

TECHNICAL MEMORANDUM

To: Iris Jehle-Peppard, Executive Director
One Truckee River
2601 Plumas Street
Reno, Nevada 89509

From: Mandy Bengtson, Project Manager

Date: May 26, 2023

Re: **Truckee River Conditions Assessment / SWCA Project No. 71509**

INTRODUCTION

SWCA Environmental Consultants (SWCA) was contracted by One Truckee River (OTR) to complete a conditions assessment of the Truckee River in accordance with the proposal funded by the Carson-Truckee Water Conservancy District (CTWCD) (the project). This technical memorandum provides an overview of the need for the project, the project's objectives, the methodology used to conduct the conditions assessment, and the results of the conditions assessment.

Project Background

The Truckee Meadows reach of the mainstem of the Truckee River (the urban core) has been strongly impacted by urban development encroachment, industrial use, recreation, use by unhoused populations, and urban runoff. These impacts from human activity have caused damage to and loss of the native vegetation that stabilizes the banks of the river, leading to severe erosion and soil loss in many areas. Loss of vegetation can have exacerbating impacts to bank stability, as eroding slopes cause a feedback cycle of continued soil and vegetation loss. Soil erosion is a concern for public safety and water quality and has contributed to degradation of water quality and ecological function within this portion of the Truckee River.

To address these issues, OTR and Nevada Land Trust developed the *Framework Vegetation Management and Restoration Plan (Framework Plan)*¹ with input and guidance from its Technical Working Group (TWG) (of which the CTWCD is an active member). That programmatic planning effort identified vegetation management strategies that 1) are compatible with the regulatory constraints of this reach of the Truckee River and the challenges of restoring riparian vegetation in an urban environment; and 2) address the critical issues and needs related to vegetation management within the area.

¹ SWCA Environmental Consultants (SWCA). 2022. *One Truckee River Framework Vegetation Management and Restoration Plan*. Reno, Nevada: SWCA Environmental Consultants. September 2022.

The conditions assessment conducted by SWCA assesses current river bank conditions along the urban reach of the Truckee River within the 14,000-cubic-feet-per-second (cfs) conveyance zone (from Crystal Peak Park to Glendale), which is under the jurisdiction of the CTWCD. The results of this conditions assessment will be used as a basis to inform prioritization of future river bank maintenance projects and implementation of the *Framework Plan*.

Conditions Assessment Goals

Two primary goals (as identified on OTR's proposal funded by the CTWCD) are addressed by the conditions assessment and this report (listed below). These goals fit into and support the larger conditions assessment and project prioritization goals being addressed and co-funded by the Bureau of Reclamation (BoR) (see Discussion and Next Steps).

Goal 1: Assess current river bank conditions along the urban reach of the Truckee River (from Crystal Peak Park to Glendale) as related to the bank maintenance objectives of the CTWCD.

- **Objective 1a:** Compile relevant spatial data related to vegetation structure, soils data, and slope/aspect data (derived from LiDAR).
- **Objective 1b:** Conduct field surveys to document the conditions of river banks, further quantifying relevant bank stability variables, including vegetation structure and soil stability (or erosion issues).

Goal 2: Synthesize results to leverage OTR's *Framework Plan* and support/guide CTWCD's management priorities.

- **Objective 2a:** Synthesize results from field surveys and desktop analyses.
- **Objective 2b:** Create a geographic information system (GIS) layer that informs future prioritization of bank stabilization projects.

METHODS

SWCA performed an assessment of current river bank conditions (conditions assessment) through a combination desktop and field-based data collection and analysis. This assessment focused on the area under the CTWCD's direct jurisdiction within the 14,000-cfs conveyance zone from Crystal Peak Park to Glendale, an area that covers a portion of the geographic scope of OTR's *Framework Plan*. Both desktop and field-based data collection were limited to public parcels only, as these are the areas that could most immediately be accessed and addressed by future restoration efforts. See the project area delineated in Figure 1.

Desktop Analysis

Prior to conducting field surveys, SWCA completed a high-level desktop analysis to inform field data collection. Spatial data examined included elevation and slope data, soils,² and aerial imagery in GIS. SWCA also analyzed parcel information/boundaries, roads, and trail information to develop an access plan for each parcel.

² Natural Resources Conservation Service. 2023. Web Soil Survey. Available at: <http://websoilsurvey.nrcs.usda.gov>. Accessed April 15, 2023.



Figure 1. Project area overview.

Field Surveys

Field surveys were conducted by two SWCA staff members (Dr. Mandy Bengtson, principal soil ecologist, and Sophie Butler, assistant staff environmental planner) on April 27, May 2 through 4, and May 10, 2023. Surveys were conducted on foot by accessing public parcels along the Truckee River from trails or roads adjacent to the parcels. The surveys generally recorded the condition of river banks, from the approximate ordinary high-water mark (OHWM) upslope to the 14,000-cfs flow conveyance zone; however, this survey area was modified for situations where the 14,000-cfs conveyance zone extended far beyond the adjacent riparian area. In those cases, the survey extent was to top of bank (e.g., bank full) or to 5 to 10 meters upslope from the river edge. In other situations where urban development such as trails, open lawn areas, and concrete walls/abutments intersected the 14,000-cfs conveyance zone, the study boundary was truncated. See Figure 1 for locations of all linear data collected. Data were recorded electronically with a tablet with 1 meter accuracy.

Through these surveys, bare soil was estimated and vegetation patches were mapped in a linear fashion (according to structural class). Invasive weeds were not specifically mapped but were noted in the data comments when encountered. For each linear map record, the percent cover of bare soil, litter, herbaceous vegetation, shrubs/woody vegetation, midstory vegetation, and overstory vegetation in homogenous sections was estimated. New line segments (i.e., linear map records) were created when changes in overall vegetation structure were encountered. Each vegetation cover type and bare soil were classified according to cover class/categories as follows: 0% cover, 1% to 5% cover, 6% to 25% cover, 26% to 50% cover, 51% to 75% cover, 76% to 95% cover, or 96% to 100% cover. Other observations regarding relative slope stability and areas of active erosion were noted in the data comments.

Data Compilation and Analysis

Data from the desktop analysis were synthesized with field data to identify any data discrepancies. Areas of low vegetation cover, elevated bare soil, and active erosion were identified, and these areas were delineated as potential focal areas for future restoration and bank stabilization/maintenance interventions. An integrated GIS layer was produced to identify seven top-priority areas for consideration by OTR, CTWCD, and other partners. See Table 1 for the locations identified.

Priority focal areas were those with steep slopes, bare soil, and lack of natural or implanted stabilization (plants, naturally occurring rock, and placed rock), and signs of active erosion. By completing a visual assessment of slope stability, seven areas were identified as candidates for maintenance work. See Appendix A for photographs of the locations identified in Table 1.

RESULTS

Results of desktop and field data collection have been compiled into a data table (Appendix B), map book (Appendix C), and spatial data layer. Spatial data (KMZ and Esri shapefile formats) are provided with this report.

Map Book

The map book (see Appendix C) displays the lines collected in the field by segment in relation to the 14,000-cfs flow conveyance zone and the public parcels. Only bare soil percent cover is shown in the map book, as bare soil best represents where bank stability and soil erosion are of greatest concern. Elevated bare soil percent cover is used as a proxy of where relative vegetation ground cover is the lowest, as presented in the map set in Appendix C. A summary of vegetation cover data can be found in tabulated format in Appendix B and is also included in the Esri shapefile attribute table.

Data Summary Table

The data summary table (see Appendix B) displays the data collected for each linear map record, consisting of bare soil cover, litter cover, herbaceous cover, shrub/woody cover, midstory cover, and overstory cover. The table also includes information on land ownership, survey extent, and other comments for each line segment.

Table 1. Priority Focal Areas for Bank Stabilization and Restoration

Restoration Area	Landowner	Parcel Numbers	Line Identification Numbers	Comments
Verdi Roundabout Parcel	Washoe County	3810034	L13, L14	Steep river bank with lots of debris present on the slope. Slope appears unstable and is actively eroding in spots.
Canepa Ranch and adjacent properties	State of Nevada and United States of America	3879001, 3815014, 3815019	L23, L26, L29, L30, L32	West side has a deep cut bank that is actively eroding. Central area is flatter with alternating patches of grass and shrubs; this could be a vegetation restoration opportunity. Perennial pepperweed (<i>Lepidium latifolium</i>) present on east side.
Idlewild Drive East of Ivan Sack Park	City of Reno	Not applicable	L123, L124, L125, L126	Steep bank with placed rock throughout and visible active erosion in sections.
Between Booth Street Bridge and Keystone Street Bridge	City of Reno	1113206	L139	Steep slope and cut bank with lots of bare soil, actively eroding.
Lake Street through Brodhead Park	City of Reno	1201301, 1201509, 1201613	L63, L64, L66, L67, L68, L69	Steep actively eroding slopes with prominent invasive species (tree of heaven, <i>Ailanthus altissima</i>)
Sutro Street through John Champion Park	City of Reno	1205122, 1205130	L73, L74, L75, L76, L77	Many areas have angular riprap placed, and erosion is still present on the steep slopes.
East end of Fisherman's Park	City of Reno and City of Sparks	1230116, 3205054	L92	Steep slope with bare sections and section with riprap. There is very little vegetation present across this area.

DISCUSSION AND NEXT STEPS

The outcomes of this conditions assessment have identified priority focal areas for bank stabilization and restoration. These areas are locations where bank stability is low and significant erosion is occurring within the 14,000-cfs conveyance zone that is under the jurisdiction of the CTWCD. OTR and Nevada Land Trust are currently undertaking a more extensive conditions assessment with funding from the BoR WaterSMART Cooperative Watershed Management Program. The data collected through this initial CTWCD-funded conditions assessment will directly inform and support the BoR-funded effort.

Future project tasks (funded by the BoR and described below) will allow these organizations and agencies to use consensus-building tools to score project locations based on existing conditions and agency need, which will include integration of other important considerations, including ecological function, human foot traffic, and habitat quality. Next steps to be led by Nevada Land Trust and OTR consist of addressing the following BoR project goals and tasks:

BoR Project Goal 1: Synthesize Truckee River data to guide multi-jurisdictional watershed management. Assess current river bank and aquatic conditions within public parcels and select parcels of interest along the project area and synthesize these results to leverage OTR's *Framework Plan* and guide multi-jurisdictional watershed management and restoration planning.

BoR Project Objective 1A: Identify watershed restoration objectives and quantitative indicators. Use the outcomes of the *Framework Plan* to articulate watershed restoration objectives and define indicators that quantitatively address each objective; collaborate with TWG members and other stakeholders to develop an approach to compile and collect indicator data.

BoR Project Objective 1B: Compile current spatial data. Collaborate with watershed partners to compile all relevant existing spatial data to inform watershed restoration planning, including elevation, hydrology, soils, wetland, aquatic habitat, aquatic wildlife presence or populations, water quality, urban planning, and demographic data; identify how these data will serve as quantitative indicators.

BoR Project Objective 1C: Collect data to fill baseline data gaps. Conduct targeted field data collection to strategically fill gaps in baseline data (i.e., select vegetation mapping, soils and slope conditions, erosion issues, and targeted water quality sampling), that can be used to strengthen indicators of riparian and aquatic condition and support restoration planning efforts; collect additional urban planning information as context for environmental data; identify any remaining data gaps.

BoR Project Objective 1D: Generate comprehensive geodatabase and analyze results. Analyze results from field surveys and desktop analyses to generate a geographic information system (GIS) geodatabase that compiles indicator data to support quantitative prioritization of watershed management and restoration projects (particularly as they relate to riparian and aquatic condition, water quality, and other beneficial uses).

BoR Project Goal 2: Collaboratively prioritize watershed restoration projects and build momentum for site-specific implementation planning. Collaborate with TWG members and other select stakeholders to identify, assess, and prioritize watershed management and restoration projects to meet the goals and management priorities of multiple jurisdictions, and use the momentum of the TWG's collective efforts to propel planning, funding, and implementing site-specific restoration projects.

BoR Project Objective 2A: Develop indicators and a scoring method to create a draft Ecological Condition Index (ECI). Use data (compiled and analyzed through Project Goal 1 activities) to develop quantitative indicators of ecological condition (both riparian and aquatic) for each parcel; develop a scoring method (a draft ECI) to evaluate the importance of indicators and support quantitative prioritization of restoration projects at the parcel level.

BoR Project Objective 2B: Solicit input on watershed management needs, opportunities, and draft Ecological Condition Index. Engage TWG members and other stakeholders (through a series of interviews and one TWG meeting) to discuss indicators and their scoring and refine the ECI as needed; solicit input from TWG members and stakeholders on agency project priorities, perceived public need, and known management opportunities, which will be considered in project prioritization and used to inform development of the draft Project Prioritization Tool.

BoR Project Objective 2C: Collaboratively develop a draft Project Prioritization Tool and Project Priorities Matrix. In close collaboration with the TWG and other stakeholders, develop a draft Project Prioritization Tool to prioritize watershed maintenance and restoration projects based on the outcomes of Objectives 2A and 2B; use this approach to develop a draft Project Priorities Matrix that supports and leverages the *Framework Plan*. The tool and matrix are expected to consider the relative importance of 1) the ECI scores for parcels, 2) agency and

public need, 3) habitat connectivity, and 4) management enhancement opportunities; prioritization may vary by agency and landowner.

BoR Project Objective 2D: Conduct TWG meeting to solidify project priorities and build momentum. Conduct a TWG meeting to review the outcomes of the scoring and to solidify top project priorities for each landowner or jurisdiction (in the Project Priorities Matrix) for future watershed restoration; develop a strategy to plan, implement, and fund priority projects through application of the *Framework Plan*.

BoR Project Objective 2E: Develop final deliverable to leverage the *Framework Plan*. Develop a deliverable that summarizes the outcomes of the project activities, which will be informed by EPA's nine minimum elements of a successful watershed plan, such that the information therein complements and supports the existing Integrated Watershed Protection Plan.

APPENDIX A

Field Photographs – Potential Bank Stabilization Areas



Photograph A-1. Verdi roundabout parcel. Washoe County, L13, L14. Steep river bank with high cover of debris on the slope (L14).



Photograph A-2. Verdi roundabout parcel (L14).



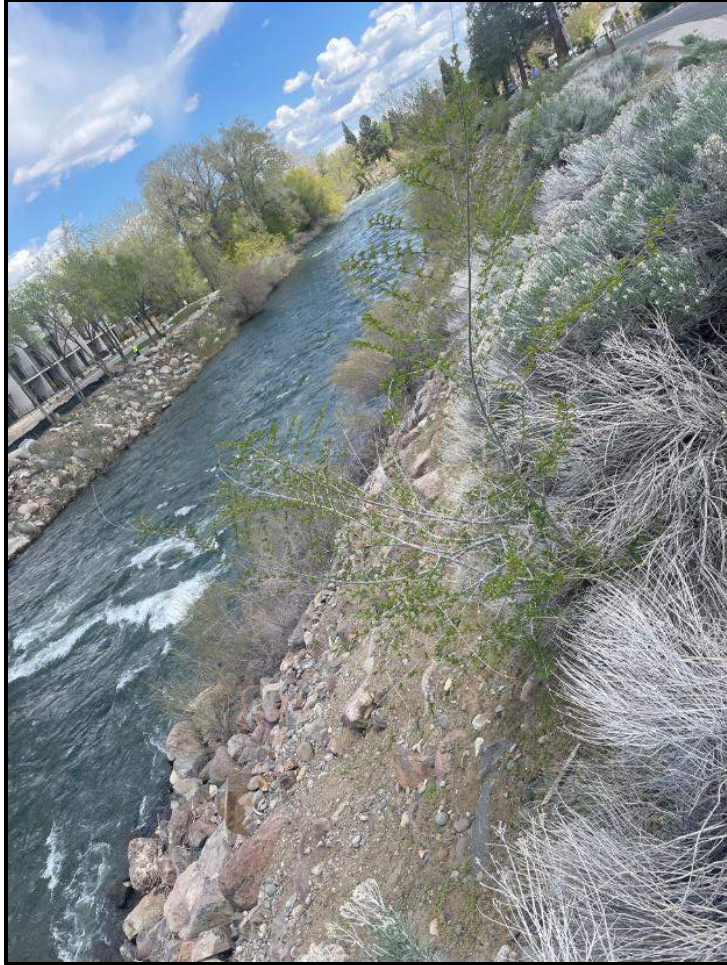
Photograph A-3. Canepa Ranch and adjacent properties. State of Nevada and United States of America, L23, L26, L29, L30, L32. West side has a deep cut bank that is actively eroding. Central area is flatter with alternating patches of grass and shrubs; possible vegetation restoration opportunity. Perennial pepperweed present on east side (L29).



Photograph A-4. Canepa Ranch and adjacent properties (L30).



Photograph A-5. Canepa Ranch and adjacent properties (L23).



Photograph A-6. Idlewild Drive east of Ivan Sack Park. City of Reno, L123, L124, L125, L126. Steep bank with placed rock throughout and active erosion in places (L124).



Photograph A-7. Idlewild Drive east of Ivan Sack Park (L126).



Photograph A-8. Between Booth Street Bridge and Keystone Street Bridge. City of Reno, L139. Steep slope and cut bank with a lot of bare soil and active erosion (L139).



Photograph A-9. Lake Street through Brodhead Park. City of Reno, L63, L64, L66, L67, L68, L69. Steep actively eroding slopes with prominent invasive species (tree of heaven) (L64).



Photograph A-10. Lake Street through Brodhead Park (L68).



Photograph A-11. Sutro Street through John Champion Park. City of Reno, L73, L74, L75, L76, L77. Angular riprap is placed in many areas, however, erosion is still occurring on the steep slopes (L74).



Photograph A-12. Sutro Street through John Champion Park (L76).



Photograph A-13. Sutro Street through John Champion Park (L77).



Photograph A-14. East end of Fisherman's Park. City of Reno and City of Sparks, L92. Steep slope with bare areas and one area with riprap. This area has very low vegetation cover (L92).



Photograph A-15. East end of Fisherman's Park (L92).

APPENDIX B

Data Summary Table

Table B-1. Data Summary Table

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L1	1-5	1-5	26-50	26-50	26-50	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, significant bare soil in the upland
L2	6-25	6-25	76-95	1-5	26-50	6-25	City of Reno, surveyed to 5 meters from river bank
L3	1-5	6-25	26-50	6-25	26-50	6-25	State of Nevada, surveyed to 5 meters from river bank
L4	0	6-25	6-25	26-50	26-50	6-25	State of Nevada, surveyed to 5 meters from river bank
L5	0	6-25	26-50	0	6-25	26-50	State of Nevada and City of Reno, surveyed around boardwalks, beaver dams
L6	1-5	1-5	6-25	6-25	6-25	51-75	Washoe County, surveyed to 14,000-cfs flow boundary near river bank
L7	1-5	6-25	26-50	1-5	26-50	51-75	Washoe County, surveyed to 14,000-cfs flow boundary near river bank, a lot of downed cottonwood debris
L8	6-25	1-5	26-50	1-5	51-75	1-5	Washoe County, surveyed to 14,000-cfs flow boundary, only walked half of segment due to accessibility concerns
L9	6-25	1-5	1-5	26-50	1-5	6-25	Washoe County, surveyed to bank full, large boulders and concrete and recreational infrastructure close to river bank
L10	6-25	1-5	26-50	6-25	6-25	26-50	Washoe County, surveyed to just above bank full
L11	1-5	1-5	6-25	6-25	6-25	51-75	Washoe County, surveyed to just above bank full, concrete from old structures
L12	1-5	6-25	6-25	6-25	6-25	6-25	Washoe County, surveyed to dirt path just above bank full

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L13	0	1-5	26-50	6-25	6-25	6-25	Washoe County, surveyed to top of bank, steep river bank, lots of debris on hillslope
L14	0	1-5	6-25	26-50	1-5	6-25	Washoe County, surveyed to top of bank, both photographs taken facing west, steep unstable slope actively eroding (potential bank stabilization opportunity)
L15	6-25	1-5	26-50	6-25	6-25	26-50	Washoe County, surveyed to 20 meters distance from the OHWM, area viewed segment from other side of river, appears to be a healthy riparian area
L16	1-5	1-5	6-25	6-25	6-25	51-75	Washoe County, surveyed to 20 meters distance from the OHWM, viewed from other side of river
L17	1-5	1-5	51-75	1-5	6-25	6-25	Washoe County, surveyed to 14,000-cfs flow boundary, healthy riparian area
L18	1-5	1-5	51-75	6-25	26-50	6-25	Washoe County, surveyed to top of bank, viewed from other side of river, intermittent patches of tree cover
L19	0	0	51-75	6-25	6-25	6-25	Washoe County, surveyed to 14,000-cfs flow boundary, steep slope mostly upland
L20	1-5	0	26-50	6-25	51-75	6-25	Washoe County, surveyed to 14,000-cfs flow boundary, lots of dead and declining riparian vegetation
L21	0	1-5	51-75	6-25	6-25	6-25	State of Nevada, surveyed to 14,000-cfs flow boundary, not able to go down to parcel or get a good vantage point, data estimated from one viewpoint (observation may not be representative due to lack of access and clear vantage point)

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L22	0	0	26–50	26–50	6–25	6–25	State of Nevada, surveyed out to 10 meters from river, viewed from other side of river
L23	1–5	0	6–25	51–75	6–25	1–5	State of Nevada and Washoe County, surveyed to top of bank, viewed from other side of river, deep cut bank actively eroding across the bank
L24	0	0	26–50	1–5	26–50	26–50	Washoe County, surveyed to 14,000-cfs flow boundary
L25	1–5	1–5	6–25	6–25	51–75	26–50	Washoe County, surveyed to top of bank, lots of dead perennial pepperweed
L26	0	1–5	51–75	6–25	6–25	6–25	State of Nevada, surveyed to top of bank, viewed from across river
L27	1–5	1–5	26–50	6–25	6–25	26–50	Washoe County, surveyed to 14,000-cfs flow boundary
L28	0	26–50	51–75	1–5	51–75	6–25	Lots of perennial pepperweed on west end of segment line
L29	0	0	26–50	51–75	1–5	1–5	State of Nevada, surveyed to top of bank, viewed from other side of river, steep eroding slope, restoration opportunity
L30	0	1–5	26–50	6–25	6–25	51–75	State of Nevada, surveyed to top of bank, viewed from other side of river, alternating patches of shrubs and grasses, grassy areas could be shrub restoration opportunity
L31	1–5	1–5	51–75	6–25	6–25	6–25	City of Reno, surveyed to halfway up steep bank, dense healthy riparian vegetation
L32	1–5	1–5	51–75	6–25	26–50	51–75	Washoe County, surveyed to edge of human-made ditch, which was running through riparian zone, lots of dead perennial pepperweed on island

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L33	1-5	1-5	51-75	1-5	51-75	6-25	Washoe County, surveyed to 14,000-cfs flow boundary
L34	0	1-5	76-95	1-5	51-75	6-25	City of Reno, surveyed to 14,000-cfs flow boundary
L35	0	1-5	76-95	1-5	51-75	6-25	City of Reno, surveyed to 14,000-cfs flow boundary
L36	1-5	1-5	26-50	6-25	26-50	51-75	City of Reno, surveyed to 14,000-cfs flow boundary, trimmed/maintained vegetation near sandier riverside area, sandy bare soil
L37	6-25	6-25	51-75	6-25	26-50	6-25	Washoe County, surveyed to 14,000-cfs flow boundary
L38	1-5	1-5	76-95	1-5	51-75	6-25	City of Reno, surveyed to 14,000-cfs flow boundary, concrete debris on edge of river
L39	6-25	1-5	26-50	6-25	26-50	26-50	City of Reno, surveyed to 14,000-cfs flow boundary, perennial pepperweed present
L40	6-25	1-5	51-75	6-25	26-50	26-50	Washoe County, surveyed to 14,000-cfs flow boundary
L41	1-5	1-5	26-50	51-75	26-50	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, viewed from other side of river
L42	0	1-5	6-25	6-25	6-25	26-50	Washoe County, surveyed to upland edge of riparian vegetation
L43	1-5	1-5	51-75	6-25	26-50	6-25	U.S. Forest Service and Washoe County, surveyed to top of bank, viewed from other side of river
L44	0	6-25	6-25	6-25	6-25	26-50	Washoe County, surveyed to upland edge of riparian vegetation, large boulders placed on bank
L45	6-25	1-5	1-5	6-25	26-50	51-75	Washoe County, surveyed to paved path

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L46	6-25	1-5	26-50	6-25	51-75	51-75	Washoe County, surveyed to 14,000-cfs flow boundary
L47	6-25	1-5	1-5	26-50	26-50	51-75	Washoe County, surveyed to paved path, boulders placed near river
L48	0	1-5	76-95	1-5	51-75	51-75	Washoe County, surveyed to paved path
L49	0	6-25	26-50	1-5	51-75	51-75	Washoe County, surveyed to 14,000-cfs flow boundary
L50	76-95	1-5	76-95	1-5	76-95	51-75	Washoe County, surveyed to 14,000-cfs flow boundary, healthy riparian
L51	0	0	51-75	0	26-50	0	City of Reno, surveyed to concrete gabions
L52	1-5	26-50	26-50	26-50	51-75	26-50	City of Reno, surveyed to concrete wall, viewed from other side of river
L53	0	0	1-5	0	26-50	51-75	City of Reno, surveyed to concrete gabion, herbaceous growth on gabion
L54	0	1-5	1-5	0	0	0	City of Reno, surveyed to concrete wall, placed rock in concrete
L55	0	6-25	6-25	0	51-75	0	City of Reno, surveyed to concrete gabions
L56	6-25	0	1-5	0	6-25	0	City of Reno, surveyed to concrete gabions
L57	1-5	0	1-5	0	1-5	1-5	City of Reno, surveyed to top of bank, placed rocks in concrete, overstory are trees casting onto rock area
L58	1-5	1-5	1-5	0	1-5	1-5	City of Reno, surveyed to top of bank, rocks placed in concrete
L59	51-75	1-5	6-25	1-5	6-25	6-25	City of Reno, surveyed to top of river bank, placed rocks in concrete

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L60	6-25	6-25	1-5	6-25	6-25	1-5	City of Reno, surveyed to top of bank, placed rocks in concrete
L61	0	26-50	51-75	6-25	26-50	1-5	City of Reno, surveyed the island
L62	0	0	1-5	0	0	0	City of Reno, surveyed up to and along concrete wall
L63	26-50	26-50	6-25	51-75	6-25	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, steep actively eroding slopes, lots of invasive tree of heaven
L64	51-75	6-25	1-5	26-50	6-25	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, actively eroding
L65	6-25	6-25	6-25	26-50	6-25	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, viewed from other side of river
L66	6-25	6-25	6-25	26-50	6-25	1-5	City of Reno, surveyed to top of bank, steep actively eroding
L67	51-75	1-5	1-5	26-50	6-25	1-5	City of Reno, surveyed to top of bank, steep actively eroding
L68	26-50	26-50	6-25	26-50	6-25	1-5	City of Reno, surveyed to 14,000-cfs flow boundary including island, river bank actively eroding
L69	26-50	6-25	1-5	26-50	1-5	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, steep slope actively eroding
L70	6-25	6-25	26-50	6-25	26-50	1-5	City of Reno, surveyed to paved path
L71	1-5	26-50	6-25	1-5	6-25	1-5	City of Reno, surveyed to paved path
L72	6-25	6-25	6-25	1-5	6-25	1-5	City of Reno, surveyed to paved path, placed rock
L73	1-5	1-5	6-25	6-25	6-25	6-25	City of Reno, surveyed to 14,000-cfs flow boundary, slope is eroding, placed rock

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L74	26–50	6–25	1–5	26–50	6–25	1–5	City of Reno, surveyed to 14,000-cfs flow boundary, steep and actively eroding
L75	1–5	1–5	6–25	6–25	1–5	6–25	City of Reno, surveyed to 14,000-cfs flow boundary, angular riprap but appears unstable
L76	1–5	6–25	6–25	6–25	6–25	1–5	City of Reno, surveyed to 14,000-cfs flow boundary
L77	1–5	1–5	1–5	26–50	6–25	1–5	City of Reno, surveyed to 14,000-cfs flow boundary
L78	1–5	6–25	1–5	26–50	1–5	1–5	Reno-Sparks Indian Colony (RSIC), surveyed to 14,000-cfs flow boundary, bare eroding slope and concrete debris
L79	51–75	0	1–5	6–25	6–25	1–5	City of Reno, surveyed to 14,000-cfs flow boundary, concentrated angular rip rap
L80	6–25	6–25	26–50	6–25	26–50	6–25	United States of America (RSIC), surveyed to 14,000-cfs flow boundary, includes small island
L81	1–5	1–5	26–50	6–25	6–25	26–50	City of Reno, surveyed to 14,000-cfs flow boundary or paved path (when 14,000-cfs flow boundary crosses the path, whichever is closer to river)
L82	6–25	6–25	26–50	1–5	76–95	1–5	City of Reno, surveyed island
L83	1–5	6–25	26–50	26–50	6–25	26–50	City of Reno, surveyed to paved path
L84	6–25	1–5	6–25	6–25	26–50	6–25	City of Reno, surveyed 14,000-cfs flow boundary
L85	6–25	6–25	6–25	26–50	6–25	6–25	City of Reno, surveyed to 14,000-cfs flow boundary
L86	6–25	1–5	6–25	26–50	6–25	6–25	RSIC, surveyed to 14,000, viewed from other side of river
L87	1–5	6–25	1–5	6–25	6–25	6–25	City of Reno, surveyed to 14,000-cfs flow boundary

Truckee River Conditions Assessment

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L88	6-25	26-50	6-25	26-50	6-25	1-5	City of Reno, surveyed to paved path
L89	6-25	1-5	1-5	6-25	1-5	6-25	United States (RSIC), surveyed to 14,000-cfs flow boundary, viewed from across river
L90	6-25	1-5	26-50	6-25	6-25	1-5	United States (RSIC), surveyed to 14,000-cfs flow boundary, viewed from other side of river
L91	1-5	6-25	6-25	6-25	6-25	6-25	United States (RSIC), surveyed to 14,000-cfs flow boundary, viewed from other side of river
L92	1-5	1-5	6-25	51-75	1-5	1-5	City of Sparks, surveyed to 14,000-cfs flow boundary, large steep slopes actively eroding lots of bare soil
L93	6-25	6-25	26-50	6-25	6-25	26-50	United States (RSIC), surveyed to 14,000-cfs flow boundary, viewed from other side of river, includes island at diversion
L94	1-5	6-25	26-50	1-5	26-50	26-50	City of Sparks, surveyed to 14,000-cfs flow boundary, small gabion near the bridge
L95	1-5	6-25	26-50	1-5	6-25	6-25	City of Reno, surveyed to 14,000-cfs flow boundary, viewed from other side of river.
L96	1-5	1-5	76-95	1-5	76-95	1-5	Washoe County, surveyed to 14,000-cfs flow boundary
L97	1-5	1-5	6-25	6-25	76-95	51-75	Washoe County, surveyed to 14,000-cfs flow boundary
L98	0	6-25	76-95	1-5	76-95	1-5	Washoe County, surveyed to 14,000-cfs flow boundary
L99	6-25	6-25	1-5	26-50	26-50	51-75	Washoe County, surveyed to 14,000-cfs flow boundary
L100	6-25	6-25	51-75	6-25	51-75	6-25	Washoe County, survey is generally based on 14,000-cfs flow boundary, did not walk full parcel, camps present

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L101	0	1-5	76-95	1-5	76-95	1-5	Washoe County, surveyed to 14,000-cfs flow boundary (south side of ditch)
L102	6-25	6-25	26-50	1-5	76-95	26-50	Washoe County, surveyed to 14,000-cfs flow boundary
L103	26-50	6-25	6-25	1-5	76-95	76-95	Washoe County, surveyed to top of bank
L104	1-5	1-5	26-50	1-5	76-95	26-50	Washoe County, surveyed to 14,000-cfs flow boundary
L105	0	1-5	51-75	1-5	51-75	26-50	Washoe County, surveyed to 14,000-cfs flow boundary
L106	0	6-25	51-75	1-5	51-75	6-25	Washoe County, surveyed to 14,000-cfs flow boundary, includes small island at diversion
L107	1-5	1-5	76-95	1-5	76-95	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, did not walk this parcel – results approximate based on adjacent survey
L108	6-25	1-5	6-25	6-25	26-50	51-75	City of Reno, surveyed to 14,000-cfs flow boundary
L109	1-5	6-25	76-95	1-5	76-95	26-50	City of Reno, surveyed to 14,000-cfs flow boundary
L110	6-25	26-50	76-95	1-5	76-95	1-5	City of Reno, surveyed to 14,000-cfs flow boundary
L111	51-75	6-25	26-50	1-5	76-95	26-50	City of Reno, surveyed to 14,000-cfs flow boundary
L112	26-50	6-25	76-95	1-5	76-95	6-25	City of Reno, surveyed to 14,000-cfs flow boundary
L113	6-25	6-25	51-75	1-5	76-95	26-50	City of Reno, surveyed to paved path
L114	6-25	6-25	51-75	1-5	76-95	6-25	City of Reno, surveyed to 14,000-cfs flow boundary
L115	26-50	6-25	6-25	6-25	6-25	51-75	City of Reno, surveyed to top of bank




Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L116	6-25	6-25	6-25	26-50	26-50	26-50	City of Reno, surveyed to 14,000-cfs flow boundary
L117	6-25	6-25	6-25	6-25	26-50	6-25	City of Reno, surveyed to 14,000-cfs flow boundary, angular riprap
L118	26-50	1-5	6-25	51-75	6-25	6-25	City of Reno, surveyed to 14,000-cfs flow boundary
L119	6-25	6-25	26-50	26-50	26-50	6-25	City of Reno, surveyed to 14,000-cfs flow boundary
L120	6-25	6-25	6-25	6-25	26-50	1-5	City of Reno, surveyed to 14,000-cfs flow boundary
L121	26-50	6-25	26-50	6-25	26-50	6-25	City of Reno, surveyed to 14,000-cfs flow boundary
L122	6-25	6-25	51-75	1-5	76-95	1-5	City of Reno, surveyed to 14,000-cfs flow boundary
L123	1-5	1-5	26-50	1-5	6-25	1-5	City of Reno, surveyed to 14,000-cfs flow boundary
L124	1-5	1-5	6-25	6-25	6-25	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, lots of placed rock, sections of slope eroding
L125	1-5	1-5	26-50	6-25	6-25	6-25	City of Reno, surveyed to 14,000-cfs flow boundary, sections of erosion, some placed rock
L126	6-25	6-25	6-25	6-25	6-25	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, actively eroding
L127	6-25	6-25	76-95	1-5	76-95	1-5	City of Reno, surveyed to 14,000-cfs flow boundary
L128	26-50	6-25	26-50	26-50	26-50	6-25	City of Reno, surveyed to 14,000-cfs flow boundary
L129	26-50	1-5	6-25	6-25	6-25	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, mostly placed rock
L130	26-50	1-5	6-25	6-25	6-25	1-5	City of Reno, surveyed to 14,000-cfs flow boundary, more open areas with erosion

Line Identification Number	Overstory Percent Cover	Midstory Percent Cover	Shrub/Woody Percent Cover	Bare Soil Percent Cover	Litter Percent Cover	Herbaceous Percent Cover	Comments
L131	26–50	6–25	6–25	26–50	26–50	6–25	City of Reno, surveyed to 14,000-cfs flow boundary
L132	1–5	6–25	26–50	6–25	6–25	1–5	City of Reno, surveyed to 14,000-cfs flow boundary
L133	1–5	6–25	6–25	1–5	26–50	6–25	City of Reno, surveyed to 14,000-cfs flow boundary, placed rock
L134	6–25	6–25	6–25	6–25	26–50	1–5	City of Reno, surveyed to 14,000-cfs flow boundary, more placed rock
L135	6–25	6–25	6–25	1–5	51–75	51–75	City of Reno, surveyed to 14,000-cfs flow boundary
L136	6–25	26–50	26–50	6–25	26–50	1–5	City of Reno, surveyed to 14,000-cfs flow boundary, loose surface and eroding
L137	26–50	1–5	6–25	1–5	51–75	1–5	City of Reno, surveyed to 14,000-cfs flow boundary
L138	1–5	26–50	26–50	26–50	26–50	6–25	City of Reno, surveyed up to bank full, angular riprap
L139	6–25	6–25	6–25	6–25	51–75	1–5	City of Reno, surveyed to 14,000-cfs flow boundary, actively eroding
L140	26–50	6–25	6–25	26–50	6–25	6–25	City of Reno, surveyed to top of bank, placed rock
L141	6–25	1–5	26–50	6–25	26–50	6–25	City of Reno, surveyed to top of bank
L142	6–25	6–25	26–50	1–5	76–95	51–75	City of Reno, surveyed to top of bank
L143	26–50	6–25	26–50	6–25	26–50	6–25	City of Reno, surveyed to top of bank, rock wall
L144	6–25	6–25	6–25	6–25	26–50	1–5	City of Reno, surveyed to top of bank, rock wall
L145	26–50	1–5	1–5	6–25	6–25	6–25	City of Reno, surveyed to top of bank, rock wall




APPENDIX C

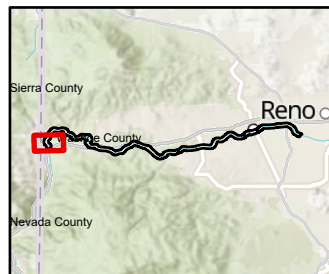
Survey Map Book



-  Project Area
-  14,000 CFS Flood Boundary
-  Publicly Owned Parcel

Bare Soil Percentage

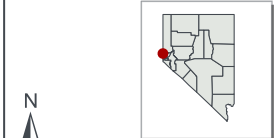
-  1%-5%
-  6%-25%
-  26%-50%



Reno, Washoe County, NV
 NAD 1983 UTM Zone 11N
 39.5151°N 119.9958°W






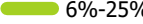
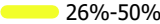
Base Map: Esri ArcGIS Online,
 accessed May 2023
 Project No. 58424

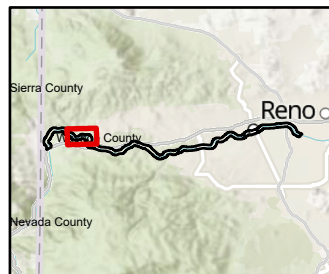


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-  Project Area
-  14,000 CFS Flood Boundary
-  Publicly Owned Parcel

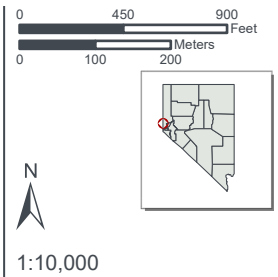
- Bare Soil Percentage**
-  6%-25%
 -  26%-50%

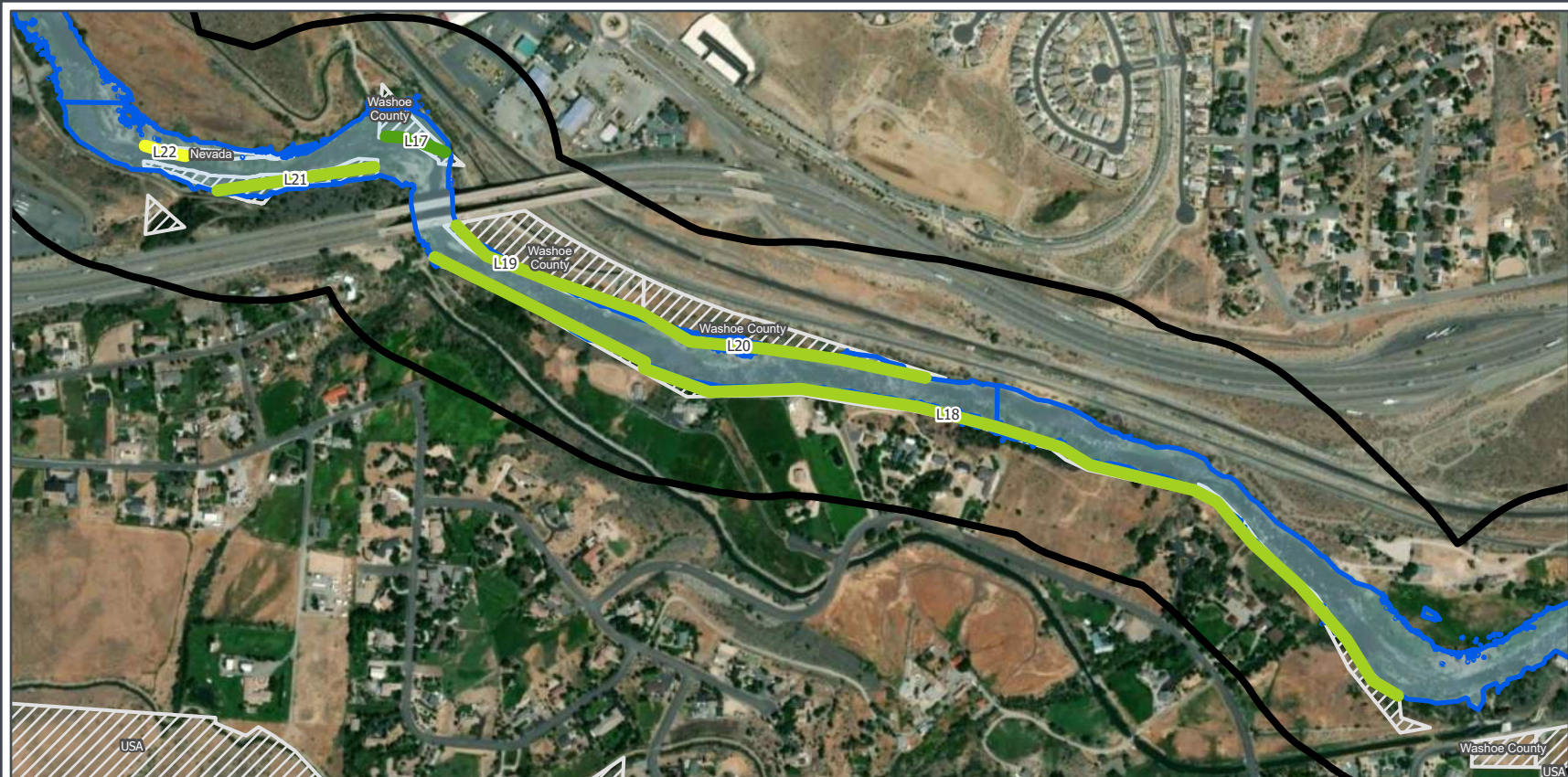





Reno, Washoe County, NV
 NAD 1983 UTM Zone 11N
 39.5209°N 119.9663°W






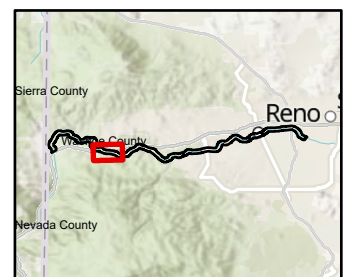
Base Map: Esri ArcGIS Online,
 accessed May 2023
 Project No. 58424





-  Project Area
-  14,000 CFS Flood Boundary
-  Publicly Owned Parcel

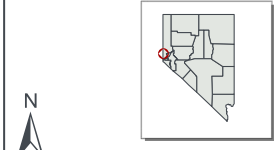
- Bare Soil Percentage**
-  1%-5%
 -  6%-25%
 -  26%-50%



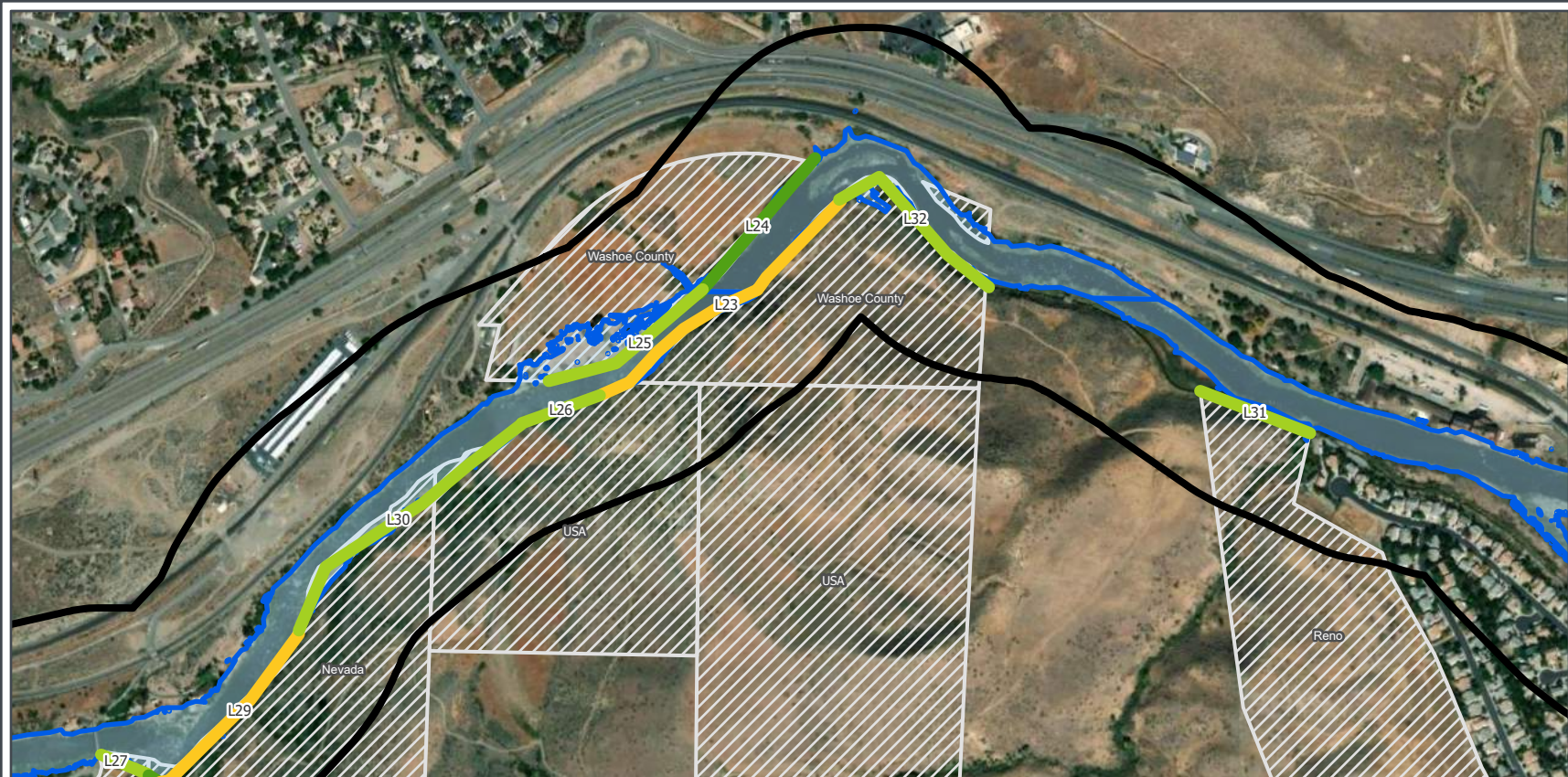
Reno, Washoe County, NV
 NAD 1983 UTM Zone 11N
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Base Map: Esri ArcGIS Online,
 accessed May 2023
 Project No. 58424




1:10,000



 Project Area


 14,000 CFS Flood Boundary

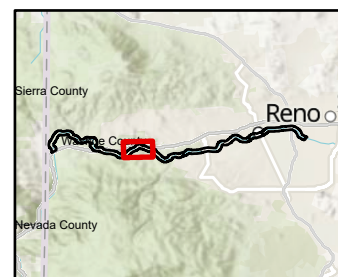
 Publicly Owned Parcel

Bare Soil Percentage

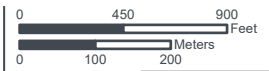
 1%-5%

 6%-25%

 51%-75%



Reno, Washoe County, NV
 NAD 1983 UTM Zone 11N
 39.512°N 119.9206°W






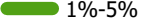
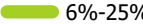

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 Project No. 58424

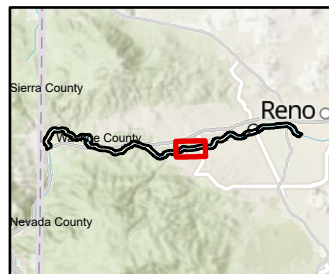


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-  Project Area
-  14,000 CFS Flood Boundary
-  Publicly Owned Parcel

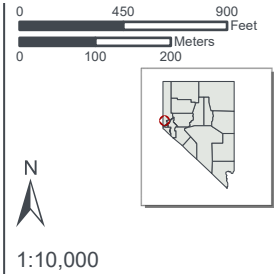
- Bare Soil Percentage**
-  1%-5%
 -  6%-25%
 -  26%-50%



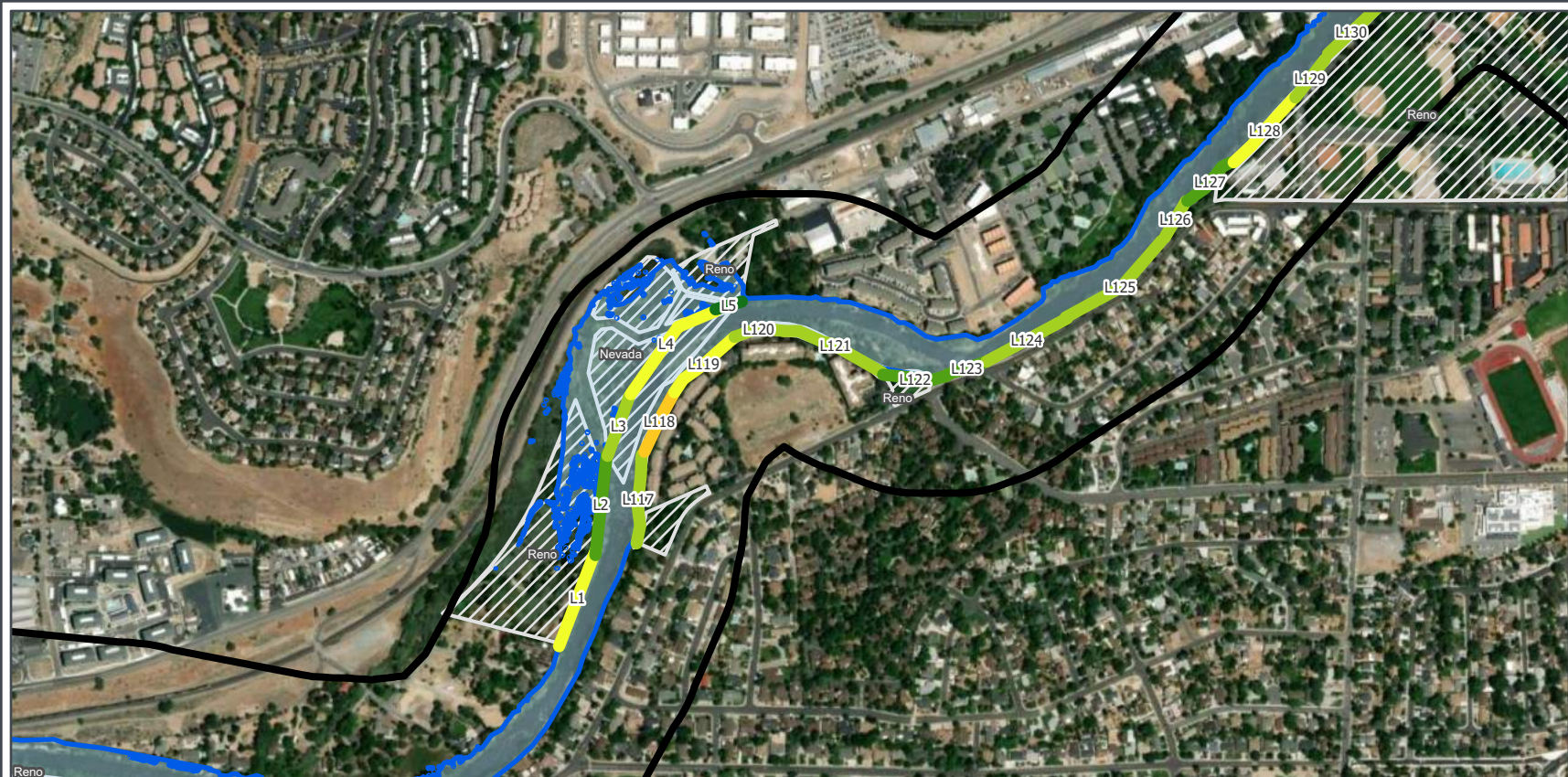
Reno, Washoe County, NV
 NAD 1983 UTM Zone 11N
 39.5097°N 119.8694°W






Base Map: Esri ArcGIS Online,
 accessed May 2023
 Project No. 58424

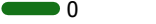
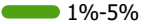
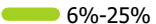
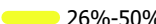
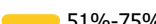


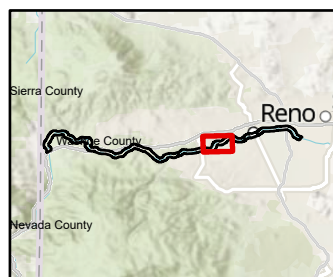
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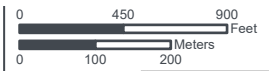
-  Project Area
-  14,000 CFS Flood Boundary
-  Publicly Owned Parcel

Bare Soil Percentage

-  0
-  1%-5%
-  6%-25%
-  26%-50%
-  51%-75%



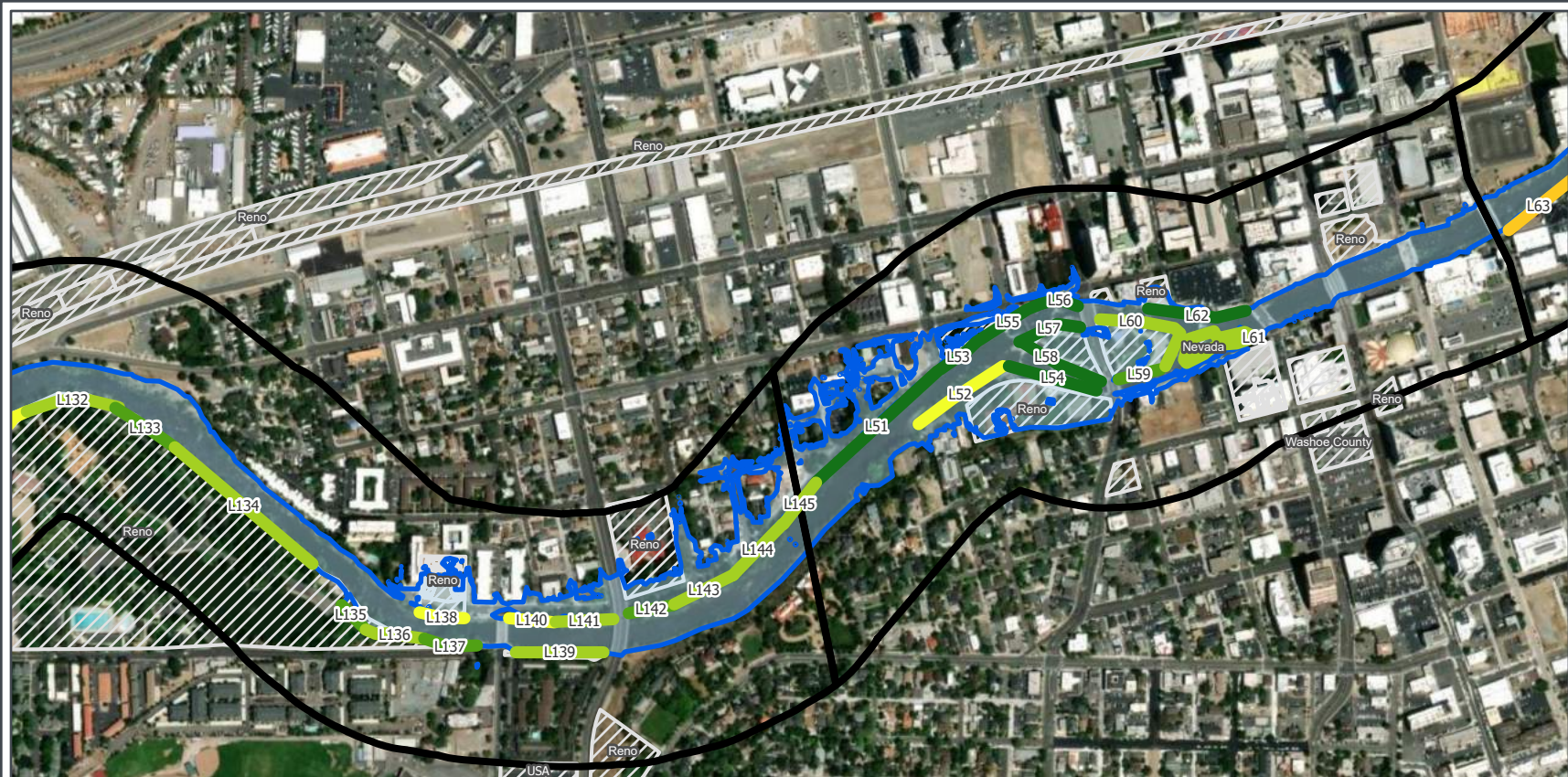
Reno, Washoe County, NV
 NAD 1983 UTM Zone 11N
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Base Map: Esri ArcGIS Online,
 accessed May 2023
 Project No. 58424



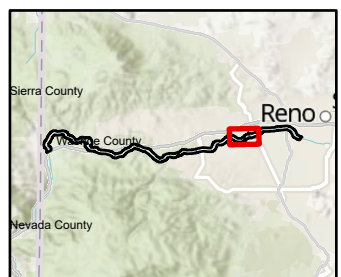
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- Project Area
- 14,000 CFS Flood Boundary
- Publicly Owned Parcel

Bare Soil Percentage

- 0
- 1%-5%
- 6%-25%
- 26%-50%
- 51%-75%



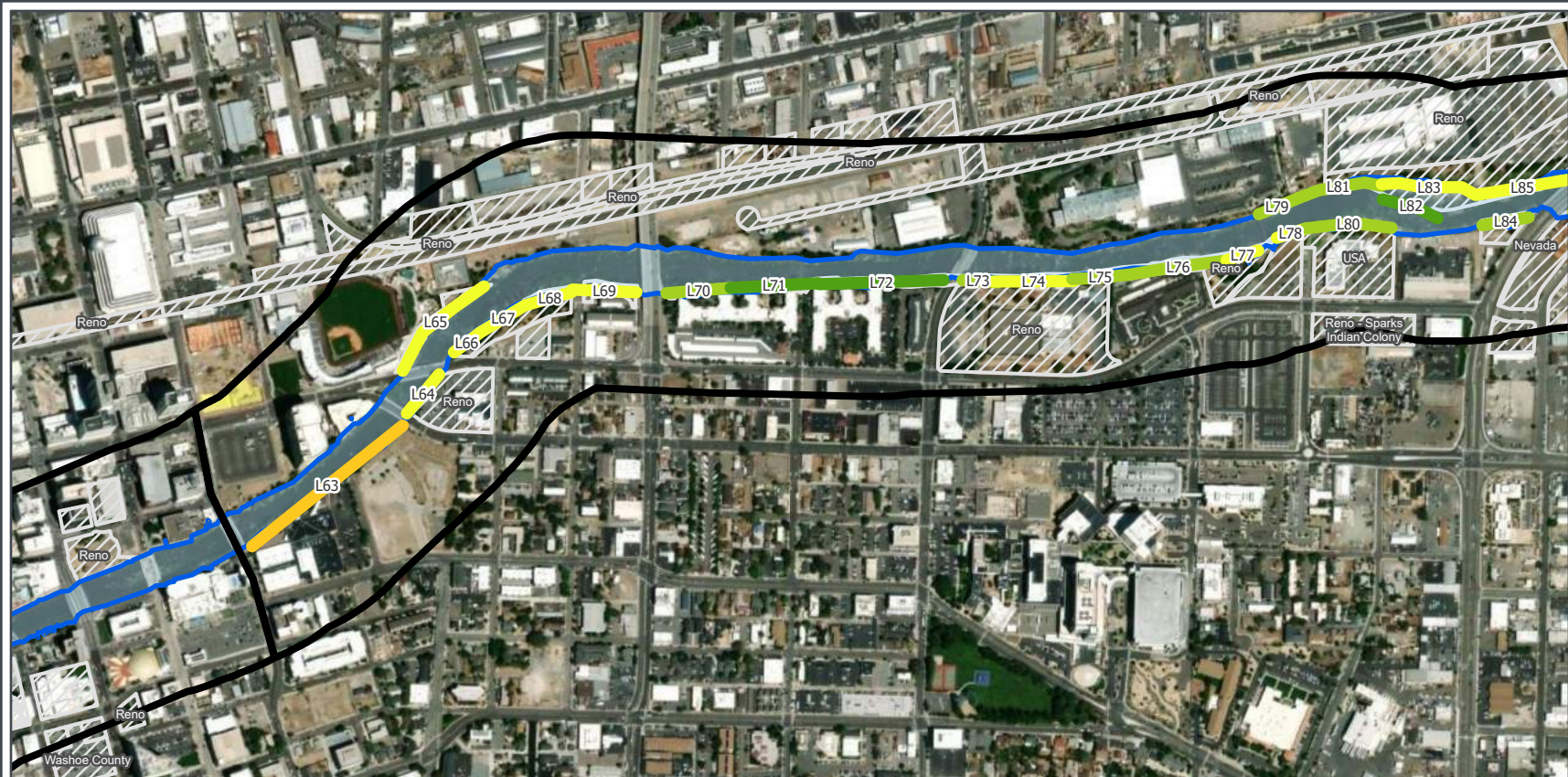
Reno, Washoe County, NV
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 39.5234°N 119.8216°W






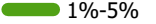
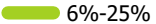

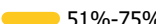
Base Map: Esri ArcGIS Online,
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 Project No. 58424

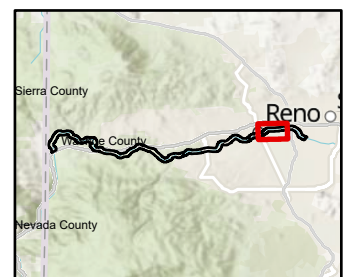


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-  Project Area
-  14,000 CFS Flood Boundary
-  Publicly Owned Parcel

- Bare Soil Percentage**
-  1%-5%
 -  6%-25%
 -  26%-50%
 -  51%-75%



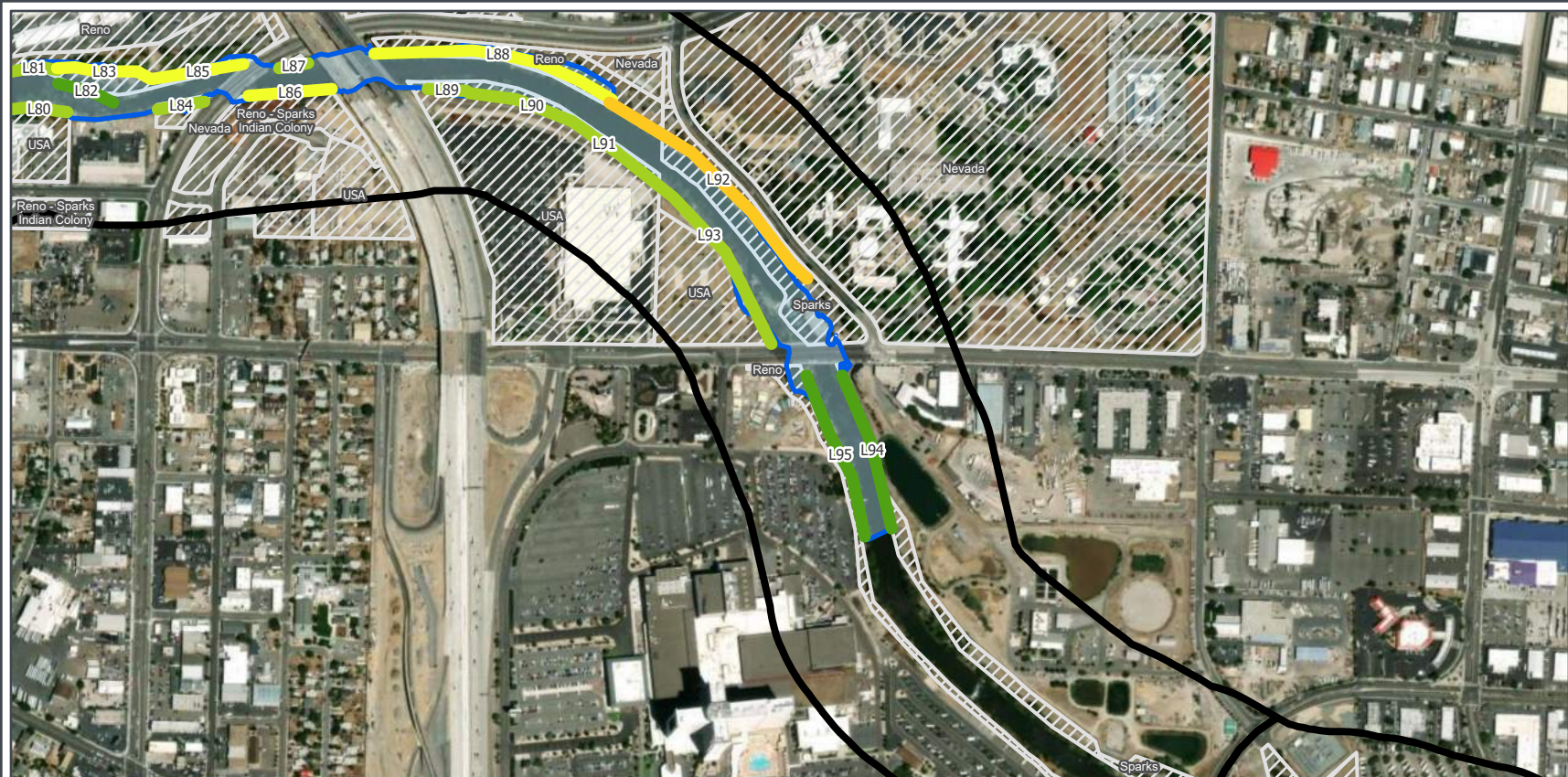
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 NAD 1983 UTM Zone 11N
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



Base Map: Esri ArcGIS Online,
 accessed May 2023
 Project No. 58424

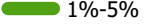
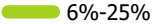

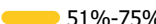


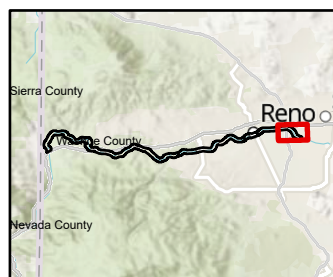
1:10,000



-  Project Area
-  14,000 CFS Flood Boundary
-  Publicly Owned Parcel

Bare Soil Percentage

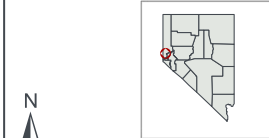
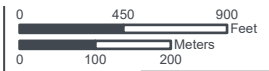
-  1%-5%
-  6%-25%
-  26%-50%
-  51%-75%



Reno, Washoe County, NV
 NAD 1983 UTM Zone 11N
 39.5271°N 119.7784°W



Base Map: Esri ArcGIS Online,
 accessed May 2023
 Project No. 58424



1:10,000