute tables for reference.

1 Manley, P. N., B. V. Horne, J. K. Roth, W. J. Zielinski, M. M. McKenzie, T. J. Weller, F. W. Weckerly, and C. Vojta. 2006. Multiple species inventory and monitoring technical guide. Gen. Tech. Rep. WO-73. . Department of Agriculture, Forest Service, Washington Office. 204 p., Washington, DC.

LANDSCAPE

RESULTS

The evaluation of land use and land cover characteristics in the local drainage areas associated with each AA showed, unsurprisingly, a high fraction of impervious cover and extensive residential and commercial development. There are few areas within the City of Aspen where contiguous natural land cover extends any measurable distance from the riparian zone. Scores for landscape metrics are low throughout the planning area but tend to decrease with increasing proximity to the urban core.

WILDLIFE

While many of the AAs are significantly compromised by residential, commercial, and/or infrastructure development, a few are important to wildlife. Some of these are valuable because they contain relatively intact plant communities which provide effective habitat, others are notable due to their adjacency to important habitat or conservation lands and provide access to the riparian corridor and the Roaring Fork River, and some provide both effective habitat, are adjacent to conservation lands, and provide wildlife access to the corridor and the river.

ASSESSMENT AREAS WITH NOTABLE WILDLIFE VALUE

AA_ID	Peak ID	Wildlife Value
-	1-R1	Meadow/old hayfield or pasture; Adjacent to mule deer/elk transition habitat, black bear fall concentration habitat; Restoration opportunity; River access
1	1-R3	Effective narrowleaf cottonwood-blue spruce riparian habitat; Adjacent to mule deer/ elk transition habitat, black bear fall concentration habitat; River access
-	1-R6	Effective narrowleaf cottonwood riparian habitat; Good water source; Adjacent to mule deer/elk transition habitat, black bear fall concentration habitat
-	2-L1	Very good candidate for wildlife habitat restoration to benefit many species including deer, bears, migratory birds
2	2-L2	Effective narrowleaf cottonwood riparian habitat; High structural and species diversity; Tent trail reduces effectiveness
5	5-1LC	Currently used by elk, deer, moose, riparian & wetland birds, diverse small mammals; Adjacent to Stillwater Ranch OS & Richmond Ridge; Excellent restoration candidate to benefit many species
-	5-L2	Stillwater Ranch OS; Currently used by elk, deer, moose, riparian & wetland birds, diverse small mammals; Adjacent to WRNF (Richmond Ridge); Adjacent to mule deer/ elk transition habitat, black bear fall concentration habitat; Provides connectivity between the river and mule deer /elk summer range & elk winter range; Excellent restoration candidate to benefit many species
5	5-L3	Relatively wide spruce dominated with aspen & narrowleaf cottonwood regeneration; Used by elk & mule deer with good structural diversity at east end
5	5-R2	Disturbed but recovering; Connectivity to Stillwater Ranch OS; Heavy deer use; Good potential restoration site to benefit all riparian species plus elk, deer, moose

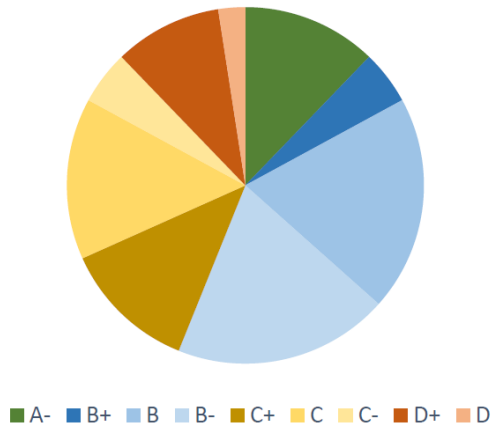
VEGETATION

Of the 41 AAs analyzed 12% received an overall vegetation health letter grade of A, 44% received a B, 32% received a C rating, and 12% received a D rating. Those AAs which received an A rating exhibited a relatively healthy and diverse riparian structure typically dominated by an overstory of narrowleaf cottonwood (Populus angustifolia) and blue spruce (Picea pungens) with native shrubs such as redosier dogwood (Cornus sericea), twinberry honeysuckle (Lonicera involucrata), thinleaf alder (Alnus incana subsp. tenuifolia), river birch (Betula occidentalis), Rocky Mountain maple (Acer glabrum), chokecherry (Prunus virginiana) and several species of willows (Salix spp). The herbaceous component of these areas was comprised of native upland and wetland species such as bluejoint reedgrass (Calamagrostis canadensis), fringed brome (Bromus ciliatus), water sedge (Carex aquatilis), beaked sedge (C. utriculata), fowl mannagrass (Glyceria striata), Baltic rush (Juncus arcticus subsp. ater), fowl

bluegrass (Poa palustris), largeleaf avens (Geum macrophyllum), false Solomon seal (Maianthemum stellatum, M. amplexicaule), bog orchids (Platanthera aquilonis, P. huronensis), meadowrue (Thalictrum fendleri), field horsetail (Equisetum arvense), souringrush (Equisetum hyemale) and roundleaf wintergreen (Pyrola rotundifolia). However, the vegetation composition is by no means pristine as all of the AAs supported some non-native naturalized species, the most common being redtop (Agrostis gigantea) and reed canarygrass (Phalaris arundinacea). In addition, noxious weeds were frequently encountered, the most abundant being ox-eye daisy (Leucanthemum vulgare), Canada thistle (Cirsium arvense), common tansy (Tanacetum vulgare), and plumeless thistle (Carduus acanthoides). In general, those AAs with lower scores showed little to no riparian shrub component or the shrub layer appeared to have been replaced by non-native pasture grasses such as smooth brome (Bromus inermis), timothy (Phleum pratense), and orchardgrass (Dactylis glomerata); bluegrass lawns; or other landscaping. The most significantly degraded sites also lacked a mature overstory of narrowleaf cottonwood or willows and instead were dominated by non-native pasture grasses and weeds. Finally, some of the AAs received lower scores due to the relatively narrow condition of the riparian zone due to existing commercial and residential development and/or recreational trails.

COMPOSITE VEGETATION GRADES FOR 41 AAS

Letter Grade	Number of AAs	Graph
A-	5	
B+	2	
B	8	
B-	8	
C+	5	
C	6	
C-	2	
D+	4	
D	1	
TOTAL NUMBER OF AAs	41	



2019 COLORADO WETLAND ECOLOGICAL INTEGRITY ASSESSMENT (EIA) – VEGETATION

LOCATION AND GENERAL INFORMATION

AA ID: _____

Date: _____ Surveyors:_____ _____

Access Comments :

SCOPE of Threat (% of AA or Buffer affected by direct threat)	
1 = Small	Affects a small portion (1-10%) of the AA or landscape
2 = Restricted	Affects some (11-30%) of the AA or landscape
3 = Large	Affects much (31-70%) of the AA or landscape
4 = Pervasive	Affects all or most (71-100%) of the AA or landscape
SEVERITY of Threat within the defined Scope (degree of degradation to AA or Buffer)	
1 = Slight	Likely to only slightly degrade/reduce
2 = Moderate	Likely to moderately degrade/reduce
3 = Serious	Likely to seriously degrade/reduce
4 = Extreme	Likely to extremely degrade/destroy or eliminate

	2015 COLORADO ECOLOGICAL INTEGRITY ASSESSMENT (EIA) –STRESSOR CHECKLIST	
	Stressors Checklist	**Vegetation Severity**
Develop	Utility / power line corridor	1, 2, 3
	Other [specify]:	
R	Low impact recreation (hunting, fishing, camping, hiking, bird-watching, canoe/kayak)	1
E	High impact recreation (ATV, mountain biking, motor boats)	3
C	Other [specify]:	
	Tree resource extraction (clear cut=3 or 4, selective cut= 2 or 3)	2, 3, 4
	Vegetation management (cutting, mowing)	2
	Livestock grazing, excessive herbivory by native species (ungulates, prairie dogs) (low=1, mod=2, high=3)	1, 2, 3
	Insect pest damage (low=1, mod=2, high=3)	1, 2, 3
V	Invasive plant species (see noxious weed list)	3
E	Direct application of agricultural chemicals, herbicide spraying	2, 3
G	Other [specify]:	
N	Evidence of recent fire (low=1, mod=2, high=3)	1, 2, 3
A	Recent beaver dam blowout	1, 2, 3
T	Other [specify]:	1, 2

AA ID#_____

VEGETATION COMPOSITION METRICS

V1. NATIVE PLANT SPECIES COVER (RELATIVE)

Select the statement that best describes the relative cover of **native plant species** within the AA.

AA contains >99% relative cover of native plant species.	**A**
AA contains 95–99% relative cover of native plant species.	**B**
AA contains 85–95% relative cover of native plant species.	**C**
AA contains 60–85% relative cover of native plant species.	**C-**
AA contains <60% relative cover of native plant species.	**D**

V2. INVASIVE NONNATIVE PLANT SPECIES COVER (ABSOLUTE)

Select the statement that best describes the absolute cover of **invasive nonnative plant species** within the AA. Use list provided in the manual.

Invasive nonnative species are absent from all strata.	**A**
Invasive species present, but sporadic (<4% absolute cover).	**B**
Noxious weeds somewhat abundant (4–10% cover).	**C**
Noxious weeds abundant (10–30% cover).	**C-**
Noxious weed very abundant (>30% cover).	**D**

V3. NATIVE PLANT SPECIES COMPOSITION

Select the statement that best describes the **native plant species composition** (species abundance and diversity) within the AA. Look for native species diagnostic of the system vs. native increasers that may thrive in human disturbance.

Native plant species composition with expected natural conditions: i) Typical range of native diagnostic species present, AND ii) Native species sensitive to anthropogenic degradation are present, AND iii) Native species indicative of anthropogenic disturbance (i.e., increasers, weedy or ruderal species) absent to minor.	**A**
Native plant species composition with minor disturbed conditions: i) Some native diagnostic species absent or substantially reduced in abundance, OR ii) Native species indicative of anthropogenic disturbance are present with low cover.	**B**
Native plant species composition with moderately disturbed conditions: i) Many native diagnostic species absent or substantially reduced in abundance, OR ii) Native species indicative of anthropogenic disturbance are present with moderate cover.	**C**
Native plant species composition with severely disturbed conditions: i) Most or all native diagnostic species absent, a few remain in low cover, OR ii) Native species indicative of anthropogenic disturbance are present with high cover.	**D**

VEGETATION STRUCTURE, REGENERATION & WOODY DEBRIS METRICS

V4. VEGETATION STRUCTURE (VERTICAL AND HORIZONTAL)

Select the statement below that best describes the **overall vertical and horizontal structure** within the A A.

General: Vegetation structure is at or near nimimally disturbed natural conditions. Little to no structural indicators of degradation evident.		General: Vegetation structure is moderately altered from natural conditions.	
AA is characterized by a complex array of nested or interspersed patches.	**A**	AA is characterized by a simple array of nested or interspersed zones.	**C**
General: Vegetation structure shows minor alterations from nature conditions		General: Vegetation structure is greatly altered from natural conditions.	
AA is characterized by a moderate array of nested or interspersed zones.	**B**	AA is charaterized by one dominant zone and several expected structural patches or vertical strata are missing.	**D**

V5. REGENERATION OF NATIVE WOODY SPECIES

V6. COARSE AND FINE WOODY DEBRIS

Select the statement that best describes the regeneration of native woody species within the AA.		Select the statement that best describes coarse and fine woody debris within the AA.	
Woody species are naturally uncommon or absent. NA	**NA**	There are no obvious inputs of woody debris or woody species are naturally uncommon. NA	**NA**
All age classes of native woody species present. Native tree saplings /seedlings and shrubs common to the type present in expected amounts and diversity. Regeneration in obvious.	**A**	AA characterized by moderate amount of coarse and fine woody debris, relative to expected conditions. There is wide size-class diversity of standing snags and downed logs in various stages of decay. For riverine wetlands, debris is sufficient to trap sediment, but does not inhibit stream flow. For non-riverine wetlands, woody debris provides structural complexity, but does not overwhelm the site.	**A**
Age classes of native woody species restricted to mature individuals and young sprouts. Middle age groups appear to be absent or there is some other indication that regeneration is moderately impacted.	**B**		**B**
Native woody species comprised of mainly mature individuals OR mainly evenly aged young sprouts that choke out other vegetation. Regeneration is obviously impacted. Site may contain Russian Olive and/or Salt Cedar.	**C**	AA characterized by small amounts of woody debris OR debris is somewhat excessive. For riverine wetlands, lack of debris may affect stream temperatures and reduce available habitat.	**C**
Native woody species predominantly consist of decadent or dying individuals OR are absent from an area that should be wooded. Site may be dominated by Russian Olive / Salt Cedar.	**D**	AA lacks woody debris, even though inputs are available.	**D**

AA_ID	Peak_ID	Pri_Obs	Sec_Obs	AA_Notes	Photos	V1	V2	V3	V4	V5	V6	v1	v2	v3	v4	v5	v6	Average	Average Letter Grade	Restoration Area?
1	1-R3	Rea Orthner		High quality NLC-BS, Well developed flood plain. Diverse native shrubs & native herbaceous component. Some Phalaris & Red top present along river. Pockets of wetlands present. Some nox weeds-Canada thistle/Ox-eye daisy	RO 1101 (interior)	B	B	A	A	A	A	3	3	4	4	4	4	3.67	A-	
1	1-L2	Reba Mitchell		NLC, Spruce. Native riparian understory & mowed, cleared lawns. Riparian understory varies along private plots.	RM, 5650 upriver	C	B	B	C	B	B	2	3	3	2	3	3	2.67	B-	
1	1-R1	Rea Orthner	Reba Mitchell	NLC with good diversity of native shrubs, Herbaceous component pasture grasses, smooth brome mainly. Some nox weeds-canada thistle (sprayed). Add'l riparian corridor N of bike path included, excluding Aspen stand	RO 1423 looking downriver	C	B	B	B	A	A	2	3	3	3	4	4	3.17	B-	
1	1-R5A	Rea Orthner		NLC forest, scattered BS. Downstream, N of powerline good structural diversity, willows, hineysuckle, dogwood, river birch, currant & dense scouring rush, beaked sedge.	RO 1428-1430	B	C-	A	A	A	A	3	1.5	4	4	4	4	3.42	B+	
2	2-L5	Rea Orthner		Narrow NLC riparian corridor on steep bank. Native shrubs & herbaceous layer above river. Social trail above	RO 1444	B	B	B	B	B	A	3	3	3	3	3	4	3.17	B	
2	2-L4	Rea Orthner		NLC some BS. Diverse healthy native shrubs & herbaceous layers. Several social trails. Some canada thistle, tansy. Recommendation-elimate social trails	RO 1440 looking upstream, 1441 social trail, 1442 canada thistle in wetland	B	B	A	A	A	A	3	3	4	4	4	4	3.67	A-	
2	2-R3B	Reba Mitchell		NLC dominate, some regen. Native shrubs & herbaceous layer present. WP 1376 fenced area & pvc pipes outside AA. Wetland area within, pasture grasses & canada thistle. AA becomes narrow/steep. Phalaris along river. Good for nox weed management	RM 5660 downriver-wetland area, 5662 view downriver, but upriver in AA-phalaris in view	C-	C-	B	C	B	B	1.5	1.5	3	2	3	3	2.33	C+	
2	2-R1	Reba Mitchell		Decadent NLC & Aspens, Native Riparian shrubs present, willow sapling along river bank. Native herbaceous component present with pasture grasses throughout	RM 5651 upriver, 5654 downriver	B	B	B	B	B	B	3	3	3	3	3	3	3.00	B	
2	2-R2	Reba Mitchell		Dense overstory of decadent NLC. Aspen along trail & BS along river bank. Native riparian shrubs & herbaceous layer present but reduced due to dense overstory. Pasture grasses and some nox canada thistle along trail. Swales/drainage within AA.	RM 5655 BS, 5656 Aspen, 5657 Swales, 5658 canopy layers	B	B	A	A	A	A	3	3	4	4	4	4	3.67	A-	
1	1-R4	Rea Orthner		Steep narrow bank above river. Sporatic cover of NLC & riparian shrubs. Low plant diverstiy	RO 1102 upstream, 1103 point discharge	C	B	B	B	B	B	2	3	3	3	3	3	2.83	B-	
1	1-L1	Rea Orthner	Reba Mitchell	Narrow NLC-Blue Spruce riparian corridor adjacent to homes. Scattered patches of riparian shrubs, but lackin gin areas due to homeowner landscaping.	RO1424, looking downstream and across	C	B	B	C	B	B	2	3	3	2	3	3	2.67	B-	
2	2-L3	Rea Orthner		Narrow NLC riparian corridor with good diverstiy of native shrubs & herbaceous layer, also BS. Seasonal or dog restrictions? Fishing trampling, some ox-eye daisy	RO 1436 looking NW, 1437 upstream, 1438 downstream from wp1483, 1439 trampling at wp 1484	B	B	A	A	A	A	3	3	4	4	4	4	3.67	A-	
0	2-L1	Rea Orthner	Reba Mitchell	Open meadow lacking cover of NLC & riparian shrubs. Dominated by smooth brome, field horsetail, some NLC regen 4-10' tall. Recommend plantings of riparian trees & shrubs. Surrounded by NLC along Castle Creek	RO 1104 looking NW, 1105 regen of NLC, 1106 overview interior	C-	B	D	D	D	NA	1.5	3	1	1	1	NULL	1.50	D+	yes
2	2-L2	Rea Orthner	Reba Mitchell	NLC riparian forest with good diversity of native shrubs & herbaceous layer. High quality paulustrine emergent wetland. Threatened by lg population of canada thistle. Recommedation-control nox weeds.	RO 1107-1108 wetland, 1109 Canada thistle, 1435 trampling by fishing	B	C-	B	A	A	A	3	1.5	3	4	4	4	3.25	B	

3	3-L1	Reba Mitchell		NLC, few BS, native shrubs along river. Pasture grasses throughout. Canada thistle along path, culvert under path is AA. Wp 1377, wetland areas. Phalaris present, clearing at bridge to river	RM 5663 upstream from bridge, 5664 downstream from bridge, 5665 clearing path	C	C	A	A	A	A	2	2	4	4	4	4	3.33	B+	
3	3-L2	Reba Mitchell		Down river section narrow riparian area. NLC & some native shrubs. Phalaris and pasture grasses throughout. Up river section willows, NLC, some Pine. Native shrubs and pasuture grasses. Phalaris present. Narrow/steep by park, nox weed (Tansy's).	RM 5666 buidling along roadway, 5667 upriver, 5668 upriver section	C	B	B	C	C	C	2	3	3	2	2	2	2.33	C+	
3	3-L3	Rea Orthner		Terrace above river NLC & BS, trail bisects AA, South is Newburry Park-Populas, poa mowed understory, (V5 D). North trail NLC/Aspen forest willow and other native shrubs. Pasture grasses and lg patch toad flax	RO 1455 park, 1456 riparian corridor on river, 1457 bench area	C-	B	C	D	A	D	1.5	3	2	1	4	1	2.08	C	
3	3-L4	Reba Mitchell		Small riparian corridor along private residential area. NLC domiate, some native shrubs. Lawns/landscaping up to river bank in areas. Sparce understory & low reveg of native species.	RM 5669 up river	D	B	C	D	C	D	1	3	2	1	2	1	1.67	C-	
3	3-R3	Rea Orthner		NLC riparian islands with riparian shrubs & pasture grasses. Nox weeds-toadflax, canada thistle. Recomendations-reduce social trails on upstream island, no trails on island downstream of bridge	RO 1458, 1459, 1460 downstream of bridge	C	B	C	A	A	A	2	3	2	4	4	4	3.17	B	
3	3-R1B	Rea Orthner	Reba Mitchell	NLC/BS riparian area. Recent restoration work, ditch/pond present. Improve pond by native riparian shrub plantings. Visitor's center lawn/benches, art reduces witdth of riparian area.	RO 1100 pond	C	B	B	B	B	C	2	3	3	3	3	2	2.67	B-	
4	4-R1	Rea Orthner		Narrow NLC corridor with diverse native shrubs (downstream carex wetland not in AA). Pasture grasses, lacking canopy of mature NLC in places. Wp1495 Anderson Park-opportunity for restoration ph1464-1465	RO 1461-wp1494, wetland, 1462 below cooper, 1463 above cooper, 1464-1465 Anderson Park	C	B	C	B	A	B	2	3	2	3	4	3	2.83	B-	
4	4-L1A	Reba Mitchell		NLC dominate & BS. Some native shrubs present, willow & non native ornamentals. Highly manicured lawns. Access to site low due to private property.	RM 5670 upriver E Hopkins, 5671-5672 on Riverside Ave	D	B	C	D	D	D	1	3	2	1	1	1	1.50	D+	
5	5-L3	Rea Orthner	Reba Mitchell	BS riparian woodland, Aspen/NLC/pine. Understory dominated by Red top, some Phalaris. Some native shrubs & herbaceous layer with timothy & orchard grass. Nox weeds-Ox-eye daisy	RO 1488 salt lick, 1489	C	C	C	C	A	B	2	2	2	2	4	3	2.50	C+	
0	5-L2	Rea Orthner		Open pasture dominated by Red top, timothy, dandelion, red clover, smooth brome patches. Canada thistle, scentless chamomile, toad flax, phalaris, Baltic rush. Willows in low lying areas & carex. Wetland. Historical aerial previous forested riparian	RO 1484 east, 1485 north	D	C-	D	D	D	NA	1	1.5	1	1	1	NULL	1.10	D	yes
5	5-R1	Rea Orthner		Irrigation ditch on river right. Narrow band of mixed Aspen/NLC with dense native shrubs. Some gaps in canopy of NLC without much regen. Understory pasture grasses. Nox weeds-tansy, canada thistle, hounds tongue	RO 1466 river rt, 1467 river left, 1468 irrigation ditch, 1471 down from wp1498, 1472 up from wp1498	C	C	C	C	B	B	2	2	2	2	3	3	2.33	C+	
5	5-R2	Rea Orthner		wp1499 restoration outside of AA. ph1473-1475 weedy disturbed, some NLC regen on edge. Some BS, willow wetland shrubland. Some Redtop, Canada thistle, browsing by elk	RO 1476 looking upstream, 1477 bench, 1478 interior, 1479 path	B	B	A	A	A	A	3	3	4	4	4	4	3.67	A-	
5	5-R3	Rea Orthner		Wet meadow, scattered willows. Phalaris dominate, area of beaked sedge. Lack of structural diverstiy, would expect more willows. NLC line irrigation ditch above	RO 1482 looking downstream, 1483 overview from ditch	C-	C	D	C	D	C	1.5	2	1	2	1	2	1.58	D+	???

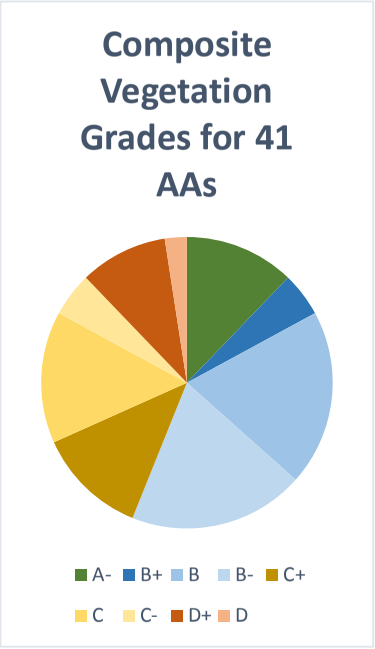
5	5-R4	Reba Mitchell		Dominate NLC some BS, native riparian shrubs. Herbaceouse layer of native veg patchy with pasture grasses. Willow along bank, head gates on both sides of upriver bank. Private land along river less managed lawns as those downriver.	RM 5677 Stillwater Ln down river across site, 5677 down river end along private properties	C	B	B	B	B	B	2	3	3	3	3	3	2.83	B-	
5	5-R5	Reba Mitchell		Some NLC, BS, Aspen (all ages), Willow. Large % of lawn and non native grasses up to river bank. Little to no riparian native heraceous layer due to lawns. Potentially riparian restoration area.	RM 5675 down river, 5676 up river	C-	B	C	C	C	NA	1.5	3	2	2	2	NULL	2.10	C	
5	5-L4	Rea Orthner	Reba Mitchell	Narrow riparian corridor of pine/spruce with native shrubs. Understory of pasture grasses, phalaris & scattered ox-eye daisy.	RO 1112	C-	C	C	B	B	B	1.5	2	2	3	3	3	2.42	C+	
5	5-L5	Rea Orthner	Reba Mitchell	Riparian bank lacking good cover of trees & shrubs. Area bisected by trail. Riparian veg on North side of trail only.	RO 1113 looking downstream	C-	B	C	C	B	C	1.5	3	2	2	3	2	2.25	C	
0	1-R2	Rea Orthner		Low lying pasture next to sm stand NLC, Potentially good restoration area. Dominated by smooth brome, intermediate wheat grasses, mullein & plumeless thiste present (sprayed). Some native shrubs and 6' tall NLC regen on east side & Aspens	RO 1421-1422	D	B	D	D	D	NA	1	3	1	1	1	NULL	1.40	D+	yes
3	3-R2	Rea Orthner		Narrow NLC riparian corridor in Spring st neighborhood. Bank armored with lg boulders, landscaping up to river edge in many areas, native shrubs present but low density	RO 1451 downstream, 1452-1453 upstream, 1454 downstream view of lawn wp1491	C-	B	C	C	B	C	1.5	3	2	2	3	2	2.25	C	
0	1-R6	Rea Orthner		NLC riparian area on steep slope N Rio Grande trail. Small wetland present with flow of water culverted under RG trail. NLC with native shrubs, Red top common. Not originally included in AA's	RO 1425-1427	C	B	C	C	A	B	2	3	2	2	4	3	2.67	B-	
1	1-R5B	Rea Orthner		S (upstream) of powerline, sturctural diversity is lower, NLC & Aspen with pasture grasses, lacks native shrub component. Canada thistle/ox-eye daisy, toadflax are common in interior, also plumeless thistle/cyno offic	RO 1431-1432	C-	C-	C	C	B	B	1.5	1.5	2	2	3	3	2.17	C	yes
2	2-R3A	Reba Mitchell		Narrow steep sloped AA. Mixed forest decadent NLC, Pine, BS, Oak, Juniper. All stages of Aspen. Native shrub & herbaceous layer on upper slope not included in AA	RM 5659 downriver	B	B	B	B	A	B	3	3	3	3	4	3	3.17	B	
3	3-R1A	Rea Orthner	Reba Mitchell	Narrow NLC riparian forest, healthy native shrubs & herbaceous layer. Trail bisects portions of AA. Nox weeds bindweed, tansy, mullein & canada thistle	RO 1446 upstream at wp1448, 1447 downstream, 1449 upstream at wp 1489	C	B	B	B	A	A	2	3	3	3	4	4	3.17	B	
4	4-L1B	Reba Mitchell		After Wheeler trail access off Ute Ave private property along riparian area ends. More diversed native shrubs & herbaceous layer present, Wp 1379. Pasture grasses present, nox weeds-ox-eye daisy, tansy along trail. wp 1378 head gate/irrigaiton ditch	RM 5673	B	B	A	B	B	B	3	3	4	3	3	3	3.17	B	
0	5-L1A	Rea Orthner		Narrow NLC riparian, some Aspen with native shrubs, pasture grasses. Herbaceous layer has redtop, smooth brome.	RO 1469 looking downstream	C-	B	C	C	C	C	1.5	3	2	2	2	2	2.08	C	
5	5-L1B	Rea Orthner		NLC riparian forest on steep slope. Good cover of riparian shrubs. Pasture grasses & horsetail understory	RO 1470 looking upstream	C	B	B	A	A	B	2	3	3	4	4	3	3.17	B	
5	5-L1C	Rea Orthner		Narrow riparian corridor dominated by willows, some alder. Herbaceous layer non native phalaris, red top, smooth brome	RO 1486 downstream, 1487 upstream	C-	D	C	D	C	B	1.5	1	2	1	2	3	1.75	C-	

Notes	EIA Numeric Rank
A	4
B	3
C	2
C-	1.5
D	1

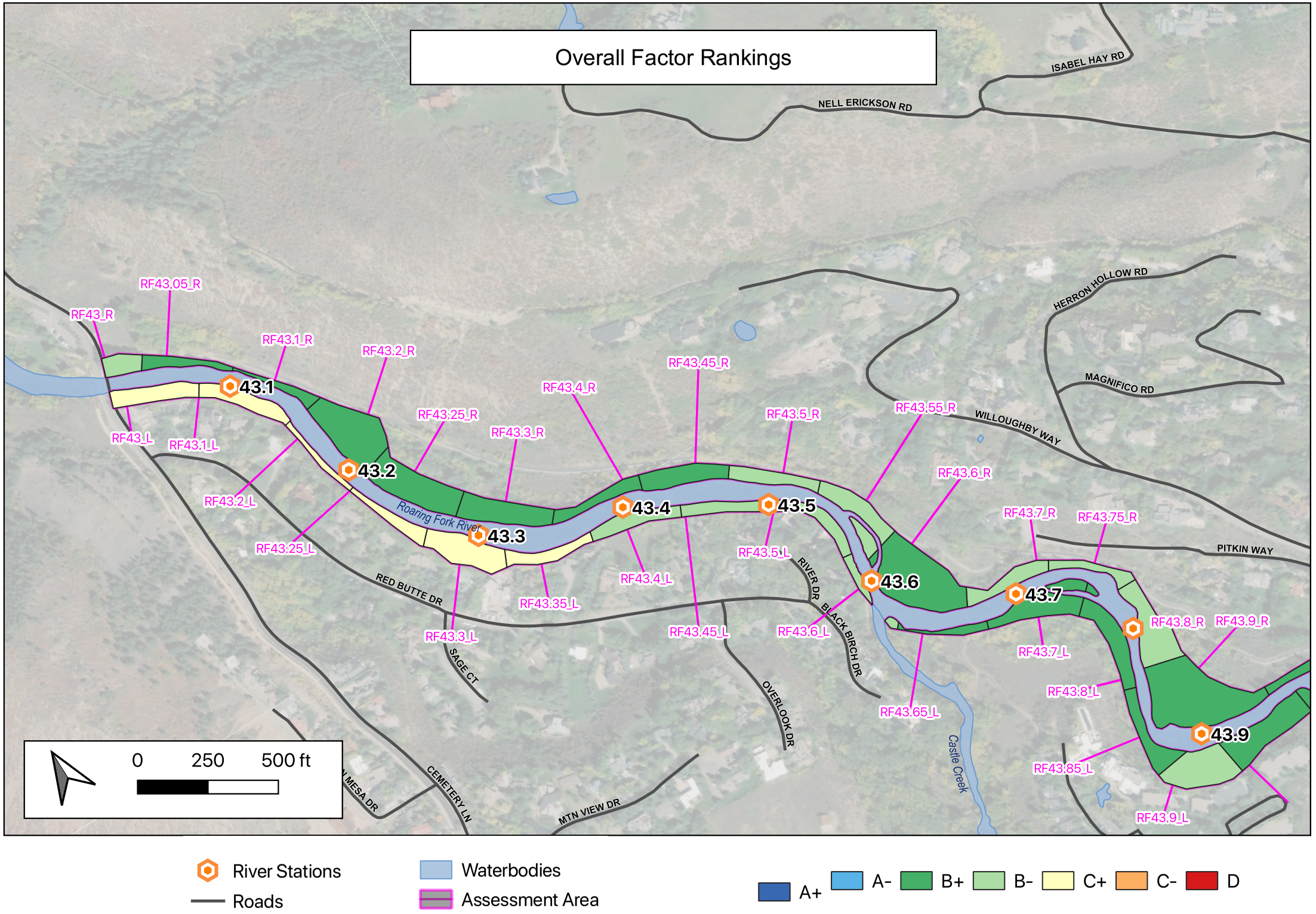
GRADING		Min. Value Needed
	97–100%	4.33 or 4.00
A	93–96%	4
A−	90–92%	3.67
B+	87–89%	3.33
B	83–86%	3
B−	80–82%	2.67
C+	77–79%	2.33
C	73–76%	2
C-	70–72%	1.67
D+	67–69%	1.33
D	63–66%	1
D-	60–62%	0.67
F	0–59%	0

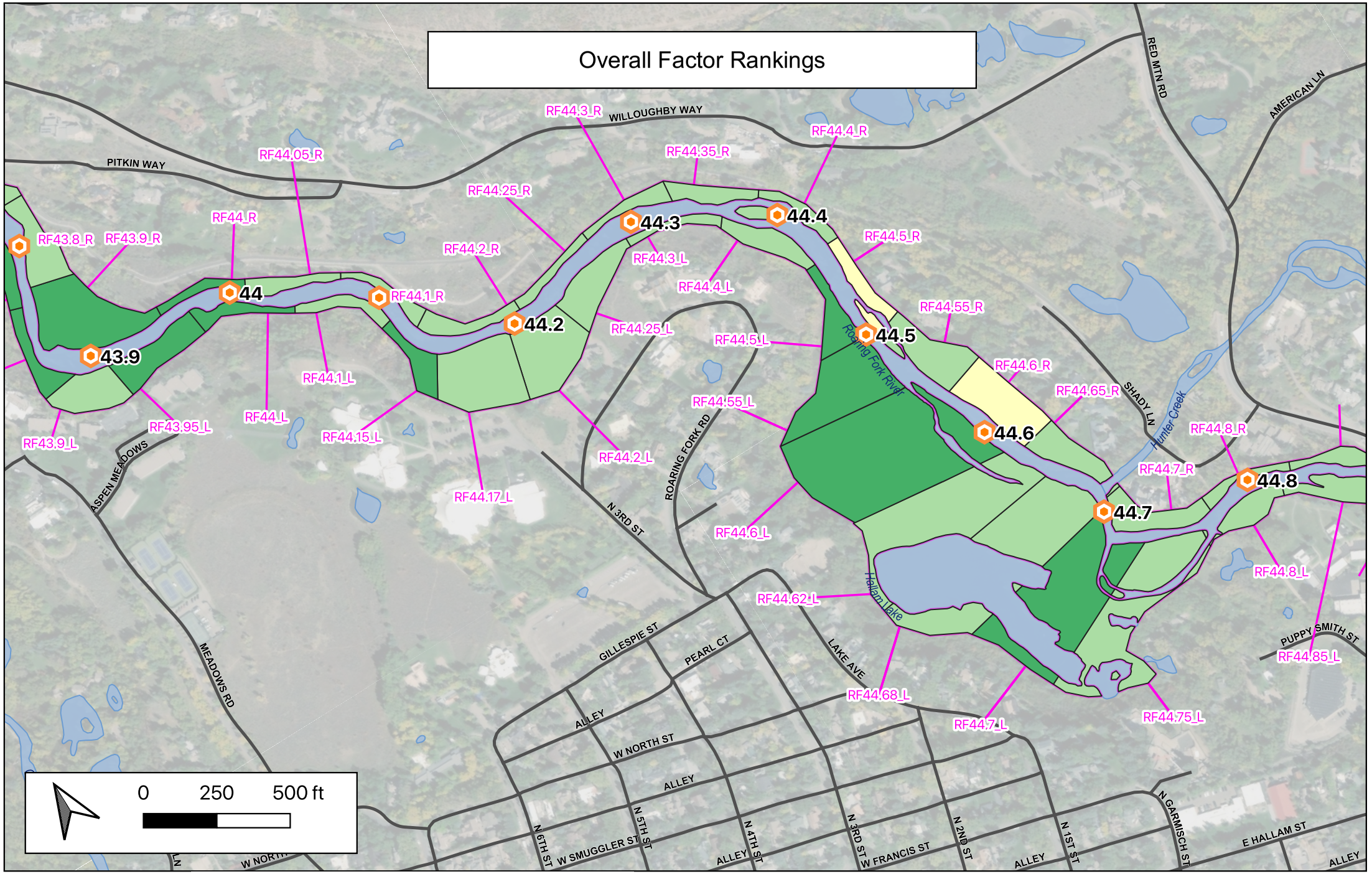
COUNTS	
A-	**5**
B+	**2**
B	**8**
B-	**8**
C+	**5**
C	**6**
C-	**2**
D+	**4**
D	**1**
	41

A	12%
B	44%
C	32%
D	12%
	100%



Ecological Integrity Assessment Results for Riparian Areas in the City of Aspen


Overall Factor Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43_R
RF43.05_R
RF43.1_R
RF43.2_R
RF43.25_R
RF43.3_R
RF43.4_R
RF43.45_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Overall Factor Rankings
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PITKIN WAY
RED MTN RD
AMERICAN LN
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RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
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RF44.55_R
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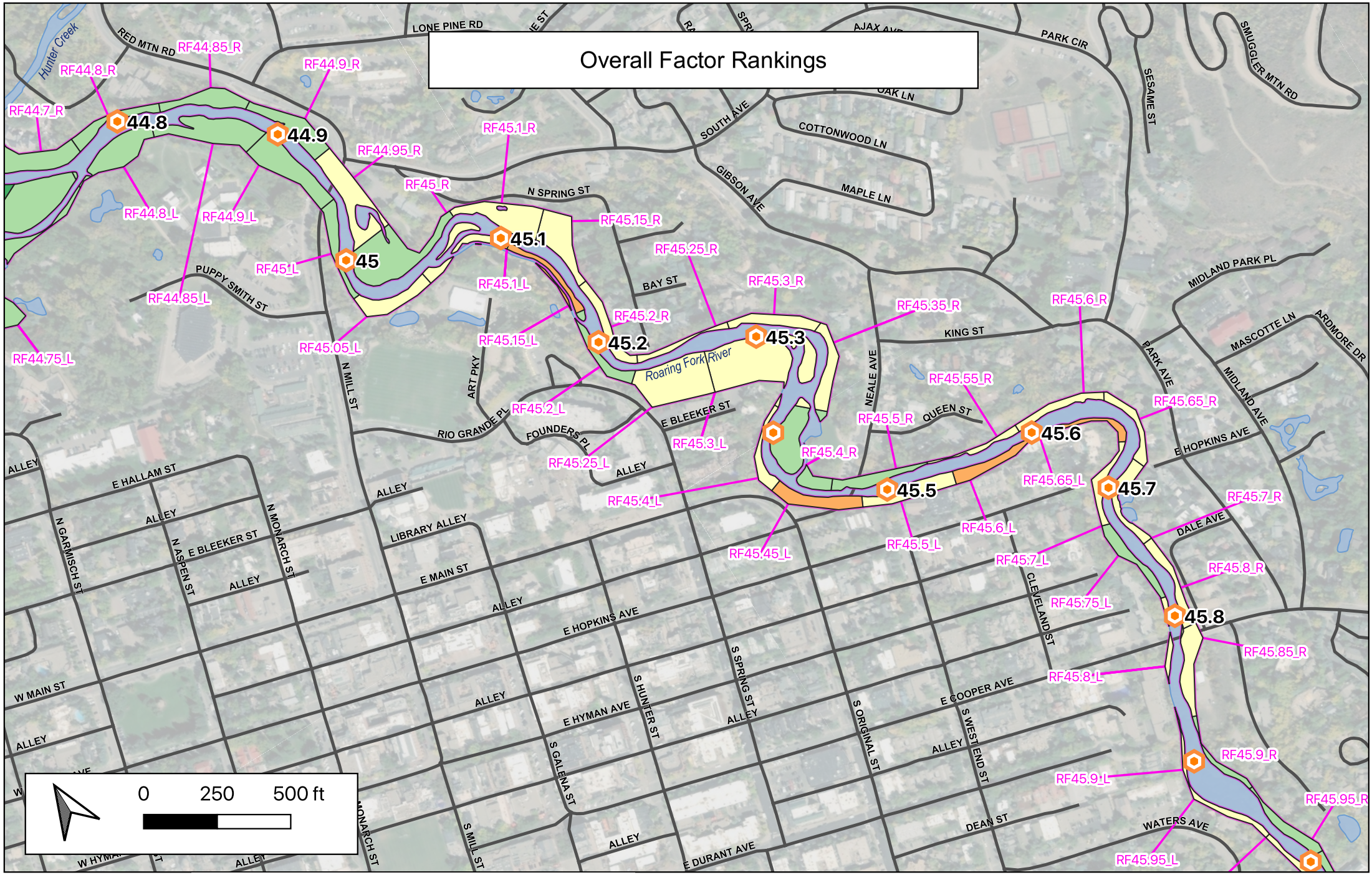
RF44.5_L
44.5
43.9
RF44.6_R
RF44.1_L
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.55_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
44.6
RF43.9_L
RF44.2_L
RF44.7_R
44.8
ASPEN MEADOWS
ROARING FORK RD
RF44.17_L
N 3RD ST
44.7
RF44.6_L
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
GILLESPIE ST
PEARL CT
LAKE AVE
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Overall Factor Rankings
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LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
KING ST
NEALE AVE
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
QUEEN ST
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
Roaring Fork River
ALLEY
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
WATERS AVE
DEAN ST
E DURANT AVE
S MILL ST
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45_R
RF45.1_R
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RF45_L
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RF45.05_L
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RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
44.8
44.9
45
45.1
45.2
45.3
45.5
45.6
45.7
45.8
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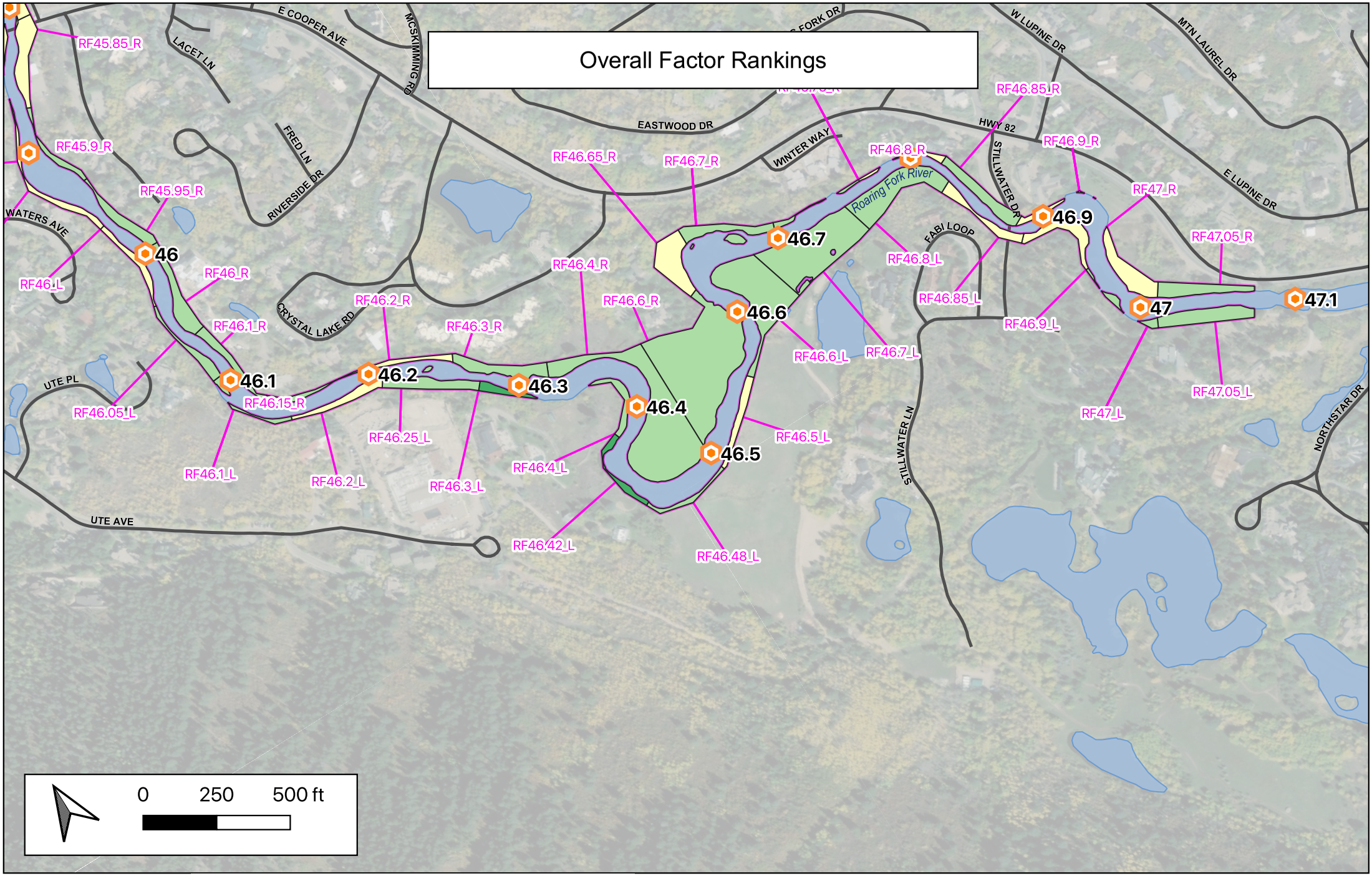
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Overall Factor Rankings
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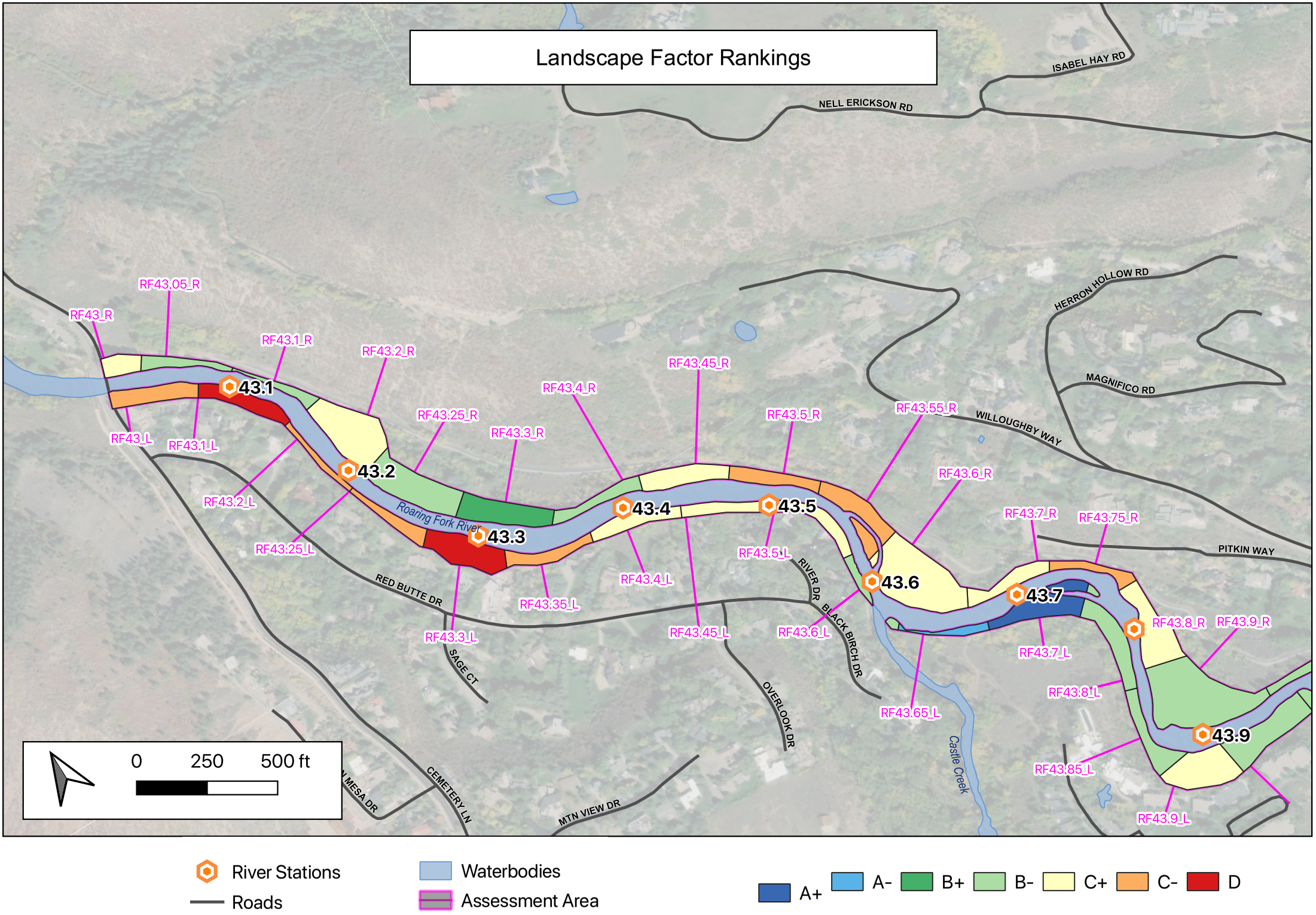
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
E LUPINE DR
RF46.85_R
RF46.9_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
FABI LOOP
46.9
RF47_R
RF47.05_R
46.7
RF46.8_L
46
RF46_L
RF46_R
RF46.4_R
RF46.6_R
46.6
RF46.85_L
47
47.1
RF46.9_L
CRYSTAL LAKE RD
RF46.2_R
RF46.3_R
RF46.1_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
46.4
46.5
RF46.05_L
RF46.15_R
RF46.25_L
RF46.5_L
RF47_L
RF47.05_L
NORTHSTAR DR
STILLWATER LN
RF46.1_L
RF46.2_L
RF46.3_L
RF46.4_L
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Landscape Factor Rankings
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HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
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RF43_R
RF43.05_R
RF43.1_R
RF43.2_R
RF43.25_R
RF43.3_R
RF43.4_R
RF43.45_R
RF43.5_R
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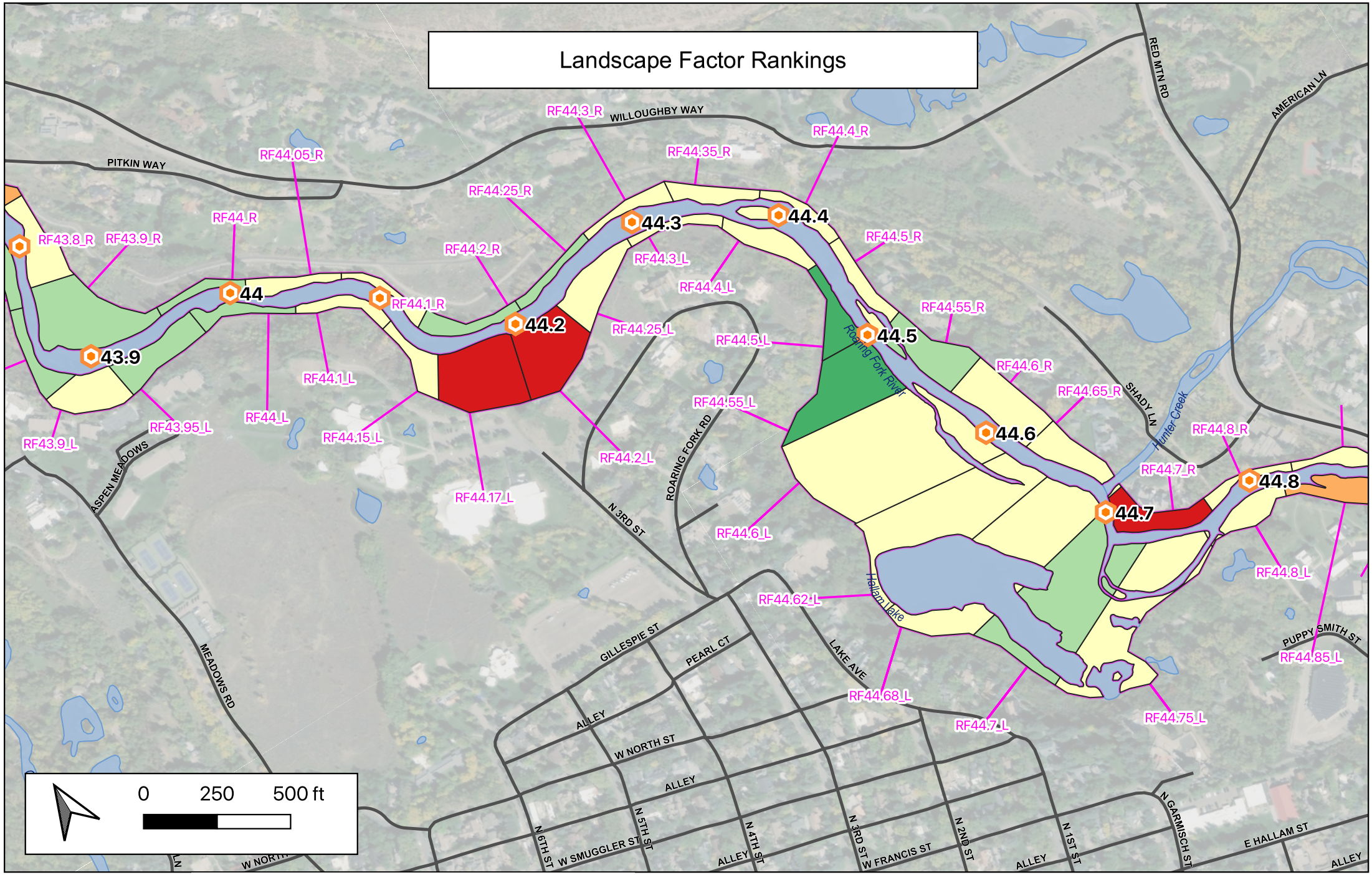
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D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AMERICAN LN
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RF44.55_R
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RF44.5_L
Roaring Fork River
RF44.6_R
RF44.65_R
SHADY LN
Hunter Creek
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RF44.8_R
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RF44.1_L
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RF44.2_L
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RF44.7_R
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RF44.17_L
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PUPPY SMITH ST
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
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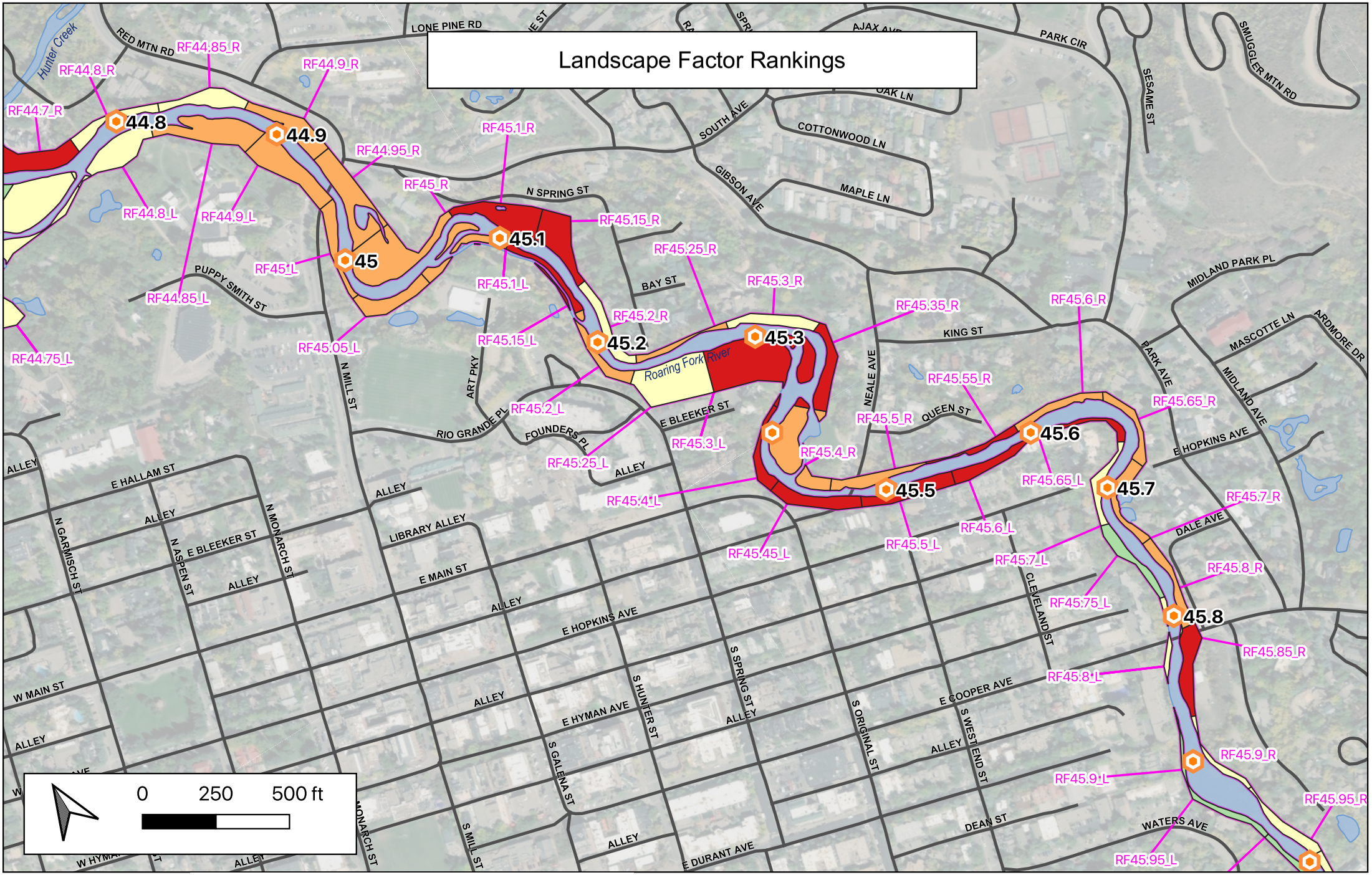
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Landscape Factor Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
KING ST
NEALE AVE
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
QUEEN ST
Roaring Fork River
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
WATERS AVE
DEAN ST
E DURANT AVE
S MILL ST
ALLEY
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
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RF45.7_L
RF45.8_R
RF45.75_L
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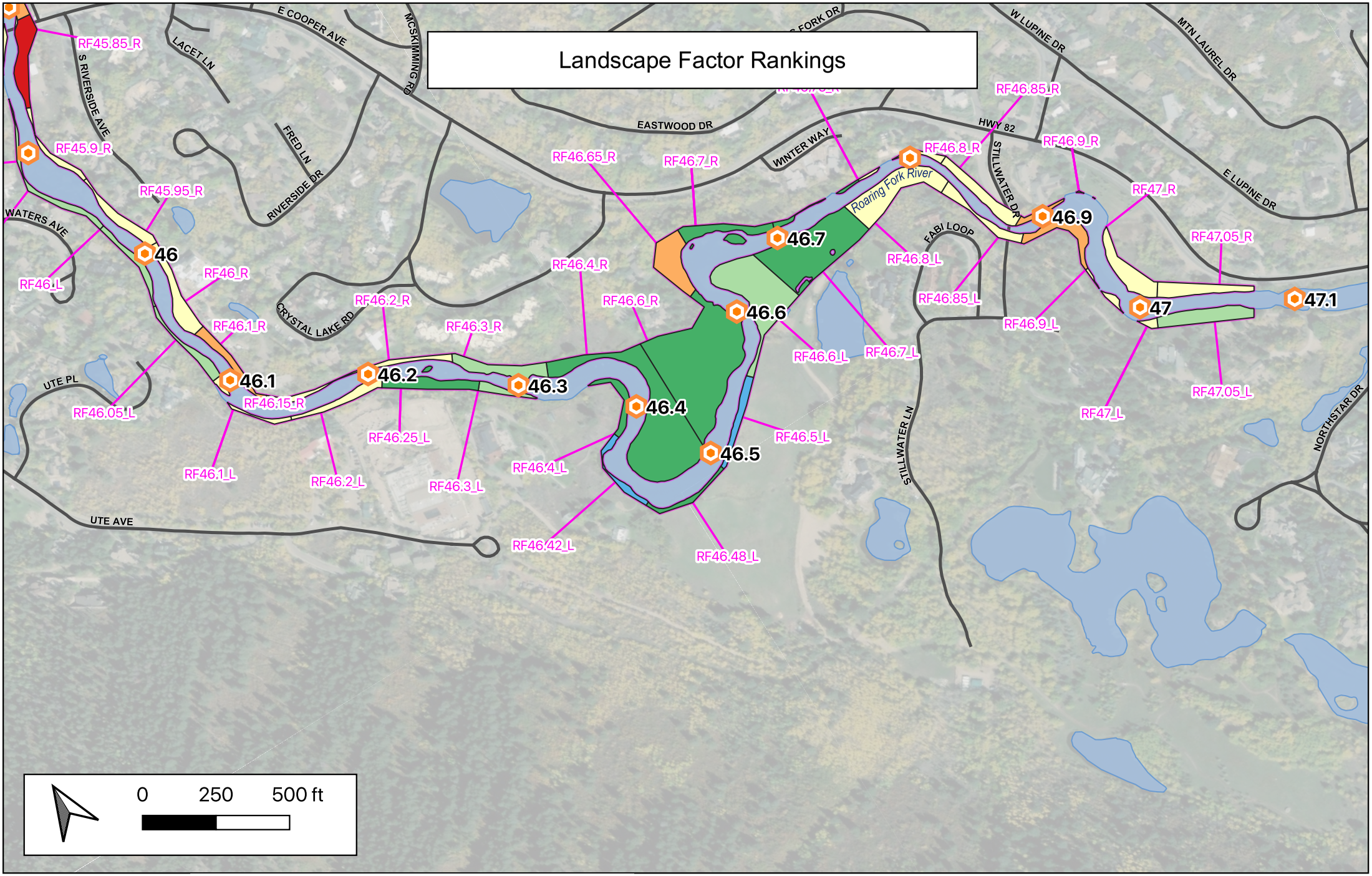
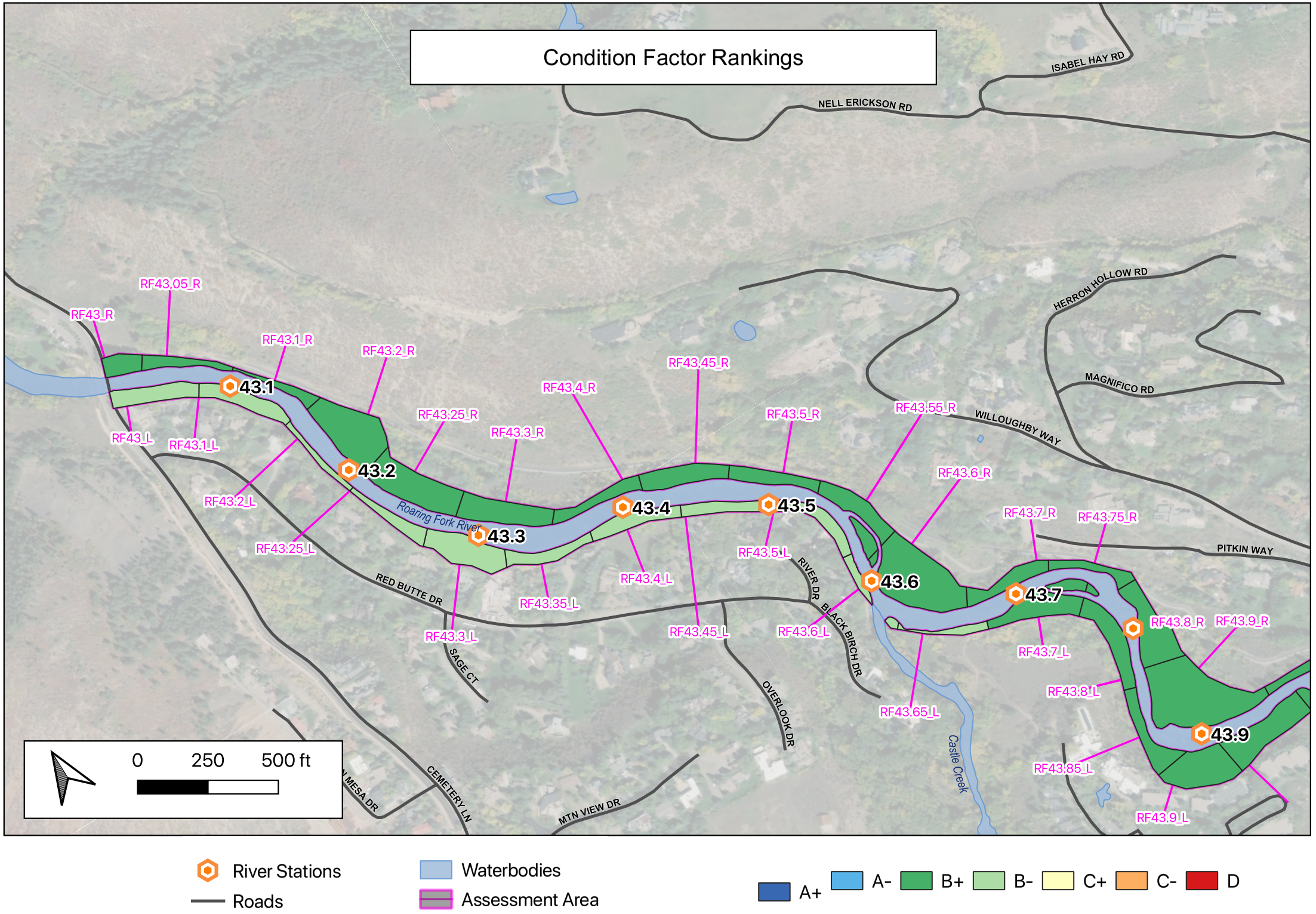
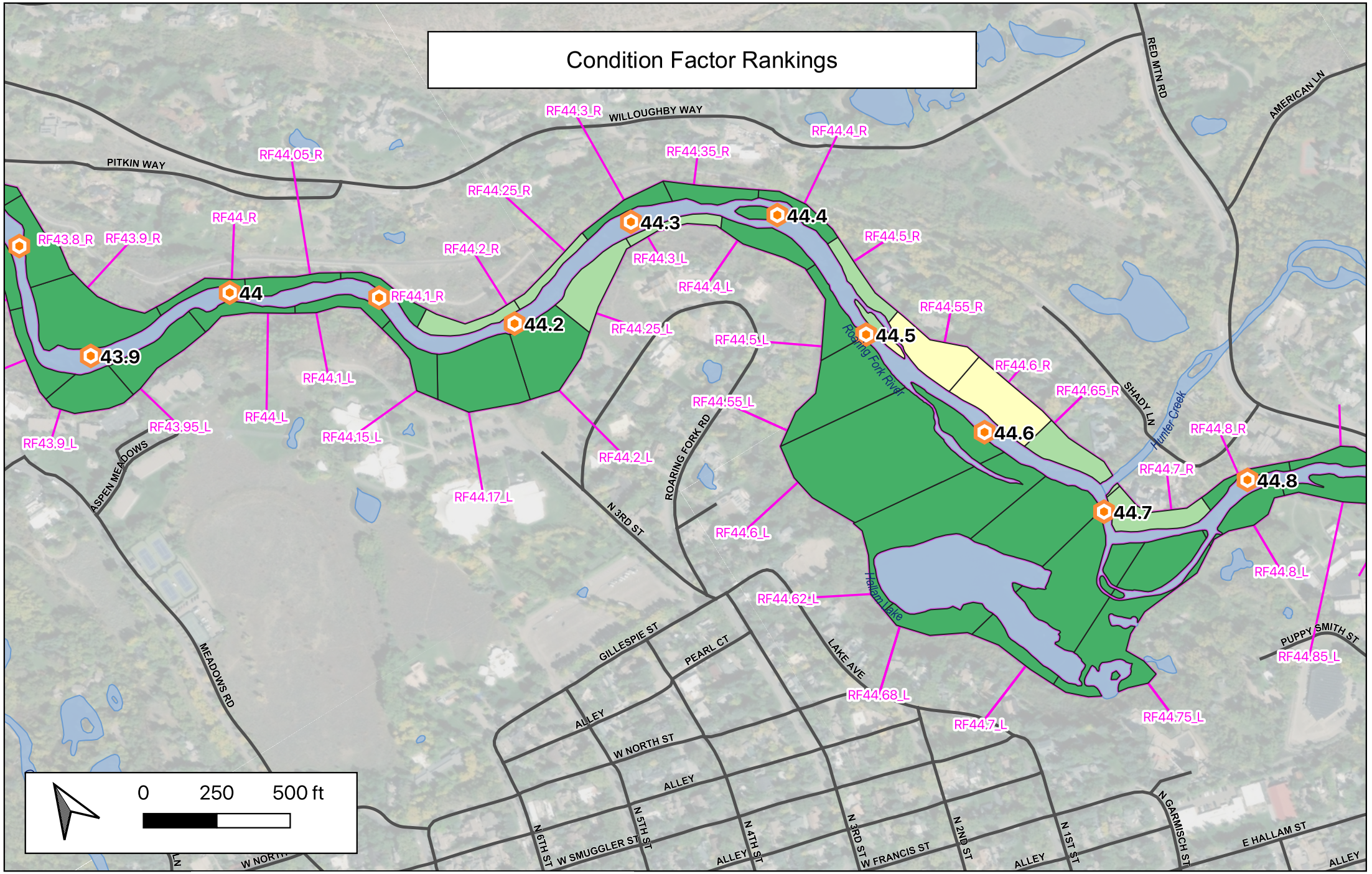
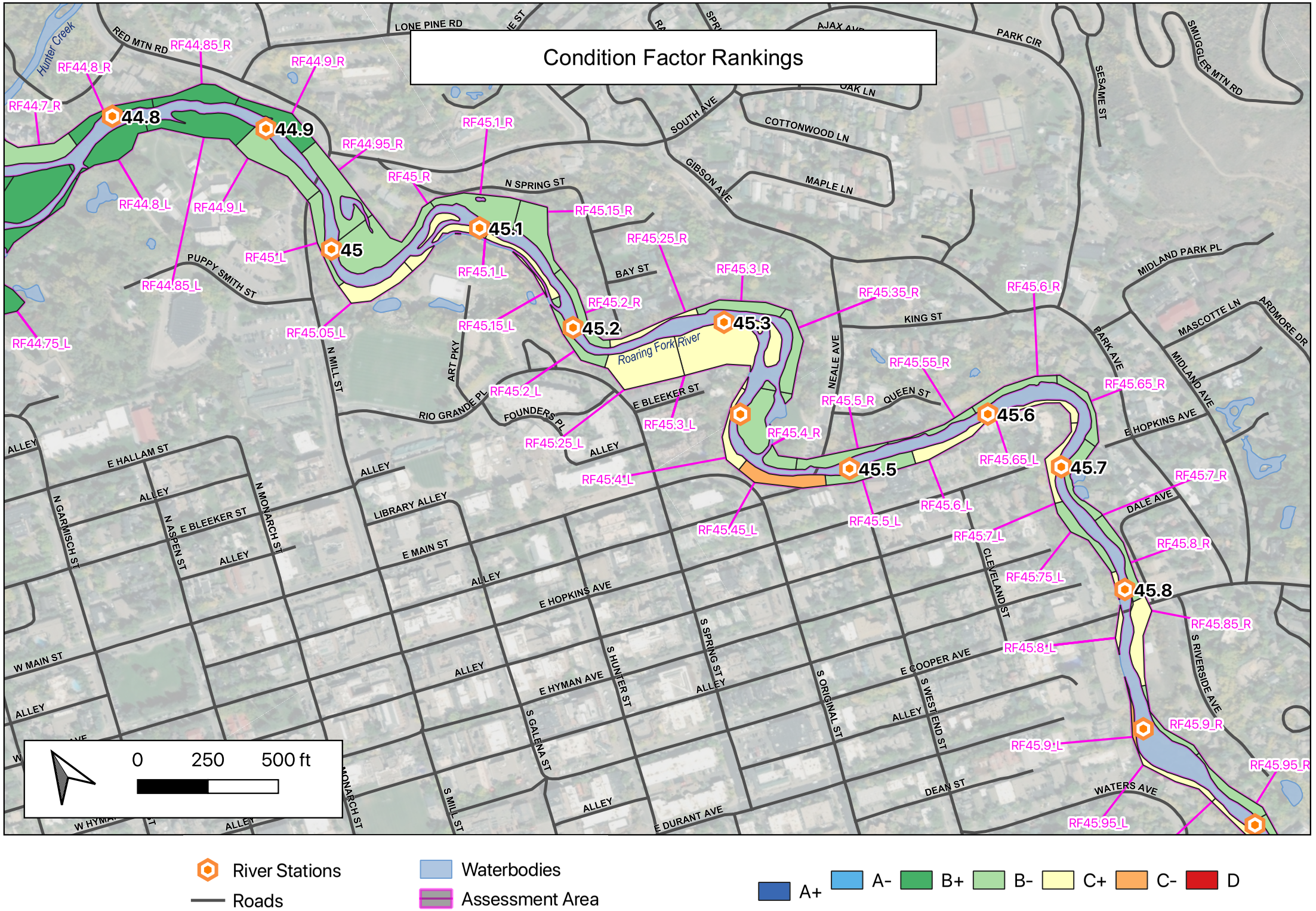
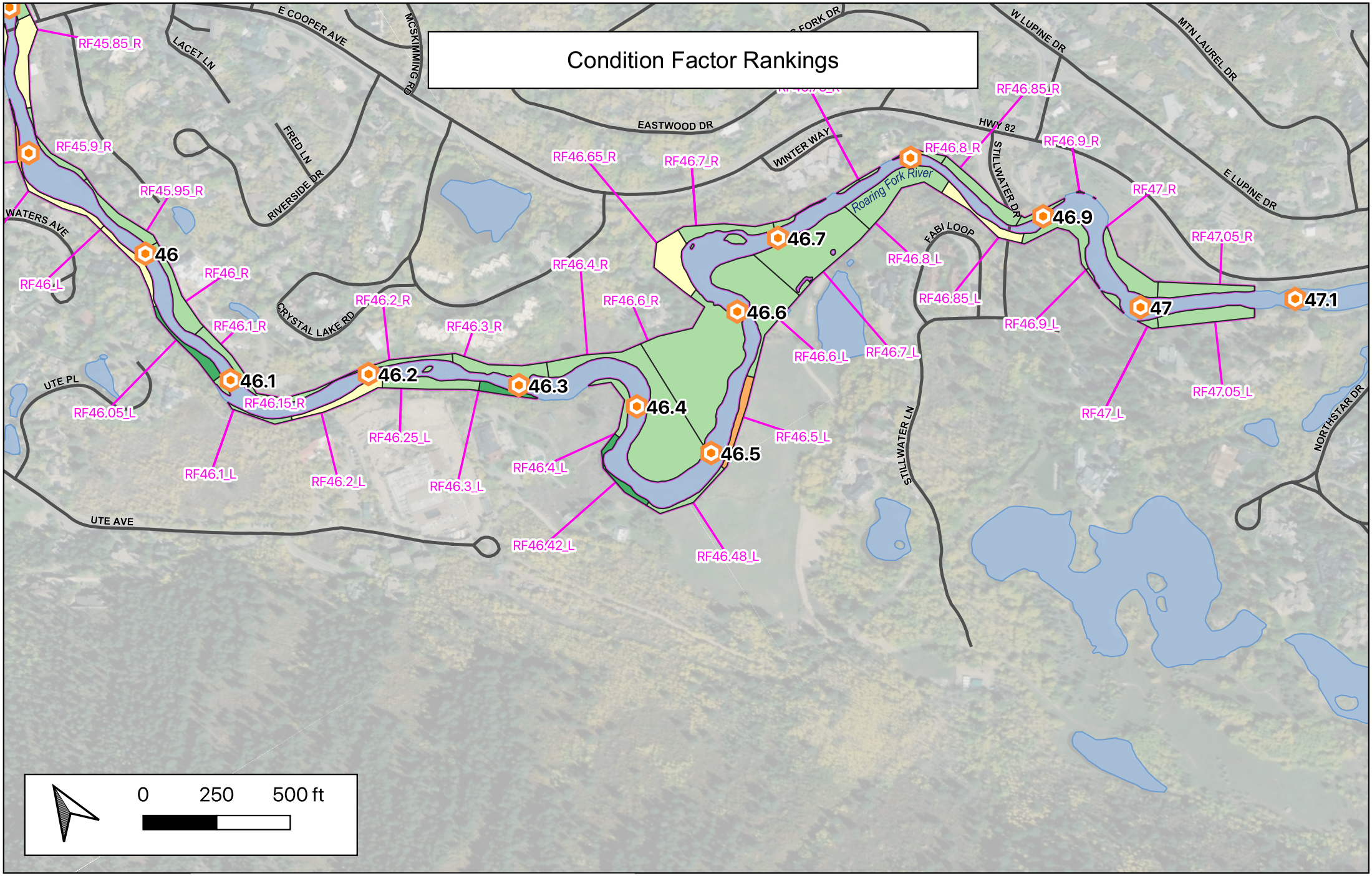
45.6
45.7
45.8
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D

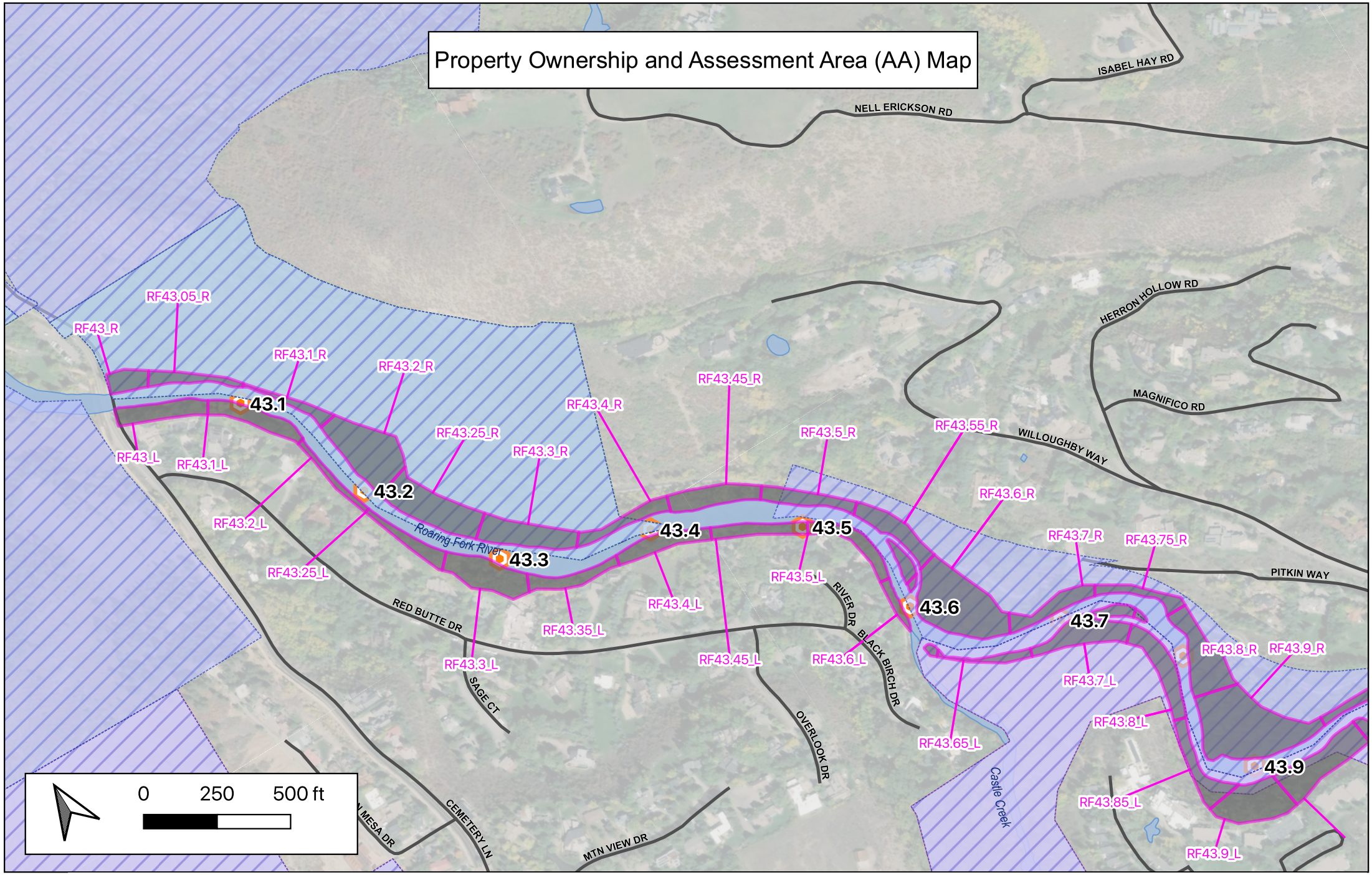

Landscape Factor Rankings
RF45.85_R
RF45.9_R
RF45.95_R
RF46_L
RF46_R
RF46.1_R
RF46.05_L
RF46.15_R
RF46.1_L
RF46.2_R
RF46.2_L
RF46.25_L
RF46.3_R
RF46.3_L
RF46.4_R
RF46.4_L
RF46.42_L
RF46.48_L
RF46.5_L
RF46.6_R
RF46.6_L
RF46.65_R
RF46.7_R
RF46.7_L
RF46.8_R
RF46.8_L
RF46.85_R
RF46.85_L
RF46.9_R
RF46.9_L
RF47_R
RF47_L
RF47.05_R
RF47.05_L
46
46.1
46.2
46.3
46.4
46.5
46.6
46.7
46.9
47
47.1
Roaring Fork River
E COOPER AVE
LACET LN
S RIVERSIDE AVE
MCSKIMMING RD
FRED LN
RIVERSIDE DR
WATERS AVE
EASTWOOD DR
WINTER WAY
HWY 82
STILLWATER DR
W LUPINE DR
E LUPINE DR
MTN LAUREL DR
FABI LOOP
CRYSTAL LAKE RD
UTE PL
UTE AVE
STILLWATER LN
NORTHSTAR DR
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D

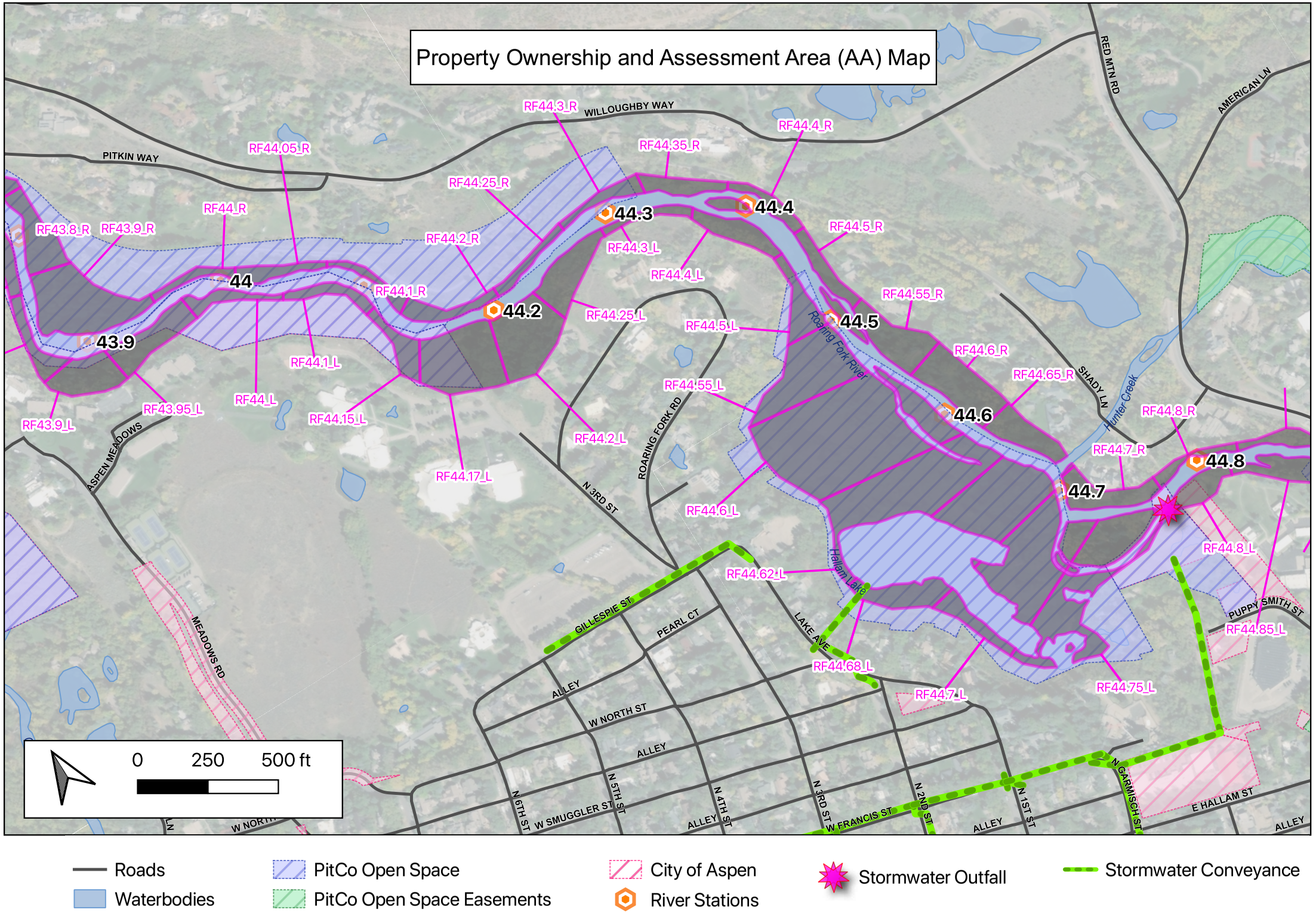

Condition Factor Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
MTN VIEW DR
CEMETERY LN
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D

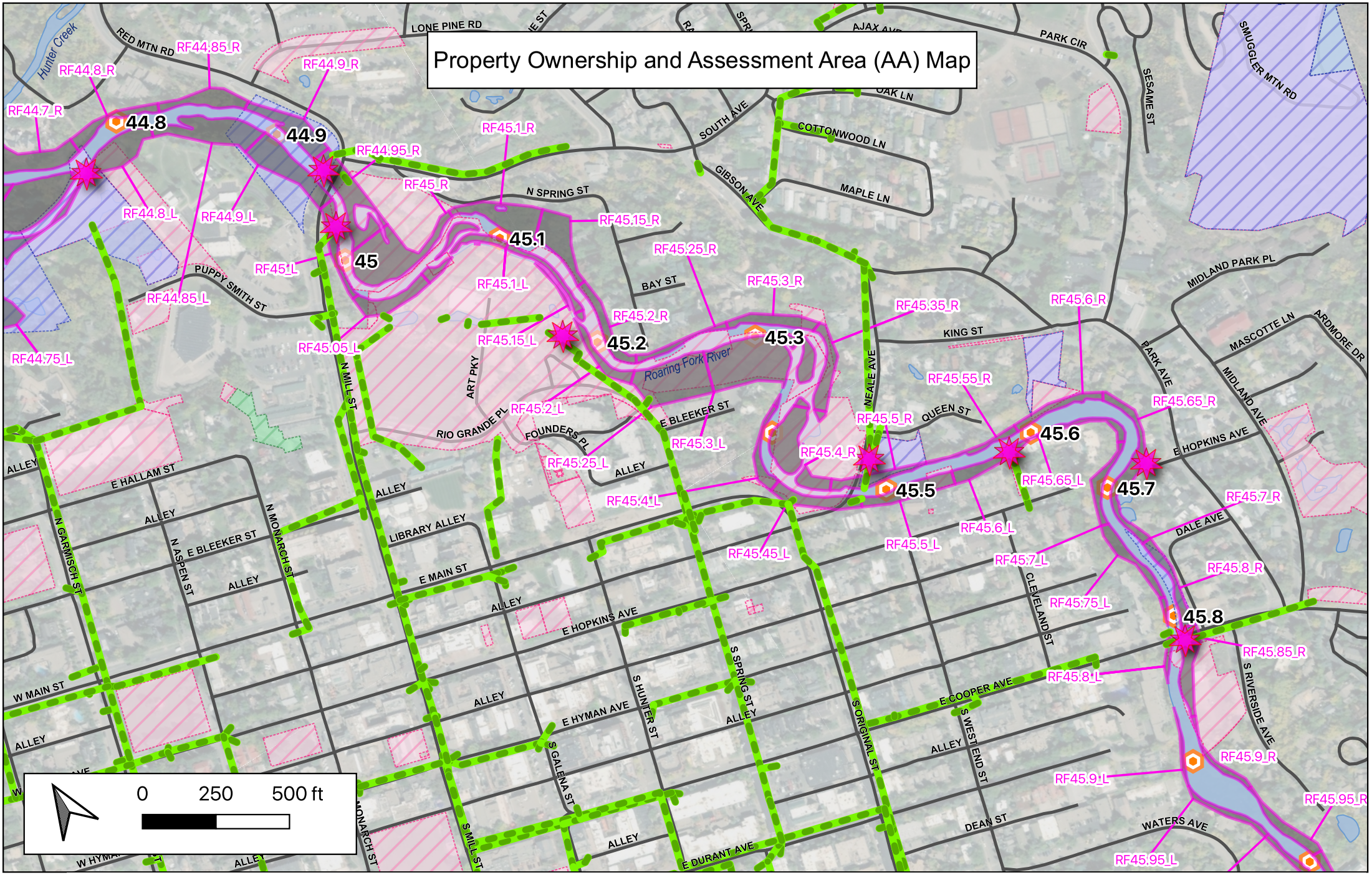

Condition Factor Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
44.5
RF44.5_L
Roaring Fork River
RF44.6_R
RF44.65_R
SHADY LN
Hunter Creek
RF44.1_L
RF44.55_L
RF44.8_R
43.9
RF43.95_L
RF44_L
RF44.15_L
RF44.6
RF43.9_L
RF44.2_L
ROARING FORK RD
RF44.7_R
44.8
ASPEN MEADOWS
RF44.17_L
N 3RD ST
44.7
RF44.6_L
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
RF44.85_L
GILLESPIE ST
PEARL CT
LAKE AVE
MEADOWS RD
RF44.68_L
ALLEY
RF44.7_L
RF44.75_L
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Condition Factor Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
ART PKY
N MILL ST
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
KING ST
NEALE AVE
QUEEN ST
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
S RIVERSIDE AVE
WATERS AVE
DEAN ST
E DURANT AVE
S MILL ST
ALLEY
Roaring Fork River
44.8
44.9
45
45.1
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF45.1_R
RF44.95_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.05_L
RF44.75_L
RF45.15_L
RF45.2_R
RF45.2_L
RF45.25_L
RF45.3_L
RF45.4_R
RF45.55_R
RF45.5_R
RF45.65_R
RF45.65_L
RF45.7_R
RF45.4_L
RF45.45_L
RF45.5_L
RF45.6_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Condition Factor Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
E LUPINE DR
RF46.85_R
RF46.9_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
STILLWATER DR
Roaring Fork River
RF47_R
46.9
46.7
FABI LOOP
RF47.05_R
46
RF46_L
RF46_R
RF46.4_R
RF46.8_L
RF46.85_L
47.1
47
RF46.9_L
CRYSTAL LAKE RD
RF46.2_R
RF46.6_R
46.6
RF46.1_R
RF46.3_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
46.4
RF46.05_L
RF46.15_R
RF47.05_L
RF47_L
NORTHSTAR DR
RF46.25_L
RF46.5_L
46.5
RF46.1_L
RF46.2_L
RF46.3_L
RF46.4_L
STILLWATER LN
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Property Ownership and Assessment Area (AA) Map
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43_05_R
RF43_R
RF43_1_R
RF43_2_R
RF43_45_R
RF43_4_R
RF43_25_R
RF43_3_R
RF43_5_R
RF43_55_R
RF43_6_R
RF43_7_R
RF43_75_R
RF43_8_R
RF43_9_R
RF43_L
RF43_1_L
RF43_2_L
RF43_25_L
RF43_3_L
RF43_35_L
RF43_4_L
RF43_45_L
RF43_5_L
RF43_6_L
RF43_65_L
RF43_7_L
RF43_8_L
RF43_85_L
RF43_9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
Roads
Waterbodies
PitCo Open Space
PitCo Open Space Easements
City of Aspen
River Stations
Stormwater Outfall
Stormwater Conveyance


Property Ownership and Assessment Area (AA) Map
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
RF44.2_R
44.3
44.4
RF44.5_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.25_L
RF44.55_R
RF44.5_L
44.5
43.9
RF44.1_L
RF44.6_R
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.55_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
44.6
RF43.9_L
RF44.2_L
RF44.7_R
ASPEN MEADOWS
ROARING FORK RD
44.8
RF44.17_L
N 3RD ST
44.7
RF44.6_L
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
RF44.85_L
GILLESPIE ST
PEARL CT
LAKE AVE
MEADOWS RD
RF44.68_L
ALLEY
RF44.7_L
RF44.75_L
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
Roads
Waterbodies
PitCo Open Space
PitCo Open Space Easements
City of Aspen
River Stations
Stormwater Outfall
Stormwater Conveyance


Property Ownership and Assessment Area (AA) Map
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
COTTONWOOD LN
SOUTH AVE
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
KING ST
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
NEALE AVE
QUEEN ST
E HOPKINS AVE
DALE AVE
CLEVELAND ST
E BLEEKER ST
RIO GRANDE PL
FOUNDERS PL
ART PKY
N MILL ST
E HALLAM ST
ALLEY
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S GALENA ST
S SPRING ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
S RIVERSIDE AVE
E DURANT AVE
DEAN ST
WATERS AVE
Roaring Fork River
44.8
44.9
45
45.1
45.2
45.3
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
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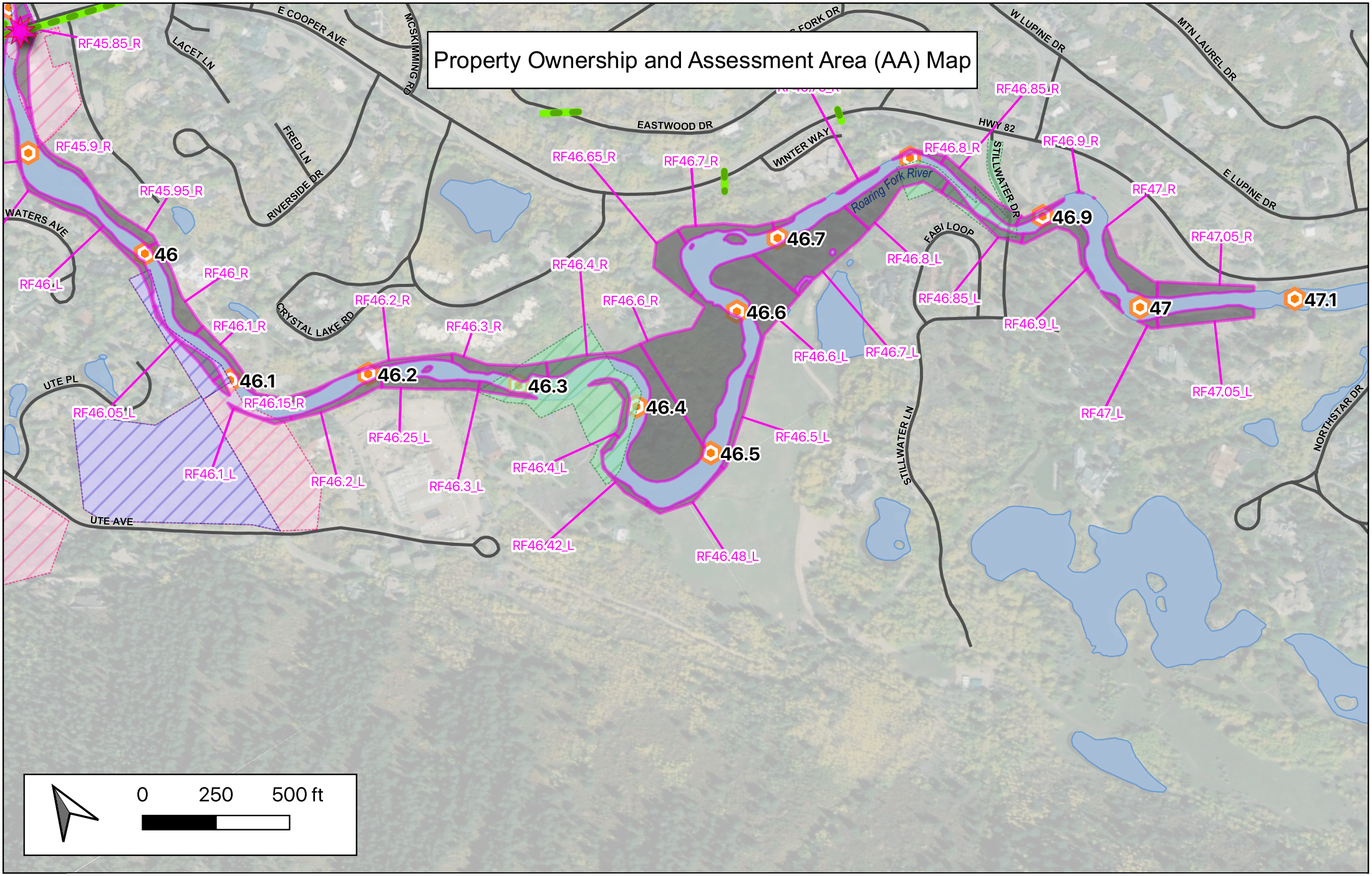
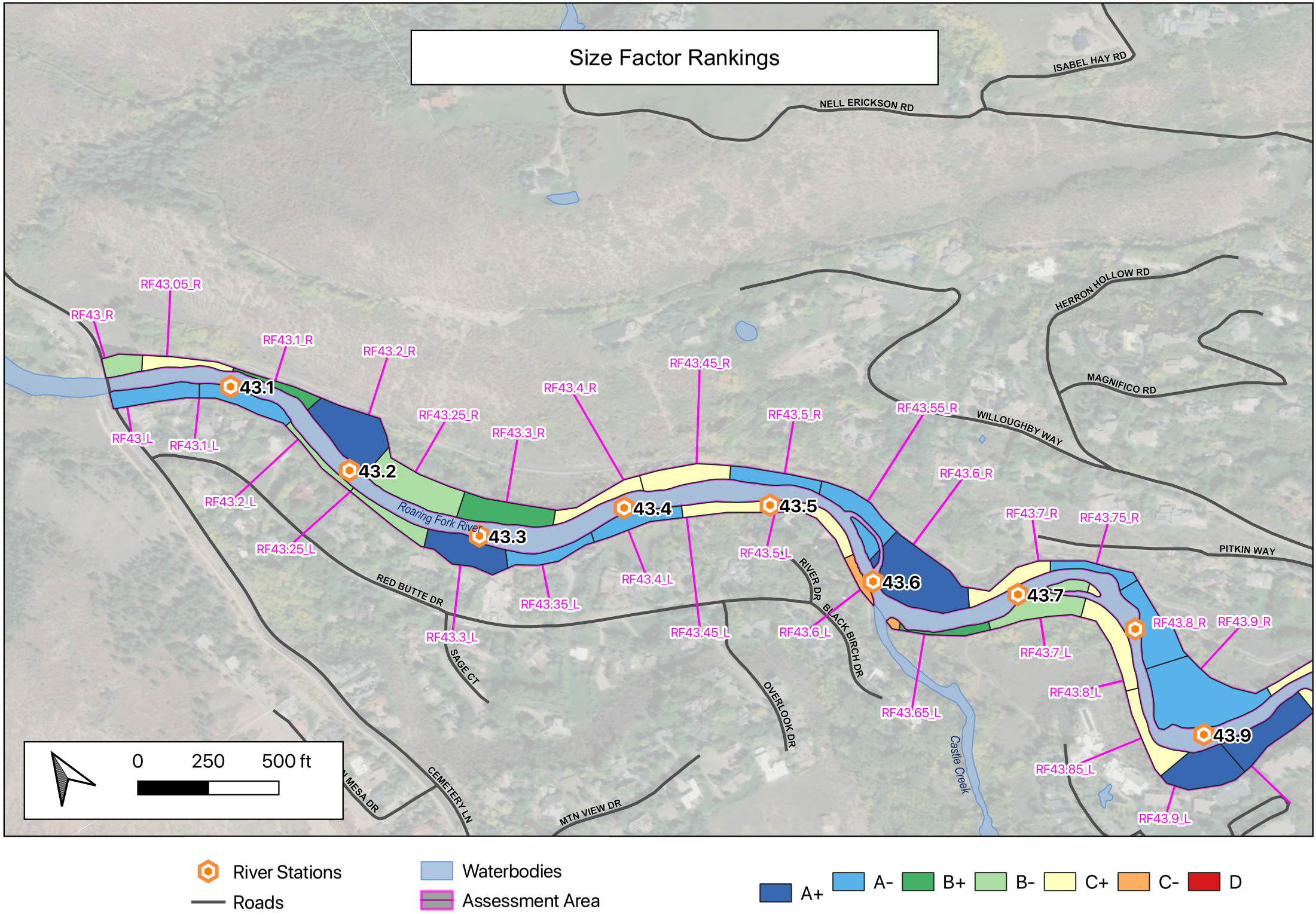
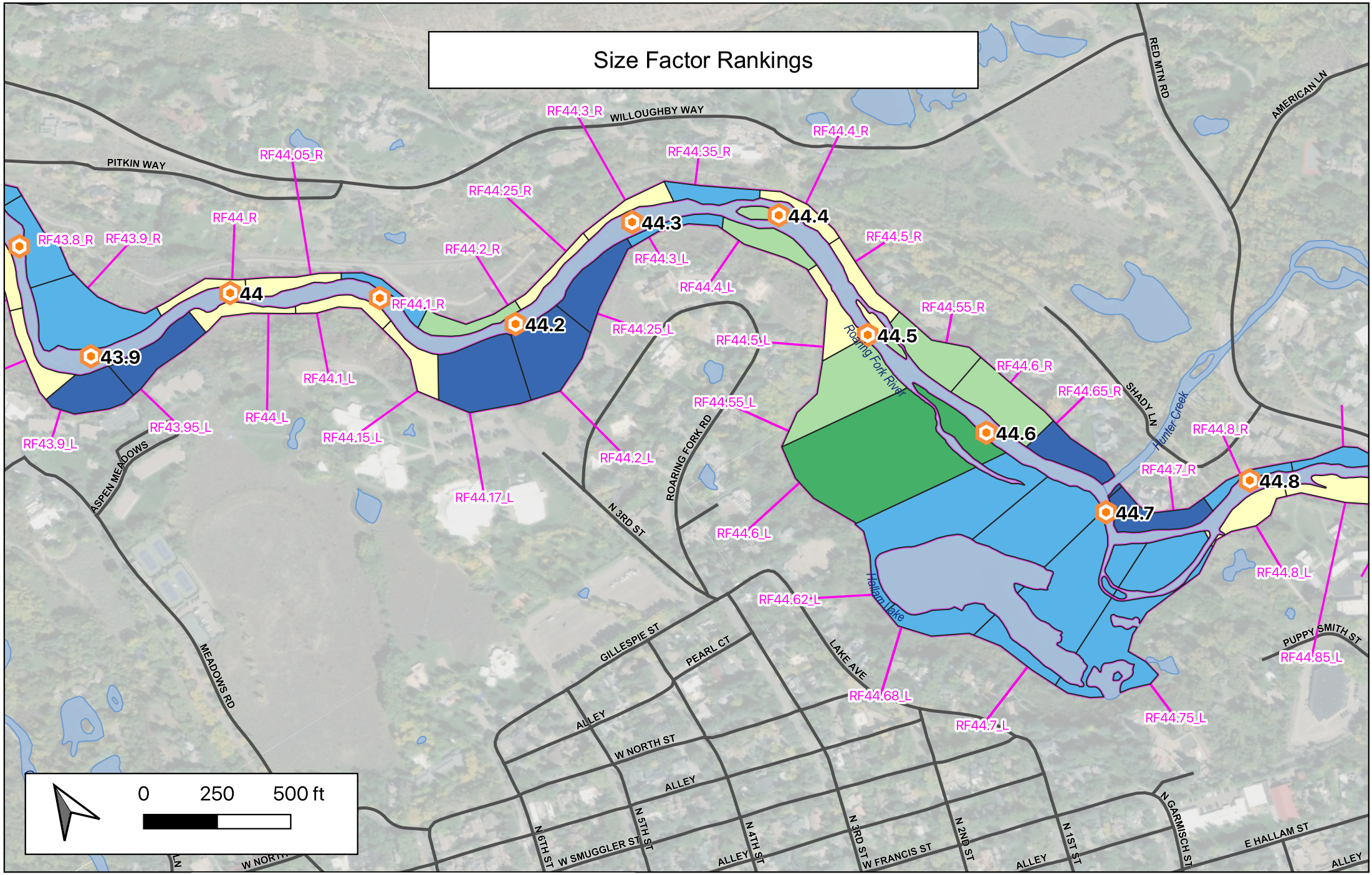
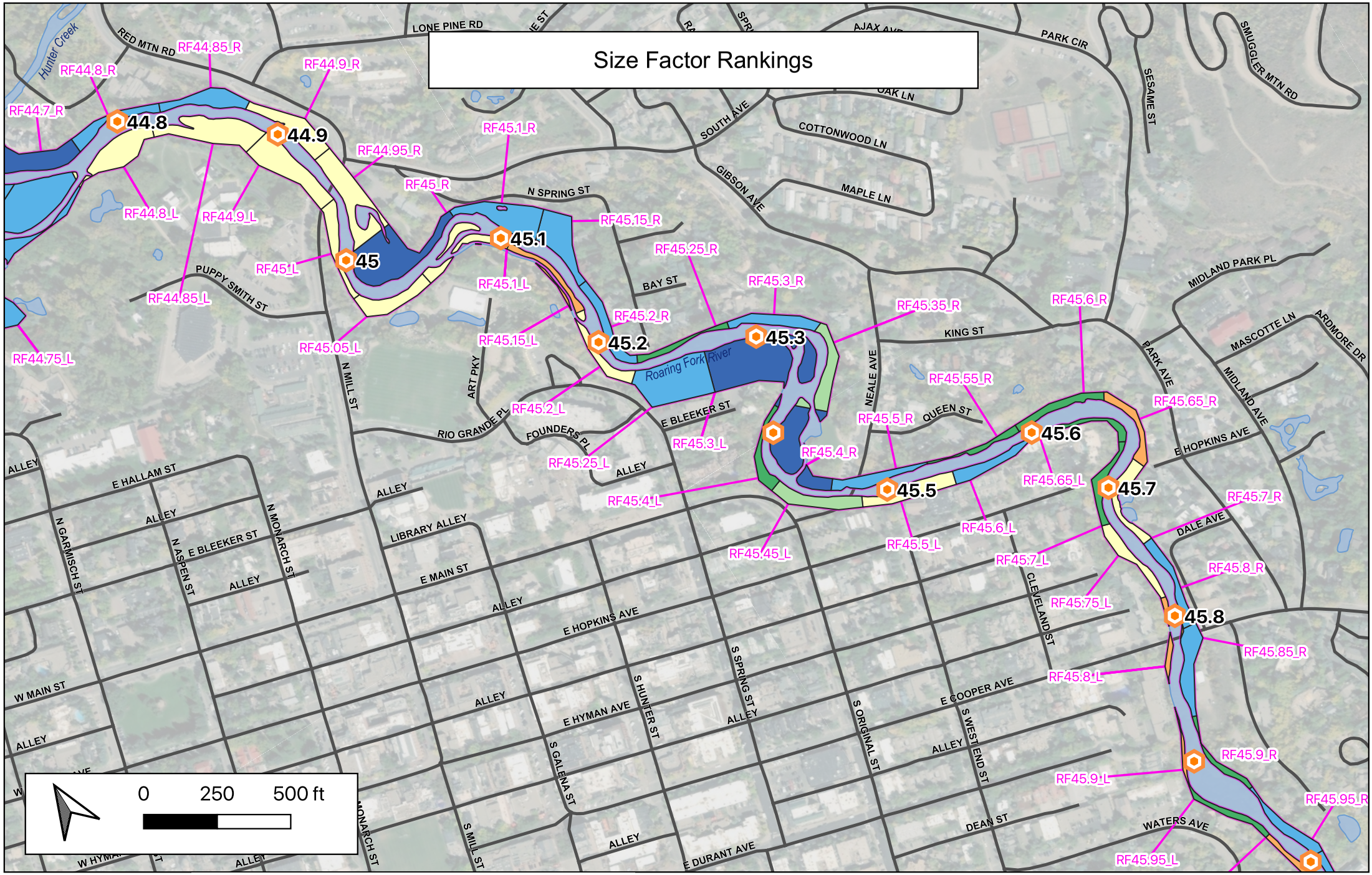
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.2_R
RF44.75_L
RF45.05_L
RF45.15_L
RF45.2_L
RF45.3_L
RF45.25_L
RF45.4_L
RF45.4_R
RF45.55_R
RF45.5_R
RF45.65_R
RF45.65_L
RF45.7_R
RF45.6_L
RF45.5_L
RF45.45_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
0
250
500 ft
Roads
Waterbodies
PitCo Open Space
PitCo Open Space Easements
City of Aspen
River Stations
Stormwater Outfall
Stormwater Conveyance


Property Ownership and Assessment Area (AA) Map
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
E LUPINE DR
RF46.85_R
RF46.9_R
RF46.8_R
STILLWATER DR
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
Roaring Fork River
46.7
46.9
RF47_R
RF47.05_R
FABI LOOP
RF46.8_L
46
RF46_L
RF46_R
RF46.4_R
RF46.2_R
CRYSTAL LAKE RD
RF46.6_R
46.6
RF46.85_L
47
47.1
RF46.1_R
RF46.3_R
RF46.9_L
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
46.4
RF46.15_R
RF46.05_L
RF46.25_L
RF46.5_L
RF47.05_L
RF47_L
NORTHSTAR DR
46.5
RF46.1_L
RF46.2_L
RF46.4_L
RF46.3_L
STILLWATER LN
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
Roads
Waterbodies
PitCo Open Space
PitCo Open Space Easements
City of Aspen
River Stations
Stormwater Outfall
Stormwater Conveyance


Size Factor Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.8
43.9
RF43_R
RF43.05_R
RF43.1_R
RF43.2_R
RF43.25_R
RF43.3_R
RF43.4_R
RF43.45_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Size Factor Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
44.5
RF44.5_L
Roaring Fork River
RF44.6_R
RF44.65_R
SHADY LN
Hunter Creek
RF44.55_L
43.9
RF44.1_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
RF44.7_R
44.8
RF43.9_L
ASPEN MEADOWS
ROARING FORK RD
RF44.17_L
N 3RD ST
44.6
44.7
RF44.6_L
Hallam Lake
RF44.8_L
RF44.62_L
GILLESPIE ST
PEARL CT
LAKE AVE
PUPPY SMITH ST
RF44.85_L
MEADOWS RD
ALLEY
RF44.68_L
RF44.75_L
RF44.7_L
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Size Factor Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
PUPPY SMITH ST
BAY ST
KING ST
NEALE AVE
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
QUEEN ST
Roaring Fork River
N MILL ST
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RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
ALLEY
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
S MILL ST
E DURANT AVE
44.8
44.9
45
45.1
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45_R
RF45.1_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF45.55_R
RF45.65_R
RF45.5_R
RF45.4_R
RF45.7_R
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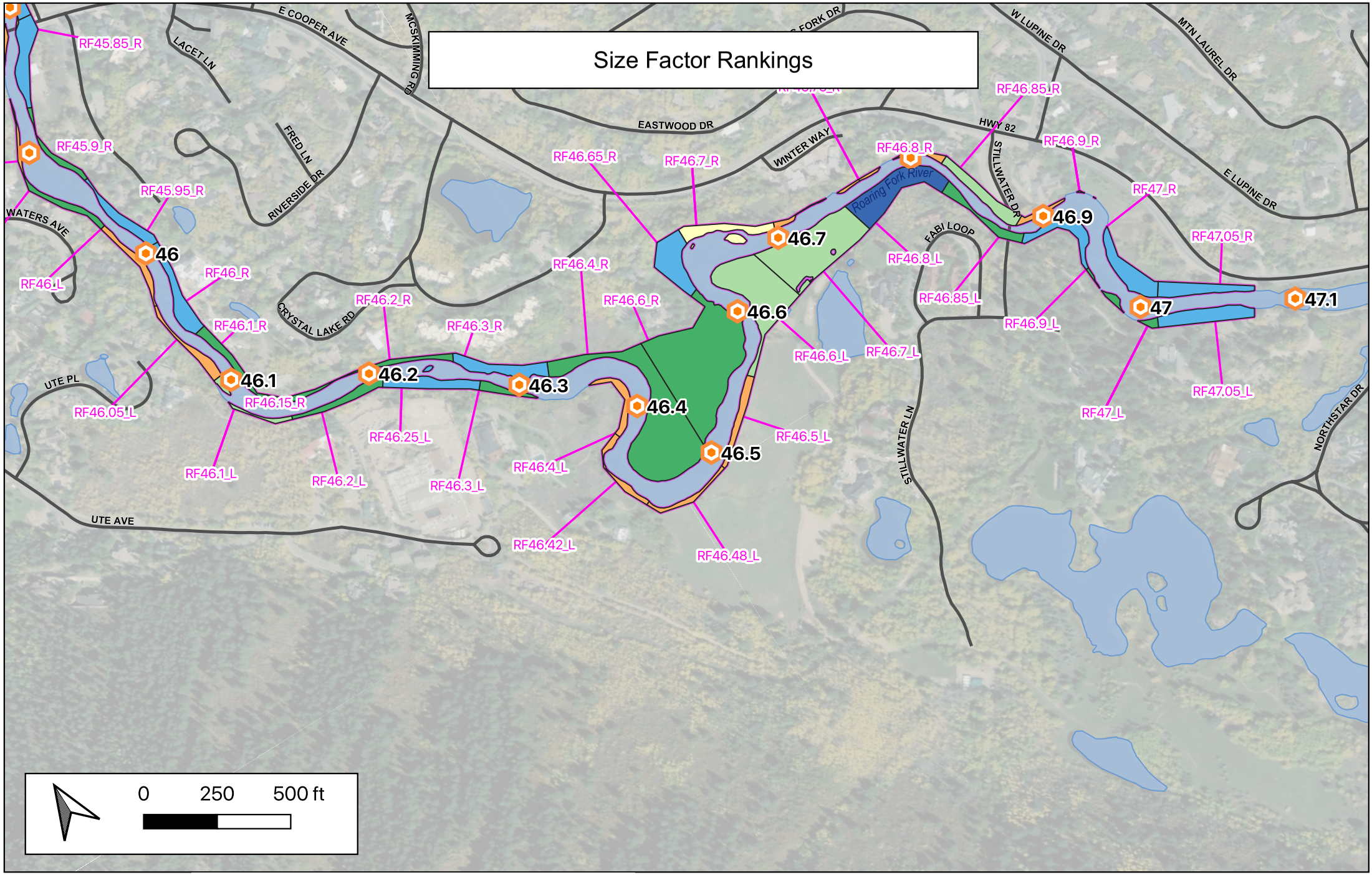
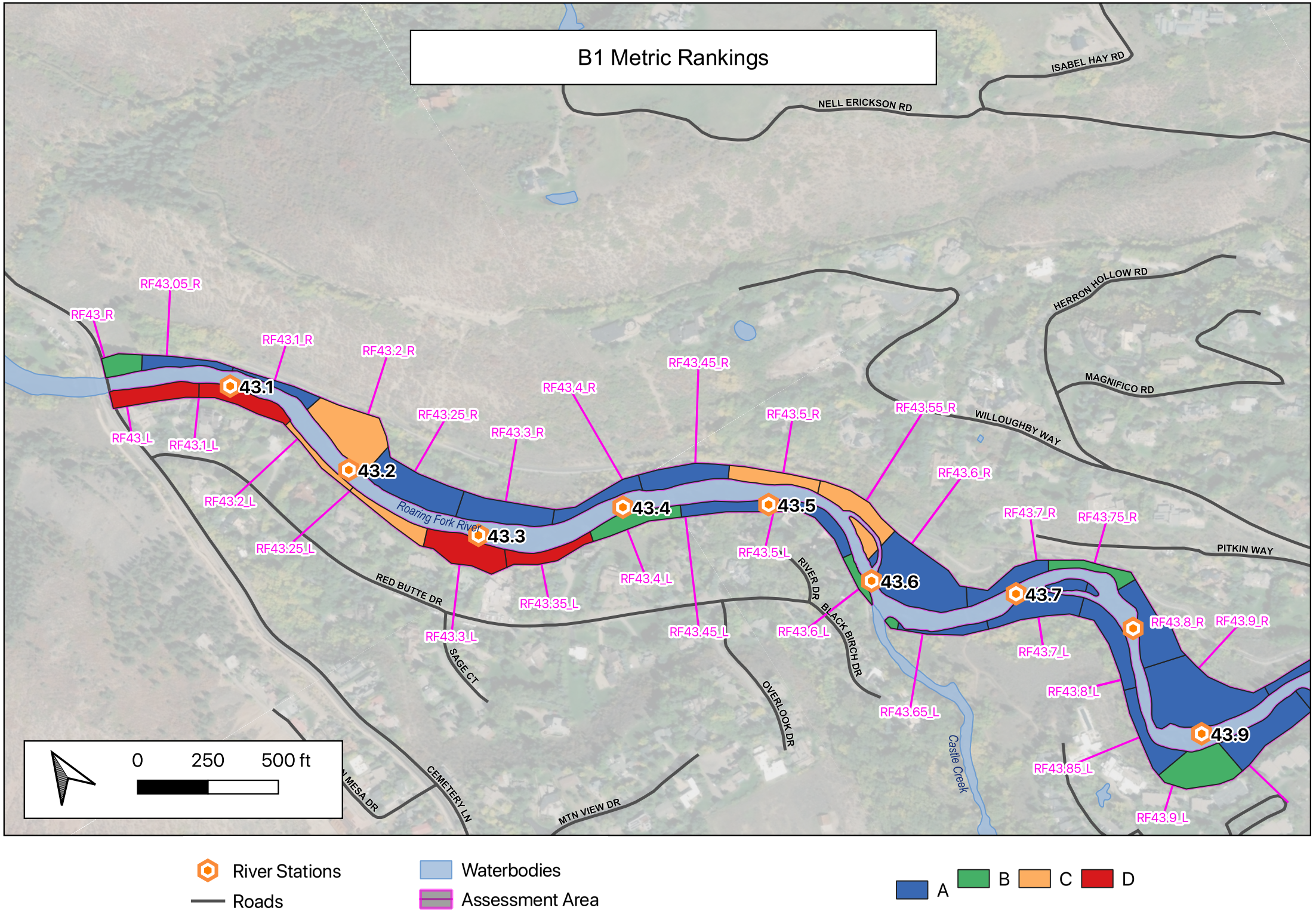
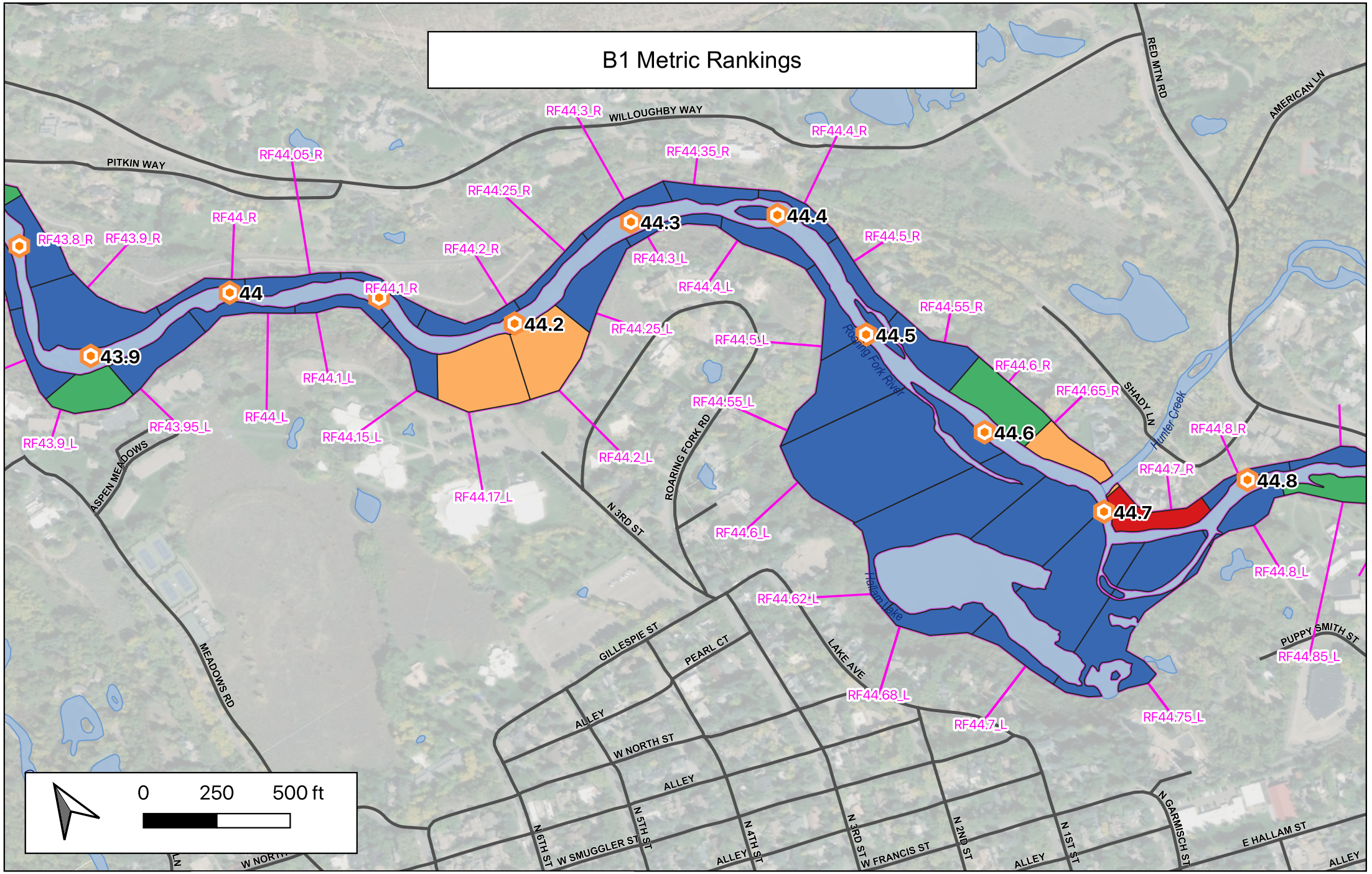
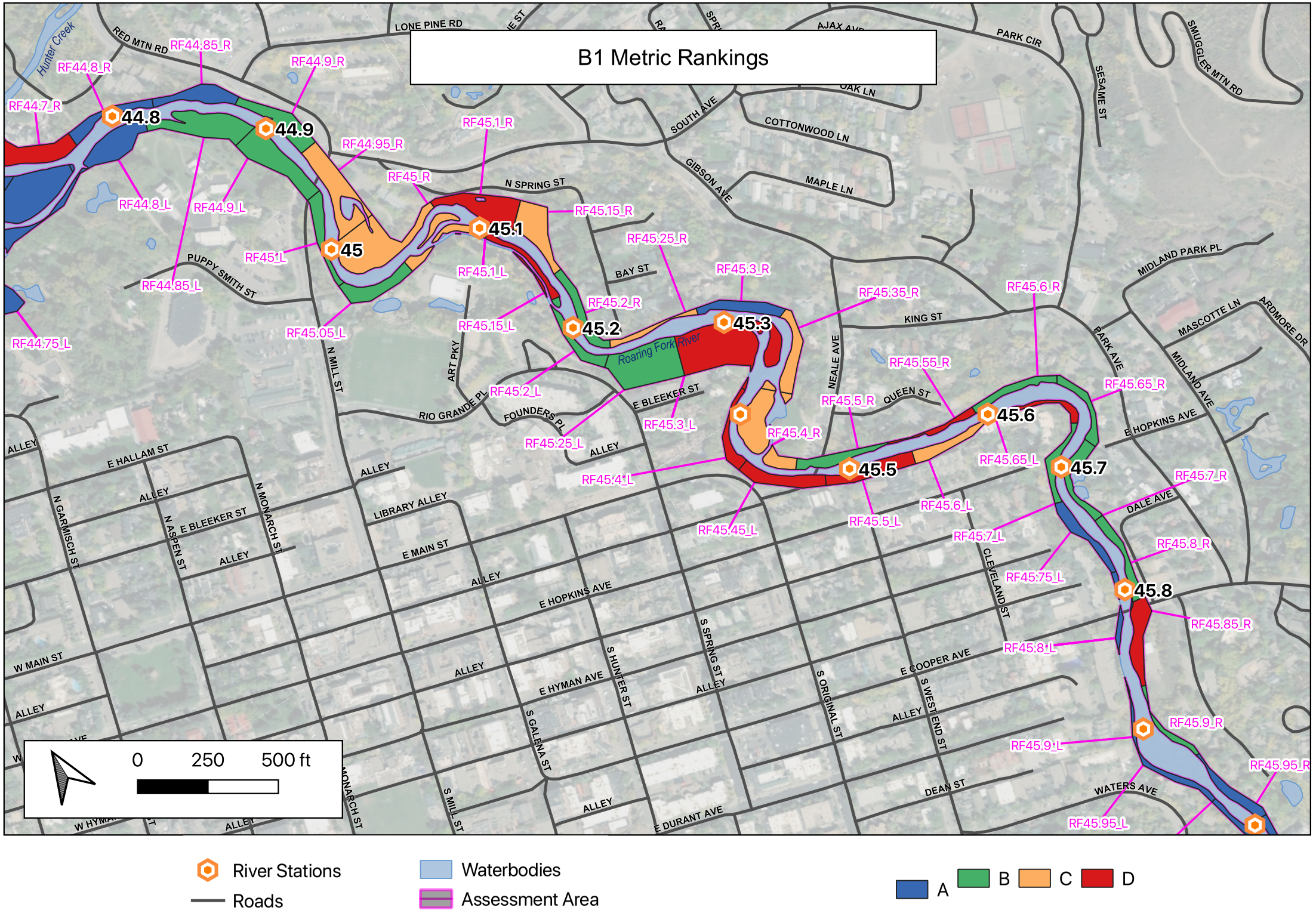
RF45.6_L
RF45.5_L
RF45.45_L
RF45.4_L
RF45.3_L
RF45.25_L
RF45.2_L
RF45.15_L
RF45.1_L
RF45_L
RF45.05_L
RF44.85_L
RF44.9_L
RF44.8_L
RF44.75_L
RF45.75_L
RF45.8_R
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


Size Factor Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
W LUPINE DR
MTN LAUREL DR
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
46
RF46_L
RF46_R
RF46.65_R
RF46.7_R
WINTER WAY
RF46.8_R
HWY 82
RF46.85_R
RF46.9_R
STILLWATER DR
E LUPINE DR
Roaring Fork River
46.7
46.9
RF47_R
FABI LOOP
RF46.8_L
RF47.05_R
RF46.4_R
RF46.2_R
RF46.6_R
46.6
RF46.85_L
47
47.1
CRYSTAL LAKE RD
RF46.3_R
RF46.1_R
RF46.9_L
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
RF46.15_R
46.4
RF47.05_L
RF46.05_L
RF47_L
NORTHSTAR DR
RF46.5_L
RF46.25_L
46.5
RF46.4_L
RF46.1_L
RF46.2_L
RF46.3_L
STILLWATER LN
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A+
A-
B+
B-
C+
C-
D


B1 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.25_R
RF43.3_R
RF43.4_R
RF43.45_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


B1 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.3_L
RF44.2_R
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
44.5
RF44.5_L
Roaring Fork River
RF44.6_R
RF44.65_R
SHADY LN
Hunter Creek
RF44.55_L
RF44.8_R
43.9
RF44.1_L
RF43.95_L
RF44_L
RF44.15_L
RF43.9_L
RF44.2_L
ROARING FORK RD
44.6
RF44.7_R
44.8
ASPEN MEADOWS
RF44.17_L
N 3RD ST
RF44.6_L
44.7
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
GILLESPIE ST
PEARL CT
LAKE AVE
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


B1 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
KING ST
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
NEALE AVE
QUEEN ST
E HOPKINS AVE
DALE AVE
CLEVELAND ST
Roaring Fork River
RIO GRANDE PL
FOUNDERS PL
ART PKY
N MILL ST
E BLEEKER ST
E HALLAM ST
ALLEY
LIBRARY ALLEY
E MAIN ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
RF44.85_R
RF44.8_R
RF44.7_R
RF44.9_R
RF44.95_R
RF45_R
RF45.1_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF44.85_L
RF44.75_L
RF45_L
RF45.05_L
RF45.1_L
RF45.15_L
RF45.2_R
RF45.2_L
RF45.25_L
RF45.3_L
RF45.4_R
RF45.4_L
RF45.45_L
RF45.5_R
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RF45.7_L
RF45.75_L
RF45.8_R
RF45.8_L
RF45.85_R
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
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44.9
45
45.1
45.2
45.3
45.5
45.6
45.7
45.8
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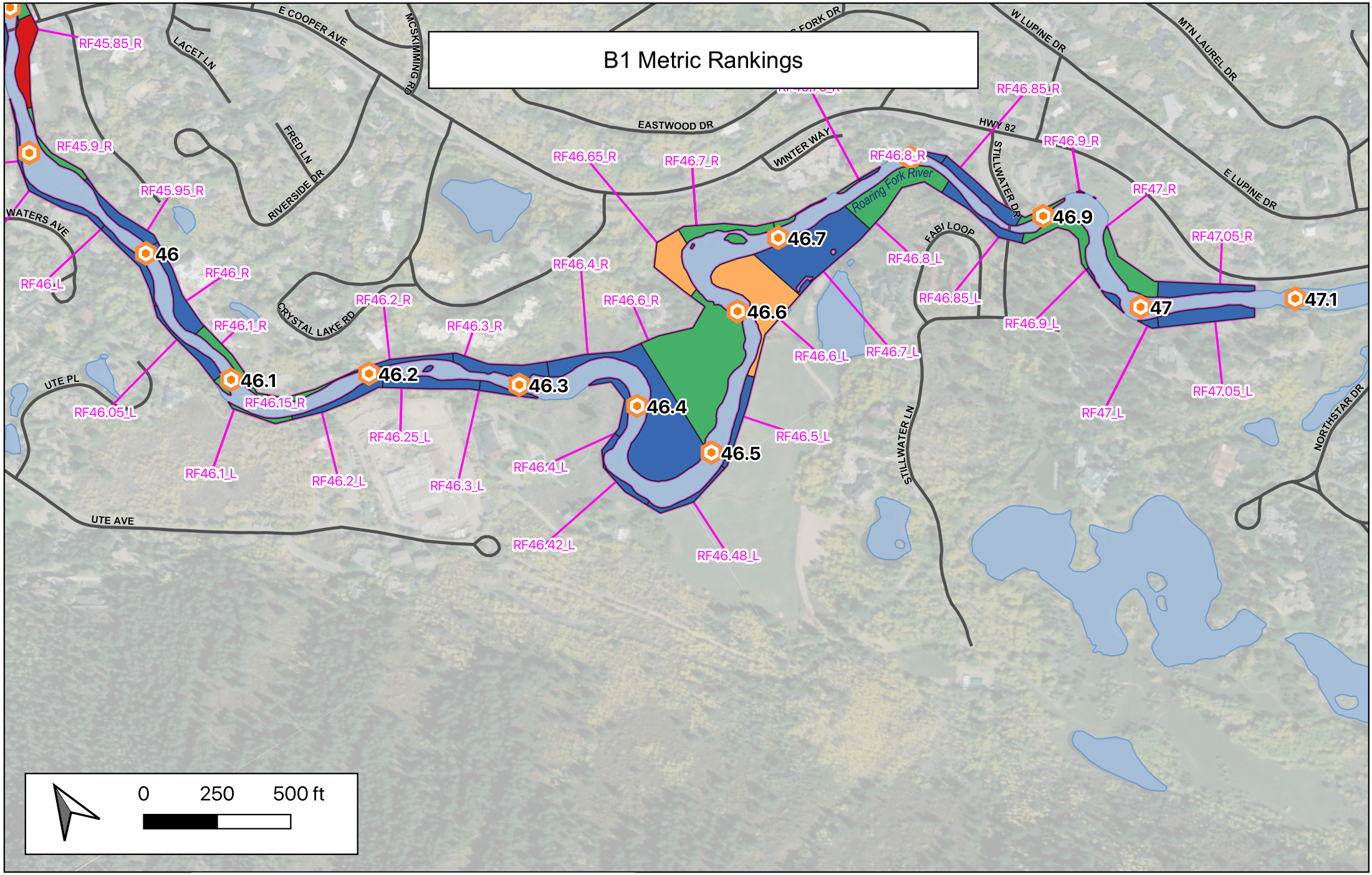
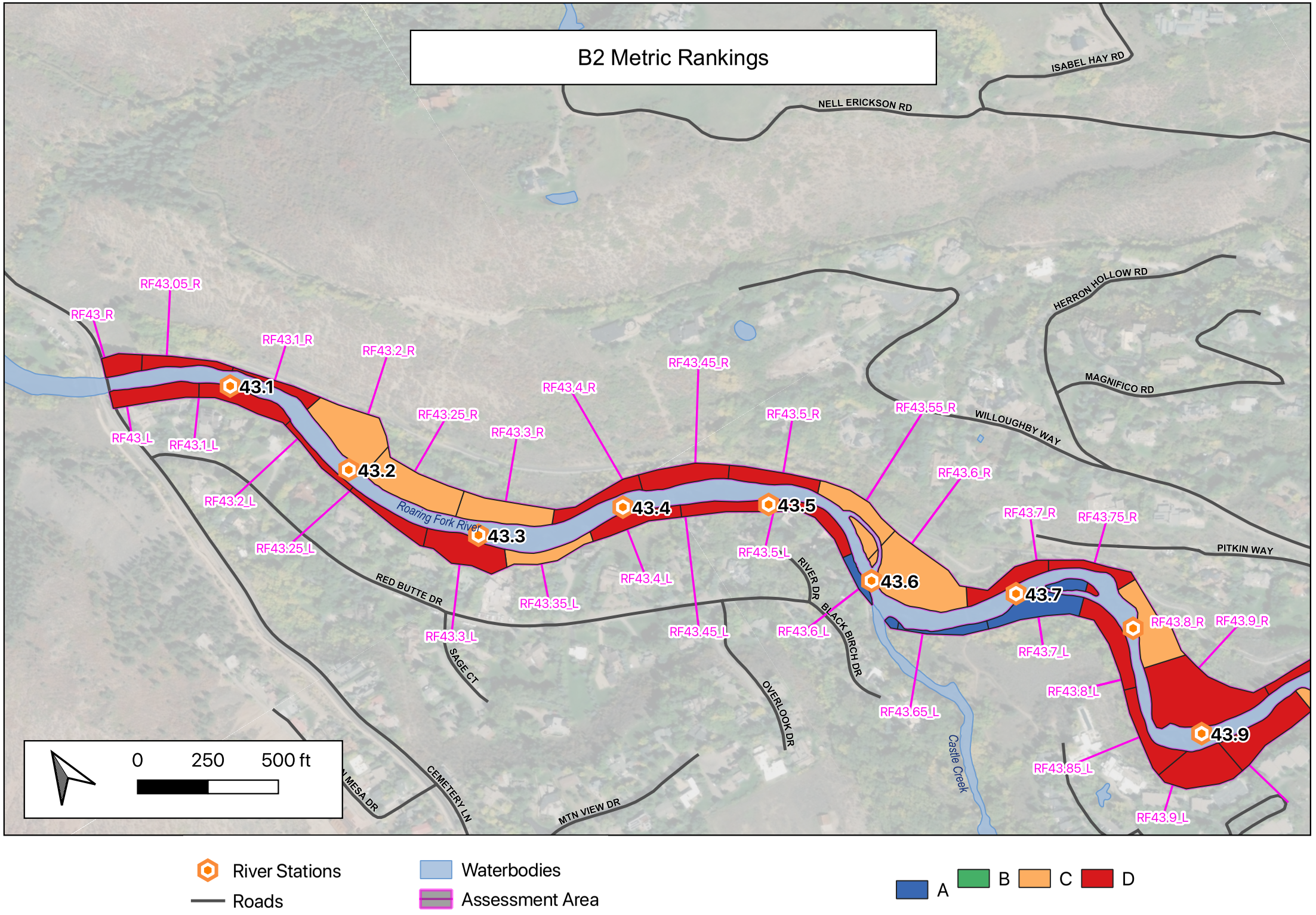
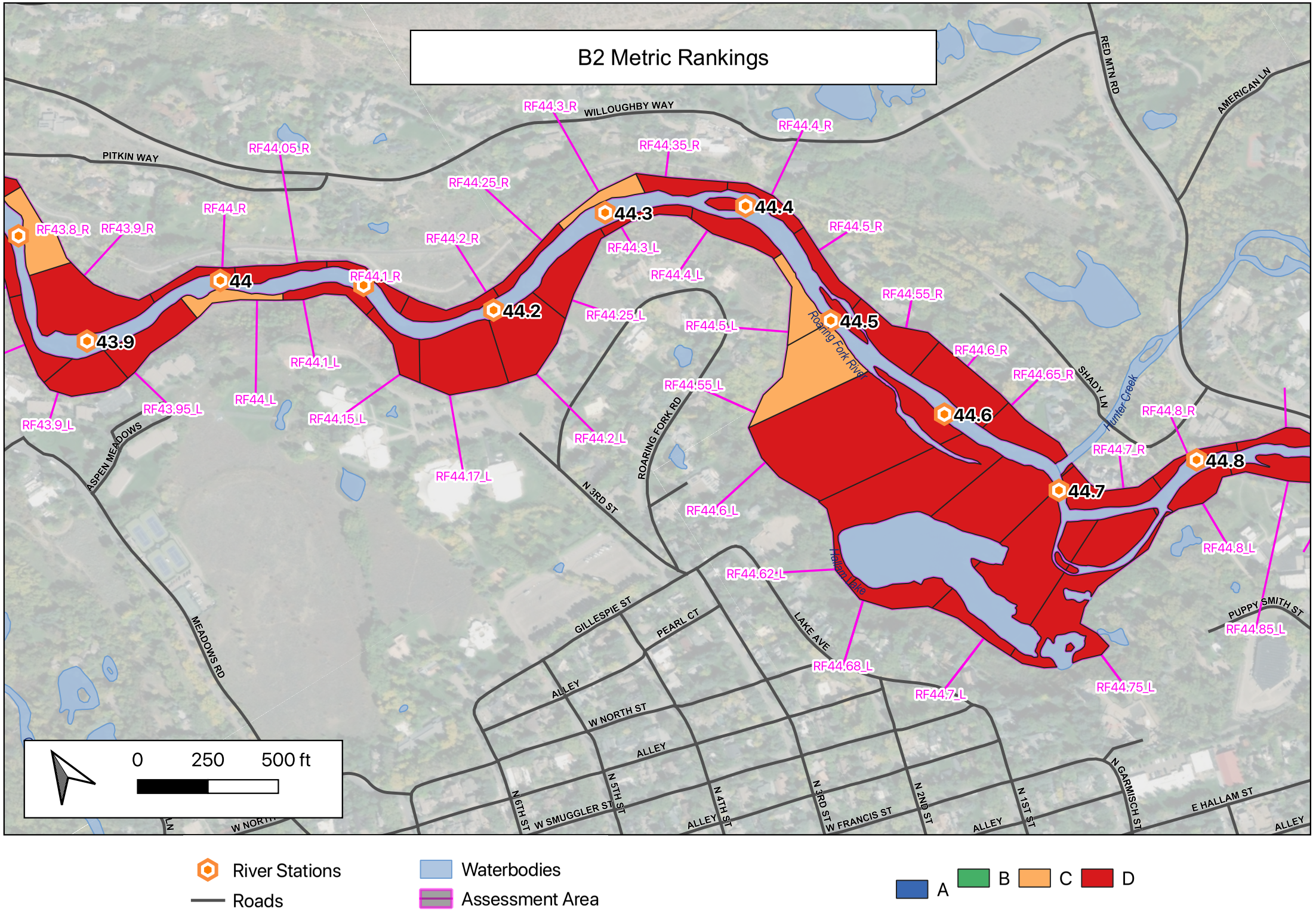
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


B1 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
RF46.85_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
RF46.9_R
E LUPINE DR
RF45.95_R
WATERS AVE
46
46.7
46.9
RF47_R
FABI LOOP
RF46.8_L
RF47.05_R
RF46_L
RF46_R
RF46.4_R
RF46.6_R
46.6
RF46.85_L
47
47.1
RF46.9_L
CRYSTAL LAKE RD
RF46.2_R
RF46.3_R
RF46.1_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
46.4
RF46.15_R
RF46.05_L
RF47.05_L
RF47_L
RF46.25_L
RF46.5_L
46.5
RF46.1_L
RF46.2_L
RF46.4_L
RF46.3_L
STILLWATER LN
NORTHSTAR DR
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


B2 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


B2 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.3_L
RF44.2_R
44
RF44.1_R
RF44.4_L
44.2
RF44.55_R
RF44.25_L
44.5
RF44.5_L
Roaring Fork River
RF44.6_R
RF44.65_R
SHADY LN
Hunter Creek
RF44.55_L
43.9
RF44.1_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
RF44.7_R
44.8
RF43.9_L
ASPEN MEADOWS
ROARING FORK RD
RF44.17_L
N 3RD ST
44.6
44.7
RF44.6_L
Hallam Lake
RF44.8_L
RF44.62_L
GILLESPIE ST
PEARL CT
LAKE AVE
PUPPY SMITH ST
RF44.85_L
MEADOWS RD
ALLEY
RF44.68_L
RF44.75_L
RF44.7_L
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
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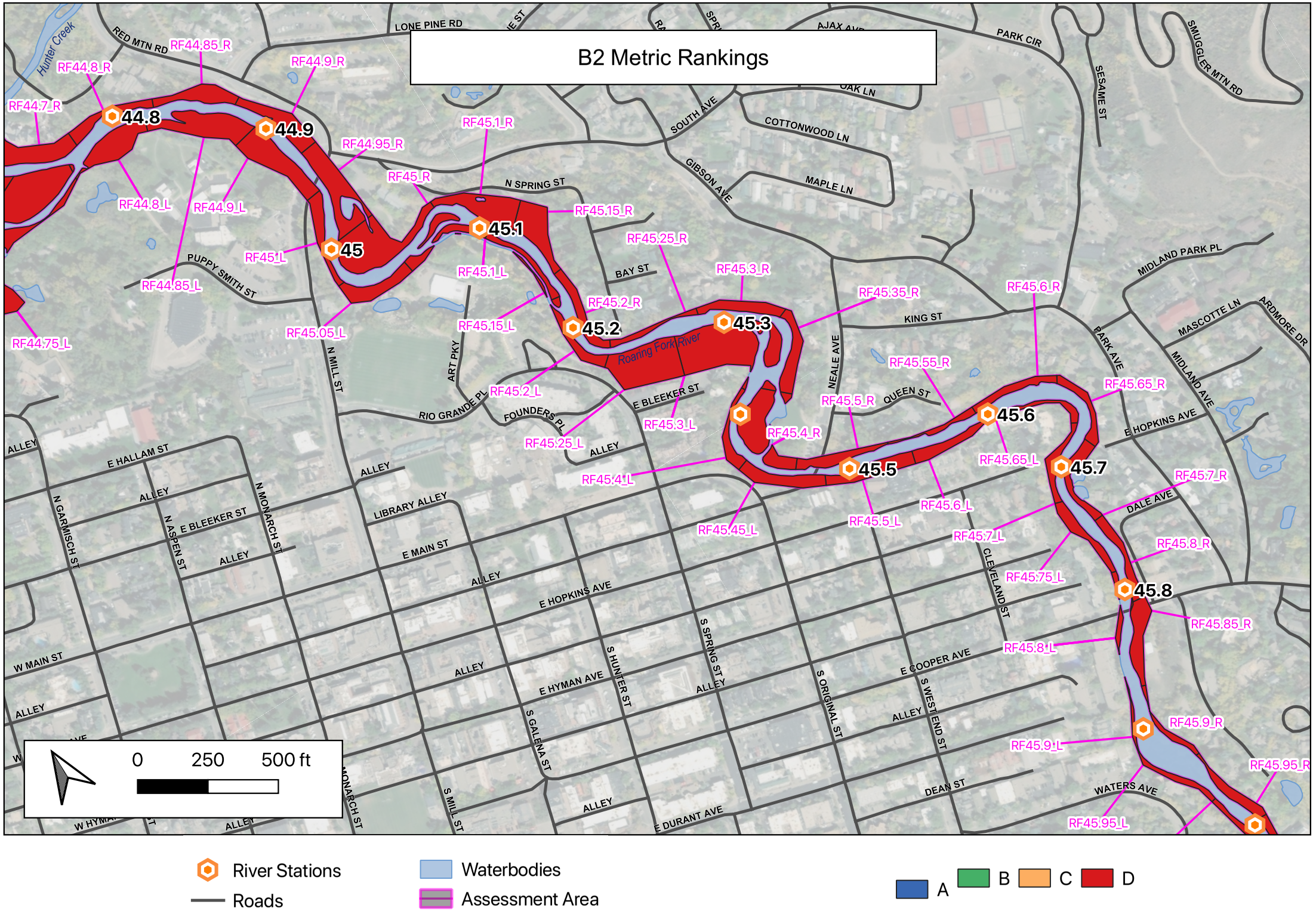
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


B2 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
KING ST
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
NEALE AVE
ART PKY
N MILL ST
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
QUEEN ST
E HOPKINS AVE
DALE AVE
CLEVELAND ST
E HALLAM ST
ALLEY
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WEST END ST
E COOPER AVE
DEAN ST
WATERS AVE
S MILL ST
E DURANT AVE
Roaring Fork River
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.2_R
RF44.75_L
RF45.05_L
RF45.15_L
RF45.55_R
RF45.65_R
RF45.2_L
RF45.5_R
RF45.3_L
RF45.4_R
RF45.25_L
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RF45.7_R
RF45.4_L
RF45.6_L
RF45.45_L
RF45.5_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
44.8
44.9
45
45.1
45.2
45.3
45.5
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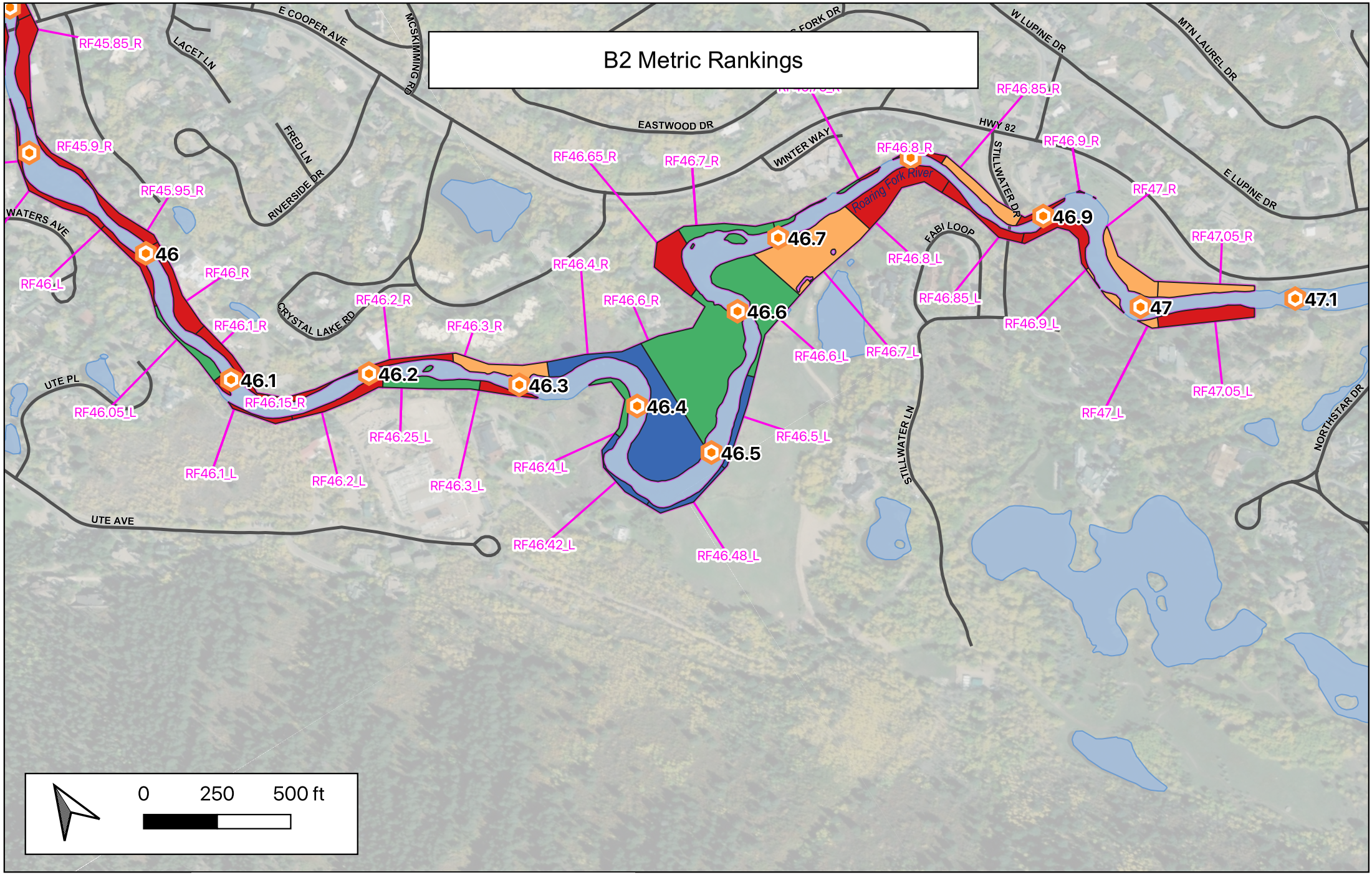
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


B2 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
RF46.85_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
RF46.9_R
E LUPINE DR
RF47_R
RF47.05_R
46
46.7
46.9
FABI LOOP
RF46.8_L
RF46_L
RF46_R
RF46.4_R
RF46.2_R
RF46.6_R
46.6
RF46.85_L
47
47.1
RF46.9_L
CRYSTAL LAKE RD
RF46.1_R
RF46.3_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
RF46.05_L
RF46.15_R
46.4
RF47.05_L
RF47_L
NORTHSTAR DR
RF46.5_L
RF46.25_L
46.5
RF46.1_L
RF46.4_L
RF46.2_L
RF46.3_L
STILLWATER LN
UTE AVE
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RF46.48_L
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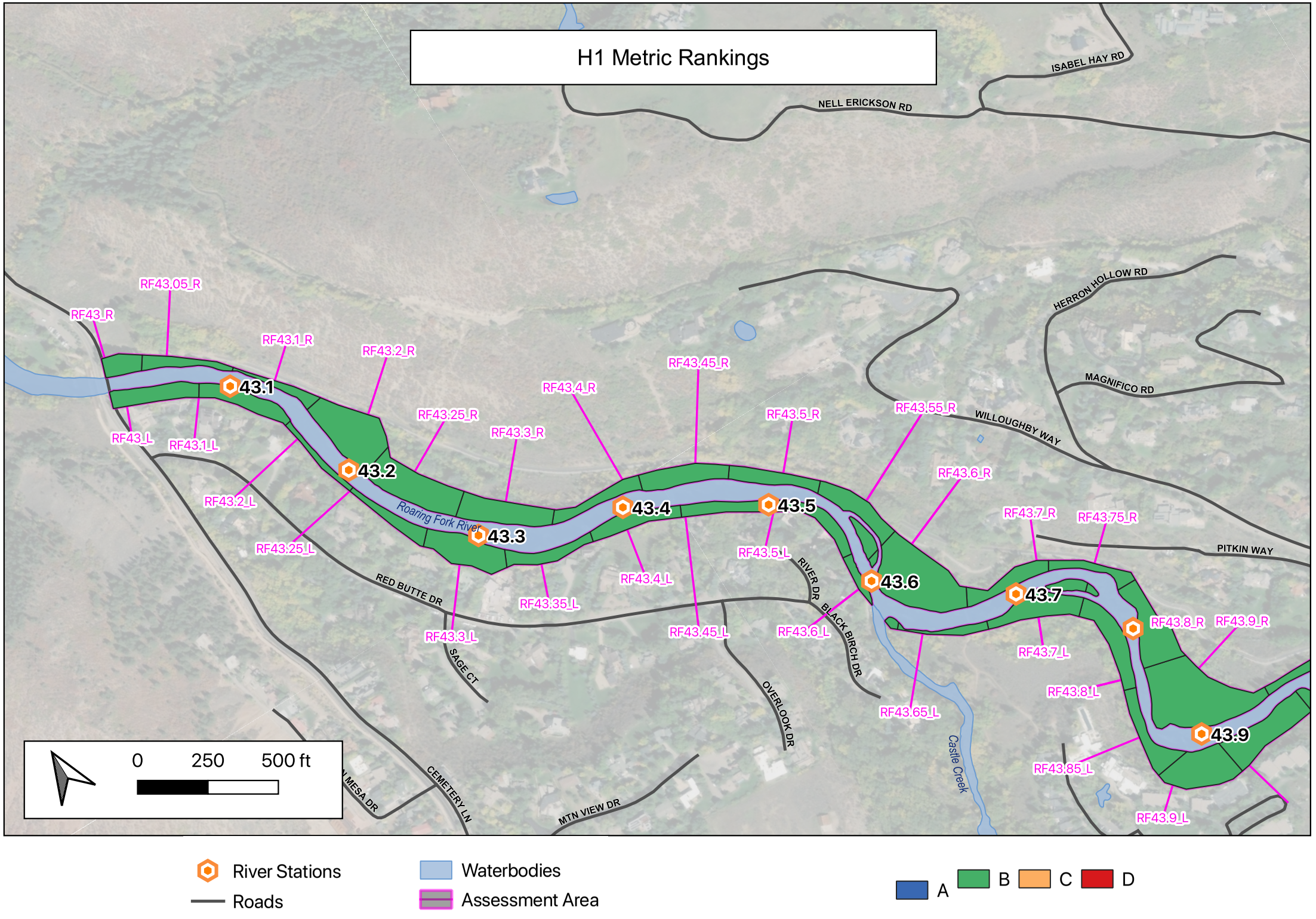
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H1 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
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RF43.1_L
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RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
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RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
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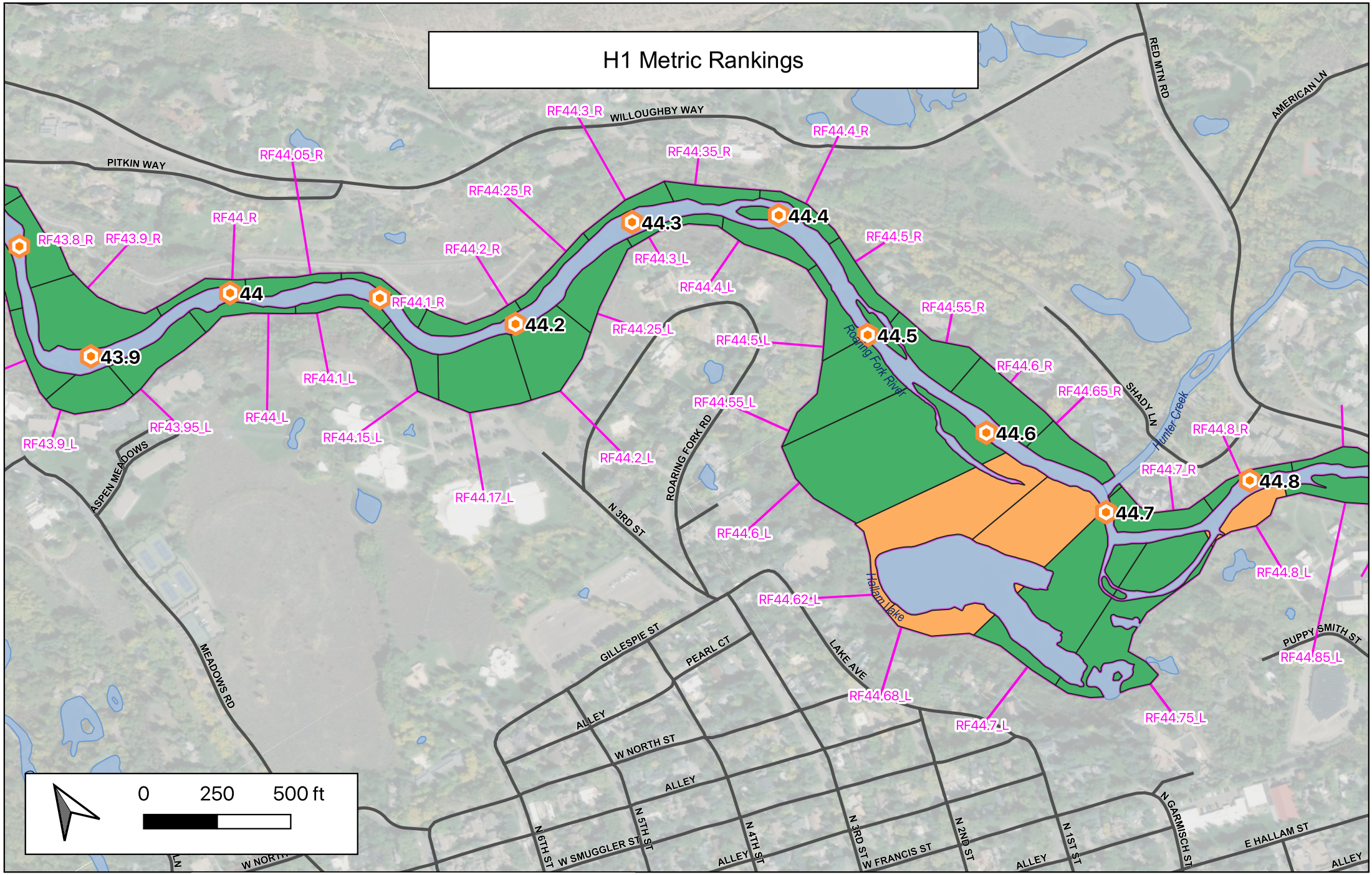
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H1 Metric Rankings
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PITKIN WAY
RED MTN RD
AMERICAN LN
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RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
RF44.2_R
44.3
44.4
RF44.5_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
RF44.5_L
44.5
43.9
RF44.6_R
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.1_L
RF44.55_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
44.6
RF43.9_L
RF44.2_L
ROARING FORK RD
RF44.7_R
44.8
ASPEN MEADOWS
RF44.17_L
N 3RD ST
44.7
RF44.6_L
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
GILLESPIE ST
PEARL CT
LAKE AVE
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
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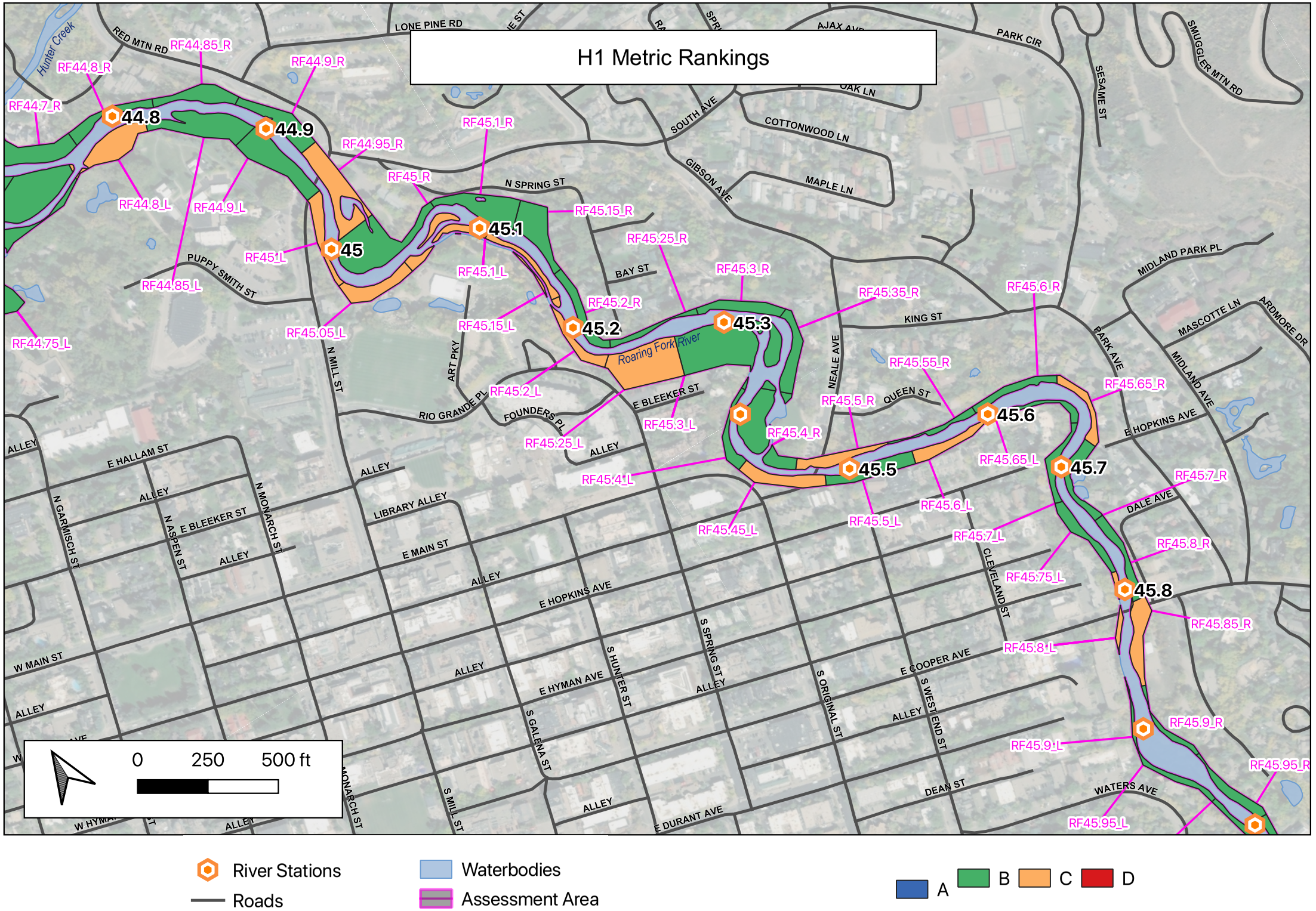
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H1 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
PUPPY SMITH ST
BAY ST
KING ST
NEALE AVE
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
QUEEN ST
Roaring Fork River
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
N MILL ST
E HALLAM ST
ALLEY
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
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RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.2_R
RF44.75_L
RF45.05_L
RF45.15_L
RF45.55_R
RF45.65_R
RF45.2_L
RF45.5_R
RF45.3_L
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RF45.4_L
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RF45.45_L
RF45.5_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
44.8
44.9
45.1
45
45.2
45.3
45.5
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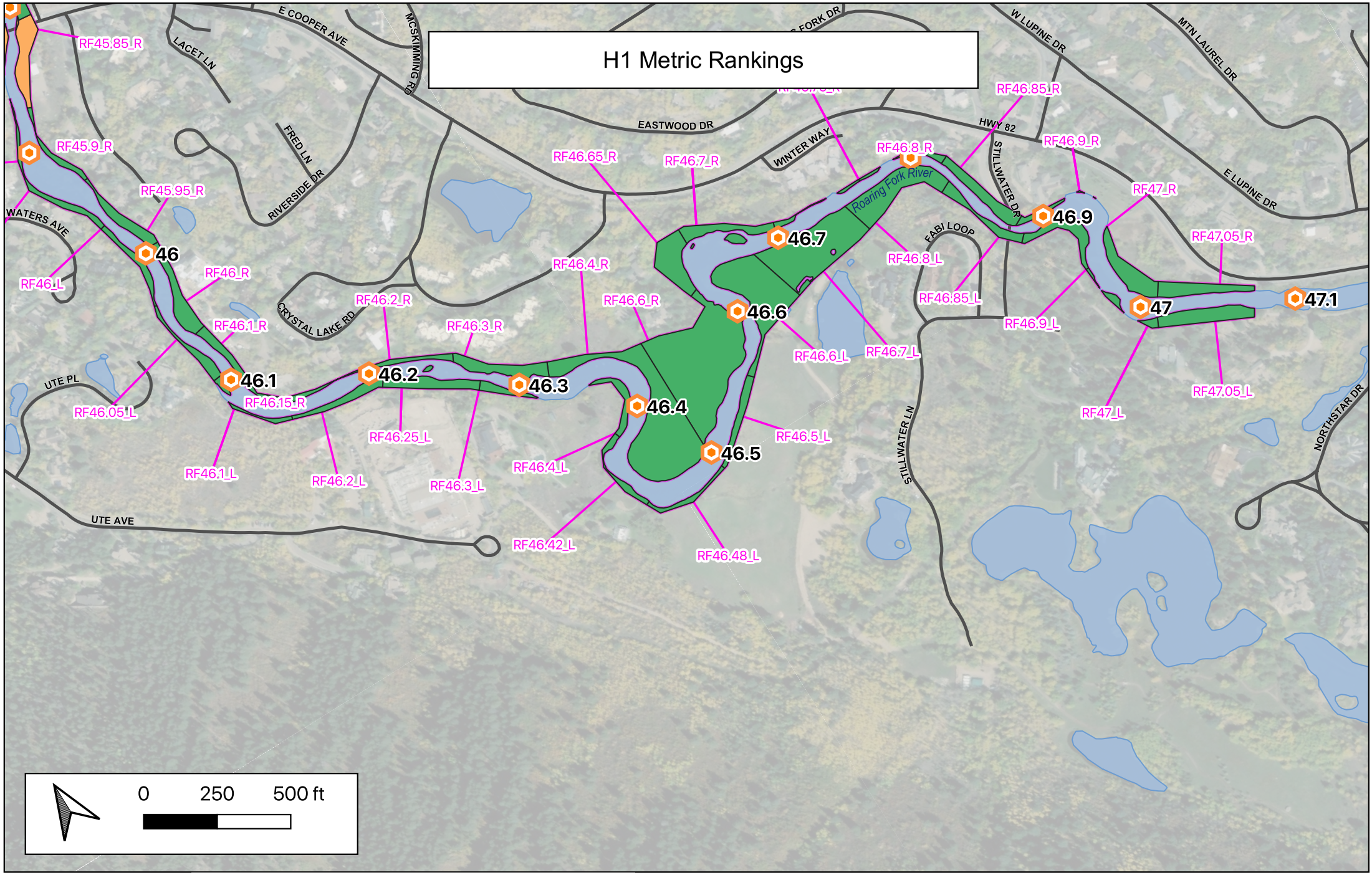
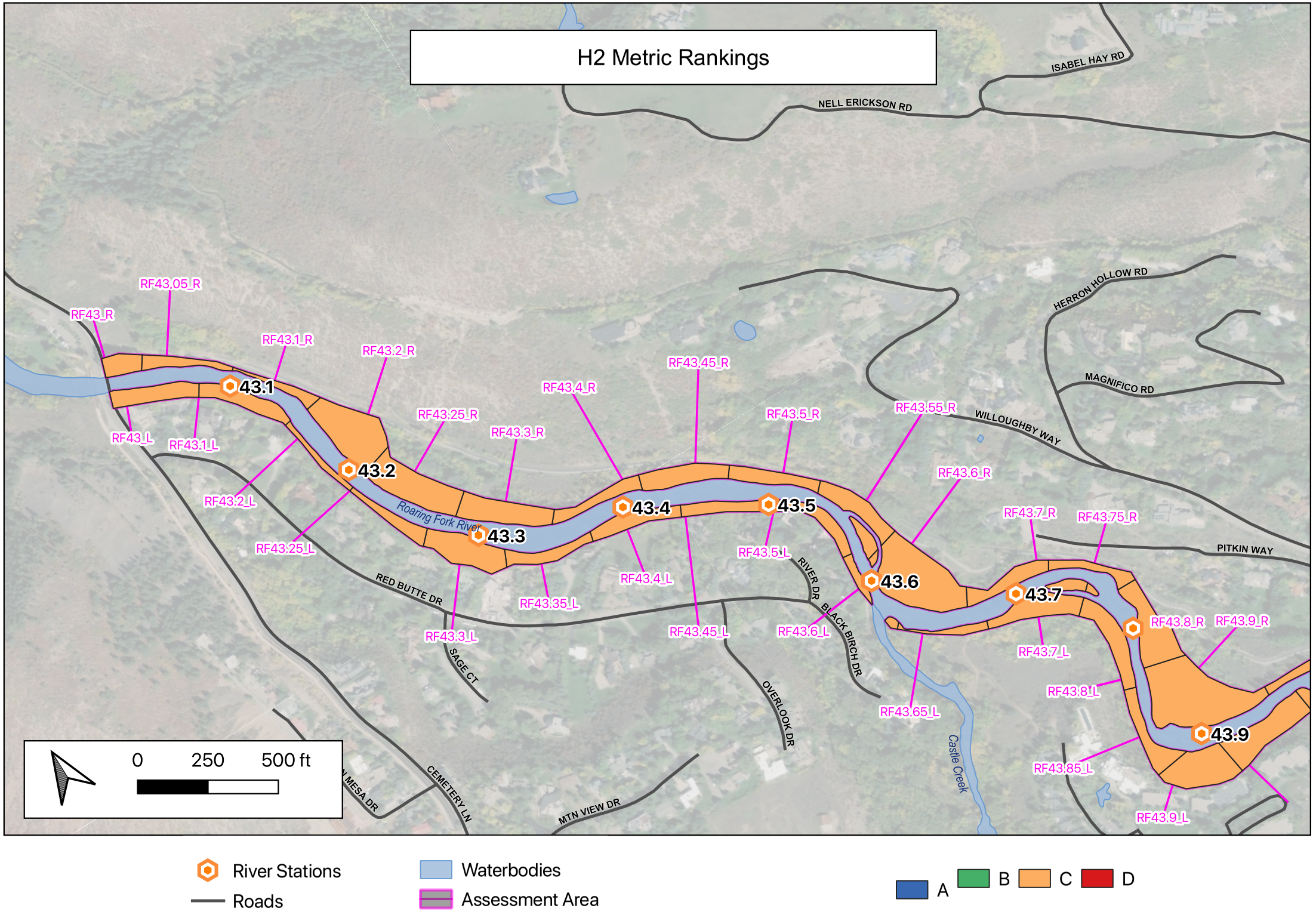
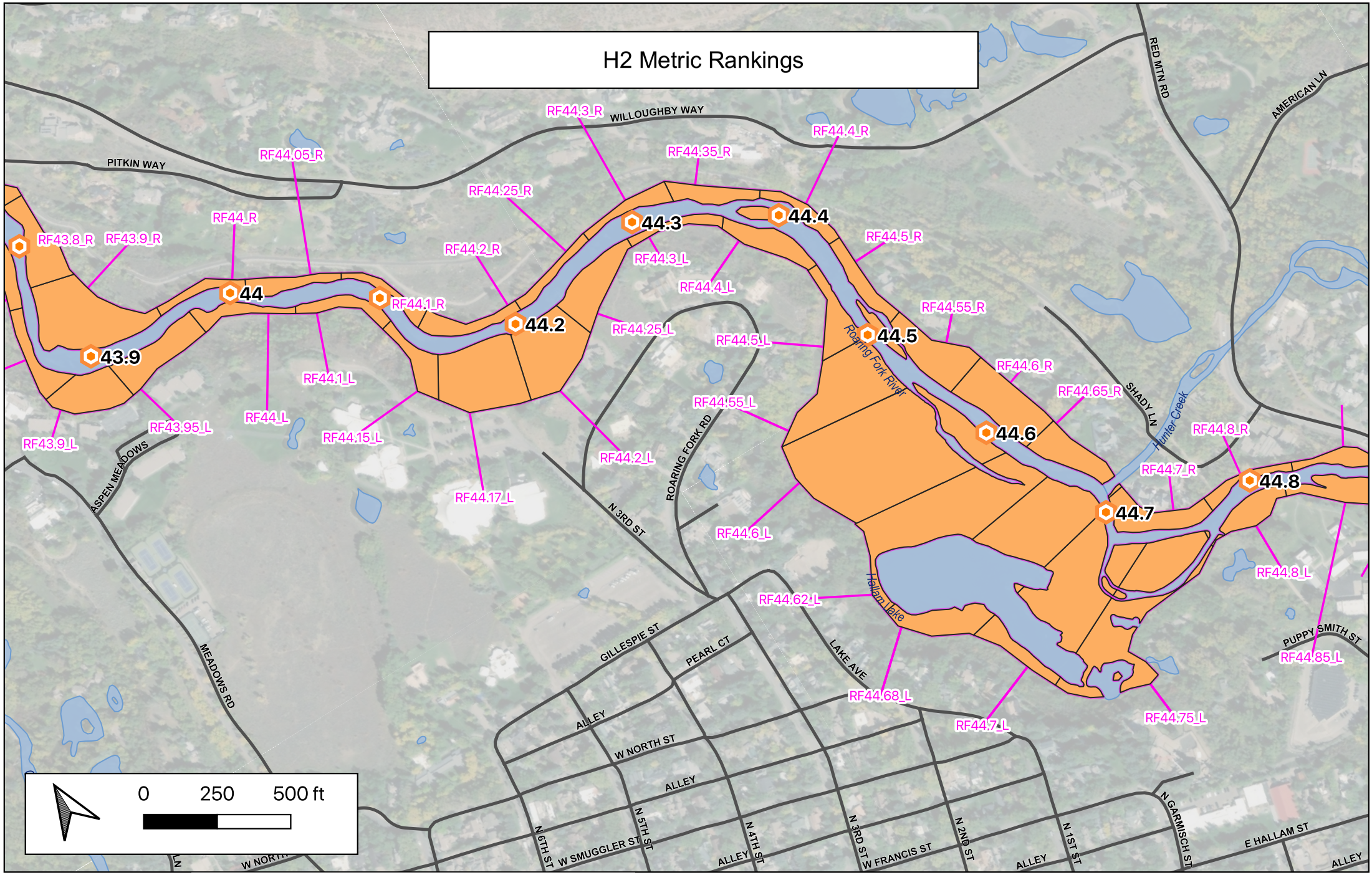
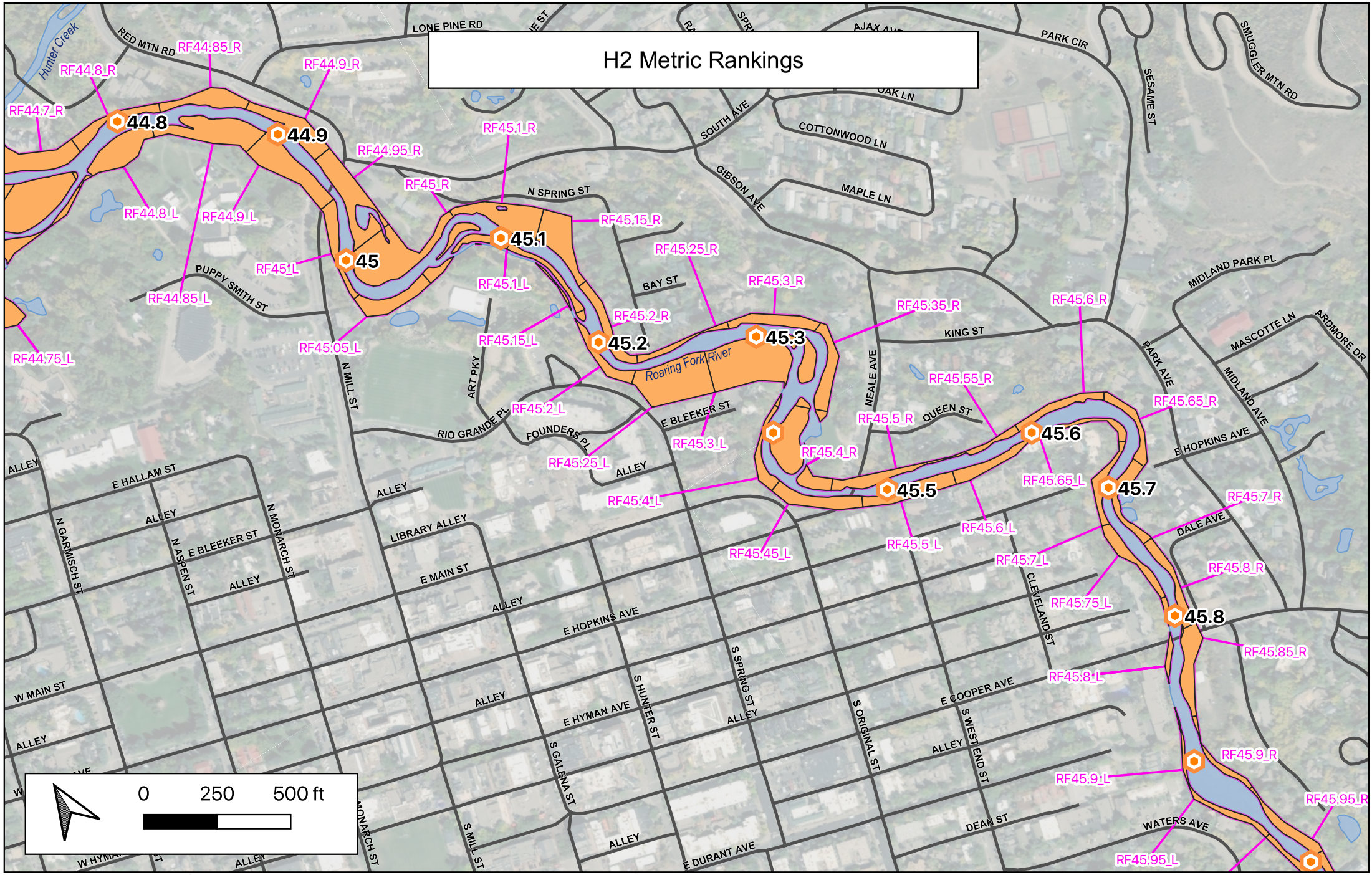
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H1 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
RF46.85_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
RF46.9_R
E LUPINE DR
RF47_R
FABI LOOP
RF47.05_R
46
46.7
46.9
RF46_L
RF46_R
RF46.4_R
RF46.8_L
RF46.85_L
RF46.9_L
47
47.1
RF46.2_R
RF46.6_R
CRYSTAL LAKE RD
RF46.1_R
RF46.3_R
46.6
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
RF46.15_R
46.4
RF46.05_L
RF46.25_L
RF46.5_L
RF47_L
RF47.05_L
STILLWATER LN
NORTHSTAR DR
46.5
RF46.1_L
RF46.2_L
RF46.3_L
RF46.4_L
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H2 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
MTN VIEW DR
CEMETERY LN
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H2 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
RF44.2_R
44.3
44.4
RF44.5_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
RF44.5_L
44.5
43.9
RF44.6_R
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.1_L
RF44.55_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
44.6
RF43.9_L
RF44.2_L
RF44.7_R
ASPEN MEADOWS
ROARING FORK RD
44.8
RF44.17_L
N 3RD ST
44.7
RF44.6_L
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
GILLESPIE ST
PEARL CT
LAKE AVE
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H2 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
KING ST
NEALE AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
E HOPKINS AVE
QUEEN ST
DALE AVE
CLEVELAND ST
Roaring Fork River
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
E HALLAM ST
ALLEY
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
RF44.85_R
RF44.8_R
RF44.7_R
RF44.9_R
RF44.95_R
RF45_R
RF45.1_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF45.55_R
RF45.65_R
RF45.5_R
RF45.4_R
RF45.7_R
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
RF45.85_L
RF45.75_L
RF45.7_L
RF45.6_L
RF45.65_L
RF45.55_L
RF45.5_L
RF45.45_L
RF45.4_L
RF45.3_L
RF45.25_L
RF45.2_L
RF45.15_L
RF45.1_L
RF45_L
RF44.95_L
RF44.9_L
RF44.8_L
RF44.75_L
44.8
44.9
45
45.1
45.2
45.3
45.5
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45.7
45.8
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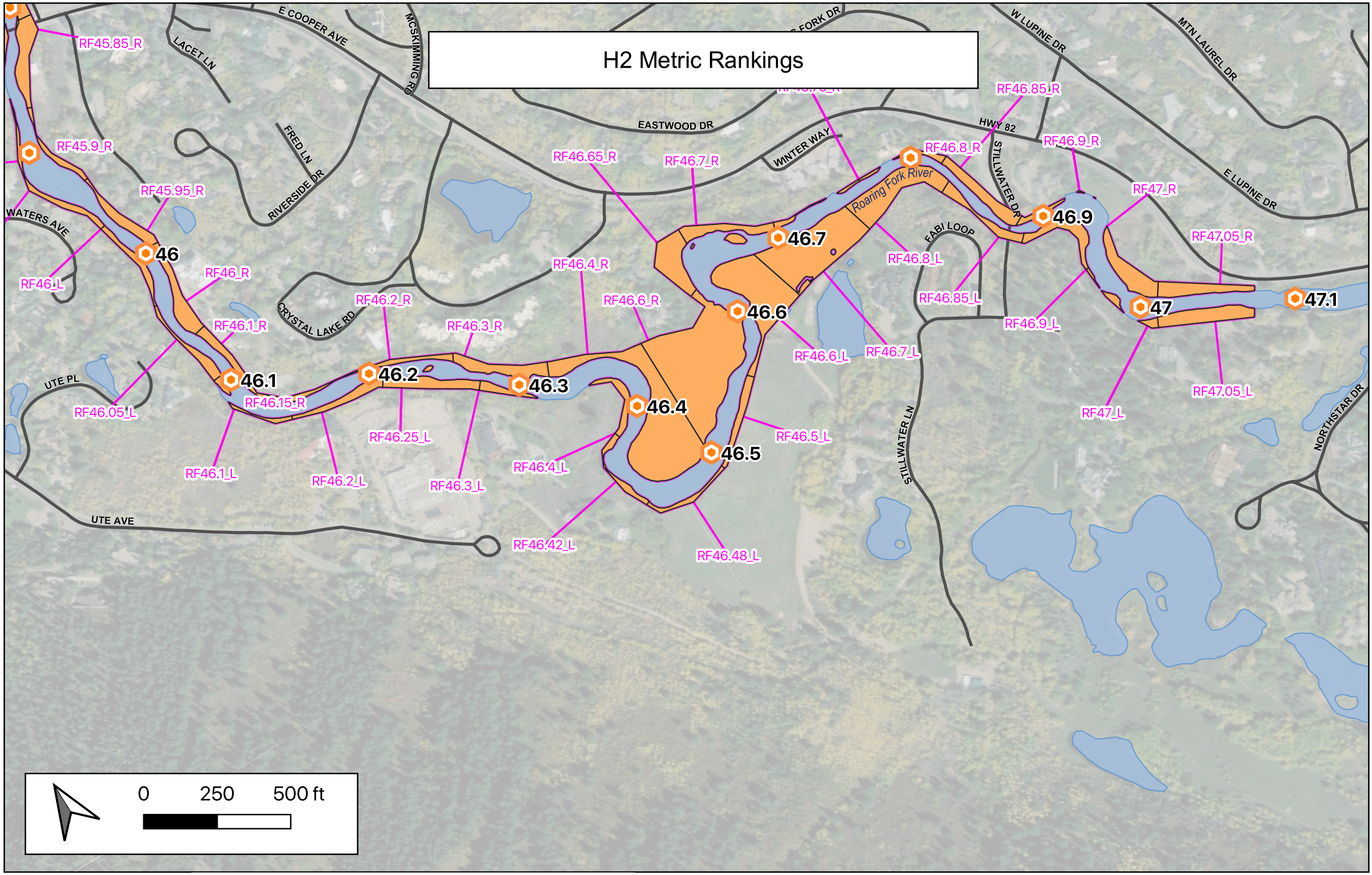
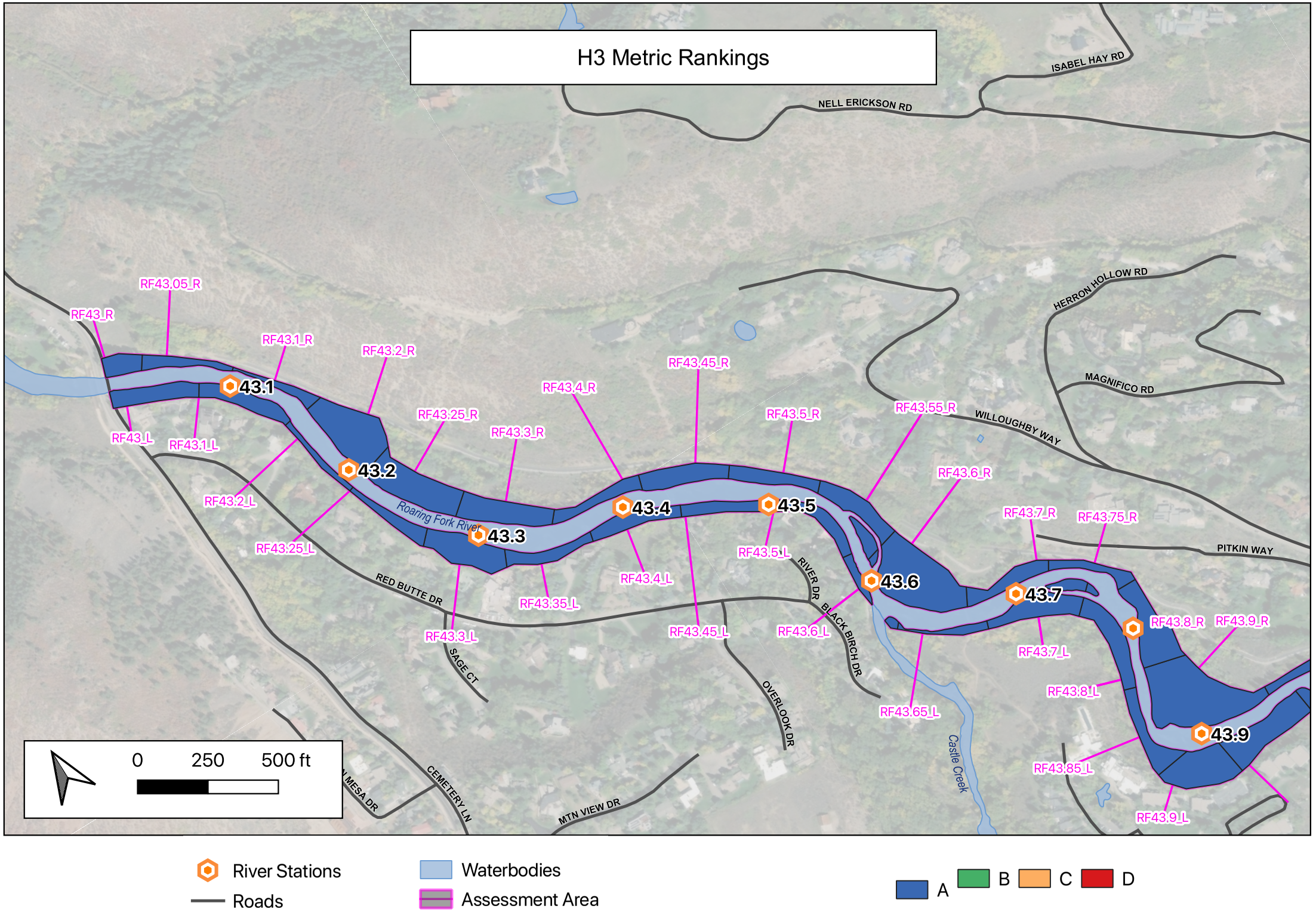
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H2 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
FORK DR
W LUPINE DR
MTN LAUREL DR
RF46.85_R
HWY 82
RF45.9_R
FRED LN
RIVERSIDE DR
WINTER WAY
RF46.65_R
RF46.7_R
RF46.8_R
STILLWATER DR
RF46.9_R
E LUPINE DR
RF45.95_R
WATERS AVE
Roaring Fork River
46.9
RF47_R
46.7
FABI LOOP
RF47.05_R
46
RF46_L
RF46_R
RF46.4_R
RF46.8_L
RF46.85_L
47.1
RF46.2_R
RF46.6_R
46.6
47
CRYSTAL LAKE RD
RF46.1_R
RF46.3_R
RF46.9_L
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
RF46.15_R
46.4
RF47.05_L
RF46.05_L
RF47_L
NORTHSTAR DR
RF46.25_L
RF46.5_L
46.5
RF46.1_L
RF46.2_L
RF46.3_L
RF46.4_L
STILLWATER LN
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H3 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
MTN VIEW DR
CEMETERY LN
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
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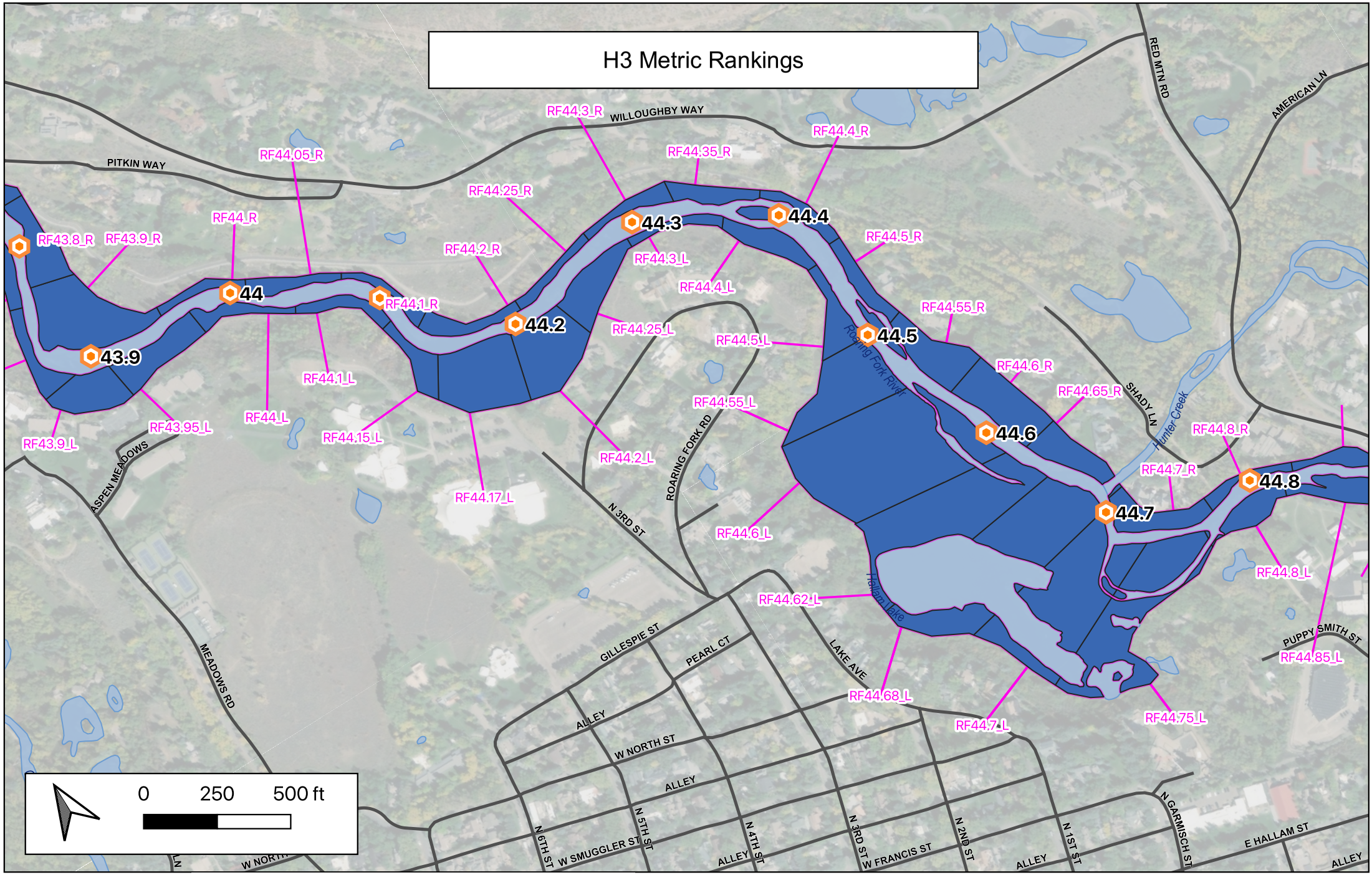
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H3 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.3_L
RF44.2_R
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
44.5
RF44.5_L
43.9
RF44.6_R
RF44.65_R
SHADY LN
RF44.1_L
RF44.55_L
Roaring Fork River
Hunter Creek
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
44.6
RF43.9_L
RF44.2_L
RF44.7_R
44.8
ASPEN MEADOWS
ROARING FORK RD
RF44.17_L
N 3RD ST
44.7
RF44.6_L
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
GILLESPIE ST
PEARL CT
LAKE AVE
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
0
250
500 ft
N 6TH ST
W SMUGGLER ST
N 5TH ST
ALLEY
N 4TH ST
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
River Stations
Roads
Waterbodies
Assessment Area
A
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C
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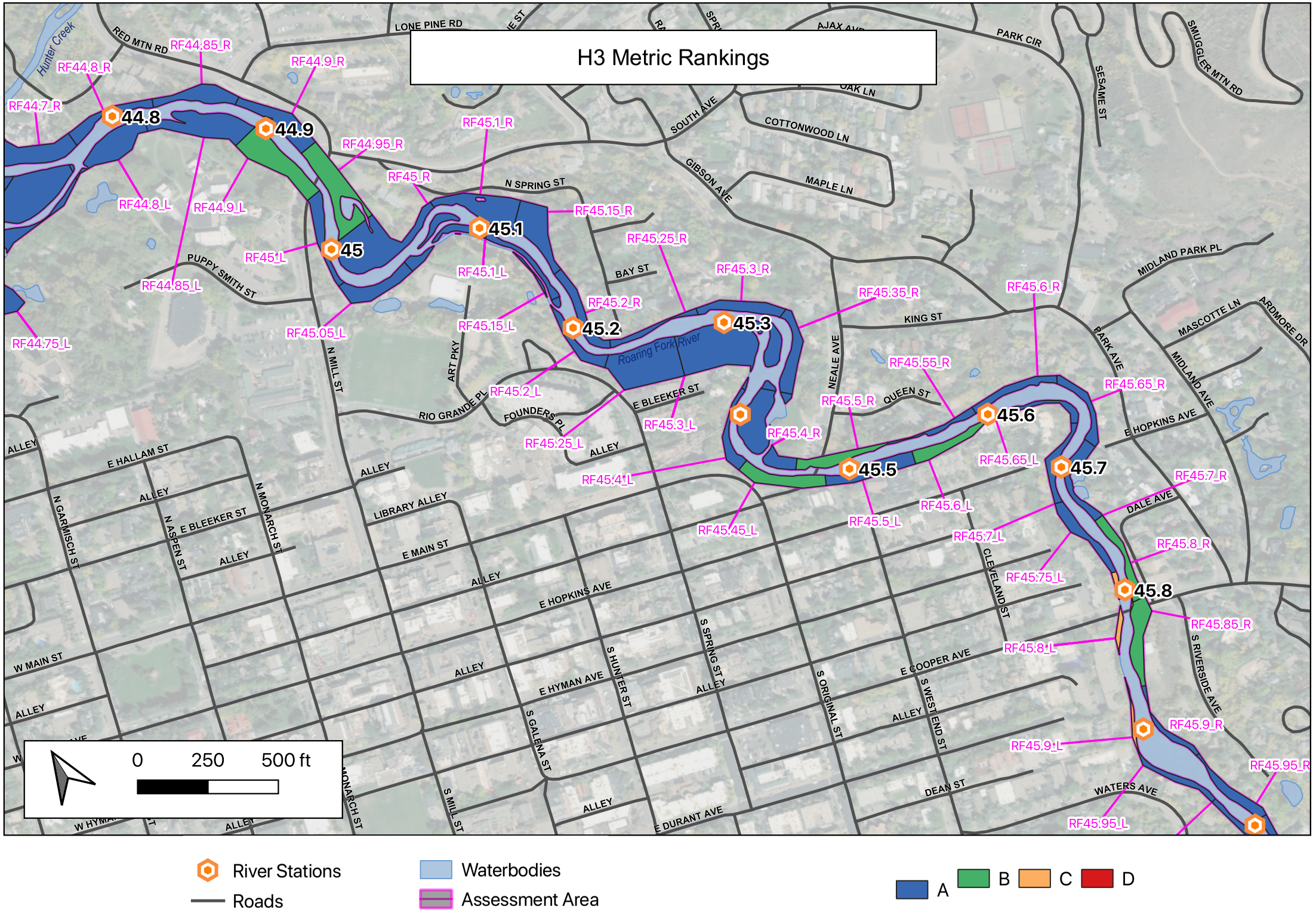
H3 Metric Rankings
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45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.8_L
RF44.9_L
RF44.85_L
RF44.75_L
RF45_R
RF45.1_R
RF44.95_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF45.55_R
RF45.65_R
RF45.5_R
RF45.4_R
RF45.65_L
RF45.7_R
RF45.6_L
RF45.5_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
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RF45.4_L
RF45.3_L
RF45.25_L
RF45.2_L
RF45.15_L
RF45.1_L
RF45_L
RF45.05_L
Roaring Fork River
Hunter Creek
RED MTN RD
LONE PINE RD
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
PUPPY SMITH ST
BAY ST
KING ST
NEALE AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
QUEEN ST
E HOPKINS AVE
DALE AVE
CLEVELAND ST
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
ALLEY
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
S RIVERSIDE AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
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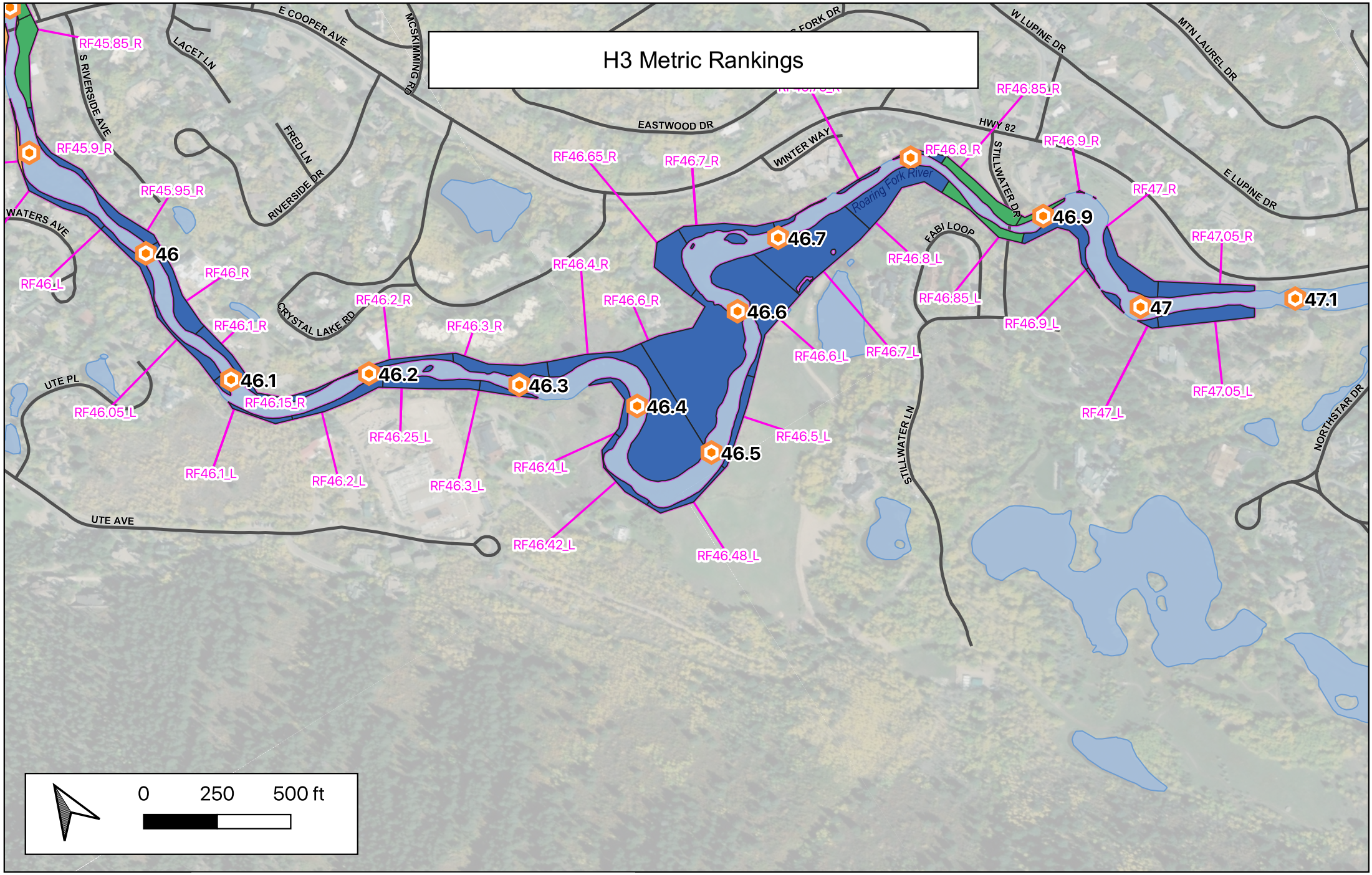
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


H3 Metric Rankings
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RF45.9_R
RF45.95_R
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RF46_R
RF46.1_R
RF46.05_L
RF46.15_R
RF46.1_L
RF46.2_R
RF46.2_L
RF46.25_L
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RF46.3_L
RF46.4_R
RF46.4_L
RF46.42_L
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RF46.48_L
RF46.7_R
RF46.7_L
RF46.65_R
RF46.5_L
RF46.8_R
RF46.8_L
RF46.85_R
RF46.85_L
RF46.9_R
RF46.9_L
RF47_R
RF47_L
RF47.05_R
RF47.05_L
46
46.1
46.2
46.3
46.4
46.5
46.6
46.7
46.9
47
47.1
Roaring Fork River
S RIVERSIDE AVE
LACET LN
E COOPER AVE
MCSKIMMING RD
FRED LN
RIVERSIDE DR
WATERS AVE
EASTWOOD DR
WINTER WAY
HWY 82
STILLWATER DR
W LUPINE DR
E LUPINE DR
MTN LAUREL DR
FABI LOOP
CRYSTAL LAKE RD
UTE PL
UTE AVE
STILLWATER LN
NORTHSTAR DR
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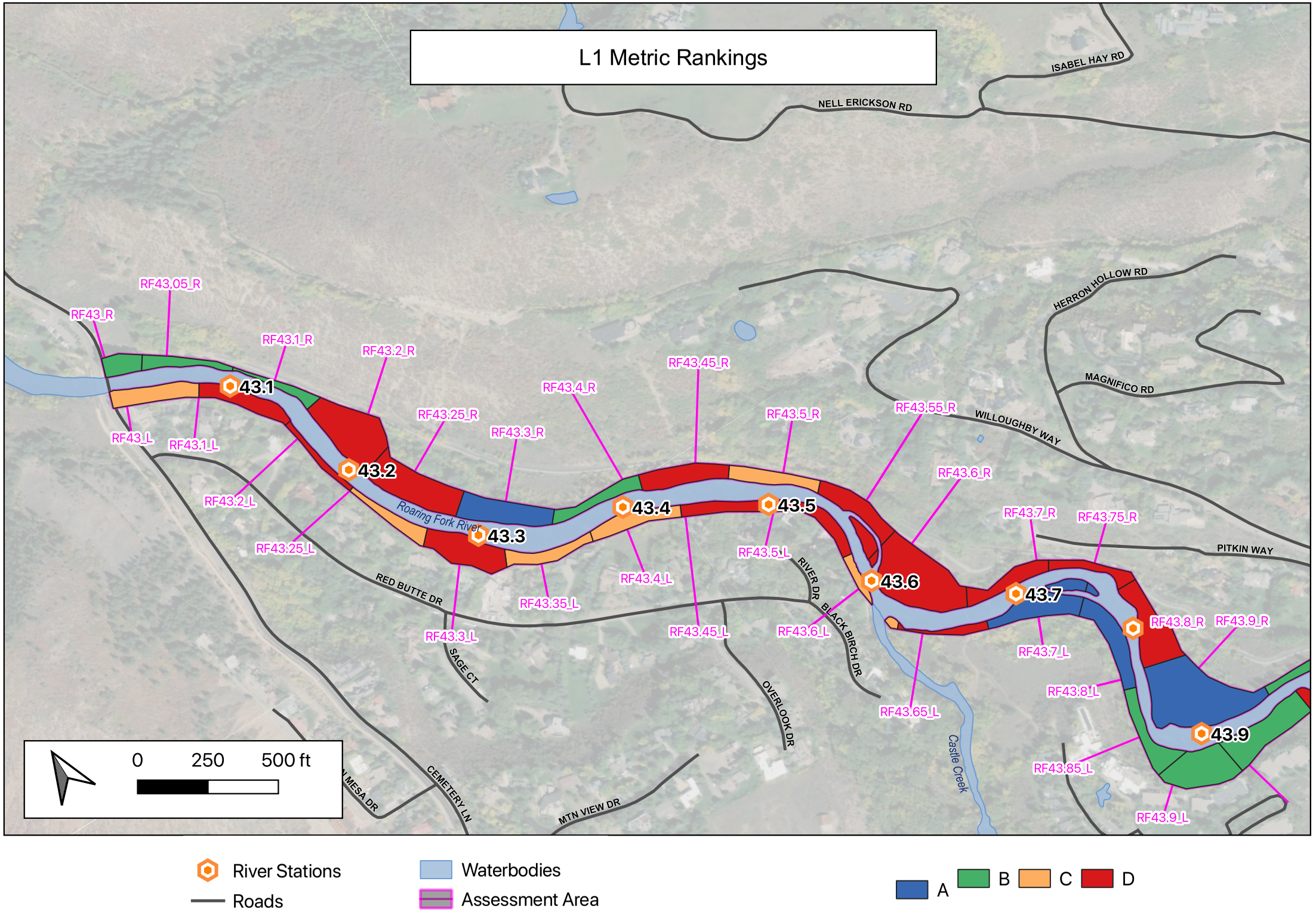
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


L1 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
MTN VIEW DR
CEMETERY LN
Roaring Fork River
Castle Creek
RF43_R
RF43.05_R
RF43.1_R
RF43.2_R
RF43.25_R
RF43.3_R
RF43.4_R
RF43.45_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
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43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
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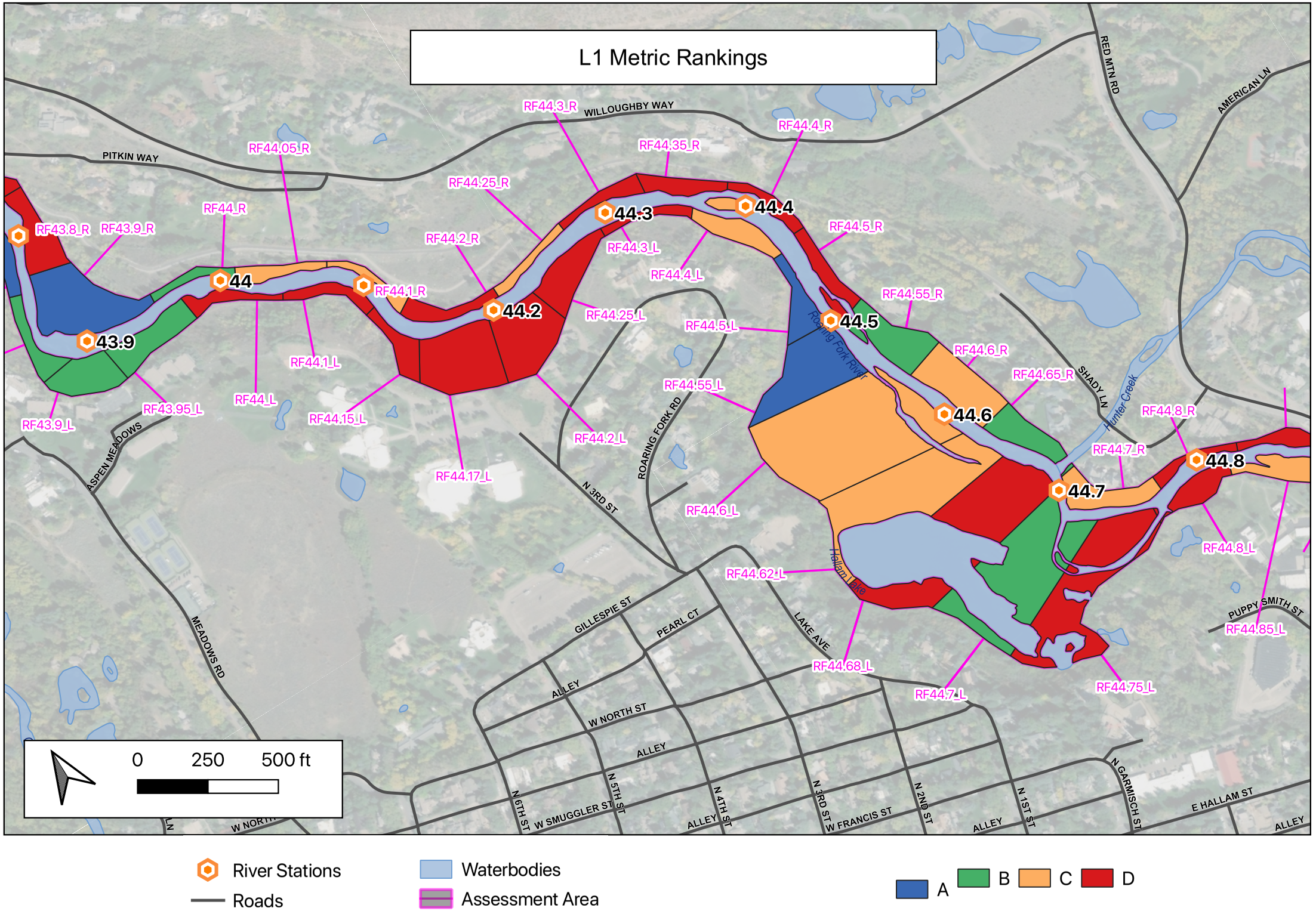
C
D


L1 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
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RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
RF44.5_L
44.5
43.9
RF44.6_R
RF44.1_L
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.55_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
44.6
RF43.9_L
ASPEN MEADOWS
ROARING FORK RD
RF44.7_R
44.8
RF44.17_L
N 3RD ST
RF44.6_L
44.7
Hallam Lake
RF44.8_L
RF44.62_L
GILLESPIE ST
PEARL CT
LAKE AVE
PUPPY SMITH ST
RF44.85_L
MEADOWS RD
ALLEY
RF44.68_L
RF44.75_L
RF44.7_L
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
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500 ft
River Stations
Roads
Waterbodies
Assessment Area
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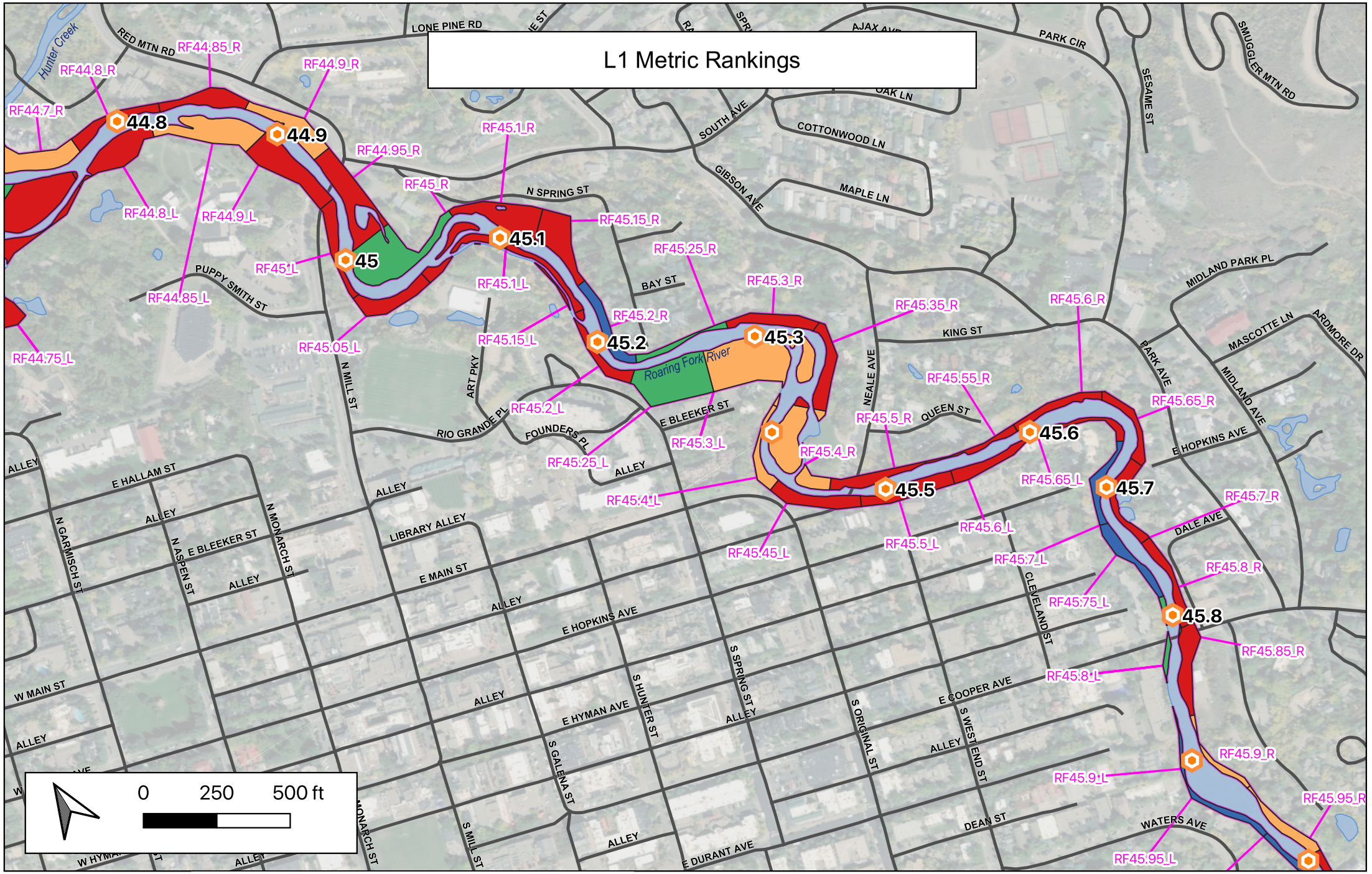
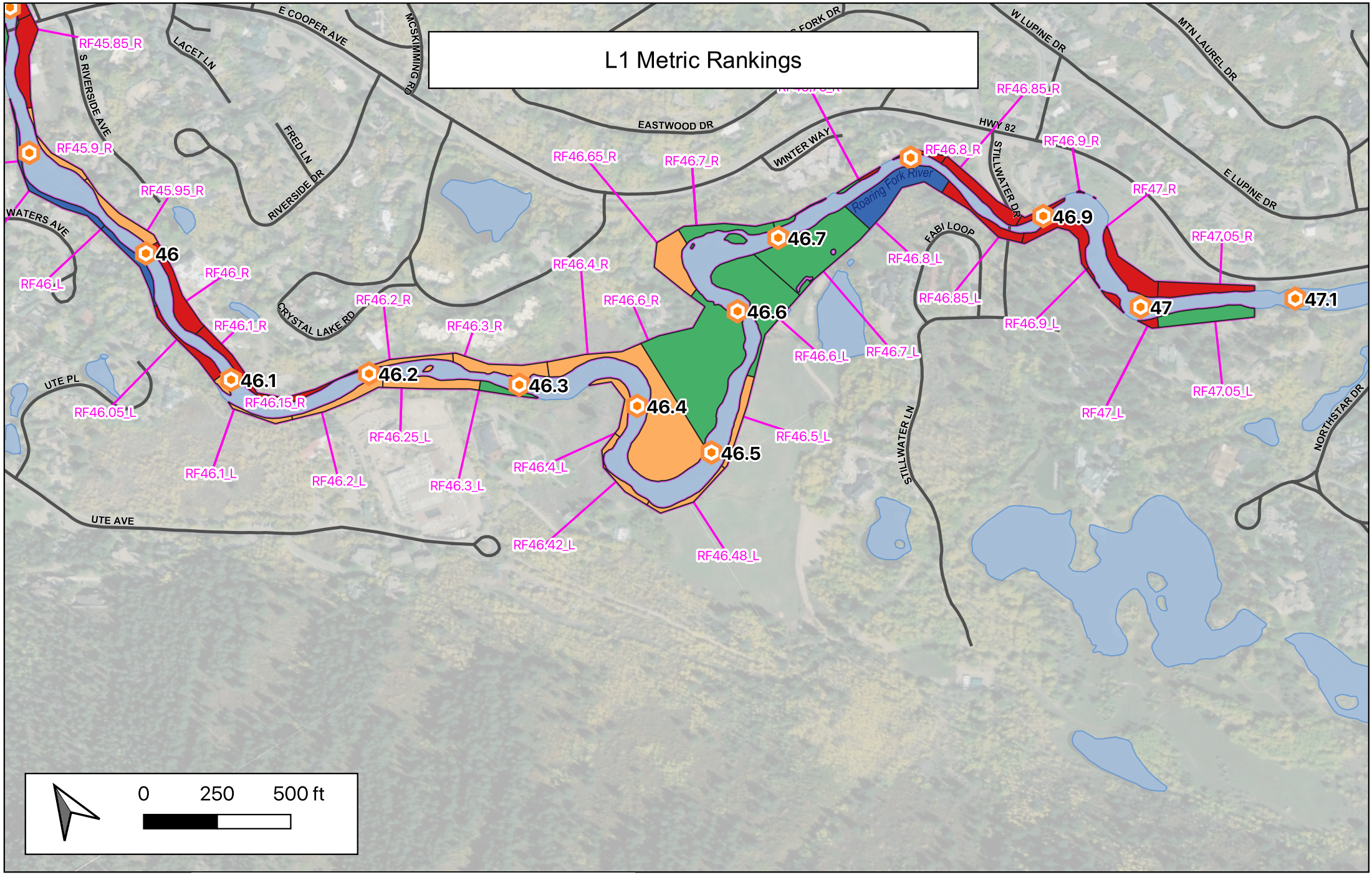
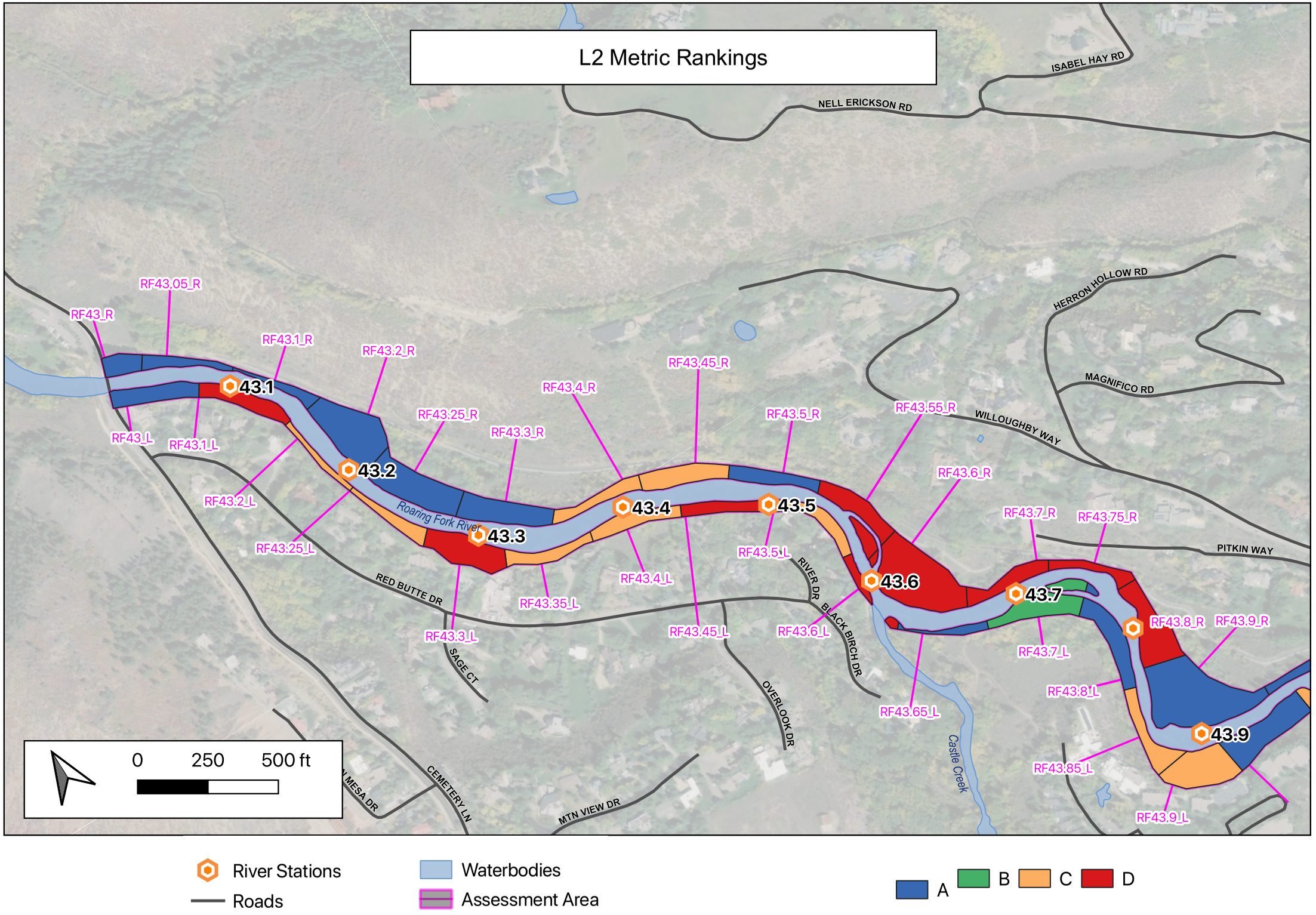
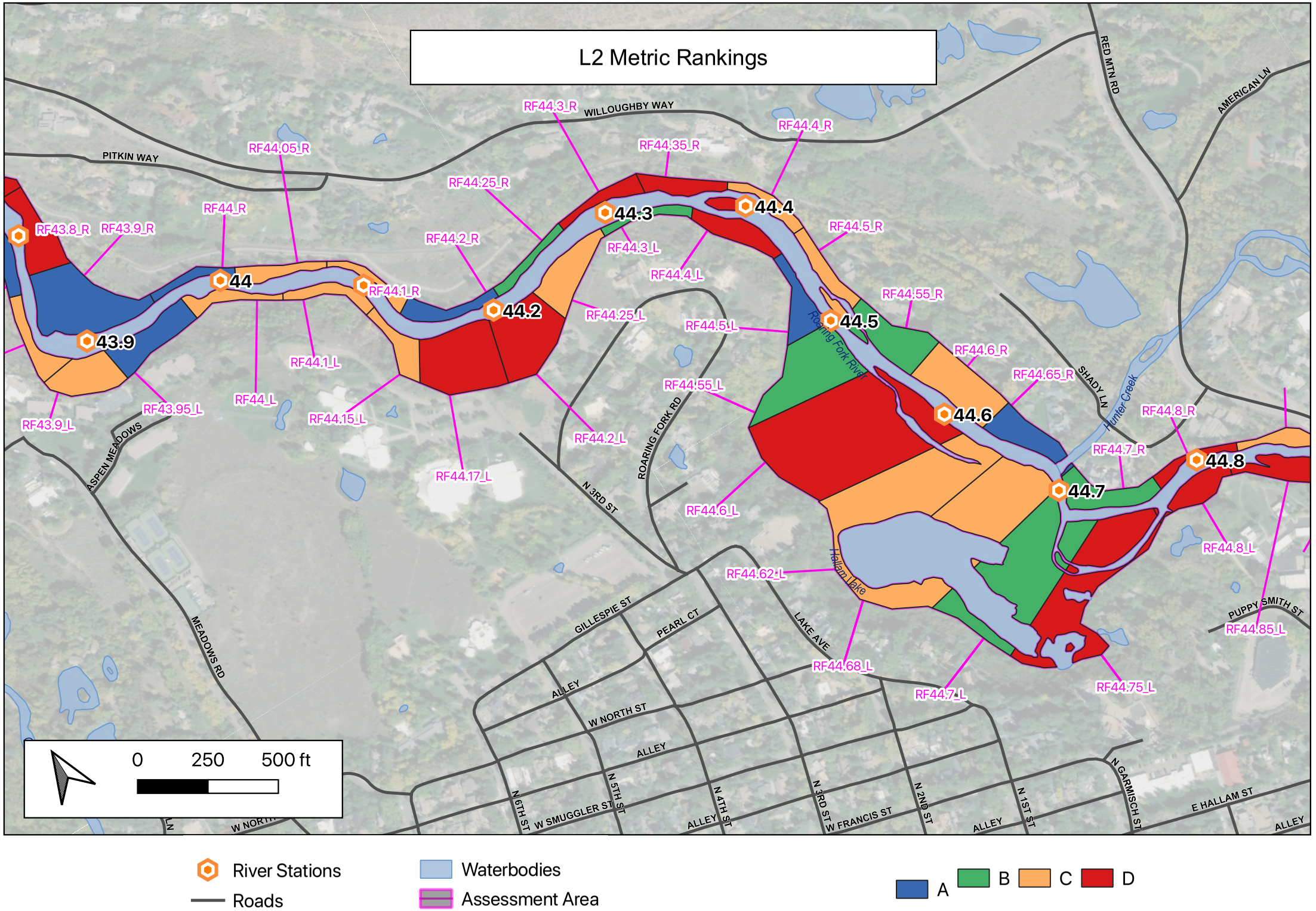
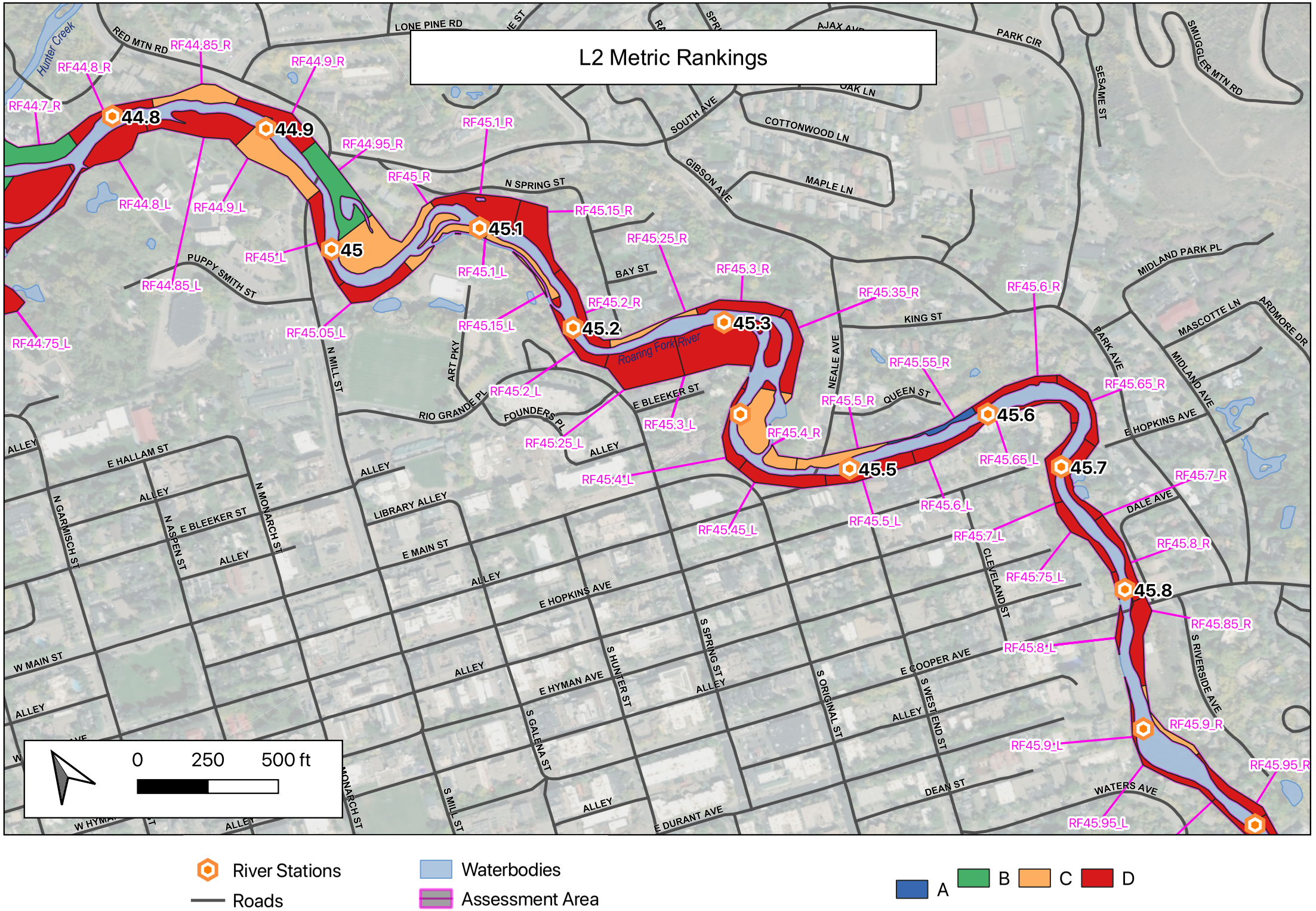
C
D

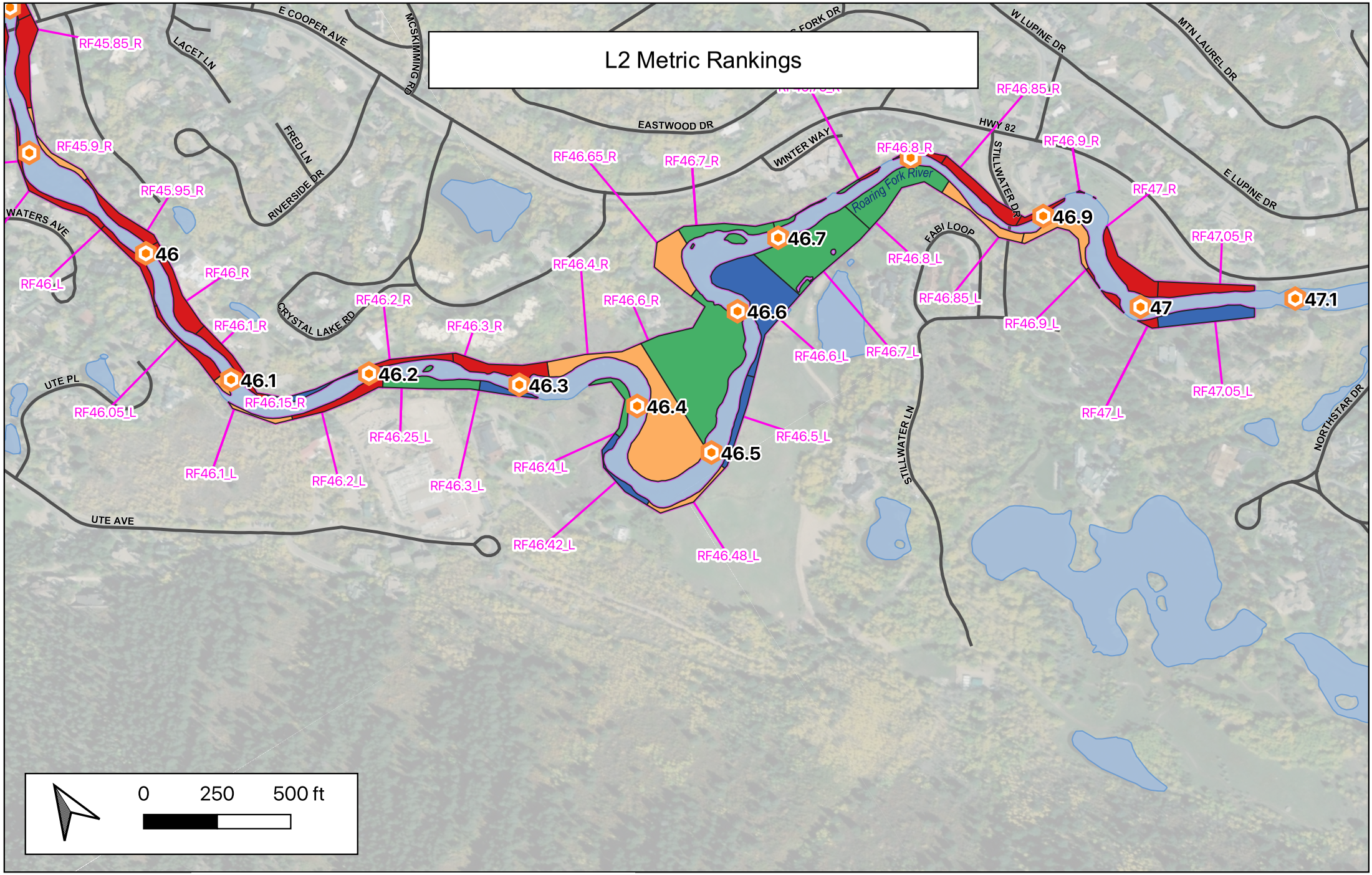

L1 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
COTTONWOOD LN
SOUTH AVE
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
KING ST
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
PUPPY SMITH ST
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
NEALE AVE
QUEEN ST
Roaring Fork River
ALLEY
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
E HOPKINS AVE
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
44.8
44.9
45.1
45
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.7_R
RF44.9_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF44.85_L
RF45_L
RF45.1_L
RF45.05_L
RF44.75_L
RF45.15_L
RF45.2_R
RF45.2_L
RF45.25_L
RF45.3_L
RF45.4_R
RF45.4_L
RF45.45_L
RF45.5_R
RF45.55_R
RF45.5_L
RF45.6_L
RF45.65_R
RF45.65_L
RF45.7_R
RF45.7_L
RF45.75_L
RF45.8_R
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

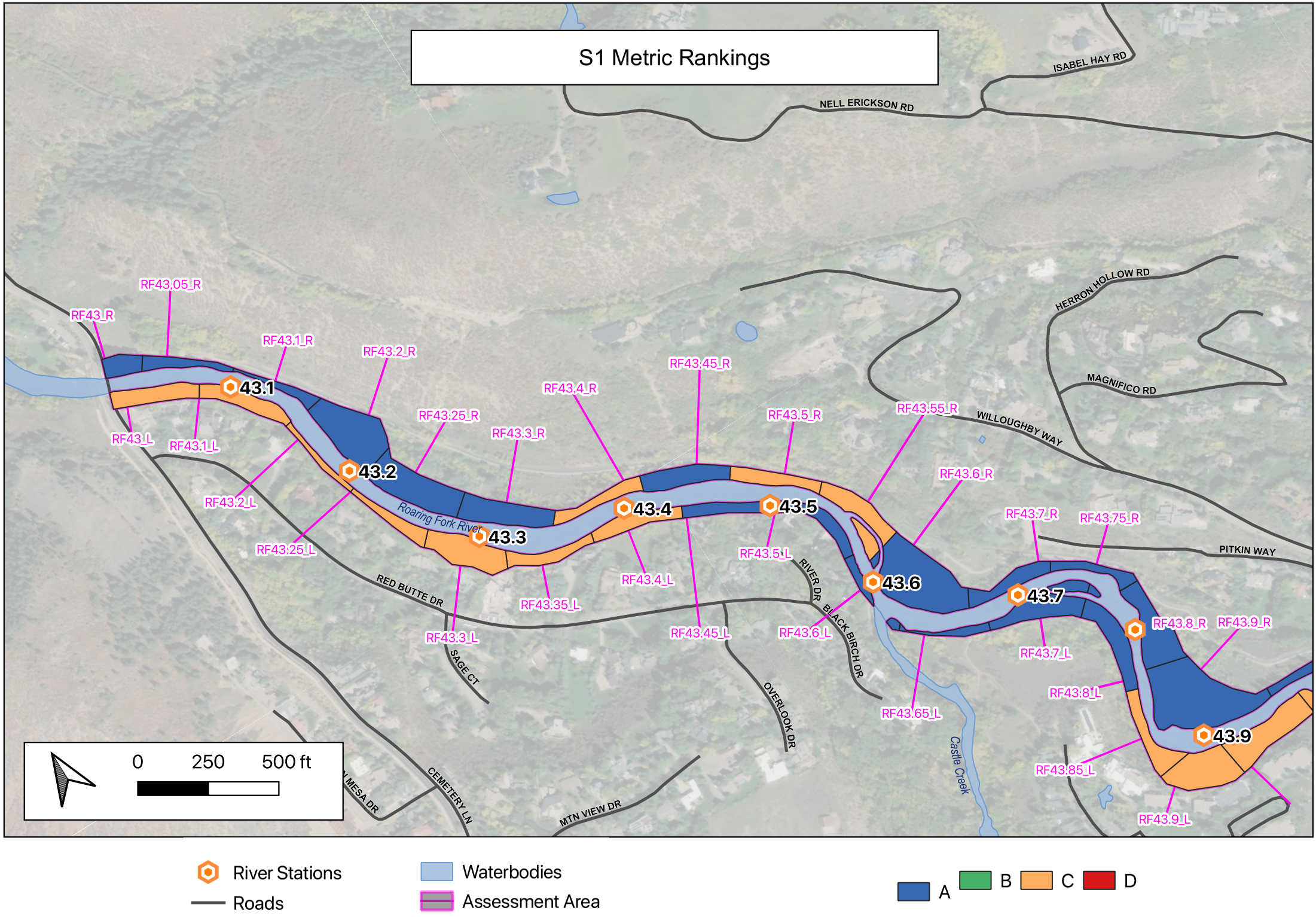

L1 Metric Rankings
RF45.85_R
RF45.9_R
RF45.95_R
RF46_L
RF46_R
RF46.1_R
RF46.05_L
RF46.15_R
RF46.1_L
RF46.2_R
RF46.2_L
RF46.25_L
RF46.3_R
RF46.3_L
RF46.4_R
RF46.4_L
RF46.42_L
RF46.48_L
RF46.6_R
RF46.6_L
RF46.65_R
RF46.7_R
RF46.7_L
RF46.5_L
RF46.8_R
RF46.8_L
RF46.85_R
RF46.85_L
RF46.9_R
RF46.9_L
RF47_R
RF47_L
RF47.05_R
RF47.05_L
46
46.1
46.2
46.3
46.4
46.5
46.6
46.7
46.9
47
47.1
Roaring Fork River
S RIVERSIDE AVE
LACET LN
E COOPER AVE
MCSKIMMING RD
FRED LN
RIVERSIDE DR
WATERS AVE
EASTWOOD DR
WINTER WAY
HWY 82
STILLWATER DR
W LUPINE DR
E LUPINE DR
MTN LAUREL DR
FABI LOOP
CRYSTAL LAKE RD
UTE PL
UTE AVE
STILLWATER LN
NORTHSTAR DR
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


L2 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
MTN VIEW DR
CEMETERY LN
Roaring Fork River
Castle Creek
RF43_R
RF43.05_R
RF43.1_R
RF43.2_R
RF43.25_R
RF43.3_R
RF43.4_R
RF43.45_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


L2 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
44.5
RF44.5_L
RF44.6_R
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.1_L
RF44.55_L
43.9
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
44.6
RF43.9_L
ASPEN MEADOWS
ROARING FORK RD
RF44.7_R
44.8
RF44.17_L
N 3RD ST
RF44.6_L
44.7
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
RF44.85_L
GILLESPIE ST
PEARL CT
LAKE AVE
MEADOWS RD
RF44.68_L
ALLEY
RF44.75_L
RF44.7_L
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


L2 Metric Rankings
44.8
44.9
45
45.1
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.15_L
RF45.2_R
RF44.75_L
RF45.05_L
RF45.2_L
RF45.25_L
RF45.3_L
RF45.4_R
RF45.55_R
RF45.5_R
RF45.65_R
RF45.65_L
RF45.7_R
RF45.4_L
RF45.45_L
RF45.5_L
RF45.6_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
Hunter Creek
Roaring Fork River
RED MTN RD
LONE PINE RD
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
PUPPY SMITH ST
BAY ST
KING ST
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
NEALE AVE
ART PKY
N MILL ST
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
QUEEN ST
E HOPKINS AVE
DALE AVE
CLEVELAND ST
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
S RIVERSIDE AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


L2 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
RF46.85_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
RF46.9_R
E LUPINE DR
RF47_R
RF47.05_R
46
46.7
46.9
RF46_L
RF46_R
RF46.4_R
RF46.8_L
FABI LOOP
RF46.85_L
RF46.6_R
46.6
47
47.1
RF46.2_R
CRYSTAL LAKE RD
RF46.3_R
RF46.9_L
RF46.1_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
RF46.05_L
RF46.15_R
46.4
RF47.05_L
RF47_L
NORTHSTAR DR
RF46.5_L
RF46.25_L
46.5
RF46.1_L
RF46.4_L
RF46.2_L
RF46.3_L
STILLWATER LN
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


S1 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
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43.7
43.9
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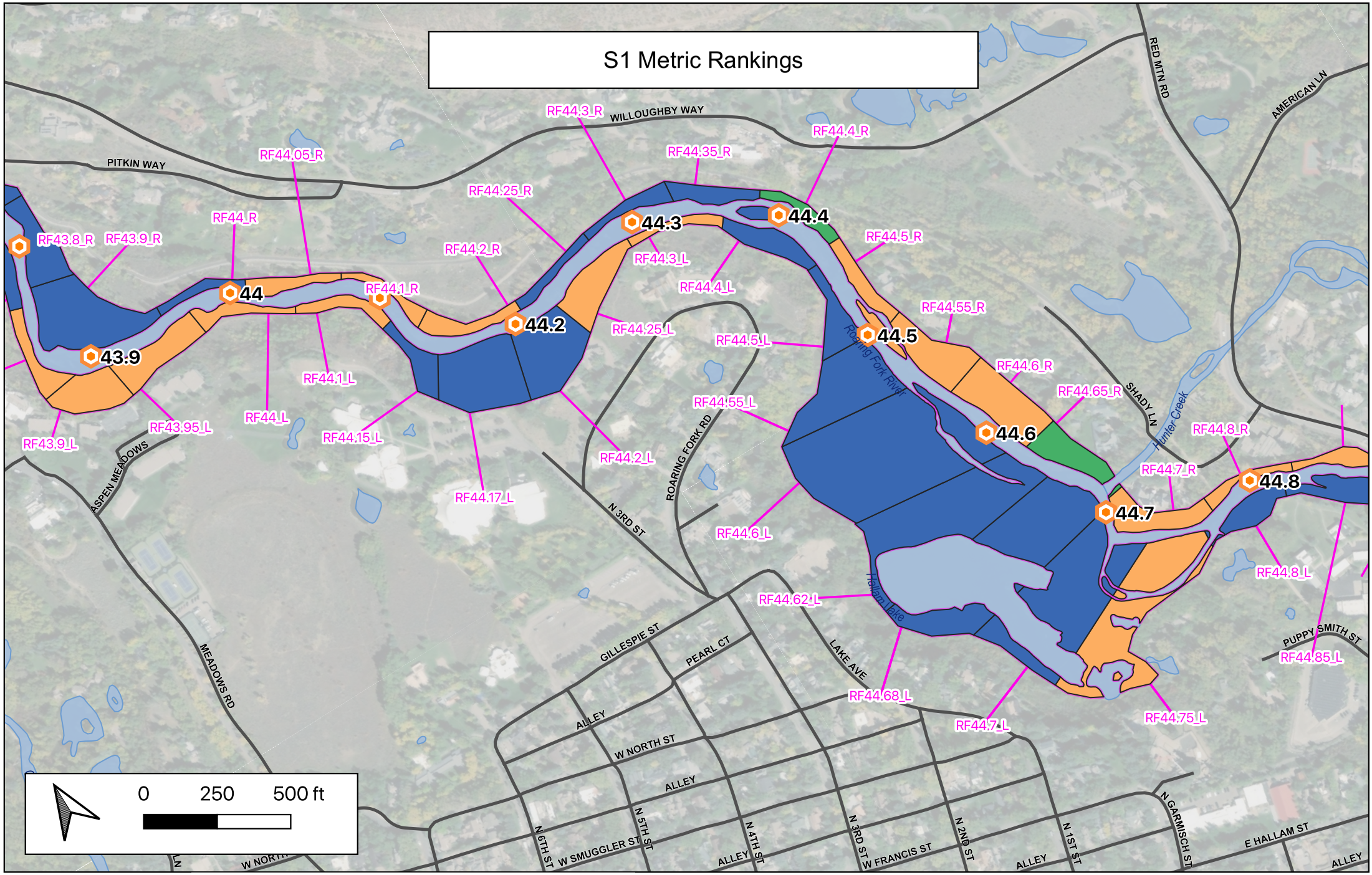
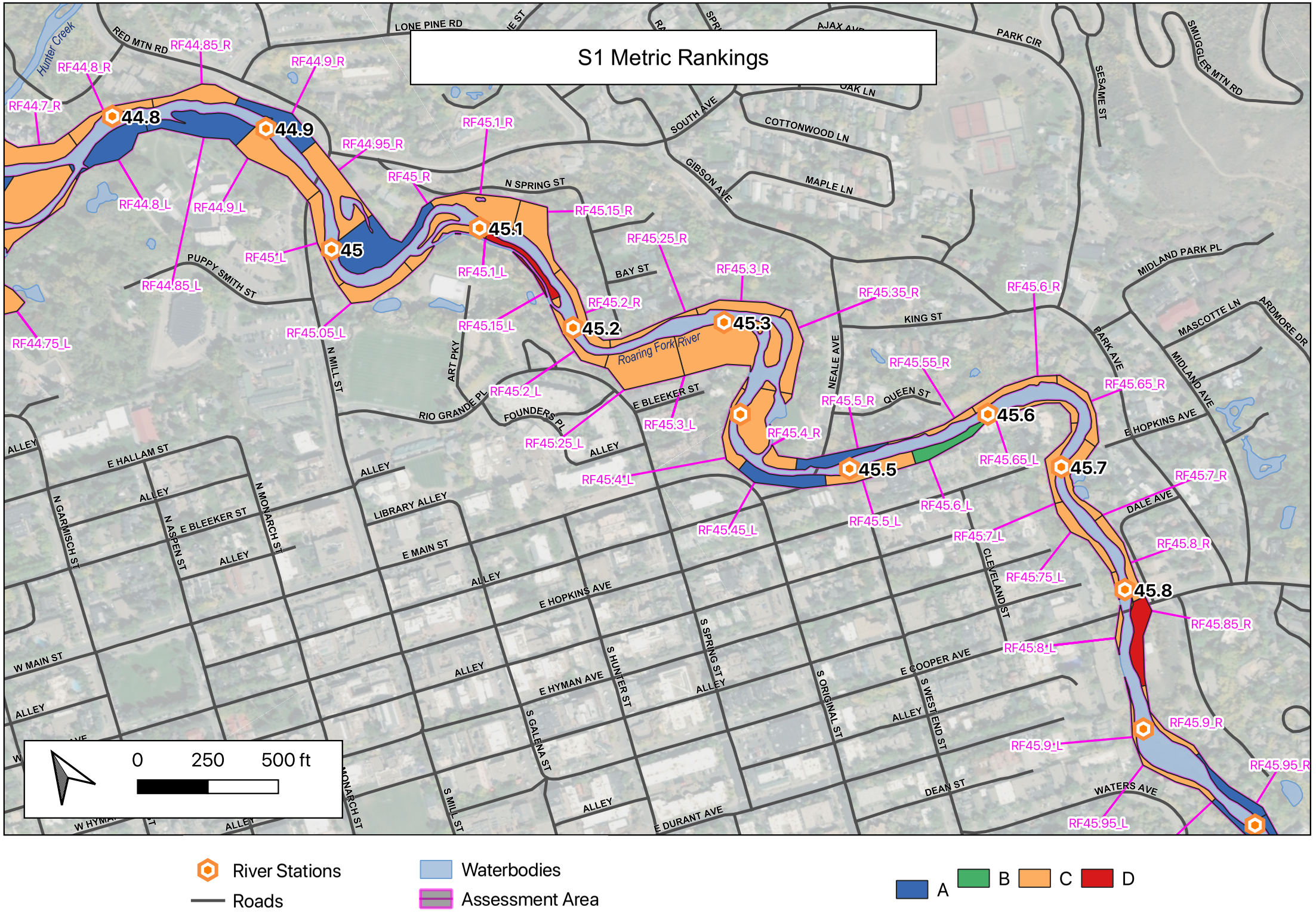
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


S1 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
RF44.2_R
RF44.3_L
RF44.4_L
RF44.5_R
RF44.1_R
RF44.55_R
RF44.25_L
RF44.5_L
RF44.6_R
RF44.65_R
RF44.1_L
RF44_L
RF43.95_L
RF44.15_L
RF44.2_L
RF44.55_L
RF44.8_R
RF43.9_L
RF44.17_L
RF44.7_R
RF44.6_L
RF44.8_L
RF44.62_L
RF44.85_L
RF44.68_L
RF44.75_L
RF44.7_L
44
43.9
44.2
44.3
44.4
44.5
44.6
44.7
44.8
Roaring Fork River
Hunter Creek
Hallam Lake
ASPEN MEADOWS
MEADOWS RD
ROARING FORK RD
SHADY LN
N 3RD ST
GILLESPIE ST
PEARL CT
LAKE AVE
PUPPY SMITH ST
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


S1 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
PUPPY SMITH ST
BAY ST
KING ST
NEALE AVE
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
QUEEN ST
Roaring Fork River
ART PKY
N MILL ST
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
E HALLAM ST
ALLEY
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
S MILL ST
E DURANT AVE
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.2_R
RF44.75_L
RF45.05_L
RF45.15_L
RF45.2_L
RF45.25_L
RF45.3_L
RF45.4_R
RF45.55_R
RF45.5_R
RF45.65_R
RF45.65_L
RF45.7_R
RF45.4_L
RF45.45_L
RF45.5_L
RF45.6_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
44.8
44.9
45
45.1
45.2
45.3
45.5
45.6
45.7
45.8
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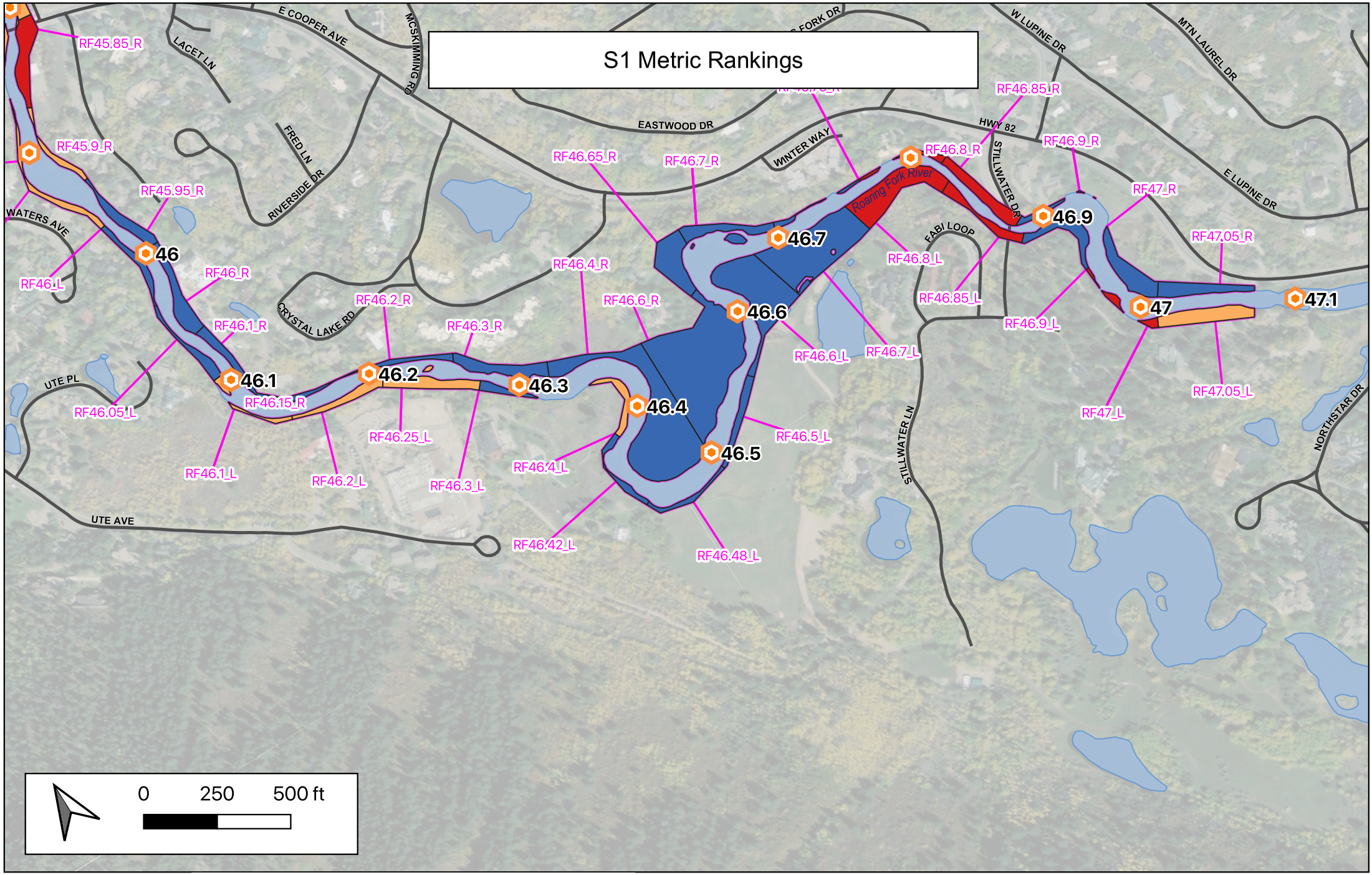
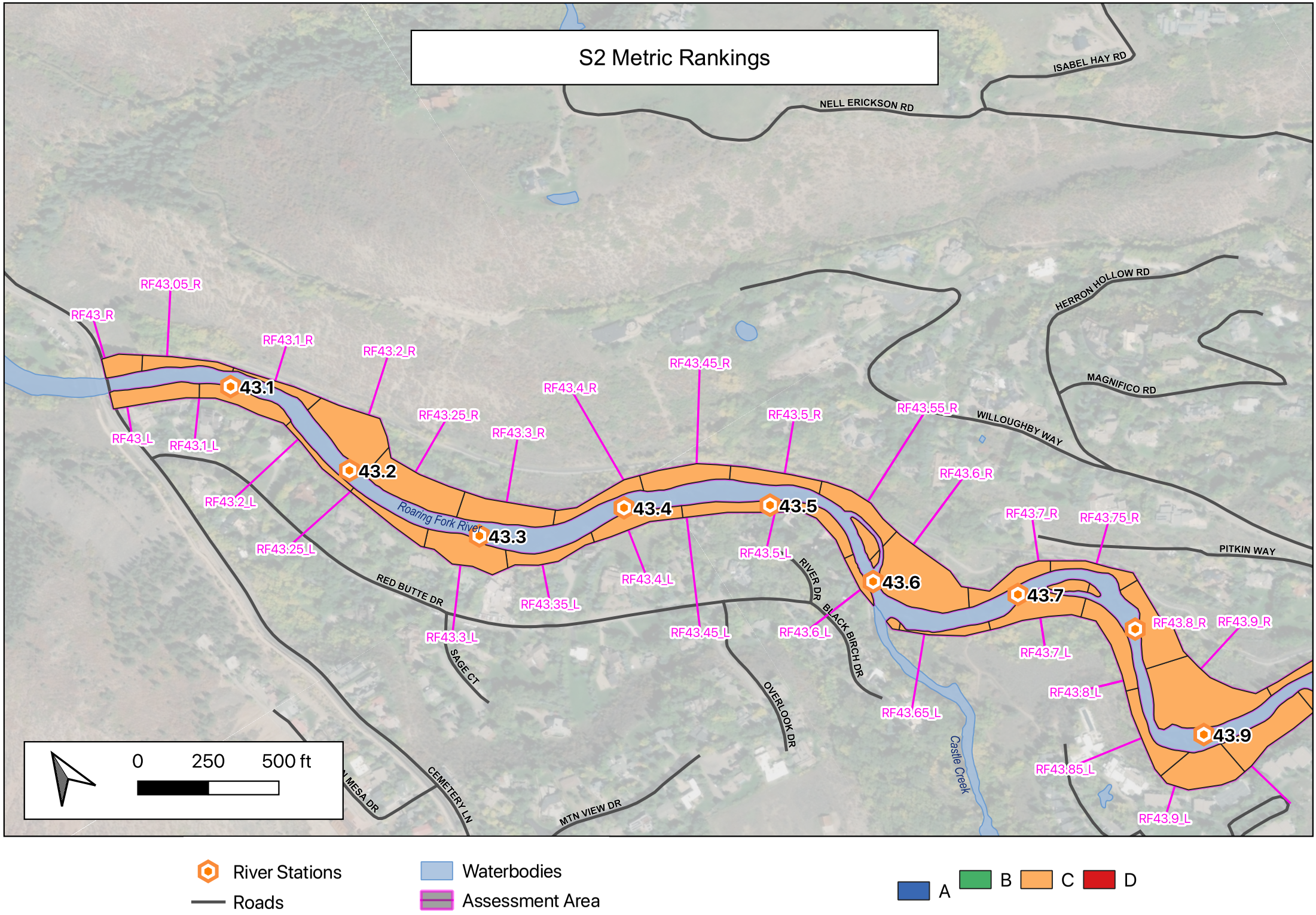
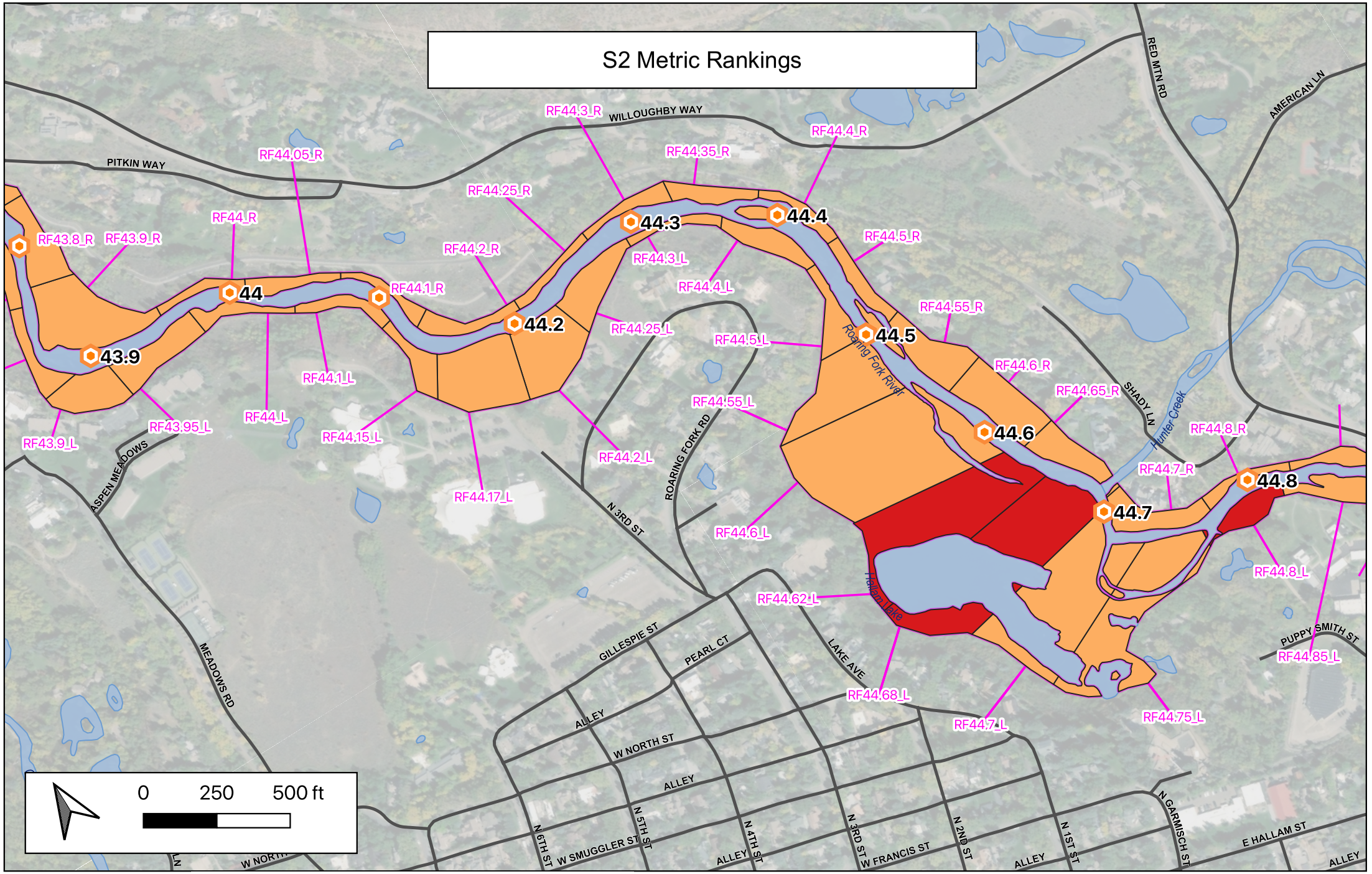
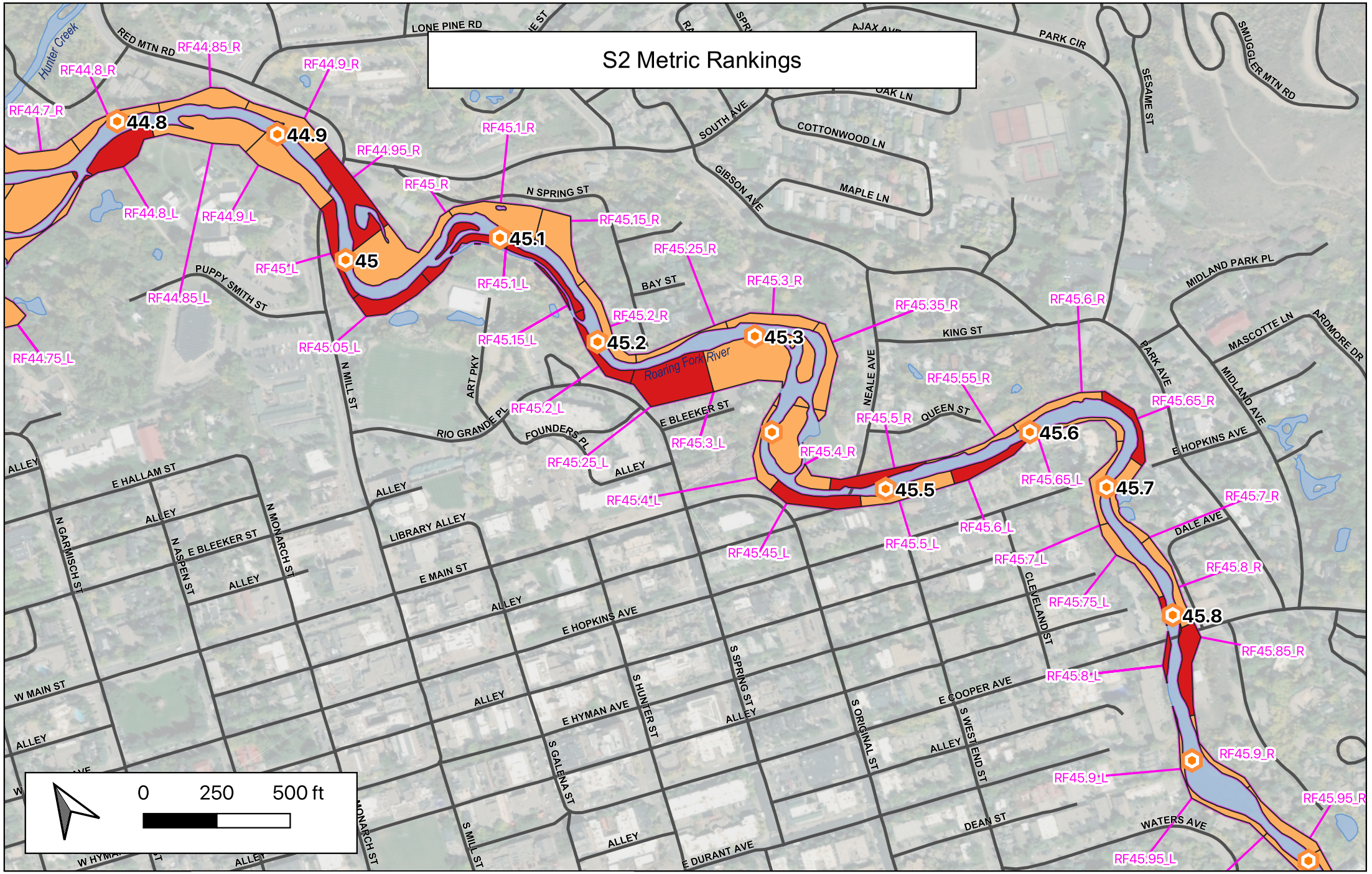
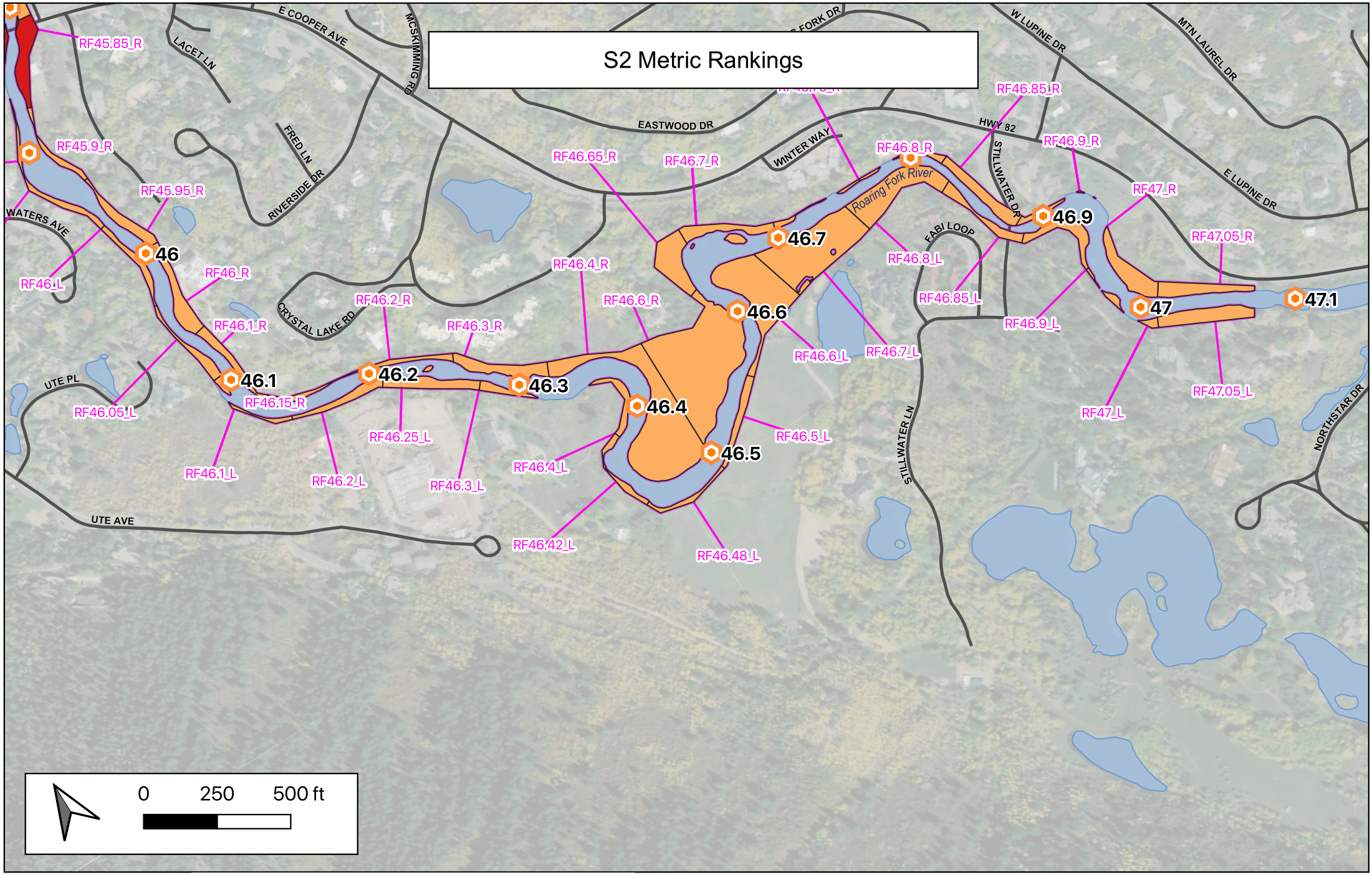
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

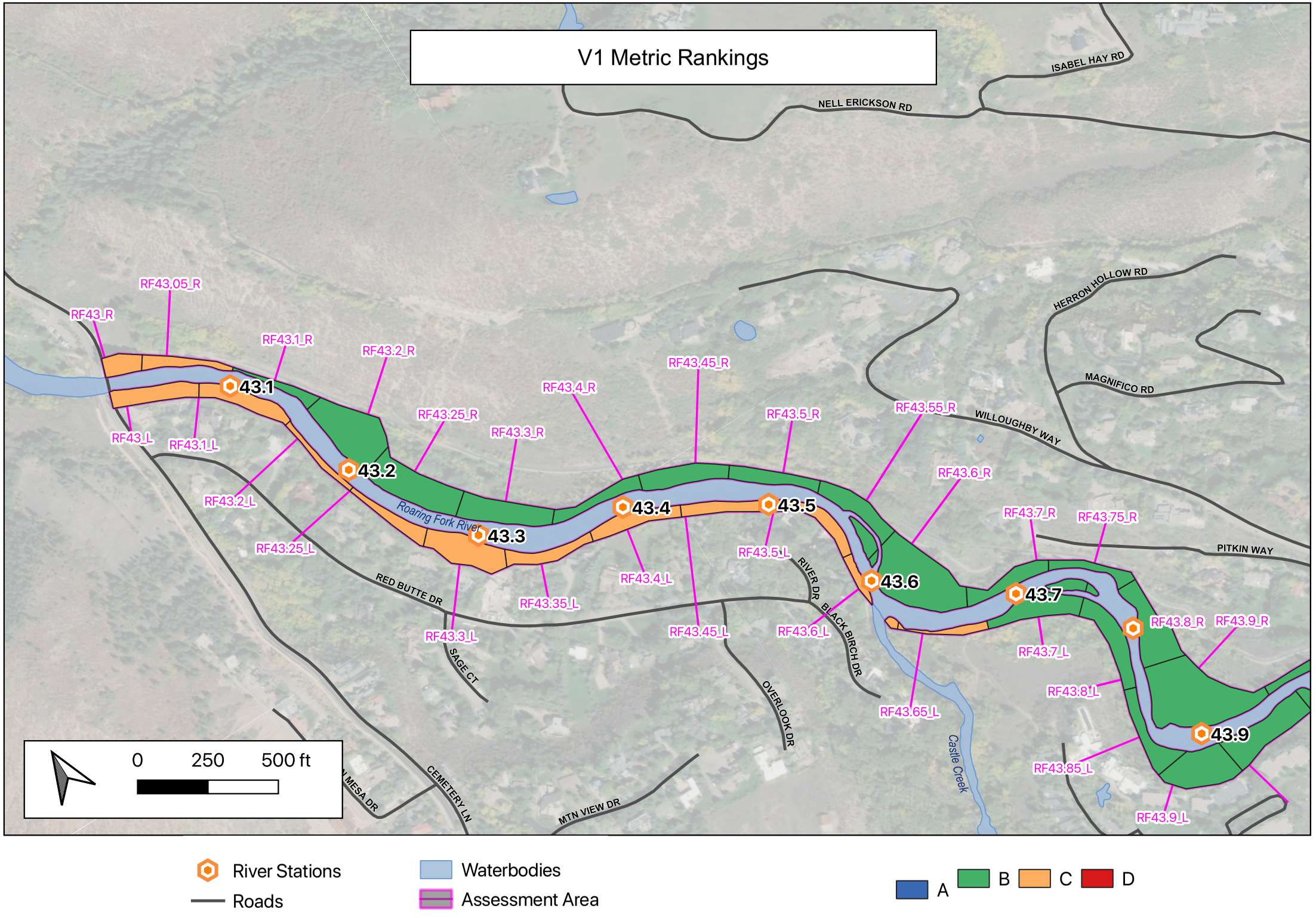

S1 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
RF46.85_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
RF46.9_R
E LUPINE DR
RF47_R
RF47.05_R
46.9
46.7
FABI LOOP
RF46.8_L
46
RF46_L
RF46_R
RF46.4_R
RF46.6_R
46.6
RF46.85_L
RF46.9_L
47
47.1
CRYSTAL LAKE RD
RF46.2_R
RF46.3_R
RF46.1_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
46.4
RF46.15_R
RF46.05_L
RF46.25_L
RF46.5_L
RF47.05_L
RF47_L
NORTHSTAR DR
46.5
RF46.1_L
RF46.2_L
RF46.3_L
RF46.4_L
STILLWATER LN
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

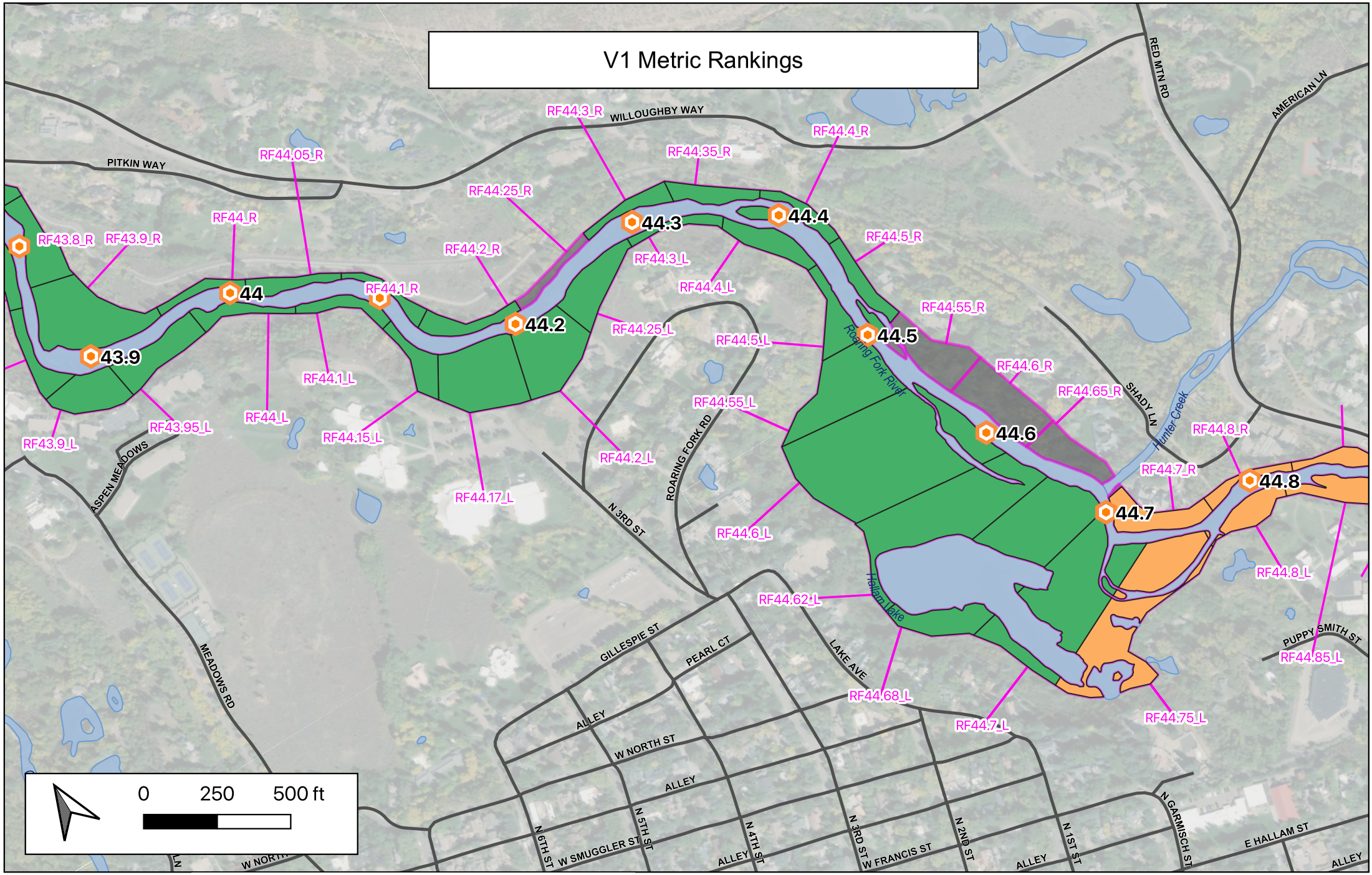

S2 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.25_R
RF43.3_R
RF43.4_R
RF43.45_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

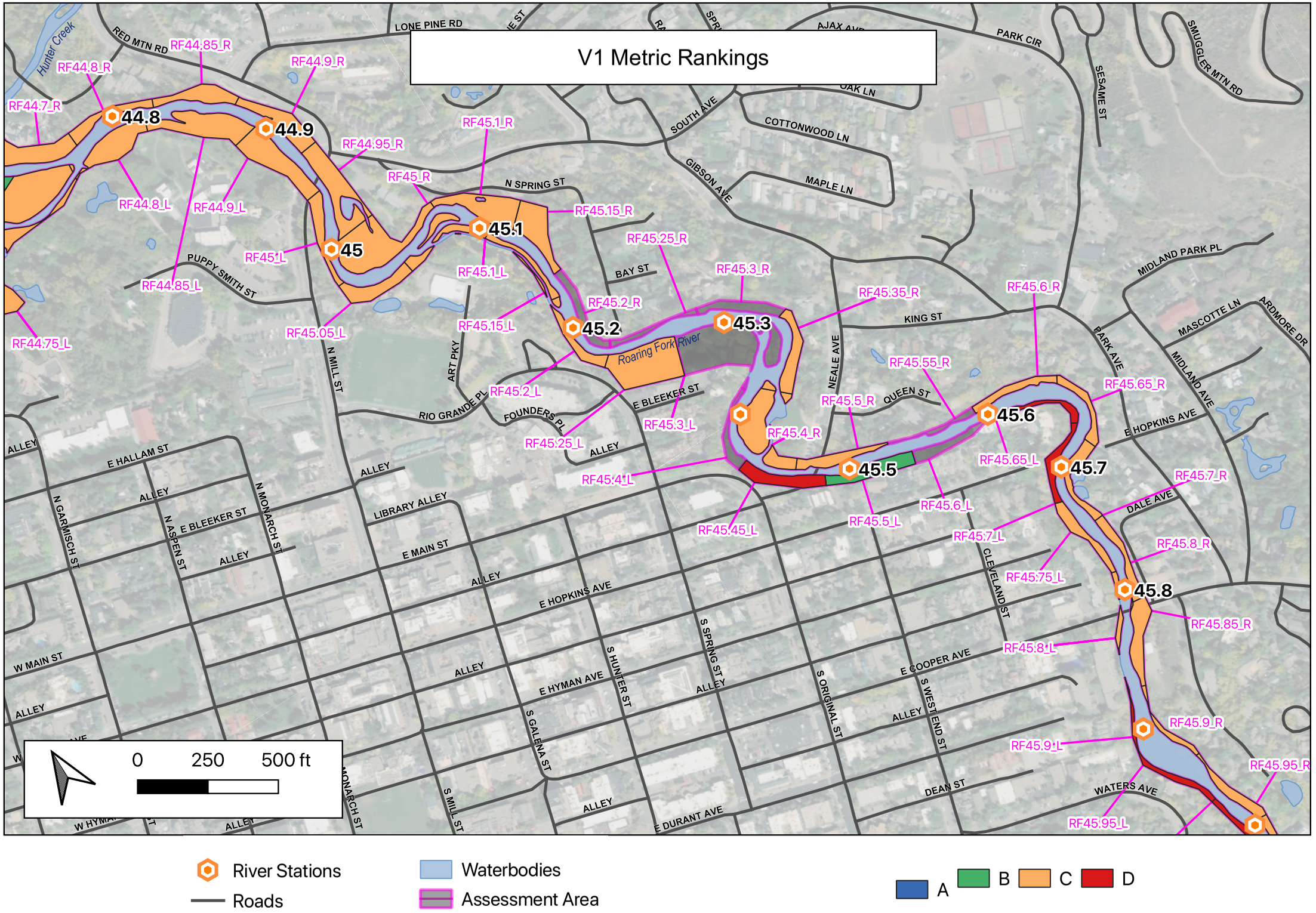

S2 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
RF44.2_R
44.3
44.4
RF44.5_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
RF44.5_L
44.5
43.9
RF44.6_R
RF44.65_R
SHADY LN
RF44.1_L
RF44.55_L
Roaring Fork River
Hunter Creek
RF44.8_R
RF43.9_L
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
ROARING FORK RD
44.6
RF44.7_R
ASPEN MEADOWS
RF44.17_L
N 3RD ST
44.8
44.7
RF44.6_L
Hallam Lake
RF44.8_L
RF44.62_L
GILLESPIE ST
PEARL CT
LAKE AVE
PUPPY SMITH ST
RF44.85_L
MEADOWS RD
ALLEY
RF44.68_L
RF44.75_L
RF44.7_L
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

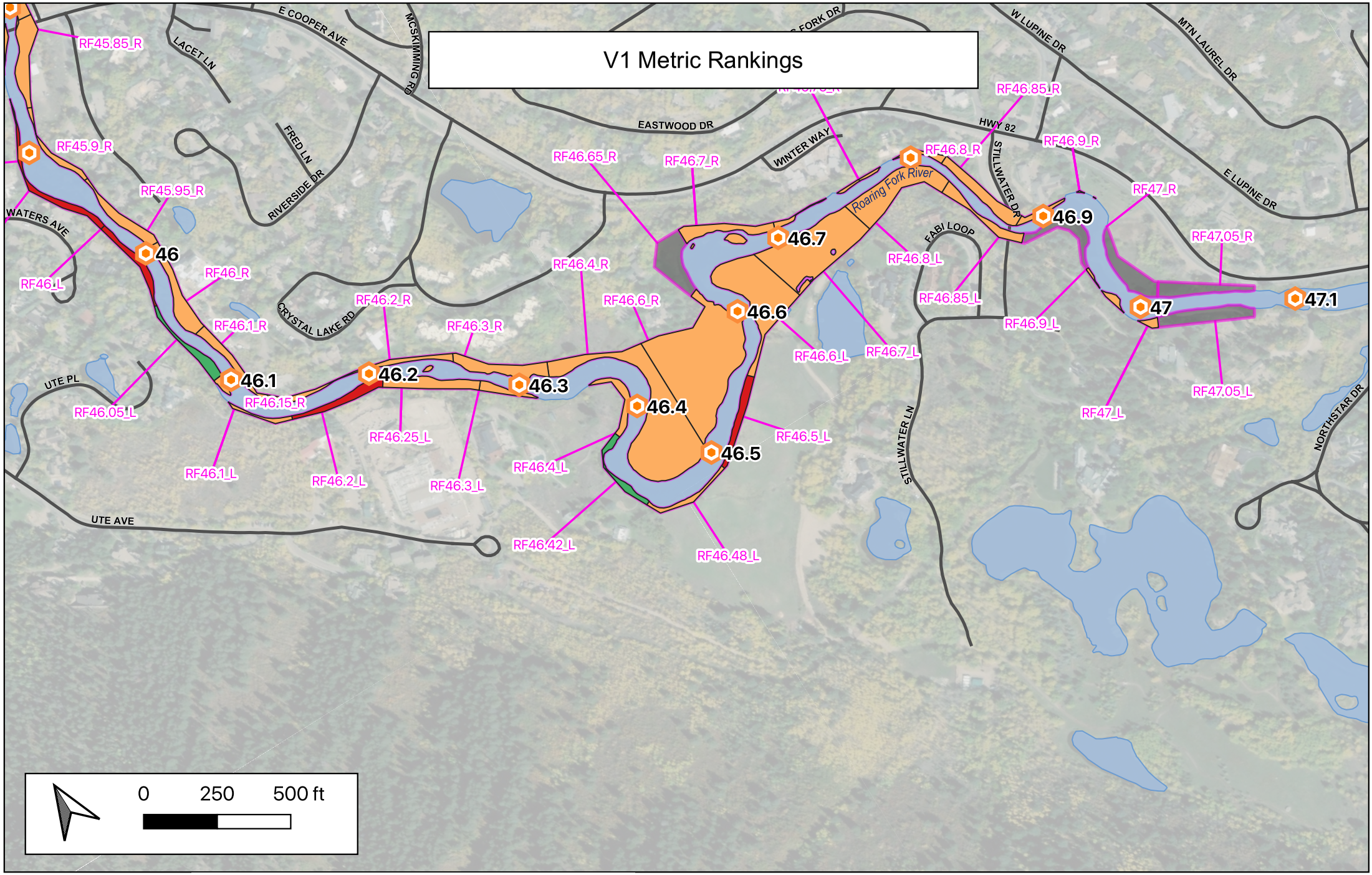

S2 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
KING ST
NEALE AVE
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
QUEEN ST
Roaring Fork River
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
ALLEY
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
WATERS AVE
DEAN ST
E DURANT AVE
S MILL ST
44.8
44.9
45
45.1
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.05_L
RF44.75_L
RF45.15_L
RF45.2_R
RF45.2_L
RF45.25_L
RF45.3_L
RF45.4_R
RF45.55_R
RF45.5_R
RF45.65_R
RF45.65_L
RF45.7_R
RF45.4_L
RF45.45_L
RF45.5_L
RF45.6_L
RF45.7_L
RF45.75_L
RF45.8_R
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

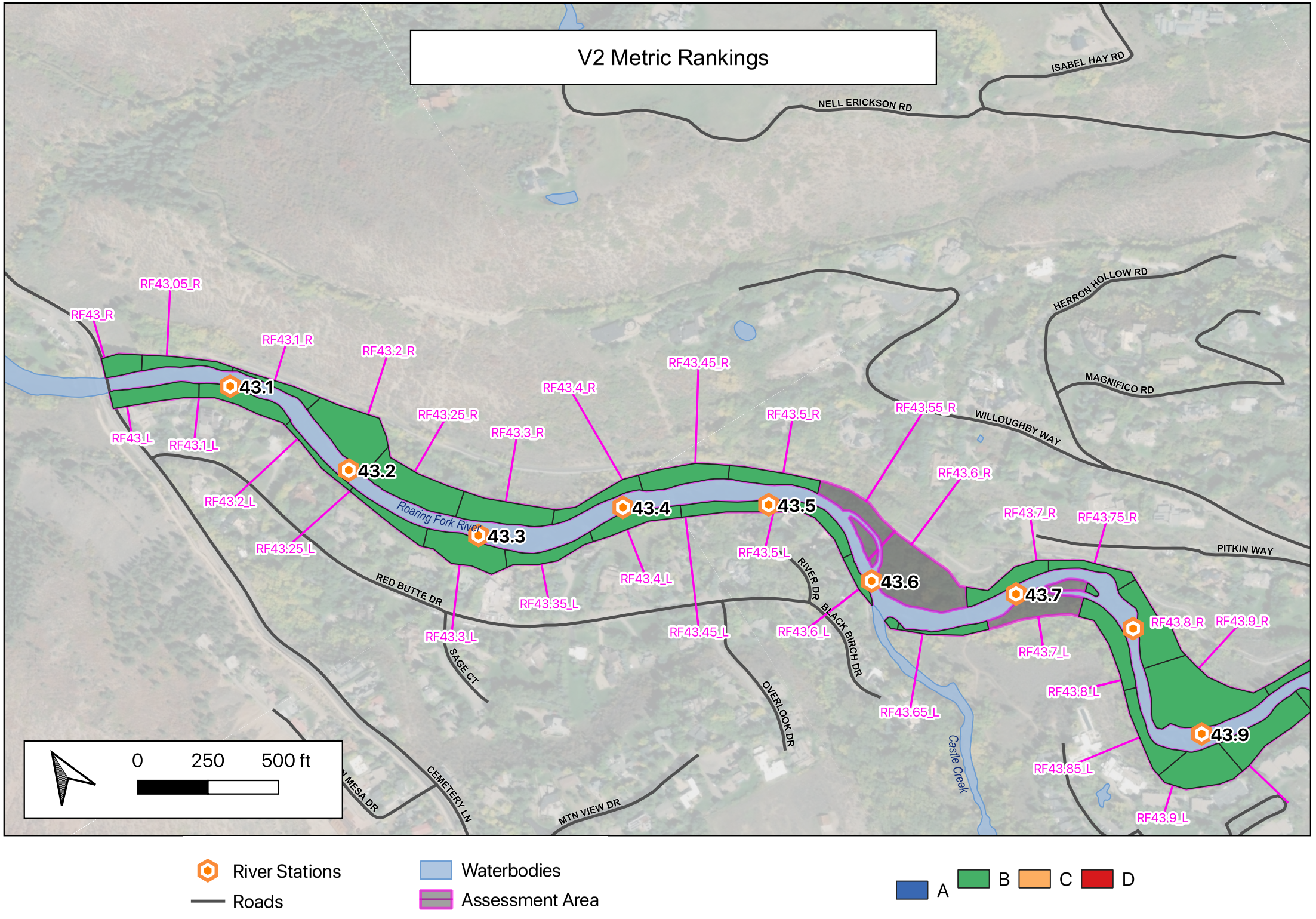

S2 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
E LUPINE DR
RF46.85_R
RF46.9_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
FABI LOOP
46.9
RF47_R
RF47.05_R
46.7
RF46.8_L
46
RF46_L
RF46_R
RF46.4_R
RF46.85_L
47
47.1
RF46.9_L
RF46.2_R
RF46.6_R
CRYSTAL LAKE RD
46.6
RF46.1_R
RF46.3_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
46.4
RF46.15_R
RF46.05_L
RF47_L
RF47.05_L
RF46.25_L
RF46.5_L
46.5
RF46.1_L
RF46.4_L
RF46.2_L
RF46.3_L
STILLWATER LN
NORTHSTAR DR
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

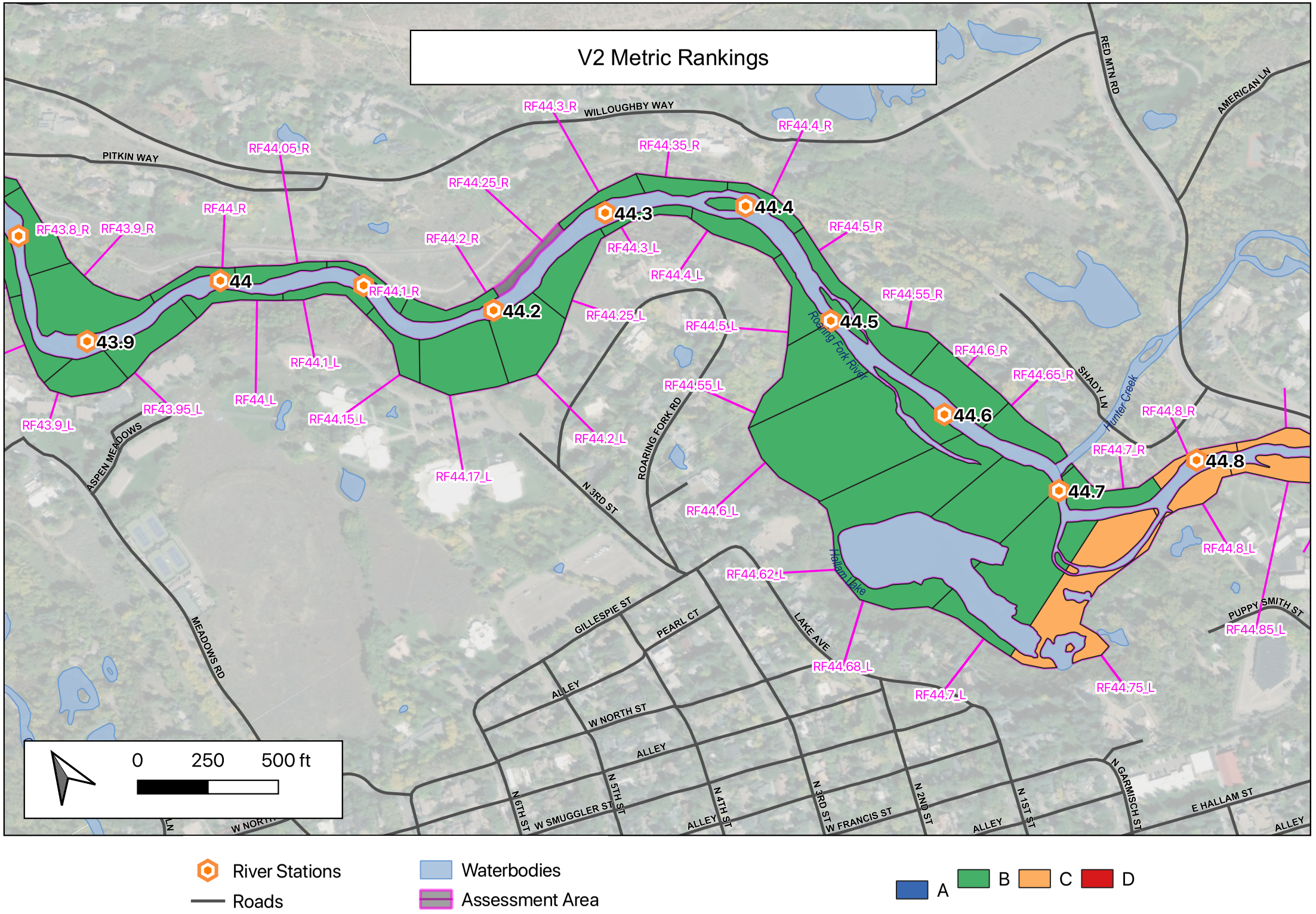

V1 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.8
43.9
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.25_R
RF43.3_R
RF43.4_R
RF43.45_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V1 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
44.5
RF44.5_L
Roaring Fork River
RF44.6_R
RF44.65_R
SHADY LN
Hunter Creek
43.9
RF44.1_L
RF44.55_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
RF44.6
RF44.7_R
RF43.9_L
ASPEN MEADOWS
RF44.2_L
ROARING FORK RD
44.8
RF44.17_L
N 3RD ST
44.7
RF44.6_L
Hallam Lake
RF44.8_L
RF44.62_L
PUPPY SMITH ST
GILLESPIE ST
PEARL CT
LAKE AVE
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V1 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
KING ST
NEALE AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
Roaring Fork River
ART PKY
N MILL ST
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
QUEEN ST
E HALLAM ST
ALLEY
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
S MILL ST
E DURANT AVE
44.8
44.9
45
45.1
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.05_L
RF44.75_L
RF45.15_L
RF45.2_R
RF45.2_L
RF45.25_L
RF45.3_L
RF45.4_R
RF45.55_R
RF45.5_R
RF45.65_R
RF45.65_L
RF45.7_R
RF45.4_L
RF45.5_L
RF45.6_L
RF45.45_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V1 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
FORK DR
W LUPINE DR
MTN LAUREL DR
RF46.85_R
HWY 82
WINTER WAY
RF46.8_R
RF46.9_R
STILLWATER DR
E LUPINE DR
RF45.9_R
FRED LN
RIVERSIDE DR
RF46.65_R
RF46.7_R
Roaring Fork River
RF47_R
RF45.95_R
WATERS AVE
46.7
46.9
FABI LOOP
RF47.05_R
46
RF46.8_L
RF46_L
RF46_R
RF46.4_R
RF46.85_L
47
47.1
RF46.2_R
RF46.6_R
46.6
RF46.9_L
CRYSTAL LAKE RD
RF46.1_R
RF46.3_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
RF46.05_L
RF46.15_R
46.4
RF47.05_L
RF47_L
NORTHSTAR DR
RF46.5_L
RF46.25_L
46.5
RF46.1_L
RF46.4_L
RF46.2_L
RF46.3_L
STILLWATER LN
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V2 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
MTN VIEW DR
CEMETERY LN
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V2 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.3_L
RF44.2_R
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
44.5
RF44.5_L
Roaring Fork River
RF44.6_R
RF44.65_R
SHADY LN
Hunter Creek
RF44.55_L
43.9
RF44.1_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
RF44.7_R
44.8
RF43.9_L
ASPEN MEADOWS
ROARING FORK RD
RF44.17_L
N 3RD ST
44.6
44.7
RF44.6_L
Hallam Lake
RF44.8_L
RF44.62_L
GILLESPIE ST
PEARL CT
LAKE AVE
PUPPY SMITH ST
RF44.85_L
MEADOWS RD
ALLEY
RF44.68_L
RF44.75_L
RF44.7_L
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
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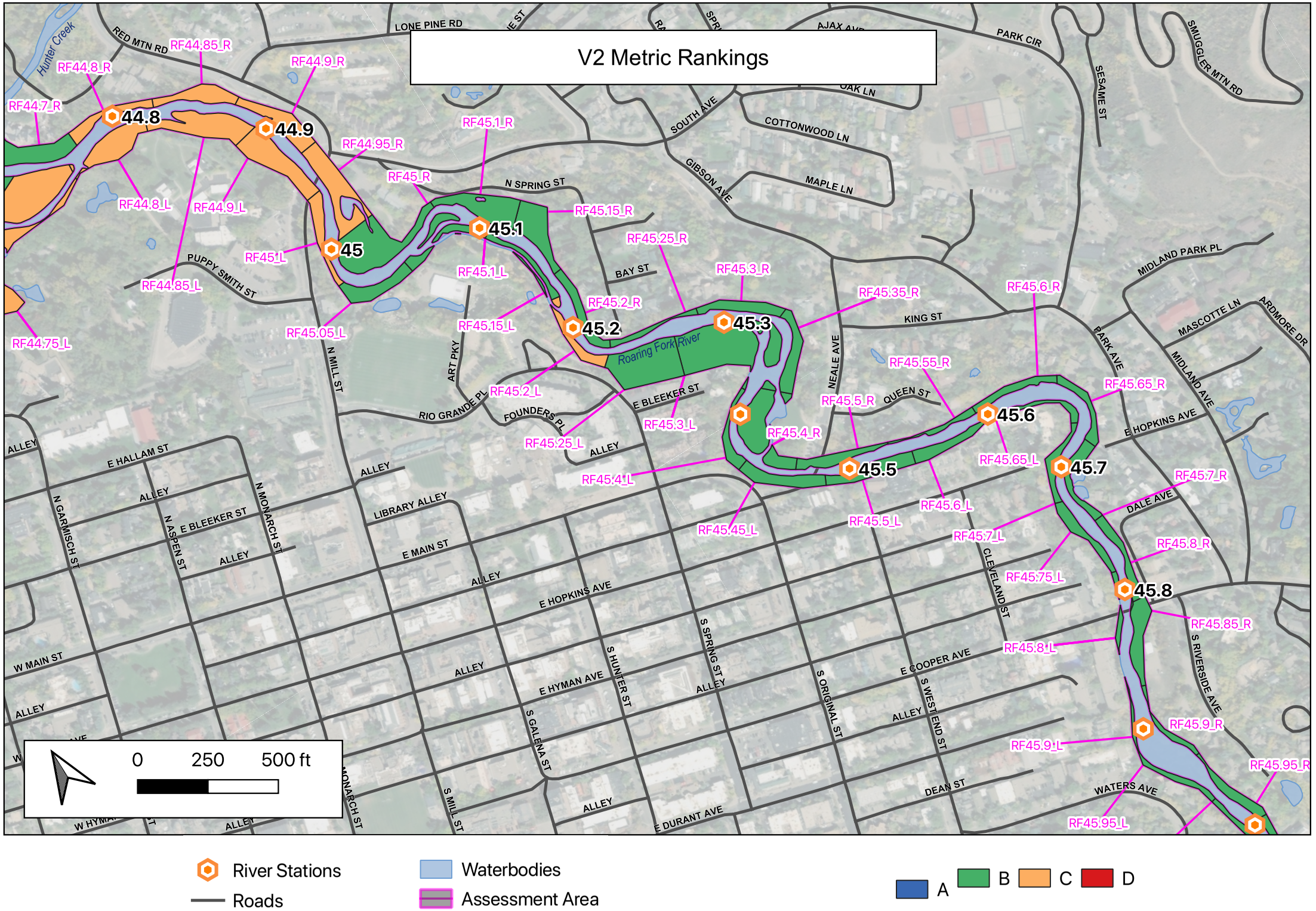
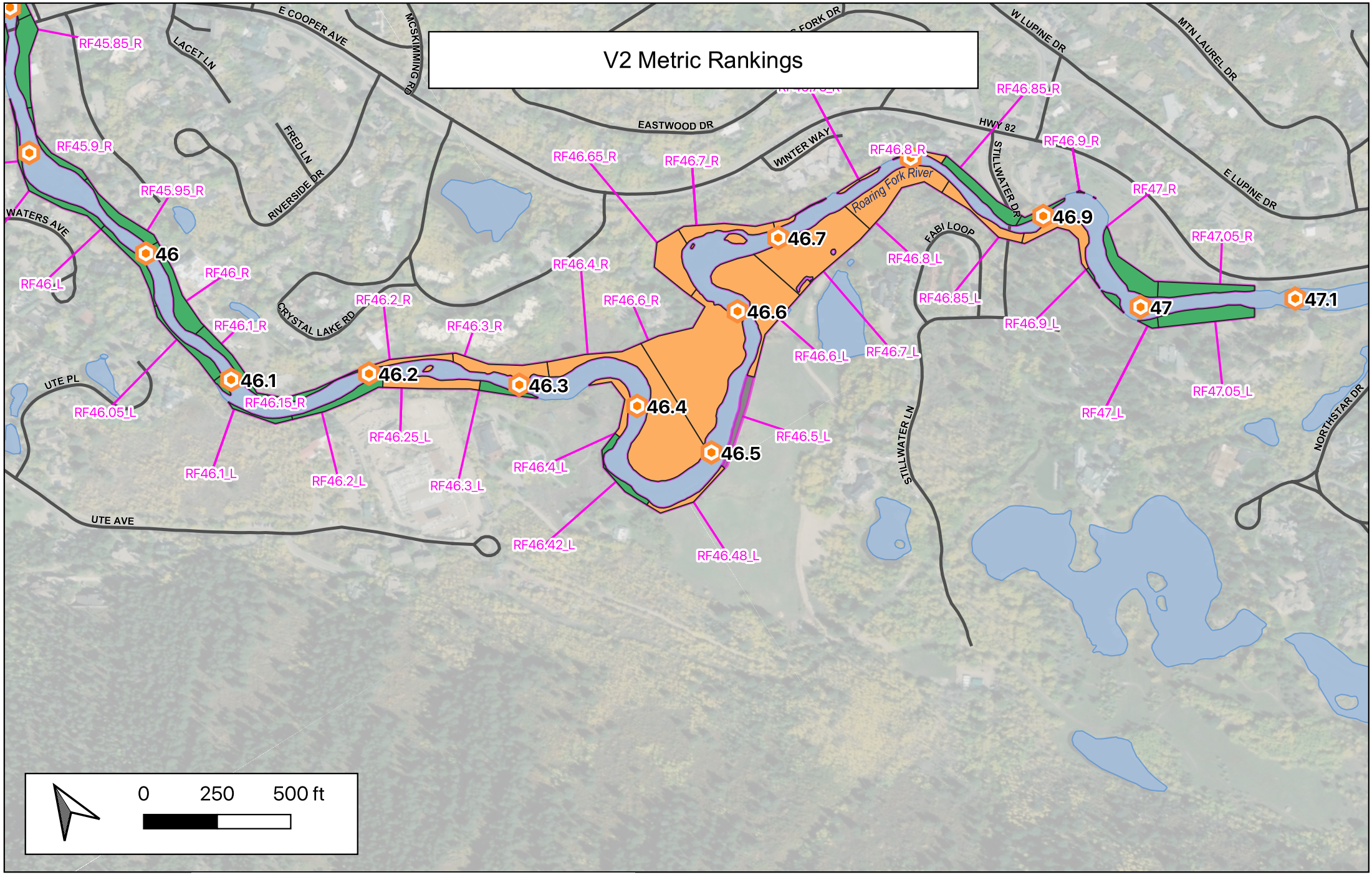
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V2 Metric Rankings
44.8
44.9
45
45.1
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.8_L
RF44.9_L
RF44.85_L
RF44.75_L
RF45_R
RF45.1_R
RF44.95_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF45.55_R
RF45.65_R
RF45.5_R
RF45.4_R
RF45.65_L
RF45.7_R
RF45.6_L
RF45.5_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
RF45.45_L
RF45.4_L
RF45.3_L
RF45.25_L
RF45.2_L
RF45.2_R
RF45.15_L
RF45.1_L
RF45_L
RF45.05_L
Roaring Fork River
Hunter Creek
LONE PINE RD
RED MTN RD
PUPPY SMITH ST
N SPRING ST
SOUTH AVE
OAK LN
COTTONWOOD LN
GIBSON AVE
MAPLE LN
PARK CIR
SESAME ST
SMUGGLER MTN RD
BAY ST
KING ST
NEALE AVE
QUEEN ST
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
S RIVERSIDE AVE
WATERS AVE
DEAN ST
E DURANT AVE
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
E HYMAN AVE
W MAIN ST
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WEST END ST
E COOPER AVE
S MILL ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V2 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
E LUPINE DR
RF46.85_R
RF46.9_R
RF45.9_R
RF45.95_R
WATERS AVE
FRED LN
RIVERSIDE DR
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
FABI LOOP
RF47_R
RF47.05_R
46
46.7
46.9
47
47.1
RF46_L
RF46_R
RF46.4_R
RF46.8_L
RF46.85_L
RF46.9_L
RF46.2_R
RF46.6_R
CRYSTAL LAKE RD
RF46.1_R
RF46.3_R
46.6
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
46.4
46.5
RF46.05_L
RF46.15_R
RF46.25_L
RF46.5_L
RF47_L
RF47.05_L
NORTHSTAR DR
STILLWATER LN
RF46.1_L
RF46.2_L
RF46.3_L
RF46.4_L
UTE AVE
RF46.42_L
RF46.48_L
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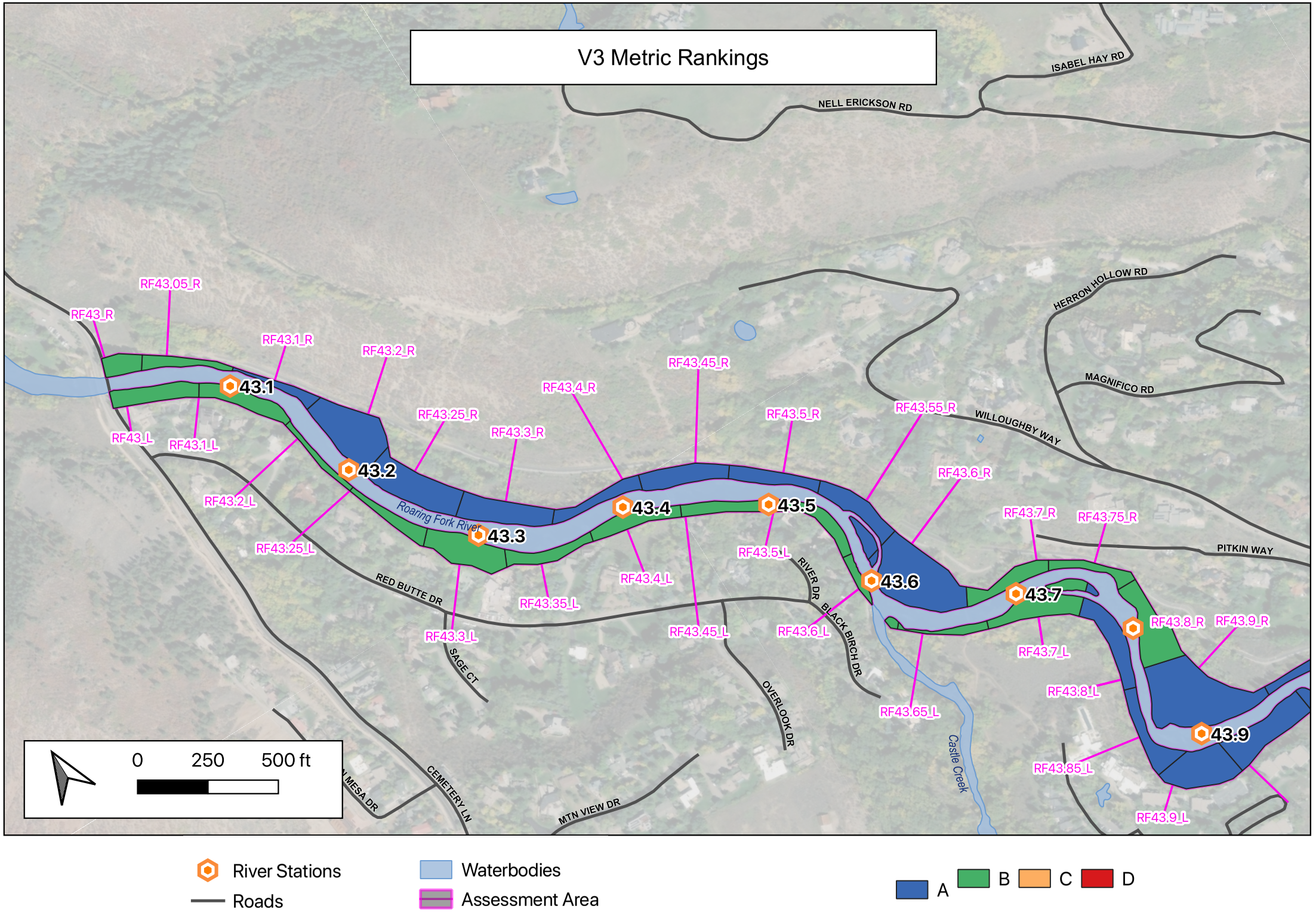
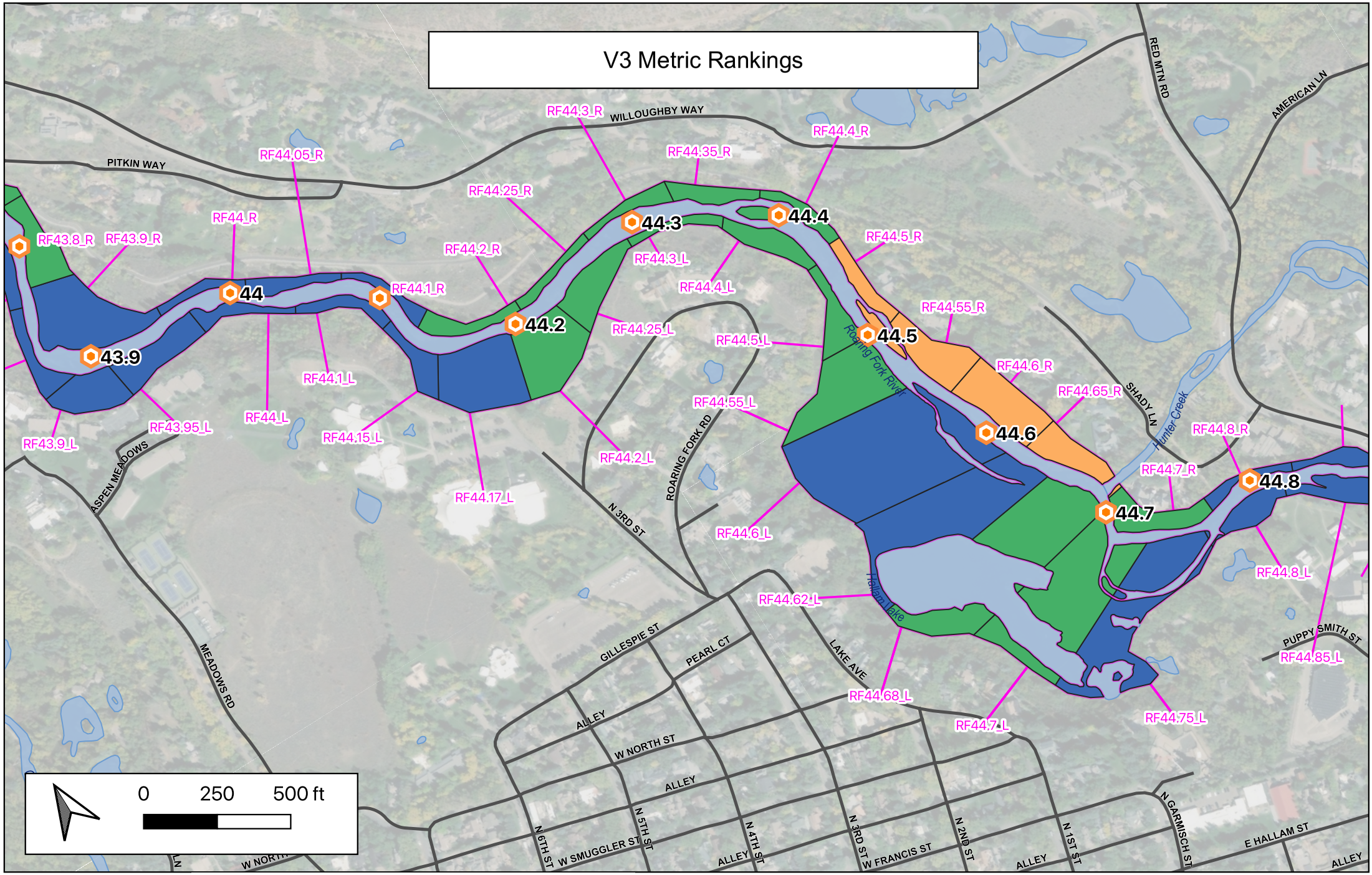
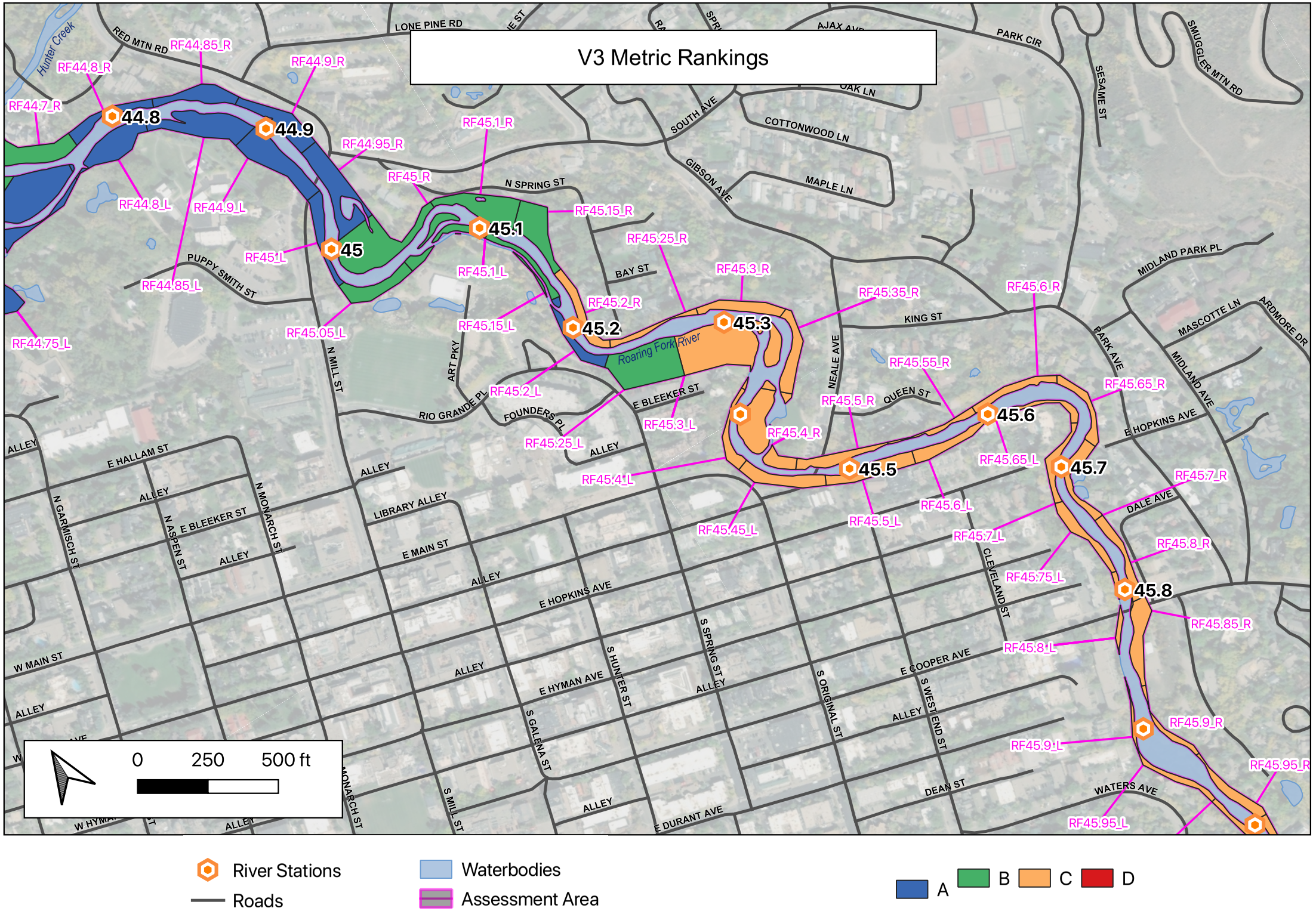
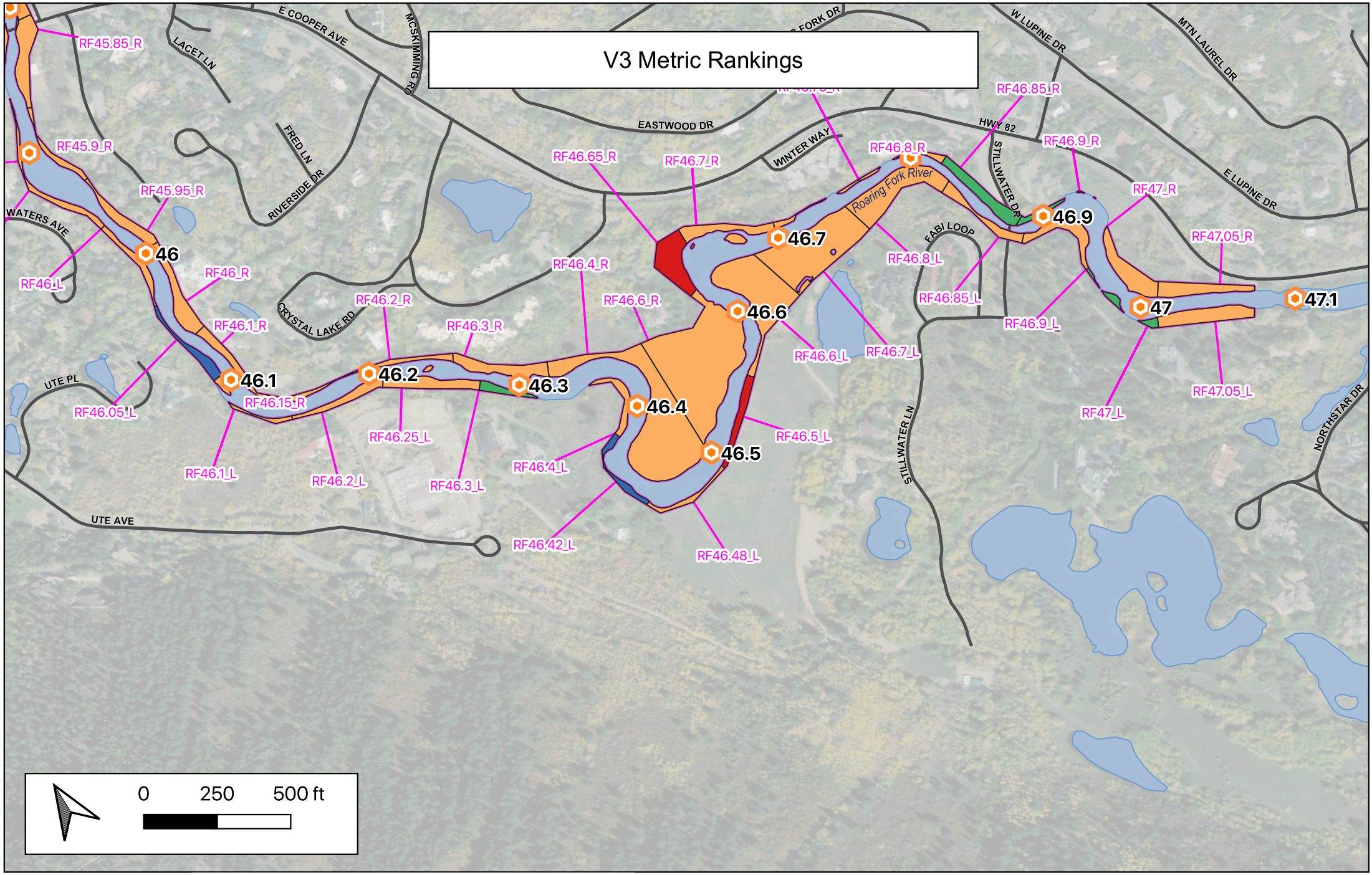
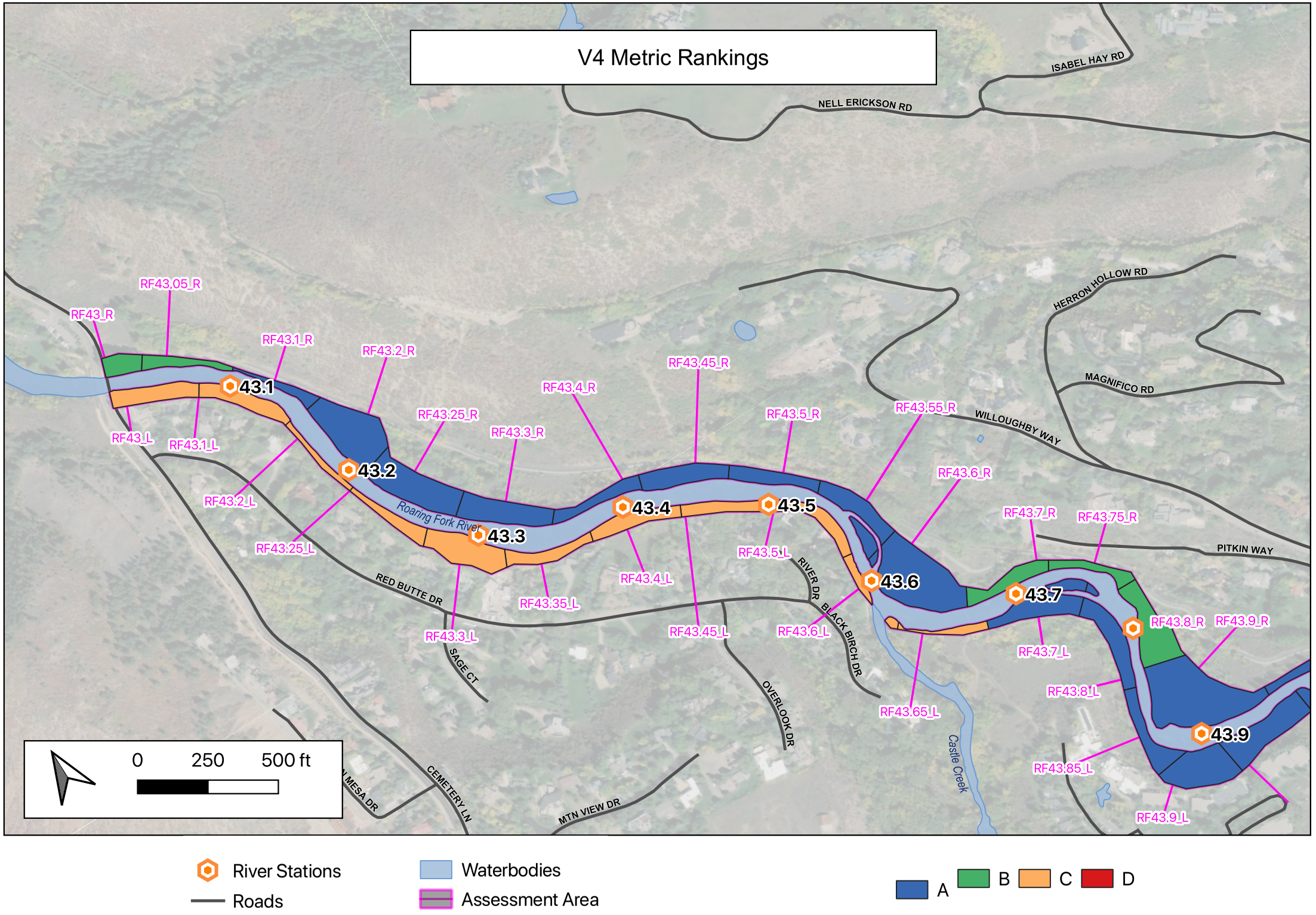
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

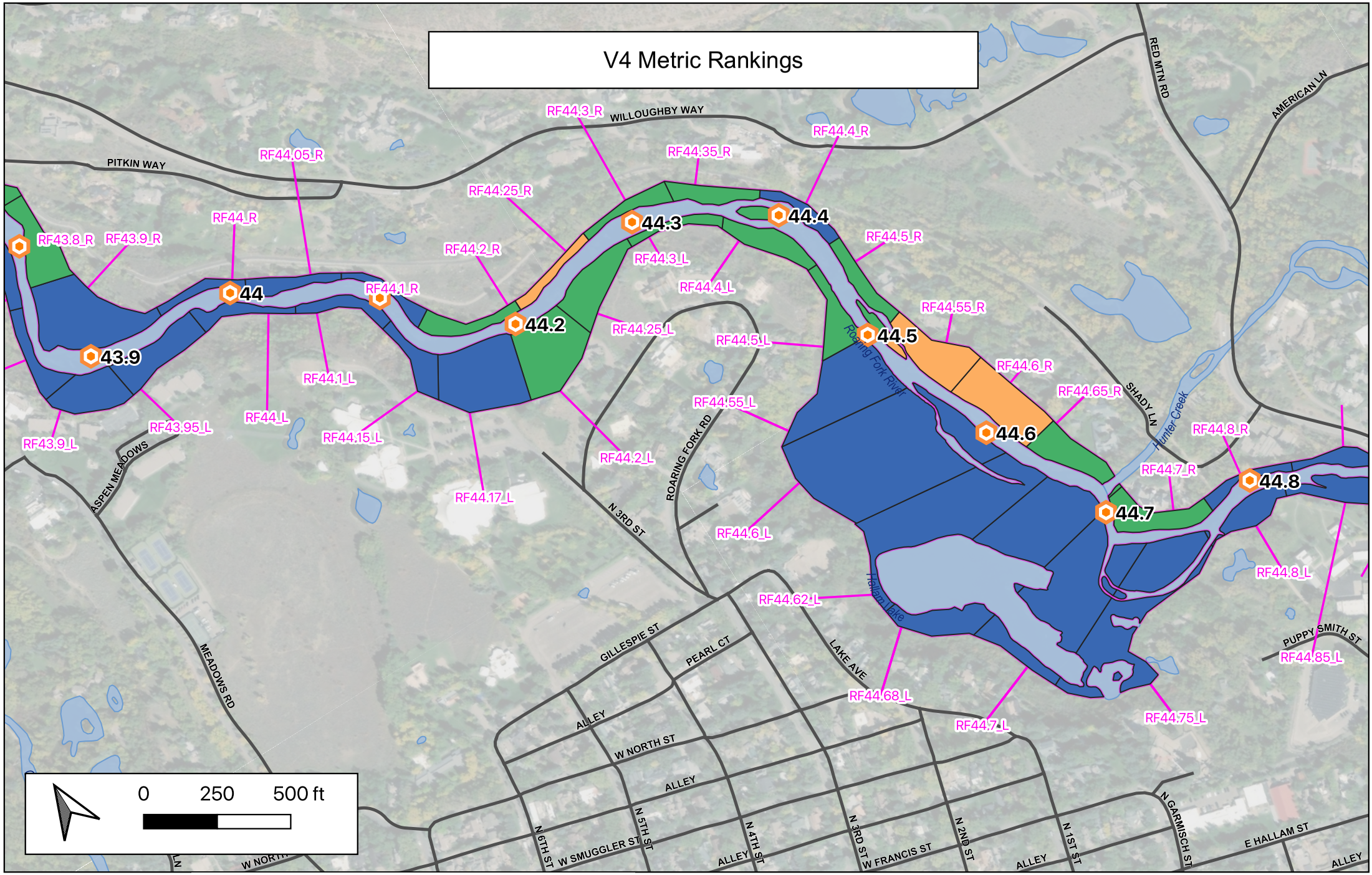

V3 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.25_R
RF43.3_R
RF43.4_R
RF43.45_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

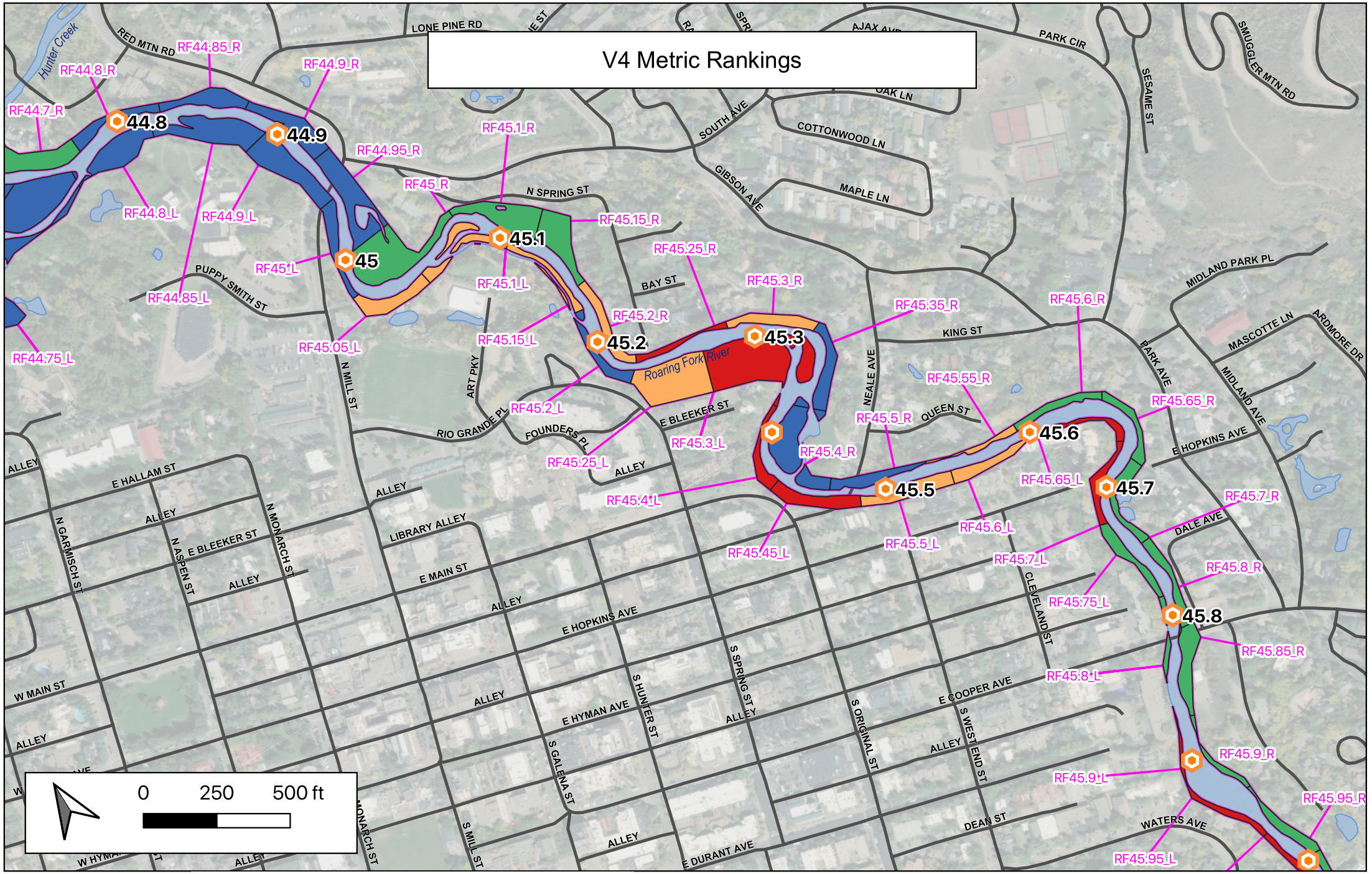

V3 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
RF44.5_L
44.5
43.9
RF44.6_R
RF44.65_R
SHADY LN
RF44.1_L
RF44.55_L
Roaring Fork River
Hunter Creek
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
44.6
RF43.9_L
ASPEN MEADOWS
ROARING FORK RD
RF44.7_R
44.8
RF44.17_L
N 3RD ST
RF44.6_L
44.7
Hallam Lake
RF44.8_L
RF44.62_L
PUPPY SMITH ST
GILLESPIE ST
PEARL CT
LAKE AVE
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

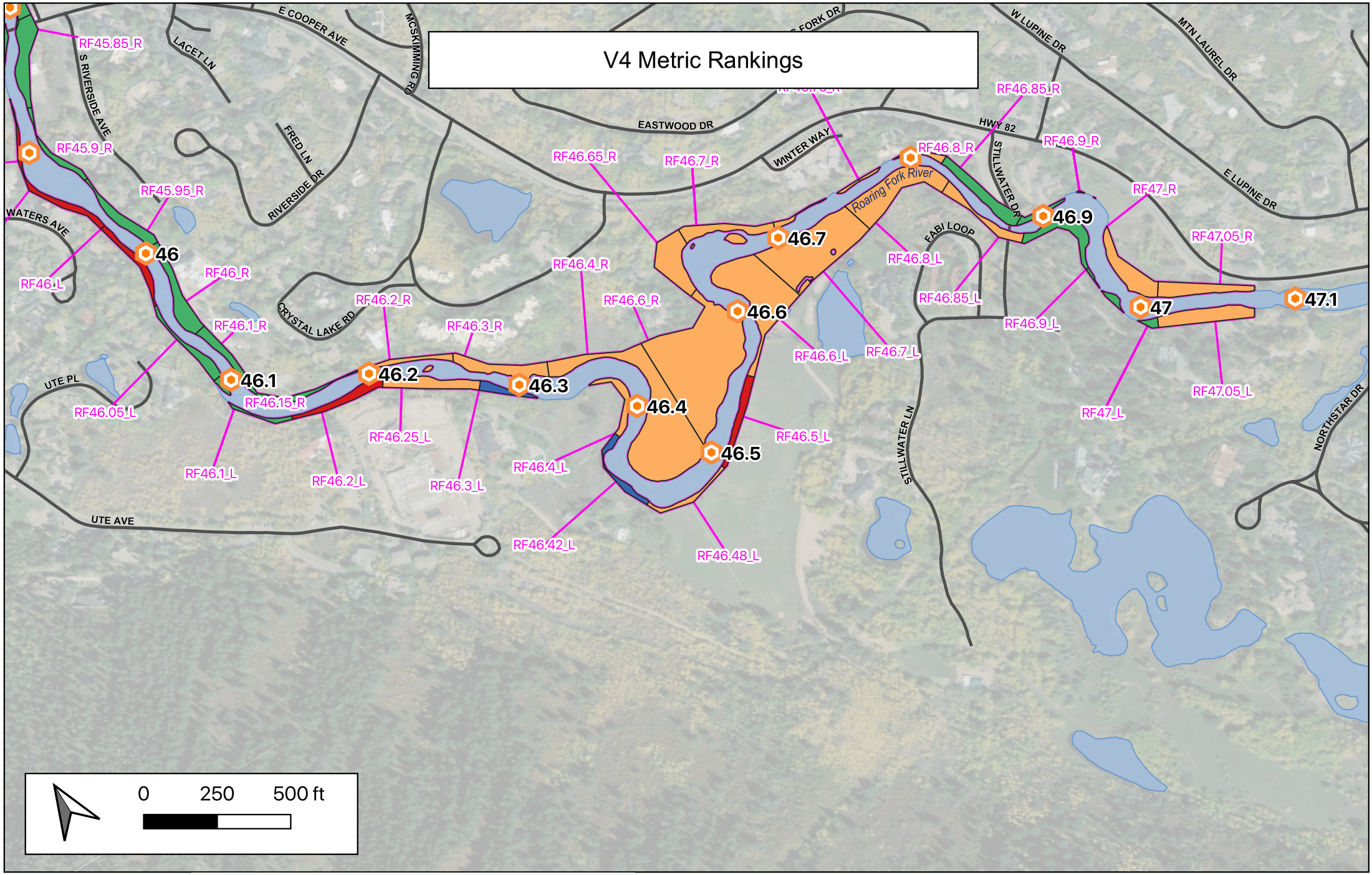

V3 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
ART PKY
N MILL ST
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
KING ST
NEALE AVE
QUEEN ST
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
PARK AVE
MIDLAND AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
E HALLAM ST
ALLEY
LIBRARY ALLEY
E MAIN ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
Roaring Fork River
44.8
44.9
45
45.1
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF45.1_R
RF44.95_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.05_L
RF44.75_L
RF45.15_L
RF45.2_R
RF45.2_L
RF45.25_L
RF45.3_L
RF45.4_R
RF45.55_R
RF45.5_R
RF45.65_R
RF45.65_L
RF45.7_R
RF45.4_L
RF45.45_L
RF45.5_L
RF45.6_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

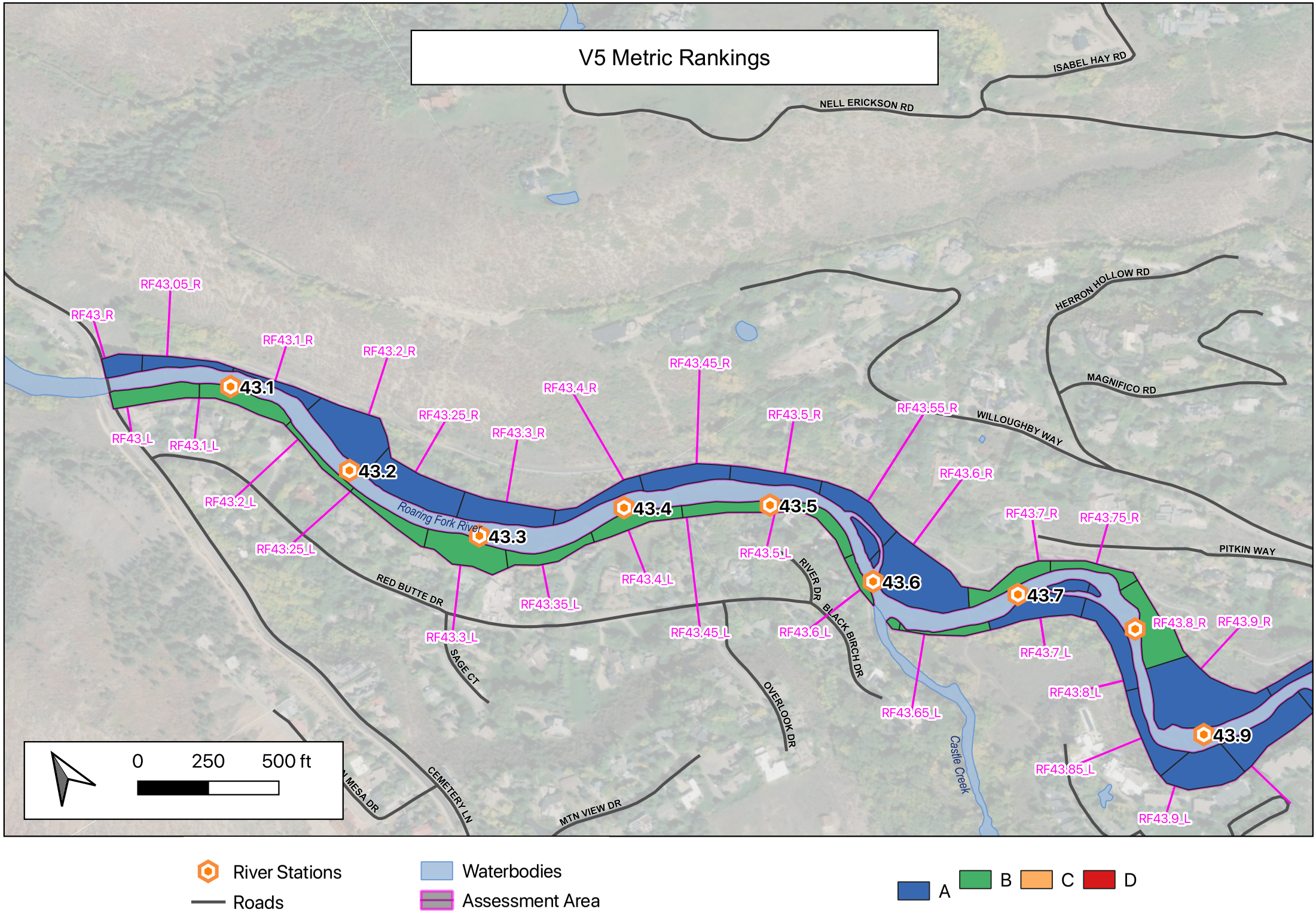

V3 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
E LUPINE DR
RF46.85_R
RF46.9_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
FABI LOOP
RF47_R
RF47.05_R
46.9
46.7
46
RF46_L
RF46_R
RF46.4_R
RF46.8_L
RF46.85_L
RF46.9_L
47
47.1
CRYSTAL LAKE RD
RF46.2_R
RF46.6_R
46.6
RF46.1_R
RF46.3_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
RF46.05_L
RF46.15_R
46.4
RF47.05_L
RF47_L
NORTHSTAR DR
RF46.25_L
RF46.5_L
46.5
RF46.1_L
RF46.2_L
RF46.4_L
RF46.3_L
STILLWATER LN
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

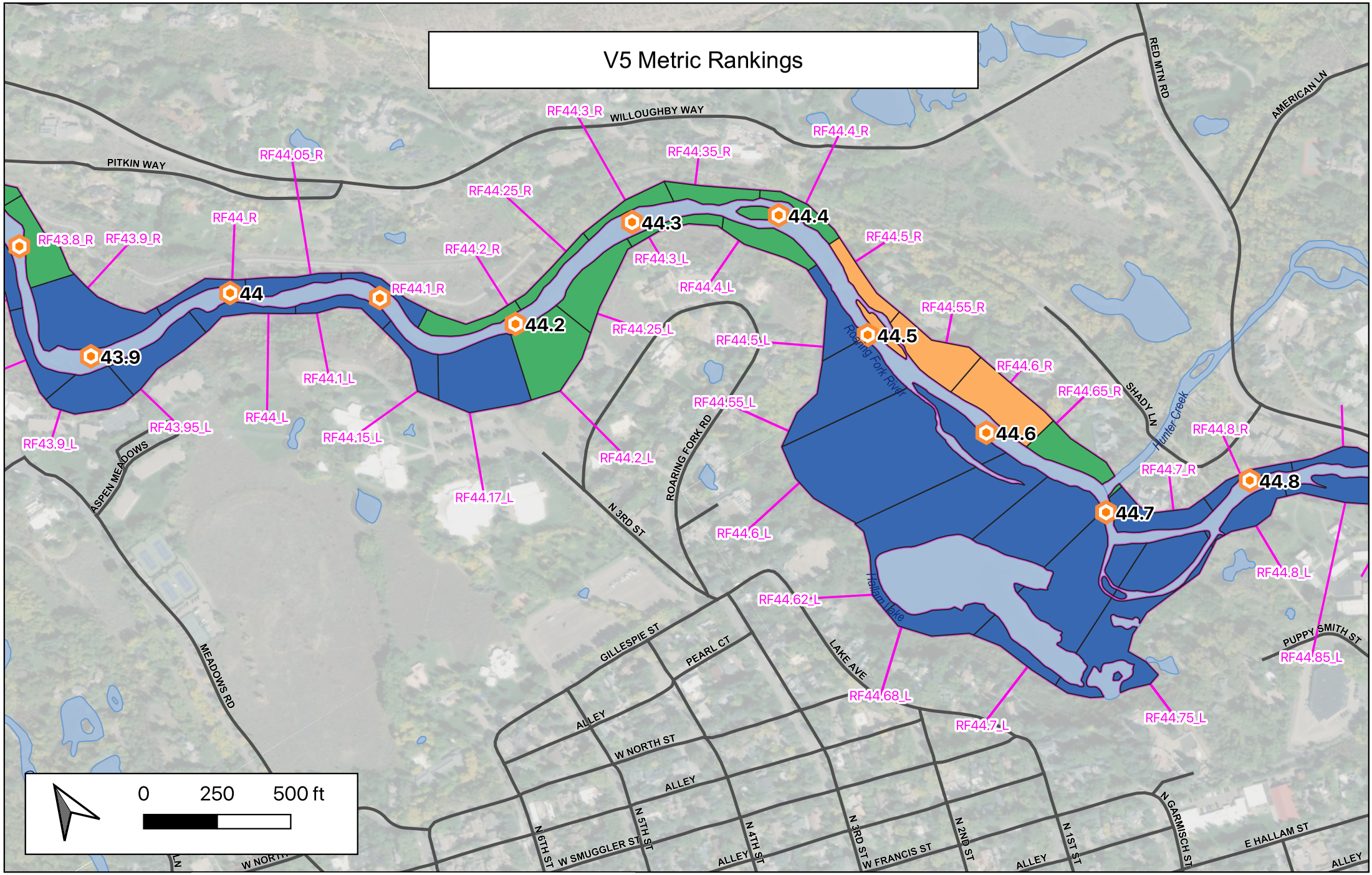

V4 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

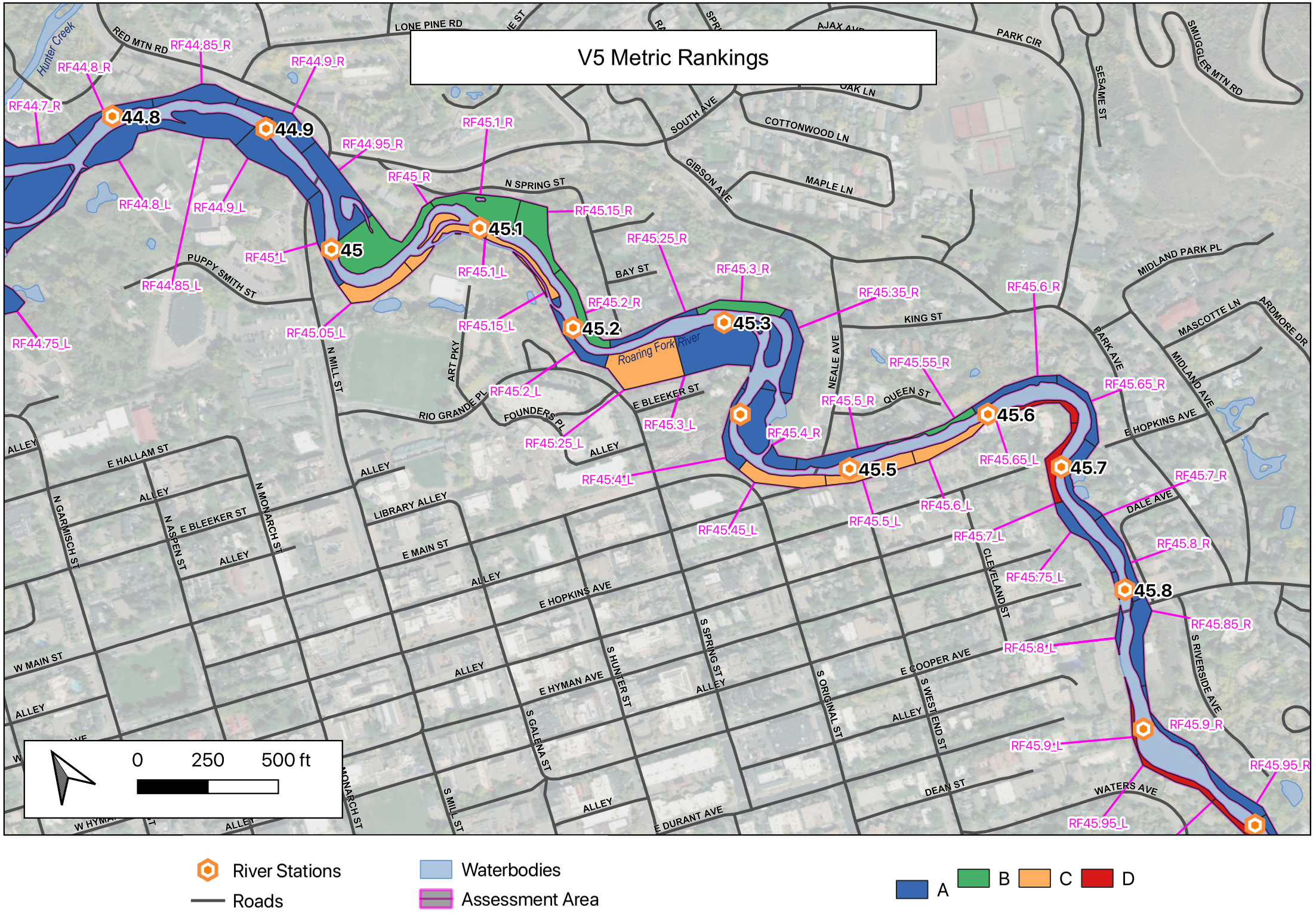

V4 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
RF44.5_L
44.5
43.9
RF44.6_R
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.1_L
RF44.55_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
44.6
RF43.9_L
ASPEN MEADOWS
ROARING FORK RD
RF44.7_R
44.8
RF44.17_L
N 3RD ST
RF44.6_L
44.7
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
RF44.85_L
GILLESPIE ST
PEARL CT
LAKE AVE
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

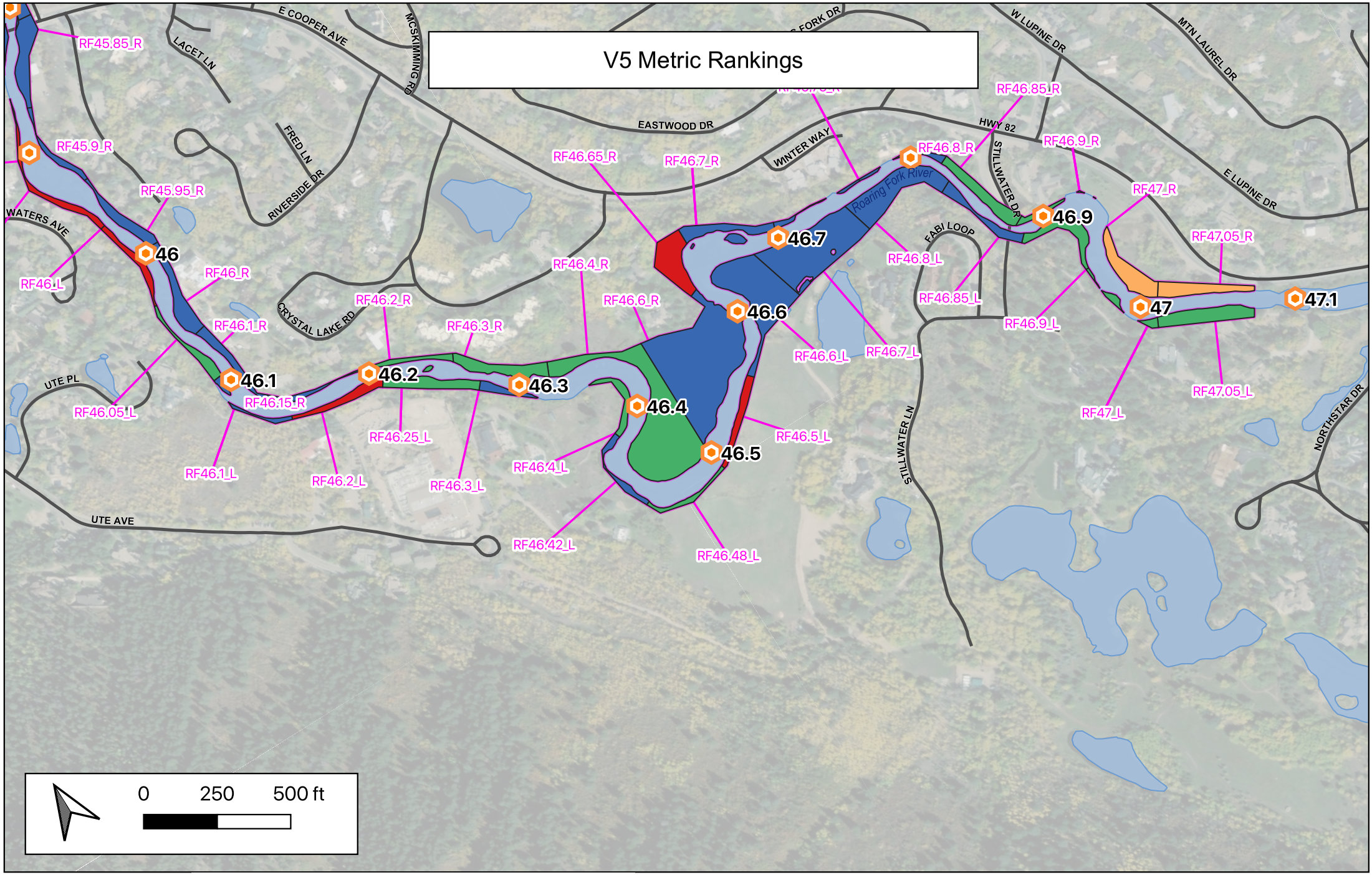

V4 Metric Rankings
44.8
44.9
45
45.1
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF44.8_L
RF44.9_L
RF45_L
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.85_L
RF45.2_R
RF45.15_L
RF44.75_L
RF45.05_L
RF45.55_R
RF45.65_R
RF45.2_L
RF45.5_R
RF45.3_L
RF45.4_R
RF45.25_L
RF45.65_L
RF45.7_R
RF45.4_L
RF45.6_L
RF45.5_L
RF45.45_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
Roaring Fork River
LONE PINE RD
RED MTN RD
Hunter Creek
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
PUPPY SMITH ST
BAY ST
KING ST
NEALE AVE
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
DALE AVE
QUEEN ST
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
ALLEY
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
CLEVELAND ST
E COOPER AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V4 Metric Rankings
RF45.85_R
RF45.9_R
RF45.95_R
RF46_L
RF46_R
RF46.1_R
RF46.05_L
RF46.15_R
RF46.1_L
RF46.2_R
RF46.25_L
RF46.2_L
RF46.3_R
RF46.3_L
RF46.4_R
RF46.4_L
RF46.42_L
RF46.48_L
RF46.6_R
RF46.6_L
RF46.7_R
RF46.7_L
RF46.5_L
RF46.65_R
RF46.8_R
RF46.8_L
RF46.85_R
RF46.85_L
RF46.9_R
RF46.9_L
RF47_R
RF47_L
RF47.05_R
RF47.05_L
46
46.1
46.2
46.3
46.4
46.5
46.6
46.7
46.9
47
47.1
Roaring Fork River
EASTWOOD DR
WINTER WAY
HWY 82
E COOPER AVE
LACET LN
MCSKIMMING RD
S RIVERSIDE AVE
FRED LN
RIVERSIDE DR
WATERS AVE
CRYSTAL LAKE RD
UTE PL
UTE AVE
W LUPINE DR
E LUPINE DR
MTN LAUREL DR
STILLWATER DR
STILLWATER LN
FABI LOOP
NORTHSTAR DR
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V5 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V5 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
RF44.5_L
44.5
43.9
RF44.6_R
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.1_L
RF44.55_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
44.6
RF43.9_L
RF44.2_L
RF44.7_R
ASPEN MEADOWS
ROARING FORK RD
44.8
RF44.17_L
N 3RD ST
44.7
RF44.6_L
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
MEADOWS RD
GILLESPIE ST
PEARL CT
LAKE AVE
RF44.85_L
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V5 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
PUPPY SMITH ST
BAY ST
KING ST
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
NEALE AVE
ART PKY
N MILL ST
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
QUEEN ST
E HOPKINS AVE
DALE AVE
CLEVELAND ST
E HALLAM ST
ALLEY
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
S RIVERSIDE AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
Roaring Fork River
44.8
44.9
45
45.1
45.2
45.3
45.4
45.5
45.6
45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45_R
RF45.1_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.15_L
RF45.2_R
RF44.75_L
RF45.05_L
RF45.2_L
RF45.3_L
RF45.25_L
RF45.4_R
RF45.55_R
RF45.5_R
RF45.65_R
RF45.65_L
RF45.7_R
RF45.4_L
RF45.45_L
RF45.5_L
RF45.6_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V5 Metric Rankings
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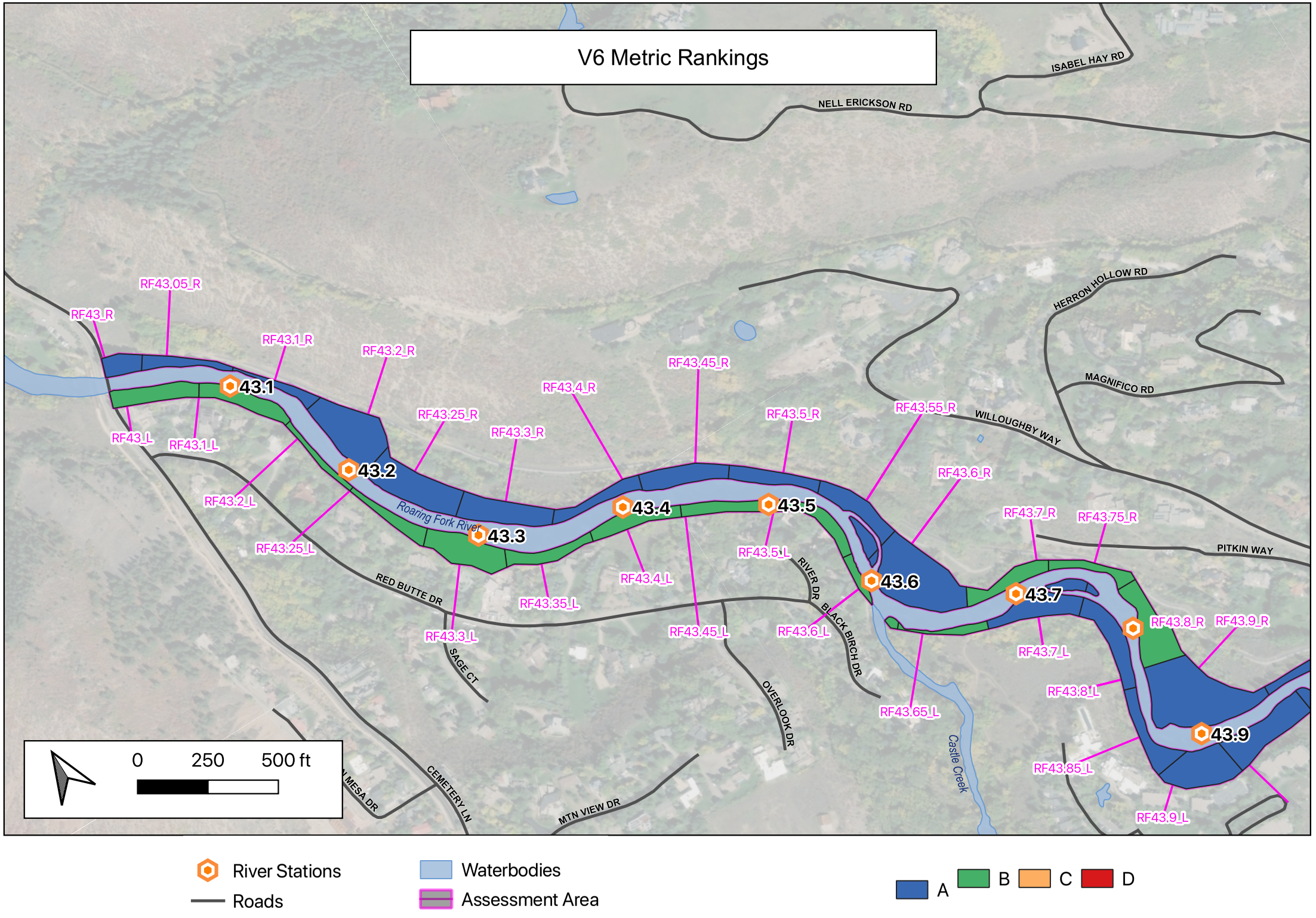
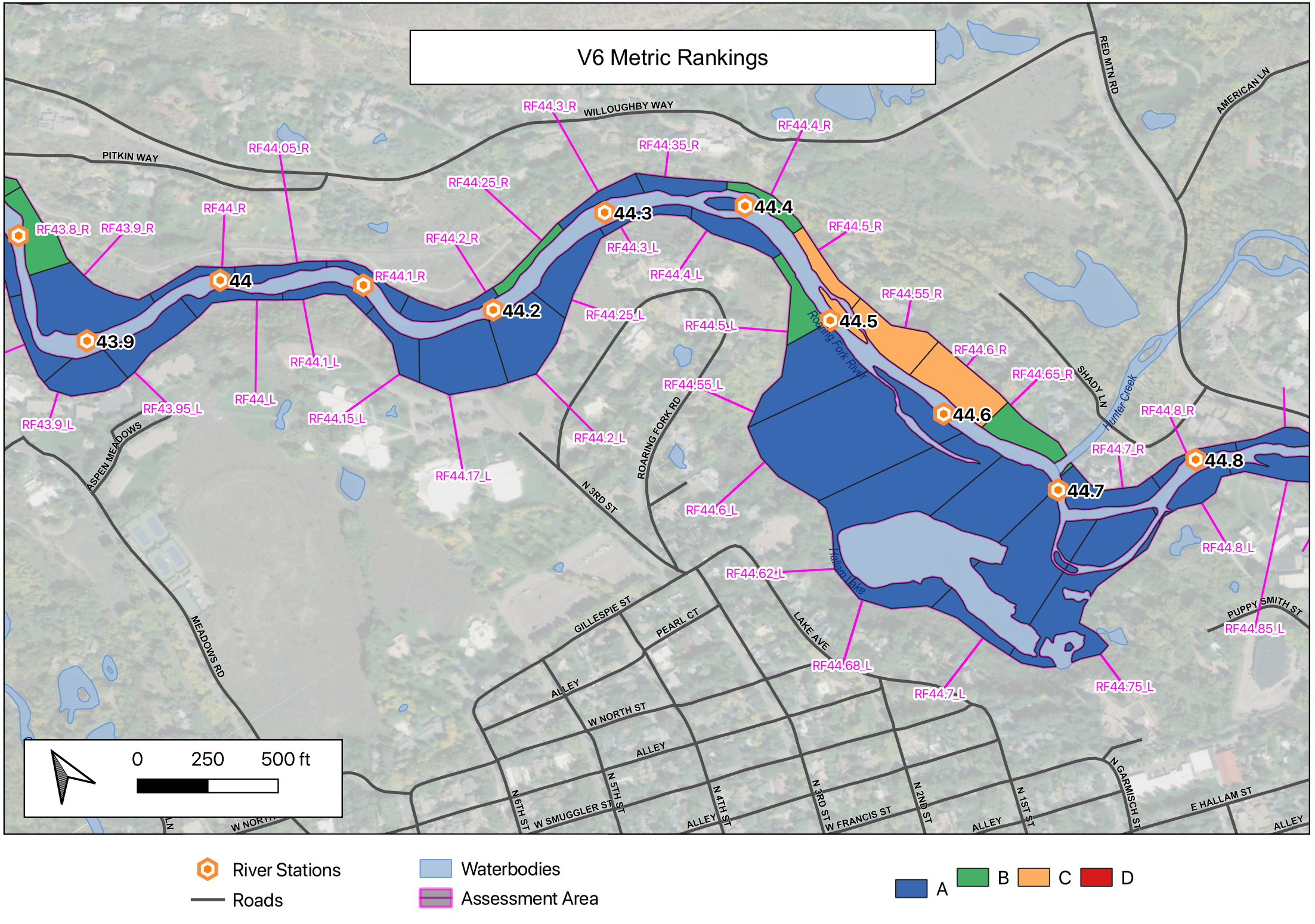
RF45.9_R
RF45.95_R
RF46_L
RF46_R
RF46.1_R
RF46.05_L
RF46.15_R
RF46.1_L
RF46.2_R
RF46.2_L
RF46.25_L
RF46.3_R
RF46.3_L
RF46.4_R
RF46.4_L
RF46.42_L
RF46.6_R
RF46.6_L
RF46.65_R
RF46.7_R
RF46.7_L
RF46.48_L
RF46.5_L
RF46.8_R
RF46.8_L
RF46.85_R
RF46.85_L
RF46.9_R
RF46.9_L
RF47_R
RF47_L
RF47.05_R
RF47.05_L
46
46.1
46.2
46.3
46.4
46.5
46.6
46.7
46.9
47
47.1
E COOPER AVE
LACET LN
MCSKIMMING RD
FRED LN
RIVERSIDE DR
WATERS AVE
CRYSTAL LAKE RD
UTE PL
UTE AVE
EASTWOOD DR
WINTER WAY
HWY 82
STILLWATER DR
STILLWATER LN
FABI LOOP
W LUPINE DR
E LUPINE DR
MTN LAUREL DR
NORTHSTAR DR
Roaring Fork River
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


V6 Metric Rankings
ISABEL HAY RD
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D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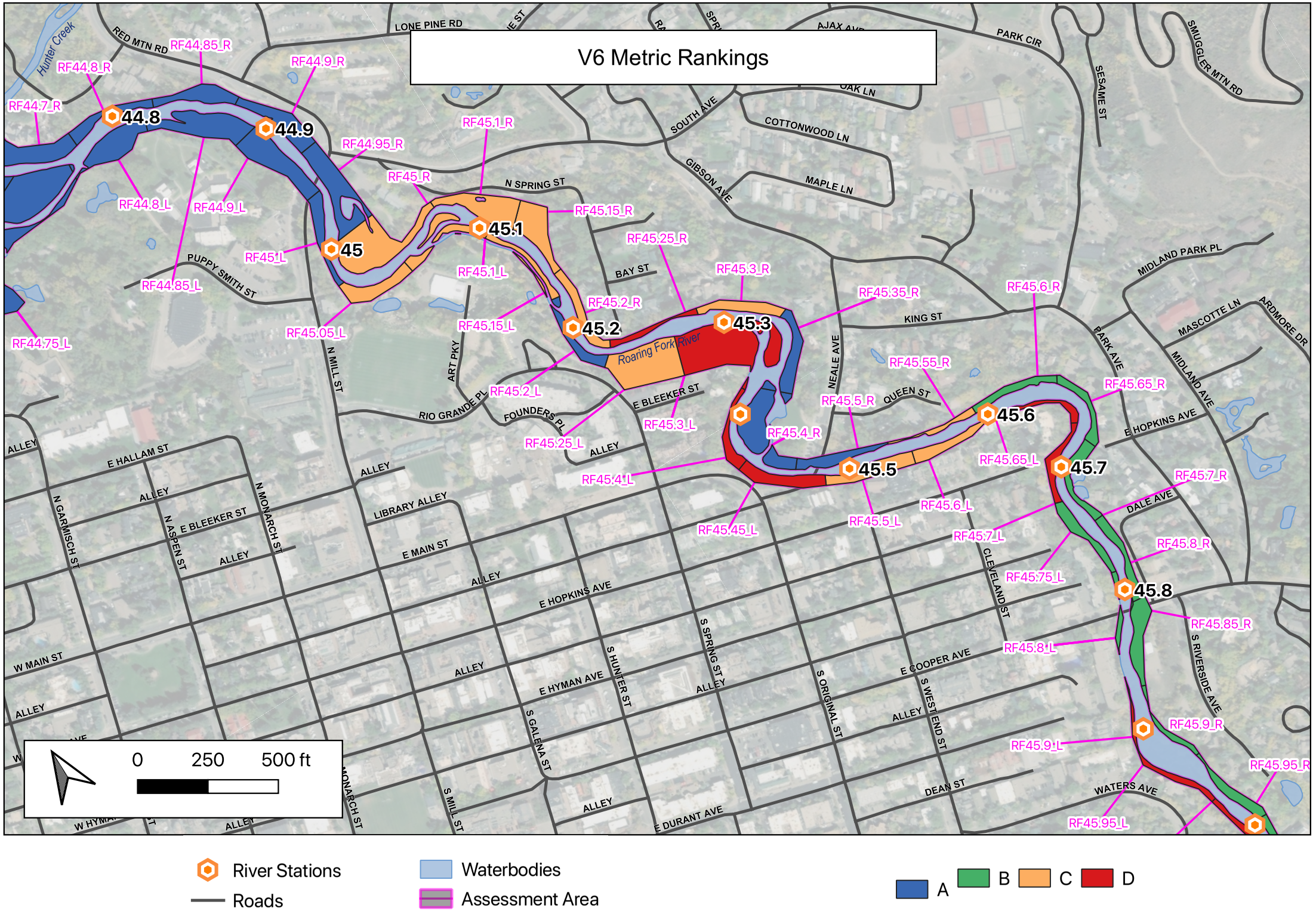
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
RF44.5_L
44.5
43.9
RF44.6_R
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.1_L
RF44.55_L
RF44.8_R
RF43.9_L
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
ROARING FORK RD
44.6
RF44.7_R
44.8
ASPEN MEADOWS
RF44.17_L
N 3RD ST
RF44.6_L
44.7
Hallam Lake
RF44.8_L
RF44.62_L
GILLESPIE ST
PEARL CT
LAKE AVE
PUPPY SMITH ST
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D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45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.1_L
RF45.2_R
RF44.75_L
RF45.05_L
RF45.15_L
RF45.2_L
RF45.55_R
RF45.65_R
RF45.5_R
RF45.3_L
RF45.4_R
RF45.65_L
RF45.25_L
RF45.4_L
RF45.7_R
RF45.45_L
RF45.5_L
RF45.6_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
Roaring Fork River
Hunter Creek
LONE PINE RD
RED MTN RD
PUPPY SMITH ST
N SPRING ST
SOUTH AVE
OAK LN
COTTONWOOD LN
GIBSON AVE
MAPLE LN
BAY ST
ART PKY
N MILL ST
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
KING ST
QUEEN ST
NEALE AVE
PARK CIR
SESAME ST
SMUGGLER MTN RD
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WEST END ST
E COOPER AVE
S RIVERSIDE AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
ALLEY
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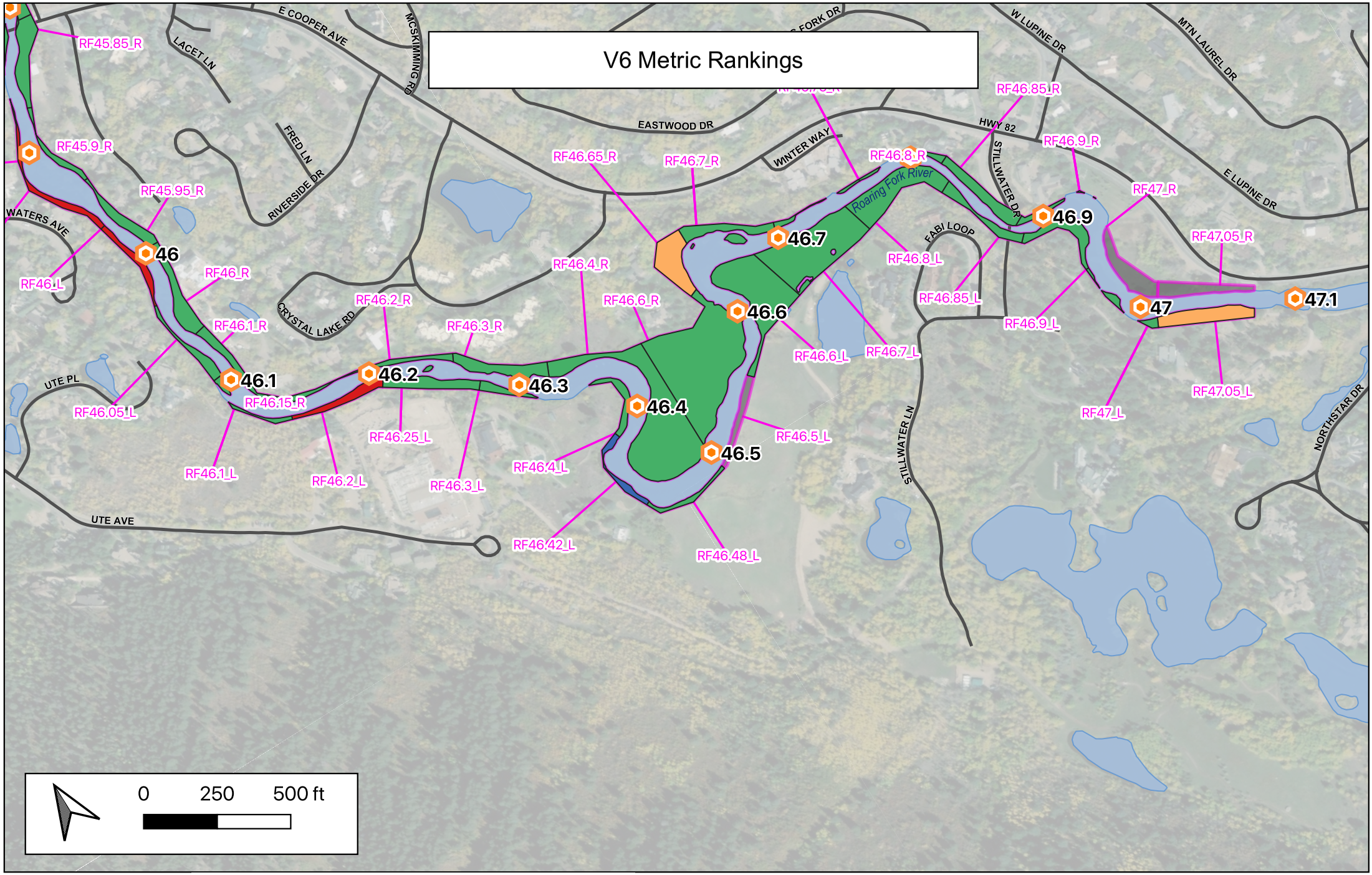
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D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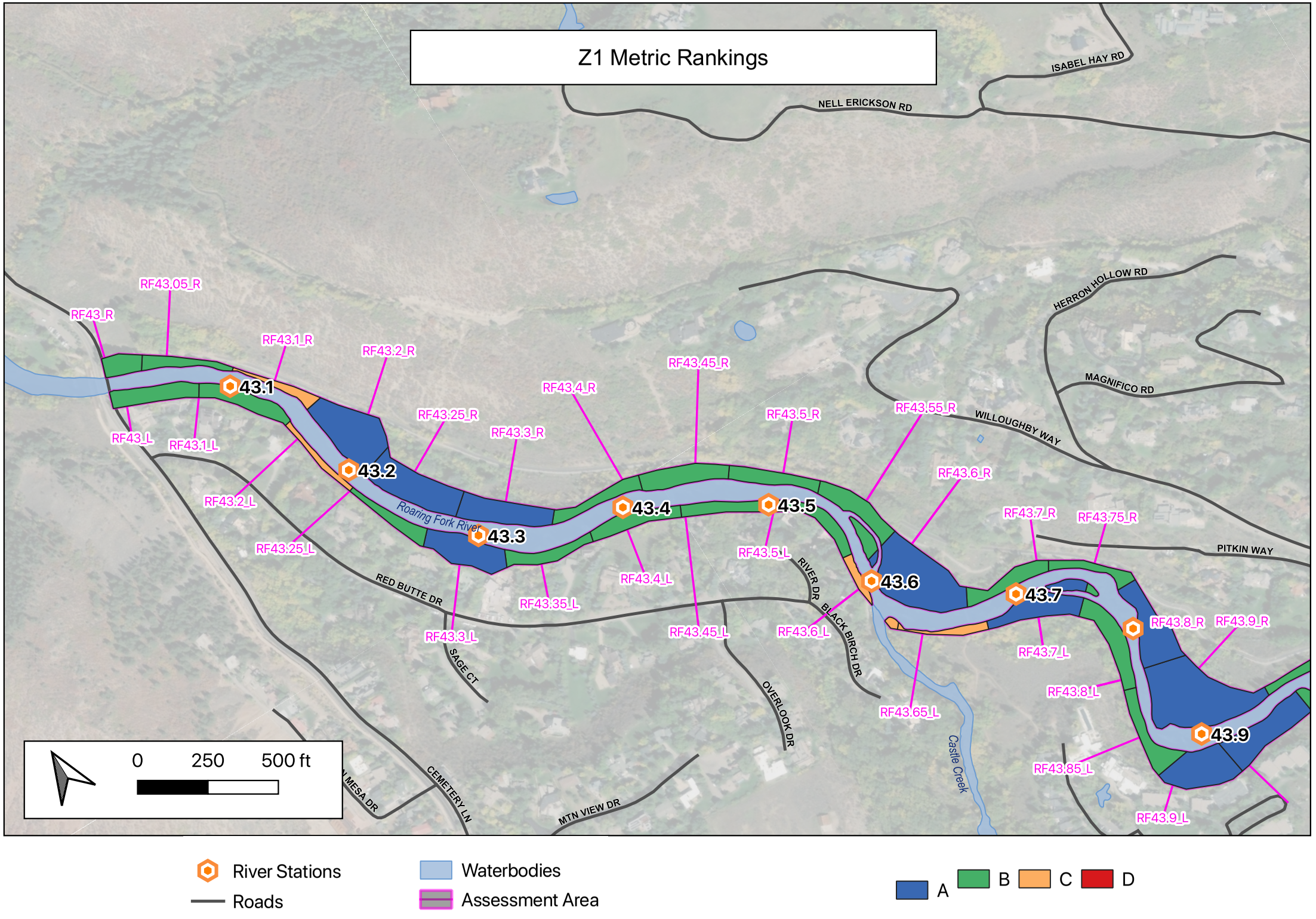
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
E LUPINE DR
RF46.85_R
RF46.9_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
FABI LOOP
46.9
RF47_R
RF47.05_R
46.7
RF46.8_L
46
RF46_L
RF46_R
RF46.4_R
RF46.85_L
47
47.1
RF46.9_L
RF46.2_R
RF46.6_R
CRYSTAL LAKE RD
46.6
RF46.1_R
RF46.3_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
46.4
RF46.15_R
RF46.05_L
RF46.25_L
RF46.5_L
46.5
RF47_L
RF47.05_L
NORTHSTAR DR
STILLWATER LN
RF46.1_L
RF46.2_L
RF46.3_L
RF46.4_L
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D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NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
CEMETERY LN
MTN VIEW DR
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
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43.9
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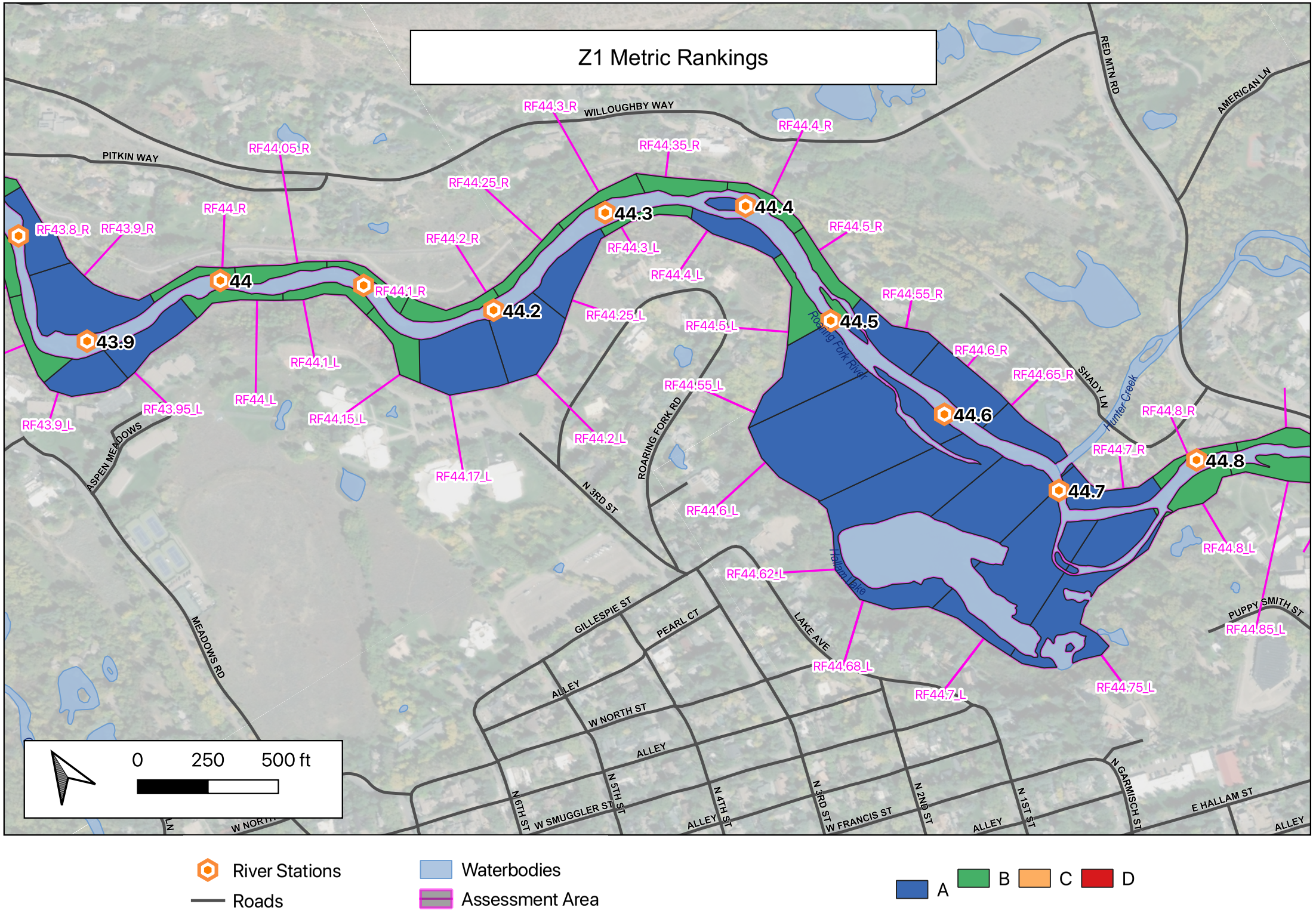
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D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PITKIN WAY
RED MTN RD
AMERICAN LN
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RF44.4_R
RF44.35_R
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RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.2_R
RF44.3_L
RF44.4_L
44
RF44.1_R
44.2
RF44.25_L
RF44.55_R
RF44.5_L
44.5
Roaring Fork River
RF44.6_R
RF44.65_R
SHADY LN
Hunter Creek
RF44.55_L
RF44.1_L
RF43.9_L
RF43.95_L
RF44_L
RF44.15_L
RF44.2_L
RF44.8_R
44.6
RF44.7_R
44.8
ASPEN MEADOWS
ROARING FORK RD
RF44.17_L
N 3RD ST
RF44.6_L
44.7
Hallam Lake
RF44.8_L
RF44.62_L
PUPPY SMITH ST
RF44.85_L
GILLESPIE ST
PEARL CT
LAKE AVE
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
ALLEY
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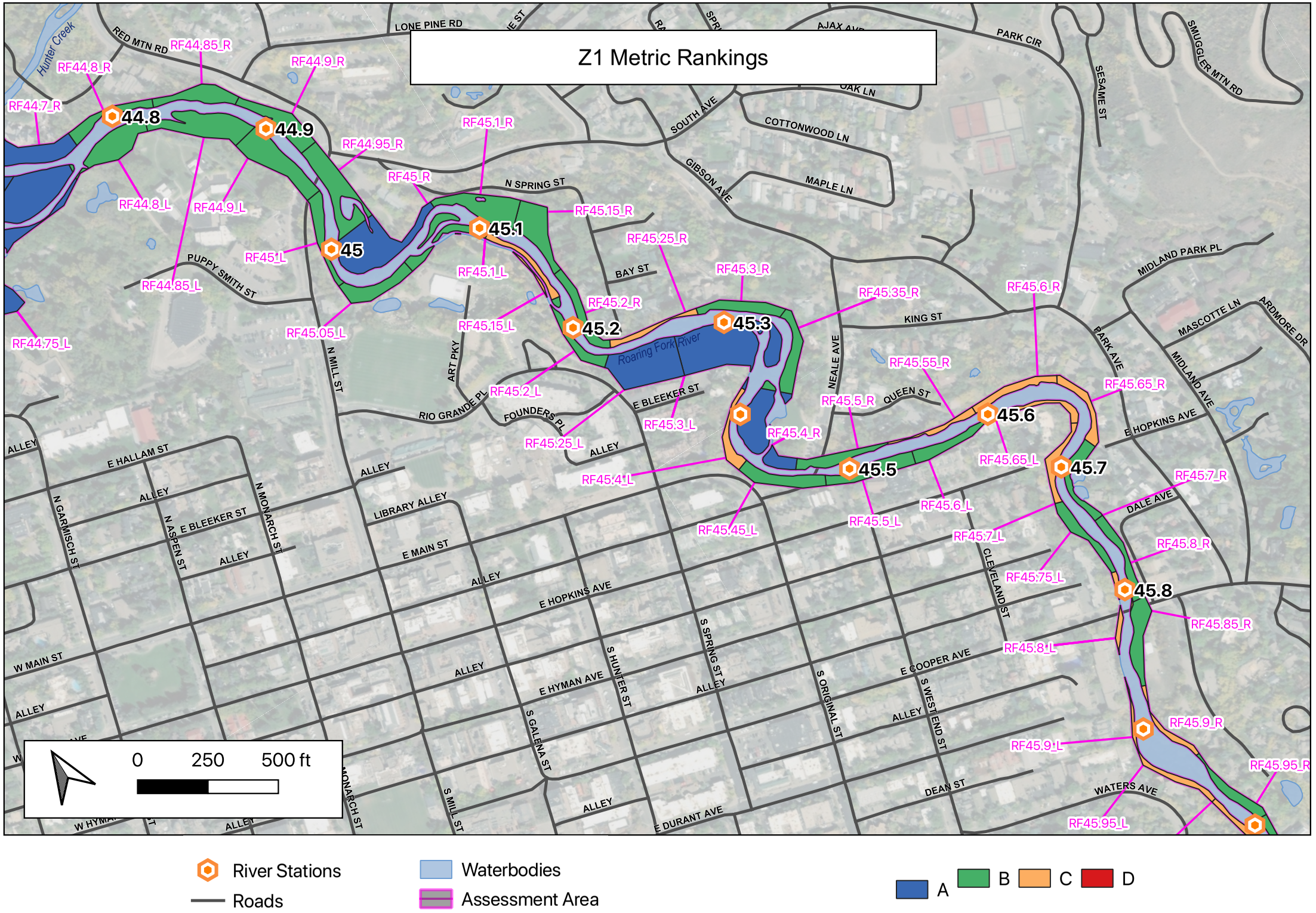
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


Z1 Metric Rankings
44.8
44.9
45
45.1
45.2
45.3
45.5
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45.7
45.8
RF44.85_R
RF44.8_R
RF44.9_R
RF44.7_R
RF44.95_R
RF45.1_R
RF45_R
RF45.15_R
RF44.8_L
RF44.9_L
RF45_L
RF44.85_L
RF45.25_R
RF45.3_R
RF45.35_R
RF45.6_R
RF44.75_L
RF45.05_L
RF45.15_L
RF45.2_R
RF45.55_R
RF45.65_R
RF45.2_L
RF45.5_R
RF45.3_L
RF45.4_R
RF45.65_L
RF45.25_L
RF45.4_L
RF45.7_R
RF45.45_L
RF45.5_L
RF45.6_L
RF45.7_L
RF45.8_R
RF45.75_L
RF45.85_R
RF45.8_L
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
Hunter Creek
RED MTN RD
LONE PINE RD
AJAX AVE
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
PUPPY SMITH ST
BAY ST
KING ST
NEALE AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
PARK AVE
E HOPKINS AVE
DALE AVE
CLEVELAND ST
Roaring Fork River
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
QUEEN ST
ALLEY
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
S MILL ST
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River Stations
Roads
Waterbodies
Assessment Area
A
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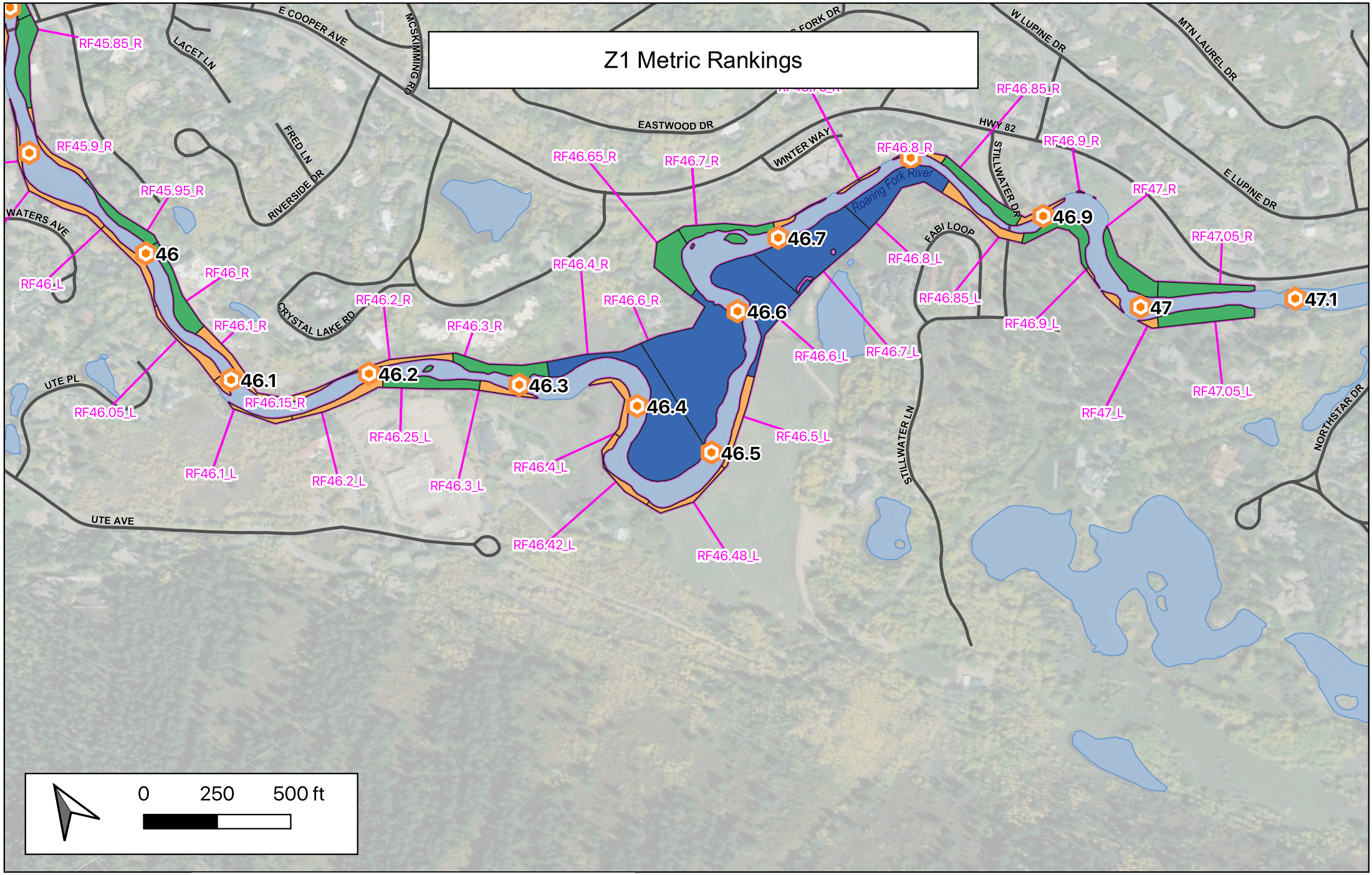
Z1 Metric Rankings
RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
WINTER WAY
HWY 82
W LUPINE DR
MTN LAUREL DR
RF46.85_R
RF45.9_R
FRED LN
RIVERSIDE DR
RF45.95_R
WATERS AVE
RF46.65_R
RF46.7_R
RF46.8_R
Roaring Fork River
STILLWATER DR
RF46.9_R
E LUPINE DR
RF47_R
RF47.05_R
46.9
46.7
FABI LOOP
RF46.8_L
46
RF46_L
RF46_R
RF46.4_R
RF46.85_L
47
47.1
RF46.9_L
CRYSTAL LAKE RD
RF46.2_R
RF46.6_R
46.6
RF46.1_R
RF46.3_R
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
RF46.05_L
RF46.15_R
46.4
RF47.05_L
RF47_L
NORTHSTAR DR
RF46.5_L
RF46.25_L
46.5
RF46.4_L
STILLWATER LN
RF46.1_L
RF46.2_L
RF46.3_L
UTE AVE
RF46.42_L
RF46.48_L
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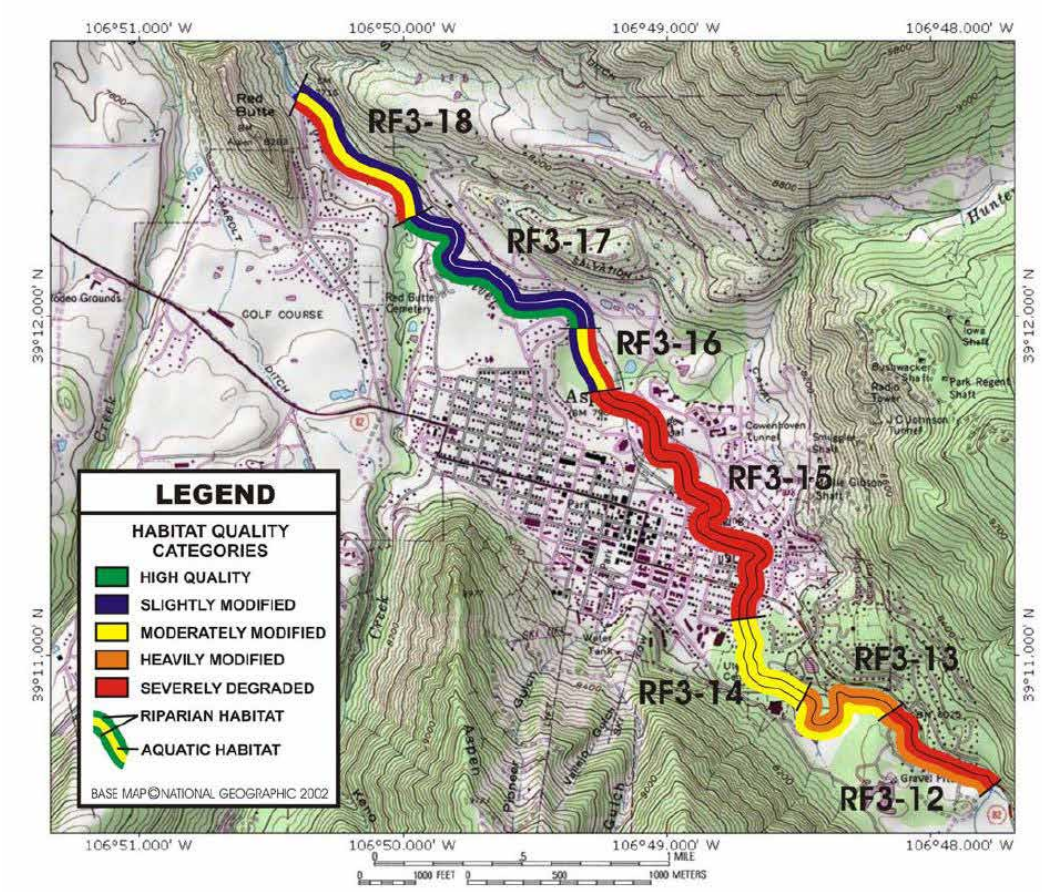
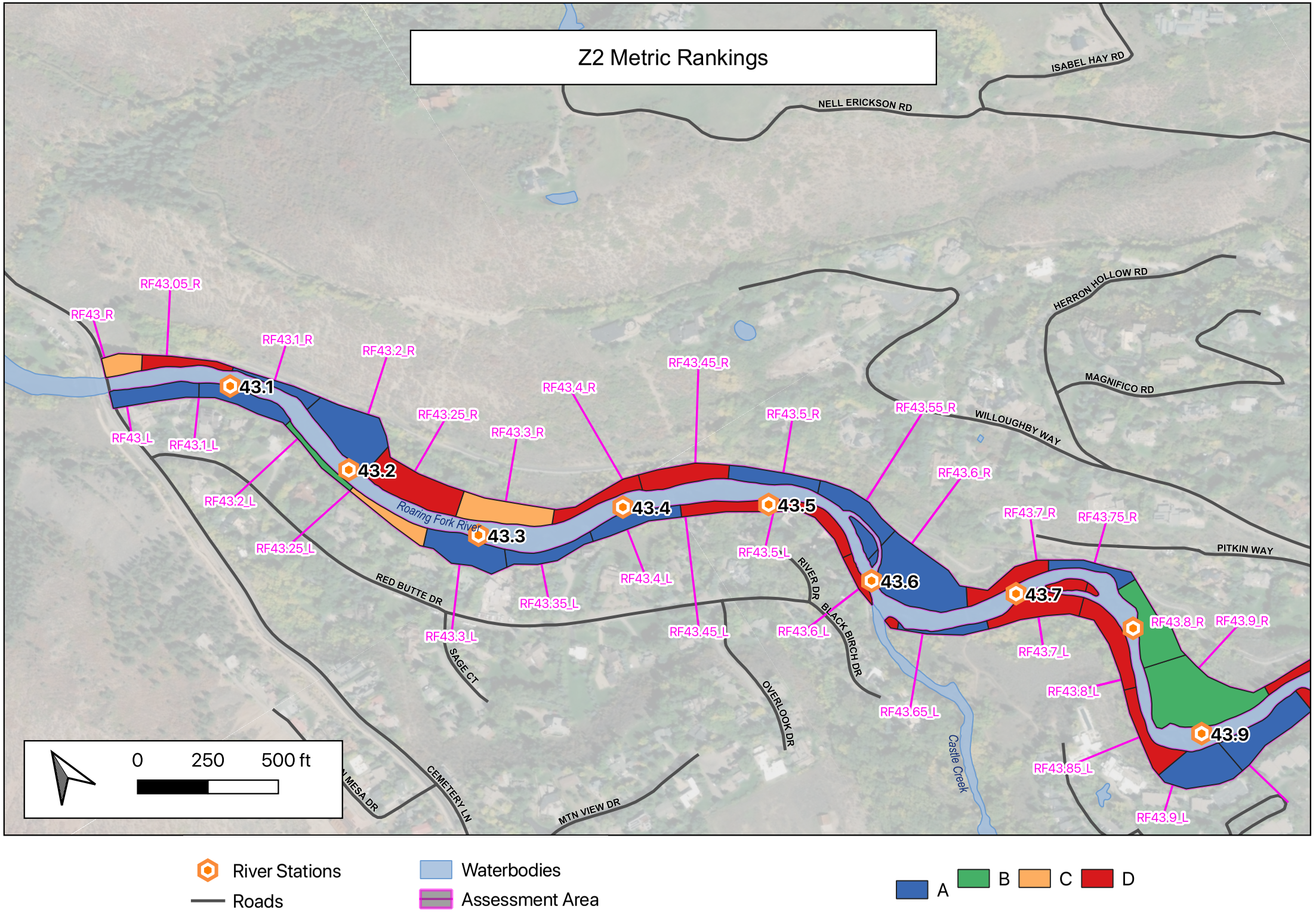
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D



Roaring Fork Mainstem: Segment 3 West

Figure A.1 Segment 3 context map with Habitat Quality Categories. Excerpt from the Catalog Of Stream and Riparian Habitat Quality for the Roaring Fork River and Tributaries, Central Colorado: : Roaring Fork River, Segment 3: Tagert Beaver Ponds to the Slaughter House Bridge, Aspen (2007)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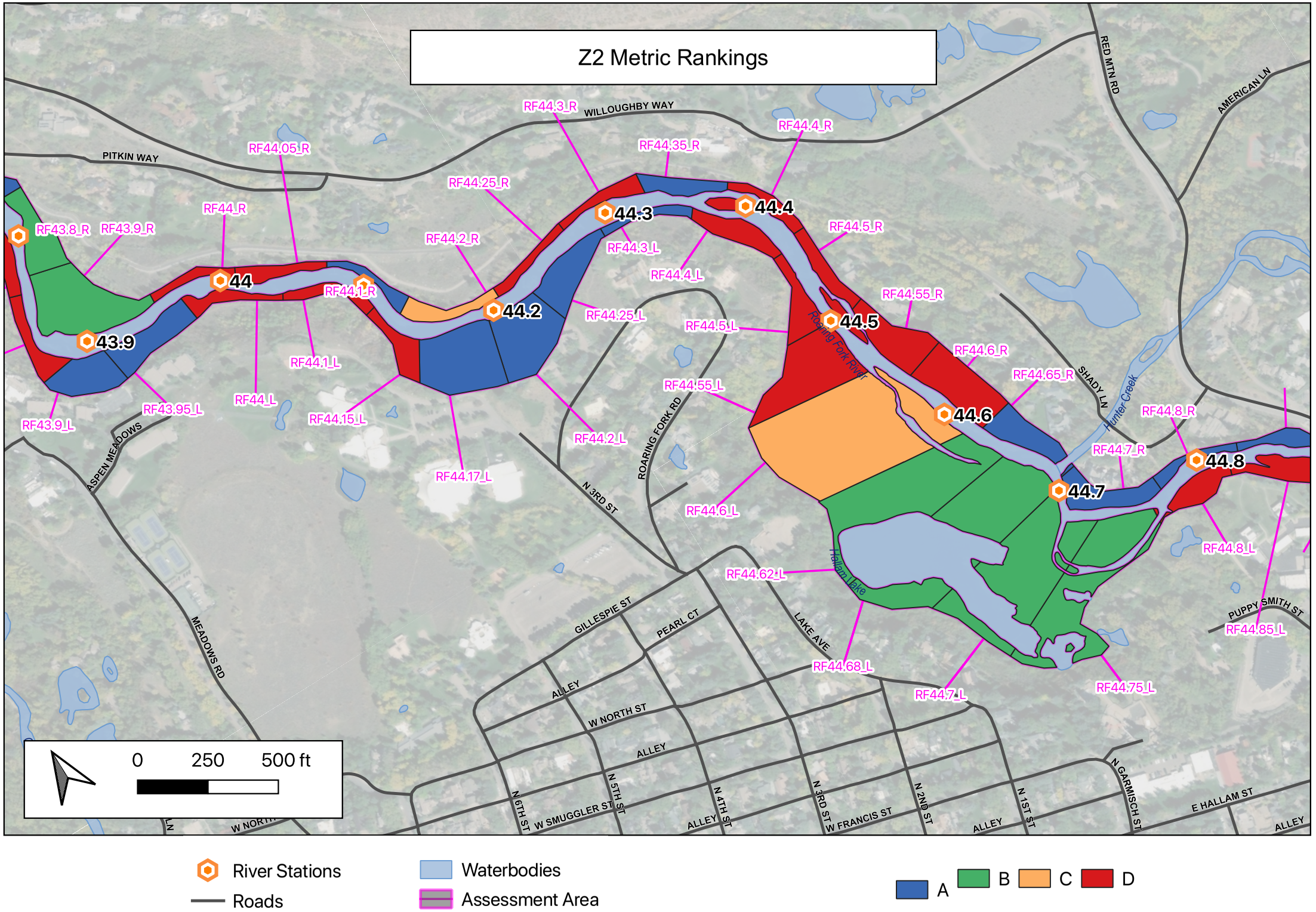
NELL ERICKSON RD
HERRON HOLLOW RD
MAGNIFICO RD
WILLOUGHBY WAY
PITKIN WAY
RED BUTTE DR
SAGE CT
RIVER DR
BLACK BIRCH DR
OVERLOOK DR
MTN VIEW DR
CEMETERY LN
Roaring Fork River
Castle Creek
RF43.05_R
RF43_R
RF43.1_R
RF43.2_R
RF43.45_R
RF43.4_R
RF43.25_R
RF43.3_R
RF43.5_R
RF43.55_R
RF43.6_R
RF43.7_R
RF43.75_R
RF43.8_R
RF43.9_R
RF43_L
RF43.1_L
RF43.2_L
RF43.25_L
RF43.3_L
RF43.35_L
RF43.4_L
RF43.45_L
RF43.5_L
RF43.6_L
RF43.65_L
RF43.7_L
RF43.8_L
RF43.85_L
RF43.9_L
43.1
43.2
43.3
43.4
43.5
43.6
43.7
43.9
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D


Z2 Metric Rankings
WILLOUGHBY WAY
PITKIN WAY
RED MTN RD
AMERICAN LN
RF44.3_R
RF44.4_R
RF44.35_R
RF44.05_R
RF44.25_R
RF44_R
RF43.8_R
RF43.9_R
44.3
44.4
RF44.5_R
RF44.3_L
RF44.2_R
RF44.4_L
44
RF44.1_R
44.2
RF44.55_R
RF44.25_L
44.5
RF44.5_L
43.9
RF44.6_R
RF44.65_R
SHADY LN
Roaring Fork River
Hunter Creek
RF44.1_L
RF44.55_L
RF44.8_R
RF43.95_L
RF44_L
RF44.15_L
44.6
RF43.9_L
RF44.2_L
RF44.7_R
ASPEN MEADOWS
ROARING FORK RD
44.8
RF44.17_L
N 3RD ST
44.7
RF44.6_L
RF44.8_L
Hallam Lake
RF44.62_L
PUPPY SMITH ST
GILLESPIE ST
PEARL CT
LAKE AVE
RF44.85_L
MEADOWS RD
RF44.68_L
RF44.75_L
RF44.7_L
ALLEY
W NORTH ST
ALLEY
N 6TH ST
W SMUGGLER ST
N 5TH ST
N 4TH ST
ALLEY
N 3RD ST
W FRANCIS ST
N 2ND ST
ALLEY
N 1ST ST
N GARMISCH ST
E HALLAM ST
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250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
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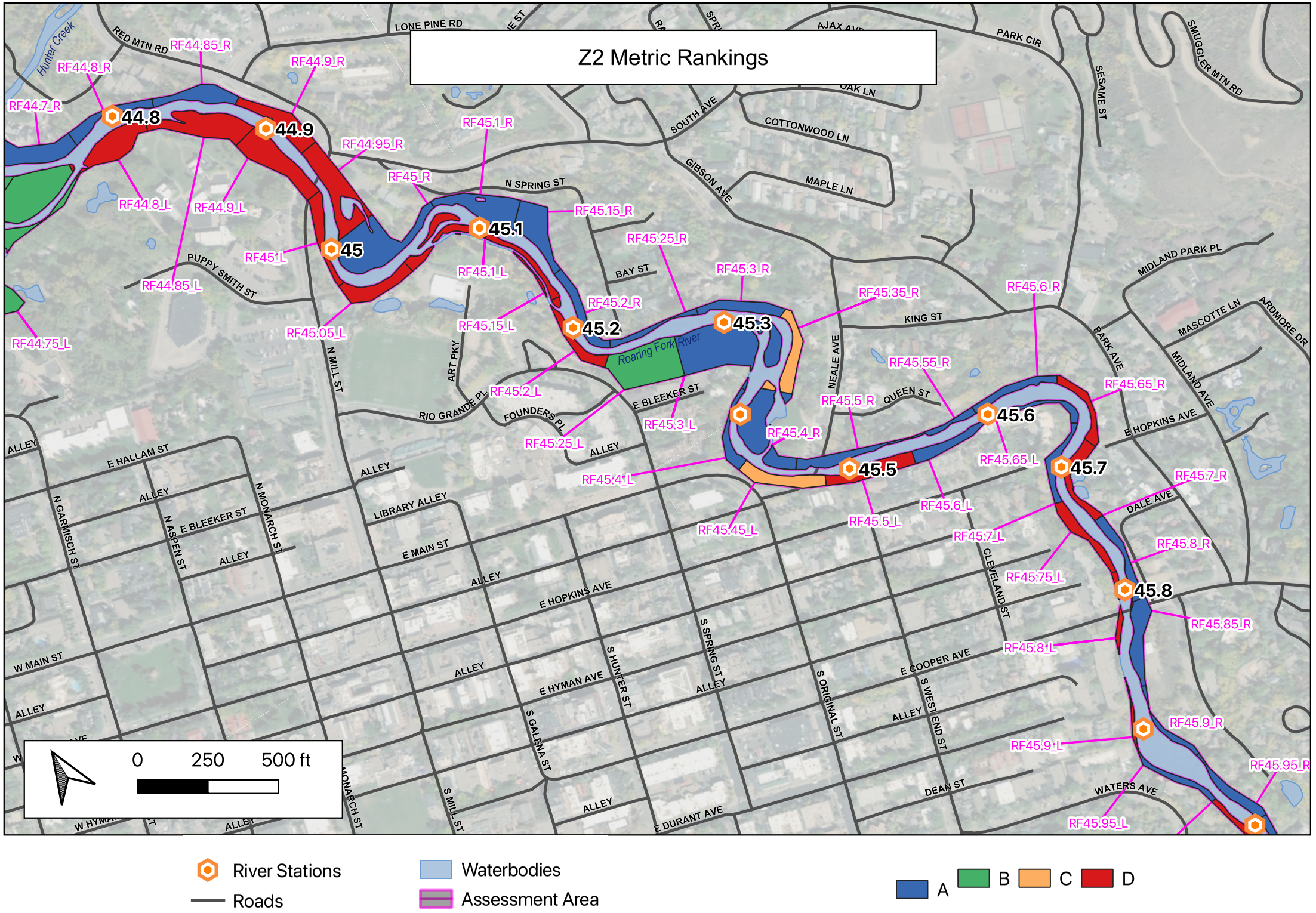
Z2 Metric Rankings
Hunter Creek
RED MTN RD
LONE PINE RD
PARK CIR
SMUGGLER MTN RD
SESAME ST
OAK LN
SOUTH AVE
COTTONWOOD LN
GIBSON AVE
MAPLE LN
N SPRING ST
BAY ST
PUPPY SMITH ST
KING ST
NEALE AVE
PARK AVE
MIDLAND PARK PL
MASCOTTE LN
ARDMORE DR
MIDLAND AVE
E HOPKINS AVE
QUEEN ST
DALE AVE
CLEVELAND ST
N MILL ST
ART PKY
RIO GRANDE PL
FOUNDERS PL
E BLEEKER ST
Roaring Fork River
ALLEY
E HALLAM ST
N GARMISCH ST
N ASPEN ST
N MONARCH ST
LIBRARY ALLEY
E MAIN ST
W MAIN ST
E HYMAN AVE
S HUNTER ST
S SPRING ST
S GALENA ST
S ORIGINAL ST
S WESTEND ST
E COOPER AVE
DEAN ST
WATERS AVE
E DURANT AVE
S MILL ST
RF44.85_R
RF44.8_R
RF44.7_R
RF44.9_R
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RF45.1_L
RF45.15_L
RF45.2_R
RF45.2_L
RF45.25_L
RF45.3_L
RF45.4_R
RF45.4_L
RF45.45_L
RF45.5_R
RF45.5_L
RF45.55_R
RF45.6_L
RF45.65_R
RF45.65_L
RF45.7_R
RF45.7_L
RF45.75_L
RF45.8_R
RF45.8_L
RF45.85_R
RF45.9_R
RF45.9_L
RF45.95_R
RF45.95_L
44.8
44.9
45
45.1
45.2
45.3
45.5
45.6
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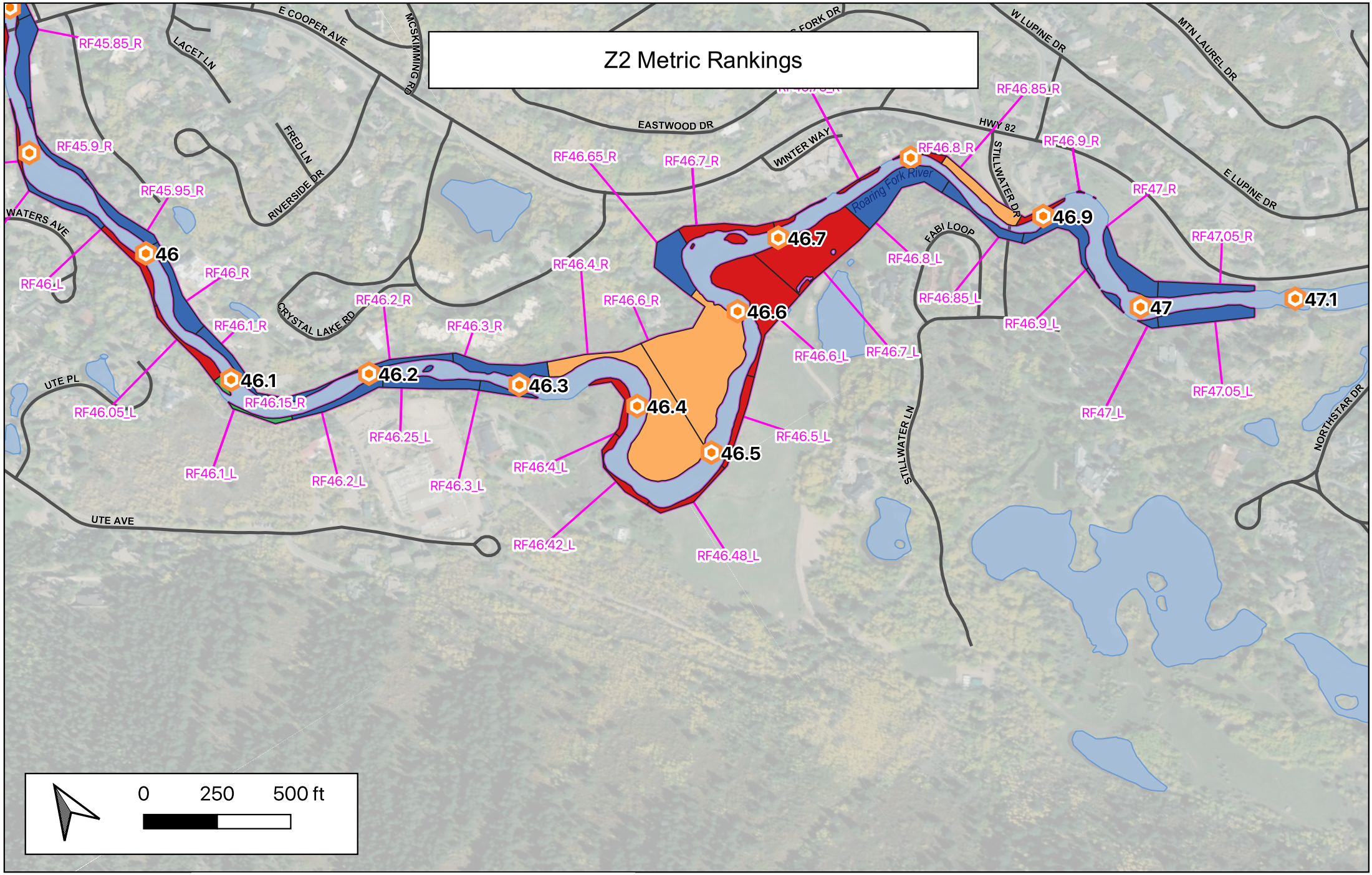
45.8
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D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RF45.85_R
LACET LN
E COOPER AVE
MCSKIMMING RD
EASTWOOD DR
FORK DR
W LUPINE DR
MTN LAUREL DR
RF46.85_R
HWY 82
RF45.9_R
FRED LN
RIVERSIDE DR
WINTER WAY
RF46.8_R
RF46.9_R
STILLWATER DR
E LUPINE DR
RF46.65_R
RF46.7_R
Roaring Fork River
RF47_R
RF45.95_R
WATERS AVE
46.7
46.9
FABI LOOP
RF47.05_R
RF46.8_L
46
RF46_R
RF46.4_R
RF46_L
RF46.2_R
RF46.6_R
46.6
47
47.1
CRYSTAL LAKE RD
RF46.85_L
RF46.1_R
RF46.3_R
RF46.9_L
RF46.6_L
RF46.7_L
UTE PL
46.1
46.2
46.3
RF46.15_R
46.4
RF47.05_L
RF46.05_L
RF47_L
NORTHSTAR DR
RF46.5_L
RF46.25_L
46.5
RF46.1_L
RF46.4_L
RF46.2_L
RF46.3_L
STILLWATER LN
UTE AVE
RF46.42_L
RF46.48_L
0
250
500 ft
River Stations
Roads
Waterbodies
Assessment Area
A
B
C
D

Site ID - AA_AspenClub1
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Outside of original aa's. located below the Aspen Club. Social use along the river causing soil disturbances with moderate erosion and soil compaction. Low vegetation cover.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
Good (B)	3	Minimal soil disturbance within AA. Some amount of bare soil, pugging, compaction, or sedimentation present due to human causes, but the extent and impact are minimal. The depth of disturbance is limited to only a few inches and does not show evidence of altering hydrology. Any disturbance is likely to recover within a few years after the disturbance is removed.
Fair (C)	2	Moderate soil disturbance within AA. Bare soil areas due to human causes are common and will be slow to recover. There may be pugging due to livestock resulting in several inches of soil disturbance. ORVs or other machinery may have left some shallow ruts. Sedimentation may be filling the wetland. Damage is obvious, but not excessive. The site could recover to potential with the removal of degrading human influences and moderate recovery times.
Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.

Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA1L1
Date: 9/13/2019
Rating: C
Observer: Jonthan Rose (DHM Design)

Notes:Soil disturbances throughout associated with development within the riparian area leading to homeowner access to river and lack of riparian vegetation in some areas. Degree of soil erosion and compaction and vegetation cover varies by lot.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
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Fair (C)	2	Moderate soil disturbance within AA. Bare soil areas due to human causes are common and will be slow to recover. There may be pugging due to livestock resulting in several inches of soil disturbance. ORVs or other machinery may have left some shallow ruts. Sedimentation may be filling the wetland. Damage is obvious, but not excessive. The site could recover to potential with the removal of degrading human influences and moderate recovery times.
Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.

Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA1R2
Date: 9/13/2019
Rating: C
Observer: Jonthan Rose (DHM Design)

Notes:aa has steep banks from the bike path down to the river with bare soils and high erosion potential. There are also two drainages in the area causing incising and soil disturbances with sediment deposition in the river associtiated with these drainages

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
Good (B)	3	Minimal soil disturbance within AA. Some amount of bare soil, pugging, compaction, or sedimentation present due to human causes, but the extent and impact are minimal. The depth of disturbance is limited to only a few inches and does not show evidence of altering hydrology. Any disturbance is likely to recover within a few years after the disturbance is removed.
Fair (C)	2	Moderate soil disturbance within AA. Bare soil areas due to human causes are common and will be slow to recover. There may be pugging due to livestock resulting in several inches of soil disturbance. ORVs or other machinery may have left some shallow ruts. Sedimentation may be filling the wetland. Damage is obvious, but not excessive. The site could recover to potential with the removal of degrading human influences and moderate recovery times.
Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.

Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA2L1
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Soil compaction and erosion in the area is associated with the social trails and foot traffic close to the river. There is also a drainage down a steep slope with incising and erosion/soil disturbances made more noticeable by a change in vegetation structure.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
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Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.

Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA2L2
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Significant erosion occurring along the trail with additional social foot trail to the river with extended soil disturbances leading to bare soils and compaction.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
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Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.

Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA2L3
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Long, steep slopes with two areas of soil disturbances and erosion. Both about 15ft cross section of disturbance down a long slope. Unclear where the disturbance is coming from.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA2R1
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Soil compaction and erosion in the area is associated with the social trails and foot traffic close to the river.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

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Table 32. Rating for Soil / Substrate Disturbance

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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA3L1
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Two track down to river used to place large boulders along river edge. Slight rutting from tires, soil compaction and moderate vegetation cover.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA3L2
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Paved bike trail and Newbury Park occupy the assessment area, high foot/bike traffic and some compacted soils.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA3L2
Date: 9/13/2019
Rating: D
Observer: Jonathan Rose (DHM Design)

Notes: Area by John Denver Sanctuary, not technically in Riparian aa's, but Highly disturbed area with high soil compaction and bare soils right along the river. Heavy foot traffic associated with park setting in middle of town.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA3R1
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Two track down to river used to place large boulders along river edge. Slight rutting from tires, soil compaction and moderate vegetation cover.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

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Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

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Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
Good (B)	3	Minimal soil disturbance within AA. Some amount of bare soil, pugging, compaction, or sedimentation present due to human causes, but the extent and impact are minimal. The depth of disturbance is limited to only a few inches and does not show evidence of altering hydrology. Any disturbance is likely to recover within a few years after the disturbance is removed.
Fair (C)	2	Moderate soil disturbance within AA. Bare soil areas due to human causes are common and will be slow to recover. There may be pugging due to livestock resulting in several inches of soil disturbance. ORVs or other machinery may have left some shallow ruts. Sedimentation may be filling the wetland. Damage is obvious, but not excessive. The site could recover to potential with the removal of degrading human influences and moderate recovery times.
Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.

Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA3R2
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Soil disturbances throughout associated with development within the riparian area leading to homeowner access to river and lack of riparian vegetation in some areas. Degree of soil erosion, compaction, and vegetation cover varies by lot. Many of the yards extend right up to the river with large rocks and boulders in place for erosion control.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
Good (B)	3	Minimal soil disturbance within AA. Some amount of bare soil, pugging, compaction, or sedimentation present due to human causes, but the extent and impact are minimal. The depth of disturbance is limited to only a few inches and does not show evidence of altering hydrology. Any disturbance is likely to recover within a few years after the disturbance is removed.
Fair (C)	2	Moderate soil disturbance within AA. Bare soil areas due to human causes are common and will be slow to recover. There may be pugging due to livestock resulting in several inches of soil disturbance. ORVs or other machinery may have left some shallow ruts. Sedimentation may be filling the wetland. Damage is obvious, but not excessive. The site could recover to potential with the removal of degrading human influences and moderate recovery times.
Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.

Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA3R3
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Moderate to high soil disturbance in the area due to high pedestrian access from park. Low grade and minimal erosion, but high soil compaction in areas of heavy foot use and low vegetation cover.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA4L1
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: highly developed area with condos and houses close to the river, and lawns going up to river bank.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA4L2
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Soil disturbances throughout associated with development within the riparian area leading to homeowner access to river and lack of riparian vegetation in some areas. Degree of soil erosion and compaction and vegetation cover varies by lot.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA4R1
Date: 9/13/2019
Rating: D
Observer: Jonathan Rose (DHM Design)

Notes: Various areas of high disturbance associated with development of house, and irrigation ditch head gate and access to river along a steep bank with high erosion by the bridge.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
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Fair (C)	2	Moderate soil disturbance within AA. Bare soil areas due to human causes are common and will be slow to recover. There may be pugging due to livestock resulting in several inches of soil disturbance. ORVs or other machinery may have left some shallow ruts. Sedimentation may be filling the wetland. Damage is obvious, but not excessive. The site could recover to potential with the removal of degrading human influences and moderate recovery times.
Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.

Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA4R2
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Soil disturbance in the area from access to the river from the Cooper Street bridge and Anderson Park, moderate soil compaction and erosion with various vegetation cover.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

Metric Rating: Assign the metric rating and associated score based on the thresholds in Table 32.

Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
Good (B)	3	Minimal soil disturbance within AA. Some amount of bare soil, pugging, compaction, or sedimentation present due to human causes, but the extent and impact are minimal. The depth of disturbance is limited to only a few inches and does not show evidence of altering hydrology. Any disturbance is likely to recover within a few years after the disturbance is removed.
Fair (C)	2	Moderate soil disturbance within AA. Bare soil areas due to human causes are common and will be slow to recover. There may be pugging due to livestock resulting in several inches of soil disturbance. ORVs or other machinery may have left some shallow ruts. Sedimentation may be filling the wetland. Damage is obvious, but not excessive. The site could recover to potential with the removal of degrading human influences and moderate recovery times.
Poor (D)	1	Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.

Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA5L1
Date: 9/13/2019
Rating: D
Observer: Jonathan Rose (DHM Design)

Notes: Highly disturbed soils along river by large head gate structure, dirt road above steep bank to access the head gate structure, high soil compaction along the road and erosion on the bank

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

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Table 32. Rating for Soil / Substrate Disturbance

Rank	*Score*	*State*
Excellent (A)	4	No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.
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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA5L2
Date: 9/13/2019
Rating: C
Observer: Jonathan Rose (DHM Design)

Notes: Gravel path runs close to the river with social foot trails to the river casuing disturbance with moderate erosion compaction.
Gravel path runs close to the river with social foot trails to the river casuing disturbance with moderate erosion compaction.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

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Metric References: Metric and thresholds adapted from Rocchio (2006a-g) and Faber-Langendoen et al. (2008; 2012).

Site ID - AA5R1
Date: 9/13/2019
Rating: D
Observer: Jonathan Rose (DHM Design)

Notes: Highly disturbed soils along river by large head gate structure, Steep slopes with low vegetation and development within aa.

Metric S1: Substrate / Soil Disturbance

Definition and Background: This metric assess the degree to which human impacts have disturbed the natural soil or substrate. Common sources of disturbance include: fill or sediment dumping; human recreation, either foot traffic of motorized vehicles; and cows that can cause unnatural hummocks (pugging), which in turn can alter the wetland hydrology and disrupt soil process like organic accumulation. A lack of soil horizons can indicate the substrate was filled or tilled when it is not otherwise obvious. It is important to rate this metric according to wetland type. For example, bare patches may be a sign of unnatural disturbance in many wetlands. Playas, however, should have bare ground with compact soils. In playas, extra sediment on top of the naturally compacted soil can be an indicator of undesirable disturbance. Because it can be difficult to assess the degree of compaction in playas as they fill and close with water, best professional judgment will be needed.

Metric Level: Level 2 (rapid assessment).

Metric Application: Use for all wetlands. Specific guidance provided by wetland type.

Measurement Protocol: Select the statement on the form that best describes the substrate or soil disturbance within the AA, in the context of the wetland ecosystem.

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Appendix E: Review of Previous Riparian Area Studies

PREVIOUSLY IDENTIFIED INTERVENTIONS WITHIN RIPARIAN AREAS			
Report	**Intervention**	**Locations within ARAAP**	**Notes**
Upper Roaring Fork River Management Plan (2017)*	» Comprehensive water management to address altered stream flows and associated consequences. » Management of river health conditions on the Roaring Fork River between Difficult Creek and Castle Creek with a focus on: › Riparian/wetland vegetation health › Aquatic macroinvertebrates › Native fisheries » Optimization of the Twin Lakes Exchange » Joint Operation of City of Aspen Municipal Supply and Salvation Ditch » Dry-Year Municipal Raw Water Supply Reductions » Maroon Creek Municipal Water Right CWCB Dedication » Dry-Year Water Leasing with the Salvation Ditch Company » Hunter Creek Cutthroat Trout Management » Hallam Lake Cutthroat Trout Introduction » North Star Preserve Wetland Drain Removal » Jointly plan and convene a facilitated workshop for City and County water managers, planners, and relevant land managers to › Discuss their interests and needs with respect to the Roaring Fork › Highlight points of shared interest as well as potential conflict, and work to develop approaches to each › Identify strategies going forward to share information, coordinate river management efforts, and undertake joint planning and communications where useful. » Engage diverse stakeholders to › Inform future water development planning and approval processes › Develop or align local water and land use policies › Improve management of existing water infrastructure › Inform strategic exercise, dedication, or acquisition of water rights › Engage with local and regional organizations or individuals involved in water management decision-making.	» The Roaring Fork River between Difficult Creek and Castle Creek	

PREVIOUSLY IDENTIFIED INTERVENTIONS WITHIN RIPARIAN AREAS			
Report	**Intervention**	**Locations within ARAAP**	**Notes**
Municipal Water Efficiency Plan: City of Aspen, Colorado (2015)	» Foundational Activities › Automatic Meter Reading Installation and Operation › Enhanced Water Loss Control › Conservation-Oriented Rates » Targeted Technical Assistance and Incentives, and Natural Replacement of Fixtures and Appliances › Fixtures, Appliances, and Incentives › Outdoor Water Efficiency › Slow the Flow › Info and education, Farmer's Market, xeriscape seminars, Efficient Parks, etc. › Commercial, Institutional, and Industrial Water Efficiency » Ordinances and Regulations › Regulatory Measures › Water Reclaim and Recycling, Raw Water Irrigation › Waste of Water Ordinance Update › Update landscape development regulations for new construction to place emphasis on water efficiency in residential development » Educational Activities › Public information, customer outreach and education › Community outreach event participation › Utility billing inserts		This report focuses on water saving measures and compares conservation measures against the alternatives of creating storage and infrastructure water projects. Although most of these interventions do not occur directly within the riparian corridor, water conservation is an important element of ensuring better riparian health, ecosystem resilience, and water quality and quantity in the long term.
Rio Grande Trail Management Plan (2015)	Monitor user-created river access trails and assess for impacts resulting in erosion Weed management through an integrative approach including; mechanical removal through mowing or pulling, chemical spot treatment, and biological agent Viewshed protection of riparian areas		The Rio Grande Trail through Aspen is the most heavily used portion of trail in Pitkin County. Large portions of the trail is within the riparian area of the Roaring Fork River resulting in higher recreational pressure on the ecosystem here.

PREVIOUSLY IDENTIFIED INTERVENTIONS WITHIN RIPARIAN AREAS			
Report	**Intervention**	**Locations within ARAAP**	**Notes**
Urban Runoff Management Plan (2014)	Removal of sediment » Runoff Reduction: Techniques that decrease runoff volume and reduce the Water Quality Capture Volume (WQCV) requiring treatment. » WQCV Treatment: BMPs that treat the required volume of storm runoff. » Flood Detention: Methods for attenuating peak runoff from larger storm events on site. » Implementation Details: Additional details for specific portions of a site. City of Aspen floodplain policy[1]		For effective stormwater management and to address several scales of runoff in Aspen, a combination of on-site, sub-regional and regional facilities will be implemented. See appenix __ for a table describing Development Types and Applicable BMPs (page 8-14)
Upper Roaring Fork River Aquatic Life Use Assessment (2013)	Improve aquatic life health » Creative solutions for improving instream flows and Address Stream Impairments › Continue current efforts towards supplementals flows and local stakeholder agreements to augment instream flows › Develop more permanent 'drought year protocols' between area stakeholders that may be implemented when specific low-flow or stream temperature criteria occur Enhance habitat, » Continued improvement to stormwater controls and targeted stormwater assessments › Engage appropriate area stakeholders for planning and design of targeted water quality studies for stormwater runoff, organic and other constituents. › Pro-actively engage water quality control divisions in causal investigation and any eventual total maximum daily load procedure to keep process locally directed › Model city runoff sources by location and volume (rather than percent area) for accurate estimates of stormwater runoff loads and locations. » Rehabilitation of physically degraded reaches and channel and habitat enhancement › Detailed assessment of available locations and project feasibility for geomorphic and habitat enhancement project in the town reach Continued Biomonitoring		

1 See appendix ___ for Chapter 6 - Floodplains of the manual for a comprehensive overview of COA floodplain development policy and goals.

PREVIOUSLY IDENTIFIED INTERVENTIONS WITHIN RIPARIAN AREAS			
Report	**Intervention**	**Locations within ARAAP**	**Notes**
Northwest Colorado Council of Governments 2012 208 Regional Water Quality Management Plan: Roaring Fork Watershed Plan (2012)	Public education » Promote programs that concern non-point source water quality impacts and methods for minimizing those impacts through Best Management Practices aimed at the general public Consistent enforcement of local regulations Water quality monitoring		This wide ranging plan looks at the larger watersheds, the Colorado and North Platte River Basins. The section covered here only focuses of the Roaring Fork.

PREVIOUSLY IDENTIFIED INTERVENTIONS WITHIN RIPARIAN AREAS			
Report	**Intervention**	**Locations within ARAAP**	**Notes**
Roaring Fork Watershed Plan (2012)[2]	Plan and Implement Key Riparian and Instream Protection and Restoration Projects » Maintain/increase the extent and continuity of native riparian plant communities so that riparian and aquatic systems are functionally connected » Maintain or increase the population size and distribution of all riparian-dependent wildlife species, particularly indicator species. » Maintain or increase the population size, range, and purity of all existing Colorado River cutthroat trout populations. » Assess the current condition of wild, naturally reproducing fish communities; undertake actions to improve existing communities, and monitor their effectiveness. » Assess key amphibian populations (boreal toads, chorus frogs, tiger salamanders, and Northern leopard frogs); undertake actions to restore or increase key amphibian populations and assess their effectiveness. Minimize the impact of development and other activities in riparian and instream areas. » Address the impacts of development and other activities on riparian and instream areas » Provide Adequate Stream Setbacks Throughout the Watershed Develop and implement a riparian and instream monitoring program Increase education/outreach programs on the importance of riparian and instream areas Eradicate/control invasive species in riparian and instream areas » Create an invasive species task force for the watershed to coordinate efforts to control riparian weeds, reestablish native species, and provide education about invasive species » Prevent Aquatic Nuisance Species (ANS), such as the New Zealand mud snail, Didymo algae, quagga and zebra mussels, and rusty crayfish, from establishing in the watershed.	Northstar area of the Roaring Fork River	

2 See appendix __ for a full excerpt of recommendations within riparian areas (page 57-69)

PREVIOUSLY IDENTIFIED INTERVENTIONS WITHIN RIPARIAN AREAS			
Report	**Intervention**	**Locations within ARAAP**	**Notes**
Catalog Of Stream and Riparian Habitat Quality for the Roaring Fork River and Tributaries, Central Colorado: : Roaring Fork River, Segment 3: Tagert Beaver Ponds to the Slaughter House Bridge, Aspen (2007)	Active mitigation » Restoration of riparian habitat within the city limits » Construction of sediment traps as part of the storm drain system » Creation of constructed wetlands to remove storm water pollutants Revegetation of disturbed stream banks is an essential and effective strategy in restoring stream functions including energy abatement, sediment trapping, and water storage and cleansing, and wildlife habitat. Encourage beaver activity and discourage the dismantling of their dams. In the arid west beaver activity results in water conservation and the creation of wildlife habitat for fish, birds, amphibians and mammals. For new development, establish and enforce a minimum riparian setback of 50 meters where native riparian vegetation is dominant and human activities are at a minimum. Strongly discourage bank armoring with boulders or riprap. Instead encourage the use of riparian vegetation for bank stabilization; use of current stabilization strategies such as willow waddles is both more effective at stabilization and dissipates flood water energy rather than increasing it in the downstream direction. Actively encourage existing development, with substandard riparian vegetation, to restore the riparian zone; tax incentives could be an effective motivator. Design trails so as to guide users away from riparian zones with directed access to the stream at designated points. Livestock should be fenced out of the riparian zone. Fencing should be designed to create designated access points to the stream where livestock may obtain water.	Location RF3 – 12: N 39 10.614/W 106 47.782; 39 10.834/106 48.157. Location RF3-13: N39 10.834/W106 48.157; N39 10.873/W106 48.487. Location RF3-14: N39 10.873/W 106 48.487; N39 11.109/W106 48.728 Location RF3-15: N39 11.109/W 106 48.728; N39 11.789/W106 49.252. Location RF3-16: N 39 11.789/W 106 49.252; N 39 11.969/W 106 49.328. Location RF3-17: N39 11.969/W106 49.328; N39 12.285/W106 49.975. Location RF3-18: N39 12.285/W106 49.975; N39 12.648/W106 50.408.	See following section for specific management recommendations by location.
Roaring Fork Watershed Water Quality Report (2006)		Stream Watch List Segments: » Roaring Fork at Mill Street Bridge (Aspen) listed for suspended solids » Roaring Fork at Slaughterhouse Bridge (Aspen) listed for aluminum levels	
The Roaring Fork River Greenway Plan			

SUMMARY OF INTERVENTIONS AND ACTIONS:

Catalog Of Stream and Riparian Habitat Quality for the Roaring Fork River and Tributaries, Central Colorado: : Roaring Fork River, Segment 3: Tagert Beaver Ponds to the Slaughter House Bridge, Aspen (2007)

Location RF3 – 12: N 39 10.614/W 106 47.782; 39 10.834/106 48.157.

- Channel heterogeneity should be enhanced to increase bank stability and decrease floodwater velocity.
  - Install large woody debris such as logs and root wads
  - Revegetate stream banks with native woody plant species.
- Riparian zone width should be increased on the left bank
  - Moving the recreational trail out of the riparian zone.
- Proximity of the highway to the stream precludes increasing the width of the riparian zone on most of the right bank. Thus on the right bank, because of downcutting and consequent drying soils riparian vegetation on the right bank should be supplemented with upland species.
- A high percentage of this reach is infested with noxious weeds indicating that the habitat is in decline.
  - Eradicate weeds.
- Numerous non-point source pollutants degrade water quality along this reach especially since there is little filtering capacity by the degraded riparian zone. Fertilizers, pesticides and road runoff threaten water quality and should be controlled.
  - Develop and implement regulations regarding fertilizer and pesticide use.
  - Provide incentives that encourage private landowners to revegetate with native plant species.
  - Install curbing or sediment ponds to prevent road runoff from directly entering the stream.

Location RF3-13: N39 10.834/W106 48.157; N39 10.873/W106 48.487.

- Restore ecologically sustainable flows.
- On undeveloped parcels, maintain a minimum undisturbed riparian zone width of at least 50 m where native riparian vegetation structural and species diversity is intact.
- On developed parcels, revegetate the riparian zone with native species that have a high stability rating.
- On pastures, increase the fencing setback from the stream to 50 m. Currently fences are 1 to 2 meters from the stream, which allows livestock to trample and browse riparian vegetation. Revegetate with willows that are native to the local habitat.
- Decrease sediment and organic pollutant inputs from lawns, pastures, and roadway.

Location RF3-14: N39 10.873/W 106 48.487; N39 11.109/W106 48.728

- Restore ecologically sustainable instream flows.
- Buffer nonpoint source pollutants such as lawn runoff and sedimentation before they enter the stream by restoring the riparian vegetative zone.
- Reduce erosion by revegetating stream banks with native riparian vegetation.
- Increase instream stability and habitat structural heterogeneity by installing instream large woody debris.
- Protect natural, unaltered areas of this reach with riparian setbacks of at least 50 meters where no development or vegetation removal is permitted.

Location RF3-15: N39 11.109/W 106 48.728; N39 11.789/W106 49.252.

- Dissipate stream energy and increase structural heterogeneity.
  - Revegetate banks with native riparian woody plant species.

- Install structural features, such as large boulders and large woody debris, which reduce water velocity and enhance structural heterogeneity.

» Establish and enforce 50m riparian zone setback

- Prohibit development and vegetation removal within 50 meters of the stream

» Reestablish habitat characteristics that would maintain river corridor connectivity for wildlife migrations. For example, the banks of the stream that run through John Denver City Park have been armored with boulders. This is an ideal site for a riparian restoration.

» Create a mitigation wetland at Jenny Adair Park to treat storm/road runoff (presently being planned by the City of Aspen).

» Funnel road runoff into culverts and then into ponding basins where pollutants can be removed

Location RF3-16: N 39 11.789/W 106 49.252; N 39 11.969/W 106 49.328.

» Enforce a 50 meter riparian zone setback for all development.

» Revegetate riparian zone with native woody species along the right bank.

» Increase instream and riparian physical habitat heterogeneity by installing large boulders, large woody debris instream and willow waddles along banks.

» Eradicate noxious weeds.

Location RF3-17: N39 11.969/W106 49.328; N39 12.285/W106 49.975.

» Close the dirt trail on the southwest side of the stream to conserve and protect this riparian habitat for wildlife.

» Identify and "harden" a few, appropriate, stream access spur trails on the right bank. Eliminate the numerous other social trails that result in vegetation destruction and wildlife disturbance.

» Install educational signage on the right bank regarding the importance of riparian vegetation and the negative trampling-induced impacts of social trails.

» Eradicate noxious weeds.

Location RF3-18: N39 12.285/W106 49.975; N39 12.648/W106 50.408.

» Stabilize stream banks:

- Revegetate stream banks with native cottonwood, blue spruce, willows, birch and alder.
- Increase structural complexity of stream banks.
- Prohibit the removal of native trees and shrubs within 50 meters of stream banks.

» Increase stream stability by slowing stream flow:

- Increase instream habitat heterogeneity.
- Enable overbanking flows.
- Increase bank roughness.

» Weed management:

- Eradicate noxious weeds.
- Encourage the use of natives and discourage the use of introduced ornamentals.

» Close and revegetate social trails on the right bank to minimize wildlife disturbance and prevent further destruction of riparian vegetation.

Appendix F: Stakeholder Survey, Survey Results and Summary Presentation

CITY OF ASPEN

Aspen Riparian Assessment and Plan Stakeholder Feedback

Policy

Policy actions are those regulatory actions, which the City would enact to enforce, limit, plan development and use within the riparian area, as well as preserve, protect and plan for critical areas within the corridor.

Examples of these types of actions are changes to enforcement of streambank setback regulations and creation of planning documents such as a sediment management plan.

The three subcategories of these policy actions are:

- **Preservation**
- **Enforcement**
- **Planning**

Policy 1:

More-explicitly institutionalize water quality projection as a goal/objective in city code segments pertaining to riparian lands uses and protections. (Report page number: 38)

* 1. **Rate the *anticipated effectiveness* of Policy 1**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 2. **Rate the *feasibility of implementation* of Policy 1.**

- ○ **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- ○ **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- ○ **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

3. **Do you have any additional comments or thoughts on Policy 1?**

Policy 2:

Strengthen riparian buffer protections on existing undeveloped locations with functional condition vegetation (Report page number: 38)

* 4. **Rate the *anticipated effectiveness* of Policy 2**

- ○ **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- ○ **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- ○ **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 5. **Rate the *feasibility of implementation* of Policy 2**

- ○ **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- ○ **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- ○ **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

6. **Do you have any additional comments or thoughts on Policy 2?**

7. **Are there any additional policy recommendations that you have?**

CITY OF ASPEN

Aspen Riparian Assessment and Plan Stakeholder Feedback

Program

Programs are actions that the city would undertake to incentivize best practices within riparian areas and educate the public about riparian areas. Programs have the potential to catalyze public action and help the City promote a more robust, connected and healthy riparian area. Program actions fall into two broad categories:

· Incentives

· Education

Program 1:

Educating property owners on how to maintain naturalized riparian buffers. Highlight importance of a zoned approach to landscaping and structure development near riparian areas. (Report page number: 38)

* 1. **Rate the *anticipated effectiveness* of Program 1**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- **Effectiveness Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

* 2. **Rate the *feasibility of implementation* of Program 1**

- ○ **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- ○ **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- ○ **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

3. **Do you have any additional comments or thoughts on Program 1?**

Program 2:

Incentivizing restoration, enhancement, or mitigation opportunities. (Report page number: 39)

* 4. **Rate the *anticipated effectiveness* of Program 2**

- ○ **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- ○ **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- ○ **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 5. **Rate the *feasibility of implementation* of Program 2**

- ○ **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- ○ **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- ○ **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

6. **Do you have any additional comments or thoughts on Program 2?**

Program 3:

Fee – In – Lieu. At sites where improvements still remain practically infeasible due to topography, parcel size, etc., provide opportunities for in-basin mitigation via fee-in-lieu or other mechanisms to support off-site work that still provides water quality benefits directly to the Roaring Fork River system.(Report page number: 39)

* 7. **Rate the *anticipated effectiveness* of Program 3**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 8. **Rate the *feasibility of implementation* of Program 3**

- **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

9. **Do you have any additional comments or thoughts on Program 3?**

10. **Are there any additional program recommendations that you have?**

CITY OF ASPEN

Aspen Riparian Assessment and Plan Stakeholder Feedback

Project

Projects include the "shovel in the dirt" variety action items. These projects fall into five categories based on: ecosystem context, level of degradation, adjacent land uses, and locations of storm water outfalls and treatment infrastructure.

These proposed projects locations are mapped in the report.

These project types are:

Preservation (i.e. conservation easements, acquisition)

Enhancement (limited restoration activities such as seeding and planting in areas that are of good quality)

Creation (installing riparian communities where they have been eliminated or would be expected to occur. Especially those locations where these installations would have measurable impacts to city goals)

Restoration (repairing degraded areas with ecological based projects including interventions such as planting, seeding, erosion control, bank stabilization etc.)

Stormwater Control and Treatment

Project 1:

Public and private restoration partnerships; in order to create a larger and more robust riparian buffer and connect high value habitat and ecosystem services, the City should consider targeted property easements and partnerships that further the goal of connectivity of the riparian area through Aspen. (Report page number: 40)

* 1. **Rate the *anticipated effectiveness* of Project 1**

- ○ **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- ○ **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- ○ **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 2. **Rate the *feasibility of implementation* of Project 1**

- ○ **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- ○ **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- ○ **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

3. **Do you have any additional comments or thoughts on Project 1?**

Project 2: Mill Parcel Restoration

Restore the native vegetation community along the floodplain bench on the northwest side of Mill Street.

Control invasive species along the streambanks on the southern side of the road crossing.

Enhance the habitat and water quality of the pond near the ACRA.

Modify site topography and plant various native wetland species to improve the habitat characteristics of the pond's vegetated fringe.

Enhance the internal forest's diversity in age class and structure.

Maintain the parcel's water rights and fisheries use.

(Report page number: 41)

* 4. **Rate the *anticipated effectiveness* of Project 2**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 5. **Rate the *feasibility of implementation* of Project 2**

- **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

6. **Do you have any additional comments or thoughts on Project 2?**

Project 3: Jenny Adair - Stormwater Control Facility

Further improve the water quality of stormwater exiting the Jenny Adair stormwater control facility.

Adaptively manage the evolving system to continue the high quality of water treatment.

Examine the flow routing and ponded water depths within the facility.

Riparian vegetation restoration through planting various wetland shrubs, forbs, and sedges.

To improve hydrological connectivity with the Roaring Fork River through structural modification of site topography.

(Report page number: 42)

* 7. **Rate the *anticipated effectiveness* of Project 3**

- ○ **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- ○ **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- ○ **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 8. **Rate the *feasibility of implementation* of Project 3**

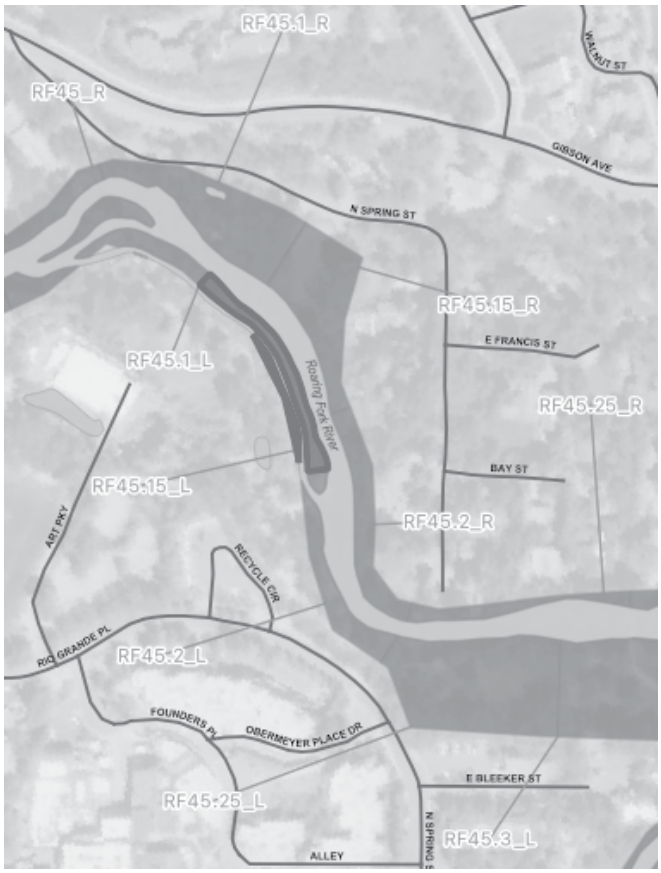
- ○ **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- ○ **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- ○ **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

9. **Do you have any additional comments or thoughts on Project 3?**

Project 4: John Denver Park - Kayak Channel and Armored Bank Restoration

Improve natural channel processes and encourage establishment of streamside vegetation.

(Report page number: 43)



* 10. **Rate the *anticipated effectiveness* of Project 4**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 11. **Rate the *feasibility of implementation* of Project 4**

- **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

12. **Do you have any additional comments or thoughts on Project 4?**

Project 5: Newberry Park Enhancement

Remove old bridge pier from streambed to support natural sediment transport dynamics and promote healthy channel function.

Increase vegetation diversity though targeted vegetation management.

Tie natural hydrology into bank to extend the riparian corridor.

(Report page number: 44)

* 13. **Rate the *anticipated effectiveness* of Project 5**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 14. **Rate the *feasibility of implantation* of Project 5**

- ○ **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- ○ **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- ○ **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

15. **Do you have any additional comments or thoughts on Project 5?**

Project 6: Herron Park Enhancement

Implement riparian restoration and management strategies that conform to the principles of the “3-Zone Buffer System”.

Restrict the number and use of social trails.

Install educational and interpretive facilities targeted at daily users and adjacent property owners.

(Report page number: 45)

* 16. **Rate the *anticipated effectiveness* of Project 6**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 17. **Rate the *feasibility of implementation* of Project 6**

- **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

18. **Do you have any additional comments or thoughts on Project 6?**

Project 7: Garrish Park Restoration and Mine Drainage

Improve water quality in mine drainage before it enters the Roaring Fork River

Implement riparian restoration and management strategies that conform to the principles of the “3-Zone Buffer System”.

Restrict the number and use of social trails.

Install educational and interpretive facilities targeted at daily users and adjacent property owners.

Increase floodplain connectivity and riparian habitat.

(Report page number: 46)

* 19. **Rate the *anticipated effectiveness* of Project 7**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 20. **Rate the *feasibility of implementation* of Project 7**

- ◯ **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- ◯ **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- ◯ **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

21. **Do you have any additional comments or thoughts on Project 7?**

Project 8: Anderson Park and Land Trust Parcel

Implement a riparian enhancement strategy targeted at:

- **Native woody riparian area age diversity**
- **Native woody riparian species diversity**
- **Improved habitat in narrow band**

(Report page number: 47)

* 22. **Rate the *anticipated effectiveness* of Project 8**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 23. **Rate the *feasibility of implementation* of Project 8**

- **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

24. **Do you have any additional comments or thoughts on Project 8?**

Project 9: Aspen Club Hydrologic Enhancements

Create a side channel on the left bank to increase diversity of river morphology.

Narrow artificially large channel to reconnect floodplain and encourage overbank flow onto riparian benches.

Private/public partnership opportunity.

Improve wheeler ditch diversion to promote/enhance vegetation of a mid-channel bar.

(Report page number: 48)

* 25. **Rate the *anticipated effectiveness* of Project 9**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3:** These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 26. **Rate the *feasibility of implementation* of Project 9**

- ○ **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- ○ **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- ○ **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

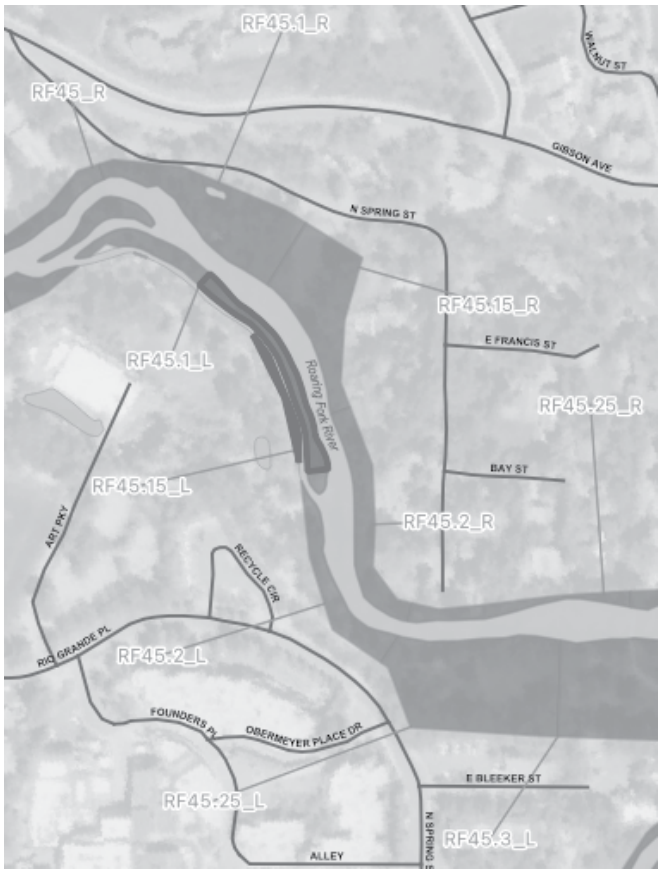
27. **Do you have any additional comments or thoughts on Project 9?**

Project 10: John Denver Park - Vegetation Management & Cattail Control

Maintain and enhance vegetation community diversity in the John Denver Park Stormwater Facility.

Mitigate water eutrophication through adaptive management practices.

(Report page number: 49)



* 28. **Rate the *anticipated effectiveness* of Project 10**

- **Effectiveness Level 1:** These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 2:** These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- **Effectiveness Level 3: These** actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

* 29. **Rate the *feasibility of of implementation* of Project 10**

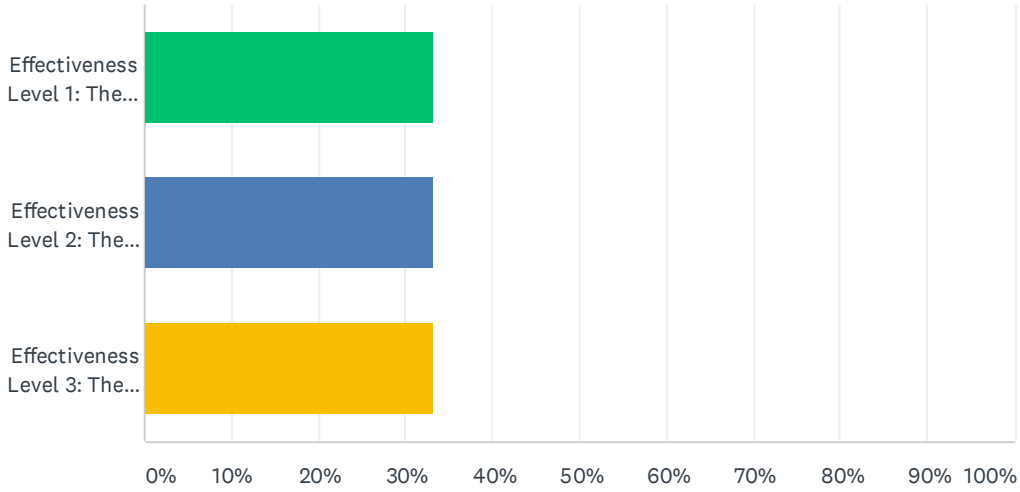
- **Feasibility Level 1:** These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
- **Feasibility Level 2:** These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.
- **Feasibility Level 3:** These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.

30. **Do you have any additional comments or thoughts on Project 10?**

31. **Are there any additional project recommendations that you have?**

Q1 Rate the anticipated effectiveness of Policy 1

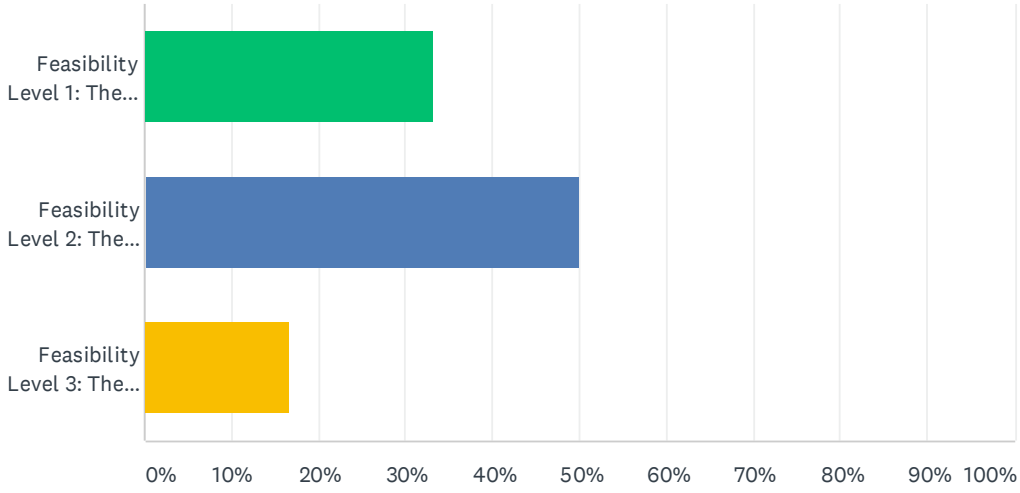
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
TOTAL		6

Q2 Rate the feasibility of implementation of Policy 1.

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	33.33%	2
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	50.00%	3
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	16.67%	1
TOTAL		6

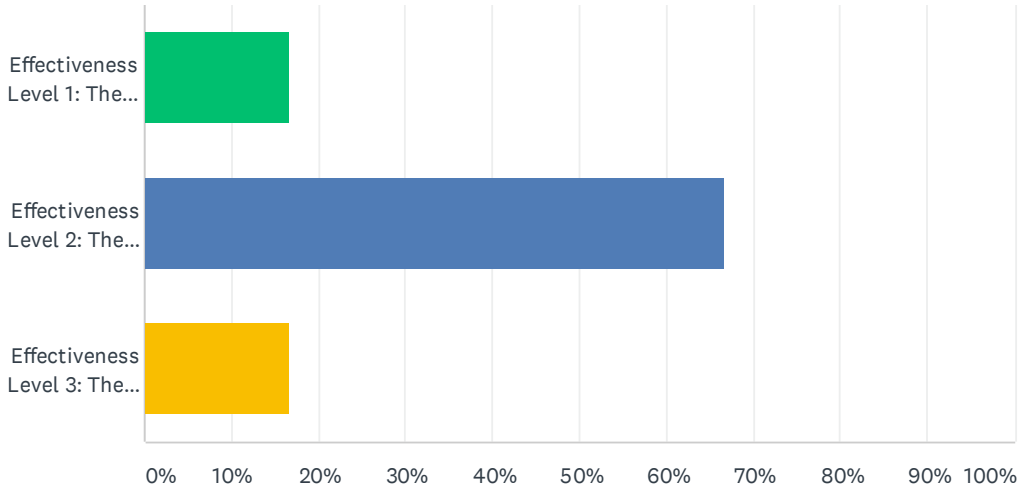
Q3 Do you have any additional comments or thoughts on Policy 1?

Answered: 5 Skipped: 1

#	RESPONSES	DATE
1	This would probably require a significant amount of public education/outreach.	5/11/2021 4:26 PM
2	I'm assuming that this is supposed to read "water quality protection" not "water quality projection"? In terms of effectiveness it seems that to some degree the development ship has sailed within the riparian in the City of Aspen, but if we think in terms of redevelopment projects I think there is potential benefits to more explicitly including water quality as a goal. I think the effects would be relatively localized because my understanding is they wouldn't come into effect unless significant redevelopment is proposed on a parcel.	5/11/2021 12:33 PM
3	Despite my rating of low effectiveness and difficult feasibility, I still think there is some value in codifying the goal and laying expectations for the future.	5/11/2021 8:02 AM
4	From a Community Development perspective, making this change to the Land Use Code (LUC) is relatively feasible and the department is open to making this change to reflect organizational/community values toward water. It's worth noting that there is a very specific process associated with amending the LUC and this process would have to be managed by someone from Water/Engineering and the Long Range Planner in Community Development.	5/10/2021 9:48 PM
5	The current top of slope and 15 foot setback is not a strong manner to protect the riparian zone. The language is not strong enough to require robust riparian plantings and the requirement is often skirted. The stream margin code should be updated to create better riparian buffers.	5/10/2021 9:25 AM

Q4 Rate the anticipated effectiveness of Policy 2

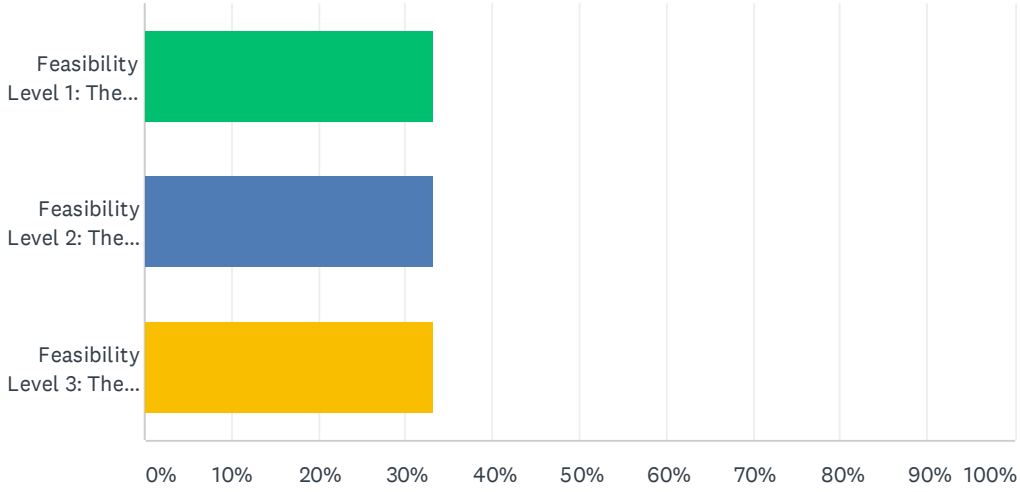
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	66.67%	4
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
TOTAL		6

Q5 Rate the feasibility of implementation of Policy 2

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	33.33%	2
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	33.33%	2
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	33.33%	2
TOTAL		6

Q6 Do you have any additional comments or thoughts on Policy 2?

Answered: 4 Skipped: 2

#	RESPONSES	DATE
1	I think it makes good sense to work towards protecting undeveloped areas- although many areas have already been impacted. Glenwood Springs recently worked to increase riparian protections and had some significant push back, unfortunately (although the measures did ultimately pass).	5/11/2021 4:26 PM
2	I see two major limitations to this policy. First there are a very limited number of parcels within the city limits that aren't currently developed and have development potential (i.e. aren't already owned by the city or county, or in other ways protected, or have terrain that precludes development). Second while city code can direct development within the riparian my understanding (as a total non-lawyer layperson) is that if we were to implement polices that in effect precludes development on the parcel it would constitute a taking and the city would be responsible for the cost of extinguishing that development right. While guided development on these parcels would be better than nothing it would still be development, there would still be; a significant increase in impervious surfaces in the riparian, a lawn which would be fertilized, a driveway and sidewalks that would be salted, and human presence in the riparian cutting off significant wildlife access.	5/11/2021 12:33 PM
3	will face resistance, but string policy should be able to withstand social pressure for development	5/11/2021 8:02 AM
4	From a Community Development perspective, the short answer is that the department would support exploring this policy. However, in reality, this could be difficult to implement. This policy could potentially reduce development rights or alter the development rights of a property depending on its specifics. Reductions in development rights, particularly those that would reduce building size allowances, would anger the community. Furthermore, any changes to the existing development standards may have unintended consequences on other development restrictions/other sections of the LUC and those would need to be carefully considered before pursuing this policy. If there is political support for this policy, then changes to the code to strengthen riparian buffer changes could be explored with the Long Range Planner managing or co-managing the process with someone from Engineering or another relevant department. Per the exact language for this policy, maintaining the existing protections can certianly be done. But strengthening protections would require a significiant process and political support as mentioned above (not an impossible process, but it's worth noting the potential difficulty of the endeavor).	5/10/2021 9:48 PM

Q7 Are there any additional policy recommendations that you have?

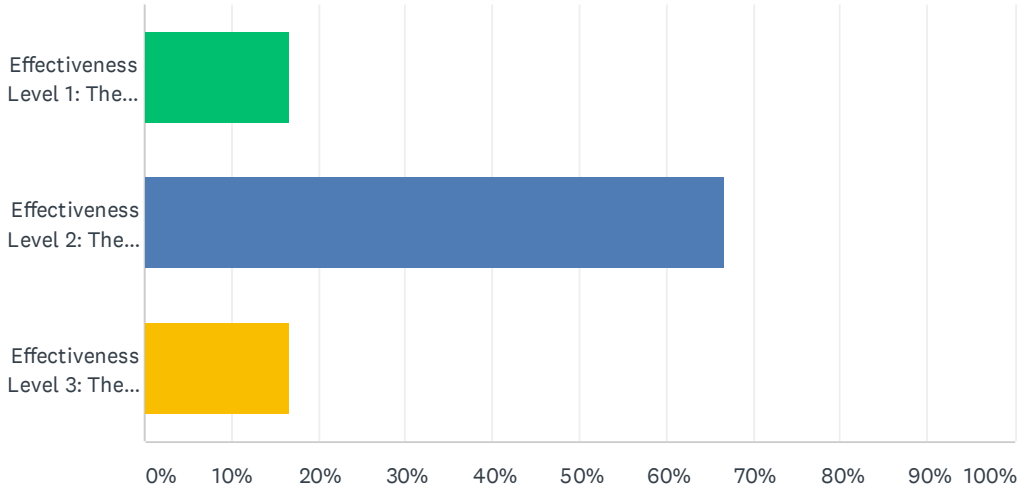
Answered: 1 Skipped: 5

#	RESPONSES	DATE

1	While some of the program recommendations incorporate ideas on how to reduce chemical runoff into the riparian areas and the river, it may be worth formulating a policy that would require a ban or limit on these chemicals (fertilizers, pesticides, etc.). A mandate on this item seems like it would be more powerful than educational/optional effort. Apologies if this has already been considered and I'm missing some context on this!	5/10/2021 9:48 PM

Q8 Rate the anticipated effectiveness of Program 1

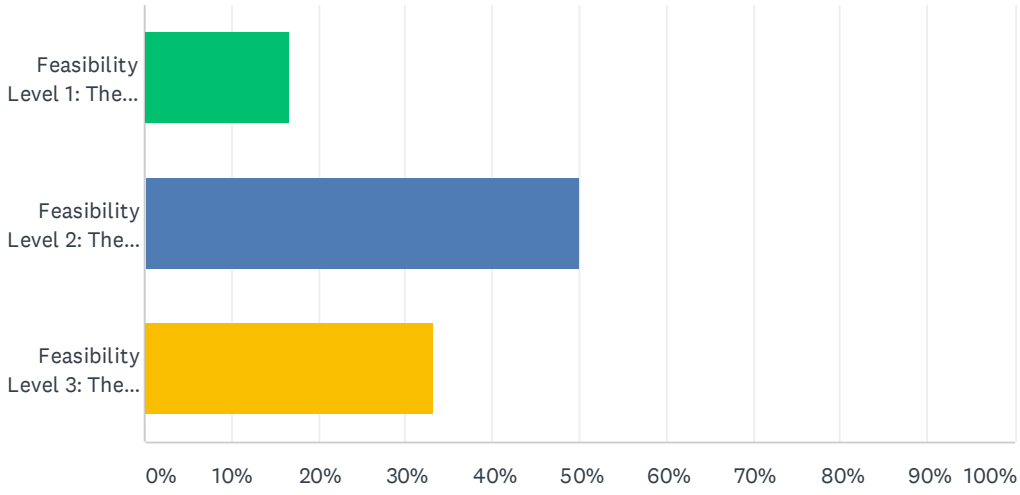
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	66.67%	4
Effectiveness Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	16.67%	1
TOTAL		6

Q9 Rate the feasibility of implementation of Program 1

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	16.67%	1
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	50.00%	3
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	33.33%	2
TOTAL		6

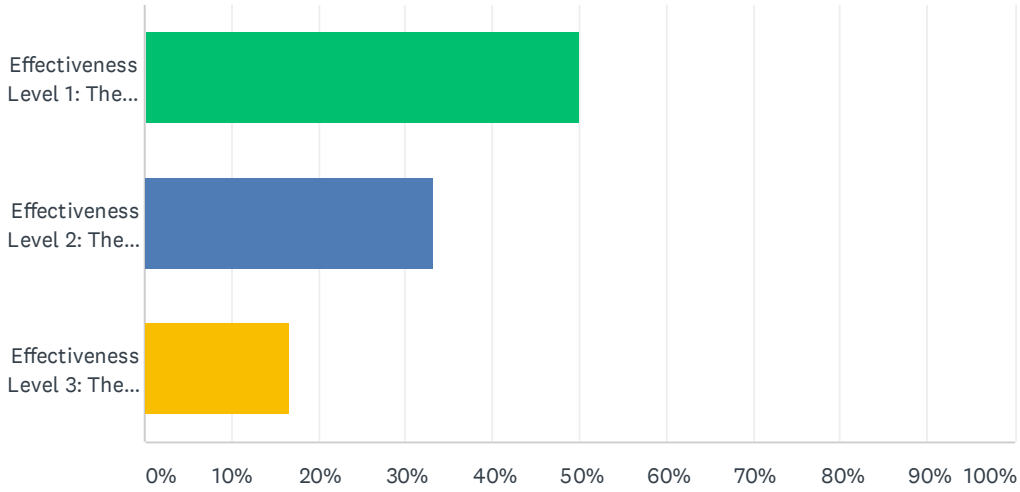
Q10 Do you have any additional comments or thoughts on Program 1?

Answered: 5 Skipped: 1

#	RESPONSES	DATE
1	I think its quite feasible to think an education campaign like this can happen. Whether people will listen/respond is a more difficult question.	5/11/2021 4:31 PM
2	Aspen homeowners are very challenging to reach, they often aren't present and when they are there are many layers of people that often insulate them from education efforts.	5/11/2021 12:43 PM
3	Can achieve education, harder to measure whether that education translates to on the ground decisions and or action	5/11/2021 8:07 AM
4	In the Climate Action Office, we've run a water conservation program for homeowners, HOAs, businesses, etc. for the past few years with the goal of reducing water consumption through irrigation practices. While the endeavor is worthwhile given the amount of water we know these properties are using for irrigation, the amount of effort that goes into this optional/educational program is substantial. Private entities are hard to reach and require a lot of staff time to engage with. The voluntary nature of this program would necessitate that significant resources be devoted to the program in order to see an impact at scale.	5/10/2021 9:48 PM
5	Education will be hard given the majority of these properties value the views and look of their property.	5/10/2021 9:33 AM

Q11 Rate the anticipated effectiveness of Program 2

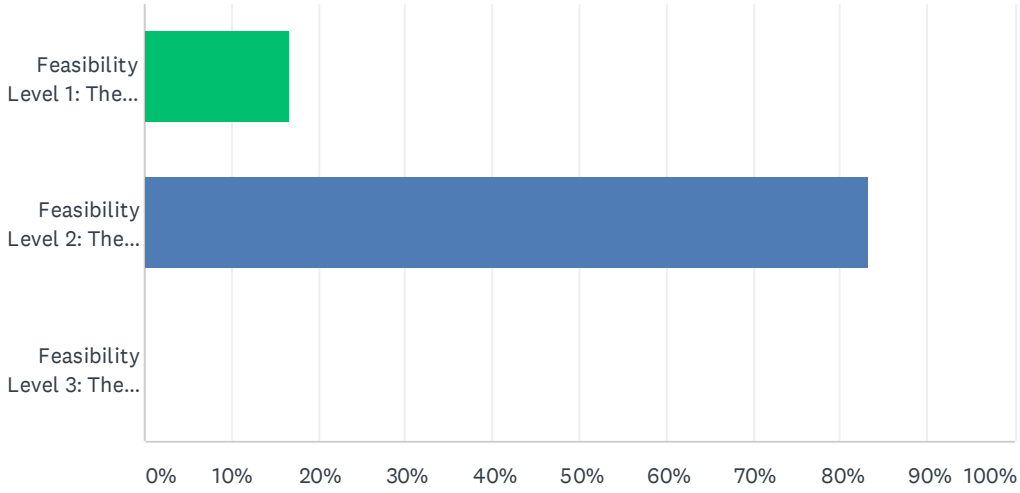
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	50.00%	3
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
TOTAL		6

Q12 Rate the feasibility of implementation of Program 2

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	16.67%	1
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	83.33%	5
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

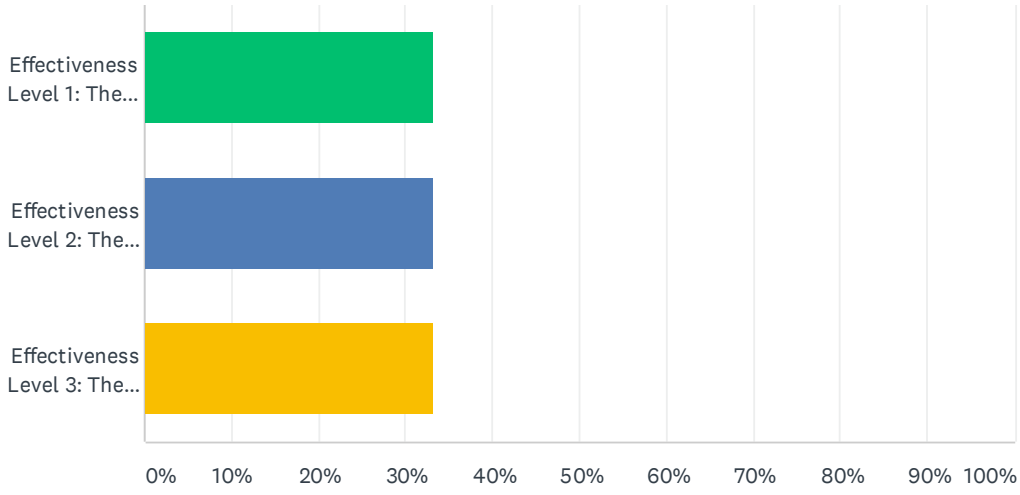
Q13 Do you have any additional comments or thoughts on Program 2?

Answered: 5 Skipped: 1

#	RESPONSES	DATE
1	I really like this idea...	5/11/2021 4:31 PM
2	I think some sort of incentive structure has a lot of potential. The challenge is going to be finding incentives that actually matter those that will be redeveloping parcels along the Roaring Fork. Most of these individuals are relatively price insensitive to the scale of financial incentives the city would be able to provide. I think the key to success here will be thinking creatively about incentives that can be offered during development that will be attractive enough for homeowners to take mitigation steps they wouldn't otherwise do.	5/11/2021 12:43 PM
3	I would guess that money and social pressure can be more effective incentives than mere education in Aspen.	5/11/2021 8:07 AM
4	This program would be laudable, but as referenced in the text of the rationale, the ability to make changes on these degraded lands is difficult and very expensive. Thus, I'm not sure of how effective the program would be. Furthermore, the text of the recommendation makes it sound optional for property owners during redevelopment - is that the case? If this would be optional, then it could be difficult to garner a high level of participation. If it is not optional, then this program would have to be considered further with Community Development.	5/10/2021 9:48 PM
5	People want more FAR. incentivizing bigger houses for robust riparian zones may work.	5/10/2021 9:33 AM

Q14 Rate the anticipated effectiveness of Program 3

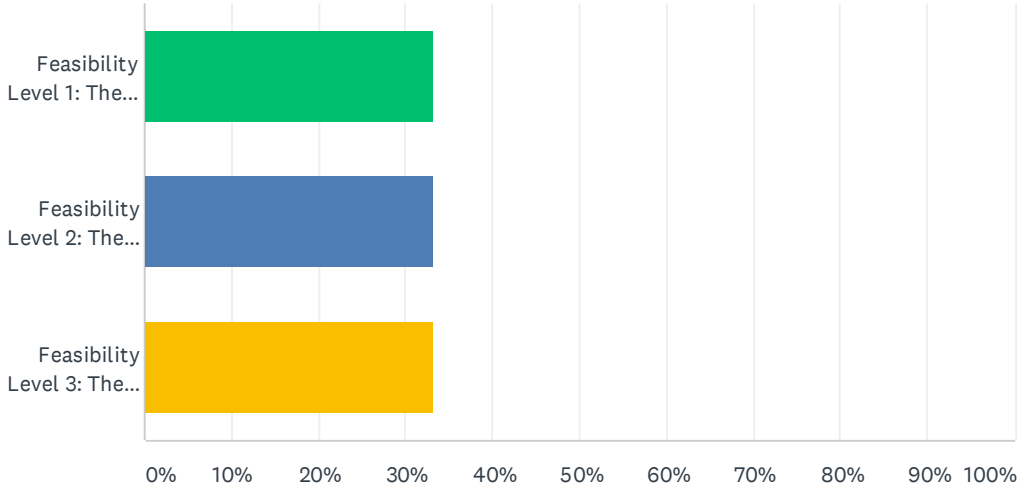
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
TOTAL		6

Q15 Rate the feasibility of implementation of Program 3

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	33.33%	2
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	33.33%	2
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	33.33%	2
TOTAL		6

Q16 Do you have any additional comments or thoughts on Program 3?

Answered: 4 Skipped: 2

#	RESPONSES	DATE
1	Seems like it could have potential and follows the precedent set by programs like CORE	5/11/2021 4:31 PM
2	This seems relatively straight forward. It looks like the second paragraph under the Fee-In-Lieu belongs in the previous incentive section.	5/11/2021 12:43 PM
3	This Program, when considered in tandem with Program #2, is slightly confusing. Personally, I've only ever seen a Fee-in-Lieu option applied to required policies (if there are voluntary, sucessful models of this, I'd be happy to learn more). If Program #2 is optional (as I'm reading it to be), and so is the Fee-in-Lieu option of Program #3, then I think participation would be extremely low. It's unlikely that private properties will contributre funds if they don't have to. Overall, I could use some clarification on this Program and Program #2 on my points above as well as some administrative questions. Is this program suggesting that the LUC is the right place to house this program? If so, who would be administering this? How would funds be collected? A lot of process questions come up. Further discussion with Community Development would be needed if this does involve the LUC in any way.	5/10/2021 9:48 PM
4	People with riverfront property in aspen have the financial means to pay a fee in lieu. They want to do the right thing but not in their back yard. I think a fee in lieu with projects elsewhere in the watershed will be effective.	5/10/2021 9:33 AM

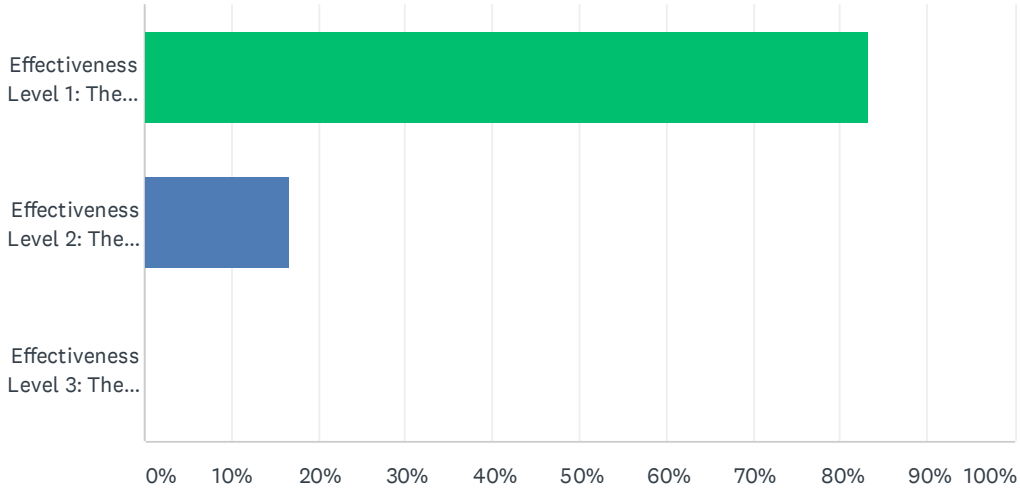
Q17 Are there any additional program recommendations that you have?

Answered: 2 Skipped: 4

#	RESPONSES	DATE
1	Pilot project turning a wealthy landowners private riverfront property into a better functioning riparian area to learn actual costs, implementation challenges and demonstrate how it can still be aesthetically pleasing to the landowner (I think this is a barrier to much riparian enhancement still...how can we help make a functioning riparian sexy for traditional green grass loving landowners!?)	5/11/2021 8:07 AM
2	Overall, Community Development is very ready to support water quality efforts for the Roaring Fork, but will need to iron out the details of these items if they do involve the code before any implementation begins.	5/10/2021 9:48 PM

Q18 Rate the anticipated effectiveness of Project 1

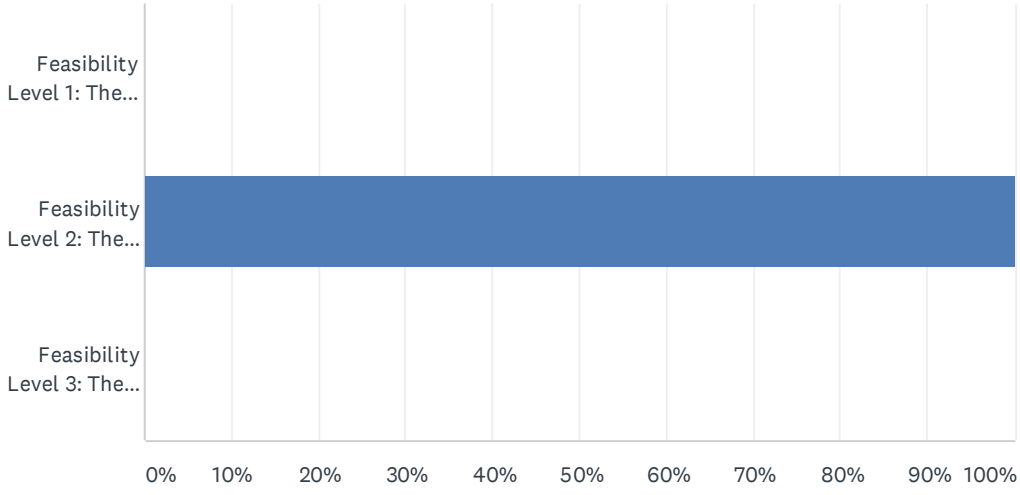
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	83.33%	5
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	0.00%	0
TOTAL		6

Q19 Rate the feasibility of implementation of Project 1

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	0.00%	0
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	100.00%	6
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

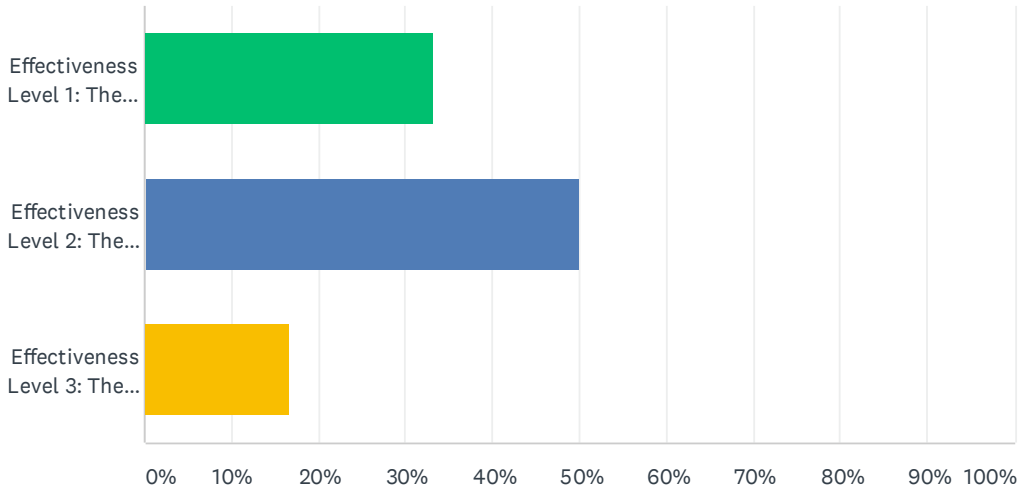
Q20 Do you have any additional comments or thoughts on Project 1?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	I think this makes a ton of sense, much of the degraded land along the RF is private so public private partnerships to address that are necessary.	5/11/2021 12:54 PM

Q21 Rate the anticipated effectiveness of Project 2

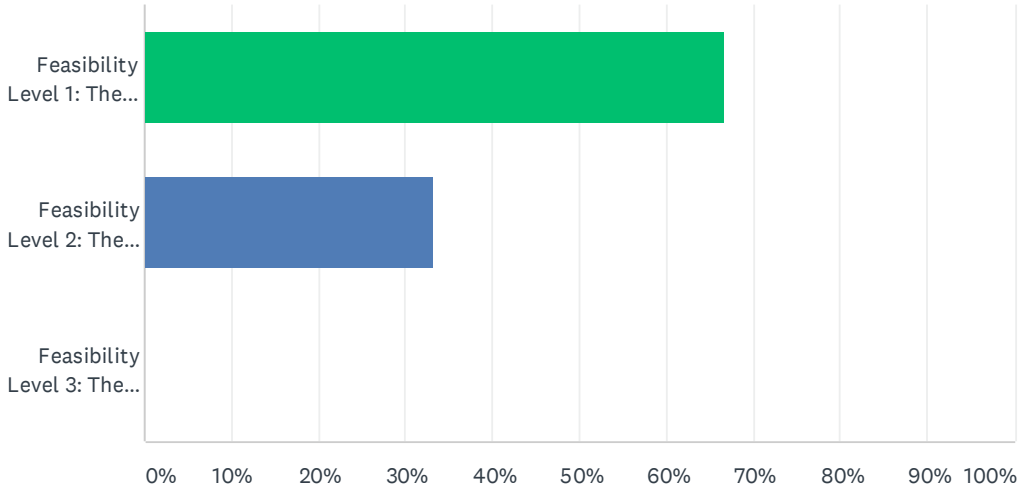
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	50.00%	3
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
TOTAL		6

Q22 Rate the feasibility of implementation of Project 2

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	66.67%	4
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	33.33%	2
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

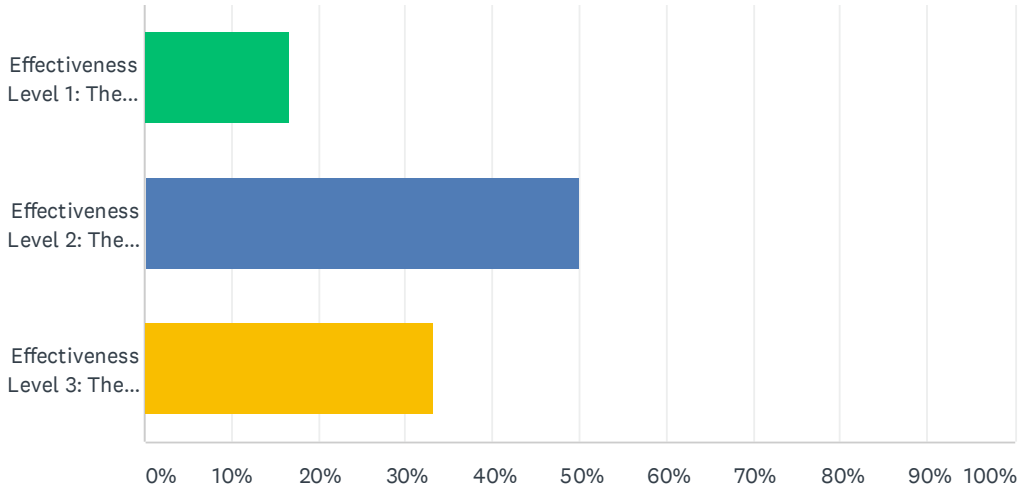
Q23 Do you have any additional comments or thoughts on Project 2?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	Seems like a project with a lot of direct benefits that could also serve as an educational asset and demonstration project as well.	5/11/2021 4:35 PM

Q24 Rate the anticipated effectiveness of Project 3

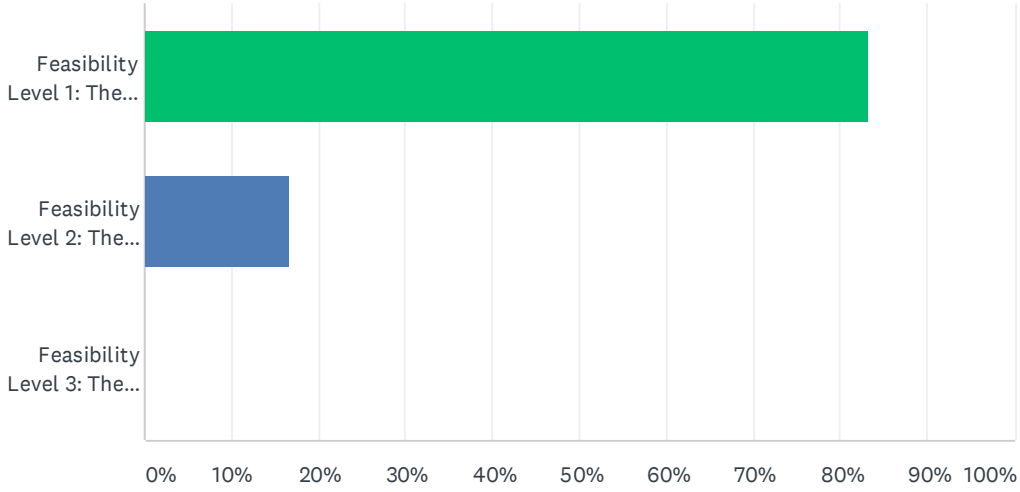
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	50.00%	3
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
TOTAL		6

Q25 Rate the feasibility of implementation of Project 3

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	83.33%	5
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	16.67%	1
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

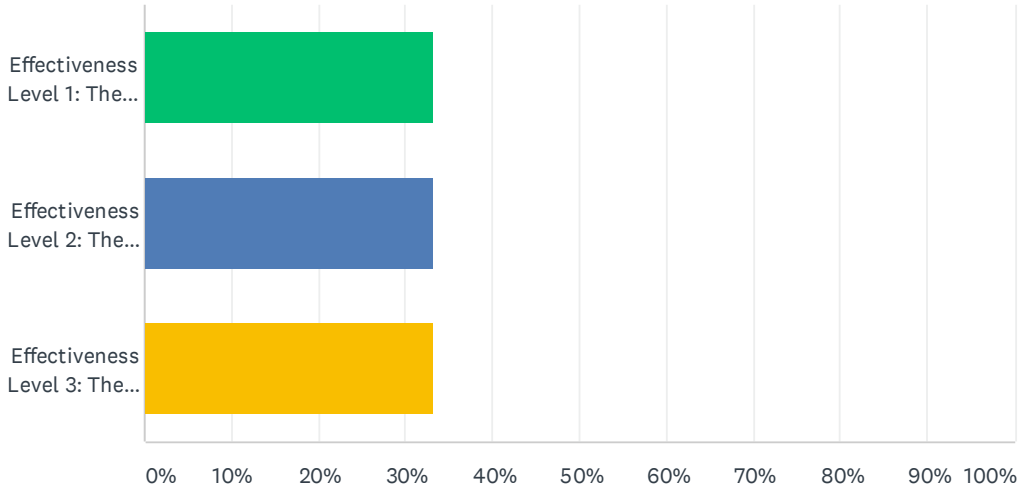
Q26 Do you have any additional comments or thoughts on Project 3?

Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

Q27 Rate the anticipated effectiveness of Project 4

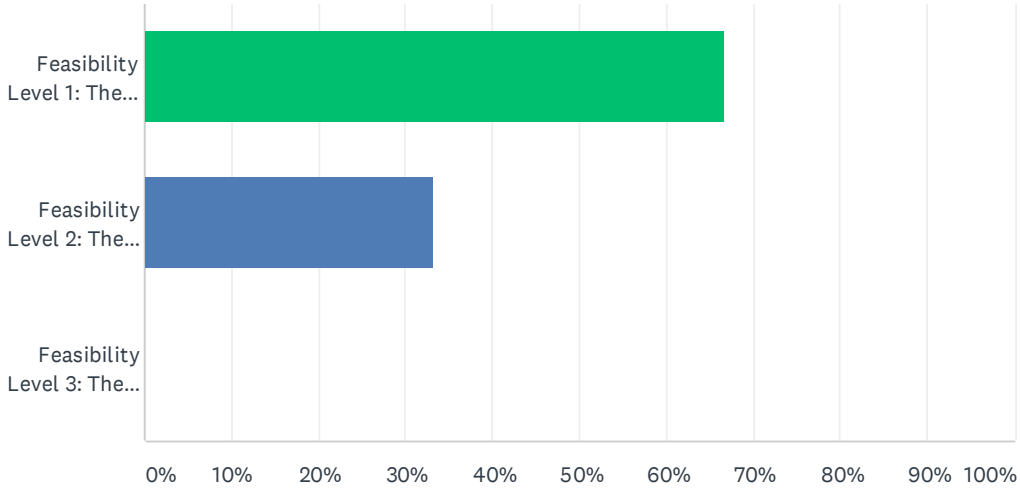
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
TOTAL		6

Q28 Rate the feasibility of implementation of Project 4

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	66.67%	4
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	33.33%	2
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

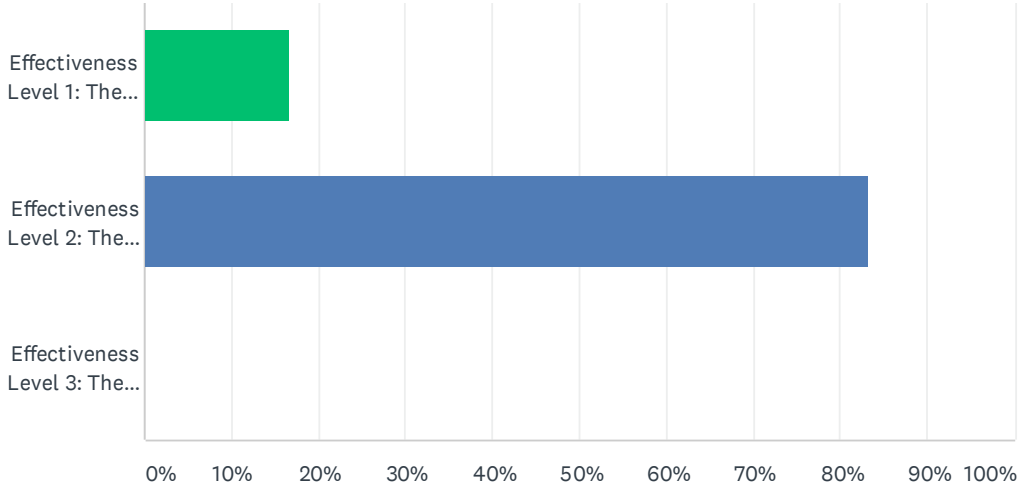
Q29 Do you have any additional comments or thoughts on Project 4?

Answered: 2 Skipped: 4

#	RESPONSES	DATE
1	Seems like a project with a lot of direct benefits that could also serve as an educational asset and demonstration project as well.	5/11/2021 4:35 PM
2	Getting some community input on this project could be useful before committing to it. Since it's maybe a more heavily trafficked area than Projects 2 & 3, there may be some stronger communtiy feelings around what should or shouldn't happen here.	5/10/2021 9:49 PM

Q30 Rate the anticipated effectiveness of Project 5

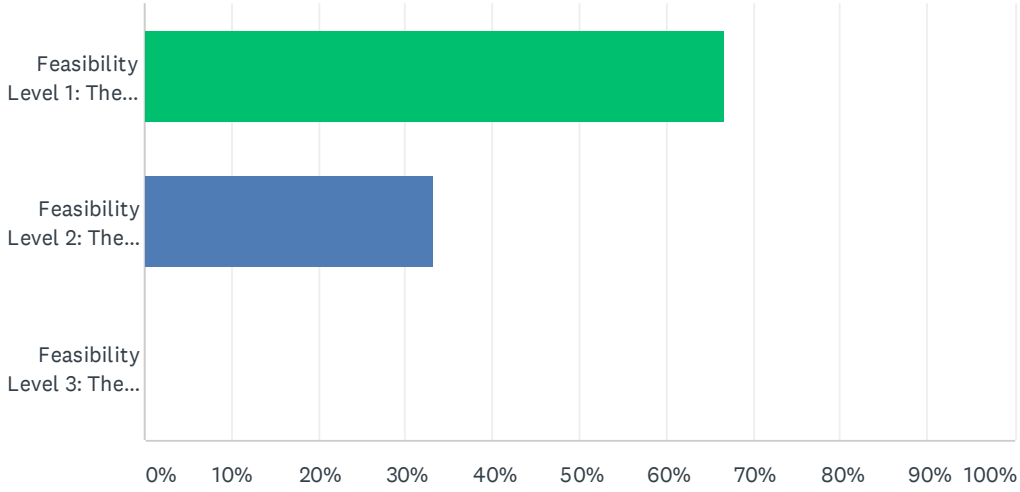
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	83.33%	5
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	0.00%	0
TOTAL		6

Q31 Rate the feasibility of implantation of Project 5

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	66.67%	4
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	33.33%	2
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

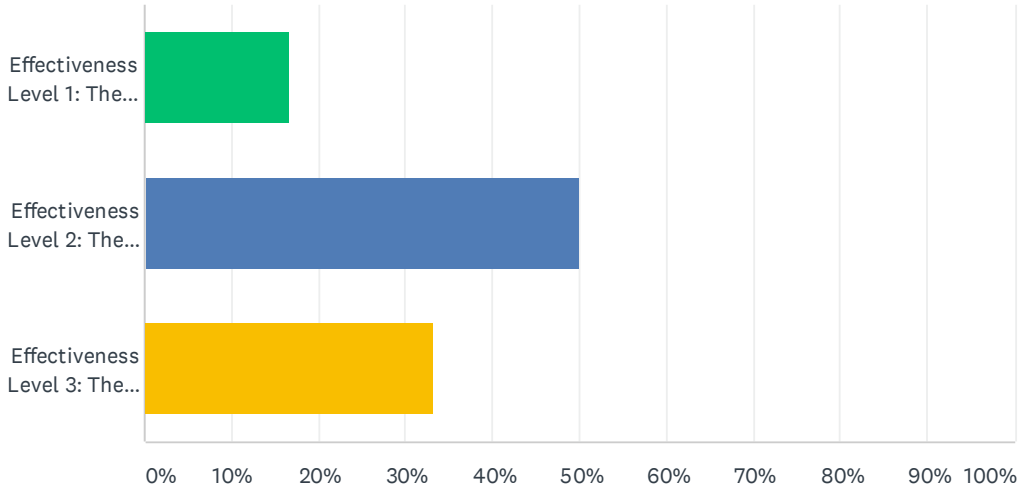
Q32 Do you have any additional comments or thoughts on Project 5?

Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

Q33 Rate the anticipated effectiveness of Project 6

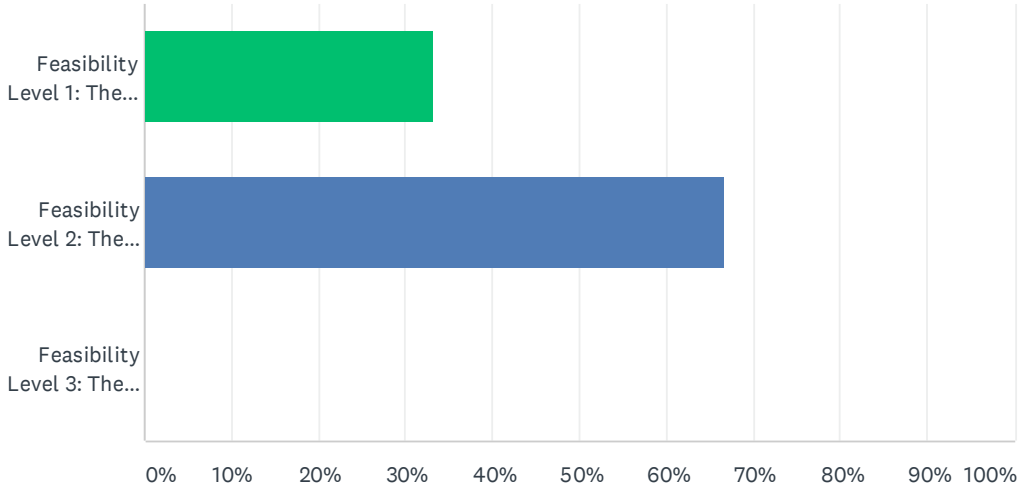
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	50.00%	3
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
TOTAL		6

Q34 Rate the feasibility of implementation of Project 6

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	33.33%	2
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	66.67%	4
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

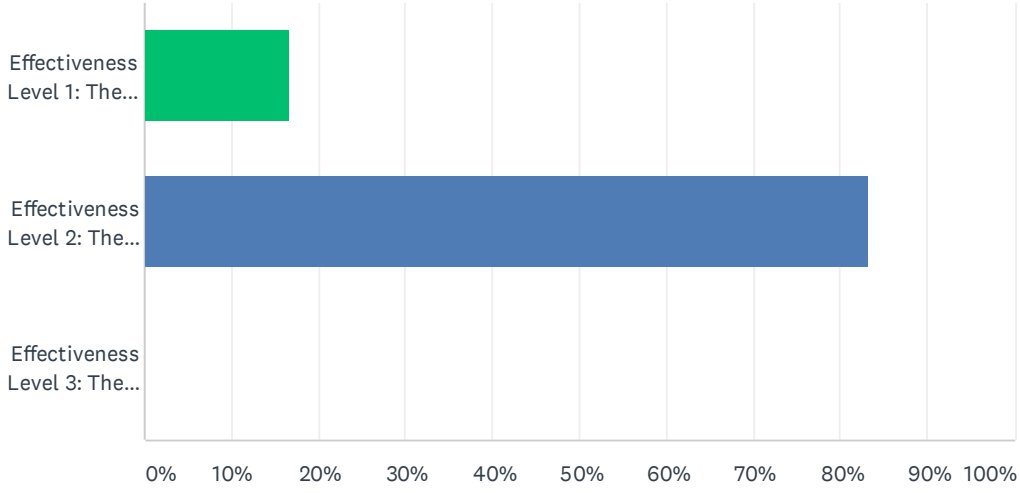
Q35 Do you have any additional comments or thoughts on Project 6?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	Since Herron Park is heavily visited, significant changes to the landscape/acess may be hard for some community members to stomach. The efforts certainly seem worthwhile, but should be planned carefully. Additionally, if this team is not already aware, there are fishing easements that are held by Pitkin County for significant portions of the river and these may inhibit the plan to limit public acess to the river in some locations. For this project and any others that plan to limit acess, this could be something to consider (I'm not totally aware of all of the details on this). Apologies if I'm just repeating something you're already aware of.	5/10/2021 9:49 PM

Q36 Rate the anticipated effectiveness of Project 7

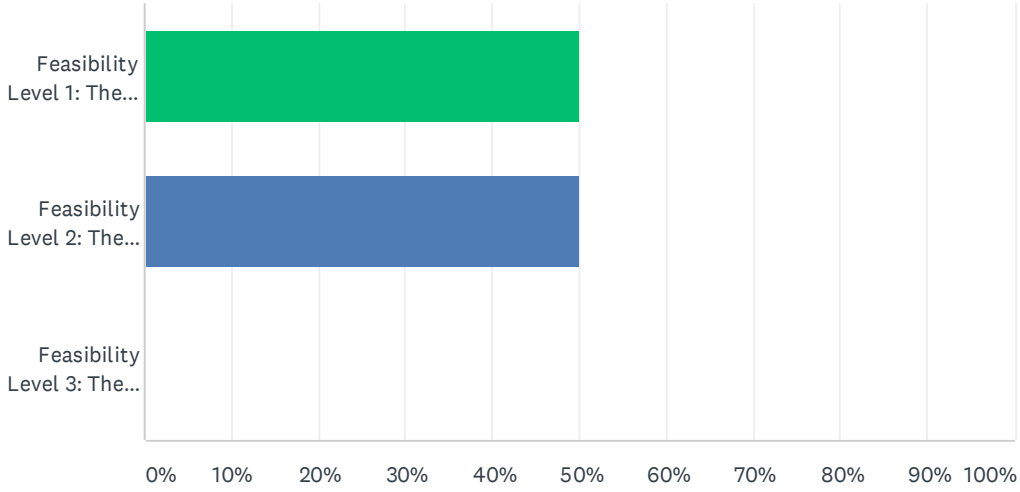
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	83.33%	5
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	0.00%	0
TOTAL		6

Q37 Rate the feasibility of implementation of Project 7

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	50.00%	3
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	50.00%	3
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

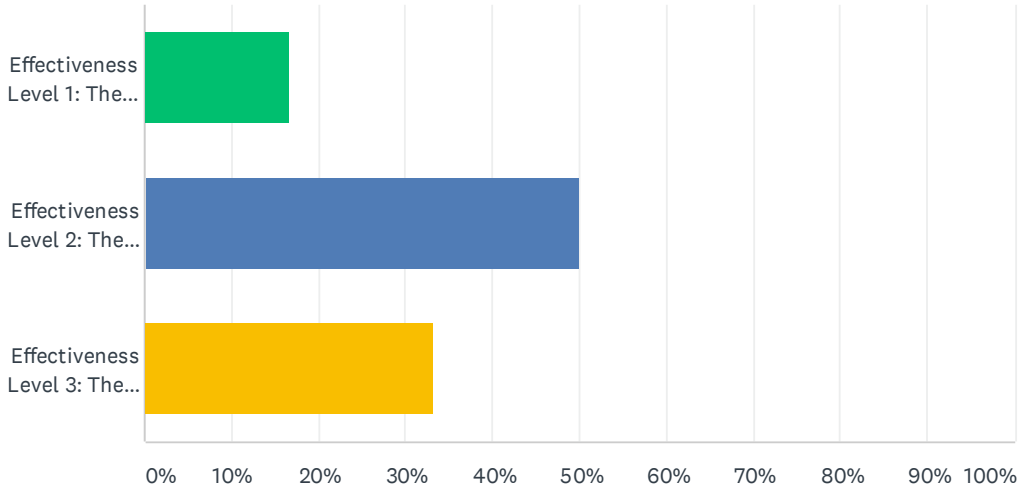
Q38 Do you have any additional comments or thoughts on Project 7?

Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

Q39 Rate the anticipated effectiveness of Project 8

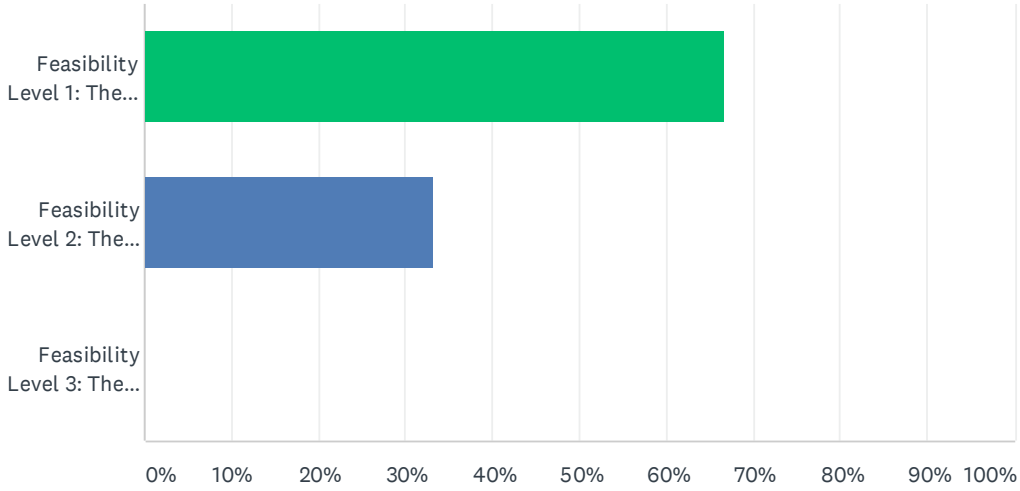
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	50.00%	3
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
TOTAL		6

Q40 Rate the feasibility of implementation of Project 8

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	66.67%	4
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	33.33%	2
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

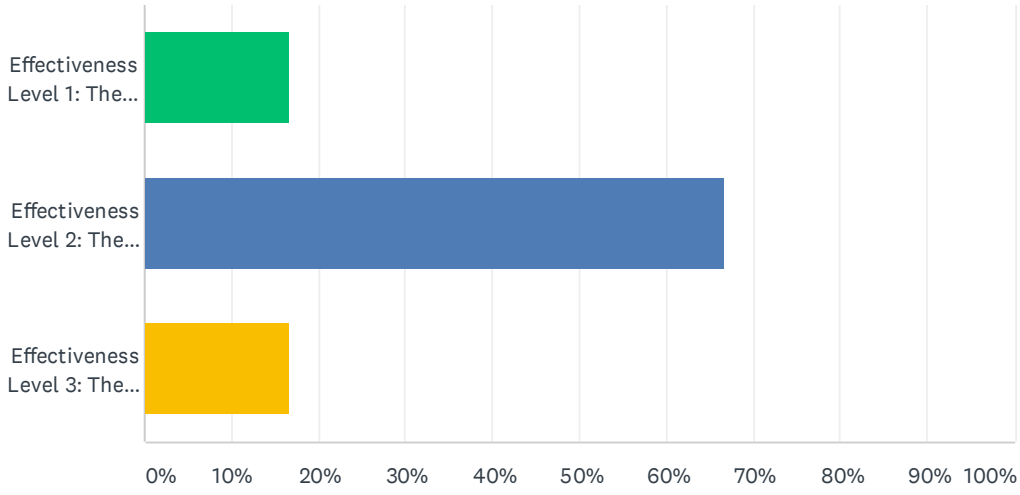
Q41 Do you have any additional comments or thoughts on Project 8?

Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

Q42 Rate the anticipated effectiveness of Project 9

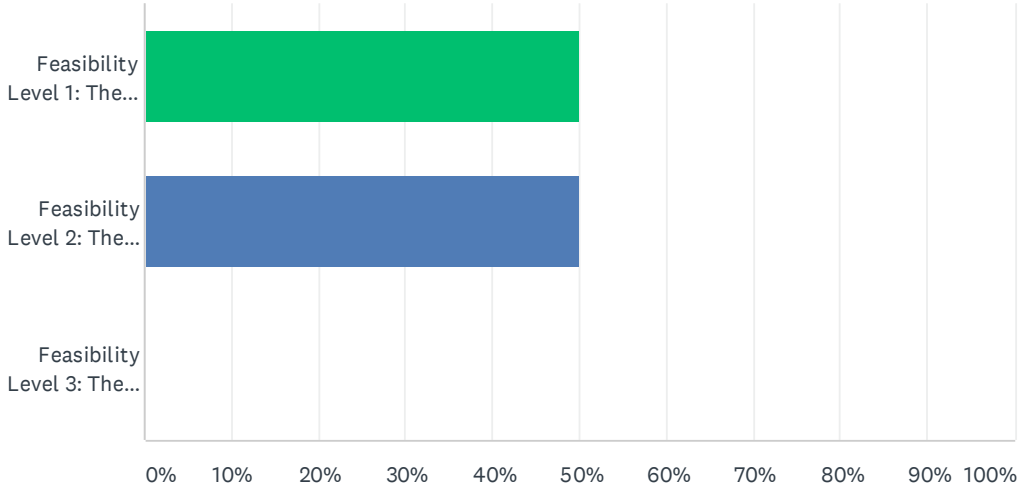
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	66.67%	4
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
TOTAL		6

Q43 Rate the feasibility of implementation of Project 9

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	50.00%	3
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	50.00%	3
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	0.00%	0
TOTAL		6

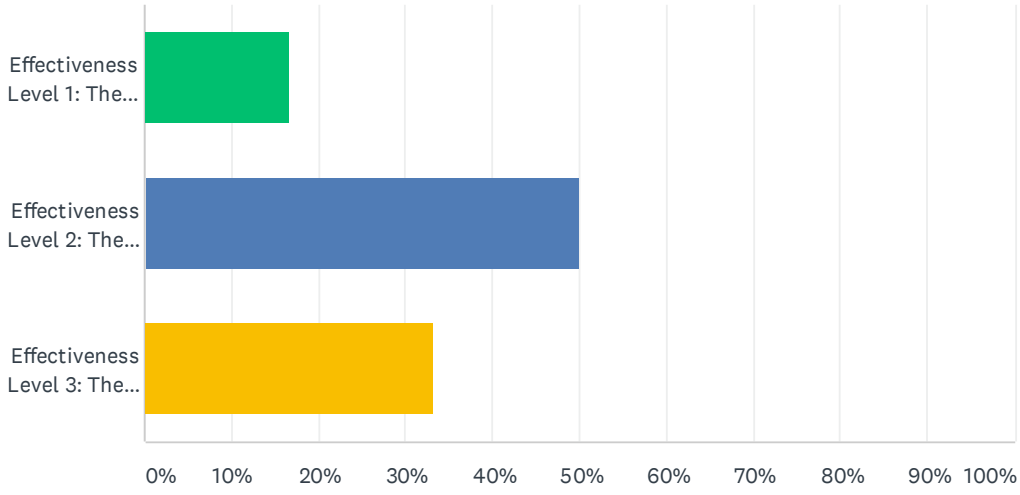
Q44 Do you have any additional comments or thoughts on Project 9?

Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

Q45 Rate the anticipated effectiveness of Project 10

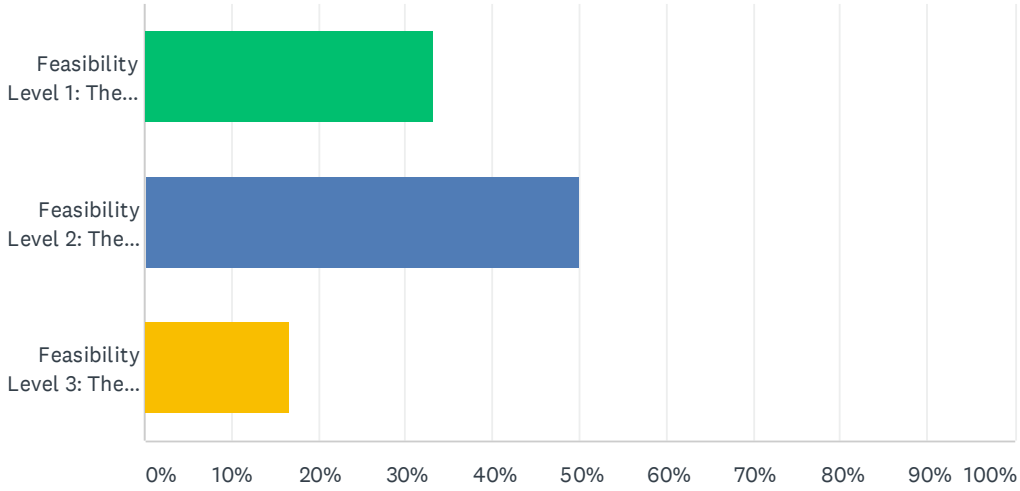
Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.	16.67%	1
Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.	50.00%	3
Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.	33.33%	2
TOTAL		6

Q46 Rate the feasibility of of implementation of Project 10

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.	33.33%	2
Feasibility Level 2: These actions will be moderately difficult to implement given the presence of some local social, land ownership, political, financial, or legal constraints.	50.00%	3
Feasibility Level 3: These actions will be difficult to implement given significant local social, land ownership, political, financial, or legal constraints.	16.67%	1
TOTAL		6

Q47 Do you have any additional comments or thoughts on Project 10?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	If you find an effective and feasible long term cattail management strategy please let me know.	5/11/2021 12:54 PM

Q48 Are there any additional project recommendations that you have?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	Currently there are a number of constructed wetlands around the city for stormwater filtration (Jenny Adair, John Denver, and Mill Street off the top of my head). All of these wetlands have management plans for how the filtered pollutants will be addressed in the future. Runoff from the West End goes into the back wetlands of Hallam Lake (this is Adam from ACES). Without some periodic mitigation and management eventually these wetlands will stop effectively filtering pollutants and change from a sink to a source of pollutants to the Roaring Fork. ACES would be interested in some sort of collaborative plan/project to manage these.	5/11/2021 12:54 PM

RAAP Meeting 2 notes: 5/12/2021

Project 1 – highest priority (lowest score) – public private partnerships:

City reaches out to develop relationship with private property owner to work on improving the riparian area in that area – everyone agrees that this is the meaning

Project 5 – Newberry park

No feedback

Project 4 – john Denver improvements, kayak channel and armored bank

Relatively high feasibility, mixed effectiveness

Project 7 – garish park

No feedback

Program 2 – incentivize restoration

Finding incentives that actually matter

Matt – clients do ask about offsetting fees (remp), from the beginning of the projects, size is important, other programs that get a similar effect – aspen modern program, more leeway but within a set of rules

Stephen – could be applied to properties not on the river, buy into a program at the time of redevelopment

Seth – how are these areas monitored to ensure they aren't gotten rid of in the future/new owner/new landscaper, etc.? Do landscaper companies help educate the owners if they want to mow down riparian areas?

April – landscapers will do what the payer wants, we see this happen, we want to be cautious to not create administrative work for ourselves, it'd be a onetime fee that would be used/saved for improvements on city property

Matt – salesforce could flag the property that shows this "program" is associated with this property so that if a permit is pulled again the flag pops up to inform city of this… the education needs to start with the LA and the City, not the landscaper necessarily, up to the individuals guiding the redevelopers to make choices that protect the riparian areas

Liza – sounds like conservation easement work, could be a way to handle the admin side, if this is a one time buy in, we won't get the long term benefits which is what should be included in the goal of the program

Allie – this may become a 2-pronged recommendation

Adam – taking money and doing projects on city land is simpler, this is one of the few options that could impact private land, even if there is more admin work, could we use this to get good

work on the private land, otherwise city parcels will have great work and be surrounded by degraded land

Project 8 – Anderson park

Seth – I'd love to hear about the effectiveness is low and why others think it is lower:

Adam – the project ends up being an island surrounded by development so it wouldn't have broader impacts, limited in scope

April – (Q) How effective can you be in riparian restoration if you can only touch one side of the river?

Stephen – it is absolutely productive to even impact one side of the river. It might change how you score the project in terms of productivity but it is still important, from wildlife and WQ POV it may be more important to restore a property like this but from a capital budget side, there may be cultural reasons to not score it so high

Seth – useful to think about riparian area downstream and upstream from parcel, not just across the river, at least as important to think about up and downstream.

Project 9 – aspen club

Allie – (Q) why are feasibility results so split?

Stephen – opportunity on this project with the redevelopment of aspen club proper (insider scoop)

Mike – immediately adjacent to Ute cemetery/park, however across the river is lawn/turf, another example,

Seth – recognizing that as things redevelopment the trend is that there is more encroachment not less encroachment. Greatest impact would be policy and program that focus on development and how it impacts the river. Degrading one side as you restore the other side, its better to prevent the degrading from the beginning

April – helpful to explain in terms of effort and money expended by the city to balance/not even make gains for the health of the river if we continue to let development encroach on the river

Seth – shifting the burden of the impact from the developer to the city, is the city okay with that?

Allie – we will prioritize and rank these, but we will need action in all three categories, the report will need to explain this

Policy 1 – institutionalize WQ protection

Adam – I could see this as a way to provide education, helps the conversation with clients,

Seth – initial thinking: need to explicitly say that riparian area protect helps with WQ and may lead to different outcomes, helps to focus the intent of the code (not for aesthetics, its for WQ) ingrain this philosophy in the code,

April – stream margin setback – built around a view plain from the river not on health of the river, we intend to use this to say that this area shouldn't' be developed to help the river not just for views

Seamus – making the code more explicitly prioritize WQ should be easy, the next step of changing the standards would be more complex, comment from Comdev – supportive to getting wq in the code but it'd take significant work to update the code

Project 6 – Herron Park

Allie – eliminating social access trails to the river – we need to be cautious of how we present this, we mean subtly showing public how to access the river not preventing it entirely,

Liza – spot on, this question isn't going anywhere, how do we manage public access to the river… conservation easement, rivers are more popular so we need to discuss this in more depth,

Allie – how do we plan for the increased recreational use; how do we design for this…

Policy 2 – strengthen riparian buffer protections – mix of responses

Seamus – presenting this to council: if council can stomach this impact on development rights politically then great the code can be easily updated but is there political will?

Adam – requires political capital and would limit the number of parcels this would impact

April – I see this as restrictions to redevelopment, to restore riparian area as necessary, this would be the biggest way to impact private property riparian area, I don't see this as takings while that will be the opposition, but we would allow the development with these protections in place, regulation + policy +partnership

Adam – (Q) how does this differ from the WQ code policy?

April – this is the standard is the "how we achieve the goal" of the code being updated to clearly state WQ is the goal

Program 3 – FIL

April – how I envision a FIL program working: there are properties the redevelop in the riparian area that have to remove + restore a non-compliant structure, relying on restoration, in there with equipment, balance – do we want them to remove a structure or have more flexibility – what would be better….. different than incentive – that can be bought into any time, FIL would be at redevelopment when you are required to come into compliance with code

Adam – (Q) how much discretion from code is staff given? Does it need to be explicitly spelled out?

April – it'd need to be explained and spelled out

Adam – one concern, the unintended consequences, how much is the fee how does it change with time, will everyone want to do this?

Seamus – keep in mind when moving forward – administrative side, staff time and effort, at some point everything will be developed and the $ will stop coming in.

PJ – would each redevelopment require them to buy into FIL or is it a one-time thing? What if they want to pull out the structure but we'd rather them pay the FIL; do we get to override based on protection of the riparian area?

Project – jenny Adair

Adam – biased, this parcel does a lot of work so the effectiveness may be underestimated, water gets hot, there is a lot of opportunity to improve the parcel that is doing a lot of work for the river.

Project 10 – john Denver vegetation management

No feedback

Program 1 – education for private property owners

No feedback

Project 2 – Mill parcel - lowest priority (highest score)

Additional recommendations:

1. Yosemite falls – aces doesn't have an O&M plan for their pond to remove sediments, they'd be open to partnering on this

Liza – would like to retake the survey, maybe they help us rank them within the subgroup categories, i.e. public private partnerships is a big umbrella, many of these fall under that category.

Adam – put the stormwater projects up higher on the list

Liza – opposite of Adam, protect first rather than try to restore

TEAM WRAP UP:

1. The whole suite of things needs to progress together
2. Explain benefits and tradeoffs in the report
    a. Nature of the benefits are different to riparian area than WQ
    b. Acute vs long-term issues
3. These should be presented in their subcategories, they aren't mutually exclusive
4. Organization of the chapter: the outreach approach and what the feedback was
5. 2 ways to organize the recommendations:
    a. Here are your top three, don't do the others
    b. Here is a matrix for decisions – not trying to get to top 5 that matter and others don't matter, ideally, we'd do all of these, the order is up to you based on this information
6. If City has any specific verbiage to include, let them know:
    a. There are acute geographic locations and issues to address but it is imperative to protect existing because restoration takes so much effort and time and money

Schedule:

Early July presentation to Council

- Draft will be finished by the end of May based on budget
- City will review early/mid-June
- Seth is gone: 7/10-7/end of month ish
- April will schedule a work session early July or early August with Council

2021

RIPARIAN AREA ASSESSMENT AND PLAN

CITY OF ASPEN

CONTENTS

SURVEY PROCESS

3 TIER PROCESS

ANTICIPATED EFFECTIVENESS

- Effectiveness Level 1: These actions likely have a significant and widespread effect on the integrity of riparian areas through the City of Aspen.
- Effectiveness Level 2: These actions likely have a strong or localized effect on the integrity of riparian areas through the City of Aspen.
- Effectiveness Level 3: These actions likely have a moderate or spatially limited effect on the integrity of riparian areas through the City of Aspen.

FEASIBILITY OF IMPLEMENTATION

- Feasibility Level 1: These actions can be implemented relatively easily as they present few constraints and/or are likely to meet little to no resistance within the community.
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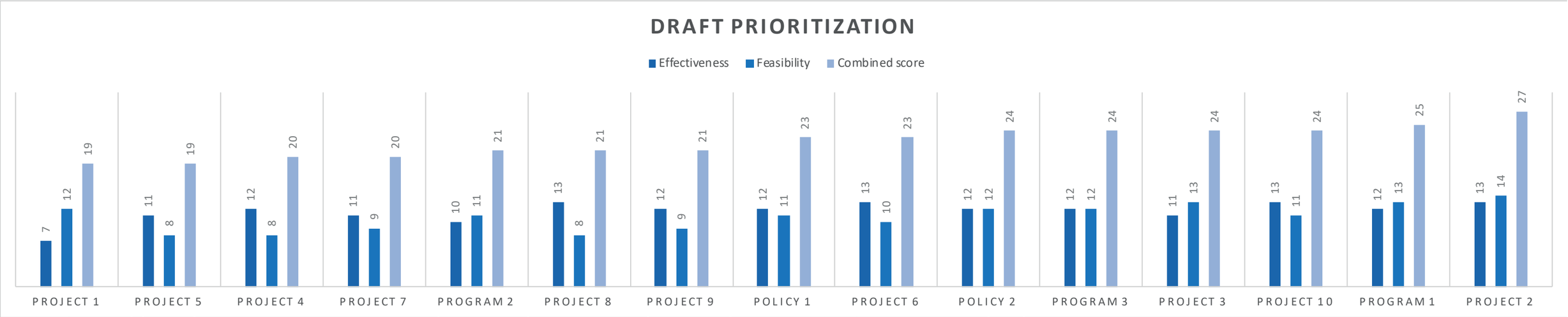


PROJECT 1: Public and private restoration partnerships; in order to create a larger and more robust riparian buffer and connect high value habitat and ecosystem services, the City should consider targeted property easements and partnerships that further the goal of connectivity of the riparian area through Aspen.

PROJECT 5: Newberry Park Enhancement

PROJECT 4: John Denver Park - Kayak Channel and Armored Bank Restoration

PROJECT 7: Garrish Park Restoration and Mine Drainage

PROGRAM 2: Incentivize restoration, enhancement, or mitigation opportunities.

PROJECT 8: Anderson Park and Land Trust Parcel

PROJECT 9: Aspen Club Hydrologic Enhancements

POLICY 1: More-explicitly institutionalize water quality projection as a goal/objective in city code segments pertaining to riparian lands uses and protections.

PROJECT 6: Herron Park Enhancement

POLICY 2: Strengthen riparian buffer protections on existing undeveloped locations with functional condition vegetation

PROGRAM 3: Fee – In – Lieu. At sites where improvements still remain practically infeasible due to topography, parcel size, etc., provide opportunities for in-basin mitigation via fee-in-lieu or other mechanisms to support off-site work that still provides water quality benefits directly to the Roaring Fork River system.

PROJECT 3: Jenny Adair - Stormwater Control Facility

PROJECT 10: John Denver Park - Vegetation Management & Cattail Control

PROGRAM 1: Educating property owners on how to maintain naturalized riparian buffers. Highlight importance of a zoned approach to landscaping and structure development near riparian areas.

PROJECT 2: Mill Parcel Restoration

QUESTIONS FOR STAKEHOLDERS

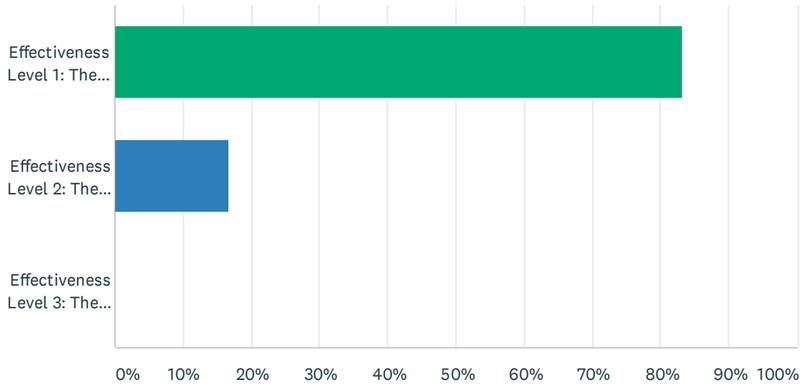
PROJECTS - REPORT PAGE NUMBER: 40

PROJECT 1:

Public and Private Restoration Partnerships

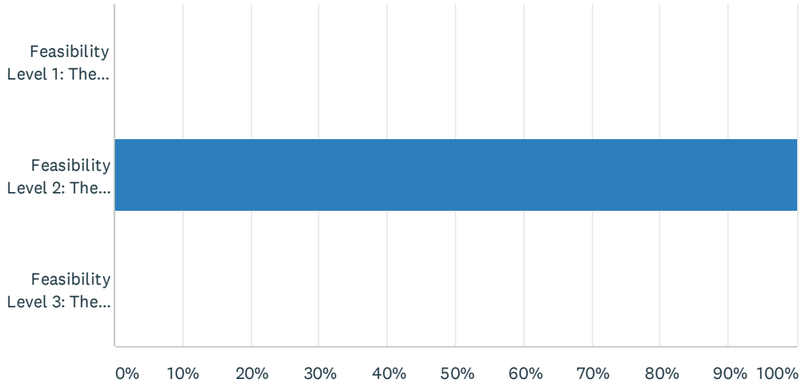
Q18 Rate the anticipated effectiveness of Project 1

Answered: 6 Skipped: 0



Q19 Rate the feasibility of implementation of Project 1

Answered: 6 Skipped: 0



Q20 Do you have any additional comments or thoughts on Project 1?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	I think this makes a ton of sense, much of the degraded land along the RF is private so public private partnerships to address that are necessary.	5/11/2021 12:54 PM

QUESTIONS FOR STAKEHOLDERS

PROJECTS - REPORT PAGE NUMBER: 44

PROJECT 5: Newberry Park

OBJECTIVES:

Remove old bridge pier from streambed to support natural sediment transport dynamics and promote healthy channel function.

Increase vegetation diversity though targeted vegetation management.

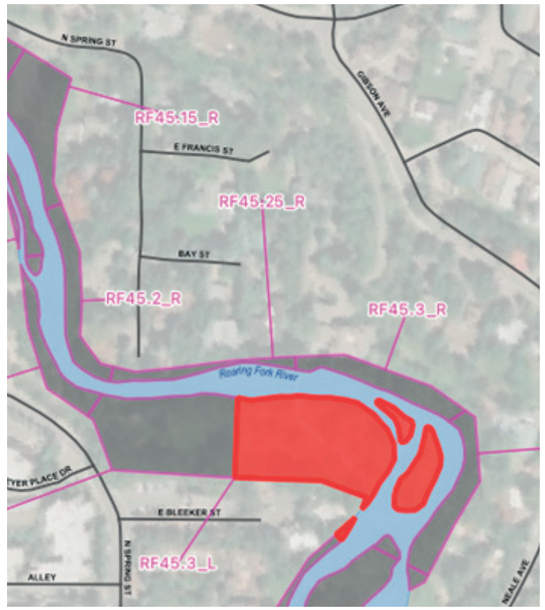
Tie natural hydrology into bank to extend the riparian corridor.

BENEFITS:

- Improved channel function
- More desirable aesthetics
- Greening infrastructure
- Increased vegetation diversity

ASSESSMENT RATING:

- OVERALL: C+
- LANDSCAPE: D
- CONDITION: C+
- SIZE: A+



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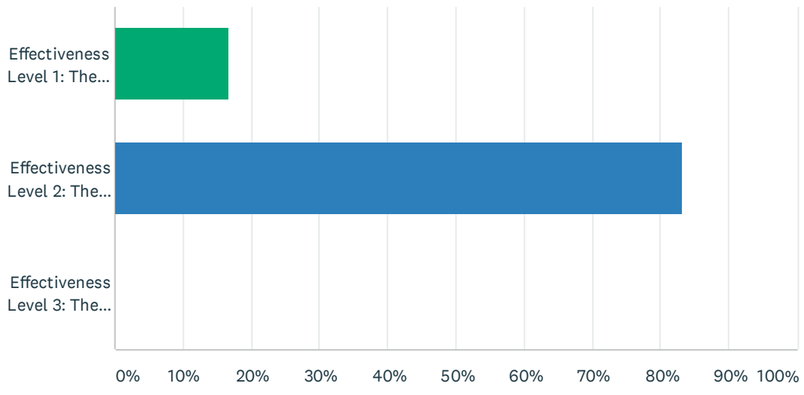
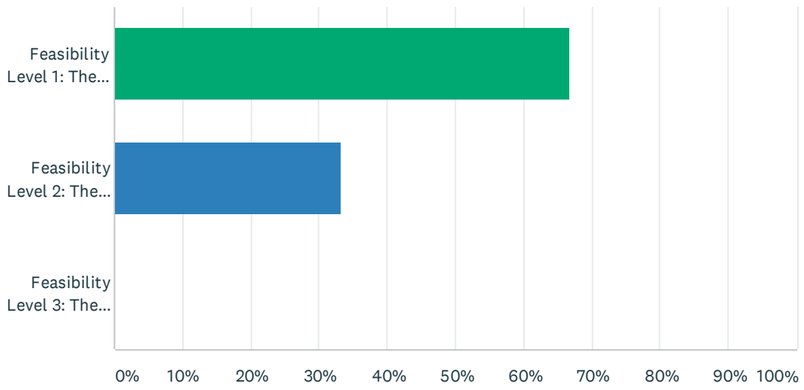
Q30 Rate the anticipated effectiveness of Project 5

Answered: 6 Skipped: 0



Q31 Rate the feasibility of implantation of Project 5

Answered: 6 Skipped: 0



Q32 Do you have any additional comments or thoughts on Project 5?

Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

QUESTIONS FOR STAKEHOLDERS

PROJECTS - REPORT PAGE NUMBER: 43

PROJECT 4: John Denver Park - Kayak Channel and Armored Bank

OBJECTIVES:

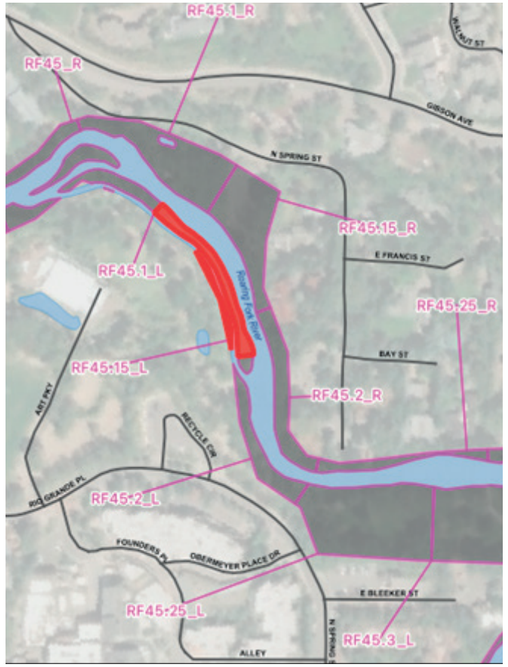
To improve natural channel processes and encourage establishment of streamside vegetation.

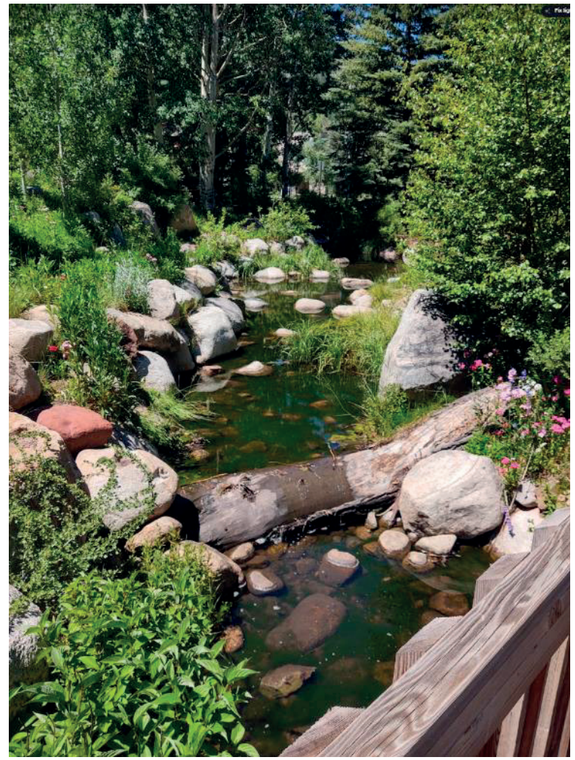
BENEFITS:

- Temperature improvements
- Riparian and wetland function
- Habitat creation
- Recreation opportunities
- More desirable aesthetics
- Greening infrastructure

ASSESSMENT RATING:

- OVERALL: C-
- LANDSCAPE: D
- CONDITION: C+
- SIZE: C-





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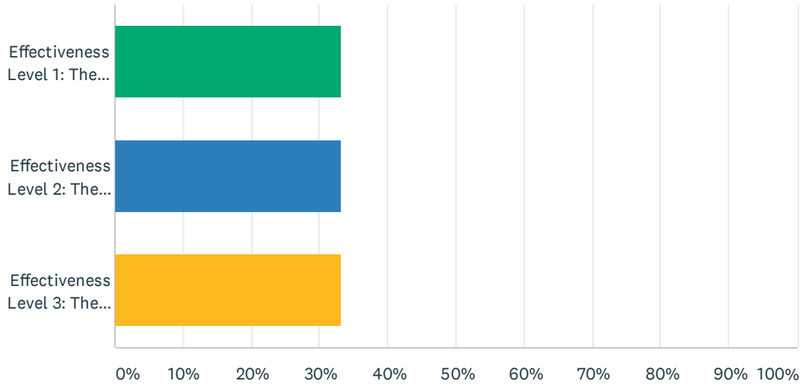
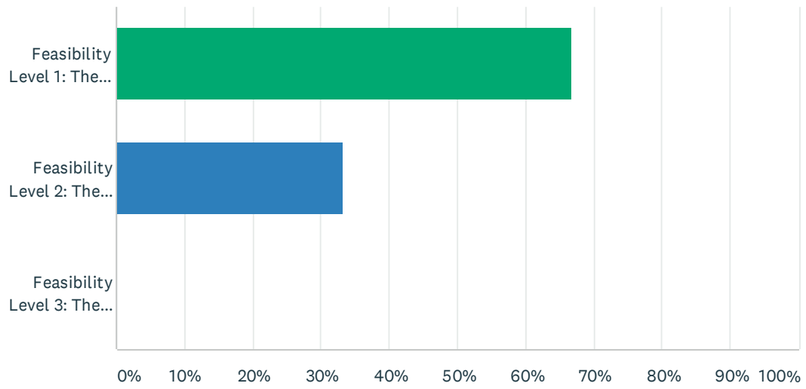
Q27 Rate the anticipated effectiveness of Project 4

Answered: 6 Skipped: 0



Q28 Rate the feasibility of implementation of Project 4

Answered: 6 Skipped: 0



Q29 Do you have any additional comments or thoughts on Project 4?

Answered: 2 Skipped: 4

#	RESPONSES	DATE
1	Seems like a project with a lot of direct benefits that could also serve as an educational asset and demonstration project as well.	5/11/2021 4:35 PM
2	Getting some community input on this project could be useful before committing to it. Since it's maybe a more heavily trafficked area than Projects 2 & 3, there may be some stronger communtiy feelings around what should or shouldn't happen here.	5/10/2021 9:49 PM

QUESTIONS FOR STAKEHOLDERS

PROJECTS - REPORT PAGE NUMBER: 46

PROJECT 7: Garrish Park - Park Restoration and Mine Drainage

OBJECTIVES:

To improve water quality in mine drainage before it enters the Roaring Fork River

To implement riparian restoration and management strategies that conform to the principles of the "3-Zone Buffer System".

Restrict the number and use of social trails.

Install educational and interpretive facilities targeted at daily users and adjacent property owners.

Increase floodplain connectivity and riparian habitat.

BENEFITS:

- Water temperature improvements
- Streambank soil de-compaction.
- Improved channel function
- More desirable aesthetics
- Greening infrastructure

ASSESSMENT RATING:

- OVERALL: C+
- LANDSCAPE: C-
- CONDITION: B-
- SIZE: B+

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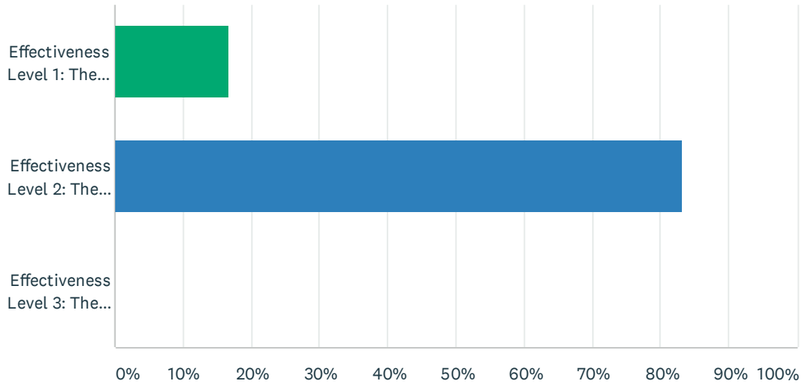
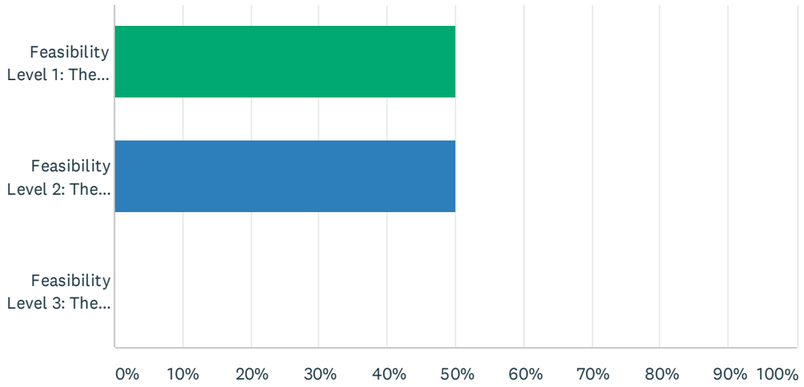
Q36 Rate the anticipated effectiveness of Project 7

Answered: 6 Skipped: 0



Q37 Rate the feasibility of implementation of Project 7

Answered: 6 Skipped: 0



Q38 Do you have any additional comments or thoughts on Project 7?

Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

QUESTIONS FOR STAKEHOLDERS

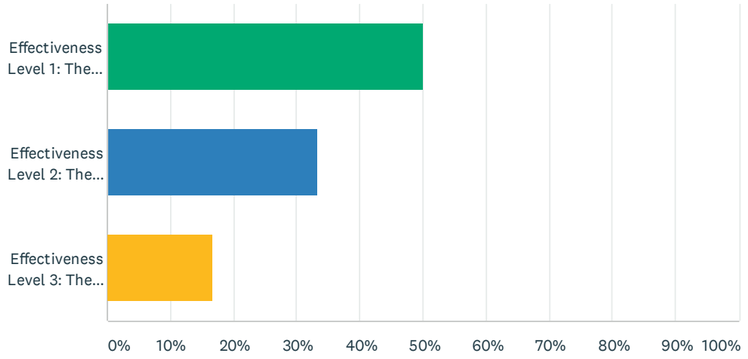
PROGRAMS - REPORT PAGE NUMBER: 39

RECOMMENDATION 2:

Incentivize restoration, enhancement, or mitigation opportunities.

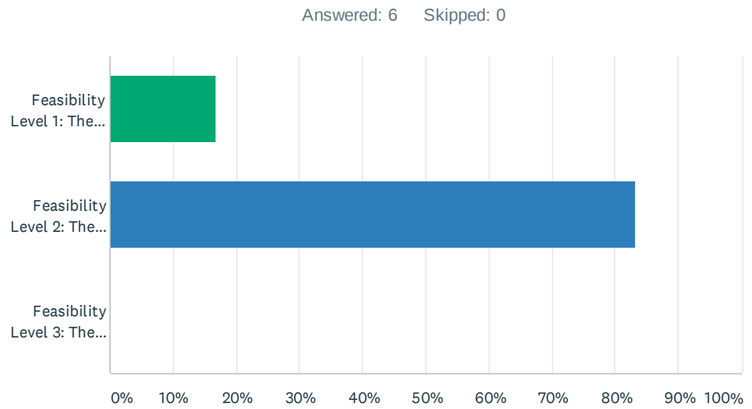
Q11 Rate the anticipated effectiveness of Program 2

Answered: 6 Skipped: 0



Q12 Rate the feasibility of implementation of Program 2

Answered: 6 Skipped: 0



Q13 Do you have any additional comments or thoughts on Program 2?

Answered: 5 Skipped: 1

#	RESPONSES	DATE
1	I really like this idea...	5/11/2021 4:31 PM
2	I think some sort of incentive structure has a lot of potential. The challenge is going to be finding incentives that actually matter those that will be redeveloping parcels along the Roaring Fork. Most of these individuals are relatively price insensitive to the scale of financial incentives the city would be able to provide. I think the key to success here will be thinking creatively about incentives that can be offered during development that will be attractive enough for homeowners to take mitigation steps they wouldn't otherwise do.	5/11/2021 12:43 PM
3	I would guess that money and social pressure can be more effective incentives than mere education in Aspen.	5/11/2021 8:07 AM
4	This program would be laudable, but as referenced in the text of the rationale, the ability to make changes on these degraded lands is difficult and very expensive. Thus, I'm not sure of how effective the program would be. Furthermore, the text of the recommendation makes it sound optional for property owners during redevelopment - is that the case? If this would be optional, then it could be difficult to garner a high level of participation. If it is not optional, then this program would have to be considered further with Community Development.	5/10/2021 9:48 PM
5	People want more FAR. incentivizing bigger houses for robust riparian zones may work.	5/10/2021 9:33 AM

QUESTIONS FOR STAKEHOLDERS

PROJECTS - REPORT PAGE NUMBER: 47

PROJECT 8: Anderson Park & Land Trust Parcel

OBJECTIVES:

To implement a riparian enhancement strategy targeted at:

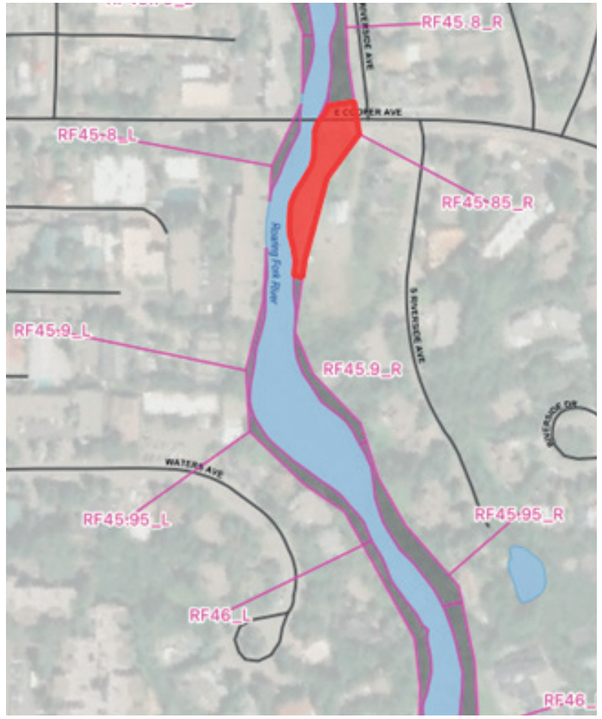
- Native woody riparian area age diversity
- Native woody riparian species diversity
- Improved habitat in narrow band

BENEFITS:

- Water temperature improvements
- Streambank soil de-compaction.
- Improved channel function
- More desirable aesthetics
- Greening infrastructure
-

ASSESSMENT RATING:

- OVERALL: C+
- LANDSCAPE: D
- CONDITION: C+
- SIZE: A-



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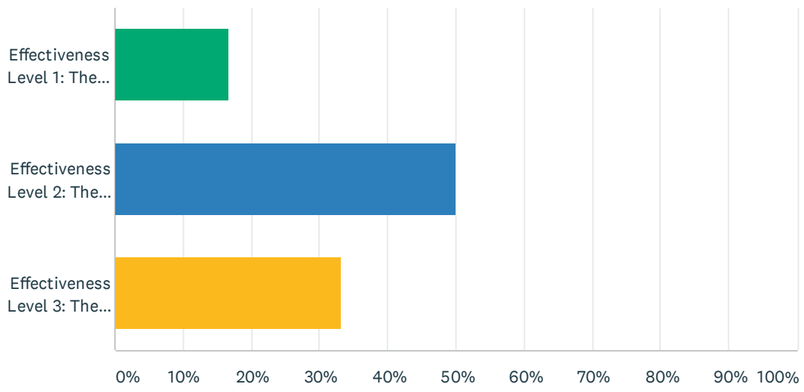
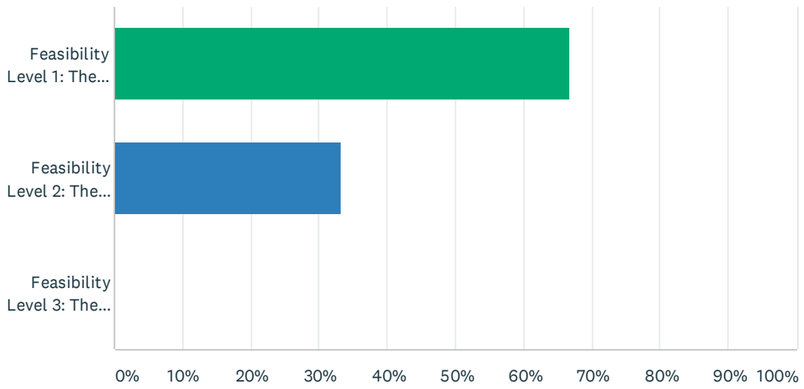
Q39 Rate the anticipated effectiveness of Project 8

Answered: 6 Skipped: 0



Q40 Rate the feasibility of implementation of Project 8

Answered: 6 Skipped: 0



Q41 Do you have any additional comments or thoughts on Project 8?

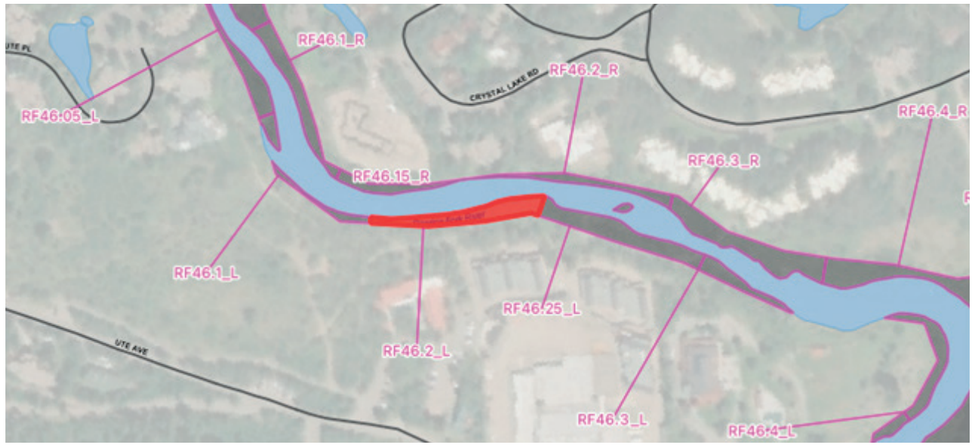
Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

QUESTIONS FOR STAKEHOLDERS

PROJECTS - REPORT PAGE NUMBER: 48

PROJECT 9: Aspen Club



OBJECTIVES:

To create a side channel on the left bank to increase diversity of river morphology.

Narrow artificially large channel to reconnect floodplain and encourage overbank flow onto riparian benches.

Create a private/public partnership opportunity.

Improve wheeler ditch diversion to promote/enhance vegetation of a mid-channel bar.

BENEFITS:

- Improved channel function
- Water quality improvement
- Water temperature improvement
- Habitat connectivity
- Wetland creation
- Improved aesthetics
- Greening infrastructure
- Partnership opportunity

ASSESSMENT RATING:

- OVERALL: C+
- LANDSCAPE: C+
- CONDITION: C+
- SIZE: B+

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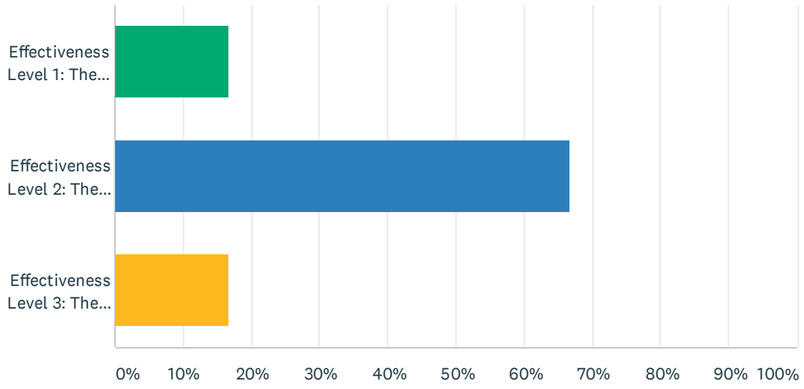
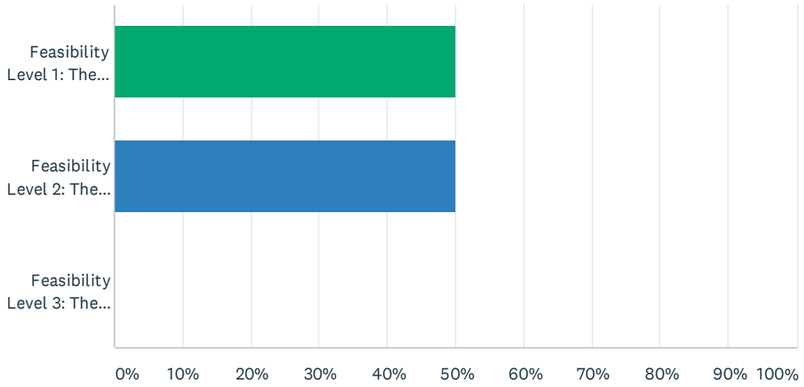
Q42 Rate the anticipated effectiveness of Project 9

Answered: 6 Skipped: 0



Q43 Rate the feasibility of implementation of Project 9

Answered: 6 Skipped: 0



Q44 Do you have any additional comments or thoughts on Project 9?

Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

QUESTIONS FOR STAKEHOLDERS

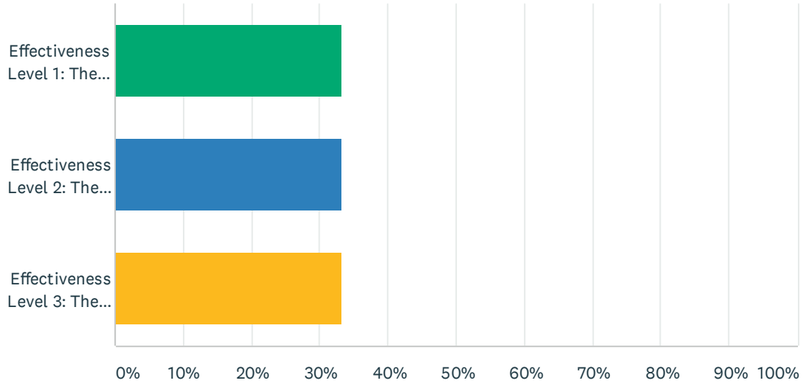
POLICY - REPORT PAGE NUMBER: 38

RECOMMENDATION 1:

More-explicitly institutionalize water quality projection as a goal/objective in city code segments pertaining to riparian lands uses and protections.

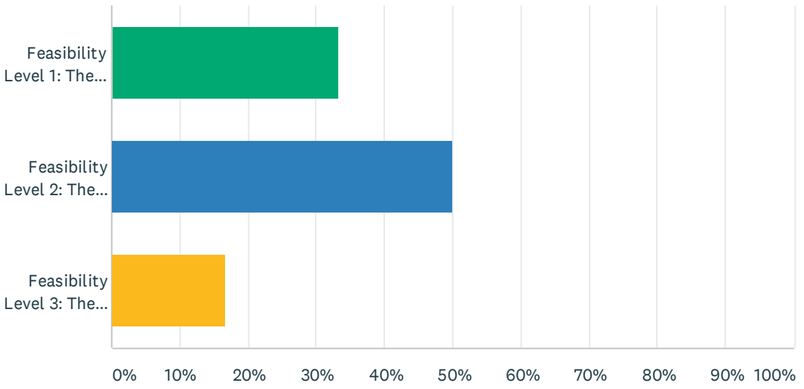
Q1 Rate the anticipated effectiveness of Policy 1

Answered: 6 Skipped: 0



Q2 Rate the feasibility of implementation of Policy 1.

Answered: 6 Skipped: 0



Q3 Do you have any additional comments or thoughts on Policy 1?

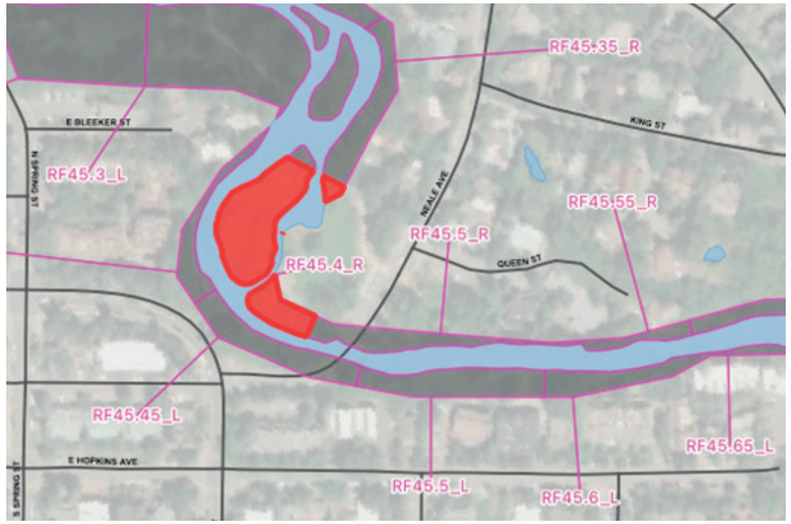
Answered: 5 Skipped: 1

#	RESPONSES	DATE
1	This would probably require a significant amount of public education/outreach.	5/11/2021 4:26 PM
2	I'm assuming that this is supposed to read "water quality protection" not "water quality projection"? In terms of effectiveness it seems that to some degree the development ship has sailed within the riparian in the City of Aspen, but if we think in terms of redevelopment projects I think there is potential benefits to more explicitly including water quality as a goal. I think the effects would be relatively localized because my understanding is they wouldn't come into effect unless significant redevelopment is proposed on a parcel.	5/11/2021 12:33 PM
3	Despite my rating of low effectiveness and difficult feasibility, I still think there is some value in codifying the goal and laying expectations for the future.	5/11/2021 8:02 AM

QUESTIONS FOR STAKEHOLDERS

PROJECTS - REPORT PAGE NUMBER: 45

PROJECT 6: Herron Park



OBJECTIVES:

To implement riparian restoration and management strategies that conform to the principles of the "3-Zone Buffer System".

Restrict the number and use of social trails.

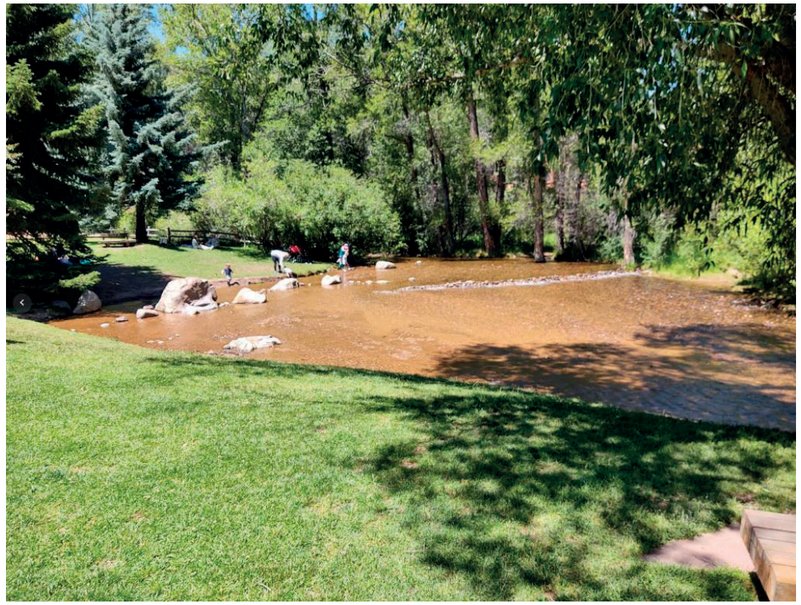
Install educational and interpretive facilities targeted at daily users and adjacent property owners.

BENEFITS:

- Water temperature improvements
- Streambank soil de-compaction.
- Improved channel function
- More desirable aesthetics
- Greening infrastructure

ASSESSMENT RATING:

- OVERALL: B-
- LANDSCAPE: C-
- CONDITION: B-
- SIZE: A+



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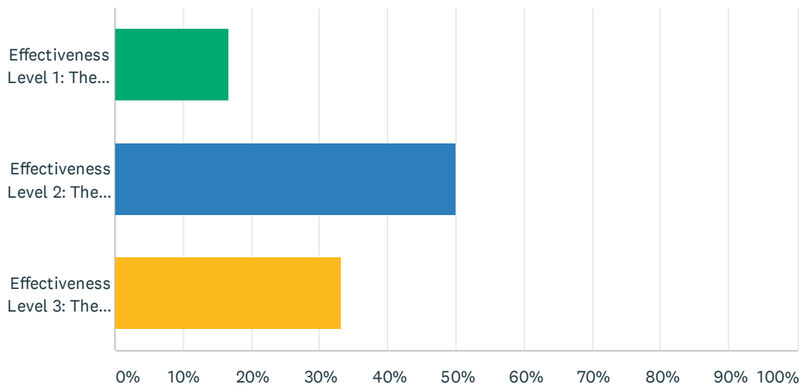
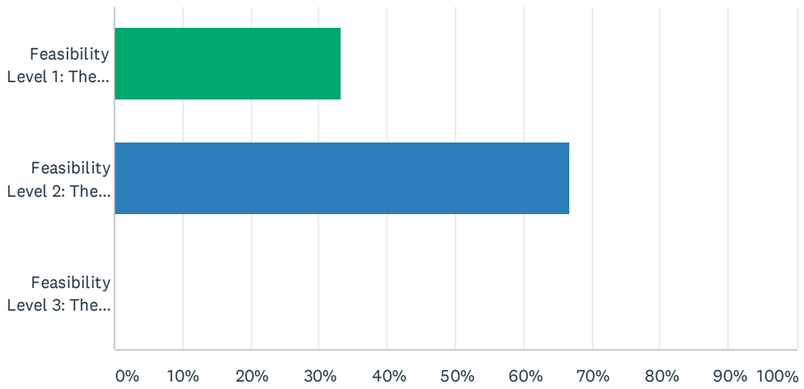
Q33 Rate the anticipated effectiveness of Project 6

Answered: 6 Skipped: 0



Q34 Rate the feasibility of implementation of Project 6

Answered: 6 Skipped: 0



Q35 Do you have any additional comments or thoughts on Project 6?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	Since Herron Park is heavily visited, significant changes to the landscape/acess may be hard for some community members to stomach. The efforts certainly seem worthwhile, but should be planned carefully. Additionally, if this team is not already aware, there are fishing easements that are held by Pitkin County for significant portions of the river and these may inhibit the plan to limit public acess to the river in some locations. For this project and any others that plan to limit acess, this could be something to consider (I'm not totally aware of all of the details on this). Apologies if I'm just repeating something you're already aware of.	5/10/2021 9:49 PM

QUESTIONS FOR STAKEHOLDERS

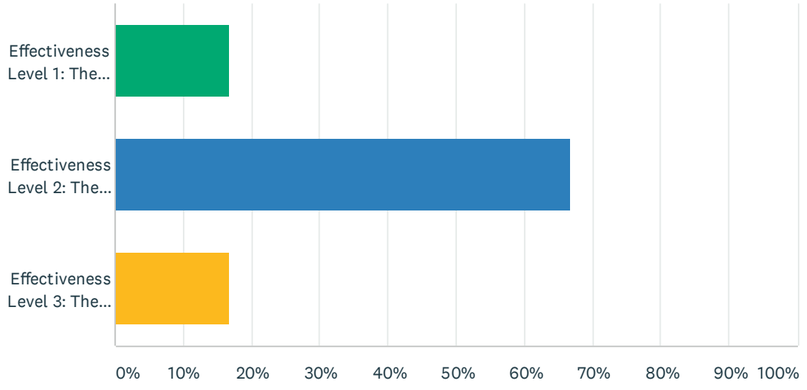
POLICY - REPORT PAGE NUMBER: 38

RECOMMENDATION 2:

Strengthen riparian buffer protections on existing undeveloped locations with high functional condition vegetation.

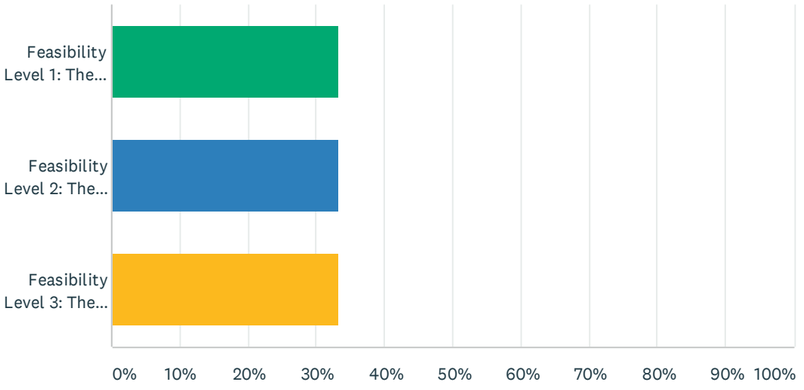
Q4 Rate the anticipated effectiveness of Policy 2

Answered: 6 Skipped: 0



Q5 Rate the feasibility of implementation of Policy 2

Answered: 6 Skipped: 0



Q6 Do you have any additional comments or thoughts on Policy 2?

Answered: 4 Skipped: 2

#	RESPONSES	DATE
1	I think it makes good sense to work towards protecting undeveloped areas- although many areas have already been impacted. Glenwood Springs recently worked to increase riparian protections and had some significant push back, unfortunately (although the measures did ultimately pass).	5/11/2021 4:26 PM
2	I see two major limitations to this policy. First there are a very limited number of parcels within the city limits that aren't currently developed and have development potential (i.e. aren't already owned by the city or county, or in other ways protected, or have terrain that precludes development). Second while city code can direct development within the riparian my understanding (as a total non-lawyer layperson) is that if we were to implement polices that in effect precludes development on the parcel it would constitute a taking and the city would be responsible for the cost of extinguishing that development right. While guided development on these parcels would be better than nothing it would still be development, there would still be; a significant increase in impervious surfaces in the riparian, a lawn which would be fertilized, a driveway and sidewalks that would be salted, and human presence in the riparian cutting off significant wildlife access.	5/11/2021 12:33 PM
3	will face resistance, but string policy should be able to withstand social pressure for development	5/11/2021 8:02 AM
4	From a Community Development perspective, the short answer is that the department would support exploring this policy. However, in reality, this could be difficult to implement. This policy could potentially reduce development rights or alter the development rights of a property depending on its specifics. Reductions in development rights, particularly those that would reduce building size allowances, would anger the community. Furthermore, any changes to the existing development standards may have unintended consequences on other development restrictions/other sections of the LUC and those would need to be carefully considered before pursuing this policy. If there is political support for this policy, then changes to the code to strengthen riparian buffer changes could be explored with the Long Range Planner managing or co-managing the process with someone from Engineering or another relevant department. Per the exact language for this policy, maintaining the existing protections can certianly be done. But strengthening protections would require a significiant process and political support as mentioned above (not an impossible process, but it's worth noting the potential difficulty of the endeavor).	5/10/2021 9:48 PM

QUESTIONS FOR STAKEHOLDERS

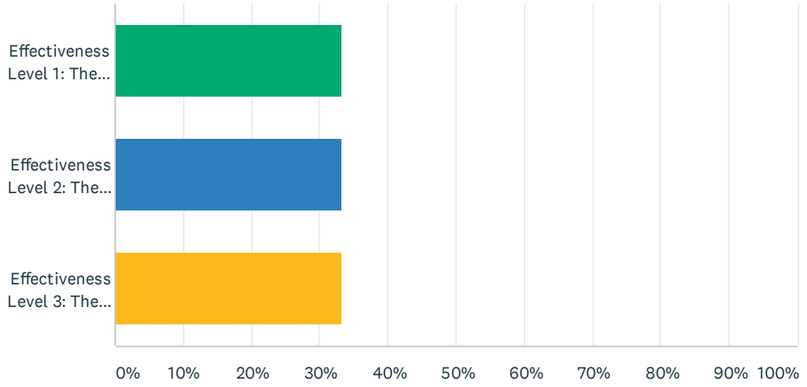
PROGRAMS - REPORT PAGE NUMBER: 39

RECOMMENDATION 3:

Fee – In – Lieu

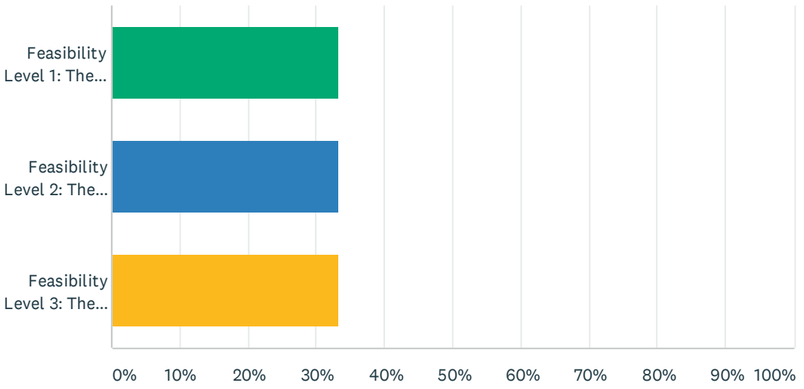
Q14 Rate the anticipated effectiveness of Program 3

Answered: 6 Skipped: 0



Q15 Rate the feasibility of implementation of Program 3

Answered: 6 Skipped: 0



Q16 Do you have any additional comments or thoughts on Program 3?

Answered: 4 Skipped: 2

#	RESPONSES	DATE
1	Seems like it could have potential and follows the precedent set by programs like CORE	5/11/2021 4:31 PM
2	This seems relatively straight forward. It looks like the second paragraph under the Fee-In-Lieu belongs in the previous incentive section.	5/11/2021 12:43 PM
3	This Program, when considered in tandem with Program #2, is slightly confusing. Personally, I've only ever seen a Fee-in-Lieu option applied to required policies (if there are voluntary, sucessful models of this, I'd be happy to learn more). If Program #2 is optional (as I'm reading it to be), and so is the Fee-in-Lieu option of Program #3, then I think participation would be extremely low. It's unlikely that private properties will contributre funds if they don't have to. Overall, I could use some clarification on this Program and Program #2 on my points above as well as some administrative questions. Is this program suggesting that the LUC is the right place to house this program? If so, who would be administering this? How would funds be collected? A lot of process questions come up. Further discussion with Community Development would be needed if this does involve the LUC in any way.	5/10/2021 9:48 PM
4	People with riverfront property in aspen have the financial means to pay a fee in lieu. They want to do the right thing but not in their back yard. I think a fee in lieu with projects elsewhere in the watershed will be effective.	5/10/2021 9:33 AM

QUESTIONS FOR STAKEHOLDERS

PROJECTS - REPORT PAGE NUMBER: 42

PROJECT 3: Jenny Adair - Stormwater Control Facility

OBJECTIVES:

To further improve the water quality of stormwater exiting the Jenny Adair stormwater control facility.

Adaptively manage the evolving system to continue the high quality of water treatment.

Examine the flow routing and ponded water depths within the facility.

Riparian vegetation restoration through planting various wetland shrubs, forbs, and sedges.

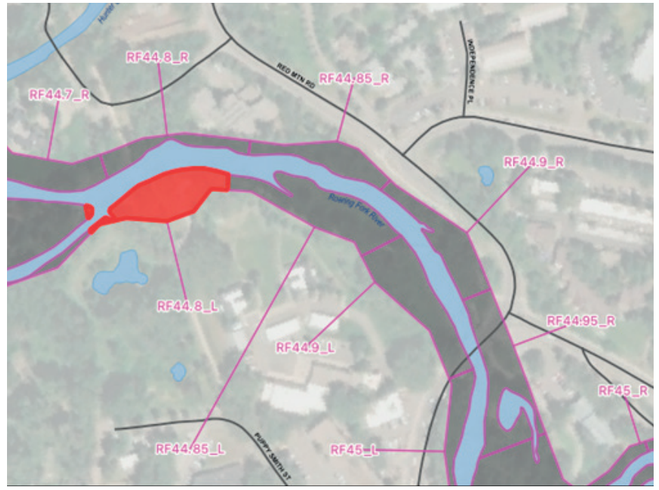
To improve hydrological connectivity with the Roaring Fork River through structural modification of site topography

BENEFITS:

- WQ improvement
- Water temperature improvments
- Wildlife habitat connectivity
- Fragmentation reduction
- Wetland creation
- Infrastructure improvement greening.
- More desirable aesthetic

ASSESSMENT RATING:

- OVERALL: B-
- LANDSCAPE: C+
- CONDITION: B+
- SIZE: C+



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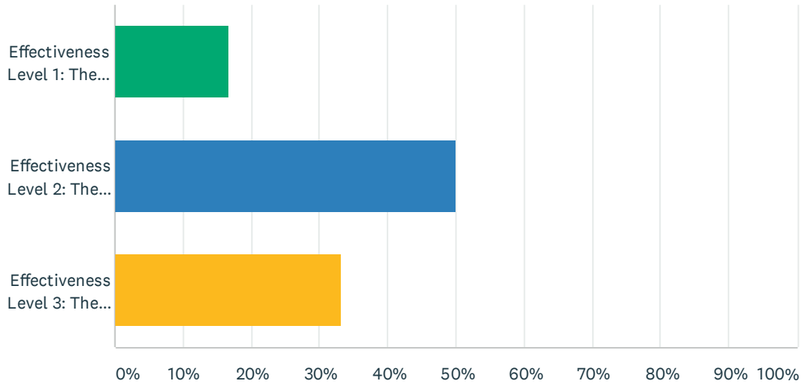
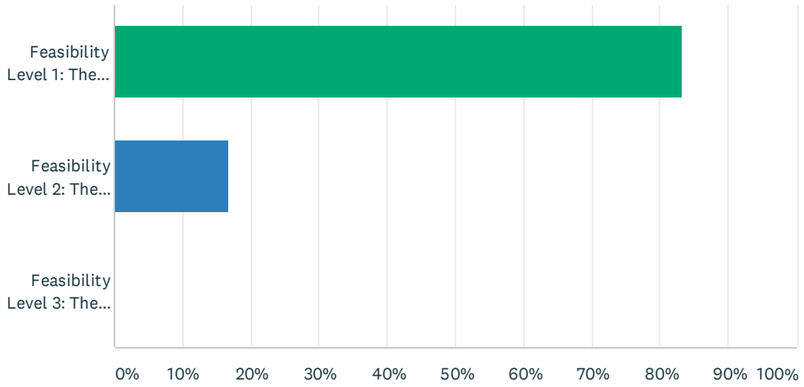
Q24 Rate the anticipated effectiveness of Project 3

Answered: 6 Skipped: 0



Q25 Rate the feasibility of implementation of Project 3

Answered: 6 Skipped: 0



Q26 Do you have any additional comments or thoughts on Project 3?

Answered: 0 Skipped: 6

#	RESPONSES	DATE
	There are no responses.	

QUESTIONS FOR STAKEHOLDERS

PROJECTS - REPORT PAGE NUMBER: 49

PROJECT 10: John Denver Park - Vegetation Management & Cattail Control

OBJECTIVES:

To maintain and enhance vegetation community diversity in the John Denver Park Stormwater Facility.

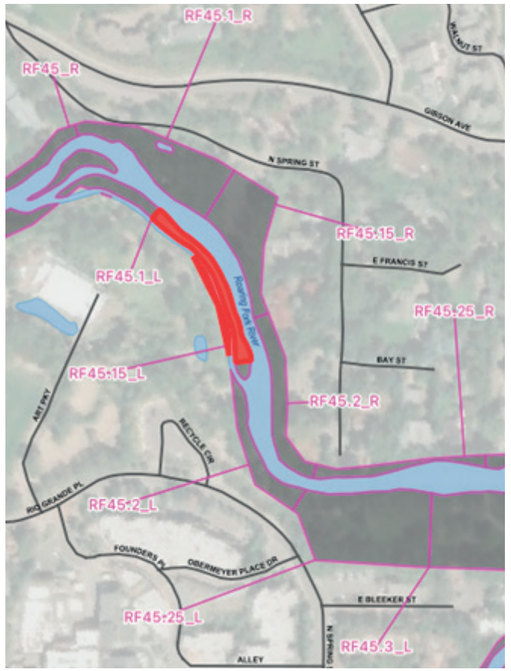
To mitigate water eutrophication through adaptive management practices.

BENEFITS:

- Water quality improvements
- Biological diversity
- Habitat value
- Adaptively managing infrastructure
- Education and outreach

ASSESSMENT RATING:

- OVERALL: C-
- LANDSCAPE: D
- CONDITION: C+
- SIZE: C-



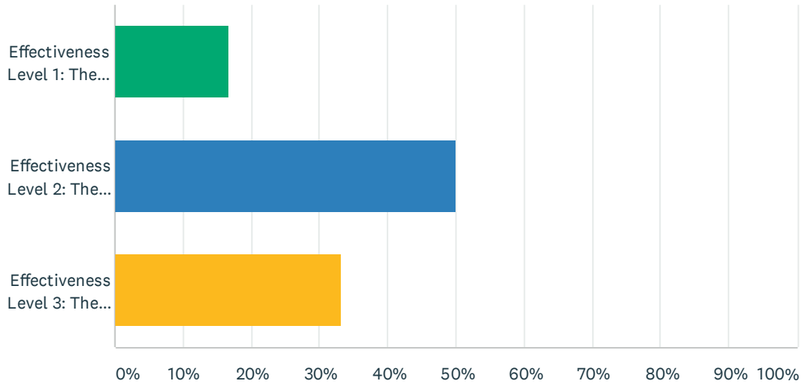
CITY OF ASPEN

lōtic hydrological

DHM DESIGN

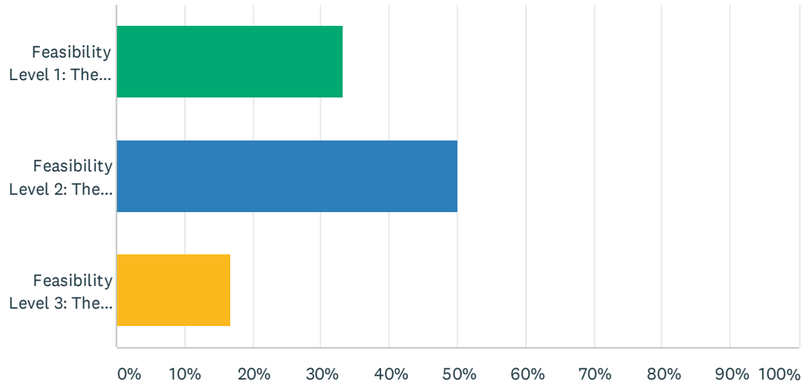
Q45 Rate the anticipated effectiveness of Project 10

Answered: 6 Skipped: 0



Q46 Rate the feasibility of of implementation of Project 10

Answered: 6 Skipped: 0



Q47 Do you have any additional comments or thoughts on Project 10?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	If you find an effective and feasible long term cattail management strategy please let me know.	5/11/2021 12:54 PM

QUESTIONS FOR STAKEHOLDERS

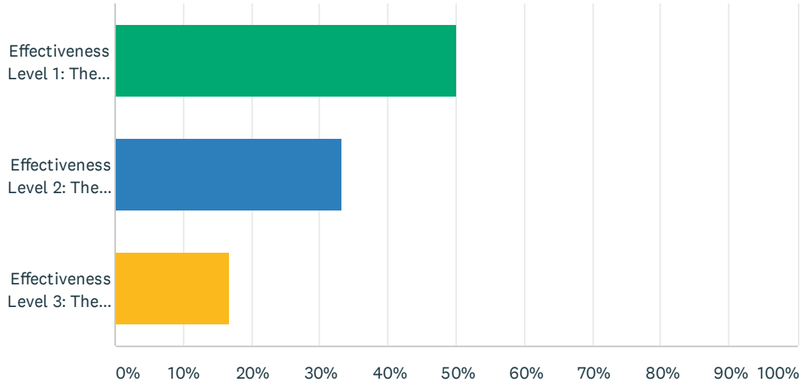
PROGRAMS - REPORT PAGE NUMBER: 38

RECOMMENDATION 1:

Educate property owners on how to maintain naturalized riparian buffers. Highlight importance of a zoned approach to landscaping and structure development near riparian areas.

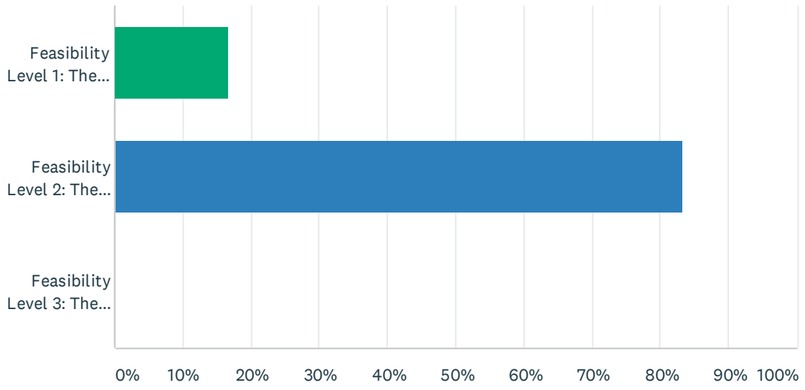
Q11 Rate the anticipated effectiveness of Program 2

Answered: 6 Skipped: 0



Q12 Rate the feasibility of implementation of Program 2

Answered: 6 Skipped: 0



Q13 Do you have any additional comments or thoughts on Program 2?

Answered: 5 Skipped: 1

#	RESPONSES	DATE
1	I really like this idea...	5/11/2021 4:31 PM
2	I think some sort of incentive structure has a lot of potential. The challenge is going to be finding incentives that actually matter those that will be redeveloping parcels along the Roaring Fork. Most of these individuals are relatively price insensitive to the scale of financial incentives the city would be able to provide. I think the key to success here will be thinking creatively about incentives that can be offered during development that will be attractive enough for homeowners to take mitigation steps they wouldn't otherwise do.	5/11/2021 12:43 PM
3	I would guess that money and social pressure can be more effective incentives than mere education in Aspen.	5/11/2021 8:07 AM
4	This program would be laudable, but as referenced in the text of the rationale, the ability to make changes on these degraded lands is difficult and very expensive. Thus, I'm not sure of how effective the program would be. Furthermore, the text of the recommendation makes it sound optional for property owners during redevelopment - is that the case? If this would be optional, then it could be difficult to garner a high level of participation. If it is not optional, then this program would have to be considered further with Community Development.	5/10/2021 9:48 PM
5	People want more FAR. Incentivizing bigger houses for riparian zone enhancement work	5/10/2021 9:33 AM

QUESTIONS FOR STAKEHOLDERS

PROJECTS - REPORT PAGE NUMBER: 41

PROJECT 2: Mill Parcel

BENEFITS:

To restore the native vegetation community along the floodplain bench on the northwest side of Mill Street.

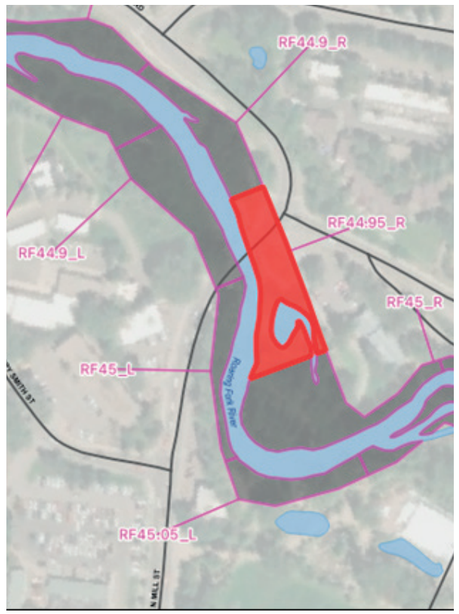
To control invasive species along the streambanks on the southern side of the road crossing.

Enhance the habitat and water quality of the pond near the ACRA.

Modify site topography and plant various native wetland species to improve the habitat characteristics of the pond's vegetated fringe.

Enhance the internal forest's diversity in age class and structure.

Maintain the parcel's water rights and fisheries use.



BENEFITS:

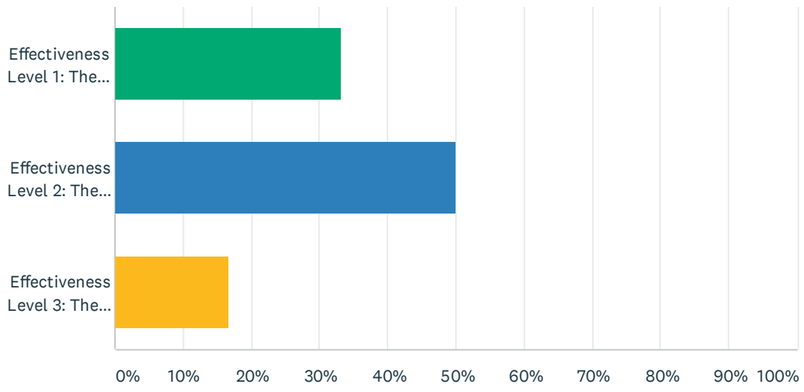
- Improve natural channel function
- Restore floodplain bench (frequently inundated area [FIA]):
- Improve fish and macroinvertebrate habitat
- Improve stream shading
- Education and outreach

ASSESSMENT RATING:

- OVERALL: C+
- LANDSCAPE: C-
- CONDITION: B-
- SIZE: C+

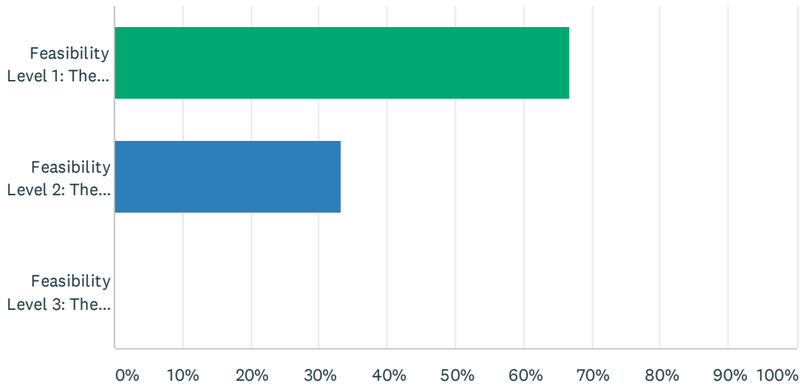
Q21 Rate the anticipated effectiveness of Project 2

Answered: 6 Skipped: 0



Q22 Rate the feasibility of implementation of Project 2

Answered: 6 Skipped: 0



Q23 Do you have any additional comments or thoughts on Project 2?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	Seems like a project with a lot of direct benefits that could also serve as an educational asset and demonstration project as well.	5/11/2021 4:35 PM

QUESTIONS FOR STAKEHOLDERS

ADDITIONAL POLICY RECOMMENDATIONS

Aspen Riparian Assessment and Plan Stakeholder Feedback SurveyMonkey

Q7 Are there any additional policy recommendations that you have?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	While some of the program recommendations incorporate ideas on how to reduce chemical runoff into the riparian areas and the river, it may be worth formulating a policy that would require a ban or limit on these chemicals (fertilizers, pesticides, etc.). A mandate on this item seems like it would be more powerful than educational/optional effort. Apologies if this has already been considered and I'm missing some context on this!	5/10/2021 9:48 PM

QUESTIONS FOR STAKEHOLDERS

ADDITIONAL PROGRAM RECOMMENDATIONS

Aspen Riparian Assessment and Plan Stakeholder Feedback SurveyMonkey

Q17 Are there any additional program recommendations that you have?

Answered: 2 Skipped: 4

#	RESPONSES	DATE
1	Pilot project turning a wealthy landowners private riverfront property into a better functioning riparian area to learn actual costs, implementation challenges and demonstrate how it can still be aesthetically pleasing to the landowner (I think this is a barrier to much riparian enhancement still...how can we help make a functioning riparian sexy for traditional green grass loving landowners!?)	5/11/2021 8:07 AM
2	Overall, Community Development is very ready to support water quality efforts for the Roaring Fork, but will need to iron out the details of these items if they do involve the code before any implementation begins.	5/10/2021 9:48 PM

QUESTIONS FOR STAKEHOLDERS

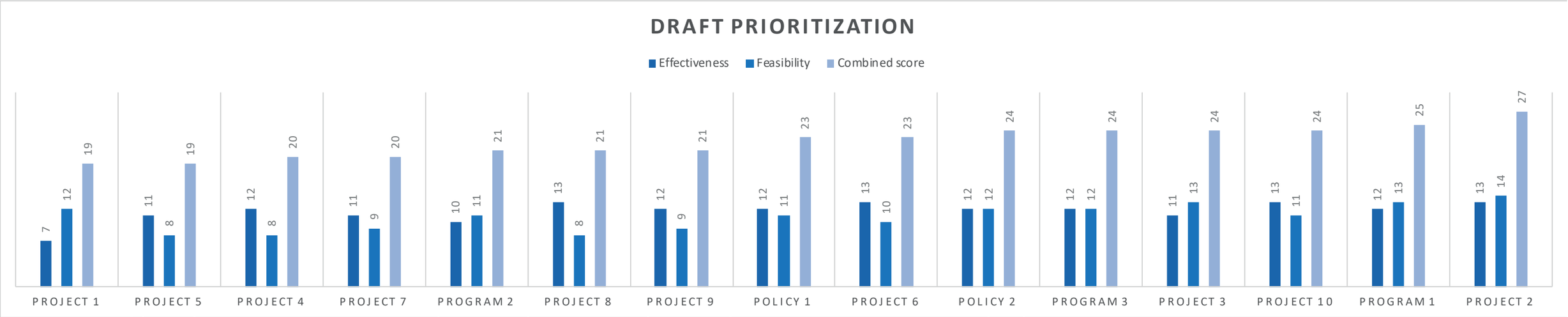
ADDITIONAL PROJECT RECOMMENDATIONS

Aspen Riparian Assessment and Plan Stakeholder Feedback SurveyMonkey

Q48 Are there any additional project recommendations that you have?

Answered: 1 Skipped: 5

#	RESPONSES	DATE
1	Currently there are a number of constructed wetlands around the city for stormwater filtration (Jenny Adair, John Denver, and Mill Street off the top of my head). All of these wetlands have management plans for how the filtered pollutants will be addressed in the future. Runoff from the West End goes into the back wetlands of Hallam Lake (this is Adam from ACES). Without some periodic mitigation and management eventually these wetlands will stop effectively filtering pollutants and change from a sink to a source of pollutants to the Roaring Fork. ACES would be interested in some sort of collaborative plan/project to manage these.	5/11/2021 12:54 PM



PROJECT 1: Public and private restoration partnerships; in order to create a larger and more robust riparian buffer and connect high value habitat and ecosystem services, the City should consider targeted property easements and partnerships that further the goal of connectivity of the riparian area through Aspen.

PROJECT 5: Newberry Park Enhancement

PROJECT 4: John Denver Park - Kayak Channel and Armored Bank Restoration

PROJECT 7: Garrish Park Restoration and Mine Drainage

PROGRAM 2: Incentivize restoration, enhancement, or mitigation opportunities.

PROJECT 8: Anderson Park and Land Trust Parcel

PROJECT 9: Aspen Club Hydrologic Enhancements

POLICY 1: More-explicitly institutionalize water quality projection as a goal/objective in city code segments pertaining to riparian lands uses and protections.

PROJECT 6: Herron Park Enhancement

POLICY 2: Strengthen riparian buffer protections on existing undeveloped locations with functional condition vegetation

PROGRAM 3: Fee – In – Lieu. At sites where improvements still remain practically infeasible due to topography, parcel size, etc., provide opportunities for in-basin mitigation via fee-in-lieu or other mechanisms to support off-site work that still provides water quality benefits directly to the Roaring Fork River system.

PROJECT 3: Jenny Adair - Stormwater Control Facility

PROJECT 10: John Denver Park - Vegetation Management & Cattail Control

PROGRAM 1: Educating property owners on how to maintain naturalized riparian buffers. Highlight importance of a zoned approach to landscaping and structure development near riparian areas.

PROJECT 2: Mill Parcel Restoration