Reevaluation of 2014 Southeast Extension Environmental Assessment

Prepared by RTD
For FTA
December 7, 2017
Acronyms and Abbreviations

EA – Environmental Assessment
EIS – Environmental Impact Statement
FTA – Federal Transit Administration
LPA – Locally Preferred Alternative
NEPA – National Environmental Policy Act
PS&E – Plan, specification, and estimate
ROW – Right of Way
RTD – Regional Transportation District
SHPO - State Historic Preservation Officer
TOD – Transit-oriented Development
USACE – United States Army Corps of Engineers
USFWS – United States Fish and Wildlife Service
Reevaluation of 2014 Environmental Assessment

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1 Background

1.1 Project Description
The Regional Transportation District (RTD) proposes to extend the LRT alignment and provide new transit service from the existing end-of-line Lincoln Station south approximately 2.3 miles to RidgeGate Parkway in the City of Lone Tree, Colorado. The locally preferred alternative (LPA) includes a 2.3-mile, double-track light rail extension that runs south from the existing Lincoln Station along the west side of I-25, crosses to the east side of I-25 just north of the Sky Ridge Medical Center, and continues south to the RidgeGate Parkway interchange. Of this, 2.0 miles, or 87 percent, is at-grade and 0.3-mile, or 13 percent, is above-grade. This alternative provides three new stations. The Sky Ridge Station across from the Sky Ridge Medical Center and the Lone Tree City Center Station situated in the core of the RidgeGate planned development are both planned as kiss-n-ride stations without parking. A new end-of-line station at RidgeGate Parkway would provide a 1,300-space Park-n-Ride, and approximately 800 feet of tail track. Figure 1 shows the LPA.

Figure 1. Locally Preferred Alternative
1.2 NEPA Document

An Environmental Assessment (EA) was completed for this project in August 2014 and a Finding of No Significant Impact (FONSI) was completed in October 2014. The Federal Transit Administration (FTA) Regional Administrator for Region 8 concurred on October 17, 2014 that the EA and its supporting documents, pursuant to 23 CFR 771.121 that there are no likely significant adverse impacts on the environment associated with the development and operation of the proposed Southeast Rail Extension (SERE) Project.

Subsequent to the EA approval and FTA issuance of a FONSI, changes to the design of the RidgeGate Station parking structure and changed site conditions relative to the location of prairie dog colonies within the project footprint necessitated an earlier reevaluation of the 2014 EA. This Reevaluation of 2014 Southeast Extension Environmental Assessment was completed on April 6, 2016 and approved by FTA on April 18, 2016. A second reevaluation is needed to address:

1.) the extension of a water line to serve the end-of-line RidgeGate Station and parking structure.
2.) the addition of a noise wall or sound barrier to mitigate noise impacts south of Lincoln Avenue and north of the SkyRidge Station.

The reason, impacts, and mitigations are described below.

2 Reason for Reevaluation

Reevaluations are completed pursuant to the Council on Environmental Quality (CEQ) guidance on the National Environmental Policy Act of 1969 (NEPA)[ 40 Code of Federal Regulations (CFR) 1502.9(c)] and subsequent agency-specific regulations set forth by FHWA in Environmental Impact and Related Procedures, (23 CFR 771.129), which is also applicable to FTA. Reevaluations of NEPA documents are completed in the case of relevant changes to the project’s impacts, affected environment, or regulatory requirements; in the case of the passage of three or more years since document completion (in the case of Environmental Impact Statements [EIS]); or to review the validity of documents prior to the next project action that requires federal approval. Depending on the context, reevaluations could be completed as consultation between the FTA and the applicant (RTD), or where supplemental information is provided, can be completed as a written evaluation. In the case of the EA for the FasTracks Southeast Rail Extension, this written evaluation examines changes to the project design, existing environment, and impacts that have occurred since publication of the EA. These changes are described below.
3 Changes since the EA

Two project changes, one as a result of a change in design and one resulting from changed site conditions, have necessitated a reevaluation of the SERE EA. These are described below and the changes in impact, with references to the applicable sections of this report, are shown in Table 1.

3.1 Extension of Water Line to Serve the RidgeGate Station Park-n-Ride

An alteration in design to include an extension of a waterline to serve the RidgeGate Station Park-n-Ride is one of two items addressed in this Reevaluation of the EA. Preliminary design for SERE contemplated several options for provision of water service to the RidgeGate Station Park-n-Ride. These included drilling a water supply well and extension of a water line from the north. However, since the publication of the EA, subsequent discussions with water providers, the established Metro District (Rampart Range), and the City of Lone Tree have resulted in the decision to obtain water service from the Parker Water and Sanitation District (PWSD) who serve properties to the east of the RidgeGate Station Park-n-Ride. This will necessitate construction of a water line extension, approximately 3.65 miles in length to east of the RidgeGate Station parcel. The alignment of the proposed water line is shown in Figure 2. This design change, and the evaluation of potential impacts from construction of the water line, are addressed in this Reevaluation.
Figure 2. Proposed Water Line Alignment
3.2 Addition of a Sound Barrier South of Lincoln Avenue

Following completion of the 2014 EA and prior to construction, a noise and vibration study was completed to update potential impacts from the light rail extension. Since completion of the 2014 EA, additional development had occurred warranting a new study to assess impact based on changed site conditions. The results of this study are presented in the Noise and Vibration Technical Memorandum that was completed in December 2016 and is appended to this report. Findings from this study indicate 26 high moderate impacts caused by train operations, that were not determined in the previous study. All of these impacts occur at the AMLI/RidgeGate Apartments located south of Lincoln Avenue, west of the light rail alignment, and north of SkyRidge Station. The evaluation of impact and required mitigation are included in this Reevaluation. Figure 3 shows the areas of impact without mitigation. High moderate impacts are presented in red.
Figure 3. Noise Impacts without Mitigation
Table 1. Impact Assessment

<table>
<thead>
<tr>
<th>Change in Environmental Impact</th>
<th>Notes</th>
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<td>No</td>
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</table>

4 Changes to Resources and Impacts

The extension of the waterline constitutes the need to consider impacts to resources in areas not considered in the 2014 SERE EA, while the updated noise and vibration study results in a need to consider impacts to previously-considered areas as a result of changed site conditions. While, the waterline will traverse an area not previously planned for construction or impact, the noise study indicated impact beyond the mitigation threshold in an already developed and disturbed area. Therefore, the resource evaluation for the waterline extension and the updated noise study are presented separately below.
4.1  Waterline Extension

As described in Section 3.1, the decision to obtain water from the PWSD to serve the RidgeGate Station Park-n-Ride resulted in a design change that includes a waterline extension (approximately 3.65 miles in length) from the east. The proposed waterline connects to the PWSD system north of the Reuter-Hess Water Treatment Facility on PWSD property (see Figure 2). The connection is made to an existing water main near the end of Hagus Place in the Heirloom Neighborhood within the municipal boundaries of the Town of Parker (Latitude: 39°31'04.94" N; Longitude: 104°49'18.08" W). From there the water line traverses west approximately 2,100 linear feet (LF) on PWSD property before turning north. The water line continues north for approximately 4,490 LF until it reaches RidgeGate Parkway right-of-way (ROW). At RidgeGate Parkway, the waterline turns west and travels approximately 5,580 LF along the north side of the existing roadway. At Happy Canyon Creek, the waterline will deflect outside of the existing ROW onto RidgeGate Investments property directly north of the existing RidgeGate Parkway ROW. After crossing Happy Canyon Creek, the water line will deflect back in to the RidgeGate Parkway ROW where it will continue west for approximately 2,730 LF until it reaches the intersection of RidgeGate Parkway and S. Havana Street. From this intersection the water line will continue south for approximately 2,580 LF on the east side of existing S. Havana Street, within the ROW, where it dead ends within the South Havana Street ROW.

4.1.1  Biological Resources

The addition of the proposed waterline will impact additional biological resources. Documentation of this evaluation, Biological, Water Quality, and Parks and Recreation Resources Evaluation Technical Report, July 2017, is appended to this Reevaluation report.

4.1.1.1  Vegetation

Vegetation conditions in the waterline survey area are similar to those documented in the 2014 EA and the survey area is located in previously disturbed and revegetated road right-of-way (ROW), utility corridors, and remnants of native shortgrass prairie impacted by prior agricultural activity and installation of underground utilities. The waterline also traverses two riparian corridors.

Preliminary design information indicates that the limits of disturbance from waterline construction may range from 50 to 100-feet in width over the length of the proposed project. The majority of these impacts will be temporary. Based on this footprint, waterline construction is expected to temporarily disturb approximately 33.6-acres of existing vegetation. Due to the need to include risers, vents, and man-holes, there will be some permanent impacts, but these are anticipated to be less than one-acre of permanent impact.

Vegetation impacts are consistent with impacts described in the 2014 EA, with the only change being the addition of 33.6 acres of potential disturbance during waterline construction.

4.1.1.2  General Wildlife

As identified in the 2014 EA, the most common wildlife species in the study area, including the water line survey area, adapt to human development. A nesting bird survey was conducted, which yielded
three inactive raptor nests and one active Red-tailed Hawk nest; however, all of these are located beyond the survey area limits. Because the impacts of waterline installation are temporary and the habitat area surveyed is mostly low-quality roadway ROW or utility corridor, the construction impacts are similar to those disclosed in the 2014 EA. Therefore, mitigation measures for potential impacts to general wildlife species beyond those included in the EA are not warranted.

The impacts of waterline installation are temporary and the habitat area surveyed is mostly low-quality roadway ROW or utility corridor, the construction impacts are similar to those disclosed in the 2014 EA. As with vegetation, this impact differs from the EA only as a result of the addition of 33.6 acres of potential disturbance.

4.1.1.3  Threatened, Endangered, and Special Status Species

No federally-listed species or their designated critical habitats were identified in the proposed waterline extension survey area. This is consistent with the overall findings in the 2014 EA. However, black-tailed prairie dogs (*Cynomys ludovicianus*, a state-identified Species of Concern), were identified in the waterline survey area. This active colony was not included in the 2014 EA. It is located in the vicinity of pipeline stationing 16+00 to 57+00 at the eastern end of the project (Figure 4). The proposed waterline extension would impact approximately 2.3-acres of active prairie dog habitat.

The 2014 EA identified three prairie dog colonies, A, B, and C on the east side of I-25. Surveys prior to construction indicated that these colonies were no longer active. This was documented in the April 6, 2016 Reevaluation. Also documented in the previous Reevaluation was the presence of a new active colony on the west side of I-25 that was 4.46-acres in size. This colony was removed in July 2016, prior to earth-moving activities in that area, in a manner consistent with the RTD Prairie Dog Mitigation Guidance, as required by the FONSI issued in 2014 and as stipulated in the April 6, 2016 Reevaluation.

The waterline extension will impact a colony located near the eastern end of the proposed waterline that is 2.3-acres in size. It is subject to the RTD Prairie Dog Mitigation Guidance as prescribed and agreed to in the October 2014 Finding of No Significant Impact (FONSI).
Figure 4. SERE Waterline Extension Project Identified Prairie Dog Colonies and Potential Impact Areas
4.1.2 Water Quality

Based on the current design, approximately 33.6 acres would be disturbed during the installation of the proposed waterline. Potential impacts to water quality associated with the construction activity are anticipated to be temporary and similar in nature to those described in the 2014 EA.

4.1.3 Wetlands and Waters of the U.S.

Field surveys to delineate waters of the U.S. (WUS), including wetlands and other waters of the U.S. (OWUS), along the alignment for the proposed waterline extension were conducted in April 2017. The results of this effort are detailed in the Wetlands and Waters of the U.S. Addendum Technical Report that is attached to this Reevaluation. The WUS delineated during these field surveys and three that were previously delineated are shown in Figure 5.

During the 2017 field surveys, one Other Waters of the U. S. (OWUS) was delineated along Havana Street east of the RidgeGate end-of-line station parcel. OW 1 is an open channel leading to a detention basin outside the study area. The basin exhibited wetland vegetation and has a hydraulic connection to Happy Canyon Creek, and is likely jurisdictional. Also observed, was a series of recently-installed stormwater basins along the north side of RidgeGate Parkway that exhibited wetland characteristics were observed. These include WL 1, WL 2, WL 3, WL 5, WL 6, and WL 7. Of these, WL 3, 5, and 6 are isolated and likely non-jurisdictional. WL 1 and 2 are stormwater basins that were excavated into uplands approximately 150-feet laterally and 50-feet vertically from Happy Canyon Creek, a jurisdictional WUS. Due to a direct hydraulic connection to Happy Canyon Creek, WL 1 and 2 are likely jurisdictional. A similar condition exists with WL 7 relative to Badger Gulch and it is likely jurisdictional as well. WL 4 is a storm drain basin fed by roadside drainage. It is isolated and likely non-jurisdictional.

Previous work performed by ERO Resources (ERO) in 2015, resulted in field delineation of two OWUS and one wetland adjacent to the OWUS. OW 2, Happy Canyon Creek, and associated WL 19, and OW 3, Badger Gulch, were determined to be jurisdictional by the USACE in September 2016.

The extension of the waterline from the east to serve the end-of-line parking structure at the RidgeGate Parkway Station, will temporarily impact 0.24-acres of cumulative OWUS and wetlands. These impacts will occur during construction and no permanent impacts are anticipated.
4.2 Addition of Sound Barrier

As introduced in Section 3.2, a noise and vibration study completed in 2016, prior to construction, indicated 26 high moderate impacts caused by train operations that were not determined in the previous study. All of these impacts occur at the AMLI/RidgeGate Apartments located south of Lincoln Avenue, west of the light rail alignment, and north of SkyRidge Station.

Along the east side of the alignment, in this same area, adjacent to the Hampton Inn, seven low moderate impacts and no high moderate impacts were measured. In compliance with FTA requirements, and consistent with the policy established by RTD to provide noise mitigation for noise-sensitive uses that would be subject to severe or high moderate impacts, mitigation is warranted for the high moderate impacts. Figure 3 is a location map that shows impacts measured relative to resources without mitigation. Table 2 shows a summary of the train noise assessment without mitigation.

In this area, the alignment is located on structure as it crosses Lincoln Avenue. Immediately south of Lincoln Avenue, it begins to descend and reaches an at-grade condition (mechanically-stabilized earth [MSE] wall) north of SkyRidge Station. Modeling efforts show that a noise wall or sound barrier, 675-feet in length and with a height of 6-feet above top-of-rail, constructed on top of and along the westerly edge of the Lincoln Avenue bridge structure and continuing south along the wall, would serve to mitigate the impacts. Modeling conducted with the sound barrier in place resulted in no impacts to the AMLI/RidgeGate Apartments, and no impacts above low-moderate to the Hampton Inn. Table 3 is a summary of the mitigated noise impacts.
4.2.1 Environmental Resources

The sound barrier described above will be constructed on the Lincoln Avenue bridge structure and the MSE wall north of SkyRidge Station along the alignment described as the Locally Preferred Alternative in the 2014 Southeast Extension Environmental Assessment. It will be composed of a plexiglass acrylic material, such as Acrylite™, which is transparent. Therefore, because the proposed mitigation will be constructed on a structure already assessed in the SERE EA and of transparent material, there will be no additional impacts to resources.
### Table 2. Summary of Train Noise Impact Assessment – Alignment without Mitigation

<table>
<thead>
<tr>
<th>Receptor Location</th>
<th>Distance to Near Track (ft)</th>
<th>Train Speed (mph)</th>
<th>Existing Noise Level(^1)</th>
<th>Project Noise Level(^2)</th>
<th>Impact Criteria</th>
<th>Total Noise Level (^1)</th>
<th>Noise Level Increase (^1)</th>
<th>Number of Impacts(^3)</th>
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<td>AMLI Apartments (East Facing)</td>
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<td>63-67</td>
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</table>

Source: Parsons Brinckerhoff, 2016.

Notes:
1 Noise levels are based on Ldn measured in dBA.
2 Predicted levels for LRT operations (rounded to the nearest decibel). 3 All impacts are residential unless otherwise noted.

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### Table 3. Summary of Train Noise Impact Assessment – Alignment with Mitigation

<table>
<thead>
<tr>
<th>Receptor Location</th>
<th>Distance to Near Track (ft)</th>
<th>Train Speed (mph)</th>
<th>Existing Noise Level(^1)</th>
<th>Project Noise Level(^2)</th>
<th>Impact Criteria</th>
<th>Total Noise Level (^1)</th>
<th>Noise Level Increase (^1)</th>
<th>Impacts With Mitigation</th>
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<tbody>
<tr>
<td>RidgeGate /AMLI Apartments</td>
<td>60-90</td>
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<td>61-62</td>
<td>51-61</td>
<td>58.4-58.9</td>
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<td>Hampton Inn(^2)</td>
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<td>58-61</td>
<td>58.9</td>
<td>62-66</td>
<td>62-64</td>
<td>0-2</td>
</tr>
</tbody>
</table>

Notes:
1 Noise levels are based on Ldn and are in dBA.
2 Predicted levels for LRT operations (rounded to the nearest decibel).
3 No mitigation required for Hampton Inn.
4 See text; no outdoor use thus no mitigation needed.

Ft = feet
mph = miles per hour
5 Mitigation
Mitigation Measures included in the FTA 2014 Finding of No Significant Impact apply to the resources and impacts listed below and are appended to this report.

5.1 Vegetation
Vegetation is subject to temporary construction impacts consistent with impacts described in the 2014 EA. Therefore, mitigation measures will remain as documented in the 2014 EA and in the October 2014 Finding of No Significant Impact (FONSI). These include, among others, best management practices (BMPs) such as compliance with local jurisdiction tree replacement requirements; reseeding with native species; adherence to the noxious weed management plan; and revegetation of disturbed areas that would not be paved.

5.2 General Wildlife
Relative to wildlife, waterline installation impacts are temporary and similar to those discussed in the 2014 EA and the mitigation measures remain as documented in the 2014 EA and FONSI. Some of these requirements are the use of BMPs to avoid impact to water quality; compliance with the requirements of the Migratory Bird Treaty Act (MBTA); and conducting nesting bird surveys.

5.3 Threatened, Endangered, and Special Status Species
Mitigation measures for impacts to black-tailed prairie dogs remain unchanged and are the same as previously documented in the EA and in the April 6, 2016 Reevaluation. RTD and its contractor will adhere to the RTD Prairie Dog Mitigation Guidance, which states that when prairie dogs are encountered on project sites, no earth-moving activities will take place until prairie dogs have been removed from the site. To remove prairie dogs, RTD will, in order of preference:

1. Avoid and minimize impacts to prairie dogs
2. Relocate prairie dogs if a relocation site can be found
3. Donate prairie dogs to a raptor rehabilitation programs or to the USFWS black-footed ferret program
4. Humanely remove the impacted prairie dogs

5.4 Water Quality
Water Quality mitigation measures are the same as those included in the 2014 and FONSI. Some of these are preparation of a Stormwater Management Plan and using BMPs such as implementation of erosion control measures including silt fences, erosion control blankets, temporary seeding; and others prior to ground disturbance activities.

5.5 Wetlands and Waters of the U.S.
The method of mitigation for impacts to wetlands remains unchanged. Consistent with FHWA and FTA guidelines on wetland mitigation, RTD will require mitigation of impacts to jurisdictional and non-jurisdictional wetlands on a 1:1 ratio. For each square foot of permanently impacted wetland, RTD will
purchase one square foot of approved wetland mitigation credits. Credits will be purchased from a wetland mitigation bank in the Cherry Creek Watershed. Temporary impacts will be mitigated by obtaining appropriate permits from the USACE and by using BMPs established in 2014 EA and in the 2014 FONSI. These include restoration to pre-construction conditions; fencing to distinguish construction areas; fencing limits of disturbance; and protection of wetlands near construction with geotextile, straw, or soil.

5.6 Noise and Vibration
To mitigate the high moderate noise impacts measured at the AMLI/RidgeGate Apartments south of Lincoln Avenue, a noise wall or sound barrier, 6-feet in height (above top-of-rail) and 675-feet in length, will be constructed on and along the westerly edge of the Lincoln Avenue bridge structure. As the alignment descends, the wall will continue along the top of an MSE wall.

6 Agency Coordination
6.1 U.S. Army Corps of Engineers (USACE)
RTD will coordinate with the USACE to obtain permits and approvals for all temporary and permanent impacts to wetlands and other waters of the U.S.

7 References


Attachments


Project: Southeast Extension

Applicant: Regional Transportation District

Project Location: Lincoln Station, Douglas County to RidgeGate Station, City of Lone Tree, Douglas County, Colorado

October 2014

Introduction

The Federal Transit Administration (FTA) is the lead agency for this project under the National Environmental Policy Act of 1969 (NEPA). The Regional Transportation District (RTD) prepared the Southeast Extension Environmental Assessment (EA) pursuant to NEPA, 42 United States Code (U.S.C) 4321 et. seq., and 49 Code of Federal Regulations (CFR) Part 622 related to 23 CFR Part 771. The analysis, potential environmental impacts, and proposed mitigation measures are described in the EA.

Project Description

RTD proposes to extend the existing light rail transit (LRT) alignment and provide new transit service south from the existing end-of-line Lincoln Station in Douglas County, Colorado approximately 2.3 miles to RidgeGate Parkway in the City of Lone Tree, Douglas County, Colorado.

The Locally Preferred Alternative (LPA) includes a 2.3-mile, double-track light rail extension that runs south from the existing Lincoln Station along the west side of I-25, crosses to the east side of I-25 just north of the Sky Ridge Medical Center, and continues south to the RidgeGate Parkway interchange. Of this, 2.0 miles, or 87 percent, is at-grade and 0.3-mile, or 13 percent, is above-grade. This alternative provides three new stations. The Sky Ridge Station across from the Sky Ridge Medical Center and the Lone Tree City Center Station situated in the core of the RidgeGate planned development are both planned as kiss-n-ride stations without parking. A new end-of-line station at RidgeGate Parkway would provide a 1,300-space Park-n-Ride, and approximately 800 feet of tail track. All three stations would accommodate feeder bus service.

The light rail tracks would be grade separated via an overpass where they cross Lincoln Avenue, I-25, and RidgeGate Parkway. One at-grade crossing is proposed on a minor roadway near the
Sky Ridge Station. The project includes eight Light Rail Vehicles (LRV), with rail service via the E Line to Denver Union Station (DUS), F Line to Downtown Denver, and the Z Line, which is new service that will operate between the RidgeGate Station and the Peoria/Smith Station on the I-225 Rail Line. The service frequencies are presented in the following table.

<table>
<thead>
<tr>
<th>Route</th>
<th>Changes from No Action</th>
<th>AM/PM Peak Service</th>
<th>Midday Service</th>
<th>Late Night Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>E Line to DUS</td>
<td>Extended LRT service to RidgeGate Station</td>
<td>30 minutes</td>
<td>15 minutes</td>
<td>15 minutes</td>
</tr>
<tr>
<td>F Line to Downtown</td>
<td>Extended LRT service to RidgeGate Station</td>
<td>15 minutes</td>
<td>No service</td>
<td>No service</td>
</tr>
<tr>
<td>Z Line (New Route)</td>
<td>LRT service between Peoria/Smith and RidgeGate stations</td>
<td>15 minutes</td>
<td>15 minutes</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>

The LPA in the EA included two parking options at the proposed end-of-line RidgeGate Station Park-n-Ride, as described below:

- **Option 1**: This option would provide a 1,300-space surface parking lot on opening day (2019). In 2035, the surface parking lot would be replaced with two parking structures that would accommodate a total of 2,100 parking spaces. The southern parking structure would consist of four levels and the northern parking structure would consist of three levels.

- **Option 2**: This option would provide one 4-level, 1,300-space parking structure on opening day (2019). In 2035, an additional 3-level parking structure would be built north of the first structure that would provide 800 parking spaces, for a total of 2,100 spaces.

The two parking structures in 2035 would be the same design and configuration under both parking options. The EA evaluated the environmental impacts of both parking options.

The LPA is shown in Figure 1.
Figure 1: Locally Preferred Alternative

Source: SE Corridor Project Team, 2014
Selection of Parking Option for RidgeGate Station Park-n-Ride
Parking Option 2 was selected as the preferred parking option for the RidgeGate Station Park-n-Ride. The selected option has a smaller footprint and would result in the need to acquire less right-of-way; would cause fewer impacts to prairie dogs, vegetation, wildlife habitat, and water quality (less impervious surface); would provide the same number of parking spaces as Option 1; and would leave more vacant land available near the RidgeGate Station for transit-oriented development by others.

Changes Made Since Distribution of the EA
The U.S. Fish and Wildlife Service (USFWS) provided a comment on the EA, requesting that additional language be added to mitigation measures to avoid construction impacts to the previously identified red-tailed hawk nest near Cottonwood Creek. In response to the USFWS comment, modifications were made to the following mitigation measure, as shown in bold underlined text. This change is reflected in the mitigation summary in Appendix B.

- Contact the USFWS Colorado field office immediately for further guidance if field survey identifies the existence of one or more active bird nests that cannot be avoided by planned construction activities. Adherence to these guidelines will help avoid the unnecessary take of migratory birds and the possible need for law enforcement action. RTD will coordinate with Colorado Parks and Wildlife (CPW) and the USFWS to implement their Raptor Guidelines, as needed. This could include seasonal restriction to encroachment within 1/3 mile of active nests, if determined by USFWS to be necessary.

Agency Coordination and Public Opportunity to Comment
Public and agency involvement activities for the Southeast Extension began when the Environmental Evaluation (EE) process was initiated in 2008, and included a comprehensive public involvement plan to proactively engage members of the public and agencies in the evaluation process.

In November 2011, at the beginning of the alternatives development process, RTD held three scoping meetings, one each with local governments, members of the public, and governmental agencies. RTD used the input received during scoping to refine the evaluation criteria and the project’s Purpose and Need, against which all alternatives would be evaluated.

Following the scoping process, RTD conducted a two-step alternatives screening process and identified a preliminary LPA. RTD then held meetings in January 2012 with local governments,
members of the public, and agencies to present the results of the screening process, present the preliminary LPA, and solicit comments and input on the screening results and preliminary LPA. The LPA determined by the screening process was accepted by meeting attendees.

RTD continued public and agency involvement during the EA process. On September 24, 2012, RTD announced initiation of the EA for the proposed project to the U.S. Fish and Wildlife Service (USFWS), Colorado Parks and Wildlife (CPW), Colorado Department of Transportation (CDOT) Region 1, CDOT Region 6, the Air Pollution Control Division (APCD), the U.S. Army Corps of Engineers (USACE), and the Denver Regional Council of Governments (DRCOG). RTD held meetings with local governments, agencies, and members of the public in December 2013 to present information on key environmental issues identified, potential impacts, and proposed measures to mitigate impacts. Public and agency comments about the proposed project did not produce significant concerns.

Notification of all meetings was made by email and website postings. The public meetings were announced in local newspapers, including the Parker Chronicle, the Highlands Ranch Herald, the Lone Tree Voice, and the Littleton Independent. Additionally, flyers were distributed to local businesses, at the Lone Tree Recreation Center and Library, at the Lincoln Station Park-n-Ride, on the RTD website, and by email blast to 55 recipients who had previously registered as interested citizens.

FTA and RTD conducted Section 106 consultation as part of the EA process with the State Historic Preservation Officer (SHPO) and other historic consulting parties regarding potential effects to cultural resources. Native American tribes were invited to participate in the 106 consultation process. No tribes elected to participate; however, one tribe, the Pueblo of Laguna, requested notification if additional resources are found during construction.

Availability of the Southeast Extension EA for agency and public review and comment, and the public meeting, were announced through the following methods:
• Announcements published in the following newspapers:
  - Centennial Citizen on August 15 and 22, 2014
  - Denver Post on August 12, 2014
  - Highlands Ranch Herald on August 14 and 21, 2014
  - Lone Tree Voice on August 14 and 21, 2014
  - Parker Chronicle on August 15 and 22, 2014

• News releases distributed to the following media:
  - CBS4 on August 12, 2014
  - Centennial Citizen on August 12, 2014
  - Denver Business Journal on August 12, 2014
  - Denver Post on August 12, 2014
  - Douglas County News-Press on August 12, 2014
  - Englewood Herald on August 12, 2014
  - Facebook on August 13, 2014
  - Highlands Ranch Herald on August 12, 2014
  - KOA/Clear Channel on August 12, 2014
  - Littleton Independent on August 12, 2014
  - Lone Tree Voice on August 12, 2014
  - Parker Chronicle on August 12, 2014
  - Twitter on August 13, 2014
  - Viva Colorado (Spanish paper published by Denver Post) on August 12, 2014

• Email blast to approximately 414 individuals on the stakeholder list.

• RTD and RTD FasTracks websites.

The Southeast Extension EA was made available for public review on August 12, 2014 for a 30-day comment period that ended on September 12, 2014. A hard copy of the EA was made available for review during the comment period at the following locations:

• City of Lone Tree Administrative Office, 9220 Kimmer Drive, Suite 100, Lone Tree, CO
• Douglas County Government, 100 Third Street, Castle Rock, CO
• Highlands Ranch Library, 9292 South Ridgeline Boulevard, Highlands Ranch, CO
• Lone Tree Library, 8827 Lone Tree Parkway, Lone Tree, CO
• Parker Library, 10851 South Crossroads Drive, Parker, CO
• RTD Administration Building, 1600 Blake Street, Denver, CO
• RTD FasTracks Office, 1560 Broadway, 7th Floor, Denver, CO

The EA was also made available on the RTD and RTD FasTracks websites.
Additionally, a hard copy of the Executive Summary of the EA was sent to representatives of the following agencies and local governments:

- City of Lone Tree
- Colorado Department of Public Health and Environment Air Pollution Control Division
- Colorado Department of Transportation
- Colorado House of Representatives
- Colorado Parks and Wildlife
- Colorado State Senate
- Coventry Development
- Denver Regional Council of Governments
- Douglas County Commissioners
- Federal Highway Administration
- Highlands Ranch Community Association
- Public Utilities Commission
- State Historic Preservation Officer
- Town of Parker
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency Region 8
- U.S. Fish and Wildlife Service
- Urban Drainage and Flood Control District

During the 30-day EA review and comment period, RTD held meetings with local governments and stakeholders, resource agencies, and the public to present the environmental impacts and mitigation measures contained in the EA and to provide opportunity to comment on the project. These meetings are summarized below. Meeting minutes are provided in Appendix A.

- **Local Governments and Stakeholders Meeting:** This meeting was held on August 27, 2014, at the City of Lone Tree Administrative Offices, 9220 Kimmer Drive, Lone Tree, Colorado, from 1:30 pm to 2:30 pm. Attendees included representatives from the City of Lone Tree, RidgeGate, and Douglas County.

- **Public Meeting:** A public meeting was held on August 27, 2014, to present the impacts and mitigation measures contained in the EA, and to provide opportunity to comment on
the project. The public meeting was held at the Lone Tree Recreation Center, Willow Room, 10249 RidgeGate Circle, Lone Tree, Colorado, from 7:00 pm to 9:00 pm. A total of 24 people registered on the sign-in sheets at the meeting. The meeting was held in an open house format followed by a short presentation and question/answer period. Project team members were available to take comments and answer questions. Members of the public could provide comments on the comment sheets provided at the public meeting or through RTD’s FasTracks website.

- **Agency Meeting**: This meeting was held on September 4, 2014, at RTD offices, 1560 Broadway, Denver, Colorado, from 9:00 am to 10:00 am. Attendees included representatives from the Denver Regional Council of Governments and the Colorado Public Utilities Commission.

**Comments on the EA**

During the 30-day EA comment period (August 12, 2014 through September 12, 2014), eight comments were received through comment sheets, email, letters, or the RTD FasTracks website. Approximately 30 verbal comments and questions were received at the local governments and stakeholders meeting, the public meeting, and the agency meeting.

All comments received were compiled and reviewed. All EA comments received and responses to each comment are provided in Appendix A and are also available for review on RTD’s FasTracks website at [http://www.rtd-fastracks.com](http://www.rtd-fastracks.com).

**Planned Outreach**

RTD will continue to coordinate with local governments and stakeholders during the final design process and construction phase. This includes coordinating with the City of Lone Tree to determine detour routes for temporary sidewalk closures along Lincoln Avenue and RidgeGate during construction.

**Mitigation Measures to Minimize Impacts**

Measures that will be undertaken by RTD to mitigate impacts as a result of the proposed project are presented below. For more detail, please refer to Appendix B.

**Resources that Require No Mitigation**

No direct, indirect, or temporary construction impacts would occur to the following resources therefore no mitigation is necessary.
• Land Use and Zoning
• Environmental Justice
• Farmlands

Resources that Require Mitigation
The following resources would have direct or indirect impacts as a result of the proposed project and, therefore, require mitigation.

• Land Acquisitions, Displacements, and Relocations of Existing Uses
• Cultural Resources
• Visual and Aesthetic Conditions
• Noise and Vibration
• Water Resources and Water Quality
• Wetlands and Waters of the U.S
• Vegetation and Noxious Weeds
• Biological Resources, including wildlife and Threatened and Endangered Species / Special Status Species
• Transportation

The following resources would have temporary construction impacts as a result of the proposed project and will be mitigated and monitored during construction.

• Social Conditions and Community Facilities
• Economic Conditions
• Cultural Resources
• Visual and Aesthetic Resources
• Park and Recreation Facilities
• Air Quality and Energy
• Noise and Vibration
• Water Resources and Water Quality
• Wetlands and Waters of the U.S
• Floodplains
• Mineral Resources, Geology, and Soils
• Biological resources, including wildlife and Threatened and Endangered Species / Special Status Species
• Vegetation
• Noxious Weeds
• Hazardous Materials
• Public Safety and Security
• Utilities
• Transportation

Determinations and Findings

National Environmental Policy Act Finding
FTA is the lead agency for the project under NEPA. RTD prepared the EA for FTA review in compliance with NEPA, 42 U.S.C § 4321 et. seq., and with FTA’s regulations, 23 CFR Part 771. FTA has independently evaluated the adequacy of the EA.

After carefully considering the EA, its supporting documents, and the public comments and responses, FTA finds under 23 CFR 771.121 that the proposed project, with the mitigation that is required herein, will have no significant adverse impact on the environment. The environmental record provides sufficient evidence and analysis for determining that an Environmental Impact Statement is not required.

Land Use and Zoning
The proposed project is consistent with and supports the existing and planned mixed-use, retail, and commercial land uses included in the RidgeGate planned development and City of Lone Tree plans. This results in no impact to land use in the Study Area.

Land Acquisitions, Displacements and Relocations of Existing Uses
Most right-of-way needs would be met through agreements with the City of Lone Tree, Coventry Development Corporation, and CDOT. No residential acquisitions would be required, and no business or residential relocations would be required. The project would require 29 acres from 33 parcels. Acreages include approximately 12 acres for the LRT alignment. The preferred parking option would require acquisition of approximately 15 acres, which is the land needed for both proposed parking structures (one in 2019 and the second in 2035) that would be acquired at the same time. North of Lincoln Avenue, portions of three commercial properties (less than 1.15 acre) adjoining the reserved 25-foot right-of-way would be acquired. Approximately 22 parking spaces would be permanently removed from one commercial property north of Lincoln Avenue.
RTD will comply with the Uniform Act and will coordinate with property owners during the final design process to seek ways to minimize parking impacts. During construction, an estimated eight acres of temporary construction easements may be needed on adjacent property to gain access. Property access may be temporarily impacted. Construction could affect surrounding roadways through temporary lane closures and/or detours.

Social Conditions
No adverse impacts to existing neighborhoods, population, or employment are anticipated. No impacts to community facilities would occur. Temporary construction impacts would include traffic congestion and temporary changes in noise, air quality, and visual conditions caused by construction activities.

Economic Conditions
The proposed project is consistent with and supports the existing and planned mixed-use, retail, and commercial land uses included in the RidgeGate planned development and City of Lone Tree plans. Construction would provide economic stimulus within the Denver metropolitan region, including creation of up to 450 construction jobs and an estimated $431.2 million of additional economic activity. Operation and maintenance of the project would generate approximately 20.5 permanent jobs and approximately 13 additional jobs would be generated in all industries not associated with transit operations. During construction, adjacent businesses may experience temporary noise, dust, and visual changes, as well as temporary access modifications.

Environmental Justice
There are no environmental justice communities within the study area. Therefore, no disproportionately high or adverse impacts to minority or low-income populations would occur.

Section 106 Compliance
Through the Section 106 process, it was determined that the minor project-related indirect visual impacts would not alter those characteristics that render the Schweiger Ranch (5DA 1753) property eligible for the National Register of Historic Places (NRHP), and the LPA would have No Adverse Effect to the Schweiger Ranch. The No Adverse Effect determination assumes certain mitigating factors to be included in the RidgeGate Station Park-n-Ride design, including the use of materials for retaining walls and parking structures associated with both parking options that would be compatible in color, texture, and design to the surrounding natural environment, and would not greatly contrast with the area landscape surrounding the ranch. FTA notified the State Historic Preservation Officer (SHPO) of their determination of No Adverse
Effect and requested concurrence in a letter dated October 23, 2013, and the SHPO concurred on November 4, 2013. In a May 15, 2014 letter, FTA notified the SHPO of minor design modifications made to the RidgeGate Station Park-n-Ride parking options, and requested the SHPO’s concurrence that the LPA would still result in No Adverse Effect to the Schweiger Ranch. The SHPO concurred on May 21, 2014. Minor visual changes near this resource would occur during construction activities. The potential exists to uncover unidentified paleontological or archaeological resources during ground disturbing construction activities.

Based on the cultural resources analysis and consultation with the SHPO, FTA finds that the project will have No Adverse Effect on the Schweiger Ranch or other historic resources. FTA finds that the Section 106 coordination and consultation requirements for this project have been fulfilled.

Visual and Aesthetic Resources
While there would be visual changes from the project, no significant visual impacts would occur from new bridges, Park-n-Ride facility and parking structures, LRT track elements, or vegetation removal. Minimal impacts would occur from views of temporary construction activities.

Parks and Recreation
No direct impacts, and minimal to no indirect and construction impacts to park or recreation resources would occur because none are located in the impact area. No noise, visual, or air quality impacts are anticipated for recreation resources in proximity to the project corridor.

Section 4(f) and 6(f) Compliance
Section 4(f) of the United States Department of Transportation Act of 1966 declares a national policy that a special effort must be made to preserve the natural beauty of the countryside, public park and recreational lands, wildlife and waterfowl refuges, and historic sites. No parks, recreational lands, or wildlife or waterfowl refuges are located within the impact area. Further, there would be No Adverse Effect to NRHP-eligible resources within the study area.

Additionally, Section 6(f) of the Land and Water Conservation Act of 1965 protects federal investments and states that properties acquired with the funding under the act shall be protected. There are no 6(f) properties within the study area.

FTA finds that the proposed project will not use any Section 4(f) properties. Additionally, the proposed project will not convert any Section 6(f) lands. The project therefore complies with the requirements of Section 4(f) and Section 6(f).
Farmland
No impacts to prime farmland, unique farmland, or land of statewide or local importance would occur.

Energy and Conformity with Air Quality Plans
There will be decreases in Mobile Source Air Toxics (MSATs) from existing conditions. The project will not violate air quality standards. The project would contribute to improvements in regional air quality. Minimal impacts to energy consumption would occur. There would be temporary impacts during construction from equipment, dust, etc., and use of energy resources during construction.

On the basis of the determinations made in compliance with relevant provisions of federal law, FTA finds that the project satisfies the requirements of NEPA, the Clean Air Act of 1970, and the U.S. Department of Transportation Act of 1966, as amended. The project is identified in the conforming Long Range Transportation Plan (LRT) and in the conforming Transportation Improvement Program (TIP) for the Denver metropolitan region.

Noise and Vibration
Noise impacts in the high moderate range at Sky Ridge Medical Center hospital tower and medical office building are anticipated to occur. No excessive ground-borne vibration is projected to occur during construction or operation of the LPA at any location along the alignment. Temporary noise impacts would occur from construction of stations, utility relocations, grading, excavation, track work, demolition, and installation of system components. Such impacts may occur in residential areas and at other noise-sensitive land uses located within several hundred feet of the alignment. The potential for noise impact would be greatest at locations near pavement breaking and at locations close to any night time construction work. RTD will coordinate with the Public Utilities Commission to establish a “quiet crossing” to eliminate the use of train horns near the grade crossing at the south end of the proposed SkyRidge Station.

After carefully reviewing the EA and supporting documents, including comments from the public and agencies and the responses to those comments, FTA finds that the proposed project, with the mitigation that is required herein, will have no significant adverse noise or vibration impacts.
Water Resources and Wetlands and Waters of the U.S.

Potential impacts to water resources and water quality were evaluated using Driscoll modeling of impervious surface areas. The increase in copper and zinc runoff to Happy Canyon Creek would occur at the RidgeGate Station. However, the increases are less than the threshold effect level as defined by the U.S. Environmental Protection Agency (EPA). Water quality effects during construction would include sedimentation in receiving streams and drainage facilities, erosion of on-site and off-site soils, and petroleum spills from heavy equipment fueling.

Two non-jurisdictional wetlands (SE-9 and SE-10) would be impacted. Approximately 9,629 square feet of the 10,953-square-foot Wetland SE-9 would be impacted from Havana Street improvements. The entire Wetland SE-10 (290 square feet) would be impacted by construction of the RidgeGate Station Park-n-Ride under both parking options. RTD will work to reduce wetland impacts during final design and for impacts to SE-9 and SE-10, RTD will purchase credits from a wetlands mitigation bank within the Cherry Creek Watershed. During construction, temporary impacts to wetland SE-8, a 450-square foot, non-jurisdictional wetland, would occur. Also, temporary sedimentation, vegetation removal, and water quality degradation would occur during construction.

After carefully reviewing the EA and supporting documents, FTA finds that the proposed project, with the mitigation that is required herein, will have no significant adverse impact on water resources.

Flooding and Floodplain Management

No direct impacts to the Cottonwood Creek 100-year floodplain would occur because the LPA would span the floodplain. The impervious surfaces from the project’s stations are not within the 100-year floodplain. Temporary impacts to the Cottonwood Creek floodplain would potentially occur during construction.

Mineral Resources, Geology, and Soils

Direct impacts would be minimal and would be similar to temporary construction impacts, which include loss of slope stability, erosion and aggradation, and ground surface settlement. Adverse substrate or groundwater conditions may influence the design. Topographic relief, range and distribution of elevations, bedrock exposure, and drainages can influence alignment placement and design. No impacts are anticipated with proper implementation of construction mitigation.
Biological Resources

Wildlife
Due to presence of existing roadways, highway, and area development, the proposed project is not expected to act as a barrier to wildlife movement. Approximately 60 acres of wildlife habitat impacts would occur. The total permanently impacted acreage of the LPA, including RidgeGate Station Park-n-Ride, would be 40 acres. Some wildlife displacement would occur during construction. Minimal indirect impacts would occur because the project area is composed of developed or developing areas that have already or soon will be bisected by roadways, including I-25 and RidgeGate Parkway. Indirect impacts would occur to aquatic life and amphibians in the project area along Cottonwood Creek from erosion along riverbanks.

Minimal temporary construction impacts to wildlife would occur. Increased noise and activity during construction may cause wildlife to temporarily leave area. Direct mortality of small terrestrial and burrowing animals could occur during ground-clearing activities and collisions with construction vehicles. Disturbance of migratory birds, such as the active red-tailed hawk nest observed in the immediate vicinity of the LPA at Cottonwood Creek, are subject to the Migratory Bird Treaty Act (MBTA). RTD will coordinate with CPW and the USFWS to implement their Raptor Guidelines, as needed.

Threatened, Endangered, and Sensitive Species
No federally-listed species or their designated habitats were identified in the project corridor. Therefore, no impacts to such species are anticipated.

The proposed project would impact a total of approximately 16.1 acres of prairie dog colonies A, B, and C within the study area. RTD or their contractor will adhere to the FasTracks Prairie Dog Mitigation Policy to avoid, minimize, and/or mitigate impacts to prairie dogs. The policy states that the first step is avoidance. If this is not feasible, sites to relocate prairie dogs should be considered next. Finally, if this is not feasible, removal and humane euthanasia should be employed. In no case will construction activities commence that would result in burying live prairie dogs.

FTA, in cooperation with RTD, prepared a Biological Assessment (BA) in 2013 for the FasTracks program to address South Platte depletions and USFWS issued a Biological Opinion (BO) in 2014. Water usage and potential depletions for the Southeast Corridor Extension project will be included in the annual report of RTD construction water usage to the USFWS.
Vegetation
Approximately 60 acres of vegetation would be impacted, of which approximately 50 acres would occur in areas that have been recently graded, previously disturbed and reseeded, or used for grazing. Several ornamental trees and shrubs would be removed from commercial landscaped areas north of Lincoln. Any trees removed will be replaced per the requirements of local governments or CDOT and when possible. Station areas will be landscaped using native species. During construction, approximately 20 acres of vegetation would be temporarily impacted.

Noxious Weeds
During construction, approximately 20 acres of vegetation would be temporarily impacted and would be susceptible to spread of weedy plant species especially along drainage ditches beside track. A noxious weed management plan will be developed to control encroachment of noxious weeds.

Hazardous Materials
No impacts are anticipated because no potential hazardous material sites are identified within or adjacent to properties to be acquired or construction areas. However, it is possible that undocumented or unanticipated hazardous materials could be encountered during ground-disturbing construction activities. Protection of construction workers and water quality would be required.

Public Safety and Security
Temporary impacts would occur during construction to police, fire, and emergency response times due to potential roadway closures and detours. RTD will convene a Fire and Life Safety Committee that will assist in preparing an emergency plan and coordinate responses to emergency situations as is standard practice. There would be no additional safety and security concerns because RTD’s Crime Prevention Through Environmental Design (CPTED) policies have been implemented in the design for this project. Additionally, all station areas and boarding facilities will be constructed in accordance with the Americans With Disabilities Act.

Utilities
Existing utilities will be relocated or protected, as required. Utility conflicts can be found in the Advanced Basic design for this project, which is the basis for the EA’s impact analysis. Additionally, the project team will coordinate with utility providers and will develop Utility Relocation Agreements (URAs) during the final design for this project. Temporary service interruptions to protect or relocate utilities as needed may occur.
Transportation

No traffic impacts are anticipated on opening day (2019). In 2035, the Level of Service at the RidgeGate Parkway and Havana Street intersection would decrease, and the RidgeGate Park-n-Ride Access #1 may reach capacity. The RidgeGate Parkway/Havana Street intersection will be monitored from opening day to 2035. RTD and the local jurisdiction will work together to determine the timing of the need for improvements and the responsibilities for implementing these improvements. During some periods of the construction process, motorists would experience travel delays. Access to local neighborhoods will be maintained and signage will be used to notify drivers of detours. The exact location of detour notifications and signage will be determined during final design. Near each station, vehicular traffic and access to local businesses will be maintained throughout construction using construction traffic control methods to be determined during final design.

It is currently anticipated that detours and/or road closures may occur on the following roadways during construction:

- Lincoln Avenue
- RidgeGate Parkway
- Havana Road
- I-25
- SkyRidge Parkway

RTD will provide signage to guide roadway users to detours and will provide public notice prior to implementing roadway detours to inform users about detour routes and dates/times that detours will be in place.

Temporary closure of sidewalks would be required along Lincoln Avenue and RidgeGate Parkway during construction of the light rail bridges over those roads to ensure the safety of sidewalk users. RTD will coordinate with the City of Lone Tree to identify sidewalk detour routes.

After carefully reviewing the EA and supporting documents, including comments from the public and agencies and the responses made to those comments, FTA finds that the proposed project, with the mitigation that is required herein, will have no significant adverse impact on transportation.
Environmental Finding

RTD has incorporated environmental considerations into a study of project alternatives, and has conducted evaluations of the project's potential environmental impacts. The EA was issued on August 12, 2014, and is hereby incorporated by reference in this Finding of No Significant Impact.

After carefully considering the analysis and conclusions in the EA, its supporting documents, and the public comments and responses, FTA finds pursuant to 23 CFR 771.121 that there are no likely significant adverse impacts on the environment associated with the development and operation of the proposed Southeast Extension Project.

Linda M. Gehrke
Regional Administrator
Federal Transit Administration, Region 8

17 October 2014

Date
Appendix A

Summary of Public and Agency Comments Received
Summary of Meetings Held After Distribution of the EA

The following meetings were held following distribution of the EA to present the impacts and mitigation measures contained in the EA and to provide opportunity to comment on the project. Refer to the meeting minutes included in this appendix for more information.

- **Local Governments and Stakeholders Meeting**: August 27, 2014, held at City of Lone Tree Administrative Offices, 9220 Kimmer Drive, Lone Tree, Colorado.

- **Public Meeting**: August 27, 2014, held at the Lone Tree Recreation Center, Willow Room, 10249 RidgeGate Circle, Lone Tree, Colorado, from 7:00 pm to 9:00 pm.

- **Agency Meeting**: September 4, 2014, held at RTD offices, 1560 Broadway, Denver, Colorado, from 9:00 am to 10:00 am
RTD Southeast Extension Environmental Assessment

RTD Southeast Extension EA
Stakeholder and Local Agency Meeting
August 27, 2014, 1:30 pm to 2:30 pm
City of Lone Tree Offices

Participants:

RTD: Susan Wood, Andy Mutz, Joni Goheen
Coventry Development: Keith Simon, Darryl Jones
City of Lone Tree: John Cotten
Douglas County: Art Griffith
Jacobs: Tom Underwood, Misty Swan

The purpose of the meeting was to provide the information to local stakeholders and agencies that will be presented at the August 27, 2014 public meeting, and obtain feedback on the information presented and answer questions.

Susan Wood began the meeting with introductions, and then presented information about the project history, where we are in the process, purpose and need, alternatives evaluated, and project schedule. She presented the findings of the Environmental Assessment (EA), including impacts and mitigation. The meeting then opened up for questions and answers, as summarized below.

1. **Question**: I thought that 2,000 parking spaces would be provided at the RidgeGate Station in 2019; why will 1,300 spaces be provided instead? **Answer**: The traffic analysis for the project was recently updated, which considered the recent economic down turn and changes that DRCOG made to their travel model. The results of the updated traffic analysis indicated that 1,300 parking spaces would be needed in 2019. RTD will monitor the occupancy of parking spaces and parking needs at the RidgeGate Station.

2. **Question**: Will the E and F light rail transit (LRT) lines be the only ones that serve the Lincoln and RidgeGate stations? **Answer**: Yes, at this time. However, when the I-225 LRT corridor is completed, the Z line, which will run along I-225, will serve both stations.

3. **Question**: Is 2,100 parking spaces the maximum number that could be provided at the RidgeGate Station? **Answer**: No. It would be possible to build additional parking if needed.

4. **Question**: Will the RidgeGate Station have a drop-off (kiss-n-ride)? **Answer**: Yes.

5. **Question**: What are the general dates associated with the steps shown in the Federal New Starts Process slide? **Answer**: General timeframes for the remaining steps are as follows:
   - Apply/receive entry into engineering phase: September 2014
   - FTA funding recommendation: Expected in February or March 2015.
   - Receive full funding grant agreement: Expected in late 2015 or early 2016.
   - Construction: Construction is anticipated to begin in 2015, with construction completion in 2019.
6. **Question:** Does the study area map just show the area within the RTD district? **Answer:** No, it shows the area that people would come from to ride the LRT.

7. **Question:** Why doesn’t the study area boundary extend farther east to include the entire Town of Parker? **Answer:** The study area boundary was determined by traffic analysis zones used in the traffic analysis for the project.

8. **Question:** The study area map does not show RidgeGate Parkway going farther east. **Answer:** Although not shown on the map, the existing RidgeGate Parkway was considered in the traffic analysis for the project.

9. **Question:** Would people living in Castle Rock pay for parking at the RidgeGate Station? **Answer:** Yes, because they are outside the district.

10. **Question:** Which parking option will be chosen for the RidgeGate Station? **Answer:** The EA evaluated both parking options for impacts, and left both configurations as options. RTD selected Option 2 (structured parking in 2019 and 2035) for the RidgeGate Station because it would result in fewer environmental impacts.

11. **Question:** Regarding the no adverse effect to Schweiger Ranch. Does that determination include potential widening of Havana Street? **Answer:** No. The project would not encroach on the Schweiger Ranch parcel.

12. **Question:** Would bikes be accommodated from RidgeGate Station to connect to the trail that Douglas County has planned farther to the south? Is there room on the west side of Havana Street to accommodate future bike/pedestrians? **Answer:** Yes. RTD is aware of the planned trail to the south, which would not be impacted by the project. Havana Street could be widened to the west to avoid Schweiger Ranch.

13. **Question:** Kids will come to RidgeGate Station via bike to visit Schweiger Ranch, and there is concern about providing that connectivity. **Answer:** Bicyclists can be accommodated as discussed earlier, and RTD is planning to include a sidewalk on the west side of Havana Street and pedestrian facilities within the RidgeGate Station to accommodate pedestrians.

14. **Question:** Regarding the noise impact at Sky Ridge Medical Center. If a train horn is eliminated at that location to mitigate the noise impact, how will train arrival be announced? **Answer:** There are options such as directional horns, gates, and bells, which are quieter than train horns.

15. **Question:** Note that eagles and burrowing owls have occurred farther east on RidgeGate Parkway. **Answer:** The project will comply with requirements of the Migratory Bird Treaty Act, including preconstruction surveys.

16. **Question:** Is there Preble’s Meadow Jumping Mouse habitat within the impact area for the project? **Answer:** No.

17. **Question:** Would the wetland at Cottonwood Creek on the east side of I-25 be impacted by the project? **Answer:** No permanent impacts to the wetland would occur. The LRT bridge would span the wetland; no piers would be constructed within the wetland. Temporary impacts may occur to the wetland during construction.

18. **Question:** Will traffic improve at Lincoln Station once people begin to use the RidgeGate Station? **Answer:** The traffic analysis takes that into consideration.

19. **Question:** Art Griffith with Douglas County requested a copy of the EA document on a thumb drive. **Answer:** The EA will be provided as requested.

20. **Question:** Will there be full closure of sidewalks during construction? **Answer:** Temporary full closure of sidewalks along Lincoln Avenue and RidgeGate Parkway is anticipated during
construction. RTD will work with the City of Lone Tree to establish detour routes. RTD will work to limit sidewalk closures to nighttime hours.

21. **Question**: Will the LRT alignment span Lincoln Avenue? **Answer**: Yes, the LRT alignment will span Lincoln Avenue; there will be no pier in the middle of Lincoln Avenue.

22. **Question**: The project will require Intergovernmental Agreements (IGAs). The meeting attendees discussed various scenarios for IGAs.
A public meeting was held on August 27, 2014, from 7:00pm to 9:00pm at the City of Lone Tree Recreation Center, City of Lone Tree, Colorado, to present the findings of the Environmental Assessment (EA) to the public to obtain input and answer questions.

Twenty-four people signed in at the meeting (see attached sign-in sheets).

Project team members present at the meeting are listed below:

- RTD: Gary Lasater (RTD Board of Directors), Susan Wood, Andy Mutz, Joni Goheen
- Federal Transit Administration: Jeff Jordan
- Jacobs: Tom Underwood, Misty Swan

Susan Wood began the meeting by introducing Gary Lasater with the RTD Board of Directors, who provided a short summary of the proposed project and purpose of the public meeting. After Director Lasater’s summary, Susan introduced other team members present at the meeting.

Susan Wood then presented information about the project history, findings of the EA, and next steps, as listed below. Please refer to the presentation attached to these meeting minutes for more information:

- Project background
- Purpose of meeting
- Why an Environmental Assessment was prepared
- Federal New Starts grant process and status
- Project status and activities
- Study area
- Purpose and Need of the project
- Alternatives evaluated in the Alternatives Analysis process
- Locally Preferred Alternative
- Two RidgeGate Park-n-Ride parking options evaluated and the option selected
- Environmental impacts, including cultural resources (Section 106)
- Mitigation measures
- Next steps
- Project schedule
- Methods to provide comments
The presentation was followed by a question and answer period. Questions received and responses provided are summarized below. Comment sheets received at the meeting are attached.

1. **Question:** Is the $92 million grant an all or nothing proposition? Will you receive the entire $92 million or get nothing? **Answer:** The project would either receive the entire $92 million or nothing. However, RTD would hope to receive the full $92 million grant.

2. **Question:** What is DRCOG’s involvement in this project? **Answer:** RTD has worked with DRCOG throughout the AA and EA processes. The project is in DRCOG’s long range transportation plan, although in a different timeframe than currently planned. DRCOG is in the process of updating their plan and this project, with the current timeframe, will be included.

3. **Question:** Does the $92 million grant pay for the second parking garage planned to be built in 2035? **Answer:** No. Funds for the second parking garage in 2035 are included in the RTD long range financial plan.

4. **Question:** How does the number of parking spaces provided by the two parking structures planned at the RidgeGate Park-n-Ride compare to the existing parking structure at the Lincoln station? **Answer:** The Lincoln Station parking structure provides approximately 2,100 spaces. The first parking structure at RidgeGate would provide 1,300 parking spaces in 2019; the second parking structure in 2035 would provide an additional 800 spaces, for a total of 2,100 parking spaces in 2035.

5. **Question:** You explained that the area within the project alignment and stations has been disturbed, but what about the possibility of finding fossils during construction? **Answer:** Mitigation measures outlined in the EA include a process that will be followed if unanticipated archaeo-

6. **Question:** Will you need to close I-25 during construction? **Answer:** No. Also note that Lincoln Avenue and RidgeGate Parkway will not be closed during construction, although steps such as lane restrictions may be required. Sidewalks along Lincoln Avenue and RidgeGate Parkway will be temporarily closed to protect the safety of sidewalk users. Sidewalk detours during construction will be established in consultation with the City of Lone Tree. It is possible that sidewalk detours may only occur during nighttime hours.

7. **Question:** Regarding new impervious surface associated with the project, how will water detention be handled? **Answer:** Initially, water detention will occur on-site; however, in the long-term, regional detention would be used.
# RTD FasTracks

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<tr>
<th>Name</th>
<th>Check below if you would like to make a Public Comment?</th>
<th>Organization</th>
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<tr>
<td>David Carter</td>
<td></td>
<td>AECOM</td>
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<td>Denver, CO 80202</td>
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<td>Christie Deluca</td>
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<td>Harold Aye</td>
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<td>9157 Prairie Sky Ln, Lone Tree</td>
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<tr>
<td>Jan &amp; Nancy Jorgensen</td>
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<td>9157 Prairie Sky Ln, Lone Tree</td>
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<td>Denver, CO 80210</td>
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<td>Fred Cressman</td>
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<td>Paul Westhoven</td>
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<td>Joe &amp; Debi Haring</td>
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COMMENTS

Option 2 at RidgeGate Park and Ride would be much preferred. Project looks great.

Please use reverse side for additional comments

If you have additional questions or comments, please visit:
http://www.rtd-fastracks.com/main_64

Name
Acrooce Anderson
Phone Number
303-777-3999
Email
harold.anderson@cityoflittleton.com

COMMENTS

1. Discuss w/ CDOT Early lane closure-detour needs of I-25 during construction
2. Beware of Archeological Finds (on Cabo’s site, previously graded and disturbed)
3. Water Quality - Storm detention - on or off-site? CC Basin site are higher than most

Please use reverse side for additional comments

If you have additional questions or comments, please visit:
http://www.rtd-fastracks.com/main_64

Name
Rick Solomon - CDOT
Phone Number
303 757 9534
Email

RTD Southeast Extension Environmental Assessment

RTD Southeast Extension EA
Agency Meeting
September 4, 2014, 9:00 am to 10:00 am
RTD Offices

Participants (sign-in sheet attached):

RTD: Susan Wood, Andy Mutz, Joni Goheen
DRCOG: Mathew Helfant
PUC: Pam Fischhaber
CDOT: Lizzie Kemp
Jacobs: Tom Underwood, Misty Swan

The purpose of the meeting was to present findings of the final Environmental Assessment (EA) to agencies to obtain their input and answer questions.

Susan Wood began the meeting with introductions, and then presented information about the project history, where we are in the process, purpose and need, alternatives evaluated, and project schedule. The findings of the EA, including impacts and proposed mitigation, were presented, followed by a question and answer session, as summarized below:

1. Matthew asked if transit travel from downtown to the RidgeGate Station under the No Action Alternative is assumed to be via bus or a combination of bus and automobile. Susan Wood said she will confirm this with Lee Cryer (RTD) and provide a response to Matthew. Actually, the transit travel time from downtown to the RidgeGate Station under the No Action is based on mixed-modes with a change from bus to rail at Lincoln Station.

2. Methods to provide a quiet crossing at the SkyRidge Station were discussed. Based on the station’s proximity to the impacted noise receptors, Pam noted that it is likely that standard bells and gates would be appropriate to mitigate noise impacts at that location. RTD will coordinate with the PUC to determine mitigation measures.
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Date: Wednesday, September 4, 2014  
Time: 9:00 p.m. – 10:30 p.m.  
Location: Civic Center Plaza – RTD FasTracks  
Systems Room – 1560 Broadway, 5th Floor, Denver, CO 80202
Summary of Comments Received on the Environmental Assessment

Following are the eight written comments submitted on the EA during the 30-day comment period from August 12, 2014 to September 12, 2014, and responses to those comments. For questions and comments received at the local governments and stakeholder meeting, public meeting, and agency meeting, and responses, please refer to the minutes for those meetings provided this appendix.

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<th>Commenter</th>
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<tr>
<td>Harold Anderson</td>
<td>Option 2 at RidgeGate Parkway Stations would be much preferred. Project looks great.</td>
<td>Thank you for reviewing the EA and providing your comment. Parking Option 2 has been selected as the preferred parking option at the RidgeGate Station.</td>
</tr>
<tr>
<td>Rick Solomon, CDOT</td>
<td>1) Discuss w/CDOT early lane closure-detour needs of I-25 during construction. 2) Beware of archeological finds (discovered on Cabelas site, previously disturbed. 3) Water quality - storm detention - on or off site? CC Basin stds. are higher than most.</td>
<td>Thank you for your comments. 1) RTD will coordinate with CDOT regarding I-25 closures required during construction. 2) The EA includes mitigation measures to address unanticipated archaeological or paleontological discoveries during construction. 3) Water detention is planned to initially occur on site, and will ultimately be handled regionally.</td>
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<tr>
<td>Jan and Nancy Jorgensen</td>
<td>We are most appreciative of the extreme, detailed, and lengthy process for getting the SE Rail Extension to this point! (as well as the other Denver area transportation progress for public transportation!) The handouts and the Wednesday, August 27 presentation at the Lone Tree Recreation Center was like a ray of bright light (!!!) for our area. Thank you!! (We learned so much and did pick up additional sets of the handouts and have given to neighbors.) Parkside Subdivision, Lone Tree.</td>
<td>Thank you for taking the time to review the EA and project information. Your feedback is appreciated.</td>
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<td>Christopher Zvolanek</td>
<td>What about the Light Rail and Bus Service to expand since City of Colorado Springs cut off funding and you need to work with them to get Bus Service RTD back on routes along to build light rail. Even though for North East and North West need the service of Colorado for new Bus Services Routes. This have to get this project immediate plan to get this set up. Thanks.</td>
<td>Thank you for your comment. The Southeast Corridor Extension is part of RTD’s FasTracks program. The project will provide feeder bus service at the proposed end-of-line station at RidgeGate Parkway in Lone Tree, CO.</td>
</tr>
<tr>
<td>Shayne Waldron</td>
<td>When will there be a solicitation?</td>
<td>It is anticipated that this project will be put out to bid by mid-2015.</td>
</tr>
<tr>
<td>Kevin Sampson</td>
<td>I am a former member of the Board of Directors of the Regional Transportation District. I was elected to oversee the reconstruction of North Interstate 25. This letter involves Federal funding of the proposed Southeast Light Rail line. Since there are many, many, more projects on the front burner, including the looming disaster on Interstate 70 this winter, I’m opposed to the ninety two million dollar Federal contribution.</td>
<td>Thank you for your comment. RTD is committed to completing construction of the FasTracks transit program. The $92M federal grant would help achieve this goal by providing funding needed to construct the Southeast Corridor Extension, which is included in the FasTracks program.</td>
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| Alison Deans Michael, CDOT/U.S. Fish and Wildlife Liaison<br>Colorado Field Office, 303 236-4758, | I reviewed the Executive Summary mailed out with your letter dated August 12, and have a comment. On page ES-23 under Mitigation for the Wildlife Resource, you mention compliance with MBTA, but because there's a red-tailed hawk nest in the vicinity, I'd like to see something more specific to avoiding or minimizing impacts to it. The CPW has put out raptor nest buffers that we refer people to; let me know if you need a copy. Also, I don't think I'll be attending the Resource Agency meeting in September. Thank you, and please let me know if you have any questions. | Thank you for your comment and for providing a copy of the Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors referenced in your comment. The EA included commitments to coordinate with the CPW regarding nest surveys and active nests. Your comment has been incorporated into one of the mitigation measures of the EA, as shown in bold underlined font in the excerpt below and in Appendix B of this FONSI:  
• Contact the USFWS Colorado field office immediately for further guidance if field survey identifies the existence of one or more active bird nests that cannot be avoided by planned construction activities. Adherence to these guidelines will help avoid the unnecessary take of migratory birds and the possible need for law enforcement action. RTD will coordinate with CPW and the USFWS to implement their Raptor Guidelines, as needed. This could include seasonal restriction to encroachment within 1/3 mile of active nests, if determined by USFWS to be necessary. |

| Liza Hunholz, Area Wildlife Manager, Colorado Parks and Wildlife | CPW – excerpts from letter:  
CPW would expect to find occasional use of the proposed sites by small ground-dwelling mammals, small birds, raptors, red fox, raccoons, and coyotes.  
Since prairie dogs were discovered near the development sites, there is the potential for presence of burrowing owls. They are classified as a state threatened | As described in the EA and in the mitigation measures listed in this FONSI, RTD will comply with the requirements of the Migratory Bird Treaty Act, and a burrowing owl survey will be conducted prior to construction. RTD will adhere to the FasTracks Prairie Dog Mitigation Policy. This includes the stipulation that no earth-moving activities will occur |
species and are protected by both state and federal laws, including the Migratory Bird Treaty Act. These laws prohibit the killing of burrowing owls or disturbance of their nest. Therefore, if any earth-moving will begin between March 1st and October 31st, a burrowing owl survey should be performed. Guidelines for performing a burrowing owl survey can be obtained from your local District Wildlife Manager. CPW would also recommend that any discovered prairie dog colony be completely vacated of living animals prior to the start of any earth-moving. Removal of the animals can be coordinated at the discretion of the development departments.

Care should be taken to make sure no raptor nests will be impacted during this project. The mentioned red-tailed hawk nest would be included in this circumstance. Raptors are protected from take, harassment, and nest disruption at both the state and federal levels. CPW recommends that buffer zones be implemented around any nest discovered within the project vicinity during any period of activity that may interfere with nesting season. This will prevent intentional or unintentional destruction of an active nest. For further information, a copy of the document “Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors” is available from your local District Wildlife Manager. Following recommendations outlined in that document will decrease the likelihood of unintentional take through disturbance.

Noxious weeds should be monitored very closely. The spread and control of noxious weeds on and around the RTD FasTracks project site is a concern for wildlife. Invasive plants endanger the

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<td>species and are protected by both state and federal laws, including the Migratory Bird Treaty Act. These laws prohibit the killing of burrowing owls or disturbance of their nest. Therefore, if any earth-moving will begin between March 1st and October 31st, a burrowing owl survey should be performed. Guidelines for performing a burrowing owl survey can be obtained from your local District Wildlife Manager. CPW would also recommend that any discovered prairie dog colony be completely vacated of living animals prior to the start of any earth-moving. Removal of the animals can be coordinated at the discretion of the development departments. Care should be taken to make sure no raptor nests will be impacted during this project. The mentioned red-tailed hawk nest would be included in this circumstance. Raptors are protected from take, harassment, and nest disruption at both the state and federal levels. CPW recommends that buffer zones be implemented around any nest discovered within the project vicinity during any period of activity that may interfere with nesting season. This will prevent intentional or unintentional destruction of an active nest. For further information, a copy of the document “Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors” is available from your local District Wildlife Manager. Following recommendations outlined in that document will decrease the likelihood of unintentional take through disturbance. Noxious weeds should be monitored very closely. The spread and control of noxious weeds on and around the RTD FasTracks project site is a concern for wildlife. Invasive plants endanger the</td>
<td>until all prairie dogs in the vicinity have been removed. RTD has incorporated your comment regarding Recommended Buffer Zones and Seasonal Restrictions for Colorado Raptors into the project’s mitigation measures, as shown in bold underlined font in the excerpt below and in Appendix B of this FONSI: • Contact the USFWS Colorado field office immediately for further guidance if field survey identifies the existence of one or more active bird nests that cannot be avoided by planned construction activities. Adherence to these guidelines will help avoid the unnecessary take of migratory birds and the possible need for law enforcement action. RTD will coordinate with CPW and the USFWS to implement their Raptor Guidelines, as needed. This could include seasonal restriction to encroachment within 1/3 mile of active nests, if determined by USFWS to be necessary. The EA included mitigation measures to address the spread of noxious weeds, including development of a noxious weed program and performing continuous weed control throughout construction. These measures are listed in Appendix B of this FONSI. RTD will continue to coordinate with the USFWS to address</td>
</tr>
<tr>
<td>Commenter</td>
<td>General Comment</td>
<td>Response</td>
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<td></td>
<td>ecosystem by disturbing natural processes and jeopardizing the survival of native plants and the wildlife that depend on them. CPW would recommend implementation of a weed management plan that may already exist within local cities or counties.</td>
<td>wildlife and threatened and endangered species potentially impacted by the project.</td>
</tr>
<tr>
<td>CPW</td>
<td>CPW recommends the applicant continues to consult with the USFWS for any additional recommendations regarding any threatened or endangered species that may exist within the outlined project boundaries.</td>
<td></td>
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<tr>
<td></td>
<td>Due to the location of the proposed project and limited disturbance to nearby habitat areas, impacts of the development can be characterized as minimal. It is important to remember that incremental and cumulative loss of natural areas and open spaces will, over time, significantly degrade the overall quality of wildlife habitat in the area. In this case, we want to focus our recommendations on planning and implementing your proposal to minimize negative impacts and maximize potential enhancements to support living with wildlife in our community.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B

Mitigation Measures
RTD will undertake the following measures to mitigate project impacts:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Use</td>
<td>• No mitigation is required.</td>
</tr>
</tbody>
</table>
| **Land Acquisitions, Displacements and Relocations of Existing Uses** | **Direct Impacts**  
• The acquisition of real property interests will fully comply with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act) and the Fifth Amendment of the United States Constitution. The Uniform Act applies to all acquisitions of real property or displacements of people resulting from federal or federally assisted programs or projects.  
• All affected owners will be provided notification of the acquiring agency’s intent to acquire an interest in their property, including a written offer letter of just compensation specifically describing those property interests.  
• RTD will coordinate with property owner during the final design process to seek ways to minimize parking impacts and identify opportunities to replace parking removed as a result of the project.  
**Indirect Impacts**  
• No mitigation is required.  
**Temporary Construction Impacts**  
• Coordinate use with specific property owners where a temporary construction easement is required.  
• Temporary access will be provided during normal business hours.  
• Adequate detours, including advanced notice and signing will be provided before beginning construction.  
• Adjacent property used during construction activities will be returned to original conditions, once construction is complete.  
• Special use permits to access CDOT right-of-way during construction will be obtained. |
| Social Conditions and Community Facilities | **Direct Impacts**  
• No mitigation is required.  
**Indirect Impacts**  
• No mitigation is required.  
**Temporary Construction Impacts**  
• Working with the communities, RTD will prepare a Construction Management Plan (CMP) that specifies public communications and construction means and methods to reduce or mitigate the inconveniences of construction such as noise, dust, visual blight, construction traffic, and preservation of access to homes, businesses, and community facilities. Refer to noise and air quality sections of this table. |
| Economic Conditions | **Direct Impacts**  
• No mitigation required.  
**Indirect Impacts**  
• No mitigation required.  
**Temporary Construction Impacts**  
• Refer to noise, air quality, and visual sections of this table.  
• Develop traffic maintenance plans to maintain access and circulation.  
• A CMP will be developed in coordination with local communities and businesses.  
• In accordance with the CMP the following measures will be implemented:  
  o Where possible business access closure will be limited to outside of normal operating hours.  
  o Provide clear signage for detours.  
  o Coordinate with local groups, business districts, and jurisdictions regarding construction impacts using a variety of media (for example radio, flyers advertisements, and website), where appropriate. |
<table>
<thead>
<tr>
<th>Resource</th>
<th>Mitigation</th>
</tr>
</thead>
</table>
| Environmental Justice            | **Direct Impacts**  
- No mitigation is required.  
**Indirect Impacts**  
- No mitigation is required.  
**Temporary Construction Impacts**  
- Working with the communities, RTD will prepare a CMP that specifies public communications and construction means and methods to reduce or mitigate the inconveniences of construction such as noise, dust, visual blight, construction traffic, and preservation of access to homes, businesses, and community facilities. |
| Cultural Resources                | **Direct Impacts**  
- No mitigation is required.  
**Indirect Impacts**  
- Use materials for retaining walls and parking structure that would be compatible in color, texture, and design to the surrounding natural environment, and would not greatly contrast with the area landscape surrounding the historic Schweiger Ranch.  
**Temporary Construction Impacts**  
- Maintain access to Schweiger Ranch during construction.  
- FTA and RTD will immediately contact SHPO should any post review discoveries be made during construction.  
- FTA and RTD will also notify the Pueblo of Laguna if additional resources are found. |
| Visual and Aesthetic Resources   | **Direct Impacts**  
- Coordinate with local municipalities and developers in the design of station area improvements.  
- Coordinate with local municipalities and developers to incorporate aesthetic treatments, such as color and texture, for structural elements, including parking lot retaining walls, parking structure, and bridge structure.  
- Pursue use of lighting standards to shield light to prevent light trespass.  
**Indirect Impacts**  
- No mitigation is required.  
**Temporary Construction Impacts**  
- Revegetate impacted areas with native species as soon as practicable upon construction completion. |
| Parks and Recreation Facilities  | **Direct Impacts**  
- No mitigation required.  
**Indirect Impacts**  
- No mitigation required.  
**Temporary Construction Impacts**  
- RTD will coordinate with local jurisdictions during construction for appropriate trail detours. |
| Farmlands                        | **Direct Impacts**  
- No mitigation is required. |
| Air Quality and Energy           | **Direct Impacts**  
- No mitigation required as there are minimal to no direct impacts.  
**Indirect Impacts**  
- No mitigation required as there are minimal to no indirect impacts.  
**Temporary Construction Impact**  
- Prepare a Dust Control Plan.  
- Obtain Air Pollution Emission Notice permit for construction activities.  
- Cover trucks hauling soil and other fine materials. Stabilize and cover stockpile areas.  
- Cover or wet temporary excavated materials.  
- Re-vegetate exposed areas.  
- Minimize off-site tracking of mud and debris by washing construction equipment and temporary stabilization.  
- Limit vehicle speed of construction-related equipment.  
- Prohibit unnecessary idling of construction equipment  
- Use low-sulfur fuel.  
- Locate diesel engines and motors as far away as possible from residential areas.  
- Locate staging areas as far away as possible from residential areas. |

### B-2
### Resource Mitigation

- Require heavy construction equipment to use the cleanest available engines or to be retrofitted with diesel particulate control technology.
- Use alternatives for diesel engines and/or diesel fuels (such as: biodiesel, liquefied natural gas, compressed natural gas, fuel cells, or electric engines).
- Install engine pre-heater devices to eliminate unnecessary idling during winter-time construction.
- Prohibit tampering with equipment to increase horsepower or to defeat emission-control devices effectiveness.
- Require construction vehicle engines to be properly tuned and maintained.
- Use construction vehicles and equipment with the minimum practical engine size for the intended job.
- Use a wheel wash station and/or large-diameter cobble apron at egress/ingress areas to minimize dirt being tracked onto public streets.
- Use vacuum powered street sweepers to control dirt tracked onto streets.

**Energy:**
- No mitigation required.

### Noise and Vibration

#### Direct Impacts
- Work to establish a PUC approved “quiet crossing” to eliminate use of train horns near the grade crossing at the south end of the proposed Sky Ridge Station.

#### Indirect Impacts
- No mitigation required.

#### Temporary Construction Impacts
- Construction activities will need to comply with local noise ordinances. Noise will be minimized during construction. Mitigation measures may include:
  - Make hotel vouchers available to affected residents in the vicinity of any night time construction activities.
  - Locate stationary construction equipment as far as possible from noise-sensitive sites.
  - Construct temporary noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive receivers.
  - Communicate early on with the general public to reduce the number of noise complaints. Inform the public of any potential construction noise impacts and the measure that will be employed to reduce these impacts. Also, establish and publicize a responsive complaint mechanism for the duration of construction.
  - Minimize construction duration in residential areas as much as possible.
  - Minimize nighttime activities as much as possible.
  - Re-route truck traffic away from residential streets, where possible.
  - Combine noisy operations to occur in the same time period.
  - Use well-maintained equipment equipped with modern mufflers.
  - Use noise blankets on equipment and/or quiet-use generators. Noise blankets (also called “acoustic wraps”) are removable and reusable sound barriers made from compost materials like Teflon impregnated cloth. The blankets are custom-fit to encapsulate the noisy equipment and block sounds at the source. These are commonly used on equipment such as fans and blowers, compressor housings, hydraulic pumps, etc. They are very effective because they block the source of the noise.
  - Use alternative construction methods, such as sonic or vibratory pile driving in noise sensitive areas.
  - Perform pile driving and other high-noise activities during daytime construction (generally 7:00AM to 7:00PM), where possible. When construction time is restricted to certain daytime hours, the overall duration of project construction would likely increase.
<table>
<thead>
<tr>
<th>Resource</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Resources and</td>
<td>Direct Impacts&lt;br&gt;• Permanent water quality BMPs, possibly including.</td>
</tr>
<tr>
<td>Water Quality</td>
<td>o Grass lined ditches.</td>
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<td></td>
<td>o Re-grading, seeding, and revegetating slopes.</td>
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<td>o Stormwater control channels and water quality detention ponds.</td>
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<td></td>
<td>• Runoff from the bridge will be mitigated by a water quality structure, such as a stormceptor or</td>
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<td></td>
<td>equivalent.</td>
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<td></td>
<td>• CDOT’s municipal separate storm sewer system (MS4) permit, as required by RTD’s MS4 permit</td>
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<td>will be adhered to where applicable.</td>
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<td></td>
<td>• Native vegetation will be reestablished, decreasing potential for erosion.</td>
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<td></td>
<td>• If any permanent water quality degradation occurs, waters shall be mitigated to appropriate water</td>
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<td>quality standards (existing conditions prior to impact).</td>
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<td></td>
<td>• Ballasted track areas do not require any water quality mitigation.</td>
</tr>
<tr>
<td></td>
<td>Indirect Impacts&lt;br&gt;• No mitigation required as there are minimal to no indirect impacts.</td>
</tr>
<tr>
<td></td>
<td><strong>Temporary Construction Impacts</strong></td>
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<tr>
<td></td>
<td>• A stormwater management plan (SWMP) will be developed and implemented that specifies BMPs</td>
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<td>to minimize soil erosion, and methods for monitoring conditions before, during and after</td>
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<td></td>
<td>construction.</td>
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<td></td>
<td>• Stabilization BMPs, such as mulching, temporary seeding, or erosion control blankets, will be</td>
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<tr>
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<td>used.</td>
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<td></td>
<td>• Temporary erosion control BMPs will be used to reduce disturbance, such as staging construction,</td>
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<td>minimizing access areas, temporary seeding, early final grading and seeding of completed areas,</td>
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<td>clean water diversions, silt fences, erosion bales, erosion control blankets, sediment traps,</td>
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<td>sediment basins, soil stockpile management, and temporary diversion structures. These BMPs will</td>
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<td>be installed prior to ground disturbance activities.</td>
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<td></td>
<td>• A spill control plan will be developed.</td>
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<td>• Operational monitoring and supply wells will be protected or replaced in the same or similar</td>
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<td>location depending on the site conditions. Non-operational monitoring and supply wells will be</td>
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<td>abandoned in accordance with state requirements.</td>
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<tr>
<td>Wetlands and Waters of</td>
<td>Direct Impacts&lt;br&gt;RTD will work to further reduce wetland impacts during final design.</td>
</tr>
<tr>
<td>the U.S.</td>
<td>• Impacts to the non-jurisdictional wetlands (SE-9 and SE-10) will be mitigated by purchasing</td>
</tr>
<tr>
<td></td>
<td>credits from a wetland mitigation bank within the Cherry Creek Watershed.</td>
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<tr>
<td></td>
<td>Indirect Impacts&lt;br&gt;Indirect impacts from spread of noxious weeds will be mitigated through the</td>
</tr>
<tr>
<td></td>
<td>noxious weed management plan that will be developed for the project.</td>
</tr>
<tr>
<td>Wetlands:</td>
<td><strong>Temporary Construction Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• Appropriate permanent BMPs will be utilized to stabilize the soil within the study area.</td>
</tr>
<tr>
<td></td>
<td>• If construction contractor determines that temporary impacts to jurisdictional wetlands will occur</td>
</tr>
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<td></td>
<td>to gain site access, the contractor will need to obtain appropriate permits from the USACE.</td>
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<td></td>
<td>• Wetlands temporarily affected during construction will be restored to pre-construction conditions.</td>
</tr>
<tr>
<td></td>
<td>• Construction zones will be fenced, and wetland areas near construction access will be covered</td>
</tr>
<tr>
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<td>with layers of geotextile, straw, or soil prior to use in order to minimize impacts.</td>
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<td></td>
<td>• The limits of disturbance will be fenced during construction to avoid inadvertent temporary</td>
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<td></td>
<td>impacts.</td>
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<td></td>
<td>• Wetland areas, used for construction access, will be covered with a layer of geotextile, straw,</td>
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<td>and soil prior to use. After construction is completed, temporary structures, fill, and geotextile</td>
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<td></td>
<td>will be removed.</td>
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<tr>
<td>Waters of the U.S.:</td>
<td>Direct Impacts&lt;br&gt;• No mitigation is necessary.</td>
</tr>
<tr>
<td></td>
<td>Indirect Impacts&lt;br&gt;• No mitigation is necessary.</td>
</tr>
<tr>
<td>Resource</td>
<td>Mitigation</td>
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<td>-------------------------------------------------------------------------</td>
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</tr>
<tr>
<td><strong>Temporary Construction Impacts</strong></td>
<td>• Appropriate BMP mandates by the federal, state, and local regulatory agencies will be used to avoid and minimize construction–related impacts.</td>
</tr>
<tr>
<td></td>
<td>• If construction contractor determines that temporary impacts to jurisdictional waters of the U.S. will occur to gain site access, the contractor will need to obtain appropriate permits from the USACE.</td>
</tr>
<tr>
<td><strong>Floodplains</strong></td>
<td><strong>Direct Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• Adherence to all Urban Drainage and Flood Control District (UDFCD) and local jurisdiction floodplain requirements.</td>
</tr>
<tr>
<td></td>
<td><strong>Indirect Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• Impacts due to development would be avoided through adherence to local development requirements.</td>
</tr>
<tr>
<td></td>
<td><strong>Temporary Construction Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• Construction impacts to floodplains and drainage areas in the study area would be avoided or minimized to comply with federal, state, and local permit regulations.</td>
</tr>
<tr>
<td></td>
<td>• Appropriate BMPs would be used during construction activities to minimize impacts.</td>
</tr>
<tr>
<td><strong>Mineral Resources, Geology, and Soils</strong></td>
<td><strong>Direct Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• No mitigation required as there are minimal to no direct impacts.</td>
</tr>
<tr>
<td></td>
<td><strong>Indirect Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• No mitigation required as there are minimal to no indirect impacts.</td>
</tr>
<tr>
<td></td>
<td><strong>Temporary Construction Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• Appropriate design and development of the slope profile and slope cuts, limited devegetation, slope cover during construction, prompt revegetation of slopes, temporary or permanent dewatering systems, retaining walls, appropriately engineered fill.</td>
</tr>
<tr>
<td></td>
<td>• Pre-flooding and/or dewatering, removal of adverse substrate, engineered backfill, geotextiles or geogrids.</td>
</tr>
<tr>
<td></td>
<td>• Appropriate design and development, coated and resistant steel and concrete, subsurface drainage and dewatering systems, specialized piers and footings, deep foundation systems, overexcavation, appropriately engineered backfills.</td>
</tr>
<tr>
<td></td>
<td>• Appropriate structural designs for existing topography.</td>
</tr>
<tr>
<td><strong>Vegetation and Noxious Weeds</strong></td>
<td><strong>Direct Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• Replace any trees impacted based on the requirements of local governments and/or CDOT.</td>
</tr>
<tr>
<td></td>
<td>• When possible, use native species for landscape plantings at Park-n-Ride and stations.</td>
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<td></td>
<td>• If impacts occur to riparian areas within CDOT right-of-way, Senate Bill 40 Certification will be necessary and obtained.</td>
</tr>
<tr>
<td></td>
<td><strong>Indirect Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• Develop noxious weed management plan.</td>
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<tr>
<td></td>
<td>• Perform continuous weed control within CDOT and RTD rights-of-way, and replant native species throughout the project until construction completion.</td>
</tr>
<tr>
<td></td>
<td><strong>Temporary Construction Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>• Reseed with native species, control invasive species, and use weed-free hay/mulch within the right-of-way.</td>
</tr>
<tr>
<td></td>
<td>• Revegetate disturbed areas that would not be paved or part of the new track embankment.</td>
</tr>
</tbody>
</table>
# Resource

<table>
<thead>
<tr>
<th>Biological Resources</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct Impacts</strong></td>
<td>- RTD will comply with the requirements of the MBTA (refer to temporary construction mitigation below).</td>
</tr>
<tr>
<td></td>
<td>- Use BMPs to avoid water quality impacts to, and tree removal along Cottonwood Creek.</td>
</tr>
<tr>
<td><strong>Indirect Impacts</strong></td>
<td>- RTD will comply with the requirements of the MBTA.</td>
</tr>
<tr>
<td></td>
<td>- Although provisions of the MBTA are applicable year-round, most migratory bird nesting activity in eastern Colorado occurs during April 1 to August 31. However, some migratory birds are known to nest outside of primary nesting season (e.g., raptors can nest in woodland habitats between February 1 and July 15).</td>
</tr>
<tr>
<td></td>
<td>- If construction is planned to occur during primary nesting season or at any other time that may result in the take of nesting migratory birds, the USFWS recommends that RTD have a qualified biologist conduct a field survey of affected habitats and structures to determine absence or presence of nesting migratory birds.</td>
</tr>
<tr>
<td></td>
<td>- Conduct nesting bird surveys during the nesting season. In some cases, such as on bridges or other similar structures, nesting can be prevented until construction is complete.</td>
</tr>
<tr>
<td></td>
<td>- Contact the USFWS Colorado field office immediately for further guidance if field survey identifies the existence of one or more active bird nests that cannot be avoided by planned construction activities. Adherence to these guidelines will help avoid the unnecessary take of migratory birds and the possible need for law enforcement action. RTD will coordinate with CPW and the USFWS to implement their Raptor Guidelines, as needed. This could include seasonal restriction to encroachment within 1/3 mile of active nests, if determined by USFWS to be necessary.</td>
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</tr>
<tr>
<td><strong>Threatened, Endangered, and Sensitive Species</strong></td>
<td><strong>Direct Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>- RTD/the contractor will adhere to the FasTracks Prairie Dog Mitigation Policy. The FasTracks program first established its Prairie Dog Mitigation Policy in 2007, as RTD takes seriously its efforts to avoid, minimize or mitigate for impacts to our environment. The mitigation policy states (in order of preference) that RTD will:</td>
</tr>
<tr>
<td></td>
<td>- First avoid, minimize and/or mitigate for impacts to prairie dogs if feasible;</td>
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<td></td>
<td>- Second, relocate prairie dogs if RTD can obtain permission and find property and the relocation is not cost prohibitive;</td>
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<td></td>
<td>- Third, donate prairie dogs to raptor rehabilitation programs or to the USFWS ferret program;</td>
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<tr>
<td></td>
<td>- Finally, humanely euthanize on site as a last resort.</td>
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<tr>
<td></td>
<td>- The policy clearly states, “At no time will RTD authorize earth-moving activities that result in the burying of live prairie dogs.” In an effort to find suitable land for relocations, RTD has established a Working Group composed of interested parties to look for ways to clear the obstacles RTD has encountered in trying to implement live relocations.</td>
</tr>
<tr>
<td></td>
<td>- Burrowing owl surveys will be conducted within one year prior to construction.</td>
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<tr>
<td></td>
<td>- Vegetation and trees removed along Cottonwood Creek will be replaced.</td>
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<tr>
<td></td>
<td><strong>Indirect Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>- Permanent BMPs will be implemented to control erosion.</td>
</tr>
<tr>
<td></td>
<td><strong>Temporary Construction Impacts</strong></td>
</tr>
<tr>
<td></td>
<td>- BMPs will be implemented during construction to control erosion.</td>
</tr>
<tr>
<td></td>
<td>- A construction barrier between construction areas and active prairie dog colonies will be erected to minimize interaction with adjacent colonies.</td>
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<td></td>
<td>- Prairie dogs will be removed from the construction side of the barriers prior to the initiation of ground-disturbing construction activities.</td>
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<tr>
<td></td>
<td>- As a result of the Biological Opinion (BO) obtained from the USFWS, water usage during construction will be tracked and gallons used will be provided to the FasTracks environmental group on an annual basis.</td>
</tr>
<tr>
<td>Resource</td>
<td>Mitigation</td>
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<tr>
<td><strong>Hazardous Materials</strong></td>
<td>Direct Impacts</td>
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<tr>
<td></td>
<td>• No mitigation required.</td>
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<td></td>
<td>Indirect Impacts</td>
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<tr>
<td></td>
<td>• No mitigation required.</td>
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<tr>
<td></td>
<td><strong>Temporary Construction Impacts</strong></td>
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<tr>
<td></td>
<td>• Prepare a Materials Management Plan to address the potential to encounter</td>
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<tr>
<td></td>
<td>contaminated soil and groundwater.</td>
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<tr>
<td></td>
<td>• Complete an asbestos survey and a lead-based paint survey on structures</td>
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<td>proposed for demolition, if applicable.</td>
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<td></td>
<td>• Prepare and implement a Health and Safety Plan to protect worker health</td>
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<td></td>
<td>and safety.</td>
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<td></td>
<td>• Comply with Occupational Safety and Health Administration requirements</td>
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<td></td>
<td>for construction workers who may be exposed to hazardous materials.</td>
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<tr>
<td></td>
<td>• Follow CDOT 250 Specification for hazardous materials when on CDOT</td>
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<td></td>
<td>right-of-way.</td>
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<td></td>
<td>• Implement construction BMPs in accordance with Stormwater Pollution</td>
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<td></td>
<td>Prevention Plan. BMPs may include secondary containment areas for refueling</td>
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<td></td>
<td>construction equipment, berms or ponds to control runoff, and a</td>
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<td></td>
<td>monitoring program to test stormwater for contaminants prior to</td>
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<td>discharge from the construction site.</td>
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<tr>
<td><strong>Public Safety and Security</strong></td>
<td>Direct Impacts</td>
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<td></td>
<td>• No mitigation required as there are minimal to no direct impacts.</td>
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<td></td>
<td>Indirect Impacts</td>
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<td></td>
<td>• No mitigation required as there are minimal to no indirect impacts.</td>
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<td></td>
<td><strong>Temporary Construction Impacts</strong></td>
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<td></td>
<td>• Provide service providers with adequate detour information, including</td>
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<td>advanced notice before construction, to ensure access is maintained</td>
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<td>during construction.</td>
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<td></td>
<td>• Coordinate with Colorado State Patrol regarding operational issues as</td>
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<td>they relate to safety and security.</td>
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<td><strong>Utilities</strong></td>
<td>Direct Impacts</td>
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<tr>
<td></td>
<td>• Avoid utilities during final design and construction.</td>
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<td></td>
<td>• Reinforce or protect utilities through casing and other construction</td>
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<tr>
<td></td>
<td>methods.</td>
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<td></td>
<td>• Use cathodic protection to mitigate corrosion or electrical grounding to</td>
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<td>mitigate effects of induced voltages caused by alternating current.</td>
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<td></td>
<td>• Relocate utilities in coordination with the utility owner or municipality.</td>
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<td></td>
<td>Indirect Impacts</td>
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<td></td>
<td>• No mitigation required.</td>
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<td></td>
<td><strong>Temporary Construction Impacts</strong></td>
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<tr>
<td></td>
<td>• Ensure that disruption of service provided by the existing utilities</td>
</tr>
<tr>
<td></td>
<td>infrastructure is limited.</td>
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<tr>
<td></td>
<td>• Conduct detailed field survey and coordinate with utility owners and</td>
</tr>
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<td></td>
<td>municipalities.</td>
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<td></td>
<td>• Coordinate temporary interruptions in utility service with affected</td>
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<td>property owners and tenants.</td>
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<tr>
<td><strong>Transportation</strong></td>
<td>Direct Impacts</td>
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<td></td>
<td>• The RidgeGate Parkway/Havana Street intersection will be monitored from</td>
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<td>opening day to 2035. RTD and the local jurisdiction will work together</td>
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<td>to determine the timing of the need for improvements and the</td>
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<td>responsibilities for implementing these improvements.</td>
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<td></td>
<td><strong>Temporary Construction Impacts</strong></td>
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<td></td>
<td>• Access to local neighborhoods will be maintained. The exact location</td>
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<td>of detour notifications and signage will be determined during final</td>
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<tr>
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<td>design.</td>
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<td></td>
<td>• Near each station, vehicular traffic and access to local businesses will</td>
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<td>be maintained throughout construction using construction traffic control</td>
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<td></td>
<td>methods to be determined during final design.</td>
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<tr>
<td></td>
<td>• RTD will coordinate with the City of Lone Tree to identify sidewalk</td>
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<td>detour routes.</td>
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## Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>CREATE</td>
<td>Chicago Region Environmental and Transportation Efficiency Program</td>
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<tr>
<td>CWR</td>
<td>continuous welded rail</td>
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<tr>
<td>dBA</td>
<td>decibels, A-weighted</td>
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<tr>
<td>EA</td>
<td>Environmental Assessment</td>
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<tr>
<td>FRA</td>
<td>Federal Railroad Administration</td>
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<tr>
<td>FTA</td>
<td>Federal Transit Administration</td>
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<tr>
<td>I-#</td>
<td>Interstate # (e.g., I-25, I-70, etc.)</td>
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<tr>
<td>ISO</td>
<td>International Standards Organization</td>
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<tr>
<td>Ldn</td>
<td>Average day-night sound level</td>
</tr>
<tr>
<td>Leq</td>
<td>Equivalent continuous sound level</td>
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<tr>
<td>LRT</td>
<td>Light Rail Transit</td>
</tr>
<tr>
<td>LRV</td>
<td>Light Rail Vehicle</td>
</tr>
<tr>
<td>MPH</td>
<td>miles-per-hour</td>
</tr>
<tr>
<td>PB</td>
<td>Parsons Brinckerhoff</td>
</tr>
<tr>
<td>PPV</td>
<td>peak particle velocity</td>
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<tr>
<td>RTD</td>
<td>Regional Transportation District</td>
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<tr>
<td>SEL</td>
<td>Sound Exposure Level</td>
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<tr>
<td>SERE</td>
<td>South East Rail Extension</td>
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<tr>
<td>TM</td>
<td>Technical Memorandum</td>
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<tr>
<td>UP</td>
<td>Union Pacific</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>VdB</td>
<td>Vibration velocity level, in decibels</td>
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1.0 NOISE AND VIBRATION

This Technical Memorandum presents results of a final environmental noise and vibration impact evaluation prepared by WSP | Parsons Brinckerhoff (PB) for the Design Build phase of the planned Denver South East Corridor Extension Project (Project). The purpose of the proposed Light Rail Transit Project is to serve the RidgeGate Planned Development District, a rapidly developing area with urban densities in commercial, residential and mixed-use development districts. The future Lone Tree Town Center, on the east side of I-25, will have population and employment densities typical of an urban center.

The current restudy was conducted subsequent to the previous study summarized in the Noise and Vibration Report (dated April 2013) that was prepared for the Project’s Environmental Assessment. The previous study evaluated potential noise and vibration impacts and mitigation based on the data available at the time of its preparation. The previous study included ambient noise measurements collected July 24, 2012 and July 25, 2012.

Subsequent to the previous study, the land use adjacent to the Project alignment has been modified in some areas and updated information has been obtained by PB. Based on the information available as of January 2016 this TM serves to confirm, revise, and supplement the findings and mitigation recommendations of the previous Noise and Vibration Report (April 2013) where appropriate. This new TM updates the assessment of potential airborne noise and ground-borne vibration impact and mitigation required at sensitive community locations along the final 2.3 miles of the alignment for the Project including E (Union Station to Lincoln) and F (18th and California to Lincoln) lines and two new stations.

The restudy of the final alignment of the Project, changes in adjacent land use, and the measurements, modeling, and the mitigation recommendations were carried out in conformance with RTD policy, and the procedures and criteria prescribed in the US FTA guidance manual Transit Noise and Vibration Impact Assessment (FTA 2006). The restudy area outline is shown below on Figure 1-1, SERE Restudy Area. As may be seen from Figure 1-1, the Project study area parallels I-25 and ends just south of the new RidgeGate Parkway interchange. The Project alignment as shown on Figure 1-1, from north to south, continues into the City of Lone Tree south of Lincoln Avenue approaches the SkyRidge Medical Center where it crosses to the east side of I-25. The alignment continues in a southerly direction towards and beyond RidgeGate Parkway.
Source: Parsons Brinckerhoff, 2016

Figure 1-1. SERE Restudy Area
1.1 **Summary of Results**

Based on the findings of the previous study, this restudy focused on potential impacts to noise-sensitive use located along the Project’s 2.3 mile alignment from Lincoln Station to the Project’s terminus at the RidgeGate end-of-line Station and Park-n-Ride facility.

As a component of the restudy, PB environmental noise specialists performed a visual reconnaissance throughout the restudy area including the previously studied alignment to confirm where new sensitive-use and potential impacts might be located or where previously identified impacts no longer exist due to physical changes in land use and/or other conditions that changed subsequent to the previous study. After the visual reconnaissance, PB conducted new ambient noise measurements at some locations noted in the previous Report (April 2013) and at new locations. Subsequent development (e.g., a new parking structure constructed at the SkyRidge Medical Center) precluded re-measurement of some of the previously measured locations. There was close agreement between the previously-measured and the restudy-measured ambient noise levels where duplicate measurements were possible. There was also very close agreement of the noise modeling results for those locations with the same modeling points selected.

The restudy evaluated the previous study’s vibration assessment methodology, findings, and recommendations. Based upon an evaluation of the previous study, this restudy TM affirms that operations vibration, and construction vibration were adequately addressed in the previous study and additional Detailed restudy of these issues is not necessary. PB used the FTA General vibration impact assessment methodology and confirmed that vibration impacts from train operations are not likely to result from this Project. In summary:

- The previous Report’s (April 2013) Detailed vibration analysis determined there would be “no operations vibration impact.”
- Field conditions have not materially changed subsequent to the previous analysis.
- PB performed a new FTA General vibration impact analysis that confirmed the previous study’s findings and also indicated “no impact.”
- No additional vibration measurements or field study was warranted or performed.
- PB agrees with the previous Report (April 2013) that no vibration mitigation measures are necessary or recommended.

Construction Noise and Vibration impacts and the mitigation recommended in the previous Report (April 2013) were re-evaluated. The restudy found no reason or basis to modify the previous findings and recommendations. PB is in agreement with the recommended measures. Construction noise and vibration mitigation measures from the previous Report are restated below:

- Construction activities will be carried out in compliance with all applicable local noise regulations.
- Avoid nighttime construction in residential neighborhoods.
- Locate stationary construction equipment as far as possible from noise-sensitive sites.
- Construct temporary noise barriers, such as temporary walls or piles of excavated material, between noisy construction activities and noise-sensitive receivers where effective and practicable.
- Route construction-related truck traffic to roadways that will cause the least disturbance to residents.
- Use alternative construction methods to minimize the use of impact and vibratory equipment (e.g., pile-drivers and compactors) where beneficial to sensitive land use.
The restudy described in this new TM addressed the potential operations noise impacts and mitigation requirements for the final SERE alignment. In addition to updated land use and Project information, the restudy effort benefitted from:

- obtaining new ambient noise measurements focused in noise-sensitive areas,
- using the confirmed train speed profile data,
- accounting for topography (the previous study assumed a “flat world”),
- assessment of noise from potential wheel squeal,
- assessment of noise from the Park-n-Ride facility,
- accounting for sound propagation including the effects of noise barriers, both natural (terrain) and constructed (noise barriers), and
- evaluating in detail the various acoustical and non-acoustical issues relating to noise barriers such as:
  - location (where)
  - extent (length)
  - placement (right-of-way or near-to-tracks)
  - height (effectiveness optimization)
  - flanking noise control (effectiveness optimization)
  - sound reflective and sound absorptive effects
  - adjacent structure effects

The previous Report (April 2013) stated that evaluating wheel squeal was not necessary. However, the potential for wheel squeal is likely and it is assessed in this TM. While it would not impact more distant noise-sensitive uses if wheel squeal does occur it could be of concern at the nearby Sky Ridge Station.

The noise mitigation approach proposed in the previous study’s Report of establishing “Quiet Zones” at all grade crossings near affected noise-sensitive areas was assumed for the restudy. The restudy also recommends the implementation of Quiet Zones.

In addition to residential use, there are a few daytime-only noise-sensitive uses located near the final alignment. These uses were identified as some commercial land uses, outdoor portions of the Sky Ridge Medical Center, and possibly the Schweiger Ranch, an historic landmark that is being restored for use as a museum. None of these resources were determined to be impacted by project operations noise. The type of noise-sensitive land use that is predicted to have noise impacts not previously identified is non-transient residential use, consisting of the RidgeGate/ALMI (nee Vue) Apartments.

The previous study did not identify Severe and High Moderate noise impacts at one location because of using the wrong distance between the tracks and a residential use when modeling impacts. Thus, using corrected distance data to evaluate potential noise impacts from train operations was an important part of the restudy. The restudy identified one multi-family residential location where Project noise impacts are expected. The recommended approach to mitigate the identified additional noise impacts consists of constructing a noise barrier. Noise barriers are recommended where they are acoustically effective (“feasible”), cost effective (“reasonable”) consistent with FTA and RTD mitigation policy, and are also compatible with other important concerns such as safety, access, constructability, etc.

Based on analysis of Project noise impact and mitigation using the new information and the assumptions and policies noted above, a total of one noise barrier is recommended within the area restudied. This represents an increase in the number of noise barriers by one compared to the earlier study.
The recommended noise mitigation would consist of 3,450 square feet of 6-foot-high noise barrier. The nominal barrier height is with respect to local top-of-rail elevation. With incorporation of the recommended Quiet Zone and recommended noise barrier mitigation measures, it is predicted that no High-Moderate noise impacts would remain in the design year (2035).

As discussed above, temporary noise impacts could result from construction activities associated with utility relocation, grading, excavation, track work, demolition, and installation of systems components. Construction activities would be carried out in compliance with all applicable local noise regulations, and mitigation measures would be applied as needed to minimize temporary construction noise impacts.

Consistent with FTA and RTD policy, the impact re-assessment performed for the restudy and summarized in this TM considers only sensitive receptors that were in existence, under construction or approved on the date of public knowledge of the Project and does not account for subsequent development. The Project’s Environmental Assessment/Finding of No Significant Impact (EA/FONSI) was approved on October 17, 2014.

1.2 Understanding Noise and FTA Noise Impact Criteria

FTA has developed standards and criteria for assessing noise impacts related to transit projects. The standards are outlined in *Transit Noise and Vibration Impact Assessment* (FTA 2006) and are based on typical community reaction to noise. These standards evaluate changes in existing noise conditions using a sliding scale. The higher the level of existing noise, the less room there is for a project to contribute additional noise. Because noise impact may result from a small contribution of project noise where the existing level of ambient noise is high, the potential exists for noise mitigation to be required of a project even when the project’s noise contribution alone is moderate to small.

The noise terminology and FTA noise impact criteria applicable to the proposed project were explained in detail in the previous Noise and Vibration Report for this project and are not reiterated in detail here. Instead, what follows is a brief summary of the information presented previously along with information provided by FTA to help characterize potential impacts.

The basic unit of measurement for environmental noise is the decibel (dB), which is a logarithmic measure of sound energy that tracks closely with human perception of loudness. To better account for human hearing sensitivity to different frequencies contained in sound (or “unwanted sound” called noise), sound level is quantified in units of “A weighted decibels” (dBA). The “A” scale approximates the average human ear’s sensitivity to sounds comprised of many different frequencies. The terms “sound” and “noise” are used interchangeably in this TM.

The most commonly used noise metric (also called a “noise descriptor”) is the Equivalent Noise Level (Leq), which is the energy sum of all the sound that occurs during a measurement period. A descriptor known as Average Day-Night Noise Level (Ldn) is nearly universally used to evaluate environmental noise in areas with noise-sensitive land uses that include sleeping quarters such as permanent and transient residential use.. The Ldn is a 24-hour Leq with a 10-dB penalty added to noise occurring from 10 PM to 7 AM. The effect of this penalty is that, in the calculation of Ldn, any sound (or noise) event occurring during nighttime hours is equivalent to 10 identical events occurring during daytime hours. This strongly weights Ldn toward nighttime noise, to reflect that people are more easily disturbed and annoyed by noise during nighttime hours when background sounds may be lower and most people are sleeping.

Figure 1-2 provides typical Ldn values experienced in a range of residential and urban areas across the country. A rural area with no major roads nearby would have a typical Ldn of around 40 dBA; a noisy urban residential area close to a major arterial highway would average around 70 dBA Ldn. During the
restudy, the measured Ldn values for Category 2 (residential) use located adjacent to the final track alignment were between 58 and 74 dBA.
The Leq, described previously, can be considered an energy-average sound level for specified time durations such as 30 minutes, or 1 hour, or other defined period. FTA noise impact criteria apply the hourly Leq of the hour of greatest transit activity during hours of noise sensitivity to assess potential impacts at receivers involving primarily daytime use (i.e., where potential sleep disturbance is not an issue). Thus, the Leq is used to consider impacts at locations such as parks, schools, museums, libraries, or churches. As stated previously, few daytime-only noise-sensitive uses were identified near the final alignment and the reanalysis indicates that they will not be impacted by project operations noise. More relevant to the SERE Project, the FTA requires use of the Ldn descriptor for residential land use. Thus, primarily the Ldn noise descriptor and FTA impact criteria for Category 2 were used in the impact/mitigation analyses reported in this TM.

The FTA Noise Impact Criteria places sensitive land uses into the following three categories:

- **Category 1:** Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as national historic landmarks with significant outdoor use. Also included are recording studios and concert halls. [There are no Category 1 uses within the restudy area]

- **Category 2:** Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels, where nighttime sensitivity is assumed to be of utmost importance. [This is the type of noise-sensitive use affected by the Project]

- **Category 3:** Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with...
activities such as speech, meditation and concentration on reading material. Places for
meditation or study associated with cemeteries, monuments, museums, campgrounds and
recreational facilities may also be considered to be in this category. Certain historical sites and
parks are also included. [There is one Category 3 use in the restudy area]

The FTA noise impact criteria are nearly always applied to exterior locations only. These exterior areas
of frequent human use may include back, front, and side yards; patios, decks, pools; common open
space and play areas. When there are no such exterior uses associated with a sensitive receiver, the
impact criteria are applied near building doors and windows, thus indirectly establishing an interior noise
standard.

Figure 1-3, below, shows graphically how “No”, “Moderate”, and “Severe” impacts are determined based
on the contribution of a project’s noise to existing noise. This figure is used by first selecting the value of
Existing Noise Level for the desired location on the horizontal axis, then selecting the Impact Noise
Level (existing ambient noise + modeled project noise) on the vertical axis. The intersect point will fall
within one of the three impact classes. Examples of this process are presented in Figures 1-4 and 1-5.

Figure 1-3. FTA Noise Impact Criteria for Transit Projects

The level of impact also affects potential mitigation requirements for a project. Note that RTD has
established a policy to provide noise mitigation for noise-sensitive use that would be subject to a Severe
Impact or a High Moderate impact (i.e., near the midway point between No Impact and Severe Impact).

The FTA policy guidance is summarized below.

Severe Impact: Severe noise impacts are considered “significant” as this term is used in NEPA
and its implementing regulations. Severe noise impacts represent the most compelling
need for mitigation. However before mitigation measures are considered, the project
sponsor should first evaluate alternative locations/alignments to determine whether it is
feasible to avoid Severe Impacts altogether. If it is not practical to avoid Severe Impacts by
changing the location or design of the project, mitigation measures must be considered.
Impacts in this range have the greatest adverse impact on the community; thus, there is a
presumption that mitigation will be incorporated in the project unless there are truly extenuating circumstances which prevent mitigation.

**Moderate Impact:** The definition of a moderate impact is that the change in the cumulative noise level is noticeable to most people, but may not be sufficient to cause strong, adverse reactions from the community (FTA 2006). Project noise levels in the Moderate Impact range will also require consideration and adoption of mitigation measures when it is considered reasonable. While impacts in this range are not of the same magnitude as Severe Impacts, there can be circumstances regarding the factors outlined below which make a compelling argument for mitigation. These other factors can include the predicted increase over existing noise levels, the type and number of noise-sensitive land uses affected, existing outdoor/indoor sound insulation, community views, special protection provided by law and the cost-effectiveness of mitigating noise to more acceptable levels. [Based on Quiet Zone assumptions and re-analysis there are predicted High and Low Moderate Impacts from the SERE Project]

For example, Figure 1-4 shows the impact levels for future noise exposure, if the existing noise exposure is 53 dBA. As shown, for residential land use (Category 2), a High Moderate Impact would occur above 57 dBA and a Severe Impact would occur at 60 dBA. For commercial land use (Category 3) a High Moderate Impact would occur above 62 dBA and a Severe Impact would occur at 65 dBA.

![Figure 1-4](image)

**Figure 1-4. Example Impact Level Criteria with Existing Noise Level of 53 dBA.**

Figure 1-5, below shows the impact levels for future noise exposure if the existing noise exposure is higher at 63 dBA. As shown, for residential land use (Category 2), a High Moderate Impact would occur above 62 dBA and a Severe Impact would occur at 65 dBA.
Figure 1-5. Example Impact Level Criteria with Existing Noise Level of 63 dBA.

1.3 AFFECTED ENVIRONMENT

1.3.1 Overview

An overview of the noise-sensitive land use and existing noise conditions along the SERE alignment within the restudy area is provided below.

1.3.1.1 Lincoln Station to Lincoln Avenue

Noise-sensitive land use includes the Candlewood Suites Hotel and Lincoln Point Lofts east of the Project alignment and east of the I-25, and the Marriott Hotel west of the Project alignment and west of the I-25. The existing ambient noise in these areas is primarily from the I-25 and local street traffic. Field review of this section, based on the final alignment, found no new potentially affected noise-sensitive land use. New field noise measurements were performed in this section to confirm the previous measurements.

1.3.1.2 Lincoln Avenue to I-25

Noise-sensitive land use includes the Hampton Inn east of the Project alignment, the RidgeGate/AMLI (nee Vue) Apartments west of the Project alignment, and the buildings for the Sky Ridge Medical Center, located west of the project alignment just before the tracks cross the I-25. The existing noise levels in this area are affected by Lincoln Avenue, the I-25 and other local street traffic. Field review of this area, based on the SERE alignment, found no new potentially affected noise-sensitive land use. However, a new measurement location was added between Lincoln Avenue and the RidgeGate/AMLI Apartments to account for the effect of Lincoln Avenue on the north facing side of the RidgeGate/AMLI Apartments and the Hampton Inn. New field noise measurements were performed in this area to confirm the previous measurements.

1.3.1.3 I-25 to RidgeGate Station

This portion of the corridor is mostly open space. It is part of the RidgeGate Planned Development District and at this time no planned development has been approved. The Schweiger Ranch, an historic landmark is located at the south end of this area, easterly of the Project alignment. The existing noise in the area is predominately from the I-25 and local street traffic. Field review of this area found no new...
potentially affected noise-sensitive land use. New field noise measurements were performed in this area to confirm the previous measurements.

1.3.2 Measured Noise Levels

To characterize the existing baseline noise conditions at potentially impacted noise-sensitive receptors along the corridor, an alignment reconnaissance and new field measurements were conducted between November 30 and December 1, 2015. The new noise measurements included both long-term (24-hour) and short-term (typically 15-minute) monitoring of the A-weighted sound level at representative noise-sensitive receptor locations. Two locations in the SERE corridor, designated as LT-1 and LT-2 were selected for long-term ambient noise monitoring. Six locations, designated as ST-1, ST-2, ST-3A, ST-3B, ST-4 and ST-5, were selected for short-term monitoring of ambient noise. Photographs of these measurement sites are included in Appendix A.

The approximate locations of all 8 measurement sites along the SERE alignment are indicated in Figure 1-6. More information about each measurement site is included in the Field Measurement Data Sheets provided in Appendix B. At each site, the measurement microphone was positioned to characterize the exposure of the site to the dominant noise sources in the area. For example, microphones were located at the approximate receptor setback lines from adjacent roads or rail lines and were positioned to avoid acoustic shielding by landscaping, fences, or other obstructions.

Additional measurements, subsequently conducted at the RidgeGate/AMLI Apartments, are discussed in Section 1.4, below.
Source: Parsons Brinckerhoff, 2016

Figure 1-6. Existing Ambient Noise Measurement Locations
The results of the existing ambient noise measurements are summarized in Table 1-1. Detailed noise data collected during site measurements at sites ST-1 through ST-5 are contained in Field Measurement Data Sheets provided in Appendix B. Data collected during long-term measurements at sites LT-1 and LT-2 is provided in Appendix C.

Ambient noise measurements were conducted along the final alignment. The measurements revealed existing ambient Ldn values between 58 dBA and 74 dBA depending on proximity to local road traffic. No specific noise sources were excluded from the measurements. The results in Table 1-1 serve as a basis for characterizing the existing environmental noise conditions at all noise-sensitive receptors along the final alignment and for evaluating noise impact as described below in Section 1.5.

As noted in Table 1-1, the Ldn levels at the various ST locations were estimated. This was accomplished by comparing the measured ST sound level during a specific time interval to a measured LT sound level for the same specific time interval. This approach is called the "master-slave offset" method. Consistent with FTA guidance, PB utilized this methodology on the SERE project. The following paragraph describes this method more fully.

PB used two sound level measuring devices in a "master-slave" configuration to estimate the Ldn at a ST measurement location based on a 24 hour measurement at the nearest 24-hour LT location. In this method, the unattended "master", a LT (24 hour) logging community noise analyzer (CNA) is installed at a selected location. This location was designated "LT-1" in PB's study. (This location is the same as the location selected by HMMH in their earlier noise study designated as "LT-1".) The CNA is programmed to measure and store in its internal memory 24 hours of continuous noise levels in 15 minute intervals. Thus, the Leq for each ¼ hour can be observed, any hourly noise level can be obtained, the interval data can be summed to yield the 24 hour Leq, and the Ldn can be calculated. The "slave" measurement device is a sound level meter (SLM) operated by a noise specialist at a ST location. The 15 minute measurement period of the slave SLM is time synchronized to match a specific 15 minute (or longer if necessary) interval of ambient sound level that is measured by and stored in the CNA. The "offset" or difference in Leq between the two measurement locations during the synchronized period is then used to estimate the Leq or Ldn at the slave ST location based on the 24 hour Leq or Ldn measured at the master LT location. The observer confirms several assumptions that are made to reasonably conclude that the master and slave locations experience similar exposure to ambient noise. For example, that one of the locations is not shielded from a major distant noise such as a busy highway while the other location has a direct exposure to that source. Also, when reviewing the data from the master CNA, a check is made that each of the 15 minute Leq intervals do not deviate significantly from the adjacent intervals. This method is consistent with FTA guidance. For residential use, the FTA, in Section 6.6.2 Noise Exposure Measurements (FTA 2006) states "For residential receivers, full 24-hour measurements are most precise. Such full-duration measurements are preferred over other options, where time and study funds allow." While FTA acknowledges the fact that time and funds may not allow for a 24 hour measurement at every sensitive receptor, PB's approach provides the benefit of a 24-hour measurement by using a dual Long-Term/Short-Term location pairing method. FTA, in Section 6.6.3 Noise Exposure from Partial Measurements (FTA 2006) also provides that "Often measurements can be made at some of the receivers of interest and then these measurements can be used to estimate noise exposure at nearby receivers," and "Measurements at one receiver can be used to represent the noise environment at other sites, but only when proximity to major noise sources is similar among the sites." To accomplish the characterization of noise environments from partial measurements FTA further states "Acoustical professionals are often adept at such computations from partial data and are encouraged here to use their experience and judgment in fully utilizing the measurements in their computations."

PB's Site 3B was used to duplicate the measurement location used earlier by HMMH. In addition, PB added Site 3A to better characterize noise from Lincoln Avenue. PB performed two 15 minute
measurements at short-term Site 3A on December 1, 2015: Starting at 10:00 am PB measured 56.1 dBA Leq. A repeat measurement starting at 3:21 pm yielded a 58.0 dBA Leq. These values were time synchronized with master site LT-1. Because of its higher noise level (attributed to traffic on Lincoln Avenue) the afternoon offset value was used to estimate the existing ambient Ldn at the apartments and hotel using the master-slave offset method.

Table 1-1. Existing Ambient Noise Measurement Results for the SERE Corridor

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Measurement Location Description</th>
<th>Distance from Track (ft)</th>
<th>Start of Measurement</th>
<th>Measured Duration</th>
<th>Outdoor Noise Exposure</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>LT-1</td>
<td>10345 Park Meadows Drive – Lone Tree, CO (Marriott Hotel)</td>
<td>132</td>
<td>10-30-15 to 12-1-15</td>
<td>3:00 P.M. to 3:00 P.M</td>
<td>24 hrs.</td>
<td>Measured</td>
</tr>
<tr>
<td>LT-2</td>
<td>10101 RidgeGate Parkway – Lone Tree, CO (Sky Ridge Medical Center Healing Garden)</td>
<td>660</td>
<td>10-30-15 to 12-1-15</td>
<td>3:00 P.M. to 3:00 P.M</td>
<td>24 hrs.</td>
<td>Measured</td>
</tr>
<tr>
<td>ST-1</td>
<td>10535 El Diente Ct – Englewood, CO (Parking lot adjacent to Candlewood Suites )</td>
<td>260</td>
<td>12-1-15</td>
<td>9:20 A.M</td>
<td>15 min.</td>
<td>Measured</td>
</tr>
<tr>
<td>ST-2</td>
<td>9800 Pyramid Ct – Englewood, CO (Office Building )</td>
<td>1,480</td>
<td>12-1-15</td>
<td>9:44 A.M. and 2:55 P.M.</td>
<td>15 min.</td>
<td>Measured</td>
</tr>
<tr>
<td>ST-3A</td>
<td>RidgeGate/AMLI Apartments frontage to Lincoln Avenue</td>
<td>60</td>
<td>12-1-15</td>
<td>10:20 A.M and 3:21 P.M.</td>
<td>15 min.</td>
<td>Measured</td>
</tr>
<tr>
<td>ST-3B</td>
<td>Intersection of Chatham Dr and Train Station Circle Lone Tree, CO (RidgeGate/AMLI Apartments)</td>
<td>90</td>
<td>12-1-15</td>
<td>10:37 A.M.</td>
<td>15 min.</td>
<td>Measured</td>
</tr>
<tr>
<td>ST-4</td>
<td>10101 RidgeGate Parkway – Lone Tree, CO (MOB3)</td>
<td>400</td>
<td>12-1-15</td>
<td>1:56 P.M.</td>
<td>15 min.</td>
<td>Measured</td>
</tr>
<tr>
<td>ST-5</td>
<td>10822 Havana Road – Lone Tree, CO (Schweiger Ranch)</td>
<td>560</td>
<td>12-1-15</td>
<td>12:38 P.M.</td>
<td>15 min.</td>
<td>Measured</td>
</tr>
</tbody>
</table>

Source: Parsons Brinckerhoff, 2016.
*Confirmed by Supplemental Measurements

Notes:
- dBA = decibels, A-weighted
- ft = feet
- hrs. = hours
- Ldn = day-night sound level
- Leq = equivalent sound level
- min. = minutes

1.4 SUPPLEMENTAL EXISTING NOISE MEASUREMENTS

PB performed supplemental noise measurements April 26 and 27, 2016 to confirm the November 30 and December 1, 2015 noise measurements conducted at the RidgeGate/AMLI Apartments. The new supplemental measurements included a long-term (24-hour) at Room 265’s second story balcony and four short-term (up to 1-hour) measurements at two locations on the property. The results of these supplemental measurements confirmed the accuracy of the measurements previously conducted by PB staff November 30 and December 1, 2015. The existing Ldn of the easterly-facing RidgeGate/AMLI Apartments is 61-62 dBA. The Field Measurement Data Sheets, the 24-hour noise level printout, and site photographs are provided in Appendix E “Supplemental Measurements”.
1.5 IMPACT EVALUATION

1.5.1 Methodology

The noise impact assessment methodology, including impact criteria and modeling assumptions is described in this section.

1.5.1.1 Evaluation Criteria

The environmental noise descriptor Ldn is used to characterize noise exposure for residential areas (Category 2). For other noise-sensitive land uses (Categories 1 and 3), the maximum 1-hour Leq occurring during the facility’s operating period would be used.

Noise impact for the Project is based on the criteria defined in the FTA guidance manual. The FTA noise impact criteria and its basis were discussed in detail on pages 5 and 6 of this TM. Recall that impacts are based on change in noise exposure using a sliding scale. Although higher contributions of transit noise from a project are allowed in neighborhoods with low levels of existing noise, only small increases in total noise exposure (existing + project) are allowed where existing noise levels are high. As previously noted, it is possible for relatively small noise contributions from a new project to cause a noise impact. The FTA Noise Impact Assessment guidelines group noise-sensitive land uses into three categories. There are no Category 1 (extremely sensitive) uses located along the final project alignment. Category 2 uses are located adjacent to the final project alignment. Category 3 (e.g., parks, schools) uses are not located close enough to the final alignment to be impacted. Thus, only Category 2 (residential) use and environmental noise levels in terms of Ldn remain of concern for noise impacts from the Project.

There are three levels of impact defined in the FTA criteria: Severe, Moderate and No Impact. The FTA interpretation of the two important levels of impact was previously discussed on pages 5 through 10 of this TM. Based on the results of the ambient noise measurements and SERE operations noise modeling (discussed in the next section), High Moderate impacts will result from this Project unless mitigated.

The FTA noise impact criteria were previously shown in graphical form in Figure 1-3, FTA Noise Impact Criteria. A different way to evaluate the FTA noise impact criteria is to look at the change in cumulative noise exposure that is predicted to result from the Project. Figure 1-7, Increase in Cumulative Noise Levels Allowed by FTA Criteria, shows the noise impact criteria for Category 1 and 2 land uses in terms of the allowable increase in the cumulative noise exposure. Recall that there are no Category 1 land uses within the SERE corridor.
1.5.1.2 Project Noise Modeling

SERE Light Rail Train (LRT) noise levels were modeled based on FasTracks operations plans, a combination of two noise prediction models, and information from the FTA and CREATE guidance manuals. Significant assumptions and factors used in the predictive noise modeling are summarized below:

- SERE trains will consist of Light Rail Vehicles (LRV).
- Based on the FTA and CREATE guidance manuals, the predictions assume that a single LRV rail vehicle operating at 50 miles per hour on ballast and tie track with CWR generates a SEL of 82 dBA at a distance of 50 feet from the track centerline.
- The operating period of revenue rail service is expected to be approximately from 4:00 a.m. to 1:00 a.m. on weekdays.
- SERE trains would operate with headways of 4.3 minutes during peak periods (approximately 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.), with headways of 5 minutes during 9:00 a.m. to 3:00 pm and from 6:00 pm to 8:00 pm; and 15 minute headways from 8:00 pm to 1:00 a.m. and 4:00 a.m. to 6:00 a.m. during the design year (2035).
- Train sets would consist of a four LRV consist during the daytime and two LRV consist at night after about 10:00 p.m. in the design year (2035); this configuration was used for impact analysis.
- Train operating speeds were taken from the Advanced Basic Engineering System Load Flow Study (December, 2014). Speeds are dependent on location, with a maximum operating speed of 40 miles per hour within the restudy area. Modeled noise emission levels conservatively assumed the design maximum train speed allowed adjacent to logical groupings of receptors (e.g., one or two contiguous residential developments with consistent setback from the final alignment). A train speed of 30 mph was used to model Project noise adjacent to the RidgeGate/AMLI Apartments and the Hampton Inn.
- Train horns, generating a sound level of 102 dBA at 50 feet (corresponding to a SEL of 105 dBA), would be sounded for a period of 20 seconds as trains approach grade crossings,
beginning no further than 0.25 mile from any crossing. Train horn noise impacts were evaluated in the previous study (April 2013) and Quiet Zone mitigation was proposed that would result in no impact from train horns. Because of anticipated implementation of Quiet Zones, restudy of train horn noise was not necessary and was not further evaluated.

- Wheel squeal was mentioned in the previous Report (April 2013) but was dismissed because the Project’s 400-foot-radius track curves were assumed not to be “tight” enough to result in wheel squeal. This incorrect assumption is discussed in the next section.

- PB reviewed planned special trackwork locations and notes that there is no special trackwork (e.g., turnouts) in the vicinity of any noise or vibration-sensitive land use. Thus, excess noise and vibration from special trackwork would not generate noise or vibration impact.

- Potential impacts to the RidgeGate Park-n-Ride facility and Schweiger Ranch were discussed in the previous Report (April 2013), with analysis based on the FTA General Noise Assessment Methodology. However, impact results were only included for Schweiger Ranch; impact analysis results for the RidgeGate Park-n-Ride facility were not provided in the previous Report. Thus, a re-analysis of potential noise impact from automobiles and transit bus operations was performed by PB. The maximum operational assumptions from the previous Report were used in the re-analysis, i.e., 3,600 automobiles and 8 buses access the facility during the peak activity hour in the design year (2035).

The assessment of LRT and Park-n-Ride operations noise impact was accomplished by using the following three components to compare existing noise exposure and noise exposure increase to impact criteria:

- Ambient noise measurements (conducted in accord with ANSI and FTA guidelines),
- Computer modeling of source noise emission levels using the Chicago Region Environmental and Transportation Efficiency Program’s Freight Noise and Vibration Model (CREATE) issued by the Federal Railroad Administration, and
- FTA Noise Impact Criteria for Category 2 (residential) and Category 3 (institutional) Land Use.
- Computer modeling using SoundPlan was additionally utilized to assess LRT operations noise.

Snapshots of the noise models’ typical input screens are provided in Appendix D.

### 1.5.2 Impact Assessment Results

#### 1.5.2.1 Direct Noise Impacts - Final Alignment

Direct noise impacts were determined for station and train operations along the Final Alignment in design year 2035 without mitigation. Based on this final analysis, 26 High Moderate impacts occur at one multi-family residential receptor location (RidgeGate/AMLI Apartments). No noise impacts are predicted for any parkland, museum, institutional or other non-residential use and no indirect noise impacts are anticipated.

According to the previous Report (and FTA noise and vibration assessment guidance), where light rail vehicles operate on tight-radius curves, there is the potential for increased noise called “wheel squeal” due to train wheel and track interaction. The previous Report (April 2013) continues, “However, this phenomenon is highly variable, and depends on the characteristics of the specific vehicle and the radius of the track curves. Because there are no curves along the project alignment where the radius is less than 400 feet, noise from wheel squeal was not included in the noise projections”.

The tight curve radius that is the typical threshold for wheel squeal concern according to FTA and PB practice is a minimum 600-foot-radius, with very little concern when the curve radius is 1000 feet or
greater. While PB agrees that the onset of wheel squeal is highly dependent on the dimensions of the rolling stock trucks and wheelbase of the LRV compared to the actual curve radius, a radius of 400 feet is much tighter than the "no concern" threshold assumed in the previous Report. Thus, this new TM evaluated the potential for generating wheel squeal noise associated with Project trains moving through tight radius curves. The tightest track curve radii in the SERE Project are 400 feet. These occur on either side of the Sky Ridge Station. The FTA formula to evaluate the potential for wheel squeal is when the curve radius is less than the LRV truck wheelbase (70.86 inches for both LRV types to use the SERE) times 100. This calculation results in a value of 590 which is greater than 400. Thus, according to FTA guidance, wheel squeal noise is expected to occur when trains traverse each curve. Identified noise-sensitive uses are sufficiently distant from each curve and are shielded from wheel squeal noise by intervening structures such that no mitigation is required. However, the RTD may want to consider the possible effect of curve-induced wheel squeal noise audibility at the station itself.

The Project has a Park-n-Ride facility associated with the RidgeGate end-of-line Station. The estimated peak-activity-hour-noise for busses and automobiles in the design year (2035) was modeled using CREATE. The model input and output data are in Appendix D. The activity level was 3600 autos per hour and 8 busses per hour at a speed of 25 mph. The reference distance from the facility was 100 feet. The results show a peak-noise-hour Leq of 55 dBA at 100 feet. No sensitive land uses (Category 1 or 2 or 3) are constructed or planned near the facility, thus no noise impacts will result from Park-n-Ride facility operations.

Noise impacts from warning bells at highway/railroad at-grade crossings were evaluated in the previous study (April 2013) and no specific noise impacts were noted. The previous study indicated that warning bells, generating a sound level of 73 dBA at 50 feet, would be sounded at all gated crossings before and after each train pass-by for a total duration of 30 seconds. Warning bell noise was evaluated during the restudy and it was determined that the bells would not cause impact because noise-sensitive use was located sufficiently distant from and/or were shielded from the warning bells by barriers. If warning bell noise should become a future issue, the warning bell sound emission level might be reset to conform to minimum allowable levels in accord with AREMA standards and local shielding of the bells could also be evaluated.

1.5.2.2 Impact Summary

With the Quiet Zone mitigation only (i.e., without noise barrier mitigation), the restudy overall impact assessment predicts 26 High Moderate noise impacts to residential use along the SERE corridor final alignment in the design year (2035). The results of the train noise impact evaluation performed for the restudy are summarized in Table 1-2, Summary of Train Noise Impact Assessment for the Final Alignment Without Noise Barrier Mitigation (2035) on the next page.
### Table 1-2. Summary of Train Noise Impact Assessment - Final Alignment Without Noise Barrier Mitigation (2035)

<table>
<thead>
<tr>
<th>Receptor Location</th>
<th>Distance to Near Track (ft)</th>
<th>Train Speed (mph)</th>
<th>Existing Noise Level</th>
<th>Project Noise Level</th>
<th>Impact Criteria</th>
<th>Total Noise Level</th>
<th>Noise Level Increase</th>
<th>Number of Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candlewood Suites</td>
<td>400</td>
<td>35</td>
<td>74</td>
<td>46-53</td>
<td>65</td>
<td>72.4</td>
<td>74</td>
<td>0</td>
</tr>
<tr>
<td>Marriott Hotel</td>
<td>160-260</td>
<td>35</td>
<td>71</td>
<td>48-60</td>
<td>65</td>
<td>67.1</td>
<td>71</td>
<td>0</td>
</tr>
<tr>
<td>Lincoln Point Lofts</td>
<td>380-560</td>
<td>35</td>
<td>71</td>
<td>48-53</td>
<td>65</td>
<td>67.1</td>
<td>71</td>
<td>0</td>
</tr>
<tr>
<td>AMLI Apartments (North Facing)</td>
<td>60</td>
<td>30</td>
<td>62</td>
<td>53-57</td>
<td>58.9</td>
<td>62-66</td>
<td>63-64</td>
<td>0-2</td>
</tr>
<tr>
<td>AMLI Apartments (East Facing)</td>
<td>60-90</td>
<td>30</td>
<td>61-62</td>
<td>60-65</td>
<td>58.4-</td>
<td>62</td>
<td>63-67</td>
<td>0-5</td>
</tr>
<tr>
<td>Hampton Inn North and South Facing</td>
<td>79</td>
<td>30</td>
<td>62</td>
<td>58-61</td>
<td>58.9</td>
<td>62-66</td>
<td>62-64</td>
<td>0-2</td>
</tr>
<tr>
<td>Sky Ridge Medical Center</td>
<td>400-427</td>
<td>25-40</td>
<td>58</td>
<td>56-56</td>
<td>56.7</td>
<td>62.4</td>
<td>58-60</td>
<td>0-2</td>
</tr>
<tr>
<td>Schweiger Ranch</td>
<td>530</td>
<td>15</td>
<td>60</td>
<td>43.7</td>
<td>57.8</td>
<td>63.4</td>
<td>60</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Parsons Brinckerhoff, 2016.

Notes:
1. Noise levels are based on Ldn measured in dBA.
2. Predicted levels for LRT operations (rounded to the nearest decibel).
3. All impacts are residential unless otherwise noted.

ft = feet
mph = miles per hour
Discussion of the design year (2035) impacts within the corridor is provided below.

1.5.2.3 SERE Area

After accounting for the Quiet Zone mitigation, based on measurements of existing environmental noise and modeling, High Moderate noise impacts from SERE train operations are projected only at the RidgeGate/AMLI Apartments representing 26 residential units. These apartments are located southerly of Lincoln Avenue and westerly of the tracks. Figure 1-8 on the next page provides a map of the noise impact locations without noise mitigation.
Figure 1-8. Noise Impacts Without Mitigation

Source: Parsons Brinckerhoff, 2016.
1.5.2.4 Parkland and Historic Property

The only historic property along the SERE corridor study area that would be considered noise-sensitive according to the FTA guidelines is the Schweiger Ranch. The previous study found that noise from SERE train operations would not impact the Schweiger Ranch. The restudy confirms the previous study findings and no mitigation is necessary.

1.5.2.5 Operations Vibration Impacts

Vibration measurements and analyses conducted in the previous study were presented in the previous Report (April 2013). The previous study determined that there was no potential for train operations vibration impact from the Project. PB reviewed planned special trackwork locations and notes that there is no special trackwork (e.g., turnouts) in the vicinity of any vibration-sensitive land use. Vibration field conditions have not materially changed since the previous analysis.

The FTA guidance (FTA 2006) regarding the necessity of conducting a Detailed vibration impact analysis states:

“The goal of the Detailed Analysis is to use all available tools to develop accurate projections of potential ground-borne vibration impact and, when necessary, to design mitigation measures. This is appropriate when the General Assessment has indicated impact and the project has entered the final design and engineering phase [emphasis supplied].”

To confirm the previous study findings, PB used the FTA General vibration impact assessment methodology, based on data for RTD SD-100 and SD-160 light rail vehicles, and confirmed that vibration impacts from train operations are not likely to result from this Project. Based upon an evaluation of the previous study plus additional information about the construction methods, this restudy TM affirms that operations vibration, and construction vibration and noise were adequately addressed in the previous study. Consistent with FTA policy guidance, further Detailed vibration impact analysis was not warranted and additional vibration field measurements were not performed. PB agrees with the mitigation measures provided in the previous Report (April 2013). No additional vibration mitigation measures are necessary or recommended.
1.5.2.6 Temporary Construction Impacts

The restudy evaluated the previous study’s vibration and construction noise assessment methodology, findings, and recommendations. The previous study predicted that temporary noise and vibration impacts could result from construction activities associated with utility relocation, grading, excavation, track work, demolition, and installation of systems components. Such impacts may occur in residential areas and at other noise-sensitive land uses located within several hundred feet of the alignment. The previous study and the restudy noted that the Project’s recommended mitigation measures included the use of alternative less noisy/lower vibration construction methods (reproduced below in Table 1-3).

While the potential for noise and vibration impacts would be greatest at locations near pile-driving operations for bridges and other structures, the current construction plan indicates that impact pile driving will not be conducted. This restudy confirms that bridge piers will be constructed using the cast-in-drilled-hole method. This approach will generate much lower noise and vibration. Also, for linear projects such as construction of a rail line, noise and vibration associated with construction will move from one location to another with less time duration at any one location. Based on the above discussion, the restudy agrees with the earlier study’s analysis that while construction impacts could occur they will be mitigated by the mitigation measures provided in Section 1.5 of this TM.

1.5.2.7 Cumulative Impacts

No cumulative noise impacts were predicted by the previous study.
1.6 MITIGATION

Recommended mitigation measures for construction and operational noise impacts are provided in this section of the TM. Table 1-3 contains a summary of the noise mitigation recommended by the previous study and the restudy.

Table 1-3. Proposed Mitigation Measures – Noise and Vibration

<table>
<thead>
<tr>
<th>Impact</th>
<th>Impact Type</th>
<th>Mitigation Measures for the Final Alignment</th>
</tr>
</thead>
</table>
| Noise and Vibration     | Construction$^{1,2}$ | • Construction shall comply with local noise regulations.  
                          |             | • Nighttime construction in residential neighborhoods will be avoided, when possible.                |
|                         |             | • Stationary construction equipment will be located as far as possible from noise-sensitive sites.     |
|                         |             | • Noise barriers, such as temporary walls or piles of excavated material, will be constructed between noisy activities and noise-sensitive receivers. |
|                         |             | • Use alternative construction methods to minimize the use of impact and vibratory equipment (e.g., pile-drivers and compactors) where beneficial to sensitive land use. |
|                         |             | • Construction-related truck traffic along roadways will be routed to cause the least disturbance to residents. |
| Operations$^1$          |             | • RTD will work with the municipalities to establish Quiet Zones.                                       |
| Operations$^2$          |             | • Work with the municipalities to establish Quiet Zones.                                                |
|                         |             | • Construct 3,450 square feet of 6-foot-high noise barrier that was found to be feasible and satisfy the reasonable cost per benefitted receiver$^3$. |

Sources: Previous Report (April 2013) and Parsons Brinckerhoff, 2016.
$^1$ Previous Report (April 2013)
$^2$ Parsons Brinckerhoff, 2016.
$^3$ Note that barrier heights are nominal minimum above top-of-rail

1.6.1.1 Temporary Construction Impact Mitigation

A list of possible mitigation measures considered in the Project’s Finding of No Significant Impact may be found in Appendix F.

The mitigation measures recommended in the previous Report (April 2013) and by this new TM follow:

Construction activities shall be carried out in compliance with all applicable local noise regulations. In addition, the following mitigation measures will be applied as needed to minimize temporary construction noise impacts:

- Avoid nighttime construction in residential neighborhoods.
- Locate stationary construction equipment as far as possible from noise-sensitive sites
- Construct temporary noise barriers, such as temporary walls, noise curtains, or piles of excavated material, between noisy activities and noise-sensitive receivers.
- Rout construction-related truck traffic to roadways that will cause the least disturbance to residents.
• Use alternative construction methods to minimize the use of impact and high vibration equipment (e.g., impact pile-drivers and vibratory compactors) near sensitive land use.

1.6.1.2 Operational Noise Impact Mitigation

To mitigate noise impact from train operations, noise control can be considered at the source, along the sound path, and/or at the receiver. Source noise control options include limiting the use of train horns (e.g., by establishing Quiet Zones to avoid horn use at grade crossings). Noise barrier wall construction is the most common path noise control treatment and is the mitigation method recommended in this TM.

The first recommended noise mitigation action in the previous Report (April 2013) was to establish Quiet Zones at all railroad/highway grade crossings located near affected noise-sensitive areas. It appears that this approach is in process and its implementation was assumed for the current restudy. This TM also recommends implementation of Quiet Zones.

Due to a distance error in its noise impact modeling calculations, the previous Report did not identify a High Moderate noise impact to the RidgeGate/AMLI (nee Vue) Apartments. As noted previously, High Moderate noise impact was identified based on measurements of existing environmental noise and modeling of the Project noise at the RidgeGate Apartments. Consistent with FTA and RTD policy, the recommended mitigation approach in this Final Design TM is to construct a noise barrier where the noise from train operations (without the noise from train horns) would result in High Moderate noise impacts to noise-sensitive use.

The required physical location and dimensions of feasible (i.e., acoustically effective) noise barriers are produced by computer modeling. The noise barrier material and construction is assumed to be robust and highly impervious to train noise. By inputting the noise source, pathway, and receptor information, plus iterative values of proposed noise barrier placements, extents, and heights, the computer model will calculate the noise reduction performance of potential noise barriers. The initial modeling of noise barriers provides a “first look” at the basic reduction in train noise provided by a proposed barrier at one or more receptor locations. Based on our noise abatement specialists’ experience, this initial modeling also serves as a quality control check on the validity of the computer model’s input/output. For example, an excessively tall barrier, or lack of noise reduction from a typical barrier that should perform well, would clearly indicate a problem. No anomalies occurred during the computer modeling runs for the SERE restudy. The placement (e.g., on the edge of guideway curb), the height, the extent (length), and the acoustical performance of the noise barrier were all within expected bounds.

However, as will be discussed in Section 1.5.1.3 of this TM, The final design of a project’s noise barriers must also reflect non-acoustical parameters such as a structural requirement for exceptionally light weight, interference with utilities, dual function as security fence and a noise barrier, and other constructability and maintenance access issues.

According to FTA policy, the use of noise barriers to mitigate Moderate noise impacts is considered appropriate if: 1) the noise barrier will effectively mitigate Severe and Moderate noise impacts, 2) the cost range for the noise barrier is within limits established by the Project owner per benefited residence ($30,562 to $53,483 in 2008 dollars), and 3) the noise barrier is constructible, practicable, has no substantial undesired effects, and is acceptable to the benefitted residents. Based on the FTA guidelines (except for the residents’ approval process that would occur later) and RTD mitigation policy, a feasible and cost-reasonable noise barrier was developed for the SERE Project. Three versions of the noise barrier were modeled and evaluated. The results and recommendation are presented below.

A 4-foot-high noise barrier would reduce the noise level at the apartments between 2.9 to 9.4 dB. The higher floors would get the lower noise reduction and Low Moderate Impact remains on the 4th floor.
for all sections of the Apartments. The noise barrier would be 575 feet long with a total surface area of 2,300 square feet. At $40/ square foot, the noise barrier would cost $92,000. For 26 benefitted dwelling units the cost per unit would be $3,538; this is reasonable.

A 5-foot-high noise barrier would reduce the noise level at the Apartments between 3.6 to 10.4 dB. The higher floors would get the lower noise reduction and No Impact at the Apartments would just be achieved with little margin. The noise barrier would be 575 feet long with a total surface area of 2,875 square feet. At $40/square foot the noise barrier would cost $115,000. For 26 benefitted dwelling units the cost per unit would be $4,423; this is reasonable.

As discussed in the next Section (1.5.1.3) and based on FTA guidance and relevant scientific literature, there could be a small decrease in a noise barrier’s performance due to the proximity of the noise barrier to the nearby surface of the passing train vehicles. While this degradation could be eliminated by constructing a sound absorptive (on the train side) noise barrier, it is likely more cost effective to use a 6-foot-high noise barrier configuration. This would provide the equivalent noise reduction performance of a less tall sound absorptive barrier and will achieve No Impact. Thus, the options of a sound-reflective opaque or transparent noise barrier are preserved as a design decision.

The recommended 6-foot-high noise barrier would reduce the noise level at the Apartments between 3.7 to 11.4 dB. The higher floors would get the lower noise reduction and there would be No Impact at the Apartments. The noise barrier would be 575 feet long with a total surface area of 3,450 square feet. At $40/square foot the noise barrier would cost $138,000. For 26 benefitted dwelling units the cost per unit would be $5,308; this is reasonable.

The noise barrier characteristics and information are provided in Tables 1-4, 1-5, and 1-6, below.
Table 1-4. Feasible Noise Barrier

<table>
<thead>
<tr>
<th>Barrier Name</th>
<th>STA</th>
<th>Top of Rail Elevation (Feet)</th>
<th>Structure Elevation at Barrier Base (Feet)</th>
<th>Top of Wall Elevation</th>
<th>Height above Deck Curb &amp; MSE Wall (Feet)</th>
<th>Height above Rail (Feet)</th>
<th>Approximate Offset from Rail Center Line (Feet)</th>
<th>Offset Side of Track</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB1</td>
<td>821+00</td>
<td>6017.22</td>
<td>6017.22</td>
<td>623.22</td>
<td>6</td>
<td>6</td>
<td>10</td>
<td>W</td>
</tr>
<tr>
<td>NB1</td>
<td>826+00</td>
<td>6009.05</td>
<td>6009.05</td>
<td>6015.05</td>
<td>6</td>
<td>6</td>
<td>10</td>
<td>W</td>
</tr>
</tbody>
</table>

The cost-reasonable evaluation is summarized below in Table 1-5, Summary of Barrier Cost Reasonableness Evaluation. The estimate of probable cost per square foot (in 2014 dollars) is based on $40/square foot for light weight, sound-absorptive opaque or sound-reflecting transparent noise barriers 6-feet-high above top-of-rail. This cost may vary depending on selection of final barrier type, but $40 per square foot provides a conservative estimate of probable cost.

Table 1-5. Summary of Barrier Cost Reasonableness Evaluation

<table>
<thead>
<tr>
<th>Barrier Name</th>
<th>Square Footage</th>
<th>Total Cost</th>
<th>Benefitted Receptors</th>
<th>Cost per Benefitted Receptors</th>
<th>Cost Reasonable?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB1</td>
<td>3,450</td>
<td>$138,000</td>
<td>26</td>
<td>$5,308</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 1-6, below summarizes the results of the overall impact analysis of the final track alignment with mitigation of Project noise by the feasible/cost-reasonable noise barrier.

Table 1-6. Summary of Noise Impact Assessment - Final Alignment with Feasible and Reasonable Noise Barriers (2035)

<table>
<thead>
<tr>
<th>Receptor Location</th>
<th>Distance to Near Track (ft)</th>
<th>Train Speed (mph)</th>
<th>Existing Noise Level¹</th>
<th>Project Noise Level¹ Predicted²</th>
<th>Total Noise Level²</th>
<th>Noise Level Increase</th>
<th>Impacts With Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RidgeGate / AMLI Apartments</td>
<td>60-90</td>
<td>30</td>
<td>61-62</td>
<td>51-61</td>
<td>58.4-58.9</td>
<td>62</td>
<td>61-64</td>
</tr>
<tr>
<td>Hampton Inn²</td>
<td>79</td>
<td>30</td>
<td>62</td>
<td>58-61</td>
<td>58.9</td>
<td>62-66</td>
<td>62-64</td>
</tr>
</tbody>
</table>

Notes:
1. Noise levels are based on Ldn and are in dBA.
2. Predicted levels for LRT operations (rounded to the nearest decibel).
3. No mitigation required for Hampton Inn.
4. See text; no outdoor use thus no mitigation needed.

As shown in Table 1-6, the results for the design year (2035) indicate that with the Quiet Zone and feasible and reasonable noise barrier mitigation measures implemented per FTA guidance and RTD policy, there are no residual noise impacts at the RidgeGate Apartments. This may be seen in Figure 1-9 on the following page. Modeling of the Hampton Inn indicates seven Low Moderate impacts, as is also shown in Table 1-6 and on Figure 1-9. However, there is no outdoor noise-sensitive use at the Hampton Inn, thus there is no mitigation required or necessary at this location per FTA guidance and RTD policy.
Figure 1-9. Noise Impacts With Mitigation

Noise barrier characteristics are discussed in the next section of this TM.
1.6.1.3 Noise Barrier Characteristics

All computer modeling was completed for “reflective” noise barriers. Due to proximity effects and/or the geometric relationship among the noise source, the noise barrier, and the noise-sensitive receptor(s), the effectiveness of a reflective noise barrier may not satisfy the acoustical performance requirements. Noise barriers that are “sound absorptive” (needed only on the train source side) can counteract an appreciable loss of noise reduction performance due to the close proximity of the transit vehicle and the noise barrier, and typically provide a useful improvement in noise-reduction performance. Corrections for this differential performance were evaluated manually. The effects and the use of sound-absorptive materials on transit sound barriers are described more fully in the FTA guidance manual. For the Ridgegate/AMLI Apartment units with a High Moderate noise impact a noise barrier was modeled at various lengths and heights with placement on the west edge of the guideway structure. The goal was to substantially minimize or to have no impacts at all noise-sensitive floors of the Ridgegate/AMLI Apartments. Noise barrier heights from 4 to 6 feet-high (above top-of-rail) were modeled and discussed in the previous Section.

Noise Barrier Locations, Extent, and Height

Preliminary Engineering design information for the noise barrier, including approximate noise barrier length and height, is presented in Table 1-7.

Table 1-7. Recommended Noise barrier Mitigation

| Ridgegate/AMLI Apartments | Install a noise barrier from Station 821+00 to Station 824+00 on the bridge structure and from 824+00 to 826+75 on top of MSE wall in front of the residential land use. Train side of the noise barrier is not required to be sound absorptive. | Length: 575 feet; Height: 6-foot-high above top-of-rail; Surface area: 3,450 square feet; Conservative estimate of probable cost per benefitted receptor is $5,308. |
| Hampton Inn | No noise mitigation required | |

In summary, Noise Barrier 1 (NB-1), located along the westerly edge of the bridge/ guideway and continuing along the westerly edge of the MSE wall, with a height of 6-foot-above-top-of-rail will mitigate the Project noise to No Impact levels at the RidgeGate Apartments. As discussed above in Section 1.6.1.2 and noted in Tables 1-6 and 1-7, there is no need for mitigation of the residual Low Moderate impacts at the Hampton Inn. The recommended typical noise barrier sections may be seen in Figures 1-10 and 1-11 below.
Figure 1-10. Typical Noise Barrier Section on Bridge
Figure 1-11. Typical Noise Barrier Section on MSE Wall
Noise Barrier Characteristics and Types

Materials
The basic property of a noise barrier for acoustic purposes (simplified for typical transportation noise sources such as commuter rail) is that it has a minimum mass of approximately four pounds per square foot of surface area. This characteristic may be easily satisfied by a wide range of basic and proprietary materials, including glass; acrylic panels such as Plexiglas™, Lexan™, Acrylite®; and other clear plastics; thin gauge metal sheets; concrete and concrete products; wood/timber; gunite/shotcrete on wire frame; bonded rubber granules, and fiberglass. At a minimum, the noise barrier must also block the line-of-sight between the radiating noise source and the noise-sensitive receptor. Additionally, to be acoustically effective, the noise barrier must present a continuous, solid surface with no holes, cracks, decorative cut-outs, or gaps, including any openings along the bottom of the barrier. Importantly, the noise barrier must be mechanically robust, constructible, resistant to the environment, repairable, aesthetically acceptable, etc.

Noise barriers may be further divided into two classes: 1) visually transparent (these are always sound reflective) and, 2) visually opaque (these are the most common sound barriers and may be sound reflective or sound absorptive).

If the physical geometric relationship among the source (train), the path with the noise barrier, and the noise-sensitive receptor does not preclude a sound barrier approach to noise mitigation, the minimum mass, plus correct placement, sufficient height and length, and possibly a sound absorptive surface is expected to allow the noise barriers to reduce the offending noise to a level that is below the noise impact criterion for the noise-sensitive use. It is an important finding in this analysis and recommendation that due to the geometric and proximity issues described earlier, the 6-foot-high noise barriers designed for this Project do not need to be sound-absorptive on the train facing side and may be visually transparent or visually opaque. Depending on aesthetic considerations, the noise barriers may require architectural treatment/texture/patterns on the public and/or train-facing side of the barrier. The noise barriers presented for consideration in this TM are capable of fulfilling all requirements as necessary.

Visually opaque noise barriers are available in both sound-reflective and sound-absorptive versions. Most noise barriers constructed of sound-reflective materials (e.g., concrete) may be made sound absorptive by adding a surface treatment, either spray-on or bolt-on. Some typically reflective materials such as Concrete Masonry Block (CMU) are also available in a licensed, locally fabricated CMU type design that is very sound-absorptive. However, it is possible that this Project may require especially light weight noise barriers. If that is the case then selection of a CMU or precast standard concrete panel type of noise barrier may not be appropriate due to the excessive weight.

Several manufacturers produce noise barriers constructed of a range of materials that are inherently sound absorptive and very effective. Versions of metal-panel noise barriers have a fiberglass core and a perforated metal skin, while other types contain bonded rubber or wood particles. These types of noise barriers are generally lighter than CMU or precast concrete, but they do use a “post and panel” design so the weight of the posts and inter-post spacing must be considered. At least one manufacturer (IAC) offers an aluminum version of its perforated panel coupled with locally-sourced aluminum posts for a very light weight noise barrier without sacrificing any, and in fact providing enhanced, acoustical performance.

Based on experience with noise barriers used to reduce transportation noise, including highway, commuter rail, and LRT sources, a range of noise barrier material types for comparison purposes that could be effective in mitigating Project noise have been selected for discussion. Coordination with key vendors regarding information about their products has been conducted. The information solicited about
Potential sound-absorptive noise barrier types are listed below for completeness. Note however, if the dead load of the noise barrier is of concern then most of the listed types will not be suitable for this Project and only the last three bulleted solutions might be considered for reasons other than acoustical performance.

- Standard reinforced masonry block plus a spray-on (e.g., Pyrok Acoustement 40) or bolt-on (e.g., Armtoc Durisol or Industrial Acoustics panel) sound-absorbing surface layer.
- Proprietary reinforced masonry block with a licensed sound-absorbing design (e.g., SoundBlox licensed by Proudfoot Co.)
- Cast-in-place concrete wall with spray-on (e.g., Pyrok Acoustement 40) or bolt-on (e.g., Armtoc Durisol or Industrial Acoustics panel) sound-absorbing surface layer.
- Post and panel noise barrier of precast concrete panels with spray-on sound-absorbing layer (e.g., Pyrok Acoustement 40) or bolt-on (e.g., Armtoc Durisol or Industrial Acoustics panel) sound-absorbing surface layer.
- Post and panel wall with precast sound-absorptive wall panels made of a proprietary material consisting of organic softwood shavings processed to an acoustically engineered size and bonded together under pressure with Portland cement (e.g., Armtoc’s Durisol NB15). The weight of the NB-15 system is 45 pounds per square foot for panels and 8 or 15 pounds per vertical foot of post depending on aluminum or steel post material.
- Post and panel noise barrier with perforated metal panel/tray containing sound-absorbing material (e.g., Industrial Acoustics Co. Transportation NoiShield™). The weight of this system is related to the material type. The lightweight aluminum panel and post system weighs 4.5 pounds per square foot for panels and 8 pounds per vertical foot for posts. The standard steel system weighs 6.5 pounds per square foot for panels and 15 pounds per vertical foot for posts (W8-21).
- Post and panel noise barrier with one-piece resin-bonded rubber granule sound-absorbing panels (e.g., Carsonite Sound Barrier). Weight available upon request.
- Proprietary structural plastic modular sound-absorptive wall systems (e.g., Sound Fighter). Weight available upon request.

Photographs and/or visual renderings of example noise barrier types are provided within this TM beginning on page 31.

**Advantages/Disadvantages of Noise barrier Types/Materials**

Because the recommended noise barrier for the Project is 6-foot high it may be sound reflective on both sides or sound absorptive on the train-facing side. There is also slightly higher train noise sideline emission when running over elevated slab track versus ballast and tie track. However, the acoustic performance of the Project’s recommended noise barrier is sufficient to provide the required noise reduction.

Different types of noise barrier construction offer different advantages/disadvantages. This TM includes information about a transparent, acrylic panel type noise barrier.

- CMU block walls’ advantages include ease of construction and limited maintenance requirements. CMU walls can be easily installed on aerial guideways and on top of retaining walls by extending rebar from the structure below into the noise barrier CMU.
- Noise barriers using cast-in place or precast concrete post and panel construction may offer cost savings due to the cost of material and ease of construction, fabrication, and installation.
• Inherently sound-absorptive noise barrier types, such as perforated metal with fiberglass core or composites such as wood/concrete, do not require the secondary step of applying a surface absorber, and they generally provide a greater degree of sound-absorptive performance which is not required because of the recommended barrier height. These types retain the benefits of post and panel construction.

• One of the intrinsically sound-absorptive post and panel noise barriers (Durisol NB-15) offers many texture and pattern options in addition to the color options that are offered by the Industrial Acoustics Company (Transportation NoiseShield).

• Acrylic transparent panel with steel or aluminum posts. This material weighs much less than the traditional concrete or cementitious/wood chip type noise barrier products and is about the same mass as the lightweight IAC product. Although it is sound reflective, it would be an acoustically acceptable choice for this Project. It has been used as an effective noise barrier on elevated structures. An example of this type barrier is the Acrylite® SoundStop Transparent Noise Barrier using the GS CC panels in a TL-4 system.
Additional Information on Select Noise Barriers

Note: The estimates of probable cost may be used for comparative purposes among products but may not reflect current pricing.

Metal Post and Panel Sound Absorptive Sound Wall

Industrial Acoustics Corporation (IAC) NoiShield® products offer the best noise-absorbing performance in the industry with a typical NRC of 1.00. This system uses fiberglass-filled metal panels with steel demountable posts. Typical panel length (post spacing) is 16 feet. An extensive range of powder-coated polyester paint colors and anti-graffiti coatings are available. Low weight and sturdy, they are well suited for structural mounting, new or retrofit applications, and bridge projects. The rumble of passing buses, trucks, and trains is a common complaint in many locations. NoiShield® excels in absorbing these low frequency sounds. Made of steel or aluminum, the noise-source-side of panel is perforated and highly sound-absorptive (a critical requirement for this project). After more than 20 years of service in freezing -40°F northern climates, IAC NoiShield® barriers are still performing well. IAC products can be supplied as free-standing barriers or as cladding for existing barriers. As stated previously, this product is currently reducing noise from aerial LRT and at-grade heavy rail in Southern California communities.

The panels and posts of an IAC sound wall may be temporarily removed for maintenance access and reinstalled with no performance degradation. In case of emergency, the panels may be quickly removed by first responders to allow access to or egress by passengers.

This sound wall type has been used in railroad noise applications up to 24-feet high. Manufacturer: IAC. Product: Transportation NoiShield®. EPC: $30 per square foot of sound wall for all material delivered to site, plus $10 per square foot for installation, including concrete piers, etc. Overall installed EPC per square foot is $40. Photographs of the IAC Transportation NoiShield® sound wall on the Los Angeles Metro Green Line are presented below in Figure 1-12 through Figure 1-14.
Figure 1-12. IAC NoiShield® 6-foot-high metal post and panel sound wall on aerial structure

Figure 1-13. IAC sound wall viewed from adjacent office building. Note this is a 6-foot-high barrier.
Figure 1-14. Aesthetics of IAC sound wall were selected to “blend in” with original visual design of the project pictured in the figure.
Composite Sound-Absorptive Post and Panel Noise Barrier
Durisol is highly sound-absorptive, porous, rigid, non-combustible, thermally insulating, and freeze-thaw resistant. Posts (concrete or steel) are 15 feet on-center (with optional spacing). Parsons Brinckerhoff staff has observed new samples of this product recently but have not seen a complete noise barrier in-person. Manufacturer: Amtec Durisol. Product: NB-15. Overall installed EPC with standard surface patterns (basket weave on public-side and plain flat on train side) and with steel posts is $22 per square foot. Additional information is provided in Figures 1-15 through 1-17, below.

Figure 1-15. Durisol precast sound wall colors
Figure 1-16. Durisol precast sound wall colors (continued)

Addition Durisol product may be seen in Figure 1-17 on the next page.
**Fiberglass Composite with Crumb Rubber Filling**

Carsonite manufacturers a fiberglass composite panel with crumb rubber filling. Different colors and finishes are available, as are a range of anti-graffiti coatings. The noise barrier is easy to install and may be repaired if damaged. This type of noise barrier has been used less than other types, but it appears to work well. Thousands of linear feet of Carbonite plastic noise barrier panels have been used for construction noise control around work zones. Manufacturer: Carsonite. Product: Sound Barrier. EPC: $14 per square foot for panels only; posts and foundations $7 per square foot of wall, delivered to site, plus $4 per square foot for erection of wall. Overall installed EPC per square foot is $25. Figure 1-18 presents train side and public side views of the Carsonite noise barrier.
Modular Polymers

This noise barrier is acoustically absorptive. Manufacturer claims molded in color and minimal maintenance costs. Modules, frames, and mock-ups comprising this product have been reviewed, but full-sized examples have not been observed. However, this wall type is currently installed and may be observed in the vicinity of Dallas-Fort Worth International Airport. Modules are 10-inches high contained in a frame. Posts (galvanized steel, but not visible) are 74 inches on-center. Manufacturer: Sound Fighter. Product: LSE 2000. EPC: $22 per square foot for panels and posts delivered to site, plus $12 per square foot for foundations, anchors, and erection of wall. Overall installed EPC per square foot is $34. Photographs of this modular noise barrier may be seen in Figure 1-19.

Figure 1-19. Sound Fighter Sound Wall

Very Low Weight Transparent Sound Reflective Noise Barriers

Clear, colored, or patterned acrylic material can be used as a high performance noise barrier. It is a sound reflective type of noise barrier. Thus, there would be some degree of acoustic performance deficit when placed very close to the sound source and/or when used in a parallel configuration. The amount of degradation may not be important depending on the specific requirements of the noise barrier. Importantly however, it can provide a very lightweight noise barrier system compared to traditional noise barrier materials. The panel thickness usually recommended for rail transit systems is 25/32 inch. The maximum post spacing for the TL-4 system described below is 8 feet on-center.

The ACRYLITE® Soundstop TL-4 System is a lightweight noise barrier system developed especially for bridges and elevated roadway or guideway applications. The system has been successfully tested under NCHRP 350 Test Level 4 conditions. As a highway noise barrier it was proven to stabilize a vehicle and reduce the severity of auto crashes. On elevated structures its construction resists striking force and prevents the falling of dangerous sized fragments after an impact.

The system is a complete turnkey solution for transparent noise barriers, vandal shields or wind screens on bridges and overpasses. These “no maintenance panels” will retain clarity and physical strength despite decades of exposure to sunlight and other elements (ASTM D 1003 & D 4812 test methods). Components meet or exceed FHWA and DOT standards.

Safest noise Barrier Available

Meets NCHRP 350 Test Level 4 conditions
Lightweight As little as 200lbs per linear foot

Attractive Panels are available as clear or colored panels
Excellent sound insulating properties
The SoundStop GS CC panel in a 25/32-inch thickness weighs 4.86 pounds per square foot, and an aluminum post could be specified. Additional characteristics of the material such as chemical and UV light resistance, thermal properties, transparency, graffiti repair, etc. and test reports are available.

ACRYLITE® SOUNDSTOP TL-4 SYSTEM

NCHRP Report No. 350 crash-tested and approved system for bridges and elevated roadway applications

Crash tested Proven to stabilize vehicles and reduce the severity of crashes

Height Available up to 4.88m (16ft) high

ACRYLITE® Soundstop GS CC has embedded polyamide filaments to contain broken fragments resulting from collision damage (complies with EN 1794-2)

AVAILABLE COLORS

ACRYLITE® Soundstop GS CC sheet for the TL-4 System is available in the following standard colors.
The color impression remains the same in different thicknesses. Other colors can be manufactured upon request.

- Clear
- Midnight Blue
- Steel Blue
- Sky Blue
- Forest Green
- Sea Green
- Spring Green
- Smoky Brown
**Noise Barrier Considerations**

1. The Project noise barrier may be sound-absorptive on the train side or reflective on both sides.

2. Certain noise barrier types/brands offer more options for aesthetic/visual features, although each of the recommended types offer desirable visual characteristics and all satisfy the noise reduction requirements.

**Recommendations**

IAC’s Transportation NoiShield® metal post and panel system would be the first choice from a purely acoustic performance perspective. It is also robust, lightweight (optionally, very lightweight), may be removed and reinstalled with no loss of performance. And it offers a unique safety feature for emergency access. Additionally, the IAC system has a proven track record in reducing train noise, including noise from elevated guideway. However, other than color choice, it offers the least range of appearance features.

If the weight of the noise barrier is not critical, Armtec Durisol™ NB-15 post and panel noise barriers offer a balance of acoustical performance and visual aesthetic options with various finishes and colors.

If the weight of the noise barrier is not critical, standard CMU may be used depending on aesthetic requirements.

If a very lightweight, transparent noise barrier is preferred for aesthetics or other reasons, then the Acrylite SoundStop TL-4 barrier system could be used, and it will provide the required acoustical performance at 6-foot above top-of-rail height.

Each of these products could be recommended to provide effective Project noise mitigation at the noise-sensitive RidgeGate/AMLI Apartments identified and discussed in this TM.

**2.0 CONCLUSION**

The restudy performed by WSP | Parsons Brinckerhoff to satisfy Project requirements is summarized in this TM. The restudy affirmed a portion of the content and mitigation measures recommended in the previous Noise and Vibration Report (April 2013). However, based on updated information, including recent ambient noise monitoring, new three dimensional modeling of SERE operations noise, plus RTD policy and constructability review, the restudy team was able to more precisely analyze noise impacts and recommend an effective noise mitigation approach. The recommended noise mitigation measures presented in this TM are expected to benefit both the Project and the occupants of residential land use located adjacent to the final alignment of the South East Rail Extension.

**3.0 REFERENCES**


Harris Miller Miller & Hansen. February 2, 2015. Supplemental information regarding HMMH’s SERE Train noise modeling. Provided by Christopher J. Bajdek of HMMH, Burlington, MA.


RTD FasTracks. April 2013. RTD Southeast Corridor Extension Project Noise and Vibration Analysis. Prepared for Jacobs Engineering by Harris Miller Miller & Hansen, Burlington, MA.


SoundPLAN® Complete. 2014. Environmental Noise Model Version 7.4. Copyright SoundPLAN International LLC; 80 E Aspley Ln; Shelton, WA.

Appendix A - Measurement Site Photographs
Figure A-1. Site LT-1: 10345 Park Meadows Dive (Marriott Hotel) – Lone Tree, CO

Figure A-2. Site LT-2: 1010 RidgeGate Parkway (Sky Ridge Medical Center Healing Garden – Lone Tree, CO
Figure A-3. Site ST-1: 10535 El Diente Ct (Candlewood Suites) – Englewood, CO

Figure A-4. Site ST-2: 9800 Pyramid Ct (Office Building) – Englewood, CO
Figure A-5. Site ST-1: 10535 El Diente Ct (Candlewood Suites) – Englewood, CO

Figure A-6. Site ST-2: 9800 Pyramid Ct (Office Building) – Englewood, CO
Figure A-7. Site ST-3A: RidgeGate/AMLI Apts – Frontage to Lincoln Avenue – Lone Tree, CO

Figure A-8. Site ST-3B: Intersection of Chatham Dr and Train Station Circle (RidgeGate/AMLI) – Lone Tree, CO
Figure A-9. Site ST-4: 10101 RidgeGate Parkway (MOB3 Building of Sky Ridge Medical Center) – Lone Tree, CO

Figure A-10. Site ST-5: 10822 Havana Road (Schweiger Ranch) – Lone Tree, CO
Appendix B - Field Measurement Data Sheets
### FIELD MEASUREMENT DATA SHEET

**Project Name:** Southeast Rail Extensions  
**Job #:** 184124A Task 3010

<table>
<thead>
<tr>
<th>SITE IDENTIFICATION:</th>
<th>LT-1</th>
<th>OBSERVER(s):</th>
<th>JF</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>START DATE &amp; TIME:</td>
<td>10-30-15</td>
<td>END DATE &amp; TIME:</td>
<td>2:33</td>
<td></td>
</tr>
<tr>
<td>ADDRESS:</td>
<td>MARKT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**GPS coordinates:**

**TEMP:** 72°F  
**HUMIDITY:** 54%  
**WIND:** CALM  
**SW**: LIGHT MODERATE VARIABLE  
**DIR:** N NE E SE S SW W NW STAY GUSTY MPH

**SKY:** CLEAR SUNNY  
DARK PARTLY CLOUDY OVRST FOG DRIZZLE RAIN Other:

**INSTRUMENT:**  
**TYPE:**  
**SERIAL #:** 222  
**CALIBRATOR:**  
**SERIAL #:** 2399

**CALIBRATION CHECK:** PRE-TEST  
POST-TEST  
WINDSCREEN

**SETTINGS:** A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:

**Read #**  
**Start Time / End Time:**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

**COMMENTS:**

### PRIMARY NOISE(S):  
**TRAFFIC**  
**AIRCRAFT**  
**RAIL**  
**INDUSTRIAL**  
**AMBIENT**  
**OTHER**

### ROADWAY TYPE:

**COUNT DURATION:** MINUTE  
**SPEED (mph):**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NB / EB / SB / WB</td>
<td>NB EB SB WB</td>
<td>NB / EB / SB / WB</td>
<td>NB EB SB WB</td>
<td></td>
</tr>
</tbody>
</table>

**AUTOS:**

**M ED. TRUCKS:**

**HVY TRUCKS:**

**BUSES:**

**MOTORCYCLES:**

**SPEED ESTIMATED BY:**  
**DRIVER / OBSERVER**

### OTHER NOISE SOURCES:

distant AIRCRAFT overhead  
HUSTLING LEAFER  
distant BARKING DOGS / BIRDS  
distant CHILDREN PLAYING  
distant TRAFFIC  
distant LANDSCAPING  
distant TRAINS

### TERRAIN:

**HARD**  
**SOFT**  
**MIXED**  
**FLAT**  
**OTHER**

### PHOTOS:

### OTHER COMMENTS / SKETCH:

385 S. Main Street, Suite 900, Orange, CA 92861, 714-863-6880
FIELD MEASUREMENT DATA SHEET

Project Name: Southeast Rail Extensions

SITE IDENTIFICATION: 57-1

START DATE & TIME: 11-14-16 7:19

ADDRESS: 1

END DATE & TIME: 12-15-16 9:24

GPS coordinates:

TEMP: 73°F HUMIDITY: 36% R.H.

WIND: (CALM) LIGHT MODERATE VARIABLE

WIND SPEED: 0 MPH

DIR. N NE E SE S SW W NW STEADY GUSTY A MPH

SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVERCAST FOG DRIZZLE RAIN Other:

INSTRUMENT: B1 B2 B3

TYPE: W2

SERIAL #: 215089

CALIBRATOR: CMK 750

SERIAL #: 2389

CALIBRATION CHECK: PRE-TEST 93.1 dBA SPL POST-TEST 93.9 dBA SPL WINDSCREEN

SETTINGS: W-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:

Time of Day:

Total Time:

Total Time:

CALIBRATION:

RECORD:

RESULTS:

COMMENTS:  

PRIMARY NOISE(S): TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER

ROADWAY TYPE:

COUNT DURATION: MINUTE SPEED (mph)

NB / EB / SB / WB NB / EB / SB / WB NB / EB / SB / WB NB / EB / SB / WB

AUTOS:  

MED. TRUCKS:  

HYV TRUCKS:  

BUSES:  

MOTORCYCL.ES:

SPEED ESTIMATED BY: BARR / DRIVING / OBSERVER

OTHER NOISE SOURCES:

DISTANT AIRCRAFT OVERHEAD / RUSTLING LEAVES / DISTANT MARKING BOGS / BIRDS

DISTANT CHILDREN PLAYING / DISTANT TRAFFIC / DISTANT LANDSCAPING / DISTANT TRAINS

OTHER:

TERRAIN: HARD SOFT MIXED FLAT OTHER:

PHOTOS:

OTHER COMMENTS / SKETCH:

SOUTHEAST RAIL EXTENSION

REGIONAL TRANSPORTATION DISTRICT

SOUTHEAST RAIL EXTENSION

Field Measurement Data Sheet

Parsons Brinckerhoff

SSBR-124-A Task 3010

505 S. Main Street, Suite 900, Orange, CA 92868, 714-833-4288
## Field Measurement Data Sheet

**Project Name:** Southeast Rail Extensions  
**Job #:** 180126A Task 3010

### Site Identification
- **Observer(s):**
- **Start Date & Time:** 12-1-16  
**End Date & Time:** 12-1-16

### Weather
- **Temp:** 67°F  
- **Humidity:** 52%  
- **Wind:** Calm  
- **Visibility:** MODERATE VARIABLE
- **Wind Speed:** 0 MPH  
- **Dir:** N NE E SE S SW W NW  
- **Sky:** Partly Cloudy  
- **Fog/Drizzle/Rain:** Other:

### Instrument
- **IN:** 0115  
- **Calibrator:** CA-515  
- **Serial #:**

### Calibration Check
- **PRE-TEST:** 94dBA SPL  
- **POST-TEST:** 93dBA SPL  
- **Windscreen:**

### Settings
- **A-Weighted Slow Frontal Random ANSI Other:**

<table>
<thead>
<tr>
<th>Rec #</th>
<th>Start Time</th>
<th>End Time</th>
<th>Lmax</th>
<th>Lmin</th>
<th>Lavg</th>
<th>Lden</th>
<th>Leq</th>
<th>Ln</th>
<th>L10</th>
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<tbody>
<tr>
<td>1</td>
<td>14:44:43</td>
<td>14:45:14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>15:00:15</td>
<td>15:00:25</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Comments

#### Primary Noise Sources
- **Traffic Aircraft Rail Industrial Ambient Other:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Count Duration</th>
<th>Number of Count</th>
<th>Speed (mph)</th>
<th>Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autos</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Med. Trucks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hvy Trucks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buses</td>
<td></td>
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</tr>
<tr>
<td>Motorcycles</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Other Noise Sources:
- Distant Aircraft Overhead
- Rustling Leaves
- Distant Barking Dogs
- Distant Children Playing
- Distant Traffic
- Distant Landscaping
- Distant Trains

#### Terrain
- **Hard Soft Mixed Flat Other:**

#### Photos

#### Other Comments/Sketch:

---

**Parsons Brinckerhoff**

503 S. Main Street, Suite 900, Orange, CA 92868, 714-833-4886
## Field Measurement Data Sheet

### Project Name: Southeast Rail Extension  
Job # 184124 A Task 309

### Site Identification: S1-3A  
Observation ID: 14K  5P

### Start Date & Time: 11-15  
End Date & Time: 11-15

### Address: 31925 N.  
Address: 31925 N.

### GPS Coordinates:

### Weather:
- **Temp:** 38°F  
- **Humidity:** 29%  
- **Wind:** CALM  
- **Light:** MODERATE  
- **Moderate:** VARIABLE

### Wind Speed:
- **Direction:** NW
- **SW
- **NW**

### Sky:
- **Clear:** SUNNY  
- **Dark:** PARTLY CLOUDY  
- **OVRST:** FOG  
- **Drizzle Rain:** Other:

### Instrument:
- **Model:** 238  
- **Type:** A  
- **Serial #:**
- **Calibrator:**  
- **Serial #:**

### Calibration Check:
- **Pre-Test:** 94.1 dBA SPL  
- **Post-Test:** 89.2 dBA SPL  
- **Windscreen:** 4

### Settings:
- **Weighted Slow:** FAST  
- **Frontal:** RANDOM  
- **Other:**

<table>
<thead>
<tr>
<th>Time (Min)</th>
<th>Speed (mph)</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:20</td>
<td>62</td>
<td>1</td>
</tr>
<tr>
<td>11:00</td>
<td>65</td>
<td>1</td>
</tr>
<tr>
<td>12:55</td>
<td>68</td>
<td>1</td>
</tr>
<tr>
<td>14:05</td>
<td>72</td>
<td>1</td>
</tr>
<tr>
<td>15:55</td>
<td>58</td>
<td>1</td>
</tr>
<tr>
<td>17:05</td>
<td>60</td>
<td>1</td>
</tr>
<tr>
<td>18:05</td>
<td>60</td>
<td>1</td>
</tr>
</tbody>
</table>

### Comments:

### Primary Noise:
- **Traffic:**
- **Aircraft:**
- **Rail:**
- **Industrial:**
- **Ambient:**
- **Other:**

### Roadway Type:
- **Count Duration:**
- **Speed (mph):**
- **#2 Count:**

### Roadway Traffic:
- **Type:**
- **Speed (mph):**

### Other Noise:
- **Sources:**
- **Distant Aircraft:**
- **Loud Leaves:**
- **Barking Dogs:**
- **Roadway Traffic:**
- **Distant Children Playing:**
- **Distant Trains:**

### Terrain:
- **Hard:**
- **Soft:**
- **Mixed:**
- **Flat:**
- **Other:**

### Photos:

### Other Comments / Sketch:

---

965 S. Main Street, Suite 900, Orange, CA 92866, 714-813-8816
**FIELD MEASUREMENT DATA SHEET**

**Project Name:** Southeast Rail Extensions  
**Job #: 184124A Task 310**

<table>
<thead>
<tr>
<th>SITE IDENTIFICATION:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>START DATE &amp; TIME:</td>
<td>12-1-15</td>
</tr>
<tr>
<td>ADDRESS:</td>
<td>AIRWAY NRT - TRANSPORTATION</td>
</tr>
</tbody>
</table>

**Weather:**
- TEMP: 39°F
- HUMIDITY: 29% R.H.
- WIND: CALM
- LIGHT MODERATE VARIABLE
- WINDSPEED: 0 MPH
- DIRECTION: NNE
- WIND: STEADY GUSTY MPH
- SKY: CLEAR, SUNNY, DARK, PARTLY CLOUDY, OVERCAST, FOG, DRIZZLE, RAIN
- Other:__________

**INSTRUMENT:** 2238  
**TYPE:** 1 2  
**SERIAL #:** 
**CALIBRATOR:** CA 150  
**CALIBRATION CHECK:** PRE-TEST 94.1 dBA SPL POST-TEST 93.9 dBA SPL WINDSCREEN Y

**SETTINGS:** A-WEIGHTED SLOW, FAST, FRONTAL RANDOM ANSI OTHER:

<table>
<thead>
<tr>
<th>REC #</th>
<th>START TIME</th>
<th>END TIME</th>
</tr>
</thead>
</table>

**COMMENTS:**

**PRIMARY NOISE(S):** TRAFFIC, AIRCRAFT, RAIL, INDUSTRIAL, AMBIENT, OTHER

**ROADWAY TYPE:**

<table>
<thead>
<tr>
<th>COUNT DURATION:</th>
<th>MINUTE</th>
<th>SPEED (mph)</th>
<th>#2 COUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>NB / EB / SB / WB</td>
<td>NB EB / SB WB</td>
<td>NB / EB / SB / WB</td>
<td></td>
</tr>
</tbody>
</table>

| AUTOS: | |
|--------| |
| MED. TRUCKS: | |
| HVY TRUCKS: | |
| BUSES: | |
| MOTORCYCLES: | |

<table>
<thead>
<tr>
<th>OTHER NOISE SOURCES:</th>
<th>Distant Aircraft Overhead / Rustling Leaves / Distant Barking Dogs / Birds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Distant Children Playing / Distant Traffic / Distant Landscaping / Distant Trains</td>
</tr>
</tbody>
</table>

**TERRAIN:** HARD, SOFT, MIXED, FLAT

**PHOTOS:**

**OTHER COMMENTS / SKETCH:**

505 S. Main Street, Suite 900, Orange, CA 92868, 714-831-6886
### FIELD MEASUREMENT DATA SHEET

**Project Name:** Southeast Rail Extensions  
**Job #:** 184124A Task 3010

<table>
<thead>
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<th>SITE IDENTIFICATION:</th>
<th>52-4</th>
<th>OBSERVER(S):</th>
<th>12K - JF</th>
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</thead>
<tbody>
<tr>
<td>START DATE &amp; TIME:</td>
<td>12-1-15</td>
<td>END DATE &amp; TIME:</td>
<td>12-1-15</td>
</tr>
<tr>
<td>ADDRESS:</td>
<td>Hospital New Bureau</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TEMP:** 40°F  
**HUMIDITY:** 79% R.H.  
**WIND:** CDF CALC LIGHT MODERATE VARIABLE  
**WINDSPEED:** 0 MPH  
**DIR:** NE E SE S SW W NW STEADY GUSTY 0 MPH  
**SKY:** CLEAR SUNNY DARK PARTLY CLOUDY OVERCAST FOG DRIZZLE RAIN Other:_____

**INSTRUMENT:** 2238  
**TYPE:** 02  
**SERIAL #:**  
**CALIBRATOR:** CAC 150  
**CALIBRATION CHECK:** PRE-TEST 94.1 dBA SPL  POST-TEST 93.9 dBA SPL  WINDSCREEN Y

**SETTINGS:** WEIGHTED SLOW FAST  
FRONTAL  RANDOM  ANSI  OTHER:_____

<table>
<thead>
<tr>
<th>Rec #</th>
<th>Start Time</th>
<th>End Time</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:30</td>
<td></td>
<td></td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
<td>L</td>
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<td>L</td>
</tr>
</tbody>
</table>

**COMMENTS:**

**PRIMARY NOISE(S):** TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER  
**ROADWAY TYPE:**

<table>
<thead>
<tr>
<th>COUNT DURATION:</th>
<th>MINUTE</th>
<th>SPEED (mph)</th>
<th>#2 COUNT:</th>
<th>SPEED (mph)</th>
</tr>
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<tbody>
<tr>
<td>NB / EB / SB / WB</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>AUTOS:</td>
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</tr>
<tr>
<td>MED. TRUCKS:</td>
<td></td>
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<tr>
<td>HVY TRUCKS:</td>
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<td></td>
</tr>
<tr>
<td>BUSES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MOTORCYCLES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPEED DETERMINED BY:** RADAR / DRIVING / OBSERVER

**OTHER NOISE SOURCES:** distant AIRCRAFT overhead / KUSTLING LEAVES / distant BARKING DOGS / BIRDS  
distant CHILDREN PLAYING / distant TRAFFIC / distant LANDSCAPING / distant TRAINS

**OTHER:**

**TERRAIN:** HARD SOFT MIXED FLAT OTHER:  
**PHOTOS:**  
**OTHER COMMENTS / SKETCH:**

---

505 S. Main Street, Suite 900, Orange, CA 92868, 714-435-6886
FIELD MEASUREMENT DATA SHEET

Project Name: Southeast Rail Extensions
JOB #: 184124A Task 3010

SITE IDENTIFICATION: S-T-S
START DATE & TIME: 12-1-15
END DATE & TIME: 12-1-15

GPS coordinates:

TEMPE 90 °F HUMIDITY 29% R.H. WIND: CALM LIGHT MODERATE VARIABLE
WINDSPEED: 0 MPH DR: N NE E SE S SW W NW STEADY CUSTY MPH
SKY: CLEAR SUNNY DARK PARTLY CLOUDY OVRST FOG DRIZZLE RAIN Other:

INSTRUMENT: 2238 TYPE A) 2 SERIAL #:
CALIBRATOR: 2CA150 SERIAL #:
CALIBRATION CHECK: PRE-TEST 94.4 dBA SPL POST-TEST 93.9 dBA SPL WINDSCREEN 4

MEASUREMENTS:

<table>
<thead>
<tr>
<th></th>
<th>Start Time</th>
<th>End Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12:38</td>
<td>12:52</td>
</tr>
<tr>
<td>2</td>
<td>12:28</td>
<td>12:30</td>
</tr>
</tbody>
</table>

COMMENTS:

PRIMARY NOISE(S): TRAFFIC AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER
ROADWAY TYPE:
COUNT DURATION: _MINUTE SPEED (mph) #2 COUNT: SPEED (mph)
AUTOS: NB / EB / SB / WB NB EB / SB WB NB / EB / SB / WB NB / EB / SB / WB

SPEED ESTIMATED BY: RADAR / DRIVING / OBSERVER
OTHER NOISE SOURCES: distant AIRCRAFT overhead / RUSTLING LEAVES / distant BARKING DOGS / BIRDS
distant CHILDREN PLAYING / distant TRAFFIC / distant LANDSCAPING / distant TRAINS

OTHER:

TERRAIN: HARD SOFT MIXED FLAT OTHER:
PHOTOS:
OTHER COMMENTS / SKETCH:

503 S, Main Street, Suite 900, Orange, CA 92868, 714-835-6860
Appendix C - Long-Term Measurement Data
Table C-1. Long-Term Leq and Ldn Measurement Data for November 30 – December 1, 2015

<table>
<thead>
<tr>
<th>Time</th>
<th>LT1</th>
<th>LT2</th>
</tr>
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<tbody>
<tr>
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<td>62.4</td>
<td>50.6</td>
</tr>
<tr>
<td>1 AM</td>
<td>61.2</td>
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<tr>
<td>2 AM</td>
<td>61.7</td>
<td>52</td>
</tr>
<tr>
<td>3 AM</td>
<td>61.6</td>
<td>54.4</td>
</tr>
<tr>
<td>4 AM</td>
<td>63.7</td>
<td>51.4</td>
</tr>
<tr>
<td>5 AM</td>
<td>66.4</td>
<td>52</td>
</tr>
<tr>
<td>6 AM</td>
<td>68.1</td>
<td>54.2</td>
</tr>
<tr>
<td>7 AM</td>
<td>67.5</td>
<td>54.3</td>
</tr>
<tr>
<td>8 AM</td>
<td>66.5</td>
<td>53</td>
</tr>
<tr>
<td>9 AM</td>
<td>68.5</td>
<td>56.2</td>
</tr>
<tr>
<td>10 AM</td>
<td>67.7</td>
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<td>67.5</td>
<td>52.4</td>
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<td>64.2</td>
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</tr>
<tr>
<td>11 PM</td>
<td>63.3</td>
<td>52.5</td>
</tr>
</tbody>
</table>

LDN Calc 71.2 59
Appendix D - Typical Input Screen Content for Noise Models
CREATE model input screen (typical)
### RESULTS

<table>
<thead>
<tr>
<th>Noise Source</th>
<th>Leq - 1-hr (d)</th>
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</thead>
<tbody>
<tr>
<td>All Sources</td>
<td>55</td>
</tr>
<tr>
<td>Source 1</td>
<td>54</td>
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<td>Source 4</td>
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**Enter noise receiver land use category below:**

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**Enter data for up to 8 noise sources below - see reference list for source numbers.**

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<th>Source 2</th>
<th>Source 3</th>
<th>Source 4</th>
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SoundPlan model input screen (typical)
SoundPlan model input screen (typical)
SoundPlan model input screen (typical)
Appendix E – Supplemental Measurements
Table E-1. Long-Term Leq and Ldn Measurement Data for April 26 – April 27, 2016

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LDN  62.4
Figure E-1. Long-Term Leq and Ldn Measurement Data for April 26 – April 27, 2016
FIELD MEASUREMENT DATA SHEET

Project Name: Southeast Rail Extension

Site Identification: 3A

Observer(s): Michael Lien

Start Date & Time: 4/27/17 7:50 AM

End Date & Time: 4/27/17 3:30 PM

Address: AMI at Ridgeway Aps

GPS coordinates: 

Temperature: 55° F
Humidity: 50% R.H.
Wind: Calm (Light)

Wind Speed: 0-5 MPH

Dir: N NE SE S SW W NW STEADY GUSTY

Sky: Clear, sunny, partly cloudy

Overcast: Fog, drizzle, rain

Other:

Instrument: BL 2238

Calibrator: CAL 900

Calibration Check: Pre-Test 940 db SPL Post-Test 940 db SPL

Settings: A-Weighted Slow

Frontal Random

Other:

Comments:

Primary Noise(s): Traffic

Aircraft

Rail

Industrial

Ambient

Other:

Roadway Type: Lincoln Ave

Count Duration: 1-hour

Speed (mph): 60

#2 Count:

NB / EB / SB / WB

NB / EB / SB / WB

Speed (mph):

NB / EB / SB / WB

Motorcycles:

Speed Estimated by: Radar

Other Noise Sources:

Distant Aircraft overhead

Distant rustling leaves

Distant barking dogs / birds

Distant children playing

Distant traffic

Distant land/imping

Distant trains

Other:

Terrain: 

Hard

Soft

Mixed

Flat

Other:

Photos:

Other Comments / Sketch:

Lincoln Ave

[Sketch of Lincoln Ave and surrounding area]
# Field Measurement Data Sheet

## Project Name:

**SENE**

**Job #:**

## Site Identification:

**Supplemental:**

**Observer:**

**Start Date & Time:** 1/17/16 9:00 a.m.

**End Date & Time:** 1/17/16 4:00 p.m.

**Address:** Rudgegate Arts

**GPS coordinates:**

## Weather Conditions:

**Temp:** 41 °F

**Humidity:** 30 % R.H.

**Wind:** Calm

**Light:** Moderate Variable

**Wind Speed:** 0.5 MPH

**Dir:** NE, E, SE, S, W, NW

**Steady:** Gusty

**Sky:** Clear

**Sunny:** Dark

**Partly Cloudy:** Overcast

**Fog:** Drizzle

**Rain:**

**Windscreen:** Y

## Instrument:

**Type:** O2

**Serial #:** 2160307

**Calibrator:** CAL 25

**Serial #:** 3715

**Calibration Check:** Pre-Test 94.0 dBA SPL, Post-Test 94.0 dBA SPL

**Windscreen:** Y

### Settings:

**A-Weighted Slow:** Fast

**Frontal:** Random

**ANSI:** Other

**Rec #:** 1

**Start Time:** 9:00

**End Time:** 10:00

**Count Duration:** 1/4A - Minute

**Speed (mph):**

- NB
- EB
- SB
- WB

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>NB</th>
<th>EB</th>
<th>SB</th>
<th>WB</th>
</tr>
</thead>
<tbody>
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<td>L-50%</td>
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<td>L-50%</td>
<td>L-50%</td>
<td>L-50%</td>
<td></td>
</tr>
</tbody>
</table>

**Comment:**

### Primary Noise Sources:

**Traffic:**

**Aircraft:**

**Rail:**

**Industrial:**

**Ambient:**

**Other:**

## Roadway Type:

**Count Duration:** 1/4A - Minute

**Count:**

- NB
- EB
- SB
- WB

**# Count:**

- NB
- EB
- SB
- WB

**Speed (mph):**

- NB
- EB
- SB
- WB

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</table>

**Estimated by:** Radar / Driving / Observer

## Other Noise Sources:

- Aircraft overhead
- Rustling leaves
- Animal Barking Dogs / Birds
- Distorted Children Playing

## Terrain:

**Hard:**

**Soft:**

**Mixed:**

**Flat:**

**Other:**

## Photos:

## Other Comments / Sketch:

- Train Station Circled
- Sidewalk below unit 205

---

*505 S. Main Street, Suite 900, Orange, CA 92868, 714-885-6680*
# Southeast Rail Extension
## Noise and Vibration Technical Memorandum
### December 2016 – Revision No. 4

---

**FIELD MEASUREMENT DATA SHEET**

**Project Name:** SERE  
**Job #**

**SITE IDENTIFICATION:** 
- 24th Ave. Unit 265  
- Observer(s): Michael Liu

**START DATE & TIME:** 12:45 PM  
**END DATE & TIME:** 1:05 PM

**ADDRESS:** Ridgegate Apt. unit 265 balcony

**GPS coordinates:**

**TEMP:** 65°F  
**HUMIDITY:** 50% R.H.  
**WIND:** CALM **LIGHT** MODERATE VARIABLE  
**WINDSPEED:**  
- DIR: N NE E SE S SW W NW STEADY GUSTY **MPH**

**SKY:** CLEAR SUNNY DARK **PARTLY CLOUDY OVRCAST FOG DRIZZLE RAIN**

**WEATHER:**

**INSTRUMENT:** ID 730  
**TYPE:** O2  
**SERIAL #:** 3465

**CALIBRATOR:** CAL 240  
**SERIAL #:**

**CALIBRATION CHECK:** PRE-TEST SPL POST-TEST SPL WINDSCREEN

**SETTNGS:** A-WEIGHTED SLOW FAST FRONTAL RANDOM ANSI OTHER:

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<th>SPL</th>
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<td>12:45 / 1:05</td>
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**COMMENTS:**

---

**PRIMARY NOISE(S):** TRAFFIC  
AIRCRAFT  
RAIL  
INDUSTRIAL  
AMBIENT  
OTHER:

**ROADWAY TYPE:**

**COUNT DURATION:** 1 MINUTE  
**SPEED (mph):**

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<th>SB / WB</th>
<th>NB / EB</th>
<th>SB / WB</th>
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**#2 COUNT:**

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</tr>
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</table>

**SPEED ESTIMATED BY:** RADAR / DRIVING / OBSERVER

**OTHER NOISE SOURCES:** Other AIRCRAFT overhead / JUSTLING LEAVES / distant BARKING DOGS / BIRDSON distant CHILDREN PLAYING / distant TRAFFIC / distant LANDSCAPING / distant TRAINS

**TERRAIN:** HARD SOFT MIXED FLAT OTHER:

**PHOTOS:**

**OTHER COMMENTS / SKETCH:**

- On balcony of unit #265

---

565 S. Main Street, Suite 900, Orange, CA 92868, 714-835-8486
Figure E-2. Long-term 2nd Story Balcony Measurement (Unit 265)
Figure E-3. Long-term 2nd Story Balcony Measurement (Unit 265)
Figure E-4. Supplemental Site 3-A, Closest Part of Building To Track Alignment

Figure E-5. Supplemental Site 3-B, Ground Level Below 24-hour 2nd Story Measurement
Appendix F – FONSI Mitigation
### Noise and Vibration

**Direct Impacts**
- Work to establish a PUC approved “quiet crossing” to eliminate use of train horns near the grade crossing at the south end of the proposed Sky Ridge Station.

**Indirect Impacts**
- No mitigation required.

**Temporary Construction Impacts**
Construction activities will need to comply with local noise ordinances. Noise will be minimized during construction. Mitigation measures may include:
- Make hotel vouchers available to affected residents in the vicinity of any night time construction activities.
- Locate stationary construction equipment as far as possible from noise-sensitive sites.
- Construct temporary noise barriers, such as temporary walls or piles of excavated material, between noisy activities and noise-sensitive receivers.
- Communicate early on with the general public to reduce the number of noise complaints. Inform the public of any potential construction noise impacts and the measure that will be employed to reduce these impacts. Also, establish and publicize a responsive complaint mechanism for the duration of construction.
- Minimize construction duration in residential areas as much as possible.
- Minimize nighttime activities as much as possible.
- Re-route truck traffic away from residential streets, where possible.
- Combine noisy operations to occur in the same time period.
- Use well-maintained equipment equipped with modern mufflers.
- Use noise blankets on equipment and/or quiet-use generators. Noise blankets (also called “acoustic wraps”) are removable and reusable sound barriers made from compost materials like Teflon impregnated cloth. The blankets are custom-fit to encapsulate the noisy equipment and block sounds at the source. These are commonly used on equipment such as fans and blowers, compressor housings, hydraulic pumps, etc. They are very effective because they block the source of the noise.
- Use alternative construction methods, such as sonic or vibratory pile driving in noise sensitive areas.
- Perform pile driving and other high-noise activities during daytime construction (generally 7:00AM to 7:00PM), where possible. When construction time is restricted to certain daytime hours, the overall duration of project construction would likely increase.
Biological, Water Quality, and Parks and Recreation Resources Evaluation Technical Report

Southeast Extension, Water Line Extension Project

Prepared for:

Federal Transit Administration

Prepared by:

Denver Regional Transportation District

July 2017
# Table of Contents

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Appendix A Southeast Water Line Extension Biological Resources Mapbook
Appendix B USFWS Official Species List – Dated April 21, 2017
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Chapter 1.0 Introduction

This Technical Report was prepared in support of the environmental re-evaluation initiated by the Regional Transportation District (RTD) to address scope changes from the Southeast Rail Extension (SERE) Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) completed by RTD in 2014. This Technical Report focuses on biological resources, water quality resources, and park and recreation resources along a proposed water line extension to RTD’s RidgeGate Station. The proposed water line extension lies completely within the bounds of the 2014 SERE EA study area.

The purpose of this report is to document for the SERE Re-evaluation the potential impacts of the proposed water line extension and recommended mitigation measures for biological, water quality, and park and recreation resources. Existing resource conditions (including applicable laws and policies) disclosed in the EA have been reviewed and updated as necessary. The impacts of the proposed water line extension are discussed and compared to the impacts of the Locally Preferred Alternative (LPA) as disclosed in the EA. The mitigation measures identified in the EA were reviewed in light of anticipated water line extension impacts to confirm adequacy and identify additional mitigation recommendations, if warranted.

1.1 Background

An EA and FONSI for the SERE were completed and approved by the Federal Transit Administration (FTA) in August and October 2014, respectively. Following approval of the environmental clearance documentation, RTD continued forward with a request for Federal funding and was awarded a Small Starts grant in May 2016. Final design was advanced and project construction was initiated. During final design, two scope changes became necessary and each requires additional environmental clearance and approval by FTA.

These changes include:

- Water Line Extension: When the EA was in preparation, several options were under consideration to provide the necessary water supply for fire protection; to serve the driver’s relief station; and to support landscaping at the end-of-line station (RidgeGate Station) and parking structure. Since that time, it has been determined that water will be supplied by Parker Water and Sanitation District via extension of the line from the east. Rampart Range Metro District will construct and own the water line extension; however, federal funds will be used to pay for a portion of the construction. Therefore, it is necessary to provide environmental documentation in the form of a Re-evaluation in order to maintain eligibility for federal funds.

- Noise Wall Requirement: At the time of preparation of the EA, area land development had not advanced as much as it is today and a noise study did not indicate the need for mitigation at any point along the project alignment. However, a more recent noise study that was conducted during final design indicated the need for a noise barrier south of Lincoln Avenue between the AMLI RidgeGate Apartments and the Hampton Inn & Suites Hotel. The noise barrier will be mounted on top and along the westerly edge of the Lincoln Avenue bridge structure, and will continue on top of and along the westerly edge of a mechanically stabilized earth (MSE) wall approved in the original EA/FONSI. Due to the previously disturbed nature of the area to build the MSE wall, addition of the noise barrier to the top of the MSE wall is unlikely to generate additional impacts to biological, water
quality, and park and recreation resources above and beyond what was documented in the original 2014 SERE EA. Thus, no further discussion or analysis is warranted and the noise barrier will not be discussed further in this document.

1.2 Regulatory Environment

Relevant regulations were reviewed for any updates that may have occurred since the completion of the SERE EA in 2014. When no changes in the resource-specific regulations were identified, the regulations were not restated from what was presented in the SERE EA. Only new regulations or updated species lists are detailed if necessary.

1.2.1 Vegetation

The state list of noxious weed species, which are covered under the Colorado Noxious Weed Act (CDA 2017), was reviewed during the preparation of the SERE EA in 2014. This list was last updated March 31, 2017 and was consulted prior to the April 2017 field surveys in support of the proposed water line extension.

The EA referenced the 1991 version of the Douglas County Undesirable Plant Management Plan. This re-evaluation references an updated version of the plan dated 2012 (Douglas County, 2012a).

1.3 Special Status Species

The U.S. Fish and Wildlife Service (USFWS) list of federally-listed species obtained for the proposed water line extension on April 21, 2017, is consistent with the species analyzed in the SERE EA (see Appendix B).

According to the Colorado Parks and Wildlife (CPW), State of Colorado threatened, endangered, and species of special concern listing designations have been updated since the completion of the SERE EA (CPW, 2017). These new state-listed designations are outlined in Chapter 4.3 Special Status Species.

1.4 Water Quality

The water quality analysis presented in this report was conducted in compliance with the Clean Water Act (CWA), 33 U.S.C. §1251 et seq. (1972), and the Colorado Department of Public Health and the Environment (CDPHE), Water Quality Control Commission (WQCC) regulations.1 Both the Colorado’s Section 303(d) List and the Integrated Water Quality Monitoring Assessment Report were updated in 2016 (WQCC 2016; WQCD 2016).2 This re-evaluation addresses any updates to these reports since the completion of the SERE EA.

1 Applicable CWA regulation sections include Section 303(d) [Impaired Waters and Total Maximum Daily Loads (TMDLs)], and Section 402 [National Pollutant Discharge Elimination System (NPDES)]. Applicable CDPHE WQCC regulations include Regulation 61: Colorado Discharge Permit System (CDPS), WQCC Regulation 93: Colorado’s Section 303(d) List of Impaired Waters and Monitoring and Evaluation List.

2 Section 305(b) of the CWA requires CDPHE to assess and report on the water quality status of waterbodies within the state.
1.5 Park and Recreation Resources

Since the completion of the SERE EA, the City of Lone has developed and the City of Lone Tree Comprehensive Plan, which was approved in August 2015 (Lone Tree 2015). This re-evaluation addresses any updates to parks and recreation associated with this 2015 plan.

Chapter 2.0 Proposed Action

The FTA in conjunction with RTD is proposing to fund a 3.65-mile water line extension project to supply water for fire protection, serve the driver's relief station and support landscaping at the end-of-line station (RidgeGate Station) and parking structure located in the city of Lone Tree, Douglas County, Colorado (see Figure 1). The proposed pipeline would connect to an existing water main near the end of Hagus Place in the Heirloom Neighborhood in the Town of Parker (Latitude: 39°30'24.97" N; Longitude: 104°49'18.08" W). The proposed water line would traverse west and north to RidgeGate Parkway at which point it would follow the north side of the road right-of-way (ROW) for approximately 1.78 miles. The proposed water line would then proceed south along the east side of the Havana Street ROW for approximately 0.51 miles to its terminus at the RidgeGate Station (Latitude: 39°31’04.94” N; Longitude: 104°51’57.70” W). Rampart Range Metro District will construct and own the water line extension. Construction is proposed to begin in 2017.
Figure 1: SERE EA Study Area and Proposed Water Line Extension Survey Area
Chapter 3.0 Methods

3.1 Literature and Database Searches

Project documents, maps, aerial photographs, and other materials were obtained from RTD, CPW, USFWS, Natural Resource Information System (NRIS) Geographic Information Clearinghouse, and the Natural Resource Conservation Service (NRCS). Jacobs obtained information at the quadrangle level from the Colorado Natural Heritage Program (CNHP) pertaining to state endangered, threatened, and sensitive plant and animal communities/species in the survey area. Federally threatened and endangered species information was obtained from the USFWS, while State of Colorado special status species information was obtained through CPW. Hydrologic information was derived from USGS quadrangle maps and the USGS Water Resources of Colorado database.

3.2 Field Surveys

Jacobs’s biologists conducted on-site surveys by walking the entirety of the approximate 85-acre SERE water line extension survey area on April 7th and 17th, 2017. The majority of the survey area was approximately 150 feet wide with two wider portions extending up to 375 feet. The proposed water line extension survey area was surveyed for the presence of wetlands, vegetation communities including invasive species, state and federally listed plant and animal species of concern and wildlife usage including tracks, scat, nest structures, and other signs. A separate wetlands and waters of the U.S. report will be prepared for the re-evaluation.

Chapter 4.0 Affected Environment and Impact Assessment

The proposed water line extension is located in the western edge of the Great Plains region that extends east from the foothills of the Rocky Mountains. Elevations range from approximately 6,000 to 6,100 feet and topography is flat to gently rolling. Annual precipitation is low (12 to 18 inches), with six to seven arid months per year. Most of the precipitation falls as snow in the winter and during spring thunderstorms. Precipitation is often less than rates of evaporation and plant transpiration, resulting in moisture deficits and a semi-arid climate (NRCS, 2006; Bailey, 1995). Average annual temperature ranges from 45 to 55 degrees Fahrenheit with an average frost-free period of about 160 days (NRCS, 2006).

The survey area is designated as Land Resource Region G, Western Great Plains Range (67B) by the NRCS (2006), and as the Palouse Dry Steppe Province (M330) by Bailey (1995). The natural community in the vicinity of the survey area is commonly referred to as shortgrass prairie, with components of wetland and riparian habitats along natural streams.

The Biological Resources Technical Report prepared for the SERE EA, indicated the “…project is located in rapidly developing areas on the edge of the Denver metropolitan area. The portion of the alignment to the north of Lincoln Avenue is fully developed with office complexes, roads, parking lots, and landscaping. South of Lincoln Avenue, some areas are being readied for development with preliminary grading, roads, and underground utilities in place. To the east of I-25, the land has not yet been developed, but has been moderately impacted by prior and current agricultural activities such as cattle grazing.”

Similarly, the water line extension is located in rapidly developing areas of Parker and Lone Tree, Colorado at the southern end of the Denver metropolitan area. The portion of the...
proposed water line alignment from station 0+00 to 72+00 is native rangeland where other utilities such as underground wastewater pipeline and power have already been laid. Although this rangeland has not been developed yet, it has been moderately impacted by prior and current agricultural activities such as cattle grazing. This rangeland is currently approved for future residential development. From stations 72+00 to 166+00 the proposed water line alignment parallels to the north side of RidgeGate Parkway. The alignment stays within the road ROW varying from a few feet north of the edge of pavement up to 125 feet from the north edge of pavement. Between stations 167+00 and 193+00, the proposed water line follows the east side of Havana Street, which parallels the east side of I-25 northbound lanes. The proposed water line extension is entirely within the SERE EA study area. Thus, the affected environment of the proposed water line is similar in nature to the affected environment discussed in the SERE EA.

4.1 Vegetation

Vegetation conditions in the water line survey area are similar to those documented in the SERE EA. The survey area is located in previously disturbed and revegetated road ROW, utility corridors, and remnants of native shortgrass prairie impacted by prior agricultural activity and installation of underground utilities. The waterline also traverses two riparian corridors.

General Vegetation

Along Havana Street and RidgeGate Parkway ROW (stations 72+00 to 193+00), species observed within the survey area during the April field visits consist of a mix of native and introduced plant species such as: smooth brome (*Bromus inermis*), slender wheatgrass (*Elymus trachycaulus*), thickspike wheatgrass (*Elymus lanceolatus*), quackgrass (*Elymus repens*), crested wheatgrass (*Agropyron cristatum*), downy brome (*Bromus tectorum*), blue grama (*Bouteloua gracilis*), western salsify (*Tragopogon dubius*), burning bush (*Kochia scoparia*), curly-cup gumweed (*Grindellia squarrosa*), hairy false goldenaster (*Geterotheca villosa*), coneflower (*Ratibida sp.*), alfalfa (*Medicago sativa*), milkweed (*Asclepias sp.*), and soapweed (*Yucca glauca*). State of Colorado designated noxious weed species include downy brome, common mullein (*Verbascum thapsus*), field bindweed (*Convolvulus arvensis*), spotted knapweed (*Centaurea stoebe*), diffuse knapweed (*Centaurea diffusa*), musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), and Scotch thistle (*Onopordum acanthium*).

Along the portions of the water line extension that traverse through native shortgrass prairie, the vegetation within the survey area is dominated by grasses. Abundant species observed include grama (*Bouteloua spp.*), downy brome, wheatgrass (such as *Agropyron, Elymus* and *Pascopyrum* spp.), needlegrass (*Stipa sp.*), and dropseed (*Sporobolus* sp.). Flowering plants included daisies (*Erigeron* spp.), sunflower (*Helianthus* sp.), prickly pear (*Opuntia* sp.) locoweed (*Oxytropis* sp.), with milkvetch (*Astragalus* sp.) and fringed sage (*Artemisia frigida*) being less abundant. Common shrubs included sagebrush (*Artemisia sp.*), broom snakeweed (*Gutierrezia sarothrae*) and rabbitbrush (*Chrysothamnus* sp.) with occasional patches of wild rose (*Rosa* sp.).

Wetland and Riparian Vegetation

A narrow riparian corridor borders Happy Canyon Creek and Badger Gulch. The overstory of the riparian corridor consists of plains cottonwood (*Populus deltoides* ssp. *monilfera*) and peachleaf willow (*Salix amygdaloides*) trees. Sandbar willow (*Salix exigua*) and wild rose (*Rosa*
sp.) dominates the shrub layer (ER0, 2015a; RTD, 2014). The slopes surrounding the riparian corridors are a transitional shortgrass prairie zone with prominent patches of mountain mahogany (Cercocarpus ledifolius), rabbitbrush, and wild rose. Patches and narrow fringes of emergent wetlands were observed along the creeks, drainages, and scattered along the upland ROW in the form of stormwater detention basins in the survey area. As identified in the SERE EA, Happy Canyon Creek is a regulated floodplain.

A separate wetlands and waters of the U.S. report will be produced in support of the re-evaluation and discuss these resources in more detail within the survey area. Since the vast majority of the water line extension survey area is within the SERE EA study area, floodplain, wetland and riparian occurrences and descriptions are similar.

Invasive Species

The SERE EA did not discuss weed distribution or density within the study area, merely presence was noted and its corresponding ranking in the Douglas County Undesirable Plant Management Plan. Since Douglas County has an approved noxious weed management plan in compliance with state law, deference to county priority designation is noted with regards to weed species found in the survey area. Table 1 below lists weed species found in the water line extension survey area, state and county designations, patchy distribution, and relative density.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Colorado State List</th>
<th>Douglas County List</th>
<th>Patchy Distribution within Re-Eval Survey Area (Density noted below)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diffuse knapweed</td>
<td>Centaurea diffusa</td>
<td>B</td>
<td>B (contained and suppressed)</td>
<td>Low</td>
</tr>
<tr>
<td>Spotted knapweed</td>
<td>Centaurea stoebe</td>
<td>B</td>
<td>B (to be eradicated)</td>
<td>Low</td>
</tr>
<tr>
<td>Canada thistle</td>
<td>Cirsium arvense</td>
<td>B</td>
<td>B (contained and suppressed)</td>
<td>Low, Moderate &amp; High</td>
</tr>
<tr>
<td>Musk thistle</td>
<td>Carduus nutans</td>
<td>B</td>
<td>B (contained and suppressed)</td>
<td>Low – Moderate</td>
</tr>
<tr>
<td>Scotch thistle</td>
<td>Onopordum tauricum (acanthium)*</td>
<td>B</td>
<td>B (contained and suppressed)</td>
<td>Low – Moderate</td>
</tr>
<tr>
<td>Downy brome</td>
<td>Bromus tectorum</td>
<td>C</td>
<td>C (control left to landowners discretion)</td>
<td>Moderate - High</td>
</tr>
<tr>
<td>Common mullein</td>
<td>Verbascom thapsus</td>
<td>C</td>
<td>C (control left to landowners discretion)</td>
<td>Low</td>
</tr>
<tr>
<td>Quackgrass</td>
<td>Elymus repens</td>
<td>C</td>
<td>B (managed as funds are available)</td>
<td>Stormwater detention basins along RidgeGate Pkwy.</td>
</tr>
<tr>
<td>Redstem filaree</td>
<td>Erodium cicutarium</td>
<td>C</td>
<td>C (control left to landowners discretion)</td>
<td>Low</td>
</tr>
<tr>
<td>Field Bindweed</td>
<td>Convolvulus arvensis</td>
<td>C</td>
<td>C (control left to landowners discretion)</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Douglas County lists Scotch thistle as Onopordum tauricum, whereas the State of Colorado lists it as O. acanthium.

Weed species noted in the SERE EA include knapweed species, Downy brome, Canada thistle, Musk thistle, and Field bindweed. Within the proposed water line extension survey area, weed
species identified during the field review were similar to those outlined in the SERE EA, with the addition of Scotch thistle, Common mullein, Quackgrass and Redstem filaree (see Appendix A).

4.1.1 Vegetation Impacts

The SERE EA estimated that there would be approximately 60 acres of impacts to vegetation from the LPA. About 83 percent of those impacts (approximately 48 acres) would occur in areas that had been recently graded, previously disturbed and revegetated (such as the highway ROW), or used for grazing.

Potential impacts to vegetation for the proposed water line extension are anticipated to primarily be temporary in nature. According to the preliminary design information provided by the design consultant (Merrick & Company), the limits of disturbance ranges from approximately 50 feet to 100 feet wide over the length of the proposed project. Based on this footprint, installation of the water line is expected to temporarily disturb approximately 33.6 acres of existing vegetation. Water lines typically include risers, vents and man-holes, thus it is likely that less than one acre of vegetation would be permanently lost. As outlined in the SERE EA, temporarily disturbed areas that would not be paved will be revegetated. Cumulative impacts associated with the installation of this waterline extension are not anticipated for this resource due to the primarily temporary nature of the impacts.

4.1.2 Vegetation Mitigation

Mitigation measures for potential impacts to vegetation resources beyond what are included in the 2014 SERE EA are not warranted.

4.2 General Wildlife

As identified in the SERE EA, the most common wildlife species in the study area are generalists that depend on, adapt easily to, or are associated with human development. General wildlife species expected to occur in the water line extension survey area are consistent with descriptions provided in the SERE EA. Species diversity within the survey area is highest within the riparian habitat along Happy Canyon Creek and Badger Gulch.

Wildlife access to the water line extension survey area is generally from undeveloped areas to the south including the Chatfield Basin Habitat Conservation Area, which is approximately three miles southwest of the survey area. A nesting bird survey was conducted during the April surveys and identified three inactive raptor nests and one active Red-tailed Hawk (Buteo jamaicensis) nest. All of these nests are located beyond the survey area limits, including the active Red-tailed Hawk nest located approximately 250 feet north of the survey area along Happy Canyon Creek (see Appendix A). The raptor nest survey area extended beyond the previously defined resource survey area because of the sensitivity of nesting raptors. This survey included the area surrounding the proposed water line including a visual line of sight up to one-half mile away. Areas that could not be viewed from the proposed project were not surveyed.
4.2.1 General Wildlife Impacts

Impacts to wildlife from the proposed water line extension would be primarily temporary in nature affecting mostly low quality habitat in the roadway ROW and some low-moderate quality habitat in utility corridors. Construction impacts would be similar to those disclosed in the EA; increased noise and activity during construction of the waterline may cause individuals to abandon the area and direct wildlife mortality of small terrestrial and burrowing animals could occur during ground clearing and earth-movement. Permanent habitat loss from installation of risers, vents, and man-holes is anticipated to be less than one acre, which is a negligible increase to the 40 acres of permanent habitat loss disclosed in the EA. Disturbance of migratory birds, such as the raptor nest observed in the immediate vicinity of Happy Canyon Creek and ground-nesting bird species, are subject to protections afforded under the MBTA.

The impacts of the water line installation are primarily temporary and the majority of the impacted habitat is low quality and not likely to be frequently occupied. Therefore, it is anticipated that the proposed water line extension project would not contribute to cumulative effects upon general wildlife populations in the SERE study area.

General Wildlife Mitigation

Mitigation measures for potential impacts to general wildlife species beyond what are included in the 2014 SERE EA are not warranted.

4.3 Special Status Species

Table 2 below provides the species listed as threatened or endangered by the USFWS and the State of Colorado, as well as state species of concern, that have the potential to occur in the proposed water line extension survey area. According to the official species list generated from the USFWS Information for Planning and Conservation online system for the proposed water line project, the federally-listed species analyzed in the SERE EA have not changed (see Appendix B). However, since the completion of the SERE EA, certain state-listed species designations have changed as noted in Table 2. Previous correspondence and technical reports prepared to support the SERE EA were also reviewed. The survey area was assessed for presence or absence of individuals or populations as well as possible habitat for each species listed in Table 2.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Potential for Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preble’s meadow jumping mouse</td>
<td><em>Zapus hudsonius preblei</em></td>
<td>FT, ST</td>
<td>Unlikely, suitable habitat limited (Happy Canyon Creek); prior surveys negative, water line survey area is within Denver Block Clearance Zone (USFWS 2010).</td>
</tr>
<tr>
<td>Black-tailed prairie dog</td>
<td><em>Cynomys ludovicianus</em></td>
<td>SSC</td>
<td>Present; temporary impacts to an active colony are anticipated.</td>
</tr>
<tr>
<td>Northern pocket gopher</td>
<td><em>Thomomys talpoides macrotis</em></td>
<td>SSC</td>
<td>Habitat may be present.</td>
</tr>
<tr>
<td>Bald Eagle</td>
<td><em>Haliaeetus leucocephalus</em></td>
<td>SSC**</td>
<td>Unlikely due to lack of nesting habitat.</td>
</tr>
</tbody>
</table>
Table 2: Threatened and Endangered Species, and/or Species of Special Concern Potentially Found in the Survey Area

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Potential for Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Burrowing Owl</td>
<td><em>Athene cunicularia</em> ssp. <em>hypugaea</em></td>
<td>ST</td>
<td>May be present; shares habitat with prairie dogs.</td>
</tr>
<tr>
<td>Piping Plover</td>
<td><em>Charadrius melodus</em></td>
<td>FT, ST</td>
<td>Unlikely; transient, no suitable habitat.</td>
</tr>
<tr>
<td>Least Tern</td>
<td><em>Sternula antillarum</em></td>
<td>FE, SE</td>
<td>Unlikely; transient, no suitable habitat.</td>
</tr>
<tr>
<td>Whooping Crane</td>
<td><em>Grus americana</em></td>
<td>FE, SE</td>
<td>Unlikely; transient, no suitable habitat.</td>
</tr>
<tr>
<td>Mexican Spotted Owl</td>
<td><em>Strix occidentalis lucida</em></td>
<td>FT, ST</td>
<td>Unlikely; transient, no suitable habitat; No effect</td>
</tr>
<tr>
<td>Ferruginous Hawk</td>
<td><em>Buteo regalis</em></td>
<td>SSC</td>
<td>Unlikely due to lack of nesting habitat and human presence.</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa darter</td>
<td><em>Etheostoma exile</em></td>
<td>SSC</td>
<td>Unlikely; lack of suitable habitat.</td>
</tr>
<tr>
<td>Common shiner</td>
<td><em>Luxilus cornutus</em></td>
<td>ST**</td>
<td>Unlikely due to habitat degradation.</td>
</tr>
<tr>
<td>Pallid sturgeon</td>
<td><em>Scaphirhynchus albus</em></td>
<td>FT</td>
<td>Not present; no suitable habitat.</td>
</tr>
<tr>
<td>Greenback cutthroat trout</td>
<td><em>Oncorhynchus clarki stomias</em></td>
<td>FT,ST**</td>
<td>Not present; no suitable habitat.</td>
</tr>
<tr>
<td>Reptiles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common garter snake</td>
<td><em>Thamnophis sirtalis</em></td>
<td>SSC</td>
<td>Likely present.</td>
</tr>
<tr>
<td>Amphibians</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern leopard frog</td>
<td><em>Rana pipens</em></td>
<td>SSC</td>
<td>Unlikely; may impact.</td>
</tr>
<tr>
<td>Plants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ute ladies'-tresses orchid</td>
<td><em>Spiranthes diluvialis</em></td>
<td>FT</td>
<td>Unlikely; suitable habitat limited and degraded.</td>
</tr>
<tr>
<td>Colorado butterfly plant</td>
<td><em>Gaura neomexicana</em></td>
<td>FT</td>
<td>Unlikely; habitat limited and degraded.</td>
</tr>
<tr>
<td>Western prairie fringed orchid</td>
<td><em>Plantanthera praeclera</em></td>
<td>FT</td>
<td>Not present; no suitable habitat.</td>
</tr>
</tbody>
</table>


Status: FT = federal threatened; FE = federal endangered; ST = state threatened; SE = state endangered; SSC = state species of special concern (CPW, 2017).

** (designates change from original 2014 SERE, EA: Bald Eagle ST to SSC; Common Shiner SSC to ST; Greenback Cutthroat Trout FT to FT,ST)

4.4 Special Status Species Impacts

4.4.1 Federally Listed Threatened or Endangered Species Impacts

No federally-listed species, nor their designated critical habitats, were identified in the proposed water line extension survey area. These findings are consistent with findings reported in the SERE EA.

Overall, potential effects to federally-listed species are expected to be consistent with the determinations made in the SERE EA. Federally-listed species that could potentially be impacted by the proposed water line are discussed below:

- **Least Tern**: Least terns are known to nest on barren to sparsely vegetated sandbars along rivers, sand and gravel pits, lake and reservoir shorelines, and occasionally gravel
rooftops (USFWS, 2016a). Habitat for this species is not present within the survey area. However, this species and its habitat may be indirectly affected by water depletions in the Platte River system. These depletions are addressed through the RTD’s participation in the South Platte River Water Related Activities Program (SPWRAP) and the Memorandum of Agreement (MOA) for implementation and operation of the Colorado Portion of the Platte River Recovery Implementation Plan (PRRIP). Consistent with the EA, these programs will be adhered to with the waterline extension project.

- **Pallid Sturgeon:** Pallid sturgeons are bottom-oriented, large river fish that are found along the Missouri and Mississippi Rivers and some tributaries from Montana to Louisiana, such as the Platte River (USFWS, 2013). The two streams within the survey area do not provide the necessary habitat for the Pallid sturgeon. However, this species and its habitat may be indirectly affected by water depletions in the Platte River system. These depletions are addressed through the RTD’s participation in the SPWRAP and the MOA for implementation and operation of the Colorado Portion of the PRRIP. Consistent with the EA, these programs will be adhered to with the waterline extension project.

- **Piping Plover:** Piping Plovers nest on sandbar islands and reservoir shorelines including areas along the Platte River system (USFWS, 2016b). Habitat for this species is not present within the survey area. However, this species and its habitat may be indirectly affected by water depletions in the Platte River system. These depletions are addressed through the RTD’s participation in the SPWRAP and the MOA for implementation and operation of the Colorado Portion of the PRRIP. Consistent with the EA, these programs will be adhered to with the waterline extension project.

- **Western Prairie Fringed Orchid:** The western prairie fringed orchid is associated with the central and lower reaches of the Platte River in Nebraska and does not occur within the survey area. However, this species and its habitat may be indirectly affected by water depletions in the Platte River system. These depletions are addressed through the RTD’s participation in the SPWRAP and the MOA for implementation and operation of the Colorado Portion of the PRRIP. Consistent with the EA, these programs will be adhered to with the waterline extension project.

- **Whooping Crane:** The whooping crane is associated with a variety of wetland and other habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields; all of which they use for breeding, migration, and foraging (USFWS, 2017). The limited wetland habitats in the water line survey area do not provide suitable habitat for the species due to their small size, degraded nature, and proximity to human activity. However, this species and its habitat may be indirectly affected by water depletions in the Platte River system. These depletions are addressed through the RTD’s participation in the SPWRAP and the MOA for implementation and operation of the Colorado Portion of the PRRIP. Consistent with the EA, these programs will be adhered to with the waterline extension project.

**Federally listed Threatened or Endangered Species Mitigation**

Mitigation requirements of the SERE EA for South Platte water depletions will also pertain to the proposed water line extension. No additional mitigation is warranted.
4.4.2 State Listed Species Impacts

With respect to State of Colorado listed Threatened, Endangered, or species of Special Concern, potential impacts (e.g., displacement, visual, noise, loss of habitat, vehicle collisions, etc.) are expected to be consistent with the determinations made in the SERE EA. Impacts for each species that may be specifically impacted by the construction of the water line are outlined below.

- **Black-Tailed Prairie Dog**: Field surveys conducted in April 2017 identified an active prairie dog colony within the survey area, primarily in the vicinity of pipeline stationing 16+00 to 57+00 at the eastern end of the project (see Figure 3). This active prairie dog colony that was identified and mapped was not included in the SERE EA. Surveys for the 2014 SERE EA identified two colonies within the proposed water line extension survey area (Colony A, B). Neither of these colonies were active at the time project construction began (May 2016) and their absence was addressed in a previous reevaluation (Reevaluation of 2014 Environmental Assessment, April 6, 2016). Their absence was reaffirmed during field visits conducted in the survey area in April 2017. The location and extent of colonies A and B as observed during preparation of the 2014 EA are shown in Figure 2.

As disclosed in the SERE EA, the LPA would permanently impact up to 14.7 acres from two black-tailed prairie dog colonies. However, since these colonies were not active when construction began, impact documented in the April 6, 2016 Reevaluation was limited to a 4.46-acre colony west of I-25. The proposed water line extension would temporarily impact approximately 2.3 acres of active prairie dog habitat between stations 16+00 and 57+00 south of RidgeGate Parkway (Figure 3). Prairie dogs could be impacted through the increased presence of construction personnel which could lead to direct mortality related to being crushed from construction equipment. They could also be impacted from the temporary removal of foraging and burrowing habitat. Because individual prairie dogs could conceivably disperse into non-occupied open areas to the south and east of the proposed water line and would likely re-inhabit the disturbed areas once construction is completed, impacts are expected to be minimal. However, consistent with the RTD Prairie Dog Mitigation Guidance, and as prescribed in the October 2014 Finding of No Significant Impact (FONSI), prior to earth moving activities all prairie dogs will be removed and no earth moving will take place that could result in the burial of live prairie dogs.
Figure 2: Prairie Dog Colonies within SERE EA Study Area
Figure 3: SERE Water Line Extension Project Identified Prairie Dog Colonies and Potential Impact Areas

Source: SE Corridor Project Team, 2013
Common Garter Snake: The common garter snake occurs along the South Platte and its tributaries below 6,000 feet, especially near marshes, ponds, and stream edges (Hammerson, 1999). The proposed water line extension crosses habitat for the common garter snake along Happy Canyon Creek and Badger Gulch. The species could be impacted from visual, vibratory, and noise disturbances associated with the increased presence construction personnel. The species could experience direct mortality from the operation of machinery and habitat degradation due to water quality impacts during construction. Water quality impacts would be temporary and minimized by implementation of best management practices (BMPs). Although the species could disperse to up-gradient or down-gradient habitats, mortality may occur and would likely be at the individual scale and not jeopardize the continued existence of the populations.

Northern Leopard Frog: Northern leopard frogs occur along the banks and shallow areas of marshes, ponds, streams, and other bodies of permanent water (Hammerson, 1999). Portions of Happy Canyon Creek and Badger Gulch may provide suitable conditions for the frog. The species could be impacted from visual, vibratory, and noise disturbances associated with the increased presence construction personnel. The species could experience direct mortality from the operation of machinery and habitat degradation due to water quality impacts during construction. Water quality impacts would be temporary and minimized by implementation of BMPs. However, given the degraded nature of the aquatic habitats, the minor disturbance nature of the proposed project, the location within roadway ROW, and potentially suitable adjacent habitat, it is anticipated that the proposed water line extension would not jeopardize the continued existence of the northern leopard frog.

Northern Pocket Gopher: The northern pocket gopher inhabits a variety of habitats including deep soils, heavily compacted soils, and shallow gravel soils. Numerous rodent holes and habitat for the northern pocket gopher were observed in the water line extension survey area. As such, there is the potential for the species to be impacted from visual, vibratory, and noise disturbance associated with construction. Additionally, the species may also experience direct mortality related to being crushed from construction equipment. They would also be impacted from the temporary removal of foraging and denning habitat. Due to the minor and short-term nature of the proposed water line extension and adjacent suitable habitat, the proposed project is not anticipated to jeopardize the continued existence of the northern pocket gopher.

Western Burrowing Owl: Western Burrowing Owls are dependent on burrowing mammals (e.g., prairie dogs) whose burrows they use for nesting and roosting. No burrowing owls were observed during the field visits on April 7 and 14, 2017. However, formal protocol surveys were not conducted. Surveys to locate burrowing owls in the prairie dog colonies in the study corridor should be conducted prior to construction in compliance with CPW and RTD policy. Through implementation of mitigation measures (e.g., pre-construction surveys) as proposed in the SERE EA, it is anticipated that the proposed water line extension may impact but would not likely jeopardize the continued existence of the Western Burrowing Owl.

It is anticipated that the proposed water line extension would not contribute to cumulative effects upon state-listed species of Special Concern, threatened, or endangered species. This is based on the temporary and relatively short-term nature of the project. The project is not anticipated to
permanently remove habitat, and the species could re-occupy the disturbed area after
construction.

**State Listed Species Mitigation**

In addition to the mitigation measures included in the SERE EA, the following measure is recommended to mitigate habitat impacts:

- Vegetation removed along Happy Canyon Creek and Badger Gulch will be replaced with native species.
- Measures to mitigate black-tailed prairie dog impacts remain valid. The contractor will adhere to the current RTD FasTracks Prairie Dog Mitigation Policy. The SERE EA referenced the 2007 RTD Prairie Dog Mitigation Policy. At the time this report was prepared, the current policy is dated 2014 and is included in Appendix C.

4.5 **Water Quality**

The water extension line survey area is located in the Upper South Platte River Basin. The types and conditions of surface waters in the water line survey area are similar to those documented in the SERE EA. Surface waters in the survey area, which are all tributaries of Cherry Creek; include Happy Canyon Creek, Badger Gulch, and seven wetlands. Happy Canyon Creek was identified in the SERE EA and characteristics remain consistent with those described in the EA. Badger Gulch, which is a tributary of Happy Canyon Creek as well as the seven wetlands, six of which are manmade stormwater basins, were not outlined in the SERE EA.

These waterbodies are part of Assessment Unit Identifiers (AUID) COSPCH04a_A, which includes: **All tributaries to Cherry Creek, Including all wetlands, from the source of East and West Cherry Creeks to the confluence with the South Platte River except for specific listings in segment 4b: excluding Goldsmith Gulch and McMurdo Gulch (WQCD 2016)**. Although both the 303(d) and 305(b) lists have been updated, no changes in the listing status has been made since the completion of the SERE to the waterbodies included in the water extension line survey area.

At the time of the SERE EA, there were no sole source aquifers identified in the state of Colorado, which is still the case (EPA, 2017). Thus, the activities associated with the re-evaluation will have no effect upon any sole source aquifers.

4.5.1 **Water Quality Impacts**

Based on the current design, approximately 33.6 acres would be disturbed for the installation of the proposed water line. Potential impacts to water quality associated with construction activity are anticipated to be temporary and similar in nature to those described in the SERE EA (i.e., sedimentation in receiving streams, erosion, and accidental spills from heavy equipment). The EA commitments require the contractor to implement appropriate BMP’s during construction as well as revegetate temporary disturbances. As a result, water quality impacts are expected to be minimal.
There are no additional paved or impervious surfaces associated with the proposed water line extension. Therefore, there would be no indirect impacts (e.g., runoff) from an increase in impervious surfaces.

With the implementation of the water quality mitigation measures identified in the SERE EA, and the lack of sole source aquifers occurring in the survey area, it is anticipated that the proposed water line extension project will not have any cumulative effects upon water quality or sole source aquifers.

**Water Quality Mitigation**

Mitigation measures for potential impacts to water quality resources beyond what are included in the 2014 SERE EA are not warranted.

### 4.6 Recreation and Park Resources

The *Douglas County 2030 Parks, Trails and Open Space Master Plan* (PTOS Plan) incorporated into the *Douglas County Comprehensive Master Plan* (Douglas County, 2012b.) was consulted to identify parks, trails, and designated open space areas in the proposed water line extension survey area. Additionally, the City of Lone Tree Comprehensive Plan (Lone Tree, 2015) was reviewed. Based on both of these reports, no existing or planned park or recreation resources, beyond those identified in the SERE EA, were identified in the water line extension survey area. A portion of one planned open space area, the RidgeGate Open Space/Schweiger Ranch, is located near the western end of the proposed water line extension, partially within the survey area. The planned recreation area would be developed in conjunction with the overall RidgeGate development south of Lincoln Avenue, which is planned to be developed over the next 10 to 15 years (DRTD 20114). The proposed water line extension survey area is adjacent to or possibly within the study area for a proposed regional connector trail identified conceptually in the PTOS Plan.

#### 4.6.1 Recreation and Park Resources Impacts

The proposed water line extension would not affect any existing parks, trails, or designated open space areas. Construction of the water line extension would result in temporary impacts where future park and recreation areas are planned south of RidgeGate Parkway. The completed waterline would be buried and any above-ground structures such as risers, vents and man-holes would not preclude future implementation of planned recreation resources. After construction of the waterline is completed, the temporarily disturbed areas will be returned to preconstruction conditions, including filling, grading, and seeding.

**Recreation and Park Resources Mitigation**

The water line extension would not have any impacts to recreational or park resources, thus no mitigation measures are necessary.
Chapter 5.0 References


City of Lone Tree (Lone Tree). 2015, City of Lone Tree Comprehensive Plan. Approved on August 4, 2015.


USFWS. 2016a. Least Tern (Interior Population) Sterna antillarum Fact Sheet Available at: https://www.fws.gov/midwest/endangered/birds/leasttern/IntLeastTernFactSheet.html


USFWS. 2017. Environmental Conservation Online System. Species Profile for Whooping crane (Grus americana). Available at: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B003


Water Quality Control Division (WQCD) 2016. Integrated Water Quality Monitoring and Assessment Report. Prepared Pursuant to Section 303(d) and Section 305(b) of the Clean Water Act.
Appendix A
Southeast Water Line Extension Biological Resources Mapbook
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Map Symbol</th>
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</thead>
<tbody>
<tr>
<td>Canada thistle</td>
<td>CIAR</td>
</tr>
<tr>
<td>Common mullein</td>
<td>VETH</td>
</tr>
<tr>
<td>Diffuse knapweed</td>
<td>CEDI</td>
</tr>
<tr>
<td>Downy brome</td>
<td>BRTE</td>
</tr>
<tr>
<td>Field blindweed</td>
<td>COAR</td>
</tr>
<tr>
<td>Plumeless thistle</td>
<td>CANU</td>
</tr>
<tr>
<td>Scotch thistle</td>
<td>ONAC</td>
</tr>
</tbody>
</table>

FasTracks
Southeast Rail Extension
Ridgeway Waterline Survey
May 2017

Weed Density
- Low
- Medium
- High

Limits of Disturbance
- Proposed Ridgeway
- Water Line
- Survey area
### Common Name Map Symbol

- **Canada thistle**: CIAR
- **Common mullein**: VETH
- **Diffuse knapweed**: CEDI
- **Downy brome**: BRTE
- **Field blindweed**: COAR
- **Plumeless thistle**: CANU
- **Scotch thistle**: ONAC

**Raptor Nest** — active
- **Raptor Nest** — inactive

**Projected Ridgegate Water Line**

**Weed Density**
- **Low**
- **Medium**
- **High**

**Survey area**

**Projection**: Lambert Conformal Conic
- **State Plane Colorado Central**
- **North American Datum 1983**

**FasTracks**
- **Southeast Rail Extension**
- **Ridgegate Waterline Survey**
  - **May 2017**
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Map Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada thistle</td>
<td>CIAR</td>
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<td>Common mullein</td>
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<tr>
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<td>Scotch thistle</td>
<td>ONAC</td>
</tr>
</tbody>
</table>

FasTracks
Southeast Rail Extension
Ridgegate Waterline Survey
May 2017

Projection: Lambert Conformal Conic
State Plane Colorado Central
North American Datum 1983
Appendix B USFWS Official Species List – Dated April 21, 2017
In Reply Refer To: Consultation Code: 06E24000-2017-SLI-0790
Event Code: 06E24000-2017-E-02119
Project Name: SERE Waterline Extension Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.
A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands
Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Colorado Ecological Services Field Office
Denver Federal Center
P.O. Box 25486
Denver, CO 80225-0486
(303) 236-4773
Project Summary

Consultation Code: 06E24000-2017-SLI-0790

Event Code: 06E24000-2017-E-02119

Project Name: SERE Waterline Extension Project

Project Type: WATER SUPPLY / DELIVERY

Project Description: The FTA in conjunction with RTD is proposing to fund a 3.65 mile waterline extension project to supply water for fire protection, serve the driver’s relief station and support landscaping at the end-of-line station (RidgeGate Station) and parking structure located in Douglas County, Colorado.

Project Location:
Approximate location of the project can be viewed in Google Maps:
https://www.google.com/maps/place/39.51539679716956N104.83032427301097W

Counties: Douglas, CO
Endangered Species Act Species

There is a total of 10 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 5 of these species should be considered only under certain conditions. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area. Please contact the designated FWS office if you have questions.

Mammals

<table>
<thead>
<tr>
<th>NAME</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preble's Meadow Jumping Mouse <em>Zapus hudsonius preblei</em></td>
<td>Threatened</td>
</tr>
</tbody>
</table>

There is a final critical habitat designated for this species. Your location is outside the designated critical habitat.

Species profile: [https://ecos.fws.gov/ecp/species/4090](https://ecos.fws.gov/ecp/species/4090)
### Birds

<table>
<thead>
<tr>
<th>NAME</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Least Tern <em>(Sterna antillarum)</em></td>
<td>Endangered</td>
</tr>
<tr>
<td>Population: interior pop.</td>
<td></td>
</tr>
<tr>
<td>No critical habitat has been designated for this species.</td>
<td></td>
</tr>
<tr>
<td>This species only needs to be considered under the following conditions:</td>
<td></td>
</tr>
<tr>
<td>▪ Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.</td>
<td></td>
</tr>
<tr>
<td>Species profile: <a href="https://ecos.fws.gov/ecp/species/8505">https://ecos.fws.gov/ecp/species/8505</a></td>
<td></td>
</tr>
<tr>
<td>Mexican Spotted Owl <em>(Strix occidentalis lucida)</em></td>
<td>Threatened</td>
</tr>
<tr>
<td>There is a <a href="https://ecos.fws.gov/ecp/species/8196">final critical habitat</a> designated for this species. Your location is outside the designated critical habitat.</td>
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<tr>
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<tr>
<td>Piping Plover <em>(Charadrius melodus)</em></td>
<td>Threatened</td>
</tr>
<tr>
<td>Population: except Great Lakes watershed</td>
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<td>There is a <a href="https://ecos.fws.gov/ecp/species/6039">final critical habitat</a> designated for this species. Your location is outside the designated critical habitat.</td>
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<td>This species only needs to be considered under the following conditions:</td>
<td></td>
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<tr>
<td>▪ Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.</td>
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<tr>
<td>Species profile: <a href="https://ecos.fws.gov/ecp/species/6039">https://ecos.fws.gov/ecp/species/6039</a></td>
<td></td>
</tr>
<tr>
<td>Whooping Crane <em>(Grus americana)</em></td>
<td>Endangered</td>
</tr>
<tr>
<td>Population: Wherever found, except where listed as an experimental population</td>
<td></td>
</tr>
<tr>
<td>There is a <a href="https://ecos.fws.gov/ecp/species/758">final critical habitat</a> designated for this species. Your location is outside the designated critical habitat.</td>
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<td>This species only needs to be considered under the following conditions:</td>
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<tr>
<td>▪ Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.</td>
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</tbody>
</table>

### Fishes

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<tr>
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<th>STATUS</th>
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</thead>
<tbody>
<tr>
<td>Greenback Cutthroat Trout <em>(Oncorhynchus clarki stomias)</em></td>
<td>Threatened</td>
</tr>
<tr>
<td>No critical habitat has been designated for this species.</td>
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<tr>
<td>Species profile: <a href="https://ecos.fws.gov/ecp/species/2775">https://ecos.fws.gov/ecp/species/2775</a></td>
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</tr>
<tr>
<td>Pallid Sturgeon <em>(Scaphirhynchus albus)</em></td>
<td>Endangered</td>
</tr>
<tr>
<td>No critical habitat has been designated for this species.</td>
<td></td>
</tr>
<tr>
<td>This species only needs to be considered under the following conditions:</td>
<td></td>
</tr>
<tr>
<td>▪ Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.</td>
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<tr>
<td>Species profile: <a href="https://ecos.fws.gov/ecp/species/7162">https://ecos.fws.gov/ecp/species/7162</a></td>
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Flowering Plants

<table>
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<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado Butterfly Plant (<em>Gaura neomexicana var. coloradensis</em>)</td>
<td>Threatened</td>
</tr>
<tr>
<td>Ute Ladies'-tresses (<em>Spiranthes diluvialis</em>)</td>
<td>Threatened</td>
</tr>
<tr>
<td>Western Prairie Fringed Orchid (<em>Platanthera praeclara</em>)</td>
<td>Threatened</td>
</tr>
</tbody>
</table>

There is a final critical habitat designated for this species. Your location is outside the designated critical habitat.

Species profile: https://ecos.fws.gov/ecp/species/6110

No critical habitat has been designated for this species.

Species profile: https://ecos.fws.gov/ecp/species/2159

This species only needs to be considered under the following conditions:
- Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Species profile: https://ecos.fws.gov/ecp/species/1669

Critical habitats

There are no critical habitats within your project area.
USFWS National Wildlife Refuges And Fish Hatcheries

Any activity proposed on [National Wildlife Refuge](#) lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuges or fish hatcheries within your project area.
Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act\(^1\) and the Bald and Golden Eagle Protection Act\(^2\).

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service\(^3\). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

2. The [Bald and Golden Eagle Protection Act](https://ecos.fws.gov/ecp/species/6582) of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The migratory birds species listed below are species of particular conservation concern (e.g. [Birds of Conservation Concern](https://ecos.fws.gov/ecp/species/8832)) that may be potentially affected by activities in this location. It is not a list of every bird species you may find in this location, nor a guarantee that all of the bird species on this list will be found on or near this location. Although it is important to try to avoid and minimize impacts to all birds, special attention should be made to avoid and minimize impacts to birds of priority concern. To view available data on other bird species that may occur in your project area, please visit the [AKN Histogram Tools](https://ecos.fws.gov/ecp/species/4736) and [Other Bird Data Resources](https://ecos.fws.gov/ecp/species/6582). To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

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<thead>
<tr>
<th>NAME</th>
<th>SEASON(S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prairie Falcon (Falco mexicanus)</td>
<td>On Land: Year-round</td>
</tr>
<tr>
<td><a href="https://ecos.fws.gov/ecp/species/4736">https://ecos.fws.gov/ecp/species/4736</a></td>
<td></td>
</tr>
<tr>
<td>Lark Bunting (Calamospiza melanocorys)</td>
<td>On Land: Breeding</td>
</tr>
<tr>
<td>American Bittern (Botaurus lentiginosus)</td>
<td>On Land: Breeding</td>
</tr>
<tr>
<td><a href="https://ecos.fws.gov/ecp/species/6582">https://ecos.fws.gov/ecp/species/6582</a></td>
<td></td>
</tr>
<tr>
<td>Dickcissel (Spiza americana)</td>
<td>On Land: Breeding</td>
</tr>
<tr>
<td>Red-headed Woodpecker (Melanerpes erythrocephalus)</td>
<td>On Land: Breeding</td>
</tr>
<tr>
<td>Williamson’s Sapsucker (Sphyrapicus thyroideus)</td>
<td>On Land: Breeding</td>
</tr>
<tr>
<td><a href="https://ecos.fws.gov/ecp/species/8832">https://ecos.fws.gov/ecp/species/8832</a></td>
<td></td>
</tr>
<tr>
<td>Golden Eagle (Aquila chrysaetos)</td>
<td>On Land: Year-round</td>
</tr>
</tbody>
</table>

---

\(^1\) The Migratory Birds Treaty Act of 1918.
\(^2\) The Bald and Golden Eagle Protection Act of 1940.
\(^3\) 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)
Bald Eagle (*Haliaeetus leucocephalus*)
[https://ecos.fws.gov/ecp/species/1680](https://ecos.fws.gov/ecp/species/1680)
On Land: Year-round

Black Rosy-finch (*Leucosticte atrata*)
[https://ecos.fws.gov/ecp/species/9460](https://ecos.fws.gov/ecp/species/9460)
On Land: Year-round

Brewer's Sparrow (*Spizella breweri*)
[https://ecos.fws.gov/ecp/species/9291](https://ecos.fws.gov/ecp/species/9291)
On Land: Breeding

Burrowing Owl (*Athene cunicularia*)
[https://ecos.fws.gov/ecp/species/9737](https://ecos.fws.gov/ecp/species/9737)
On Land: Breeding

Cassin's Finch (*Carpodacus cassinii*)
[https://ecos.fws.gov/ecp/species/9462](https://ecos.fws.gov/ecp/species/9462)
On Land: Year-round

Ferruginous Hawk (*Buteo regalis*)
[https://ecos.fws.gov/ecp/species/6038](https://ecos.fws.gov/ecp/species/6038)
On Land: Year-round

Flammulated Owl (*Otus flammeolus*)
[https://ecos.fws.gov/ecp/species/7728](https://ecos.fws.gov/ecp/species/7728)
On Land: Breeding

Lewis's Woodpecker (*Melanerpes lewis*)
[https://ecos.fws.gov/ecp/species/9408](https://ecos.fws.gov/ecp/species/9408)
On Land: Breeding

Loggerhead Shrike (*Lanius ludovicianus*)
[https://ecos.fws.gov/ecp/species/8833](https://ecos.fws.gov/ecp/species/8833)
On Land: Breeding

Long-billed Curlew (*Numenius americanus*)
[https://ecos.fws.gov/ecp/species/5511](https://ecos.fws.gov/ecp/species/5511)
On Land: Breeding

Mountain Plover (*Charadrius montanus*)
[https://ecos.fws.gov/ecp/species/3638](https://ecos.fws.gov/ecp/species/3638)
On Land: Breeding

Peregrine Falcon (*Falco peregrinus*)
[https://ecos.fws.gov/ecp/species/8831](https://ecos.fws.gov/ecp/species/8831)
On Land: Breeding

Sage Thrasher (*Oreoscoptes montanus*)
[https://ecos.fws.gov/ecp/species/9433](https://ecos.fws.gov/ecp/species/9433)
On Land: Breeding

Short-eared Owl (*Asio flammeus*)
[https://ecos.fws.gov/ecp/species/9295](https://ecos.fws.gov/ecp/species/9295)
On Land: Wintering

Swainson's Hawk (*Buteo swainsoni*)
[https://ecos.fws.gov/ecp/species/1098](https://ecos.fws.gov/ecp/species/1098)
On Land: Breeding

Virginia's Warbler (*Vermivora virginiae*)
[https://ecos.fws.gov/ecp/species/9441](https://ecos.fws.gov/ecp/species/9441)
On Land: Breeding
Western Grebe (*aechmophorus occidentalis*)  
https://ecos.fws.gov/ecp/species/6743  
On Land: Breeding

Willow Flycatcher (*Empidonax traillii*)  
https://ecos.fws.gov/ecp/species/3482  
On Land: Breeding

Rufous Hummingbird (*selasphorus rufus*)  
https://ecos.fws.gov/ecp/species/8002  
On Land: Migrating

Additional information can be found using the following links:

- Conservation measures for birds  
- Year-round bird occurrence data  
  [http://www.birdscanada.org/birdmon/default/datasummaries.jsp](http://www.birdscanada.org/birdmon/default/datasummaries.jsp)
Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

RIVERINE

- R4USA
Appendix C
RTD/FasTracks 2014 Prairie Dog Mitigation Guidance
Prairie Dog Mitigation Guidance
April 2014 (Version 5)

The following guidelines should be applied to all RTD, including FasTracks, construction projects that impact black-tailed prairie dogs.

Guidelines

- To the extent possible, projects will be designed and constructed to avoid and minimize impacts to prairie dog colonies regardless of colony size.
- If a colony is less than two acres, but has the potential to expand into areas that are currently inactive (i.e., not constrained), the available and accessible habitat will be the determining size of the area to be considered.
- Projects involving towns less than two acres in area will be designed and constructed to avoid and minimize impacts, which may include the relocation of prairie dogs, so long as doing so will not increase the impacts to other resources (e.g. wetlands, historical properties, environmental justice issues, archeological sites, etc.) and is not cost prohibitive.
- The area of prairie dog towns that will be affected by a project will be calculated before construction begins.
- Relocation efforts for prairie dog towns greater than two acres shall be conducted in accordance with CRS 35-7-203, as well as any other applicable laws or regulations.
  o If a relocation site cannot be located for towns larger than two acres, the prairie dogs will be captured and donated to raptor rehabilitation facilities, or turned over to the Fish and Wildlife Service (FWS) for the black-footed ferret reintroduction program;
  o At no time will RTD authorize earth-moving activities that result in the burying of living prairie dogs. If needed, humane techniques for the killing of prairie dogs within a town < 2 acres in size, will be obtained from the Colorado Department of Parks and Wildlife (CPW);
  o Where relocation proves to be infeasible, RTD will humanely remove the impacted prairie dogs.
- Coordination with the CPW District Wildlife Manager whose area the project is in will be initiated before any manipulation of prairie dogs or their colonies begins.
- All relocation of prairie dogs is to be done in compliance with the CPW Permit to Capture and Relocate Prairie Dogs. This permit is to be acquired prior to any relocation activities.
- Various local jurisdictions also have ordinances or regulations that regulate actions associated with disturbance of prairie dogs. FasTracks corridor teams will research the requirements of local jurisdictions prior to preparing a plan for prairie dog town disturbance. The plans will be reviewed with the FasTracks Environmental Resource Group.
- The Project Manager for the corridor will determine the appropriate course of action consistent with this policy.

Rick Clarke
Assistant General Manager of Capital Programs

Bill Van Meter
Assistant General Manager of Planning
Wetlands and Waters of the U.S. Addendum Technical Report
Southeast Extension, Water Line Extension Project

Prepared for:
Federal Transit Administration

Prepared by:
Denver Regional Transportation District

July 2017
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Chapter 1.0 Introduction

This Technical Report was prepared in support of the environmental Re-evaluation initiated by RTD to address scope changes from the Southeast Extension (SERE) Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) completed by the Regional Transportation District (RTD) in 2014. This Technical Report focuses on Waters of the U.S. (WUS), including wetlands and other waters of the U.S. (OWUS), along a proposed water line extension to RTD’s RidgeGate Station (Figure 1). The proposed water line extension lies completely within the bounds of the 2014 SERE EA study area.

The purpose of this report is to addend the Wetlands and Waters of the United States portion of the Natural Resource Assessment completed by ERO Resources Corp. (ERO) in 2015, document potential impacts of the water line extension for the SERE Re-evaluation, and recommended any additional mitigation measures for WUS. Existing resource conditions (including applicable laws and policies) disclosed in the EA have been reviewed and updated as necessary. The impacts of the proposed water line extension are discussed and compared to the impacts of the Locally Preferred Alternative (LPA) as disclosed in the EA. The mitigation measures identified in the EA were reviewed in light of anticipated water line extension impacts to confirm adequacy and identify additional mitigation recommendations, if warranted.

1.1 Background

An EA and FONSI for the SERE were completed and approved by the Federal Transit Administration (FTA) in August and October 2014, respectfully. Following approval of the environmental clearance documentation, RTD proceeded with a request for federal funding and was awarded a Small Starts grant in May 2016. Final design was advanced and project construction was initiated. During final design, two scope changes became necessary and each requires additional environmental clearance and approval by FTA. These changes include:

- Water Line Extension: When the EA was in preparation, several options were under consideration to provide the necessary water supply for fire protection, the driver’s relief station, and to support landscaping at the end-of-line station (RidgeGate Station) and parking structure. Since that time, it has been determined that water will be supplied by Parker Water and Sanitation District via extension of a water line from the east. Rampart Range Metro District will construct and own the water line extension; however, federal funds will be used to pay for a portion of the construction. Therefore, it is necessary to provide environmental documentation in the form of a Re-evaluation in order to maintain eligibility for federal funds.

- Noise Wall Requirement: The previous noise study did not indicate the need for mitigation at any point along the project alignment. However, area land development has advanced since the EA was prepared and a more recent noise study conducted during final design indicated the need for a noise barrier south of Lincoln Avenue between the AMLI RidgeGate Apartments and the Hampton Inn & Suites Hotel. The noise barrier will be mounted on top and along the westerly edge of the Lincoln Avenue bridge structure, and will continue on top of and along the westerly edge of a mechanically stabilized earth (MSE) wall approved in the original EA/FONSI. Due to the previously disturbed nature of the area to build the MSE wall, addition of the noise barrier to the top of the MSE wall is unlikely to generate additional impacts to WUS above and beyond what was documented.
in the original 2014 SERE EA. Thus, no further discussion or analysis is warranted and the noise barrier will not be discussed further in this document.

**Figure 1: Project Location**
In October 2015, Rampart Range Metropolitan District No.1 hired ERO, an independent consulting firm to conduct a natural resources assessment for a project area described as RidgeGate East. As part of this 2015 report, WUS were delineated. In November 2015, a request was sent to the United States Army Corps of Engineers (USACE) for a Jurisdictional Determination (JD) for Happy Canyon Creek, Badger Gulch, the Arapahoe Canal, as well as several unnamed drainages. On September 30, 2016 the USACE confirmed that Happy Canyon and Badger Gulch were jurisdictional but all of the unnamed drainages identified and Arapahoe Canal were not jurisdictional.

Existing resource conditions (including applicable laws and policies), impacts, and mitigation measures identified in the SERE EA were reviewed and updated for this report, as described below.

**Chapter 2.0 Regulatory Environment**

As described in Section 404 of the Clean Water Act (CWA), the USACE and the Environmental Protection Agency (EPA) regulate the discharge of dredged and fill materials into WUS. As defined in 33 CFR 328.3, WUS generally include wetlands and OWUS, such as intrastate lakes, rivers, streams, mudflats, and tributaries to those waters. In general, swales or erosional features such as gullies, small washes characterized by low volume, infrequent or short duration flows are not regulated under the CWA. The CWA generally requires the issuance of a permit, or coverage under an existing permit, for all actions that result in the discharge of dredge or fill material into WUS.

The USACE and EPA are responsible for making all final jurisdictional determinations. Under Section 404 of the CWA, the USACE and the EPA reserve the right to determine jurisdiction on a case-by-case basis (CFR, Volume 41, Number 219). Utility line installations are typically covered under a Nationwide Permit 12 – Utility Line Activities.). A NWP 12 requires a Pre-Construction Notification (PCN) if discharges result in the loss of 0.10 acre or more of WUS.

Executive Order (EO) 11990 directs federal agencies to observe a “no net loss” of wetlands in order to “minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands,” regardless of jurisdictional statuses. Therefore, non-jurisdictional wetland impacts must still be quantified and mitigated.

Additionally, it is the policy of RTD (RTD, 2007) to mitigate for wetland impacts regardless of jurisdictional status. Therefore, in addition to impacts to jurisdictional WUS, all permanent impacts to non-jurisdictional wetlands will be mitigated through the purchase of wetland mitigation bank credits.

Happy Canyon Creek is a Federal Emergency Management Agency (FEMA) designated floodplain. As such any work occurring within or through the Happy Canyon Creek designated floodplain will require a Douglas County Floodplain Development Permit.

Regulations protecting floodplains, wetlands, and OWUS have not changed since the SERE EA was approved in 2014.
Chapter 3.0 Methods

3.1 Preliminary Investigation

Prior to the field survey, the following information was reviewed to determine if potentially jurisdictional wetlands and OWUS occur within the survey area:

- Topographic map quadrangles were reviewed online at the U.S. Geological Survey (USGS) National Map Viewer.
- National Wetlands Inventory (NWI) data from the U.S. Fish and Wildlife Service (USFWS) Wetlands Mapper database (USFWS 2007). See Figure 2.
- National Hydrography dataset (USGS 2015). See Figure 2.
- Soils data – NRCS’ online Web Soil Survey (USDA NRCS 2017). The soil report for the project area is included in Appendix A.
- ERO Resources Corp. 2015. Request for Approved Jurisdictional Determination for Several Unnamed Drainages, Douglas County, Colorado (Appendix B).

3.2 Field Survey

On April 7th and 17th, 2017 Jacobs' biologists, Christy Payne, wildlife biologist and certified wetland delineator, and Pat Basting, senior biologist and certified wetland delineator, conducted a wetland delineation in accordance with the USACE 1987 Wetland Delineation Manual. The survey area was investigated for the presence of wetland indicators (wetland hydrology, hydrophytic vegetation, and hydric soils); for OWUS and Waters of the State, including drainages or other water bodies with flowing water or characteristics of an active channel, including an ordinary high water mark (OHWM). The majority of the survey area was approximately 150 feet wide with two wider portions extending up to 375 feet.

All identified features were mapped using a sub-meter accuracy Global Positioning System (GPS) unit (Trimble GeoXH). GPS data was post-processed using ArcGIS 10.3 and mapped features were then overlain on aerial imagery. All figures were created in ArcGIS 10.3.
Figure 2: National Wetland Inventory and National Hydrography Dataset
3.3 Other Waters of the U.S.

Other waters refer to un-vegetated waterways and other water bodies with a defined bed and bank, such as tide channels, drainages, ponds, creeks, rivers, and lakes (USACE 1987). Other waters typically lack wetland vegetation and may also lack hydric soils. Other waters are identified as perennial, intermittent, and ephemeral drainages with flowing water or characteristics of an active channel (e.g., ordinary high water mark [OHWM]). OHWM means the line on the shore established by the fluctuation of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area. Representative photos of OWUS delineated during the April surveys are included in Appendix D.

3.4 Wetlands

Methodology for delineating wetlands includes using the guidelines and criteria of the USACE 1987 Wetland Delineation Manual (1987 Manual) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Supplement) (USACE, 2010). According to the 1987 Manual and Supplement, wetlands are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances/conditions do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. A wetland is present if all three criteria (hydrophytic vegetation, hydric soils, wetland hydrology) are observed. Wetlands were grouped using the Cowardin classification system.

Hydrophytic vegetation was identified utilizing the National Wetland Plant List, wetland indicator status for the Great Plains Region (Lichvar et al. 2016). Taxonomy was determined utilizing Common Wetland Plants of Colorado’s Eastern Plains, A Pocket Guide (Culver, 2014), and Field Guide to Colorado’s Wetland Plants (Culver and Lemly, 2013). Per the Supplement (USACE 2010), if an observed plant species did not occur on the applicable regional list, the plant was assumed to be an upland species. A minimum indicator status of “facultative” was used for all unidentified Carex species.

Wetland hydrology indicators were used in combination with hydric soils and hydrophytic vegetation to make the final wetland determination at each data point. Wetland hydrology indicators included direct observation of surface or groundwater, evidence of site flooding or ponding, evidence of soil saturation and vegetation, and soil features that indicate contemporary wet conditions.

Hydric soil indicators typically include a combination of low chroma colors and evidence of iron oxidation, including iron reduction and concentrations. Other indicators include manganese concretions, gleying, sulfidic odor, high organic content, or organic streaking resulting from prolonged inundation or saturation (Environmental Laboratory 1987).

Chapter 4.0 Results

Table 1 summarizes the results of the April 2017 field delineations for the proposed water line extension. Table 1 does not include previously delineated features. Figure 3 depicts the locations of all delineated features within the 2017 study area, including features previously
delineated. The Delineation Mapbook in Appendix E displays the locations of the delineated wetlands and OWUS. Great Plains Wetland Data Forms are included in Appendix F.

Figure 3: Waters of the U.S. Overview

4.1 Other Waters of the U.S.

4.1.1 Non-Relatively Permanent Waters (NRPW)

NRPWs are those drainages that flow after heavy precipitation or snow melt. One NRPW (identified as OWUS 1) is located at approximate pipeline station 176+10 was not included in the previous ERO delineation or in the SERE EA and is therefore addressed here (Figure 3). OWUS 1 bisects Havana Street and its associated ROW via two 36 inch concrete culverts. The open channel begins at the edge of the roadway ROW and was devoid of vegetation within the OHWM. At the OHWM, OWUS 1 exhibited bank undercutting, root exposure, water staining, and shelving. The channel width ranged from 10 ft wide at the two culvert outlets and narrowed down to approximately 1.5 ft wide where the channel fed into a detention basin outside of the study area (see Appendix D). The detention basin exhibited a dominance of wetland vegetation; however, a delineation was not performed in the basin as it was outside the study area. No wetlands were identified within or adjacent to OWUS 1 within the survey area. This basin overflow has a hydraulic connection to Happy Canyon Creek, thus, this channel is likely jurisdictional.
4.2 Wetlands

WL 1, (Approx. Sta: 144+00), WL 2 (Approx. Sta: 140+00), WL 3 (Approx. Sta: 127+25), WL 5 (Approx. Sta: 114+00), WL 6 (Approx. Sta: 106+50), and WL 7 (Approx. Sta: 87+75): A series of stormwater basins exhibiting wetland characteristics were installed relatively recently along the north edge of Ridgegate Parkway, within the survey area. In general these stormwater basin wetlands exhibited hydrophytic vegetation dominated by Three-square (_Schoenoplectus pungens_), and Baltic rush (_Juncus balticus_) with lesser but still prominent amounts of Broad-leaf cattail (_Typha latifolia_) and Softstem bulrush (_Schoenoplectus tabernaemontani_). Hydrology is provided by roadside drainage. Some of these basins also have concave surfaces with either standing water or bare, cracked soil surrounded by a ring of vegetation consisting of the species listed above. Dominant textures encountered during the wetland delineation for both wetlands and uplands included sandy, gravelly loam, sandy clay loam and clay loam. Each of these wetlands were classified as palustrine and were further divided into the emergent wetland subclass.

WL 3, 5, and 6 are isolated and likely non-jurisdictional. WL 1 and WL 2 are stormwater basins excavated into uplands approximately 150 ft laterally and 50 ft vertically from Happy Canyon Creek, a jurisdictional WUS. The overflow from these basins connects directly to wetlands along the edge of the Happy Canyon Creek stream channel via a culvert. Due to the direct hydraulic connection to Happy Canyon Creek and the potential to affect water quality at a localized scale, these would likely be considered jurisdictional. The same conditions hold true for WL 7 relative to Badger Gulch.

WL 4 (Approx. Sta: 128+50): This storm drain basin is dominated by Curly dock (_Rumex crispus_). Hydrology is provided via storm drain fed by roadside drainage. WL 4 is isolated and likely non-jurisdictional.

Table 1: Addendum Wetlands and Other Waters of the U.S.

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Approximate Station</th>
<th>Cowardin Classification</th>
<th>Rapanos/Carabell/SWANCC Comment</th>
<th>Connection/ Significant Nexus</th>
<th>Width at OHWM</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Acre Square Feet</td>
</tr>
<tr>
<td>OW 1</td>
<td>176+10</td>
<td>R4; Riverine Intermittent</td>
<td>NRPW</td>
<td>Drains into Happy Canyon Creek</td>
<td>1-5’</td>
<td>0.03 1,350</td>
</tr>
<tr>
<td>Wetlands</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WL 1</td>
<td>144+00</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Likely Jurisdictional; connected via culvert to Happy Canyon Creek</td>
<td>n/a</td>
<td>0.05 2,183</td>
</tr>
<tr>
<td>WL 2</td>
<td>141+25</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Likely Jurisdictional; connected via culvert to Happy Canyon Creek</td>
<td>n/a</td>
<td>0.04 1,790</td>
</tr>
</tbody>
</table>
Table 1: Addendum Wetlands and Other Waters of the U.S.

| Feature Name | Approximate Station | Cowardin Classification | Rapanos/ Carabell/ SWANCC Comment | Connection/ Significant Nexus | Width at OHWM | Area
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>WL 3*</td>
<td>127+25</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Isolated, storm drain basin cut in upland; no connection to WUS</td>
<td>n/a</td>
<td>0.02</td>
</tr>
<tr>
<td>WL 4*</td>
<td>128+50</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Isolated, storm drain basin cut in upland; no connection to WUS</td>
<td>n/a</td>
<td>0.03</td>
</tr>
<tr>
<td>WL 5*</td>
<td>114+00</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Isolated, storm drain basin cut in upland; no connection to WUS</td>
<td>n/a</td>
<td>0.03</td>
</tr>
<tr>
<td>WL 6*</td>
<td>106+50</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Isolated, storm drain basin cut in upland; no connection to WUS</td>
<td>n/a</td>
<td>0.03</td>
</tr>
<tr>
<td>WL 7</td>
<td>87+75</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Likely Jurisdictional; connected via culvert to Badger Gulch</td>
<td>n/a</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Cumulative Total: 0.26 acre, 11,070 square feet

* These wetlands are isolated and are likely non-jurisdictional

4.2.1 Previous Wetland Delineation

Based on the 2015 field delineation conducted by ERO, two OWUS and one wetland adjacent to an OWUS were mapped; all of which bisect the proposed water line extension survey area. Happy Canyon Creek (OW 2) was flowing during the April 2017 survey and is a relatively permanent water (RPW) that has a defined surface connection to Cherry Creek, which is a known WUS. Multiple wetlands associated with Happy Canyon Creek were identified, but only Wetland 19 (WL 19) occurs within the 2017 survey area. Badger Gulch (OW 3) is a NRPW that was determined to have a connection to Happy Canyon Creek. The USACE determined in an approved JD (September 30, 2016) that both of these waterways and wetlands located adjacent to these waters were jurisdictional (see Appendix C).

4.2.2 Non-Wetland Areas

Three areas exhibiting wetland characteristics were investigated and determined to lack either hydrophytic vegetation or hydric soils. Specifically these areas were:

- **Approximate Station: 168+50 – 173+90:** This roadside ditch swale cut in an upland area receives water from roadside drainage, and has a prevalence of hydrophytic vegetation mainly Curly dock and Broad-leaf cattail. However, this site lacked hydric soils and thus did not meet the wetland criteria. This ditch has recently developed and is likely due to installation of a farm field approach (approx. Sta: 174+00) that does not have a culvert to facilitate drainage. Over time this area may develop hydric soils.

- **Approximate Station: 166+35 – 167+70:** This area is a roadside ditch swale in the vicinity where the proposed water line extension would have a small spur for installation
of a blow off valve. Although a prevalence of hydrophytic vegetation was present, this area lacked hydric soils and thus did not meet the wetland criteria.

- **Approximate Station: 83+50:** This is a small stormwater basin adjacent to Badger Gulch. The basin has a prevalence of bare soil and the surrounding vegetation did not meet requirements for a prevalence of hydrophytic vegetation and thus, does not meet the wetland criteria.

Because these areas did not meet the wetland criteria, they are not displayed in the Delineation Mapbook in Appendix E.

### 4.2.3 Impact Assessment

Impacts of the LPA disclosed in the SERE EA included impacts to two non-jurisdictional wetlands, neither of which are located within the proposed water line extension survey area. No impacts to OWUS were anticipated. Impacts to wetland and OWUS from the proposed water line extension project are discussed outlined below.

Because the project involves the placement of a buried water line, project impacts are expected to be temporary as post-construction contours and elevations would be similar to existing conditions. Based upon preliminary design information provided by the design consultant (Merrick & Company) on May 2, 2017, the proposed water line extension would temporarily impact approximately 0.24 acre of wetlands and OWUS. Of this 0.24 acre, temporary impacts to likely jurisdictional wetlands and OWUS would be approximately 0.16 acre, while impacts to likely non-jurisdictional wetlands would be 0.08 acre.

Table 2 outlines the potential temporary impacts to wetlands and OWUS and are separated by anticipated jurisdictional status. Impacts were assessed for wetlands and OWUS delineated by ERO in 2015 and Jacobs in 2017 (see Delineation Mapbook, Appendix E).

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Approx. Station</th>
<th>Cowardin Classification</th>
<th>Rapanos/Carabell/SWANCC Comment</th>
<th>Connection/Significant Nexus</th>
<th>Width at OHWM (ft)</th>
<th>Area within Survey</th>
<th>Impacted Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>OW 1</td>
<td>176+10</td>
<td>R4; Riverine Intermittent</td>
<td>NRPW</td>
<td>Likely Jurisdictional / Drains into Happy Canyon Creek</td>
<td>1-5</td>
<td>0.03</td>
<td>0.0</td>
</tr>
<tr>
<td>Badger Gulch (OW 3)</td>
<td>87+00</td>
<td>R4; Riverine Intermittent</td>
<td>NRPW</td>
<td>Jurisdictional / Drains into Happy Canyon Creek</td>
<td>1-4</td>
<td>0.004</td>
<td>0.002</td>
</tr>
<tr>
<td>Happy Canyon Creek (OW 2)</td>
<td>142+00</td>
<td>R4; Riverine Perennial</td>
<td>RPW</td>
<td>Jurisdictional / Drains into Cherry Creek</td>
<td>4-25</td>
<td>0.09</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>OWUS Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>0.124</strong></td>
<td><strong>0.022</strong></td>
</tr>
</tbody>
</table>
Table 2: Temporary Impacts to Wetlands and Other Waters of the U.S.

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Approx. Station</th>
<th>Cowardin Classification</th>
<th>Rapanos/Carabell/SWANCC Comment</th>
<th>Connection/Significant Nexus</th>
<th>Width at OHWM (ft)</th>
<th>Area within Survey</th>
<th>Impacted Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>WL 1</td>
<td>144+00</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Likely Jurisdictional, connected via culvert to Happy Canyon Creek</td>
<td>n/a</td>
<td>0.05</td>
<td>2,183</td>
</tr>
<tr>
<td>WL 2</td>
<td>140+00</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Likely Jurisdictional, connected via culvert to Happy Canyon Creek</td>
<td>n/a</td>
<td>0.04</td>
<td>1,790</td>
</tr>
<tr>
<td>WL 3*</td>
<td>127+25</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Isolated, storm drain basin cut in upland, no connection to WUS</td>
<td>n/a</td>
<td>0.02</td>
<td>847</td>
</tr>
<tr>
<td>WL 4*</td>
<td>128+50</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Isolated, storm drain basin cut in upland, no connection to WUS</td>
<td>n/a</td>
<td>0.03</td>
<td>1,111</td>
</tr>
<tr>
<td>WL 5*</td>
<td>114+00</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Isolated, storm drain basin cut in upland, no connection to WUS</td>
<td>n/a</td>
<td>0.03</td>
<td>1,105</td>
</tr>
<tr>
<td>WL 6*</td>
<td>106+50</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Isolated, storm drain basin cut in upland, no connection to WUS</td>
<td>n/a</td>
<td>0.03</td>
<td>1,274</td>
</tr>
<tr>
<td>WL 7</td>
<td>87+75</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Likely Jurisdictional, connected via culvert to Badger Gulch</td>
<td>n/a</td>
<td>0.03</td>
<td>1,410</td>
</tr>
<tr>
<td>WL 19</td>
<td>142+00</td>
<td>PEM: Palustrine Emergent</td>
<td>PEM Wetland</td>
<td>Jurisdictional, fringe wetland along Happy Canyon Creek</td>
<td>n/a</td>
<td>0.03</td>
<td>1,187</td>
</tr>
</tbody>
</table>

| Wetlands total | 0.25          | 10,907 | 0.22 | 9,502 |
| Cumulative (OWUS + Wetlands) Total | 0.37 | 16,442 | 0.24 | 10,665 |

* These wetlands are isolated and are likely non-jurisdictional

Chapter 5.0 Summary

OW 2 (Happy Canyon Creek) was identified in the SERE EA; however, no impacts associated with the EA Proposed Action were anticipated to this feature. The SERE EA did not identify or affect any of the other features included in this report.

A jurisdictional determination must be obtained for the WUS identified in this report. If permanent impacts to jurisdictional WUS remain below the 2017 NWP 12 (Utility Lines) permit threshold of 0.10 acre, a PCN is not required. However, because the SERE project currently holds an active CWA 404 NWP14, USACE coordination must occur to verify their concurrence.
Since impacts will be approximately 0.24 acre to WUS, all impacts must be temporary and therefore must be restored to their pre-construction conditions, including contours, vegetation, and hydrology.

The proposed water line extension will pass through and have potential impacts to Happy Canyon Creek and its designated floodplain. Therefore, the proposed water line extension project will require a Floodplain Development Permit from Douglas County.
Chapter 6.0 References


Appendix A NRCS Soil Report
Custom Soil Resource Report for
Castle Rock Area, Colorado

April 3, 2017
The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 9, Sep 22, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 16, 2012—Aug 21, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
Map Unit Legend (SERE Water Line Extension)

<table>
<thead>
<tr>
<th>Map Unit Symbol</th>
<th>Map Unit Name</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BrD</td>
<td>Bresser sandy loam, cool, 5 to 9 percent slopes</td>
<td>9.0</td>
<td>0.3%</td>
</tr>
<tr>
<td>En</td>
<td>Englewood clay loam</td>
<td>66.7</td>
<td>2.6%</td>
</tr>
<tr>
<td>FoB</td>
<td>Fondis clay loam, 1 to 3 percent slopes</td>
<td>294.6</td>
<td>11.3%</td>
</tr>
<tr>
<td>FoD</td>
<td>Fondis clay loam, 3 to 9 percent slopes</td>
<td>149.6</td>
<td>5.7%</td>
</tr>
<tr>
<td>Fu</td>
<td>Fondis-Kutch association</td>
<td>412.7</td>
<td>15.9%</td>
</tr>
<tr>
<td>Hg</td>
<td>Hilly gravelly land</td>
<td>257.7</td>
<td>9.9%</td>
</tr>
<tr>
<td>Lo</td>
<td>Loamy alluvial land</td>
<td>92.9</td>
<td>3.6%</td>
</tr>
<tr>
<td>Ma</td>
<td>Manzanola clay loam</td>
<td>196.4</td>
<td>7.5%</td>
</tr>
<tr>
<td>NeE</td>
<td>Newlin gravelly sandy loam, 8 to 30 percent slopes</td>
<td>150.4</td>
<td>5.8%</td>
</tr>
<tr>
<td>NeE</td>
<td>Newlin-Satanta complex, 5 to 20 percent slopes</td>
<td>354.4</td>
<td>13.6%</td>
</tr>
<tr>
<td>RnE</td>
<td>Renohill-Buick complex, 5 to 25 percent slopes</td>
<td>443.7</td>
<td>17.0%</td>
</tr>
<tr>
<td>RnE</td>
<td>Renohill-Manzanola clay loams, 3 to 20 percent slopes</td>
<td>139.2</td>
<td>5.3%</td>
</tr>
<tr>
<td>RoE</td>
<td>Renohill sandy loam, reddish variant, 5 to 20 percent slopes</td>
<td>25.3</td>
<td>1.0%</td>
</tr>
<tr>
<td>Sn</td>
<td>Satanta loam</td>
<td>2.5</td>
<td>0.1%</td>
</tr>
<tr>
<td>Sv</td>
<td>Stony steep land</td>
<td>7.9</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>Totals for Area of Interest</strong></td>
<td></td>
<td><strong>2,602.9</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Map Unit Descriptions (SERE Water Line Extension)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit. A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some
observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An association is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately.
pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An undifferentiated group is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.
Castle Rock Area, Colorado

BrD—Bresser sandy loam, cool, 5 to 9 percent slopes

Map Unit Setting
National map unit symbol: 2tlpk
Elevation: 5,500 to 6,960 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 100 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition
Bresser, cool, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bresser, Cool

Setting
Landform: Interfluves
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Tertiary aged alluvium derived from arkose

Typical profile
Ap - 0 to 5 inches: sandy loam
Bt1 - 5 to 8 inches: sandy loam
Bt2 - 8 to 27 inches: sandy clay loam
Bt3 - 27 to 36 inches: sandy loam
C - 36 to 80 inches: loamy coarse sand

Properties and qualities
Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups
Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No
Minor Components

Ascalon
Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Truckton
Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

En—Englewood clay loam

Map Unit Setting
National map unit symbol: jqym
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 52 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Englewood and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the map unit.

Description of Englewood

Setting
Landform: Swales, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Weathered from alluvium derived from sedimentary rock

Typical profile
H1 - 0 to 10 inches: clay loam
H2 - 10 to 29 inches: clay
H3 - 29 to 60 inches: clay
Properties and qualities

- **Slope:** 1 to 4 percent
- **Depth to restrictive feature:** More than 80 inches
- **Natural drainage class:** Well drained
- **Runoff class:** Medium
- **Capacity of the most limiting layer to transmit water (Ksat):** Moderately low to moderately high (0.06 to 0.20 in/hr)
- **Depth to water table:** More than 80 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Calcium carbonate, maximum in profile:** 15 percent
- **Salinity, maximum in profile:** Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- **Available water storage in profile:** High (about 9.7 inches)

Interpretive groups

- **Land capability classification (irrigated):** 2e
- **Land capability classification (nonirrigated):** 3e
- **Hydrologic Soil Group:** C
- **Ecological site:** Clayey Foothill (R049BY208CO)
- **Hydric soil rating:** No

Minor Components

- **Sampson**
  - **Percent of map unit:** 10 percent
  - **Hydric soil rating:** No

- **Satanta**
  - **Percent of map unit:** 9 percent
  - **Hydric soil rating:** No

- **Fluvaquentic haplustolls**
  - **Percent of map unit:** 1 percent
  - **Landform:** Terraces
  - **Hydric soil rating:** Yes

FoB—Fondis clay loam, 1 to 3 percent slopes

**Map Unit Setting**

- **National map unit symbol:** jqyn
- **Elevation:** 5,500 to 6,800 feet
- **Mean annual precipitation:** 15 to 19 inches
- **Mean annual air temperature:** 47 to 50 degrees F
- **Frost-free period:** 120 to 135 days
- **Farmland classification:** Farmland of statewide importance

**Map Unit Composition**

- **Fondis and similar soils:** 80 percent
- **Minor components:** 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fondis

Setting

Landform: Buttes, mesas, ridges, hills
Landform position (three-dimensional): Crest
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over sedimentary rock coarse-silty outwash derived from arkose

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 24 inches: clay
H3 - 24 to 60 inches: sandy clay loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Ecological site: Clayey Foothill (R049BY208CO)
Hydric soil rating: No

Minor Components

Kutch

Percent of map unit: 7 percent
Hydric soil rating: No

Satanta

Percent of map unit: 6 percent
Hydric soil rating: No

Buick

Percent of map unit: 6 percent
Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes
FoD—Fondis clay loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: jqyp
Elevation: 5,500 to 6,800 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Fondis and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fondis

Setting

Landform: Buttes, mesas, ridges
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over coarse-silty outwash derived from arkose

Typical profile

H1 - 0 to 7 inches: clay loam
H2 - 7 to 24 inches: clay
H3 - 24 to 60 inches: sandy clay loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Clayey Foothill (R049BY208CO)
Hydric soil rating: No
Minor Components

Englewood
Percent of map unit: 5 percent
Hydric soil rating: No

Kutch
Percent of map unit: 5 percent
Hydric soil rating: No

Denver
Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Fu—Fondis-Kutch association

Map Unit Setting
National map unit symbol: jqyq
Elevation: 5,500 to 6,800 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition
Fondis and similar soils: 50 percent
Kutch and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the map unit.

Description of Fondis

Setting
Landform: Draws, valley sides
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over coarse-silty outwash derived from arkose

Typical profile
H1 - 0 to 7 inches: loam
H2 - 7 to 24 inches: clay
H3 - 24 to 60 inches: sandy clay loam

Properties and qualities
Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: Clayey Foothill (R049BY208CO)
Hydric soil rating: No

Description of Kutch
Setting
  Down-slope shape: Linear
  Across-slope shape: Linear
  Parent material: Fine-textured residuum weathered from calcareous shale

Typical profile
  H1 - 0 to 6 inches: sandy loam
  H2 - 6 to 32 inches: clay
  H3 - 32 to 36 inches: weathered bedrock

Properties and qualities
  Slope: 5 to 40 percent
  Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
  Natural drainage class: Well drained
  Runoff class: Very high
  Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
  Depth to water table: More than 80 inches
  Frequency of flooding: None
  Frequency of ponding: None
  Calcium carbonate, maximum in profile: 15 percent
  Gypsum, maximum in profile: 2 percent
  Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
  Available water storage in profile: Low (about 5.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components
Bresser
  Percent of map unit: 5 percent
  Hydric soil rating: No
Newlin

Percent of map unit: 5 percent
Hydric soil rating: No

Hilly gravelly land

Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Hg—Hilly gravelly land

Map Unit Setting

National map unit symbol: jqyw
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 48 to 51 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Hilly gravelly land: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hilly Gravelly Land

Setting

Landform: Hills
Landform position (three-dimensional): Crest, base slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

H1 - 0 to 7 inches: cobbly sandy loam
H2 - 7 to 24 inches: cobbly clay loam
H3 - 24 to 28 inches: weathered bedrock

Properties and qualities

Slope: 5 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: Cobbly Foothill (R049XY213CO)
Hydric soil rating: No

Minor Components
Kutch
Percent of map unit: 4 percent
Hydric soil rating: No

Newlin
Percent of map unit: 4 percent
Hydric soil rating: No

Bresser
Percent of map unit: 4 percent
Hydric soil rating: No

Fondis
Percent of map unit: 4 percent
Hydric soil rating: No

Truckton
Percent of map unit: 3 percent
Hydric soil rating: No

Aquic haplustolls
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Lo—Loamy alluvial land

Map Unit Setting
National map unit symbol: jqzb
Elevation: 7,000 to 8,000 feet
Mean annual precipitation: 17 to 19 inches
Mean annual air temperature: 44 to 46 degrees F
Frost-free period: 115 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition
Loamy alluvial land: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the map unit.
Description of Loamy Alluvial Land

Setting
Landform: Flood plains, swales
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile
H1 - 0 to 20 inches: sandy loam
H2 - 20 to 40 inches: stratified loamy sand to clay loam
H3 - 40 to 60 inches: sand and gravel

Properties and qualities
Slope: 1 to 5 percent
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: Frequent
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Ecological site: Overflow (R049XY036CO)
Hydric soil rating: No

Minor Components
Sampson
Percent of map unit: 7 percent
Hydric soil rating: No

Bresser
Percent of map unit: 7 percent
Hydric soil rating: No

Sandy alluvial land
Percent of map unit: 5 percent

Fluvaquentic haplustolls
Percent of map unit: 1 percent
Landform: Terraces
Hydric soil rating: Yes
Ma—Manzanola clay loam

Map Unit Setting
National map unit symbol: jqzf
Elevation: 5,500 to 6,200 feet
Mean annual precipitation: 15 to 17 inches
Mean annual air temperature: 49 to 54 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition
Manzanola and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the map unit.

Description of Manzanola
Setting
Landform: Mesas, plateaus
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits

Typical profile
H1 - 0 to 8 inches: clay loam
H2 - 8 to 42 inches: clay loam
H3 - 42 to 60 inches: clay loam

Properties and qualities
Slope: 3 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water storage in profile: High (about 10.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: Clayey Foothill (R049BY208CO)
Hydric soil rating: No
Minor Components

Renohill
Percent of map unit: 5 percent
Hydric soil rating: No

Buick
Percent of map unit: 3 percent
Hydric soil rating: No

Satanta
Percent of map unit: 3 percent
Hydric soil rating: No

Newlin
Percent of map unit: 2 percent
Hydric soil rating: No

Fondis
Percent of map unit: 2 percent
Hydric soil rating: No

NeE—Newlin gravelly sandy loam, 8 to 30 percent slopes

Map Unit Setting
National map unit symbol: jqzg
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition
Newlin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the map unit.

Description of Newlin

Setting
Landform: Mesas, terraces, plateaus
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Unconformable sandy and gravelly and/or mixed source alluvium

Typical profile
H1 - 0 to 8 inches: gravelly sandy loam
H2 - 8 to 17 inches: gravelly sandy clay loam
H3 - 17 to 22 inches: gravelly sandy loam
H4 - 22 to 60 inches: very gravelly sand
Properties and qualities
- **Slope:** 8 to 30 percent
- **Depth to restrictive feature:** More than 80 inches
- **Natural drainage class:** Well drained
- **Runoff class:** Medium
- **Capacity of the most limiting layer to transmit water (Ksat):** Moderately high to high (0.20 to 2.00 in/hr)
- **Depth to water table:** More than 80 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Available water storage in profile:** Low (about 3.8 inches)

Interpretive groups
- **Land capability classification (irrigated):** None specified
- **Land capability classification (nonirrigated):** 6e
- **Hydrologic Soil Group:** B
- **Ecological site:** Gravelly Foothill (R049BY214CO)
- **Hydric soil rating:** No

Minor Components
- **Bresser**
  - **Percent of map unit:** 5 percent
  - **Hydric soil rating:** No
- **Satanta**
  - **Percent of map unit:** 4 percent
  - **Hydric soil rating:** No
- **Stapleton**
  - **Percent of map unit:** 4 percent
  - **Hydric soil rating:** No
- **Aquic haplustolls**
  - **Percent of map unit:** 2 percent
  - **Landform:** Swales
  - **Hydric soil rating:** Yes

NsE—Newlin-Satanta complex, 5 to 20 percent slopes

Map Unit Setting
- **National map unit symbol:** jqzh
- **Elevation:** 5,500 to 6,600 feet
- **Mean annual precipitation:** 15 to 19 inches
- **Mean annual air temperature:** 49 to 51 degrees F
- **Frost-free period:** 120 to 135 days
- **Farmland classification:** Not prime farmland

Map Unit Composition
- **Newlin and similar soils:** 50 percent
- **Satanta and similar soils:** 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newlin

Setting
Landform: Knobs, drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Unconformable sandy and gravelly and/or mixed source alluvium

Typical profile
H1 - 0 to 8 inches: gravelly sandy loam
H2 - 8 to 17 inches: gravelly sandy clay loam
H3 - 17 to 22 inches: gravelly sandy loam
H4 - 22 to 60 inches: very gravelly sand

Properties and qualities
Slope: 5 to 20 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: Loamy Foothill 14-19 P.Z. (R049XC202CO)
Hydric soil rating: No

Description of Satanta

Setting
Landform: Knobs, drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from mixed

Typical profile
H1 - 0 to 9 inches: loam
H2 - 9 to 30 inches: clay loam
H3 - 30 to 60 inches: loam

Properties and qualities
Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: High (about 10.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Bresser
Percent of map unit: 6 percent
Hydric soil rating: No

Buick
Percent of map unit: 6 percent
Hydric soil rating: No

Truckton
Percent of map unit: 6 percent
Hydric soil rating: No

Aquic haplustolls
Percent of map unit: 2 percent
Landform: Swales
Hydric soil rating: Yes

RmE—Renohill-Buick complex, 5 to 25 percent slopes

Map Unit Setting
National map unit symbol: jqzy
Elevation: 5,500 to 6,200 feet
Mean annual precipitation: 15 to 17 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition
Renohill and similar soils: 50 percent
Buick and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Renohill

Setting
Landform: Hills
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Weathered, calcareous clayey shale

**Typical profile**
- **H1 - 0 to 3 inches**: clay loam
- **H2 - 3 to 12 inches**: clay loam
- **H3 - 12 to 24 inches**: clay loam
- **H4 - 24 to 28 inches**: unweathered bedrock

**Properties and qualities**
- **Slope**: 5 to 25 percent
- **Depth to restrictive feature**: 20 to 40 inches to paralithic bedrock
- **Natural drainage class**: Well drained
- **Runoff class**: High
- **Capacity of the most limiting layer to transmit water (Ksat)**: Moderately low to moderately high (0.06 to 0.20 in/hr)
- **Depth to water table**: More than 80 inches
- **Frequency of flooding**: None
- **Frequency of ponding**: None
- **Calcium carbonate, maximum in profile**: 15 percent
- **Salinity, maximum in profile**: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- **Available water storage in profile**: Low (about 4.3 inches)

**Interpretive groups**
- **Land capability classification (irrigated)**: None specified
- **Land capability classification (nonirrigated)**: 6e
- **Hydrologic Soil Group**: D
- **Ecological site**: Loamy Foothill 14-19 P.Z. (R049XC202CO)
- **Hydric soil rating**: No

**Description of Buick**

**Setting**
- **Landform**: Hills
- **Landform position (three-dimensional)**: Side slope, base slope
- **Down-slope shape**: Linear
- **Across-slope shape**: Linear
- **Parent material**: Eolian deposits over silty alluvium

**Typical profile**
- **H1 - 0 to 4 inches**: loam
- **H2 - 4 to 15 inches**: silty clay loam
- **H3 - 15 to 22 inches**: loam
- **H4 - 22 to 60 inches**: sandy clay loam

**Properties and qualities**
- **Slope**: 5 to 8 percent
- **Depth to restrictive feature**: More than 80 inches
- **Natural drainage class**: Well drained
- **Runoff class**: Medium
- **Capacity of the most limiting layer to transmit water (Ksat)**: Moderately high (0.20 to 0.60 in/hr)
- **Depth to water table**: More than 80 inches
- **Frequency of flooding**: None
- **Frequency of ponding**: None
- **Calcium carbonate, maximum in profile**: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.9 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components
Manzanola
  Percent of map unit: 6 percent
  Hydric soil rating: No

Satanta
  Percent of map unit: 6 percent
  Hydric soil rating: No

Fondis
  Percent of map unit: 6 percent
  Hydric soil rating: No

Aquic haplustolls
  Percent of map unit: 2 percent
  Landform: Swales
  Hydric soil rating: Yes

RnE—Renohill-Manzanola clay loams, 3 to 20 percent slopes

Map Unit Setting
  National map unit symbol: jqzz
  Elevation: 5,500 to 6,200 feet
  Mean annual precipitation: 15 to 17 inches
  Mean annual air temperature: 48 to 50 degrees F
  Frost-free period: 120 to 135 days
  Farmland classification: Not prime farmland

Map Unit Composition
  Renohill and similar soils: 50 percent
  Manzanola and similar soils: 30 percent
  Minor components: 20 percent
  Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Renohill
Setting
  Landform: Valley sides, drainageways
  Down-slope shape: Linear
  Across-slope shape: Linear
Parent material: Weathered, calcareous clayey shale

Typical profile
- H1 - 0 to 3 inches: clay loam
- H2 - 3 to 12 inches: clay loam
- H3 - 12 to 24 inches: clay loam
- H4 - 24 to 28 inches: unweathered bedrock

Properties and qualities
- Slope: 3 to 20 percent
- Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
- Natural drainage class: Well drained
- Runoff class: High
- Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
- Depth to water table: More than 80 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Calcium carbonate, maximum in profile: 15 percent
- Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
- Available water storage in profile: Low (about 4.3 inches)

Interpretive groups
- Land capability classification (irrigated): None specified
- Land capability classification (nonirrigated): 6e
- Hydrologic Soil Group: D
- Ecological site: Clayey Foothill (R049BY208CO)
- Hydric soil rating: No

Description of Manzanola

Setting
- Landform: Ridges, valley sides
- Down-slope shape: Linear
- Across-slope shape: Linear
- Parent material: Alluvium derived from sedimentary rock and/or eolian deposits

Typical profile
- H1 - 0 to 8 inches: clay loam
- H2 - 8 to 42 inches: clay loam
- H3 - 42 to 60 inches: clay loam

Properties and qualities
- Slope: 3 to 20 percent
- Depth to restrictive feature: More than 80 inches
- Natural drainage class: Well drained
- Runoff class: High
- Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
- Depth to water table: More than 80 inches
- Frequency of flooding: None
- Frequency of ponding: None
- Calcium carbonate, maximum in profile: 25 percent
- Gypsum, maximum in profile: 2 percent
- Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Available water storage in profile: High (about 10.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Newlin
Percent of map unit: 5 percent
Hydric soil rating: No

Fondis
Percent of map unit: 5 percent
Hydric soil rating: No

Buick
Percent of map unit: 5 percent
Hydric soil rating: No

Other soils
Percent of map unit: 3 percent
Hydric soil rating: No

Aquic haplustolls
Percent of map unit: 2 percent
Landform: Swales
Hydric soil rating: Yes

**RoE—Renohill sandy loam, reddish variant, 5 to 20 percent slopes**

Map Unit Setting
National map unit symbol: jr00
Elevation: 5,700 to 6,200 feet
Mean annual precipitation: 15 to 17 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition
Renohill, reddish variant, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Renohill, Reddish Variant

Setting
Landform: Hillsides, ridges, hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from noncalcareous shale

Typical profile
H1 - 0 to 8 inches: sandy loam
H2 - 8 to 32 inches: clay loam
H3 - 32 to 36 inches: weathered bedrock

Properties and qualities
Slope: 5 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Newlin
Percent of map unit: 8 percent
Hydric soil rating: No

Satanta
Percent of map unit: 7 percent
Hydric soil rating: No

Sn—Satanta loam

Map Unit Setting
National map unit symbol: jr05
Elevation: 5,400 to 6,200 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Farmland of statewide importance
Map Unit Composition
Satanta and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Satanta

Setting
Landform: Ridges, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed source eolian deposits

Typical profile
H1 - 0 to 9 inches: loam
H2 - 9 to 30 inches: clay loam
H3 - 30 to 60 inches: loam

Properties and qualities
Slope: 1 to 4 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: High (about 10.2 inches)

Interpretive groups
Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Loamy Foothill 14-19 P.Z. (R049XC202CO)
Hydric soil rating: No

Minor Components
Sampson
Percent of map unit: 5 percent
Hydric soil rating: No

Fondis
Percent of map unit: 5 percent
Hydric soil rating: No

Englewood
Percent of map unit: 2 percent
Hydric soil rating: No

Buick
Percent of map unit: 2 percent
Hydric soil rating: No

Aquic haplustolls
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Sv—Stony steep land

Map Unit Setting
National map unit symbol: jr0c
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition
Stony steep land: 100 percent
Estimates are based on observations, descriptions, and transects of the map unit.

Description of Stony Steep Land

Setting
Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile
H1 - 0 to 6 inches: cobbly sandy loam
H2 - 6 to 20 inches: cobbly sandy loam
H3 - 20 to 24 inches: unweathered bedrock

Properties and qualities
Slope: 9 to 65 percent
Depth to restrictive feature: 10 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Rocky Foothill (R049XY206CO)
Hydric soil rating: No
Appendix B
ERO Resources Corp. 2015. Request for Approved Jurisdictional Determination for Several Unnamed Drainages, Douglas County, Colorado
Mr. Aaron Eilers  
Denver Regulatory Office  
U.S. Army Corps of Engineers  
9307 S. Wadsworth Blvd.  
Littleton, CO 80128-6901  

RE: Request for Approved Jurisdictional Determination for Several Unnamed Drainages, Douglas County, Colorado  

Dear Mr. Eilers:

On behalf of the Rampart Range Metropolitan District No. 1 (District), ERO Resources Corporation (ERO) is requesting an approved Jurisdictional Determination (JD) for several unnamed drainages, the Arapahoe Canal, and Badger Gulch located on a property in Douglas County, Colorado (study area; Figure 1). The District is considering developing the property and as part of their evaluation of the property, the District would like to know the jurisdictional status of the unnamed drainages, Arapahoe Canal, and Badger Gulch. ERO completed a wetland delineation on the entire property in July 2015 to determine if the drainages had characteristics of a water of the U.S. (WUS) and had a defined surface connection to Happy Canyon Creek or any other known jurisdictional waters of the U.S.

The property is bounded by Interstate 25 on the west, West Parker Road on the east, Lincoln Avenue on the north, and undeveloped land to the south (Figures 1 and 2). Ridgegate Parkway runs through the southern section of the survey area. Cottonwood Creek occurs in the northwest corner of the property. Happy Canyon Creek flows through the entire property from the southwest corner to the northeast corner. This JD request does not include Happy Canyon Creek or Cottonwood Creek as the District is aware those creeks have a surface connection to Cherry Creek, a known water of the U.S.

The study area is in Sections 11, 13-15 and 22-24, Township 6 South, Range 67 West and Section 7, Township 6 South, Range 66 West of the 6th Principal Meridian in Douglas County, Colorado (Figure 1). The UTM coordinates for the approximate center of the study area are 513025mE, 4375108mN, Zone 13 North. The latitude/longitude of the study area is 39.525522°N/104.848455°W. The elevation of the study area is approximately 6,000 feet above sea level.

Based on the July 2015 review, the unnamed drainages intermittently have characteristics of a WUS as follows and shown on Figures 3 through 5:

**Drainage 1 (Figure 3)**

- The majority of the drainage through the property is an upland vegetated swale that lacks a bed and bank, ordinary high water mark (OHWM), and wetlands (Photo 1).
• Near the northern end of the property, adjacent to East Lincoln Avenue, the drainage contains a small patch of wetlands (Photo 2).

• Immediately upstream and downstream of the wetland patch at the crossing of Lincoln Avenue, the drainage is an upland vegetated swale that lacks a bed and bank, OHWM, and wetlands.

**Drainage 2 (Figures 4 and 5)**

• The entire drainage through the property is an upland vegetated swale that lacks a bed and bank, OHWM, and wetlands.

**Drainage 3 (Figures 4 and 5)**

• The lower approximate 750 feet of the drainage is an upland vegetated swale that lacks a bed and bank, OHWM, and wetlands.

• Progressing upgradient, the next 250 feet of the drainage contains an OHWM and bed and bank but no wetlands.

• The next 600 feet of the drainage is an upland vegetated swale that lacks a bed and bank, OHWM, and wetlands (Photo 3).

• The next 500 feet of the drainage has intermittent patches of a bed and bank and OHWM but no wetlands (Photo 4).

• Upgradient through the remainder of the property, the drainage is an upland vegetated swale that lacks a bed and bank, OHWM, and wetlands.

**Drainage 4 (Figures 4 and 5)**

• The lower approximate 900 feet of the drainage has a bed and bank and OHWM and connects to Happy Canyon Creek (Photo 5).

• Progressing upgradient, the next approximate 650 feet of the drainage is an upland vegetated swale that lacks a bed and bank, OHWM, and wetlands.

• The next approximate 1,350 feet of the drainage has a bed and bank and OHWM, with a small patch of wetlands (Photo 6).

• The next approximate 500 feet of the drainage is an upland vegetated swale that lacks a bed and bank, OHWM, and wetlands (Photo 7).

• The next 200 feet of the drainage has a bed and bank and OHWM, but no wetlands (Photo 8).

• Upgradient of this section of the drainage, the drainage is an upland vegetated swale that lacks a bed and bank, OHWM, and wetlands, minus one small scoured area that contains an OHWM (Photo 9).

**Badger Gulch (Figures 4 and 5)**

• Between its connection to Happy Canyon Creek and the study area, Badger Gulch is mostly an upland vegetated swale with no defined bed and bank, OHWM, or wetlands (Photo 10).

• Within the study area, Badger Gulch is a mixture of areas containing a bed and bank, OHWM, and/or wetlands, or is an upland vegetated swale with no
characteristics of a water of the U.S. In areas where the channel is defined, the
gulch is approximately 1 to 4 feet wide (Photo 11).

Arapahoe Canal (Figure 5)

- The Arapahoe Canal through the study area is abandoned and dry with no
defined bed and bank, OHWM, or wetlands, and is dominated by upland
vegetation (Photo 12).

Drainages 1 through 4 are tributaries to Happy Canyon Creek. Happy Canyon Creek is
a tributary of Cherry Creek, and Cherry Creek Reservoir is the closest Traditionally
Navigable Water (TNW), approximately 9 miles downstream of the study area.

Based on the information provided, ERO has the following questions:

- Do the upland vegetated swales along Drainages 1 through 4 provide a
substantial enough break in jurisdictional characteristics (i.e., lack of a bed and
bank, OHWM, or wetlands) to isolate the reaches of the drainages upgradient of
the upland vegetated swales?

- Does the combination of the upland vegetated swales and the distance to the
nearest TNW make it likely that the drainages lack a significant nexus to a TNW
and do not have more than a speculative or insubstantial effect on the chemical,
physical, and/or biological integrity of the downstream TNW?

- Would the discharge of fill material into the sections of drainages that contain a
bed and bank, OHWM, and/or wetlands require a Section 404 permit?

- Does the Corps have enough information to determine the jurisdictional status of
the drainages? If so, please provide an approved JD. If not, please provide a list
of the additional information needed to provide an approved JD.

Please contact me with any questions at mworah@eroresources.com.

Sincerely,

Moneka Worah
Natural Resource Specialist

cc: Denise Denslow – CliftonLarsonAllen LLP
Darryl Jones – Coventry Development Corporation
John Connelly – Merrick & Company

Attachments
Figure 1
Vicinity Map

Ridgegate East
Sections 13-15, 23, and 24, T6S, R67W; 6th PM
UTM NAD 83: Zone 13N; 513013mE, 4375176mN
Latitude, Longitude: 39.526138°N, 104.848598°W
USGS Parker, CO Quadrangle
Douglas County, Colorado

Prepared for: Rampart Range Metropolitan District
File: 6274 Figure 1.mxd (GS)
October 29, 2015
Photo Log
Drainages located on properties southeast of Interstate 25 and Lincoln Avenue
Douglas County, Colorado
July 2015

Photo 1 - Drainage 1 consisting of an upland vegetated swale within the property. View is to the northwest.

Photo 2 - Wetland patch along Drainage 1 located downstream of a culvert at East Lincoln Avenue. View is to the northeast.
PHOTO LOG

DRAINAGES LOCATED ON PROPERTIES SOUTHEAST OF INTERSTATE 25 AND LINCOLN AVENUE
DOUGLAS COUNTY, COLORADO
JULY 2015

Photo 3 - Overview of Drainage 3, lacking a defined channel bed and bank and consisting of upland vegetation. View is to the south.

Photo 4 - Intermittent patches of a bed and bank along Drainage 3. View is to the northeast.
PHOTO LOG

DRAINAGES LOCATED ON PROPERTIES SOUTHEAST OF INTERSTATE 25 AND LINCOLN AVENUE
DOUGLAS COUNTY, COLORADO
JULY 2015

Photo 5 - Drainage 4 with a defined bed and bank at its lower end where it adjoins Happy Canyon Creek. View is to the south.

Photo 6 - Drainage 4 with a defined channel. View is to the northeast.
Photo Log
DRAINAGES LOCATED ON PROPERTIES SOUTHEAST OF INTERSTATE 25 AND LINCOLN AVENUE
DOUGLAS COUNTY, COLORADO
JULY 2015

Photo 7 - Overview of a portion of Drainage 4 comprised of an upland vegetated swale. View is to the north.

Photo 8 - Headcut at the upper end of Drainage 4 dominated by upland vegetation. View is to the northeast.
PHOTO LOG
DRAINAGES LOCATED ON PROPERTIES SOUTHEAST OF INTERSTATE 25 AND LINCOLN AVENUE
DOUGLAS COUNTY, COLORADO
JULY 2015

Photo 9 - Small scour hole with an ordinary high water mark and fringe of wetlands. View is to the south.

Photo 10 - Badger Gulch comprised mostly of an upland vegetated swale with no defined bed and bank. View is to the north.
Photo 11 - Badger Gulch containing a bed and bank and wetlands. View is to the south.

Photo 12 - Arapahoe Canal comprised of a dry upland vegetated swale. View is to the northeast.
Appendix C
RidgeGate East Approved Jurisdictional Determination(s), Corps File No. NWO-2015-02227-DEN.
September 30, 2016

SUBJECT:  Ridgegate East Approved Jurisdictional Determination(s), Arapahoe County, CO
          Corps File No. NWO-2015-02227-DEN

Keith Simon
Conventry Development Corporation
10270 Commonwealth Street, Suite B
Lone Tree, CO 80124

Dear Mr. Simon:

Reference is made to the above mentioned project located in Arapahoe County, Colorado. You have requested an Approved Jurisdictional Determination for wetlands and open waters located in the vicinity of Happy Canyon Creek on a parcel located north of Ridgegate Parkway known as Ridgegate East. You have requested that the U.S. Army Corps of Engineers (Corps) determine if waters of the United States are located on the subject parcel.

The project area has been reviewed in accordance with Section 404 of the Clean Water Act under which the Corps regulates the discharge of dredged and fill material, and any excavation activity associated with a dredge and fill project in waters of the U.S. The Corps has determined that Happy Canyon Creek, Badger Gulch and Cottonwood Creek, and wetlands located adjacent to these waters, are waters of the U.S. Drainages 1, 2, 3, 4 and the Arapahoe Canal are not waters of the U.S.

An approved jurisdictional determination (JD) has been completed for this project. The JD is attached to this letter. If you are not in agreement with the JD decision, you may request an administrative appeal under regulation 33 CFR 331, by using the attached Appeal Form and Administrative Appeal Process form. The request for appeal must be received within 60 days from the date of this letter. If you would like more information on the jurisdictional appeal process, contact this office. It is not necessary to submit a Request for Appeal if you do not object to the JD.

This JD is valid for a period of five years from the date of this letter, unless new information warrants revisions of the JDs before the expiration date, or unless the Corps has identified, after a possible public notice and comment, that specific geographic areas with rapidly changing environmental conditions merit re-verification on a more frequent basis.

If there are any questions call Aaron Eilers of my office at 303-979-4120 and reference Corps File No. NWO-2015-02227-DEN.

Sincerely,

[Signature]

Kiel G. Downing
Chief, Denver Regulatory Office
Cc: Moneka Worah, ERO Resources, 1842 Clarkson St. Denver, CO 80218

Attachment(s)
Approved Jurisdictional Determination Ridgegate East Relevant Reach 1 (September 21, 2016)
Approved Jurisdictional Determination Ridgegate East Relevant Reach 2 (September 21, 2016)
Approved Jurisdictional Determination Ridgegate East Relevant Reach 3 (September 21, 2016)
Approved Jurisdictional Determination Ridgegate East Relevant Reach 4 (September 21, 2016)
Notification of Administrative Appeal Options (September 30, 2016)
Administrative Appeal Process Appendix C
APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): September 21, 2016

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Denver Regulatory Office, Ridgegate East (Relevant Reach 1), NWO-2015-02227-DEN

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: CO  
County-parish/borough: Douglas  
City:
Center coordinates of site (lat/long in degree decimal format): Lat: 39.52522 N; Long: -104.848455 W
Universal Transverse Mercator: 513025mE, 4375108mN

Name of nearest waterbody: Cottonwood Creek

Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Cherry Creek Reservoir

Name of watershed or Hydrologic Unit Code (HUC): 101900030301, Happy Canyon Creek-Cherry Creek

☑ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.

☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☒ Office (Desk) Determination. Date: 12/19/2015
☒ Field Determination. Date(s): 02/18/2016

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There are no "navigable waters of the U.S." within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [Required]

☐ Waters subject to the ebb and flow of the tide.

☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There are and are not "waters of the U.S." within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [Required]

1. Waters of the U.S.
   a. Indicate presence of waters of U.S. in review area (check all that apply):  
      ☐ TNWs including territorial seas
      ☐ Wetlands adjacent to TNWs
      ☐ Relatively permanent waters (RPWs) that flow directly or indirectly into TNWs
      ☐ Non-RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      ☐ Wetlands adjacent to non-TNWs that flow directly or indirectly into TNWs
      ☐ Impoundments of jurisdictional waters
      ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. Identify (estimate) size of waters of the U.S. in the review area: Cottonwood Creek - RPW
      Non-wetland waters: 932 linear feet; width (ft) and/or 0.077 acres.
      Wetlands: 1.127 acres.

   c. Limits (boundaries) of jurisdiction based on: Established by OHWM.
      Elevation of established OHWM (if known):

2. Non-regulated waters/wetlands (check if applicable):
   ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
      Explain:

      Drainage 1 - Drainage 1 is composed of one (1) segment (1a), approximately 4846 linear feet long. Drainage 1 is an upland erosional feature. Drainage 1 lacks a defined bed and bank, and does not have an Ordinary High Water Mark. Drainage 1 is not an aquatic resource and is not a water of the U.S.

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1 Boxes checked below shall be supported by completing the appropriate sections in Section III below.

2 For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).

3 Supporting documentation is presented in Section III.F.
SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1 only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
   Identify TNW:
   
   Summarize rationale supporting determination:
   
2. Wetland adjacent to TNW
   Summarize rationale supporting conclusion that wetland is “adjacent”:

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under Rapanos have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are “relatively permanent waters” (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW
   
   (i) General Area Conditions:
   Watershed size: acres
   Drainage area: acres
   Average annual rainfall: inches
   Average annual snowfall: inches
   
   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   - Tributary flows directly into TNW.
   - Tributary flows through Pick List tributaries before entering TNW.
   
   Project waters are Pick List river miles from TNW.
   Project waters are Pick List river miles from RPW.
   Project waters are Pick List aerial (straight) miles from TNW.
   Project waters are Pick List aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain:

   4 Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
Identify flow route to TNW:\(^3\):

Tributary stream order, if known:

(b) General Tributary Characteristics (check all that apply):

Tributary is:  
- [x] Natural  
- [ ] Artificial (man-made). Explain:  
- [ ] Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):

- Average width: feet
- Average depth: feet
- Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

- [ ] Silts
- [ ] Sands  
- [ ] Cobbles
- [x] Gravel
- [ ] Bedrock  
- [ ] Vegetation. Type/\% cover:
- [ ] Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:

Presence of run/riffle/pool complexes. Explain:

Tributary geometry: **Pick List**

Tributary gradient (approximate average slope):

(c) Flow:

Tributary provides for: **Pick List**

Estimate average number of flow events in review area/year: **Pick List**

Describe flow regime:

Other information on duration and volume:

Surface flow is: **Pick List.** Characteristics:

Subsurface flow: **Pick List.** Explain findings:

- [ ] Dye (or other) test performed:

Tributary has (check all that apply):

- [ ] Bed and banks
- [ ] OHWM\(^5\) (check all indicators that apply):
  - [ ] clear, natural line impressed on the bank
  - [ ] changes in the character of soil
  - [ ] shelving
  - [ ] vegetation matted down, bent, or absent
  - [ ] leaf litter disturbed or washed away
  - [ ] sediment deposition
  - [ ] water staining
  - [ ] other (list):
- [ ] Discontinuous OHWM.\(^7\) Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

- [ ] High Tide Line indicated by:
  - [ ] oil or scum line along shore objects
  - [ ] fine shell or debris deposits (foreshore)
  - [ ] physical markings/characteristics
  - [ ] tidal gauges
  - [ ] other (list):
- [ ] Mean High Water Mark indicated by:
  - [ ] survey to available datum;
  - [ ] physical markings;
  - [ ] vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolorated, oily film; water quality; general watershed characteristics, etc.). Explain:

Identify specific pollutants, if known:

\(^3\) Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

\(^5\) A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

\(^7\) Ibid.
(iv) Biological Characteristics. Channel supports (check all that apply):

- Riparian corridor. Characteristics (type, average width):
- Wetland fringe. Characteristics:
- Habitat for:
  - Federally Listed species. Explain findings:
  - Fish/spawn areas. Explain findings:
  - Other environmentally-sensitive species. Explain findings:
  - Aquatic/wildlife diversity. Explain findings:

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:
- Properties:
  - Wetland size: acres
  - Wetland type. Explain:
  - Wetland quality. Explain:
- Project wetlands cross or serve as state boundaries. Explain:

(b) General Flow Relationship with Non-TNW:
- Flow is: Pick List. Explain:
- Surface flow is: Pick List. Explain:
- Subsurface flow: Pick List. Explain:
- Dye (or other) test performed:

(c) Wetland Adjacency Determination with Non-TNW:
- Directly abutting
- Not directly abutting
  - Discrete wetland hydrologic connection. Explain:
  - Ecological connection. Explain:
  - Separated by berm/barrier. Explain:

(d) Proximity (Relationship) to TNW
- Project wetlands are Pick List river miles from TNW.
- Project waters are Pick List aerial (straight) miles from TNW.
- Flow is from: Pick List.
- Estimate approximate location of wetland as within the Pick List floodplain.

(ii) Chemical Characteristics:
- Characterize wetland system (e.g., water color is clear; brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain:
- Identify specific pollutants, if known:

(iii) Biological Characteristics. Wetland supports (check all that apply):

- Riparian buffer. Characteristics (type, average width):
- Vegetation type/percent cover. Explain:
- Habitat for:
  - Federally Listed species. Explain findings:
  - Fish/spawn areas. Explain findings:
  - Other environmentally-sensitive species. Explain findings:
  - Aquatic/wildlife diversity. Explain findings:

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: Pick List
- Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

| Directly abuts? (Y/N) | Size (in acres) | Directly abuts? (Y/N) | Size (in acres) |
C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the Rapanos Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs. Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs. Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW. Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. TNWs and Adjacent Wetlands. Check all that apply and provide size estimates in review area:
   - TNWs: linear feet width (ft), Or, acres.
   - Wetlands adjacent to TNWs: acres.

2. RPWs that flow directly or indirectly into TNWs.
   - Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial:
   - Tributaries of TNW where tributaries have continuous flow “seasonally” (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: Cottonwood Creek – The Cottonwood Creek Drainage is an aquatic resource composed of a defined bed and bank and possessing a continuous OHWM and wetlands. OHWM physical indicators were identified throughout the conveyance. The presence of wetlands and standing water in conjunction with the identification of other physical indicators of ordinary high water such as sediment sorting/deposition, the presence of a wrack line, and an abrupt change in vegetation indicate the channel conveys relatively permanent flows. Flows in the channel are intermittent, primarily originating from extremely heavy, periodic, localized rain events, but some groundwater discharge could be occurring. Water from surface flows and groundwater discharge remains in the channel long enough to create wetland conditions. Because Cottonwood Creek does have a defined bed and bank and physical indicators of OHWM throughout much of the channel, the Corps determined that Cottonwood Creek is a seasonal RPW and is a water of the US.
Provide estimates for jurisdictional waters in the review area (check all that apply):

- Tributary waters: 932 linear feet 15 width (ft).
- Other non-wetland waters: acres.
- Identify type(s) of waters:

3. **Non-RPWs** that flow directly or indirectly into TNWs.

☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

- Tributary waters: linear feet width (ft).
- Other non-wetland waters: acres.
- Identify type(s) of waters:

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**

☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.

☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW.

☐ Wetlands directly abutting an RPW where tributaries typically flow “seasonally.” Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW. Cottonwood Creek is a blue line stream on USGS maps, which includes a mapped floodplain. Aerial photos reviewed over a period of 20 years show continuous flow within Cottonwood Creek regardless of season or year.

Provide acreage estimates for jurisdictional wetlands in the review area: 1.13 acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**

☐ Wetlands that do not directly abut an RPW, but are considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**

☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.**

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

- Demonstrate that impoundment was created from “waters of the U.S.,” or
- Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
- Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):**

☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.

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8 See Footnote # 3.
9 To complete the analysis refer to the key in Section III.D.6 of the Instrucational Guidebook.
10 Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA Memorandum Regarding CWA Act Jurisdiction Following Rapanos.
Interstate isolated waters. Explain:  
Other factors. Explain:  

Identify water body and summarize rationale supporting determination:  

Provide estimates for jurisdictional waters in the review area (check all that apply):  
☐ Tributary waters: linear feet width (ft).  
☐ Other non-wetland waters: acres.  
Identify type(s) of waters:  
☐ Wetlands: acres.  

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):  
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.  
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.  
☐ Prior to the Jan 2001 Supreme Court decision in "SWANCC," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).  
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain:  
☐ Other: (explain, if not covered above): Drainage 1 - This drainage is composed of one (1) segment (1a), approximately 4846 linear feet long. The entire Drainage 1 is an upland erosional feature located adjacent to a dirt road. Drainage 1 lacks a defined bed and bank, and does not have an Ordinary High Water Mark. Drainage 1 is not an aquatic resource and is not a water of the U.S.  

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):  
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).  
☐ Lakes/ponds: acres.  
☐ Other non-wetland waters: acres. List type of aquatic resource:  
☐ Wetlands: acres.  

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):  
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).  
☐ Lakes/ponds: acres.  
☐ Other non-wetland waters: acres. List type of aquatic resource:  
☐ Wetlands: acres.  

SECTION IV: DATA SOURCES.  

A. SUPPORTING DATA. Data reviewed for JD (check all that apply) - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):  
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: Letter Report from ERO Resources (November 19, 2015)  
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.  
☐ Office concurs with data sheets/delineation report.  
☐ Office does not concur with data sheets/delineation report.  
☐ Data sheets prepared by the Corps:  
☐ U.S. Geological Survey Hydrologic Atlas:  
☐ USGS NHD data.  
☒ USGS 8 and 12 digit HUC maps.  
☒ U.S. Geological Survey map(s). Cite scale & quad name: 1:24000 - Parker  
☐ USDA Natural Resources Conservation Service Soil Survey. Citation:  
☐ National wetlands inventory map(s). Cite name:  
☐ State/Local wetland inventory map(s):  
☐ FEMA/FIRM maps:  
☐ 100-year Floodplain Elevation is: (National Geodetic Vertical Datum of 1929)  
☐ Photographs: ☐ Aerial (Name & Date):  
☐ or ☐ Other (Name & Date):  
☐ Previous determination(s). File no. and date of response letter:  
☒ Applicable/supporting case law: Rapanos and Carabell cases.  
☐ Applicable/supporting scientific literature:  
☐ Other information (please specify): Figure 1: Vicinity Map;  
Figure 2: Map Index;
B. ADDITIONAL COMMENTS TO SUPPORT JD:

Relevant Reach 1

Cottonwood Creek – Seasonal RPW. Cottonwood Creek is a water of the US.

Drainage 1 – Lacks bed, bank and an Ordinary High Water Mark. Not an aquatic resource. Not a jurisdictional water of the US.
Ridgegate East
Sections 13-15, 23, and 24, T6S, R67W; 6th PM
UTM NAD 83: Zone 13N; 513013mE, 4375176mN
Latitude, Longitude: 39.526138°N, 104.848598°W
USGS Parker, CO Quadrangle
Douglas County, Colorado

Figure 1
Vicinity Map
Appendix D
April 2017 Delineation Photolog
1 — Other Waters OW 1 (STA 176+10). April 17, 2017. Photo taken facing southeast.

2 — Wetland WL 1 (STA 144+00) stormwater detention basin. April 17, 2017. Photo taken facing northwest.


6 — Wetland WL 5 (STA 114+00) stormwater detention basin. April 17, 2017. Photo taken facing northwest.


8 — Wetland WL 8 (STA 87+75) stormwater detention basin. April 17, 2017. Photo taken facing east.


Photo Log

RTD Southeast Rail Extension, Water Line Extension
Wetlands and Other Waters of the U.S. Addendum Technical Report 2017

Appendix E
Delineation Mapbook
Other Waters 1 (OW 1)

FasTracks
Southeast Rail Extension
Ridgegate Waterline Survey
May 2017

Projection: Lambert Conformal Conic
State Plane Colorado Central
North American Datum 1983

Survey area
Inlet/Outlet
Limits of Disturbance
Proposed
Ridgegate Water Line

OWUS
OW 1
0.06 acre

175 + 00

In
Out

Other Waters 1 (OW 1)
H a p p y  C a n y o n  C r e e k  ( O W  2 ) ,  W e t l a n d s  1 ( W L  1 ) ,  2 ( W L  2 ) ,  a n d  1 9 ( W L  1 9 )
Wetland 5 (WL 5)

Inlet/Outlet
- Soil Pit
- Limits of Disturbance
- Proposed Ridgegate Water Line
- Temporary Wetland Impact
- Survey area

FasTracks
Southeast Rail Extension
Ridgegate Waterline Survey
May 2017

Projection: Lambert Conformal Conic
State Plane Colorado Central
North American Datum 1983

WL 5 0.09 acre
DP 7
Wetland 6 (WL 6)

Survey area

Wetland 6 (WL 6) 0.03 acre

Inlet/Outlet

Soil Pit

Limits of Disturbance

Proposed Ridgegate Water Line

Temporary

Wetland Impact

FasTracks
Southeast Rail Extension
Ridgegate Waterline Survey
May 2017

Projection: Lambert Conformal Conic
State Plane Colorado Central
North American Datum 1983
Badger Gulch (OW 3) and Wetland 7 (WL 7)

FasTracks
Southeast Rail Extension
Ridgegate Waterline Survey
May 2017

Projection: Lambert Conformal Conic
State Plane Colorado Central
North American Datum 1983
Appendix F
April 2017 Delineation Data Forms
WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: SERE-RidgeGate Waterline Extension
City/County: LoneTree, Douglas
Sampling Date: 4/14/17

Applicant/Owner: RTD
State: CO
Sampling Point: DP 3 (WL 1)

Investigator(s): Pat Basting, Christy Payne
Section, Township, Range: Sec 14, T6S, R67W

Landform (hillslope, terrace, etc.): Terrace
Local relief (concave, convex, none): Concave
Slope (%): 1 - 2%
Subregion (LRR): G: Western Gt Plains and Irrigated Rgn

Soil Map Unit Name: Newlin gravelly sandy loam, FoB (Fondis) Sandy Clay Loam, Ma (Manzanola) Clay Loam
NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No (If no, explain in Remarks.)

Are Vegetation _____ , Soil _____ , or Hydrology _____ significantly disturbed? Are “Normal Circumstances” present? Yes ✓ No _____

Are Vegetation _____ , Soil _____ , or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No _____
Hydric Soil Present? Yes ✓ No _____
Wetland Hydrology Present? Yes ✓ No _____

Is the Sampled Area within a Wetland? Yes ✓ No _____

Remarks:
Stormwater detention basin along RidgeGate Parkway, water with ring of wetland vegetation surrounding.

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
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<td>3.</td>
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<td></td>
<td></td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= Total Cover

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
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<tr>
<td>3.</td>
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<td></td>
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<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= Total Cover

<table>
<thead>
<tr>
<th>Herb Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Sporobolus cryptandrus</td>
<td>5</td>
<td>FACU</td>
<td></td>
</tr>
<tr>
<td>3. Hordeum jubatum</td>
<td>10</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>4. Typha latifolia</td>
<td>25</td>
<td>Y OBL</td>
<td></td>
</tr>
<tr>
<td>5. Schoenoplectus tabernaemontani</td>
<td>40</td>
<td>Y OBL</td>
<td></td>
</tr>
<tr>
<td>6. Juncus balticus</td>
<td>10</td>
<td>FACW</td>
<td></td>
</tr>
<tr>
<td>7. Schoenoplectus pungens</td>
<td>10</td>
<td>OBL</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= Total Cover

<table>
<thead>
<tr>
<th>Woody Vine Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= Total Cover

% Bare Ground in Herb Stratum 75

Remarks:
Stormwater detention basin

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x 1 = _______</td>
</tr>
<tr>
<td>FACW species</td>
<td>x 2 = _______</td>
</tr>
<tr>
<td>FAC species</td>
<td>x 3 = _______</td>
</tr>
<tr>
<td>FACU species</td>
<td>x 4 = _______</td>
</tr>
<tr>
<td>UPL species</td>
<td>x 5 = _______</td>
</tr>
<tr>
<td>Column Totals:</td>
<td>_______ (A) (B)</td>
</tr>
</tbody>
</table>

Prevalence Index = B/A = _______

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation
2 - Dominance Test is >50%
3 - Prevalence Index is ≤3.0
4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
5 - Wetland Non-Vascular Plants¹
6 - Problematic Hydrophytic Vegetation ¹ (Explain)

Hydrophytic Vegetation Present? Yes ✓ No _____

Remark: Stormwater detention basin along RidgeGate Parkway, water with ring of wetland vegetation surrounding.
**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Redox Features</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>10YR 3/2</td>
<td>N/A</td>
<td>SaCILm</td>
<td></td>
</tr>
<tr>
<td>4-16+</td>
<td>10YR 3/3</td>
<td>2.5YR 4/6</td>
<td>CILm</td>
<td></td>
</tr>
</tbody>
</table>

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.</th>
</tr>
</thead>
</table>

**Restrictive Layer (if present):**

- **Type:**
- **Depth (inches):**

**Hydric Soil Present?** Yes ✔ No

**Remarks:**

**HYDROLOGY**

**Wetland Hydrology Indicators:**

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (2 or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Water-Stained Leaves (B9) (except MLRA 1)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Water-Stained Leaves (B9) (MLR 1, 2, 4A, and 4B)</td>
</tr>
<tr>
<td>✔ Saturation (A3)</td>
<td>✔ Drainage Patterns (B10)</td>
</tr>
<tr>
<td>✔ Water Marks (B1)</td>
<td>✔ Dry-Season Water Table (C2)</td>
</tr>
<tr>
<td>✔ Sediment Deposits (B2)</td>
<td>✔ Saturation Visible on Aerial Imagery (C9)</td>
</tr>
<tr>
<td>✔ Drift Deposits (B3)</td>
<td>✔ Geomorphic Position (D2)</td>
</tr>
<tr>
<td>✔ Algal Mat or Crust (B4)</td>
<td>✔ FAC-Neutral Test (D5)</td>
</tr>
<tr>
<td>✔ Iron Deposits (B5)</td>
<td>✔ Raised Ant Mounds (D6) (LRR A)</td>
</tr>
<tr>
<td>✔ Surface Soil Cracks (B6)</td>
<td>✔ Frost-Heave Hummocks (D7)</td>
</tr>
<tr>
<td>✔ Inundation Visible on Aerial Imagery (B7)</td>
<td>✔ Other (Explain in Remarks)</td>
</tr>
<tr>
<td>✔ Sparsely Vegetated Concave Surface (B8)</td>
<td>✔ Other (Explain in Remarks)</td>
</tr>
</tbody>
</table>

**Field Observations:**

- **Surface Water Present?** Yes ✔ No
- **Water Table Present?** Yes ✔ No
- **Saturation Present?** Yes ✔ No
- **Depth (inches):** 0-6"

**Wetland Hydrology Present?** Yes ✔ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

- **Remarks:**
  - Stormwater detention basin fed by roadside runoff.
### WETLAND DETERMINATION DATA FORM – Great Plains Region

**Project/Site:** SERE-RidgeGate Waterline Extension  
**City/County:** Lonetree, Douglas  
**State:** CO  
**Sampling Date:** 4/14/17

**Applicant/Owner:** RTD  
**Sampling Point:** Upl DP 3 (WL 1)

**Investigator(s):** Pat Basting, Christy Payne  
**Section, Township, Range:** Sec 14 T6S R67W

**Landform (hillslope, terrace, etc.):** Terrace/Road R/W  
**Local relief (concave, convex, none):** convex  
**Slope (%):** 2 - 5%

**Subregion (LRR):** G: Western Grt Plains and Irrigated Rgn  
**Lat:** 39.522403  
**Long:** -104.853357  
**Datum:** NAD 83

**Soil Map Unit Name:** Ma,FoB Clay loams  
**NWI classification:** PEM

---

**Are climatic / hydrologic conditions on the site typical for this time of year?** Yes ✓ No  
(If no, explain in Remarks.)

**Are Vegetation, Soil, or Hydrology significantly disturbed?** Are “Normal Circumstances” present? Yes ✓ No  
(If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes ☑ No</th>
<th>Is the Sampled Area within a Wetland?</th>
<th>Yes ☑ No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes ☑ No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland Hydrology Present?</td>
<td>Yes ☑ No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

---

**VEGETATION – Use scientific names of plants.**

### Tree Stratum (Plot size: __________)

<table>
<thead>
<tr>
<th>Species</th>
<th>% Cover</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cover =** Total Cover

### Sapling/Shrub Stratum (Plot size: __________)

<table>
<thead>
<tr>
<th>Species</th>
<th>% Cover</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Cover =** Total Cover

### Herb Stratum (Plot size: __________)

<table>
<thead>
<tr>
<th>Species</th>
<th>% Cover</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kochia scoparia</td>
<td>5</td>
<td>FACU</td>
</tr>
<tr>
<td>Sporobolus cryptandrus</td>
<td>5</td>
<td>FACU</td>
</tr>
<tr>
<td>Bromus tectorum</td>
<td>15</td>
<td>Y UPL</td>
</tr>
<tr>
<td>Elymus repens</td>
<td>25</td>
<td>Y FACU</td>
</tr>
<tr>
<td>Elymus trachycaulus</td>
<td>30</td>
<td>Y FACU</td>
</tr>
<tr>
<td>Cirsium arvense</td>
<td>15</td>
<td>Y FACU</td>
</tr>
<tr>
<td>Forbs</td>
<td>5</td>
<td>FACU/UPL</td>
</tr>
</tbody>
</table>

**Total Cover =** Total Cover

**Remarks:**

---

**Hydrophytic Vegetation Indicators:**

1. Rapid Test for Hydrophytic Vegetation
2. Dominance Test is >50%
3. Prevalence Index is ≤3.0
4. Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
5. Wetland Non-Vascular Plants¹
6. Problematic Hydrophytic Vegetation¹ (Explain)

**Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.**

**Hydrophytic Vegetation Present?** Yes ☑ No ✓

**Dominance Test worksheet:**

| Number of Dominant Species That Are OBL, FACW, or FAC: | 0 | (A) |
| Total Number of Dominant Species Across All Strata: | 4 | (B) |
| Percent of Dominant Species That Are OBL, FACW, or FAC: | 0 | (A/B) |

**Prevalence Index worksheet:**

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x 1 =</td>
</tr>
<tr>
<td>FACW species</td>
<td>x 2 =</td>
</tr>
<tr>
<td>FAC species</td>
<td>x 3 =</td>
</tr>
<tr>
<td>FACU species</td>
<td>x 4 =</td>
</tr>
<tr>
<td>UPL species</td>
<td>x 5 =</td>
</tr>
<tr>
<td>Column Totals:</td>
<td>(A) (B)</td>
</tr>
</tbody>
</table>

**Prevalence Index = B/A =**

**Hydrophytic Vegetation Indicators:**

---

**Remarks:**

Roadway fill & ROW previously disturbed and revegetated
### SOIL

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Redox Features</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>10YR 3/3</td>
<td>N/A</td>
<td>SaClLm</td>
<td>Road ROW and Roadfill Material</td>
</tr>
<tr>
<td>2-16+</td>
<td>10YR 4/4</td>
<td>N/A</td>
<td>SaClLm</td>
<td>Road ROW and Roadfill Material</td>
</tr>
</tbody>
</table>

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

**Restrictive Layer (if present):**

- Type: ___________________________
- Depth (inches): __________________
- Hydric Soil Present? Yes ☑ No ☐

**Remarks:**

Roadway fill & ROW previously disturbed and revegetated

### HYDROLOGY

**Wetland Hydrology Indicators:**

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)

- Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Stunted or Stressed Plants (D1) (LRR A)
- Other (Explain in Remarks)

**Secondary Indicators (2 or more required):**

- Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (LRR A)
- Frost-Heave Hummocks (D7)

**Field Observations:**

- Surface Water Present? Yes ☑ No ☐ Depth (inches): ___________
- Water Table Present? Yes ☑ No ☐ Depth (inches): ___________
- Saturation Present? (includes capillary fringe) Yes ☑ No ☐ Depth (inches): ___________

**Wetland Hydrology Present? Yes ☑ No ☐**

**Remarks:**

Roadside fill material and/or ROW previously disturbed and revegetated.
WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: SERE-RidgeGate Waterline Extension
City/County: Lonetree, Douglas
State: CO
Sampling Date: 4/14/17
Applicant/Owner: RTD
Investigator(s): Pat Basting, Christy Payne
Section, Township, Range: Sec 23, T6S, R67W
Landform (hillslope, terrace, etc.): Terrace
Local relief (concave, convex, none): Concave
Slope (%): 1 - 2%
Subregion (LRR): G: Western Grt Plains and Irrigated Rgn
Lat: 39.521829
Long: -104.852313
Datum: NAD 83
Soil Map Unit Name: NeE Newlin gravelly sandy loam, FoB (Fondis) Sandy Clay Loam, Ma (Manzanola) Clay Loam
NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are “Normal Circumstances” present? Yes ✓ No
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ✓ No
Hydric Soil Present? Yes ✓ No
Wetland Hydrology Present? Yes ✓ No

Remarks:
Stormwater detention basin along RidgeGate Parkway, bare soil with ring of wetland vegetation surrounding.

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum (Plot size: ________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Domain Test worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td>Number of Dominant Species That Are OBL, FACW, or FAC:</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td>2 (A)</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td>Total Number of Dominant Species Across All Strata:</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td>2 (B)</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td>Percent of Dominant Species That Are OBL, FACW, or FAC:</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td>100 (A/B)</td>
</tr>
<tr>
<td>7.</td>
<td></td>
<td></td>
<td></td>
<td>Prevalence Index = B/A =</td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td>Hydrophytic Vegetation Indicators:</td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
<td></td>
<td>1 - Rapid Test for Hydrophytic Vegetation</td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
<td></td>
<td>2 - Dominance Test is &gt;50%</td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td></td>
<td></td>
<td>3 - Prevalence Index is ≤3.0</td>
</tr>
<tr>
<td>12.</td>
<td></td>
<td></td>
<td></td>
<td>4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet)</td>
</tr>
<tr>
<td>13.</td>
<td></td>
<td></td>
<td></td>
<td>5 - Wetland Non-Vascular Plants ¹</td>
</tr>
<tr>
<td>14.</td>
<td></td>
<td></td>
<td></td>
<td>6 - Problematic Hydrophytic Vegetation ¹ (Explain)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot size: ________)</th>
<th>= Total Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>= Total Cover</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum (Plot size: ________)</th>
<th>= Total Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2. Sporobolus cryptandrus</td>
<td>5 FACU</td>
</tr>
<tr>
<td>3. Hordeum jubatum</td>
<td>10 FACW</td>
</tr>
<tr>
<td>4. Typha latifolia</td>
<td>25 Y OBL</td>
</tr>
<tr>
<td>5. Schoenoplectus tabernaemontani</td>
<td>40 Y OBL</td>
</tr>
<tr>
<td>6. Juncus balticus</td>
<td>10 FACW</td>
</tr>
<tr>
<td>7. Schoenoplectus pungens</td>
<td>10 OBL</td>
</tr>
<tr>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>100 = Total Cover</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine Stratum (Plot size: ________)</th>
<th>= Total Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>% Bare Ground in Herb Stratum: 75</td>
<td></td>
</tr>
</tbody>
</table>

Remarks:
Stormwater detention basin

Remarks:

Hydrophytic Vegetation Present? Yes ✓ No

Hydrophytic Vegetation Present? Yes ✓ No
### SOIL

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix Color (moist)</th>
<th>%</th>
<th>Redox Features Color (moist)</th>
<th>%</th>
<th>Type</th>
<th>Loc</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>10YR 3/2</td>
<td></td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td>SaClLm</td>
<td></td>
</tr>
<tr>
<td>4-16+</td>
<td>10YR 3/3</td>
<td>2.5YR 4/6</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td>CILm</td>
<td></td>
</tr>
</tbody>
</table>

1Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. 
2Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)  ✔ Sandy Redox (SS)
- Histic Epipedon (A2)  Stripped Matrix (S6)
- Black Histic (A3)  Loamy Mucky Mineral (F1) (except MLRA 1)
- Hydrogen Sulfide (A4)  Loamy Gleyed Matrix (F2)
- Depleted Below Dark Surface (A11)  Depleted Matrix (F3)
- Thick Dark Surface (A12)  Redox Dark Surface (F6)
- Sandy Mucky Mineral (S1)  Depleted Dark Surface (F7)
- Sandy Gleyed Matrix (S4)  Redox Depressions (F8)

**Restrictive Layer (if present):**

Type: ____________________________

Depth (inches): ________________________

**Hydric Soil Present?** Yes ✔ No ____

**Remarks:**

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- ☑ Saturation (A3)
- ☑ Water Marks (B1)
- ☑ Sediment Deposits (B2)
- ❌ Drift Deposits (B3)
- ❌ Algal Mat or Crust (B4)
- ❌ Iron Deposits (B5)
- ❌ Surface Soil Cracks (B6)
- ❌ Inundation Visible on Aerial Imagery (B7)
- ✔ Sparsely Vegetated Concave Surface (B8)

Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)

Aquatic Invertebrates (B13)

Hydrogen Sulfide Odor (C1)

Oxidized Rhizospheres along Living Roots (C3)

Presence of Reduced Iron (C4)

Recent Iron Reduction in Tilled Soils (C6)

Stunted or Stressed Plants (D1) (LRR A)

Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (LRR A)
- Frost-Heave Hummocks (D7)

**Field Observations:**

- Surface Water Present? Yes ✔ No ____ Depth (inches): 0-6"
- Water Table Present? Yes ✔ No ____ Depth (inches): ____
- Saturation Present? Yes ✔ No ____ Depth (inches): ____ (includes capillary fringe)

**Wetland Hydrology Present?** Yes ✔ No ____

**Remarks:**

Stormwater detention basin fed by roadside runoff.

---

US Army Corps of Engineers

Great Plains – Version 2.0
**WETLAND DETERMINATION DATA FORM – Great Plains Region**

| Project/Site: | SERE-RidgeGate Waterline Extension |
| City/County: | Lonetree, Douglas |
| Sampling Date: | 4/14/17 |
| Applicant/Owner: | RTD |
| Investigator(s): | Pat Basting, Christy Payne |
| Landform (hillslope, terrace, etc.): | Terrace/Road R/W |
| Sampling Date: | Sec 23, T6S, R67W |
| Local relief (concave, convex, none): | convex |
| Slope (%): | 2 - 5% |
| Subregion (LRR): | G: Western Grt Plains and Irrigated Rgn |
| Lat: | 39.521907 |
| Long: | -104.852294 |
| Soil Map Unit Name: | Ma,FoB Clay loams |
| NWI classification: | PEM |

**Are climatic / hydrologic conditions on the site typical for this time of year?** Yes [✓] No [ ] (If no, explain in Remarks.)

**Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed?**

**Are “Normal Circumstances” present?** Yes [✓] No [ ]

**Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic?**

(If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes [✓] No [ ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes [✓] No [ ]</td>
</tr>
<tr>
<td>Wetland Hydrology Present?</td>
<td>Yes [✓] No [ ]</td>
</tr>
<tr>
<td>Is the Sampled Area within a Wetland?</td>
<td>Yes [✓] No [ ]</td>
</tr>
</tbody>
</table>

**Remarks:**

---

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td>Number of Dominant Species That Are OBL, FACW, or FAC:</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td>0 (A)</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td>Total Number of Dominant Species Across All Strata:</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td>4 (B)</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td>Percent of Dominant Species That Are OBL, FACW, or FAC:</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td></td>
<td>0 (A/B)</td>
</tr>
<tr>
<td><strong>Total Cover</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Prevalence Index worksheet:**

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x 1 =</td>
</tr>
<tr>
<td>FACW species</td>
<td>x 2 =</td>
</tr>
<tr>
<td>FAC species</td>
<td>x 3 =</td>
</tr>
<tr>
<td>FACU species</td>
<td>x 4 =</td>
</tr>
<tr>
<td>UPL species</td>
<td>x 5 =</td>
</tr>
<tr>
<td>Column Totals</td>
<td>(A) (B)</td>
</tr>
<tr>
<td><strong>Prevalence Index = B/A =</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Hydrophytic Vegetation Indicators:**

1. Rapid Test for Hydrophytic Vegetation
2. Dominance Test is >50%
3. Prevalence Index is ≤3.0
4. Morphological Adaptations
5. Wetland Non-Vascular Plants
   1. Problematic Hydrophytic Vegetation

**Remarks:**

Roadway fill & ROW previously disturbed and revegetated
## SOIL

### Profile Description:
(Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix Color (moist)</th>
<th>% Color (moist)</th>
<th>% Redox Features</th>
<th>Type¹</th>
<th>Loc²</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>10YR 3/3</td>
<td>N/A</td>
<td></td>
<td>SaCILm</td>
<td></td>
<td>Road ROW and Roadfill Material</td>
<td></td>
</tr>
<tr>
<td>2-16+</td>
<td>10YR 4/4</td>
<td>N/A</td>
<td></td>
<td>SaCILm</td>
<td></td>
<td>Road ROW and Roadfill Material</td>
<td></td>
</tr>
</tbody>
</table>

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

### Hydric Soil Indicators:
(Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol (A1)</td>
<td>Sandy Redox (S5)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
<td>Stripped Matrix (S6)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
<td>Loamy Mucky Mineral (F1) (except MLRA 1)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
<td>Loamy Gleyed Matrix (F2)</td>
</tr>
<tr>
<td>Depleted Below Dark Surface (A11)</td>
<td>Depleted Matrix (F3)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
<td>Redox Dark Surface (F6)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
<td>Depleted Dark Surface (F7)</td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
<td>Redox Depressions (F8)</td>
</tr>
</tbody>
</table>

### Restrictive Layer (if present):
Type: ____________________________
Depth (inches): ____________________________

Hydric Soil Present? Yes ☑ No ☐

Remarks:
Roadway fill & ROW previously disturbed and revegetated

## HYDROLOGY

### Wetland Hydrology Indicators:
(Primary Indicators (minimum of one required; check all that apply))

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Salt Crust (B11)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
<td>Aquatic Invertebrates (B13)</td>
</tr>
<tr>
<td>Water Marks (B1)</td>
<td>Hydrogen Sulfide Odor (C1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2)</td>
<td>Oxidized Rhizospheres along Living Roots (C3)</td>
</tr>
<tr>
<td>Drift Deposits (B3)</td>
<td>Presence of Reduced Iron (C4)</td>
</tr>
<tr>
<td>Algal Mat or Crust (B4)</td>
<td>Recent Iron Reduction in Tilled Soils (C6)</td>
</tr>
<tr>
<td>Iron Deposits (B5)</td>
<td>Stunted or Stressed Plants (D1) (LRR A)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
<td>Other (Explain in Remarks)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
<td>FAC-Neutral Test (D5)</td>
</tr>
<tr>
<td>Sparsely Vegetated Concave Surface (B8)</td>
<td>Raised Ant Mounds (D6) (LRR A)</td>
</tr>
</tbody>
</table>

### Field Observations:

- Surface Water Present? Yes ☑ No ☐ Depth (inches): ____________
- Water Table Present? Yes ☑ No ☐ Depth (inches): ____________
- Saturation Present? Yes ☑ No ☐ Depth (inches): ____________

Wetland Hydrology Present? Yes ☑ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Roadside fill material and/or ROW previously disturbed and revegetated.
**WETLAND DETERMINATION DATA FORM – Great Plains Region**

- **Project/Site:** SERE-RidgeGate Waterline Extension
- **City/County:** Lonetree, Douglas
- **State:** CO
- **Sampling Date:** 4/14/17
- **Applicant/Owner:** Pat Basting, Christy Payne
- **Section, Township, Range:** Sec 24, T6S, R67W
- **Landform (hillslope, terrace, etc.):** Terrace
- **Local relief (concave, convex, none):** Concave
- **Slope (%):** 1 - 2%
- **Subregion (LRR):** G: Western Grt Plains and Irrigated Rgn
- **Lat:** 39.519806
- **Long:** -104.848483
- **Datum:** NAD 83
- **Soil Map Unit Name:** NE Newlin gravelly sandy loam, FoB (Fondis) Sandy Clay Loam, Ma (Manzanola) Clay Loam
- **NWI classification:** PEM
- **Remarks:** Stormwater detention basin along RidgeGate Parkway, bare soil with ring of wetland vegetation surrounding.

**SUMMARY OF FINDINGS** – Attach site map showing sampling point locations, transects, important features, etc.

- **Hydrophytic Vegetation Present?** Yes ✓ No _____
- **Hydric Soil Present?** Yes ✓ No _____
- **Wetland Hydrology Present?** Yes ✓ No _____
- **Is the Sampled Area within a Wetland?** Yes ✓ No _____

**VEGETATION** – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Species</th>
<th>% Cover</th>
<th>Indicator Status</th>
<th>Absolute</th>
<th>Dominant Species</th>
<th>Status</th>
<th>Indicator Status</th>
<th>Absolute</th>
<th>Dominant Species</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Stratum</td>
<td></td>
<td></td>
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<td>3.</td>
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<td>4.</td>
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<tr>
<td>Sapling/Shrub Stratum</td>
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<td>1.</td>
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<td>2.</td>
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<td>3.</td>
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<td>4.</td>
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<tr>
<td>5.</td>
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</tr>
<tr>
<td>= Total Cover</td>
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<td></td>
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</tr>
<tr>
<td>Herb Stratum</td>
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<tr>
<td>1.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Sporobolus cryptandrus</td>
<td>5</td>
<td>FACU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Hordeum jubatum</td>
<td>10</td>
<td>FACW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Typha latifolia</td>
<td>25</td>
<td>Y</td>
<td>OBL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Schoenoplectus tabernaemontani</td>
<td>40</td>
<td>Y</td>
<td>OBL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Juncus balticus</td>
<td>10</td>
<td>FACW</td>
<td></td>
<td></td>
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<tr>
<td>7.</td>
<td>Schoenoplectus pungens</td>
<td>10</td>
<td>OBL</td>
<td></td>
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<td>8.</td>
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<td>10.</td>
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<td>11.</td>
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<tr>
<td>= Total Cover</td>
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<td></td>
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<tr>
<td>Woody Vine Stratum</td>
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<td>1.</td>
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<td>2.</td>
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<td></td>
<td></td>
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<tr>
<td>= Total Cover</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Bare Ground in Herb Stratum</td>
<td></td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:**

- Stormwater detention basin

**Hydrophytic Vegetation Indicators:**

1. Rapid Test for Hydrophytic Vegetation
2. Dominance Test is >50%
3. Prevalence Index is ≤3.0
4. Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
5. Wetland Non-Vascular Plants¹

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ✓ No _____

**Prevalence Index worksheet:**

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
<th>Column Totals:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x 1 =</td>
<td>(A)</td>
</tr>
<tr>
<td>FACW species</td>
<td>x 2 =</td>
<td>(A)</td>
</tr>
<tr>
<td>FAC species</td>
<td>x 3 =</td>
<td>(B)</td>
</tr>
<tr>
<td>FACU species</td>
<td>x 4 =</td>
<td>(B)</td>
</tr>
<tr>
<td>UPL species</td>
<td>x 5 =</td>
<td>(B)</td>
</tr>
</tbody>
</table>

- Prevalence Index = B/A =

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Remarks:**

- Stormwater detention basin along RidgeGate Parkway, bare soil with ring of wetland vegetation surrounding.
## SOIL

### Profile Description:
(Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix Color</th>
<th>Redox Features Color</th>
<th>Redox Features %</th>
<th>Type</th>
<th>Loc</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>10YR 3/2</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td>SaCILm</td>
<td></td>
</tr>
<tr>
<td>4-16+</td>
<td>10YR 3/3</td>
<td>2.5YR 4/6</td>
<td>10</td>
<td></td>
<td>CILm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

**Indicators of Problematic Hydric Soils:**

- 2 cm Muck (A10)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

**Restrictive Layer (if present):**

Type: __________________________

Depth (inches): __________________________

Hydric Soil Present? Yes ✔ No ___

Remarks:

---

### HYDROLOGY

#### Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
<th>Secondary Indicators (2 or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
<td>Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
<td>Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)</td>
</tr>
<tr>
<td>✔ Saturation (A3)</td>
<td>✔ Drainage Patterns (B10)</td>
</tr>
<tr>
<td>✔ Water Marks (B1)</td>
<td>✔ Dry-Season Water Table (C2)</td>
</tr>
<tr>
<td>✔ Sediment Deposits (B2)</td>
<td>✔ Saturation Visible on Aerial Imagery (C9)</td>
</tr>
<tr>
<td>✔ Drift Deposits (B3)</td>
<td>✔ Geomorphic Position (D2)</td>
</tr>
<tr>
<td>✔ Algal Mat or Crust (B4)</td>
<td>✔ Shallow Aquitard (D3)</td>
</tr>
<tr>
<td>✔ Iron Deposits (B5)</td>
<td>✔ FAC-Neutral Test (D5)</td>
</tr>
<tr>
<td>✔ Surface Soil Cracks (B6)</td>
<td>✔ Frost-Heave Hummocks (D6) (LRR A)</td>
</tr>
<tr>
<td>✔ Sparsely Vegetated Concave Surface (B8)</td>
<td>✔ Other (Explain in Remarks)</td>
</tr>
<tr>
<td>✔ Inundation Visible on Aerial Imagery (B7)</td>
<td></td>
</tr>
</tbody>
</table>

**Field Observations:**

| Surface Water Present? | Yes ✔ No |
| Water Table Present?   | Yes ✔ No |
| Saturation Present?    | Yes ✔ No |
| (includes capillary fringe) | Depth (inches): 0-6" |

Wetland Hydrology Present? Yes ✔ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Stormwater detention basin fed by roadside runoff.
WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: SERE-RidgeGate Waterline Extension
City/County: Lonetree, Douglas
Sampling Date: 4/14/17
Applicant/Owner: RTD
State: CO
Sampling Point: Up DP 5 (WL 3)
Investigator(s): Pat Basting, Christy Payne
Section, Township, Range: Sec 24, T6S, R67W
Landform (hillslope, terrace, etc.): Terrace/Road R/W
Local relief (concave, convex, none): convex
Slope (%): 2 - 5%
Subregion (LRR): G: Western Grt Plains and Irrigated Rgn
Lat: 39.519852
Long: -104.848429
Datum: NAD 83
Soil Map Unit Name: Ma,FoB Clay loams
NWI classification: PEM
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☑ No ☑ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are “Normal Circumstances” present? Yes ☑ No ☑
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes ☑ No ☑</th>
<th>Is the Sampled Area within a Wetland?</th>
<th>Yes ☑ No ☑</th>
</tr>
</thead>
</table>

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: )

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>% Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= Total Cover

Sapling/Shrub Stratum (Plot size: )

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>% Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= Total Cover

Herb Stratum (Plot size: )

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>% Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kochia scoparia</td>
<td>FACU</td>
<td>5</td>
</tr>
<tr>
<td>Sporobolus cryptandrus</td>
<td>FACU</td>
<td>5</td>
</tr>
<tr>
<td>Bromus tectorum</td>
<td>UPL</td>
<td>15</td>
</tr>
<tr>
<td>Elymus repens</td>
<td>FACU</td>
<td>25</td>
</tr>
<tr>
<td>Elymus trachycaulus</td>
<td>FACU</td>
<td>30</td>
</tr>
<tr>
<td>Cirsium arvense</td>
<td>FACU</td>
<td>15</td>
</tr>
<tr>
<td>Forbs</td>
<td>FACU/UPL</td>
<td>5</td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

= Total Cover

Woody Vine Stratum (Plot size: )

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>% Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

= Total Cover

% Bare Ground in Herb Stratum 75

Remarks:

Roadway fill & ROW previously disturbed and revegetated

Prevalence Index worksheet:

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x 1 =</td>
</tr>
<tr>
<td>FACW species</td>
<td>x 2 =</td>
</tr>
<tr>
<td>FAC species</td>
<td>x 3 =</td>
</tr>
<tr>
<td>FACU species</td>
<td>x 4 =</td>
</tr>
<tr>
<td>UPL species</td>
<td>x 5 =</td>
</tr>
</tbody>
</table>

Column Totals: (A) (B)

Prevalence Index = B/A = 

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation
2 - Dominance Test is >50%
3 - Prevalence Index ≤3.0
4 - Morphological Adaptations1 (Provide supporting data in Remarks or on a separate sheet)
5 - Wetland Non-Vascular Plants1
6 - Problematic Hydrophytic Vegetation1 (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☑ No ☑
### SOIL

#### Profile Description:
(Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix Color (moist)</th>
<th>Redox Features Color (moist)</th>
<th>%</th>
<th>Type¹</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>10YR 3/3</td>
<td>N/A</td>
<td></td>
<td></td>
<td>SaClLm</td>
<td>Road ROW and Roadfill Material</td>
</tr>
<tr>
<td>2-16+</td>
<td>10YR 4/4</td>
<td>N/A</td>
<td></td>
<td></td>
<td>SaClLm</td>
<td>Road ROW and Roadfill Material</td>
</tr>
</tbody>
</table>

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

#### Hydric Soil Indicators:
(Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

#### Restrictive Layer (if present):
Type: ________________________________
Depth (inches): _______________________

#### Remarks:
Roadway fill & ROW previously disturbed and revegetated

#### HYDROLOGY

#### Wetland Hydrology Indicators:
(Primary Indicators (minimum of one required; check all that apply))

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)

(Secondary Indicators (2 or more required))

- Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Stunted or Stressed Plants (D1) (LRR A)
- Other (Explain in Remarks)

#### Field Observations:
- Surface Water Present? Yes ☑ No ☐ Depth (inches): ___________
- Water Table Present? Yes ☑ No ☐ Depth (inches): ___________
- Saturation Present? Yes ☑ No ☐ Depth (inches): ___________

#### Wetland Hydrology Present? Yes ☑ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Roadside fill material and/or ROW previously disturbed and revegetated.
WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: SERE-RidgeGate Waterline Extension
City/County: Lonetree, Douglas
State: CO
Sampling Date: 4/14/17

Applicant/Owner: RTD
Investigator(s): Pat Basting, Christy Payne
Section, Township, Range: Sec 23 & 24, T6S, R67W
Landform (hillslope, terrace, etc.): Terrace
Local relief (concave, convex, none): concave
Slope (%): 1 - 2%

Subregion (LRR): G: Western Grt Plains and Irrigated Rgn
Lat: 39.520060
Long: -104.844026
Datum: NAD 83

Soil Map Unit Name: NeE Newlin gravelly sandy loam, FoB (Fondis) Sandy Clay Loam, Ma (Manzanola) Clay Loam
NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☑️ No ☐ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are “Normal Circumstances” present? Yes ☑️ No ☐

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

REMARKS:

Stormwater detention basin along RidgeGate Parkway, with ring of wetland vegetation surrounding.

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
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<td>3.</td>
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<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot size: __________)</th>
<th>= Total Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
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<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum</th>
<th>= Total Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
</tr>
<tr>
<td>6.</td>
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<td>7.</td>
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<td>8.</td>
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<td>9.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine Stratum (Plot size: __________)</th>
<th>= Total Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
</tr>
</tbody>
</table>

% Bare Ground in Herb Stratum: 75

Remarks:

Stormwater detention basin

Hydrophytic Vegetation Present? Yes ☑️ No ☐

Hydric Soil Present? Yes ☑️ No ☐

Wetland Hydrology Present? Yes ☑️ No ☐

Is the Sampled Area within a Wetland? Yes ☑️ No ☐

Remarks:

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1. 1 - Rapid Test for Hydrophytic Vegetation
2. 2 - Dominance Test is >50%
3. 3 - Prevalence Index is ≤3.0
4. 4 - Morphological Adaptations (Provide supporting data in Remarks or on a separate sheet)
5. 5 - Wetland Non-Vascular Plants

Problematic Hydrophytic Vegetation: (Explain)

Hydrophytic Vegetation Present? Yes ☑️ No ☐

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)
Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation
2 - Dominance Test is >50%
3 - Prevalence Index is ≤3.0
4 - Morphological Adaptations (Provide supporting data in Remarks or on a separate sheet)
5 - Wetland Non-Vascular Plants

Problematic Hydrophytic Vegetation: (Explain)

Hydrophytic Vegetation Present? Yes ☑️ No ☐

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)
Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation
2 - Dominance Test is >50%
3 - Prevalence Index is ≤3.0
4 - Morphological Adaptations (Provide supporting data in Remarks or on a separate sheet)
5 - Wetland Non-Vascular Plants

Problematic Hydrophytic Vegetation: (Explain)

Hydrophytic Vegetation Present? Yes ☑️ No ☐

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)
Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

1 - Rapid Test for Hydrophytic Vegetation
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5 - Wetland Non-Vascular Plants

Problematic Hydrophytic Vegetation: (Explain)

Hydrophytic Vegetation Present? Yes ☑️ No ☐

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)
Prevalence Index = B/A =
### SOIL

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Color (moist)</th>
<th>%</th>
<th>Redox Features</th>
<th>Color (moist)</th>
<th>%</th>
<th>Type 1</th>
<th>Loc 2</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td></td>
<td>10YR 3/2</td>
<td>N/A</td>
<td></td>
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<td></td>
<td>SaCILm</td>
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<tr>
<td>4-16+</td>
<td></td>
<td>10YR 3/3</td>
<td>2.5YR 4/6</td>
<td>10</td>
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<td>CILm</td>
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</tbody>
</table>

**Hydric Soil Indicators:** (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Depleted Matrix (F3)
- Loamy Mucky Mineral (F1) (except MLRA 1)
- Loamy Gleyed Matrix (F2)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

**Restrictive Layer (if present):**

- Type: 
- Depth (inches): 

**Hydric Soil Present?** Yes ✔ No

**HYDROLOGY**

**Wetland Hydrology Indicators:**

- Primary Indicators (minimum of one required; check all that apply)
  - Surface Water (A1)
  - High Water Table (A2)
  - Saturation (A3)
  - Water Marks (B1)
  - Sediment Deposits (B2)
  - Drift Deposits (B3)
  - Algal Mat or Crust (B4)
  - Iron Deposits (B5)
  - Surface Soil Cracks (B6)
  - Inundation Visible on Aerial Imagery (B7)
  - Sparsely Vegetated Concave Surface (B8)

- Secondary Indicators (2 or more required)
  - Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
  - Salt Crust (B11)
  - Aquatic Invertebrates (B13)
  - Hydrogen Sulfide Odor (C1)
  - Oxidized Rhizospheres along Living Roots (C3)
  - Presence of Reduced Iron (C4)
  - Recent Iron Reduction in Tilled Soils (C6)
  - Stunted or Stressed Plants (D1) (LRR A)
  - Other (Explain in Remarks)

**Field Observations:**

- Surface Water Present? Yes ✔ No
- Water Table Present? Yes ✔ No
- Saturation Present? Yes ✔ No (includes capillary fringe)
- Depth (inches): 0-6"

**Wetland Hydrology Present?** Yes ✔ No

**Remarks:**

Stormwater detention basin fed by roadside runoff.
**WETLAND DETERMINATION DATA FORM – Great Plains Region**

Project/Site: SERE-RidgeGate Waterline Extension  
City/County: Lonetree, Douglas  
Sampling Date: 4/14/17

Applicant/Owner: RTD  
State: CO  
Sampling Point: Upl DP 7 (WL 5)

Investigator(s): Pat Basting, Christy Payne  
Section, Township, Range: Sec 23 & 24, T6S,R67W

Landform (hillslope, terrace, etc.): Terrace/Road R/W  
Local relief (concave, convex, none): convex  
Slope (%): 2 - 5%

Subregion (LRR): G: Western Grt Plains and Irrigated Rgn  
Lat: 39.520020  
Long: -104.843959  
Datum: NAD 83

Soil Map Unit Name: Ma,FoB Clay loams  
NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☑ No ☐  
(If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are “Normal Circumstances” present? Yes ☑ No ☐

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic?  
(If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes ☑ No ☐</th>
<th>Is the Sampled Area within a Wetland?</th>
<th>Yes ☑ No ☐</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes ☑ No ☐</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland Hydrology Present?</td>
<td>Yes ☑ No ☐</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks:

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>5.</td>
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</tbody>
</table>

Total Cover = Total Cover

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>5.</td>
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</tbody>
</table>

Total Cover = Total Cover

<table>
<thead>
<tr>
<th>Herb Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kochia scoparia</td>
<td>5</td>
<td>FACU</td>
<td></td>
</tr>
<tr>
<td>Sporobolus cryptandrus</td>
<td>5</td>
<td>FACU</td>
<td></td>
</tr>
<tr>
<td>Bromus tectorum</td>
<td>15</td>
<td>Y UPL</td>
<td></td>
</tr>
<tr>
<td>Elymus repens</td>
<td>25</td>
<td>Y FACU</td>
<td></td>
</tr>
<tr>
<td>Elymus trachycaulus</td>
<td>30</td>
<td>Y FACU</td>
<td></td>
</tr>
<tr>
<td>Cirsium arvense</td>
<td>15</td>
<td>Y FACU</td>
<td></td>
</tr>
<tr>
<td>Forbs</td>
<td>5</td>
<td>FACU/UPL</td>
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</tbody>
</table>

Total Cover = Total Cover

<table>
<thead>
<tr>
<th>Woody Vine Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Total Cover = Total Cover

% Bare Ground in Herb Stratum 75

Remarks:

Roadway fill & ROW previously disturbed and revegetated

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

**Prevalence Index worksheet:**

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x 1 = ______</td>
</tr>
<tr>
<td>FACW species</td>
<td>x 2 = ______</td>
</tr>
<tr>
<td>FAC species</td>
<td>x 3 = ______</td>
</tr>
<tr>
<td>FACU species</td>
<td>x 4 = ______</td>
</tr>
<tr>
<td>UPL species</td>
<td>x 5 = ______</td>
</tr>
</tbody>
</table>

Column Totals: (A) ______ (B)

Prevalence Index = B/A = ______

**Hydrophytic Vegetation Indicators:**

1. Rapid Test for Hydrophytic Vegetation
2. Dominance Test is >50%
3. Prevalence Index is ≤3.0
4. Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
5. Wetland Non-Vascular Plants¹
6. Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ☑ No ☐
### SOIL

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Redox Features</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>10YR 3/3</td>
<td>N/A</td>
<td>SaCILm</td>
</tr>
<tr>
<td>2-16+</td>
<td>10YR 4/4</td>
<td>N/A</td>
<td>SaCILm</td>
</tr>
</tbody>
</table>

1. **Type:** C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.
2. **Location:** PL=Pore Lining, M=Matrix.

#### Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

#### Restrictive Layer (if present):

- Depth (inches): __________

#### Remarks:

Roadway fill & ROW previously disturbed and revegetated

#### HYDROLOGY

**Wetland Hydrology Indicators:**

**Primary Indicators (minimum of one required; check all that apply):**

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
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- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Stunted or Stressed Plants (D1) (LRR A)
- Other (Explain in Remarks)

#### Field Observations:

- Surface Water Present? Yes __ No ✔
- Water Table Present? Yes __ No ✔
- Saturation Present? Yes __ No ✔

#### Wetland Hydrology Present? Yes __ No ✔

#### Remarks:

Roadside fill material and/or ROW previously disturbed and revegetated.

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**US Army Corps of Engineers**

**Great Plains – Version 2.0**
**WETLAND DETERMINATION DATA FORM – Great Plains Region**

**Project/Site:** SERE-RidgeGate Waterline Extension  
**City/County:** Lonetree, Douglas  
**State:** CO  
**Sampling Date:** 4/14/17  
**Applicant/Owner:** RTD  
**Sampling Point:** DP (WL 6)

**Investigator(s):** Pat Basting, Christy Payne  
**Landform (hillslope, terrace, etc.):** Terrace  
**Local relief (concave, convex, none):** Concave  
**Slope (%):** 1 - 2%  
**Subregion (LRR):** G: Western Grt Plains and Irrigated Rgn  
**Lat:** 39.521101  
**Long:** -104.841717  
**Datum:** NAD 83

**Soil Map Unit Name:** NeE Newlin gravelly sandy loam, FoB (Fondis) Sandy Clay Loam, Ma (Manzanola) Clay Loam  
**NWI classification:** PEM

**Remarks:** Stormwater detention basin along RidgeGate Parkway, bare soil with ring of wetland vegetation surrounding.

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes ✔</th>
<th>No</th>
<th>Is the Sampled Area within a Wetland?</th>
<th>Yes ✔</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes ✔</td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland Hydrology Present?</td>
<td>Yes ✔</td>
<td>No</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Remarks:**

Stormwater detention basin along RidgeGate Parkway, bare soil with ring of wetland vegetation surrounding.

### VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Stratum</th>
<th>Plot size:</th>
<th>% Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Absolute</th>
<th>% OBL</th>
<th>% FACW</th>
<th>% FACU</th>
<th>% UPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Stratum</td>
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<td>1.</td>
<td></td>
<td>5</td>
<td>Y</td>
<td>OBL</td>
<td>FACU</td>
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<td>2.</td>
<td></td>
<td>10</td>
<td>Y</td>
<td>OBL</td>
<td>FACW</td>
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<td>3.</td>
<td></td>
<td>25</td>
<td>Y</td>
<td>OBL</td>
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<td>4.</td>
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<td>Y</td>
<td>OBL</td>
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<td>5.</td>
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<td>FACU</td>
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<td>FACW</td>
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<td>Y</td>
<td>OBL</td>
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<td>11.</td>
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<td>= Total Cover</td>
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<td>Herb Stratum</td>
<td>Plot size:</td>
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<td>6.</td>
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<td>5</td>
<td>FACU</td>
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<td>7.</td>
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<td>FACW</td>
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<td>8.</td>
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<td>25</td>
<td>Y</td>
<td>OBL</td>
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<td>9.</td>
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<td>11.</td>
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<tr>
<td>Woody Vine Stratum</td>
<td>Plot size:</td>
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<tr>
<td>% Bare Ground in Herb Stratum</td>
<td>75</td>
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</tr>
</tbody>
</table>

**Remarks:**

Stormwater detention basin

### Dominance Test worksheet:

<table>
<thead>
<tr>
<th>Number of Dominant Species That Are OBL, FACW, or FAC:</th>
<th>2</th>
<th>(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Dominant Species Across All Strata:</td>
<td>2</td>
<td>(B)</td>
</tr>
<tr>
<td>Percent of Dominant Species That Are OBL, FACW, or FAC:</td>
<td>100</td>
<td>(A/B)</td>
</tr>
</tbody>
</table>

### Prevalence Index worksheet:

<table>
<thead>
<tr>
<th>Total % Cover of:</th>
<th>Multiply by:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL species</td>
<td>x 1 =</td>
</tr>
<tr>
<td>FACW species</td>
<td>x 2 =</td>
</tr>
<tr>
<td>FAC species</td>
<td>x 3 =</td>
</tr>
<tr>
<td>FACU species</td>
<td>x 4 =</td>
</tr>
<tr>
<td>UPL species</td>
<td>x 5 =</td>
</tr>
<tr>
<td>Column Totals</td>
<td>(A) = (B)</td>
</tr>
</tbody>
</table>

**Prevalence Index** = B/A =

### Hydrophytic Vegetation Indicators:

1. 1 - Rapid Test for Hydrophytic Vegetation
2. 2 - Dominance Test is >50%
3. 3 - Prevalence Index is ≤3.0
4. 4 - Morphological Adaptations\(^1\) (Provide supporting data in Remarks or on a separate sheet)
5. 5 - Wetland Non-Vascular Plants\(^1\)
6. 6 - Problematic Hydrophytic Vegetation\(^1\) (Explain)

\(^1\)Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

### Hydrophytic Vegetation Present? Yes ✔ | No

### Remarks:

Stormwater detention basin
SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Redox Features</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>10YR 3/2</td>
<td>N/A</td>
<td>SaCILm</td>
</tr>
<tr>
<td>4-16+</td>
<td>10YR 3/3</td>
<td>2.5YR 4/6</td>
<td>CILm</td>
</tr>
</tbody>
</table>

1Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. 2Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1) ✔ Sandy Redox (S5)
- Histic Epipedon (A2) Stripped Matrix (S6)
- Black Histic (A3) Loamy Mucky Mineral (F1) (except MLRA 1)
- Hydrogen Sulfide (A4) Loamy Gleyed Matrix (F2)
- Depleted Below Dark Surface (A11) Depleted Matrix (F3)
- Thick Dark Surface (A12) Redox Dark Surface (F6)
- Sandy Mucky Mineral (S1) Depleted Dark Surface (F7)
- Sandy Gleyed Matrix (S4) Redox Depressions (F8)

Indicators of Problematic Hydric Soils:

- 2 cm Muck (A10)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

Restrictive Layer (if present):

Depth (inches): ________________

Hydric Soil Present? Yes ✔ No __

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- High Water Table (A2) Salt Crust (B11)
- Saturation (A3) Aquatic Invertebrates (B13)
- Water Marks (B1) Hydrogen Sulfide Odor (C1)
- Sediment Deposits (B2) Oxidized Rhizospheres along Living Roots (C3)
- Drift Deposits (B3) Presence of Reduced Iron (C4)
- Algal Mat or Crust (B4) Recent Iron Reduction in Tilled Soils (C6)
- Iron Deposits (B5) Stunted or Stressed Plants (D1) (LRR A)
- Surface Soil Cracks (B6) Other (Explain in Remarks)
- Inundation Visible on Aerial Imagery (B7) FAC-Neutral Test (D5)
- Sparsely Vegetated Concave Surface (B8) Raised Ant Mounds (D6) (LRR A)

Secondary Indicators (2 or more required)

- Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ✔ No __ Depth (inches): 0-6"
Water Table Present? Yes ✔ No __
Saturation Present? Yes ✔ No __
(includes capillary fringe)

Wetland Hydrology Present? Yes ✔ No __

Remarks:

Stormwater detention basin fed by roadside runoff.
**WETLAND DETERMINATION DATA FORM – Great Plains Region**

Project/Site: SERE-RidgGate Waterline Extension  
City/County: Lonetree, Douglas  
Sampling Date: 4/14/17  
Applicant/Owner: RTD  
State: CO  
Investigator(s): Pat Basting, Christy Payne  
Section, Township, Range: Sec 24 T6S R67W  
Landform (hillslope, terrace, etc.): Terrace/Road R/W  
Local relief (concave, convex, none): convex  
Slope (%): 2 - 5%  
Subregion (LRR): G: Western Grt Plains and Irrigated Rgn  
Lat: 39.521061  
Long: -104.841665  
Datum: NAD 83  
Soil Map Unit Name: Ma.FoB Clay loams  
NWI classification: PEM  
Are climatic / hydrologic conditions on the site typical for this time of year? Yes □ No □
(If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly disturbed? Are “Normal Circumstances” present? Yes □ No □
(If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes □ No □</th>
<th>Is the Sampled Area within a Wetland?</th>
<th>Yes □ No □</th>
</tr>
</thead>
</table>

**VEGETATION – Use scientific names of plants.**

<table>
<thead>
<tr>
<th>Tree Stratum (Plot size: __________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
<th>Dominance Test worksheet:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td>Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td>Total Number of Dominant Species Across All Strata: 4 (B)</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td>Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td>Prevalence Index worksheet:</td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
<td>Total % Cover of: Multiply by:</td>
</tr>
<tr>
<td>1. Kochia scoparia</td>
<td>5</td>
<td>FACU</td>
<td></td>
<td>OBL species ________ x 1 = ________</td>
</tr>
<tr>
<td>2. Sporobolus cryptandrus</td>
<td>5</td>
<td>FACU</td>
<td></td>
<td>FACW species ________ x 2 = ________</td>
</tr>
<tr>
<td>3. Bromus tectorum</td>
<td>15</td>
<td>Y</td>
<td>UPL</td>
<td>FAC species ________ x 3 = ________</td>
</tr>
<tr>
<td>4. Elymus repens</td>
<td>25</td>
<td>Y</td>
<td>FACU</td>
<td>FACU species ________ x 4 = ________</td>
</tr>
<tr>
<td>5. Elymus trachycaulus</td>
<td>30</td>
<td>Y</td>
<td>FACU</td>
<td>UPL species ________ x 5 = ________</td>
</tr>
<tr>
<td>6. Cirsium arvense</td>
<td>15</td>
<td>Y</td>
<td>FACU</td>
<td>Column Totals: (A) (B)</td>
</tr>
<tr>
<td>7. Forbs</td>
<td>5</td>
<td>FACU/UPL</td>
<td></td>
<td>Prevalence Index = B/A = ________</td>
</tr>
<tr>
<td>8.</td>
<td></td>
<td></td>
<td></td>
<td>Hydrophytic Vegetation Indicators:</td>
</tr>
<tr>
<td>9.</td>
<td></td>
<td></td>
<td></td>
<td>1 - Rapid Test for Hydrophytic Vegetation</td>
</tr>
<tr>
<td>10.</td>
<td></td>
<td></td>
<td></td>
<td>2 - Dominance Test is &gt;50%</td>
</tr>
<tr>
<td>11.</td>
<td></td>
<td></td>
<td></td>
<td>3 - Prevalence Index is ≤3.0</td>
</tr>
<tr>
<td>Woody Vine Stratum (Plot size: __________)</td>
<td></td>
<td></td>
<td></td>
<td>4 - Morphological Adaptations1 (Provide supporting data in Remarks or on a separate sheet)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 - Wetland Non-Vascular Plants1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 - Problematic Hydrophytic Vegetation1 (Explain)</td>
</tr>
</tbody>
</table>

**Remarks:**
Roadway fill & ROW previously disturbed and revegetated
### Profile Description:
(Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Redox Features</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>10YR 3/3</td>
<td>N/A</td>
<td>SaCILm</td>
<td>Road ROW and Roadfill Material</td>
</tr>
<tr>
<td>2-16+</td>
<td>10YR 4/4</td>
<td>N/A</td>
<td>SaCILm</td>
<td>Road ROW and Roadfill Material</td>
</tr>
</tbody>
</table>

1Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.  
2Location: PL=Pore Lining, M=Matrix.

#### Hydric Soil Indicators:
(Applicable to all LRRs, unless otherwise noted.)

<table>
<thead>
<tr>
<th>Indicators of Problematic Hydric Soils³:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol (A1)</td>
</tr>
<tr>
<td>Histic Epipedon (A2)</td>
</tr>
<tr>
<td>Black Histic (A3)</td>
</tr>
<tr>
<td>Hydrogen Sulfide (A4)</td>
</tr>
<tr>
<td>Depleted Below Dark Surface (A11)</td>
</tr>
<tr>
<td>Thick Dark Surface (A12)</td>
</tr>
<tr>
<td>Sandy Mucky Mineral (S1)</td>
</tr>
<tr>
<td>Sandy Gleyed Matrix (S4)</td>
</tr>
</tbody>
</table>

#### Restrictive Layer (if present):

<table>
<thead>
<tr>
<th>Type:</th>
<th>Depth (inches):</th>
<th>Hydric Soil Present?</th>
<th>Yes ✔ No</th>
</tr>
</thead>
</table>

Remarks:
Roadway fill & ROW previously disturbed and revegetated

### HYDROLOGY

#### Wetland Hydrology Indicators:

<table>
<thead>
<tr>
<th>Primary Indicators (minimum of one required; check all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water (A1)</td>
</tr>
<tr>
<td>High Water Table (A2)</td>
</tr>
<tr>
<td>Saturation (A3)</td>
</tr>
<tr>
<td>Water Marks (B1)</td>
</tr>
<tr>
<td>Sediment Deposits (B2)</td>
</tr>
<tr>
<td>Drift Deposits (B3)</td>
</tr>
<tr>
<td>Algal Mat or Crust (B4)</td>
</tr>
<tr>
<td>Iron Deposits (B5)</td>
</tr>
<tr>
<td>Surface Soil Cracks (B6)</td>
</tr>
<tr>
<td>Inundation Visible on Aerial Imagery (B7)</td>
</tr>
<tr>
<td>Sparsely Vegetated Concave Surface (B8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Indicators (2 or more required)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)</td>
</tr>
<tr>
<td>Drainage Patterns (B10)</td>
</tr>
<tr>
<td>Dry-Season Water Table (C2)</td>
</tr>
<tr>
<td>Saturation Visible on Aerial Imagery (C9)</td>
</tr>
<tr>
<td>Geomorphic Position (D2)</td>
</tr>
<tr>
<td>Shallow Aquitard (D3)</td>
</tr>
<tr>
<td>FAC-Neutral Test (D5)</td>
</tr>
<tr>
<td>Raised Ant Mounds (D6) (LRR A)</td>
</tr>
<tr>
<td>Frost-Heave Hummocks (D7)</td>
</tr>
</tbody>
</table>

#### Field Observations:

<table>
<thead>
<tr>
<th>Surface Water Present?</th>
<th>Yes ✔ No</th>
<th>Water Table Present?</th>
<th>Yes ✔ No</th>
<th>Saturation Present?</th>
<th>Yes ✔ No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Depth (inches):</td>
<td></td>
<td>Depth (inches):</td>
<td></td>
</tr>
</tbody>
</table>

Wetland Hydrology Present? Yes ✔ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Roadside fill material and/or ROW previously disturbed and revegetated.
WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: SERE-RidgeGate Waterline Extension
City/County: Lonestar, Douglas

Applicant/Owner: RTD
State: CO

Investigator(s): Pat Basting, Christy Payne
Section, Township, Range: Sec 24, T6S, R67W

Landform (hillslope, terrace, etc.): Terrace
Local relief (concave, convex, none): Concave
Slope (%): 1 - 2%

Subregion (LRR): G: Western Grt Plains and Irrigated Rgn

Soil Map Unit Name: NeE Newlin gravelly sandy loam, FoB (Fondis) Sandy Clay Loam, Ma (Manzanola) Clay Loam
NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☑️ No ☐ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are “Normal Circumstances” present? Yes ☑️ No ☐ (If needed, explain any answers in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ☑️ No ☐

Hydric Soil Present? Yes ☑️ No ☐

Wetland Hydrology Present? Yes ☑️ No ☐

Is the Sampled Area within a Wetland? Yes ☑️ No ☐

Remarks:
Stormwater detention basin along RidgeGate Parkway, bare soil with ring of wetland vegetation surrounding.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____________)

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>% Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sporobolus cryptandrus</td>
<td>FACU</td>
<td>5</td>
</tr>
<tr>
<td>2. Hordeum jubatum</td>
<td>FACW</td>
<td>10</td>
</tr>
<tr>
<td>4. Typha latifolia</td>
<td>OBL</td>
<td>25</td>
</tr>
<tr>
<td>5. Schoenoplectus tabernaemontani</td>
<td>OBL</td>
<td>40</td>
</tr>
<tr>
<td>6. Juncus balticus</td>
<td>FACW</td>
<td>10</td>
</tr>
<tr>
<td>7. Schoenoplectus pungens</td>
<td>OBL</td>
<td>10</td>
</tr>
</tbody>
</table>

Sapling/Shrub Stratum (Plot size: ____________)

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>% Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sporobolus cryptandrus</td>
<td>FACU</td>
<td>5</td>
</tr>
<tr>
<td>2. Hordeum jubatum</td>
<td>FACW</td>
<td>10</td>
</tr>
<tr>
<td>4. Typha latifolia</td>
<td>OBL</td>
<td>25</td>
</tr>
<tr>
<td>5. Schoenoplectus tabernaemontani</td>
<td>OBL</td>
<td>40</td>
</tr>
<tr>
<td>6. Juncus balticus</td>
<td>FACW</td>
<td>10</td>
</tr>
<tr>
<td>7. Schoenoplectus pungens</td>
<td>OBL</td>
<td>10</td>
</tr>
</tbody>
</table>

Herb Stratum (Plot size: ____________)

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>% Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sporobolus cryptandrus</td>
<td>FACU</td>
<td>5</td>
</tr>
<tr>
<td>2. Hordeum jubatum</td>
<td>FACW</td>
<td>10</td>
</tr>
<tr>
<td>4. Typha latifolia</td>
<td>OBL</td>
<td>25</td>
</tr>
<tr>
<td>5. Schoenoplectus tabernaemontani</td>
<td>OBL</td>
<td>40</td>
</tr>
<tr>
<td>6. Juncus balticus</td>
<td>FACW</td>
<td>10</td>
</tr>
<tr>
<td>7. Schoenoplectus pungens</td>
<td>OBL</td>
<td>10</td>
</tr>
</tbody>
</table>

Woody Vine Stratum (Plot size: ____________)

<table>
<thead>
<tr>
<th>Species</th>
<th>Status</th>
<th>% Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sporobolus cryptandrus</td>
<td>FACU</td>
<td>5</td>
</tr>
<tr>
<td>2. Hordeum jubatum</td>
<td>FACW</td>
<td>10</td>
</tr>
<tr>
<td>4. Typha latifolia</td>
<td>OBL</td>
<td>25</td>
</tr>
<tr>
<td>5. Schoenoplectus tabernaemontani</td>
<td>OBL</td>
<td>40</td>
</tr>
<tr>
<td>6. Juncus balticus</td>
<td>FACW</td>
<td>10</td>
</tr>
<tr>
<td>7. Schoenoplectus pungens</td>
<td>OBL</td>
<td>10</td>
</tr>
</tbody>
</table>

% Bare Ground in Herb Stratum: 75

Remarks:
Stormwater detention basin

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:
Total % Cover of: Multiply by:
OBL species × 1 =
FACW species × 2 =
FAC species × 3 =
FACU species × 4 =
UPL species × 5 =
Column Totals: (A) (B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
1 - Rapid Test for Hydrophytic Vegetation
2 - Dominance Test is >50%
3 - Prevalence Index is ≤3.0
4 - Morphological Adaptations (Provide supporting data in Remarks or on a separate sheet)
5 - Wetland Non-Vascular Plants
6 - Problematic Hydrophytic Vegetation (Explain)

Hydrophytic Vegetation Present? Yes ☑️ No ☐

Remarks:
Stormwater detention basin
SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Redox Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Color (moist)</td>
<td>%</td>
</tr>
<tr>
<td>0-4</td>
<td>10YR 3/2</td>
<td>N/A</td>
</tr>
<tr>
<td>4-16+</td>
<td>10YR 3/3</td>
<td>2.5YR 4/6</td>
</tr>
</tbody>
</table>

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1) ✔
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)

Indicators for Problematic Hydric Soils:

- 2 cm Muck (A10)
- Red Parent Material (TF2)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

Restrictive Layer (if present):

Type: 

Depth (inches): ____________________________

Hydric Soil Present? Yes ✔ No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply):  
- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1)
- Sediment Deposits (B2)
- Drift Deposits (B3)
- Algal Mat or Crust (B4)
- Iron Deposits (B5)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Sparsely Vegetated Concave Surface (B8)

Secondary Indicators (2 or more required):

- Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- Salt Crust (B11)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Stunted or Stressed Plants (D1) (LRR A)
- Other (Explain in Remarks)
- Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Saturation Visible on Aerial Imagery (C9)
- Geomorphic Position (D2)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)
- Raised Ant Mounds (D6) (LRR A)
- Frost-Heave Hummocks (D7)

Field Observations:

- Surface Water Present? Yes ✔ No Depth (inches): 0-6"
- Water Table Present? Yes ✔ No Depth (inches): ____________________________
- Saturation Present? Yes ✔ No Depth (inches): ____________________________

Wetland Hydrology Present? Yes ✔ No

Remarks:

Stormwater detention basin fed by roadside runoff.
WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: SERE-RidgeGate Waterline Extension
City/County: Lonetree, Douglas
Sampling Date: 4/14/17
Applicant/Owner: RTD
State: CO
Investigator(s): Pat Basting, Christy Payne
Section, Township, Range: Sec 24 T6S R67W
Landform (hillslope, terrace, etc.): Terrace/Road R/W
Local relief (concave, convex, none): convex
Slope (%): 2 - 5%
Subregion (LRR): G: Western Grt Plains and Irrigated Rgn
Lat: 39.520848
Long: -104.835152
Datum: NAD 83
Soil Map Unit Name: Ma,FoB Clay loams
NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☑ No _____ (If no, explain in Remarks.)
Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are “Normal Circumstances” present? Yes ☑ No _____
Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

<table>
<thead>
<tr>
<th>Hydrophytic Vegetation Present?</th>
<th>Yes ☑ No _____</th>
<th>Is the Sampled Area within a Wetland?</th>
<th>Yes ☑ No _____</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydric Soil Present?</td>
<td>Yes ☑ No _____</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wetland Hydrology Present?</td>
<td>Yes ☑ No _____</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Remarks: __________________________

VEGETATION – Use scientific names of plants.

<table>
<thead>
<tr>
<th>Tree Stratum (Plot size: _________)</th>
<th>Absolute % Cover</th>
<th>Dominant Species?</th>
<th>Indicator Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>= Total Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sapling/Shrub Stratum (Plot size: _________)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>= Total Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Herb Stratum (Plot size: _________)</th>
<th></th>
<th>FACU</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kochia scoparia</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sporobolus cryptandrus</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bromus tectorum</td>
<td>15</td>
<td>Y</td>
<td>UPL</td>
</tr>
<tr>
<td>Elymus repens</td>
<td>25</td>
<td>Y</td>
<td>FACU</td>
</tr>
<tr>
<td>Elymus trachycaulus</td>
<td>30</td>
<td>Y</td>
<td>FACU</td>
</tr>
<tr>
<td>Cirsium arvense</td>
<td>15</td>
<td>Y</td>
<td>FACU</td>
</tr>
<tr>
<td>Forbs</td>
<td>5</td>
<td></td>
<td>FACU/UPL</td>
</tr>
<tr>
<td>= Total Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Woody Vine Stratum (Plot size: _________)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>= Total Cover</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% Bare Ground in Herb Stratum</th>
<th>75%</th>
</tr>
</thead>
</table>

Remarks: Roadway fill & ROW previously disturbed and revegetated
## SOIL

**Profile Description:** (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

<table>
<thead>
<tr>
<th>Depth (inches)</th>
<th>Matrix</th>
<th>Redox Features</th>
<th>Texture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>10YR 3/3</td>
<td>N/A</td>
<td>SaClLm</td>
<td>Road ROW and Roadfill Material</td>
</tr>
<tr>
<td>2-16+</td>
<td>10YR 4/4</td>
<td>N/A</td>
<td>SaClLm</td>
<td>Road ROW and Roadfill Material</td>
</tr>
</tbody>
</table>

1. **Type:** C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains.
2. **Location:** PL=Pore Lining, M=Matrix.

### Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)  
- Histic Epipedon (A2)  
- Black Histic (A3)  
- Hydrogen Sulfide (A4)  
- Depleted Below Dark Surface (A11)  
- Thick Dark Surface (A12)  
- Sandy Mucky Mineral (S1)  
- Sandy Gleyed Matrix (S4)  
- Roadway fill & ROW previously disturbed and revegetated

### Restrictive Layer (if present):

- Type:  
- Depth (inches):  

### Hydric Soil Present? **Yes**

**Remarks:** Roadway fill & ROW previously disturbed and revegetated

## HYDROLOGY

### Wetland Hydrology Indicators:

- Primary Indicators (minimum of one required; check all that apply)  
- Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)  
- Salt Crust (B11)  
- Aquatic Invertebrates (B13)  
- Hydrogen Sulfide Odor (C1)  
- Oxidized Rhizospheres along Living Roots (C3)  
- Presence of Reduced Iron (C4)  
- Recent Iron Reduction in Tilled Soils (C6)  
- Stunted or Stressed Plants (D1) (LRR A)  
- Other (Explain in Remarks)  
- FAC-Neutral Test (D5)  
- Raised Ant Mounds (D6) (LRR A)  
- Frost-Heave Hummocks (D7)  

- Secondary Indicators (2 or more required)  
- Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)  
- Drainage Patterns (B10)  
- Dry-Season Water Table (C2)  
- Saturation Visible on Aerial Imagery (C9)  
- Geomorphic Position (D2)  
- Shallow Aquitard (D3)  

### Field Observations:

- Surface Water Present? **Yes**  
- Water Table Present? **Yes**  
- Saturation Present? **Yes** (includes capillary fringe)

### Wetland Hydrology Present? **Yes**

**Remarks:** Roadside fill material and/or ROW previously disturbed and revegetated.